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

January 2, 2014

Via Fed Ex

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

Re: **Notice of Exempt Modification – Antenna Modifications**
414 Chapel Hill Road, Montville, Connecticut

Dear Ms. Bachman:

Dominion Nuclear Connecticut, Inc. ("DNC") currently maintains one (1) communications antenna at the 61-foot level on the existing 181-foot lattice tower at 414 Chapel Hill Road in Montville, Connecticut. The tower and underlying property are owned by Northeast Utilities. DNC intends to install one (1) additional (Model BNF 800/900S) antenna at the 128-foot level on the tower and one (1) additional antenna cable. Included in Attachment 1 is the specification sheet for the new 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 Montville's Mayor, Ronald McDaniel, Jr.

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. DNC's new antenna will be installed at the 128-foot level on the 181-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.

Law Offices

BOSTON
PROVIDENCE
HARTFORD
NEW LONDON
STAMFORD
WHITE PLAINS
NEW YORK CITY
ALBANY
SARASOTA

www.rc.com

ROBINSON & COLE LLP

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

4. The operation of DNC's new antenna will not increase radio frequency (RF) emissions at the property to a level at or above the Federal Communications Commission (FCC) safety standard. A Calculated Radio Frequency Emissions Report for the modified tower is included in Attachment 2.

5. The proposed installation of one (1) additional antenna at the 128-foot level will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support DNC's proposed installation of one (1) additional antenna. (*See* Structural Analysis Report included in Attachment 3).

For the foregoing reasons, DNC 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:
Mayor Ronald McDaniel, Jr.
Sandy M. Carter

ATTACHMENT 1

COMTELCO

Technical Specification

BNF800/900S
BNM800/900S

806-960MHz, 3dBd / 5dBi Gain

BASE STATION ANTENNA

Reliable Performance: *Rated at 100 watts, you can expect years of continuous service.*

Construction: *The radiating elements are collinear stacked and phased copper alloy tubes. They are encased in an ABS radome for total environmental protection.*

Weatherproof: *The ABS radome is ultraviolet inhibited. The mounting sleeve is ABS plastic with an extruded drain system to allow for any condensation dissipation.*

Lightweight: *These antennas are lightweight at less than 2 lbs. but are designed to easily withstand winds of over 125 MPH.*

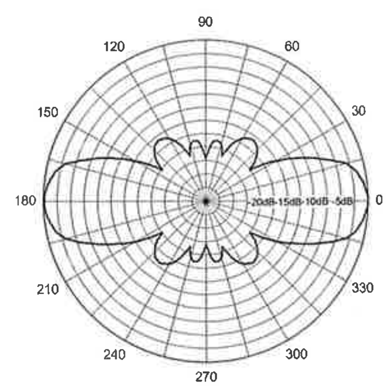
Simple Installation: *Using the optional BNT mounting kit, installation takes only minutes.*

Termination: *This antenna is available with either an "N" female or "N" male termination.*

ELECTRICAL SPECIFICATIONS:

PART NO.	**FREQUENCY:**
BNF800S-06	806-896MHz
BNM800S-06	
BNF800S-96	896-960MHz
BNM800S-96	
BNF915S	900-930MHz
BNM915S	
GAIN:	3dBd / 5dBi
VERTICAL BEAMWIDTH:	35º
BANDWIDTH:	100MHz@ <2:1
POWER RATING:	100 watts
IMPEDANCE:	50 ohms

Vertical Pattern



MECHANICAL SPECIFICATIONS:

ANTENNA LENGTH:	21"
WEIGHT:	2 lbs,
RADIATOR:	Copper alloy elements
RADOME:	White UV inhibited ABS
MOUNTING SLEEVE:	White UV inhibited ABS
SLEEVE DIAMETER:	1.35"
FLAT PLATE AREA:	.08 ft^2
WIND RATING:	125 MPH
WIND LOAD:	5.4 lbs.
TERMINATION:	BNF800S "N" FEMALE BNM800S "N" MALE

ATTACHMENT 2

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions

Montville – Chapel Hill Road

414 Chapel Hill Road, Montville, CT 06370

November 26, 2013

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed addition to the existing lattice tower located at 414 Chapel Hill Road in Montville, CT. The coordinates of the tower are 41° 28' 08.24" N, 72° 12' 16.70" W.

Dominion is proposing the following:

1) Install one 850 MHz band antenna at a centerline height of 128'.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right)$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{\left(H^2 + V^2\right)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the finished installation.

4. Calculation Results

Table 1 below outlines the power density information for the site.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
CL&P	181	154.46375	1	900	0.0099	0.2000	4.94%
CL&P	181	48.52	1	120	0.0013	0.2000	0.66%
CL&P	172	6795	1	5248	0.0638	1.0000	6.38%
CL&P	166	173.25	1	380	0.0050	0.2000	2.48%
CL&P	154	6815	1	1548	0.0235	1.0000	2.35%
CL&P	151	47.76	1	100	0.0016	0.2000	0.79%
CL&P	148	6565	1	4365	0.0717	1.0000	7.17%
Montville FD	132	33.96	1	100	0.0021	0.2000	1.03%
CL&P	137	47.76	1	100	0.0019	0.2000	0.96%
CL&P	134	451.25	1	250	0.0050	0.3008	1.66%
CL&P	130	451.25	1	250	0.0053	0.3008	1.77%
Montville FD	102	37.92	1	50	0.0017	0.2000	0.86%
Montville Public Works	105	159.3525	1	60	0.0020	0.2000	0.98%
CL&P	85	48.52	1	120	0.0060	0.2000	2.99%
Dominion	61	161	1	237	0.0229	0.2000	11.45%
Dominion	**128**	**855.1375**	**5**	**50**	0.0055	**0.5701**	**0.96%**
						Total	**47.42%**

Table 1: Carrier Information[1,2,3]

[1] Please note that %MPE values listed are rounded to two decimal points. The total %MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not reflect the total value listed in the table.

[2] Antenna heights listed for Dominion are based on information obtained directly from the operator.

[3] CSC database currently lists the antenna shown in Table 1 at a centerline of 61' as belonging to CL&P. Dominion has since assumed ownership of this antenna and its associated equipment. All recommended updates to the CSC database are reflected in bold type.

5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **47.42% of the FCC limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished installation.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

Daniel L. Goulet
C Squared Systems, LLC

November 26, 2013
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[4]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	$(900/f^2)$*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[5]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	$(180/f^2)$*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[4] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

[5] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

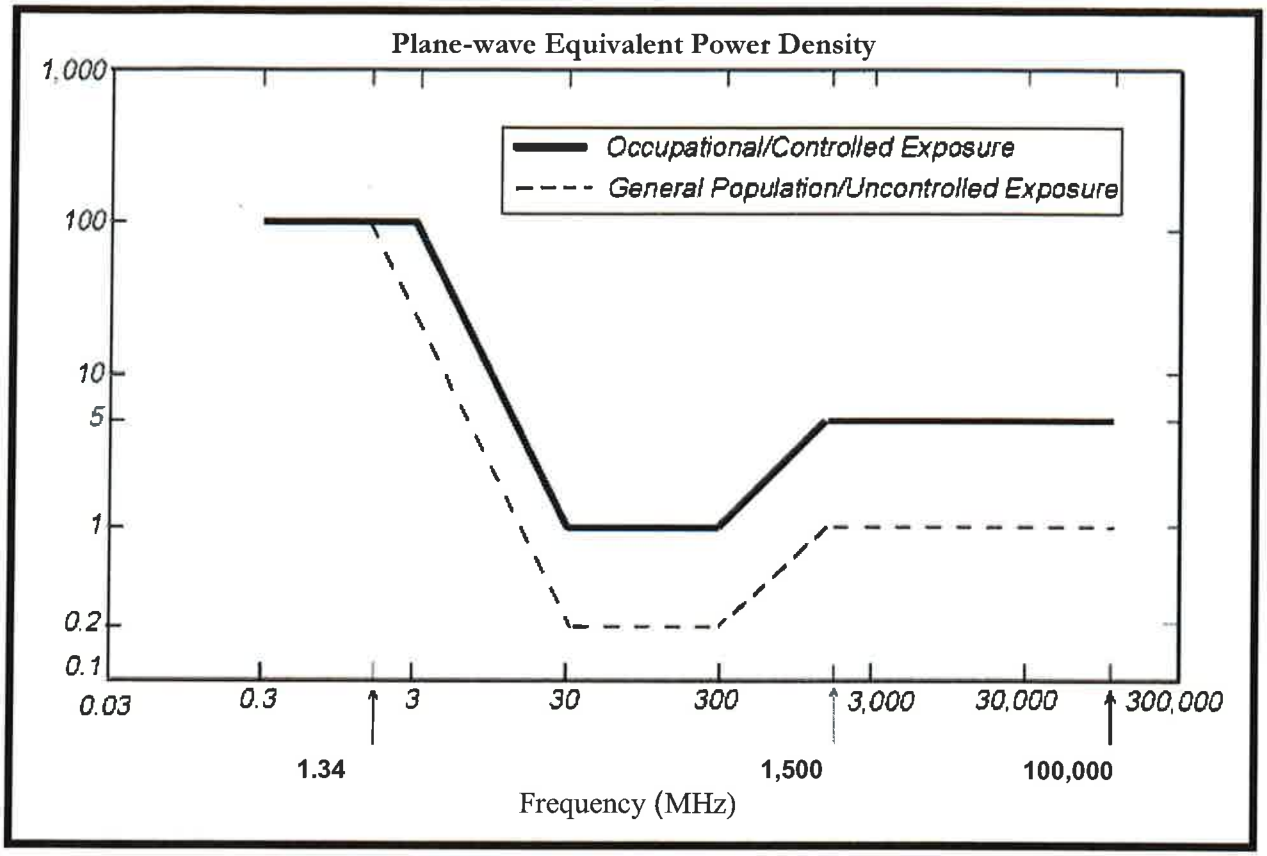


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180' Existing ROHN Lattice Tower

Proposed Dominion Nuclear (Millstone) Antenna Upgrade

NU Site Ref: Chapel Hill

414 Chapel Hill
Montville, CT

Centek Project No. 13254.000

Date: December 20, 2013

Prepared for:

Dominion Nuclear CT, Inc.
Rope Ferry Road
Waterford, CT 06385

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 installation/modification proposed by Dominion Nuclear (Millstone) on the existing lattice tower located in Montville, Connecticut.

The host tower is a 180-ft, three legged, lattice tower originally manufactured by ROHN eng. file no. 0604135, 58213EH dated October 9, 2007. The tower geometry, structure member sizes and foundation information were taken from the aforementioned design documents.

Antenna and appurtenance inventory were taken from a tower inventory provided by Northeast Utilities dated October 29, 2013, visual verification from grade by Centek personnel on December 20, 2013 and information provided by Dominion.

The tower consists of nine (9) 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 6-ft 8-in at the top and 23-ft 2-in at the bottom.

Dominion proposes the installation of one (1) Omni-directional whip antenna mounted on a 3-ft sidearm. 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:

- Northeast Utilities (Existing):
  Antenna: One (1) RFS 1142-2CN Omni-directional whip antenna mounted on a 4-ft side arm with an elevation of ±178-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Northeast Utilities (Existing):
  Antenna: One (1) RFS 220-3AN Omni-directional whip antenna mounted on a 3-ft side arm with an elevation of ±178-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Future (Reserved):
  Antenna: One (1) 8-ft ∅ dish leg mounted with an elevation of ±177-ft above grade level.
  Coax Cable: One (1) E-65 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Northeast Utilities (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±168-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- Town (Existing):
  Antenna: One (1) 3-ft Omni-directional whip antenna mounted on a 6-ft side arm with an elevation of ±164-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) 6-ft Omni-directional whip antenna mounted on a 2-ft side arm with an elevation of ±163-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Future (Reserved):
  Antenna: One (1) 8-ft ∅ dish leg mounted with an elevation of ±155-ft above grade level.
  Coax Cable: One (1) E-65 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Northeast Utilities (Existing):
  Antenna: One (1) RFS 1142-2CN Omni-directional whip antenna mounted on a 6-ft side arm with an elevation of ±152-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Northeast Utilities (Existing):
  Antenna: One (1) 8-ft ∅ dish leg mounted with an elevation of ±148-ft above grade level.
  Coax Cable: One (1) E-65 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±144-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Unkown (Existing):
  Antenna: One (1) empty 6-ft side arm with an elevation of ±138-ft above grade level.
- Town (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±136-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Northeast Utilities (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±132-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- Dominion (Existing):
  Antenna: One (1) Comtelco BNF800S-06 Omni-directional whip antenna mounted on a 3-ft side arm with an elevation of ±122-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 15-ft dipole antenna mounted on a 3-ft side arm with an elevation of ±103-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 15-ft dipole antenna mounted on a 3-ft side arm with an elevation of ±103-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Northeast Utilities (Existing):
  Antenna: One (1) RFS 220-3AN Omni-directional whip antenna mounted on a 6-ft side arm with an elevation of ±84-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 10-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±84-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 2-ft ∅ dish leg mounted with an elevation of ±83-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.
- **Dominion (Proposed):**
  Antenna: One (1) Comtelco BNF800S-06 Omni-directional whip antenna mounted on a 3-ft side arm with an elevation of ±129-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

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.

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 legs, and the model assumes that the leg members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for 95 mph basic wind speed (fastest mile) with no ice and 85mph with ½ inch accumulative ice to determine stresses in members as per guidelines of Northeast Utilities Substation Standard (NU SUB-090), 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).

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 tower structure and its components.

Basic Wind Speed:	New London; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	NU SUB-090; v = 85 mph (fastest mile)	*[Northeast Utilities Substation Standard 090]*
	Montville; v = 115 mph (3 second gust) equivalent to v = 95 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix K wind speed controls	
Load Cases:	Load Case 1; 95 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design of monopole towers.	*[Appendix K of the 2005 CT Building Code Supplement]*
	Load Case 2; 85 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	*[Northeast Utilities Substation Standard 090]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

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 **82.5%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal Bolts (T9)	0'-0"-20'-0"	82.5%	**PASS**
Leg (T9)	0'-0"-20'-0"	38.9%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 4-ft ∅ x 3.5-ft long reinforced concrete piers on a 33-ft square x 2.5-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 a geotechnical report prepared by Dr. Clarence Welti dated May 31, 2007. Tower legs are connected to the foundation by means of (12) 1"∅, ASTM A1554 Gr. 105 anchor bolts per leg, embedded into the concrete foundation structure.

- 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	**44 kips**
	Compression	**39 kips**
	Moment	**4209 kip-ft**
Leg	Shear	**30 kips**
	Uplift	**186 kips**
	Compression	**227 kips**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	34.7%	**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	3.16	**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 Dominion Nuclear (Millstone) and Northeast Utilities. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

Prepared by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

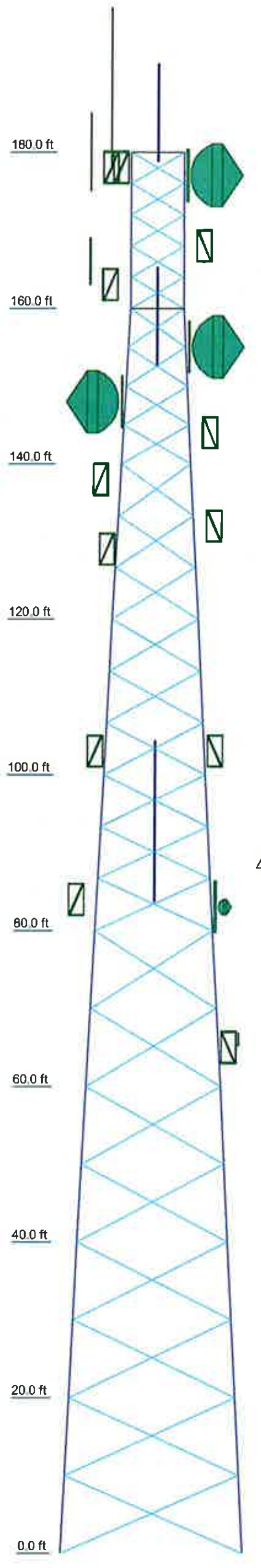
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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	T1	T2	T3	T4	T5	T6	T7	T8	T9	
Legs	ROHN 3 STD	ROHN 4 EH	ROHN 5 EH	ROHN 6 EH	ROHN 8 EHS	ROHN 8 EH		ROHN 10 EH		
Leg Grade					A572-50					
Diagonals	L1 3/4x1 3/4x3/16	L2x2x1/4	L2 1/2x2 1/2x1/4	L3x3x1/4		L3 1/2x3 1/2x1/4		L4x4x5/16		
Diagonal Grade		A36					A572-50			
Top Girts	L2x2x1/8					N.A.				
Face Width (ft)	6.6875	6.761	8.8333	10.9167	13.0521	14.9896	17.1458	19.1563	21.1563	23.1563
# Panels @ (ft)	5 @ 4	4 @ 5		9 @ 6.66667				8 @ 10		
Weight (K)	1.0	1.6	2.1	2.9	3.4	3.9	5.3	5.5	5.7	31.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3' Whip (Town - Existing)	178	DB222 (Town - Existing)	136
ROHN 6-ft Side Arm (Town - Existing)	178	ROHN 6-ft Side Arm (Town - Existing)	136
1142-2CN (NU - Existing)	178	ROHN 6-ft Side Arm (NU - Existing)	132
ROHN 4-ft Side Arm (NU - Existing)	178	DB222 (NU - Existing)	132
220-3AN (NU - Existing)	178	BNF800S-06 (Dominion - Proposed)	129
ROHN 3-ft Side Arm (NU - Existing)	178	ROHN 3-ft Side Arm (Dominion - Proposed)	129
6'8"x4" Pipe Mount (Future)	177	ROHN 3-ft Side Arm (Town - Existing)	103
8' Dish (Future)	177	ROHN 3-ft Side Arm (Town - Existing)	103
ROHN 6-ft Side Arm (NU - Existing)	168	DB212-1 (Town - Existing)	103
DB222 (NU - Existing)	168	DB212-1 (Town - Existing)	103
ROHN 3-ft Side Arm	163	ROHN 6-ft Side Arm (NU - Existing)	84
6' x 3" Dia Omni	163	220-3AN (NU - Existing)	84
6'8"x4" Pipe Mount (Future)	155	DB222 (Town - Existing)	84
8' Dish (Future)	155	ROHN 6-ft Side Arm (Town - Existing)	84
1142-2CN (NU - Existing)	152	6'8"x4" Pipe Mount (Town - Existing)	83
ROHN 6-ft Side Arm (NU - Existing)	152	Andrew 2' w/Radome (Town - Existing)	83
6'8"x4" Pipe Mount (NU - Existing)	148	BNF800S-06 (Dominion - Existing)	65
8' Dish (NU - Existing)	148	ROHN 3-ft Side Arm (Dominion - Existing)	65
ROHN 6-ft Side Arm (Town - Existing)	144		
DB222 (Town - Existing)	144		
ROHN 6-ft Side Arm (Future)	138		

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 95 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 85 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 82.5%

MAX. CORNER REACTIONS AT BASE:
DOWN: 227 K
UPLIFT: -186 K
SHEAR: 30 K

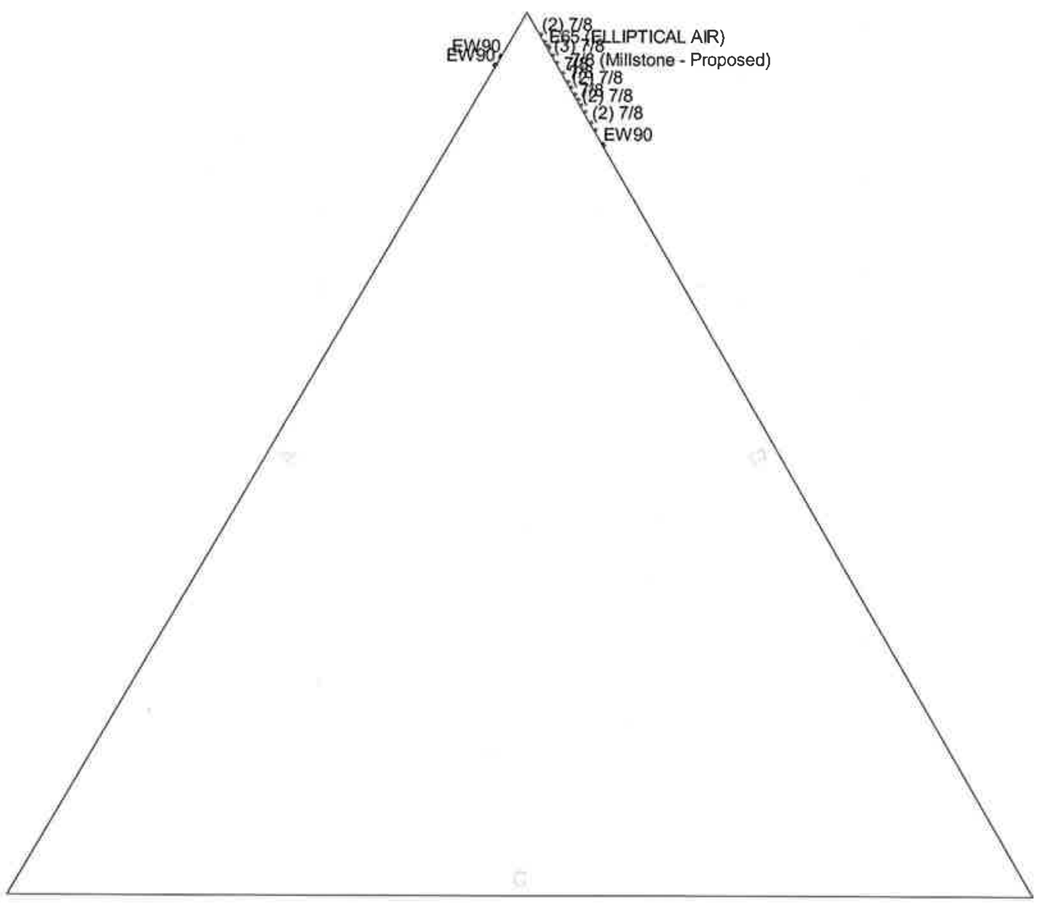
AXIAL 52 K
SHEAR 44 K
MOMENT 4213 kip-ft
TORQUE 44 kip-ft
85 mph WIND - 0.5000 in ICE

AXIAL 39 K
SHEAR 44 K
MOMENT 4209 kip-ft
TORQUE 29 kip-ft
REACTIONS - 95 mph WIND

Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: 13254.000 - Millstone/NU Chapel Hill		
	Project: 180' Rohn Lattice Tower - 414 Chapel Hill Rd., Montville, CT		
	Client: Millstone	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 12/20/13	Scale: NTS
	Path:		Dwg No. E-1

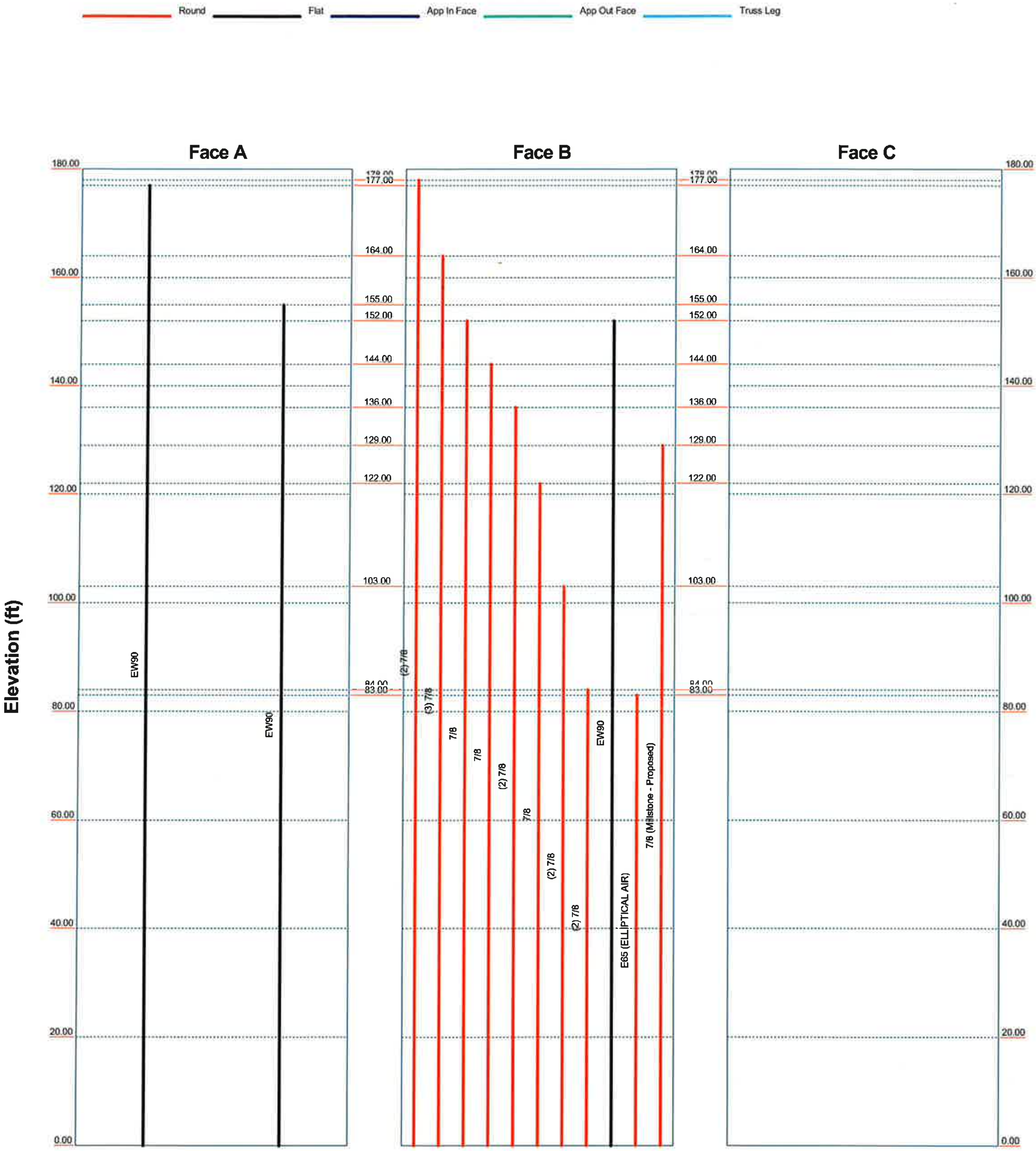
Feedline Plan

Round Flat App In Face App Out Face



Centek Engineering Inc.	Job: 13254.000 - Millstone/NU Chapel Hill		
63-2 North Branford Rd.	Project: 180' Rohn Lattice Tower - 414 Chapel Hill Rd., Montville, CT		
Branford, CT 06405	Client: Millstone	Drawn by: TJL	App'd:
Phone: (203) 488-0580	Code: TIA/EIA-222-F	Date: 12/20/13	Scale: NTS
FAX: (203) 488-8587	Path:		Dwg No. E-7

Feedline Distribution Chart
0' - 180'



Centek Engineering Inc.	Job: ***13254.000 - Millstone/NU Chapel Hill***		
63-2 North Branford Rd.	Project: ***180' Rohn Lattice Tower - 414 Chapel Hill Rd., Montville, CT***		
Branford, CT 06405	Client: Millstone	Drawn by: TJL	App'd:
Phone: (203) 488-0580	Code: TIA/EIA-222-F	Date: 12/20/13	Scale: NTS
FAX: (203) 488-8587	Path:		Dwg No. E-7

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.69 ft at the top and 23.16 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

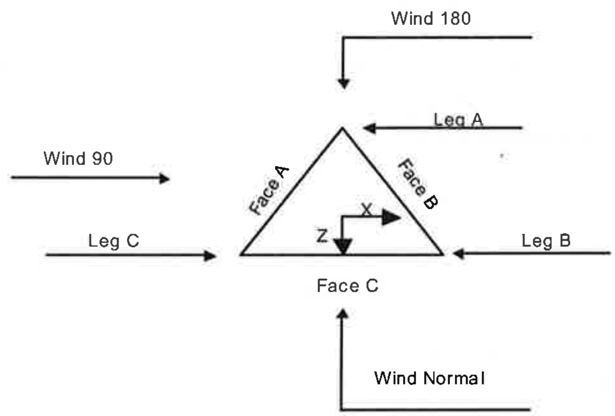
- Basic wind speed of 95 mph.
- Nominal ice thickness of 0.5000 in.
- Ice density of 56 pcf.
- A wind speed of 85 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 50 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated 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
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	180.00-160.00			6.69	1	20.00
T2	160.00-140.00			6.76	1	20.00
T3	140.00-120.00			8.83	1	20.00
T4	120.00-100.00			10.92	1	20.00
T5	100.00-80.00			13.05	1	20.00
T6	80.00-60.00			14.99	1	20.00
T7	60.00-40.00			17.15	1	20.00
T8	40.00-20.00			19.16	1	20.00
T9	20.00-0.00			21.16	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	180.00-160.00	4.00	X Brace	No	Yes	0.0000	0.0000
T2	160.00-140.00	5.00	X Brace	No	Yes	0.0000	0.0000
T3	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	*Tower Elevation* *ft*	*Diagonal Spacing* *ft*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset* *in*	*Bottom Girt Offset* *in*
T7	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 180.00-160.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 160.00-140.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T3 140.00-120.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T4 120.00-100.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T5 100.00-80.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T6 80.00-60.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T7 60.00-40.00	Pipe	ROHN 10 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T8 40.00-20.00	Pipe	ROHN 10 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T9 20.00-0.00	Pipe	ROHN 10 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	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 180.00-160.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T2 160.00-140.00	Single Angle	L2x2x1/8	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 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000

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

Tower Section Geometry *(cont'd)*

			K Factors[1]							
Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 160.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 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 180.00-160.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T2 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 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
T7 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
T8 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
T9 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	0.8750 A325N	4	0.6250 A325X	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	1.0000 A325N	4	0.6250 A325X	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	8	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-80.00	Flange	1.0000 A325N	8	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 80.00-60.00	Flange	1.0000 A325N	12	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 60.00-40.00	Flange	1.0000 A325N	12	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 40.00-20.00	Flange	1.0000 A325N	12	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 20.00-0.00	Flange	1.0000 F1554-105	12	0.7500 A325X	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
7/8	B	Yes	Ar (CfAe)	178.00 - 0.00	0.0000	-0.47	2	2	1.1100	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	164.00 - 0.00	0.0000	-0.45	3	3	1.1100	1.1100		0.54

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8	B	Yes	Ar (CfAe)	152.00 - 0.00	0.0000	-0.43	1	1	1.1100	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	144.00 - 0.00	0.0000	-0.42	1	1	1.1100	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	136.00 - 0.00	0.0000	-0.41	2	2	1.1100	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	122.00 - 0.00	0.0000	-0.4	1	1	1.1100	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	103.00 - 0.00	0.0000	-0.39	2	2	1.1100	1.1100		0.54
7/8	B	Yes	Ar (CfAe)	84.00 - 0.00	0.0000	-0.37	2	2	1.1100	1.1100		0.54
EW90	B	Yes	Af (CfAe)	152.00 - 0.00	0.0000	-0.35	1	1	0.9869	0.9869	3.2550	0.32
E65 (ELLIPTICAL AIR)	B	Yes	Ar (CfAe)	83.00 - 0.00	0.0000	-0.46	1	1	1.2000	1.2000		0.67
EW90	A	Yes	Af (CfAe)	177.00 - 0.00	0.0000	0.45	1	1	0.9869	0.9869	3.2550	0.32
EW90	A	Yes	Af (CfAe)	155.00 - 0.00	0.0000	0.44	1	1	0.9869	0.9869	3.2550	0.32
7/8 (Millstone - Proposed)	B	Yes	Ar (CfAe)	129.00 - 0.00	2.0000	-0.43	1	1	1.1100	1.1100		0.54

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	180.00-160.00	A	0.000	1.398	0.000	0.000	0.01
		B	4.440	0.000	0.000	0.000	0.03
		C	0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.000	2.879	0.000	0.000	0.01
		B	10.730	0.987	0.000	0.000	0.07
		C	0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	0.000	3.290	0.000	0.000	0.01
		B	16.927	1.645	0.000	0.000	0.11
		C	0.000	0.000	0.000	0.000	0.00
T4	120.00-100.00	A	0.000	3.290	0.000	0.000	0.01
		B	20.905	1.645	0.000	0.000	0.13
		C	0.000	0.000	0.000	0.000	0.00
T5	100.00-80.00	A	0.000	3.290	0.000	0.000	0.01
		B	25.090	1.645	0.000	0.000	0.15
		C	0.000	0.000	0.000	0.000	0.00
T6	80.00-60.00	A	0.000	3.290	0.000	0.000	0.01
		B	29.750	1.645	0.000	0.000	0.18
		C	0.000	0.000	0.000	0.000	0.00
T7	60.00-40.00	A	0.000	3.290	0.000	0.000	0.01
		B	29.750	1.645	0.000	0.000	0.18
		C	0.000	0.000	0.000	0.000	0.00
T8	40.00-20.00	A	0.000	3.290	0.000	0.000	0.01
		B	29.750	1.645	0.000	0.000	0.18
		C	0.000	0.000	0.000	0.000	0.00
T9	20.00-0.00	A	0.000	3.290	0.000	0.000	0.01
		B	29.750	1.645	0.000	0.000	0.18
		C	0.000	0.000	0.000	0.000	0.00

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

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	180.00-160.00	A	0.500	0.000	2.343	0.000	0.000	0.02
		B		8.440	0.000	0.000	0.000	0.07
		C		0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.500	0.000	4.823	0.000	0.000	0.05
		B		20.397	1.654	0.000	0.000	0.19
		C		0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	0.500	0.000	5.512	0.000	0.000	0.05
		B		32.178	2.756	0.000	0.000	0.31
		C		0.000	0.000	0.000	0.000	0.00
T4	120.00-100.00	A	0.500	0.000	5.512	0.000	0.000	0.05
		B		39.738	2.756	0.000	0.000	0.37
		C		0.000	0.000	0.000	0.000	0.00
T5	100.00-80.00	A	0.500	0.000	5.512	0.000	0.000	0.05
		B		47.673	2.756	0.000	0.000	0.44
		C		0.000	0.000	0.000	0.000	0.00
T6	80.00-60.00	A	0.500	0.000	5.512	0.000	0.000	0.05
		B		56.417	2.756	0.000	0.000	0.52
		C		0.000	0.000	0.000	0.000	0.00
T7	60.00-40.00	A	0.500	0.000	5.512	0.000	0.000	0.05
		B		56.417	2.756	0.000	0.000	0.52
		C		0.000	0.000	0.000	0.000	0.00
T8	40.00-20.00	A	0.500	0.000	5.512	0.000	0.000	0.05
		B		56.417	2.756	0.000	0.000	0.52
		C		0.000	0.000	0.000	0.000	0.00
T9	20.00-0.00	A	0.500	0.000	5.512	0.000	0.000	0.05
		B		56.417	2.756	0.000	0.000	0.52
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Shielding

Section	Elevation ft	Face	A_R ft²	A_R Ice ft²	A_F ft²	A_F Ice ft²
T1	180.00-160.00	A	0.000	0.148	0.130	0.262
		B	0.000	0.444	0.414	0.786
		C	0.000	0.000	0.000	0.000
T2	160.00-140.00	A	0.000	0.254	0.252	0.508
		B	0.000	0.982	1.028	1.963
		C	0.000	0.000	0.000	0.000
T3	140.00-120.00	A	0.000	0.200	0.248	0.500
		B	0.000	1.072	1.402	2.680
		C	0.000	0.000	0.000	0.000
T4	120.00-100.00	A	0.000	0.190	0.283	0.569
		B	0.000	1.232	1.937	3.697
		C	0.000	0.000	0.000	0.000
T5	100.00-80.00	A	0.000	0.183	0.273	0.550
		B	0.000	1.412	2.221	4.236
		C	0.000	0.000	0.000	0.000
T6	80.00-60.00	A	0.000	0.130	0.226	0.455
		B	0.000	1.173	2.158	4.105
		C	0.000	0.000	0.000	0.000
T7	60.00-40.00	A	0.000	0.126	0.250	0.504
		B	0.000	1.137	2.390	4.547
		C	0.000	0.000	0.000	0.000
T8	40.00-20.00	A	0.000	0.123	0.245	0.493
		B	0.000	1.111	2.337	4.446
		C	0.000	0.000	0.000	0.000

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T9	20.00-0.00	A	0.000	0.121	0.241	0.484
		B	0.000	1.092	2.297	4.369
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-160.00	0.0619	-3.0692	0.0836	-3.6626
T2	160.00-140.00	0.2638	-6.9256	0.3412	-8.5938
T3	140.00-120.00	0.5725	-10.6178	0.7682	-13.9081
T4	120.00-100.00	0.7161	-11.8582	0.9903	-16.0515
T5	100.00-80.00	0.8882	-13.2302	1.2536	-18.3234
T6	80.00-60.00	1.2455	-17.4971	1.7745	-24.5124
T7	60.00-40.00	1.1520	-16.3098	1.6990	-23.6496
T8	40.00-20.00	1.2338	-17.5733	1.8205	-25.4943
T9	20.00-0.00	1.3086	-18.7301	1.9315	-27.1840

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
3' Whip (Town - Existing)	C	From Leg	6.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice	1.25 1.56	1.25 1.56	0.01 0.04
ROHN 6-ft Side Arm (Town - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
1142-2CN (NU - Existing)	A	From Leg	4.00 0.00 7.00	0.0000	178.00	No Ice 1/2" Ice	2.50 3.77	2.50 3.77	0.02 0.04
ROHN 4-ft Side Arm (NU - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	5.28 7.88	5.28 7.88	0.07 0.08
220-3AN (NU - Existing)	C	From Leg	3.00 0.00 10.00	0.0000	178.00	No Ice 1/2" Ice	5.69 7.79	5.69 7.79	0.02 0.07
ROHN 3-ft Side Arm (NU - Existing)	C	From Leg	1.50 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	3.10 5.00	3.10 5.00	0.07 0.10
6'8"x4" Pipe Mount (Future)	B	From Leg	0.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
DB222 (NU - Existing)	B	From Leg	6.00 0.00 6.00	0.0000	168.00	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	0.02 0.02

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*
ROHN 6-ft Side Arm (NU - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
6' x 3" Dia Omni	C	From Leg	6.00 0.00 3.00	0.0000	163.00	No Ice 1/2" Ice	1.77 2.13	1.77 2.13	0.02 0.03
ROHN 3-ft Side Arm	C	From Leg	3.00 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	3.10 5.00	3.10 5.00	0.07 0.10
6'8"x4" Pipe Mount (Future)	B	From Leg	0.50 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
1142-2CN (NU - Existing)	A	From Leg	6.00 0.00 7.00	0.0000	152.00	No Ice 1/2" Ice	2.50 3.77	2.50 3.77	0.02 0.04
ROHN 6-ft Side Arm (NU - Existing)	A	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
6'8"x4" Pipe Mount (NU - Existing)	C	From Leg	0.50 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
DB222 (Town - Existing)	B	From Leg	6.00 0.00 6.00	0.0000	144.00	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	0.02 0.02
ROHN 6-ft Side Arm (Town - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
ROHN 6-ft Side Arm (Future)	C	From Leg	3.00 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
DB222 (Town - Existing)	A	From Leg	6.00 0.00 6.00	0.0000	136.00	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	0.02 0.02
ROHN 6-ft Side Arm (Town - Existing)	A	From Leg	3.00 0.00 0.00	0.0000	136.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
DB222 (NU - Existing)	B	From Leg	6.00 0.00 6.00	0.0000	132.00	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	0.02 0.02
ROHN 6-ft Side Arm (NU - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
DB212-1 (Town - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice	4.50 8.10	4.50 8.10	0.03 0.04
ROHN 3-ft Side Arm (Town - Existing)	B	From Leg	1.50 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice	3.10 5.00	3.10 5.00	0.07 0.10
DB212-1 (Town - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice	4.50 8.10	4.50 8.10	0.03 0.04
ROHN 3-ft Side Arm (Town - Existing)	C	From Leg	1.50 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice	3.10 5.00	3.10 5.00	0.07 0.10
220-3AN (NU - Existing)	A	From Leg	6.00 0.00 10.00	0.0000	84.00	No Ice 1/2" Ice	5.69 7.79	5.69 7.79	0.02 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert (ft ft ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (K)
ROHN 6-ft Side Arm (NU - Existing)	A	From Leg	3.00 0.00 0.00	0.0000	84.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
DB222 (Town - Existing)	C	From Leg	6.00 0.00 6.00	0.0000	84.00	No Ice 1/2" Ice	1.60 2.88	1.60 2.88	0.02 0.02
ROHN 6-ft Side Arm (Town - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	84.00	No Ice 1/2" Ice	6.68 10.00	6.68 10.00	0.08 0.10
6'8"x4" Pipe Mount (Town - Existing)	B	From Leg	0.50 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
BNF800S-06 (Dominion - Existing)	B	From Leg	3.00 0.00 1.00	0.0000	65.00	No Ice 1/2" Ice	0.19 0.31	0.19 0.31	2.00 2.00
ROHN 3-ft Side Arm (Dominion - Existing)	B	From Leg	1.50 0.00 0.00	0.0000	65.00	No Ice 1/2" Ice	3.10 5.00	3.10 5.00	0.07 0.10
BNF800S-06 (Dominion - Proposed)	C	From Leg	3.00 0.00 1.00	0.0000	129.00	No Ice 1/2" Ice	0.19 0.31	0.19 0.31	2.00 2.00
ROHN 3-ft Side Arm (Dominion - Proposed)	C	From Leg	1.50 0.00 0.00	0.0000	129.00	No Ice 1/2" Ice	3.10 5.00	3.10 5.00	0.07 0.10

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 (ft^2)	Weight (K)
8' Dish (Future)	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		177.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.10 0.26
8' Dish (Future)	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		155.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.10 0.26
8' Dish (NU - Existing)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		148.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.10 0.26
Andrew 2' w/Radome (Town - Existing)	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		83.00	2.00	No Ice 1/2" Ice	3.14 3.41	0.07 0.28

Tower Pressures - No Ice

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 180.00-160.00	170.00	1.597	37	140.318	A	13.249	11.667	11.667	46.82	0.000	0.000
					B	11.567	16.107		42.16	0.000	0.000
					C	11.981	11.667		49.34	0.000	0.000
T2 160.00-140.00	150.00	1.541	36	163.453	A	15.485	15.027	15.027	49.25	0.000	0.000
					B	12.818	25.757		38.95	0.000	0.000
					C	12.859	15.027		53.89	0.000	0.000
T3 140.00-120.00	130.00	1.48	34	206.784	A	17.265	18.577	18.577	51.83	0.000	0.000
					B	14.466	35.504		37.18	0.000	0.000
					C	14.223	18.577		56.64	0.000	0.000
T4 120.00-100.00	110.00	1.411	33	250.745	A	22.662	22.125	22.125	49.40	0.000	0.000
					B	19.363	43.030		35.46	0.000	0.000
					C	19.655	22.125		52.96	0.000	0.000
T5 100.00-80.00	90.00	1.332	31	294.809	A	25.161	28.795	28.795	53.37	0.000	0.000
					B	21.568	53.885		38.16	0.000	0.000
					C	22.144	28.795		56.53	0.000	0.000
T6 80.00-60.00	70.00	1.24	29	335.750	A	24.161	28.806	28.806	54.38	0.000	0.000
					B	20.584	58.556		36.40	0.000	0.000
					C	21.097	28.806		57.72	0.000	0.000
T7 60.00-40.00	50.00	1.126	26	380.960	A	29.379	35.894	35.894	54.99	0.000	0.000
					B	25.594	65.644		39.34	0.000	0.000
					C	26.340	35.894		57.68	0.000	0.000
T8 40.00-20.00	30.00	1	23	421.064	A	31.716	35.893	35.893	53.09	0.000	0.000
					B	27.979	65.643		38.34	0.000	0.000
					C	28.671	35.893		55.59	0.000	0.000
T9 20.00-0.00	10.00	1	23	461.064	A	34.153	35.893	35.893	51.24	0.000	0.000
					B	30.452	65.643		37.35	0.000	0.000
					C	31.104	35.893		53.57	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 180.00-160.00	170.00	1.597	30	0.5000	141.985	A	14.061	21.622	15.000	42.04	0.000	0.000
						B	11.195	29.766		36.62	0.000	0.000
						C	11.981	21.770		44.44	0.000	0.000
T2 160.00-140.00	150.00	1.541	29	0.5000	165.122	A	17.174	24.541	18.366	44.03	0.000	0.000
						B	12.549	44.211		32.36	0.000	0.000
						C	12.859	24.796		48.78	0.000	0.000
T3 140.00-120.00	130.00	1.48	27	0.5000	208.453	A	19.235	27.406	21.916	46.99	0.000	0.000
						B	14.300	58.711		30.02	0.000	0.000
						C	14.223	27.606		52.39	0.000	0.000
T4 120.00-100.00	110.00	1.411	26	0.5000	252.414	A	24.598	31.827	25.465	45.13	0.000	0.000
						B	18.713	70.522		28.54	0.000	0.000
						C	19.655	32.017		49.28	0.000	0.000
T5 100.00-80.00	90.00	1.332	25	0.5000	296.477	A	27.106	39.331	32.133	48.37	0.000	0.000
						B	20.665	85.776		30.19	0.000	0.000
						C	22.144	39.515		52.11	0.000	0.000
T6 80.00-60.00	70.00	1.24	23	0.5000	337.419	A	26.154	38.043	32.145	50.07	0.000	0.000
						B	19.748	93.417		28.41	0.000	0.000
						C	21.097	38.173		54.24	0.000	0.000
T7 60.00-40.00	50.00	1.126	21	0.5000	382.629	A	31.347	45.691	39.233	50.93	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
						B	24.548	101.097		31.22	0.000	0.000
						C	26.340	45.817		54.37	0.000	0.000
T8 40.00-20.00	30.00	1	18	0.5000	422.733	A	33.690	46.276	39.232	49.06	0.000	0.000
						B	26.981	101.705		30.49	0.000	0.000
						C	28.671	46.400		52.26	0.000	0.000
T9 20.00-0.00	10.00	1	18	0.5000	462.733	A	36.132	46.887	39.232	47.26	0.000	0.000
						B	29.491	102.332		29.76	0.000	0.000
						C	31.104	47.008		50.23	0.000	0.000

Tower Pressure - Service

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 180.00-160.00	170.00	1.597	10	140.318	A	13.249	11.667	11.667	46.82	0.000	0.000
					B	11.567	16.107		42.16	0.000	0.000
					C	11.981	11.667		49.34	0.000	0.000
T2 160.00-140.00	150.00	1.541	10	163.453	A	15.485	15.027	15.027	49.25	0.000	0.000
					B	12.818	25.757		38.95	0.000	0.000
					C	12.859	15.027		53.89	0.000	0.000
T3 140.00-120.00	130.00	1.48	9	206.784	A	17.265	18.577	18.577	51.83	0.000	0.000
					B	14.466	35.504		37.18	0.000	0.000
					C	14.223	18.577		56.64	0.000	0.000
T4 120.00-100.00	110.00	1.411	9	250.745	A	22.662	22.125	22.125	49.40	0.000	0.000
					B	19.363	43.030		35.46	0.000	0.000
					C	19.655	22.125		52.96	0.000	0.000
T5 100.00-80.00	90.00	1.332	9	294.809	A	25.161	28.795	28.795	53.37	0.000	0.000
					B	21.568	53.885		38.16	0.000	0.000
					C	22.144	28.795		56.53	0.000	0.000
T6 80.00-60.00	70.00	1.24	8	335.750	A	24.161	28.806	28.806	54.38	0.000	0.000
					B	20.584	58.556		36.40	0.000	0.000
					C	21.097	28.806		57.72	0.000	0.000
T7 60.00-40.00	50.00	1.126	7	380.960	A	29.379	35.894	35.894	54.99	0.000	0.000
					B	25.594	65.644		39.34	0.000	0.000
					C	26.340	35.894		57.68	0.000	0.000
T8 40.00-20.00	30.00	1	6	421.064	A	31.716	35.893	35.893	53.09	0.000	0.000
					B	27.979	65.643		38.34	0.000	0.000
					C	28.671	35.893		55.59	0.000	0.000
T9 20.00-0.00	10.00	1	6	461.064	A	34.153	35.893	35.893	51.24	0.000	0.000
					B	30.452	65.643		37.35	0.000	0.000
					C	31.104	35.893		53.57	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 ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.98	A	0.178	2.673	0.586	1	1	20.087	2.27	113.53	B

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*
180.00-160.00			B	0.197	2.605	0.59	1	1	21.068			
			C	0.169	2.704	0.584	1	1	18.800			
T2	0.08	1.64	A	0.187	2.641	0.588	1	1	24.317	2.79	139.73	B
160.00-140.00			B	0.236	2.48	0.598	1	1	28.231			
			C	0.171	2.697	0.585	1	1	21.647			
T3	0.12	2.12	A	0.173	2.687	0.585	1	1	28.138	3.37	168.72	B
140.00-120.00			B	0.242	2.463	0.6	1	1	35.761			
			C	0.159	2.74	0.583	1	1	25.051			
T4	0.14	2.93	A	0.179	2.669	0.586	1	1	35.634	4.03	201.74	B
120.00-100.00			B	0.249	2.441	0.602	1	1	45.249			
			C	0.167	2.711	0.584	1	1	32.580			
T5	0.17	3.36	A	0.183	2.654	0.587	1	1	42.066	4.51	225.71	B
100.00-80.00			B	0.256	2.42	0.603	1	1	54.083			
			C	0.173	2.689	0.585	1	1	38.996			
T6	0.19	3.92	A	0.158	2.743	0.583	1	1	40.946	4.43	221.51	B
80.00-60.00			B	0.236	2.481	0.598	1	1	55.620			
			C	0.149	2.777	0.581	1	1	37.841			
T7	0.19	5.32	A	0.171	2.695	0.585	1	1	50.376	4.68	233.78	B
60.00-40.00			B	0.239	2.469	0.599	1	1	64.932			
			C	0.163	2.723	0.584	1	1	47.288			
T8	0.19	5.50	A	0.161	2.733	0.583	1	1	52.647	4.38	219.05	B
40.00-20.00			B	0.222	2.523	0.595	1	1	67.051			
			C	0.153	2.759	0.582	1	1	49.560			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	1	1	55.035	4.61	230.52	B
			B	0.208	2.568	0.592	1	1	69.323			
			C	0.145	2.789	0.581	1	1	51.950			
Sum Weight:	1.31	31.45						OTM	2815.39 kip-ft	35.09		

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	0.03	0.98	A	0.178	2.673	0.586	0.825	1	17.768	2.05	102.62	B
180.00-160.00			B	0.197	2.605	0.59	0.825	1	19.043			
			C	0.169	2.704	0.584	0.825	1	16.703			
T2	0.08	1.64	A	0.187	2.641	0.588	0.825	1	21.607	2.57	128.63	B
160.00-140.00			B	0.236	2.48	0.598	0.825	1	25.988			
			C	0.171	2.697	0.585	0.825	1	19.397			
T3	0.12	2.12	A	0.173	2.687	0.585	0.825	1	25.117	3.14	156.78	B
140.00-120.00			B	0.242	2.463	0.6	0.825	1	33.229			
			C	0.159	2.74	0.583	0.825	1	22.562			
T4	0.14	2.93	A	0.179	2.669	0.586	0.825	1	31.668	3.73	186.63	B
120.00-100.00			B	0.249	2.441	0.602	0.825	1	41.861			
			C	0.167	2.711	0.584	0.825	1	29.140			
T5	0.17	3.36	A	0.183	2.654	0.587	0.825	1	37.663	4.20	209.95	B
100.00-80.00			B	0.256	2.42	0.603	0.825	1	50.308			
			C	0.173	2.689	0.585	0.825	1	35.120			
T6	0.19	3.92	A	0.158	2.743	0.583	0.825	1	36.717	4.14	207.16	B
80.00-60.00			B	0.236	2.481	0.598	0.825	1	52.018			
			C	0.149	2.777	0.581	0.825	1	34.149			
T7	0.19	5.32	A	0.171	2.695	0.585	0.825	1	45.234	4.35	217.66	B
60.00-40.00			B	0.239	2.469	0.599	0.825	1	60.453			
			C	0.163	2.723	0.584	0.825	1	42.678			

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
T8 40.00-20.00	0.19	5.50	A	0.161	2.733	0.583	0.825	1	47.097	4.06	203.05	B
			B	0.222	2.523	0.595	0.825	1	62.154			
			C	0.153	2.759	0.582	0.825	1	44.543			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	0.825	1	49.058	4.26	212.80	B
			B	0.208	2.568	0.592	0.825	1	63.994			
			C	0.145	2.789	0.581	0.825	1	46.506			
Sum Weight:	1.31	31.45						OTM	2602.99 kip-ft	32.51		

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 180.00-160.00	0.03	0.98	A	0.178	2.673	0.586	0.8	1	17.437	2.02	101.06	B
			B	0.197	2.605	0.59	0.8	1	18.754			
			C	0.169	2.704	0.584	0.8	1	16.404			
T2 160.00-140.00	0.08	1.64	A	0.187	2.641	0.588	0.8	1	21.220	2.54	127.04	B
			B	0.236	2.48	0.598	0.8	1	25.668			
			C	0.171	2.697	0.585	0.8	1	19.075			
T3 140.00-120.00	0.12	2.12	A	0.173	2.687	0.585	0.8	1	24.685	3.10	155.07	B
			B	0.242	2.463	0.6	0.8	1	32.868			
			C	0.159	2.74	0.583	0.8	1	22.206			
T4 120.00-100.00	0.14	2.93	A	0.179	2.669	0.586	0.8	1	31.101	3.69	184.47	B
			B	0.249	2.441	0.602	0.8	1	41.376			
			C	0.167	2.711	0.584	0.8	1	28.649			
T5 100.00-80.00	0.17	3.36	A	0.183	2.654	0.587	0.8	1	37.034	4.15	207.70	B
			B	0.256	2.42	0.603	0.8	1	49.769			
			C	0.173	2.689	0.585	0.8	1	34.567			
T6 80.00-60.00	0.19	3.92	A	0.158	2.743	0.583	0.8	1	36.113	4.10	205.11	B
			B	0.236	2.481	0.598	0.8	1	51.503			
			C	0.149	2.777	0.581	0.8	1	33.621			
T7 60.00-40.00	0.19	5.32	A	0.171	2.695	0.585	0.8	1	44.500	4.31	215.35	B
			B	0.239	2.469	0.599	0.8	1	59.813			
			C	0.163	2.723	0.584	0.8	1	42.020			
T8 40.00-20.00	0.19	5.50	A	0.161	2.733	0.583	0.8	1	46.304	4.02	200.77	B
			B	0.222	2.523	0.595	0.8	1	61.455			
			C	0.153	2.759	0.582	0.8	1	43.826			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	0.8	1	48.204	4.21	210.27	B
			B	0.208	2.568	0.592	0.8	1	63.233			
			C	0.145	2.789	0.581	0.8	1	45.729			
Sum Weight:	1.31	31.45						OTM	2572.65 kip-ft	32.14		

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

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 180.00-160.00	0.03	0.98	A	0.178	2.673	0.586	0.85	1	18.099	2.08	104.18	B
			B	0.197	2.605	0.59	0.85	1	19.333			
			C	0.169	2.704	0.584	0.85	1	17.003			
T2 160.00-140.00	0.08	1.64	A	0.187	2.641	0.588	0.85	1	21.995	2.60	130.22	B
			B	0.236	2.48	0.598	0.85	1	26.308			
			C	0.171	2.697	0.585	0.85	1	19.718			
T3 140.00-120.00	0.12	2.12	A	0.173	2.687	0.585	0.85	1	25.549	3.17	158.48	B
			B	0.242	2.463	0.6	0.85	1	33.591			
			C	0.159	2.74	0.583	0.85	1	22.917			
T4 120.00-100.00	0.14	2.93	A	0.179	2.669	0.586	0.85	1	32.234	3.78	188.79	B
			B	0.249	2.441	0.602	0.85	1	42.345			
			C	0.167	2.711	0.584	0.85	1	29.631			
T5 100.00-80.00	0.17	3.36	A	0.183	2.654	0.587	0.85	1	38.292	4.24	212.20	B
			B	0.256	2.42	0.603	0.85	1	50.847			
			C	0.173	2.689	0.585	0.85	1	35.674			
T6 80.00-60.00	0.19	3.92	A	0.158	2.743	0.583	0.85	1	37.322	4.18	209.21	B
			B	0.236	2.481	0.598	0.85	1	52.532			
			C	0.149	2.777	0.581	0.85	1	34.676			
T7 60.00-40.00	0.19	5.32	A	0.171	2.695	0.585	0.85	1	45.969	4.40	219.96	B
			B	0.239	2.469	0.599	0.85	1	61.092			
			C	0.163	2.723	0.584	0.85	1	43.337			
T8 40.00-20.00	0.19	5.50	A	0.161	2.733	0.583	0.85	1	47.890	4.11	205.34	B
			B	0.222	2.523	0.595	0.85	1	62.854			
			C	0.153	2.759	0.582	0.85	1	45.260			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	0.85	1	49.912	4.31	215.33	B
			B	0.208	2.568	0.592	0.85	1	64.755			
			C	0.145	2.789	0.581	0.85	1	47.284			
Sum Weight:	1.31	31.45						OTM	2633.34 kip-ft	32.87		

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 180.00-160.00	0.10	1.58	A	0.251	2.434	0.602	1	1	27.083	2.27	113.38	B
			B	0.288	2.327	0.612	1	1	29.425			
			C	0.238	2.475	0.599	1	1	25.018			
T2 160.00-140.00	0.24	2.30	A	0.253	2.43	0.603	1	1	31.961	2.82	141.15	B
			B	0.344	2.186	0.63	1	1	40.414			
			C	0.228	2.505	0.597	1	1	27.650			
T3 140.00-120.00	0.36	2.84	A	0.224	2.519	0.596	1	1	35.556	3.43	171.26	B
			B	0.35	2.171	0.633	1	1	51.438			
			C	0.201	2.594	0.591	1	1	30.526			
T4 120.00-100.00	0.42	3.86	A	0.224	2.519	0.595	1	1	43.551	4.01	200.57	B
			B	0.354	2.163	0.634	1	1	63.406			
			C	0.205	2.58	0.591	1	1	38.589			
T5 100.00-80.00	0.49	4.45	A	0.224	2.518	0.596	1	1	50.532	4.47	223.31	B
			B	0.359	2.151	0.636	1	1	75.196			
			C	0.208	2.57	0.592	1	1	45.539			
T6 80.00-60.00	0.57	4.96	A	0.19	2.629	0.588	1	1	48.541	4.44	222.13	B
			B	0.335	2.206	0.627	1	1	78.354			
			C	0.176	2.679	0.586	1	1	43.457			
T7 60.00-40.00	0.57	6.61	A	0.201	2.592	0.591	1	1	58.336	4.55	227.68	B
			B	0.328	2.223	0.625	1	1	87.734			

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
			C	0.189	2.635	0.588	1	1	53.287			
T8 40.00-20.00	0.57	6.85	A	0.189	2.633	0.588	1	1	60.912	4.25	212.54	B
			B	0.304	2.284	0.617	1	1	89.760			
			C	0.178	2.673	0.586	1	1	55.865			
T9 20.00-0.00	0.57	7.11	A	0.179	2.666	0.586	1	1	63.627	4.46	223.00	B
			B	0.285	2.337	0.611	1	1	92.056			
			C	0.169	2.703	0.585	1	1	58.582			
Sum Weight:	3.89	40.56						OTM	2808.21 kip-ft	34.70		

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 180.00-160.00	0.10	1.58	A	0.251	2.434	0.602	0.825	1	24.622	2.12	105.83	B
			B	0.288	2.327	0.612	0.825	1	27.466			
			C	0.238	2.475	0.599	0.825	1	22.921			
T2 160.00-140.00	0.24	2.30	A	0.253	2.43	0.603	0.825	1	28.956	2.67	133.48	B
			B	0.344	2.186	0.63	0.825	1	38.218			
			C	0.228	2.505	0.597	0.825	1	25.400			
T3 140.00-120.00	0.36	2.84	A	0.224	2.519	0.596	0.825	1	32.190	3.26	162.93	B
			B	0.35	2.171	0.633	0.825	1	48.936			
			C	0.201	2.594	0.591	0.825	1	28.036			
T4 120.00-100.00	0.42	3.86	A	0.224	2.519	0.595	0.825	1	39.246	3.80	190.21	B
			B	0.354	2.163	0.634	0.825	1	60.132			
			C	0.205	2.58	0.591	0.825	1	35.149			
T5 100.00-80.00	0.49	4.45	A	0.224	2.518	0.596	0.825	1	45.789	4.25	212.57	B
			B	0.359	2.151	0.636	0.825	1	71.579			
			C	0.208	2.57	0.592	0.825	1	41.664			
T6 80.00-60.00	0.57	4.96	A	0.19	2.629	0.588	0.825	1	43.964	4.25	212.33	B
			B	0.335	2.206	0.627	0.825	1	74.898			
			C	0.176	2.679	0.586	0.825	1	39.765			
T7 60.00-40.00	0.57	6.61	A	0.201	2.592	0.591	0.825	1	52.850	4.33	216.53	B
			B	0.328	2.223	0.625	0.825	1	83.438			
			C	0.189	2.635	0.588	0.825	1	48.677			
T8 40.00-20.00	0.57	6.85	A	0.189	2.633	0.588	0.825	1	55.016	4.03	201.36	B
			B	0.304	2.284	0.617	0.825	1	85.038			
			C	0.178	2.673	0.586	0.825	1	50.848			
T9 20.00-0.00	0.57	7.11	A	0.179	2.666	0.586	0.825	1	57.304	4.21	210.50	B
			B	0.285	2.337	0.611	0.825	1	86.895			
			C	0.169	2.703	0.585	0.825	1	53.139			
Sum Weight:	3.89	40.56						OTM	2661.67 kip-ft	32.91		

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 180.00-160.00	0.10	1.58	A	0.251	2.434	0.602	0.8	1	24.270	2.10	104.75	B
			B	0.288	2.327	0.612	0.8	1	27.186			
			C	0.238	2.475	0.599	0.8	1	22.621			
T2 160.00-140.00	0.24	2.30	A	0.253	2.43	0.603	0.8	1	28.526	2.65	132.39	B
			B	0.344	2.186	0.63	0.8	1	37.904			
			C	0.228	2.505	0.597	0.8	1	25.078			
T3 140.00-120.00	0.36	2.84	A	0.224	2.519	0.596	0.8	1	31.709	3.23	161.74	B
			B	0.35	2.171	0.633	0.8	1	48.578			
			C	0.201	2.594	0.591	0.8	1	27.681			
T4 120.00-100.00	0.42	3.86	A	0.224	2.519	0.595	0.8	1	38.631	3.77	188.73	B
			B	0.354	2.163	0.634	0.8	1	59.664			
			C	0.205	2.58	0.591	0.8	1	34.658			
T5 100.00-80.00	0.49	4.45	A	0.224	2.518	0.596	0.8	1	45.111	4.22	211.03	B
			B	0.359	2.151	0.636	0.8	1	71.063			
			C	0.208	2.57	0.592	0.8	1	41.110			
T6 80.00-60.00	0.57	4.96	A	0.19	2.629	0.588	0.8	1	43.310	4.22	210.93	B
			B	0.335	2.206	0.627	0.8	1	74.405			
			C	0.176	2.679	0.586	0.8	1	39.237			
T7 60.00-40.00	0.57	6.61	A	0.201	2.592	0.591	0.8	1	52.067	4.30	214.94	B
			B	0.328	2.223	0.625	0.8	1	82.824			
			C	0.189	2.635	0.588	0.8	1	48.019			
T8 40.00-20.00	0.57	6.85	A	0.189	2.633	0.588	0.8	1	54.174	4.00	199.76	B
			B	0.304	2.284	0.617	0.8	1	84.364			
			C	0.178	2.673	0.586	0.8	1	50.131			
T9 20.00-0.00	0.57	7.11	A	0.179	2.666	0.586	0.8	1	56.400	4.17	208.72	B
			B	0.285	2.337	0.611	0.8	1	86.158			
			C	0.169	2.703	0.585	0.8	1	52.361			
Sum Weight:	3.89	40.56						OTM	2640.74 kip-ft	32.66		

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 180.00-160.00	0.10	1.58	A	0.251	2.434	0.602	0.85	1	24.973	2.14	106.91	B
			B	0.288	2.327	0.612	0.85	1	27.745			
			C	0.238	2.475	0.599	0.85	1	23.220			
T2 160.00-140.00	0.24	2.30	A	0.253	2.43	0.603	0.85	1	29.385	2.69	134.58	B
			B	0.344	2.186	0.63	0.85	1	38.531			
			C	0.228	2.505	0.597	0.85	1	25.721			
T3 140.00-120.00	0.36	2.84	A	0.224	2.519	0.596	0.85	1	32.671	3.28	164.12	B
			B	0.35	2.171	0.633	0.85	1	49.293			
			C	0.201	2.594	0.591	0.85	1	28.392			
T4 120.00-100.00	0.42	3.86	A	0.224	2.519	0.595	0.85	1	39.861	3.83	191.69	B
			B	0.354	2.163	0.634	0.85	1	60.599			
			C	0.205	2.58	0.591	0.85	1	35.640			
T5 100.00-80.00	0.49	4.45	A	0.224	2.518	0.596	0.85	1	46.466	4.28	214.10	B
			B	0.359	2.151	0.636	0.85	1	72.096			
			C	0.208	2.57	0.592	0.85	1	42.218			
T6 80.00-60.00	0.57	4.96	A	0.19	2.629	0.588	0.85	1	44.618	4.27	213.73	B
			B	0.335	2.206	0.627	0.85	1	75.392			
			C	0.176	2.679	0.586	0.85	1	40.292			
T7 60.00-40.00	0.57	6.61	A	0.201	2.592	0.591	0.85	1	53.634	4.36	218.12	B
			B	0.328	2.223	0.625	0.85	1	84.051			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.189	2.635	0.588	0.85	1	49.336			
T8 40.00-20.00	0.57	6.85	A	0.189	2.633	0.588	0.85	1	55.859	4.06	202.96	B
			B	0.304	2.284	0.617	0.85	1	85.713			
			C	0.178	2.673	0.586	0.85	1	51.565			
T9 20.00-0.00	0.57	7.11	A	0.179	2.666	0.586	0.85	1	58.207	4.25	212.29	B
			B	0.285	2.337	0.611	0.85	1	87.632			
			C	0.169	2.703	0.585	0.85	1	53.916			
Sum Weight:	3.89	40.56						OTM	2682.61 kip-ft	33.17		

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 180.00-160.00	0.03	0.98	A	0.178	2.673	0.586	1	1	20.087	0.63	31.45	B
			B	0.197	2.605	0.59	1	1	21.068			
			C	0.169	2.704	0.584	1	1	18.800			
T2 160.00-140.00	0.08	1.64	A	0.187	2.641	0.588	1	1	24.317	0.77	38.71	B
			B	0.236	2.48	0.598	1	1	28.231			
			C	0.171	2.697	0.585	1	1	21.647			
T3 140.00-120.00	0.12	2.12	A	0.173	2.687	0.585	1	1	28.138	0.93	46.74	B
			B	0.242	2.463	0.6	1	1	35.761			
			C	0.159	2.74	0.583	1	1	25.051			
T4 120.00-100.00	0.14	2.93	A	0.179	2.669	0.586	1	1	35.634	1.12	55.88	B
			B	0.249	2.441	0.602	1	1	45.249			
			C	0.167	2.711	0.584	1	1	32.580			
T5 100.00-80.00	0.17	3.36	A	0.183	2.654	0.587	1	1	42.066	1.25	62.52	B
			B	0.256	2.42	0.603	1	1	54.083			
			C	0.173	2.689	0.585	1	1	38.996			
T6 80.00-60.00	0.19	3.92	A	0.158	2.743	0.583	1	1	40.946	1.23	61.36	B
			B	0.236	2.481	0.598	1	1	55.620			
			C	0.149	2.777	0.581	1	1	37.841			
T7 60.00-40.00	0.19	5.32	A	0.171	2.695	0.585	1	1	50.376	1.30	64.76	B
			B	0.239	2.469	0.599	1	1	64.932			
			C	0.163	2.723	0.584	1	1	47.288			
T8 40.00-20.00	0.19	5.50	A	0.161	2.733	0.583	1	1	52.647	1.21	60.68	B
			B	0.222	2.523	0.595	1	1	67.051			
			C	0.153	2.759	0.582	1	1	49.560			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	1	1	55.035	1.28	63.86	B
			B	0.208	2.568	0.592	1	1	69.323			
			C	0.145	2.789	0.581	1	1	51.950			
Sum Weight:	1.31	31.45						OTM	779.89 kip-ft	9.72		

Tower Forces - Service - Wind 45 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E *ft²*	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 180.00-160.00	0.03	0.98	A	0.178	2.673	0.586	0.825	1	17.768	0.57	28.43	B
			B	0.197	2.605	0.59	0.825	1	19.043			
			C	0.169	2.704	0.584	0.825	1	16.703			
T2 160.00-140.00	0.08	1.64	A	0.187	2.641	0.588	0.825	1	21.607	0.71	35.63	B
			B	0.236	2.48	0.598	0.825	1	25.988			
			C	0.171	2.697	0.585	0.825	1	19.397			
T3 140.00-120.00	0.12	2.12	A	0.173	2.687	0.585	0.825	1	25.117	0.87	43.43	B
			B	0.242	2.463	0.6	0.825	1	33.229			
			C	0.159	2.74	0.583	0.825	1	22.562			
T4 120.00-100.00	0.14	2.93	A	0.179	2.669	0.586	0.825	1	31.668	1.03	51.70	B
			B	0.249	2.441	0.602	0.825	1	41.861			
			C	0.167	2.711	0.584	0.825	1	29.140			
T5 100.00-80.00	0.17	3.36	A	0.183	2.654	0.587	0.825	1	37.663	1.16	58.16	B
			B	0.256	2.42	0.603	0.825	1	50.308			
			C	0.173	2.689	0.585	0.825	1	35.120			
T6 80.00-60.00	0.19	3.92	A	0.158	2.743	0.583	0.825	1	36.717	1.15	57.39	B
			B	0.236	2.481	0.598	0.825	1	52.018			
			C	0.149	2.777	0.581	0.825	1	34.149			
T7 60.00-40.00	0.19	5.32	A	0.171	2.695	0.585	0.825	1	45.234	1.21	60.29	B
			B	0.239	2.469	0.599	0.825	1	60.453			
			C	0.163	2.723	0.584	0.825	1	42.678			
T8 40.00-20.00	0.19	5.50	A	0.161	2.733	0.583	0.825	1	47.097	1.12	56.25	B
			B	0.222	2.523	0.595	0.825	1	62.154			
			C	0.153	2.759	0.582	0.825	1	44.543			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	0.825	1	49.058	1.18	58.95	B
			B	0.208	2.568	0.592	0.825	1	63.994			
			C	0.145	2.789	0.581	0.825	1	46.506			
Sum Weight:	1.31	31.45						OTM	721.05 kip-ft	9.00		

Tower Forces - Service - Wind 60 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E *ft²*	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 180.00-160.00	0.03	0.98	A	0.178	2.673	0.586	0.8	1	17.437	0.56	27.99	B
			B	0.197	2.605	0.59	0.8	1	18.754			
			C	0.169	2.704	0.584	0.8	1	16.404			
T2 160.00-140.00	0.08	1.64	A	0.187	2.641	0.588	0.8	1	21.220	0.70	35.19	B
			B	0.236	2.48	0.598	0.8	1	25.668			
			C	0.171	2.697	0.585	0.8	1	19.075			
T3 140.00-120.00	0.12	2.12	A	0.173	2.687	0.585	0.8	1	24.685	0.86	42.96	B
			B	0.242	2.463	0.6	0.8	1	32.868			
			C	0.159	2.74	0.583	0.8	1	22.206			
T4 120.00-100.00	0.14	2.93	A	0.179	2.669	0.586	0.8	1	31.101	1.02	51.10	B
			B	0.249	2.441	0.602	0.8	1	41.376			
			C	0.167	2.711	0.584	0.8	1	28.649			
T5 100.00-80.00	0.17	3.36	A	0.183	2.654	0.587	0.8	1	37.034	1.15	57.54	B
			B	0.256	2.42	0.603	0.8	1	49.769			
			C	0.173	2.689	0.585	0.8	1	34.567			
T6 80.00-60.00	0.19	3.92	A	0.158	2.743	0.583	0.8	1	36.113	1.14	56.82	B
			B	0.236	2.481	0.598	0.8	1	51.503			
			C	0.149	2.777	0.581	0.8	1	33.621			
T7 60.00-40.00	0.19	5.32	A	0.171	2.695	0.585	0.8	1	44.500	1.19	59.65	B
			B	0.239	2.469	0.599	0.8	1	59.813			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.163	2.723	0.584	0.8	1	42.020			
T8 40.00-20.00	0.19	5.50	A	0.161	2.733	0.583	0.8	1	46.304	1.11	55.61	B
			B	0.222	2.523	0.595	0.8	1	61.455			
			C	0.153	2.759	0.582	0.8	1	43.826			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	0.8	1	48.204	1.16	58.25	B
			B	0.208	2.568	0.592	0.8	1	63.233			
			C	0.145	2.789	0.581	0.8	1	45.729			
Sum Weight:	1.31	31.45						OTM	712.65 kip-ft	8.90		

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 180.00-160.00	0.03	0.98	A	0.178	2.673	0.586	0.85	1	18.099	0.58	28.86	B
			B	0.197	2.605	0.59	0.85	1	19.333			
			C	0.169	2.704	0.584	0.85	1	17.003			
T2 160.00-140.00	0.08	1.64	A	0.187	2.641	0.588	0.85	1	21.995	0.72	36.07	B
			B	0.236	2.48	0.598	0.85	1	26.308			
			C	0.171	2.697	0.585	0.85	1	19.718			
T3 140.00-120.00	0.12	2.12	A	0.173	2.687	0.585	0.85	1	25.549	0.88	43.90	B
			B	0.242	2.463	0.6	0.85	1	33.591			
			C	0.159	2.74	0.583	0.85	1	22.917			
T4 120.00-100.00	0.14	2.93	A	0.179	2.669	0.586	0.85	1	32.234	1.05	52.30	B
			B	0.249	2.441	0.602	0.85	1	42.345			
			C	0.167	2.711	0.584	0.85	1	29.631			
T5 100.00-80.00	0.17	3.36	A	0.183	2.654	0.587	0.85	1	38.292	1.18	58.78	B
			B	0.256	2.42	0.603	0.85	1	50.847			
			C	0.173	2.689	0.585	0.85	1	35.674			
T6 80.00-60.00	0.19	3.92	A	0.158	2.743	0.583	0.85	1	37.322	1.16	57.95	B
			B	0.236	2.481	0.598	0.85	1	52.532			
			C	0.149	2.777	0.581	0.85	1	34.676			
T7 60.00-40.00	0.19	5.32	A	0.171	2.695	0.585	0.85	1	45.969	1.22	60.93	B
			B	0.239	2.469	0.599	0.85	1	61.092			
			C	0.163	2.723	0.584	0.85	1	43.337			
T8 40.00-20.00	0.19	5.50	A	0.161	2.733	0.583	0.85	1	47.890	1.14	56.88	B
			B	0.222	2.523	0.595	0.85	1	62.854			
			C	0.153	2.759	0.582	0.85	1	45.260			
T9 20.00-0.00	0.19	5.68	A	0.152	2.764	0.582	0.85	1	49.912	1.19	59.65	B
			B	0.208	2.568	0.592	0.85	1	64.755			
			C	0.145	2.789	0.581	0.85	1	47.284			
Sum Weight:	1.31	31.45						OTM	729.46 kip-ft	9.11		

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	18.80					
Bracing Weight	12.65					
Total Member Self-Weight	31.45			13.72	-8.26	
Total Weight	38.87			13.72	-8.26	
Wind 0 deg - No Ice		-0.25	-44.14	-4141.11	36.44	6.02
Wind 30 deg - No Ice		20.25	-36.09	-3384.33	-1872.30	-6.77
Wind 45 deg - No Ice		28.66	-29.14	-2728.59	-2671.33	-12.33
Wind 60 deg - No Ice		35.04	-20.39	-1904.20	-3286.06	-17.92
Wind 90 deg - No Ice		42.14	0.05	22.09	-4008.46	-26.09
Wind 120 deg - No Ice		38.52	21.98	2079.63	-3652.75	-28.67
Wind 135 deg - No Ice		29.39	29.09	2758.27	-2795.06	-24.36
Wind 150 deg - No Ice		20.93	35.52	3332.92	-1988.39	-19.50
Wind 180 deg - No Ice		-0.07	39.58	3669.30	4.41	-6.93
Wind 210 deg - No Ice		-20.94	35.05	3248.62	1973.84	7.79
Wind 225 deg - No Ice		-29.40	28.59	2669.42	2781.39	15.21
Wind 240 deg - No Ice		-38.55	21.71	2031.05	3641.50	22.65
Wind 270 deg - No Ice		-42.77	-0.06	2.68	4102.97	27.40
Wind 300 deg - No Ice		-36.01	-20.86	-1989.07	3441.90	24.85
Wind 315 deg - No Ice		-29.58	-29.80	-2845.05	2818.64	20.73
Wind 330 deg - No Ice		-21.07	-36.80	-3511.22	2002.09	17.17
Member Ice	9.11					
Total Weight Ice	51.98			-4.71	-11.39	
Wind 0 deg - Ice		-0.21	-44.07	-4176.04	25.20	6.06
Wind 30 deg - Ice		20.68	-36.66	-3473.64	-1934.15	-15.25
Wind 45 deg - Ice		29.30	-29.70	-2813.50	-2755.37	-24.36
Wind 60 deg - Ice		35.88	-20.84	-1975.43	-3388.69	-32.49
Wind 90 deg - Ice		42.71	0.04	2.15	-4079.51	-42.69
Wind 120 deg - Ice		38.41	21.96	2071.56	-3661.73	-42.84
Wind 135 deg - Ice		29.90	29.65	2805.98	-2856.60	-35.76
Wind 150 deg - Ice		21.24	36.19	3399.81	-2029.14	-27.59
Wind 180 deg - Ice		-0.06	40.71	3789.39	-1.02	-6.76
Wind 210 deg - Ice		-21.25	35.81	3330.82	2007.97	16.09
Wind 225 deg - Ice		-29.91	29.25	2733.26	2836.15	26.71
Wind 240 deg - Ice		-38.43	21.74	2031.81	3643.27	36.78
Wind 270 deg - Ice		-43.22	-0.05	-13.74	4147.60	43.76
Wind 300 deg - Ice		-36.67	-21.23	-2044.89	3506.97	39.25
Wind 315 deg - Ice		-30.06	-30.23	-2908.81	2866.66	32.80
Wind 330 deg - Ice		-21.35	-37.24	-3577.49	2031.12	25.69
Total Weight	38.87			13.72	-8.26	
Wind 0 deg - Service		-0.07	-12.23	-1126.44	4.87	1.67
Wind 30 deg - Service		5.61	-10.00	-916.80	-523.87	-1.87
Wind 45 deg - Service		7.94	-8.07	-735.16	-745.21	-3.42
Wind 60 deg - Service		9.71	-5.65	-506.79	-915.49	-4.96
Wind 90 deg - Service		11.67	0.01	26.80	-1115.60	-7.23
Wind 120 deg - Service		10.67	6.09	596.76	-1017.07	-7.94
Wind 135 deg - Service		8.14	8.06	784.75	-779.48	-6.75
Wind 150 deg - Service		5.80	9.84	943.93	-556.03	-5.40
Wind 180 deg - Service		-0.02	10.96	1037.11	-4.00	-1.92
Wind 210 deg - Service		-5.80	9.71	920.58	541.55	2.16
Wind 225 deg - Service		-8.14	7.92	760.14	765.24	4.21
Wind 240 deg - Service		-10.68	6.01	583.30	1003.50	6.27
Wind 270 deg - Service		-11.85	-0.02	21.43	1131.33	7.59
Wind 300 deg - Service		-9.97	-5.78	-530.30	948.21	6.88
Wind 315 deg - Service		-8.19	-8.25	-767.42	775.56	5.74
Wind 330 deg - Service		-5.84	-10.19	-951.95	549.37	4.76

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

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	15	11.04	-0.14	0.05
			Max. Compression	24	-11.93	0.15	-0.04
			Max. Mx	32	0.39	0.50	0.07
			Max. My	34	-0.49	0.01	-0.81
			Max. Vy	15	0.78	-0.39	0.07
			Max. Vx	4	0.83	0.05	-0.27
		Diagonal	Max Tension	14	2.45	0.00	0.00
			Max. Compression	31	-2.48	0.00	0.00
			Max. Mx	31	0.54	0.01	0.00
			Max. My	5	-1.84	0.00	-0.00
			Max. Vy	24	-0.01	0.01	-0.00
			Max. Vx	5	0.00	0.00	0.00
		Top Girt	Max Tension	15	0.14	0.00	0.00
			Max. Compression	14	-0.13	0.00	0.00
			Max. Mx	18	-0.01	-0.02	0.00
			Max. My	21	-0.02	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	21	-0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	15	29.43	-0.20	0.15
			Max. Compression	24	-31.75	0.24	0.07
			Max. Mx	5	18.82	0.45	0.08
			Max. My	9	-0.63	-0.04	0.69
			Max. Vy	15	-0.68	-0.05	-0.11
			Max. Vx	11	0.90	-0.00	0.00
		Diagonal	Max Tension	6	4.11	0.00	0.00
			Max. Compression	6	-4.11	0.00	0.00
			Max. Mx	32	2.33	0.02	0.00
			Max. My	5	-3.50	0.01	-0.01
			Max. Vy	32	0.02	0.02	0.00
			Max. Vx	22	0.00	0.00	0.00
		Top Girt	Max Tension	15	0.06	0.00	0.00
			Max. Compression	17	-0.05	0.00	0.00
			Max. Mx	18	-0.00	-0.02	0.00
			Max. My	20	0.01	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	15	50.83	-0.22	0.01
			Max. Compression	30	-57.46	0.39	-0.03
			Max. Mx	22	29.40	-0.47	0.08
			Max. My	31	-2.58	-0.00	-0.42
			Max. Vy	22	-0.27	-0.47	0.08
			Max. Vx	23	-0.32	-0.00	0.40
		Diagonal	Max Tension	6	4.72	0.00	0.00
			Max. Compression	6	-4.80	0.00	0.00
			Max. Mx	32	3.52	0.04	0.00
			Max. My	22	-3.85	0.02	-0.01
			Max. Vy	32	0.02	0.04	0.00
			Max. Vx	21	0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	15	71.75	-0.46	0.03
			Max. Compression	30	-81.86	0.55	0.07
			Max. Mx	32	70.34	-0.58	0.06
			Max. My	34	-6.45	-0.01	0.63
			Max. Vy	32	0.22	-0.58	0.06
			Max. Vx	21	0.25	0.11	-0.58
		Diagonal	Max Tension	6	4.97	0.00	0.00
			Max. Compression	6	-5.00	0.00	0.00
			Max. Mx	32	3.94	0.06	-0.01
			Max. My	21	-3.45	0.04	-0.01
			Max. Vy	32	0.03	0.06	-0.01
			Max. Vx	21	0.00	0.00	0.00
T5	100 - 80	Leg	Max Tension	15	93.89	-0.67	-0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	30	-108.63	1.43	-0.13
			Max. Mx	7	-105.54	1.47	0.08
			Max. My	31	-7.26	-0.01	-1.19
			Max. Vy	7	-0.33	1.47	0.08
			Max. Vx	23	-0.37	-0.02	1.15
		Diagonal	Max Tension	34	6.16	0.00	0.00
			Max. Compression	34	-6.21	0.00	0.00
			Max. Mx	32	4.80	0.07	-0.01
			Max. My	25	-6.06	0.04	0.01
			Max. Vy	32	0.04	0.07	-0.01
			Max. Vx	31	0.00	0.00	0.00
T6	80 - 60	Leg	Max Tension	15	114.70	-0.66	-0.04
			Max. Compression	24	-135.34	1.27	0.15
			Max. Mx	32	111.27	-1.74	-0.14
			Max. My	31	-9.22	-0.11	-1.40
			Max. Vy	32	0.33	-1.74	-0.14
			Max. Vx	23	-0.23	-0.11	1.38
		Diagonal	Max Tension	34	7.24	0.00	0.00
			Max. Compression	34	-7.35	0.00	0.00
			Max. Mx	32	5.22	0.12	-0.02
			Max. My	25	-7.01	0.06	0.02
			Max. Vy	32	0.05	0.12	-0.02
			Max. Vx	32	0.00	0.00	0.00
T7	60 - 40	Leg	Max Tension	15	134.80	-1.32	-0.03
			Max. Compression	24	-163.69	-0.02	0.05
			Max. Mx	32	133.92	-2.63	-0.06
			Max. My	14	-8.32	-0.00	-1.48
			Max. Vy	27	0.32	-2.55	-0.00
			Max. Vx	14	0.21	-0.00	-1.48
		Diagonal	Max Tension	34	8.69	0.00	0.00
			Max. Compression	34	-8.33	0.00	0.00
			Max. Mx	32	6.14	0.18	-0.02
			Max. My	32	-7.26	0.13	-0.03
			Max. Vy	32	0.07	0.18	-0.02
			Max. Vx	32	0.00	0.00	0.00
T8	40 - 20	Leg	Max Tension	15	157.63	-1.40	-0.03
			Max. Compression	24	-193.28	-4.31	0.04
			Max. Mx	32	155.92	-7.24	-0.05
			Max. My	14	-9.38	-0.08	-1.54
			Max. Vy	27	1.01	-7.15	0.00
			Max. Vx	14	-0.24	-0.08	-1.54
		Diagonal	Max Tension	34	10.56	0.00	0.00
			Max. Compression	34	-9.56	0.00	0.00
			Max. Mx	32	5.46	0.21	-0.02
			Max. My	24	-9.05	0.14	0.03
			Max. Vy	32	0.08	0.19	-0.02
			Max. Vx	31	0.00	0.00	0.00
T9	20 - 0	Leg	Max Tension	15	180.04	-1.52	-0.04
			Max. Compression	24	-223.54	0.00	0.00
			Max. Mx	24	-222.98	9.23	0.03
			Max. My	14	-11.55	-0.15	-2.74
			Max. Vy	27	-1.48	-7.15	0.00
			Max. Vx	14	-0.45	-0.15	-2.74
		Diagonal	Max Tension	33	13.96	0.00	0.00
			Max. Compression	34	-12.28	0.00	0.00
			Max. Mx	32	3.43	0.28	-0.03
			Max. My	32	-11.33	0.23	-0.04
			Max. Vy	32	0.09	0.28	-0.03
			Max. Vx	32	0.01	0.00	0.00

Maximum Reactions

Location	*Condition*	*Gov. Load Comb.*	*Vertical K*	*Horizontal, X K*	*Horizontal, Z K*
Leg C	Max. Vert	30	225.63	17.09	-10.90
	Max. H_x	13	221.12	23.00	-13.90
	Max. H_z	21	-172.09	-24.47	15.88
	Min. Vert	22	-178.56	-25.47	15.65
	Min. H_x	22	-178.56	-25.47	15.65
	Min. H_z	13	221.12	23.00	-13.90
Leg B	Max. Vert	24	227.42	-17.08	-11.08
	Max. H_x	32	-185.41	25.88	16.08
	Max. H_z	33	-179.29	24.88	16.35
	Min. Vert	15	-185.54	19.86	12.20
	Min. H_x	7	222.82	-22.99	-14.07
	Min. H_z	7	222.82	-22.99	-14.07
Leg A	Max. Vert	19	225.88	0.16	20.22
	Max. H_x	31	18.01	4.54	-5.51
	Max. H_z	2	219.72	0.16	26.79
	Min. Vert	27	-171.92	-0.16	-29.37
	Min. H_x	23	17.22	-4.49	-5.57
	Min. H_z	27	-171.92	-0.16	-29.37

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	38.87	0.00	0.00	13.72	-8.26	0.00
Dead+Wind 0 deg - No Ice	38.87	-0.25	-44.14	-4146.48	36.51	6.00
Dead+Wind 30 deg - No Ice	38.87	20.25	-36.09	-3388.71	-1874.69	-6.76
Dead+Wind 45 deg - No Ice	38.87	28.66	-29.14	-2732.12	-2674.76	-12.31
Dead+Wind 60 deg - No Ice	38.87	35.04	-20.39	-1906.65	-3290.29	-17.88
Dead+Wind 90 deg - No Ice	38.87	42.14	0.05	22.13	-4013.67	-26.04
Dead+Wind 120 deg - No Ice	38.87	38.52	21.98	2082.33	-3657.51	-28.62
Dead+Wind 135 deg - No Ice	38.87	29.39	29.09	2761.86	-2798.70	-24.32
Dead+Wind 150 deg - No Ice	38.87	20.93	35.52	3337.23	-1990.97	-19.46
Dead+Wind 180 deg - No Ice	38.87	-0.07	39.58	3674.02	4.44	-6.91
Dead+Wind 210 deg - No Ice	38.87	-20.94	35.05	3252.80	1976.43	7.78
Dead+Wind 225 deg - No Ice	38.87	-29.40	28.59	2672.86	2785.04	15.20
Dead+Wind 240 deg - No Ice	38.87	-38.55	21.71	2033.67	3646.27	22.62
Dead+Wind 270 deg - No Ice	38.87	-42.77	-0.06	2.67	4108.37	27.35
Dead+Wind 300 deg - No Ice	38.87	-36.01	-20.86	-1991.68	3446.42	24.79
Dead+Wind 315 deg - No Ice	38.87	-29.58	-29.80	-2848.78	2822.34	20.68
Dead+Wind 330 deg - No Ice	38.87	-21.07	-36.80	-3515.82	2004.72	17.13
Dead+Ice+Temp	51.98	-0.00	0.00	-4.71	-11.39	0.00
Dead+Wind 0 deg+Ice+Temp	51.98	-0.21	-44.07	-4182.29	25.27	6.05
Dead+Wind 30 deg+Ice+Temp	51.98	20.68	-36.66	-3478.82	-1936.99	-15.25
Dead+Wind 45 deg+Ice+Temp	51.98	29.30	-29.70	-2817.69	-2759.43	-24.34
Dead+Wind 60 deg+Ice+Temp	51.98	35.88	-20.84	-1978.37	-3393.72	-32.46
Dead+Wind 90 deg+Ice+Temp	51.98	42.71	0.04	2.16	-4085.63	-42.65
Dead+Wind 120 deg+Ice+Temp	51.98	38.41	21.96	2074.68	-3667.24	-42.79
Dead+Wind 135 deg+Ice+Temp	51.98	29.90	29.65	2810.21	-2860.89	-35.72
Dead+Wind 150 deg+Ice+Temp	51.98	21.24	36.19	3404.91	-2032.18	-27.55
Dead+Wind 180 deg+Ice+Temp	51.98	-0.06	40.71	3795.05	-0.99	-6.75

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 210 deg+Ice+Temp	51.98	-21.25	35.81	3335.78	2011.02	16.08
Dead+Wind 225 deg+Ice+Temp	51.98	-29.91	29.25	2737.35	2840.46	26.70
Dead+Wind 240 deg+Ice+Temp	51.98	-38.43	21.74	2034.84	3648.79	36.74
Dead+Wind 270 deg+Ice+Temp	51.98	-43.22	-0.05	-13.77	4153.92	43.72
Dead+Wind 300 deg+Ice+Temp	51.98	-36.67	-21.23	-2047.99	3512.29	39.21
Dead+Wind 315 deg+Ice+Temp	51.98	-30.06	-30.23	-2913.21	2871.01	32.76
Dead+Wind 330 deg+Ice+Temp	51.98	-21.35	-37.24	-3582.89	2034.20	25.65
Dead+Wind 0 deg - Service	38.87	-0.07	-12.23	-1138.67	4.15	1.66
Dead+Wind 30 deg - Service	38.87	5.61	-10.00	-928.76	-525.28	-1.87
Dead+Wind 45 deg - Service	38.87	7.94	-8.07	-746.88	-746.90	-3.41
Dead+Wind 60 deg - Service	38.87	9.71	-5.65	-518.22	-917.41	-4.95
Dead+Wind 90 deg - Service	38.87	11.67	0.01	16.07	-1117.79	-7.21
Dead+Wind 120 deg - Service	38.87	10.67	6.09	586.77	-1019.13	-7.93
Dead+Wind 135 deg - Service	38.87	8.14	8.06	775.01	-781.23	-6.73
Dead+Wind 150 deg - Service	38.87	5.80	9.84	934.38	-557.48	-5.39
Dead+Wind 180 deg - Service	38.87	-0.02	10.96	1027.68	-4.74	-1.91
Dead+Wind 210 deg - Service	38.87	-5.80	9.71	911.00	541.52	2.15
Dead+Wind 225 deg - Service	38.87	-8.14	7.92	750.35	765.51	4.20
Dead+Wind 240 deg - Service	38.87	-10.68	6.01	573.29	1004.08	6.26
Dead+Wind 270 deg - Service	38.87	-11.85	-0.02	10.68	1132.09	7.58
Dead+Wind 300 deg - Service	38.87	-9.97	-5.78	-541.77	948.72	6.87
Dead+Wind 315 deg - Service	38.87	-8.19	-8.25	-779.20	775.85	5.73
Dead+Wind 330 deg - Service	38.87	-5.84	-10.19	-963.97	549.36	4.74

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	-38.87	0.00	0.00	38.87	0.00	0.000%
2	-0.25	-38.87	-44.14	0.25	38.87	44.14	0.000%
3	20.25	-38.87	-36.09	-20.25	38.87	36.09	0.000%
4	28.66	-38.87	-29.14	-28.66	38.87	29.14	0.000%
5	35.04	-38.87	-20.39	-35.04	38.87	20.39	0.000%
6	42.14	-38.87	0.05	-42.14	38.87	-0.05	0.000%
7	38.52	-38.87	21.98	-38.52	38.87	-21.98	0.000%
8	29.39	-38.87	29.09	-29.39	38.87	-29.09	0.002%
9	20.93	-38.87	35.52	-20.93	38.87	-35.52	0.000%
10	-0.07	-38.87	39.58	0.07	38.87	-39.58	0.000%
11	-20.94	-38.87	35.05	20.94	38.87	-35.05	0.000%
12	-29.40	-38.87	28.59	29.40	38.87	-28.59	0.001%
13	-38.55	-38.87	21.71	38.55	38.87	-21.71	0.000%
14	-42.77	-38.87	-0.06	42.77	38.87	0.06	0.000%
15	-36.01	-38.87	-20.86	36.01	38.87	20.86	0.000%
16	-29.58	-38.87	-29.80	29.58	38.87	29.80	0.000%
17	-21.07	-38.87	-36.80	21.07	38.87	36.80	0.000%
18	0.00	-51.98	0.00	0.00	51.98	-0.00	0.000%
19	-0.21	-51.98	-44.07	0.21	51.98	44.07	0.000%
20	20.68	-51.98	-36.66	-20.68	51.98	36.66	0.000%
21	29.30	-51.98	-29.70	-29.30	51.98	29.70	0.000%
22	35.88	-51.98	-20.84	-35.88	51.98	20.84	0.000%
23	42.71	-51.98	0.04	-42.71	51.98	-0.04	0.000%
24	38.41	-51.98	21.96	-38.41	51.98	-21.96	0.000%
25	29.90	-51.98	29.65	-29.90	51.98	-29.65	0.000%
26	21.24	-51.98	36.19	-21.24	51.98	-36.19	0.000%
27	-0.06	-51.98	40.71	0.06	51.98	-40.71	0.000%
28	-21.25	-51.98	35.81	21.25	51.98	-35.81	0.000%
29	-29.91	-51.98	29.25	29.91	51.98	-29.25	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
30	-38.43	-51.98	21.74	38.43	51.98	-21.74	0.000%
31	-43.22	-51.98	-0.05	43.22	51.98	0.05	0.000%
32	-36.67	-51.98	-21.23	36.67	51.98	21.23	0.000%
33	-30.06	-51.98	-30.23	30.06	51.98	30.23	0.000%
34	-21.35	-51.98	-37.24	21.35	51.98	37.24	0.000%
35	-0.07	-38.87	-12.23	0.07	38.87	12.23	0.000%
36	5.61	-38.87	-10.00	-5.61	38.87	10.00	0.000%
37	7.94	-38.87	-8.07	-7.94	38.87	8.07	0.000%
38	9.71	-38.87	-5.65	-9.71	38.87	5.65	0.000%
39	11.67	-38.87	0.01	-11.67	38.87	-0.01	0.000%
40	10.67	-38.87	6.09	-10.67	38.87	-6.09	0.000%
41	8.14	-38.87	8.06	-8.14	38.87	-8.06	0.000%
42	5.80	-38.87	9.84	-5.80	38.87	-9.84	0.000%
43	-0.02	-38.87	10.96	0.02	38.87	-10.96	0.000%
44	-5.80	-38.87	9.71	5.80	38.87	-9.71	0.000%
45	-8.14	-38.87	7.92	8.14	38.87	-7.92	0.000%
46	-10.68	-38.87	6.01	10.68	38.87	-6.01	0.000%
47	-11.85	-38.87	-0.02	11.85	38.87	0.02	0.000%
48	-9.97	-38.87	-5.78	9.97	38.87	5.78	0.000%
49	-8.19	-38.87	-8.25	8.19	38.87	8.25	0.000%
50	-5.84	-38.87	-10.19	5.84	38.87	10.19	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	0.00000158
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	0.00000151
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	180 - 160	1.970	46	0.0978	0.0271
T2	160 - 140	1.564	46	0.0906	0.0182
T3	140 - 120	1.194	46	0.0790	0.0084
T4	120 - 100	0.877	40	0.0647	0.0051
T5	100 - 80	0.622	40	0.0515	0.0048
T6	80 - 60	0.409	40	0.0391	0.0046
T7	60 - 40	0.245	40	0.0289	0.0036
T8	40 - 20	0.126	40	0.0197	0.0026
T9	20 - 0	0.044	40	0.0101	0.0014

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
178.00	3' Whip	46	1.929	0.0971	0.0263	416036
177.00	8' Dish	46	1.908	0.0968	0.0259	416036
168.00	DB222	46	1.723	0.0938	0.0220	173348
163.00	6' x 3" Dia Omni	46	1.623	0.0919	0.0197	122700
155.00	8' Dish	46	1.467	0.0881	0.0156	100861
152.00	1142-2CN	46	1.410	0.0865	0.0141	99062
148.00	8' Dish	46	1.336	0.0842	0.0120	96761
144.00	DB222	46	1.264	0.0817	0.0101	94558
138.00	ROHN 6-ft Side Arm	46	1.159	0.0776	0.0076	89617
136.00	DB222	46	1.126	0.0762	0.0069	87214
132.00	DB222	46	1.059	0.0733	0.0058	82538
129.00	BNF800S-06	46	1.011	0.0711	0.0054	79343
103.00	DB212-1	40	0.657	0.0535	0.0049	102858
84.00	220-3AN	40	0.448	0.0414	0.0047	89825
83.00	Andrew 2' w/Radome	40	0.438	0.0408	0.0047	88828

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
65.00	BNF800S-06	40	0.282	0.0313	0.0039	101258

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	7.047	31	0.3461	0.0980
T2	160 - 140	5.588	31	0.3206	0.0658
T3	140 - 120	4.270	31	0.2790	0.0307
T4	120 - 100	3.154	24	0.2297	0.0315
T5	100 - 80	2.232	24	0.1842	0.0298
T6	80 - 60	1.467	24	0.1401	0.0263
T7	60 - 40	0.882	24	0.1030	0.0201
T8	40 - 20	0.454	24	0.0706	0.0144
T9	20 - 0	0.157	7	0.0361	0.0077

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	3' Whip	31	6.899	0.3440	0.0950	115134
177.00	8' Dish	31	6.825	0.3429	0.0935	115134
168.00	DB222	31	6.161	0.3322	0.0794	47972
163.00	6' x 3" Dia Omni	31	5.801	0.3253	0.0711	33960
155.00	8' Dish	31	5.243	0.3117	0.0564	28013
152.00	1142-2CN	31	5.040	0.3058	0.0507	27488
148.00	8' Dish	31	4.777	0.2974	0.0433	26817
144.00	DB222	31	4.520	0.2884	0.0363	26178
138.00	ROHN 6-ft Side Arm	31	4.148	0.2742	0.0308	25059
136.00	DB222	31	4.028	0.2693	0.0308	24602
132.00	DB222	24	3.798	0.2594	0.0308	23705
129.00	BNF800S-06	24	3.630	0.2519	0.0308	23074
103.00	DB212-1	24	2.360	0.1909	0.0302	30027
84.00	220-3AN	24	1.607	0.1484	0.0273	25651
83.00	Andrew 2' w/Radome	24	1.571	0.1463	0.0270	25326
65.00	BNF800S-06	24	1.012	0.1116	0.0218	28320

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325N	0.8750	4	2.76	26.46	0.104 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	2.45	6.12	0.401 ✔	1.333	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Top Girt	A325N	0.6250	1	0.14	4.08	0.034 ✔	1.333	Member Bearing
T2	160	Leg	A325N	1.0000	4	7.36	34.56	0.213 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	4.11	8.16	0.503 ✔	1.333	Member Bearing
		Top Girt	A325N	0.6250	1	0.06	4.08	0.014 ✔	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	8.47	34.56	0.245 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	4.72	9.06	0.521 ✔	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	8	8.97	34.56	0.260 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	4.97	10.16	0.490 ✔	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	8	11.74	34.56	0.340 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	6.16	10.16	0.606 ✔	1.333	Member Bearing
T6	80	Leg	A325N	1.0000	12	9.56	34.56	0.277 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	7.24	10.16	0.713 ✔	1.333	Member Bearing
T7	60	Leg	A325N	1.0000	12	11.23	34.56	0.325 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	8.69	12.70	0.684 ✔	1.333	Member Bearing
T8	40	Leg	A325N	1.0000	12	13.14	34.56	0.380 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	10.56	12.70	0.832 ✔	1.333	Member Bearing
T9	20	Leg	F1554-105	1.0000	12	15.00	32.40	0.463 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	13.96	12.70	1.100 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 3 STD	20.00	4.00	41.3 K=1.00	25.655	2.2285	-11.93	57.17	0.209 ✔
T2	160 - 140	ROHN 4 EH	20.04	5.01	40.7 K=1.00	25.733	4.4074	-31.75	113.42	0.280 ✔
T3	140 - 120	ROHN 5 EH	20.04	6.68	43.6 K=1.00	25.320	6.1120	-57.46	154.75	0.371 ✔
T4	120 - 100	ROHN 6 EH	20.04	6.68	36.5 K=1.00	26.311	8.4049	-81.86	221.14	0.370 ✔
T5	100 - 80	ROHN 8 EHS	20.03	6.68	27.4 K=1.00	27.463	9.7193	-108.64	266.92	0.407 ✔
T6	80 - 60	ROHN 8 EH	20.04	10.02	41.8 K=1.00	25.581	12.7627	-135.34	326.48	0.415 ✔
T7	60 - 40	ROHN 10 EH	20.03	10.02	33.1 K=1.00	26.758	16.1007	-163.69	430.81	0.380 ✔

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 $\frac{P}{P_a}$
T8	40 - 20	ROHN 10 EH	20.03	10.02	33.1 K=1.00	26.758	16.1007	-193.28	430.81	0.449 ✔
T9	20 - 0	ROHN 10 EH	20.03	10.02	33.1 K=1.00	26.758	16.1007	-223.54	430.81	0.519 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	7.85	3.62	126.6 K=1.00	9.314	0.6211	-2.48	5.78	0.428 ✔
T2	160 - 140	L2x2x1/4	9.93	4.76	146.1 K=1.00	6.995	0.9380	-4.11	6.56	0.627 ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.50	6.03	147.5 K=1.00	6.866	1.1900	-4.80	8.17	0.587 ✔
T4	120 - 100	L3x3x1/4	14.34	6.91	140.2 K=1.00	7.602	1.4400	-5.00	10.95	0.456 ✔
T5	100 - 80	L3x3x1/4	16.11	7.69	155.9 K=1.00	6.142	1.4400	-6.21	8.84	0.702 ✔
T6	80 - 60	L3 1/2x3 1/2x1/4	19.39	9.44	163.3 K=1.00	5.601	1.6900	-7.35	9.47	0.777 ✔
T7	60 - 40	L4x4x5/16	21.17	10.21	155.0 K=1.00	6.219	2.4000	-8.33	14.92	0.558 ✔
T8	40 - 20	L4x4x5/16	22.95	11.11	168.5 K=1.00	5.257	2.4000	-8.91	12.62	0.706 ✔
T9	20 - 0	L4x4x5/16	23.86	11.57	175.5 K=1.00	4.849	2.4000	-12.28	11.64	1.055 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	6.69	6.13	184.9 K=1.00	4.369	0.4844	-0.13	2.12	0.061 ✔
T2	160 - 140	L2x2x1/8	6.76	6.20	187.1 K=1.00	4.266	0.4844	-0.05	2.07	0.024 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in²	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 3 STD	20.00	4.00	41.3	30.000	2.2285	11.04	66.85	0.165 ✔
T2	160 - 140	ROHN 4 EH	20.04	5.01	40.7	30.000	4.4074	29.43	132.22	0.223 ✔
T3	140 - 120	ROHN 5 EH	20.04	6.68	43.6	30.000	6.1120	50.83	183.36	0.277 ✔
T4	120 - 100	ROHN 6 EH	20.04	6.68	36.5	30.000	8.4049	71.75	252.15	0.285 ✔
T5	100 - 80	ROHN 8 EHS	20.03	6.68	27.4	30.000	9.7193	93.89	291.58	0.322 ✔
T6	80 - 60	ROHN 8 EH	20.04	10.02	41.8	30.000	12.7627	114.70	382.88	0.300 ✔
T7	60 - 40	ROHN 10 EH	20.03	10.02	33.1	30.000	16.1007	134.80	483.02	0.279 ✔
T8	40 - 20	ROHN 10 EH	20.03	10.02	33.1	30.000	16.1007	157.63	483.02	0.326 ✔
T9	20 - 0	ROHN 10 EH	20.03	10.02	33.1	30.000	16.1007	180.04	483.02	0.373 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in²	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L1 3/4x1 3/4x3/16	7.85	3.62	84.0	21.600	0.6211	2.45	13.42	0.183 ✔
T2	160 - 140	L2x2x1/4	9.93	4.76	96.5	21.600	0.9380	4.11	20.26	0.203 ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.50	6.03	96.4	21.600	1.1900	4.72	25.70	0.184 ✔
T4	120 - 100	L3x3x1/4	14.34	6.91	91.1	32.500	1.2213	4.97	39.69	0.125 ✔
T5	100 - 80	L3x3x1/4	16.11	7.69	101.1	32.500	1.2213	6.16	39.69	0.155 ✔
T6	80 - 60	L3 1/2x3 1/2x1/4	19.39	9.44	105.6	32.500	1.4713	7.24	47.82	0.152 ✔
T7	60 - 40	L4x4x5/16	21.17	10.21	100.3	32.500	2.1266	8.69	69.11	0.126 ✔
T8	40 - 20	L4x4x5/16	22.95	11.11	108.9	32.500	2.1266	10.56	69.11	0.153 ✔
T9	20 - 0	L4x4x5/16	24.77	12.02	117.7	32.500	2.1266	13.96	69.11	0.202 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	6.69	6.13	122.6	21.600	0.4844	0.14	10.46	0.013 ✔
T2	160 - 140	L2x2x1/8	6.76	6.20	124.0	21.600	0.4844	0.06	10.46	0.005 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 3 STD	2	-11.93	76.21	15.7	Pass
T2	160 - 140	Leg	ROHN 4 EH	38	-31.75	151.18	21.0	Pass
T3	140 - 120	Leg	ROHN 5 EH	67	-57.46	206.29	27.9	Pass
T4	120 - 100	Leg	ROHN 6 EH	88	-81.86	294.78	27.8	Pass
T5	100 - 80	Leg	ROHN 8 EHS	109	-108.64	355.81	30.5	Pass
T6	80 - 60	Leg	ROHN 8 EH	131	-135.34	435.19	31.1	Pass
T7	60 - 40	Leg	ROHN 10 EH	146	-163.69	574.27	28.5	Pass
T8	40 - 20	Leg	ROHN 10 EH	161	-193.28	574.28	33.7	Pass
T9	20 - 0	Leg	ROHN 10 EH	176	-223.54	574.28	38.9	Pass
T1	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	7	-2.48	7.71	32.1	Pass
T2	160 - 140	Diagonal	L2x2x1/4	44	-4.11	8.75	47.0	Pass
T3	140 - 120	Diagonal	L2 1/2x2 1/2x1/4	71	-4.80	10.89	44.1	Pass
T4	120 - 100	Diagonal	L3x3x1/4	92	-5.00	14.59	34.2 36.7 (b)	Pass
T5	100 - 80	Diagonal	L3x3x1/4	115	-6.21	11.79	52.7	Pass
T6	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	136	-7.35	12.62	58.3	Pass
T7	60 - 40	Diagonal	L4x4x5/16	151	-8.33	19.89	41.9 51.3 (b)	Pass
T8	40 - 20	Diagonal	L4x4x5/16	166	-8.91	16.82	53.0 62.4 (b)	Pass
T9	20 - 0	Diagonal	L4x4x5/16	187	-12.28	15.51	79.2 82.5 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	5	-0.13	2.82	4.5	Pass
T2	160 - 140	Top Girt	L2x2x1/8	40	-0.05	2.75	1.8	Pass
							Summary	
						Leg (T9)	38.9	Pass
						Diagonal (T9)	82.5	Pass
						Top Girt (T1)	4.5	Pass
						Bolt Checks	82.5	Pass
						RATING =	**82.5**	**Pass**

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 4209 \cdot ft \cdot kips$	(User Input from RISATower)
Shear Force =	$S_t := 44 \cdot kip$	(User Input from RISATower)
Axial Force =	$WT_t := 1 \cdot kip$	(User Input from RISATower)
Max Compression Force =	$C_t := 227 \cdot kip$	(User Input from RISATower)
Max Uplift Force =	$U_t := 186 \cdot kip$	(User Input from RISATower)
Tower Height =	$H_t := 180 \cdot ft$	(User Input)
Tower Width =	$W_t := 23.16 \cdot ft$	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 5.5 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 2.5 \cdot ft$	(User Input)
Width of Footing =	$W_f := 33 \cdot ft$	(User Input)
Length of Pier =	$L_p := 3.5 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 4 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 6000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 16$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.0 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 46$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.0 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 46$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$

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

Load Factor =

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

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 125 \cdot \text{pcf}$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.326 \cdot \text{ksf}$

$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.326 \cdot \text{ksf}$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.432 \cdot \text{ksf}$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.879 \cdot \text{ksf}$

$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 2.5$

$A_p := W_f \cdot T_p = 82.5$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 155.026 \cdot \text{kip}$

Weight of Concrete Pad = $WT_{pad} := (W_f^2 \cdot T_f) \cdot \gamma_c = 408.375 \cdot \text{kip}$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot \gamma_c\right] = 19.792 \cdot \text{kip}$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 428 \cdot \text{kip}$

Weight of Soil Above Footing = $WT_{s1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot (L_p - L_{pag}) \cdot \gamma_s = 394 \cdot \text{kip}$

Weight of Soil Back Face = $WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (D_f - T_f - n)^2}{2} \cdot W_f\right] \cdot \gamma_s = 13 \cdot \text{kip}$

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

$X_t := \text{if}(Pos_t, X_{t1}, X_{t2}) = 6.471$

$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot \text{deg}))}{3} + X_t\right] = 3.343$

Resisting Moment = $M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 14120 \cdot \text{ki}$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 4473 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 3.16$

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

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

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 823 \cdot kip$

Area of the Mat = $A_{mat} := W_f^{\ 2} = 1.089 \times 10^3$

Section Modulus of Mat = $S := \frac{W_f^{\ 3}}{6} = 5989.5 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.503 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = 9.304 \times 10^{-3} \cdot ksf$

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

Min_Pressure_Check = "Okay"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 11.069$

Distance to Kern = $X_k := \frac{W_f}{6} = 5.5$

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

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 5.432$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.503 \cdot ksf$

$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 1.503 \cdot ksf$

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 = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^{\ 2}}{4} = 3.999 \times 10^3 \cdot kips$ (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)

$d := T_f - Cvr_{pad} - \frac{d_{bbot}}{2} = 26.5 \cdot in$

$FL := \frac{C_t}{W_f^2} = 0.2084 \cdot ksf$

$V_{req} := LF \cdot FL \cdot (X_t - 0.5 \cdot d_p - d) \cdot W_f = 20.751 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 1128 \cdot kip$ (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 = $b_o := (d_p + d) \cdot \pi = 19.5$

Required Shear Strength = $V_{req} := LF \cdot FL \cdot \left[W_f^2 - (d_p + d)^2 \cdot \frac{\pi}{4}\right] = 294.2 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1333.7 \cdot kip$ (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)

$$M_{nT} := LF \cdot \left[U_t \cdot \left(W_t \cdot \sin(60 \cdot deg) - \frac{d_p}{2} \right) + S_t \cdot \left(D_f + L_{pag} \right) \right] - WT_t \cdot X_{off} = 4826 \cdot ft \cdot k$$

$$M_{nS} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot deg) - \frac{d_p}{2} \right)^2 \cdot W_t \cdot \left[\gamma_s \cdot \left(D_f - T_f - n \right) \right] \right] = -1949.064 \cdot ft \cdot kips$$

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

Design Moment = $M_n := \dfrac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 1030.55 \cdot kips \cdot ft$

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

(ACI-200810.2.7.3)

$$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 288.686 \cdot in$$

$$d := T_f - Cvr_{pad} - d_{bbot} = 26 \cdot in$$

$$A_s := \frac{M_n}{\left(f_y \cdot d \right)} = 7.927 \cdot in^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.485 \cdot in$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} = 8.002 \cdot in^2$$

$$\rho := \frac{A_s}{b_{eff} \cdot d} = 0.00107$$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := \begin{vmatrix} (\rho \cdot b_{eff} \cdot d) \text{ if } (\rho \cdot b_{eff} \cdot d) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \text{ otherwise} \end{vmatrix} = 8.002 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 36.1 \cdot in^2$$

Pad_Reinforcement_Bot := if(As_{prov} > As, "Okay", "No Good")

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 6.8 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 36.1 \cdot in^2$$

Pad_Reinforcement_Top := if(As_{prov} > As, "Okay", "No Good")

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing = $$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 7.64 \cdot in$$

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

Transverse Reinforcement Index = $k_{tr} := 0$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 23.7 \cdot in$$

Minimum Development Length = $L_{dbmin} := 12 \cdot in$ (ACI-2008 12.2.1)

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

Available Length in Pad = $$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 56.04 \cdot in$$

Lpad_Check := if($L_{Pad} > L_{dbt}$, "Okay", "No Good")

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^{\,2}}{4} = 1809.56 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 0.9 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 12.57 \cdot in^2$

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

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 8.425 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 42 \cdot in$

Maximum Moment in Pier = $M_p := \left[S_t \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] \cdot LF = 2815.3 \cdot in \cdot kips$

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

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) := \left(d_p \cdot 12 \;\; NB_{pier} \;\; BS_{pier} \;\; \frac{C_t \cdot 1.333}{kips} \;\; \frac{M_p}{in \cdot kips}\right)$$

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = (48 \;\; 16 \;\; 8 \;\; 302.6 \;\; 2815.3)$$

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

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

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = (2168.5 \;\; 20176 \;\; -44 \;\; 0)$$

Axial_Load_Check := if($\phi P_n \ge P_u$, "Okay", "No Good")

Axial_Load_Check = "Okay"

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

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{pier} := L_p - Cvr_{pier} = 39 \cdot in$$

$$L_{pad} := T_f - Cvr_{pad} = 27 \cdot in$$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension = $c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement = $k_{tr} := 0$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 23.72 \cdot in$$

Minimum Development Length = $L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 13.282 \cdot in$ (ACI 12.2.1)

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

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

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

$$L_{tension\_Check} = \text{"Okay"}$$

Compression: (ACI-2008 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 18.974 \cdot in$$

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

$$L_{dbc} := if(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}) = 18.974 \cdot in$$

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

$$L_{compression\_Check} = \text{"Okay"}$$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #3 Ties

Seismic Factor = $z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

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

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

$s_{lim3} := D_f \cdot z = 66 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $$s_{tie} := min\left(\left(\begin{matrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{matrix}\right)\right) = 16 \cdot in$$

Number of Ties Required = $$n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 3.25$$

Check Anchor Steel Embedment:

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

Length of Anchor Bolt = $$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 10.87 \cdot ft$$

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

Depth_Check = "No Good"

Note: Anchor plate is provided

BNF800/900S
BNM800/900S

COMTELCO
Technical Specification

806-960MHz, 3dBd / 5dBi Gain — BASE STATION ANTENNA

Reliable Performance: *Rated at 100 watts, you can expect years of continuous service.*

Construction: *The radiating elements are collinear stacked and phased copper alloy tubes. They are encased in an ABS radome for total environmental protection.*

Weatherproof: *The ABS radome is ultraviolet inhibited. The mounting sleeve is ABS plastic with an extruded drain system to allow for any condensation dissipation.*

Lightweight: *These antennas are lightweight at less than 2 lbs. but are designed to easily withstand winds of over 125 MPH.*

Simple Installation: *Using the optional BNT mounting kit, installation takes only minutes.*

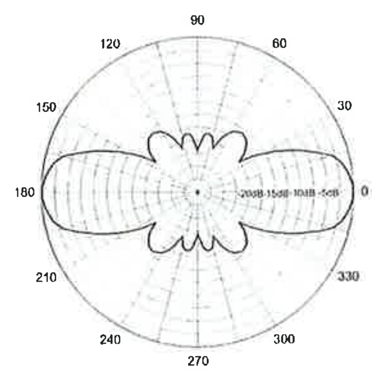
Termination: *This antenna is available with either an "N" female or "N" male termination.*

ELECTRICAL SPECIFICATIONS:

PART NO.	FREQUENCY:
BNF800S-06	806-896MHz
BNM800S-06	
BNF800S-96	896-960MHz
BNM800S-96	
BNF915S	900-930MHz
BNM915S	

GAIN:	3dBd / 5dBi
VERTICAL BEAMWIDTH:	35°
BANDWIDTH:	100MHz@ <2:1
POWER RATING:	100 watts
IMPEDANCE:	50 ohms

Vertical Pattern



MECHANICAL SPECIFICATIONS:

ANTENNA LENGTH:	21"
WEIGHT:	2 lbs,
RADIATOR:	Copper alloy elements
RADOME:	White UV inhibited ABS
MOUNTING SLEEVE:	White UV inhibited ABS
SLEEVE DIAMETER:	1.35"
FLAT PLATE AREA:	.08 ft^2
WIND RATING:	125 MPH
WIND LOAD:	5.4 lbs.
TERMINATION:	BNF800S "N" FEMALE BNM800S "N" MALE