

October 17, 2017

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

Re: **PE1133-VER-20160615 – Cellco Partnership d/b/a Verizon Wireless
911 Route 32, Montville, Connecticut**

Dear Ms. Bachman:

On July 18, 2016, the Siting Council approved the above-referenced Eligible Facilities Request to install antennas and associated equipment at the above-referenced facility pursuant to the Federal Communications Commission Wireless Structural Report and Order referenced in that filing. As a part of that filing the petitioner, Cellco Partnership d/b/a Verizon Wireless (“Cellco”) submitted a Structural Analysis Report, pursuant to Rev. F of the Connecticut State Building Code.

Cellco has now completed the approved modifications and asked its engineer to complete a new Structural Analysis Report updated to comply with the 2016 Connecticut State Building Code (Rev. G) standards. This updated Structural Analysis Report confirms that the existing structure can support Cellco’s modifications. Please note that the updated Structural Analysis Report does not require any specific antenna cable routing requirement.

Robinson+Cole

Melanie Bachman, Esq.
October 17, 2017
Page 2

If you have any questions or need any additional information regarding these facility modifications please do not hesitate to contact me.

Sincerely,



Kenneth C. Baldwin

KCB/kmd
Enclosure
Copy to:
Elizabeth Jamieson

PJF PAUL J. FORD & COMPANY

Report Date: August 29, 2017

Client: On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
Attn: David Weinpahl
(201) 456-4624
dweinpahl@onaireng.com

Structure: Existing 145-ft Self Support
Site Name: Uncasville SC2 CT
Site Address: 911 Route 32
City, County, State: Uncasville, New London County, CT
Latitude, Longitude: 41.451231, -72.105211

PJF Project: A42917-0011.001.8700

Paul J. Ford and Company is pleased to submit this "Structural Analysis Report". The purpose of this analysis is to determine if the structure has sufficient capacity to support the existing and reserved equipment described herein.

Analysis Criteria:

Reference Standard: 2016 Connecticut State Building Code with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1

Ultimate Wind Speed: 143 mph 3-second gust wind speed without ice
Ice Wind Speed: 50 mph 3-second gust wind speed with 0.75" ice
Service Wind Speed: 60 mph 3-second gust wind speed (Serviceability) without ice
TIA-222 Criteria: Risk Category III, Topographic Category I, Exposure Category B

Proposed Appurtenance Loads:

The structure was analyzed with the addition of the proposed appurtenances loads shown in Table 1 combined with the existing and reserved loads shown in Table 1 of this report.

Summary of Analysis Results:

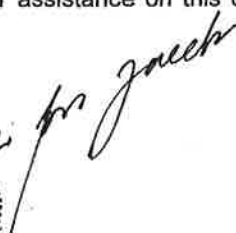
Existing Structure: Pass
Existing Foundation: Pass

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and On Air Engineering, LLC. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully Submitted by:
Paul J. Ford and Company



Kurt J. Swarts, P.E.
Project Manager
kswarts@pjfweb.com



Columbus
250 E Broad St, Suite 600
Columbus, OH 43215
Phone 614.221.6679



SEP 05 2017

Orlando
1801 Lee Rd, Suite 230
Winter Park, FL 32789
Phone 407.898.9039

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Existing and Reserved Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 3 - Section Capacity (Summary)

Table 4- Tower Components vs. Capacity

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 145-ft Self Support tower designed by Valmont in November of 2011. The tower was originally designed for a wind speed of 120 mph per TIA-222-G.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 143 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B with topographic category 1 and crest height of 0 feet.

Table 1 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	151.0	1	kreco	CO-41A	4	1/2	1
	147.5	2	telewave	ANT150F2			
	145.0	3	-	3-Ft Standoff Mounts			
	143.3	1	telewave	ANT450F2			
125.0	130.0	1	-	CO156AN	2	7/8 1/2	1
	127.5	2	telewave	ANT150F2			
	125.0	3	-	3-Ft Standoff Mounts			
115.0	115.0	2	telewave	ANT150D	2	1/2	1
		2	-	3-Ft Side Arm Mounts			
110.0	112.5	1	telewave	ANT150F2	1	1/2	1
	110.0	1	-	3-Ft Standoff Mount			
105.0	110.0	1	-	10-Ft Omni	2	1/2	1
		1	telewave	ANT150D			
		1	-	3-Ft Standoff Mount			
102.0	102.0	1	telewave	ANT150D	1	1/2	1
		1	-	3-Ft Side Arm Mount			
95.0	95.0	1	radiowaves	SP2-4.7	2	1/2	1
70.0	70.0	1	commscope	NH65PS-DF-F0M	1	7/8	2
67.0	67.0	1	raycap	RRFDC-3315-PF-48	2	1/2	2
		1	alcatel lucent	RRH2x60-AWS	-	-	3
66.0	66.0	1	pole mounts	2.375" OD x 6' Mount Pipe	-	-	2

- Notes:
 1) Existing Equipment
 2) Existing VZW Antennas
 3) Reserved VZW Equipment

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Tower Drawings	Valmont: 239626: 11/11/2011	-	-
Foundation Drawings	Valmont: 239626: 11/11/2011	-	-
Structural Analysis	Centek: 15115.000: 10/20/2015	-	-

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 3 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	145 - 130	Leg	1 3/4" solid	2	-4.028	80.225	5.0	Pass
T2	130 - 120	Leg	Valmont 208951 (12x1.25)	50	-6.103	143.058	8.2	Pass
T3	120 - 100	Leg	Valmont 207628 (12x1.25)	61	-17.512	142.493	12.3	Pass
T4	100 - 80	Leg	Valmont 207628 (12x1.25)	76	-32.331	142.493	22.7	Pass
T5	80 - 60	Leg	Valmont 207628 (12x1.25)	92	-48.320	142.493	33.9	Pass
T6	60 - 40	Leg	Valmont 207628 (12x1.25)	107	-65.103	142.493	45.7	Pass
T7	40 - 20	Leg	Valmont 207628 (12x1.25)	122	-81.923	142.493	57.5	Pass
T8	20 - 0	Leg	Valmont 207628 (12x1.25)	137	-98.500	142.493	69.1	Pass
T1	145 - 130	Diagonal	7/8" solid	14	-0.568	7.769	7.3	Pass
T2	130 - 120	Diagonal	L 2.5 x 2.5 x 3/16	56	-1.314	13.384	9.8 12.9 (b)	Pass
T3	120 - 100	Diagonal	L 2.5 x 2.5 x 3/16	65	-2.373	10.790	22.0 25.4 (b)	Pass
T4	100 - 80	Diagonal	L 2.5 x 2.5 x 3/16	80	-3.019	8.549	35.3	Pass
T5	80 - 60	Diagonal	L 2.5 x 2.5 x 3/16	95	-3.508	6.833	51.3	Pass
T6	60 - 40	Diagonal	L 2.5 x 2.5 x 3/16	109	-3.881	5.523	70.3	Pass
T7	40 - 20	Diagonal	L 3 x 3 x 3/16	124	-4.315	7.923	54.5	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T8	20 - 0	Diagonal	L 3 x 3 x 3/16	139	-5.269	6.564	80.3	Pass
T1	145 - 130	Top Girt	1" solid	6	-0.154	6.670	2.3	Pass
T2	130 - 120	Top Girt	L 3 x 3 x 3/16	54	-0.153	19.371	0.8 1.6 (b)	Pass
T1	145 - 130	Bottom Girt	1" solid	8	-0.151	6.670	2.3	Pass
T1	145 - 130	Mid Girt	1" solid	12	-0.015	6.670	0.2	Pass
							Summary	
						Leg (T8)	69.1	Pass
						Diagonal (T8)	80.3	Pass
						Top Girt (T1)	2.3	Pass
						Bottom Girt (T1)	2.3	Pass
						Mid Girt (T1)	0.2	Pass
						Bolt Checks	47.3	Pass
						Rating =	80.3	Pass

Table 4 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	35.5	Pass
1	Base Foundation	0	36.3	Pass
1	Base Foundation Soil Interaction	0	30.4	Pass

Structure Rating (max from all components) =	80.3%
---	--------------

Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation(s) have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

**STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING
SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY**

- 1) It is the responsibility of the client to ensure that the information provided to Paul J. Ford and Company is accurate and complete. Paul J. Ford and Company will rely on the accuracy and completeness of such information in performing or furnishing services under this project.
- 2) If the existing conditions are not as represented on the referenced drawings and/or documents, Paul J. Ford and Company should be contacted immediately to evaluate the significance of the deviation.
- 3) The structure has been analyzed according to the minimum design loads recommended by the Reference Standard. If additional design loads are required, Paul J. Ford and Company should be made aware of this prior to the start of the project.
- 4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.
- 5) All Services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Paul J. Ford and Company is not responsible for the conclusions, opinions and/or recommendations made by others based on the information supplied herein.

APPENDIX A
TNXTOWER OUTPUT

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 145' above the ground line.

The base of the tower is set at an elevation of 0' above the ground line.

The face width of the tower is 5' at the top and 18' at the base.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

ASCE 7-10 Wind Data is used.

Basic wind speed of 143 mph.

Risk Category II.

Exposure Category B.

Topographic Category 1.

Crest Height 0'.

Nominal ice thickness of 0.750 in.

Ice thickness is considered to increase with height.

Ice density of 56.000 pcf.

A wind speed of 50 mph is used in combination with ice.

Deflections calculated using a wind speed of 60 mph.

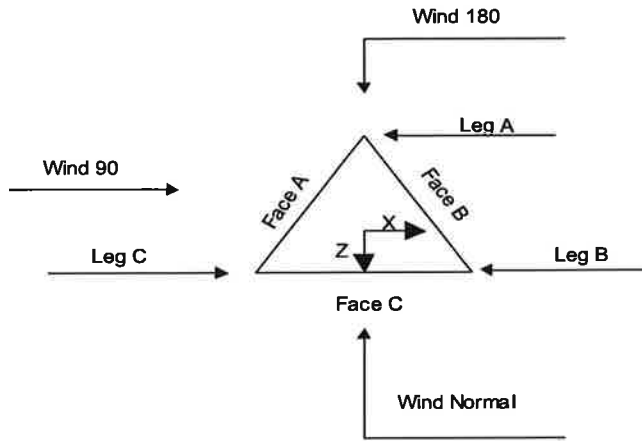
Pressures are calculated at each section.

Stress ratio used in tower member design is 1.

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

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
√ Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	145'-130'		106768 (60)	5'	1	15'
T2	130'-120'		U06 208951 [L2.5 x 3/16]	5'	1	10'
T3	120'-100'		U08 207629 [L2.5 x 3/16]	6'	1	20'
T4	100'-80'		U10 207629 [L2.5 x 1/4]	8'	1	20'
T5	80'-60'		U12 105216 [L2.5 x 1/4]	10'	1	20'
T6	60'-40'		U14 105216 [L3 x 3/16]	12'	1	20'
T7	40'-20'		U16 105216 [L3 x 3/16]	14'	1	20'
T8	20'-0'		U18 105218 [L3 x 5/16]	16'	1	20'

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	145'-130'	2'4"	X Brace	No	No	5.500	6.500
T2	130'-120'	10'	X Brace	No	No	0.000	0.000
T3	120'-100'	10'	X Brace	No	No	0.000	0.000
T4	100'-80'	10'	X Brace	No	No	0.000	0.000
T5	80'-60'	10'	X Brace	No	No	0.000	0.000
T6	60'-40'	10'	X Brace	No	No	0.000	0.000
T7	40'-20'	10'	X Brace	No	No	0.000	0.000
T8	20'-0'	10'	X Brace	No	No	0.000	0.000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 145'-130'	Solid Round	1 3/4" solid	A572-50 (50 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)
T2 130'-120'	Truss Leg	Valmont 208951 (12x1.25)	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T3 120'-100'	Truss Leg	Valmont 207628 (12x1.25)	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T4 100'-80'	Truss Leg	Valmont 207628 (12x1.25)	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T5 80'-60'	Truss Leg	Valmont 207628 (12x1.25)	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T6 60'-40'	Truss Leg	Valmont 207628 (12x1.25)	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T7 40'-20'	Truss Leg	Valmont 207628 (12x1.25)	A572-50 (50 ksi)	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)
T8 20'-0'	Truss Leg	Valmont 207628 (12x1.25)	A572-50 (50 ksi)	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 145'-130'	Solid Round	1" solid	A572-50 (50 ksi)	Solid Round	1" solid	A572-50 (50 ksi)
T2 130'-120'	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 145'-130'	1	Solid Round	1" solid	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 145'-130'	0.000	0.000	A36 (36 ksi)	1	1	1.03	36.000	36.000	36.000
T2 130'-120'	0.000	0.500	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T3 120'-100'	0.000	0.500	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T4 100'-80'	0.000	0.500	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T5 80'-60'	0.000	0.500	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T6 60'-40'	0.000	0.500	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
T7 40'-20'	0.000	0.500	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T8 20'-0'	0.000	0.500	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹									
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace			
											X	Y	X
T1 145'-130'	No	No	1	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1
T2 130'-120'	Yes	No	1	1	1	1	1	1	1	1	1	1	1
T3 120'-100'	Yes	No	1	1	1	1	1	1	1	1	1	1	1
T4 100'-80'	Yes	No	1	1	1	1	1	1	1	1	1	1	1
T5 80'-60'	Yes	No	1	1	1	1	1	1	1	1	1	1	1
T6 60'-40'	Yes	No	1	1	1	1	1	1	1	1	1	1	1
T7 40'-20'	Yes	No	1	1	1	1	1	1	1	1	1	1	1
T8 20'-0'	Yes	No	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry (cont'd)

Tower Elevation	Truss-Leg K Factors					
	Truss-Legs Used As Leg Members			Truss-Legs Used As Inner Members		
	Leg Panels	X Brace Diagonals	Z Brace Diagonals	Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2 130'-120'	1	0.5	0.85	1	0.5	0.85
T3 120'-100'	1	0.5	0.85	1	0.5	0.85
T4 100'-80'	1	0.5	0.85	1	0.5	0.85
T5 80'-60'	1	0.5	0.85	1	0.5	0.85
T6 60'-40'	1	0.5	0.85	1	0.5	0.85
T7 40'-20'	1	0.5	0.85	1	0.5	0.85
T8 20'-0'	1	0.5	0.85	1	0.5	0.85

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 145'-130'	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T2 130'-120'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 120'-100'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 100'-80'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 80'-60'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 60'-40'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 40'-20'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 20'-0'	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 145'-130'	Flange	1.000	6	0.500	0	0.500	0	0.500	0	0.500	0	0.500	0	0.500	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 130'-120'	Flange	1.000	6	1.000	1	1.000	1	0.000	0	0.000	0	0.000	0	0.000	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 120'-100'	Flange	1.000	6	1.000	1	1.000	0	1.000	0	1.000	0	1.000	0	1.000	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 100'-80'	Flange	1.000	6	1.000	1	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 80'-60'	Flange	1.000	6	1.000	1	1.000	0	1.000	0	1.000	0	1.000	0	1.000	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 60'-40'	Flange	1.000	6	1.000	1	1.000	0	1.000	0	1.000	0	1.000	0	1.000	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 40'-20'	Flange	1.000	6	1.000	1	1.000	0	1.000	0	1.000	0	1.000	0	1.000	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T8 20'-0'	Flange	1.000	6	1.000	1	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	145' - 125'	-3.000	-0.46	4	2	0.630	0.630		0.000
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	125' - 115'	-3.000	-0.46	6	3	0.630	0.630		0.000
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	115' - 110'	-3.000	-0.46	8	3	0.630	0.630		0.000
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	110' - 105'	-3.000	-0.46	9	5	0.630	0.630		0.000
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	105' - 102'	-3.000	-0.46	11	5	0.630	0.630		0.000
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	102' - 95'	-3.000	-0.46	12	6	0.630	0.630		0.000
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	95' - 0'	-3.000	-0.46	14	7	0.630	0.630		0.000
LDF5-50A (7/8" foam)	C	No	Ar (CaAa)	125' - 0'	-3.000	-0.42	1	1	1.090	1.090		0.000
HB078-1-	C	No	Ar (CaAa)	70' - 0'	-3.000	-0.4	1	1	1.090	1.090		0.001

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 r in	Weight klf
04S3-S3F(7/8") LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	70' - 0'	-3.000	-0.4	2	2	0.630	0.630		0.000

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	145'-130'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	3.780	0.000	0.009
T2	130'-120'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	3.695	0.000	0.009
T3	120'-100'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	13.016	0.000	0.032
T4	100'-80'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	19.190	0.000	0.047
T5	80'-60'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	22.170	0.000	0.057
T6	60'-40'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	24.520	0.000	0.065
T7	40'-20'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	24.520	0.000	0.065
T8	20'-0'	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	24.520	0.000	0.065

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	145'-130'	A	1.730	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	14.187	0.000	0.148
T2	130'-120'	A	1.714	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	12.245	0.000	0.142
T3	120'-100'	A	1.692	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	33.602	0.000	0.436
T4	100'-80'	A	1.658	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	39.677	0.000	0.553
T5	80'-60'	A	1.617	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	52.298	0.000	0.676
T6	60'-40'	A	1.564	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	63.489	0.000	0.770
T7	40'-20'	A	1.486	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	61.808	0.000	0.728

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
T8	20'-0'	A	1.331	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	58.476	0.000	0.649

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
T1	145'-130'	1.569	0.832	0.308	0.163
T2	130'-120'	1.242	0.675	0.386	0.213
T3	120'-100'	2.277	1.296	1.037	0.596
T4	100'-80'	3.757	2.169	1.990	1.163
T5	80'-60'	4.889	2.907	2.924	1.771
T6	60'-40'	5.941	3.606	3.666	2.272
T7	40'-20'	6.386	3.911	4.073	2.547
T8	20'-0'	7.038	4.341	4.536	2.854

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T1	1	LDF4-50A (1/2" foam)	130.00 - 145.00	0.6000	0.4889
T2	1	LDF4-50A (1/2" foam)	125.00 - 130.00	0.6000	0.3667
T2	2	LDF4-50A (1/2" foam)	120.00 - 125.00	0.6000	0.3667
T2	8	LDF5-50A (7/8" foam)	120.00 - 125.00	0.6000	0.3667
T3	2	LDF4-50A (1/2" foam)	115.00 - 120.00	0.6000	0.4552
T3	3	LDF4-50A (1/2" foam)	110.00 - 115.00	0.6000	0.4552
T3	4	LDF4-50A (1/2" foam)	105.00 - 110.00	0.6000	0.4552
T3	5	LDF4-50A (1/2" foam)	102.00 - 105.00	0.6000	0.4552
T3	6	LDF4-50A (1/2" foam)	100.00 - 102.00	0.6000	0.4552
T3	8	LDF5-50A (7/8" foam)	100.00 - 120.00	0.6000	0.4552
T4	6	LDF4-50A (1/2" foam)	95.00 - 100.00	0.6000	0.5483
T4	7	LDF4-50A (1/2" foam)	80.00 - 95.00	0.6000	0.5483
T4	8	LDF5-50A (7/8" foam)	80.00 - 100.00	0.6000	0.5483
T5	7	LDF4-50A (1/2" foam)	60.00 - 80.00	0.6000	0.6000
T5	8	LDF5-50A (7/8" foam)	60.00 - 80.00	0.6000	0.6000
T5	10	HB078-1-04S3-S3F(7/8")	60.00 - 70.00	0.6000	0.6000
T5	11	LDF4-50A (1/2" foam)	60.00 - 70.00	0.6000	0.6000
T6	7	LDF4-50A (1/2" foam)	40.00 - 60.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T6	8	LDF5-50A (7/8" foam)	40.00 - 60.00	0.6000	0.6000
T6	10	HB078-1-04S3-S3F(7/8")	40.00 - 60.00	0.6000	0.6000
T6	11	LDF4-50A (1/2" foam)	40.00 - 60.00	0.6000	0.6000
T7	7	LDF4-50A (1/2" foam)	20.00 - 40.00	0.6000	0.6000
T7	8	LDF5-50A (7/8" foam)	20.00 - 40.00	0.6000	0.6000
T7	10	HB078-1-04S3-S3F(7/8")	20.00 - 40.00	0.6000	0.6000
T7	11	LDF4-50A (1/2" foam)	20.00 - 40.00	0.6000	0.6000
T8	7	LDF4-50A (1/2" foam)	0.00 - 20.00	0.6000	0.6000
T8	8	LDF5-50A (7/8" foam)	0.00 - 20.00	0.6000	0.6000
T8	10	HB078-1-04S3-S3F(7/8")	0.00 - 20.00	0.6000	0.6000
T8	11	LDF4-50A (1/2" foam)	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
5/8" x 10' Lightning Rod	C	From Leg	0.000 0' 5'	0.000	145'	No Ice	0.625	0.007
						1/2" Ice	1.639	0.014
						Ice	2.669	0.027
						1" Ice		
**** ANT150F2	A	From Leg	3.000 0' 2'6"	0.000	145'	No Ice	1.212	0.013
						1/2" Ice	1.598	0.023
						Ice	1.911	0.037
						1" Ice		
ANT150F2	B	From Leg	3.000 0' 2'6"	0.000	145'	No Ice	1.212	0.013
						1/2" Ice	1.598	0.023
						Ice	1.911	0.037
						1" Ice		
ANT450F2	B	From Leg	3.000 0' -1'9"	0.000	145'	No Ice	0.749	0.009
						1/2" Ice	1.007	0.016
						Ice	1.234	0.026
						1" Ice		
CO-41A	C	From Leg	3.000 0' 6'	0.000	145'	No Ice	3.074	0.014
						1/2" Ice	4.380	0.037
						Ice	5.627	0.068
						1" Ice		
(3) 3-Ft Standoff Mounts	C	None		0.000	145'	No Ice	7.120	0.375
						1/2" Ice	9.880	0.461
						Ice	12.640	0.546
						1" Ice		
**** SO 203-3 ANT150F2	A	From Leg	3.000 0' 2'6"	0.000	125'	No Ice	1.236	0.013
						1/2" Ice	1.598	0.023
						Ice	1.911	0.037
						1" Ice		
ANT150F2	C	From Leg	3.000 0' 2'6"	0.000	125'	No Ice	1.236	0.013
						1/2" Ice	1.598	0.023
						Ice	1.911	0.037
						1" Ice		

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}			Weight
			Horz	Lateral			Front	Side	Weight	
			ft	ft	°	ft	ft ²	ft ²	K	
CO156AN	B	From Leg	3.000		0.000	125'	No Ice	2.400	2.400	0.025
			0'				1/2"	3.625	3.625	0.044
			5'				Ice	4.867	4.867	0.070
							1" Ice			
(3) 3-Ft Standoff Mounts	C	None			0.000	125'	No Ice	7.120	7.120	0.375
							1/2"	9.880	9.880	0.461
							Ice	12.640	12.640	0.546
							1" Ice			

ANT150D	A	From Leg	3.000		0.000	115'	No Ice	1.460	1.460	0.005
			0'				1/2"	4.380	4.380	0.015
			0'				Ice	7.300	7.300	0.025
							1" Ice			
ANT150D	B	From Leg	3.000		0.000	115'	No Ice	1.460	1.460	0.005
			0'				1/2"	4.380	4.380	0.015
			0'				Ice	7.300	7.300	0.025
							1" Ice			
3-Ft Side Arm Mount	A	From Leg	1.500		0.000	115'	No Ice	0.850	1.670	0.065
			0'				1/2"	1.140	2.340	0.079
			0'				Ice	1.430	3.010	0.093
							1" Ice			
3-Ft Side Arm Mount	B	From Leg	1.500		0.000	115'	No Ice	0.850	1.670	0.065
			0'				1/2"	1.140	2.340	0.079
			0'				Ice	1.430	3.010	0.093
							1" Ice			
**** SO 701-1										
ANT150F2	C	From Leg	3.000		0.000	110'	No Ice	1.257	1.257	0.013
			0'				1/2"	1.598	1.598	0.023
			2'6"				Ice	1.911	1.911	0.037
							1" Ice			
3-Ft Standoff Mounts	C	From Leg	1.500		0.000	110'	No Ice	2.960	3.360	0.125
			0'				1/2"	4.100	4.680	0.154
			0'				Ice	5.240	6.000	0.182
							1" Ice			
**** SO203-1										
2" Dia 10' Omni	C	From Leg	3.000		0.000	105'	No Ice	2.000	2.000	0.010
			0'				1/2"	3.030	3.030	0.025
			5'				Ice	4.060	4.060	0.040
							1" Ice			
ANT150D	A	From Leg	3.000		0.000	105'	No Ice	1.460	1.460	0.005
			0'				1/2"	4.380	4.380	0.015
			0'				Ice	7.300	7.300	0.025
							1" Ice			
3-Ft Side Arm Mount	A	From Leg	1.500		0.000	105'	No Ice	0.850	1.670	0.065
			0'				1/2"	1.140	2.340	0.079
			0'				Ice	1.430	3.010	0.093
							1" Ice			
3-Ft Standoff Mounts	C	From Leg	1.500		0.000	105'	No Ice	2.960	3.360	0.125
			0'				1/2"	4.100	4.680	0.154
			0'				Ice	5.240	6.000	0.182
							1" Ice			

ANT150D	C	From Leg	3.000		0.000	102'	No Ice	1.460	1.460	0.005
			0'				1/2"	4.380	4.380	0.015
			0'				Ice	7.300	7.300	0.025
							1" Ice			
3-Ft Side Arm Mount	C	From Leg	1.500		0.000	102'	No Ice	0.850	1.670	0.065
			0'				1/2"	1.140	2.340	0.079
			0'				Ice	1.430	3.010	0.093
							1" Ice			

NH65PS-DF-F0M	B	From Leg	1.000		0.000	70'	No Ice	1.196	1.196	0.025
			0'				1/2"	1.877	1.877	0.048
			0'				Ice	2.089	2.089	0.073
							1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _{Front}	C _A A _{Side}	Weight	
			Horz Lateral	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
RRH2x60-AWS	B	From Leg	1.000	0.000	0.000	67'	No Ice	1.877	1.236	0.044
			0'	0'			1/2" Ice	2.055	1.386	0.060
			0'	0'			1" Ice	2.240	1.544	0.079
RRFDC-3315-PF-48	B	From Leg	1.000	0.000	0.000	67'	No Ice	3.364	2.192	0.032
			0'	0'			1/2" Ice	3.597	2.395	0.061
			0'	0'			1" Ice	3.838	2.606	0.093
2.375" OD x 6' Mount Pipe	B	From Leg	1.000	0.000	0.000	66'	No Ice	1.425	1.425	0.025
			0'	0'			1/2" Ice	1.925	1.925	0.036
			0'	0'			1" Ice	2.294	2.294	0.051

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz Lateral	Vert							
				ft	ft	°	°	ft	ft	ft ²	K	
SP2-4.7		Paraboloid w/o Radome	None			0.000		95'	2.108	No Ice	3.490	0.022
										1/2" Ice	3.770	0.041
										1" Ice	4.050	0.061

Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter	Leg Area
	in ²	in ²	K	K	r	r Ice	in ²
					in	in	
Valmont 208951 (12x1.25)	832.708	2668.864	0.598	1.035	5.783	18.534	3.682
Valmont 207628 (12x1.25)	2161.774	6112.762	0.461	2.122	7.506	21.225	3.682
Valmont 207628 (12x1.25)	2161.774	6088.852	0.461	2.100	7.506	21.142	3.682
Valmont 207628 (12x1.25)	2161.774	6059.576	0.461	2.072	7.506	21.040	3.682
Valmont 207628 (12x1.25)	2161.774	6021.515	0.461	2.037	7.506	20.908	3.682
Valmont 207628 (12x1.25)	2161.774	5966.124	0.461	1.986	7.506	20.716	3.682
Valmont 207628 (12x1.25)	2161.774	5856.164	0.461	1.900	7.506	20.334	3.682

Tower Pressures - No Ice

$$G_H = 0.850$$

Section Elevation ft	z ft	K_z	q_z ksf	A_G ft ²	F a c e	A_F ft ²	A_R ft ²	A_{leg} ft ²	Leg %	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²
T1 145'-130'	137'6"	1.082	0.048	77.188	A	0.000	10.276	4.375	42.58	0.000	0.000
					B	0.000	10.276				
					C	0.000	10.276				
T2 130'-120'	125'	1.053	0.047	66.055	A	5.476	9.654	9.654	63.81	0.000	0.000
					B	5.476	9.654				
					C	5.476	9.654				
T3 120'-100'	110'	1.016	0.045	162.111	A	8.723	25.062	25.062	74.18	0.000	0.000
					B	8.723	25.062				
					C	8.723	25.062				
T4 100'-80'	90'	0.959	0.043	202.111	A	9.970	25.062	25.062	71.54	0.000	0.000
					B	9.970	25.062				
					C	9.970	25.062				
T5 80'-60'	70'	0.892	0.040	242.111	A	11.267	25.062	25.062	68.99	0.000	0.000
					B	11.267	25.062				
					C	11.267	25.062				
T6 60'-40'	50'	0.811	0.036	282.111	A	12.620	25.062	25.062	66.51	0.000	0.000
					B	12.620	25.062				
					C	12.620	25.062				
T7 40'-20'	30'	0.701	0.031	322.111	A	16.830	25.062	25.062	59.83	0.000	0.000
					B	16.830	25.062				
					C	16.830	25.062				
T8 20'-0'	10'	0.7	0.031	362.111	A	18.566	25.062	25.062	57.44	0.000	0.000
					B	18.566	25.062				
					C	18.566	25.062				

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_z	q_z ksf	t_z in	A_G ft ²	F a c e	A_F ft ²	A_R ft ²	A_{leg} ft ²	Leg %	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²
T1 145'-130'	137'6"	1.082	0.006	1.730	81.513	A	0.000	41.661	13.025	31.27	0.000	0.000
						B	0.000	41.661				
						C	0.000	41.661				
T2 130'-120'	125'	1.053	0.006	1.714	68.915	A	5.476	38.170	30.941	70.89	0.000	0.000
						B	5.476	38.170				
						C	5.476	38.170				
T3 120'-100'	110'	1.016	0.006	1.692	167.758	A	8.723	82.674	70.867	77.54	0.000	0.000
						B	8.723	82.674				
						C	8.723	82.674				
T4 100'-80'	90'	0.959	0.005	1.658	207.646	A	9.970	83.817	70.590	75.27	0.000	0.000
						B	9.970	83.817				
						C	9.970	83.817				
T5 80'-60'	70'	0.892	0.005	1.617	247.508	A	11.267	84.826	70.251	73.11	0.000	0.000
						B	11.267	84.826				
						C	11.267	84.826				
T6 60'-40'	50'	0.811	0.004	1.564	287.330	A	12.620	85.596	69.810	71.08	0.000	0.000
						B	12.620	85.596				
						C	12.620	85.596				
T7 40'-20'	30'	0.701	0.004	1.486	327.070	A	16.830	85.838	69.167	67.37	0.000	0.000
						B	16.830	85.838				
						C	16.830	85.838				
T8 20'-0'	10'	0.7	0.004	1.331	366.554	A	18.566	84.369	67.893	65.96	0.000	0.000
						B	18.566	84.369				
						C	18.566	84.369				

Tower Pressure - Service

$G_H = 0.850$

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
T1 145'-130'	137'6"	1.082	0.008	77.188	A	0.000	10.276	4.375	42.58	0.000	0.000
					B	0.000	10.276				
					C	0.000	10.276				
T2 130'-120'	125'	1.053	0.008	66.055	A	5.476	9.654	9.654	63.81	0.000	0.000
					B	5.476	9.654				
					C	5.476	9.654				
T3 120'-100'	110'	1.016	0.008	162.11	A	8.723	25.062	25.062	74.18	0.000	0.000
					B	8.723	25.062				
					C	8.723	25.062				
T4 100'-80'	90'	0.959	0.008	202.11	A	9.970	25.062	25.062	71.54	0.000	0.000
					B	9.970	25.062				
					C	9.970	25.062				
T5 80'-60'	70'	0.892	0.007	242.11	A	11.267	25.062	25.062	68.99	0.000	0.000
					B	11.267	25.062				
					C	11.267	25.062				
T6 60'-40'	50'	0.811	0.006	282.11	A	12.620	25.062	25.062	66.51	0.000	0.000
					B	12.620	25.062				
					C	12.620	25.062				
T7 40'-20'	30'	0.701	0.005	322.11	A	16.830	25.062	25.062	59.83	0.000	0.000
					B	16.830	25.062				
					C	16.830	25.062				
T8 20'-0'	10'	0.7	0.005	362.11	A	18.566	25.062	25.062	57.44	0.000	0.000
					B	18.566	25.062				
					C	18.566	25.062				

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	klf	
T1 145'-130'	0.009	0.922	A	0.133	2.835	0.048	1	1	5.816	0.762	0.051	C
			B	0.133	2.835	1	1	5.816				
			C	0.133	2.835	1	1	5.816				
T2 130'-120'	0.009	1.178	A	0.229	2.502	0.047	1	1	11.076	1.190	0.119	C
			B	0.229	2.502	1	1	11.076				
			C	0.229	2.502	1	1	11.076				
T3 120'-100'	0.032	1.858	A	0.208	2.568	0.045	1	1	23.158	2.572	0.129	C
			B	0.208	2.568	1	1	23.158				
			C	0.208	2.568	1	1	23.158				
T4 100'-80'	0.047	1.907	A	0.173	2.687	0.043	1	1	24.264	2.783	0.139	C
			B	0.173	2.687	1	1	24.264				
			C	0.173	2.687	1	1	24.264				
T5 80'-60'	0.057	1.961	A	0.15	2.771	0.040	1	1	25.490	2.834	0.142	C
			B	0.15	2.771	1	1	25.490				
			C	0.15	2.771	1	1	25.490				
T6 60'-40'	0.065	2.020	A	0.134	2.833	0.036	1	1	26.807	2.780	0.139	C
			B	0.134	2.833	1	1	26.807				
			C	0.134	2.833	1	1	26.807				
T7 40'-20'	0.065	2.228	A	0.13	2.846	0.031	1	1	31.010	2.729	0.136	C
			B	0.13	2.846	1	1	31.010				
			C	0.13	2.846	1	1	31.010				
T8 20'-0'	0.065	2.308	A	0.12	2.883	0.031	1	1	32.731	2.888	0.144	C
			B	0.12	2.883	1	1	32.731				
			C	0.12	2.883	1	1	32.731				
Sum Weight:	0.350	14.382						OTM	1234.965 kip-ft	18.536		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w kif	Ctrl. Face
T1 145'-130'	0.009	0.922	A	0.133	2.835	0.048	0.8	1	5.816	0.762	0.051	C
			B	0.133	2.835		0.8	1	5.816			
			C	0.133	2.835		0.8	1	5.816			
T2 130'-120'	0.009	1.178	A	0.229	2.502	0.047	0.8	1	9.981	1.081	0.108	A
			B	0.229	2.502		0.8	1	9.981			
			C	0.229	2.502		0.8	1	9.981			
T3 120'-100'	0.032	1.858	A	0.208	2.568	0.045	0.8	1	21.414	2.400	0.120	A
			B	0.208	2.568		0.8	1	21.414			
			C	0.208	2.568		0.8	1	21.414			
T4 100'-80'	0.047	1.907	A	0.173	2.687	0.043	0.8	1	22.270	2.588	0.129	A
			B	0.173	2.687		0.8	1	22.270			
			C	0.173	2.687		0.8	1	22.270			
T5 80'-60'	0.057	1.961	A	0.15	2.771	0.040	0.8	1	23.237	2.623	0.131	A
			B	0.15	2.771		0.8	1	23.237			
			C	0.15	2.771		0.8	1	23.237			
T6 60'-40'	0.065	2.020	A	0.134	2.833	0.036	0.8	1	24.283	2.560	0.128	A
			B	0.134	2.833		0.8	1	24.283			
			C	0.134	2.833		0.8	1	24.283			
T7 40'-20'	0.065	2.228	A	0.13	2.846	0.031	0.8	1	27.644	2.475	0.124	A
			B	0.13	2.846		0.8	1	27.644			
			C	0.13	2.846		0.8	1	27.644			
T8 20'-0'	0.065	2.308	A	0.12	2.883	0.031	0.8	1	29.018	2.605	0.130	A
			B	0.12	2.883		0.8	1	29.018			
			C	0.12	2.883		0.8	1	29.018			
Sum Weight:	0.350	14.382						OTM	1148.732 kip-ft	17.094		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w kif	Ctrl. Face
T1 145'-130'	0.009	0.922	A	0.133	2.835	0.048	0.85	1	5.816	0.762	0.051	C
			B	0.133	2.835		0.85	1	5.816			
			C	0.133	2.835		0.85	1	5.816			
T2 130'-120'	0.009	1.178	A	0.229	2.502	0.047	0.85	1	10.255	1.106	0.111	B
			B	0.229	2.502		0.85	1	10.255			
			C	0.229	2.502		0.85	1	10.255			
T3 120'-100'	0.032	1.858	A	0.208	2.568	0.045	0.85	1	21.850	2.433	0.122	B
			B	0.208	2.568		0.85	1	21.850			
			C	0.208	2.568		0.85	1	21.850			
T4 100'-80'	0.047	1.907	A	0.173	2.687	0.043	0.85	1	22.768	2.614	0.131	B
			B	0.173	2.687		0.85	1	22.768			
			C	0.173	2.687		0.85	1	22.768			
T5 80'-60'	0.057	1.961	A	0.15	2.771	0.040	0.85	1	23.800	2.653	0.133	B
			B	0.15	2.771		0.85	1	23.800			
			C	0.15	2.771		0.85	1	23.800			
T6 60'-40'	0.065	2.020	A	0.134	2.833	0.036	0.85	1	24.914	2.595	0.130	B
			B	0.134	2.833		0.85	1	24.914			
			C	0.134	2.833		0.85	1	24.914			
T7 40'-20'	0.065	2.228	A	0.13	2.846	0.031	0.85	1	28.486	2.521	0.126	B
			B	0.13	2.846		0.85	1	28.486			
			C	0.13	2.846		0.85	1	28.486			
T8 20'-0'	0.065	2.308	A	0.12	2.883	0.031	0.85	1	29.946	2.658	0.133	B
			B	0.12	2.883		0.85	1	29.946			
			C	0.12	2.883		0.85	1	29.946			
Sum Weight:	0.350	14.382						OTM	1163.558 kip-ft	17.341		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	kif	
T1 145'-130'	0.148	2.606	A	0.511	1.886	0.006	1	1	28.790	0.296	0.020	C
			B	0.511	1.886	1	1	28.790				
			C	0.511	1.886	1	1	28.790				
T2 130'-120'	0.142	3.673	A	0.633	1.787	0.006	1	1	34.688	0.319	0.032	C
			B	0.633	1.787	1	1	34.688				
			C	0.633	1.787	1	1	34.688				
T3 120'-100'	0.436	9.819	A	0.545	1.849	0.006	1	1	67.436	0.647	0.032	C
			B	0.545	1.849	1	1	67.436				
			C	0.545	1.849	1	1	67.436				
T4 100'-80'	0.553	9.916	A	0.452	1.971	0.005	1	1	65.298	0.660	0.033	C
			B	0.452	1.971	1	1	65.298				
			C	0.452	1.971	1	1	65.298				
T5 80'-60'	0.676	10.006	A	0.388	2.088	0.005	1	1	64.812	0.677	0.034	C
			B	0.388	2.088	1	1	64.812				
			C	0.388	2.088	1	1	64.812				
T6 60'-40'	0.770	10.060	A	0.342	2.191	0.004	1	1	65.094	0.664	0.033	C
			B	0.342	2.191	1	1	65.094				
			C	0.342	2.191	1	1	65.094				
T7 40'-20'	0.728	10.446	A	0.314	2.26	0.004	1	1	68.622	0.612	0.031	C
			B	0.314	2.26	1	1	68.622				
			C	0.314	2.26	1	1	68.622				
T8 20'-0'	0.649	10.163	A	0.281	2.348	0.004	1	1	68.613	0.625	0.031	C
			B	0.281	2.348	1	1	68.613				
			C	0.281	2.348	1	1	68.613				
Sum Weight:	4.102	66.689						OTM	316.422 kip-ft	4.501		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	kif	
T1 145'-130'	0.148	2.606	A	0.511	1.886	0.006	0.8	1	28.790	0.296	0.020	C
			B	0.511	1.886	0.8	1	28.790				
			C	0.511	1.886	0.8	1	28.790				
T2 130'-120'	0.142	3.673	A	0.633	1.787	0.006	0.8	1	33.593	0.310	0.031	A
			B	0.633	1.787	0.8	1	33.593				
			C	0.633	1.787	0.8	1	33.593				
T3 120'-100'	0.436	9.819	A	0.545	1.849	0.006	0.8	1	65.691	0.632	0.032	A
			B	0.545	1.849	0.8	1	65.691				
			C	0.545	1.849	0.8	1	65.691				
T4 100'-80'	0.553	9.916	A	0.452	1.971	0.005	0.8	1	63.304	0.643	0.032	A
			B	0.452	1.971	0.8	1	63.304				
			C	0.452	1.971	0.8	1	63.304				
T5 80'-60'	0.676	10.006	A	0.388	2.088	0.005	0.8	1	62.558	0.658	0.033	A
			B	0.388	2.088	0.8	1	62.558				
			C	0.388	2.088	0.8	1	62.558				
T6 60'-40'	0.770	10.060	A	0.342	2.191	0.004	0.8	1	62.570	0.644	0.032	A
			B	0.342	2.191	0.8	1	62.570				
			C	0.342	2.191	0.8	1	62.570				
T7 40'-20'	0.728	10.446	A	0.314	2.26	0.004	0.8	1	65.256	0.587	0.029	A
			B	0.314	2.26	0.8	1	65.256				
			C	0.314	2.26	0.8	1	65.256				
T8 20'-0'	0.649	10.163	A	0.281	2.348	0.004	0.8	1	64.900	0.597	0.030	A
			B	0.281	2.348	0.8	1	64.900				
			C	0.281	2.348	0.8	1	64.900				

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	kif	
Sum Weight:	4.102	66.689						OTM	308.580 kip-ft	4.366		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	kif	
T1 145'-130'	0.148	2.606	A	0.511	1.886	0.006	0.85	1	28.790	0.296	0.020	C
			B	0.511	1.886	0.85	1	28.790				
			C	0.511	1.886	0.85	1	28.790				
T2 130'-120'	0.142	3.673	A	0.633	1.787	0.006	0.85	1	33.867	0.312	0.031	B
			B	0.633	1.787	0.85	1	33.867				
			C	0.633	1.787	0.85	1	33.867				
T3 120'-100'	0.436	9.819	A	0.545	1.849	0.006	0.85	1	66.127	0.633	0.032	B
			B	0.545	1.849	0.85	1	66.127				
			C	0.545	1.849	0.85	1	66.127				
T4 100'-80'	0.553	9.916	A	0.452	1.971	0.005	0.85	1	63.802	0.638	0.032	B
			B	0.452	1.971	0.85	1	63.802				
			C	0.452	1.971	0.85	1	63.802				
T5 80'-60'	0.676	10.006	A	0.388	2.088	0.005	0.85	1	63.122	0.652	0.033	B
			B	0.388	2.088	0.85	1	63.122				
			C	0.388	2.088	0.85	1	63.122				
T6 60'-40'	0.770	10.060	A	0.342	2.191	0.004	0.85	1	63.201	0.638	0.032	B
			B	0.342	2.191	0.85	1	63.201				
			C	0.342	2.191	0.85	1	63.201				
T7 40'-20'	0.728	10.446	A	0.314	2.26	0.004	0.85	1	66.097	0.584	0.029	B
			B	0.314	2.26	0.85	1	66.097				
			C	0.314	2.26	0.85	1	66.097				
T8 20'-0'	0.649	10.163	A	0.281	2.348	0.004	0.85	1	65.828	0.595	0.030	B
			B	0.281	2.348	0.85	1	65.828				
			C	0.281	2.348	0.85	1	65.828				
Sum Weight:	4.102	66.689						OTM	307.714 kip-ft	4.348		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	kif	
T1 145'-130'	0.009	0.922	A	0.133	2.835	0.008	1	1	5.816	0.134	0.009	C
			B	0.133	2.835	1	1	5.816				
			C	0.133	2.835	1	1	5.816				
T2 130'-120'	0.009	1.178	A	0.229	2.502	0.008	1	1	11.076	0.210	0.021	C
			B	0.229	2.502	1	1	11.076				
			C	0.229	2.502	1	1	11.076				
T3 120'-100'	0.032	1.858	A	0.208	2.568	0.008	1	1	23.158	0.453	0.023	C
			B	0.208	2.568	1	1	23.158				
			C	0.208	2.568	1	1	23.158				
T4 100'-80'	0.047	1.907	A	0.173	2.687	0.008	1	1	24.264	0.490	0.024	C
			B	0.173	2.687	1	1	24.264				
			C	0.173	2.687	1	1	24.264				
T5 80'-60'	0.057	1.961	A	0.15	2.771	0.007	1	1	25.490	0.499	0.025	C
			B	0.15	2.771	1	1	25.490				
			C	0.15	2.771	1	1	25.490				

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	klf	
T6 60'-40'	0.065	2.020	A	0.134	2.833	0.006	1	1	26.807	0.489	0.024	C
			B	0.134	2.833	1	1	26.807				
			C	0.134	2.833	1	1	26.807				
T7 40'-20'	0.065	2.228	A	0.13	2.846	0.005	1	1	31.010	0.480	0.024	C
			B	0.13	2.846	1	1	31.010				
			C	0.13	2.846	1	1	31.010				
T8 20'-0'	0.065	2.308	A	0.12	2.883	0.005	1	1	32.731	0.508	0.025	C
			B	0.12	2.883	1	1	32.731				
			C	0.12	2.883	1	1	32.731				
Sum Weight:	0.350	14.382						OTM	217.413 kip-ft	3.263		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	klf	
T1 145'-130'	0.009	0.922	A	0.133	2.835	0.008	0.8	1	5.816	0.134	0.009	C
			B	0.133	2.835	0.8	1	5.816				
			C	0.133	2.835	0.8	1	5.816				
T2 130'-120'	0.009	1.178	A	0.229	2.502	0.008	0.8	1	9.981	0.190	0.019	A
			B	0.229	2.502	0.8	1	9.981				
			C	0.229	2.502	0.8	1	9.981				
T3 120'-100'	0.032	1.858	A	0.208	2.568	0.008	0.8	1	21.414	0.422	0.021	A
			B	0.208	2.568	0.8	1	21.414				
			C	0.208	2.568	0.8	1	21.414				
T4 100'-80'	0.047	1.907	A	0.173	2.687	0.008	0.8	1	22.270	0.456	0.023	A
			B	0.173	2.687	0.8	1	22.270				
			C	0.173	2.687	0.8	1	22.270				
T5 80'-60'	0.057	1.961	A	0.15	2.771	0.007	0.8	1	23.237	0.462	0.023	A
			B	0.15	2.771	0.8	1	23.237				
			C	0.15	2.771	0.8	1	23.237				
T6 60'-40'	0.065	2.020	A	0.134	2.833	0.006	0.8	1	24.283	0.451	0.023	A
			B	0.134	2.833	0.8	1	24.283				
			C	0.134	2.833	0.8	1	24.283				
T7 40'-20'	0.065	2.228	A	0.13	2.846	0.005	0.8	1	27.644	0.436	0.022	A
			B	0.13	2.846	0.8	1	27.644				
			C	0.13	2.846	0.8	1	27.644				
T8 20'-0'	0.065	2.308	A	0.12	2.883	0.005	0.8	1	29.018	0.459	0.023	A
			B	0.12	2.883	0.8	1	29.018				
			C	0.12	2.883	0.8	1	29.018				
Sum Weight:	0.350	14.382						OTM	202.232 kip-ft	3.009		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	klf	
T1 145'-130'	0.009	0.922	A	0.133	2.835	0.008	0.85	1	5.816	0.134	0.009	C
			B	0.133	2.835	0.85	1	5.816				
			C	0.133	2.835	0.85	1	5.816				
T2 130'-120'	0.009	1.178	A	0.229	2.502	0.008	0.85	1	10.255	0.195	0.019	B
			B	0.229	2.502	0.85	1	10.255				
			C	0.229	2.502	0.85	1	10.255				

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K				ksf			ft ²	K	kif	
T3 120'-100'	0.032	1.858	A	0.208	2.568	0.008	0.85	1	21.850	0.428	0.021	B
			B	0.208	2.568	0.85	1	21.850				
			C	0.208	2.568	0.85	1	21.850				
T4 100'-80'	0.047	1.907	A	0.173	2.687	0.008	0.85	1	22.768	0.460	0.023	B
			B	0.173	2.687	0.85	1	22.768				
			C	0.173	2.687	0.85	1	22.768				
T5 80'-60'	0.057	1.961	A	0.15	2.771	0.007	0.85	1	23.800	0.467	0.023	B
			B	0.15	2.771	0.85	1	23.800				
			C	0.15	2.771	0.85	1	23.800				
T6 60'-40'	0.065	2.020	A	0.134	2.833	0.006	0.85	1	24.914	0.457	0.023	B
			B	0.134	2.833	0.85	1	24.914				
			C	0.134	2.833	0.85	1	24.914				
T7 40'-20'	0.065	2.228	A	0.13	2.846	0.005	0.85	1	28.486	0.444	0.022	B
			B	0.13	2.846	0.85	1	28.486				
			C	0.13	2.846	0.85	1	28.486				
T8 20'-0'	0.065	2.308	A	0.12	2.883	0.005	0.85	1	29.946	0.468	0.023	B
			B	0.12	2.883	0.85	1	29.946				
			C	0.12	2.883	0.85	1	29.946				
Sum Weight:	0.350	14.382						OTM	204.842 kip-ft	3.053		

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	9.593					
Bracing Weight	4.789					
Total Member Self-Weight	14.382			2.114	-1.402	
Total Weight	16.290			2.114	-1.402	
Wind 0 deg - No Ice		-0.039	-20.806	-1498.662	1.546	6.413
Wind 30 deg - No Ice		9.795	-16.964	-1234.282	-715.489	8.001
Wind 60 deg - No Ice		16.003	-9.194	-676.194	-1182.600	7.439
Wind 90 deg - No Ice		18.420	0.039	5.062	-1363.792	5.434
Wind 120 deg - No Ice		17.292	9.982	728.645	-1260.227	2.032
Wind 150 deg - No Ice		9.862	17.003	1241.458	-720.594	-2.243
Wind 180 deg - No Ice		0.039	19.363	1416.657	-4.349	-5.812
Wind 210 deg - No Ice		-9.795	16.964	1238.511	712.685	-8.001
Wind 240 deg - No Ice		-17.253	9.915	723.539	1254.476	-8.053
Wind 270 deg - No Ice		-18.420	-0.039	-0.833	1360.989	-5.434
Wind 300 deg - No Ice		-16.042	-9.261	-681.300	1182.744	-2.019
Wind 330 deg - No Ice		-9.862	-17.003	-1237.230	717.790	2.243
Member Ice	52.307					
Total Weight Ice	74.447			16.203	-21.428	
Wind 0 deg - Ice		-0.007	-5.258	-389.701	-20.830	0.609
Wind 30 deg - Ice		2.551	-4.417	-327.480	-219.945	0.890
Wind 60 deg - Ice		4.306	-2.477	-178.070	-359.274	0.935
Wind 90 deg - Ice		4.958	0.007	16.801	-411.019	0.769
Wind 120 deg - Ice		4.430	2.557	215.433	-366.664	0.404
Wind 150 deg - Ice		2.563	4.425	360.484	-220.982	-0.095
Wind 180 deg - Ice		0.007	5.123	414.265	-22.027	-0.574
Wind 210 deg - Ice		-2.551	4.417	359.885	177.088	-0.890
Wind 240 deg - Ice		-4.423	2.545	214.397	323.209	-0.970
Wind 270 deg - Ice		-4.958	-0.007	15.604	368.162	-0.769
Wind 300 deg - Ice		-4.313	-2.490	-179.107	317.016	-0.403
Wind 330 deg - Ice		-2.563	-4.425	-328.078	178.125	0.095
Total Weight	16.290			2.114	-1.402	
Wind 0 deg - Service		-0.007	-3.663	-263.255	1.032	1.129
Wind 30 deg - Service		1.724	-2.986	-216.712	-125.200	1.409
Wind 60 deg - Service		2.817	-1.619	-118.462	-207.434	1.310
Wind 90 deg - Service		3.243	0.007	1.472	-239.332	0.957

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 120 deg - Service		3.044	1.757	128.857	-221.100	0.358
Wind 150 deg - Service		1.736	2.993	219.137	-126.099	-0.395
Wind 180 deg - Service		0.007	3.409	249.980	-0.006	-1.023
Wind 210 deg - Service		-1.724	2.986	218.618	126.227	-1.409
Wind 240 deg - Service		-3.037	1.746	127.958	221.608	-1.418
Wind 270 deg - Service		-3.243	-0.007	0.434	240.359	-0.957
Wind 300 deg - Service		-2.824	-1.630	-119.360	208.979	-0.355
Wind 330 deg - Service		-1.736	-2.993	-217.231	127.125	0.395

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft		
T1	145 - 130	Leg	Max Tension	15	3.071	-0.004	0.057		
			Max. Compression	10	-4.028	-0.220	-0.100		
			Max. Mx	8	-3.563	-0.232	-0.017		
			Max. My	2	-3.996	-0.009	0.241		
			Max. Vy	8	0.529	-0.232	-0.017		
			Max. Vx	2	-0.553	-0.009	0.241		
		Diagonal	Max Tension	20	0.558	0.000	0.000		
			Max. Compression	8	-0.568	0.000	0.000		
			Max. Mx	30	0.207	-0.007	0.000		
			Max. My	10	0.329	-0.002	0.000		
			Max. Vy	30	0.013	-0.007	0.000		
			Max. Vx	10	-0.000	0.000	0.000		
		Top Girt	Max Tension	3	0.143	0.000	0.000		
			Max. Compression	22	-0.154	0.000	0.000		
			Max. Mx	26	-0.022	0.028	0.000		
		Bottom Girt	Max. Vy	26	-0.023	0.000	0.000		
			Max Tension	6	0.164	0.000	0.000		
			Max. Compression	19	-0.151	0.000	0.000		
		Mid Girt	Max. Mx	26	0.022	0.028	0.000		
			Max. Vy	26	-0.023	0.000	0.000		
			Max Tension	14	0.029	0.000	0.000		
			Max. Compression	11	-0.015	0.000	0.000		
			Max. Mx	26	0.019	0.028	0.000		
			Max. Vy	26	-0.023	0.000	0.000		
T2	130 - 120	Leg	Max Tension	15	4.417	-0.232	-0.009		
			Max. Compression	10	-6.103	0.564	0.012		
			Max. Mx	6	3.937	-0.669	-0.026		
			Max. My	4	-1.088	-0.059	-0.667		
			Max. Vy	22	0.240	-0.666	-0.014		
			Max. Vx	4	0.261	-0.059	-0.667		
		Diagonal	Max Tension	23	1.180	0.000	0.000		
			Max. Compression	10	-1.314	0.000	0.000		
			Max. Mx	33	0.178	0.034	-0.007		
			Max. My	31	-0.547	0.031	-0.008		
			Max. Vy	33	0.028	0.034	-0.007		
			Max. Vx	31	0.003	0.000	0.000		
		Top Girt	Max Tension	2	0.159	0.000	0.000		
			Max. Compression	23	-0.153	0.000	0.000		
			Max. Mx	26	-0.006	-0.054	0.000		
			Max. My	26	-0.004	0.000	0.002		
			Max. Vy	26	0.043	0.000	0.000		
			Max. Vx	26	-0.001	0.000	0.000		
		T3	120 - 100	Leg	Max Tension	7	13.466	-0.719	0.010
					Max. Compression	18	-17.512	0.947	-0.010
					Max. Mx	11	-16.640	0.965	-0.036
					Max. My	24	-2.320	-0.022	0.978
					Max. Vy	6	0.244	-0.960	0.013
					Max. Vx	12	-0.350	-0.005	-0.685
Diagonal	Max Tension			8	2.323	0.000	0.000		
	Max. Compression			8	-2.373	0.000	0.000		
	Max. Mx			33	0.529	0.048	-0.008		
	Max. My			36	-0.784	0.042	0.008		
	Max. Vy			33	0.037	0.048	-0.008		
	Max. Vx			36	-0.003	0.000	0.000		
T4	100 - 80			Leg	Max Tension	23	26.226	-1.000	0.002
					Max. Compression	18	-32.331	1.100	0.011
					Max. Mx	19	-31.566	1.101	0.012
					Max. My	16	-2.793	-0.014	1.107
					Max. Vy	19	-0.178	1.029	0.018
					Max. Vx	4	0.198	-0.017	-1.020
		Diagonal	Max Tension	8	2.997	0.000	0.000		
			Max. Compression	8	-3.019	0.000	0.000		
			Max. Mx	33	0.664	0.065	0.010		
			Max. My	27	-0.871	0.057	0.010		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T5	80 - 60	Leg	Max. Vy	33	0.045	0.065	0.010
			Max. Vx	27	-0.003	0.000	0.000
			Max Tension	23	39.932	-1.242	0.004
			Max. Compression	10	-48.320	1.357	0.001
			Max. Mx	11	-47.363	1.360	0.001
			Max. My	16	-3.809	-0.012	1.357
			Max. Vy	22	-0.198	-1.247	0.005
		Diagonal	Max. Vx	16	0.238	-0.021	1.222
			Max Tension	20	3.475	0.000	0.000
			Max. Compression	8	-3.508	0.000	0.000
			Max. Mx	33	0.687	0.084	0.012
			Max. My	31	-0.926	0.074	-0.012
			Max. Vy	33	0.053	0.084	0.012
			Max. Vx	31	0.003	0.000	0.000
T6	60 - 40	Leg	Max Tension	23	54.131	-1.303	0.002
			Max. Compression	10	-65.103	1.684	-0.006
			Max. Mx	10	-65.103	1.684	-0.006
			Max. My	16	-4.668	0.023	1.516
			Max. Vy	3	-0.157	1.669	-0.030
			Max. Vx	4	0.156	0.024	-1.512
			Max Tension	20	3.841	0.000	0.000
		Diagonal	Max. Compression	20	-3.881	0.000	0.000
			Max. Mx	33	0.662	0.104	-0.014
			Max. My	30	-1.096	0.095	-0.014
			Max. Vy	33	0.060	0.104	-0.014
			Max. Vx	30	0.003	0.000	0.000
			Max Tension	23	68.311	-1.391	0.001
			Max. Compression	10	-81.923	1.879	0.000
T7	40 - 20	Leg	Max. Mx	10	-81.923	1.879	0.000
			Max. My	16	-5.141	-0.080	1.673
			Max. Vy	2	-0.163	1.868	-0.015
			Max. Vx	16	0.207	-0.080	1.673
			Max Tension	20	4.229	0.000	0.000
			Max. Compression	20	-4.315	0.000	0.000
			Max. Mx	33	0.623	0.145	-0.018
		Diagonal	Max. My	29	-1.129	0.132	-0.019
			Max. Vy	33	0.075	0.145	-0.018
			Max. Vx	29	0.004	0.000	0.000
			Max Tension	23	82.131	-1.609	0.003
			Max. Compression	10	-98.500	0.000	0.000
			Max. Mx	10	-90.399	1.879	0.000
			Max. My	16	-6.196	-0.167	3.038
T8	20 - 0	Leg	Max. Vy	22	-0.279	-1.651	0.004
			Max. Vx	16	0.428	-0.167	3.038
			Max Tension	21	4.808	0.000	0.000
			Max. Compression	18	-5.269	0.000	0.000
			Max. Mx	31	0.617	0.165	0.021
			Max. My	34	0.631	0.165	0.021
			Max. Vy	32	0.078	0.165	-0.021
		Diagonal	Max. Vx	34	-0.004	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	102.804	11.624	-6.405
	Max. H _x	18	102.804	11.624	-6.405
	Max. H _z	7	-85.890	-9.954	5.474
	Min. Vert	7	-85.890	-9.954	5.474
	Min. H _x	7	-85.890	-9.954	5.474
	Min. H _z	18	102.804	11.624	-6.405
Leg B	Max. Vert	10	103.319	-11.564	-6.599
	Max. H _x	23	-86.078	9.900	5.643
	Max. H _z	23	-86.078	9.900	5.643

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg A	Min. Vert	23	-86.078	9.900	5.643
	Min. H _x	10	103.319	-11.564	-6.599
	Min. H _z	10	103.319	-11.564	-6.599
	Max. Vert	2	102.630	0.210	13.264
	Max. H _x	20	6.543	0.947	0.627
	Max. H _z	2	102.630	0.210	13.264
	Min. Vert	15	-85.979	-0.187	-11.359
	Min. H _x	11	-43.537	-0.983	-5.899
	Min. H _z	15	-85.979	-0.187	-11.359

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
Dead Only	16.290	0.000	0.000	2.114	-1.402	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	19.549	-0.039	-20.806	-1498.259	1.265	6.413
0.9 Dead+1.0 Wind 0 deg - No Ice	14.661	-0.039	-20.806	-1498.893	1.686	6.413
1.2 Dead+1.0 Wind 30 deg - No Ice	19.549	9.795	-16.964	-1233.877	-715.779	8.001
0.9 Dead+1.0 Wind 30 deg - No Ice	14.661	9.795	-16.964	-1234.511	-715.358	8.001
1.2 Dead+1.0 Wind 60 deg - No Ice	19.549	16.790	-9.648	-702.192	-1228.641	7.439
0.9 Dead+1.0 Wind 60 deg - No Ice	14.661	16.790	-9.648	-702.826	-1228.220	7.439
1.2 Dead+1.0 Wind 90 deg - No Ice	19.549	19.657	0.039	5.485	-1434.981	5.434
0.9 Dead+1.0 Wind 90 deg - No Ice	14.661	19.657	0.039	4.850	-1434.560	5.434
1.2 Dead+1.0 Wind 120 deg - No Ice	19.549	18.078	10.437	755.487	-1306.269	2.032
0.9 Dead+1.0 Wind 120 deg - No Ice	14.661	18.078	10.437	754.853	-1305.848	2.032
1.2 Dead+1.0 Wind 150 deg - No Ice	19.549	9.862	17.003	1241.898	-720.884	-2.243
0.9 Dead+1.0 Wind 150 deg - No Ice	14.661	9.862	17.003	1241.264	-720.464	-2.243
1.2 Dead+1.0 Wind 180 deg - No Ice	19.549	0.039	19.363	1417.099	-4.630	-5.812
0.9 Dead+1.0 Wind 180 deg - No Ice	14.661	0.039	19.363	1416.465	-4.209	-5.812
1.2 Dead+1.0 Wind 210 deg - No Ice	19.549	-9.795	16.964	1238.950	712.414	-8.001
0.9 Dead+1.0 Wind 210 deg - No Ice	14.661	-9.795	16.964	1238.316	712.835	-8.001
1.2 Dead+1.0 Wind 240 deg - No Ice	19.549	-18.039	10.369	750.382	1299.957	-8.052
0.9 Dead+1.0 Wind 240 deg - No Ice	14.661	-18.039	10.369	749.748	1300.377	-8.052
1.2 Dead+1.0 Wind 270 deg - No Ice	19.549	-19.657	-0.039	-0.411	1431.616	-5.434
0.9 Dead+1.0 Wind 270 deg - No Ice	14.661	-19.657	-0.039	-1.045	1432.037	-5.434
1.2 Dead+1.0 Wind 300 deg - No Ice	19.549	-16.829	-9.715	-707.297	1228.224	-2.019
0.9 Dead+1.0 Wind 300 deg - No Ice	14.661	-16.829	-9.715	-707.931	1228.645	-2.019
1.2 Dead+1.0 Wind 330 deg - No Ice	19.549	-9.862	-17.003	-1236.824	717.520	2.243
0.9 Dead+1.0 Wind 330 deg - No Ice	14.661	-9.862	-17.003	-1237.458	717.940	2.243
1.2 Dead+1.0 Ice	77.706	0.000	0.000	16.625	-21.709	0.000

Load Combination	Vertical	Shear _x	Shear _z	Overturing Moment, M _x	Overturing Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	77.706	-0.007	-5.258	-389.288	-21.110	0.609
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	77.706	2.551	-4.417	-327.065	-220.230	0.890
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	77.706	4.441	-2.555	-181.892	-366.906	0.935
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	77.706	5.114	0.007	17.224	-419.788	0.769
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	77.706	4.565	2.635	220.100	-374.296	0.404
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	77.706	2.563	4.425	360.914	-221.267	-0.095
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	77.706	0.007	5.123	414.696	-22.307	-0.574
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	77.706	-2.551	4.417	360.315	176.813	-0.890
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	77.706	-4.558	2.623	219.063	330.280	-0.970
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	77.706	-5.114	-0.007	16.027	376.371	-0.769
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	77.706	-4.448	-2.568	-182.928	324.087	-0.403
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	77.706	-2.563	-4.425	-327.663	177.849	0.095
Dead+Wind 0 deg - Service	16.290	-0.007	-3.663	-262.098	-0.883	1.129
Dead+Wind 30 deg - Service	16.290	1.724	-2.986	-215.554	-127.117	1.409
Dead+Wind 60 deg - Service	16.290	2.956	-1.698	-121.952	-217.405	1.310
Dead+Wind 90 deg - Service	16.290	3.461	0.007	2.633	-253.731	0.957
Dead+Wind 120 deg - Service	16.290	3.183	1.837	134.669	-231.071	0.358
Dead+Wind 150 deg - Service	16.290	1.736	2.993	220.301	-128.016	-0.395
Dead+Wind 180 deg - Service	16.290	0.007	3.409	251.145	-1.921	-1.023
Dead+Wind 210 deg - Service	16.290	-1.724	2.986	219.782	124.313	-1.409
Dead+Wind 240 deg - Service	16.290	-3.176	1.825	133.771	227.749	-1.418
Dead+Wind 270 deg - Service	16.290	-3.461	-0.007	1.595	250.927	-0.957
Dead+Wind 300 deg - Service	16.290	-2.963	-1.710	-122.851	215.120	-0.355
Dead+Wind 330 deg - Service	16.290	-1.736	-2.993	-216.073	125.212	0.395

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-16.290	0.000	0.000	16.290	0.000	0.000%
2	-0.039	-19.549	-20.806	0.039	19.549	20.806	0.000%
3	-0.039	-14.661	-20.806	0.039	14.661	20.806	0.000%
4	9.795	-19.549	-16.964	-9.795	19.549	16.964	0.000%
5	9.795	-14.661	-16.964	-9.795	14.661	16.964	0.000%
6	16.790	-19.549	-9.648	-16.790	19.549	9.648	0.000%
7	16.790	-14.661	-9.648	-16.790	14.661	9.648	0.000%
8	19.657	-19.549	0.039	-19.657	19.549	-0.039	0.000%
9	19.657	-14.661	0.039	-19.657	14.661	-0.039	0.000%
10	18.078	-19.549	10.437	-18.078	19.549	-10.437	0.000%
11	18.078	-14.661	10.437	-18.078	14.661	-10.437	0.000%
12	9.862	-19.549	17.003	-9.862	19.549	-17.003	0.000%
13	9.862	-14.661	17.003	-9.862	14.661	-17.003	0.000%
14	0.039	-19.549	19.363	-0.039	19.549	-19.363	0.000%
15	0.039	-14.661	19.363	-0.039	14.661	-19.363	0.000%
16	-9.795	-19.549	16.964	9.795	19.549	-16.964	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
17	-9.795	-14.661	16.964	9.795	14.661	-16.964	0.000%
18	-18.039	-19.549	10.369	18.039	19.549	-10.369	0.000%
19	-18.039	-14.661	10.369	18.039	14.661	-10.369	0.000%
20	-19.657	-19.549	-0.039	19.657	19.549	0.039	0.000%
21	-19.657	-14.661	-0.039	19.657	14.661	0.039	0.000%
22	-16.829	-19.549	-9.715	16.829	19.549	9.715	0.000%
23	-16.829	-14.661	-9.715	16.829	14.661	9.715	0.000%
24	-9.862	-19.549	-17.003	9.862	19.549	17.003	0.000%
25	-9.862	-14.661	-17.003	9.862	14.661	17.003	0.000%
26	0.000	-77.706	0.000	0.000	77.706	0.000	0.000%
27	-0.007	-77.706	-5.258	0.007	77.706	5.258	0.000%
28	2.551	-77.706	-4.417	-2.551	77.706	4.417	0.000%
29	4.441	-77.706	-2.555	-4.441	77.706	2.555	0.000%
30	5.114	-77.706	0.007	-5.114	77.706	-0.007	0.000%
31	4.565	-77.706	2.635	-4.565	77.706	-2.635	0.000%
32	2.563	-77.706	4.425	-2.563	77.706	-4.425	0.000%
33	0.007	-77.706	5.123	-0.007	77.706	-5.123	0.000%
34	-2.551	-77.706	4.417	2.551	77.706	-4.417	0.000%
35	-4.558	-77.706	2.623	4.558	77.706	-2.623	0.000%
36	-5.114	-77.706	-0.007	5.114	77.706	0.007	0.000%
37	-4.448	-77.706	-2.568	4.448	77.706	2.568	0.000%
38	-2.563	-77.706	-4.425	2.563	77.706	4.425	0.000%
39	-0.007	-16.290	-3.663	0.007	16.290	3.663	0.000%
40	1.724	-16.290	-2.986	-1.724	16.290	2.986	0.000%
41	2.956	-16.290	-1.698	-2.956	16.290	1.698	0.000%
42	3.461	-16.290	0.007	-3.461	16.290	-0.007	0.000%
43	3.183	-16.290	1.837	-3.183	16.290	-1.837	0.000%
44	1.736	-16.290	2.993	-1.736	16.290	-2.993	0.000%
45	0.007	-16.290	3.409	-0.007	16.290	-3.409	0.000%
46	-1.724	-16.290	2.986	1.724	16.290	-2.986	0.000%
47	-3.176	-16.290	1.825	3.176	16.290	-1.825	0.000%
48	-3.461	-16.290	-0.007	3.461	16.290	0.007	0.000%
49	-2.963	-16.290	-1.710	2.963	16.290	1.710	0.000%
50	-1.736	-16.290	-2.993	1.736	16.290	2.993	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	1.528	43	0.075	0.006
T2	130 - 120	1.293	43	0.073	0.005
T3	120 - 100	1.139	43	0.072	0.005
T4	100 - 80	0.841	43	0.067	0.004
T5	80 - 60	0.570	43	0.058	0.003
T6	60 - 40	0.340	43	0.046	0.003
T7	40 - 20	0.163	43	0.032	0.002
T8	20 - 0	0.048	43	0.017	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145'	5/8" x 10' Lightning Rod	43	1.528	0.075	0.006	Inf
125'	ANT150F2	43	1.215	0.073	0.005	435699
115'	ANT150D	43	1.063	0.071	0.005	345718
110'	ANT150F2	43	0.987	0.070	0.004	252245
105'	2" Dia 10' Omni	43	0.913	0.069	0.004	194417
102'	ANT150D	43	0.870	0.068	0.004	171425
95'	SP2-4.7	43	0.770	0.065	0.004	142599

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
70'	NH65PS-DF-F0M	43	0.449	0.052	0.003	100080
67'	RRH2x60-AWS	43	0.415	0.051	0.003	97419
66'	2.375" OD x 6' Mount Pipe	43	0.404	0.050	0.003	96564

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	8.645	10	0.422	0.036
T2	130 - 120	7.311	10	0.415	0.030
T3	120 - 100	6.438	10	0.407	0.027
T4	100 - 80	4.750	10	0.377	0.022
T5	80 - 60	3.217	10	0.327	0.020
T6	60 - 40	1.921	10	0.261	0.015
T7	40 - 20	0.919	10	0.183	0.010
T8	20 - 0	0.270	10	0.095	0.005

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145'	5/8" x 10' Lightning Rod	10	8.645	0.422	0.036	206632
125'	ANT150F2	10	6.873	0.411	0.029	79741
115'	ANT150D	10	6.007	0.402	0.026	62027
110'	ANT150F2	10	5.581	0.395	0.024	45371
105'	2" Dia 10' Omni	10	5.161	0.387	0.023	35551
102'	ANT150D	10	4.914	0.381	0.023	31535
95'	SP2-4.7	10	4.349	0.367	0.021	26094
70'	NH65PS-DF-F0M	10	2.535	0.296	0.018	17813
67'	RRH2x60-AWS	10	2.344	0.286	0.017	17304
66'	2.375" OD x 6' Mount Pipe	10	2.281	0.282	0.017	17141

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	145	Leg	A325N	1.000	6	0.032	53.014	0.001	1	Bolt Tension
T2	130	Leg	A325N	1.000	6	0.736	53.014	0.014	1	Bolt Tension
		Diagonal	A325N	1.000	1	1.180	9.144	0.129	1	Member Block Shear
T3	120	Top Girt	A325N	1.000	1	0.159	10.164	0.016	1	Member Block Shear
		Leg	A325N	1.000	6	1.366	53.014	0.026	1	Bolt Tension
T4	100	Diagonal	A325N	1.000	1	2.323	9.144	0.254	1	Member Block Shear
		Leg	A325N	1.000	6	3.261	53.014	0.062	1	Bolt Tension
T5	80	Diagonal	A325N	1.000	1	2.997	9.144	0.328	1	Member Block Shear
		Leg	A325N	1.000	6	5.499	53.014	0.104	1	Bolt Tension
T6	60	Diagonal	A325N	1.000	1	3.475	9.144	0.380	1	Member Block Shear
		Leg	A325N	1.000	6	7.830	53.014	0.148	1	Bolt Tension

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
T7	40	Diagonal	A325N	1.000	1	3.841	9.144	0.420	1	Member Block Shear
		Leg	A325N	1.000	6	10.205	53.014	0.192	1	Bolt Tension
T8	20	Diagonal	A325N	1.000	1	4.229	10.164	0.416	1	Member Block Shear
		Leg	A325N	1.000	6	12.587	53.014	0.237	1	Bolt Tension
		Diagonal	A325N	1.000	1	4.808	10.164	0.473	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	KI/r	A in ²	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1 3/4" solid	15'	2'4"	64.0	2.405	-4.028	80.225	0.050 ¹
T2	130 - 120	Valmont 208951 (12x1.25)	10'7/32'	10'7/32'	44.8	3.682	-6.103	143.058	0.043 ¹
T3	120 - 100	Valmont 207628 (12x1.25)	20'13/32'	10'7/32'	45.4	3.682	-17.512	142.493	0.123 ¹
T4	100 - 80	Valmont 207628 (12x1.25)	2"	10'7/32'	45.4	3.682	-32.331	142.493	0.227 ¹
T5	80 - 60	Valmont 207628 (12x1.25)	2"	10'7/32'	45.4	3.682	-48.320	142.493	0.339 ¹
T6	60 - 40	Valmont 207628 (12x1.25)	2"	10'7/32'	45.4	3.682	-65.103	142.493	0.457 ¹
T7	40 - 20	Valmont 207628 (12x1.25)	2"	10'7/32'	45.4	3.682	-81.923	142.493	0.575 ¹
T8	20 - 0	Valmont 207628 (12x1.25)	2"	10'7/32'	45.4	3.682	-98.500	142.493	0.691 ¹

¹ $P_u / \phi P_n$ controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	KI/r	ϕP_n K	A in ²	V_u K	ϕV_n K	Stress Ratio
T2	130 - 120	0.5	1'5-21/32"	120.0	165.670	0.196	0.274	3.361	0.082
T3	120 - 100	0.5	1'5-25/32"	121.0	165.670	0.196	0.322	3.292	0.098
T4	100 - 80	0.5	1'5-25/32"	121.0	165.670	0.196	0.208	3.292	0.063
T5	80 - 60	0.5	1'5-25/32"	121.0	165.670	0.196	0.216	3.292	0.066
T6	60 - 40	0.5	1'5-25/32"	121.0	165.670	0.196	0.167	3.292	0.051
T7	40 - 20	0.5	1'5-25/32"	121.0	165.670	0.196	0.209	3.292	0.064
T8	20 - 0	0.5	1'5-25/32"	121.0	165.670	0.196	0.429	3.292	0.130

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	7/8" solid	5'6-7/32"	2'8-1/8"	132.2 K=0.90	0.601	-0.568	7.769	0.073 ¹
T2	130 - 120	L 2.5 x 2.5 x 3/16	11'5"	5'9/32"	121.8 K=1.00	0.902	-1.314	13.384	0.098 ¹
T3	120 - 100	L 2.5 x 2.5 x 3/16	12'6-1/32"	5'8-1/32"	137.4 K=1.00	0.902	-2.373	10.790	0.220 ¹
T4	100 - 80	L 2.5 x 2.5 x 3/16	13'9-9/16"	6'4-7/16"	154.4 K=1.00	0.902	-3.019	8.549	0.353 ¹
T5	80 - 60	L 2.5 x 2.5 x 3/16	15'2-29/32"	7'1-15/32"	172.7 K=1.00	0.902	-3.508	6.833	0.513 ¹
T6	60 - 40	L 2.5 x 2.5 x 3/16	16'9-5/8"	7'11-3/32"	192.1 K=1.00	0.902	-3.881	5.523	0.703 ¹
T7	40 - 20	L 3 x 3 x 3/16	18'5-3/8"	8'9-1/8"	176.3 K=1.00	1.090	-4.315	7.923	0.545 ¹
T8	20 - 0	L 3 x 3 x 3/16	20'1-29/32"	9'7-1/2"	193.7 K=1.00	1.090	-5.269	6.564	0.803 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1" solid	5'	4'10-1/4"	163.1 K=0.70	0.785	-0.154	6.670	0.023 ¹
T2	130 - 120	L 3 x 3 x 3/16	5'	4'6-1/4"	105.5 K=1.16	1.090	-0.153	19.371	0.008 ¹

¹ P_u / φP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1" solid	5'	4'10-1/4"	163.1 K=0.70	0.785	-0.151	6.670	0.023 ¹

¹ P_u / φP_n controls

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1" solid	5'	4'10-1/4"	163.1 K=0.70	0.785	-0.015	6.670	0.002 ¹

¹ $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1 3/4" solid	15'	2'4"	64.0	2.405	3.071	108.238	0.028 ¹
T2	130 - 120	Valmont 208951 (12x1.25)	10'7/32'	10'7/32'	44.8	3.682	4.417	165.670	0.027 ¹
T3	120 - 100	Valmont 207628 (12x1.25)	20'13/32'	10'7/32'	45.4	3.682	13.386	165.670	0.081 ¹
T4	100 - 80	Valmont 207628 (12x1.25)	20'13/32'	10'7/32'	45.4	3.682	26.226	165.670	0.158 ¹
T5	80 - 60	Valmont 207628 (12x1.25)	20'13/32'	10'7/32'	45.4	3.682	39.908	165.670	0.241 ¹
T6	60 - 40	Valmont 207628 (12x1.25)	20'13/32'	10'7/32'	45.4	3.682	54.131	165.670	0.327 ¹
T7	40 - 20	Valmont 207628 (12x1.25)	20'13/32'	10'7/32'	45.4	3.682	68.311	165.670	0.412 ¹
T8	20 - 0	Valmont 207628 (12x1.25)	20'13/32'	10'7/32'	45.4	3.682	82.131	165.670	0.496 ¹

¹ $P_u / \phi P_n$ controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in ²	V_u K	ϕV_n K	Stress Ratio
T2	130 - 120	0.5	1'5- 21/32"	120.0	165.670	0.196	0.274	3.361	0.082
T3	120 - 100	0.5	1'5- 25/32"	121.0	165.670	0.196	0.322	3.292	0.098
T4	100 - 80	0.5	1'5- 25/32"	121.0	165.670	0.196	0.208	3.292	0.063
T5	80 - 60	0.5	1'5- 25/32"	121.0	165.670	0.196	0.216	3.292	0.066
T6	60 - 40	0.5	1'5- 25/32"	121.0	165.670	0.196	0.167	3.292	0.051
T7	40 - 20	0.5	1'5- 25/32"	121.0	165.670	0.196	0.209	3.292	0.064
T8	20 - 0	0.5	1'5- 25/32"	121.0	165.670	0.196	0.429	3.292	0.130

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	7/8" solid	5'6- 7/32"	2'8-1/8"	146.9	0.601	0.558	27.059	0.021 ¹
T2	130 - 120	L 2.5 x 2.5 x 3/16	11'5"	5'9/32"	80.0	0.518	1.180	22.546	0.052 ¹
T3	120 - 100	L 2.5 x 2.5 x 3/16	12'6- 1/32"	5'8- 1/32"	89.9	0.518	2.323	22.546	0.103 ¹
T4	100 - 80	L 2.5 x 2.5 x 3/16	13'9- 9/16"	6'4- 7/16"	100.7	0.518	2.997	22.546	0.133 ¹

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T5	80 - 60	L 2.5 x 2.5 x 3/16	15'2- 29/32"	7'1- 15/32"	112.3	0.518	3.475	22.546	0.154 ¹
T6	60 - 40	L 2.5 x 2.5 x 3/16	16'9- 5/8"	7'11- 3/32"	124.7	0.518	3.841	22.546	0.170 ¹
T7	40 - 20	L 3 x 3 x 3/16	18'5- 3/8"	8'9-1/8"	114.0	0.659	4.229	28.674	0.147 ¹
T8	20 - 0	L 3 x 3 x 3/16	20'1- 29/32"	9'7-1/2"	125.1	0.659	4.808	28.674	0.168 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1" solid	5'	4'10- 1/4"	233.0	0.785	0.143	35.343	0.004 ¹
T2	130 - 120	L 3 x 3 x 3/16	5'	4'6-1/4"	62.0	0.659	0.159	28.674	0.006 ¹

¹ P_u / φP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1" solid	5'	4'10- 1/4"	233.0	0.785	0.164	35.343	0.005 ¹

¹ P_u / φP_n controls

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	145 - 130	1" solid	5'	4'10- 1/4"	233.0	0.785	0.029	35.343	0.001 ¹

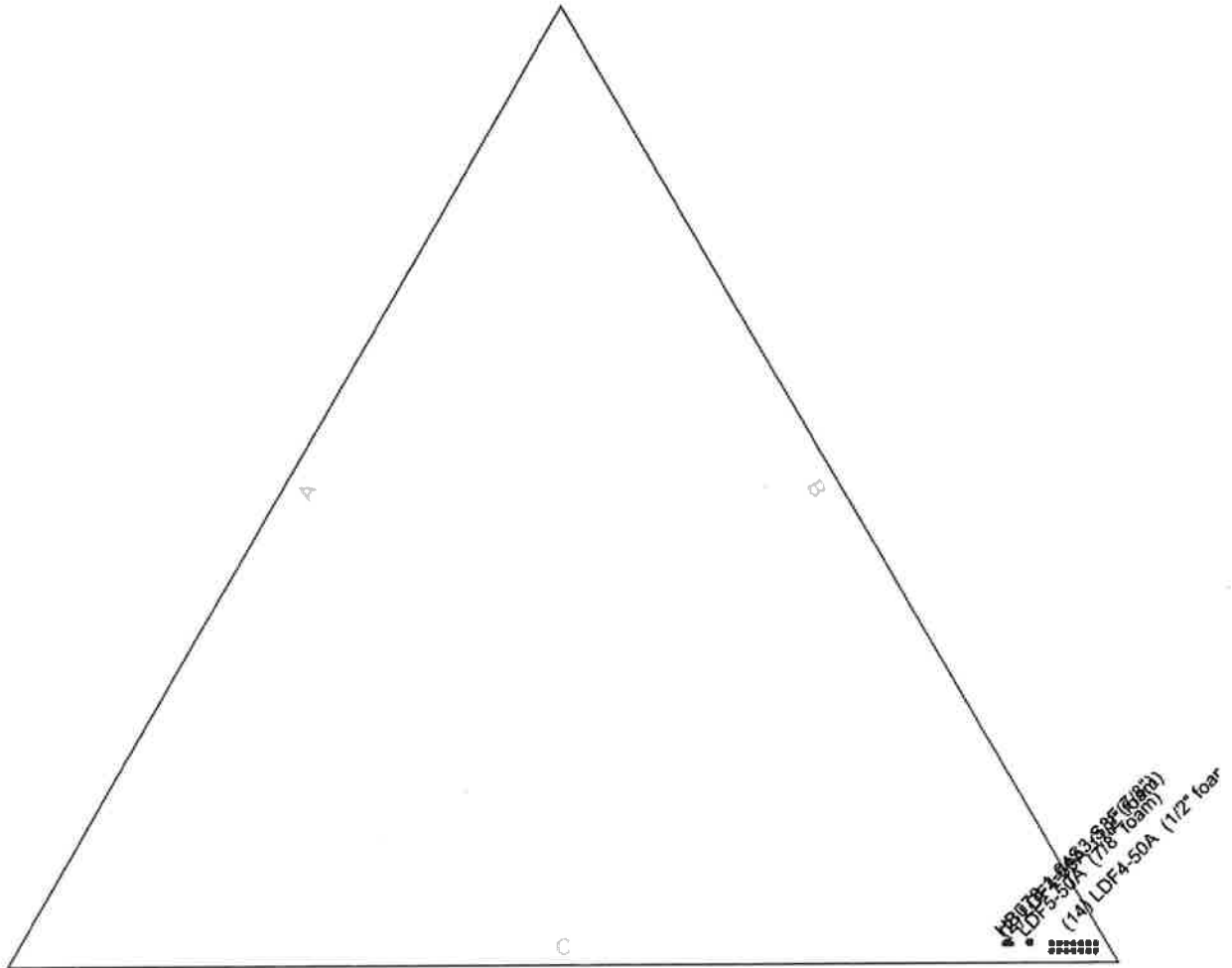
¹ P_u / φP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
T1	145 - 130	Leg	1 3/4" solid	2	-4.028	80.225	5.0	Pass
T2	130 - 120	Leg	Valmont 208951 (12x1.25)	50	-6.103	143.058	8.2	Pass
T3	120 - 100	Leg	Valmont 207628 (12x1.25)	61	-17.512	142.493	12.3	Pass
T4	100 - 80	Leg	Valmont 207628 (12x1.25)	76	-32.331	142.493	22.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
T5	80 - 60	Leg	Valmont 207628 (12x1.25)	92	-48.320	142.493	33.9	Pass	
T6	60 - 40	Leg	Valmont 207628 (12x1.25)	107	-65.103	142.493	45.7	Pass	
T7	40 - 20	Leg	Valmont 207628 (12x1.25)	122	-81.923	142.493	57.5	Pass	
T8	20 - 0	Leg	Valmont 207628 (12x1.25)	137	-98.500	142.493	69.1	Pass	
T1	145 - 130	Diagonal	7/8" solid	14	-0.568	7.769	7.3	Pass	
T2	130 - 120	Diagonal	L 2.5 x 2.5 x 3/16	56	-1.314	13.384	9.8	Pass	
T3	120 - 100	Diagonal	L 2.5 x 2.5 x 3/16	65	-2.373	10.790	12.9 (b) 22.0	Pass	
T4	100 - 80	Diagonal	L 2.5 x 2.5 x 3/16	80	-3.019	8.549	25.4 (b) 35.3	Pass	
T5	80 - 60	Diagonal	L 2.5 x 2.5 x 3/16	95	-3.508	6.833	51.3	Pass	
T6	60 - 40	Diagonal	L 2.5 x 2.5 x 3/16	109	-3.881	5.523	70.3	Pass	
T7	40 - 20	Diagonal	L 3 x 3 x 3/16	124	-4.315	7.923	54.5	Pass	
T8	20 - 0	Diagonal	L 3 x 3 x 3/16	139	-5.269	6.564	80.3	Pass	
T1	145 - 130	Top Girt	1" solid	6	-0.154	6.670	2.3	Pass	
T2	130 - 120	Top Girt	L 3 x 3 x 3/16	54	-0.153	19.371	0.8	Pass	
T1	145 - 130	Bottom Girt	1" solid	8	-0.151	6.670	1.6 (b) 2.3	Pass	
T1	145 - 130	Mid Girt	1" solid	12	-0.015	6.670	0.2	Pass	
							Summary		
							Leg (T8)	69.1	Pass
							Diagonal (T8)	80.3	Pass
							Top Girt (T1)	2.3	Pass
							Bottom Girt (T1)	2.3	Pass
							Mid Girt (T1)	0.2	Pass
							Bolt	47.3	Pass
							Checks		
							RATING =	80.3	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
5/8" x 10' Lightning Rod	145	ANT150F2	110
ANT150F2	145	3-Ft Standoff Mounts	110
ANT150F2	145	2" Dia 10' Omnl	105
ANT450F2	145	ANT150D	105
CO-41A	145	3-Ft Slide Arm Mount	105
(3) 3-Ft Standoff Mounts	145	3-Ft Standoff Mounts	105
ANT150F2	125	ANT150D	102
ANT150F2	125	3-Ft Slide Arm Mount	102
CO156AN	125	SP2-4.7	95
(3) 3-Ft Standoff Mounts	125	NH65PS-DF-F0M - VZW	70
ANT150D	115	RRFDC-3315-PF-48 - VZW	67
ANT150D	115	RRH2x80-AWS - VZW	67
3-Ft Side Arm Mount	115	2.375" OD x 6' Mount Pipe - VZW	66
3-Ft Slide Arm Mount	115		

SYMBOL LIST

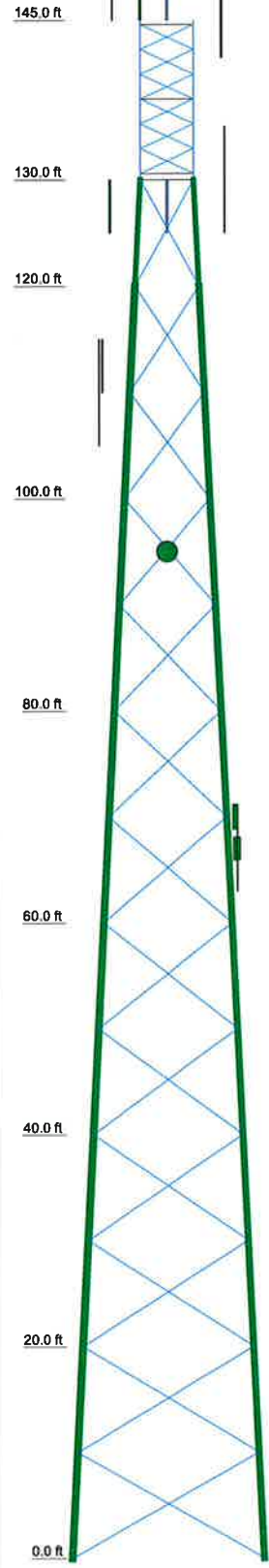
MARK	SIZE	MARK	SIZE
A	Valmont 208951 (12x1.25)		

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 Exposure B to the TIA-222-G Standard.
2. Tower designed for a 143 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0'

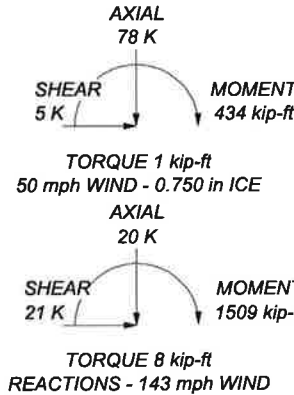


ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:

DOWN: 103 K
SHEAR: 13 K

UPLIFT: -86 K
SHEAR: 11 K



Legs	SR 1 3/4" solid	A	12	08
Leg Grade				
Diagonals	SR 7/8" solid			
Diagonal Grade	A572-50			
Top Girts	L 3 x 3 x 3/16		12	
Mid Girts				
Bottom Girts				
Face Width (ft)	18			
# Panels @ (ft)	14.4			
Weight (K)	14.4			

<p>Paul J Ford and Company 250 E. Broad Street Suite 600 Columbus, OH 43215 Phone: 614.221.6679 FAX: 614.448.4105</p>	<p>Job: 145-Ft Self-Support Tower: Uncasville, CT</p>		
	<p>Project: 42917-0011.001.8700</p>		
	<p>Client: On-Air Engineering</p>	<p>Drawn by: Kurt J Swarts</p>	<p>App'd:</p>
	<p>Code: TIA-222-G</p>	<p>Date: 08/29/17</p>	<p>Scale: N</p>
<p>Path:</p>		<p>Dwg No.:</p>	
<p><small>© TOWER0429 On Air Engineering 2017\HG017-0011 Uncasville BC3 CT\TJK042917-0011.001.8700.dwg</small></p>			

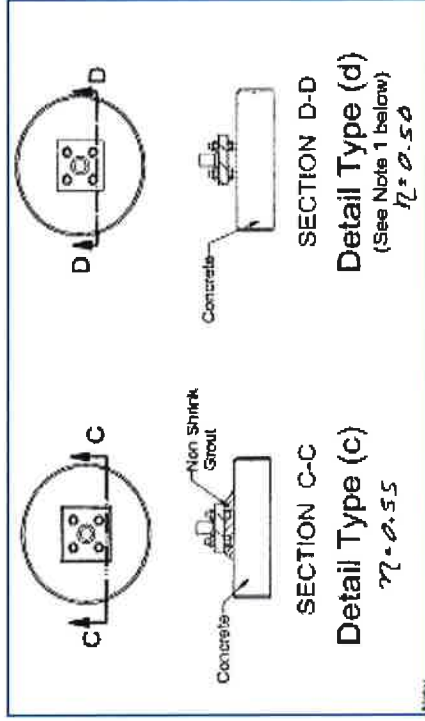
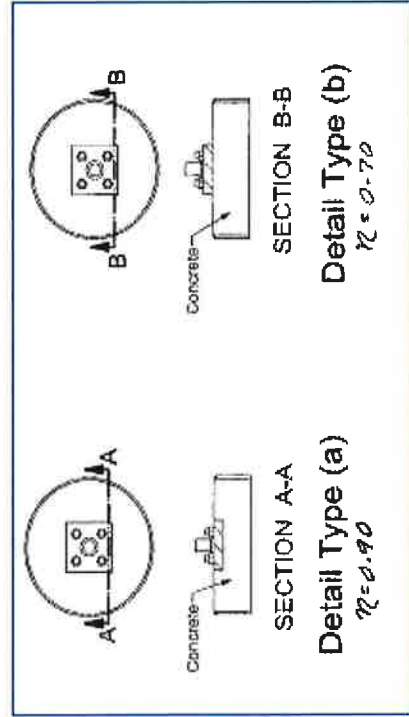
Self-Support Tower Anchor Rod Capacity - TIA-G

Loads		Maximum Ratio
Compression:	103 kips	1.00
Shear:	13 kips	

Existing Anchor Rods	
Anchor Rod Condition (n):	0.5
Anchor Rod ϕ :	1 in
Anchor Rod Quantity:	6
Anchor Rod Grade:	F1554 Gr. 105

F_y : 105 ksi
 F_u : 125 ksi
 Threads per Inch: 8
 Total Net Tensile Area: 3.63 in²
 ϕ : 0.8
 Total Anchor Rod Capacity ϕR_{nt} : 363.45 kip
 Anchor Rod Ratio: 0.355

I_{ar} : inches
 Moment: k-in

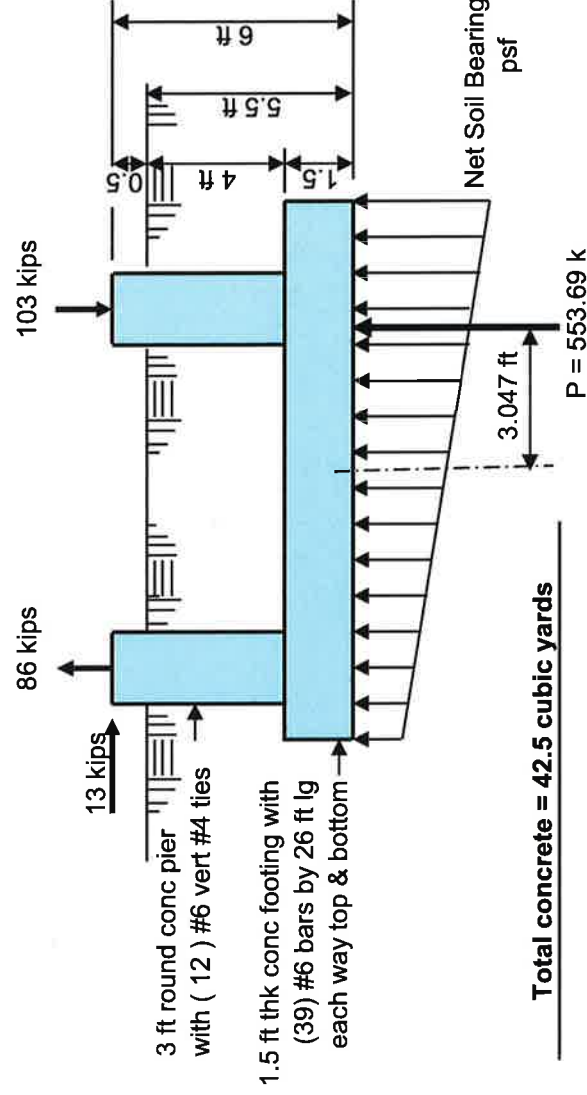
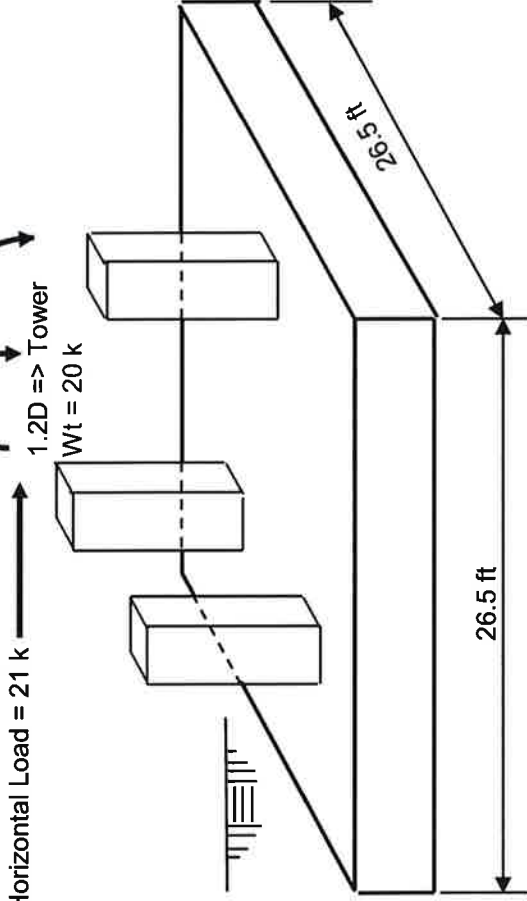


Combined Footing Foundation

- Concrete strength $F'_c = 4$ (ksi)
- Rebar Strength $F_y = 60$ (ksi)
- Soil Density = **100** (pcf)
- Depth to Water Table = **10** (ft)
- minimum cover over vert rebar = **3** inches

Overturning Moment = 1509 ft-k

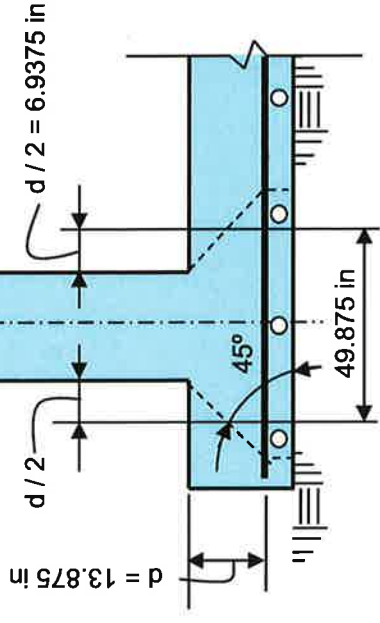
Total Horizontal Load = 21 k



Total concrete = 42.5 cubic yards

$P = 553.69 \text{ k}$

Net Soil Bearing = 672 psf



Ftg Overturning Resistance = 5502.2 ft-kips
 Total Overturning Moment = 1674 ft-kips
 Required Overturning Safety Factor = 1
 Overturning Safety Factor = 3.29
Ratio = 0.3 OK

Maximum Net Soil Bearing = 0.871 ksf
 Ultimate Net Soil Bearing = 6 ksf
Soil Bearing Stress Ratio = 0.15 OK

Ult Punching Shear Capacity = 253 psi
 Ult Punching Shear Force = 56 psi
Punching Shear Stress Ratio = 0.22 OK

Pad Bending Moment Capacity= 1035 ft-k
 Pad Bending Moment = 375 ft-k
Bending Moment Stress Ratio = 0.36 OK

Pier Rebar Capacity = -285.12 kips
 Pier Rebar Required = -86 kips
Pier Rebar Stress Ratio = 0.3 OK

Pad Bending Shear Capacity= 419 ft-k
 Pad Bending Shear = 39 ft-k
Bending Shear Stress Ratio = 0.09 OK