

May 12, 2021

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Subject: Structural Analysis Report

Verizon Wireless Designation: **Carrier Site Number:** 278206
Carrier Site Name: Williamson North Fort White

Engineering Firm Designation: **TEP Project Number:** 252166.499040

Site Data: **1282 SW Watson St., Fort White, Columbia County, FL 32038**
Latitude 30° 1' 19.83", Longitude -82° 41' 40.33"
250 Foot - Self Supporting Tower

Dear John Scandura,

Tower Engineering Professionals is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC1: Existing + Proposed Loading

Note: See Table 1 for the existing and proposed loading

Sufficient Capacity

Structure Capacity	Foundation Capacity
57.0%	60.6%

The analysis has been performed in accordance with the ANSI/TIA-222-H Structural Standard for Antenna Supporting Structures, Antennas, and Small Wind Turbine Support Structures and the 2020 Florida Building Code, 7th Edition.

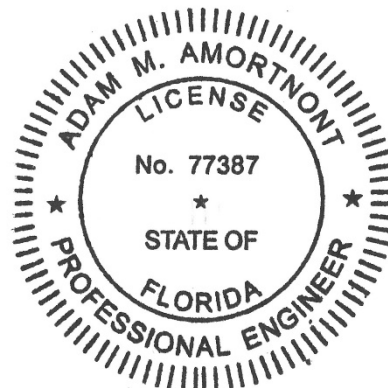
All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Table 1 for the determined available structural capacity to be effective.

We at *Tower Engineering Professionals* appreciate the opportunity of providing our continuing professional services to you and *Verizon Wireless*. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Matthew T. Weavil, P.E. / ANH

Respectfully submitted by:

Adam M. Amortnont, P.E.



This item has been electronically signed and sealed by Adam M. Amortnont, P.E. on 05/12/2021 using a Digital Signature.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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1) INTRODUCTION

This tower is a 250-ft self supporting tower designed by Valmont Structures. All information provided to TEP was to be assumed accurate and complete.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	120 mph
Exposure Category:	C
Topographic Factor:	1.0
Service Wind Speed:	60 mph

Table 1 - Existing and Proposed Antenna and Cable Information

Existing/ Proposed/	Mount Level (ft)	Ant CL (ft)	Qty	Antenna Model	Mount Type	Qty Coax	Coax Size	Coax Location	Owner/ Tenant
Proposed	247.0	250.0	3	Ericsson VZE01	(3) Sector Mounts w/ Modifications	1	12x24	CA Face	Verizon
			3	Ericsson 8843 B2/B66A					
			1	Raycap RHSDC-6627-PF-48					
Existing	247.0	250.0	6	CSS Antenna X7CQAP-86-865-V-1		1 12	12x24 1-5/8	CA Face	
			3	Ericsson 8843 B2/B66A					
			3	Ericsson 4449 B13/B5					
			3	Commscope BAIST					
			1	Raycap RCMDC-6627-PF-48					

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Source
Geotechnical Report	Madrid Engineering Group, Inc., dated May 29, 2014 Project No.: 11404	Verizon
Mount Modification Report	Maser Consulting, dated February 16, 2021 Maser Consulting Project #: 20944772A	Verizon
Previous Structural Analysis	Tectonic Engineering & Surveying Consultants, P.C., dated April 18, 2018 Tectonic W.O.: 9126.32	Verizon
Correspondence	Correspondence from Verizon with regards to the existing and proposed loading.	Verizon

3.1) Analysis Method

tnxTower (version 8.0.9.0), 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) The tower and foundation were built in accordance with the manufacturer's specifications.
- 2) The tower and foundation have been maintained in accordance with the manufacturer's specification.
- 3) All tower components are in sufficient condition to carry their full design capacity.
- 4) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
- 5) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not analyze antennas supporting mounts as part of this structural analysis report.
- 6) Unless specified by the client or tower mapping, the location of the existing coax is assumed by TEP and listed in Table 1.
- 7) TEP assumed the tower geometry, anchor rods, and foundation parameters in the previous structural analysis prepared by Tectonic Engineering & Surveying Consultants, P.C., dated April 18, 2018 was correct. Tectonic Engineering & Surveying Consultants, P.C. had the original tower and foundation documents listed in their report under "3.0 Reference Documents".
- 8) TEP assumed the tower member grades based on similar Manufacture Drawings for Valmont Truss Leg Towers.

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals 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)	ϕP_{allow} (K)	% Capacity	Pass / Fail
T1	250 - 240	Leg	1 1/2	2	-16.83	52.70	31.9	Pass
T2	240 - 220	Leg	2	44	-65.32	114.59	57.0	Pass
T3	220 - 200	Leg	Valmont 194434	122	-83.38	174.61	47.8	Pass
T4	200 - 180	Leg	Valmont 194651	140	-103.52	260.85	39.7	Pass
T5	180 - 160	Leg	Valmont 195213	155	-124.73	365.36	34.1	Pass
T6	160 - 140	Leg	Valmont 195217	170	-145.70	365.36	39.9	Pass
T7	140 - 120	Leg	Valmont 195217	185	-167.74	365.36	45.9	Pass
T8	120 - 100	Leg	Valmont 195637	200	-181.35	422.03	43.0	Pass
T9	100 - 80	Leg	Valmont 195960	209	-206.07	534.43	38.6	Pass
T10	80 - 60	Leg	Valmont 195960	218	-227.22	534.43	42.5	Pass
T11	60 - 40	Leg	Valmont 195960	227	-248.85	534.43	46.6	Pass
T12	40 - 20	Leg	Valmont 195962	236	-273.21	660.20	41.4	Pass
T13	20 - 0	Leg	Valmont 195964	245	-292.80	660.20	44.4	Pass
T1	250 - 240	Diagonal	3/4	20	-3.00	6.06	49.5	Pass
T2	240 - 220	Diagonal	7/8	54	-3.93	11.48	34.2	Pass
T3	220 - 200	Diagonal	L3x3x5/16	138	-6.77	43.73	15.5	Pass
T4	200 - 180	Diagonal	L2 1/2x2 1/2x3/16	144	-4.35	14.35	30.3	Pass
T5	180 - 160	Diagonal	L2 1/2x2 1/2x1/4	159	-4.51	14.76	30.5	Pass
T6	160 - 140	Diagonal	L3x3x3/16	174	-4.84	15.92	30.4	Pass
T7	140 - 120	Diagonal	L3x3x3/16	190	-5.21	12.87	40.4	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	ϕP_{allow} (K)	% Capacity	Pass / Fail
T8	120 - 100	Diagonal	2L3x3x3/16x3/8	204	-9.34	26.29	35.5	Pass
T9	100 - 80	Diagonal	2L3x3x3/16x3/8	213	-8.25	23.82	34.6	Pass
T10	80 - 60	Diagonal	2L3x3x3/16x3/8	222	-8.93	21.54	41.4	Pass
T11	60 - 40	Diagonal	2L3 1/2x3 1/2x1/4x3/8	231	-10.17	40.69	25.0	Pass
T12	40 - 20	Diagonal	2L3 1/2x3 1/2x1/4x3/8	241	-9.15	36.80	24.9	Pass
T13	20 - 0	Diagonal	2L3 1/2x3 1/2x1/4x3/8	249	-11.75	33.32	35.3	Pass
T1	250 - 240	Horizontal	3/4	36	-0.66	3.48	19.0	Pass
T2	240 - 220	Horizontal	3/4	58	-1.20	3.55	33.7	Pass
T1	250 - 240	Top Girt	3/4	5	-0.20	3.48	5.7	Pass
T2	240 - 220	Top Girt	7/8	46	-1.20	6.58	18.2	Pass
T3	220 - 200	Top Girt	L3x3x3/16	126	1.99	30.11	6.6	Pass
T1	250 - 240	Bottom Girt	3/4	9	-0.43	3.48	12.4	Pass
T2	240 - 220	Bottom Girt	7/8	49	-1.20	6.58	18.2	Pass
							Summary	
						Leg (T2)	57.0	Pass
						Diagonal (T1)	49.5	Pass
						Horizontal (T2)	33.7	Pass
						Top Girt (T2)	18.2	Pass
						Bottom Girt (T2)	18.2	Pass
						Bolt Checks	52.9	Pass
						RATING =	57.0	Pass

Table 4 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	-	38.0	Pass
1,2	Base Foundation Soil Interaction	-	60.6	Pass
1,2	Base Foundation Structural	-	21.1	Pass

Structure Rating (max from all components) =	60.6%
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Notes:

- 1) See additional documentation in "Appendix B - Additional Calculations" for calculations supporting the % capacity listed.
- 2) Rating per TIA-222-H, Section 15.5

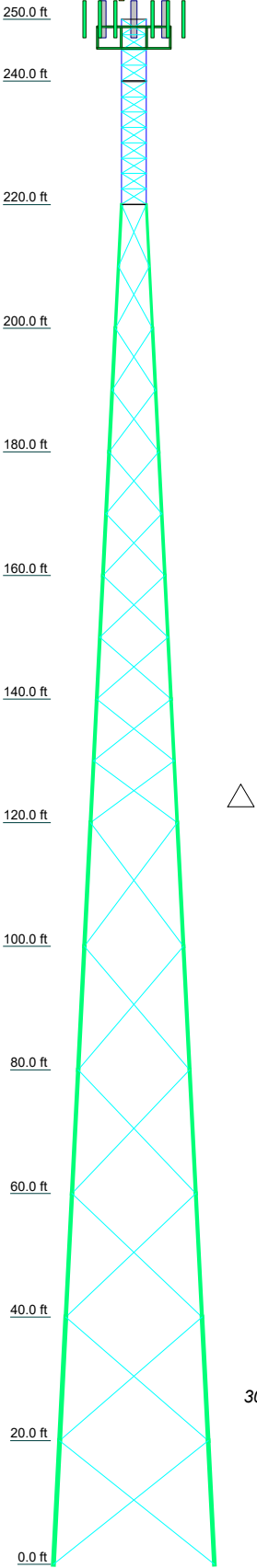
4.1) Recommendations

- 1) If the load differs from that described in Table 1 of this report, the referenced drawings, or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
- 2) The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

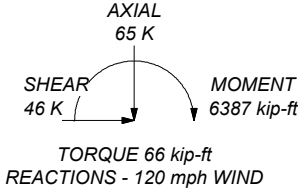
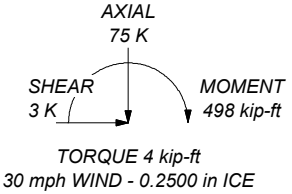
Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	
Legs	SR 1 1/2	SR 2	Valmont 194434	Valmont 194651	Valmont 195213	Valmont 195217		Valmont 195637	Valmont 195960	Valmont 195962	Valmont 195964	Valmont 195962	Valmont 195964	
Leg Grade	A572-50	SR 7/8	L3x3x5/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x1/4	L3x3x3/16		A572-58	2L3x3x3/16x3/8	2L3 1/2x3 1/2x1/4x3/8		2L3 1/2x3 1/2x1/4x3/8		
Diagonals	SR 3/4	SR 7/8						A36						
Diagonal Grade	A36	A572-50												
Top Girts	SR 3/4	SR 7/8	L3x3x3/16					N.A.						
Bottom Girts	SR 3/4	SR 7/8						N.A.						
Horizontals								N.A.						
Face Width (ft)	4		6	8	10 @ 10	12	14	16	18	20	22	24	26	
# Panels @ (ft)		12 @ 2.47917								6 @ 20				
Weight (K)	0.4	1.3	2.3	2.2	2.8	2.8	2.9	3.8	4.3	4.4	5.2	5.9	6.0	44.3



ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 305 K
SHEAR: 31 K

UPLIFT: -257 K
SHEAR: 26 K



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12" x 24" Beacon	250	RRUS 4449 B13/B5	247
2.4" Dia. x 6-ft	250	RRUS 4449 B13/B5	247
VZE01 w/ Mount Pipe	247	RCMDC-6627-PF-48	247
VZE01 w/ Mount Pipe	247	RHSDC-6627-PF-48	247
VZE01 w/ Mount Pipe	247	2.9" Dia. x 12.5' Pipe	247
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	247	2.9" Dia. x 12.5' Pipe	247
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	247	2.9" Dia. x 12.5' Pipe	247
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	247	(4) L2 1/2x2 1/4x1/4 x 8-ft	247
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	247	(4) L2 1/2x2 1/4x1/4 x 8-ft	247
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	247	(4) L2 1/2x2 1/4x1/4 x 8-ft	247
(2) RRUS 8843 B2/B66A	247	2.4" Dia. x 10-ft Mount Pipe	247
(2) RRUS 8843 B2/B66A	247	2.4" Dia. x 10-ft Mount Pipe	247
(2) RRUS 8843 B2/B66A	247	2.4" Dia. x 10-ft Mount Pipe	247
RRUS 4449 B13/B5	247	Sector Mount [SM 502-3]	247

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A572-58	58 ksi	75 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 120 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 30 mph basic wind with 0.25 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 57%



Tower Engineering Professionals

Tower Engineering Professionals

326 Tryon Road
Raleigh, NC

Phone: (919)-661-6351
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Job: **278206 - Williamson North Fort White**

Project: **TEP No. 252166.499040**

Client: Verizon Wireless	Drawn by: anhowe	App'd:
Code: TIA-222-H	Date: 05/11/21	Scale: NTS
Path: C:\Users\anhowe.TOWER\Desktop\SAs\Fort Williamson\278206 - Williamson North Fort White.dwg		Dwg No. E-1

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	Project TEP No. 252166.499040	Date 12:23:17 05/11/21
	Client Verizon Wireless	Designed by anhowe

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 250.00 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 4.00 ft at the top and 26.00 ft at the base.

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

The following design criteria apply:

Tower base elevation above sea level: 81.00 ft.

Basic wind speed of 120 mph.

Risk Category II.

Exposure Category C.

Simplified Topographic Factor Procedure for wind speed-up calculations is used.

Topographic Category: 1.

Crest Height: 0.00 ft.

Nominal ice thickness of 0.2500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 30 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

Stress ratio used in tower member design is 1.

Tower analysis based on target reliabilities in accordance with Annex S.

Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.

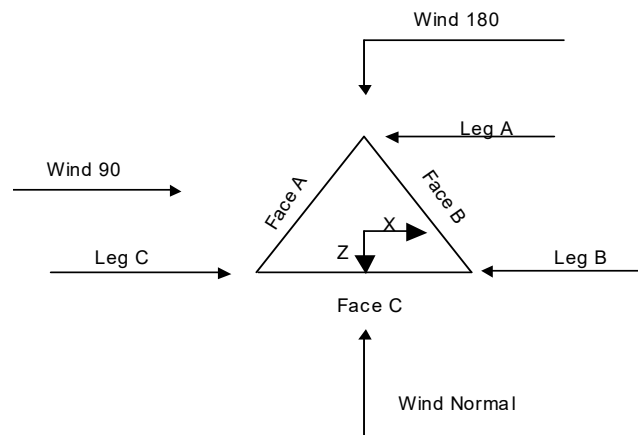
Maximum demand-capacity ratio is: 1.05.

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-H Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-H 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	Ignore KL/ry For 60 Deg. Angle Legs	Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are
		Known

tnxTower Tower Engineering Professionals 326 Tryon Road Raleigh, NC Phone: (919)-661-6351 FAX: (919)-661-6350	Job 278206 - Williamson North Fort White	Page 2 of 21
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	Client Verizon Wireless	Designed by anhowe



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	250.00-240.00			4.00	1	10.00
T2	240.00-220.00			4.00	1	20.00
T3	220.00-200.00			4.00	1	20.00
T4	200.00-180.00			6.00	1	20.00
T5	180.00-160.00			8.00	1	20.00
T6	160.00-140.00			10.00	1	20.00
T7	140.00-120.00			12.00	1	20.00
T8	120.00-100.00			14.00	1	20.00
T9	100.00-80.00			16.00	1	20.00
T10	80.00-60.00			18.00	1	20.00
T11	60.00-40.00			20.00	1	20.00
T12	40.00-20.00			22.00	1	20.00
T13	20.00-0.00			24.00	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T1	250.00-240.00	2.48	X Brace	No	Yes	0.0000	1.0000
T2	240.00-220.00	2.48	X Brace	No	Yes	1.0000	1.0000

<i>tnxTower</i> <i>Tower Engineering Professionals</i> 326 Tryon Road Raleigh, NC Phone: (919)-661-6351 FAX: (919)-661-6350	Job	278206 - Williamson North Fort White	Page	3 of 21
	Project	TEP No. 252166.499040	Date	12:23:17 05/11/21
	Client	Verizon Wireless	Designed by	anhowe

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Diagonal Spacing</i>	<i>Bracing Type</i>	<i>Has K Brace End Panels</i>	<i>Has Horizontals</i>	<i>Top Girt Offset</i>	<i>Bottom Girt Offset</i>
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T3	220.00-200.00	10.00	X Brace	No	No	0.0000	0.0000
T4	200.00-180.00	10.00	X Brace	No	No	0.0000	0.0000
T5	180.00-160.00	10.00	X Brace	No	No	0.0000	0.0000
T6	160.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T7	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T8	120.00-100.00	20.00	X Brace	No	No	0.0000	0.0000
T9	100.00-80.00	20.00	X Brace	No	No	0.0000	0.0000
T10	80.00-60.00	20.00	X Brace	No	No	0.0000	0.0000
T11	60.00-40.00	20.00	X Brace	No	No	0.0000	0.0000
T12	40.00-20.00	20.00	X Brace	No	No	0.0000	0.0000
T13	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>Leg Type</i>	<i>Leg Size</i>	<i>Leg Grade</i>	<i>Diagonal Type</i>	<i>Diagonal Size</i>	<i>Diagonal Grade</i>
<i>ft</i>						
T1 250.00-240.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 240.00-220.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 220.00-200.00	Truss Leg	Valmont 194434	A572-58 (58 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T4 200.00-180.00	Truss Leg	Valmont 194651	A572-58 (58 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 180.00-160.00	Truss Leg	Valmont 195213	A572-58 (58 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T6 160.00-140.00	Truss Leg	Valmont 195217	A572-58 (58 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 140.00-120.00	Truss Leg	Valmont 195217	A572-58 (58 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T8 120.00-100.00	Truss Leg	Valmont 195637	A572-58 (58 ksi)	Double Angle	2L3x3x3/16x3/8	A36 (36 ksi)
T9 100.00-80.00	Truss Leg	Valmont 195960	A572-58 (58 ksi)	Double Angle	2L3x3x3/16x3/8	A36 (36 ksi)
T10 80.00-60.00	Truss Leg	Valmont 195960	A572-58 (58 ksi)	Double Angle	2L3x3x3/16x3/8	A36 (36 ksi)
T11 60.00-40.00	Truss Leg	Valmont 195960	A572-58 (58 ksi)	Double Angle	2L3 1/2x3 1/2x1/4x3/8	A36 (36 ksi)
T12 40.00-20.00	Truss Leg	Valmont 195962	A572-58 (58 ksi)	Double Angle	2L3 1/2x3 1/2x1/4x3/8	A36 (36 ksi)
T13 20.00-0.00	Truss Leg	Valmont 195964	A572-58 (58 ksi)	Double Angle	2L3 1/2x3 1/2x1/4x3/8	A36 (36 ksi)

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>Top Girt Type</i>	<i>Top Girt Size</i>	<i>Top Girt Grade</i>	<i>Bottom Girt Type</i>	<i>Bottom Girt Size</i>	<i>Bottom Girt Grade</i>
<i>ft</i>						
T1 250.00-240.00	Solid Round	3/4	A36 (36 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 240.00-220.00	Solid Round	7/8	A572-50	Solid Round	7/8	A572-50

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<i>Tower Elevation ft</i>	<i>Top Girt Type</i>	<i>Top Girt Size</i>	<i>Top Girt Grade</i>	<i>Bottom Girt Type</i>	<i>Bottom Girt Size</i>	<i>Bottom Girt Grade</i>
T3 220.00-200.00	Equal Angle	L3x3x3/16	(50 ksi) A36 (36 ksi)	Solid Round		(50 ksi) A36 (36 ksi)

Tower Section Geometry (cont'd)

<i>Tower Elevation ft</i>	<i>No. of Mid Girts</i>	<i>Mid Girt Type</i>	<i>Mid Girt Size</i>	<i>Mid Girt Grade</i>	<i>Horizontal Type</i>	<i>Horizontal Size</i>	<i>Horizontal Grade</i>
T1 250.00-240.00	None	Flat Bar		A36 (36 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 240.00-220.00	None	Flat Bar		A36 (36 ksi)	Solid Round	3/4	A36 (36 ksi)

Tower Section Geometry (cont'd)

<i>Tower Elevation ft</i>	<i>Gusset Area (per face) ft²</i>	<i>Gusset Thickness in</i>	<i>Gusset Grade</i>	<i>Adjust. Factor A_f</i>	<i>Adjust. Factor A_r</i>	<i>Weight Mult.</i>	<i>Double Angle Stitch Bolt Spacing Diagonals in</i>	<i>Double Angle Stitch Bolt Spacing Horizontals in</i>	<i>Double Angle Stitch Bolt Spacing Redundants in</i>
T1 250.00-240.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 240.00-220.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 220.00-200.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T4 200.00-180.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T5 180.00-160.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T6 160.00-140.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T7 140.00-120.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T8 120.00-100.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	Third-Pt	36.0000	36.0000
T9 100.00-80.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	Third-Pt	36.0000	36.0000
T10 80.00-60.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	Third-Pt	36.0000	36.0000
T11 60.00-40.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	Third-Pt	36.0000	36.0000
T12 40.00-20.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	Third-Pt	36.0000	36.0000
T13 20.00-0.00	0.00	0.3750	A36 (36 ksi)	1.03	1	1.05	Third-Pt	36.0000	36.0000

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Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
250.00-240.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
240.00-220.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
220.00-200.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
200.00-180.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T12	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T13	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				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 ft	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
T3	1	0.5	0.7	1	0.5	0.85
220.00-200.00						
T4	1	0.5	0.7	1	0.5	0.85
200.00-180.00						
T5	1	0.5	0.7	1	0.5	0.85
180.00-160.00						
T6	1	0.5	0.7	1	0.5	0.85
160.00-140.00						
T7	1	0.5	0.7	1	0.5	0.85
140.00-120.00						
T8	1	0.5	0.7	1	0.5	0.85
120.00-100.00						
T9	1	0.5	0.7	1	0.5	0.85
100.00-80.00						

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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.
T13 20.00-0.00	Flange	0.0000 A325N	0	0.8750 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8 ***	B	No	No	Ar (CaAa)	250.00 - 0.00	0.0000	0.5	1	1	0.3750	0.3750		0.22
Feedline Ladder (Af)	A	No	No	Af (CaAa)	250.00 - 0.00	0.0000	0.4	1	1	3.0000	3.0000		8.40
LDF7-50A(1- 5/8)	A	No	No	Ar (CaAa)	250.00 - 0.00	0.0000	0.4	12	6	0.5000	1.9800		0.82
MLCH 12/24 LOW INDUCTION(2) ***** *****	A	No	No	Ar (CaAa)	250.00 - 0.00	0.0000	0.43	2	1	0.5000	2.0160		3.04

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf
***** ***								

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	250.00-240.00	A	0.000	0.000	32.792	0.000	0.24
		B	0.000	0.000	0.375	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	240.00-220.00	A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	220.00-200.00	A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00

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<i>Tower Section</i>	<i>Tower Elevation ft</i>	<i>Face</i>	<i>A_R</i>	<i>A_F</i>	<i>C_AA_A In Face</i>	<i>C_AA_A Out Face</i>	<i>Weight</i>
			<i>ft²</i>	<i>ft²</i>	<i>ft²</i>	<i>ft²</i>	<i>K</i>
T4	200.00-180.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T5	180.00-160.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T6	160.00-140.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T7	140.00-120.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T8	120.00-100.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T9	100.00-80.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T10	80.00-60.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T11	60.00-40.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T12	40.00-20.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
T13	20.00-0.00	C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	65.584	0.000	0.49
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

<i>Tower Section</i>	<i>Tower Elevation ft</i>	<i>Face or Leg</i>	<i>Ice Thickness in</i>	<i>A_R</i>	<i>A_F</i>	<i>C_AA_A In Face</i>	<i>C_AA_A Out Face</i>	<i>Weight</i>
				<i>ft²</i>	<i>ft²</i>	<i>ft²</i>	<i>ft²</i>	<i>K</i>
T1	250.00-240.00	A	0.260	0.000	0.000	32.221	0.000	0.41
		B		0.000	0.000	0.894	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	240.00-220.00	A	0.258	0.000	0.000	64.414	0.000	0.82
		B		0.000	0.000	1.782	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T3	220.00-200.00	A	0.256	0.000	0.000	64.374	0.000	0.82
		B		0.000	0.000	1.773	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T4	200.00-180.00	A	0.253	0.000	0.000	64.331	0.000	0.82
		B		0.000	0.000	1.763	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T5	180.00-160.00	A	0.250	0.000	0.000	64.283	0.000	0.82
		B		0.000	0.000	1.751	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T6	160.00-140.00	A	0.247	0.000	0.000	80.418	0.000	0.70
		B		0.000	0.000	1.739	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T7	140.00-120.00	A	0.244	0.000	0.000	80.208	0.000	0.70
		B		0.000	0.000	1.725	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00

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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
T8	120.00-100.00	A	0.240	0.000	0.000	79.965	0.000	0.69
		B		0.000	0.000	1.709	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T9	100.00-80.00	A	0.235	0.000	0.000	79.680	0.000	0.69
		B		0.000	0.000	1.690	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T10	80.00-60.00	A	0.229	0.000	0.000	79.330	0.000	0.68
		B		0.000	0.000	1.666	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T11	60.00-40.00	A	0.222	0.000	0.000	78.875	0.000	0.68
		B		0.000	0.000	1.636	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T12	40.00-20.00	A	0.210	0.000	0.000	78.213	0.000	0.67
		B		0.000	0.000	1.592	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T13	20.00-0.00	A	0.189	0.000	0.000	76.899	0.000	0.65
		B		0.000	0.000	1.504	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	250.00-240.00	-1.7494	-14.1405	-1.2920	-12.2565
T2	240.00-220.00	-1.6311	-13.3136	-1.2382	-11.7823
T3	220.00-200.00	-1.0363	-10.4043	-0.8305	-9.6170
T4	200.00-180.00	-1.2104	-13.8582	-0.9336	-12.7571
T5	180.00-160.00	-1.2998	-16.3333	-0.9844	-15.0672
T6	160.00-140.00	-1.3229	-17.9391	-0.9714	-16.7173
T7	140.00-120.00	-1.4047	-20.0280	-1.0226	-18.6895
T8	120.00-100.00	-1.6529	-23.9906	-1.1798	-22.1740
T9	100.00-80.00	-1.7289	-25.8383	-1.2321	-23.9223
T10	80.00-60.00	-1.8346	-28.0924	-1.3090	-26.0443
T11	60.00-40.00	-1.8264	-28.8051	-1.3230	-26.9776
T12	40.00-20.00	-1.8750	-30.0916	-1.3758	-28.2889
T13	20.00-0.00	-1.9542	-31.8574	-1.4785	-30.1505

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	Safety Line 3/8	240.00 - 250.00	0.6000	0.6000
T1	3	Feedline Ladder (Af)	240.00 - 250.00	0.6000	0.6000
T1	4	LDF7-50A(1-5/8)	240.00 - 250.00	0.6000	0.6000
T1	5	MLCH 12/24 LOW INDUCTION(2)	240.00 - 250.00	0.6000	0.6000
T2	1	Safety Line 3/8	220.00 -	0.6000	0.6000

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<i>Tower Section</i>	<i>Feed Line Record No.</i>	<i>Description</i>	<i>Feed Line Segment Elev.</i>	<i>K_a No Ice</i>	<i>K_a Ice</i>
T2	3	Feedline Ladder (Af)	240.00 - 220.00	0.6000	0.6000
T2	4	LDF7-50A(1-5/8)	240.00 - 220.00	0.6000	0.6000
T2	5	MLCH 12/24 LOW INDUCTION(2)	240.00 - 220.00	0.6000	0.6000
T3	1	Safety Line 3/8	220.00 - 200.00	0.6000	0.6000
T3	3	Feedline Ladder (Af)	200.00 - 220.00	0.6000	0.6000
T3	4	LDF7-50A(1-5/8)	220.00 - 200.00	0.6000	0.6000
T3	5	MLCH 12/24 LOW INDUCTION(2)	200.00 - 220.00	0.6000	0.6000
T4	1	Safety Line 3/8	220.00 - 180.00	0.6000	0.6000
T4	3	Feedline Ladder (Af)	200.00 - 180.00	0.6000	0.6000
T4	4	LDF7-50A(1-5/8)	180.00 - 200.00	0.6000	0.6000
T4	5	MLCH 12/24 LOW INDUCTION(2)	200.00 - 180.00	0.6000	0.6000
T5	1	Safety Line 3/8	180.00 - 160.00	0.6000	0.6000
T5	3	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.6000
T5	4	LDF7-50A(1-5/8)	180.00 - 160.00	0.6000	0.6000
T5	5	MLCH 12/24 LOW INDUCTION(2)	160.00 - 180.00	0.6000	0.6000
T6	1	Safety Line 3/8	180.00 - 140.00	0.6000	0.6000
T6	3	Feedline Ladder (Af)	160.00 - 140.00	0.6000	0.6000
T6	4	LDF7-50A(1-5/8)	140.00 - 160.00	0.6000	0.6000
T6	5	MLCH 12/24 LOW INDUCTION(2)	160.00 - 140.00	0.6000	0.6000
T7	1	Safety Line 3/8	140.00 - 120.00	0.6000	0.6000
T7	3	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T7	4	LDF7-50A(1-5/8)	140.00 - 120.00	0.6000	0.6000
T7	5	MLCH 12/24 LOW INDUCTION(2)	120.00 - 140.00	0.6000	0.6000
T8	1	Safety Line 3/8	140.00 - 100.00	0.6000	0.6000
T8	3	Feedline Ladder (Af)	120.00 - 100.00	0.6000	0.6000
T8	4	LDF7-50A(1-5/8)	100.00 - 120.00	0.6000	0.6000
T8	5	MLCH 12/24 LOW INDUCTION(2)	120.00 - 100.00	0.6000	0.6000
T9	1	Safety Line 3/8	100.00 - 80.00	0.6000	0.6000
T9	3	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T9	4	LDF7-50A(1-5/8)	100.00 - 80.00	0.6000	0.6000
T9	5	MLCH 12/24 LOW INDUCTION(2)	80.00 - 100.00	0.6000	0.6000
T10	1	Safety Line 3/8	80.00 - 60.00	0.6000	0.6000
T10	3	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T10	4	LDF7-50A(1-5/8)	60.00 - 80.00	0.6000	0.6000
T10	5	MLCH 12/24 LOW INDUCTION(2)	60.00 - 80.00	0.6000	0.6000
T11	1	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T11	3	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T11	4	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T11	5	MLCH 12/24 LOW INDUCTION(2)	40.00 - 60.00	0.6000	0.6000
T12	1	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T12	3	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T12	4	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T12	5	MLCH 12/24 LOW INDUCTION(2)	20.00 - 40.00	0.6000	0.6000
T13	1	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T13	3	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T13	4	LDF7-50A(1-5/8)	0.00 - 20.00	0.6000	0.6000
T13	5	MLCH 12/24 LOW INDUCTION(2)	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 Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
** misc **									
12" x 24" Beacon	C	From Leg	0.00 0.00 3.00	0.0000	250.00	No Ice 1/2" Ice	1.00 1.58	1.00 1.58	0.03 0.05
2.4" Dia. x 6-ft	C	From Leg	0.00 0.00 1.50	0.0000	250.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	0.02 0.03
247									
VZE01 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	247.00	No Ice 1/2" Ice	5.60 6.43	4.45 5.49	0.13 0.18
VZE01 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	247.00	No Ice 1/2" Ice	5.60 6.43	4.45 5.49	0.13 0.18
VZE01 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	247.00	No Ice 1/2" Ice	5.60 6.43	4.45 5.49	0.13 0.18
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	247.00	No Ice 1/2" Ice	13.44 14.04	9.71 11.13	0.08 0.18
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	247.00	No Ice 1/2" Ice	13.44 14.04	9.71 11.13	0.08 0.18
(2) X7CQAP-86-865-VR0 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	247.00	No Ice 1/2" Ice	13.44 14.04	9.71 11.13	0.08 0.18
(2) RRUS 8843 B2/B66A	A	From Leg	4.00	0.0000	247.00	No Ice	1.64	1.35	0.07

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<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>	<i>C_{AA} Front ft²</i>	<i>C_{AA} Side ft²</i>	<i>Weight K</i>
			0.00		1/2" Ice	1.80	1.50	0.09
			3.00					
(2) RRUS 8843 B2/B66A	B	From Leg	4.00	0.0000	247.00	No Ice	1.64	1.35
			0.00		1/2" Ice	1.80	1.50	0.07
			3.00					0.09
(2) RRUS 8843 B2/B66A	C	From Leg	4.00	0.0000	247.00	No Ice	1.64	1.35
			0.00		1/2" Ice	1.80	1.50	0.07
			3.00					0.09
RRUS 4449 B13/B5	A	From Leg	4.00	0.0000	247.00	No Ice	1.98	1.41
			0.00		1/2" Ice	2.16	1.57	0.07
			3.00					0.09
RRUS 4449 B13/B5	B	From Leg	4.00	0.0000	247.00	No Ice	1.98	1.41
			0.00		1/2" Ice	2.16	1.57	0.07
			3.00					0.09
RRUS 4449 B13/B5	C	From Leg	4.00	0.0000	247.00	No Ice	1.98	1.41
			0.00		1/2" Ice	2.16	1.57	0.07
			3.00					0.09
RCMDC-6627-PF-48	C	From Leg	4.00	0.0000	247.00	No Ice	4.06	3.10
			0.00		1/2" Ice	4.32	3.34	0.03
			3.00					0.07
RHSDC-6627-PF-48	B	From Leg	4.00	0.0000	247.00	No Ice	4.06	3.10
			0.00		1/2" Ice	4.32	3.34	0.03
			3.00					0.07
2.9" Dia. x 12.5' Pipe	A	From Leg	4.00	0.0000	247.00	No Ice	3.63	3.63
			0.00		1/2" Ice	4.91	4.91	0.07
			0.00					0.10
2.9" Dia. x 12.5' Pipe	B	From Leg	4.00	0.0000	247.00	No Ice	3.63	3.63
			0.00		1/2" Ice	4.91	4.91	0.07
			0.00					0.10
2.9" Dia. x 12.5' Pipe	C	From Leg	4.00	0.0000	247.00	No Ice	3.63	3.63
			0.00		1/2" Ice	4.91	4.91	0.07
			0.00					0.10
(4) L2 1/2x2 1/4x1/4 x 8-ft	A	From Leg	2.00	0.0000	247.00	No Ice	3.33	3.33
			0.00		1/2" Ice	4.25	4.25	0.03
			0.00					0.05
(4) L2 1/2x2 1/4x1/4 x 8-ft	B	From Leg	2.00	0.0000	247.00	No Ice	3.33	3.33
			0.00		1/2" Ice	4.25	4.25	0.03
			0.00					0.05
(4) L2 1/2x2 1/4x1/4 x 8-ft	C	From Leg	2.00	0.0000	247.00	No Ice	3.33	3.33
			0.00		1/2" Ice	4.25	4.25	0.03
			0.00					0.05
2.4" Dia. x 10-ft Mount Pipe	A	From Leg	2.00	0.0000	247.00	No Ice	2.38	2.38
			0.00		1/2" Ice	3.40	3.40	0.04
			0.00					0.05
2.4" Dia. x 10-ft Mount Pipe	B	From Leg	2.00	0.0000	247.00	No Ice	2.38	2.38
			0.00		1/2" Ice	3.40	3.40	0.04
			0.00					0.05
2.4" Dia. x 10-ft Mount Pipe	C	From Leg	2.00	0.0000	247.00	No Ice	2.38	2.38
			0.00		1/2" Ice	3.40	3.40	0.04
			0.00					0.05
Sector Mount [SM 502-3]	C	None		0.0000	247.00	No Ice	29.82	29.82
					1/2" Ice	42.21	42.21	1.67
								2.27

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Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in ²	in ²	K	K	in	in	in ²
Valmont 194434	1793.7356	2476.1488	0.46	0.08	6.2282	8.5977	3.6816
Valmont 194651	1911.1516	2584.9680	0.57	0.08	6.6359	8.9756	5.3014
Valmont 195213	2040.9591	2724.2570	0.70	0.08	7.0867	9.4592	7.2158
Valmont 195217	2040.9591	2714.8148	0.70	0.08	7.0867	9.4264	7.2158
Valmont 195217	2040.9591	2704.2007	0.70	0.08	7.0867	9.3896	7.2158
Valmont 195637	2178.7121	2858.2258	0.86	0.08	7.5650	9.9244	9.4248
Valmont 195960	2314.6481	3002.5621	1.04	0.08	8.0370	10.4256	11.9282
Valmont 195960	2314.6481	2983.4140	1.04	0.08	8.0370	10.3591	11.9282
Valmont 195960	2314.6481	2958.7119	1.04	0.08	8.0370	10.2733	11.9282
Valmont 195962	2454.9435	3086.4493	1.24	0.08	8.5241	10.7168	14.7262
Valmont 195964	2454.9435	3014.1107	1.24	0.07	8.5241	10.4657	14.7262

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	29.56					
Bracing Weight	14.74					
Total Member Self-Weight	44.30					
Total Weight	54.40			-41.40	4.44	
Wind 0 deg - No Ice		0.00	-42.55	-5932.30	4.44	-4.88
Wind 30 deg - No Ice		19.57	-33.87	-4791.78	-2742.37	-23.06
Wind 60 deg - No Ice		34.64	-19.98	-2852.17	-4871.19	-44.99
Wind 90 deg - No Ice		43.29	0.00	-41.40	-6052.35	-65.64
Wind 120 deg - No Ice		40.13	23.15	3159.82	-5547.47	-58.83
Wind 150 deg - No Ice		21.64	37.46	5196.71	-3023.96	-26.72
Wind 180 deg - No Ice		0.00	39.96	5580.14	4.44	4.88
Wind 210 deg - No Ice		-19.57	33.87	4708.98	2751.25	23.06
Wind 240 deg - No Ice		-36.87	21.27	2904.05	5113.35	44.99
Wind 270 deg - No Ice		-43.29	0.00	-41.40	6061.24	65.64
Wind 300 deg - No Ice		-37.90	-21.86	-3107.93	5323.07	58.83
Wind 330 deg - No Ice		-21.64	-37.46	-5279.50	3032.84	26.72
Member Ice	5.85					
Total Weight Ice	64.40			-59.31	6.42	
Wind 0 deg - Ice		0.00	-3.07	-486.93	6.42	-0.27
Wind 30 deg - Ice		1.44	-2.49	-410.02	-196.33	-1.61
Wind 60 deg - Ice		2.53	-1.46	-265.15	-350.56	-3.11
Wind 90 deg - Ice		3.11	0.00	-59.31	-429.52	-4.38
Wind 120 deg - Ice		2.85	1.65	169.12	-389.69	-3.94
Wind 150 deg - Ice		1.55	2.69	317.76	-211.55	-1.85
Wind 180 deg - Ice		0.00	2.92	352.36	6.42	0.27
Wind 210 deg - Ice		-1.44	2.49	291.39	209.16	1.61
Wind 240 deg - Ice		-2.66	1.54	154.49	377.20	3.11
Wind 270 deg - Ice		-3.11	0.00	-59.31	442.35	4.38
Wind 300 deg - Ice		-2.72	-1.57	-279.77	388.72	3.94
Wind 330 deg - Ice		-1.55	-2.69	-436.39	224.38	1.85
Total Weight	54.40			-41.40	4.44	
Wind 0 deg - Service		0.00	-11.20	-1550.06	0.10	-1.28
Wind 30 deg - Service		5.15	-8.91	-1249.91	-722.78	-6.07

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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 60 deg - Service		9.12	-5.26	-739.46	-1283.02	-11.84
Wind 90 deg - Service		11.39	0.00	0.25	-1593.86	-17.27
Wind 120 deg - Service		10.56	6.09	842.71	-1460.99	-15.48
Wind 150 deg - Service		5.70	9.86	1378.75	-796.88	-7.03
Wind 180 deg - Service		0.00	10.52	1479.66	0.10	1.28
Wind 210 deg - Service		-5.15	8.91	1250.40	722.98	6.07
Wind 240 deg - Service		-9.70	5.60	775.40	1344.61	11.84
Wind 270 deg - Service		-11.39	0.00	0.25	1594.06	17.27
Wind 300 deg - Service		-9.97	-5.75	-806.77	1399.80	15.48
Wind 330 deg - Service		-5.70	-9.86	-1378.26	797.08	7.03

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	250	Leg	A325N	1.0000	2	8.31	54.52	0.153	1.05	Bolt Tension
T2	240	Leg	A325N	1.0000	4	16.31	54.52	0.299	1.05	Bolt Tension
T3	220	Leg	A325N	1.0000	6	12.94	54.52	0.237	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	6.18	16.94	0.365	1.05	Member Block Shear
		Top Girt	A325N	1.0000	1	1.99	10.16	0.195	1.05	Member Block Shear
T4	200	Leg	A325N	1.0000	6	15.95	54.52	0.293	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	4.07	9.14	0.445	1.05	Member Block Shear
T5	180	Leg	A325N	1.2500	6	19.01	87.22	0.218	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	4.22	12.19	0.346	1.05	Member Block Shear
T6	160	Leg	A325N	1.2500	6	21.97	87.22	0.252	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	4.68	10.16	0.461	1.05	Member Block Shear
T7	140	Leg	A325N	1.2500	6	25.06	87.22	0.287	1.05	Bolt Tension
		Diagonal	A325N	1.0000	1	5.65	10.16	0.556	1.05	Member Block Shear
T8	120	Leg	A325N	1.0000	12	13.48	54.52	0.247	1.05	Bolt Tension
		Diagonal	A325N	0.8750	1	8.44	20.19	0.418	1.05	Member Block Shear
T9	100	Leg	A325N	1.0000	12	15.13	54.52	0.278	1.05	Bolt Tension
		Diagonal	A325N	0.8750	1	8.70	20.19	0.431	1.05	Member Block Shear
T10	80	Leg	A325N	1.0000	12	16.53	54.52	0.303	1.05	Bolt Tension
		Diagonal	A325N	0.8750	1	8.22	20.19	0.407	1.05	Member Block Shear
T11	60	Leg	A325N	1.0000	12	17.95	54.52	0.329	1.05	Bolt Tension
		Diagonal	A325N	0.8750	1	9.14	22.18	0.412	1.05	Gusset Bearing
T12	40	Leg	A325N	1.2500	12	19.47	87.22	0.223	1.05	Bolt Tension
		Diagonal	A325N	0.8750	1	10.00	22.18	0.451	1.05	Gusset Bearing
T13	20	Diagonal	A325N	0.8750	1	10.42	22.18	0.470	1.05	Gusset Bearing

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Compression Checks

Leg 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	250 - 240	1 1/2	10.00	2.48	79.3 K=1.00	1.7672	-16.83	50.19	0.335 ¹
T2	240 - 220	2	20.00	2.48	59.5 K=1.00	3.1416	-65.32	109.13	0.599 ¹
T3	220 - 200	Valmont 194434	20.03	10.02	41.3 K=1.00	3.6816	-83.38	166.29	0.501 ¹
T4	200 - 180	Valmont 194651	20.03	10.02	35.7 K=1.00	5.3014	-103.52	248.43	0.417 ¹
T5	180 - 160	Valmont 195213	20.03	10.02	30.6 K=1.00	7.2158	-124.73	347.96	0.358 ¹
T6	160 - 140	Valmont 195217	20.03	10.02	30.6 K=1.00	7.2158	-145.70	347.96	0.419 ¹
T7	140 - 120	Valmont 195217	20.03	10.02	30.6 K=1.00	7.2158	-167.74	347.96	0.482 ¹
T8	120 - 100	Valmont 195637	20.03	20.03	48.8 K=1.00	9.4248	-181.35	401.94	0.451 ¹
T9	100 - 80	Valmont 195960	20.03	20.03	48.8 K=1.00	11.9282	-206.07	508.98	0.405 ¹
T10	80 - 60	Valmont 195960	20.03	20.03	48.8 K=1.00	11.9282	-227.22	508.98	0.446 ¹
T11	60 - 40	Valmont 195960	20.03	20.03	48.8 K=1.00	11.9282	-248.85	508.98	0.489 ¹
T12	40 - 20	Valmont 195962	20.03	20.03	48.7 K=1.00	14.7262	-273.21	628.76	0.435 ¹
T13	20 - 0	Valmont 195964	20.03	20.03	48.7 K=1.00	14.7262	-292.80	628.76	0.466 ¹

¹ P_u / φP_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
T3	220 - 200	0.5	1.40	94.1	192.18	0.1963	1.01	4.71	0.214
T4	200 - 180	0.5	1.42	95.2	276.74	0.1963	0.40	4.57	0.088
T5	180 - 160	0.5	1.40	94.4	376.67	0.1963	0.29	4.61	0.063
T6	160 - 140	0.5	1.40	94.4	376.67	0.1963	0.27	4.61	0.059
T7	140 - 120	0.5	1.40	94.4	376.67	0.1963	0.55	4.61	0.120
T8	120 - 100	0.5	1.39	93.2	491.97	0.1963	0.45	4.67	0.097
T9	100 - 80	0.5	1.38	92.4	622.65	0.1963	0.62	4.71	0.131
T10	80 - 60	0.5	1.38	92.4	622.65	0.1963	0.68	4.71	0.144
T11	60 - 40	0.5	1.38	92.4	622.65	0.1963	0.71	4.71	0.151
T12	40 - 20	0.5	1.36	91.6	768.71	0.1963	0.73	4.75	0.153
T13	20 - 0	0.5	1.36	91.6	768.71	0.1963	0.71	4.75	0.150

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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	250 - 240	3/4	4.71	2.28	131.3 K=0.90	0.4418	-3.00	5.78	0.520 ¹
T2	240 - 220	7/8	4.71	2.25	111.3 K=0.90	0.6013	-3.93	10.93	0.359 ¹
T3	220 - 200	L3x3x5/16	10.97	4.89	105.5 K=1.05	1.7800	-6.77	41.65	0.162 ¹
T4	200 - 180	L2 1/2x2 1/2x3/16	12.50	5.67	137.5 K=1.00	0.9023	-4.35	13.67	0.318 ¹
T5	180 - 160	L2 1/2x2 1/2x1/4	13.80	6.37	155.6 K=1.00	1.1900	-4.51	14.06	0.321 ¹
T6	160 - 140	L3x3x3/16	15.24	7.12	143.4 K=1.00	1.0900	-4.84	15.17	0.319 ¹
T7	140 - 120	L3x3x3/16	16.80	7.92	159.5 K=1.00	1.0900	-5.21	12.26	0.425 ¹
T8	120 - 100	2L3x3x3/16x3/8	25.01	12.35	157.9 K=1.00	2.1800	-9.34	25.04	0.373 ¹
T9	100 - 80	2L3x3x3/16x3/8	26.26	12.98	165.8 K=1.00	2.1800	-8.25	22.69	0.364 ¹
T10	80 - 60	2L3x3x3/16x3/8	27.59	13.65	174.4 K=1.00	2.1800	-8.93	20.52	0.435 ¹
T11	60 - 40	2L3 1/2x3 1/2x1/4x3/8	29.01	14.35	158.0 K=1.00	3.3800	-10.17	38.75	0.263 ¹
T12	40 - 20	2L3 1/2x3 1/2x1/4x3/8	30.49	15.09	166.1 K=1.00	3.3800	-9.15	35.05	0.261 ¹
T13	20 - 0	2L3 1/2x3 1/2x1/4x3/8	32.02	15.86	174.6 K=1.00	3.3800	-11.75	31.73	0.370 ¹

¹ P_u / φP_n controls

Horizontal 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	250 - 240	3/4	4.00	3.88	173.6 K=0.70	0.4418	-0.66	3.31	0.200 ¹
T2	240 - 220	3/4	4.00	3.83	171.7 K=0.70	0.4418	-1.20	3.38	0.354 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	250 - 240	3/4	4.00	3.88	173.6 K=0.70	0.4418	-0.20	3.31	0.060 ¹

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T2	240 - 220	7/8	4.00	3.83	147.2 K=0.70	0.6013	-1.20	6.27	0.191 ¹
T3	220 - 200	L3x3x3/16	4.00	2.67	86.8 K=1.62	1.0900	-1.81	29.22	0.062 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	250 - 240	3/4	4.00	3.88	173.6 K=0.70	0.4418	-0.43	3.31	0.130 ¹
T2	240 - 220	7/8	4.00	3.83	147.2 K=0.70	0.6013	-1.20	6.27	0.191 ¹

¹ P_u / φP_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	250 - 240	1 1/2	10.00	0.08	2.7	1.7672	16.63	79.52	0.209 ¹
T2	240 - 220	2	20.00	0.08	2.0	3.1416	65.24	141.37	0.461 ¹
T3	220 - 200	Valmont 194434	20.03	10.02	41.3	3.6816	77.65	192.18	0.404 ¹
T4	200 - 180	Valmont 194651	20.03	10.02	35.7	5.3014	95.72	276.74	0.346 ¹
T5	180 - 160	Valmont 195213	20.03	10.02	30.6	7.2158	114.03	376.67	0.303 ¹
T6	160 - 140	Valmont 195217	20.03	10.02	30.6	7.2158	131.81	376.67	0.350 ¹
T7	140 - 120	Valmont 195217	20.03	10.02	30.6	7.2158	150.39	376.67	0.399 ¹
T8	120 - 100	Valmont 195637	20.03	20.03	48.8	9.4248	161.73	491.97	0.329 ¹
T9	100 - 80	Valmont 195960	20.03	20.03	48.8	11.9282	181.56	622.65	0.292 ¹
T10	80 - 60	Valmont 195960	20.03	20.03	48.8	11.9282	198.37	622.65	0.319 ¹
T11	60 - 40	Valmont 195960	20.03	20.03	48.8	11.9282	215.43	622.65	0.346 ¹
T12	40 - 20	Valmont 195962	20.03	20.03	48.7	14.7262	233.63	768.71	0.304 ¹
T13	20 - 0	Valmont 195964	20.03	20.03	48.7	14.7262	248.37	768.71	0.323 ¹

¹ P_u / φP_n controls

Truss-Leg Diagonal Data

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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
T3	220 - 200	0.5	1.40	94.1	192.18	0.1963	1.01	4.71	0.214
T4	200 - 180	0.5	1.42	95.2	276.74	0.1963	0.40	4.57	0.088
T5	180 - 160	0.5	1.40	94.4	376.67	0.1963	0.29	4.61	0.063
T6	160 - 140	0.5	1.40	94.4	376.67	0.1963	0.27	4.61	0.059
T7	140 - 120	0.5	1.40	94.4	376.67	0.1963	0.55	4.61	0.120
T8	120 - 100	0.5	1.39	93.2	491.97	0.1963	0.45	4.67	0.097
T9	100 - 80	0.5	1.38	92.4	622.65	0.1963	0.62	4.71	0.131
T10	80 - 60	0.5	1.38	92.4	622.65	0.1963	0.68	4.71	0.144
T11	60 - 40	0.5	1.38	92.4	622.65	0.1963	0.71	4.71	0.151
T12	40 - 20	0.5	1.36	91.6	768.71	0.1963	0.73	4.75	0.153
T13	20 - 0	0.5	1.36	91.6	768.71	0.1963	0.71	4.75	0.150

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	250 - 240	3/4	4.71	2.28	145.9	0.4418	2.91	14.31	0.204 ¹
T2	240 - 220	7/8	4.71	2.25	123.7	0.6013	3.78	27.06	0.140 ¹
T3	220 - 200	L3x3x5/16	10.97	4.89	66.1	1.0713	6.18	46.60	0.133 ¹
T4	200 - 180	L2 1/2x2 1/2x3/16	12.50	5.67	90.0	0.5186	4.07	22.56	0.180 ¹
T5	180 - 160	L2 1/2x2 1/2x1/4	13.80	6.37	102.0	0.6816	4.22	29.65	0.142 ¹
T6	160 - 140	L3x3x3/16	15.24	7.12	93.2	0.6593	4.68	28.68	0.163 ¹
T7	140 - 120	L3x3x3/16	16.80	7.92	103.4	0.6593	5.65	28.68	0.197 ¹
T8	120 - 100	2L3x3x3/16x3/8	25.01	12.35	159.8	1.3537	8.44	58.89	0.143 ¹
T9	100 - 80	2L3x3x3/16x3/8	26.26	12.98	167.8	1.3537	8.70	58.89	0.148 ¹
T10	80 - 60	2L3x3x3/16x3/8	27.59	13.65	176.3	1.3537	8.22	58.89	0.140 ¹
T11	60 - 40	2L3 1/2x3 1/2x1/4x3/8	29.01	14.35	159.7	2.1600	9.14	93.96	0.097 ¹
T12	40 - 20	2L3 1/2x3 1/2x1/4x3/8	30.49	15.09	167.8	2.1600	10.00	93.96	0.106 ¹
T13	20 - 0	2L3 1/2x3 1/2x1/4x3/8	32.02	15.86	176.3	2.1600	10.42	93.96	0.111 ¹

¹ $P_u / \phi P_n$ controls

Horizontal 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	250 - 240	3/4	4.00	3.88	248.0	0.4418	0.73	14.31	0.051 ¹
T2	240 - 220	3/4	4.00	3.83	245.3	0.4418	1.21	14.31	0.084 ¹

¹ $P_u / \phi P_n$ controls

Top Girt 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 $\frac{P_u}{\phi P_n}$
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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	250 - 240	3/4	4.00	3.88	248.0	0.4418	0.18	14.31	0.013 ¹
T2	240 - 220	7/8	4.00	3.83	210.3	0.6013	1.20	27.06	0.044 ¹
T3	220 - 200	L3x3x3/16	4.00	2.67	38.3	0.6593	1.99	28.68	0.069 ¹

¹ P_u / φP_n controls

Bottom Girt 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	250 - 240	3/4	4.00	3.88	248.0	0.4418	0.52	14.31	0.036 ¹
T2	240 - 220	7/8	4.00	3.83	210.3	0.6013	1.20	27.06	0.044 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	250 - 240	Leg	1 1/2	2	-16.83	52.70	31.9	Pass
T2	240 - 220	Leg	2	44	-65.32	114.59	57.0	Pass
T3	220 - 200	Leg	Valmont 194434	122	-83.38	174.61	47.8	Pass
T4	200 - 180	Leg	Valmont 194651	140	-103.52	260.85	39.7	Pass
T5	180 - 160	Leg	Valmont 195213	155	-124.73	365.36	34.1	Pass
T6	160 - 140	Leg	Valmont 195217	170	-145.70	365.36	39.9	Pass
T7	140 - 120	Leg	Valmont 195217	185	-167.74	365.36	45.9	Pass
T8	120 - 100	Leg	Valmont 195637	200	-181.35	422.03	43.0	Pass
T9	100 - 80	Leg	Valmont 195960	209	-206.07	534.43	38.6	Pass
T10	80 - 60	Leg	Valmont 195960	218	-227.22	534.43	42.5	Pass
T11	60 - 40	Leg	Valmont 195960	227	-248.85	534.43	46.6	Pass
T12	40 - 20	Leg	Valmont 195962	236	-273.21	660.20	41.4	Pass
T13	20 - 0	Leg	Valmont 195964	245	-292.80	660.20	44.4	Pass
T1	250 - 240	Diagonal	3/4	20	-3.00	6.06	49.5	Pass
T2	240 - 220	Diagonal	7/8	54	-3.93	11.48	34.2	Pass
T3	220 - 200	Diagonal	L3x3x5/16	138	-6.77	43.73	15.5	Pass
T4	200 - 180	Diagonal	L2 1/2x2 1/2x3/16	144	-4.35	14.35	30.3	Pass
T5	180 - 160	Diagonal	L2 1/2x2 1/2x1/4	159	-4.51	14.76	30.5	Pass
T6	160 - 140	Diagonal	L3x3x3/16	174	-4.84	15.92	30.4	Pass
T7	140 - 120	Diagonal	L3x3x3/16	190	-5.21	12.87	40.4	Pass
T8	120 - 100	Diagonal	2L3x3x3/16x3/8	204	-9.34	26.29	35.5	Pass
T9	100 - 80	Diagonal	2L3x3x3/16x3/8	213	-8.25	23.82	34.6	Pass
T10	80 - 60	Diagonal	2L3x3x3/16x3/8	222	-8.93	21.54	41.4	Pass
T11	60 - 40	Diagonal	2L3 1/2x3 1/2x1/4x3/8	231	-10.17	40.69	25.0	Pass
T12	40 - 20	Diagonal	2L3 1/2x3 1/2x1/4x3/8	241	-9.15	36.80	24.9	Pass
T13	20 - 0	Diagonal	2L3 1/2x3 1/2x1/4x3/8	249	-11.75	33.32	35.3	Pass
T1	250 - 240	Horizontal	3/4	36	-0.66	3.48	19.0	Pass
T2	240 - 220	Horizontal	3/4	58	-1.20	3.55	33.7	Pass
T1	250 - 240	Top Girt	3/4	5	-0.20	3.48	5.7	Pass
T2	240 - 220	Top Girt	7/8	46	-1.20	6.58	18.2	Pass
T3	220 - 200	Top Girt	L3x3x3/16	126	1.99	30.11	6.6	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	250 - 240	Bottom Girt	3/4	9	-0.43	3.48	12.4	Pass
T2	240 - 220	Bottom Girt	7/8	49	-1.20	6.58	18.2	Pass
Summary								
						Leg (T2)	57.0	Pass
						Diagonal (T1)	49.5	Pass
						Horizontal (T2)	33.7	Pass
						Top Girt (T2)	18.2	Pass
						Bottom Girt (T2)	18.2	Pass
						Bolt Checks	52.9	Pass
						RATING =	57.0	Pass

APPENDIX B

ADDITIONAL CALCULATIONS

ASCE 7 Hazards Report

Address:

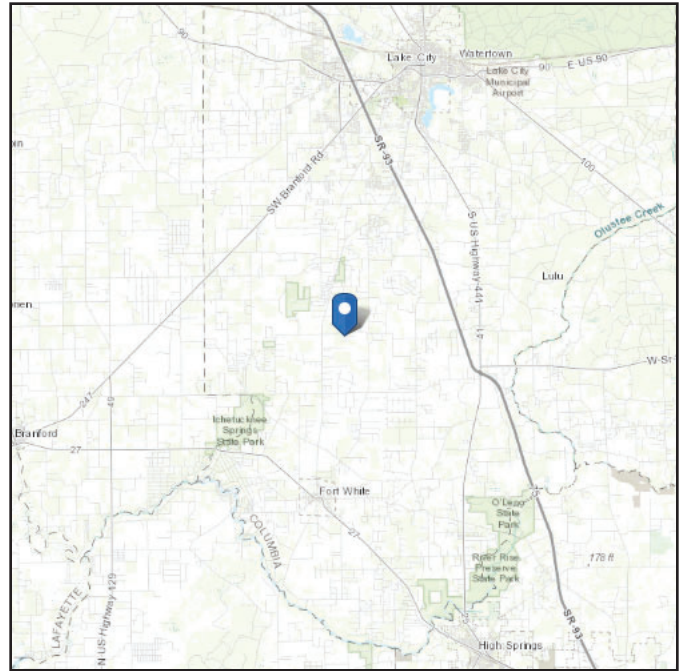
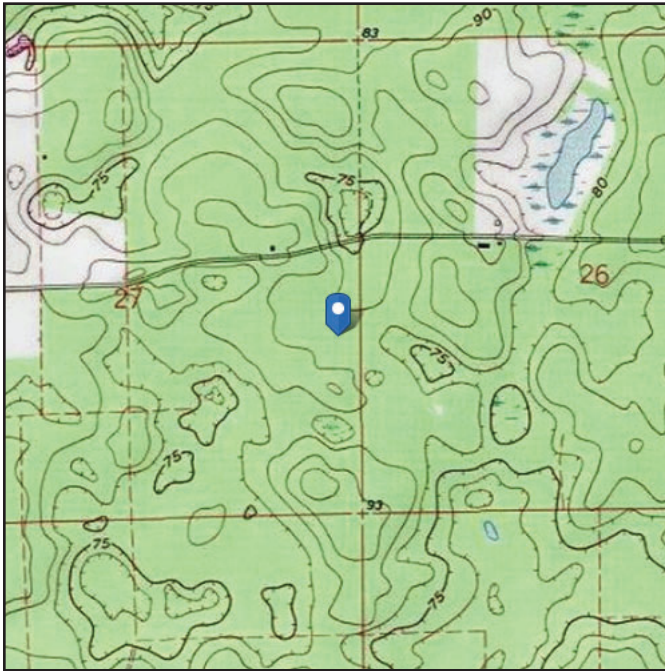
No Address at This
Location

Standard:

ASCE/SEI 7-16

Risk Category: II**Soil Class:**

D - Default (see
Section 11.4.3)

Elevation: 81.18 ft (NAVD 88)**Latitude:** 30.022175**Longitude:** -82.694536

Wind

Results:

Wind Speed:	119 Vmph	*120 Vmph per Jurisdiction Requirements
10-year MRI	75 Vmph	
25-year MRI	84 Vmph	
50-year MRI	90 Vmph	
100-year MRI	98 Vmph	

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Thu May 06 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

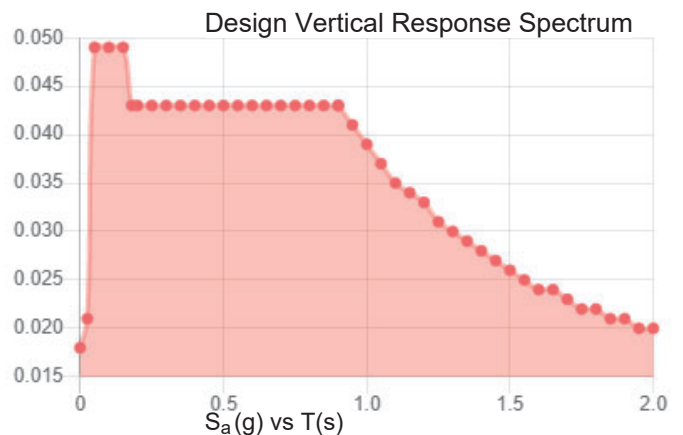
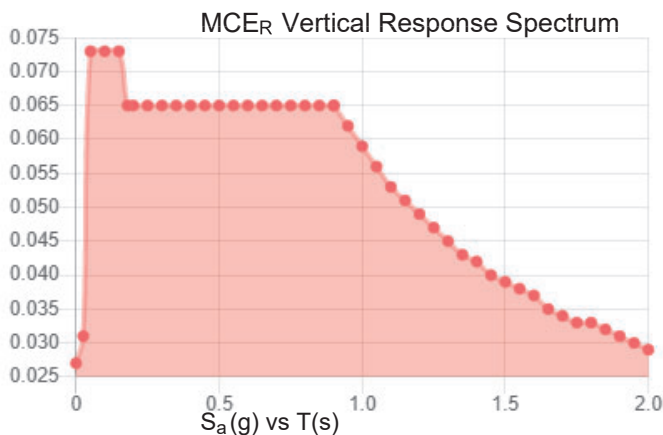
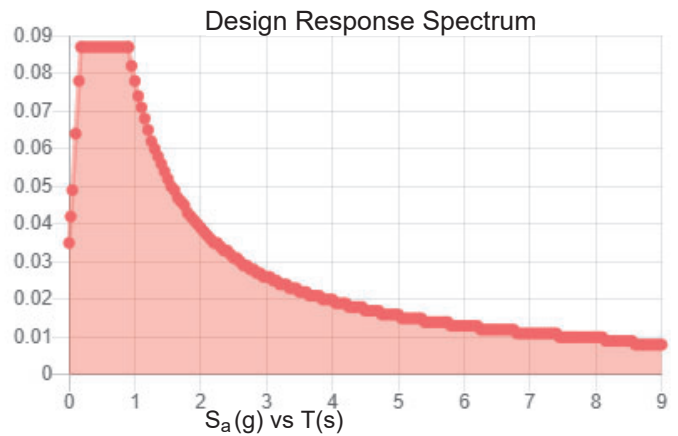
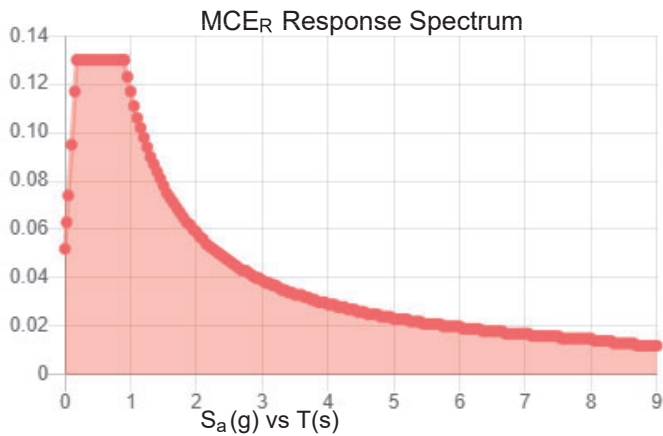
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	0.081	S_{D1} :	0.078
S_1 :	0.049	T_L :	8
F_a :	1.6	PGA :	0.039
F_v :	2.4	PGA _M :	0.062
S_{MS} :	0.13	F_{PGA} :	1.6
S_{M1} :	0.117	I_e :	1
S_{DS} :	0.087	C_v :	0.7

Seismic Design Category B



Data Accessed:

Thu May 06 2021

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Results:

Ice Thickness: 0.25 in.
Concurrent Temperature: 25 F
Gust Speed: 30 mph

Data Source: Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

Date Accessed: Thu May 06 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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Self Support Anchor Rod Capacity

Site Info		
Site #	278206	
Site Name	Williamson North Fort White	
TEP #	252166.499040	

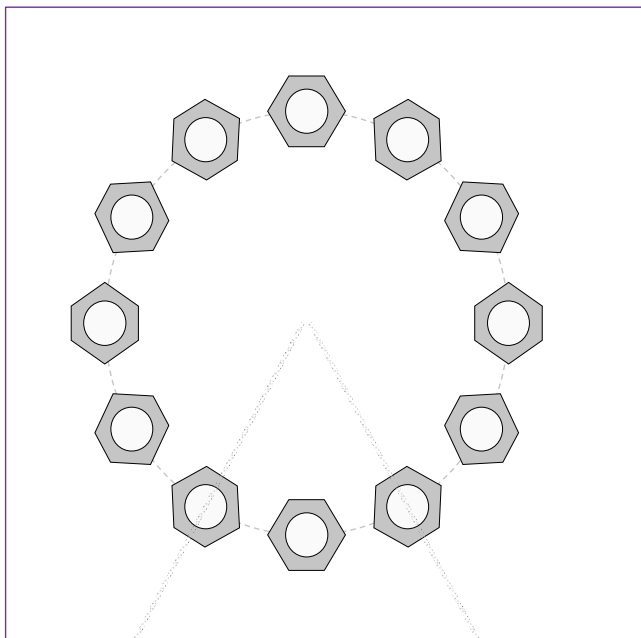
Analysis Considerations		
TIA-222 Revision	H	
Grout Considered:	No	
l_{ar} (in)	3.25	

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	305.00	257.00
Shear Force (kips)	31.00	26.00

*TIA-222-H Section 15.5 Applied

Considered Eccentricity		
Leg Mod Eccentricity (in)	0.000	
Anchor Rod N.A Shift (in)	0.000	
Total Eccentricity (in)	0.000	

*Anchor Rod Eccentricity Applied



Connection Properties

Anchor Rod Data

(12) 1-1/4" ϕ bolts (A687 N; $F_y=105$ ksi, $F_u=125$ ksi)
 l_{ar} (in): 3.25

Analysis Results

Anchor Rod Summary

(units of kips, kip-in)

$Pu_c = 25.42$	$\phi Pn_c = 115.97$	Stress Rating
$Vu = 2.58$	$\phi Vn = 52.19$	38.0%
$Mu = 5.46$	$\phi Mn = 30.76$	Pass

Drilled Pier Foundation

Site #: 278206
 Site Name: Williamson North Fort White
 TEP Number: 252166.499040

Report File:

TIA-222 Revision: H
 Tower Type: Self Support

Applied Loads		
	Comp.	Uplift
Moment (kip-ft)		
Axial Force (kips)	305	257
Shear Force (kips)	31	26

Material Properties		
Concrete Strength, f _c :	3	ksi
Rebar Strength, F _y :	60	ksi
Tie Yield Strength, F _y t:	40	ksi

Pier Design Data	
Depth	54 ft
Ext. Above Grade	0.5 ft
Pier Section 1	
From 0.5' above grade to 54' below grade	
Pier Diameter	5.5 ft
Rebar Quantity	33
Rebar Size	7
Clear Cover to Ties	3 in
Tie Size	5
Tie Spacing	in

[Rebar & Pier Options](#)

[Embedded Pole Inputs](#)

[Belled Pier Inputs](#)

Analysis Results		
Soil Lateral Check	Compression	Uplift
D _{v=0} (ft from TOC)	27.30	27.30
Soil Safety Factor	40.56	48.36
Max Moment (kip-ft)	573.26	480.80
Rating*	3.1%	2.6%
Soil Vertical Check	Compression	Uplift
Skin Friction (kips)	608.82	405.88
End Bearing (kips)	90.88	-
Weight of Concrete (kips)	140.52	105.39
Total Capacity (kips)	699.69	511.27
Axial (kips)	445.52	257.00
Rating*	60.6%	47.9%
Reinforced Concrete Flexure	Compression	Uplift
Critical Depth (ft from TOC)	28.07	26.11
Critical Moment (kip-ft)	572.60	479.43
Critical Moment Capacity	2776.93	2160.16
Rating*	19.6%	21.1%
Reinforced Concrete Shear	Compression	Uplift
Critical Depth (ft from TOC)	40.98	43.52
Critical Shear (kip)	34.89	36.59
Critical Shear Capacity	396.46	307.63
Rating*	8.4%	11.3%
Soil Interaction Rating* 60.6%		
Structural Foundation Rating* 21.1%		

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☒
N/A	☐
Shear Design Options	
Check Shear along Depth of Pier:	☒
Utilize Shear-Friction Methodology:	☐
Override Critical Depth:	☐

[Go to Soil Calculations](#)

Soil Profile														
Groundwater Depth		2	# of Layers		6									
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	Y _{soil} (pcf)	Y _{concrete} (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	2	2	110	150	0		0.000	0.000					Cohesionless
2	2	5	3	59	87.6	0		0.000	0.000					Cohesionless
3	5	8	3	59	87.6	0.1	28	0.000	0.000	0.20	0.13			Cohesionless
4	8	32	24	64	87.6	0.1	30	0.000	0.000	0.86	0.57			Cohesionless
5	32	37	5	64	87.6	2		1.100	1.100	1.10	0.73			Cohesive
6	37	54	17	64	87.6	0.1	30	0.000	0.000	1.20	0.80	5.1		Cohesionless