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Also admitted in Massachusetts

December 9, 2013

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

Re: **Notice of Exempt Modification – Facility Modification
76 East Ridge Road, Ridgefield, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 128-foot level on the existing 130-foot tower at the above-referenced address. The tower and underlying property are owned by the Town of Ridgefield. The Council approved Cellco’s use of this tower in 1989. Cellco now intends to replace three (3) of its antennas with three (3) model BXA-171063-12CF AWS antennas at the 128-foot level on the tower. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its AWS 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 Rudy Marconi, First Selectman of the Town of Ridgefield.

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 128-foot level on the 130-foot tower.



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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. A cumulative General Power Density table for Cellco's modified facility is included behind Attachment 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis Report included in Attachment 3).

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Rudy Marconi, Ridgefield First Selectman
Sandy M. Carter



ATTACHMENT 1

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

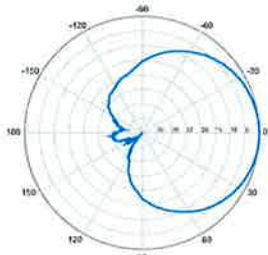
Replace 'X' with desired electrical downtilt

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

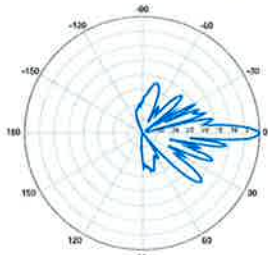
Electrical Characteristics	1710-2170 MHz			
	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz	
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz	
Polarization	±45°	±45°	±45°	
Horizontal beamwidth	68°	65°	60°	
Vertical beamwidth	4.5°	4.5°	4.5°	
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 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

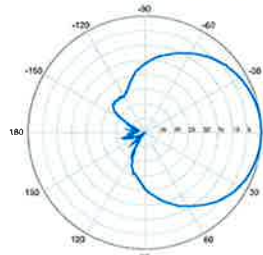


Horizontal | 1710-1880 MHz
BXA-171063-12CF-EDIN-0

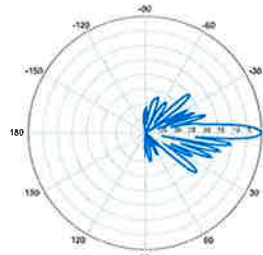


0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-X

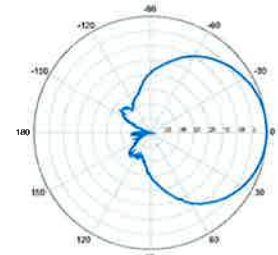


Horizontal | 1850-1990 MHz
BXA-171063-12CF-EDIN-0

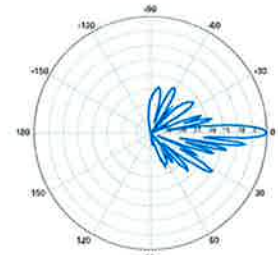


0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1920-2170 MHz
BXA-171063-12CF-EDIN-0



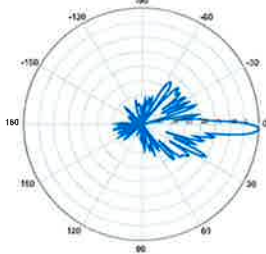
0° | Vertical | 1920-2170 MHz

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

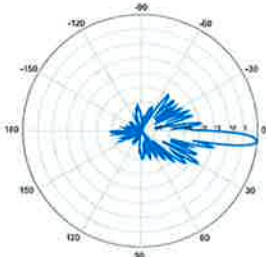
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



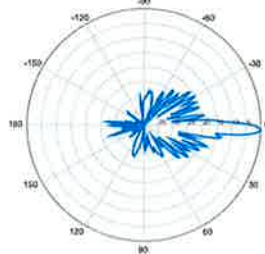
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



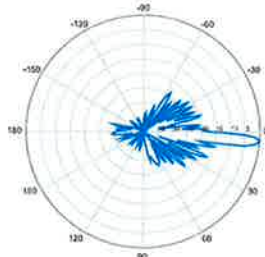
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



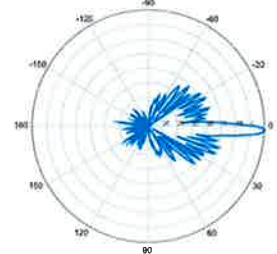
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5



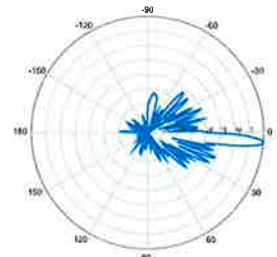
5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



5° | 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.

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

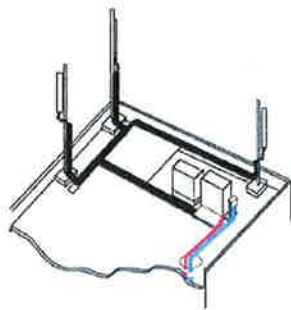
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent 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

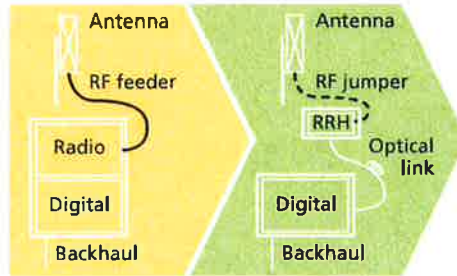
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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



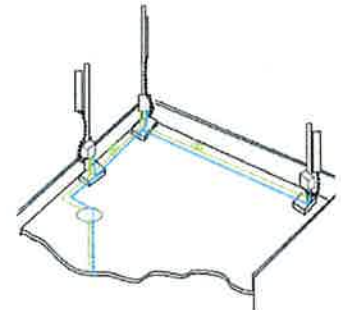
Macro

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



RRH for space-constrained cell sites



Distributed

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

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (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

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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-connected and on-site options are available.

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

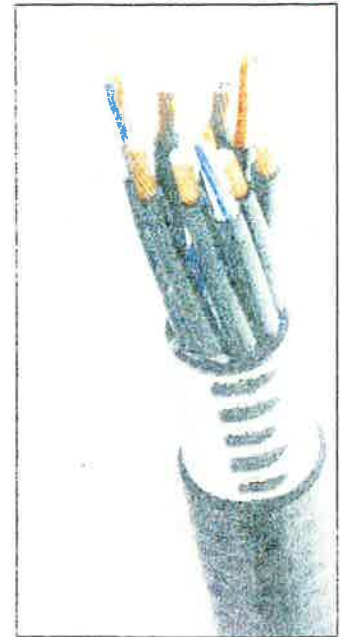


Figure 1: HYBRIFLEX Series

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
Mechanical Properties			
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)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	0.68 (0.205)
DC-Resistance Power Cable, 8.4mm ² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Optical Properties			
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)			UL34-V0, UL1666, RoHS Compliant
Power Properties			
Size (Power)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (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), IEEE 1202/FT4, RoHS Compliant
Temperature			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)

* This data is provisional and subject to change

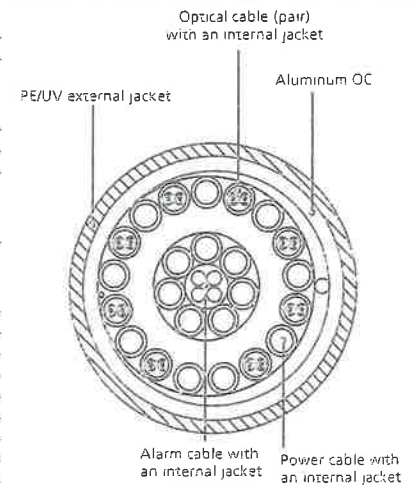


Figure 2: Construction Detail

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

ATTACHMENT 2

ATTACHMENT 3

Structural Analysis Report

130-ft Existing Valmont Monopole

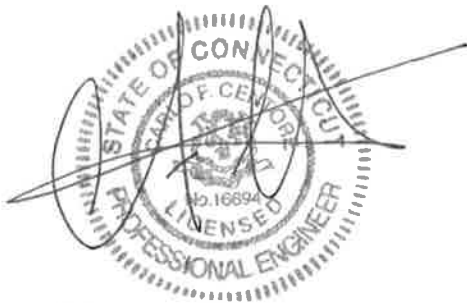
*Proposed Verizon Wireless
Antenna Upgrade*

Verizon Site Ref: Ridgefield

*76 East Ridge Road
Ridgefield, CT*

Centek Project No. 13001.067

Date: November 13, 2013



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

CENTEK Engineering, Inc.
Structural Analysis – 130-ft Valmont Monopole
Verizon Wireless Antenna Upgrade – Ridgefield
Ridgefield, CT
November 13, 2013

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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 monopole (tower) located in Ridgefield, CT.

The host tower is a 130-ft tall, three-section, twelve sided, tapered monopole, originally designed and manufactured by Valmont Industries Inc.; order no. 10533-89 dated October 24, 1989. The tower geometry, structure member sizes and foundation system information were obtained from the original manufacturers design documents.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek job no; 11001.CO39 dated July 22, 2011, visual verification from grade conducted by Centek personnel on November 6, 2013 and Verizon RF data sheet.

The tower is made up of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 16.26-in at the top and 43.80-in at the base.

Verizon proposes the removal of three (3) existing panel antennas and the installation of three (3) panel antennas, three (3) remote radio heads and one (1) main distribution box on the existing 13-ft platform with handrails. 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 (EXSITING):
Antennas: One (1) RFS PD 440 dipole antenna mounted on the Verizon 13-ft platform with handrails with an elevation of 130-ft above grade level.
Coax Cables: One (1) 1/2" \varnothing coax cable running on the inside of the existing tower.
- SPRINT (EXSITING):
Antennas: Three (3) RFS APXVSP18-C-A20 panel antennas, three (3) 1900MHz 4X45W RRH's and three (3) 800MHz 2X50W RRH's mounted on a 13-ft platform with handrails with a RAD center elevation of 118-ft above grade level.
Coax Cables: Three (3) 1-5/8" \varnothing fiber cables running on the exterior of the existing tower.
- T-MOBILE (EXSITING):
Antennas: Six (6) 5-ft panel antennas and six (6) TMAs mounted on a 13-ft platform with handrails with a RAD center elevation of 100-ft above grade level.
Coax Cables: Twenty-four (24) 7/8" \varnothing coax cables running on the inside of the existing tower.
- UNKNOWN (EXSITING):
Antennas: One (1) RFS PD 440 dipole antenna and two (2) RFS PD 1142 Omni-directional whip antennas mounted on the T-Mobile 13-ft platform with handrails with an elevation of 100-ft above grade level.
Coax Cables: Three (3) 1/2" \varnothing coax cables running on the inside of the existing tower.

- **UNKNOWN (EXISTING):**
Antennas: One (1) RFS PD 1121-6 dipole antenna and one (1) RFS PD 1142 Omni-directional whip antenna mounted on one (1) 3-ft standoff with an elevation of 86-ft above grade level.
Coax Cables: Two (2) 1/2" Ø coax cables running on the inside of the existing tower.
- **UNKNOWN (EXISTING):**
Antennas: One (1) RFS PD 1142 and one (1) RFS PD 1167 Omni-directional whip antennas mounted on two (2) 3-ft standoffs with an elevation of 58-ft above grade level.
Coax Cables: Two (2) 1/2" Ø coax cables running on the inside of the existing tower.
- **VERIZON (EXISTING TO REMAIN):**
Antennas: One (1) GPS antenna mounted on a 3-ft standoff with an elevation of 50-ft above grade level.
Coax Cables: One (1) 1/2" Ø coax cable running on the inside of the existing tower.
- **VERIZON (EXISTING TO REMAIN):**
Antennas: Three (3) RFS APX75-866512T0, three (3) Antel BXA-80080/4CF and three (3) RYMSA MG D3-800T0 panel antennas mounted on the existing 13-ft platform with handrails with a RAD center elevation of 128-ft above grade level.
Coax Cables: Twelve (12) 7/8" Ø coax cables running on the inside of the existing tower and six (6) 7/8" Ø coax cables running on the exterior of the existing tower.
- **VERIZON (EXISTING TO REMOVE):**
Antennas: **Three (3) RFS APX75-866512T0 panel antennas mounted on the existing 13-ft platform with handrails with a RAD center elevation of 128-ft above grade level.**
- **VERIZON (PROPOSED):**
Antennas: **Three (3) BXA-171063-12BF panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Head and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on the existing 13-ft platform with handrails with a RAD center elevation of 128-ft above grade level.**
Coax Cables: **One (1) 1-5/8" Ø fiber cables running on the exterior of the existing tower.**

Primary Assumptions Used in the Analysis

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

Analysis

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

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

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC¹ 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:	Fairfield; v = 85 mph (fastest mile)	<i>[Section 16 of TIA/EIA-222-F-96]</i>
	Ridgefield; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile) <i>TIA/EIA wind speed controls.</i>	<i>[Appendix K of the 2005 CT Building Code Supplement]</i>
Load Cases:	<u>Load Case 1</u> ; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	<i>[Section 2.3.16 of TIA/EIA-222-F-96]</i>
	<u>Load Case 2</u> ; 74 mph wind speed w/ ½” radial ice plus gravity load – used in calculation of tower stresses. The 74 mph wind speed velocity represents 75% of the wind pressure generated by the 85 mph wind speed.	<i>[Section 2.3.16 of TIA/EIA-222-F-96]</i>
	<u>Load Case 3</u> ; Seismic – not checked	<i>[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type</i>

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

Tower Capacity

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

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **99.2%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L2)	44.37'-89.92'	99.2%	PASS

Foundation and Anchors

The existing foundation consists of a 6-ft Ø x 21.0-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (12) 2.25"Ø, ASTM A615-75 anchor bolts embedded approximately 8.5-ft into the concrete foundation structure.

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

Location	Vector	Proposed Reactions
Base	Shear	26 kips
	Compression	25 kips
	Moment	2307 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	52.0% ⁽¹⁾	PASS

Note 1: Moment capacity based strength load condition.

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Structural Analysis – 130-ft Valmont Monopole
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Ridgefield, CT
November 13, 2013

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	89.3%	PASS
Base Plate	Bending	72.8%	PASS

Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:



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

*CENTEK Engineering, Inc.
Structural Analysis – 130-ft Valmont Monopole
Verizon Wireless Antenna Upgrade – Ridgefield
Ridgefield, CT
November 13, 2013*

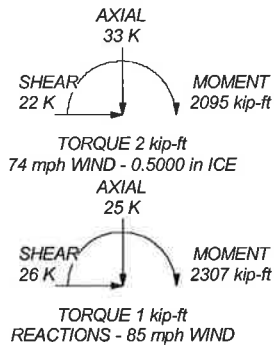
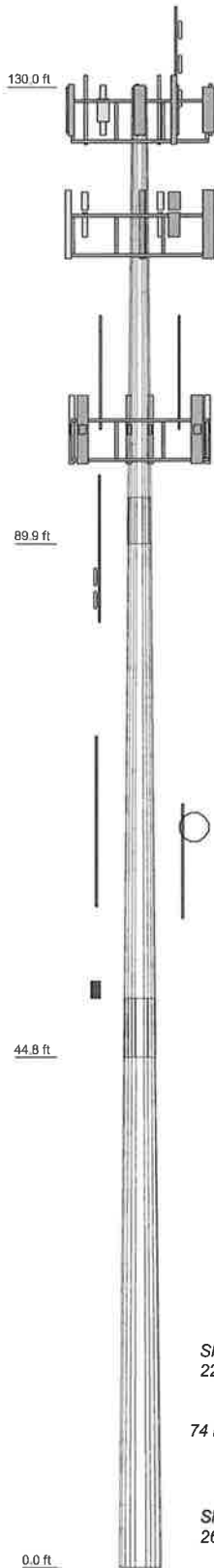
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

TnxTower Features:

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

Section	1	2	3
Length (ft)	40.08	49.17	50.00
Number of Sides	12	12	12
Thickness (in)	0.2190	0.3130	0.3750
Socket Length (ft)	4.08	5.17	
Top Dia (in)	16.2600	23.7435	32.7873
Bot Dia (in)	25.0600	34.5600	43.8000
Grade		A572-65	
Weight (K)	2.0	4.9	7.8



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
440-3 (Town - Existing)	130	FD-RRH 2x50 800 (Sprint - Existing)	118
APX75-866512-CT0 (Verizon - Existing)	128	FD-RRH 2x50 800 (Sprint - Existing)	118
BXA-80080/4CF (Verizon - Existing)	128	FD-RRH 2x50 800 (Sprint - Existing)	118
BXA-171063-12CF (Verizon - Proposed)	128	APXVSP18-C-A20 (Sprint - Existing)	118
MG D3-800T0 (Verizon - Existing)	128	Valmont 13' Platform w/Rails (Sprint - Existing)	117
APX75-866512-CT0 (Verizon - Existing)	128	(2) 5' Panel Antenna (T-Mobile - Existing)	100
BXA-80080/4CF (Verizon - Existing)	128	(2) 5' Panel Antenna (T-Mobile - Existing)	100
BXA-171063-12CF (Verizon - Proposed)	128	(2) TMA 10"x8"x3" (T-Mobile - Existing)	100
MG D3-800T0 (Verizon - Existing)	128	(2) TMA 10"x8"x3" (T-Mobile - Existing)	100
APX75-866512-CT0 (Verizon - Existing)	128	(2) TMA 10"x8"x3" (T-Mobile - Existing)	100
BXA-80080/4CF (Verizon - Existing)	128	PD1142-1 (Town - Existing)	100
BXA-171063-12CF (Verizon - Proposed)	128	PD1142-1 (Town - Existing)	100
RRH2x40-AWS (Verizon - Proposed)	128	440-3 (Town - Existing)	100
RRH2x40-AWS (Verizon - Proposed)	128	(2) 5' Panel Antenna (T-Mobile - Existing)	100
RRH2x40-AWS (Verizon - Proposed)	128	Valmont 13' Platform w/Rails (T-Mobile - Existing)	99
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	128	3' Stand-off Mount (Town - Existing)	86
MG D3-800T0 (Verizon - Existing)	128	PD1142-1 (Town - Existing)	86
Valmont 13' Platform w/Rails (Verizon - Existing)	127	PD1121-6 (Town - Existing)	86
APXVSP18-C-A20 (Sprint - Existing)	118	PD1142-1 (Town - Existing)	58
APXVSP18-C-A20 (Sprint - Existing)	118	3' Stand-off Mount (Town - Existing)	58
FD-RRH 4x45 1900 (Sprint - Existing)	118	PD1167 (Town - Existing)	58
FD-RRH 4x45 1900 (Sprint - Existing)	118	3' Stand-off Mount (Town - Existing)	58
FD-RRH 4x45 1900 (Sprint - Existing)	118	GPS (Verizon - Existing)	50
FD-RRH 4x45 1900 (Sprint - Existing)	118	3' GPS Stand-off Mount (Verizon - Existing)	50

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 99.2%

Centek Engineering Inc.	Job: 13001.067 - Ridgefield
63-2 North Branford Rd.	Project: 130' Valmont Monopole - 76 East Ridge Rd., Ridgefield, CT
Branford, CT 06405	Client: Verizon Wireless
Phone: (203) 488-0580	Drawn by: TJL
FAX: (203) 488-8587	Date: 11/13/13
	Scale: NTS
	Path: TIA/EIA-222-F
	Dwg No: E-1

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 13001.067 - Ridgefield	Page 1 of 20
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	Client Verizon Wireless	Designed by TJL

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in Fairfield County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing	Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feedline Torque Include Angle Block Shear Check <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	130.00-89.92	40.08	4.08	12	16.2600	25.0800	0.2190	0.8760	A572-65 (65 ksi)
L2	89.92-44.84	49.17	5.17	12	23.7435	34.5600	0.3130	1.2520	A572-65 (65 ksi)
L3	44.84-0.00	50.00		12	32.7973	43.8000	0.3750	1.5000	A572-65 (65 ksi)

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Tapered Pole Properties

Section	Tip Dia. in	Area in ²	J in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q ₂ in ²	w in	w/t
L1	16.8336	11.3118	371.5183	5.7427	8.4227	44.1093	752.7969	5.5673	3.7708	17.218
	25.9647	17.5315	1383.0622	8.9002	12.9914	106.4595	2802.4590	8.6285	6.1345	28.012
L2	25.5110	23.6147	1654.7432	8.3881	12.2991	134.5415	3352.9584	11.6224	5.5244	17.65
	35.7791	34.5162	5167.1820	12.2604	17.9021	288.6358	10470.1117	16.9878	8.4232	26.911
L3	35.1313	39.1499	5252.9582	11.6072	16.9890	309.1977	10643.9175	19.2684	7.7847	20.759
	45.3451	52.4357	12620.9652	15.5461	22.6884	556.2739	25573.4973	25.8073	10.7334	28.622

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _e	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft ²	in						
L1 130.00-89.92				1	1	1		
L2 89.92-44.84				1	1	1		
L3 44.84-0.00				1	1	1		

Monopole Base Plate Data

Base Plate Data	
Base plate is square	
Base plate is grouted	√
Anchor bolt grade	A615
Anchor bolt size	2.2500 in
Number of bolts	12
Embedment length	102.0000 in
f _c	4 ksi
Grout space	4.5000 in
Base plate grade	A607-60
Base plate thickness	2.5000 in
Bolt circle diameter	49.7500 in
Outer diameter	56.0800 in
Inner diameter	24.0000 in
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{AA} ft ² /ft	Weight plf
7/8 (Verizon - Existing)	A	No	Inside Pole	130.00 - 10.00	12	No Ice 1/2" Ice	0.00 0.54
1/2 (Verizon - Existing)	A	No	Inside Pole	50.00 - 10.00	1	No Ice 1/2" Ice	0.00 0.25
LCF78-50J (7/8 FOAM) (T-Mobile - Existing)	C	No	Inside Pole	100.00 - 10.00	24	No Ice 1/2" Ice	0.00 0.53
1/2 (Town)	A	No	Inside Pole	58.00 - 28.00	2	No Ice 1/2" Ice	0.00 0.25
1/2 (Town)	A	No	Inside Pole	86.00 - 28.00	2	No Ice 1/2" Ice	0.00 0.25
1/2	A	No	Inside Pole	130.00 - 28.00	3	No Ice	0.00

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 13001.067 - Ridgefield	Page 3 of 20
	Project 130' Valmont Monopole - 76 East Ridge Rd., Ridgefield, CT	Date 17:48:02 11/13/13
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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_A A_A$ ft ² /ft	Weight plf
(Town) 1/2	A	No	Inside Pole	130.00 - 28.00	1	1/2" Ice	0.00	0.25
(Town) 7/8	A	No	CaAa (Out Of Face)	126.00 - 10.00	2	No Ice	0.00	0.25
(Verizon - Existing) 7/8	A	No	CaAa (Out Of Face)	126.00 - 10.00	4	1/2" Ice	0.11	0.54
(Verizon - Existing) HYBRIFLEX 1-5/8"	A	No	CaAa (Out Of Face)	126.00 - 10.00	1	No Ice	0.21	1.52
(Verizon - Existing) HYBRIFLEX 1-5/8"	A	No	CaAa (Out Of Face)	126.00 - 10.00	1	No Ice	0.00	0.54
(Verizon - Existing) HYBRIFLEX 1-5/8"	A	No	CaAa (Out Of Face)	126.00 - 10.00	1	1/2" Ice	0.00	1.52
(Verizon - Existing) HYBRIFLEX 1-5/8"	A	No	CaAa (Out Of Face)	126.00 - 10.00	1	No Ice	0.00	1.90
(Verizon - Existing) HYBRIFLEX 1-5/8"	A	No	CaAa (Out Of Face)	126.00 - 10.00	1	1/2" Ice	0.00	3.41
(Verizon - Existing) HYBRIFLEX 1-5/8"	C	No	CaAa (Out Of Face)	118.00 - 10.00	3	No Ice	0.00	1.90
(Verizon - Existing) HYBRIFLEX 1-5/8"	C	No	CaAa (Out Of Face)	118.00 - 10.00	3	1/2" Ice	0.00	3.41

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	130.00-89.92	A	0.000	0.000	0.000	8.010	0.49
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.29
L2	89.92-44.84	A	0.000	0.000	0.000	10.009	0.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.83
L3	44.84-0.00	A	0.000	0.000	0.000	7.734	0.45
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.64

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	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	130.00-89.92	A	0.500	0.000	0.000	0.000	15.225	0.75
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.42
L2	89.92-44.84	A	0.500	0.000	0.000	0.000	19.025	0.93
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1.04
L3	44.84-0.00	A	0.500	0.000	0.000	0.000	14.701	0.70
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.80

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	130.00-89.92	0.0000	-0.2743	0.0000	-0.4586
L2	89.92-44.84	0.0000	-0.3055	0.0000	-0.5254
L3	44.84-0.00	0.0000	-0.2387	0.0000	-0.4241

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Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz Lateral	Vert					
MG D3-800T0 (Verizon - Existing)	A	From Face	3.00	0.0000	128.00	No Ice	3.46	2.24	0.03
			6.00			1/2" Ice	3.80	2.57	0.05
			0.00						
APX75-866512-CT0 (Verizon - Existing)	A	From Face	3.00	0.0000	128.00	No Ice	6.19	2.63	0.03
			0.00			1/2" Ice	6.61	2.95	0.06
			0.00						
BXA-80080/4CF (Verizon - Existing)	A	From Face	3.00	0.0000	128.00	No Ice	5.25	2.84	0.01
			-6.00			1/2" Ice	5.64	3.15	0.05
			0.00						
BXA-171063-12CF (Verizon - Proposed)	A	From Face	3.00	0.0000	128.00	No Ice	4.79	3.62	0.02
			-3.00			1/2" Ice	5.24	4.06	0.04
			0.00						
MG D3-800T0 (Verizon - Existing)	B	From Face	3.00	0.0000	128.00	No Ice	3.46	2.24	0.03
			6.00			1/2" Ice	3.80	2.57	0.05
			0.00						
APX75-866512-CT0 (Verizon - Existing)	B	From Face	3.00	0.0000	128.00	No Ice	6.19	2.63	0.03
			0.00			1/2" Ice	6.61	2.95	0.06
			0.00						
BXA-80080/4CF (Verizon - Existing)	B	From Face	3.00	0.0000	128.00	No Ice	5.25	2.84	0.01
			-6.00			1/2" Ice	5.64	3.15	0.05
			0.00						
BXA-171063-12CF (Verizon - Proposed)	B	From Face	3.00	0.0000	128.00	No Ice	4.79	3.62	0.02
			-3.00			1/2" Ice	5.24	4.06	0.04
			0.00						
MG D3-800T0 (Verizon - Existing)	C	From Face	3.00	0.0000	128.00	No Ice	3.46	2.24	0.03
			6.00			1/2" Ice	3.80	2.57	0.05
			0.00						
APX75-866512-CT0 (Verizon - Existing)	C	From Face	3.00	0.0000	128.00	No Ice	6.19	2.63	0.03
			0.00			1/2" Ice	6.61	2.95	0.06
			0.00						
BXA-80080/4CF (Verizon - Existing)	C	From Face	3.00	0.0000	128.00	No Ice	5.25	2.84	0.01
			-6.00			1/2" Ice	5.64	3.15	0.05
			0.00						
BXA-171063-12CF (Verizon - Proposed)	C	From Face	3.00	0.0000	128.00	No Ice	4.79	3.62	0.02
			-3.00			1/2" Ice	5.24	4.06	0.04
			0.00						
RRH2x40-AWS (Verizon - Proposed)	A	From Face	3.00	0.0000	128.00	No Ice	0.00	1.59	0.04
			-3.00			1/2" Ice	0.00	1.80	0.06
			0.00						
RRH2x40-AWS (Verizon - Proposed)	B	From Face	3.00	0.0000	128.00	No Ice	0.00	1.59	0.04
			-3.00			1/2" Ice	0.00	1.80	0.06
			0.00						
RRH2x40-AWS (Verizon - Proposed)	C	From Face	3.00	0.0000	128.00	No Ice	0.00	1.59	0.04
			-3.00			1/2" Ice	0.00	1.80	0.06
			0.00						
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	A	From Face	3.00	0.0000	128.00	No Ice	5.60	2.33	0.04
			0.00			1/2" Ice	5.92	2.56	0.08
			0.00						
Valmont 13' Platform w/Rails (Verizon - Existing)	C	None		0.0000	127.00	No Ice	53.00	53.00	2.00
						1/2" Ice	68.00	68.00	3.00

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	Client Verizon Wireless	Designed by TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Vert			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
APXVSP18-C-A20 (Sprint - Existing)	A	From Face	3.00 -6.00 0.00		0.0000	118.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
APXVSP18-C-A20 (Sprint - Existing)	B	From Face	3.00 -6.00 0.00		0.0000	118.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
APXVSP18-C-A20 (Sprint - Existing)	C	From Face	3.00 -6.00 0.00		0.0000	118.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
FD-RRH 4x45 1900 (Sprint - Existing)	A	From Face	3.00 -3.00 0.00		0.0000	118.00	No Ice 1/2" Ice	2.71 2.94	2.78 3.02	0.06 0.08
FD-RRH 4x45 1900 (Sprint - Existing)	B	From Face	3.00 -3.00 0.00		0.0000	118.00	No Ice 1/2" Ice	2.71 2.94	2.78 3.02	0.06 0.08
FD-RRH 4x45 1900 (Sprint - Existing)	C	From Face	3.00 -3.00 0.00		0.0000	118.00	No Ice 1/2" Ice	2.71 2.94	2.78 3.02	0.06 0.08
FD-RRH 2x50 800 (Sprint - Existing)	A	From Face	3.00 -3.00 2.00		0.0000	118.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
FD-RRH 2x50 800 (Sprint - Existing)	B	From Face	3.00 -3.00 2.00		0.0000	118.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
FD-RRH 2x50 800 (Sprint - Existing)	C	From Face	3.00 -3.00 2.00		0.0000	118.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
Valmont 13' Platform w/Rails (Sprint - Existing)	C	None			0.0000	117.00	No Ice 1/2" Ice	53.00 68.00	53.00 68.00	2.00 3.00
(2) 5' Panel Antenna (T-Mobile - Existing)	A	From Face	3.00 0.00 0.00		0.0000	100.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
(2) 5' Panel Antenna (T-Mobile - Existing)	B	From Face	3.00 0.00 0.00		0.0000	100.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
(2) 5' Panel Antenna (T-Mobile - Existing)	C	From Face	3.00 0.00 0.00		0.0000	100.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	3.00 0.00 0.00		0.0000	100.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	0.02 0.02
(2) TMA 10"x8"x3" (T-Mobile - Existing)	B	From Face	3.00 0.00 0.00		0.0000	100.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	0.02 0.02
(2) TMA 10"x8"x3" (T-Mobile - Existing)	C	From Face	3.00 0.00 0.00		0.0000	100.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	0.02 0.02
Valmont 13' Platform w/Rails (T-Mobile - Existing)	C	None			0.0000	99.00	No Ice 1/2" Ice	40.00 51.00	40.00 51.00	1.70 2.55
3' GPS Stand-off Mount (Verizon - Existing)	A	From Face	0.00 0.00 0.00		0.0000	50.00	No Ice 1/2" Ice	2.45 3.98	2.45 3.98	0.05 0.07
GPS (Verizon - Existing)	A	From Face	3.00 0.00 0.00		0.0000	50.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	0.01 0.01
3' Stand-off Mount (Town - Existing)	B	From Face	0.00 0.00		0.0000	58.00	No Ice 1/2" Ice	2.45 3.98	2.45 3.98	0.05 0.07

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _{Front}	C _A A _{Side}	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
PD1167 (Town - Existing)	B	From Face	0.00	3.00	0.0000	58.00	No Ice	1.06	1.06	0.01
			3.00	0.00			1/2" Ice	2.26	2.26	0.02
			0.00	4.00						
			4.00	0.00						
3' Stand-off Mount (Town - Existing)	A	From Face	0.00	0.00	0.0000	58.00	No Ice	2.45	2.45	0.05
			0.00	0.00			1/2" Ice	3.98	3.98	0.07
			0.00	0.00						
			0.00	0.00						
PD1142-1 (Town - Existing)	A	From Face	3.00	0.00	0.0000	58.00	No Ice	1.32	1.32	0.01
			0.00	0.00			1/2" Ice	3.21	3.21	0.02
			0.00	7.50						
			7.50	0.00						
3' Stand-off Mount (Town - Existing)	A	From Face	0.00	0.00	0.0000	86.00	No Ice	2.45	2.45	0.05
			0.00	0.00			1/2" Ice	3.98	3.98	0.07
			0.00	0.00						
			0.00	0.00						
PD1142-1 (Town - Existing)	A	From Face	3.00	0.00	0.0000	86.00	No Ice	1.32	1.32	0.01
			0.00	0.00			1/2" Ice	3.21	3.21	0.02
			0.00	5.00						
			5.00	0.00						
PD1121-6 (Town - Existing)	A	From Face	3.00	0.00	0.0000	86.00	No Ice	0.23	0.23	0.00
			0.00	0.00			1/2" Ice	0.41	0.41	0.00
			0.00	0.00						
			0.00	0.00						
PD1142-1 (Town - Existing)	A	From Face	3.00	0.00	0.0000	100.00	No Ice	1.32	1.32	0.01
			0.00	0.00			1/2" Ice	3.21	3.21	0.02
			0.00	5.00						
			5.00	0.00						
PD1142-1 (Town - Existing)	B	From Face	3.00	0.00	0.0000	100.00	No Ice	1.32	1.32	0.01
			0.00	0.00			1/2" Ice	3.21	3.21	0.02
			0.00	5.00						
			5.00	0.00						
440-3 (Town - Existing)	C	From Face	3.00	0.00	0.0000	100.00	No Ice	1.48	1.48	0.02
			0.00	0.00			1/2" Ice	2.66	2.66	0.03
			0.00	5.00						
			5.00	0.00						
440-3 (Town - Existing)	B	From Face	3.00	0.00	0.0000	130.00	No Ice	1.48	1.48	0.02
			0.00	0.00			1/2" Ice	2.66	2.66	0.03
			0.00	2.00						
			2.00	0.00						

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _A A _{In} Face	C _A A _{Out} Face
ft	ft		psf	ft ²	e	ft ²	ft ²	ft ²		ft ²	ft ²
L1 130.00-89.92	108.79	1.406	26	69.038	A	0.000	69.038	69.038	100.00	0.000	8.010
					B	0.000	69.038		100.00	0.000	0.000
					C	0.000	69.038		100.00	0.000	0.000
L2 89.92-44.84	66.66	1.222	22	111.210	A	0.000	111.210	111.210	100.00	0.000	10.009
					B	0.000	111.210		100.00	0.000	0.000
					C	0.000	111.210		100.00	0.000	0.000
L3 44.84-0.00	21.49	1	19	145.221	A	0.000	145.221	145.221	100.00	0.000	7.734
					B	0.000	145.221		100.00	0.000	0.000
					C	0.000	145.221		100.00	0.000	0.000

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Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 130.00-89.92	108.79	1.406	19	0.5000	72.378	A	0.000	72.378	72.378	100.00	0.000	15.225
						B	0.000	72.378	100.00	0.000	0.000	
						C	0.000	72.378	100.00	0.000	0.000	
L2 89.92-44.84	66.66	1.222	17	0.5000	114.967	A	0.000	114.967	114.967	100.00	0.000	19.025
						B	0.000	114.967	100.00	0.000	0.000	
						C	0.000	114.967	100.00	0.000	0.000	
L3 44.84-0.00	21.49	1	14	0.5000	148.957	A	0.000	148.957	148.957	100.00	0.000	14.701
						B	0.000	148.957	100.00	0.000	0.000	
						C	0.000	148.957	100.00	0.000	0.000	

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 130.00-89.92	108.79	1.406	9	69.038	A	0.000	69.038	69.038	100.00	0.000	8.010
					B	0.000	69.038	100.00	0.000	0.000	
					C	0.000	69.038	100.00	0.000	0.000	
L2 89.92-44.84	66.66	1.222	8	111.210	A	0.000	111.210	111.210	100.00	0.000	10.009
					B	0.000	111.210	100.00	0.000	0.000	
					C	0.000	111.210	100.00	0.000	0.000	
L3 44.84-0.00	21.49	1	6	145.221	A	0.000	145.221	145.221	100.00	0.000	7.734
					B	0.000	145.221	100.00	0.000	0.000	
					C	0.000	145.221	100.00	0.000	0.000	

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 130.00-89.92	0.77	1.97	A	1	1.03	1	1	1	69.038	3.47	86.63	C
			B	1	1.03	1	1	69.038				
			C	1	1.03	1	1	69.038				
L2 89.92-44.84	1.43	4.86	A	1	1.03	1	1	111.210	4.73	105.02	C	
			B	1	1.03	1	1	111.210				
			C	1	1.03	1	1	111.210				
L3 44.84-0.00	1.09	7.79	A	1	1.03	1	1	145.221	4.92	109.84	C	
			B	1	1.03	1	1	145.221				
			C	1	1.03	1	1	145.221				
Sum Weight:	3.29	14.62						OTM	799.19 kip-ft	13.13		

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Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 130.00-89.92	0.77	1.97	A	1	1.03	1	1	1	69.038	3.47	86.63	C
			B	1	1.03	1	1	69.038				
			C	1	1.03	1	1	69.038				
L2 89.92-44.84	1.43	4.86	A	1	1.03	1	1	111.210	4.73	105.02	C	
			B	1	1.03	1	1	111.210				
			C	1	1.03	1	1	111.210				
L3 44.84-0.00	1.09	7.79	A	1	1.03	1	1	145.221	4.92	109.84	C	
			B	1	1.03	1	1	145.221				
			C	1	1.03	1	1	145.221				
Sum Weight:	3.29	14.62						OTM 799.19 kip-ft	13.13			

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 130.00-89.92	0.77	1.97	A	1	1.03	1	1	1	69.038	3.47	86.63	C
			B	1	1.03	1	1	69.038				
			C	1	1.03	1	1	69.038				
L2 89.92-44.84	1.43	4.86	A	1	1.03	1	1	111.210	4.73	105.02	C	
			B	1	1.03	1	1	111.210				
			C	1	1.03	1	1	111.210				
L3 44.84-0.00	1.09	7.79	A	1	1.03	1	1	145.221	4.92	109.84	C	
			B	1	1.03	1	1	145.221				
			C	1	1.03	1	1	145.221				
Sum Weight:	3.29	14.62						OTM 799.19 kip-ft	13.13			

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 130.00-89.92	0.77	1.97	A	1	1.03	1	1	1	69.038	3.47	86.63	C
			B	1	1.03	1	1	69.038				
			C	1	1.03	1	1	69.038				
L2 89.92-44.84	1.43	4.86	A	1	1.03	1	1	111.210	4.73	105.02	C	
			B	1	1.03	1	1	111.210				
			C	1	1.03	1	1	111.210				
L3 44.84-0.00	1.09	7.79	A	1	1.03	1	1	145.221	4.92	109.84	C	
			B	1	1.03	1	1	145.221				
			C	1	1.03	1	1	145.221				

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K	e						ft ²	K	plf	
Sum Weight:	3.29	14.62						OTM	799.19 kip-ft	13.13		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K	e						ft ²	K	plf	
L1 130.00-89.92	1.17	2.50	A		1.03				72.378	2.95	73.72	C
			B		1.03				72.378			
			C		1.03				72.378			
L2 89.92-44.84	1.97	5.71	A		1.03				114.967	3.92	86.91	C
			B		1.03				114.967			
			C		1.03				114.967			
L3 44.84-0.00	1.50	8.90	A		1.03				148.957	3.95	88.04	C
			B		1.03				148.957			
			C		1.03				148.957			
Sum Weight:	4.64	17.11						OTM	667.50 kip-ft	10.82		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K	e						ft ²	K	plf	
L1 130.00-89.92	1.17	2.50	A		1.03				72.378	2.95	73.72	C
			B		1.03				72.378			
			C		1.03				72.378			
L2 89.92-44.84	1.97	5.71	A		1.03				114.967	3.92	86.91	C
			B		1.03				114.967			
			C		1.03				114.967			
L3 44.84-0.00	1.50	8.90	A		1.03				148.957	3.95	88.04	C
			B		1.03				148.957			
			C		1.03				148.957			
Sum Weight:	4.64	17.11						OTM	667.50 kip-ft	10.82		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K	e						ft ²	K	plf	
L1 130.00-89.92	1.17	2.50	A		1.03				72.378	2.95	73.72	C
			B		1.03				72.378			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L2	1.97	5.71	C	1	1.03	1	1	1	72.378			
89.92-44.84			A	1	1.03	1	1	1	114.967	3.92	86.91	C
			B	1	1.03	1	1	1	114.967			
			C	1	1.03	1	1	1	114.967			
L3	1.50	8.90	A	1	1.03	1	1	1	148.957	3.95	88.04	C
44.84-0.00			B	1	1.03	1	1	1	148.957			
			C	1	1.03	1	1	1	148.957			
Sum Weight:	4.64	17.11						OTM	667.50	10.82		
									kip-ft			

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	1.17	2.50	A	1	1.03	1	1	1	72.378	2.95	73.72	C
130.00-89.92			B	1	1.03	1	1	1	72.378			
			C	1	1.03	1	1	1	72.378			
L2	1.97	5.71	A	1	1.03	1	1	1	114.967	3.92	86.91	C
89.92-44.84			B	1	1.03	1	1	1	114.967			
			C	1	1.03	1	1	1	114.967			
L3	1.50	8.90	A	1	1.03	1	1	1	148.957	3.95	88.04	C
44.84-0.00			B	1	1.03	1	1	1	148.957			
			C	1	1.03	1	1	1	148.957			
Sum Weight:	4.64	17.11						OTM	667.50	10.82		
									kip-ft			

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.77	1.97	A	1	1.03	1	1	1	69.038	1.20	29.98	C
130.00-89.92			B	1	1.03	1	1	1	69.038			
			C	1	1.03	1	1	1	69.038			
L2	1.43	4.86	A	1	1.03	1	1	1	111.210	1.64	36.34	C
89.92-44.84			B	1	1.03	1	1	1	111.210			
			C	1	1.03	1	1	1	111.210			
L3	1.09	7.79	A	1	1.03	1	1	1	145.221	1.70	38.01	C
44.84-0.00			B	1	1.03	1	1	1	145.221			
			C	1	1.03	1	1	1	145.221			
Sum Weight:	3.29	14.62						OTM	276.54	4.54		
									kip-ft			

Tower Forces - Service - Wind 45 To Face

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Section Elevation	Add Weight	Self Weight	Face	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 130.00-89.92	0.77	1.97	A	1	1.03	1	1	1	69.038	1.20	29.98	C
			B	1	1.03	1	1	1	69.038			
			C	1	1.03	1	1	1	69.038			
L2 89.92-44.84	1.43	4.86	A	1	1.03	1	1	1	111.210	1.64	36.34	C
			B	1	1.03	1	1	1	111.210			
			C	1	1.03	1	1	1	111.210			
L3 44.84-0.00	1.09	7.79	A	1	1.03	1	1	1	145.221	1.70	38.01	C
			B	1	1.03	1	1	1	145.221			
			C	1	1.03	1	1	1	145.221			
Sum Weight:	3.29	14.62						OTM	276.54 kip-ft	4.54		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 130.00-89.92	0.77	1.97	A	1	1.03	1	1	1	69.038	1.20	29.98	C
			B	1	1.03	1	1	1	69.038			
			C	1	1.03	1	1	1	69.038			
L2 89.92-44.84	1.43	4.86	A	1	1.03	1	1	1	111.210	1.64	36.34	C
			B	1	1.03	1	1	1	111.210			
			C	1	1.03	1	1	1	111.210			
L3 44.84-0.00	1.09	7.79	A	1	1.03	1	1	1	145.221	1.70	38.01	C
			B	1	1.03	1	1	1	145.221			
			C	1	1.03	1	1	1	145.221			
Sum Weight:	3.29	14.62						OTM	276.54 kip-ft	4.54		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 130.00-89.92	0.77	1.97	A	1	1.03	1	1	1	69.038	1.20	29.98	C
			B	1	1.03	1	1	1	69.038			
			C	1	1.03	1	1	1	69.038			
L2 89.92-44.84	1.43	4.86	A	1	1.03	1	1	1	111.210	1.64	36.34	C
			B	1	1.03	1	1	1	111.210			
			C	1	1.03	1	1	1	111.210			
L3 44.84-0.00	1.09	7.79	A	1	1.03	1	1	1	145.221	1.70	38.01	C
			B	1	1.03	1	1	1	145.221			
			C	1	1.03	1	1	1	145.221			
Sum Weight:	3.29	14.62						OTM	276.54 kip-ft	4.54		

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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	14.62					
Bracing Weight	0.00					
Total Member Self-Weight	14.62			-0.63	0.94	
Total Weight	25.13			-0.63	0.94	
Wind 0 deg - No Ice		-0.07	-25.41	-2212.78	9.27	-0.72
Wind 30 deg - No Ice		12.69	-21.97	-1912.24	-1102.73	-1.24
Wind 45 deg - No Ice		17.97	-17.92	-1558.97	-1564.20	-1.38
Wind 60 deg - No Ice		22.04	-12.65	-1099.49	-1919.01	-1.42
Wind 90 deg - No Ice		25.48	0.07	7.71	-2220.84	-1.23
Wind 120 deg - No Ice		22.10	12.76	1112.67	-1927.35	-0.70
Wind 135 deg - No Ice		18.07	18.01	1569.49	-1575.99	-0.36
Wind 150 deg - No Ice		12.80	22.04	1919.32	-1117.17	0.01
Wind 180 deg - No Ice		0.07	25.41	2211.52	-7.40	0.72
Wind 210 deg - No Ice		-12.69	21.97	1910.98	1104.61	1.24
Wind 225 deg - No Ice		-17.97	17.92	1557.70	1566.08	1.38
Wind 240 deg - No Ice		-22.04	12.65	1098.23	1920.89	1.42
Wind 270 deg - No Ice		-25.48	-0.07	-8.97	2222.72	1.23
Wind 300 deg - No Ice		-22.10	-12.76	-1113.93	1929.22	0.70
Wind 315 deg - No Ice		-18.07	-18.01	-1570.75	1577.87	0.36
Wind 330 deg - No Ice		-12.80	-22.04	-1920.58	1119.05	-0.01
Member Ice	2.49					
Total Weight Ice	32.81			-1.64	1.72	
Wind 0 deg - Ice		-0.05	-22.31	-1977.31	8.14	-0.88
Wind 30 deg - Ice		11.14	-19.30	-1709.41	-984.26	-1.64
Wind 45 deg - Ice		15.78	-15.74	-1394.11	-1396.00	-1.87
Wind 60 deg - Ice		19.35	-11.11	-983.91	-1712.48	-1.97
Wind 90 deg - Ice		22.37	0.05	4.78	-1981.37	-1.76
Wind 120 deg - Ice		19.40	11.20	991.76	-1718.90	-1.09
Wind 135 deg - Ice		15.85	15.81	1399.91	-1405.08	-0.62
Wind 150 deg - Ice		11.23	19.35	1712.55	-995.39	-0.12
Wind 180 deg - Ice		0.05	22.31	1974.03	-4.71	0.88
Wind 210 deg - Ice		-11.14	19.30	1706.12	987.70	1.64
Wind 225 deg - Ice		-15.78	15.74	1390.82	1399.43	1.87
Wind 240 deg - Ice		-19.35	11.11	980.63	1715.91	1.97
Wind 270 deg - Ice		-22.37	-0.05	-8.07	1984.81	1.76
Wind 300 deg - Ice		-19.40	-11.20	-995.04	1722.34	1.09
Wind 315 deg - Ice		-15.85	-15.81	-1403.20	1408.52	0.62
Wind 330 deg - Ice		-11.23	-19.35	-1715.84	998.83	0.12
Total Weight	25.13			-0.63	0.94	
Wind 0 deg - Service		-0.02	-8.79	-765.74	3.15	-0.25
Wind 30 deg - Service		4.39	-7.60	-661.75	-381.63	-0.43
Wind 45 deg - Service		6.22	-6.20	-539.50	-541.31	-0.48
Wind 60 deg - Service		7.63	-4.38	-380.52	-664.08	-0.49
Wind 90 deg - Service		8.82	0.02	2.60	-768.52	-0.43
Wind 120 deg - Service		7.65	4.42	384.94	-666.96	-0.24
Wind 135 deg - Service		6.25	6.23	543.01	-545.39	-0.12
Wind 150 deg - Service		4.43	7.63	664.05	-386.63	0.00
Wind 180 deg - Service		0.02	8.79	765.16	-2.62	0.25
Wind 210 deg - Service		-4.39	7.60	661.17	382.16	0.43
Wind 225 deg - Service		-6.22	6.20	538.93	541.84	0.48
Wind 240 deg - Service		-7.63	4.38	379.94	664.61	0.49
Wind 270 deg - Service		-8.82	-0.02	-3.17	769.05	0.43
Wind 300 deg - Service		-7.65	-4.42	-385.51	667.49	0.24
Wind 315 deg - Service		-6.25	-6.23	-543.58	545.91	0.12
Wind 330 deg - Service		-4.43	-7.63	-664.63	387.15	-0.00

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Load Combinations

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

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	130 - 89.92	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-13.93	0.41	0.46
			Max. Mx	14	-7.87	348.81	2.47
			Max. My	2	-7.88	2.51	346.14
			Max. Vy	14	-15.72	348.81	2.47
			Max. Vx	2	-15.64	2.51	346.14
			Max. Torque	23			0.52
L2	89.92 - 44.836	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-21.39	1.09	1.17
			Max. Mx	14	-14.44	1146.50	5.79
			Max. My	2	-14.45	5.91	1140.28
			Max. Vy	14	-20.58	1146.50	5.79
			Max. Vx	2	-20.50	5.91	1140.28
			Max. Torque	22			1.55
L3	44.836 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-32.81	1.78	1.71
			Max. Mx	14	-25.10	2301.53	9.34
			Max. My	2	-25.10	9.66	2291.23
			Max. Vy	14	-25.51	2301.53	9.34
			Max. Vx	2	-25.44	9.66	2291.23
			Max. Torque	22			1.97

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	31	32.81	22.37	0.05
	Max. H _x	14	25.13	25.48	0.07
	Max. H _z	2	25.13	0.07	25.41
	Max. M _x	2	2291.23	0.07	25.41
	Max. M _z	6	2299.58	-25.48	-0.07
	Max. Torsion	22	1.97	-19.35	11.11
	Min. Vert	1	25.13	0.00	0.00
	Min. H _x	6	25.13	-25.48	-0.07
	Min. H _z	10	25.13	-0.07	-25.41
	Min. M _x	10	-2289.92	-0.07	-25.41
	Min. M _z	14	-2301.53	25.48	0.07
	Min. Torsion	30	-1.97	19.35	-11.11

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	25.13	0.00	0.00	-0.63	0.94	0.00
Dead+Wind 0 deg - No Ice	25.13	-0.07	-25.41	-2291.23	9.66	-0.72
Dead+Wind 30 deg - No Ice	25.13	12.69	-21.97	-1980.04	-1141.83	-1.24
Dead+Wind 45 deg - No Ice	25.13	17.97	-17.92	-1614.21	-1619.68	-1.37
Dead+Wind 60 deg - No Ice	25.13	22.04	-12.65	-1138.42	-1987.08	-1.42
Dead+Wind 90 deg - No Ice	25.13	25.48	0.07	8.04	-2299.58	-1.22
Dead+Wind 120 deg - No Ice	25.13	22.10	12.76	1152.12	-1995.69	-0.70
Dead+Wind 135 deg - No Ice	25.13	18.07	18.01	1625.12	-1631.90	-0.36

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Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - No Ice	25.13	12.80	22.04	1987.34	-1156.83	0.01
Dead+Wind 180 deg - No Ice	25.13	0.07	25.41	2289.92	-7.72	0.72
Dead+Wind 210 deg - No Ice	25.13	-12.69	21.97	1978.72	1143.76	1.24
Dead+Wind 225 deg - No Ice	25.13	-17.97	17.92	1612.90	1621.62	1.37
Dead+Wind 240 deg - No Ice	25.13	-22.04	12.65	1137.11	1989.02	1.42
Dead+Wind 270 deg - No Ice	25.13	-25.48	-0.07	-9.34	2301.53	1.22
Dead+Wind 300 deg - No Ice	25.13	-22.10	-12.76	-1153.43	1997.64	0.70
Dead+Wind 315 deg - No Ice	25.13	-18.07	-18.01	-1626.43	1633.85	0.36
Dead+Wind 330 deg - No Ice	25.13	-12.80	-22.04	-1988.65	1158.78	-0.01
Dead+Ice+Temp	32.81	-0.00	-0.00	-1.71	1.78	0.00
Dead+Wind 0 deg+Ice+Temp	32.81	-0.05	-22.31	-2082.60	8.66	-0.89
Dead+Wind 30 deg+Ice+Temp	32.81	11.14	-19.30	-1800.42	-1036.65	-1.65
Dead+Wind 45 deg+Ice+Temp	32.81	15.78	-15.74	-1468.31	-1470.33	-1.87
Dead+Wind 60 deg+Ice+Temp	32.81	19.35	-11.11	-1036.25	-1803.68	-1.97
Dead+Wind 90 deg+Ice+Temp	32.81	22.37	0.05	5.10	-2086.89	-1.76
Dead+Wind 120 deg+Ice+Temp	32.81	19.40	11.20	1044.58	-1810.46	-1.08
Dead+Wind 135 deg+Ice+Temp	32.81	15.85	15.81	1474.44	-1479.94	-0.62
Dead+Wind 150 deg+Ice+Temp	32.81	11.23	19.35	1803.72	-1048.45	-0.11
Dead+Wind 180 deg+Ice+Temp	32.81	0.05	22.31	2079.11	-5.02	0.89
Dead+Wind 210 deg+Ice+Temp	32.81	-11.14	19.30	1796.93	1040.28	1.65
Dead+Wind 225 deg+Ice+Temp	32.81	-15.78	15.74	1464.82	1473.96	1.87
Dead+Wind 240 deg+Ice+Temp	32.81	-19.35	11.11	1032.77	1807.31	1.97
Dead+Wind 270 deg+Ice+Temp	32.81	-22.37	-0.05	-8.58	2090.54	1.76
Dead+Wind 300 deg+Ice+Temp	32.81	-19.40	-11.20	-1048.06	1814.11	1.08
Dead+Wind 315 deg+Ice+Temp	32.81	-15.85	-15.81	-1477.93	1483.60	0.62
Dead+Wind 330 deg+Ice+Temp	32.81	-11.23	-19.35	-1807.21	1052.11	0.11
Dead+Wind 0 deg - Service	25.13	-0.02	-8.79	-794.75	3.99	-0.25
Dead+Wind 30 deg - Service	25.13	4.39	-7.60	-686.86	-395.20	-0.43
Dead+Wind 45 deg - Service	25.13	6.22	-6.20	-560.04	-560.86	-0.48
Dead+Wind 60 deg - Service	25.13	7.63	-4.38	-395.10	-688.23	-0.50
Dead+Wind 90 deg - Service	25.13	8.82	0.02	2.35	-796.59	-0.43
Dead+Wind 120 deg - Service	25.13	7.65	4.42	398.99	-691.25	-0.25
Dead+Wind 135 deg - Service	25.13	6.25	6.23	562.98	-565.12	-0.12
Dead+Wind 150 deg - Service	25.13	4.43	7.63	688.55	-400.42	0.00
Dead+Wind 180 deg - Service	25.13	0.02	8.79	793.43	-2.04	0.25
Dead+Wind 210 deg - Service	25.13	-4.39	7.60	685.54	397.15	0.43
Dead+Wind 225 deg - Service	25.13	-6.22	6.20	558.72	562.82	0.48
Dead+Wind 240 deg - Service	25.13	-7.63	4.38	393.77	690.19	0.50
Dead+Wind 270 deg - Service	25.13	-8.82	-0.02	-3.68	798.55	0.43
Dead+Wind 300 deg - Service	25.13	-7.65	-4.42	-400.32	693.20	0.25
Dead+Wind 315 deg - Service	25.13	-6.25	-6.23	-564.30	567.08	0.13
Dead+Wind 330 deg - Service	25.13	-4.43	-7.63	-689.87	402.37	-0.00

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-25.13	0.00	0.00	25.13	0.00	0.000%
2	-0.07	-25.13	-25.41	0.07	25.13	25.41	0.000%
3	12.69	-25.13	-21.97	-12.69	25.13	21.97	0.000%
4	17.97	-25.13	-17.92	-17.97	25.13	17.92	0.000%
5	22.04	-25.13	-12.65	-22.04	25.13	12.65	0.000%
6	25.48	-25.13	0.07	-25.48	25.13	-0.07	0.000%
7	22.10	-25.13	12.76	-22.10	25.13	-12.76	0.000%
8	18.07	-25.13	18.01	-18.07	25.13	-18.01	0.000%
9	12.80	-25.13	22.04	-12.80	25.13	-22.04	0.000%
10	0.07	-25.13	25.41	-0.07	25.13	-25.41	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
11	-12.69	-25.13	21.97	12.69	25.13	-21.97	0.000%
12	-17.97	-25.13	17.92	17.97	25.13	-17.92	0.000%
13	-22.04	-25.13	12.65	22.04	25.13	-12.65	0.000%
14	-25.48	-25.13	-0.07	25.48	25.13	0.07	0.000%
15	-22.10	-25.13	-12.76	22.10	25.13	12.76	0.000%
16	-18.07	-25.13	-18.01	18.07	25.13	18.01	0.000%
17	-12.80	-25.13	-22.04	12.80	25.13	22.04	0.000%
18	0.00	-32.81	0.00	0.00	32.81	0.00	0.000%
19	-0.05	-32.81	-22.31	0.05	32.81	22.31	0.000%
20	11.14	-32.81	-19.30	-11.14	32.81	19.30	0.000%
21	15.78	-32.81	-15.74	-15.78	32.81	15.74	0.000%
22	19.35	-32.81	-11.11	-19.35	32.81	11.11	0.000%
23	22.37	-32.81	0.05	-22.37	32.81	-0.05	0.000%
24	19.40	-32.81	11.20	-19.40	32.81	-11.20	0.000%
25	15.85	-32.81	15.81	-15.85	32.81	-15.81	0.000%
26	11.23	-32.81	19.35	-11.23	32.81	-19.35	0.000%
27	0.05	-32.81	22.31	-0.05	32.81	-22.31	0.000%
28	-11.14	-32.81	19.30	11.14	32.81	-19.30	0.000%
29	-15.78	-32.81	15.74	15.78	32.81	-15.74	0.000%
30	-19.35	-32.81	11.11	19.35	32.81	-11.11	0.000%
31	-22.37	-32.81	-0.05	22.37	32.81	0.05	0.000%
32	-19.40	-32.81	-11.20	19.40	32.81	11.20	0.000%
33	-15.85	-32.81	-15.81	15.85	32.81	15.81	0.000%
34	-11.23	-32.81	-19.35	11.23	32.81	19.35	0.000%
35	-0.02	-25.13	-8.79	0.02	25.13	8.79	0.000%
36	4.39	-25.13	-7.60	-4.39	25.13	7.60	0.000%
37	6.22	-25.13	-6.20	-6.22	25.13	6.20	0.000%
38	7.63	-25.13	-4.38	-7.63	25.13	4.38	0.000%
39	8.82	-25.13	0.02	-8.82	25.13	-0.02	0.000%
40	7.65	-25.13	4.42	-7.65	25.13	-4.42	0.000%
41	6.25	-25.13	6.23	-6.25	25.13	-6.23	0.000%
42	4.43	-25.13	7.63	-4.43	25.13	-7.63	0.000%
43	0.02	-25.13	8.79	-0.02	25.13	-8.79	0.000%
44	-4.39	-25.13	7.60	4.39	25.13	-7.60	0.000%
45	-6.22	-25.13	6.20	6.22	25.13	-6.20	0.000%
46	-7.63	-25.13	4.38	7.63	25.13	-4.38	0.000%
47	-8.82	-25.13	-0.02	8.82	25.13	0.02	0.000%
48	-7.65	-25.13	-4.42	7.65	25.13	4.42	0.000%
49	-6.25	-25.13	-6.23	6.25	25.13	6.23	0.000%
50	-4.43	-25.13	-7.63	4.43	25.13	7.63	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00063399
3	Yes	5	0.00000001	0.00072680
4	Yes	5	0.00000001	0.00079663
5	Yes	5	0.00000001	0.00075864
6	Yes	4	0.00000001	0.00048072
7	Yes	5	0.00000001	0.00074306
8	Yes	5	0.00000001	0.00080386
9	Yes	5	0.00000001	0.00075015
10	Yes	4	0.00000001	0.00035233
11	Yes	5	0.00000001	0.00075530

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12	Yes	5	0.00000001	0.00079639
13	Yes	5	0.00000001	0.00072564
14	Yes	4	0.00000001	0.00083636
15	Yes	5	0.00000001	0.00076140
16	Yes	5	0.00000001	0.00080577
17	Yes	5	0.00000001	0.00075209
18	Yes	4	0.00000001	0.00000809
19	Yes	5	0.00000001	0.00026920
20	Yes	6	0.00000001	0.00013272
21	Yes	6	0.00000001	0.00014977
22	Yes	6	0.00000001	0.00013923
23	Yes	5	0.00000001	0.00027321
24	Yes	6	0.00000001	0.00013508
25	Yes	6	0.00000001	0.00015101
26	Yes	6	0.00000001	0.00013739
27	Yes	5	0.00000001	0.00026266
28	Yes	6	0.00000001	0.00013833
29	Yes	6	0.00000001	0.00014968
30	Yes	6	0.00000001	0.00013217
31	Yes	5	0.00000001	0.00028640
32	Yes	6	0.00000001	0.00014017
33	Yes	6	0.00000001	0.00015194
34	Yes	6	0.00000001	0.00013750
35	Yes	4	0.00000001	0.00011842
36	Yes	5	0.00000001	0.00006779
37	Yes	5	0.00000001	0.00008121
38	Yes	5	0.00000001	0.00007407
39	Yes	4	0.00000001	0.00013094
40	Yes	5	0.00000001	0.00007073
41	Yes	5	0.00000001	0.00008278
42	Yes	5	0.00000001	0.00007207
43	Yes	4	0.00000001	0.00009969
44	Yes	5	0.00000001	0.00007343
45	Yes	5	0.00000001	0.00008125
46	Yes	5	0.00000001	0.00006767
47	Yes	4	0.00000001	0.00015530
48	Yes	5	0.00000001	0.00007478
49	Yes	5	0.00000001	0.00008371
50	Yes	5	0.00000001	0.00007291

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 89.92	36.203	48	2.5042	0.0045
L2	94.003 - 44.836	18.679	48	1.9635	0.0023
L3	50.003 - 0	5.031	48	0.9444	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
130.00	440-3	48	36.203	2.5042	0.0047	16939
128.00	MG D3-800T0	48	35.168	2.4786	0.0046	16939

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
127.00	Valmont 13' Platform w/Rails	48	34.651	2.4657	0.0045	16939
118.00	APXVSP18-C-A20	48	30.033	2.3474	0.0039	7057
117.00	Valmont 13' Platform w/Rails	48	29.527	2.3338	0.0038	6514
100.00	(2) 5' Panel Antenna	48	21.317	2.0737	0.0027	2821
99.00	Valmont 13' Platform w/Rails	48	20.866	2.0562	0.0026	2730
86.00	3' Stand-off Mount	48	15.438	1.7975	0.0020	2319
58.00	3' Stand-off Mount	48	6.742	1.1310	0.0012	2214
50.00	3' GPS Stand-off Mount	48	5.030	0.9443	0.0010	2226

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	130 - 89.92	103.889	15	7.1957	0.0147
L2	94.003 - 44.836	53.693	15	5.6474	0.0090
L3	50.003 - 0	14.485	15	2.7191	0.0040

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
130.00	440-3	15	103.889	7.1957	0.0159	6079
128.00	MG D3-800T0	15	100.926	7.1223	0.0154	6079
127.00	Valmont 13' Platform w/Rails	15	99.445	7.0855	0.0152	6079
118.00	APXVSP18-C-A20	15	86.225	6.7472	0.0133	2531
117.00	Valmont 13' Platform w/Rails	15	84.775	6.7083	0.0131	2336
100.00	(2) 5' Panel Antenna	15	61.256	5.9635	0.0102	1008
99.00	Valmont 13' Platform w/Rails	15	59.962	5.9131	0.0101	975
86.00	3' Stand-off Mount	15	44.396	5.1710	0.0081	823
58.00	3' Stand-off Mount	15	19.409	3.2558	0.0048	775
50.00	3' GPS Stand-off Mount	15	14.483	2.7189	0.0040	776

Base Plate Design Data

Plate Thickness	Number of Anchor Bolts	Anchor Bolt Size	Actual Allowable Ratio Bolt Tension K	Actual Allowable Ratio Concrete Stress ksi	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Critical Ratio
in		in						
2.5000	12	2.2500	140.29	2.414	43.683		Bolt T	1.19
			118.09	2.800	45.000			✓
			1.19	0.86	0.97			

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Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio $\frac{P}{P_a}$
L1	130 - 89.92 (1)	TP25.08x16.26x0.219	40.08	0.00	0.0	39.000	16.8979	-7.86	659.02	0.012
L2	89.92 - 44.836 (2)	TP34.56x23.7435x0.313	49.17	0.00	0.0	39.000	33.3705	-14.44	1301.45	0.011
L3	44.836 - 0 (3)	TP43.8x32.7973x0.375	50.00	0.00	0.0	39.000	52.4357	-25.10	2044.99	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	130 - 89.92 (1)	TP25.08x16.26x0.219	350.19	-42.503	39.000	1.090	0.00	0.000	39.000	0.000
L2	89.92 - 44.836 (2)	TP34.56x23.7435x0.313	1149.72	-51.154	39.000	1.312	0.00	0.000	39.000	0.000
L3	44.836 - 0 (3)	TP43.8x32.7973x0.375	2306.72	-49.761	39.000	1.276	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	130 - 89.92 (1)	TP25.08x16.26x0.219	0.012	1.090	0.000	1.102	1.333	H1-3 ✓
L2	89.92 - 44.836 (2)	TP34.56x23.7435x0.313	0.011	1.312	0.000	1.323	1.333	H1-3 ✓
L3	44.836 - 0 (3)	TP43.8x32.7973x0.375	0.012	1.276	0.000	1.288	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail	
L1	130 - 89.92	Pole	TP25.08x16.26x0.219	1	-7.86	878.47	82.7	Pass	
L2	89.92 - 44.836	Pole	TP34.56x23.7435x0.313	2	-14.44	1734.83	99.2	Pass	
L3	44.836 - 0	Pole	TP43.8x32.7973x0.375	3	-25.10	2725.97	96.6	Pass	
							Summary		
							Pole (L2)	99.2	Pass
							Base Plate	89.1	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
RATING =							99.2	Pass

Program Version 6.0.0.8 - 9/7/2011 File:J:/Jobs/1300100.WI/067 - Ridgefield CT/Backup Documentation/Calcs/ERI Files/130' Valmont Monopole - Ridgefield, CT.eri

Caisson Foundation:

Input Data:

Shear Force =	S := 26k	USER INPUT-FROM RISATower
Overturing Moment =	M := 2307ft.k	USER INPUT-FROM RISATower
Applied Axial Load =	A1 := 25k	USER INPUT-FROM RISATower
Moment Capacity =	Mn := 5674ft.k	USER INPUT-FROM LPILE
Foundation Diameter =	d := 6.0ft	USER INPUT
Overall Length of Caisson =	L _c := 21.0ft	USER INPUT
Depth From Top of Caisson to Grade =	L _{pag} := 0.5ft	USER INPUT
Number of Rebar =	n := 26	USER INPUT
Area of Rebar =	Ar := 1.56in ²	USER INPUT
Rebar Yield Strength =	fy := 60ksi	USER INPUT
Concrete Comp Strength =	fc := 3ksi	USER INPUT

Check Moment Capacity:

Factor of Safety =	FS := $\frac{M_n}{M}$ = 2.5
Factor of Safety Required =	FS _{reqd} := 1.3
	FOSCheck := if(FS ≥ FS _{reqd} , "OK", "NO GOOD")
	FOSCheck = "OK"

Check Axial Capacity:

Concrete Weight =	A2 := $.150 \frac{k}{ft^3} \cdot LD \cdot \pi \frac{d^2}{4} = 86.9 \text{ kips}$
Total Axial Load =	AT := A1 + A2 = 111.9 kips
Area of Concrete =	Ag := $\pi \cdot \frac{d^2}{4} = 28.27 \text{ ft}^2$
Axial Capacity =	Po := n Ar fy + (Ag - n Ar) · 0.85 · fc = 12712.5 kips
	AxialCheck := if(AT ≤ Po, "OK", "NO GOOD")
	AxialCheck = "OK"

Ridgefield Caisson Analysis.lpo

LPILE Plus for Windows, Version 5.0 (5.0.47)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

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Centek Engineering

Files Used for Analysis

Path to file locations: J:\Jobs\1300100.WI\067 - Ridgefield CT\Backup Documentation\Calcs\L-Pile\
Name of input data file: Ridgefield Caisson Analysis.lpd
Name of output file: Ridgefield Caisson Analysis.lpo
Name of plot output file: Ridgefield Caisson Analysis.lpp
Name of runtime file: Ridgefield Caisson Analysis.lpr

Time and Date of Analysis

Date: November 13, 2013 Time: 18:28:14

Problem Title

13001.067 - Ridgefield

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 2:
- Computation of Ultimate Bending Moment of Cross Section (Section Design)

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 72.0000 in

Material Properties:

Compressive Strength of Concrete = 3.000 kip/in**2
Yield Stress of Reinforcement = 60. kip/in**2
Modulus of Elasticity of Reinforcement = 29000. kip/in**2
Number of Reinforcing Bars = 26
Area of Single Bar = 1.56000 in**2
Number of Rows of Reinforcing Bars = 13
Area of Steel = 40.560 in**2
Area of Shaft = 4071.504 in**2
Percentage of Steel Reinforcement = 0.996 percent
Cover Thickness (edge to bar center) = 5.000 in

Unfactored Axial Squash Load Capacity = 12712.51 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement	Distance to Centroidal Axis
------------	-----------------------	-----------------------------

Ridgefield Caisson Analysis.lpo

	in**2	in
1	3.120	30.774
2	3.120	28.986
3	3.120	25.512
4	3.120	20.557
5	3.120	14.406
6	3.120	7.419
7	3.120	0.000
8	3.120	-7.419
9	3.120	-14.406
10	3.120	-20.557
11	3.120	-25.512
12	3.120	-28.986
13	3.120	-30.774

Axial Thrust Force = 25000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
3920318.	4.704382E+12	8.333333E-07	0.00003192	38.29986441	97.98365723	799.28445
7796222.	4.677733E+12	0.00000167	0.00006201	37.20348251	188.51288	1545.57712
11629673.	4.651869E+12	0.00000250	0.00009216	36.86212528	277.51849	2293.61728
15418754.	4.625626E+12	0.00000333	0.00012226	36.67924583	364.69583	3040.47802
15418754.	3.700501E+12	0.00000417	0.00008551	20.52270663	254.73524	5588.69494
15418754.	3.083751E+12	0.00000500	0.00010163	20.32510722	301.15294	6735.08584
15418754.	2.643215E+12	0.00000583	0.00011757	20.15539205	346.60855	7886.31030
15418754.	2.312813E+12	0.00000667	0.00013355	20.03189456	391.67325	9036.80224
15418754.	2.055834E+12	0.00000750	0.00014954	19.93924034	436.34545	10186.55481
15418754.	1.850250E+12	0.00000833	0.00016557	19.86820042	480.62339	11335.56221
15418754.	1.682046E+12	0.00000917	0.00018162	19.81290400	524.50538	12483.81807
15418754.	1.541875E+12	0.00001000	0.00019769	19.76943934	567.98972	13631.31537
15418754.	1.423270E+12	0.00001083	0.00021380	19.73509634	611.07466	14778.04774
15418754.	1.321607E+12	0.00001167	0.00022993	19.70793951	653.75838	15924.00871
15418754.	1.233500E+12	0.00001250	0.00024608	19.68655050	696.03911	17069.19142
15637688.	1.172827E+12	0.00001333	0.00026226	19.66986716	737.91507	18213.58840
16575310.	1.170022E+12	0.00001417	0.00027848	19.65707624	779.38442	19357.19261
17511413.	1.167428E+12	0.00001500	0.00029471	19.64754260	820.44519	20499.99814
18445990.	1.165010E+12	0.00001583	0.00031098	19.64077270	861.09569	21641.99543
19379023.	1.162741E+12	0.00001667	0.00032727	19.63636100	901.33373	22783.18015
20310508.	1.160600E+12	0.00001750	0.00034359	19.63399208	941.15768	23923.54138
21240427.	1.158569E+12	0.00001833	0.00035995	19.63339555	980.56529	25063.07479
22168772.	1.156632E+12	0.00001917	0.00037633	19.63435900	1019.55478	26201.76995
23095530.	1.154777E+12	0.00002000	0.00039273	19.63670003	1058.12409	27339.61954
24020687.	1.152993E+12	0.00002083	0.00040917	19.64026415	1096.27105	28476.61703
24944234.	1.151272E+12	0.00002167	0.00042564	19.64492691	1133.99378	29613.56221
25866153.	1.149607E+12	0.00002250	0.00044214	19.65057456	1171.28994	30748.01885
26786437.	1.147990E+12	0.00002333	0.00045867	19.65711915	1208.15766	31882.40585
27705070.	1.146417E+12	0.00002417	0.00047522	19.66447699	1244.59461	33015.90659
28622038.	1.144882E+12	0.00002500	0.00049181	19.67257941	1280.59863	34148.51187
29537329.	1.143380E+12	0.00002583	0.00050844	19.68136632	1316.16750	35280.12174
30450926.	1.141910E+12	0.00002667	0.00052509	19.69078410	1351.29889	36411.00104
31362821.	1.140466E+12	0.00002750	0.00054177	19.70078981	1385.99068	37540.86527
32272994.	1.139047E+12	0.00002833	0.00055849	19.71134055	1420.24039	38669.79806
33181434.	1.137649E+12	0.00002917	0.00057524	19.72240198	1454.04572	39797.78893
34088128.	1.136271E+12	0.00003000	0.00059202	19.73394406	1487.40438	40924.82700
34993057.	1.134910E+12	0.00003083	0.00060883	19.74593675	1520.31377	42050.90429
35896203.	1.133564E+12	0.00003167	0.00062568	19.75835431	1552.77137	43176.01176
36797561.	1.132233E+12	0.00003250	0.00064256	19.77117956	1584.77495	44300.13480
38594826.	1.129605E+12	0.00003417	0.00067643	19.79796731	1647.40926	46545.39438
40384722.	1.127015E+12	0.00003583	0.00071044	19.82616699	1708.19577	48786.59726
42167111.	1.124456E+12	0.00003750	0.00074459	19.85567129	1767.11285	51023.65539
43941860.	1.121920E+12	0.00003917	0.00077888	19.88639867	1824.13846	53256.47222
45708827.	1.119400E+12	0.00004083	0.00081333	19.91828263	1879.24966	55484.94917
47467853.	1.116891E+12	0.00004250	0.00084793	19.95126522	1932.42241	57708.98993
49218785.	1.114388E+12	0.00004417	0.00088268	19.98530567	1983.63220	59928.48743
50644800.	1.104977E+12	0.00004583	0.00091547	19.97383440	2029.82398	60000.00000
51759128.	1.089666E+12	0.00004750	0.00094623	19.92072880	2071.30436	60000.00000
52843438.	1.074782E+12	0.00004917	0.00097694	19.86986768	2110.97432	60000.00000
53720477.	1.056796E+12	0.00005083	0.00100618	19.79373372	2147.11024	60000.00000
54506872.	1.038226E+12	0.00005250	0.00103485	19.71142209	2181.00219	60000.00000
55289565.	1.020730E+12	0.00005417	0.00106361	19.63586533	2213.51001	60000.00000
56068498.	1.004212E+12	0.00005583	0.00109246	19.56648409	2244.62042	60000.00000
56616835.	9.846406E+11	0.00005750	0.00111938	19.46746337	2272.21377	60000.00000
57148818.	9.658955E+11	0.00005917	0.00114625	19.37327492	2298.45710	60000.00000
57677949.	9.481307E+11	0.00006083	0.00117320	19.28551948	2323.47116	60000.00000
58204199.	9.312672E+11	0.00006250	0.00120023	19.20370138	2347.24529	60000.00000
58749157.	9.155713E+11	0.00006417	0.00123058	19.17788994	2372.47222	60000.00000
59266673.	9.002533E+11	0.00006583	0.00125743	19.10012949	2393.29857	60000.00000
59622587.	8.832976E+11	0.00006750	0.00128246	18.99936426	2411.49913	60000.00000
59950661.	8.667565E+11	0.00006917	0.00130725	18.90000236	2428.41229	60000.00000
60276658.	8.509646E+11	0.00007083	0.00133211	18.80627954	2444.26821	60000.00000
60600563.	8.358698E+11	0.00007250	0.00135704	18.71782243	2459.05806	60000.00000
60922339.	8.214248E+11	0.00007417	0.00138204	18.63428557	2472.77254	60000.00000
61241962.	8.075863E+11	0.00007583	0.00140711	18.55535781	2485.40234	60000.00000

Ridgefield Caisson Analysis.lpo

61559409.	7.943150E+11	0.00007750	0.00143226	18.48075593	2496.93799	60000.00000
61874655.	7.815746E+11	0.00007917	0.00145748	18.41022027	2507.36976	60000.00000
62187665.	7.693319E+11	0.00008083	0.00148277	18.34351051	2516.68761	60000.00000
62485232.	7.573968E+11	0.00008250	0.00150793	18.27789295	2524.81649	60000.00000
62668953.	7.445816E+11	0.00008417	0.00153139	18.19474232	2531.35674	60000.00000
62851004.	7.322447E+11	0.00008583	0.00155492	18.11555064	2536.92963	60000.00000
63031353.	7.203583E+11	0.00008750	0.00157851	18.04009688	2541.52700	60000.00000
63113265.	7.078123E+11	0.00008917	0.00160500	17.99999893	2545.52289	60000.00000
63423859.	6.982443E+11	0.00009083	0.00163142	17.96054256	2548.24877	60000.00000
63594325.	6.875062E+11	0.00009250	0.00165460	17.88753498	2549.60105	60000.00000
63762974.	6.771289E+11	0.00009417	0.00167784	17.81781900	2549.65093	60000.00000
63928323.	6.670782E+11	0.00009583	0.00170116	17.75123584	2545.73664	60000.00000
64092555.	6.573595E+11	0.00009750	0.00172454	17.68763530	2545.19299	60000.00000
64255640.	6.479560E+11	0.00009917	0.00174800	17.62687361	2547.58305	60000.00000
64578330.	6.300325E+11	0.00010250	0.00179512	17.51336038	2549.92589	60000.00000
64894675.	6.131780E+11	0.00010583	0.00184260	17.41042149	2544.25571	60000.00000
65206688.	5.973132E+11	0.00010917	0.00189036	17.31630170	2546.89686	60000.00000
65427322.	5.815762E+11	0.00011250	0.00193607	17.20954549	2549.58018	60000.00000
65584261.	5.661951E+11	0.00011583	0.00198047	17.09756649	2547.61209	60000.00000
65737917.	5.516469E+11	0.00011917	0.00202512	16.99398601	2541.53450	60000.00000
65889686.	5.378750E+11	0.00012250	0.00206994	16.89745438	2546.02752	60000.00000
66039533.	5.248175E+11	0.00012583	0.00211494	16.80744159	2548.94640	60000.00000
66540151.	5.151496E+11	0.00012917	0.00217000	16.80000007	2548.57123	60000.00000
66540151.	5.021898E+11	0.00013250	0.00221521	16.71854246	2543.09734	60000.00000
66540151.	4.898661E+11	0.00013583	0.00225955	16.63470089	2541.53397	60000.00000
66641975.	4.788645E+11	0.00013917	0.00230403	16.55589330	2545.65760	60000.00000
66776563.	4.686075E+11	0.00014250	0.00234865	16.48178709	2548.42867	60000.00000
66909932.	4.588110E+11	0.00014583	0.00239343	16.41208184	2549.82481	60000.00000
67041233.	4.494384E+11	0.00014917	0.00243843	16.34701359	2547.61886	60000.00000
67170829.	4.404645E+11	0.00015250	0.00248363	16.28606951	2542.84848	60000.00000
67299649.	4.318694E+11	0.00015583	0.00252893	16.22843635	2538.05887	60000.00000
67427667.	4.236293E+11	0.00015917	0.00257435	16.17391670	2541.13032	60000.00000
67554882.	4.157224E+11	0.00016250	0.00261988	16.12233460	2544.96261	60000.00000
67673740.	4.080829E+11	0.00016583	0.00266513	16.07110870	2547.69111	60000.00000
67728097.	4.003631E+11	0.00016917	0.00270707	16.00239909	2549.19456	60000.00000
67782016.	3.929392E+11	0.00017250	0.00274911	15.93684375	2549.92565	60000.00000
67834942.	3.857911E+11	0.00017583	0.00279131	15.87473238	2547.99114	60000.00000
67887156.	3.789051E+11	0.00017917	0.00283363	15.81562722	2544.42581	60000.00000
67939169.	3.722694E+11	0.00018250	0.00287602	15.75899184	2540.85053	60000.00000
67990966.	3.658707E+11	0.00018583	0.00291846	15.70469320	2537.26531	60000.00000
68042556.	3.596963E+11	0.00018917	0.00296095	15.65261328	2533.66996	60000.00000
68093922.	3.537347E+11	0.00019250	0.00300351	15.60263622	2536.60963	60000.00000
68093922.	3.477136E+11	0.00019583	0.00305500	15.59999907	2541.79558	60000.00000
68136148.	3.421062E+11	0.00019917	0.00310700	15.59999907	2545.78292	60000.00000
68278803.	3.371793E+11	0.00020250	0.00315646	15.58744419	2548.25219	60000.00000
68307653.	3.318590E+11	0.00020583	0.00320036	15.54831612	2549.41676	60000.00000
68336182.	3.267068E+11	0.00020917	0.00324436	15.51086175	2549.95901	60000.00000
68363809.	3.217120E+11	0.00021250	0.00328857	15.47561753	2547.94525	60000.00000
68390929.	3.168692E+11	0.00021583	0.00333291	15.44207275	2544.72736	60000.00000
68417889.	3.121729E+11	0.00021917	0.00337731	15.40978754	2541.50028	60000.00000
68444702.	3.076166E+11	0.00022250	0.00342176	15.37871253	2538.26371	60000.00000
68471352.	3.031942E+11	0.00022583	0.00346627	15.34879410	2535.01767	60000.00000
68497845.	2.988997E+11	0.00022917	0.00351083	15.31998718	2531.76194	60000.00000
68524175.	2.947276E+11	0.00023250	0.00355545	15.29224670	2528.49640	60000.00000
68576343.	2.867304E+11	0.00023917	0.00364485	15.23980200	2534.31555	60000.00000
68627831.	2.791641E+11	0.00024583	0.00373449	15.19115317	2540.78212	60000.00000
68678630.	2.719946E+11	0.00025250	0.00382437	15.14603198	2545.57200	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 68089.68828 in-kip

The analysis ended normally.

SITE NAME	RIDGEFIELD CT		ECP - CELL #	5	111
LATITUDE	41-16-51.30 N		LONGITUDE	73-29-34.40 W	
			SAVE BUTTON		
Additional Comments: 2014 AWS ADD.			STRUCTURE TYPE	MONOPOLE	
AWS - LTE ANTENNA ADD			ALPHA	BETA	GAMMA
EQUIPMENT TYPE	2100 MHz BBU		2100 MHz BBU		2100 MHz BBU
ANTENNA TYPE	BXA-171063-12CF-EDIN-2		BXA-171063-12CF-EDIN-2		BXA-171063-12CF-EDIN-2
QTY OF ANTENNAS PER FACE	1		1		1
ORIENTATION (DEG)	30		150		270
DOWN TILT (MECH/DEG)	3		3		4
RAD CTR (FT AGL)	128		128		128
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
RRH - QTY/MODEL	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS	1 ALU RH_2X40-AWS
SECTOR DISTRIBUTION BOX					
MAIN DISTRIBUTION BOX	1		DB-T1-6Z-8AB-0Z		
700 Mhz - LTE Current Config			ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 MHz eNodeB + TRDU		700 MHz eNodeB + TRDU		700 MHz eNodeB + TRDU
ANTENNA TYPE	APX75-866512-T2		APX75-866512-T2		APX75-866512-T2
QTY OF ANTENNAS PER FACE	1		1		1
ORIENTATION (DEG)	30		150		270
DOWN TILT (MECH/DEG)	0		0		0
RAD CTR (FT AGL)	128		128		128
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
RRH - QTY/MODEL					
SECTOR DISTRIBUTION BOX					
MAIN DISTRIBUTION BOX					
700 Mhz - LTE Future Config			ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 MHz eNodeB + TRDU		700 MHz eNodeB + TRDU		700 MHz eNodeB + TRDU
ANTENNA TYPE	APX75-866512-T2		APX75-866512-T2		APX75-866512-T2
QTY OF ANTENNAS PER FACE	1		1		1
ORIENTATION (DEG)	20		150		260
DOWN TILT (MECH/DEG)	4		0		0
RAD CTR (FT AGL)	128		128		128
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
RRH - QTY/MODEL					
SECTOR DISTRIBUTION BOX					
MAIN DISTRIBUTION BOX					
850 Cellular - Current Config			ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0HD		Cellular Modcell 4.0HD		Cellular Modcell 4.0HD
ANTENNA TYPE	BXA-80080/4CF FP		BXA-80080/4CF FP		BXA-80080/4CF FP
QTY OF ANTENNAS PER FACE	1		1		1
ORIENTATION (DEG)	30		150		270
DOWN TILT (MECH/DEG)	0		0		0
RAD CTR (FT AGL)	128		128		128
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
850 Cellular - Future Config			ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0HD		Cellular Modcell 4.0HD		Cellular Modcell 4.0HD
ANTENNA TYPE	BXA-80080/4CF FP		BXA-80080/4CF FP		BXA-80080/4CF FP
QTY OF ANTENNAS PER FACE	1		1		1
ORIENTATION (DEG)	30		150		270
DOWN TILT (MECH/DEG)	0		0		0
RAD CTR (FT AGL)	128		128		128
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
1900 PCS - Current Config			ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0		PCS Modcell 4.0		PCS Modcell 4.0
ANTENNA TYPE	MG D3-800T0		MG D3-800T0		MG D3-800T0
QTY OF ANTENNAS PER FACE	1		1		1
ORIENTATION (DEG)	30		150		270
DOWN TILT (MECH/DEG)	0		0		0
RAD CTR (FT AGL)	128		128		128
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL	2		2		2
1900 PCS - Future Config			ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0		PCS Modcell 4.0		PCS Modcell 4.0
ANTENNA TYPE	MG D3-800T0		MG D3-800T0		MG D3-800T0
QTY OF ANTENNAS PER FACE	1		1		1
ORIENTATION (DEG)	30		150		270
DOWN TILT (MECH/DEG)	0		0		0
RAD CTR (FT AGL)	128		128		128
TMA - QTY / MODEL					
DIPLEX WITH CELLULAR CABLE					
13001.067					

NUMBER OF CABLE'S NEEDED					ESTIMATED CABLE LENGTH								
MAINLINE SIZE		1 5/8"		TOTAL # OF MAINLINES		18		MAINLINE (FT)					
JUMPER SIZE		1/2"		TOTAL # OF TOP JUMPERS		18		TOP JUMPER (FT)					
Equipment Cable Ordering		MAIN CABLE		18		+		0		TOP JUMPER #	18	+	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-Band			700 Mhz C - B		Cellular (Watts)		20			
TX - 869-880,890-891.5 MHz			TX - 1970-1975			TX - 746-757		PCS (Watts)		16			
RX - 824-835,845-846.5 MHz			RX - 1890-1895			RX - 776-787		LTE (Watts)		40			
ALPHA				BETA				GAMMA					
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code		
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN		
A2	1900	Tx1/Rx0	RED/WHITE	A8	1900	Tx2/Rx0	BLUE/WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE		
A3	700	Tx1/Rx0	RED/ORANGE	A9	700	Tx2/Rx0	BLUE/ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE		
A4	700	Tx4/Rx1	RED/RED/ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ORANGE		
A5	1900	Tx4/Rx1	RED/RED/WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/WHITE		
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN		
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN		
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN		
RF ENGINEER				RF MANAGER				INITIALS		DATE			
Prepared By : Maria Montrose				Robert Hesselbach				MMM		8/28/2013			

Site Configuration

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

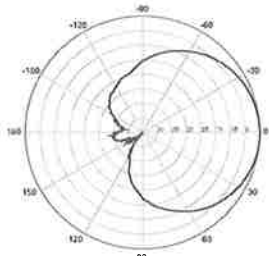
Replace "X" with desired electrical downtilt.

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

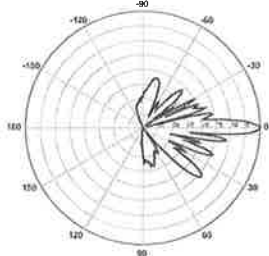
Electrical Characteristics	1710-2170 MHz			
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz	
Polarization	±45°	±45°	±45°	
Horizontal beamwidth	68°	65°	60°	
Vertical beamwidth	4.5°	4.5°	4.5°	
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi	
Electrical downtilt (X)	0, 2, 5			
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 m ² Side: 0.19 m ²	Front: 3.1 ft ² Side: 2.1 ft ²		
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

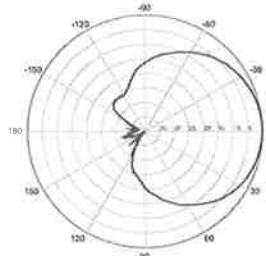


Horizontal | 1710-1880 MHz
BXA-171063-12CF-EDIN-0

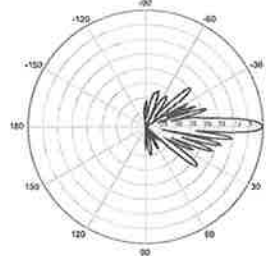


0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-X

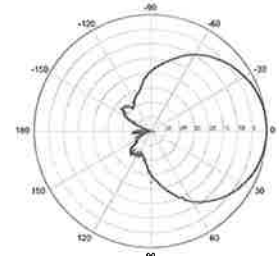


Horizontal | 1850-1990 MHz
BXA-171063-12CF-EDIN-0

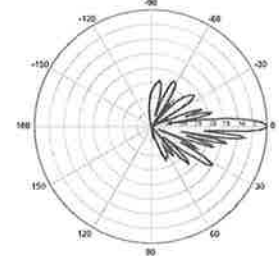


0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1920-2170 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.

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

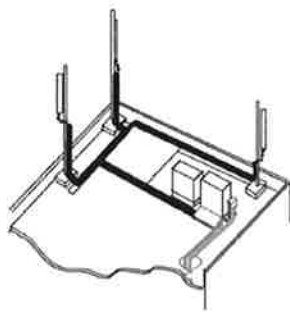
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent 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.



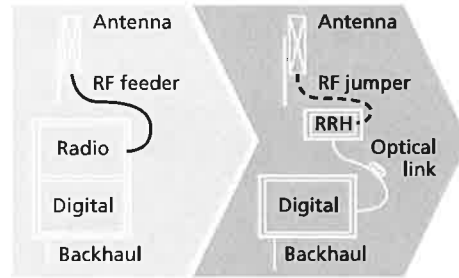
Macro

Features

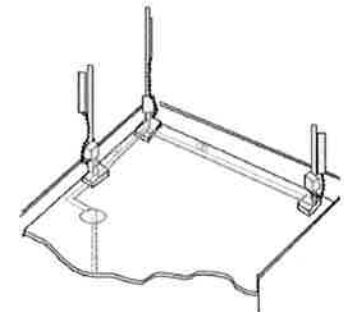
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

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



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (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

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DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

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



Features/Benefits

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

Technical Specifications

Mechanical Specifications

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

Electrical Specifications

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

* This data is provisional and subject to change.

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