STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

December 10, 2013

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-004-131122** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 324 Montevideo Road, Avon, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Prior to installing its proposed antennas, Verizon shall verify the implementation of the reinforcements outlined in the structural analysis and reinforcement design prepared by Centek Engineering for AT&T Mobility job no. 13140.CO2 dated September 18, 2013;
- Within 45 days following completion of the antenna installation, Verizon shall provide documentation certified by a professional engineer that its installation complied with the recommendations of the structural analysis prepared by Centek Engineering dated November 18, 2013 and stamped by Carlo Centore;
- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration.

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated November 21, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/CDM/jb

c: The Honorable Mark W. Zacchio, Chairman, Town of Avon
Brandon Robertson, Town Manager, Town of Avon
Steven V. Kushner, Town Planner, Town of Avon
Talcott Mountain Science Center

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

May 20, 2015

ORIGINAL

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

Re: **EM-VER-004-131122 – Cellco Partnership d/b/a Verizon Wireless**
324 Montevideo Road, Avon, Connecticut

Dear Ms. Bachman:

On December 10, 2013, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its telecommunications facility at 324 Montevideo Road in Avon, Connecticut. The modifications involved the replacement of its antennas, the installation of remote radio heads and the installation of a new fiber optic antenna cable.

As a condition of the acknowledgement, Cellco was required to provide the Council with a letter stating that the modifications referenced in the structural report were completed. Attached is a Professional Engineer's Tower Modification Certification Letter verifying that the modifications were completed in accordance with the Structural Analysis Report and all construction activity has now been completed.

If you have any questions please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Tim Parks
Rachel A. Mayo

13822572-v1

CENTEK engineering

Centered on Solutions℠

May 20, 2015

Mr. Tim Parks
Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Tower Modification Certification

Project:	**Verizon Talcott Mountain** 324 Montevideo Road, Avon, CT
Tower Owner:	**Talcott Mountain Science Center** 324 Montevideo Road, Avon, CT
Engineer:	**Centek Engineering** 63-2 North Branford Road, Branford, CT

Centek Project No.: 15003.033

CSC Exempt Mod Reference No.: EM-VER-004-131122

Dear Mr. Parks,

We are providing this "Tower Modification Certification" with regard to the structural components at the above referenced project.

The following are the basis for substantiating compliance with the tower modification documents prepared by Centek Engineering (Centek Project Number: 13001.066):

- Review of the Centek Engineering Structural Analysis dated 11/18/2013.
- Review of the Centek Engineering Structural Analysis dated 09/18/2013.
- Review of the Centek Engineering Modification Drawings T-1, N-1, N-2, MI-1, S-1 and S-2 dated 12/19/2013 Rev-3.
- Review of the Centek Engineering Final Report of Special Inspections dated 09/09/2014.
- Field observations by Centek personnel of the completed reinforcements on 10/24/2014 which determined all tower reinforcements were installed in general compliance with the recommendations of the structural analysis report prepared by Centek Engineering on 11/18/2013.

The modification design prepared by this office demonstrates the tower will not exceed 100 percent of the post construction structural rating. The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above.

Sincerely,

Carlo F. Centore, PE
Principal - Structural

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 18804
LICENSED
PROFESSIONAL ENGINEER

ROBINSON & COLE LLP

KENNETH C. BALDWIN

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Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

November 21, 2013

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

Re: **Notice of Exempt Modification – Antenna Swap**
324 Montevideo Road, Avon, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains ten (10) wireless telecommunications antennas at the 55-foot level on the existing 60-foot tower at the above-referenced address. The tower and underlying property are owned by Talcott Mountain Science Center. The Council approved Cellco's shared use of this tower in 1989. Cellco now intends to replace four (4) of its existing antennas with two (2) model BXA-171063-8CF PCS antennas and two (2) model BXA-171063-12CF AWS antennas, all at the same level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for the 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 Brandon Robertson, Avon's Town Manager and Talcott Mountain Science Center.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be located at the 55-foot level on the 60-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 modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for the RF emissions at each of Cellco's operating frequencies for the modified Montevideo Road facility are included in Attachment 2. As indicated on these tables, Cellco's modified facility will operate well within the FCC standards for RF emissions.

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 modifications, can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Brandon Roberts, Avon Town Manger
Talcott Mountain Science Center
Sandy M. Carter

ATTACHMENT 1

BXA-171063-8CF-EDIN-X

X-Pol | FET Panel | 63° | 17.4 dBi

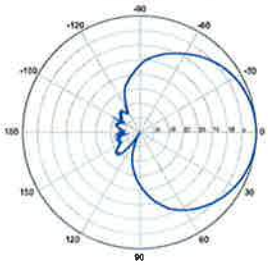
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 6, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	> 25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1225 x 154 x 105 mm		48.2 x 6.1 x 4.1 in
Depth with t-brackets	133 mm		5.2 in
Weight without mounting brackets	4.2 kg		9.2 lbs
Survival wind speed	296 km/hr		184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²		Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N		Front: 63 lbf Side: 50 lbf

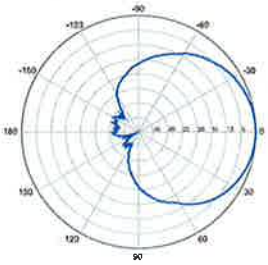
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8CF-EDIN-X-FP		

BXA-171063-8CF-EDIN-X



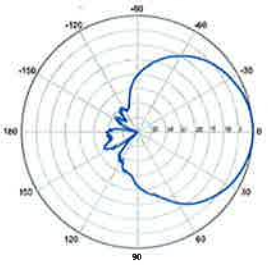
Horizontal | 1710-1880 MHz

BXA-171063-8CF-EDIN-X



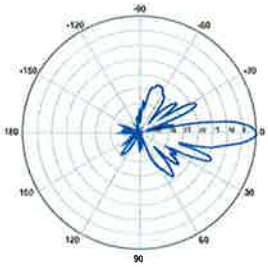
Horizontal | 1850-1990 MHz

BXA-171063-8CF-EDIN-X



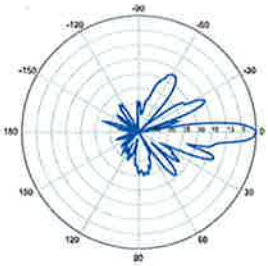
Horizontal | 1920-2170 MHz

BXA-171063-8CF-EDIN-0



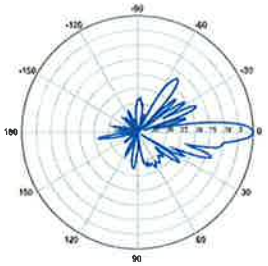
0° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-0

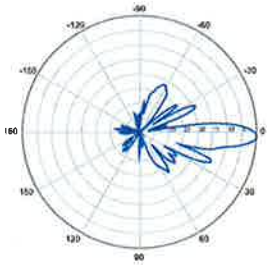


0° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-X

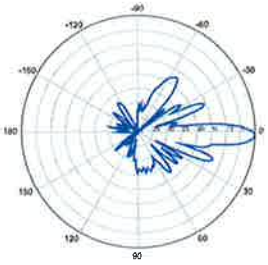
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8CF-EDIN-2



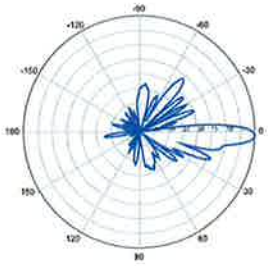
2° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-2



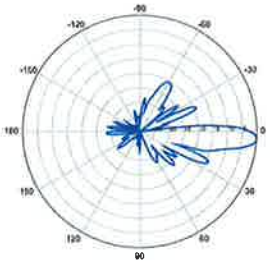
2° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-2



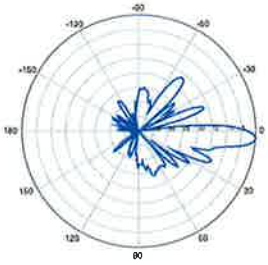
2° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-4



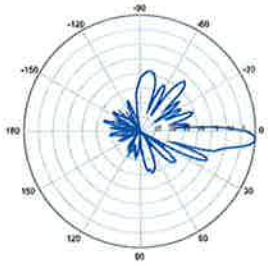
4° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-4



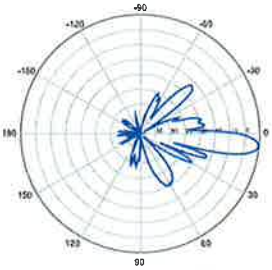
4° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-4



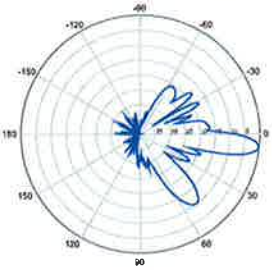
4° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-6



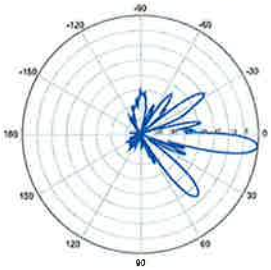
6° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-6



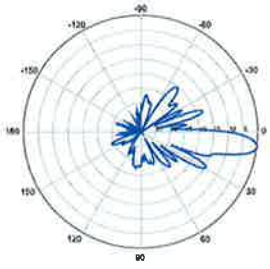
6° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-6



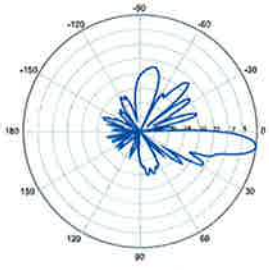
6° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-8



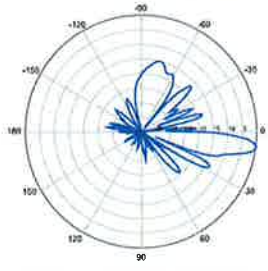
8° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-8



8° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-8



8° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

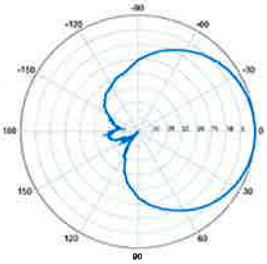
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	< -25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1842 x 154 x 105 mm		72.5 x 6.1 x 4.1 in
Depth with z-brackets	133 mm		5.2 in
Weight without mounting brackets	5.8 kg		12.8 lbs
Survival wind speed	> 201 km/hr		> 125 mph
Wind area	Front: 0.28 m² Side: 0.19 m²		Front: 3.1 ft² Side: 2.1 ft²
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N		Front: 103 lbf Side: 68 lbf

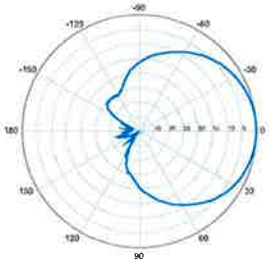
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12CF-EDIN-X-FP		

BXA-171063-12CF-EDIN-X



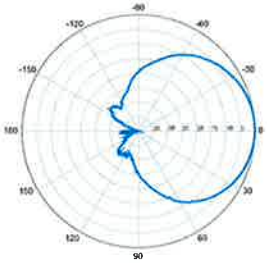
Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



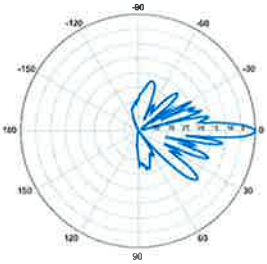
Horizontal | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



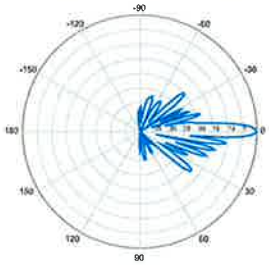
Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



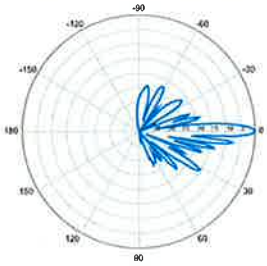
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-0



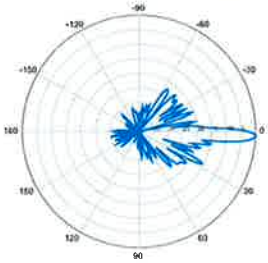
0° | Vertical | 1920-2170 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-171063-12CF-EDIN-X

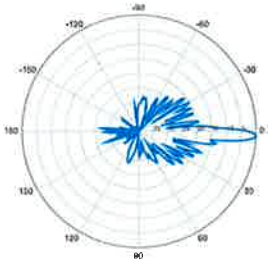
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



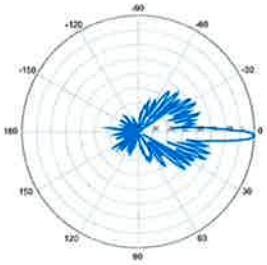
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



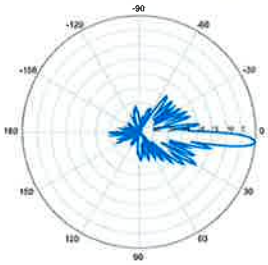
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



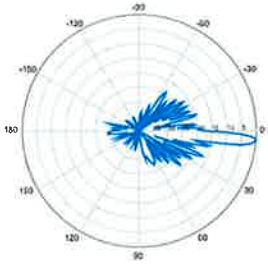
2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



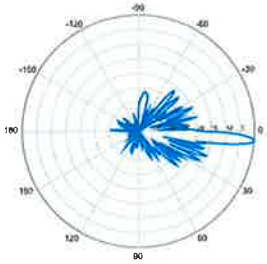
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1920-2170 MHz

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

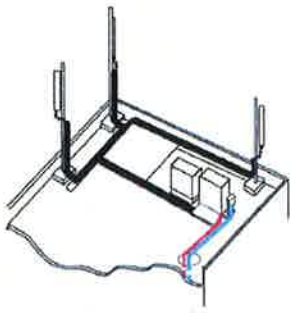
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation 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

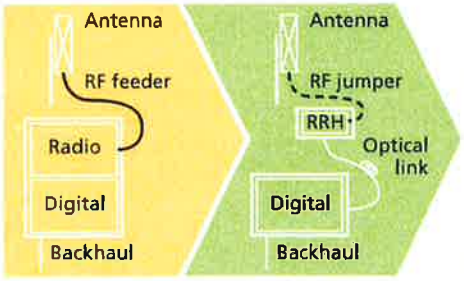
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

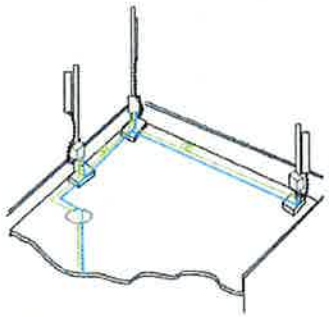
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility 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 (0.295)
DC-Resistance Power Cable 8.4mm²/8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

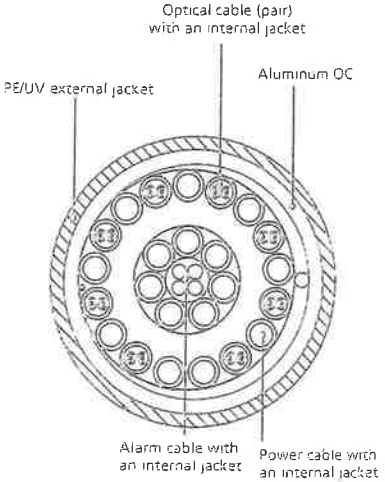


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

Far Field Approximation
with downtilt variation

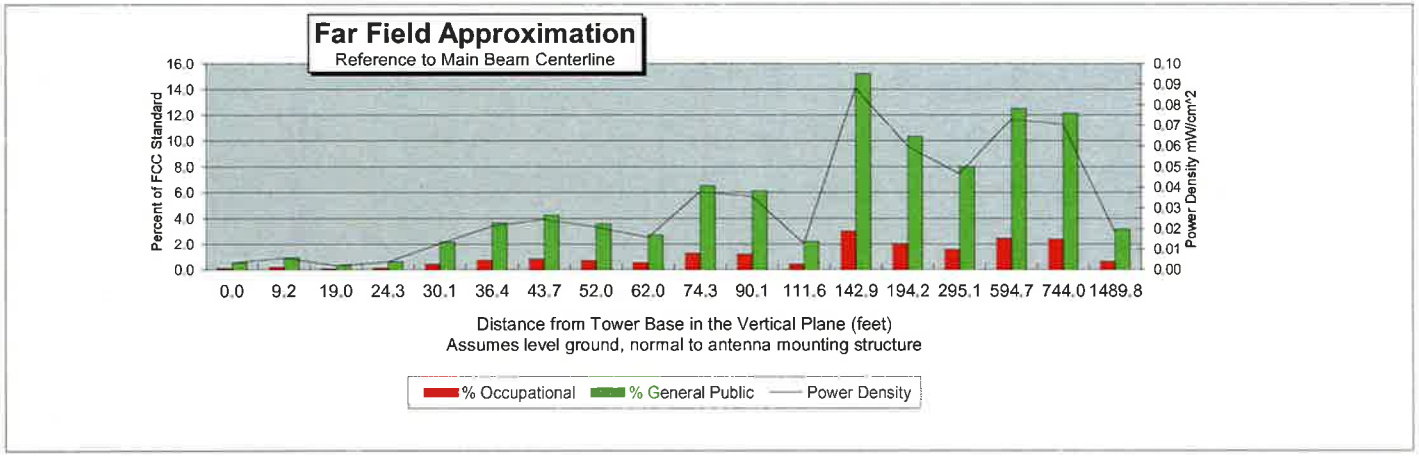
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	TALCOTT MTN, CT
Site #:	
Date:	11/19/13
Name:	Mark Brauer
File Name:	Talcott Mtn CT 850 CELL

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**55.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**71.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**3997.0**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	1490.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	1489.8	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.04	0.04	0.01	0.09	0.06	0.05	0.07	0.07	0.02	
Percent of Occupational Standard	0.1	0.2	0.1	0.1	0.4	0.7	0.8	0.7	0.5	1.3	1.2	0.4	3.0	2.1	1.6	2.5	2.4	0.6	
Percent of General Population Standard	0.6	0.9	0.3	0.6	2.2	3.7	4.2	3.6	2.7	6.5	6.1	2.2	15.2	10.3	8.0	12.5	12.2	3.2	

Antenna Type LPA-80063-6CF
Max% 15.23%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

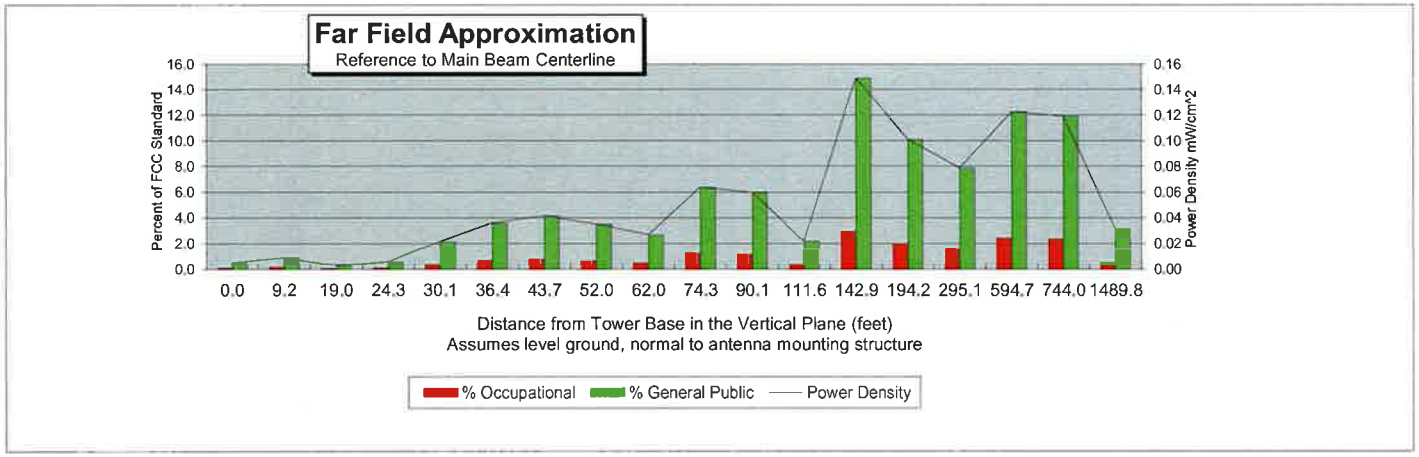
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	TALCOTT MTN, CT
Site #:	
Date:	11/19/13
Name:	Mark Brauer
File Name:	Talcott Mtn CT PCS

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**55.0**
Antenna Gain (dBi):	**17.5**
Antenna Size (in.):	**48.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**5616.0**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	1490.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	1489.8	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.01	0.01	0.00	0.01	0.02	0.04	0.04	0.04	0.03	0.06	0.06	0.02	0.15	0.10	0.08	0.12	0.12	0.03	
Percent of Occupational Standard	0.1	0.2	0.1	0.1	0.4	0.7	0.8	0.7	0.5	1.3	1.2	0.4	3.0	2.0	1.6	2.5	2.4	0.6	
Percent of General Population Standard	0.5	0.9	0.3	0.6	2.1	3.6	4.1	3.5	2.7	6.4	6.0	2.2	14.9	10.1	7.9	12.3	11.9	3.1	

Antenna Type BXA-171063-8CF
Max% 14.90%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

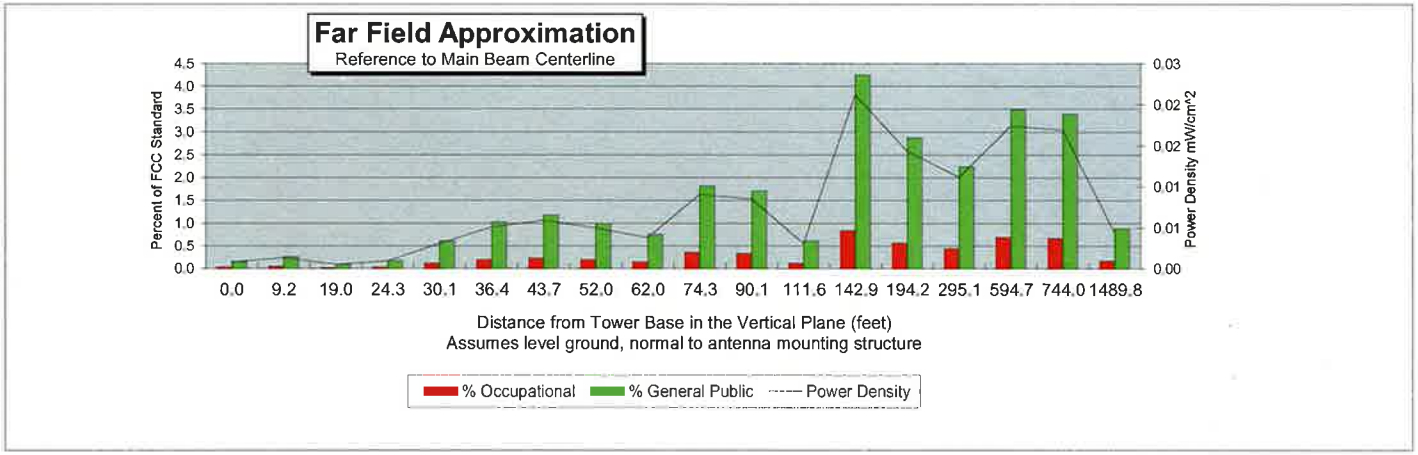
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	TALCOTT MTN, CT
Site #:	
Date:	11/19/13
Name:	Mark Brauer
File Name:	Talcott Mtn CT 700 LTE

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**55.0**
Antenna Gain (dBi):	**16.3**
Antenna Size (in.):	**82.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1050.0**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	1490.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	1489.8	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.02	0.00	
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.4	0.3	0.1	0.9	0.6	0.4	0.7	0.7	0.2	
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.6	1.0	1.2	1.0	0.8	1.8	1.7	0.6	4.3	2.9	2.2	3.5	3.4	0.9	

Antenna Type APX75-866514
Max% 4.25%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

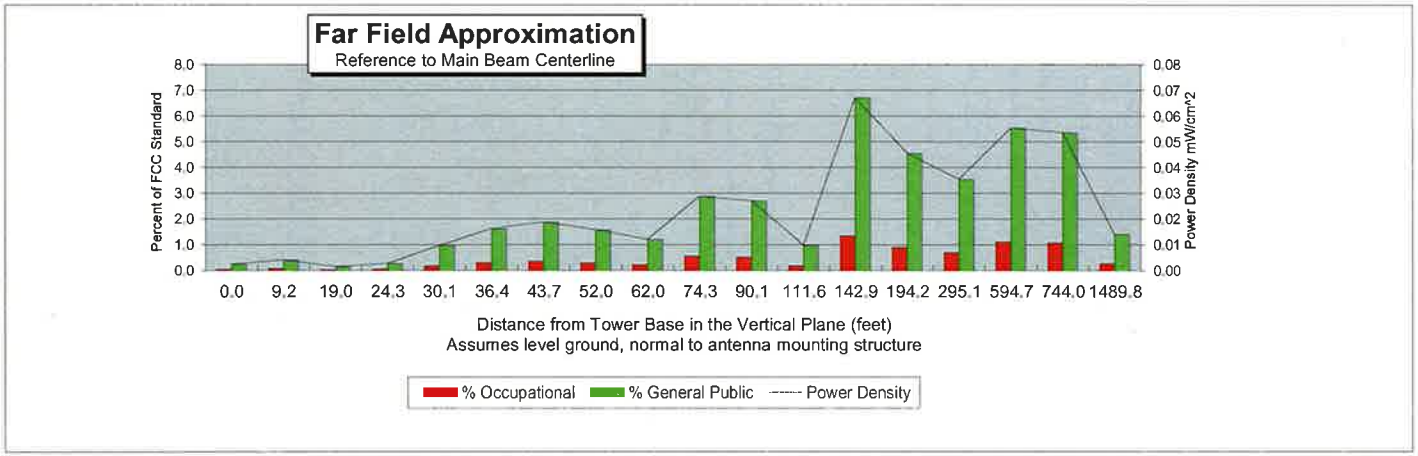
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	TALCOTT MTN, CT
Site #:	
Date:	11/19/13
Name:	Mark Brauer
File Name:	Talcott Mtn CT AWS LTE

Operating Freq. (MHz)	**2145.0**
Antenna Height (ft):	**55.0**
Antenna Gain (dBi):	**19.1**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1750.0**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	1490.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	1489.8	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.01	0.03	0.03	0.01	0.07	0.05	0.04	0.06	0.05	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.1	0.2	0.3	0.4	0.3	0.2	0.6	0.5	0.2	1.3	0.9	0.7	1.1	1.1	0.3	
Percent of General Population Standard	0.2	0.4	0.1	0.3	1.0	1.6	1.9	1.6	1.2	2.9	2.7	1.0	6.7	4.5	3.5	5.5	5.4	1.4	

Antenna Type BXA-171063-12BF
Max% 6.71%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

60-ft Existing Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Talcott Mountain

324 Montevideo Road
Avon, CT

Centek Project No. 13001.066

Date: November 18, 2013

Prepared for:

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

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

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing lattice (tower) located in Avon, CT.

The host tower is a 60-ft, three legged, steel lattice tower. The tower geometry, structure member sizes and foundation information were obtained from a previous structural report prepared by Centek Engineering, Inc. job no.; 13140.CO2 dated September 18, 2013.

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

The tower consists of one (1) tapered and two (2) straight vertical steel sections consisting of ASTM A53-B-35 (35ksi) pipe legs. Diagonal and horizontal lateral support bracing consists of steel angle conforming to ASTM A36 (36ksi) and steel pipe conforming to ASTM A53-B-35 (35ksi). The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted and welded gusset connections. The tower face width is 7.58-ft at the top and 9.70-ft at the bottom.

Verizon proposes the removal of four (4) panel antennas and the installation of four (4) panel antennas, three (3) remote radio heads and one (1) main distribution box mounted on the existing two (2) sector 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, proposed and future loads considered in this analysis consist of the following:

- UNKNOWN (Existing):
  Antennas: One (1) 18-ft dome mounted to the top of the tower.
  Coax Cables: One (1) 7/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (RESERVED):
  Antennas: Nine (9) Andrew SBNH-1D6565C panel antennas, three (3) Ericsson KRC 118 054/1 panel antennas, fifteen (15) Ericsson RRUS-11 remote radio units and three (3) Raycap DC6-48-60-18-8F surge arrestors mounted within the existing doppler radar dome with a RAD center elevation of ±67-ft above grade.
  Coax Cables: Three (3) fiber cables (within 2.25" innerducts), six (6) dc control cables, three (3) RET cables and one (1) #2 THHN ground running on a leg of the existing tower.
- VERIZON WIRELESS (Existing to Remain):
  Antennas: One (1) RFS APX75-866514-CT8, one (1) Antel BXA-70080-6CF, two (2) Antel LPA-80063-6CF and two (2) LPA-80080-6CF panel antennas mounted on two (2) 13-ft face mount fames with a RAD center elevation of ±55-ft above finished grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables on a leg/face of the existing tower as specified in Section 3 of this report.

- VERIZON WIRELESS (Existing to Remove):
  Antennas: Four (4) Antel LPA-171063-8CF panel antennas mounted on two (2) 13-ft face mount fames with a RAD center elevation of ±55-ft above finished grade.
- **VERIZON (Proposed):**
  Antennas: Two (2) Antel BXA-171063-12CF panel antennas, two (2) BXA-171063-8CF panel antennas, two (2) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on two (2) 13-ft face mount fames with a RAD center elevation of ±55-ft above finished grade.
  Coax Cables: One (1) 1-5/8" Ø fiber cable running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.
- **All reinforcements outlined in the structural analysis and reinforcement design prepared by Centek engineering for AT&T Mobility job no; 13140.CO2 dated September 18 2013 must be installed prior to Verizon Wireless's antenna upgrade.**

Analysis

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

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

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

Tower Loading

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

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Avon; 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; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses **with the implementation of the reinforcements outlined in the structural analysis and reinforcement design prepared by Centek engineering for AT&T Mobility job no; 13140.CO2 dated September 18 2013** were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **99.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T5)	0'-6.3'	99.0%	**PASS**
Diagonal (T2)	19.5'-39.5'	70.1%	**PASS**

Foundation and Anchors

The foundation consists of a 3.5-ft thick triangular mat. The tower legs are encased within the concrete mat.

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

Location	Vector	Proposed Base Reactions
Base	Shear	**12 kips**
	Compression	**12 kips**
	Moment	**592 kip-ft**
Leg	Shear	**7 kips**
	Uplift	**74 kips**
	Compression	**65 kips**

- The foundation system was found to be within allowable limits.

Foundation Type	Design Limit	Allowable Limit/FS	Proposed Loading	Result
Triangular Mat Foundation	Bearing Pressure	12.0 ksf (1)	1.35 ksf	**PASS**
	OM (2)	2.0 (3)	2.81	**PASS**

Note 1: Minimum allowable soil bearing pressure taken as 12.0ksf (conservative) for basalt rock.
Note 2: (OM) Denotes overturning moment.
Note 3: Min required Factor of Safety (FS) of 2.0 required per IBC 2003/2005 CSBC Section 3108.4.2.

Conclusion

- This analysis shows that the subject tower **is adequate** to support the proposed antenna modification **with the implementation of the reinforcements outlined in the structural analysis and reinforcement design prepared by Centek engineering for AT&T Mobility job no; 13140.CO2 dated September 18 2013.**

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. 16694
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:

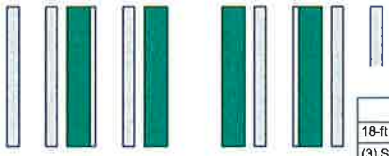
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or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

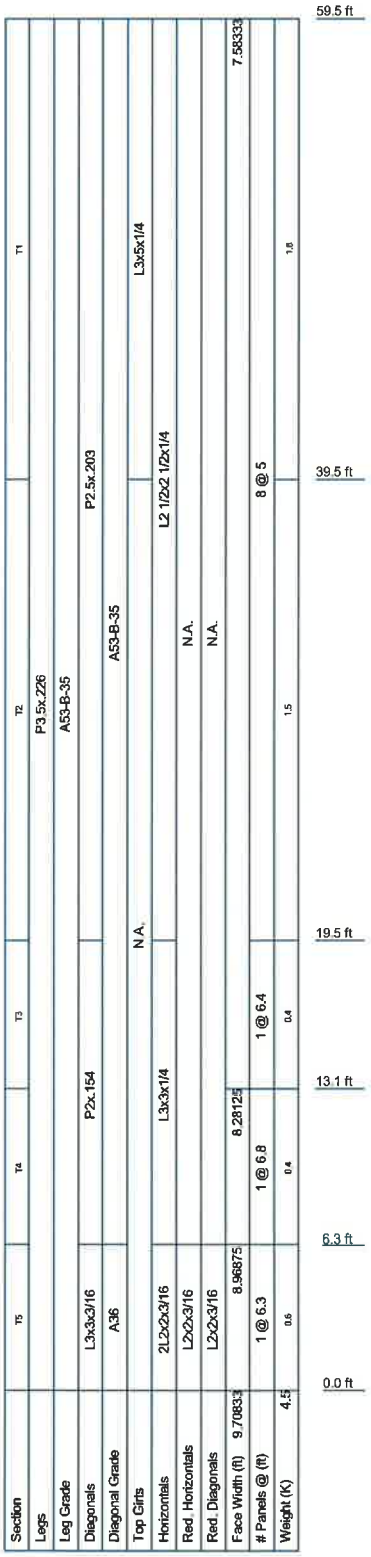
General Description of Structural Analysis Program

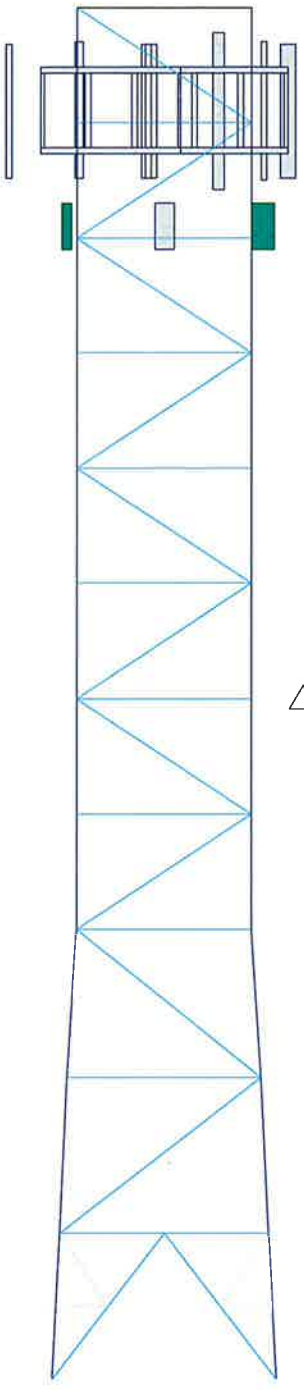
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

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.







DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
18-ft Doppler	68.5	LPA-80080-6CF (Verizon - Existing)	55
(3) SBNH-1D6565C (ATI - Reserved)	67	BXA-171063-12CF (Verizon - Proposed)	55
(3) SBNH-1D6565C (ATI - Reserved)	67	BXA-70080-6CF (Verizon - Existing)	55
(3) SBNH-1D6565C (ATI - Reserved)	67	13-ft Face Mount Frame (Verizon - Existing)	55
KRC 118 054/1 (ATI - Reserved)	67	13-ft Face Mount Frame (Verizon - Existing)	55
KRC 118 054/1 (ATI - Reserved)	67	LPA-80063-6CF (Verizon - Existing)	55
KRC 118 054/1 (ATI - Reserved)	67	BXA-171063-12CF (Verizon - Proposed)	55
(5) RRUS-11 (ATI - Reserved)	67	APX75-866514-CT8 (Verizon - Existing)	55
(5) RRUS-11 (ATI - Reserved)	67	BXA-171063-8CF (Verizon - Proposed)	55
(5) RRUS-11 (ATI - Reserved)	67	RRH2x40-AWS (Verizon - Proposed)	50
(3) DC6-48-60-18-8F Surge Arrestor (ATI - Reserved)	67	RRH2x40-AWS (Verizon - Proposed)	50
Doppler Platform	60	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	50
Doppler Platform Support	57		
Doppler Platform Support	57		
Doppler Platform Support	57		
BXA-171063-8CF (Verizon - Proposed)	55		
LPA-80080-6CF (Verizon - Existing)	55		
LPA-80063-6CF (Verizon - Proposed)	55		

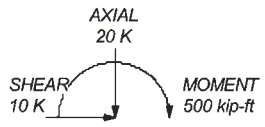
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A36	36 ksi	58 ksi

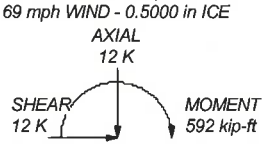
TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 99%

MAX. CORNER REACTIONS AT BASE:
DOWN: 74 K
UPLIFT: -65 K
SHEAR: 7 K



TORQUE 3 kip-ft
69 mph WIND - 0.5000 in ICE



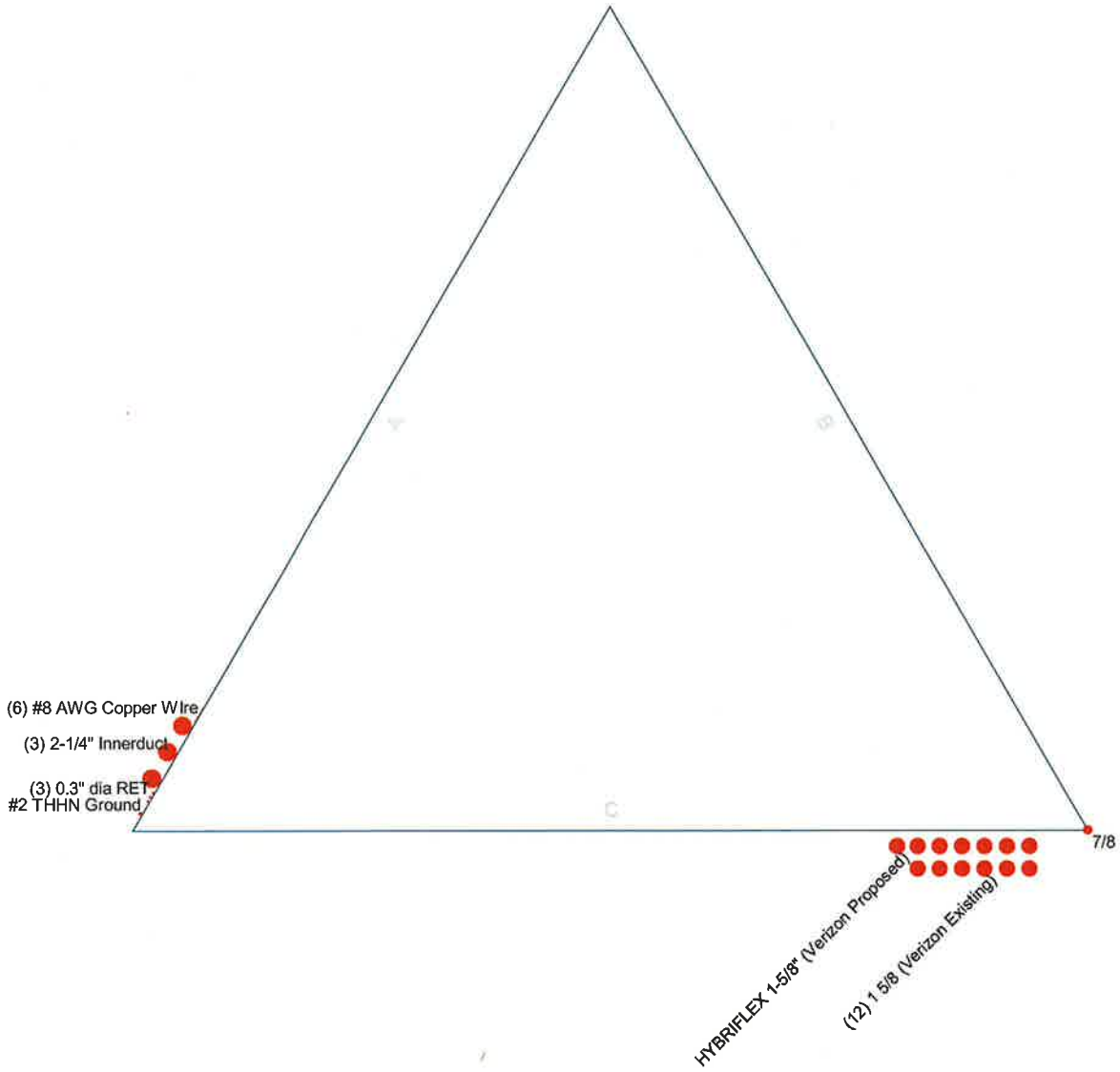
TORQUE 3 kip-ft
REACTIONS - 80 mph WIND

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

Job: 13001.066 - Talcott Mountain			
Project: 60' Lattice Tower - 324 Montevideo Road, Avon, CT			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/18/13	Scale: NTS	
Path:		Dwg No. E-1	

Feedline Plan

Round Flat App In Face App Out Face



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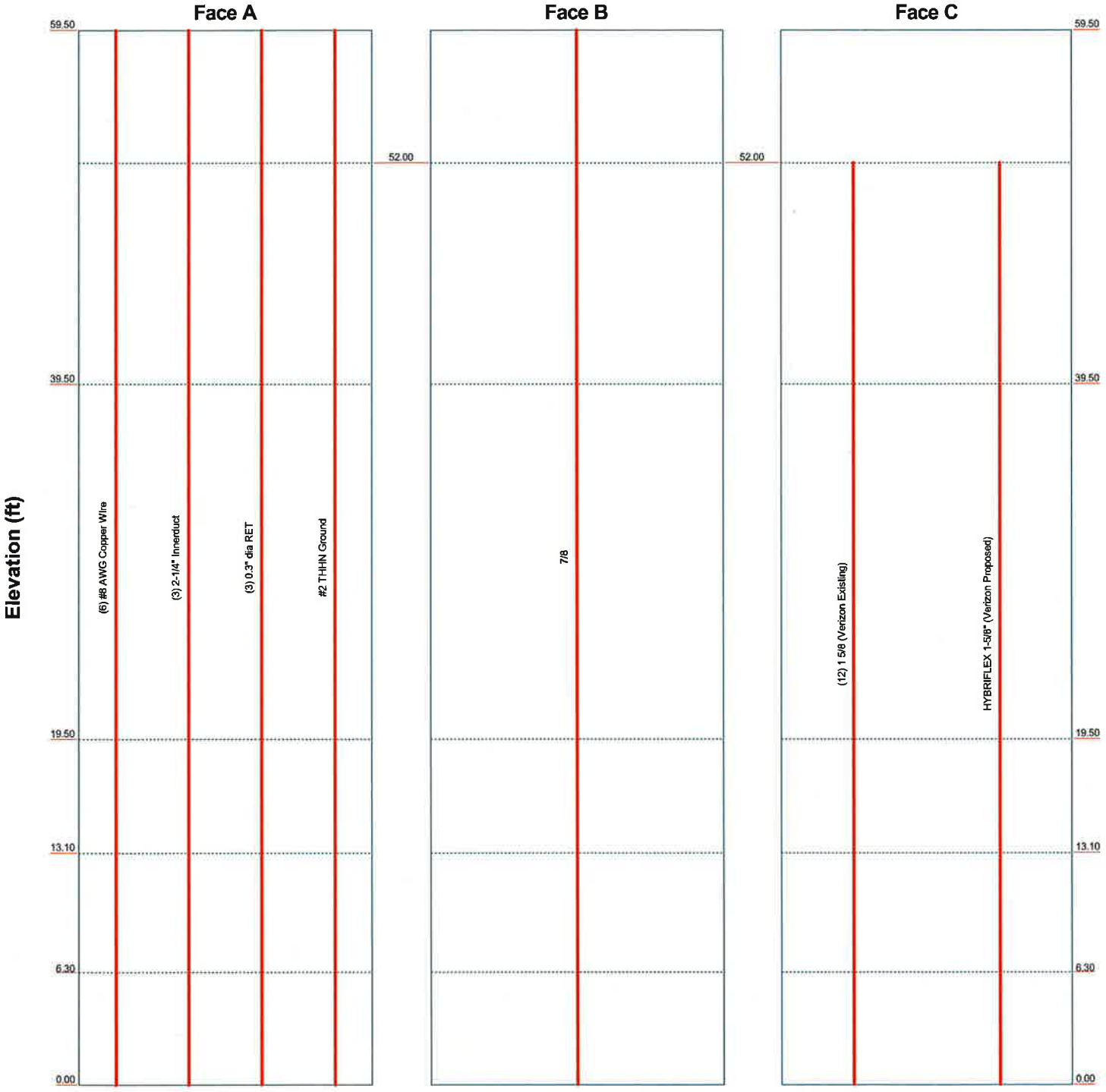
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 11/18/13	Scale: NTS	
Path:		Dwg No. E-7	

Feedline Distribution Chart
0' - 59'6"

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



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Path:		Dwg No. E-7	

tnxTower	Job	Page
	13001.066 - Talcott Mountain	1 of 29
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Project 60' Lattice Tower - 324 Montevideo Road, Avon, CT	Date 12:56:45 11/18/13
	Client Verizon Wireless	Designed by TJL

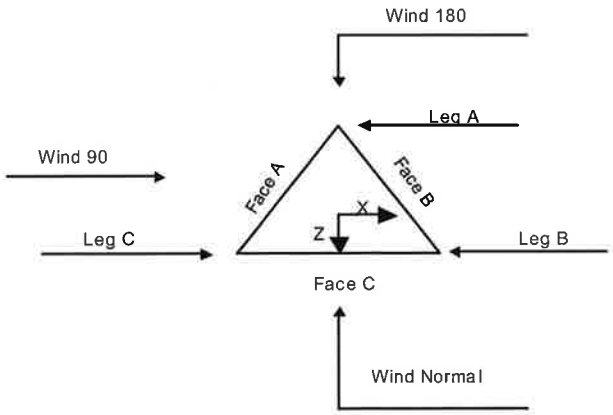
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 59.50 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 7.58 ft at the top and 9.71 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, 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	59.50-39.50			7.58	1	20.00
T2	39.50-19.50			7.58	1	20.00
T3	19.50-13.10			7.58	1	6.40
T4	13.10-6.30			8.28	1	6.80
T5	6.30-0.00			8.97	1	6.30

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	59.50-39.50	5.00	K Brace Left	No	Yes	0.0000	0.0000
T2	39.50-19.50	5.00	K Brace Left	No	Yes	0.0000	0.0000
T3	19.50-13.10	6.40	K Brace Right	No	Yes	0.0000	0.0000
T4	13.10-6.30	6.80	K Brace Left	No	Yes	0.0000	0.0000
T5	6.30-0.00	6.30	K1 Down	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 59.50-39.50	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2.5x.203	A53-B-35 (35 ksi)
T2 39.50-19.50	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2.5x.203	A53-B-35 (35 ksi)
T3 19.50-13.10	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2x.154	A53-B-35 (35 ksi)
T4 13.10-6.30	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2x.154	A53-B-35 (35 ksi)
T5 6.30-0.00	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Single Angle	L3x3x3/16	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 59.50-39.50	Single Angle	L3x5x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 59.50-39.50	None	Flat Bar		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T2 39.50-19.50	None	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T3 19.50-13.10	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T4 13.10-6.30	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T5 6.30-0.00	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L2x2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T5 6.30-0.00	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 59.50-39.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 39.50-19.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 19.50-13.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 13.10-6.30	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 6.30-0.00	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	X Brace Diags Y	K Single Diags X	K 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	No	1	1	1	1	1	1	1	1	1	1	1	1	1
59.50-39.50				1	1	1	1	1	1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
39.50-19.50				1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	No	0.5	1	1	1	1	1	1	1	1	1	1	1	1
19.50-13.10				1	1	1	1	1	1	1	1	1	1	1	1
T4 13.10-6.30	Yes	No	0.5	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1
T5 6.30-0.00	Yes	No	0.8	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg 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 59.50-39.50	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 39.50-19.50	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 19.50-13.10	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 13.10-6.30	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 6.30-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 59.50-39.50	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T2 39.50-19.50	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T3 19.50-13.10	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T4 13.10-6.30	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 6.30-0.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

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 59.50-39.50	Flange	0.8750 A325N	4	0.5000 A325N	2	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T2 39.50-19.50	Flange	0.8750 A325N	4	0.5000 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T3 19.50-13.10	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.7500 A325N	1	0.6250 A325N	0
T4 13.10-6.30	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T5 6.30-0.00	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon Existing)	C	Yes	Ar (CfAe)	52.00 - 0.00	1.0000	-0.38	12	6	0.7500	1.9800		1.04
7/8	B	No	Ar (Leg)	59.50 - 0.00	0.0000	0	1	1	1.1100	1.1100		0.54
#8 AWG Copper WIre	A	Yes	Ar (CfAe)	59.50 - 0.00	0.0000	-0.36	6	6	0.2500	0.1285		0.05
2-1/4" Innerduct	A	Yes	Ar (CfAe)	59.50 - 0.00	0.0000	-0.41	3	3	1.5000	2.2500		4.00
0.3" dia RET	A	Yes	Ar (CfAe)	59.50 - 0.00	0.0000	-0.46	3	3	0.3000	0.3000		0.00
#2 THHN Ground	A	Yes	Ar (CfAe)	59.50 - 0.00	0.0000	-0.48	1	1	0.3780	0.3780		0.23
HYBRIFLEX	C	Yes	Ar (CfAe)	52.00 - 0.00	1.0000	-0.3	1	1	1.9800	1.9800		1.90

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1-5/8" (Verizon Proposed)												

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	59.50-39.50	A	14.665	0.000	0.000	0.000	0.25
		B	1.850	0.000	0.000	0.000	0.01
		C	16.288	0.000	0.000	0.000	0.18
T2	39.50-19.50	A	14.665	0.000	0.000	0.000	0.25
		B	1.850	0.000	0.000	0.000	0.01
		C	24.950	0.000	0.000	0.000	0.29
T3	19.50-13.10	A	4.693	0.000	0.000	0.000	0.08
		B	0.592	0.000	0.000	0.000	0.00
		C	7.984	0.000	0.000	0.000	0.09
T4	13.10-6.30	A	4.986	0.000	0.000	0.000	0.09
		B	0.629	0.000	0.000	0.000	0.00
		C	8.483	0.000	0.000	0.000	0.10
T5	6.30-0.00	A	4.619	0.000	0.000	0.000	0.08
		B	0.583	0.000	0.000	0.000	0.00
		C	7.859	0.000	0.000	0.000	0.09

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	59.50-39.50	A	0.500	22.594	5.154	0.000	0.000	0.41
		B		3.517	0.000	0.000	0.000	0.03
		C		9.725	14.219	0.000	0.000	0.47
T2	39.50-19.50	A	0.500	22.594	5.154	0.000	0.000	0.41
		B		3.517	0.000	0.000	0.000	0.03
		C		13.450	22.750	0.000	0.000	0.75
T3	19.50-13.10	A	0.500	7.230	1.649	0.000	0.000	0.13
		B		1.125	0.000	0.000	0.000	0.01
		C		4.304	7.280	0.000	0.000	0.24
T4	13.10-6.30	A	0.500	7.682	1.752	0.000	0.000	0.14
		B		1.196	0.000	0.000	0.000	0.01
		C		4.573	7.735	0.000	0.000	0.26
T5	6.30-0.00	A	0.500	7.117	1.624	0.000	0.000	0.13
		B		1.108	0.000	0.000	0.000	0.01
		C		4.237	7.166	0.000	0.000	0.24

Feed Line Shielding

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T1	59.50-39.50	A	0.842	2.609	0.642	1.214
		B	0.000	0.000	0.000	0.000
		C	0.829	1.921	0.632	0.894
T2	39.50-19.50	A	0.842	2.609	0.611	1.156
		B	0.000	0.000	0.000	0.000
		C	1.326	3.073	0.963	1.362
T3	19.50-13.10	A	0.186	0.617	0.183	0.347
		B	0.000	0.000	0.000	0.000
		C	0.294	0.727	0.289	0.409
T4	13.10-6.30	A	0.185	0.612	0.183	0.347
		B	0.000	0.000	0.000	0.000
		C	0.291	0.721	0.289	0.409
T5	6.30-0.00	A	0.000	0.632	0.768	1.453
		B	0.000	0.000	0.000	0.000
		C	0.000	0.744	1.210	1.711

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	59.50-39.50	-0.3408	5.9859	-1.2563	5.6694
T2	39.50-19.50	1.8438	7.5548	0.5356	6.8779
T3	19.50-13.10	2.0804	8.5435	0.5814	7.8338
T4	13.10-6.30	2.2576	9.2073	0.6304	8.4716
T5	6.30-0.00	1.8422	7.2061	0.6218	6.1515

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
18-ft Doppler	C	None		0.0000	68.50	No Ice	203.47	203.47	2.00
						1/2" Ice	205.47	205.47	4.40
Doppler Platform	C	None		0.0000	60.00	No Ice	0.00	0.00	1.00
						1/2" Ice	0.00	0.00	1.30
Doppler Platform Support	A	None		0.0000	57.00	No Ice	3.17	3.17	0.10
						1/2" Ice	3.87	3.87	0.14
Doppler Platform Support	B	None		0.0000	57.00	No Ice	3.17	3.17	0.10
						1/2" Ice	3.87	3.87	0.14
Doppler Platform Support	C	None		0.0000	57.00	No Ice	3.17	3.17	0.10
						1/2" Ice	3.87	3.87	0.14
13-ft Face Mount Frame (Verizon - Existing)	B	From Face	0.50 0.00 0.00	0.0000	55.00	No Ice	6.50	6.50	0.30
						1/2" Ice	7.80	7.80	0.35
13-ft Face Mount Frame (Verizon - Existing)	A	From Face	0.50 0.00 0.00	0.0000	55.00	No Ice	6.50	6.50	0.30
						1/2" Ice	7.80	7.80	0.35

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
LPA-80063-6CF	B	From Face	0.50	0.0000	55.00	No Ice	10.31	9.01	0.03
(Verizon - Existing)			6.00			1/2" Ice	10.87	9.55	0.10
			0.00						
BXA-171063-12CF	B	From Face	0.50	0.0000	55.00	No Ice	4.79	3.62	0.02
(Verizon - Proposed)			4.00			1/2" Ice	5.24	4.06	0.04
			0.00						
APX75-866514-CT8	B	From Face	0.50	0.0000	55.00	No Ice	9.77	4.71	0.03
(Verizon - Existing)			0.00			1/2" Ice	10.38	5.21	0.08
			0.00						
BXA-171063-8CF	B	From Face	0.50	0.0000	55.00	No Ice	2.94	2.16	0.01
(Verizon - Proposed)			4.00			1/2" Ice	3.26	2.46	0.03
			0.00						
LPA-80063-6CF	B	From Face	0.50	0.0000	55.00	No Ice	10.31	9.01	0.03
(Verizon - Proposed)			-6.00			1/2" Ice	10.87	9.55	0.10
			0.00						
LPA-80080-6CF	A	From Face	0.50	0.0000	55.00	No Ice	4.33	9.09	0.02
(Verizon - Existing)			-8.75			1/2" Ice	4.76	9.64	0.07
			0.00						
BXA-171063-12CF	B	From Face	0.50	0.0000	55.00	No Ice	4.79	3.62	0.02
(Verizon - Proposed)			4.00			1/2" Ice	5.24	4.06	0.04
			0.00						
BXA-70080-6CF	A	From Face	0.50	0.0000	55.00	No Ice	5.77	4.56	0.02
(Verizon - Existing)			-2.75			1/2" Ice	6.22	5.00	0.05
			0.00						
BXA-171063-8CF	B	From Face	0.50	0.0000	55.00	No Ice	2.94	2.16	0.01
(Verizon - Proposed)			4.00			1/2" Ice	3.26	2.46	0.03
			0.00						
LPA-80080-6CF	A	From Face	0.50	0.0000	55.00	No Ice	4.33	9.09	0.02
(Verizon - Existing)			3.25			1/2" Ice	4.76	9.64	0.07
			0.00						
(3) SBNH-1D6565C	A	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.06
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.13
			0.00						
(3) SBNH-1D6565C	B	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.06
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.13
			0.00						
(3) SBNH-1D6565C	C	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.06
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.13
			0.00						
KRC 118 054/1	A	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.12
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.19
			0.00						
KRC 118 054/1	B	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.12
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.19
			0.00						
KRC 118 054/1	C	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.12
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.19
			0.00						
(5) RRUS-11	A	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.05
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.07
			0.00						
(5) RRUS-11	B	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.05
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.07
			0.00						
(5) RRUS-11	C	From Face	4.00	0.0000	67.00	No Ice	0.00	0.00	0.05
(AT&T - Reserved)			0.00			1/2" Ice	0.00	0.00	0.07
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(3) DC6-48-60-18-8F Surge Arrestor	A	From Face	4.00 0.00 0.00	0.0000	67.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.02 0.04
(AT&T - Reserved)									
RRH2x40-AWS (Verizon - Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-AWS (Verizon - Proposed)	C	From Leg	0.50 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08

Tower Pressures - No Ice

$G_H = 1.202$

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 59.50-39.50	49.50	1.123	18	158.333	A	5.702	35.466	13.333	32.39	0.000	0.000
					B	6.344	23.492		44.69	0.000	0.000
					C	5.712	37.101		31.14	0.000	0.000
T2 39.50-19.50	29.50	1	16	158.333	A	5.431	35.466	13.333	32.60	0.000	0.000
					B	6.042	23.492		45.15	0.000	0.000
					C	5.079	45.267		26.48	0.000	0.000
T3 19.50-13.10	16.30	1	16	52.903	A	1.629	10.723	4.275	34.61	0.000	0.000
					B	1.812	6.809		49.59	0.000	0.000
					C	1.524	13.907		27.71	0.000	0.000
T4 13.10-6.30	9.70	1	16	60.920	A	1.804	11.440	4.541	34.29	0.000	0.000
					B	1.987	7.267		49.07	0.000	0.000
					C	1.698	14.830		27.47	0.000	0.000
T5 6.30-0.00	3.15	1	16	60.936	A	6.358	8.829	4.210	27.72	0.000	0.000
					B	7.126	4.792		35.32	0.000	0.000
					C	5.916	12.069		23.41	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.202$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	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 59.50-39.50	49.50	1.123	14	0.5000	160.000	A	10.284	50.268	16.667	27.52	0.000	0.000
						B	6.344	33.799		41.52	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	19.669	38.087		28.86	0.000	0.000
T2 39.50-19.50	29.50	1	12	0.5000	160.000	A	10.040	50.268	16.667	27.64	0.000	0.000
						B	6.042	33.799		41.83	0.000	0.000
						C	27.430	40.659		24.48	0.000	0.000
T3 19.50-13.10	16.30	1	12	0.5000	53.437	A	3.115	15.320	5.344	28.99	0.000	0.000
						B	1.812	9.833		45.89	0.000	0.000
						C	8.684	12.285		25.49	0.000	0.000
T4 13.10-6.30	9.70	1	12	0.5000	61.487	A	3.393	16.389	5.676	28.70	0.000	0.000
						B	1.987	10.515		45.40	0.000	0.000
						C	9.313	13.171		25.25	0.000	0.000
T5 6.30-0.00	3.15	1	12	0.5000	61.462	A	7.296	14.670	5.262	23.95	0.000	0.000
						B	7.126	9.292		32.05	0.000	0.000
						C	12.581	11.677		21.69	0.000	0.000

Tower Pressure - Service

$G_H = 1.202$

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 59.50-39.50	49.50	1.123	7	158.333	A	5.702	35.466	13.333	32.39	0.000	0.000
					B	6.344	23.492		44.69	0.000	0.000
					C	5.712	37.101		31.14	0.000	0.000
T2 39.50-19.50	29.50	1	6	158.333	A	5.431	35.466	13.333	32.60	0.000	0.000
					B	6.042	23.492		45.15	0.000	0.000
					C	5.079	45.267		26.48	0.000	0.000
T3 19.50-13.10	16.30	1	6	52.903	A	1.629	10.723	4.275	34.61	0.000	0.000
					B	1.812	6.809		49.59	0.000	0.000
					C	1.524	13.907		27.71	0.000	0.000
T4 13.10-6.30	9.70	1	6	60.920	A	1.804	11.440	4.541	34.29	0.000	0.000
					B	1.987	7.267		49.07	0.000	0.000
					C	1.698	14.830		27.47	0.000	0.000
T5 6.30-0.00	3.15	1	6	60.936	A	6.358	8.829	4.210	27.72	0.000	0.000
					B	7.126	4.792		35.32	0.000	0.000
					C	5.916	12.069		23.41	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	0.44	1.58	A	0.26	2.408	0.604	1	1	27.140	1.48	74.22	C
59.50-39.50			B	0.188	2.635	0.588	1	1	20.160			
			C	0.27	2.378	0.607	1	1	28.243			
T2	0.55	1.52	A	0.258	2.413	0.604	1	1	26.853	1.47	73.54	C
39.50-19.50			B	0.187	2.642	0.588	1	1	19.849			
			C	0.318	2.249	0.622	1	1	33.215			
T3	0.18	0.39	A	0.233	2.488	0.598	1	1	8.039	0.46	71.70	C
19.50-13.10			B	0.163	2.724	0.584	1	1	5.786			

Section Elevation ft	Add Weight K	Self Weight K	Face e	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.292	2.318	0.613	1	1	10.054			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	1	1	8.600	0.50	73.63	C
			B	0.152	2.764	0.582	1	1	6.215			
			C	0.271	2.375	0.608	1	1	10.708			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	1	1	11.670	0.61	96.19	C
			B	0.196	2.611	0.59	1	1	9.951			
			C	0.295	2.309	0.614	1	1	13.332			
Sum Weight:	1.53	4.48						OTM	131.11 kip-ft	4.52		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face e	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.44	1.58	A	0.26	2.408	0.604	0.825	1	26.142	1.43	71.59	C
59.50-39.50			B	0.188	2.635	0.588	0.825	1	19.050			
			C	0.27	2.378	0.607	0.825	1	27.244			
T2	0.55	1.52	A	0.258	2.413	0.604	0.825	1	25.902	1.43	71.57	C
39.50-19.50			B	0.187	2.642	0.588	0.825	1	18.792			
			C	0.318	2.249	0.622	0.825	1	32.326			
T3	0.18	0.39	A	0.233	2.488	0.598	0.825	1	7.754	0.45	69.80	C
19.50-13.10			B	0.163	2.724	0.584	0.825	1	5.468			
			C	0.292	2.318	0.613	0.825	1	9.788			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	0.825	1	8.284	0.49	71.59	C
			B	0.152	2.764	0.582	0.825	1	5.867			
			C	0.271	2.375	0.608	0.825	1	10.411			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	0.825	1	10.558	0.56	88.72	C
			B	0.196	2.611	0.59	0.825	1	8.704			
			C	0.295	2.309	0.614	0.825	1	12.296			
Sum Weight:	1.53	4.48						OTM	126.87 kip-ft	4.36		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face e	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.44	1.58	A	0.26	2.408	0.604	0.8	1	26.000	1.42	71.22	C
59.50-39.50			B	0.188	2.635	0.588	0.8	1	18.891			
			C	0.27	2.378	0.607	0.8	1	27.101			
T2	0.55	1.52	A	0.258	2.413	0.604	0.8	1	25.767	1.43	71.29	C
39.50-19.50			B	0.187	2.642	0.588	0.8	1	18.641			
			C	0.318	2.249	0.622	0.8	1	32.199			
T3	0.18	0.39	A	0.233	2.488	0.598	0.8	1	7.714	0.44	69.52	C
19.50-13.10			B	0.163	2.724	0.584	0.8	1	5.423			
			C	0.292	2.318	0.613	0.8	1	9.749			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	0.8	1	8.239	0.48	71.29	C
			B	0.152	2.764	0.582	0.8	1	5.818			

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
			C	0.271	2.375	0.608	0.8	1	10.369			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	0.8	1	10.399	0.55	87.65	C
			B	0.196	2.611	0.59	0.8	1	8.526			
			C	0.295	2.309	0.614	0.8	1	12.148			
Sum Weight:	1.53	4.48						OTM	126.26 kip-ft	4.33		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.44	1.58	A	0.26	2.408	0.604	0.85	1	26.285	1.44	71.97	C
59.50-39.50			B	0.188	2.635	0.588	0.85	1	19.208			
			C	0.27	2.378	0.607	0.85	1	27.386			
T2	0.55	1.52	A	0.258	2.413	0.604	0.85	1	26.038	1.44	71.85	C
39.50-19.50			B	0.187	2.642	0.588	0.85	1	18.943			
			C	0.318	2.249	0.622	0.85	1	32.453			
T3	0.18	0.39	A	0.233	2.488	0.598	0.85	1	7.795	0.45	70.07	C
19.50-13.10			B	0.163	2.724	0.584	0.85	1	5.514			
			C	0.292	2.318	0.613	0.85	1	9.826			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	0.85	1	8.329	0.49	71.88	C
			B	0.152	2.764	0.582	0.85	1	5.917			
			C	0.271	2.375	0.608	0.85	1	10.454			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	0.85	1	10.716	0.57	89.79	C
			B	0.196	2.611	0.59	0.85	1	8.882			
			C	0.295	2.309	0.614	0.85	1	12.444			
Sum Weight:	1.53	4.48						OTM	127.47 kip-ft	4.38		

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	0.91	2.19	A	0.378	2.108	0.643	1	1	42.608	1.56	78.12	C
59.50-39.50			B	0.251	2.435	0.602	1	1	26.694			
			C	0.361	2.146	0.636	1	1	43.909			
T2	1.19	2.11	A	0.377	2.112	0.642	1	1	42.334	1.62	80.89	C
39.50-19.50			B	0.249	2.44	0.602	1	1	26.376			
			C	0.426	2.016	0.662	1	1	54.361			
T3	0.38	0.56	A	0.345	2.183	0.631	1	1	12.778	0.51	79.87	C
19.50-13.10			B	0.218	2.537	0.594	1	1	7.655			
			C	0.392	2.079	0.649	1	1	16.651			
T4 13.10-6.30	0.41	0.60	A	0.322	2.24	0.623	1	1	13.599	0.56	82.18	C
			B	0.203	2.585	0.591	1	1	8.202			
			C	0.366	2.136	0.638	1	1	17.719			
T5 6.30-0.00	0.38	0.89	A	0.357	2.155	0.635	1	1	16.614	0.62	98.04	C
			B	0.267	2.387	0.606	1	1	12.761			

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	0.395	2.075	0.649	1	1	20.164			
Sum Weight:	3.26	6.36						OTM	140.76 kip-ft	4.87		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.91	2.19	A	0.378	2.108	0.643	0.825	1	40.808	1.44	72.00	C
59.50-39.50			B	0.251	2.435	0.602	0.825	1	25.584			
			C	0.361	2.146	0.636	0.825	1	40.467			
T2	1.19	2.11	A	0.377	2.112	0.642	0.825	1	40.577	1.47	73.75	C
39.50-19.50			B	0.249	2.44	0.602	0.825	1	25.319			
			C	0.426	2.016	0.662	0.825	1	49.561			
T3	0.38	0.56	A	0.345	2.183	0.631	0.825	1	12.232	0.46	72.58	C
19.50-13.10			B	0.218	2.537	0.594	0.825	1	7.338			
			C	0.392	2.079	0.649	0.825	1	15.131			
T4 13.10-6.30	0.41	0.60	A	0.322	2.24	0.623	0.825	1	13.005	0.51	74.62	C
			B	0.203	2.585	0.591	0.825	1	7.854			
			C	0.366	2.136	0.638	0.825	1	16.089			
T5 6.30-0.00	0.38	0.89	A	0.357	2.155	0.635	0.825	1	15.337	0.55	87.34	C
			B	0.267	2.387	0.606	0.825	1	11.514			
			C	0.395	2.075	0.649	0.825	1	17.963			
Sum Weight:	3.26	6.36						OTM	129.02 kip-ft	4.44		

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	0.91	2.19	A	0.378	2.108	0.643	0.8	1	40.551	1.42	71.12	C
59.50-39.50			B	0.251	2.435	0.602	0.8	1	25.426			
			C	0.361	2.146	0.636	0.8	1	39.976			
T2	1.19	2.11	A	0.377	2.112	0.642	0.8	1	40.326	1.45	72.73	C
39.50-19.50			B	0.249	2.44	0.602	0.8	1	25.168			
			C	0.426	2.016	0.662	0.8	1	48.875			
T3	0.38	0.56	A	0.345	2.183	0.631	0.8	1	12.155	0.46	71.54	C
19.50-13.10			B	0.218	2.537	0.594	0.8	1	7.293			
			C	0.392	2.079	0.649	0.8	1	14.914			
T4 13.10-6.30	0.41	0.60	A	0.322	2.24	0.623	0.8	1	12.921	0.50	73.54	C
			B	0.203	2.585	0.591	0.8	1	7.805			
			C	0.366	2.136	0.638	0.8	1	15.856			
T5 6.30-0.00	0.38	0.89	A	0.357	2.155	0.635	0.8	1	15.155	0.54	85.81	C
			B	0.267	2.387	0.606	0.8	1	11.335			
			C	0.395	2.075	0.649	0.8	1	17.648			
Sum Weight:	3.26	6.36						OTM	127.34 kip-ft	4.38		

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	0.91	2.19	A	0.378	2.108	0.643	0.85	1	41.066	1.46	72.87	C
59.50-39.50			B	0.251	2.435	0.602	0.85	1	25.743			
			C	0.361	2.146	0.636	0.85	1	40.959			
T2	1.19	2.11	A	0.377	2.112	0.642	0.85	1	40.828	1.50	74.77	C
39.50-19.50			B	0.249	2.44	0.602	0.85	1	25.470			
			C	0.426	2.016	0.662	0.85	1	50.247			
T3	0.38	0.56	A	0.345	2.183	0.631	0.85	1	12.310	0.47	73.62	C
19.50-13.10			B	0.218	2.537	0.594	0.85	1	7.383			
			C	0.392	2.079	0.649	0.85	1	15.348			
T4 13.10-6.30	0.41	0.60	A	0.322	2.24	0.623	0.85	1	13.090	0.51	75.70	C
			B	0.203	2.585	0.591	0.85	1	7.904			
			C	0.366	2.136	0.638	0.85	1	16.322			
T5 6.30-0.00	0.38	0.89	A	0.357	2.155	0.635	0.85	1	15.520	0.56	88.87	C
			B	0.267	2.387	0.606	0.85	1	11.692			
			C	0.395	2.075	0.649	0.85	1	18.277			
Sum Weight:	3.26	6.36						OTM	130.69 kip-ft	4.50		

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	0.44	1.58	A	0.26	2.408	0.604	1	1	27.140	0.58	28.99	C
59.50-39.50			B	0.188	2.635	0.588	1	1	20.160			
			C	0.27	2.378	0.607	1	1	28.243			
T2	0.55	1.52	A	0.258	2.413	0.604	1	1	26.853	0.57	28.73	C
39.50-19.50			B	0.187	2.642	0.588	1	1	19.849			
			C	0.318	2.249	0.622	1	1	33.215			
T3	0.18	0.39	A	0.233	2.488	0.598	1	1	8.039	0.18	28.01	C
19.50-13.10			B	0.163	2.724	0.584	1	1	5.786			
			C	0.292	2.318	0.613	1	1	10.054			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	1	1	8.600	0.20	28.76	C
			B	0.152	2.764	0.582	1	1	6.215			
			C	0.271	2.375	0.608	1	1	10.708			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	1	1	11.670	0.24	37.57	C
			B	0.196	2.611	0.59	1	1	9.951			
			C	0.295	2.309	0.614	1	1	13.332			
Sum Weight:	1.53	4.48						OTM	51.21 kip-ft	1.77		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.44	1.58	A	0.26	2.408	0.604	0.825	1	26.142	0.56	27.97	C
59.50-39.50			B	0.188	2.635	0.588	0.825	1	19.050			
			C	0.27	2.378	0.607	0.825	1	27.244			
T2	0.55	1.52	A	0.258	2.413	0.604	0.825	1	25.902	0.56	27.96	C
39.50-19.50			B	0.187	2.642	0.588	0.825	1	18.792			
			C	0.318	2.249	0.622	0.825	1	32.326			
T3	0.18	0.39	A	0.233	2.488	0.598	0.825	1	7.754	0.17	27.26	C
19.50-13.10			B	0.163	2.724	0.584	0.825	1	5.468			
			C	0.292	2.318	0.613	0.825	1	9.788			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	0.825	1	8.284	0.19	27.96	C
			B	0.152	2.764	0.582	0.825	1	5.867			
			C	0.271	2.375	0.608	0.825	1	10.411			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	0.825	1	10.558	0.22	34.66	C
			B	0.196	2.611	0.59	0.825	1	8.704			
			C	0.295	2.309	0.614	0.825	1	12.296			
Sum Weight:	1.53	4.48						OTM	49.56 kip-ft	1.70		

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	0.44	1.58	A	0.26	2.408	0.604	0.8	1	26.000	0.56	27.82	C
59.50-39.50			B	0.188	2.635	0.588	0.8	1	18.891			
			C	0.27	2.378	0.607	0.8	1	27.101			
T2	0.55	1.52	A	0.258	2.413	0.604	0.8	1	25.767	0.56	27.85	C
39.50-19.50			B	0.187	2.642	0.588	0.8	1	18.641			
			C	0.318	2.249	0.622	0.8	1	32.199			
T3	0.18	0.39	A	0.233	2.488	0.598	0.8	1	7.714	0.17	27.16	C
19.50-13.10			B	0.163	2.724	0.584	0.8	1	5.423			
			C	0.292	2.318	0.613	0.8	1	9.749			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	0.8	1	8.239	0.19	27.85	C
			B	0.152	2.764	0.582	0.8	1	5.818			
			C	0.271	2.375	0.608	0.8	1	10.369			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	0.8	1	10.399	0.22	34.24	C
			B	0.196	2.611	0.59	0.8	1	8.526			
			C	0.295	2.309	0.614	0.8	1	12.148			
Sum Weight:	1.53	4.48						OTM	49.32 kip-ft	1.69		

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	0.44	1.58	A	0.26	2.408	0.604	0.85	1	26.285	0.56	28.11	C
59.50-39.50			B	0.188	2.635	0.588	0.85	1	19.208			
			C	0.27	2.378	0.607	0.85	1	27.386			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2	0.55	1.52	A	0.258	2.413	0.604	0.85	1	26.038	0.56	28.07	C
39.50-19.50			B	0.187	2.642	0.588	0.85	1	18.943			
			C	0.318	2.249	0.622	0.85	1	32.453			
T3	0.18	0.39	A	0.233	2.488	0.598	0.85	1	7.795	0.18	27.37	C
19.50-13.10			B	0.163	2.724	0.584	0.85	1	5.514			
			C	0.292	2.318	0.613	0.85	1	9.826			
T4 13.10-6.30	0.19	0.42	A	0.217	2.539	0.594	0.85	1	8.329	0.19	28.08	C
			B	0.152	2.764	0.582	0.85	1	5.917			
			C	0.271	2.375	0.608	0.85	1	10.454			
T5 6.30-0.00	0.17	0.57	A	0.249	2.44	0.602	0.85	1	10.716	0.22	35.07	C
			B	0.196	2.611	0.59	0.85	1	8.882			
			C	0.295	2.309	0.614	0.85	1	12.444			
Sum Weight:	1.53	4.48						OTM	49.79 kip-ft	1.71		

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	1.63					
Bracing Weight	2.85					
Total Member Self-Weight	4.48			2.28	0.49	
Total Weight	11.95			2.28	0.49	
Wind 0 deg - No Ice		0.17	-11.45	-576.38	-9.18	1.39
Wind 30 deg - No Ice		5.84	-9.88	-500.54	-297.06	2.46
Wind 45 deg - No Ice		8.15	-8.11	-410.73	-414.88	2.76
Wind 60 deg - No Ice		9.90	-5.78	-293.00	-504.17	2.87
Wind 90 deg - No Ice		11.38	-0.17	-7.39	-577.87	2.56
Wind 120 deg - No Ice		9.89	5.58	283.24	-498.70	1.59
Wind 135 deg - No Ice		7.90	7.86	401.62	-401.21	0.83
Wind 150 deg - No Ice		5.54	9.71	495.44	-280.31	0.09
Wind 180 deg - No Ice		-0.17	11.27	576.10	10.16	-1.37
Wind 210 deg - No Ice		-5.84	9.88	505.11	298.05	-2.46
Wind 225 deg - No Ice		-8.15	8.11	415.30	415.87	-2.76
Wind 240 deg - No Ice		-10.06	5.88	299.99	509.36	-2.98
Wind 270 deg - No Ice		-11.38	0.17	11.95	578.86	-2.56
Wind 300 deg - No Ice		-9.72	-5.48	-276.25	495.49	-1.51
Wind 315 deg - No Ice		-7.90	-7.86	-397.06	402.19	-0.83
Wind 330 deg - No Ice		-5.54	-9.71	-490.87	281.30	-0.09
Member Ice	1.88					
Total Weight Ice	20.15			6.10	-1.75	
Wind 0 deg - Ice		0.13	-10.28	-482.24	-9.14	0.78
Wind 30 deg - Ice		5.09	-8.65	-411.79	-248.54	1.88
Wind 45 deg - Ice		7.09	-7.05	-336.13	-345.76	2.23
Wind 60 deg - Ice		8.58	-5.01	-237.76	-418.91	2.41
Wind 90 deg - Ice		9.95	-0.13	-1.29	-482.54	2.41
Wind 120 deg - Ice		8.87	5.02	243.87	-423.15	1.87
Wind 135 deg - Ice		6.90	6.87	337.88	-335.30	1.13
Wind 150 deg - Ice		4.86	8.51	416.60	-235.74	0.53
Wind 180 deg - Ice		-0.13	9.78	481.01	5.64	-0.78
Wind 210 deg - Ice		-5.09	8.65	423.99	245.05	-1.88
Wind 225 deg - Ice		-7.09	7.05	348.33	342.26	-2.23
Wind 240 deg - Ice		-9.01	5.25	256.67	427.04	-2.65
Wind 270 deg - Ice		-9.95	0.13	13.49	479.04	-2.41

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 300 deg - Ice		-8.45	-4.78	-224.95	408.02	-1.64
Wind 315 deg - Ice		-6.90	-6.87	-325.67	331.81	-1.13
Wind 330 deg - Ice		-4.86	-8.51	-404.40	232.24	-0.53
Total Weight	11.95			2.28	0.49	
Wind 0 deg - Service		0.07	-4.47	-226.97	-3.70	0.54
Wind 30 deg - Service		2.28	-3.86	-197.34	-116.16	0.96
Wind 45 deg - Service		3.18	-3.17	-162.26	-162.18	1.08
Wind 60 deg - Service		3.87	-2.26	-116.27	-197.06	1.12
Wind 90 deg - Service		4.44	-0.07	-4.70	-225.85	1.00
Wind 120 deg - Service		3.86	2.18	108.82	-194.92	0.62
Wind 135 deg - Service		3.09	3.07	155.07	-156.84	0.32
Wind 150 deg - Service		2.16	3.79	191.71	-109.62	0.04
Wind 180 deg - Service		-0.07	4.40	223.22	3.85	-0.53
Wind 210 deg - Service		-2.28	3.86	195.49	116.31	-0.96
Wind 225 deg - Service		-3.18	3.17	160.41	162.33	-1.08
Wind 240 deg - Service		-3.93	2.30	115.37	198.85	-1.16
Wind 270 deg - Service		-4.44	0.07	2.85	226.00	-1.00
Wind 300 deg - Service		-3.80	-2.14	-109.73	193.43	-0.59
Wind 315 deg - Service		-3.09	-3.07	-156.92	156.99	-0.32
Wind 330 deg - Service		-2.16	-3.79	-193.56	109.76	-0.04

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp

Comb. No.	Description
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	59.5 - 39.5	Leg	Max Tension	5	23.31	0.29	-0.65
			Max. Compression	13	-28.55	0.85	-0.18
			Max. Mx	6	18.85	-1.08	0.08
			Max. My	3	-24.05	-0.36	0.96
			Max. Vy	14	1.67	-0.15	0.25
			Max. Vx	10	-1.68	0.25	0.44
		Diagonal	Max Tension	6	6.39	0.00	0.00
			Max. Compression	14	-6.46	0.00	0.00
			Max. Mx	20	3.09	0.06	0.00
			Max. My	22	-0.06	0.00	-0.00
			Max. Vy	20	-0.03	0.00	0.00
			Max. Vx	22	-0.00	0.00	0.00
		Horizontal	Max Tension	10	0.82	0.00	0.00
			Max. Compression	2	-0.79	0.00	0.00
			Max. Mx	32	0.27	-0.05	0.00
			Max. My	21	0.70	0.00	0.00
			Max. Vy	32	0.02	0.00	0.00
			Max. Vx	21	-0.00	0.00	0.00
		Top Girt	Max Tension	5	1.95	0.00	0.00
			Max. Compression	13	-1.89	0.00	0.00
			Max. Mx	18	0.02	-0.07	0.00
			Max. My	23	1.31	0.00	-0.00
			Max. Vy	18	0.04	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
T2	39.5 - 19.5	Leg	Max Tension	5	50.20	0.21	-0.87
			Max. Compression	13	-57.22	0.93	-0.48
			Max. Mx	14	35.02	1.25	0.20
			Max. My	17	-41.01	0.30	1.13
			Max. Vy	7	0.37	-0.81	-0.46
			Max. Vx	2	-0.34	-0.01	0.95
		Diagonal	Max Tension	6	7.62	0.00	0.00
			Max. Compression	14	-7.70	0.00	0.00
			Max. Mx	20	5.24	0.06	0.00
			Max. My	22	-0.43	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. Vy	20	-0.03	0.00	0.00
			Max. Vx	22	-0.00	0.00	0.00
		Horizontal	Max Tension	13	0.99	0.00	0.00
			Max. Compression	13	-0.99	0.00	0.00
			Max. Mx	18	0.11	-0.05	0.00
			Max. My	23	0.76	0.00	-0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
T3	19.5 - 13.1	Leg	Max Tension	5	56.38	0.32	0.61
			Max. Compression	13	-63.95	0.76	0.19
			Max. Mx	6	-53.30	0.93	-0.04
			Max. My	13	-63.86	-0.34	-0.75
			Max. Vy	4	0.19	-0.81	0.01
			Max. Vx	31	-0.17	0.37	0.33
		Diagonal	Max Tension	14	4.03	0.00	0.00
			Max. Compression	6	-4.09	0.00	0.00
			Max. Mx	31	3.62	0.05	0.00
			Max. My	22	-0.61	0.00	-0.00
			Max. Vy	31	-0.02	0.00	0.00
			Max. Vx	22	0.00	0.00	0.00
		Horizontal	Max Tension	5	1.54	0.00	0.00
			Max. Compression	13	-1.88	0.00	0.00
			Max. Mx	24	0.72	-0.05	0.00
			Max. My	30	0.97	0.00	0.00
			Max. Vy	24	0.03	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T4	13.1 - 6.3	Leg	Max Tension	5	60.17	0.14	-0.56
			Max. Compression	13	-68.23	0.18	-0.24
			Max. Mx	11	51.29	-0.30	-0.13
			Max. My	4	-22.10	-0.09	-0.76
			Max. Vy	19	-0.10	0.28	-0.29
			Max. Vx	6	0.21	0.10	-0.60
		Diagonal	Max Tension	6	4.51	0.00	0.00
			Max. Compression	14	-4.52	0.00	0.00
			Max. Mx	29	3.24	0.06	0.00
			Max. My	24	0.25	0.00	-0.00
			Max. Vy	29	-0.02	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Horizontal	Max Tension	13	1.18	0.00	0.00
			Max. Compression	13	-1.18	0.00	0.00
			Max. Mx	32	0.55	-0.07	0.00
			Max. My	21	0.73	0.00	0.00
			Max. Vy	32	0.03	0.00	0.00
			Max. Vx	21	-0.00	0.00	0.00
T5	6.3 - 0	Leg	Max Tension	5	61.73	0.30	0.48
			Max. Compression	13	-70.34	1.32	0.08
			Max. Mx	13	-70.29	1.32	0.08
			Max. My	6	-59.76	-0.16	-0.75
			Max. Vy	13	-0.56	1.32	0.08
			Max. Vx	5	-0.31	0.00	-0.73
		Diagonal	Max Tension	6	3.08	0.12	0.00
			Max. Compression	14	-3.14	0.00	0.00
			Max. Mx	13	-1.86	-0.17	-0.00
			Max. My	30	-2.29	-0.13	0.00
			Max. Vy	13	-0.05	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Horizontal	Max Tension	14	2.91	-0.02	-0.01
			Max. Compression	6	-3.21	-0.02	-0.01
			Max. Mx	5	0.64	-0.06	-0.00
			Max. My	23	-2.93	-0.01	-0.01
			Max. Vy	22	-0.03	-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. Vx	22	0.00	0.00	0.00
		Redund Horz 1 Bracing	Max Tension	13	1.22	0.00	0.00
			Max. Compression	13	-1.22	0.00	0.00
			Max. Mx	26	0.91	-0.00	0.00
			Max. My	28	0.94	0.00	0.00
			Max. Vy	31	-0.00	0.00	0.00
			Max. Vx	28	-0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	13	1.02	0.00	0.00
			Max. Compression	13	-1.02	0.00	0.00
			Max. Mx	30	0.91	-0.00	0.00
			Max. My	24	0.34	0.00	0.00
			Max. Vy	30	0.00	0.00	0.00
			Max. Vx	24	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	13	74.37	6.46	-3.44
	Max. H_x	13	74.37	6.46	-3.44
	Max. H_z	4	-63.27	-5.54	3.16
	Min. Vert	5	-65.47	-5.84	3.10
	Min. H_x	5	-65.47	-5.84	3.10
	Min. H_z	12	71.61	6.07	-3.45
Leg B	Max. Vert	7	72.27	-6.18	-3.52
	Max. H_x	15	-63.57	5.57	3.18
	Max. H_z	16	-61.14	5.26	3.28
	Min. Vert	15	-63.57	5.57	3.18
	Min. H_x	7	72.27	-6.18	-3.52
	Min. H_z	8	69.28	-5.79	-3.57
Leg A	Max. Vert	2	72.62	0.00	7.17
	Max. H_x	14	2.56	0.58	0.14
	Max. H_z	2	72.62	0.00	7.17
	Min. Vert	10	-64.63	-0.01	-6.48
	Min. H_x	6	4.87	-0.59	0.48
	Min. H_z	10	-64.63	-0.01	-6.48

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	11.95	0.00	-0.00	2.29	0.50	0.00
Dead+Wind 0 deg - No Ice	11.95	0.17	-11.45	-577.05	-9.20	1.38
Dead+Wind 30 deg - No Ice	11.95	5.84	-9.88	-501.22	-297.46	2.46
Dead+Wind 45 deg - No Ice	11.95	8.15	-8.10	-411.31	-415.45	2.77
Dead+Wind 60 deg - No Ice	11.95	9.90	-5.78	-293.43	-504.87	2.88
Dead+Wind 90 deg - No Ice	11.95	11.37	-0.17	-7.43	-578.64	2.57
Dead+Wind 120 deg - No Ice	11.95	9.89	5.58	283.54	-499.28	1.60
Dead+Wind 135 deg - No Ice	11.95	7.90	7.86	402.15	-401.74	0.84

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 150 deg - No Ice	11.95	5.54	9.71	496.08	-280.67	0.09
Dead+Wind 180 deg - No Ice	11.95	-0.17	11.26	576.89	10.21	-1.37
Dead+Wind 210 deg - No Ice	11.95	-5.84	9.88	505.79	298.48	-2.47
Dead+Wind 225 deg - No Ice	11.95	-8.15	8.10	415.87	416.46	-2.77
Dead+Wind 240 deg - No Ice	11.95	-10.06	5.88	300.36	509.98	-2.98
Dead+Wind 270 deg - No Ice	11.95	-11.37	0.17	11.99	579.63	-2.56
Dead+Wind 300 deg - No Ice	11.95	-9.72	-5.48	-276.61	496.16	-1.51
Dead+Wind 315 deg - No Ice	11.95	-7.90	-7.86	-397.57	402.73	-0.83
Dead+Wind 330 deg - No Ice	11.95	-5.54	-9.71	-491.51	281.66	-0.10
Dead+Ice+Temp	20.15	-0.00	-0.00	6.13	-1.76	-0.00
Dead+Wind 0 deg+Ice+Temp	20.15	0.13	-10.27	-483.63	-9.19	0.78
Dead+Wind 30 deg+Ice+Temp	20.15	5.09	-8.64	-413.10	-249.35	1.89
Dead+Wind 45 deg+Ice+Temp	20.15	7.09	-7.05	-337.22	-346.88	2.24
Dead+Wind 60 deg+Ice+Temp	20.15	8.58	-5.01	-238.55	-420.29	2.43
Dead+Wind 90 deg+Ice+Temp	20.15	9.95	-0.13	-1.31	-484.08	2.43
Dead+Wind 120 deg+Ice+Temp	20.15	8.87	5.02	244.56	-424.38	1.89
Dead+Wind 135 deg+Ice+Temp	20.15	6.90	6.87	338.95	-336.38	1.14
Dead+Wind 150 deg+Ice+Temp	20.15	4.86	8.51	417.92	-236.48	0.53
Dead+Wind 180 deg+Ice+Temp	20.15	-0.13	9.78	482.59	5.68	-0.78
Dead+Wind 210 deg+Ice+Temp	20.15	-5.09	8.64	425.35	245.85	-1.89
Dead+Wind 225 deg+Ice+Temp	20.15	-7.09	7.05	349.47	343.38	-2.24
Dead+Wind 240 deg+Ice+Temp	20.15	-9.01	5.25	257.45	428.30	-2.67
Dead+Wind 270 deg+Ice+Temp	20.15	-9.95	0.13	13.57	480.56	-2.42
Dead+Wind 300 deg+Ice+Temp	20.15	-8.45	-4.78	-225.66	409.34	-1.64
Dead+Wind 315 deg+Ice+Temp	20.15	-6.90	-6.87	-326.70	332.86	-1.13
Dead+Wind 330 deg+Ice+Temp	20.15	-4.86	-8.51	-405.66	232.96	-0.53
Dead+Wind 0 deg - Service	11.95	0.07	-4.47	-224.02	-3.29	0.54
Dead+Wind 30 deg - Service	11.95	2.28	-3.86	-194.40	-115.90	0.96
Dead+Wind 45 deg - Service	11.95	3.18	-3.17	-159.27	-161.99	1.08
Dead+Wind 60 deg - Service	11.95	3.87	-2.26	-113.23	-196.92	1.12
Dead+Wind 90 deg - Service	11.95	4.44	-0.07	-1.50	-225.73	1.00
Dead+Wind 120 deg - Service	11.95	3.86	2.18	112.16	-194.73	0.63
Dead+Wind 135 deg - Service	11.95	3.09	3.07	158.48	-156.63	0.33
Dead+Wind 150 deg - Service	11.95	2.16	3.79	195.18	-109.34	0.04
Dead+Wind 180 deg - Service	11.95	-0.07	4.40	226.74	4.29	-0.53
Dead+Wind 210 deg - Service	11.95	-2.28	3.86	198.97	116.89	-0.96
Dead+Wind 225 deg - Service	11.95	-3.18	3.17	163.85	162.98	-1.08
Dead+Wind 240 deg - Service	11.95	-3.93	2.30	118.72	199.51	-1.17
Dead+Wind 270 deg - Service	11.95	-4.44	0.07	6.08	226.72	-1.00
Dead+Wind 300 deg - Service	11.95	-3.80	-2.14	-106.66	194.12	-0.59
Dead+Wind 315 deg - Service	11.95	-3.09	-3.07	-153.91	157.62	-0.33
Dead+Wind 330 deg - Service	11.95	-2.16	-3.79	-190.60	110.33	-0.04

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	-11.95	0.00	-0.00	11.95	0.00	0.000%
2	0.17	-11.95	-11.45	-0.17	11.95	11.45	0.005%
3	5.84	-11.95	-9.88	-5.84	11.95	9.88	0.005%
4	8.15	-11.95	-8.11	-8.15	11.95	8.10	0.005%
5	9.90	-11.95	-5.78	-9.90	11.95	5.78	0.005%
6	11.38	-11.95	-0.17	-11.37	11.95	0.17	0.005%
7	9.89	-11.95	5.58	-9.89	11.95	-5.58	0.005%
8	7.90	-11.95	7.86	-7.90	11.95	-7.86	0.005%
9	5.54	-11.95	9.71	-5.54	11.95	-9.71	0.005%
10	-0.17	-11.95	11.27	0.17	11.95	-11.26	0.005%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
11	-5.84	-11.95	9.88	5.84	11.95	-9.88	0.005%
12	-8.15	-11.95	8.11	8.15	11.95	-8.10	0.005%
13	-10.06	-11.95	5.88	10.06	11.95	-5.88	0.005%
14	-11.38	-11.95	0.17	11.37	11.95	-0.17	0.005%
15	-9.72	-11.95	-5.48	9.72	11.95	5.48	0.005%
16	-7.90	-11.95	-7.86	7.90	11.95	7.86	0.005%
17	-5.54	-11.95	-9.71	5.54	11.95	9.71	0.005%
18	0.00	-20.15	0.00	0.00	20.15	0.00	0.000%
19	0.13	-20.15	-10.28	-0.13	20.15	10.27	0.000%
20	5.09	-20.15	-8.65	-5.09	20.15	8.64	0.000%
21	7.09	-20.15	-7.05	-7.09	20.15	7.05	0.000%
22	8.58	-20.15	-5.01	-8.58	20.15	5.01	0.000%
23	9.95	-20.15	-0.13	-9.95	20.15	0.13	0.000%
24	8.87	-20.15	5.02	-8.87	20.15	-5.02	0.000%
25	6.90	-20.15	6.87	-6.90	20.15	-6.87	0.000%
26	4.86	-20.15	8.51	-4.86	20.15	-8.51	0.000%
27	-0.13	-20.15	9.78	0.13	20.15	-9.78	0.000%
28	-5.09	-20.15	8.65	5.09	20.15	-8.64	0.000%
29	-7.09	-20.15	7.05	7.09	20.15	-7.05	0.000%
30	-9.01	-20.15	5.25	9.01	20.15	-5.25	0.000%
31	-9.95	-20.15	0.13	9.95	20.15	-0.13	0.000%
32	-8.45	-20.15	-4.78	8.45	20.15	4.78	0.000%
33	-6.90	-20.15	-6.87	6.90	20.15	6.87	0.000%
34	-4.86	-20.15	-8.51	4.86	20.15	8.51	0.000%
35	0.07	-11.95	-4.47	-0.07	11.95	4.47	0.003%
36	2.28	-11.95	-3.86	-2.28	11.95	3.86	0.003%
37	3.18	-11.95	-3.17	-3.18	11.95	3.17	0.003%
38	3.87	-11.95	-2.26	-3.87	11.95	2.26	0.003%
39	4.44	-11.95	-0.07	-4.44	11.95	0.07	0.003%
40	3.86	-11.95	2.18	-3.86	11.95	-2.18	0.003%
41	3.09	-11.95	3.07	-3.09	11.95	-3.07	0.003%
42	2.16	-11.95	3.79	-2.16	11.95	-3.79	0.003%
43	-0.07	-11.95	4.40	0.07	11.95	-4.40	0.003%
44	-2.28	-11.95	3.86	2.28	11.95	-3.86	0.003%
45	-3.18	-11.95	3.17	3.18	11.95	-3.17	0.003%
46	-3.93	-11.95	2.30	3.93	11.95	-2.30	0.003%
47	-4.44	-11.95	0.07	4.44	11.95	-0.07	0.003%
48	-3.80	-11.95	-2.14	3.80	11.95	2.14	0.003%
49	-3.09	-11.95	-3.07	3.09	11.95	3.07	0.003%
50	-2.16	-11.95	-3.79	2.16	11.95	3.79	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00004051
2	Yes	4	0.00000001	0.00098573
3	Yes	4	0.00000001	0.00097628
4	Yes	4	0.00000001	0.00097359
5	Yes	4	0.00000001	0.00097481
6	Yes	4	0.00000001	0.00098451
7	Yes	4	0.00000001	0.00098678
8	Yes	4	0.00000001	0.00098311
9	Yes	4	0.00000001	0.00097794
10	Yes	4	0.00000001	0.00097662
11	Yes	4	0.00000001	0.00098595

12	Yes	4	0.00000001	0.00098864
13	Yes	4	0.00000001	0.00098696
14	Yes	4	0.00000001	0.00097784
15	Yes	4	0.00000001	0.00097607
16	Yes	4	0.00000001	0.00098037
17	Yes	4	0.00000001	0.00098528
18	Yes	4	0.00000001	0.00007675
19	Yes	5	0.00000001	0.00013353
20	Yes	5	0.00000001	0.00013250
21	Yes	5	0.00000001	0.00013221
22	Yes	5	0.00000001	0.00013247
23	Yes	5	0.00000001	0.00013394
24	Yes	5	0.00000001	0.00013429
25	Yes	5	0.00000001	0.00013396
26	Yes	5	0.00000001	0.00013323
27	Yes	5	0.00000001	0.00013301
28	Yes	5	0.00000001	0.00013423
29	Yes	5	0.00000001	0.00013462
30	Yes	5	0.00000001	0.00013422
31	Yes	5	0.00000001	0.00013281
32	Yes	5	0.00000001	0.00013224
33	Yes	5	0.00000001	0.00013272
34	Yes	5	0.00000001	0.00013339
35	Yes	4	0.00000001	0.00095866
36	Yes	4	0.00000001	0.00095529
37	Yes	4	0.00000001	0.00095443
38	Yes	4	0.00000001	0.00095506
39	Yes	4	0.00000001	0.00095900
40	Yes	4	0.00000001	0.00096020
41	Yes	4	0.00000001	0.00095926
42	Yes	4	0.00000001	0.00095783
43	Yes	4	0.00000001	0.00095855
44	Yes	4	0.00000001	0.00096287
45	Yes	4	0.00000001	0.00096387
46	Yes	4	0.00000001	0.00096298
47	Yes	4	0.00000001	0.00095859
48	Yes	4	0.00000001	0.00095643
49	Yes	4	0.00000001	0.00095739
50	Yes	4	0.00000001	0.00095881

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	59.5 - 39.5	1.318	46	0.1514	0.0094
T2	39.5 - 19.5	0.654	46	0.1289	0.0078
T3	19.5 - 13.1	0.161	46	0.0718	0.0048
T4	13.1 - 6.3	0.069	46	0.0481	0.0089
T5	6.3 - 0	0.006	35	0.0232	0.0012

Critical Deflections and Radius of Curvature - Service Wind

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
68.50	18-ft Doppler	46	1.318	0.1514	0.0094	122694
67.00	(3) SBNH-1D6565C	46	1.318	0.1514	0.0094	122694
60.00	Doppler Platform	46	1.318	0.1514	0.0094	122694
57.00	Doppler Platform Support	46	1.232	0.1496	0.0096	122694
55.00	13-ft Face Mount Frame	46	1.163	0.1480	0.0097	122694
50.00	RRH2x40-AWS	46	0.993	0.1436	0.0098	64576

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	59.5 - 39.5	3.362	13	0.3864	0.0224
T2	39.5 - 19.5	1.670	13	0.3289	0.0190
T3	19.5 - 13.1	0.411	13	0.1832	0.0123
T4	13.1 - 6.3	0.177	13	0.1228	0.0201
T5	6.3 - 0	0.015	13	0.0591	0.0031

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
68.50	18-ft Doppler	13	3.362	0.3864	0.0224	48031
67.00	(3) SBNH-1D6565C	13	3.362	0.3864	0.0224	48031
60.00	Doppler Platform	13	3.362	0.3864	0.0224	48031
57.00	Doppler Platform Support	13	3.142	0.3816	0.0224	48031
55.00	13-ft Face Mount Frame	13	2.967	0.3776	0.0224	48031
50.00	RRH2x40-AWS	13	2.533	0.3663	0.0221	25280

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	59.5	Leg	A325N	0.8750	4	5.83	26.46	0.220 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3.23	4.12	0.784 ✔	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	0.82	4.12	0.198 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	2	0.98	6.44	0.152 ✔	1.333	Bolt Shear
T2	39.5	Leg	A325N	0.8750	4	12.55	26.46	0.474 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3.85	4.12	0.934 ✔	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	0.99	4.12	0.240 ✔	1.333	Bolt Shear
T3	19.5	Diagonal	A325N	0.7500	1	4.09	9.28	0.441 ✔	1.333	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Horizontal	A325N	0.7500	1	1.88	9.28	0.203 ✓	1.333	Bolt Shear
T4	13.1	Diagonal	A325N	0.7500	1	4.52	9.28	0.488 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	1.18	4.12	0.287 ✓	1.333	Bolt Shear
T5	6.3	Diagonal	A325N	0.7500	1	3.08	6.80	0.453 ✓	1.333	Member Bearing
		Horizontal	A325N	0.5000	1	3.21	8.25	0.389 ✓	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	59.5 - 39.5	P3.5x.226	20.00	5.00	44.9 K=1.00	18.319	2.6795	-28.55	49.09	0.582 ✓
T2	39.5 - 19.5	P3.5x.226	20.00	5.00	44.9 K=1.00	18.319	2.6795	-57.22	49.09	1.166 ✓
T3	19.5 - 13.1	P3.5x.226	6.41	6.41	28.8 K=0.50	19.497	2.6795	-63.95	52.24	1.224 ✓
T4	13.1 - 6.3	P3.5x.226	6.81	6.81	30.6 K=0.50	19.377	2.6795	-68.23	51.92	1.314 ✓
T5	6.3 - 0	P3.5x.226	6.31	3.16	22.7 K=0.80	19.885	2.6795	-70.34	53.28	1.320 ✓

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	59.5 - 39.5	P2.5x.203	8.67	8.67	109.8 K=1.00	11.571	1.7040	-6.46	19.72	0.328 ✓
T2	39.5 - 19.5	P2.5x.203	8.67	8.67	109.8 K=1.00	11.571	1.7040	-7.70	19.72	0.391 ✓
T3	19.5 - 13.1	P2x.154	9.81	9.81	149.6 K=1.00	6.676	1.0745	-4.09	7.17	0.570 ✓
T4	13.1 - 6.3	P2x.154	10.60	10.60	161.6 K=1.00	5.722	1.0745	-4.52	6.15	0.736 ✓
T5	6.3 - 0	L3x3x3/16	7.96	7.39	107.2 K=1.14	11.867	1.0900	-3.14	12.94	0.243 ✓

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 $\frac{P}{P_a}$
T1	59.5 - 39.5	L2 1/2x2 1/2x1/4	7.58	7.02	171.6 K=1.00	5.072	1.1900	-0.79	6.04	0.131 ✔
T2	39.5 - 19.5	L2 1/2x2 1/2x1/4	7.58	7.02	171.6 K=1.00	5.072	1.1900	-0.99	6.04	0.164 ✔
T3	19.5 - 13.1	L3x3x1/4	7.58	6.96	141.0 K=1.00	7.506	1.4400	-1.88	10.81	0.174 ✔
T4	13.1 - 6.3	L3x3x1/4	8.28	7.72	156.5 K=1.00	6.100	1.4400	-1.18	8.78	0.135 ✔
T5	6.3 - 0	2L2x2x3/16	8.97	8.41	120.1 K=1.00	10.270	1.4300	-3.21	14.69	0.219 ✔

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	59.5 - 39.5	L3x5x1/4	7.58	6.82	122.1 K=0.99	9.242	1.9400	-1.89	17.93	0.105 ✔

Redundant Horizontal (1) 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	6.3 - 0	L2x2x3/16	2.24	2.08	91.6 K=1.45	14.013	0.7150	-1.22	10.02	0.122 ✔

Redundant Diagonal (1) 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	6.3 - 0	L2x2x3/16	3.76	3.46	112.7 K=1.07	11.308	0.7150	-1.02	8.09	0.127 ✔

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	59.5 - 39.5	P3.5x.226	20.00	5.00	44.9	21.000	2.6795	23.31	56.27	0.414 ✔
T2	39.5 - 19.5	P3.5x.226	20.00	5.00	44.9	21.000	2.6795	50.20	56.27	0.892 ✔
T3	19.5 - 13.1	P3.5x.226	6.41	6.41	57.6	21.000	2.6795	56.38	56.27	1.002 ✔
T4	13.1 - 6.3	P3.5x.226	6.81	6.81	61.1	21.000	2.6795	60.17	56.27	1.069 ✔
T5	6.3 - 0	P3.5x.226	6.31	3.16	28.3	21.000	2.6795	61.73	56.27	1.097 ✔

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	59.5 - 39.5	P2.5x.203	8.67	8.67	109.8	21.000	1.7040	6.39	35.79	0.179 ✔
T2	39.5 - 19.5	P2.5x.203	8.67	8.67	109.8	21.000	1.7040	7.62	35.79	0.213 ✔
T3	19.5 - 13.1	P2x.154	9.81	9.81	149.6	21.000	1.0745	4.03	22.57	0.179 ✔
T4	13.1 - 6.3	P2x.154	10.60	10.60	161.6	21.000	1.0745	4.51	22.57	0.200 ✔
T5	6.3 - 0	L3x3x3/16	7.96	7.39	98.2	29.000	0.6945	3.08	20.14	0.153 ✔

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 $\frac{P}{P_a}$
T1	59.5 - 39.5	L2 1/2x2 1/2x1/4	7.58	7.02	113.1	29.000	0.7753	0.82	22.48	0.036 ✔
T2	39.5 - 19.5	L2 1/2x2 1/2x1/4	7.58	7.02	113.1	29.000	0.7753	0.99	22.48	0.044 ✔
T3	19.5 - 13.1	L3x3x1/4	7.58	6.96	93.5	29.000	0.9159	1.54	26.56	0.058 ✔
T4	13.1 - 6.3	L3x3x1/4	8.28	7.72	102.6	29.000	0.9628	1.18	27.92	0.042 ✔
T5	6.3 - 0	2L2x2x3/16	8.97	8.41	123.4	29.000	0.8967	2.91	26.00	0.112 ✔

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	59.5 - 39.5	L3x5x1/4	7.58	6.82	101.0	29.000	1.3144	1.95	38.12	0.051 ✔

Redundant Horizontal (1) 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	6.3 - 0	L2x2x3/16	2.24	2.08	40.4	21.600	0.7150	1.22	15.44	0.079 ✔

Redundant Diagonal (1) 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	6.3 - 0	L2x2x3/16	3.76	3.46	67.3	21.600	0.7150	1.02	15.44	0.066 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	59.5 - 39.5	Leg	P3.5x.226	1	-28.55	65.43	43.6	Pass
T2	39.5 - 19.5	Leg	P3.5x.226	28	-57.22	65.43	87.5	Pass
T3	19.5 - 13.1	Leg	P3.5x.226	55	-63.95	69.64	91.8	Pass
T4	13.1 - 6.3	Leg	P3.5x.226	64	-68.23	69.21	98.6	Pass
T5	6.3 - 0	Leg	P3.5x.226	73	-70.34	71.03	99.0	Pass
T1	59.5 - 39.5	Diagonal	P2.5x.203	7	-6.46	26.28	24.6 58.8 (b)	Pass
T2	39.5 - 19.5	Diagonal	P2.5x.203	34	-7.70	26.28	29.3 70.1 (b)	Pass
T3	19.5 - 13.1	Diagonal	P2x.154	61	-4.09	9.56	42.8	Pass
T4	13.1 - 6.3	Diagonal	P2x.154	70	-4.52	8.20	55.2	Pass
T5	6.3 - 0	Diagonal	L3x3x3/16	77	-3.14	17.24	18.2 34.0 (b)	Pass
T1	59.5 - 39.5	Horizontal	L2 1/2x2 1/2x1/4	23	-0.79	8.05	9.8 14.9 (b)	Pass
T2	39.5 - 19.5	Horizontal	L2 1/2x2 1/2x1/4	31	-0.99	8.05	12.3 18.0 (b)	Pass
T3	19.5 - 13.1	Horizontal	L3x3x1/4	60	-1.88	14.41	13.0 15.2 (b)	Pass
T4	13.1 - 6.3	Horizontal	L3x3x1/4	67	-1.18	11.71	10.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
							21.5 (b)	
T5	6.3 - 0	Horizontal	2L2x2x3/16	76	-3.21	19.58	16.4	Pass
							29.2 (b)	
T1	59.5 - 39.5	Top Girt	L3x5x1/4	4	-1.89	23.90	7.9	Pass
							11.4 (b)	
T5	6.3 - 0	Redund Horz 1 Bracing	L2x2x3/16	95	-1.22	13.36	9.1	Pass
T5	6.3 - 0	Redund Diag 1 Bracing	L2x2x3/16	79	-1.02	10.78	9.5	Pass
							Summary	
						Leg (T5)	99.0	Pass
						Diagonal (T2)	70.1	Pass
						Horizontal (T5)	29.2	Pass
						Top Girt (T1)	11.4	Pass
						Redund Horz 1 Bracing (T5)	9.1	Pass
						Redund Diag 1 Bracing (T5)	9.5	Pass
						Bolt Checks	70.1	Pass
						RATING =	**99.0**	**Pass**

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Subject:	FOUNDATION REINFORCEMENT DESIGN
Location:	Avon, CT
Rev. 0: 11/18/13	Prepared by: T.J.L. Checked by: C.F.C. Job No. 13001.066

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 592 \cdot kips$	(User Input from RISATower)
Shear Force =	$S_t := 12 \cdot kip$	(User Input from RISATower)
Axial Force =	$WT_t := 12 \cdot kip$	(User Input from RISATower)
Max Compression Force =	$C_t := 74 \cdot kip$	(User Input from RISATower)
Uplift Force =	$U_t := 65 \cdot kip$	(User Input from RISATower)
Tower Height =	$H_t := 59.5 \cdot ft$	(User Input)
Tower Width =	$W_t := 8.97 \cdot ft$	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)

Mat Data:

Overall Depth of Mat =	$D_f := 3.5 \cdot ft$	(User Input)
Thickness of Mat =	$T_f := 3.5 \cdot ft$	(User Input)
Length of Pier =	$L_p := 0ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.0 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 0.0 \cdot ft$	(User Input)
Foundation Reinforcement Area =	$A_{matreinf} := 310.10ft^2$	(User Input)
Distance From Center of Compression Leg to Extreme Edge of Proposed Mat =	$C_x := 5.75ft$	(User Input)
Distance From Tower/Mat Centroid to Front Edge of Proposed Mat =	$WT_x := 11.25ft$	(User Input)
Distance From Tower/Mat Centroid to Rear Edge of Proposed Mat =	$WTx_2 := 8.38ft$	(User Input)
Distance From Center of Uplift Legs to Extreme Edge of Proposed Mat =	$U_x := 14.00ft$	(User Input)
Section Moment of Area/Inertia of Mat =	$I_{mat} := 8120.4ft^4$	(User Input)
Section Modulus of Mat =	$S_{mat} := \left(\frac{I_{mat}}{WT_x}\right) = 743.03 \cdot ft^3$	(User Input)
Overall Width of Mat From Toe to Rear Edge=	$W_f := 19.63 \cdot ft$	(User Input)
Overall Width of Mat at Toe =	$W_{ftoe} := 6.25ft$	(User Input)
Overturing Moment Factor of Safety Required =	$FS_{reqd} := 2.0$	(User Input)

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Subject:		FOUNDATION REINFORCEMENT DESIGN
Location:		Avon, CT
Rev. 0: 11/18/13		Prepared by: T.J.L. Checked by: C.F.C. Job No. 13001.066

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\theta_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 12000 \cdot psf$	(User Input)	(Note: Allowable soil bearing pressure may be increased by 1/3rd for transient load efffects.
Unit Weight of Soil =	$\gamma_{soil} := 0 \cdot pcf$	(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 =	$n := 3.5 \cdot ft$	(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)	

Proposed Mat Reinforcement:

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

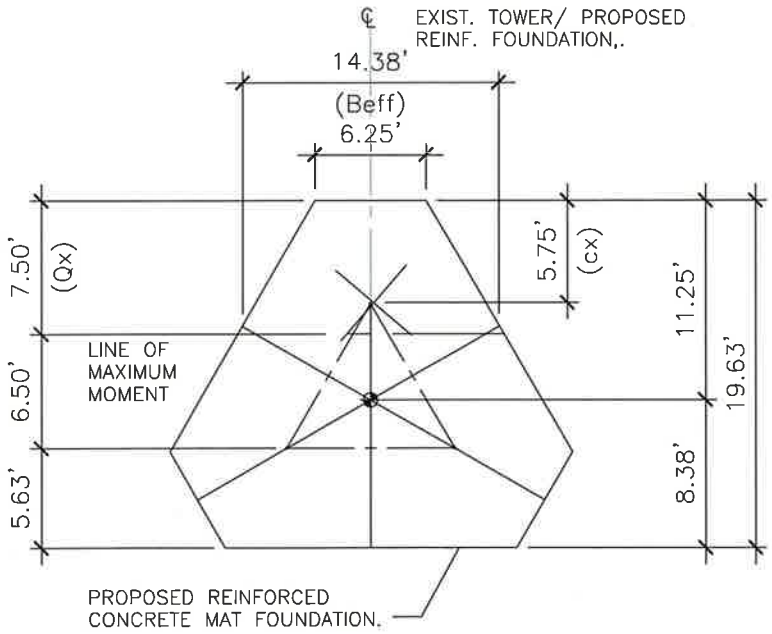
Calculated Factors:

Mat Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.6 \cdot in^2$

Mat Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.6 \cdot in^2$

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

Load Factor = $LF := \begin{cases} 1.333 \text{ if } H_t \le 700\cdot ft \\ 1.7 \text{ if } H_t \ge 1200\cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft}\right)\cdot 0.4 \text{ otherwise} \end{cases}$ = 1.33



PLAN

Area: 310.100242
Perimeter: 67.852540
Bounding box: X: -11.308757 -- 11.308757
Y: -8.333333 -- 11.254008
Centroid: X: 0.000000
Y: 0.000000
Moments of inertia: X: 8120.374659
Y: 8120.374659
Product of inertia: XY: 0.000000
Radii of gyration: X: 5.117254
Y: 5.117254
Principal moments and X-Y directions about centroid:
I: 8120.374659 along [0.006003 0.999982]
J: 8120.374659 along [-0.999982 0.006003]

Proposed Reinforced Foundation Geometry:

Stability of Mat:

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

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 0 \cdot pcf$

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

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

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

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0 \cdot ksf$$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 0$ $A_p := W_{ftoe} \cdot T_p = 0$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 0 \cdot kip$

Volume of Existing Concrete Piers Within Mat = $V_{pier} := 3 \cdot \left(T_f \cdot \frac{d_p^2 \cdot \pi}{4} \right) = 0 \cdot ft^3$

Volume of Proposed Mat = $V_{matreinf} := A_{matreinf} \cdot T_f = 1085.35 \cdot ft^3$

Weight of Concrete Mat = $WT_c := V_{matreinf} \cdot \gamma_{conc} = 162.8 \cdot kips$

Total Weight of Concrete Mat and Tower = $WT_{tot} := WT_c = 162.8 \cdot kips$

Overturning Moment = $M_{ot} := OM + S_t \cdot (T_f) = 634 \cdot kip \cdot ft$

Required Moment = $M_{design} := M_{ot} \cdot FS_{reqd} = 1268 \cdot kip \cdot ft$

Resisting Moment without Anchors = $M_r := (WT_{tot}) \cdot WT_x = 1779 \cdot kip \cdot ft$

Factor of Safety Actual = $$FS := \frac{M_r}{M_{ot}} = 2.81$$

$OverTurning\_Moment\_Check := if(FS \geq FS_{reqd}, "Okay", "Provide Anchorage")$

OverTurning_Moment_Check = "Okay"

Reinforced Concrete Mat Shear and Moment Calculations:

Mat Dead Load = $WT_{tot} = 162.8 \cdot kips$

Equivalent Soil Reaction Occuring at Base of Foundation = $Q := C_t + WT_{tot} - U_t = 171.8 \cdot kips$

Summing Moments About Toe of Mat Foundation to Find Distance of Soil Reaction (Qx) =

$$M := \left[\left(C_t \cdot C_x\right) + \left(WT_{tot} \cdot WT_x\right) - \left(U_t \cdot U_x\right)\right] - S_t \cdot \left(T_f + L_{pag}\right) = 1284.06 \cdot kip \cdot ft$$

$$Q_x := \frac{M}{Q} = 7.47 \cdot ft$$

Qx > Cx Therefore Shear and Moment Calculations Are As Follows:

$C_x = 5.75 \cdot ft$

$V1_A := -C_t = -74 \cdot kips$

$V2_A := V1_A + Q = 97.8 \cdot kips$

$V3_A := V2_A - WT_{tot} = -65 \cdot kips$

$V4_A := V3_A + U_t = 0 \cdot kips$

$$M1_A := -\left[\frac{S_t}{2} \cdot \left(T_f + L_{pag}\right)\right] = -21 \cdot kip \cdot ft$$

$$M2_A := M1_A + V1_A \cdot \left(Q_x - C_x\right) = -148.58 \cdot kip \cdot ft$$

$$M3_A := M2_A + V2_A \cdot \left(WT_x - Q_x\right) = 189.31 \cdot kip \cdot ft$$

$$M4_A := M3_A + V3_A \cdot \left(U_x - WT_x\right) = 21 \cdot kip \cdot ft$$

$$M5_A := M4_A - \left[\frac{S_t}{2} \cdot \left(T_f + L_{pag}\right)\right] = 0 \cdot kip \cdot ft$$

$M_1 := \left|M1_A\right| = 21 \cdot kip \cdot ft$

$M_2 := \left|M2_A\right| = 148.58 \cdot kip \cdot ft$

$M_3 := \left|M3_A\right| = 189.31 \cdot kip \cdot ft$

$M_4 := \left|M4_A\right| = 21 \cdot kip \cdot ft$

$M_5 := \left|M5_A\right| = 0 \cdot kip \cdot ft$

$$M_{max} := \max\begin{pmatrix} M_1 \\ M_2 \\ M_3 \\ M_4 \\ M_5 \\ 0 \\ 0 \\ 0 \end{pmatrix} = 189.31 \cdot kip \cdot ft$$

Mat Steel Reinforcement Design:

Required Reinforcement for Bending:

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

Design Moment = $M_n := \left(\frac{LF}{\phi_m}\right) \cdot M_{max} = 280.39 \cdot kip \cdot ft$

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

(ACI-200810.2.7.3)

$b_{eff} := 171in$ (User Input) Effective width taken at point of maximum moment through triangular mat foundation.

$d := T_f - Cvr_{Mat} - d_{bbot} = 38.13 \cdot in$

$$A_{st} := \frac{M_n}{(0.9 f_y \cdot d)} = 1.63 \cdot in^2$$

$$a := \frac{A_{st} \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.17 \cdot in$$

$$A_{st} := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 1.47 \cdot in^2$$

$$\rho := \frac{A_{st}}{b_{eff} d} = 0.00023$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \ge 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$

(ACI -2008 7.12.2.1)

Determine Bottom Bars:

$$As := \begin{cases} A_{st} & \text{if } \rho > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot b_{eff} \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 5.87 \cdot in^2$$

Quantity of Rebar Required = $Nbar_{reqd} := \frac{As}{A_{bbot}} = 9.8$ $Nbar_{prov} := 14$

Rebar Spacing = $B_s := \left(\frac{b_{eff} - 2 \cdot Cvr_{Mat} - d_{bbot}}{Nbar_{prov}}\right) - d_{bbot} = 10.8 \cdot in$

(USE #7 @12" o.c. min.
Area of steel =
0.60in^2*14 = 8.40in^2

Soil Bearing Pressure:

Distance to Kern = $X_k := \frac{W_f}{3} = 6.54$

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

Distance of Equivalent Soil Reaction From Toe = $a := Q_x = 7.47 \cdot ft$

$Eccentricity\_Check := if(a > X_k, "InsideMiddleThird", "OutsideMiddleThird")$

Eccentricity_Check = "InsideMiddleThird"

Total Load = $P_{total} := Q = 172 \cdot kip$

For Equilibrium Total Soil Reacton Shall Equal Total Downward Dead Load

Maximum Pressure in Mat = $P_{max} := \frac{P_{total}}{A_{matreinf}} + \frac{P_{total} \cdot (WT_x - Q_x) \cdot WT_x}{I_{mat}} = 1.35 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{P_{total}}{A_{matreinf}} - \frac{P_{total} \cdot (WT_x - Q_x) \cdot WT_x}{I_{mat}} = -0.24 \cdot ksf$

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

Min_Pressure_Check = "No Good"

If Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced as Follows:-

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 5.54$

Area Under Mat Subjected to Triangular Pressure Distribution = $A_{pressure} := a \cdot \left(\frac{a}{\tan(60 \cdot deg)}\right) + W_{ftoe} \cdot (a) = 78.96 \cdot ft^2$

Total Pressure Within Triangular Pressure Diagram = $P_a := \frac{2 \cdot P_{total}}{3 \cdot A_{pressure}} = 1.45 \cdot ksf$

Adjusted Soil Pressure = $q_{adj} := if(a \leq X_k, P_a, P_{max}) = 1.35 \cdot ksf$

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

Pressure_Check = "Okay"

SITE NAME	TALCOTT MTN CT	ECP - CELL #	8	133
LATITUDE	41-48-41.90 N	LONGITUDE	72-47-55.50 W	
Additional Comments: **2014 AWS ADD. Replace PCS antennas, add AWS antennas, 2 AWS RRH's, 1 Main Distribution Box. 10 antennas, 12 lines.**		SAVE BUTTON		
		STRUCTURE TYPE	LATTICE	

AWS - LTE ANTENNA ADD	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	**2100 MHz BBU**		**2100 MHz BBU**
ANTENNA TYPE	**BXA-171063-12CF-EDIN-2**		**BXA-171063-12CF-EDIN-2**
QTY OF ANTENNAS PER FACE	**1**		**1**
ORIENTATION (DEG)	**30**		**270**
DOWN TILT (MECH/DEG)	**3**		**3**
RAD CTR (FT AGL)	**55**		**55**
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
RRH - QTY/MODEL	**1 ALU RH_2X40-AWS**		**1 ALU RH_2X40-AWS**
SECTOR DISTRIBUTION BOX			
MAIN DISTRIBUTION BOX	**1**		**DB-T1-6Z-8AB-0Z**

700 Mhz - Current Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	700 MHZ eNodeB + TRDU		700 MHZ eNodeB + TRDU
ANTENNA TYPE	APX75-866514-T8		BXA-70080-6CF-EDIN-6
QTY OF ANTENNAS PER FACE	1		1
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	3		5
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

700 Mhz - Future Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	700 MHZ eNodeB + TRDU		700 MHZ eNodeB + TRDU
ANTENNA TYPE	APX75-866514-T8		BXA-70080-6CF-EDIN-6
QTY OF ANTENNAS PER FACE	1		1
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	3		5
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Current Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	Cellular Modcell 4.0 HD		Cellular Modcell 4.0 HD
ANTENNA TYPE	LPA-80063-6CF-EDIN-10		LPA-80080-6CF-EDIN-6
QTY OF ANTENNAS PER FACE	2		2
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	3		5
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Future Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	Cellular Modcell 4.0 HD		Cellular Modcell 4.0 HD
ANTENNA TYPE	LPA-80063-6CF-EDIN-10		LPA-80080-6CF-EDIN-6
QTY OF ANTENNAS PER FACE	2		2
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	3		5
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
DIPLEX WITH LTE CABLE			

1900 PCS - Current Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	PCS Modcell 4.0 HD		PCS Modcell 4.0 HD
ANTENNA TYPE	LPA-171063-8CF-EDIN-2		LPA-171063-8CF-EDIN-2
QTY OF ANTENNAS PER FACE	2		2
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	4		4
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

1900 PCS - Future Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	PCS Modcell 4.0 HD		PCS Modcell 4.0 HD
ANTENNA TYPE	**BXA-171063-8CF-EDIN-2**		**BXA-171063-8CF-EDIN-2**
QTY OF ANTENNAS PER FACE	**1**		**1**
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	4		4
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE			

NUMBER OF CABLE'S NEEDED						ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES			12	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			12	TOP JUMPER (FT)			12
Equipment Cable Ordering		**MAIN CABLE #**	12	+	0	**TOP JUMPER #**	12	+	0
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES			**1**	FIBER LINE MODEL #			**HB158-1-08U8-S8J18**
JUMPER SIZE	5/8"	TOTAL # OF TOP JUMPERS			**3**	TOP JUMPER MODEL #			**HB058-1-08U1-S1J18**
Fiber Cable Ordering		**FIBER CABLE #**	0	+	**1**	**TOP JUMPER #**	0	+	**3**

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

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED					A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE					A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE					A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE					A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE					A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED					A18	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/ BROWN					F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/ BROWN					F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By: Maria Montrose	Robert Hesselbach		11/15/2013

Site Configuration

BXA-171063-8CF-EDIN-X

X-Pol | FET Panel | 63° | 17.4 dBi

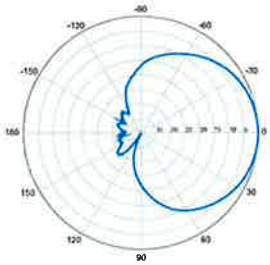
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 6, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	< -25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1225 x 154 x 105 mm	48.2 x 6.1 x 4.1 in	
Depth with t-brackets	133 mm	5.2 in	
Weight without mounting brackets	4.2 kg	9.2 lbs	
Survival wind speed	296 km/hr	184 mph	
Wind area	Front: 0.19 m² Side: 0.14 m²	Front: 2.0 ft² Side: 1.5 ft²	
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf	

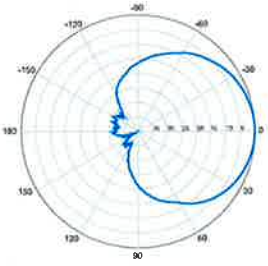
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8CF-EDIN-X-FP		

BXA-171063-8CF-EDIN-X



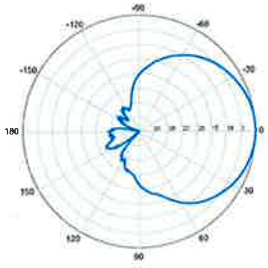
Horizontal | 1710-1880 MHz

BXA-171063-8CF-EDIN-X



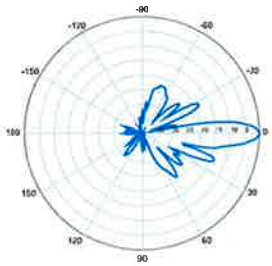
Horizontal | 1850-1990 MHz

BXA-171063-8CF-EDIN-X



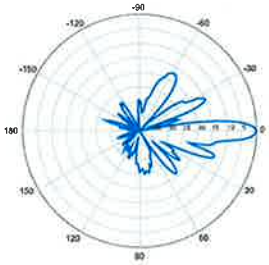
Horizontal | 1920-2170 MHz

BXA-171063-8CF-EDIN-0



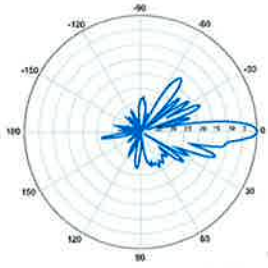
0° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-0



0° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

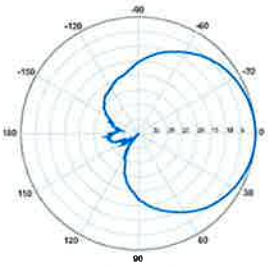
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	< -25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1842 x 154 x 105 mm		72.5 x 6.1 x 4.1 in
Depth with z-brackets	133 mm		5.2 in
Weight without mounting brackets	5.8 kg		12.8 lbs
Survival wind speed	> 201 km/hr		> 125 mph
Wind area	Front: 0.28 m² Side: 0.19 m²		Front: 3.1 ft² Side: 2.1 ft²
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N		Front: 103 lbf Side: 68 lbf

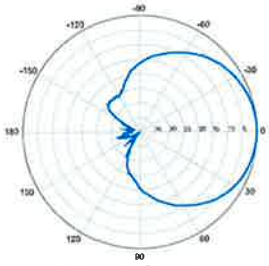
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12CF-EDIN-X-FP		

BXA-171063-12CF-EDIN-X



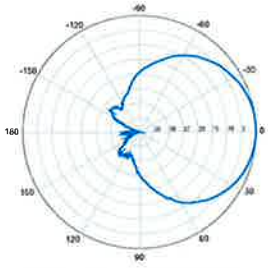
Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



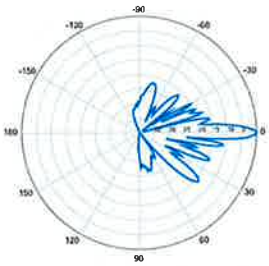
Horizontal | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



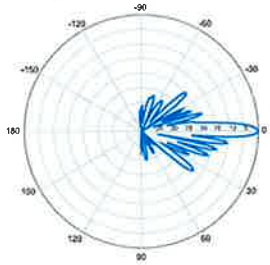
Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



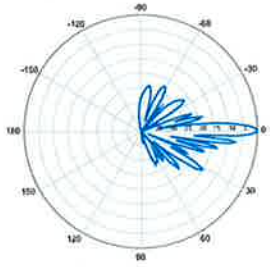
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1920-2170 MHz

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

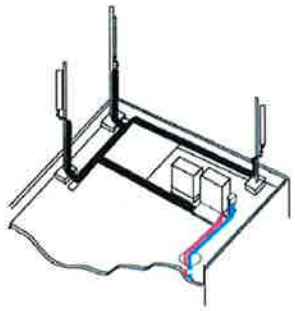
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation 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

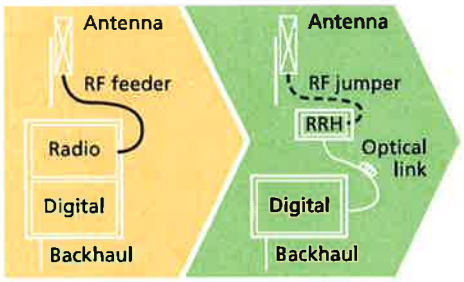
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

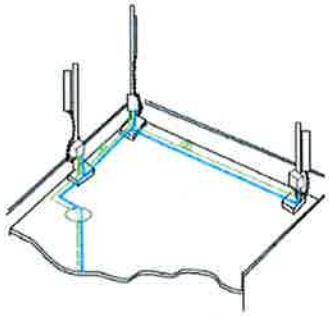
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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