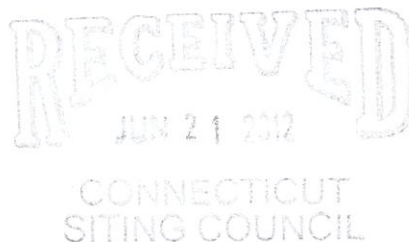


280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

June 20, 2012



Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap
1323 King Street, Greenwich, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains eight (8) wireless telecommunications antennas at the 98-foot level of the existing 100-foot lattice tower at the Bruce Memorial Golf Course in Greenwich. The tower is owned by the Town of Greenwich. The Council approved Cellco’s shared use of this tower in 1993. Cellco now intends to replace four (4) of its existing antennas with two (2) model BXA-171063-8BF PCS antennas; and two (2) model SLCP 2X6015 LTE antennas, all at the same 98-foot level. Cellco also intends to install three (3) additional coax cables. Attached behind Tab 1 are the specifications for the replacement antennas.



Law Offices

BOSTON

PROVIDENCE

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STAMFORD

WHITE PLAINS

NEW YORK CITY

ALBANY

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www.rc.com

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 Peter Tesei, First Selectman for the Town of Greenwich. The Town of Greenwich is the owner of the property on which the tower is located.

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 will be located at the 98-foot level on the 100-foot tower.

ROBINSON & COLE_{LLP}

Linda Roberts
June 20, 2012
Page 2

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

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

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed modifications. (See Tab 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:

Peter Tesei, Greenwich First Selectman
Diane Fox, Planning Director
Sandy M. Carter



BXA-171063-8BF-EDIN-X

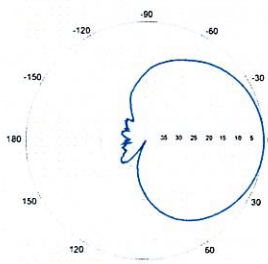
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in	
Depth with t-brackets	133 mm	5.2 in	
Weight without mounting brackets	4.8 kg	10.5 lbs	
Survival wind speed	296 km/hr	184 mph	
Wind area	Front: 0.19 m ² Side: 0.14 m ²	Front: 2.0 ft ² Side: 1.5 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

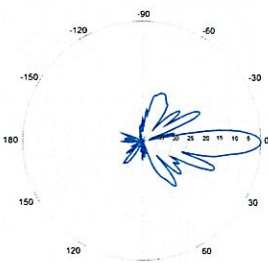


BXA-171063-8BF-EDIN-X



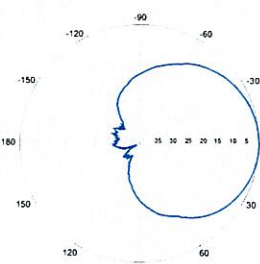
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



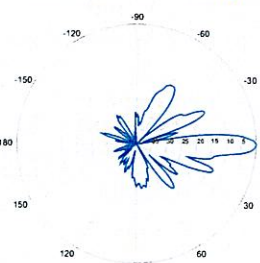
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



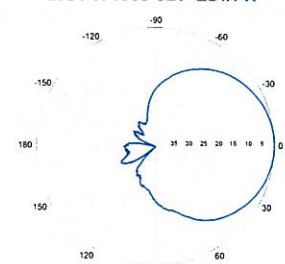
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-0



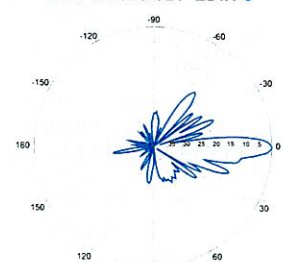
0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



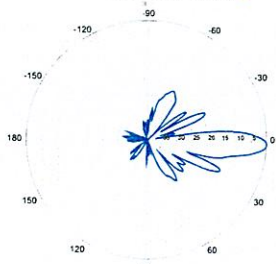
0° | Vertical | 1920-2170 MHz

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.

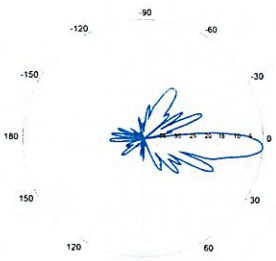
BXA-171063-8BF-EDIN-X

X-Pol | FET Panel | 63° | 17.4 dBi

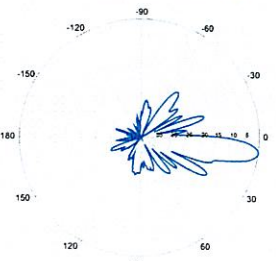
BXA-171063-8BF-EDIN-2



2° | Vertical | 1710-1880 MHz
BXA-171063-8BF-EDIN-4

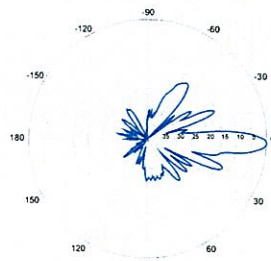


4° | Vertical | 1710-1880 MHz
BXA-171063-8BF-EDIN-8

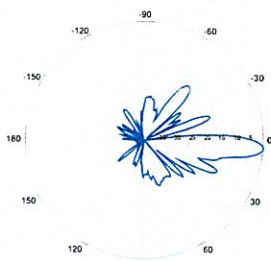


8° | Vertical | 1710-1880 MHz

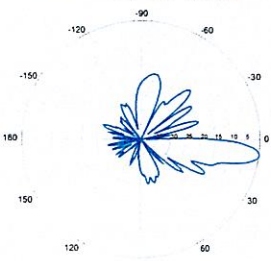
BXA-171063-8BF-EDIN-2



2° | Vertical | 1850-1990 MHz
BXA-171063-8BF-EDIN-4

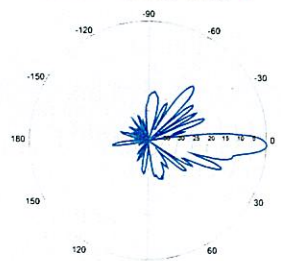


4° | Vertical | 1850-1990 MHz
BXA-171063-8BF-EDIN-8

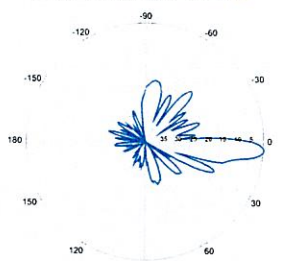


8° | Vertical | 1850-1990 MHz

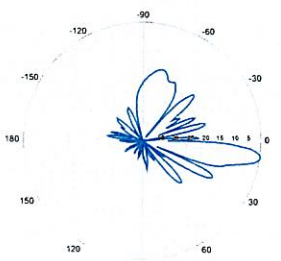
BXA-171063-8BF-EDIN-2



2° | Vertical | 1920-2170 MHz
BXA-171063-8BF-EDIN-4



4° | Vertical | 1920-2170 MHz
BXA-171063-8BF-EDIN-8



8° | Vertical | 1920-2170 MHz

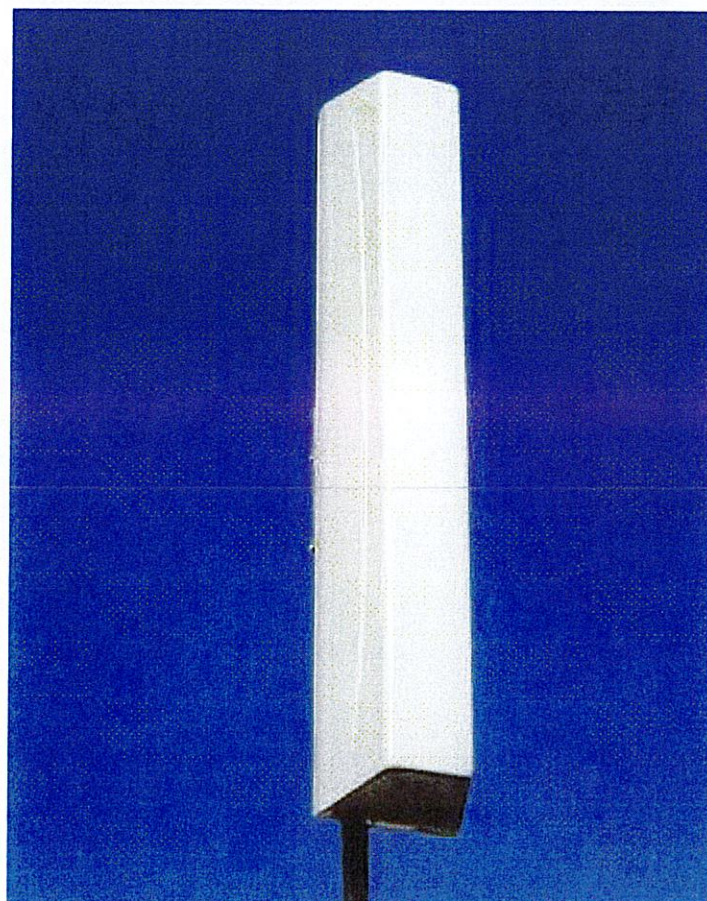
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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

SLCP 2x6015

Dual (2x) Circularly Polarized log-periodic antenna

Features

- ☐ **Transmit Diversity Gain**
- ☐ **Can be configured to combine space & polarization diversity**
- ☐ **Outstanding performance over the entire band (700 - 800 MHz)**
- ☐ **Excellent Axial Ratio**
- ☐ **Optimized for 4G & 3G systems**
- ☐ **Low intermodulation**
- ☐ **Improved Side-to-side rejection**
- ☐ **Fading reduction**
- ☐ **Excellent isolation between ports**



Electrical specifications

Frequency range:	700-800 MHz	
Impedance:	50 ohm	
Connector type:	7/16 Din	
Return loss:	18 dB	
Polarization:	Circular	
Gain ea. port [Circular]:	2x15 dBdC	
Gain ea. port [Linear]:	2x12 dBdL	
Axial Ratio:	2 dB	
Isolation between ports (TX band):	30 dB	
Front-to-back ratio:	30 dB	
Intermodulation (2x20W):	IM3	150 dB
	IM5	160 dB
	IM7/9	170 dB
Power rating:	2x 500 W	
H-plane (-3 dB point):	2x 55°	
V-plane (-3 dB point):	2x 11°	
Lightning protection:	DC grounded	

Mechanical specifications

Overall height:	77 in	[1956 mm]
Width:	14 in	[356 mm]
Depth:	11 in	[279 mm]
Weight (excluding brackets):	30 lbs	[13.6 Kg]
Wind load measured up to:	150 mph	[240 Km/h]
Wind area (side of antenna):	7.49 sq. ft.	[0.70 sq.m]
Lateral thrust at 113 mph/ 180 Km/h (worst case):	382 lbs	[1701 N]

Materials

Radiating Elements:	Aluminum
Transformer (Power distribution)	Ceramic PCB
Chassis:	Aluminum
Radome:	Grey Fiberglass/PVC
Mounting bolts:	Stainless steel

The SLCP 2x6015 is made in the U.S.A.

Structural Analysis Report

100' Existing Rohn Lattice Tower

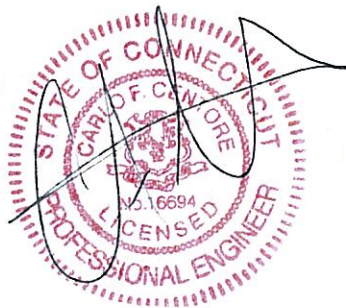
*Proposed Verizon Wireless
Antenna Upgrade*

Verizon Site Ref: Bruce

*1323 King Street
Greenwich, CT*

Centek Project No. 12001.CO61

Date: June 4, 2012



Prepared for:

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

Table of Contents

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- INTRODUCTION.
- ANTENNA AND APPURTENANCE SUMMARY.
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- ANALYSIS.
- TOWER LOADING.
- TOWER CAPACITY.
- FOUNDATION AND ANCHORS
- CONCLUSION AND RECOMMENDATIONS.

SECTION 2 – CONDITIONS & SOFTWARE

- STANDARD ENGINEERING CONDITIONS.
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM.

SECTION 3 – CALCULATIONS

- RISATower INPUT/OUTPUT SUMMARY.
- RISATower FEED LINE PLAN.
- RISATower FEED LINE DISTRIBUTION.
- RISATower DETAILED OUTPUT.
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SECTION 4 – REFERENCE MATERIALS

- VERIZON RF DATA SHEET.
- ANTENNA CUT SHEETS.

Introduction

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

The host tower is a 100-ft, three legged, lattice tower originally manufactured by ROHN eng. file no. 29307JC dated 4/23/93. The tower geometry, structure member sizes and foundation information were taken from a previous structural report prepared by GPD Group job no. 2011147.13 dated June 22, 2011. Antenna and appurtenance inventory were taken from the aforementioned GPD structural report, visual verification from grade by Centek personnel on May 24, 2012 and a Verizon RF data sheet.

The tower consists of five (5) tapered vertical sections consisting of steel pipe legs conforming to ASTM A572 Gr. 50 and lateral bracing conforming to ASTM A572 Gr. 50 and ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 8-ft 6-in at the top and 17-ft 5-in at the bottom.

Verizon Wireless proposes the removal of four (4) panel antennas and the installation of four (4) panel antennas mounted on two (2) existing T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- UNKNOWN (Existing):
Antenna: One (1) 8-ft Omni-directional whip antenna leg mounted with an elevation of ± 100 -ft above grade level.
Coax Cable: One (1) 7/8" $\varnothing$ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
Antenna: Six (6) Powerwave 7770 panel antennas, three (3) Powerwave P65-16-XLH-RR panel antennas and twelve (12) Powerwave LGP21401TMA's mounted on three (3) 12-ft Wireless Frames with a RAD center elevation of ± 88 -ft above grade level.
Coax Cable: Twelve (12) 1-5/8" $\varnothing$ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrester mounted with an elevation of 86-ft above grade level.
Coax Cables: One (1) fiber cable and two (2) dc control cables running inside of the existing tower.
- UNKNOWN (Existing):
Antenna: One (1) 4-ft $\varnothing$ dish leg mounted with an elevation of ± 84 -ft above grade level.
Coax Cable: One (1) EW90 cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
Antenna: One (1) 4-ft Ø dish leg mounted with an elevation of ± 70 -ft above grade level.
Coax Cable: One (1) EW90 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
Antennas: Four (4) Andrew DB844H90E-XY panel antennas mounted on two (2) 12-ft T-Frames with a RAD center elevation of ± 98 -ft above grade level.
Coax Cables: Nine (9) 7/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remove):
Antennas: Four (4) Andrew DB948F85T2E-M panel antennas mounted on two (2) 12-ft T-Frames with a RAD center elevation of ± 98 -ft above grade level.
- VERIZON (Proposed):
Antennas: Two (2) Swedcom SLCP 2X6015 and two (2) Antel BXA-171063-8BF panel antennas mounted on two (2) 12-ft T-Frames with a RAD center elevation of ± 98 -ft above grade level.
Coax Cables: Three (3) 7/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

A n a l y s i s

The existing tower was analyzed using a comprehensive computer program entitled RISATower. 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 of the tower analysis.

T o w e r L o a d i n g

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)	[Section 16 of TIA/EIA-222-F-96]
	Greenwich; v = 100 mph (3 second gust) equivalent to v = 80 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	TIA/EIA-222-F wind speed controls.	
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.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<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.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

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

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software RISATower. 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 RISATower "Section Capacity Table", this tower was found to be at **49.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal (T5)	0'-0"-20'-0"	43.9%	PASS
Leg (T3)	40'-0"-60'-0"	49.4%	PASS

Foundation and Anchors

The existing foundation consists of three (3) 3-ft Ø x 3-ft long reinforced concrete piers on a 24-ft square x 4-ft thick reinforced concrete pad bearing directly on existing sub grade. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural report prepared by GPD Group job no. 2011147.13 dated June 22, 2011. Tower legs are connected to the foundation by means of (4) 1"Ø, ASTM A354-BC anchor bolts per leg, embedded into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

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

Reactions	Vector	Proposed Base Reactions
Base	Shear	17 kips
	Compression	14 kips
	Moment	1046 kip-ft
Leg	Shear	10 kips
	Uplift	65 kips
	Compression	74 kips

CEN TEK Engineering, Inc.

Structural Analysis - 100-ft Rohn Lattice Tower

Verizon Wireless Antenna Upgrade – Bruce

Greenwich, CT

June 4, 2012

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	34.1%	PASS

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS) ⁽¹⁾	Proposed Loading (FS) ⁽¹⁾	Result
Reinforced Concrete Mat	OM ⁽²⁾	2.0	5.14	PASS

Note 1: FS denotes Factor of Safety

Note 2: OM denotes Overturning Moment.

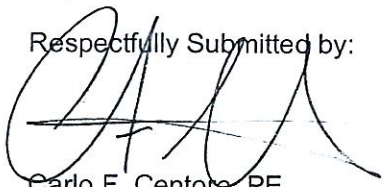
Conclusion`

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

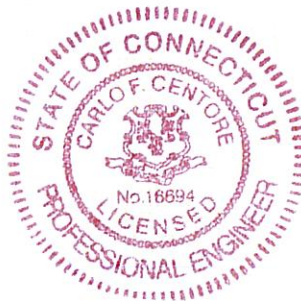
The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

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, EIT
Structural Engineer

*Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures*

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

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

RISATower Features:

- RISATower 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.
- RISATower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	T1	T2	T3	T4	T5	T6	100.0 ft
Legs	ROHN 2.5 STD	ROHN 3 STD	ROHN 3.5 STD	ROHN 4 EH	ROHN 5 X-STR	ROHN 2.5 STD	
Leg Grade			A572-50				
Diagonals		ROHN 2 STD					
Diagonal Grade			A572-50				
Top Girts			N.A.				
Horizontals	ROHN 1.5 STD			ROHN 2 STD			
Inner Bracing							
Face Width (ft)	8.5	8.54167	10.5833	12.625	14.9583	17.4583	
# Panels @ (ft)		9 @ 6.66667			4 @ 10		
Weight (K)	1.1	1.3	1.5	2.1	2.6	8.8	



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
8' x 3" Dia Omni	100	(2) 7770.00 (ATI Existing)	88
4' x 2.875" Pipe Mount	100	(2) 7770.00 (ATI Existing)	88
Pirol 12' T-Frame Sector Mount (1) (Verizon Existing)	98	P65-16-XLH-RR (ATI Existing)	88
Pirol 12' T-Frame Sector Mount (1) (Verizon Existing)	98	P65-16-XLH-RR (ATI Existing)	88
DB844H90-XY (Verizon Existing)	98	P65-16-XLH-RR (ATI Existing)	88
SLCP 2x6015 (Verizon Proposed)	98	(4) LPG21401 TMA (ATI Existing)	88
BXA-171063/8BF (Verizon Proposed)	98	(4) LPG21401 TMA (ATI Existing)	88
DB844H90-XY (Verizon Existing)	98	(2) RRUS-11 (ATI Existing)	88
SLCP 2x6015 (Verizon Proposed)	98	(2) RRUS-11 (ATI Existing)	88
BXA-171063/8BF (Verizon Proposed)	98	(2) RRUS-11 (ATI Existing)	88
DB844H90-XY (Verizon Existing)	98	DC6-48-60-18-8F Surge Arrestor (ATI Existing)	86
P1000 Unistrut (9' Long) (ATI Existing)	88.5 - 88	3' x 4.5" Pipe Mount	84
P1000 Unistrut (9' Long) (ATI Existing)	88.5 - 88	4 FT DISH	84
P1000 Unistrut (9' Long) (ATI Existing)	88.5 - 88	P1000 Unistrut (9' Long) (ATI Existing)	78.5
12' Frame (ATI Existing)	88	P1000 Unistrut (9' Long) (ATI Existing)	78.5
12' Frame (ATI Existing)	88	P1000 Unistrut (9' Long) (ATI Existing)	78.5
12' Frame (ATI Existing)	88	3' x 4.5" Pipe Mount	70
(2) 7770.00 (ATI Existing)	88	4 FT DISH	70

MATERIAL STRENGTH

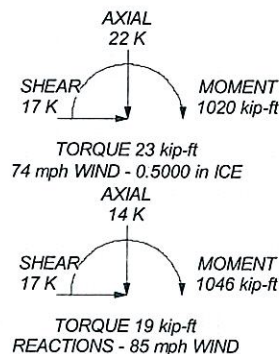
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 49.4%

MAX. CORNER REACTIONS AT BASE:

DOWN: 74 K
UPLIFT: -65 K
SHEAR: 10 K



Centek Engineering Inc.

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

Job: 12001.CO61 - Bruce

Project: 100' Rohn Lattice Tower - 1323 King St., Greenwich, CT

Client: Verizon Wireless Drawn by: TJL App'd:

Code: TIA/EIA-222-F Date: 06/04/12 Scale: NTS

Path: J:\Jobs\1200100.W\CO61 - Bruce\Cad\ERI Files\100-Rohn Lattice Tower.dwg Dwg No. E-1

Feedline Plan

Round

Flat

App In Face

App Out Face

(12) 1 5/8 (AT&T Existing)

RG6-Fiber (AT&T Existing)

(1) #8 AWG Copper Wire (AT&T Existing)

7/8"
E/W 90°

(9) LDF5-50A (7/8 FOAM) (Verizon Existing)
(3) LDF5-50A (7/8 FOAM) (Verizon Proposed)

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App'd:

Code: TIA/EIA-222-F

Date: 06/04/12

Scale: NTS

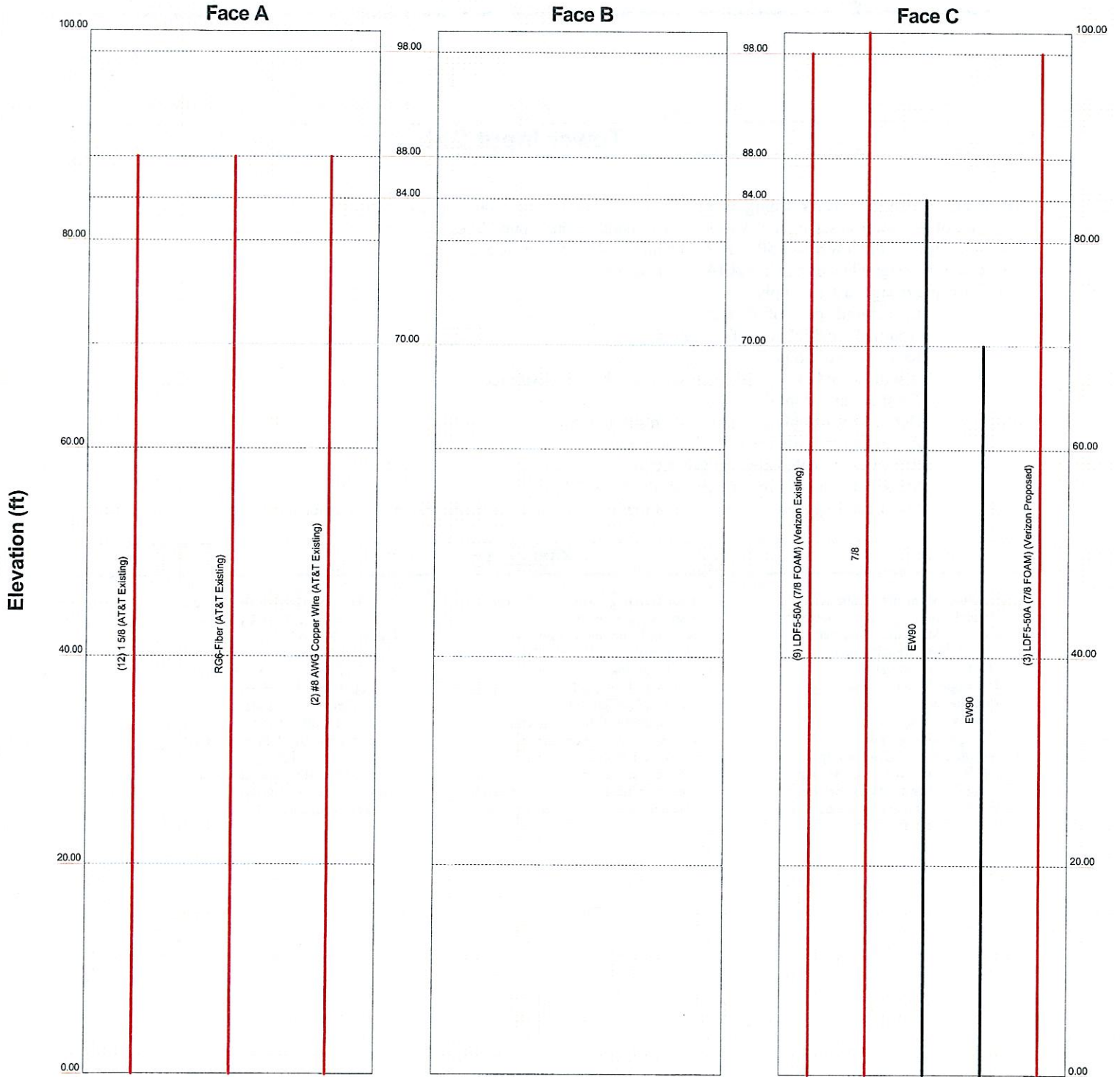
Path:

Dwg No. E-7

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Feedline Distribution Chart 0' - 100'

Round Flat App In Face App Out Face Truss Leg



Centek Engineering Inc.		Job: 12001.CO61 - Bruce	
63-2 North Branford Rd.		Project: 100' Rohn Lattice Tower - 1323 King St., Greenwich, CT	
Branford, CT 06405		Client: Verizon Wireless	Drawn by: TJL
Phone: (203) 488-0580		Code: TIA/EIA-222-F	Date: 06/04/12
FAX: (203) 488-8587		Path: J:\Jobs\12001\100 W\CD61 - Bruce\Calcs\VERI Files\100-4 Rohn Lattice Tower.dwg	Scale: NTS
			Dwg No. E-7

<i>RISATower</i> Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	12001.CO61 - Bruce	Page	1 of 30
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	Client	Verizon Wireless	Designed by	TJL

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 8.50 ft at the top and 17.46 ft at the base.

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

The following design criteria apply:

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

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

Pressures are calculated at each section.

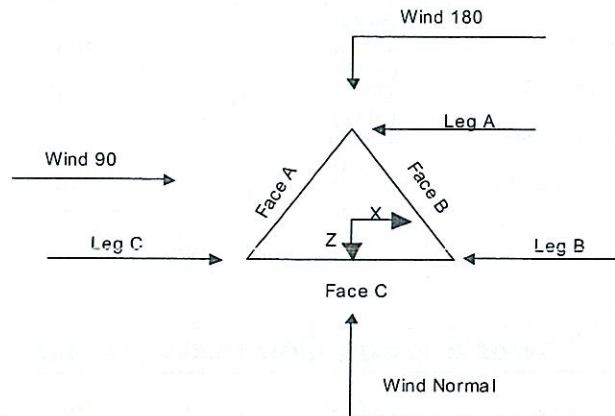
Stress ratio used in tower member design is 1.333.

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

Options

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

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Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	100.00-80.00			8.50	1	20.00
T2	80.00-60.00			8.54	1	20.00
T3	60.00-40.00			10.58	1	20.00
T4	40.00-20.00			12.63	1	20.00
T5	20.00-0.00			14.96	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	100.00-80.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T2	80.00-60.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T3	60.00-40.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T4	40.00-20.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T5	20.00-0.00	10.00	K Brace Down	No	Yes	0.0000	0.0000

Tower Section Geometry (cont'd)

<i>RISATower</i> Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	12001.CO61 - Bruce	Page 3 of 30
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Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 100.00-80.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T2 80.00-60.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T3 60.00-40.00	Pipe	ROHN 3.5 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 40.00-20.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T5 20.00-0.00	Pipe	ROHN 5 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 100.00-80.00	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 100.00-80.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T2 80.00-60.00	None	Solid Round		A572-50 (50 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T3 60.00-40.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 40.00-20.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T5 20.00-0.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 100.00-80.00	Single Angle		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T2 80.00-60.00	Single Angle		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)

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Tower Elevation	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
<i>ft</i>						
T3 60.00-40.00	Single Angle		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T4 40.00-20.00	Single Angle		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T5 20.00-0.00	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
<i>ft</i>	<i>ft²</i>	<i>in</i>					<i>in</i>	<i>in</i>
T1 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
<i>ft</i>				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1 100.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1
T2 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1
T3 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1
T4 40.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1
T5 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1

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

Tower Section Geometry (cont'd)

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Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T2 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 100.00-80.00	Flange	0.7500	4	0.6250	3	0.6250	2	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T2 80.00-60.00	Flange	A325N		A325N		A325N		A325N		A325N		A325N		A325N	
		0.8750	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T3 60.00-40.00	Flange	A325N		A325N		A325N		A325N		A325N		A325N		A325N	
		0.8750	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T4 40.00-20.00	Flange	A325N		A325N		A325N		A325N		A325N		A325N		A325N	
		1.0000	4	0.6250	3	0.6250	1	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T5 20.00-0.00	Flange	A325N		A325N		A325N		A325N		A325N		A325N		A325N	
		1.0000	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A354-BC		A325N		A325N		A325N		A325N		A325N		A325N	

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF5-50A (7/8 FOAM) (Verizon Existing)	C	Yes	Ar (CfAe)	98.00 - 0.00	1.0000	0.3	9	9	1.0900	1.0900		0.33
1 5/8 (AT&T Existing)	A	Yes	Ar (CfAe)	88.00 - 0.00	1.0000	-0.33	12	12	1.9800	1.9800		1.04
RG6-Fiber (AT&T Existing)	A	Yes	Ar (CfAe)	88.00 - 0.00	1.0000	-0.45	1	1	0.5000	0.5000		1.00
#8 AWG Copper Wire (AT&T Existing)	A	Yes	Ar (CfAe)	88.00 - 0.00	1.0000	-0.47	2	2	0.2500	0.1285		0.05
7/8 EW90	C	Yes	Ar (CfAe)	100.00 - 0.00	1.0000	0.41	1	1	1.1100	1.1100		0.54
EW90	C	Yes	Af (CfAe)	84.00 - 0.00	1.0000	0.39	1	1	0.9869	0.9869	3.2550	0.32
EW90	C	Yes	Af (CfAe)	70.00 - 0.00	1.0000	0.37	1	1	0.9869	0.9869	3.2550	0.32
LDF5-50A	C	Yes	Ar (CfAe)	98.00 - 0.00	4.0000	0.28	3	3	1.0900	1.0900		0.33

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Description	Face or Leg	Allow or Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	# Per Row	# Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(7/8 FOAM) (Verizon Proposed)											

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
T1	100.00-80.00	A	16.345	0.000	0.000	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.00
		C	21.470	0.329	0.000	0.000	0.08
T2	80.00-60.00	A	40.862	0.000	0.000	0.000	0.27
		B	0.000	0.000	0.000	0.000	0.00
		C	23.650	2.467	0.000	0.000	0.10
T3	60.00-40.00	A	40.862	0.000	0.000	0.000	0.27
		B	0.000	0.000	0.000	0.000	0.00
		C	23.650	3.290	0.000	0.000	0.10
T4	40.00-20.00	A	40.862	0.000	0.000	0.000	0.27
		B	0.000	0.000	0.000	0.000	0.00
		C	23.650	3.290	0.000	0.000	0.10
T5	20.00-0.00	A	40.862	0.000	0.000	0.000	0.27
		B	0.000	0.000	0.000	0.000	0.00
		C	23.650	3.290	0.000	0.000	0.10

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
T1	100.00-80.00	A	0.500	25.592	0.252	0.000	0.000	0.26
		B		0.000	0.000	0.000	0.000	0.00
		C		41.137	0.551	0.000	0.000	0.32
T2	80.00-60.00	A	0.500	63.981	0.631	0.000	0.000	0.66
		B		0.000	0.000	0.000	0.000	0.00
		C		45.317	4.134	0.000	0.000	0.38
T3	60.00-40.00	A	0.500	63.981	0.631	0.000	0.000	0.66
		B		0.000	0.000	0.000	0.000	0.00
		C		45.317	5.512	0.000	0.000	0.40
T4	40.00-20.00	A	0.500	63.981	0.631	0.000	0.000	0.66
		B		0.000	0.000	0.000	0.000	0.00
		C		45.317	5.512	0.000	0.000	0.40
T5	20.00-0.00	A	0.500	63.981	0.631	0.000	0.000	0.66
		B		0.000	0.000	0.000	0.000	0.00
		C		45.317	5.512	0.000	0.000	0.40

Feed Line Shielding

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Section	Elevation	Face	A_R	$A_{R_{Ice}}$	A_F	$A_{F_{Ice}}$
	ft		ft ²	ft ²	ft ²	ft ²
T1	100.00-80.00	A	1.289	2.960	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	1.719	4.788	0.000	0.000
T2	80.00-60.00	A	3.009	6.922	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	1.923	5.387	0.000	0.000
T3	60.00-40.00	A	3.033	6.816	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	2.000	5.479	0.000	0.000
T4	40.00-20.00	A	2.487	5.394	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	1.640	4.336	0.000	0.000
T5	20.00-0.00	A	2.330	5.059	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	1.536	4.067	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	$CP_{X_{Ice}}$	$CP_{Z_{Ice}}$
	ft	in	in	in	in
T1	100.00-80.00	-12.5856	8.2064	-13.7582	9.5288
T2	80.00-60.00	-19.7855	10.4393	-20.9670	11.7807
T3	60.00-40.00	-21.8380	11.6166	-23.6369	13.3565
T4	40.00-20.00	-25.3885	13.5275	-28.2221	15.9579
T5	20.00-0.00	-27.1881	14.5052	-30.8668	17.4617

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	$C_{AA_{Front}}$	$C_{AA_{Side}}$	Weight
			ft ft ft	°	ft	ft ²	ft ²	K
8' x 3" Dia Omni	C	From Leg	1.00	0.0000	100.00	No Ice	2.40	0.03
			0.00			1/2" Ice	3.19	0.04
			4.00					
4' x 2.875" Pipe Mount	C	From Leg	0.50	0.0000	100.00	No Ice	0.97	0.02
			0.00			1/2" Ice	1.22	0.03
			0.00					
Pirod 12' T-Frame Sector Mount (1) (Verizon Existing)	A	None		0.0000	98.00	No Ice	13.60	0.47
						1/2" Ice	18.40	0.60
Pirod 12' T-Frame Sector Mount (1) (Verizon Existing)	B	None		0.0000	98.00	No Ice	13.60	0.47
						1/2" Ice	18.40	0.60
DB844H90-XY (Verizon Existing)	A	From Leg	4.00	0.0000	98.00	No Ice	2.87	0.01
			-6.00			1/2" Ice	3.18	0.04
			0.00				4.34	
SLCP 2x6015	A	From Leg	4.00	0.0000	98.00	No Ice	10.48	0.03

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(Verizon Proposed)			0.00			1/2" Ice	11.07	8.81	0.10
BXA-171063/8BF	A	From Leg	0.00						
(Verizon Proposed)			4.00	0.0000	98.00	No Ice	2.94	2.16	0.01
			4.00			1/2" Ice	3.26	2.46	0.03
DB844H90-XY	A	From Leg	0.00						
(Verizon Existing)			4.00	0.0000	98.00	No Ice	2.87	3.97	0.01
			6.00			1/2" Ice	3.18	4.34	0.04
DB844H90-XY	B	From Leg	0.00						
(Verizon Existing)			4.00	0.0000	98.00	No Ice	2.87	3.97	0.01
			-6.00			1/2" Ice	3.18	4.34	0.04
SLCP 2x6015	B	From Leg	0.00						
(Verizon Proposed)			4.00	0.0000	98.00	No Ice	10.48	8.23	0.03
			0.00			1/2" Ice	11.07	8.81	0.10
BXA-171063/8BF	B	From Leg	0.00						
(Verizon Proposed)			4.00	0.0000	98.00	No Ice	2.94	2.16	0.01
			4.00			1/2" Ice	3.26	2.46	0.03
DB844H90-XY	B	From Leg	0.00						
(Verizon Existing)			4.00	0.0000	98.00	No Ice	2.87	3.97	0.01
			6.00			1/2" Ice	3.18	4.34	0.04
12' Frame	A	From Leg	0.00						
(AT&T Existing)			1.00	0.0000	88.00	No Ice	9.80	9.80	0.26
			0.00			1/2" Ice	14.80	14.80	0.36
12' Frame	B	From Leg	0.00						
(AT&T Existing)			1.00	0.0000	88.00	No Ice	9.80	9.80	0.26
			0.00			1/2" Ice	14.80	14.80	0.36
12' Frame	C	From Leg	0.00						
(AT&T Existing)			1.00	0.0000	88.00	No Ice	9.80	9.80	0.26
			0.00			1/2" Ice	14.80	14.80	0.36
P1000 Unistrut (9' Long)	A	From Face	0.00						
(AT&T Existing)			3.00	0.0000	88.00 - 88.50	No Ice	1.71	0.03	0.02
			0.00			1/2" Ice	2.42	0.05	0.03
P1000 Unistrut (9' Long)	A	From Face	0.00						
(AT&T Existing)			3.00	0.0000	78.50	No Ice	1.71	0.03	0.02
			0.00			1/2" Ice	2.42	0.05	0.03
P1000 Unistrut (9' Long)	B	From Face	0.00						
(AT&T Existing)			3.00	0.0000	88.00 - 88.50	No Ice	1.71	0.03	0.02
			0.00			1/2" Ice	2.42	0.05	0.03
P1000 Unistrut (9' Long)	B	From Face	0.00						
(AT&T Existing)			3.00	0.0000	78.50	No Ice	1.71	0.03	0.02
			0.00			1/2" Ice	2.42	0.05	0.03
P1000 Unistrut (9' Long)	C	From Face	0.00						
(AT&T Existing)			3.00	0.0000	88.00 - 88.50	No Ice	1.71	0.03	0.02
			0.00			1/2" Ice	2.42	0.05	0.03
P1000 Unistrut (9' Long)	C	From Face	0.00						
(AT&T Existing)			3.00	0.0000	78.50	No Ice	1.71	0.03	0.02
			0.00			1/2" Ice	2.42	0.05	0.03
(2) 7770.00	A	From Face	0.00						
(AT&T Existing)			3.00	0.0000	88.00	No Ice	5.88	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
(2) 7770.00	B	From Face	0.00						
(AT&T Existing)			3.00	0.0000	88.00	No Ice	5.88	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
(2) 7770.00	C	From Face	0.00						
(AT&T Existing)			3.00	0.0000	88.00	No Ice	5.88	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
P65-16-XLH-RR	A	From Face	0.00						
			3.00	0.0000	88.00	No Ice	8.40	4.70	0.06

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(AT&T Existing)			0.00		1/2" Ice	8.95	5.15	0.11
P65-16-XLH-RR (AT&T Existing)	B	From Face	0.00	0.0000	88.00	No Ice	8.40	0.06
			0.00		1/2" Ice	8.95	5.15	0.11
P65-16-XLH-RR (AT&T Existing)	C	From Face	0.00	0.0000	88.00	No Ice	8.40	0.06
			0.00		1/2" Ice	8.95	5.15	0.11
(4) LPG21401 TMA (AT&T Existing)	A	From Face	0.00	0.0000	88.00	No Ice	0.95	0.02
			0.00		1/2" Ice	1.09	0.48	0.02
(4) LPG21401 TMA (AT&T Existing)	B	From Face	0.00	0.0000	88.00	No Ice	0.95	0.02
			0.00		1/2" Ice	1.09	0.48	0.02
(4) LPG21401 TMA (AT&T Existing)	C	From Face	0.00	0.0000	88.00	No Ice	0.95	0.02
			0.00		1/2" Ice	1.09	0.48	0.02
(2) RRUS-11 (AT&T Existing)	A	From Face	0.00	0.0000	88.00	No Ice	2.99	0.05
			0.00		1/2" Ice	3.23	1.41	0.07
(2) RRUS-11 (AT&T Existing)	B	From Face	0.00	0.0000	88.00	No Ice	2.99	0.05
			0.00		1/2" Ice	3.23	1.41	0.07
(2) RRUS-11 (AT&T Existing)	C	From Face	0.00	0.0000	88.00	No Ice	2.99	0.05
			0.00		1/2" Ice	3.23	1.41	0.07
DC6-48-60-18-8F Surge Arrestor (AT&T Existing)	C	From Face	0.50	0.0000	86.00	No Ice	2.23	0.02
			0.50		1/2" Ice	2.45	2.45	0.04
3' x 4.5" Pipe Mont	B	From Leg	0.00	0.0000	84.00	No Ice	0.93	0.03
			0.00		1/2" Ice	1.13	1.13	0.04
3' x 4.5" Pipe Mont	B	From Leg	0.00	0.0000	70.00	No Ice	0.93	0.03
			0.00		1/2" Ice	1.13	1.13	0.04

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft²	Weight K
4 FT DISH	B	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		84.00	4.00	No Ice 1/2" Ice	12.56 13.09
4 FT DISH	B	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		70.00	4.00	No Ice 1/2" Ice	12.56 13.09

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Tower Pressures - No Ice

$$G_H = 1.162$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
T1 100.00-80.00	90.00	1.332	25	175.208	A	0.000	37.703	9.583	25.42	0.000	0.000
					B	0.000	22.647		42.32	0.000	0.000
					C	0.329	42.398		22.43	0.000	0.000
T2 80.00-60.00	70.00	1.24	23	197.091	A	0.000	63.367	11.687	18.44	0.000	0.000
					B	0.000	25.514		45.81	0.000	0.000
					C	2.467	47.241		23.51	0.000	0.000
T3 60.00-40.00	50.00	1.126	21	238.758	A	0.000	68.020	13.356	19.64	0.000	0.000
					B	0.000	30.192		44.24	0.000	0.000
					C	3.290	51.842		24.23	0.000	0.000
T4 40.00-20.00	30.00	1	18	283.346	A	0.000	69.997	15.034	21.48	0.000	0.000
					B	0.000	31.623		47.54	0.000	0.000
					C	3.290	53.633		26.41	0.000	0.000
T5 20.00-0.00	10.00	1	18	333.456	A	0.000	75.314	18.592	24.69	0.000	0.000
					B	0.000	36.782		50.55	0.000	0.000
					C	3.290	58.896		29.90	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.162$$

Section Elevation	z	K _Z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
T1 100.00-80.00	90.00	1.332	18	0.5000	176.875	A	0.252	54.526	12.917	23.58	0.000	0.000
						B	0.000	31.895		40.50	0.000	0.000
						C	0.551	68.243		18.78	0.000	0.000
T2 80.00-60.00	70.00	1.24	17	0.5000	198.759	A	0.631	92.181	15.026	16.19	0.000	0.000
						B	0.000	35.122		42.78	0.000	0.000
						C	4.134	75.051		18.98	0.000	0.000
T3 60.00-40.00	50.00	1.126	16	0.5000	240.427	A	0.631	97.785	16.696	16.96	0.000	0.000
						B	0.000	40.620		41.10	0.000	0.000
						C	5.512	80.457		19.42	0.000	0.000
T4 40.00-20.00	30.00	1	14	0.5000	285.015	A	0.631	99.693	18.375	18.32	0.000	0.000
						B	0.000	41.106		44.70	0.000	0.000
						C	5.512	82.087		20.98	0.000	0.000
T5 20.00-0.00	10.00	1	14	0.5000	335.126	A	0.631	105.812	21.934	20.61	0.000	0.000
						B	0.000	46.890		46.78	0.000	0.000
						C	5.512	88.140		23.42	0.000	0.000

Tower Pressure - Service

$$G_H = 1.162$$

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Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _{MA} In Face	C _{MA} Out Face
ft	ft		psf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
T1 100.00-80.00	90.00	1.332	9	175.208	A	0.000	37.703	9.583	25.42	0.000	0.000
					B	0.000	22.647		42.32	0.000	0.000
					C	0.329	42.398		22.43	0.000	0.000
T2 80.00-60.00	70.00	1.24	8	197.091	A	0.000	63.367	11.687	18.44	0.000	0.000
					B	0.000	25.514		45.81	0.000	0.000
					C	2.467	47.241		23.51	0.000	0.000
T3 60.00-40.00	50.00	1.126	7	238.758	A	0.000	68.020	13.356	19.64	0.000	0.000
					B	0.000	30.192		44.24	0.000	0.000
					C	3.290	51.842		24.23	0.000	0.000
T4 40.00-20.00	30.00	1	6	283.346	A	0.000	69.997	15.034	21.48	0.000	0.000
					B	0.000	31.623		47.54	0.000	0.000
					C	3.290	53.633		26.41	0.000	0.000
T5 20.00-0.00	10.00	1	6	333.456	A	0.000	75.314	18.592	24.69	0.000	0.000
					B	0.000	36.782		50.55	0.000	0.000
					C	3.290	58.896		29.90	0.000	0.000

Tower Forces - No 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							ft ²	K	plf	
T1 100.00-80.00	0.19	1.14	A	0.215	2.546	0.594	1	1	22.381	1.81	90.64	C
			B	0.129	2.849	0.579	1	1	13.102			
			C	0.244	2.456	0.6	1	1	25.782			
T2 80.00-60.00	0.37	1.30	A	0.322	2.24	0.623	1	1	39.460	2.36	117.78	A
			B	0.129	2.849	0.579	1	1	14.761			
			C	0.252	2.431	0.602	1	1	30.927			
T3 60.00-40.00	0.37	1.59	A	0.285	2.337	0.611	1	1	41.587	2.35	117.62	A
			B	0.126	2.86	0.578	1	1	17.456			
			C	0.231	2.496	0.597	1	1	34.250			
T4 40.00-20.00	0.37	2.11	A	0.247	2.446	0.601	1	1	42.077	2.21	110.63	A
			B	0.112	2.918	0.576	1	1	18.226			
			C	0.201	2.593	0.591	1	1	34.964			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	1	1	44.888	2.42	121.18	A
			B	0.11	2.923	0.576	1	1	21.194			
			C	0.186	2.642	0.588	1	1	37.905			
Sum Weight:	1.69	8.79						OTM	536.28 kip-ft	11.16		

Tower Forces - No 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							ft ²	K	plf	
T1 100.00-80.00	0.19	1.14	A	0.215	2.546	0.594	0.825	1	22.381	1.81	90.44	C
			B	0.129	2.849	0.579	0.825	1	13.102			
			C	0.244	2.456	0.6	0.825	1	25.724			
T2 80.00-60.00	0.37	1.30	A	0.322	2.24	0.623	0.825	1	39.460	2.36	117.78	A
			B	0.129	2.849	0.579	0.825	1	14.761			
			C	0.252	2.431	0.602	0.825	1	30.495			
T3	0.37	1.59	A	0.285	2.337	0.611	0.825	1	41.587	2.35	117.62	A

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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	
60.00-40.00			B	0.126	2.86	0.578	0.825	1	17.456			
			C	0.231	2.496	0.597	0.825	1	33.674			
T4	0.37	2.11	A	0.247	2.446	0.601	0.825	1	42.077	2.21	110.63	A
40.00-20.00			B	0.112	2.918	0.576	0.825	1	18.226			
			C	0.201	2.593	0.591	0.825	1	34.389			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	0.825	1	44.888	2.42	121.18	A
			B	0.11	2.923	0.576	0.825	1	21.194			
			C	0.186	2.642	0.588	0.825	1	37.329			
Sum Weight:	1.69	8.79						OTM	535.92 kip-ft	11.15		

Tower Forces - No 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							ft ²	K	plf	
T1	0.19	1.14	A	0.215	2.546	0.594	0.8	1	22.381	1.81	90.41	C
100.00-80.00			B	0.129	2.849	0.579	0.8	1	13.102			
			C	0.244	2.456	0.6	0.8	1	25.716			
T2	0.37	1.30	A	0.322	2.24	0.623	0.8	1	39.460	2.36	117.78	A
80.00-60.00			B	0.129	2.849	0.579	0.8	1	14.761			
			C	0.252	2.431	0.602	0.8	1	30.434			
T3	0.37	1.59	A	0.285	2.337	0.611	0.8	1	41.587	2.35	117.62	A
60.00-40.00			B	0.126	2.86	0.578	0.8	1	17.456			
			C	0.231	2.496	0.597	0.8	1	33.592			
T4	0.37	2.11	A	0.247	2.446	0.601	0.8	1	42.077	2.21	110.63	A
40.00-20.00			B	0.112	2.918	0.576	0.8	1	18.226			
			C	0.201	2.593	0.591	0.8	1	34.307			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	0.8	1	44.888	2.42	121.18	A
			B	0.11	2.923	0.576	0.8	1	21.194			
			C	0.186	2.642	0.588	0.8	1	37.247			
Sum Weight:	1.69	8.79						OTM	535.87 kip-ft	11.15		

Tower Forces - No 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	
T1	0.19	1.14	A	0.215	2.546	0.594	0.85	1	22.381	1.81	90.47	C
100.00-80.00			B	0.129	2.849	0.579	0.85	1	13.102			
			C	0.244	2.456	0.6	0.85	1	25.733			
T2	0.37	1.30	A	0.322	2.24	0.623	0.85	1	39.460	2.36	117.78	A
80.00-60.00			B	0.129	2.849	0.579	0.85	1	14.761			
			C	0.252	2.431	0.602	0.85	1	30.557			
T3	0.37	1.59	A	0.285	2.337	0.611	0.85	1	41.587	2.35	117.62	A
60.00-40.00			B	0.126	2.86	0.578	0.85	1	17.456			
			C	0.231	2.496	0.597	0.85	1	33.756			
T4	0.37	2.11	A	0.247	2.446	0.601	0.85	1	42.077	2.21	110.63	A

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	Project 100' Rohn Lattice Tower - 1323 King St., Greenwich, CT	Date 08:56:20 06/04/12
	Client Verizon Wireless	Designed by TJL

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	
40.00-20.00			B	0.112	2.918	0.576	0.85	1	18.226			
			C	0.201	2.593	0.591	0.85	1	34.471			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	0.85	1	44.888	2.42	121.18	A
			B	0.11	2.923	0.576	0.85	1	21.194			
			C	0.186	2.642	0.588	0.85	1	37.412			
Sum Weight:	1.69	8.79						OTM	535.97 kip-ft	11.15		

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							ft ²	K	plf	
T1	0.58	1.70	A	0.31	2.271	0.619	1	1	34.000	2.00	100.16	C
100.00-80.00			B	0.18	2.663	0.587	1	1	18.709			
			C	0.389	2.086	0.647	1	1	44.715			
T2	1.04	1.91	A	0.467	1.947	0.681	1	1	63.425	2.47	123.37	A
80.00-60.00			B	0.177	2.676	0.586	1	1	20.579			
			C	0.398	2.067	0.651	1	1	52.989			
T3	1.05	2.32	A	0.409	2.046	0.655	1	1	64.724	2.40	120.18	A
60.00-40.00			B	0.169	2.703	0.585	1	1	23.744			
			C	0.358	2.154	0.635	1	1	56.619			
T4	1.05	2.82	A	0.352	2.167	0.633	1	1	63.755	2.23	111.36	A
40.00-20.00			B	0.144	2.793	0.581	1	1	23.866			
			C	0.307	2.277	0.618	1	1	56.256			
T5 20.00-0.00	1.05	3.47	A	0.318	2.25	0.621	1	1	66.388	2.41	120.41	A
			B	0.14	2.809	0.58	1	1	27.196			
			C	0.279	2.352	0.61	1	1	59.263			
Sum Weight:	4.78	12.21						OTM	564.09 kip-ft	11.51		

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							ft ²	K	plf	
T1	0.58	1.70	A	0.31	2.271	0.619	0.825	1	33.956	2.00	99.94	C
100.00-80.00			B	0.18	2.663	0.587	0.825	1	18.709			
			C	0.389	2.086	0.647	0.825	1	44.618			
T2	1.04	1.91	A	0.467	1.947	0.681	0.825	1	63.314	2.46	123.16	A
80.00-60.00			B	0.177	2.676	0.586	0.825	1	20.579			
			C	0.398	2.067	0.651	0.825	1	52.265			
T3	1.05	2.32	A	0.409	2.046	0.655	0.825	1	64.614	2.40	119.98	A
60.00-40.00			B	0.169	2.703	0.585	0.825	1	23.744			
			C	0.358	2.154	0.635	0.825	1	55.654			
T4	1.05	2.82	A	0.352	2.167	0.633	0.825	1	63.645	2.22	111.16	A
40.00-20.00			B	0.144	2.793	0.581	0.825	1	23.866			
			C	0.307	2.277	0.618	0.825	1	55.291			
T5 20.00-0.00	1.05	3.47	A	0.318	2.25	0.621	0.825	1	66.278	2.40	120.21	A

RISATower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	12001.CO61 - Bruce	Page	15 of 30
	Project	100' Rohn Lattice Tower - 1323 King St., Greenwich, CT	Date	08:56:20 06/04/12
	Client	Verizon Wireless	Designed by	TJL

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	
									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	
T1	0.19	1.14	A	0.215	2.546	0.594	1	1	22.381	0.63	31.36	C
100.00-80.00			B	0.129	2.849	0.579	1	1	13.102			
			C	0.244	2.456	0.6	1	1	25.782			
T2	0.37	1.30	A	0.322	2.24	0.623	1	1	39.460	0.82	40.75	A
80.00-60.00			B	0.129	2.849	0.579	1	1	14.761			
			C	0.252	2.431	0.602	1	1	30.927			
T3	0.37	1.59	A	0.285	2.337	0.611	1	1	41.587	0.81	40.70	A
60.00-40.00			B	0.126	2.86	0.578	1	1	17.456			
			C	0.231	2.496	0.597	1	1	34.250			
T4	0.37	2.11	A	0.247	2.446	0.601	1	1	42.077	0.77	38.28	A
40.00-20.00			B	0.112	2.918	0.576	1	1	18.226			
			C	0.201	2.593	0.591	1	1	34.964			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	1	1	44.888	0.84	41.93	A
			B	0.11	2.923	0.576	1	1	21.194			
			C	0.186	2.642	0.588	1	1	37.905			
Sum Weight:	1.69	8.79						OTM	185.57 kip-ft	3.86		

Tower Forces - Service - 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							ft ²	K	plf	
T1	0.19	1.14	A	0.215	2.546	0.594	0.825	1	22.381	0.63	31.29	C
100.00-80.00			B	0.129	2.849	0.579	0.825	1	13.102			
			C	0.244	2.456	0.6	0.825	1	25.724			
T2	0.37	1.30	A	0.322	2.24	0.623	0.825	1	39.460	0.82	40.75	A
80.00-60.00			B	0.129	2.849	0.579	0.825	1	14.761			
			C	0.252	2.431	0.602	0.825	1	30.495			
T3	0.37	1.59	A	0.285	2.337	0.611	0.825	1	41.587	0.81	40.70	A
60.00-40.00			B	0.126	2.86	0.578	0.825	1	17.456			
			C	0.231	2.496	0.597	0.825	1	33.674			
T4	0.37	2.11	A	0.247	2.446	0.601	0.825	1	42.077	0.77	38.28	A
40.00-20.00			B	0.112	2.918	0.576	0.825	1	18.226			
			C	0.201	2.593	0.591	0.825	1	34.389			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	0.825	1	44.888	0.84	41.93	A
			B	0.11	2.923	0.576	0.825	1	21.194			
			C	0.186	2.642	0.588	0.825	1	37.329			
Sum Weight:	1.69	8.79						OTM	185.44 kip-ft	3.86		

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	Client	Verizon Wireless	Designed by	TJL

Tower Forces - Service - 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							ft ²	K	plf	
T1 100.00-80.00	0.19	1.14	A	0.215	2.546	0.594	0.8	1	22.381	0.63	31.28	C
			B	0.129	2.849	0.579	0.8	1	13.102			
			C	0.244	2.456	0.6	0.8	1	25.716			
T2 80.00-60.00	0.37	1.30	A	0.322	2.24	0.623	0.8	1	39.460	0.82	40.75	A
			B	0.129	2.849	0.579	0.8	1	14.761			
			C	0.252	2.431	0.602	0.8	1	30.434			
T3 60.00-40.00	0.37	1.59	A	0.285	2.337	0.611	0.8	1	41.587	0.81	40.70	A
			B	0.126	2.86	0.578	0.8	1	17.456			
			C	0.231	2.496	0.597	0.8	1	33.592			
T4 40.00-20.00	0.37	2.11	A	0.247	2.446	0.601	0.8	1	42.077	0.77	38.28	A
			B	0.112	2.918	0.576	0.8	1	18.226			
			C	0.201	2.593	0.591	0.8	1	34.307			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	0.8	1	44.888	0.84	41.93	A
			B	0.11	2.923	0.576	0.8	1	21.194			
			C	0.186	2.642	0.588	0.8	1	37.247			
Sum Weight:	1.69	8.79						OTM	185.42 kip-ft	3.86		

Tower Forces - Service - 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	
T1 100.00-80.00	0.19	1.14	A	0.215	2.546	0.594	0.85	1	22.381	0.63	31.30	C
			B	0.129	2.849	0.579	0.85	1	13.102			
			C	0.244	2.456	0.6	0.85	1	25.733			
T2 80.00-60.00	0.37	1.30	A	0.322	2.24	0.623	0.85	1	39.460	0.82	40.75	A
			B	0.129	2.849	0.579	0.85	1	14.761			
			C	0.252	2.431	0.602	0.85	1	30.557			
T3 60.00-40.00	0.37	1.59	A	0.285	2.337	0.611	0.85	1	41.587	0.81	40.70	A
			B	0.126	2.86	0.578	0.85	1	17.456			
			C	0.231	2.496	0.597	0.85	1	33.756			
T4 40.00-20.00	0.37	2.11	A	0.247	2.446	0.601	0.85	1	42.077	0.77	38.28	A
			B	0.112	2.918	0.576	0.85	1	18.226			
			C	0.201	2.593	0.591	0.85	1	34.471			
T5 20.00-0.00	0.37	2.65	A	0.226	2.512	0.596	0.85	1	44.888	0.84	41.93	A
			B	0.11	2.923	0.576	0.85	1	21.194			
			C	0.186	2.642	0.588	0.85	1	37.412			
Sum Weight:	1.69	8.79						OTM	185.46 kip-ft	3.86		

Force Totals

RISATower**Centek Engineering Inc.**

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Branford, CT 06405
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Project

100' Rohn Lattice Tower - 1323 King St., Greenwich, CT

Date

08:56:20 06/04/12

Client

Verizon Wireless

Designed by

TJL

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M_x	Sum of Overturning Moments, M_z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	3.50					
Bracing Weight	5.28					
Total Member Self-Weight	8.79			5.13	5.92	
Total Weight	13.84			5.13	5.92	
Wind 0 deg - No Ice		-0.91	-16.87	-1045.00	76.25	-15.40
Wind 30 deg - No Ice		8.19	-14.18	-871.50	-499.73	-7.44
Wind 45 deg - No Ice		11.80	-11.50	-704.51	-726.42	-2.66
Wind 60 deg - No Ice		14.40	-8.18	-500.28	-887.23	2.49
Wind 90 deg - No Ice		16.73	0.04	8.73	-1033.75	11.48
Wind 120 deg - No Ice		14.61	8.45	531.64	-903.96	16.34
Wind 135 deg - No Ice		11.88	11.87	743.46	-733.31	17.06
Wind 150 deg - No Ice		8.40	14.49	905.77	-517.04	16.82
Wind 180 deg - No Ice		0.13	16.58	1033.11	-3.99	13.85
Wind 210 deg - No Ice		-8.17	14.19	882.38	510.49	7.44
Wind 225 deg - No Ice		-12.18	11.30	698.88	767.84	2.81
Wind 240 deg - No Ice		-15.04	7.65	469.28	948.45	-0.94
Wind 270 deg - No Ice		-17.05	-0.56	-38.58	1070.28	-9.26
Wind 300 deg - No Ice		-14.90	-8.62	-534.33	938.22	-16.33
Wind 315 deg - No Ice		-12.35	-11.93	-737.80	781.49	-18.47
Wind 330 deg - No Ice		-9.01	-14.51	-896.86	575.95	-19.03
Member Ice	3.42					
Total Weight Ice	21.97			13.31	18.39	
Wind 0 deg - Ice		-0.71	-16.64	-1013.04	73.25	-18.91
Wind 30 deg - Ice		8.12	-14.06	-849.38	-479.45	-9.46
Wind 45 deg - Ice		11.65	-11.42	-686.24	-699.00	-3.69
Wind 60 deg - Ice		14.23	-8.11	-484.17	-857.14	2.47
Wind 90 deg - Ice		16.52	0.03	16.01	-999.26	13.54
Wind 120 deg - Ice		14.41	8.33	527.51	-870.85	20.17
Wind 135 deg - Ice		11.72	11.71	735.12	-704.22	21.39
Wind 150 deg - Ice		8.29	14.30	894.65	-492.77	21.35
Wind 180 deg - Ice		0.10	16.39	1021.47	10.76	17.65
Wind 210 deg - Ice		-8.11	14.07	876.48	515.38	9.46
Wind 225 deg - Ice		-11.95	11.26	700.44	758.90	3.81
Wind 240 deg - Ice		-14.75	7.70	478.97	933.28	-1.26
Wind 270 deg - Ice		-16.77	-0.44	-20.74	1055.34	-11.80
Wind 300 deg - Ice		-14.62	-8.45	-510.58	924.40	-20.13
Wind 315 deg - Ice		-12.09	-11.75	-712.10	769.41	-22.50
Wind 330 deg - Ice		-8.76	-14.32	-869.08	566.35	-23.08
Total Weight	13.84			5.13	5.92	
Wind 0 deg - Service		-0.31	-5.84	-362.17	21.98	-5.33
Wind 30 deg - Service		2.83	-4.91	-302.13	-177.32	-2.57
Wind 45 deg - Service		4.08	-3.98	-244.35	-255.76	-0.92
Wind 60 deg - Service		4.98	-2.83	-173.68	-311.40	0.86
Wind 90 deg - Service		5.79	0.02	2.45	-362.10	3.97
Wind 120 deg - Service		5.06	2.92	183.38	-317.19	5.65
Wind 135 deg - Service		4.11	4.11	256.68	-258.14	5.90
Wind 150 deg - Service		2.91	5.01	312.84	-183.31	5.82
Wind 180 deg - Service		0.04	5.74	356.90	-5.78	4.79
Wind 210 deg - Service		-2.83	4.91	304.75	172.24	2.57
Wind 225 deg - Service		-4.22	3.91	241.25	261.28	0.97
Wind 240 deg - Service		-5.20	2.65	161.80	323.78	-0.32
Wind 270 deg - Service		-5.90	-0.19	-13.92	365.94	-3.21
Wind 300 deg - Service		-5.16	-2.98	-185.47	320.24	-5.65
Wind 315 deg - Service		-4.27	-4.13	-255.87	266.01	-6.39
Wind 330 deg - Service		-3.12	-5.02	-310.91	194.89	-6.59

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	Client	Verizon Wireless	Designed by	TJL

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

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
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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
T1	100 - 80	Leg	Max Tension	10	2.92	-0.42	-0.00
			Max. Compression	24	-6.17	-0.01	-0.03
			Max. Mx	15	-0.38	0.77	-0.10
			Max. My	10	-0.44	0.26	-1.01
			Max. Vy	15	0.77	-0.48	0.06
		Diagonal	Max. Vx	17	-0.82	0.05	0.53
			Max Tension	9	4.38	0.00	0.00
			Max. Compression	9	-4.44	0.00	0.00
			Max. Mx	31	3.85	0.02	0.00
			Max. My	32	0.03	0.00	0.00
		Horizontal	Max. Vy	31	0.01	0.00	0.00
			Max. Vx	32	0.00	0.00	0.00
			Max Tension	16	2.47	0.00	0.00
			Max. Compression	8	-2.41	-0.01	-0.00
			Max. Mx	27	0.07	-0.02	-0.01
		Top Girt	Max. My	15	-0.54	-0.01	-0.01
			Max. Vy	27	-0.01	-0.02	-0.01
			Max. Vx	15	0.00	-0.01	-0.01
			Max Tension	10	0.62	-0.01	0.00
			Max. Compression	2	-0.62	-0.01	-0.00
		Inner Bracing	Max. Mx	22	-0.23	-0.01	-0.00
			Max. My	15	-0.13	-0.01	-0.00
			Max. Vy	22	-0.01	-0.01	-0.00
			Max. Vx	15	0.00	-0.01	-0.00
			Max Tension	2	0.01	0.00	0.00
T2	80 - 60	Leg	Max. Compression	2	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-0.01	0.00
			Max. My	27	-0.00	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	27	-0.00	0.00	0.00
		Diagonal	Max Tension	15	18.97	-0.16	0.04
			Max. Compression	30	-23.19	0.04	-0.02
			Max. Mx	13	6.16	0.23	0.08
			Max. My	13	-17.13	0.12	-0.21
			Max. Vy	15	0.12	-0.16	0.04
		Horizontal	Max. Vx	17	0.15	0.03	0.20
			Max Tension	6	4.20	0.00	0.00
			Max. Compression	6	-4.27	0.00	0.00
			Max. Mx	31	4.08	0.03	0.00
			Max. My	32	-0.10	0.00	0.00
		Inner Bracing	Max. Vy	31	-0.01	0.00	0.00
			Max. Vx	32	-0.00	0.00	0.00
			Max Tension	14	2.63	-0.01	0.00
			Max. Compression	6	-2.62	-0.01	-0.00
			Max. Mx	27	0.23	-0.02	-0.00
T3	60 - 40	Leg	Max. My	15	-0.28	-0.01	-0.00
			Max. Vy	27	-0.02	-0.02	-0.00
			Max. Vx	15	0.00	-0.01	-0.00
			Max Tension	7	0.00	0.00	0.00
			Max. Compression	32	-0.00	0.00	0.00
		Diagonal	Max. Mx	18	-0.00	-0.01	0.00
			Max. My	32	-0.00	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	32	-0.00	0.00	0.00
			Max Tension	15	34.88	-0.08	0.03
		Horizontal	Max. Compression	30	-40.12	0.11	0.01
			Max. Mx	15	34.86	-0.14	0.06
			Max. My	34	-6.40	-0.01	0.20
			Max. Vy	22	0.04	-0.14	-0.00
			Max. Vx	34	-0.08	-0.01	0.20
Diagonal	Max Tension	23	4.35	0.00	0.00		

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	Client	Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T4	40 - 20	Horizontal	Max. Compression	23	-4.50	0.00	0.00
			Max. Mx	31	4.27	0.04	0.00
			Max. My	32	-0.50	0.00	0.00
			Max. Vy	31	-0.02	0.00	0.00
			Max. Vx	32	-0.00	0.00	0.00
			Max Tension	23	3.05	0.00	0.00
			Max. Compression	23	-3.00	-0.03	-0.00
			Max. Mx	32	0.37	-0.05	-0.01
			Max. My	15	-0.37	-0.03	-0.01
			Max. Vy	32	-0.02	-0.05	-0.01
		Inner Bracing	Max. Vx	15	0.00	-0.03	-0.01
			Max Tension	2	0.00	0.00	0.00
			Max. Compression	32	-0.00	0.00	0.00
			Max. Mx	18	-0.00	-0.02	0.00
			Max. My	30	0.00	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
			Max Tension	15	46.62	-0.17	0.08
			Max. Compression	30	-53.45	0.07	0.00
		Diagonal	Max. Mx	22	39.24	-0.18	-0.00
			Max. My	17	-5.20	-0.01	0.26
			Max. Vy	22	0.05	-0.16	-0.00
			Max. Vx	26	0.10	-0.02	-0.26
			Max Tension	23	5.33	0.00	0.00
			Max. Compression	23	-5.55	0.00	0.00
			Max. Mx	31	5.20	0.09	0.00
			Max. My	32	-0.93	0.00	0.00
			Max. Vy	31	-0.03	0.00	0.00
			Max. Vx	32	-0.00	0.00	0.00
		Horizontal	Max Tension	23	3.25	0.00	0.00
			Max. Compression	23	-3.21	-0.04	-0.00
			Max. Mx	32	0.50	-0.05	-0.01
			Max. My	15	-0.60	-0.04	-0.01
			Max. Vy	32	-0.03	-0.05	-0.01
			Max. Vx	15	0.00	-0.04	-0.01
		Inner Bracing	Max Tension	17	0.00	0.00	0.00
			Max. Compression	32	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-0.02	0.00
			Max. My	30	-0.00	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T5	20 - 0	Leg	Max Tension	15	58.89	-0.32	0.09
			Max. Compression	30	-67.97	0.00	-0.00
			Max. Mx	24	-59.08	0.48	-0.10
			Max. My	17	-6.79	-0.01	0.40
			Max. Vy	5	-0.09	-0.32	0.00
			Max. Vx	17	0.15	-0.01	0.40
		Diagonal	Max Tension	23	5.29	0.00	0.00
			Max. Compression	23	-5.56	0.00	0.00
			Max. Mx	23	5.29	0.11	0.00
			Max. My	32	-1.11	0.00	0.00
			Max. Vy	23	-0.03	0.00	0.00
			Max. Vx	32	0.00	0.00	0.00
		Horizontal	Max Tension	23	3.59	0.00	0.00
			Max. Compression	23	-3.48	-0.03	-0.00
			Max. Mx	32	0.63	-0.05	-0.01
			Max. My	15	-0.75	-0.04	-0.01
			Max. Vy	32	-0.03	-0.04	-0.01
			Max. Vx	15	0.00	-0.04	-0.01
		Inner Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	23	-0.01	0.00	0.00

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	Project	100' Rohn Lattice Tower - 1323 King St., Greenwich, CT	Date	08:56:20 06/04/12
	Client	Verizon Wireless	Designed by	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	18	-0.00	-0.04	0.00
			Max. My	19	-0.00	0.00	-0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	74.24	8.68	-4.90
	Max. H _x	30	74.24	8.68	-4.90
	Max. H _z	3	-50.88	-5.98	4.74
	Min. Vert	5	-60.50	-7.75	4.37
	Min. H _x	5	-60.50	-7.75	4.37
Leg B	Min. H _z	28	63.76	6.80	-5.27
	Max. Vert	24	72.26	-8.95	-4.38
	Max. H _x	15	-64.55	8.32	4.18
	Max. H _z	16	-62.38	7.86	4.35
	Min. Vert	15	-64.55	8.32	4.18
Leg A	Min. H _x	24	72.26	-8.95	-4.38
	Min. H _z	8	69.03	-8.31	-4.66
	Max. Vert	19	71.94	-0.59	9.93
	Max. H _x	13	-25.30	1.53	-3.87
	Max. H _z	19	71.94	-0.59	9.93
	Min. Vert	10	-61.47	0.45	-8.92
	Min. H _x	22	38.15	-1.43	5.15
	Min. H _z	10	-61.47	0.45	-8.92

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	13.84	0.00	0.00	5.13	5.92	0.00
Dead+Wind 0 deg - No Ice	13.84	-0.91	-16.87	-1010.98	76.35	-15.41
Dead+Wind 30 deg - No Ice	13.84	8.19	-14.18	-842.01	-482.70	-7.44
Dead+Wind 45 deg - No Ice	13.84	11.80	-11.50	-680.42	-702.35	-2.66
Dead+Wind 60 deg - No Ice	13.84	14.40	-8.18	-483.24	-857.76	2.49
Dead+Wind 90 deg - No Ice	13.84	16.73	0.04	8.76	-999.73	11.49
Dead+Wind 120 deg - No Ice	13.84	14.61	8.45	514.65	-874.49	16.35
Dead+Wind 135 deg - No Ice	13.84	11.88	11.87	719.42	-709.25	17.07
Dead+Wind 150 deg - No Ice	13.84	8.40	14.49	876.33	-500.02	16.83
Dead+Wind 180 deg - No Ice	13.84	0.13	16.58	999.09	-3.99	13.86
Dead+Wind 210 deg - No Ice	13.84	-8.17	14.19	852.90	493.46	7.44
Dead+Wind 225 deg - No Ice	13.84	-12.18	11.30	674.78	743.82	2.81
Dead+Wind 240 deg - No Ice	13.84	-15.04	7.65	452.21	919.04	-0.94
Dead+Wind 270 deg - No Ice	13.84	-17.05	-0.56	-38.62	1036.30	-9.27
Dead+Wind 300 deg - No Ice	13.84	-14.90	-8.62	-517.33	908.81	-16.35
Dead+Wind 315 deg - No Ice	13.84	-12.35	-11.93	-713.74	757.50	-18.48
Dead+Wind 330 deg - No Ice	13.84	-9.01	-14.51	-867.39	559.02	-19.04
Dead+Ice+Temp	21.97	0.00	0.00	13.30	18.38	0.00
Dead+Wind 0 deg+Ice+Temp	21.97	-0.71	-16.64	-976.90	73.37	-18.93

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	Client Verizon Wireless	Designed by TJL

Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead+Wind 30 deg+Ice+Temp	21.97	8.12	-14.06	-818.09	-461.36	-9.46
Dead+Wind 45 deg+Ice+Temp	21.97	11.65	-11.42	-660.69	-673.47	-3.69
Dead+Wind 60 deg+Ice+Temp	21.97	14.23	-8.11	-466.09	-825.88	2.48
Dead+Wind 90 deg+Ice+Temp	21.97	16.52	0.03	16.05	-963.16	13.55
Dead+Wind 120 deg+Ice+Temp	21.97	14.41	8.33	509.49	-839.55	20.20
Dead+Wind 135 deg+Ice+Temp	21.97	11.72	11.71	709.66	-678.70	21.42
Dead+Wind 150 deg+Ice+Temp	21.97	8.29	14.30	863.44	-474.71	21.37
Dead+Wind 180 deg+Ice+Temp	21.97	0.10	16.39	985.42	10.77	17.67
Dead+Wind 210 deg+Ice+Temp	21.97	-8.11	14.07	845.23	497.35	9.46
Dead+Wind 225 deg+Ice+Temp	21.97	-11.95	11.26	674.90	733.45	3.80
Dead+Wind 240 deg+Ice+Temp	21.97	-14.75	7.70	460.90	902.10	-1.27
Dead+Wind 270 deg+Ice+Temp	21.97	-16.77	-0.44	-20.76	1019.32	-11.82
Dead+Wind 300 deg+Ice+Temp	21.97	-14.62	-8.45	-492.55	893.25	-20.15
Dead+Wind 315 deg+Ice+Temp	21.97	-12.09	-11.75	-686.57	743.99	-22.52
Dead+Wind 330 deg+Ice+Temp	21.97	-8.76	-14.32	-837.82	548.41	-23.11
Dead+Wind 0 deg - Service	13.84	-0.31	-5.84	-346.45	30.30	-5.33
Dead+Wind 30 deg - Service	13.84	2.83	-4.91	-287.99	-163.14	-2.57
Dead+Wind 45 deg - Service	13.84	4.08	-3.98	-232.07	-239.15	-0.92
Dead+Wind 60 deg - Service	13.84	4.98	-2.83	-163.85	-292.92	0.86
Dead+Wind 90 deg - Service	13.84	5.79	0.02	6.39	-342.05	3.98
Dead+Wind 120 deg - Service	13.84	5.06	2.92	181.44	-298.70	5.66
Dead+Wind 135 deg - Service	13.84	4.11	4.11	252.29	-241.53	5.91
Dead+Wind 150 deg - Service	13.84	2.91	5.01	306.58	-169.14	5.82
Dead+Wind 180 deg - Service	13.84	0.04	5.74	349.07	2.49	4.79
Dead+Wind 210 deg - Service	13.84	-2.83	4.91	298.47	174.62	2.57
Dead+Wind 225 deg - Service	13.84	-4.22	3.91	236.84	261.24	0.97
Dead+Wind 240 deg - Service	13.84	-5.20	2.65	159.83	321.87	-0.33
Dead+Wind 270 deg - Service	13.84	-5.90	-0.19	-10.00	362.46	-3.21
Dead+Wind 300 deg - Service	13.84	-5.16	-2.98	-175.65	318.35	-5.66
Dead+Wind 315 deg - Service	13.84	-4.27	-4.13	-243.61	265.99	-6.40
Dead+Wind 330 deg - Service	13.84	-3.12	-5.02	-296.77	197.31	-6.59

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	-13.84	0.00	0.00	13.84	0.00	0.000%
2	-0.91	-13.84	-16.87	0.91	13.84	16.87	0.000%
3	8.19	-13.84	-14.18	-8.19	13.84	14.18	0.000%
4	11.80	-13.84	-11.50	-11.80	13.84	11.50	0.000%
5	14.40	-13.84	-8.18	-14.40	13.84	8.18	0.000%
6	16.73	-13.84	0.04	-16.73	13.84	-0.04	0.000%
7	14.61	-13.84	8.45	-14.61	13.84	-8.45	0.000%
8	11.88	-13.84	11.87	-11.88	13.84	-11.87	0.000%
9	8.40	-13.84	14.49	-8.40	13.84	-14.49	0.000%
10	0.13	-13.84	16.58	-0.13	13.84	-16.58	0.000%
11	-8.17	-13.84	14.19	8.17	13.84	-14.19	0.000%
12	-12.18	-13.84	11.30	12.18	13.84	-11.30	0.000%
13	-15.04	-13.84	7.65	15.04	13.84	-7.65	0.000%
14	-17.05	-13.84	-0.56	17.05	13.84	0.56	0.000%
15	-14.90	-13.84	-8.62	14.90	13.84	8.62	0.000%
16	-12.35	-13.84	-11.93	12.35	13.84	11.93	0.000%
17	-9.01	-13.84	-14.51	9.01	13.84	14.51	0.000%
18	0.00	-21.97	0.00	0.00	21.97	0.00	0.000%
19	-0.71	-21.97	-16.64	0.71	21.97	16.64	0.000%
20	8.12	-21.97	-14.06	-8.12	21.97	14.06	0.000%
21	11.65	-21.97	-11.42	-11.65	21.97	11.42	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	
22	14.23	-21.97	-8.11	-14.23	21.97	8.11	0.000%
23	16.52	-21.97	0.03	-16.52	21.97	-0.03	0.000%
24	14.41	-21.97	8.33	-14.41	21.97	-8.33	0.000%
25	11.72	-21.97	11.71	-11.72	21.97	-11.71	0.000%
26	8.29	-21.97	14.30	-8.29	21.97	-14.30	0.000%
27	0.10	-21.97	16.39	-0.10	21.97	-16.39	0.000%
28	-8.11	-21.97	14.07	8.11	21.97	-14.07	0.000%
29	-11.95	-21.97	11.26	11.95	21.97	-11.26	0.000%
30	-14.75	-21.97	7.70	14.75	21.97	-7.70	0.000%
31	-16.77	-21.97	-0.44	16.77	21.97	0.44	0.000%
32	-14.62	-21.97	-8.45	14.62	21.97	8.45	0.000%
33	-12.09	-21.97	-11.75	12.09	21.97	11.75	0.000%
34	-8.76	-21.97	-14.32	8.76	21.97	14.32	0.000%
35	-0.31	-13.84	-5.84	0.31	13.84	5.84	0.000%
36	2.83	-13.84	-4.91	-2.83	13.84	4.91	0.000%
37	4.08	-13.84	-3.98	-4.08	13.84	3.98	0.000%
38	4.98	-13.84	-2.83	-4.98	13.84	2.83	0.000%
39	5.79	-13.84	0.02	-5.79	13.84	-0.02	0.000%
40	5.06	-13.84	2.92	-5.06	13.84	-2.92	0.000%
41	4.11	-13.84	4.11	-4.11	13.84	-4.11	0.000%
42	2.91	-13.84	5.01	-2.91	13.84	-5.01	0.000%
43	0.04	-13.84	5.74	-0.04	13.84	-5.74	0.000%
44	-2.83	-13.84	4.91	2.83	13.84	-4.91	0.000%
45	-4.22	-13.84	3.91	4.22	13.84	-3.91	0.000%
46	-5.20	-13.84	2.65	5.20	13.84	-2.65	0.000%
47	-5.90	-13.84	-0.19	5.90	13.84	0.19	0.000%
48	-5.16	-13.84	-2.98	5.16	13.84	2.98	0.000%
49	-4.27	-13.84	-4.13	4.27	13.84	4.13	0.000%
50	-3.12	-13.84	-5.02	3.12	13.84	5.02	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001

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23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	0.951	48	0.0747	0.0112
T2	80 - 60	0.627	48	0.0719	0.0131
T3	60 - 40	0.338	48	0.0559	0.0127
T4	40 - 20	0.139	48	0.0322	0.0089
T5	20 - 0	0.038	48	0.0142	0.0046

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	8' x 3" Dia Omni	48	0.951	0.0747	0.0112	573712
98.00	Pirol 12' T-Frame Sector Mount (1)	48	0.918	0.0747	0.0115	573712
88.50	P1000 Unistrut (9' Long)	48	0.763	0.0742	0.0124	249440
88.25	P1000 Unistrut (9' Long)	48	0.759	0.0742	0.0124	244132
88.00	12' Frame	48	0.755	0.0741	0.0124	239046
86.00	DC6-48-60-18-8F Surge Arrestor	48	0.722	0.0738	0.0125	204897
84.00	4 FT DISH	48	0.690	0.0733	0.0126	179205
78.50	P1000 Unistrut (9' Long)	48	0.603	0.0712	0.0132	122577
70.00	4 FT DISH	48	0.474	0.0656	0.0134	70175

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Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	2.752	15	0.2167	0.0481
T2	80 - 60	1.811	15	0.2084	0.0550
T3	60 - 40	0.974	15	0.1617	0.0482
T4	40 - 20	0.401	15	0.0926	0.0323
T5	20 - 0	0.109	15	0.0408	0.0164

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	8' x 3" Dia Omni	15	2.752	0.2167	0.0481	207736
98.00	Pirol 12' T-Frame Sector Mount (1)	15	2.657	0.2167	0.0491	207736
88.50	P1000 Unistrut (9' Long)	15	2.206	0.2152	0.0533	90320
88.25	P1000 Unistrut (9' Long)	15	2.194	0.2151	0.0534	88398
88.00	12' Frame	15	2.183	0.2150	0.0535	86557
86.00	DC6-48-60-18-8F Surge Arrestor	15	2.089	0.2139	0.0541	74191
84.00	4 FT DISH	15	1.996	0.2125	0.0546	64888
78.50	P1000 Unistrut (9' Long)	15	1.743	0.2064	0.0550	44312
70.00	4 FT DISH	15	1.369	0.1900	0.0534	24939

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	100	Leg	A325N	0.7500	4	0.73	19.44	0.037 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	1.48	6.44	0.230 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	1.24	6.44	0.192 ✓	1.333	Bolt Shear
		Top Girt	A325N	0.6250	2	0.31	6.44	0.048 ✓	1.333	Bolt Shear
T2	80	Leg	A325N	0.8750	4	4.74	26.46	0.179 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	1.42	6.44	0.221 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	1.32	6.44	0.204 ✓	1.333	Bolt Shear
T3	60	Leg	A325N	0.8750	4	8.72	26.46	0.330 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	1.50	6.44	0.233 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	1.53	6.44	0.237 ✓	1.333	Bolt Shear
T4	40	Leg	A325N	1.0000	4	11.65	34.56	0.337 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	1.85	6.44	0.287 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	1.62	6.44	0.252 ✓	1.333	Bolt Shear

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
T5	20	Leg	A354-BC	1.0000	4	14.72	32.40	0.454 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	1.85	6.44	0.288 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	1.80	6.44	0.279 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	ROHN 2.5 STD	20.00	6.67	84.4 K=1.00	18.110	1.7040	-6.17	30.86	0.200 ✓
T2	80 - 60	ROHN 3 STD	20.03	6.68	68.9 K=1.00	21.146	2.2285	-23.19	47.12	0.492 ✓
T3	60 - 40	ROHN 3.5 STD	20.03	6.68	60.0 K=1.00	22.726	2.6795	-40.12	60.89	0.659 ✓
T4	40 - 20	ROHN 4 EH	20.05	10.02	81.4 K=1.00	18.721	4.4074	-53.45	82.51	0.648 ✓
T5	20 - 0	ROHN 5 X-STR	20.05	10.03	65.4 K=1.00	21.771	6.1120	-67.97	133.06	0.511 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	ROHN 2 STD	7.92	7.70	117.3 K=1.00	10.850	1.0745	-4.44	11.66	0.381 ✓
T2	80 - 60	ROHN 2 STD	8.51	8.28	126.2 K=1.00	9.373	1.0745	-4.27	10.07	0.424 ✓
T3	60 - 40	ROHN 2 STD	9.18	8.94	136.3 K=1.00	8.038	1.0745	-4.50	8.64	0.521 ✓
T4	40 - 20	ROHN 2.5 STD	12.49	12.18	154.3 K=1.00	6.275	1.7040	-5.55	10.69	0.519 ✓
T5	20 - 0	ROHN 2.5 STD	13.28	12.93	163.7 K=1.00	5.571	1.7040	-5.56	9.49	0.585 ✓

Horizontal Design Data (Compression)

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	ROHN 1.5 STD	8.53	4.14	79.9 K=1.00	19.038	0.7995	-2.41	15.22	0.159
T2	80 - 60	ROHN 1.5 STD	9.90	4.81	92.6 K=1.00	16.368	0.7995	-2.62	13.09	0.200
T3	60 - 40	ROHN 2 STD	11.94	5.81	88.5 K=1.00	17.257	1.0745	-3.00	18.54	0.162
T4	40 - 20	ROHN 2 STD	13.79	6.71	102.3 K=1.00	14.176	1.0745	-3.21	15.23	0.211
T5	20 - 0	ROHN 2 STD	16.21	7.87	120.0 K=1.00	10.367	1.0745	-3.48	11.14	0.313

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	ROHN 1.5 STD	8.50	4.13	79.6 K=1.00	19.091	0.7995	-0.62	15.26	0.041

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	L2x2x1/8	4.25	4.25	128.3 K=1.00	9.074	0.4844	-0.01	4.39	0.002
T2	80 - 60	L2x2x1/8	4.95	4.95	149.5 K=1.00	6.685	0.4844	-0.00	3.24	0.001
T3	60 - 40	L2x2x1/8	5.97	5.97	180.3 K=1.00	4.595	0.4844	-0.00	2.23	0.002
T4	40 - 20	L2x2x1/8	6.90	6.90	208.2 K=1.00	3.447	0.4844	-0.01	1.67	0.003
T5	20 - 0	L2 1/2x2 1/2x3/16	8.10	8.10	196.5 K=1.00	3.869	0.9020	-0.01	3.49	0.002

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	ROHN 2.5 STD	20.00	6.67	84.4	30.000	1.7040	2.92	51.12	0.057

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T2	80 - 60	ROHN 3 STD	20.03	6.68	68.9	30.000	2.2285	18.97	66.85	0.284 ✓
T3	60 - 40	ROHN 3.5 STD	20.03	6.68	60.0	30.000	2.6795	34.88	80.39	0.434 ✓
T4	40 - 20	ROHN 4 EH	20.05	10.02	81.4	30.000	4.4074	46.62	132.22	0.353 ✓
T5	20 - 0	ROHN 5 X-STR	20.05	10.03	65.4	30.000	6.1120	58.89	183.36	0.321 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	ROHN 2 STD	7.92	7.70	117.3	30.000	1.0745	4.38	32.24	0.136 ✓
T2	80 - 60	ROHN 2 STD	8.51	8.28	126.2	30.000	1.0745	4.20	32.24	0.130 ✓
T3	60 - 40	ROHN 2 STD	9.18	8.94	136.3	30.000	1.0745	4.35	32.24	0.135 ✓
T4	40 - 20	ROHN 2.5 STD	12.49	12.18	154.3	30.000	1.7040	5.33	51.12	0.104 ✓
T5	20 - 0	ROHN 2.5 STD	13.28	12.93	163.7	30.000	1.7040	5.29	51.12	0.103 ✓

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	100 - 80	ROHN 1.5 STD	8.53	4.14	79.9	30.000	0.7995	2.47	23.98	0.103 ✓
T2	80 - 60	ROHN 1.5 STD	9.90	4.81	92.6	30.000	0.7995	2.63	23.98	0.110 ✓
T3	60 - 40	ROHN 2 STD	11.94	5.81	88.5	30.000	1.0745	3.05	32.24	0.095 ✓
T4	40 - 20	ROHN 2 STD	13.79	6.71	102.3	30.000	1.0745	3.25	32.24	0.101 ✓
T5	20 - 0	ROHN 2 STD	16.21	7.87	120.0	30.000	1.0745	3.59	32.24	0.112 ✓

Top Girt Design Data (Tension)

Designed by
TJI

0.02

0.00 ✓
0.00 ✓
0.00 ✓
0.00 ✓

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
T1	100 - 80	Leg	ROHN 2.5 STD	2	-6.17	41.14	15.0	Pass
T2	80 - 60	Leg	ROHN 3 STD	40	-23.19	62.81	36.9	Pass
T3	60 - 40	Leg	ROHN 3.5 STD	79	-40.12	81.17	49.4	Pass
T4	40 - 20	Leg	ROHN 4 EH	118	-53.45	109.99	48.6	Pass
T5	20 - 0	Leg	ROHN 5 X-STR	145	-67.97	177.37	38.3	Pass
T1	100 - 80	Diagonal	ROHN 2 STD	11	-4.44	15.54	28.6	Pass
T2	80 - 60	Diagonal	ROHN 2 STD	45	-4.27	13.43	31.8	Pass
T3	60 - 40	Diagonal	ROHN 2 STD	84	-4.50	11.51	39.1	Pass
T4	40 - 20	Diagonal	ROHN 2.5 STD	123	-5.55	14.25	38.9	Pass
T5	20 - 0	Diagonal	ROHN 2.5 STD	150	-5.56	12.65	43.9	Pass
T1	100 - 80	Horizontal	ROHN 1.5 STD	10	-2.41	20.29	11.9	Pass
T2	80 - 60	Horizontal	ROHN 1.5 STD	43	-2.62	17.44	14.4 (b)	Pass
T3	60 - 40	Horizontal	ROHN 2 STD	82	-3.00	24.72	15.3 (b)	Pass
T4	40 - 20	Horizontal	ROHN 2 STD	121	-3.21	20.31	12.1	Pass
T5	20 - 0	Horizontal	ROHN 2 STD	148	-3.48	14.85	17.8 (b)	Pass
T1	100 - 80	Top Girt	ROHN 1.5 STD	5	-0.62	20.34	15.8	Pass
T1	100 - 80	Inner Bracing	L2x2x1/8	37	-0.01	5.86	18.9 (b)	Pass
T2	80 - 60	Inner Bracing	L2x2x1/8	53	-0.00	4.32	0.2	Pass
T3	60 - 40	Inner Bracing	L2x2x1/8	91	-0.00	2.97	0.2	Pass
T4	40 - 20	Inner Bracing	L2x2x1/8	131	-0.01	2.23	0.3	Pass
T5	20 - 0	Inner Bracing	L2 1/2x2 1/2x3/16	157	-0.01	4.65	0.2	Pass
							Summary	
							Leg (T3)	Pass
							Diagonal (T5)	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF * P_{allow}$ K	% Capacity	Pass Fail
						Horizontal (T5)	23.5	Pass
						Top Girt (T1)	3.6	Pass
						Inner Bracing (T4)	0.3	Pass
						Bolt Checks	34.1	Pass
						RATING =	49.4	Pass

Mat Foundation Analysis:**Input Data:**Tower Data

Overturning Moment =	OM := 1046-ft-kips	(User Input from RISATower)
Shear Force =	S _t := 17-kip	(User Input from RISATower)
Axial Force =	WT _t := 14-kip	(User Input from RISATower)
Max Compression Force =	C _t := 74-kip	(User Input from RISATower)
Max Uplift Force =	U _t := 65-kip	(User Input from RISATower)
Tower Height =	H _t := 100-ft	(User Input)
Tower Width =	W _t := 17.45-ft	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	Pos _t := 2	(User Input)

Footing Data:

Overall Depth of Footing =	D _f := 6.5-ft	(User Input)
Thickness of Footing =	T _f := 4-ft	(User Input)
Width of Footing =	W _f := 24-ft	(User Input)
Length of Pier =	L _p := 3-ft	(User Input)
Extension of Pier Above Grade =	L _{pag} := 0.5-ft	(User Input)
Diameter of Pier =	d _p := 3-ft	(User Input)

Material Properties:

Concrete Compressive Strength =	f _c := 3000-psi	(User Input)
Steel Reinforcement Yield Strength =	f _y := 60000-psi	(User Input)
Internal Friction Angle of Soil =	Φ _s := 0-deg	(User Input)
Allowable Soil Bearing Capacity =	q _s := 4000-psf	(User Input)
Unit Weight of Soil =	γ _{soil} := 100-pcf	(User Input)
Unit Weight of Concrete =	γ _{conc} := 150-pcf	(User Input)
Foundation Bouyancy =	Bouyancy := 0	(User Input) (Yes=1 / No=0)
Depth to Neglect =	n := 0-ft	(User Input)
Cohesion of Clay Type Soil =	c := 0-ksf	(User Input) (Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input) (UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	μ := 0.45	(User Input)

Pier Reinforcement:

Bar Size =	$BS_{\text{pier}} := 8$	(User Input)	
Bar Diameter =	$d_{\text{bpier}} := 1.0\text{-in}$	(User Input)	
Number of Bars =	$NB_{\text{pier}} := 12$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{\text{pier}} := 3.0\text{-in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{\text{Tie}} := 3\text{-in}$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{\text{top}} := 7$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{\text{btop}} := 0.875\text{-in}$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{\text{top}} := 25$	(User Input)	(Top of Pad)
Bar Size =	$BS_{\text{bot}} := 7$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{\text{bbot}} := 0.875\text{-in}$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{\text{bot}} := 25$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{\text{pad}} := 3.0\text{-in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =	$A_{\text{bpier}} := \frac{\pi \cdot d_{\text{bpier}}^2}{4} = 0.785 \cdot \text{in}^2$	
Pad Top Reinforcement Bar Area =	$A_{\text{btop}} := \frac{\pi \cdot d_{\text{btop}}^2}{4} = 0.601 \cdot \text{in}^2$	
Pad Bottom Reinforcement Bar Area =	$A_{\text{bbot}} := \frac{\pi \cdot d_{\text{bbot}}^2}{4} = 0.601 \cdot \text{in}^2$	
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 1$	
Load Factor =	$LF := \begin{cases} 1.333 & \text{if } H_t \leq 700\text{-ft} \\ 1.7 & \text{if } H_t \geq 1200\text{-ft} \\ 1.333 + \left(\frac{H_t - 700\text{ft}}{1200\text{ft} - 700\text{ft}} \right) \cdot 0.4 & \text{otherwise} \end{cases}$	= 1.333

Stability of Footing:

Adjusted Concrete Unit Weight =

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

Adjusted Soil Unit Weight =

$$\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4 \text{pcf}, \gamma_{\text{soil}}) = 100 \text{pcf}$$

Passive Pressure =

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

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 0.25 \text{ksf}$$

$$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 0.25 \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 0.65 \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.45 \text{ksf}$$

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

$$A_p := W_f \cdot T_p = 96$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 43.2 \text{kip}$$

Weight of Concrete Pad =

$$W_{Tpad} := (W_f^2 \cdot T_f) \cdot \gamma_c = 345.6 \text{kip}$$

Weight of Concrete Piers =

$$W_{Tpier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4} \right) \cdot \gamma_c \right] = 9.543 \text{kip}$$

Total Weight of Concrete =

$$W_{Tc} := W_{Tpad} + W_{Tpier} = 355 \text{kip}$$

Weight of Soil Above Footing =

$$W_{Ts1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4} \right) \cdot (L_p - L_{pag}) \cdot \gamma_s = 139 \text{kip}$$

Weight of Soil Above Footing =

$$W_{Ts2} := \left[\frac{\tan(\Phi_s) \cdot (L_p - L_{pag})^2}{2} \cdot W_f \right] \cdot \gamma_s = 0 \text{kip}$$

Tower Offset =

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

$$X_t := \text{if}(Pos_t, X_{t1}, X_{t2}) = 4.444$$

$$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \text{-deg}))}{3} + X_t \right] = 2.519$$

Resisting Moment =

$$M_r := (W_{Tc} + W_{Ts1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + W_{Ts2} \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3} \right] = 5984 \text{kip}$$

Overturning Moment =

$$M_{ot} := OM + S_t \cdot (L_p + T_f) = 1165 \text{kip-ft}$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 5.14$$

Factor of Safety Required =

$$FS_{req} := 2$$

$$\text{OverTurning_Moment_Check} := \text{if}(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"})$$

$$\text{OverTurning_Moment_Check} = \text{"Okay"}$$

Bearing Pressure Caused by Footing:

Total Load =

$$\text{Load}_{\text{tot}} := \text{WT}_c + \text{WT}_{s1} + \text{WT}_t = 508 \cdot \text{kip}$$

Area of the Mat =

$$A_{\text{mat}} := W_f^2 = 576$$

Section Modulus of Mat =

$$S := \frac{W_f^3}{6} = 2304 \cdot \text{ft}^3$$

Maximum Pressure in Mat =

$$P_{\text{max}} := \frac{\text{Load}_{\text{tot}}}{A_{\text{mat}}} + \frac{M_{\text{ot}}}{S} = 1.387 \cdot \text{ksf}$$

$$\text{Max_Pressure_Check} := \text{if}(P_{\text{max}} < q_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{Max_Pressure_Check} = \text{"Okay"}$$

Minimum Pressure in Mat =

$$P_{\text{min}} := \frac{\text{Load}_{\text{tot}}}{A_{\text{mat}}} - \frac{M_{\text{ot}}}{S} = 0.376 \cdot \text{ksf}$$

$$\text{Min_Pressure_Check} := \text{if}((P_{\text{min}} \geq 0) \cdot (P_{\text{min}} < q_s), \text{"Okay"}, \text{"No Good"})$$

$$\text{Min_Pressure_Check} = \text{"Okay"}$$

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{P_{\text{max}}}{P_{\text{max}} - P_{\text{min}}} \cdot \frac{1}{3} = 10.975$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 4$$

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

Eccentricity =

$$e := \frac{M_{\text{ot}}}{\text{Load}_{\text{tot}}} = 2.294$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot \text{Load}_{\text{tot}}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)} = 1.453 \cdot \text{ksf}$$

$$q_{\text{adj}} := \text{if}(P_{\text{min}} < 0, P_a, P_{\text{max}}) = 1.387 \cdot \text{ksf}$$

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

$$\text{Pressure_Check} = \text{"Okay"}$$

Concrete Bearing Capacity:

Strength Reduction Factor =

$$\Phi_c := 0.65 \quad (\text{ACI-2008 9.3.2.2})$$

Bearing Strength Between Pier and Pad =

$$P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.687 \times 10^3 \cdot \text{kips} \quad (\text{ACI-2008 10.14})$$

$$\text{Bearing_Check} := \text{if}(P_b > \text{LF} \cdot C_t, \text{"Okay"}, \text{"No Good"})$$

$$\text{Bearing_Check} = \text{"Okay"}$$

Shear Strength of Concrete:

Beam Shear:

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

$$\phi_c := 0.85 \quad (\text{ACI 9.3.2.5})$$

$$d := T_f - C_{vr_pad} - d_{bbot} = 44.125 \text{ in}$$

$$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$$

$$d_2 := d_1 - d$$

$$L := \left(\frac{W_f}{2} - e \right) \cdot 3$$

$$\text{Slope} := \text{if} \left(L > W_f, \frac{P_{\max} - P_{\min}}{W_f}, \frac{q_{\text{adj}}}{L} \right)$$

$$V_{\text{req}} := LF \cdot \left[(q_{\text{adj}} - \text{Slope} \cdot d_1) + \left(\frac{\text{Slope} \cdot d_1}{2} \right) \right] \cdot W_f \cdot d_1 = 391.709 \text{ kip}$$

$$V_{\text{Avail}} := \phi_c \cdot 2 \cdot \sqrt{f_c} \cdot \text{psi} \cdot W_f \cdot d = 1183 \text{ kip} \quad (\text{ACI-2008 11.2.1.1})$$

$$\text{Beam_Shear_Check} := \text{if}(V_{\text{req}} < V_{\text{Avail}}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Beam_Shear_Check} = \text{"Okay"}$$

Punching Shear:

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

$$\text{Critical Perimeter of Punching Shear} =$$

$$b_o := (d_p + d) \cdot \pi = 21$$

$$\text{Area Included Inside Perimeter} =$$

$$A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 35$$

$$\text{Area Outside of Perimeter} =$$

$$A_{\text{out}} := A_{\text{mat}} - A_{bo} = 541$$

$$\text{Guess Value} =$$

$$v_u := 1 \text{ ksf}$$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

$$\text{Given}$$

$$d^2 + d_p \cdot d = \frac{\text{Load}_{\text{tot}}}{\pi \cdot v_u}$$

$$v_u := \text{Find}(v_u) = 6.6 \times 10^3 \text{ lbf}$$

$$V_u := v_u \cdot d \cdot W_f = 581 \text{ kips}$$

Required Shear Strength =

$$V_{req} := LF \cdot V_u = 774.5 \text{ kips}$$

Available Shear Strength =

$$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \text{ psi}} \cdot b_o \cdot d = 2068.4 \text{ kip} \quad (\text{ACI-2008 11.11.2.1})$$

$$\text{Punching_Shear_Check} := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Punching_Shear_Check} = \text{"Okay"}$$

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor =

$$\phi_m := .90$$

(ACI-2008 9.3.2.1)

$$M_{nT} := LF \left[U_t \left(W_t \sin(60\text{-deg}) - \frac{d_p}{2} \right) + S_t (D_f + L_{pag}) \right] - W_{T_t} \cdot X_{off} = 1303 \text{ ft-k}$$

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

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

Design Moment =

$$M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 43.341 \text{ kips-ft}$$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \text{ psi} \leq f_c \leq 4000 \text{ psi} \\ 0.65 & \text{if } f_c > 8000 \text{ psi} \end{cases} = 0.85$$

(ACI-2008 10.2.7.3)

$$\left[\left[\left[\frac{f_c}{\text{psi}} - 4000 \right] \right] \right] \left[\frac{0.85 - \left[\frac{f_c}{\text{psi}} - 4000 \right]}{1000} \right] \cdot 0.5 \quad \text{otherwise}$$

$$b_{eff} := W_t \cos(30\text{-deg}) + d_p = 217.346 \text{ in}$$

$$d := T_f - C_{vr_{pad}} - d_{bbot} = 44.125 \text{ in}$$

$$A_s := \frac{M_n}{(f_y \cdot d)} = 0.196 \text{ in}^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.021 \text{ in}$$

$$A_s := \frac{M_n}{f_y \left(d - \frac{a}{2} \right)} = 0.196 \text{ in}^2$$

$$\rho := \frac{A_s}{b_{eff} d} = 2.04887 \times 10^{-5}$$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$A_s := \begin{cases} (\rho \cdot b_{eff} \cdot d) & \text{if } (\rho \cdot b_{eff} \cdot d) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 8.631 \cdot \text{in}^2$$

$$A_{s_{prov}} := A_{b_{bot}} \cdot N_{b_{bot}} = 15 \cdot \text{in}^2$$

$$\text{Pad_Reinforcement_Bot} := \text{if}(A_{s_{prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{Pad_Reinforcement_Bot} = \text{"Okay"}$$

Check top Bars:

$$A_s := \text{if} \left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \right) = 8.6 \cdot \text{in}^2$$

$$A_{s_{prov}} := A_{b_{top}} \cdot N_{b_{top}} = 15 \cdot \text{in}^2$$

$$\text{Pad_Reinforcement_Top} := \text{if}(A_{s_{prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{Pad_Reinforcement_Top} = \text{"Okay"}$$

Development Length Pad Reinforcement:

Bar Spacing =

$$B_{s_{pad}} := \frac{W_f - 2 \cdot C_{vr_{pad}} - N_{b_{bot}} \cdot d_{b_{bot}}}{N_{b_{bot}} - 1} = 10.84 \cdot \text{in}$$

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{vr_{pad}} < \frac{B_{s_{pad}}}{2}, C_{vr_{pad}}, \frac{B_{s_{pad}}}{2} \right) = 3 \cdot \text{in}$$

Transverse Reinforcement Index =

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

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

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{pad} := \frac{W_f}{2} - \frac{W_t}{2} - C_{vr_{pad}} = 36.3 \cdot \text{in}$$

$$L_{pad_Check} := \text{if}(L_{pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$$

$$L_{pad_Check} = \text{"Okay"}$$

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 1017.88 \cdot \text{in}^2$$

$$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 0.51 \cdot \text{in}^2 \quad (\text{ACI-2008 10.8.4 \& 10.9.1})$$

$$A_{sprov} := N_{B_{pier}} \cdot A_{B_{pier}} = 9.42 \cdot \text{in}^2$$

$$\text{Steel_Area_Check} := \text{if}(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Steel_Area_Check} = \text{"Okay"}$$

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{N_{B_{pier}}} - d_{B_{pier}} = 8.425 \cdot \text{in}$$

Diameter of Reinforcement Cage =

$$\text{Diam}_{cage} := d_p - 2 \cdot C_{v_{pier}} = 30 \cdot \text{in}$$

Maximum Moment in Pier =

$$M_p := \left[S_t \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 951.8 \cdot \text{in-kips}$$

Pier Check evaluated from outside program and results are listed below;

$$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p^{12} \ N_{B_{pier}} \ B_{s_{pier}} \ \frac{C_t \cdot 1.333}{\text{kips}} \ \frac{M_p}{\text{in-kips}} \right)$$

$$(D \ N \ n \ P_u \ M_{xu}) = (36 \ 12 \ 8 \ 98.6 \ 951.8)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := (0 \ 0 \ 0 \ 0)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := \phi P'_n (D, N, n, P_u, M_{xu})^T$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) = (1015.9 \ 9802.1 \ -57 \ 0)$$

$$\text{Axial_Load_Check} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"})$$

$$\text{Axial_Load_Check} = \text{"Okay"}$$

$$\text{Bending_Check} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Bending_Check} = \text{"Okay"}$$

Development Length Pier Reinforcement:Available Length in Foundation:

$$L_{\text{pier}} := L_p - C_{\text{vr}}_{\text{pier}} = 33\text{-in}$$

$$L_{\text{pad}} := T_f - C_{\text{vr}}_{\text{pad}} = 45\text{-in}$$

Tension:

(ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{\text{vr}}_{\text{pier}} < \frac{B_{\text{sPier}}}{2}, C_{\text{vr}}_{\text{pier}}, \frac{B_{\text{sPier}}}{2} \right) = 3\text{-in}$$

Transverse Reinforcement =

$$k_{\text{tr}} := 0$$

(ACI-2008 12.2.3)

$$L_{\text{dbt}} := \frac{3 \cdot f_y \cdot \alpha_{\text{pier}} \cdot \beta_{\text{pier}} \cdot \gamma_{\text{pier}} \cdot \lambda_{\text{pier}}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \left(\frac{c + k_{\text{tr}}}{d_{\text{bpier}}} \right)} \cdot d_{\text{bpier}} = 27.39\text{-in}$$

Minimum Development Length =

Pier reinforcement bars are standard 90 degree hooks
and therefore development in the pad is computed
as follows:

$$L_{\text{dh}} := \frac{1200 \cdot d_{\text{bpier}}}{\sqrt{\frac{f_c}{\text{psi}}}} \cdot .7 = 15.336\text{-in} \quad (\text{ACI } 12.2.1)$$

$$L_{\text{db}} := \max(L_{\text{dbt}}, L_{\text{dbmin}})$$

$$L_{\text{tension_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{tension_Check}} = \text{"Okay"}$$

Compression:

(ACI-2008 12.3.2)

$$L_{\text{dbc1}} := \frac{.02 \cdot d_{\text{bpier}} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} = 21.909\text{-in}$$

$$L_{\text{dbmin}} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{\text{bpier}} \cdot f_y) = 18\text{-in}$$

$$L_{\text{dbc}} := \text{if}(L_{\text{dbc1}} \geq L_{\text{dbmin}}, L_{\text{dbc1}}, L_{\text{dbmin}}) = 21.909\text{-in}$$

$$L_{\text{compression_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{compression_Check}} = \text{"Okay"}$$

Tie Size and Spacing in Column:

Minimum Tie Size =

$$Tie_{min} := \text{if}(BS_{pier} \leq 10, 3, 4) = 3$$

Used #3 Ties

Seismic Factor =

$$z := \text{if}(Z \leq 2, 1, 0.5) = 1$$

(ACI-2008 21.10.5)

$$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 16 \cdot \text{in}$$

$$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \cdot \text{in}$$

$$s_{lim3} := D_f \cdot z = 78 \cdot \text{in}$$

$$s_{lim4} := 18 \cdot \text{in}$$

Maximum Spacing =

$$s_{tie} := \min \begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix} = 16 \cdot \text{in}$$

Number of Ties Required =

$$n_{tie} := \frac{L_{pier} - 3 \cdot \text{in}}{s_{tie}} + 1 = 2.875$$

Check Anchor Steel Embedment:

Depth Available =

$$D_{ab} := L_{st} - A_{BP} = 5 \cdot \text{ft}$$

Length of Anchor Bolt =

$$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot \text{in}}{\sqrt{f_c \cdot \text{psi}}} = 12.552 \cdot \text{ft}$$

$$\text{Depth_Check} := \text{if}(D_{ab} \geq L_{anchor}, \text{"Okay"}, \text{"No Good"})$$

Depth_Check = "No Good"

Note: Anchor plate is provided

SITE NAME		BRUCES CT		ECP - CELL #		5		121			
LATITUDE		41-04-27.35 N		LONGITUDE		73-41-50.47 W					
Additional Comments:				SAVE BUTTON							
				STRUCTURE TYPE		MONOPOLE					
700 Mhz - LTE ANTENNA ADD		ALPHA		BETA		GAMMA					
EQUIPMENT TYPE		eNodeB		eNodeB		eNodeB					
ANTENNA TYPE		SLCP 2X6015		SLCP 2X6015		#N/A					
QTY OF ANTENNAS PER FACE		1		1		#N/A					
ORIENTATION (DEG)		0		110		#N/A					
DOWN TILT (MECH/DEG)		0		3		#N/A					
RAD CTR (FT AGL)		98		98		#N/A					
TMA - QTY / MODEL											
DIPLEXER - QTY / MODEL											
850 Cellular - Current Config		ALPHA		BETA		GAMMA					
EQUIPMENT TYPE		#N/A		#N/A		#N/A					
ANTENNA TYPE		DB844H90-XY		DB844H90-XY		#N/A					
QTY OF ANTENNAS PER FACE		2		2		#N/A					
ORIENTATION (DEG)		30		150		#N/A					
DOWN TILT (MECH/DEG)		0		7		#N/A					
RAD CTR (FT AGL)		98		98		#N/A					
TMA - QTY / MODEL						#N/A					
DIPLEXER - QTY / MODEL											
850 Cellular - Future Config		ALPHA		BETA		GAMMA					
EQUIPMENT TYPE		#N/A		#N/A		#N/A					
ANTENNA TYPE		DB844H90-XY		DB844H90-XY		#N/A					
QTY OF ANTENNAS PER FACE		2		2		#N/A					
ORIENTATION (DEG)		30		150		#N/A					
DOWN TILT (MECH/DEG)		0		7		#N/A					
RAD CTR (FT AGL)		98		98		#N/A					
TMA - QTY / MODEL						#N/A					
DIPLEXER - QTY / MODEL											
DIPLEX WITH LTE CABLE											
1900 PCS - Current Config		ALPHA		BETA		GAMMA					
EQUIPMENT TYPE		PCS Modcell 4.0		PCS Modcell 4.0		#N/A					
ANTENNA TYPE		948F85T2E-M_2		948F85T2E-M_2		#N/A					
QTY OF ANTENNAS PER FACE		2		2		#N/A					
ORIENTATION (DEG)		30		150		#N/A					
DOWN TILT (MECH/DEG)		0		0		#N/A					
RAD CTR (FT AGL)		98		98		#N/A					
TMA - QTY / MODEL						#N/A					
DIPLEXER - QTY / MODEL											
1900 PCS - Future Config		ALPHA		BETA		GAMMA					
EQUIPMENT TYPE		PCS Modcell 4.0		PCS Modcell 4.0		#N/A					
ANTENNA TYPE		BXA-171063-8BF_2°		BXA-171063-8BF_2°		#N/A					
QTY OF ANTENNAS PER FACE		1		1		#N/A					
ORIENTATION (DEG)		0		110		#N/A					
DOWN TILT (MECH/DEG)		0		0		#N/A					
RAD CTR (FT AGL)		98		98		#N/A					
TMA - QTY / MODEL						#N/A					
DIPLEX WITH CELLULAR CABLE											
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)		12	
Equipment Cable Ordering		MAIN CABLE		12	+	6	TOP JUMPER #		12	+	6
TX / RX FREQUENCIES					TX POWER OUTPUT						
Cellular A-Band		PCS F / AWS-Band		700 Mhz C - E		Cellular (Watts)		20			
TX - 869-880,890-891.5 MHz		TX - 1970-1975 / 2145-21		TX - 746-757		PCS (Watts)		16			
RX - 824-835,845-846.5 MHz		RX - 1890-1895 / 1745-17		RX - 776-787		LTE (Watts)		40			

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
RF ENGINEER				RF MANAGER				INITIALS		DATE	
Prepared By: Dany Bustamante				Steve Weatherbee				DB		5/2/2012	

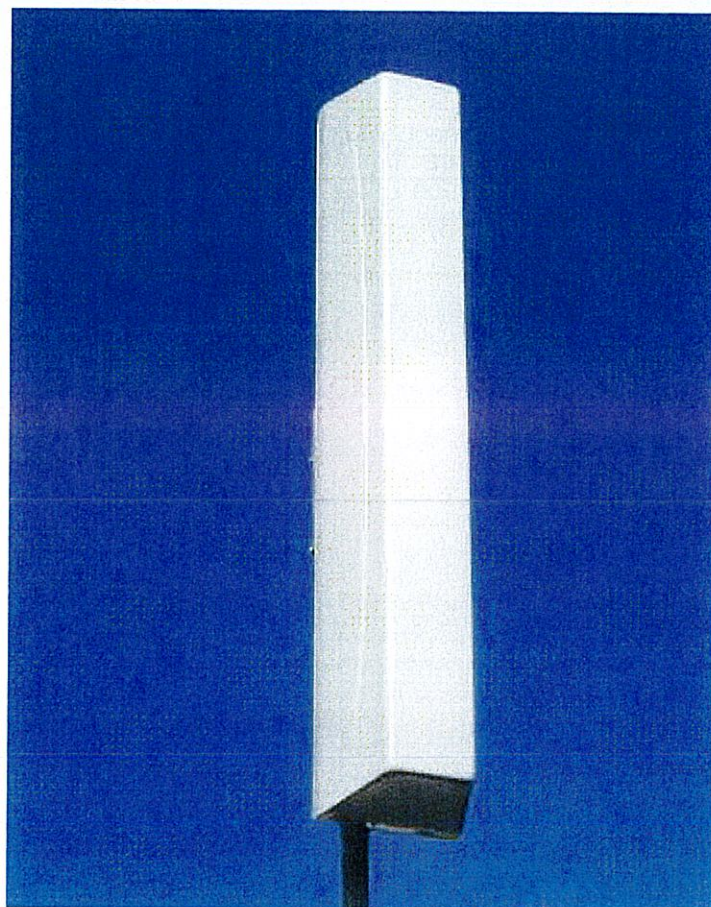
Site Configuration

SLCP 2x6015

Dual (2x) Circularly Polarized log-periodic antenna

Features

- ☐ Transmit Diversity Gain
- ☐ Can be configured to combine space & polarization diversity
- ☐ Outstanding performance over the entire band (700 - 800 MHz)
- ☐ Excellent Axial Ratio
- ☐ Optimized for 4G & 3G systems
- ☐ Low intermodulation
- ☐ Improved Side-to-side rejection
- ☐ Fading reduction
- ☐ Excellent isolation between ports



Electrical specifications

Frequency range:	700-800 MHz	
Impedance:	50 ohm	
Connector type:	7/16 Din	
Return loss:	18 dB	
Polarization:	Circular	
Gain ea. port [Circular]:	2x15 dBdC	
Gain ea. port [Linear]:	2x12 dBdL	
Axial Ratio:	2 dB	
Isolation between ports (TX band):	30 dB	
Front-to-back ratio:	30 dB	
Intermodulation (2x20W):	IM3	150 dB
	IM5	160 dB
	IM7/9	170 dB
Power rating:	2x 500 W	
H-plane (-3 dB point):	2x 55°	
V-plane (-3 dB point):	2x 11°	
Lightning protection:	DC grounded	

Mechanical specifications

Overall height:	77 in	[1956 mm]
Width:	14 in	[356 mm]
Depth:	11 in	[279 mm]
Weight (excluding brackets):	30 lbs	[13.6 Kg]
Wind load measured up to:	150 mph	[240 Km/h]
Wind area (side of antenna):	7.49 sq. ft.	[0.70 sq.m]
Lateral thrust at 113 mph/ 180 Km/h (worst case):	382 lbs	[1701 N]

Materials

Radiating Elements:	Aluminum
Transformer (Power distribution)	Ceramic PCB
Chassis:	Aluminum
Radome:	Grey Fiberglass/PVC
Mounting bolts:	Stainless steel

The SLCP 2x6015 is made in the U.S.A.

BXA-171063-8BF-EDIN-X

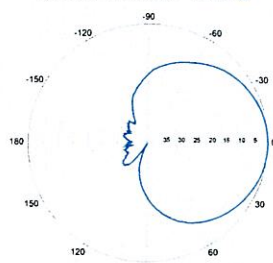
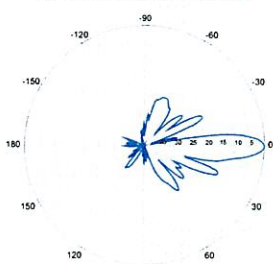
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in	
Depth with t-brackets	133 mm	5.2 in	
Weight without mounting brackets	4.8 kg	10.5 lbs	
Survival wind speed	296 km/hr	184 mph	
Wind area	Front: 0.19 m ² Side: 0.14 m ²	Front: 2.0 ft ² Side: 1.5 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

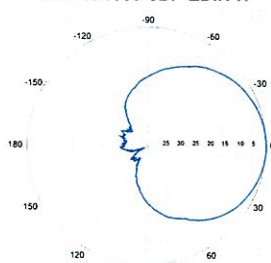
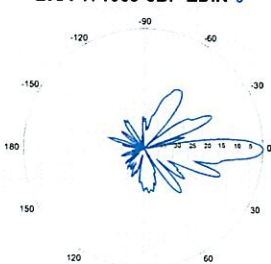


BXA-171063-8BF-EDIN-X

Horizontal | 1710-1880 MHz
BXA-171063-8BF-EDIN-0

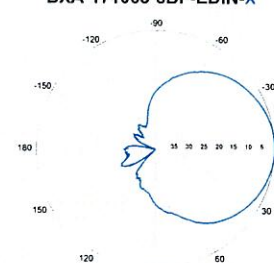
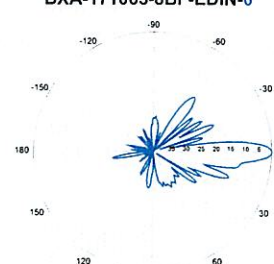
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-X

Horizontal | 1850-1990 MHz
BXA-171063-8BF-EDIN-0

0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-X

Horizontal | 1920-2170 MHz
BXA-171063-8BF-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.