ROBINSON & COLE LLP

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

October 3, 2013

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

Re: **Notice of Exempt Modification – Antenna Swap**
80 Lonetown Road, Redding, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 90-foot level of the existing 100-foot tower at the above-referenced address. The tower and underlying property are owned by James H. Gianninato, Gordon J. Gianninato and Patrick Gianninato. The Council approved Cellco's use of this tower in 1993 (Petition No. 311). Cellco now intends to replace one (1) of its existing antennas with one (1) model SWCP 2x7014 LTE antenna at the same level on the tower. Included in Attachment 1 are specifications for the replacement antenna.

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 Natalie Ketcham, First Selectwoman for the Town of Redding. A copy of this letter is also being sent to James H. Gianninato, Gordon J. Gianninato and Patrick Gianninato, the owners of the property on which the tower is located.

The proposed 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 90-foot level on the 100-foot tower.

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

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

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

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

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

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

Sincerely,

Kenneth C. Baldwin

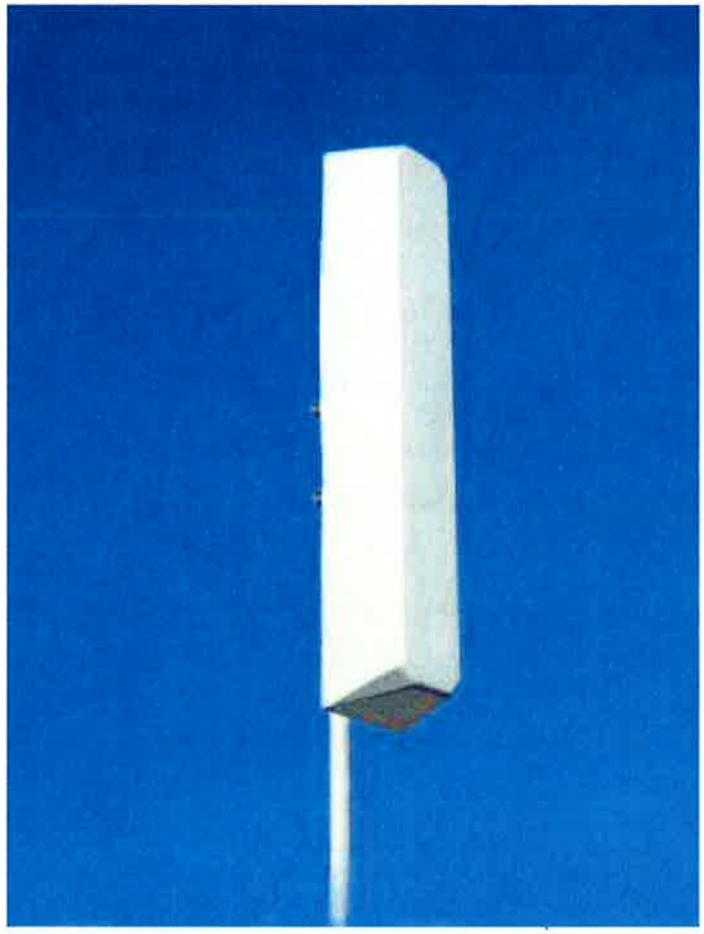
Enclosures
Copy to:
Natalie Ketcham, Redding First Selectwoman
James H. Gianninato
Gordon J. Gianninato
Patrick Gianninato
Sandy M. Carter

ATTACHMENT 1

Swedcom

SWCP 2x7014

698 - 896 MHz Dual (2x) CP log-periodic antenna



Features

- Transmit Diversity Gain
- Can be configured to combine space & polarization diversity
- Outstanding performance over the entire band (698 - 896 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:	**698 - 896 MHz**	
Impedance:	**50 ohm**	
Connector type:	**7/16 Din**	
Return loss:	**18 dB**	
Polarization:	**Circular**	
Gain ea. port [Circular]:	**2x14 dBdC**	
Gain ea. port [Linear]:	**2x11 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 70°**	
V-plane (-3 dB point):	**2x 11°**	
Lightning protection:	**DC grounded**	

Mechanical specifications

Overall height:	**76.7 in**	**[1948 mm]**
Width:	**14 in**	**[356 mm]**
Depth:	**11.3 in**	**[287 mm]**
Weight (excluding brackets):	**30 lbs**	**[13.5 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (front of antenna):	**7.46 sq. ft.**	**[0.69 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**381 lbs**	**[1694 N]**

Materials

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

The SWCP 2x7014 is made in the U.S.A.

ATTACHMENT 2

Site Name: REDDING, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW PCS	1970	15	443	6645	90	0.2950	1.0	29.50%
VZW Cellular	869	9	406	3654	90	0.1622	0.579333333	28.00%
VZW AWS	2145	1	1750	1750	90	0.0777	1.0	7.77%
VZW 700	698	1	840	840	90	0.0373	0.465333333	8.01%
Total Percentage of Maximum Permissible Exposure								73.29%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used.

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

100-ft ROHN Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Redding

80 Lonetown Road
Redding, CT

Centek Project No. 13075.039

Date: September 23, 2013

Prepared for:

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

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

Table of Contents

Introduction

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

The host tower is a 100-ft three-legged, tapered steel self-support lattice tower originally designed and manufactured by ROHN. The tower geometry, structure member sizes and foundation system information were taken from a previous structural report prepared by Centek Engineering job no. 12001.CO6 dated February 9, 2012

Antenna and appurtenance information were obtained from information provided by Verizon Wireless.

The tower is made up of five (5) steel sections consisting of A572-50 pipe legs. Diagonal lateral support bracing consists of A36 steel angle construction. The vertical tower sections are connected by bolted flange plates while the solid legs and bracing are connected by bolted and welded gusset connections. The tower face width is 2.5-ft at the top and 12.71-ft at the bottom.

Verizon proposes the replacement of one (1) existing panel antenna with one (1) proposed panel antenna mounted to the existing T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- VERIZON (EXISTING TO REMAIN):
  Antennas: Two (2) Antel BXA-70063-6CF panel antennas, two (2) Antel BXA-80063-6CF panel antennas, one (1) Antel BXA-80080-4CF panel antenna, two (2) Antel BXA-171063-12BF panel antennas, one (1) Antel BXA-171085-8BF panel antenna and six (6) RFS FD9R6004/2C-3L diplexers mounted on three (3) 12-ft Lightweight T-Frames with a RAD center elevation of 90-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables mounted to a leg of the existing tower.
- VERIZON (EXISTING TO REMOVE):
  Antennas: One (1) Antel BXA-70063-6CF panel antenna mounted on three (3) 12-ft Lightweight T-Frames with a RAD center elevation of 90-ft above grade.
- **VERIZON (EXISTING TO REMOVE):**
  Antennas: One (1) Swedcom SWCP 2x7014 panel antenna mounted on three (3) 12-ft Lightweight T-Frames with a RAD center elevation of 90-ft above grade.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

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

Tower Loading

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

Basic Wind Speed:	Fairfield; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Redding; v = 100 mph (3 second gust) equivalent to v = 80 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA 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 tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **70.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T4)	20.00'-40.00'	70.0%	**PASS**
Diagonal (T5)	0.00'-20.00'	58.3%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 2-ft square x 1-ft long reinforced concrete piers on a 18.5-ft x 15.5-ft x 4.5-ft thick reinforced concrete mat bearing directly on existing sub grade. Tower legs are connected to the foundation by means of (4) 3/4"∅, ASTM A325 anchor bolts per leg, embedded into the concrete foundation structure.

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

Location	Vector	Proposed Reactions
Base	Shear	11 kips
	Compression	12 kips
	Moment	596 kip-ft
Leg	Compression	58 kips
	Uplift	47 kips
	Shear	7 kips

- 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 and Piers (3)	OTM(2)	2.0	2.68	**PASS**

Note 1: FS denotes Factor of Safety.
Note 2: OTM denotes Overturning Moment

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	43.9%	**PASS**

Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 15684
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

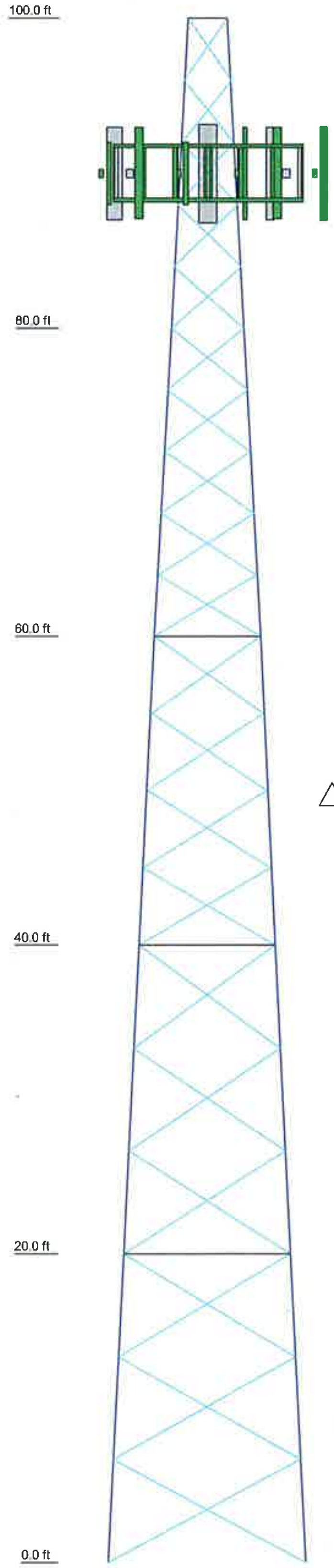
General Description of Structural Analysis Program

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

tnxTower Features:

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

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Face Width (ft)	# Panels @ (ft)	Weight (K)
T1	ROHN 2.5 STD	A572-50	L1 1/4x1 1/4x3/16	A36	L3x3x1/4	2.5	10 @ 4	0.6
T2					N.A.	4.71875		0.7
T3			L1 1/2x1 1/2x1/4		L1 1/2x1 1/2x1/4	6.76	4 @ 5	0.9
T4	ROHN 3 STD		L2x2x1/4		L2x2x1/4	8.65	6 @ 6.66667	1.2
T5	ROHN 3 X-STR		L2 1/2x2 1/2x1/4		L2 1/2x2 1/2x1/4	10.69		1.7
						12.71		5.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-80063/6CF (Verizon - Existing)	90	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	90
SWCP 2x7014 (Verizon - Proposed)	90		
BXA-171063-12BF (Verizon - Existing)	90	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	90
BXA-80063/6CF (Verizon - Existing)	90		
BXA-70063/6CF (Verizon - Existing)	90	12-ft Lightweight T-Frame (Verizon - Existing)	90
BXA-171063-12BF (Verizon - Existing)	90		
BXA-80080-4CF (Verizon - Existing)	90	12-ft Lightweight T-Frame (Verizon - Existing)	90
BXA-70063/6CF (Verizon - Existing)	90		
BXA-171085-8BF (Verizon - Existing)	90	12-ft Lightweight T-Frame (Verizon - Existing)	90
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	90		

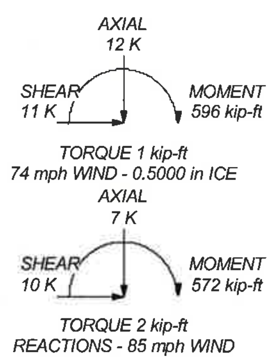
MATERIAL STRENGTH

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

TOWER DESIGN NOTES

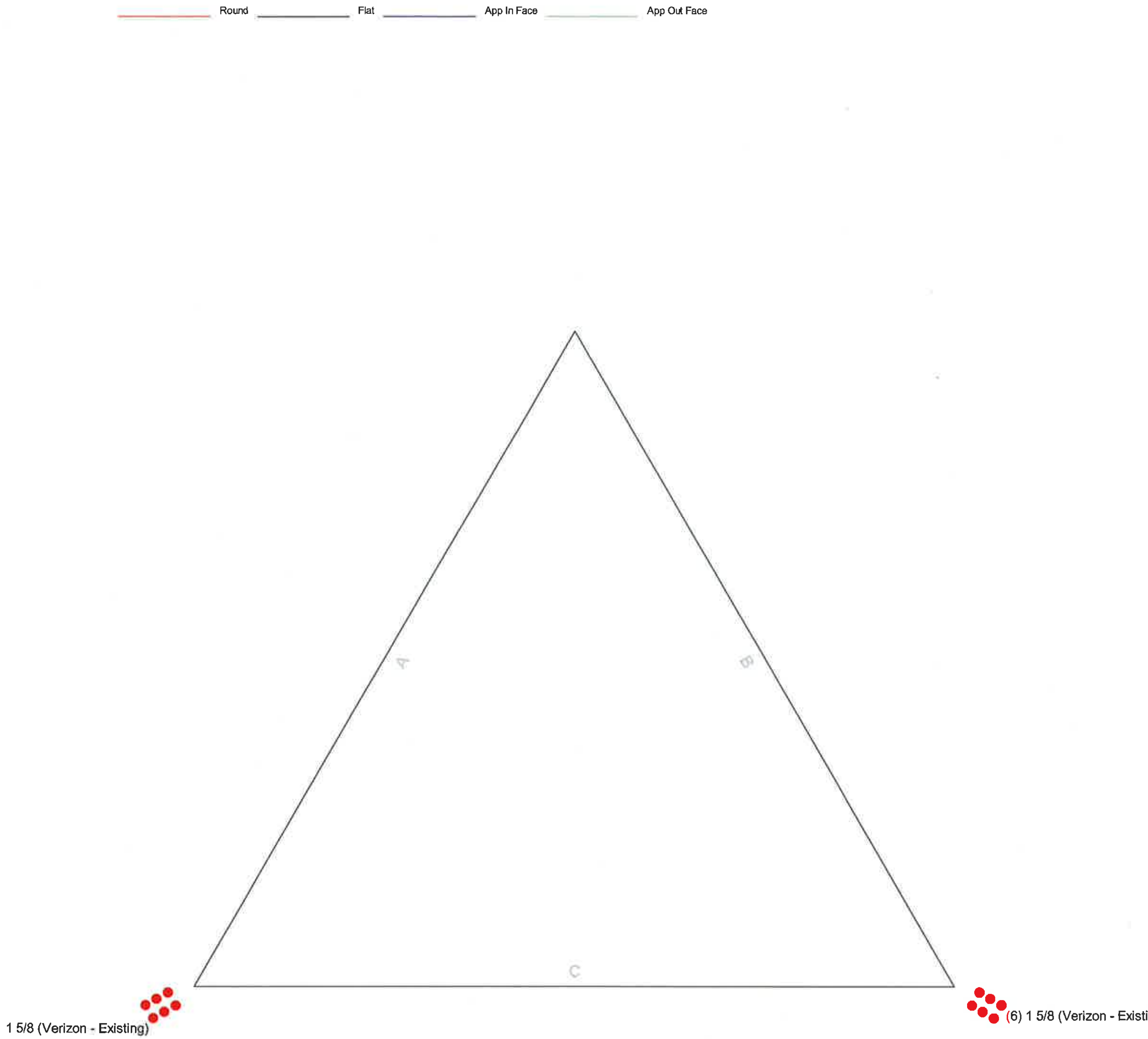
1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 70%

MAX. CORNER REACTIONS AT BASE:
DOWN: 58 K
UPLIFT: -47 K
SHEAR: 7 K



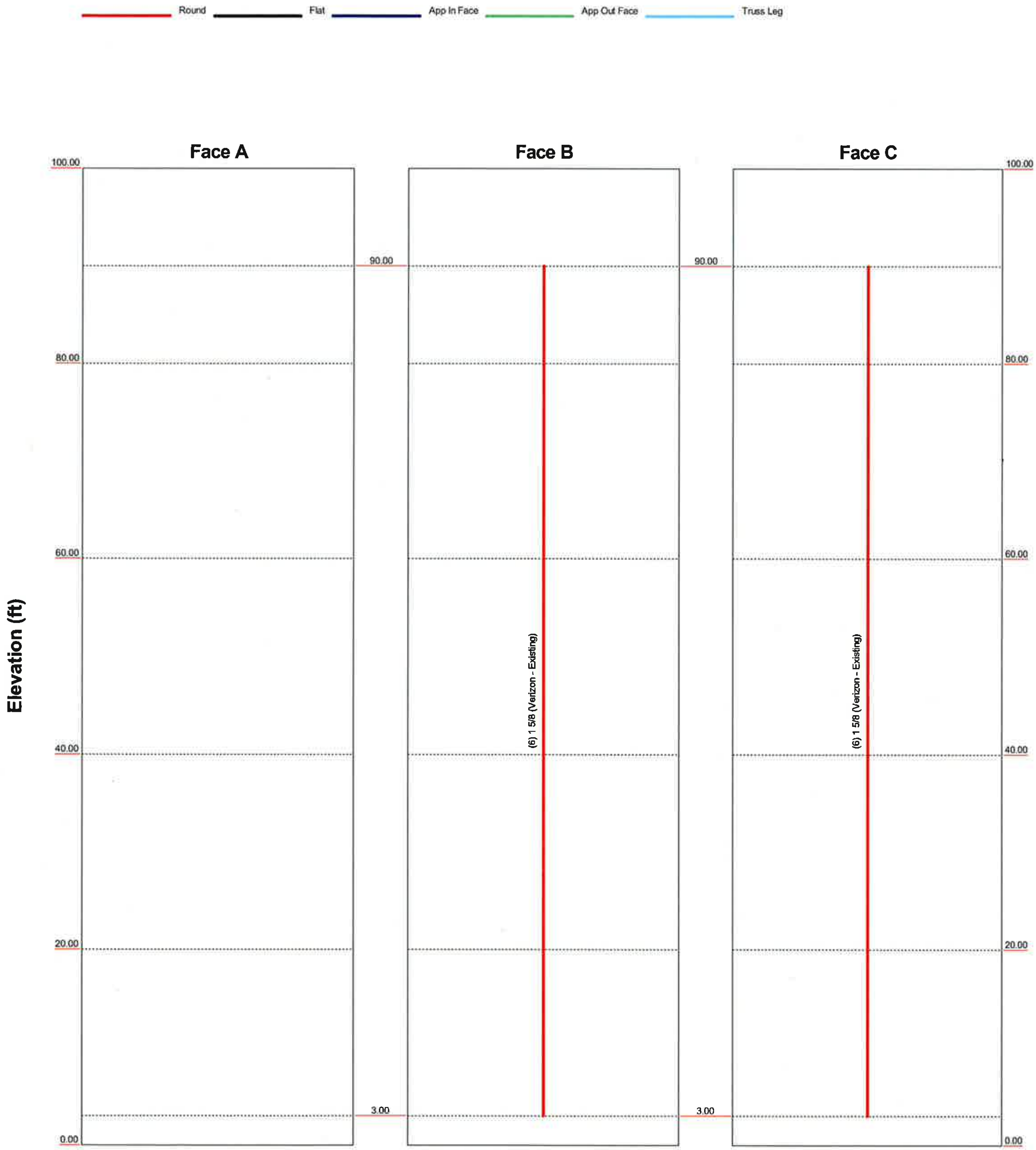
Centek Engineering Inc.	Job: 13075.039 - Redding		
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Project: 100-ft Rohn Lattice Tower - 80 Lonetown Rd., Redding, CT		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 09/23/13	Scale: NTS
	Path:		Dwg No. E-1

Feedline Plan



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***13075.039 - Redding***		
	Project: ***100-ft Rohn Lattice Tower - 80 Lonetown Rd., Redding, CT***		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 09/23/13	Scale: NTS
	Path:		Dwg No. E-7

Feedline Distribution Chart
0' - 100'



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***13075.039 - Redding***		
	Project: ***100-ft Rohn Lattice Tower - 80 Lonetown Rd., Redding, CT***		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 09/23/13	Scale: NTS
	Path:		Dwg No. E-7

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 2.50 ft at the top and 12.71 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

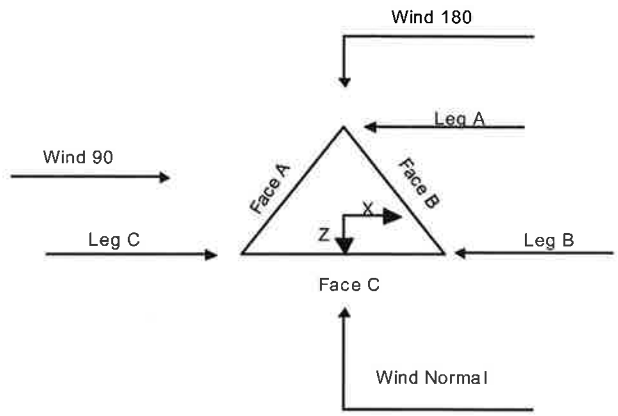
- Basic wind speed of 85 mph.
- Nominal ice thickness of 0.5000 in.
- Ice density of 56 pcf.
- A wind speed of 74 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 50 mph.
- Weld together tower sections have flange connections..
- Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
- Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
- Welds are fabricated with ER-70S-6 electrodes..
- 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
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
Bypass Mast Stability Checks
Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
√ SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feedline Torque
Include Angle Block Shear Check
Poles
Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets



Triangular Tower

Tower Section Geometry

Tower Section	*Tower Elevation* ft	*Assembly Database*	*Description*	*Section Width* ft	*Number of Sections*	*Section Length* ft
T1	100.00-80.00		SSV 6N288 (1993)	2.50	1	20.00
T2	80.00-60.00		SSV 7N415 (1990)	4.72	1	20.00
T3	60.00-40.00		SSV 8N217 (1985)	6.76	1	20.00
T4	40.00-20.00		SSV 9N154 (1980)	8.65	1	20.00
T5	20.00-0.00		SSV 10N111 (1980)	10.69	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	*Tower Elevation* ft	*Diagonal Spacing* ft	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset* in	*Bottom Girt Offset* in
T1	100.00-80.00	4.00	X Brace	No	No	0.0000	0.0000
T2	80.00-60.00	4.00	X Brace	No	No	0.0000	0.0000
T3	60.00-40.00	5.00	X Brace	No	No	0.0000	0.0000
T4	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T5	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 100.00-80.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T2 80.00-60.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T3 60.00-40.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/4	A36 (36 ksi)
T4 40.00-20.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T5 20.00-0.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Top Girt Type*	*Top Girt Size*	*Top Girt Grade*	*Bottom Girt Type*	*Bottom Girt Size*	*Bottom Girt Grade*
T3 60.00-40.00	Single Angle	L1 1/2x1 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T4 40.00-20.00	Single Angle	L2x2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T5 20.00-0.00	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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

Tower Section Geometry *(cont'd)*

K Factors[1]

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

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

Tower Section Geometry *(cont'd)*

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Connection Type*	*Leg*		*Diagonal*		*Top Girt*		*Bottom Girt*		*Mid Girt*		*Long Horizontal*		*Short Horizontal*	
		Bolt Size in	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*
T1 100.00-80.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 80.00-60.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 60.00-40.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 40.00-20.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 20.00-0.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon - Existing)	B	No	Ar (Leg)	90.00 - 3.00	0.0000	-0.05	6	3	0.5000 1.0000	1.9800		1.04
1 5/8 (Verizon - Existing)	C	No	Ar (Leg)	90.00 - 3.00	0.0000	-0.05	6	3	0.5000 1.0000	1.9800		1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	100.00-80.00	A	4.950	0.000	0.000	0.000	0.00
		B	4.950	0.000	0.000	0.000	0.06
		C	9.900	0.000	0.000	0.000	0.06
T2	80.00-60.00	A	9.900	0.000	0.000	0.000	0.00
		B	9.900	0.000	0.000	0.000	0.12
		C	19.800	0.000	0.000	0.000	0.12
T3	60.00-40.00	A	9.900	0.000	0.000	0.000	0.00
		B	9.900	0.000	0.000	0.000	0.12
		C	19.800	0.000	0.000	0.000	0.12
T4	40.00-20.00	A	9.900	0.000	0.000	0.000	0.00
		B	9.900	0.000	0.000	0.000	0.12
		C	19.800	0.000	0.000	0.000	0.12
T5	20.00-0.00	A	8.415	0.000	0.000	0.000	0.00
		B	8.415	0.000	0.000	0.000	0.11
		C	16.830	0.000	0.000	0.000	0.11

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	100.00-80.00	A	0.500	2.483	4.133	0.000	0.000	0.00
		B		2.483	4.133	0.000	0.000	0.16
		C		4.967	8.267	0.000	0.000	0.16
T2	80.00-60.00	A	0.500	4.967	8.267	0.000	0.000	0.00
		B		4.967	8.267	0.000	0.000	0.32
		C		9.933	16.533	0.000	0.000	0.32
T3	60.00-40.00	A	0.500	4.967	8.267	0.000	0.000	0.00
		B		4.967	8.267	0.000	0.000	0.32
		C		9.933	16.533	0.000	0.000	0.32
T4	40.00-20.00	A	0.500	4.967	8.267	0.000	0.000	0.00
		B		4.967	8.267	0.000	0.000	0.32
		C		9.933	16.533	0.000	0.000	0.32
T5	20.00-0.00	A	0.500	4.222	7.027	0.000	0.000	0.00
		B		4.222	7.027	0.000	0.000	0.27
		C		8.443	14.053	0.000	0.000	0.27

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	100.00-80.00	0.0000	2.3487	0.0000	1.3507
T2	80.00-60.00	0.0000	4.7862	0.0000	2.7581
T3	60.00-40.00	0.0000	5.8866	0.0000	3.4168
T4	40.00-20.00	0.0000	6.3729	0.0000	3.8663
T5	20.00-0.00	0.0000	5.8776	0.0000	3.6336

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
BXA-80063/6CF (Verizon - Existing)	A	From Leg	3.00 -6.00 0.00	0.0000	90.00	No Ice 1/2" Ice	7.74 8.28	4.05 4.49	0.02 0.06
SWCP 2x7014 (Verizon - Proposed)	A	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	10.44 11.03	8.43 9.00	0.03 0.10
BXA-171063-12BF (Verizon - Existing)	A	From Leg	3.00 4.00 0.00	0.0000	90.00	No Ice 1/2" Ice	4.73 5.18	3.57 4.01	0.02 0.04
BXA-80063/6CF (Verizon - Existing)	B	From Leg	3.00 -6.00 0.00	0.0000	90.00	No Ice 1/2" Ice	7.74 8.28	4.05 4.49	0.02 0.06
BXA-70063/6CF (Verizon - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12BF (Verizon - Existing)	B	From Leg	3.00 4.00 0.00	0.0000	90.00	No Ice 1/2" Ice	4.73 5.18	3.57 4.01	0.02 0.04
BXA-80080-4CF (Verizon - Existing)	C	From Leg	3.00 -6.00 0.00	0.0000	90.00	No Ice 1/2" Ice	3.69 4.06	2.79 3.10	0.01 0.04
BXA-70063/6CF (Verizon - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171085-8BF (Verizon - Existing)	C	From Leg	3.00 4.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.94 3.26	2.16 2.46	0.01 0.03
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	A	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.37 0.45	0.08 0.14	0.00 0.01
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.37 0.45	0.08 0.14	0.00 0.01
(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.37 0.45	0.08 0.14	0.00 0.01
12-ft Lightweight T-Frame	A	From Leg	1.50	0.0000	90.00	No Ice	10.20	10.20	0.25

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
(Verizon - Existing)			0.00 0.00			1/2" Ice	16.20	16.20	0.35
12-ft Lightweight T-Frame (Verizon - Existing)	B	From Leg	1.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	10.20 16.20	10.20 16.20	0.25 0.35
12-ft Lightweight T-Frame (Verizon - Existing)	C	From Leg	1.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	10.20 16.20	10.20 16.20	0.25 0.35

Tower Pressures - No Ice

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	1.332	25	76.987	A	5.820	14.553	9.603	47.14	0.000	0.000
					B	5.820	14.553		47.14	0.000	0.000
					C	5.820	19.503		37.92	0.000	0.000
T2 80.00-60.00	70.00	1.24	23	119.585	A	6.991	19.500	9.600	36.24	0.000	0.000
					B	6.991	19.500		36.24	0.000	0.000
					C	6.991	29.400		26.38	0.000	0.000
T3 60.00-40.00	50.00	1.126	21	158.897	A	9.720	19.498	9.598	32.85	0.000	0.000
					B	9.720	19.498		32.85	0.000	0.000
					C	9.720	29.398		24.54	0.000	0.000
T4 40.00-20.00	30.00	1	18	199.241	A	12.809	21.587	11.687	33.98	0.000	0.000
					B	12.809	21.587		33.98	0.000	0.000
					C	12.809	31.487		26.38	0.000	0.000
T5 20.00-0.00	10.00	1	18	239.841	A	18.584	20.101	11.686	30.21	0.000	0.000
					B	18.584	20.101		30.21	0.000	0.000
					C	18.584	28.516		24.81	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	1.332	18	0.5000	78.656	A	9.953	19.818	12.943	43.48	0.000	0.000
						B	9.953	19.818		43.48	0.000	0.000
						C	14.086	22.302		35.57	0.000	0.000
T2 80.00-60.00	70.00	1.24	17	0.5000	121.254	A	15.258	23.498	12.939	33.39	0.000	0.000
						B	15.258	23.498		33.39	0.000	0.000
						C	23.524	28.465		24.89	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T3 60.00-40.00	50.00	1.126	16	0.5000	160.566	A	17.986	24.382	12.936	30.53	0.000	0.000
						B	17.986	24.382		30.53	0.000	0.000
						C	26.253	29.349		23.27	0.000	0.000
T4 40.00-20.00	30.00	1	14	0.5000	200.910	A	21.076	26.397	15.026	31.65	0.000	0.000
						B	21.076	26.397		31.65	0.000	0.000
						C	29.342	31.364		24.75	0.000	0.000
T5 20.00-0.00	10.00	1	14	0.5000	241.510	A	25.611	26.681	15.025	28.73	0.000	0.000
						B	25.611	26.681		28.73	0.000	0.000
						C	32.637	30.902		23.65	0.000	0.000

Tower Pressure - Service

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	1.332	9	76.987	A	5.820	14.553	9.603	47.14	0.000	0.000
					B	5.820	14.553		47.14	0.000	0.000
					C	5.820	19.503		37.92	0.000	0.000
T2 80.00-60.00	70.00	1.24	8	119.585	A	6.991	19.500	9.600	36.24	0.000	0.000
					B	6.991	19.500		36.24	0.000	0.000
					C	6.991	29.400		26.38	0.000	0.000
T3 60.00-40.00	50.00	1.126	7	158.897	A	9.720	19.498	9.598	32.85	0.000	0.000
					B	9.720	19.498		32.85	0.000	0.000
					C	9.720	29.398		24.54	0.000	0.000
T4 40.00-20.00	30.00	1	6	199.241	A	12.809	21.587	11.687	33.98	0.000	0.000
					B	12.809	21.587		33.98	0.000	0.000
					C	12.809	31.487		26.38	0.000	0.000
T5 20.00-0.00	10.00	1	6	239.841	A	18.584	20.101	11.686	30.21	0.000	0.000
					B	18.584	20.101		30.21	0.000	0.000
					C	18.584	28.516		24.81	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	1	1	14.635	1.15	57.29	C
			B	0.265	2.394	0.606	1	1	14.635			
			C	0.329	2.222	0.625	1	1	18.012			
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	1	1	18.594	1.53	76.51	C
			B	0.222	2.526	0.595	1	1	18.594			
			C	0.304	2.285	0.617	1	1	25.137			
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	1	1	21.169	1.62	81.16	C
			B	0.184	2.651	0.587	1	1	21.169			
			C	0.246	2.449	0.601	1	1	27.385			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	1	1	25.442	1.71	85.55	C
			B	0.173	2.69	0.585	1	1	25.442			
			C	0.222	2.523	0.595	1	1	31.550			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	1	1	30.309	1.98	99.23	C
			B	0.161	2.73	0.583	1	1	30.309			
			C	0.196	2.608	0.59	1	1	35.399			
Sum Weight:	1.09	5.14						OTM	362.58 kip-ft	7.99		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	0.825	1	13.616	1.08	54.05	C
			B	0.265	2.394	0.606	0.825	1	13.616			
			C	0.329	2.222	0.625	0.825	1	16.994			
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	0.825	1	17.370	1.46	72.79	C
			B	0.222	2.526	0.595	0.825	1	17.370			
			C	0.304	2.285	0.617	0.825	1	23.914			
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	0.825	1	19.468	1.52	76.12	C
			B	0.184	2.651	0.587	0.825	1	19.468			
			C	0.246	2.449	0.601	0.825	1	25.684			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	0.825	1	23.200	1.59	79.48	C
			B	0.173	2.69	0.585	0.825	1	23.200			
			C	0.222	2.523	0.595	0.825	1	29.309			
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	0.825	1	27.056	1.80	90.11	C
			B	0.161	2.73	0.583	0.825	1	27.056			
			C	0.196	2.608	0.59	0.825	1	32.147			
Sum Weight:	1.09	5.14						OTM	341.03 kip-ft	7.45		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	0.8	1	13.471	1.07	53.59	C
			B	0.265	2.394	0.606	0.8	1	13.471			
			C	0.329	2.222	0.625	0.8	1	16.848			
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	0.8	1	17.196	1.45	72.26	C
			B	0.222	2.526	0.595	0.8	1	17.196			
			C	0.304	2.285	0.617	0.8	1	23.739			
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	0.8	1	19.226	1.51	75.40	C
			B	0.184	2.651	0.587	0.8	1	19.226			
			C	0.246	2.449	0.601	0.8	1	25.441			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	0.8	1	22.880	1.57	78.61	C
			B	0.173	2.69	0.585	0.8	1	22.880			
			C	0.222	2.523	0.595	0.8	1	28.988			
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	0.8	1	26.592	1.78	88.81	C
			B	0.161	2.73	0.583	0.8	1	26.592			
			C	0.196	2.608	0.59	0.8	1	31.683			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	1.09	5.14						OTM	337.95 kip-ft	7.37		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	0.85	1	13.762	1.09	54.51	C
			B	0.265	2.394	0.606	0.85	1	13.762			
			C	0.329	2.222	0.625	0.85	1	17.139			
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	0.85	1	17.545	1.47	73.32	C
			B	0.222	2.526	0.595	0.85	1	17.545			
			C	0.304	2.285	0.617	0.85	1	24.089			
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	0.85	1	19.711	1.54	76.84	C
			B	0.184	2.651	0.587	0.85	1	19.711			
			C	0.246	2.449	0.601	0.85	1	25.927			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	0.85	1	23.520	1.61	80.34	C
			B	0.173	2.69	0.585	0.85	1	23.520			
			C	0.222	2.523	0.595	0.85	1	29.629			
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	0.85	1	27.521	1.83	91.41	C
			B	0.161	2.73	0.583	0.85	1	27.521			
			C	0.196	2.608	0.59	0.85	1	32.612			
Sum Weight:	1.09	5.14						OTM	344.11 kip-ft	7.53		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.32	0.99	A	0.379	2.108	0.643	1	1	22.697	1.23	61.31	C
			B	0.379	2.108	0.643	1	1	22.697			
			C	0.463	1.953	0.679	1	1	29.233			
T2 80.00-60.00	0.64	1.07	A	0.32	2.245	0.622	1	1	29.876	1.70	85.19	C
			B	0.32	2.245	0.622	1	1	29.876			
			C	0.429	2.01	0.664	1	1	42.418			
T3 60.00-40.00	0.64	1.41	A	0.264	2.397	0.606	1	1	32.750	1.77	88.60	C
			B	0.264	2.397	0.606	1	1	32.750			
			C	0.346	2.18	0.631	1	1	44.777			
T4 40.00-20.00	0.64	1.82	A	0.236	2.479	0.598	1	1	36.874	1.80	89.87	C
			B	0.236	2.479	0.598	1	1	36.874			
			C	0.302	2.29	0.617	1	1	48.680			
T5 20.00-0.00	0.54	2.51	A	0.217	2.542	0.594	1	1	41.457	1.99	99.27	C
			B	0.217	2.542	0.594	1	1	41.457			
			C	0.263	2.399	0.605	1	1	51.343			
Sum Weight:	2.78	7.80						OTM	391.99 kip-ft	8.48		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation *ft*	Add Weight *K*	Self Weight *K*	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F *K*	w *plf*	Ctrl. Face
T1	0.32	0.99	A	0.379	2.108	0.643	0.825	1	20.956	1.12	56.14	C
100.00-80.00			B	0.379	2.108	0.643	0.825	1	20.956			
			C	0.463	1.953	0.679	0.825	1	26.767			
T2	0.64	1.07	A	0.32	2.245	0.622	0.825	1	27.206	1.54	76.92	C
80.00-60.00			B	0.32	2.245	0.622	0.825	1	27.206			
			C	0.429	2.01	0.664	0.825	1	38.301			
T3	0.64	1.41	A	0.264	2.397	0.606	0.825	1	29.602	1.59	79.51	C
60.00-40.00			B	0.264	2.397	0.606	0.825	1	29.602			
			C	0.346	2.18	0.631	0.825	1	40.182			
T4	0.64	1.82	A	0.236	2.479	0.598	0.825	1	33.185	1.61	80.39	C
40.00-20.00			B	0.236	2.479	0.598	0.825	1	33.185			
			C	0.302	2.29	0.617	0.825	1	43.545			
T5 20.00-0.00	0.54	2.51	A	0.217	2.542	0.594	0.825	1	36.975	1.76	88.23	C
			B	0.217	2.542	0.594	0.825	1	36.975			
			C	0.263	2.399	0.605	0.825	1	45.631			
Sum Weight:	2.78	7.80						OTM	354.13 kip-ft	7.62		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation *ft*	Add Weight *K*	Self Weight *K*	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F *K*	w *plf*	Ctrl. Face
T1	0.32	0.99	A	0.379	2.108	0.643	0.8	1	20.707	1.11	55.40	C
100.00-80.00			B	0.379	2.108	0.643	0.8	1	20.707			
			C	0.463	1.953	0.679	0.8	1	26.415			
T2	0.64	1.07	A	0.32	2.245	0.622	0.8	1	26.824	1.51	75.74	C
80.00-60.00			B	0.32	2.245	0.622	0.8	1	26.824			
			C	0.429	2.01	0.664	0.8	1	37.713			
T3	0.64	1.41	A	0.264	2.397	0.606	0.8	1	29.153	1.56	78.22	C
60.00-40.00			B	0.264	2.397	0.606	0.8	1	29.153			
			C	0.346	2.18	0.631	0.8	1	39.526			
T4	0.64	1.82	A	0.236	2.479	0.598	0.8	1	32.659	1.58	79.03	C
40.00-20.00			B	0.236	2.479	0.598	0.8	1	32.659			
			C	0.302	2.29	0.617	0.8	1	42.812			
T5 20.00-0.00	0.54	2.51	A	0.217	2.542	0.594	0.8	1	36.335	1.73	86.65	C
			B	0.217	2.542	0.594	0.8	1	36.335			
			C	0.263	2.399	0.605	0.8	1	44.815			
Sum Weight:	2.78	7.80						OTM	348.72 kip-ft	7.50		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.32	0.99	A	0.379	2.108	0.643	0.85	1	21.205	1.14	56.87	C
			B	0.379	2.108	0.643	0.85	1	21.205			
			C	0.463	1.953	0.679	0.85	1	27.120			
T2 80.00-60.00	0.64	1.07	A	0.32	2.245	0.622	0.85	1	27.587	1.56	78.10	C
			B	0.32	2.245	0.622	0.85	1	27.587			
			C	0.429	2.01	0.664	0.85	1	38.890			
T3 60.00-40.00	0.64	1.41	A	0.264	2.397	0.606	0.85	1	30.052	1.62	80.81	C
			B	0.264	2.397	0.606	0.85	1	30.052			
			C	0.346	2.18	0.631	0.85	1	40.839			
T4 40.00-20.00	0.64	1.82	A	0.236	2.479	0.598	0.85	1	33.712	1.63	81.74	C
			B	0.236	2.479	0.598	0.85	1	33.712			
			C	0.302	2.29	0.617	0.85	1	44.279			
T5 20.00-0.00	0.54	2.51	A	0.217	2.542	0.594	0.85	1	37.615	1.80	89.81	C
			B	0.217	2.542	0.594	0.85	1	37.615			
			C	0.263	2.399	0.605	0.85	1	46.447			
Sum Weight:	2.78	7.80						OTM	359.54 kip-ft	7.75		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	1	1	14.635	0.40	19.82	C
			B	0.265	2.394	0.606	1	1	14.635			
			C	0.329	2.222	0.625	1	1	18.012			
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	1	1	18.594	0.53	26.48	C
			B	0.222	2.526	0.595	1	1	18.594			
			C	0.304	2.285	0.617	1	1	25.137			
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	1	1	21.169	0.56	28.08	C
			B	0.184	2.651	0.587	1	1	21.169			
			C	0.246	2.449	0.601	1	1	27.385			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	1	1	25.442	0.59	29.60	C
			B	0.173	2.69	0.585	1	1	25.442			
			C	0.222	2.523	0.595	1	1	31.550			
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	1	1	30.309	0.69	34.33	C
			B	0.161	2.73	0.583	1	1	30.309			
			C	0.196	2.608	0.59	1	1	35.399			
Sum Weight:	1.09	5.14						OTM	125.46 kip-ft	2.77		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	0.825	1	13.616	0.37	18.70	C
			B	0.265	2.394	0.606	0.825	1	13.616			
			C	0.329	2.222	0.625	0.825	1	16.994			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	0.825	1	17.370	0.50	25.19	C
			B	0.222	2.526	0.595	0.825	1	17.370			
			C	0.304	2.285	0.617	0.825	1	23.914			
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	0.825	1	19.468	0.53	26.34	C
			B	0.184	2.651	0.587	0.825	1	19.468			
			C	0.246	2.449	0.601	0.825	1	25.684			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	0.825	1	23.200	0.55	27.50	C
			B	0.173	2.69	0.585	0.825	1	23.200			
			C	0.222	2.523	0.595	0.825	1	29.309			
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	0.825	1	27.056	0.62	31.18	C
			B	0.161	2.73	0.583	0.825	1	27.056			
			C	0.196	2.608	0.59	0.825	1	32.147			
Sum Weight:	1.09	5.14						OTM	118.00 kip-ft	2.58		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	0.8	1	13.471	0.37	18.54	C
			B	0.265	2.394	0.606	0.8	1	13.471			
			C	0.329	2.222	0.625	0.8	1	16.848			
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	0.8	1	17.196	0.50	25.00	C
			B	0.222	2.526	0.595	0.8	1	17.196			
			C	0.304	2.285	0.617	0.8	1	23.739			
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	0.8	1	19.226	0.52	26.09	C
			B	0.184	2.651	0.587	0.8	1	19.226			
			C	0.246	2.449	0.601	0.8	1	25.441			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	0.8	1	22.880	0.54	27.20	C
			B	0.173	2.69	0.585	0.8	1	22.880			
			C	0.222	2.523	0.595	0.8	1	28.988			
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	0.8	1	26.592	0.61	30.73	C
			B	0.161	2.73	0.583	0.8	1	26.592			
			C	0.196	2.608	0.59	0.8	1	31.683			
Sum Weight:	1.09	5.14						OTM	116.94 kip-ft	2.55		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.12	0.62	A	0.265	2.394	0.606	0.85	1	13.762	0.38	18.86	C
			B	0.265	2.394	0.606	0.85	1	13.762			
			C	0.329	2.222	0.625	0.85	1	17.139			
T2 80.00-60.00	0.25	0.66	A	0.222	2.526	0.595	0.85	1	17.545	0.51	25.37	C
			B	0.222	2.526	0.595	0.85	1	17.545			
			C	0.304	2.285	0.617	0.85	1	24.089			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T3 60.00-40.00	0.25	0.91	A	0.184	2.651	0.587	0.85	1	19.711	0.53	26.59	C
			B	0.184	2.651	0.587	0.85	1	19.711			
			C	0.246	2.449	0.601	0.85	1	25.927			
T4 40.00-20.00	0.25	1.21	A	0.173	2.69	0.585	0.85	1	23.520	0.56	27.80	C
			B	0.173	2.69	0.585	0.85	1	23.520			
			C	0.222	2.523	0.595	0.85	1	29.629			
T5 20.00-0.00	0.21	1.73	A	0.161	2.73	0.583	0.85	1	27.521	0.63	31.63	C
			B	0.161	2.73	0.583	0.85	1	27.521			
			C	0.196	2.608	0.59	0.85	1	32.612			
Sum Weight:	1.09	5.14						OTM	119.07 kip-ft	2.61		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	2.12					
Bracing Weight	3.02					
Total Member Self-Weight	5.14			2.62	-0.08	
Total Weight	7.17			2.62	-0.08	
Wind 0 deg - No Ice		-0.04	-10.26	-563.98	3.45	0.09
Wind 30 deg - No Ice		4.86	-8.46	-470.30	-271.05	1.11
Wind 45 deg - No Ice		6.84	-6.84	-380.28	-382.94	1.50
Wind 60 deg - No Ice		8.33	-4.79	-265.30	-467.61	1.77
Wind 90 deg - No Ice		9.79	0.04	6.15	-548.14	2.06
Wind 120 deg - No Ice		8.91	5.16	288.98	-492.48	1.92
Wind 135 deg - No Ice		6.90	6.90	390.52	-387.94	1.37
Wind 150 deg - No Ice		4.93	8.50	479.08	-277.17	0.95
Wind 180 deg - No Ice		0.04	9.64	544.59	-3.61	-0.09
Wind 210 deg - No Ice		-4.86	8.46	475.54	270.89	-1.11
Wind 225 deg - No Ice		-6.84	6.84	385.53	382.79	-1.50
Wind 240 deg - No Ice		-8.87	5.10	282.86	488.79	-2.01
Wind 270 deg - No Ice		-9.79	-0.04	-0.91	547.98	-2.06
Wind 300 deg - No Ice		-8.37	-4.85	-271.42	470.99	-1.68
Wind 315 deg - No Ice		-6.90	-6.90	-385.28	387.78	-1.37
Wind 330 deg - No Ice		-4.93	-8.50	-473.83	277.01	-0.95
Member Ice	2.66					
Total Weight Ice	12.16			6.66	-0.11	
Wind 0 deg - Ice		-0.03	-10.67	-581.70	2.58	0.09
Wind 30 deg - Ice		4.94	-8.58	-473.42	-275.77	0.60
Wind 45 deg - Ice		6.91	-6.91	-380.69	-387.52	0.78
Wind 60 deg - Ice		8.37	-4.82	-263.55	-470.89	0.90
Wind 90 deg - Ice		9.93	0.03	9.35	-556.08	1.05
Wind 120 deg - Ice		9.25	5.36	303.17	-511.05	1.03
Wind 135 deg - Ice		6.96	6.95	397.82	-391.32	0.66
Wind 150 deg - Ice		4.99	8.61	489.43	-280.42	0.45
Wind 180 deg - Ice		0.03	9.68	551.74	-2.80	-0.09
Wind 210 deg - Ice		-4.94	8.58	486.74	275.55	-0.60
Wind 225 deg - Ice		-6.91	6.91	394.02	387.30	-0.78
Wind 240 deg - Ice		-9.22	5.31	298.52	508.14	-1.12
Wind 270 deg - Ice		-9.93	-0.03	3.98	555.86	-1.05
Wind 300 deg - Ice		-8.40	-4.87	-268.20	473.35	-0.81
Wind 315 deg - Ice		-6.96	-6.95	-384.49	391.10	-0.66
Wind 330 deg - Ice		-4.99	-8.61	-476.11	280.20	-0.45

Load Case	*Vertical Forces* *K*	*Sum of Forces X* *K*	*Sum of Forces Z* *K*	*Sum of Overturning Moments, M_x* *kip-ft*	*Sum of Overturning Moments, M_z* *kip-ft*	*Sum of Torques* *kip-ft*
Total Weight	7.17			2.62	-0.08	
Wind 0 deg - Service		-0.01	-3.55	-196.17	1.14	0.03
Wind 30 deg - Service		1.68	-2.93	-163.76	-93.84	0.38
Wind 45 deg - Service		2.37	-2.37	-132.61	-132.56	0.52
Wind 60 deg - Service		2.88	-1.66	-92.83	-161.86	0.61
Wind 90 deg - Service		3.39	0.01	1.10	-189.72	0.71
Wind 120 deg - Service		3.08	1.79	98.97	-170.46	0.66
Wind 135 deg - Service		2.39	2.39	134.10	-134.29	0.47
Wind 150 deg - Service		1.71	2.94	164.74	-95.96	0.33
Wind 180 deg - Service		0.01	3.34	187.41	-1.30	-0.03
Wind 210 deg - Service		-1.68	2.93	163.52	93.68	-0.38
Wind 225 deg - Service		-2.37	2.37	132.37	132.40	-0.52
Wind 240 deg - Service		-3.07	1.76	96.85	169.08	-0.70
Wind 270 deg - Service		-3.39	-0.01	-1.34	189.56	-0.71
Wind 300 deg - Service		-2.90	-1.68	-94.94	162.92	-0.58
Wind 315 deg - Service		-2.39	-2.39	-134.34	134.13	-0.47
Wind 330 deg - Service		-1.71	-2.94	-164.98	95.80	-0.33

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

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	100 - 80	Leg	Max Tension	15	6.45	0.05	0.01
			Max. Compression	24	-8.11	0.05	0.00
			Max. Mx	15	0.65	0.55	-0.05
			Max. My	14	-0.45	-0.00	0.69
			Max. Vy	15	0.41	-0.26	-0.05
			Max. Vx	6	-0.49	-0.01	0.28
		Diagonal	Max Tension	16	1.52	0.00	0.00
			Max. Compression	8	-1.53	0.00	0.00
			Max. Mx	24	0.90	0.00	0.00
			Max. My	32	-1.30	0.00	-0.00
			Max. Vy	32	0.00	0.00	-0.00
			Max. Vx	32	0.00	0.00	0.00
		Top Girt	Max Tension	7	0.06	0.00	0.00
			Max. Compression	32	-0.07	0.00	0.00
			Max. Mx	18	-0.01	-0.01	0.00
			Max. My	32	0.03	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	32	-0.00	0.00	0.00
T2	80 - 60	Leg	Max Tension	15	17.84	-0.02	0.00
			Max. Compression	24	-21.01	0.08	-0.00
			Max. Mx	19	-20.54	0.08	0.00
			Max. My	9	-0.74	-0.00	-0.08
			Max. Vy	19	-0.03	0.08	0.00
			Max. Vx	9	-0.04	-0.00	-0.08
		Diagonal	Max Tension	16	1.26	0.00	0.00
			Max. Compression	34	-1.29	0.00	0.00
			Max. Mx	24	0.98	0.01	0.00
			Max. My	32	-1.10	0.00	-0.00
			Max. Vy	26	0.01	0.01	-0.00
			Max. Vx	32	0.00	0.00	0.00
T3	60 - 40	Leg	Max Tension	15	27.82	-0.02	0.00
			Max. Compression	24	-33.14	0.10	-0.00
			Max. Mx	19	-32.38	0.10	0.00
			Max. My	26	-2.16	-0.01	-0.12
			Max. Vy	19	-0.03	0.10	0.00
			Max. Vx	9	0.05	-0.01	-0.12
		Diagonal	Max Tension	34	1.56	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	34	-1.59	0.00	0.00
			Max. Mx	24	1.35	0.02	0.00
			Max. My	26	-1.45	0.00	0.00
			Max. Vy	24	-0.01	0.02	0.00
			Max. Vx	26	-0.00	0.00	0.00
		Top Girt	Max Tension	27	0.28	0.00	0.00
			Max. Compression	7	-0.26	0.00	0.00
			Max. Mx	18	0.03	-0.02	0.00
			Max. My	18	0.03	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
T4	40 - 20	Leg	Max Tension	10	36.47	-0.08	0.00
			Max. Compression	24	-43.97	0.19	-0.01
			Max. Mx	19	-42.99	0.19	-0.00
			Max. My	9	-1.47	-0.00	-0.13
			Max. Vy	19	-0.05	0.19	-0.00
			Max. Vx	9	0.05	-0.00	-0.13
		Diagonal	Max Tension	24	2.05	0.00	0.00
			Max. Compression	24	-2.22	0.00	0.00
			Max. Mx	24	1.21	0.04	0.00
			Max. My	26	-1.81	0.00	0.01
			Max. Vy	24	-0.02	0.04	0.00
			Max. Vx	26	-0.00	0.00	0.00
		Top Girt	Max Tension	27	0.74	0.00	0.00
			Max. Compression	7	-0.61	0.00	0.00
			Max. Mx	18	0.12	-0.05	0.00
			Max. My	18	0.13	0.00	0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
T5	20 - 0	Leg	Max Tension	10	45.51	-0.10	0.00
			Max. Compression	24	-57.05	0.00	0.00
			Max. Mx	19	-50.44	0.31	-0.00
			Max. My	9	-2.16	-0.01	-0.15
			Max. Vy	19	-0.09	0.31	-0.00
			Max. Vx	7	-0.05	-0.06	-0.14
		Diagonal	Max Tension	33	3.21	0.00	0.00
			Max. Compression	31	-3.16	0.00	0.00
			Max. Mx	27	0.21	0.07	0.00
			Max. My	28	3.08	0.02	0.01
			Max. Vy	27	0.03	0.07	0.00
			Max. Vx	22	0.00	0.00	0.00
		Top Girt	Max Tension	10	1.07	0.00	0.00
			Max. Compression	24	-1.89	0.00	0.00
			Max. Mx	18	-0.82	-0.09	0.00
			Max. My	31	-1.69	0.00	0.00
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	31	-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	57.75	4.57	-2.57
	Max. H_x	13	53.79	5.72	-3.19
	Max. H_z	21	-43.87	-6.16	3.67
	Min. Vert	5	-46.54	-4.94	2.76

Location	*Condition*	*Gov. Load Comb.*	*Vertical K*	*Horizontal, X K*	*Horizontal, Z K*
	Min. H_x	22	-45.11	-6.34	3.63
	Min. H_z	13	53.79	5.72	-3.19
Leg B	Max. Vert	24	58.19	-4.60	-2.59
	Max. H_x	32	-45.52	6.37	3.65
	Max. H_z	33	-44.33	6.19	3.69
	Min. Vert	15	-47.09	4.98	2.79
	Min. H_x	7	54.36	-5.76	-3.22
	Min. H_z	7	54.36	-5.76	-3.22
Leg A	Max. Vert	19	57.06	0.00	5.24
	Max. H_x	31	3.69	0.43	-1.32
	Max. H_z	2	53.72	0.00	6.57
	Min. Vert	10	-47.18	-0.00	-5.69
	Min. H_x	23	3.20	-0.43	-1.36
	Min. H_z	27	-46.22	-0.00	-7.34

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	7.17	0.00	0.00	2.62	-0.08	0.00
Dead+Wind 0 deg - No Ice	7.17	-0.04	-10.26	-565.04	3.46	0.09
Dead+Wind 30 deg - No Ice	7.17	4.86	-8.46	-471.19	-271.56	1.11
Dead+Wind 45 deg - No Ice	7.17	6.84	-6.84	-381.00	-383.67	1.50
Dead+Wind 60 deg - No Ice	7.17	8.33	-4.79	-265.80	-468.50	1.78
Dead+Wind 90 deg - No Ice	7.17	9.79	0.04	6.17	-549.18	2.07
Dead+Wind 120 deg - No Ice	7.17	8.91	5.16	289.53	-493.41	1.93
Dead+Wind 135 deg - No Ice	7.17	6.90	6.90	391.27	-388.68	1.37
Dead+Wind 150 deg - No Ice	7.17	4.93	8.50	479.99	-277.70	0.95
Dead+Wind 180 deg - No Ice	7.17	0.04	9.64	545.62	-3.62	-0.09
Dead+Wind 210 deg - No Ice	7.17	-4.86	8.46	476.45	271.41	-1.11
Dead+Wind 225 deg - No Ice	7.17	-6.84	6.84	386.26	383.51	-1.50
Dead+Wind 240 deg - No Ice	7.17	-8.87	5.10	283.40	489.71	-2.02
Dead+Wind 270 deg - No Ice	7.17	-9.79	-0.04	-0.91	549.02	-2.07
Dead+Wind 300 deg - No Ice	7.17	-8.37	-4.85	-271.94	471.89	-1.69
Dead+Wind 315 deg - No Ice	7.17	-6.90	-6.90	-386.01	388.52	-1.37
Dead+Wind 330 deg - No Ice	7.17	-4.93	-8.50	-474.73	277.54	-0.95
Dead+Ice+Temp	12.16	0.00	-0.00	6.66	-0.11	-0.00
Dead+Wind 0 deg+Ice+Temp	12.16	-0.03	-10.67	-583.41	2.58	0.09
Dead+Wind 30 deg+Ice+Temp	12.16	4.94	-8.58	-474.83	-276.59	0.61
Dead+Wind 45 deg+Ice+Temp	12.16	6.91	-6.91	-381.83	-388.67	0.80
Dead+Wind 60 deg+Ice+Temp	12.16	8.37	-4.82	-264.34	-472.29	0.91
Dead+Wind 90 deg+Ice+Temp	12.16	9.93	0.03	9.38	-557.74	1.07
Dead+Wind 120 deg+Ice+Temp	12.16	9.25	5.36	304.06	-512.56	1.05
Dead+Wind 135 deg+Ice+Temp	12.16	6.96	6.95	399.00	-392.48	0.67
Dead+Wind 150 deg+Ice+Temp	12.16	4.99	8.61	490.88	-281.26	0.46
Dead+Wind 180 deg+Ice+Temp	12.16	0.03	9.68	553.39	-2.81	-0.09
Dead+Wind 210 deg+Ice+Temp	12.16	-4.94	8.58	488.19	276.37	-0.61
Dead+Wind 225 deg+Ice+Temp	12.16	-6.91	6.91	395.19	388.45	-0.80
Dead+Wind 240 deg+Ice+Temp	12.16	-9.22	5.31	299.39	509.64	-1.14
Dead+Wind 270 deg+Ice+Temp	12.16	-9.93	-0.03	3.99	557.52	-1.07
Dead+Wind 300 deg+Ice+Temp	12.16	-8.40	-4.87	-269.01	474.76	-0.83
Dead+Wind 315 deg+Ice+Temp	12.16	-6.96	-6.95	-385.64	392.26	-0.67
Dead+Wind 330 deg+Ice+Temp	12.16	-4.99	-8.61	-477.52	281.04	-0.46
Dead+Wind 0 deg - Service	7.17	-0.01	-3.55	-193.81	1.15	0.03
Dead+Wind 30 deg - Service	7.17	1.68	-2.93	-161.32	-94.02	0.39
Dead+Wind 45 deg - Service	7.17	2.37	-2.37	-130.12	-132.81	0.52

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 60 deg - Service	7.17	2.88	-1.66	-90.25	-162.16	0.62
Dead+Wind 90 deg - Service	7.17	3.39	0.01	3.85	-190.08	0.72
Dead+Wind 120 deg - Service	7.17	3.08	1.79	101.91	-170.79	0.67
Dead+Wind 135 deg - Service	7.17	2.39	2.39	137.11	-134.54	0.47
Dead+Wind 150 deg - Service	7.17	1.71	2.94	167.80	-96.14	0.33
Dead+Wind 180 deg - Service	7.17	0.01	3.34	190.52	-1.30	-0.03
Dead+Wind 210 deg - Service	7.17	-1.68	2.93	166.58	93.86	-0.39
Dead+Wind 225 deg - Service	7.17	-2.37	2.37	135.37	132.65	-0.52
Dead+Wind 240 deg - Service	7.17	-3.07	1.76	99.78	169.41	-0.70
Dead+Wind 270 deg - Service	7.17	-3.39	-0.01	1.40	189.92	-0.72
Dead+Wind 300 deg - Service	7.17	-2.90	-1.68	-92.37	163.23	-0.58
Dead+Wind 315 deg - Service	7.17	-2.39	-2.39	-131.85	134.38	-0.48
Dead+Wind 330 deg - Service	7.17	-1.71	-2.94	-162.55	95.98	-0.33

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-7.17	0.00	0.00	7.17	0.00	0.000%
2	-0.04	-7.17	-10.26	0.04	7.17	10.26	0.000%
3	4.86	-7.17	-8.46	-4.86	7.17	8.46	0.000%
4	6.84	-7.17	-6.84	-6.84	7.17	6.84	0.000%
5	8.33	-7.17	-4.79	-8.33	7.17	4.79	0.000%
6	9.79	-7.17	0.04	-9.79	7.17	-0.04	0.000%
7	8.91	-7.17	5.16	-8.91	7.17	-5.16	0.000%
8	6.90	-7.17	6.90	-6.90	7.17	-6.90	0.000%
9	4.93	-7.17	8.50	-4.93	7.17	-8.50	0.000%
10	0.04	-7.17	9.64	-0.04	7.17	-9.64	0.000%
11	-4.86	-7.17	8.46	4.86	7.17	-8.46	0.000%
12	-6.84	-7.17	6.84	6.84	7.17	-6.84	0.000%
13	-8.87	-7.17	5.10	8.87	7.17	-5.10	0.000%
14	-9.79	-7.17	-0.04	9.79	7.17	0.04	0.000%
15	-8.37	-7.17	-4.85	8.37	7.17	4.85	0.000%
16	-6.90	-7.17	-6.90	6.90	7.17	6.90	0.000%
17	-4.93	-7.17	-8.50	4.93	7.17	8.50	0.000%
18	0.00	-12.16	0.00	0.00	12.16	0.00	0.000%
19	-0.03	-12.16	-10.67	0.03	12.16	10.67	0.000%
20	4.94	-12.16	-8.58	-4.94	12.16	8.58	0.000%
21	6.91	-12.16	-6.91	-6.91	12.16	6.91	0.000%
22	8.37	-12.16	-4.82	-8.37	12.16	4.82	0.000%
23	9.93	-12.16	0.03	-9.93	12.16	-0.03	0.000%
24	9.25	-12.16	5.36	-9.25	12.16	-5.36	0.000%
25	6.96	-12.16	6.95	-6.96	12.16	-6.95	0.000%
26	4.99	-12.16	8.61	-4.99	12.16	-8.61	0.000%
27	0.03	-12.16	9.68	-0.03	12.16	-9.68	0.000%
28	-4.94	-12.16	8.58	4.94	12.16	-8.58	0.000%
29	-6.91	-12.16	6.91	6.91	12.16	-6.91	0.000%
30	-9.22	-12.16	5.31	9.22	12.16	-5.31	0.000%
31	-9.93	-12.16	-0.03	9.93	12.16	0.03	0.000%
32	-8.40	-12.16	-4.87	8.40	12.16	4.87	0.000%
33	-6.96	-12.16	-6.95	6.96	12.16	6.95	0.000%
34	-4.99	-12.16	-8.61	4.99	12.16	8.61	0.000%
35	-0.01	-7.17	-3.55	0.01	7.17	3.55	0.000%
36	1.68	-7.17	-2.93	-1.68	7.17	2.93	0.000%
37	2.37	-7.17	-2.37	-2.37	7.17	2.37	0.000%
38	2.88	-7.17	-1.66	-2.88	7.17	1.66	0.000%
39	3.39	-7.17	0.01	-3.39	7.17	-0.01	0.000%

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX K*	*PY K*	*PZ K*	*PX K*	*PY K*	*PZ K*	*% Error*
40	3.08	-7.17	1.79	-3.08	7.17	-1.79	0.000%
41	2.39	-7.17	2.39	-2.39	7.17	-2.39	0.000%
42	1.71	-7.17	2.94	-1.71	7.17	-2.94	0.000%
43	0.01	-7.17	3.34	-0.01	7.17	-3.34	0.000%
44	-1.68	-7.17	2.93	1.68	7.17	-2.93	0.000%
45	-2.37	-7.17	2.37	2.37	7.17	-2.37	0.000%
46	-3.07	-7.17	1.76	3.07	7.17	-1.76	0.000%
47	-3.39	-7.17	-0.01	3.39	7.17	0.01	0.000%
48	-2.90	-7.17	-1.68	2.90	7.17	1.68	0.000%
49	-2.39	-7.17	-2.39	2.39	7.17	2.39	0.000%
50	-1.71	-7.17	-2.94	1.71	7.17	2.94	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
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	1.960	40	0.1584	0.0082
T2	80 - 60	1.294	40	0.1510	0.0030
T3	60 - 40	0.711	40	0.1172	0.0013
T4	40 - 20	0.301	40	0.0709	0.0013
T5	20 - 0	0.076	40	0.0311	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
90.00	BXA-80063/6CF	40	1.623	0.1570	0.0053	130091

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
T1	100 - 80	5.816	24	0.4678	0.0238
T2	80 - 60	3.851	24	0.4462	0.0102
T3	60 - 40	2.122	24	0.3483	0.0038
T4	40 - 20	0.901	24	0.2119	0.0038
T5	20 - 0	0.228	24	0.0932	0.0021

Critical Deflections and Radius of Curvature - Design Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
90.00	BXA-80063/6CF	24	4.820	0.4635	0.0165	45423

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	0.6250	4	1.61	13.50	0.119 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1.53	4.12	0.371 ✔	1.333	Bolt Shear
T2	80	Leg	A325N	0.6250	4	4.46	13.50	0.330 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1.29	4.12	0.314 ✔	1.333	Bolt Shear
T3	60	Leg	A325N	0.6250	4	6.96	13.50	0.515 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1.59	4.12	0.386 ✔	1.333	Bolt Shear
T4	40	Leg	A325N	0.6250	4	9.12	13.50	0.675 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2.22	4.12	0.539 ✔	1.333	Bolt Shear
T5	20	Leg	A325N	0.7500	4	11.38	19.44	0.585 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3.21	4.12	0.778 ✔	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	ROHN 2.5 STD	20.04	4.01	50.8 K=1.00	24.230	1.7040	-8.11	41.29	0.196 ✔
T2	80 - 60	ROHN 2.5 STD	20.03	4.01	50.8 K=1.00	24.233	1.7040	-21.01	41.29	0.509 ✔
T3	60 - 40	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	22.124	1.7040	-33.14	37.70	0.879 ✔
T4	40 - 20	ROHN 3 STD	20.03	6.68	68.9 K=1.00	21.146	2.2285	-43.97	47.12	0.933 ✔
T5	20 - 0	ROHN 3 X-STR	20.03	6.68	70.5 K=1.00	20.841	3.0159	-57.05	62.85	0.908 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	L1 1/4x1 1/4x3/16	5.70	2.73	134.4 K=1.00	8.265	0.4336	-1.53	3.58	0.426

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	80 - 60	L1 1/4x1 1/4x3/16	7.68	3.71	182.5 K=1.00	4.484	0.4336	-1.29	1.94	0.666 ✔
T3	60 - 40	L1 1/2x1 1/2x1/4	9.79	4.78	196.3 K=1.00	3.874	0.6875	-1.59	2.66	0.597 ✔
T4	40 - 20	L2x2x1/4	12.31	6.07	186.3 K=1.00	4.302	0.9380	-2.22	4.04	0.550 ✔
T5	20 - 0	L2 1/2x2 1/2x1/4	13.47	6.65	162.5 K=1.00	5.658	1.1900	-3.16	6.73	0.469 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	L3x3x1/4	2.50	2.26	82.9 K=1.81	15.028	1.4400	-0.07	21.64	0.003 ✔
T3	60 - 40	L1 1/2x1 1/2x1/4	6.76	6.52	211.0 K=0.79	3.354	0.6875	-0.26	2.31	0.114 ✔
		KL/R > 200 (C) - 75								
T4	40 - 20	L2x2x1/4	8.65	8.41	204.9 K=0.79	3.555	0.9380	-0.61	3.33	0.182 ✔
		KL/R > 200 (C) - 105								
T5	20 - 0	L2 1/2x2 1/2x1/4	10.69	10.40	202.5 K=0.80	3.642	1.1900	-1.89	4.33	0.435 ✔
		KL/R > 200 (C) - 129								

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	ROHN 2.5 STD	20.04	4.01	50.8	30.000	1.7040	6.45	51.12	0.126 ✔
T2	80 - 60	ROHN 2.5 STD	20.03	4.01	50.8	30.000	1.7040	17.84	51.12	0.349 ✔
T3	60 - 40	ROHN 2.5 STD	20.03	5.01	63.4	30.000	1.7040	27.82	51.12	0.544 ✔
T4	40 - 20	ROHN 3 STD	20.03	6.68	68.9	30.000	2.2285	36.47	66.85	0.545 ✔
T5	20 - 0	ROHN 3 X-STR	20.03	6.68	70.5	30.000	3.0159	45.51	90.48	0.503 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	L1 1/4x1 1/4x3/16	5.70	2.73	90.6	29.000	0.2373	1.52	6.88	0.221 ✔
T2	80 - 60	L1 1/4x1 1/4x3/16	6.34	3.05	100.8	29.000	0.2373	1.26	6.88	0.184 ✔
T3	60 - 40	L1 1/2x1 1/2x1/4	9.79	4.78	130.8	29.000	0.3984	1.56	11.55	0.135 ✔
T4	40 - 20	L2x2x1/4	11.75	5.79	116.4	29.000	0.5863	2.05	17.00	0.120 ✔
T5	20 - 0	L2 1/2x2 1/2x1/4	14.06	6.94	110.1	29.000	0.7753	3.21	22.48	0.143 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	L3x3x1/4	2.50	2.26	29.2	21.600	1.4400	0.06	31.10	0.002 ✔
T3	60 - 40	L1 1/2x1 1/2x1/4	6.76	6.52	174.3	21.600	0.6875	0.28	14.85	0.019 ✔
T4	40 - 20	L2x2x1/4	8.65	8.41	165.7	21.600	0.9380	0.74	20.26	0.036 ✔
T5	20 - 0	L2 1/2x2 1/2x1/4	10.69	10.40	162.3	21.600	1.1900	1.07	25.70	0.042 ✔

Section Capacity Table

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	-8.11	55.04	14.7	Pass
T2	80 - 60	Leg	ROHN 2.5 STD	38	-21.01	55.05	38.2	Pass
T3	60 - 40	Leg	ROHN 2.5 STD	71	-33.14	50.26	65.9	Pass
T4	40 - 20	Leg	ROHN 3 STD	101	-43.97	62.81	70.0	Pass
T5	20 - 0	Leg	ROHN 3 X-STR	125	-57.05	83.79	68.1	Pass
T1	100 - 80	Diagonal	L1 1/4x1 1/4x3/16	15	-1.53	4.78	32.0	Pass
T2	80 - 60	Diagonal	L1 1/4x1 1/4x3/16	43	-1.29	2.59	49.9	Pass
T3	60 - 40	Diagonal	L1 1/2x1 1/2x1/4	79	-1.59	3.55	44.8	Pass
T4	40 - 20	Diagonal	L2x2x1/4	107	-2.22	5.38	41.3	Pass
T5	20 - 0	Diagonal	L2 1/2x2 1/2x1/4	136	-3.16	8.98	35.2 58.3 (b)	Pass
T1	100 - 80	Top Girt	L3x3x1/4	6	-0.07	28.85	0.2	Pass
T3	60 - 40	Top Girt	L1 1/2x1 1/2x1/4	75	-0.26	3.07	8.6	Pass
T4	40 - 20	Top Girt	L2x2x1/4	105	-0.61	4.45	13.7	Pass
T5	20 - 0	Top Girt	L2 1/2x2 1/2x1/4	129	-1.89	5.78	32.6	Pass

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P K*	*SF*P_{allow} K*	*% Capacity*	*Pass Fail*
							Summary	
						Leg (T4)	70.0	Pass
						Diagonal (T5)	58.3	Pass
						Top Girt (T5)	32.6	Pass
						Bolt Checks	58.3	Pass
						RATING =	**70.0**	**Pass**

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 596 \cdot ft \cdot kips$	(User Input from RISATower)
Shear Force =	$S_t := 11 \cdot kip$	(User Input from RISATower)
Axial Force =	$WT_t := 12 \cdot kip$	(User Input from RISATower)
Max Compression Force =	$C_t := 58 \cdot kip$	(User Input from RISATower)
Max Uplift Force =	$U_t := 47 \cdot kip$	(User Input from RISATower)
Tower Height =	$H_t := 100 \cdot ft$	(User Input)
Tower Width =	$W_t := 12.71 \cdot ft$	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 4 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 4.5 \cdot ft$	(User Input)
Width 1 of Footing =	$W_{f1} := 18.5 \cdot ft$	(User Input)
Width 2 of Footing =	$W_{f2} := 15.5 \cdot ft$	(User Input)
Length of Pier =	$L_p := 1 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 1 \cdot ft$	(User Input)
Width of Pier =	$d_p := 2 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 3500 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.00 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 16$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.00 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 16$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pad Top Reinforcement Bar Area =
$$A_{btop} := \frac{\pi \cdot d_{btop}^{\,2}}{4} = 0.785 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =
$$A_{bbot} := \frac{\pi \cdot d_{bbot}^{\,2}}{4} = 0.785 \cdot in^2$$

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

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

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 120 \cdot \text{pcf}$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = -0.18 \cdot \text{ksf}$

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

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.44 \cdot \text{ksf}$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.72 \cdot \text{ksf}$

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

$A_p := W_{f1} \cdot T_p = 74$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 53.28 \cdot \text{kip}$

Weight of Concrete Pad = $WT_{pad} := (W_{f1} \cdot W_{f2} \cdot T_f) \cdot \gamma_c = 193.556 \cdot \text{kip}$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot \left[\left(L_p \cdot d_p^{\,2}\right) \cdot \gamma_c\right] = 1.8 \cdot \text{kip}$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 195 \cdot \text{kip}$

Volume of Soil = $V_{soil} := \frac{1}{2} \cdot \tan(\Phi_s) \cdot D_f^{\,2} \cdot W_{f1} = 85.448$

Weight of Soil = $WT_s := V_{soil} \cdot \gamma_{soil} = 10.254 \cdot \text{kips}$

Tower Offset = $X_{t1} := \left[\frac{W_{f2}}{2} - \frac{(W_t \cdot \cos(30 \cdot \text{deg}))}{2}\right]$ $X_{t2} := \frac{W_{f2}}{2} - \frac{(W_t \cdot \cos(30 \cdot \text{deg}))}{3}$

$X_t := \text{if}(\text{Pos}_t, X_{t1}, X_{t2}) = 2.246$

$X_{off} := \frac{W_{f2}}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot \text{deg}))}{3} + X_t\right] = 1.835$

Resisting Moment = $M_r := (WT_c) \cdot \frac{W_{f2}}{2} + WT_s \cdot \left(W_{f2} + \frac{1}{3} \cdot \tan(\Phi_s) \cdot D_f\right) + S_u \cdot \frac{T_f}{3} = 1761 \cdot \text{kip} \cdot \text{ft}$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 656.5 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.68$

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

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

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_t = 207 \cdot kip$

Area of the Mat = $A_{mat} := W_{f1} \cdot W_{f2} = 286.75$

Section Modulus of Mat = $S := \frac{W_{f1} \cdot W_{f2}^2}{6} = 740.77 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.609 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.163 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_{f2}}} \cdot \frac{1}{3} = 4.691$

Distance to Kern = $X_k := \frac{W_{f2}}{6} = 2.583$

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

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 3.166$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_{f1} \cdot \left(\frac{W_{f2}}{2} - e\right)} = 1.63 \cdot ksf$

$q_{adj} :=$ if($P_{min} < 0, P_a, P_{max}$) $= 1.63 \cdot ksf$

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

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot d_p^2 = 1113.84 \cdot kips$ (ACI-2008 10.14)

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

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 50 \cdot in$

$d_1 := \frac{W_{f2}}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_{f2}}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_{f2}, \frac{P_{max} - P_{min}}{W_{f2}}, \frac{q_{adj}}{L}\right)$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_{f2} \cdot d_1 = 171.547 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_{f2} \cdot d = 935 \cdot kip$ (ACI-2008 11.2.1.1)

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

Beam_Shear_Check = "Okay"

Punching Shear:

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

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 19.4$

Area Included Inside Perimeter = $A_{bo} := \left(d_p + d\right)^2 = 38$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 248.7$

Guess Value = $v_u := 1ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{Load_{tot}}{v_u}$

$v_u := Find\left(v_u\right) = 8.1 \times 10^3 lbf$

$V_u := v_u \cdot d \cdot W_{f2} = 521.2 \cdot kips$

Required Shear Strength = $V_{req} := LF \cdot V_u = 694.7 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 2338.1 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$$M_{nT} := LF \cdot \left[U_t \cdot \left(W_t \cdot \sin(60 \cdot deg) - \frac{d_p}{2}\right) + S_t \cdot \left(D_f + L_{pag}\right)\right] - WT_t \cdot X_{off} = 678 \cdot ft \cdot k$$

$$M_{nS} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_{f2}}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot deg) - \frac{d_p}{2}\right)^2 \cdot W_t \cdot \left[\gamma_s \cdot \left(T_f - T_f\right)\right]\right]$$

$$M_{nC} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_{f2}}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot deg) - \frac{d_p}{2}\right)^2 \cdot W_t \cdot \left(\gamma_c \cdot T_f\right)\right]$$

Design Moment = $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 236.214 \cdot kips \cdot ft$

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

(ACI-200810.2.7.3)

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 156.086 \cdot in$

$d := T_f - Cvr_{pad} - d_{bbot} = 50 \cdot in$

$$A_s := \frac{M_n}{\left(f_y \cdot d\right)} = 0.945 \cdot in^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.122 \cdot in$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 0.946 \cdot in^2$$

$$\rho := \frac{A_s}{b_{eff} \cdot d} = 0.00012$$

Required Reinforcement for Temperature and Shrinkage:

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

(ACI -2008 7.12.2.1)

Check Bottom Bars:

$$As := \begin{cases} (\rho \cdot b_{eff} \cdot d) & \text{if } (\rho \cdot b_{eff} \cdot d) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 7.024 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 12.6 \cdot in^2$$

Pad_Reinforcement_Bot := if(As_prov > As, "Okay", "No Good")

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := \text{if}\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 7 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 12.6 \cdot in^2$$

Pad_Reinforcement_Top := if(As_prov > As, "Okay", "No Good")

Pad_Reinforcement_Top = "Okay"

SITE NAME	REDDING CT	ECP - CELL #	5	87
LATITUDE	41-19-40.20 N	LONGITUDE	73-22-59.90 W	
		SAVE BUTTON		
Additional Comments: 2013 LTE ANTMO. Swap alpha LTE		STRUCTURE TYPE	MONOPOLE	

700 Mhz - LTE Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 MHz eNodeB + TRDU	700 MHz eNodeB + TRDU	700 MHz eNodeB + TRDU
ANTENNA TYPE	BXA-70063-6CF-2	BXA-70063-6CF-2	BXA-70063-6CF-2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
RRH - QTY/MODEL			
SECTOR DISTRIBUTION BOX			
MAIN DISTRIBUTION BOX			

700 Mhz - LTE Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 MHz eNodeB + TRDU	700 MHz eNodeB + TRDU	700 MHz eNodeB + TRDU
ANTENNA TYPE	**SWCP 2X7014**	BXA-70063-6CF-2	BXA-70063-6CF-2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	**2**	2	2
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
RRH - QTY/MODEL			
SECTOR DISTRIBUTION BOX			
MAIN DISTRIBUTION BOX			

850 Celluar - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0HD	Cellular Modcell 4.0HD	Cellular Modcell 4.0HD
ANTENNA TYPE	BXA-80063/6CF	BXA-80063/6CF	BXA-80080-4CF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2	2	2

850 Celluar - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0HD	Cellular Modcell 4.0HD	Cellular Modcell 4.0HD
ANTENNA TYPE	BXA-80063/6CF	BXA-80063/6CF	BXA-80080-4CF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2	2	2

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0
ANTENNA TYPE	BXA-171063-12BF-EDIN-0	BXA-171063-12BF-EDIN-0	BXA-171063-12BF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	2	2	2
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	diplexed w/cell	diplexed w/cell	diplexed w/cell

1900 PCS - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0
ANTENNA TYPE	BXA-171063-12BF-EDIN-0	BXA-171063-12BF-EDIN-0	BXA-171063-12BF-EDIN-0
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	2	2	2
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	diplexed w/cell	diplexed w/cell	diplexed w/cell

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

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

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/	F1-E	1700	Tx/Rx	BLUE/BLUE/BR	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By : Maria Montrose	Robert Hesselbach	MMM	8/26/2013

Swedcom

SWCP 2x7014

698 - 896 MHz Dual (2x) CP log-periodic antenna

Features

- **Transmit Diversity Gain**
- **Can be configured to combine space & polarization diversity**
- **Outstanding performance over the entire band (698 - 896 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:	**698 - 896 MHz**	
Impedance:	**50 ohm**	
Connector type:	**7/16 Din**	
Return loss:	**18 dB**	
Polarization:	**Circular**	
Gain ea. port [Circular]:	**2x14 dBdC**	
Gain ea. port [Linear]:	**2x11 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 70°**	
V-plane (-3 dB point):	**2x 11°**	
Lightning protection:	**DC grounded**	

Mechanical specifications

Overall height:	**76.7 in**	**[1948 mm]**
Width:	**14 in**	**[356 mm]**
Depth:	**11.3 in**	**[287 mm]**
Weight (excluding brackets):	**30 lbs**	**[13.5 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (front of antenna):	**7.46 sq. ft.**	**[0.69 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**381 lbs**	**[1694 N]**

Materials

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

The SWCP 2x7014 is made in the U.S.A.