Date: **December 15, 2021**

B&V New York LLP
489 Fifth Avenue 8 & 12 Floor
New York, NY 10017
(913) 458-6909

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Site Number:	404764
	Site Name:	WOODOAK - A
Crown Castle Designation:	**BU Number:**	808716
	Site Name:	Tusten
	JDE Job Number:	694710
	Work Order Number:	2055240
	Order Number:	594303 Rev. 0
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	406642
Site Data:	**6067 State Route 97, Narrowsburg, Sullivan County, NY** **Latitude *41° 35' 34.1"*, Longitude *-75° 1' 17.5"*** **179.098 Foot - Self Support Tower**	

B&V New York LLP 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:

LC5: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 112 mph as required by the 2020 New York Uniform Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Warit Chaisuwan / Jumpon Uea-areevorakul

Respectfully submitted by:

Bryan C. Lindsey, P.E.
Professional Engineer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 179.098 ft Self Support tower designed by GlenMartin.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	112 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1 in
Wind Speed with Ice:	40 mph
Seismic Ss:	0.146
Seismic S1:	0.048
Service Wind Speed:	60 mph
Seismic Loading:	Does not control per engineering judgment

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
150.0	150.0	1	cci tower mounts (v2.1)	Sector Mount [SM 801-3]	2	1-5/8
		6	quintel technology	QS8656-5 w/ Mount Pipe		
		1	raycap	RVZDC-6627-PF-48		
		3	samsung telecommunications	MT6407-77A w/ Mount Pipe		
		3	samsung telecommunications	RF4439D-25A		
		3	samsung telecommunications	RF4440D-13A		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
176.0	180.0	3	alcatel lucent	B25 RRH4x30-4R	2 2 1 4 12 1	5/16 3/8 1/2 13/16 1-5/8 Conduit
		3	alcatel lucent	RRH4X25-WCS		
		3	andrew	DBXLH-8585A-R2M		
		3	andrew	SBNHH-1D65C		
		6	commscope	NNHH-65A-R4		
		3	nokia	AIRSCALE RRH 4T4R B5 160W		
		2	raycap	DC6-48-60-18-8F		
		6	andrew	ETD819G-12UB		
	177.0	1	telewave	ANT150F2		
		2	andrew	ETD819G-12UB		
	176.0	3	alcatel lucent	RRH2X40-07-L-AT		
		6	andrew	ETD819G-12UB		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		1	cci tower mounts (v2.1)	Sector Mount [SM 201-3]		
		1	Jsource technologies	12128FM4SEC		
160.0	160.0	1	andrew	HPX8-59	1	3/8
		1	ceragon	FIBEAIR IP-10		
		1	cci tower mounts (v2.1)	Pipe Mount [PM 602-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-TOWER MANUFACTURER DRAWINGS	2924679	CCIsites
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	2924681	CCIsites
4-GEOTECHNICAL REPORTS	2924676	CCIsites

3.1) Analysis Method

tnxTower (version 8.1.1.0), 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. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

1) Tower and structures were maintained in accordance with the TIA-222 Standard.
2) 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. B&V New York LLP should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary) (Self Support Tower)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	179.098 - 159.41	Leg	P3x.216	2	-81.63	87.22	93.6	Pass
T2	159.41 - 158.827	Leg	P5x.258	33	-84.37	202.96	42.5	Pass
T3	158.827 - 139.139	Leg	P5x.258	36	-100.43	178.59	56.2	Pass
T4	139.139 - 119.452	Leg	P6x.28	57	-131.98	240.98	54.8	Pass
T5	119.452 - 99.7642	Leg	P8x.322	78	-158.71	376.50	42.2	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T6	99.7642 - 80.0767	Leg	P8x.322	99	-183.39	376.50	48.7	Pass
T7	80.0767 - 60.3892	Leg	P8x.406	120	-207.78	469.43	44.3	Pass
T8	60.3892 - 40.7017	Leg	P10x.365	141	-228.91	521.60	43.9	Pass
T9	40.7017 - 21.0142	Leg	P10x.365	156	-251.81	521.60	48.3	Pass
T10	21.0142 - 1.32667	Leg	P10x.365	171	-275.56	521.60	52.8	Pass
T11	1.32667 - 0	Leg	P10x.593	186	-282.19	892.79	38.4	Pass
T1	179.098 - 159.41	Diagonal	L1 3/4x1 3/4x3/16	12	-4.24	15.51	27.4	Pass
T3	158.827 - 139.139	Diagonal	L2x2x3/16	54	-6.70	15.86	42.2	Pass
T4	139.139 - 119.452	Diagonal	L2x2x1/4	63	-4.83	14.27	33.8	Pass
T5	119.452 - 99.7642	Diagonal	L2 1/2x2 1/2x3/16	84	-4.70	17.36	27.0	Pass
T6	99.7642 - 80.0767	Diagonal	L2 1/2x2 1/2x3/16	105	-4.89	13.28	36.8	Pass
T7	80.0767 - 60.3892	Diagonal	L2 1/2x2 1/2x1/4	126	-5.02	13.48	37.2	Pass
T8	60.3892 - 40.7017	Diagonal	L3x3x3/16	147	-6.03	14.09	42.8	Pass
T9	40.7017 - 21.0142	Diagonal	L3x3x1/4	162	-6.59	15.94	41.3	Pass
T10	21.0142 - 1.32667	Diagonal	L3x3x1/4	177	-8.73	13.89	62.8	Pass
T1	179.098 - 159.41	Top Girt	L3x3x1/4	5	-0.55	39.51	1.4	Pass
							Summary	
						Leg (T1)	93.6	Pass
						Diagonal (T10)	62.8	Pass
						Top Girt (T1)	1.4	Pass
						Bolt Checks	86.2	Pass
						Rating =	93.6	Pass

Table 5 - Tower Component Stresses vs. Capacity (Self Support Tower) - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	20.1	Pass
1	Base Foundation (Structure)	0	32.0	Pass
	Base Foundation (Soil Interaction)		52.0	Pass

Structure Rating (max from all components) =	93.6%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity. Rating per TIA-222-H Section 15.5.

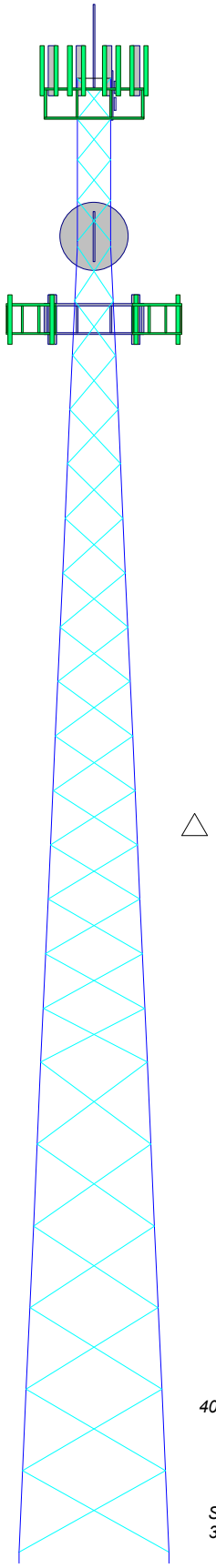
4.1) Recommendations

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
Legs	P3x.216		P5x.258	P6x.28	P8x.322		P8x.406		P10x.365		A
Leg Grade	A500-50										
Diagonals	L1 3/4x1 3/4x3/16	B	L2x2x3/16	L2x2x1/4	L2 1/2x2 1/2x3/16		L2 1/2x2 1/2x1/4	L3x3x3/16	L3x3x1/4		B
Diagonal Grade	A36	B		A36							B
Top Girts	L3x3x1/4			N.A.							
Face Width (ft)	4			5.75	7.5	9.25	11	12.75	14.5	16.25	18
# Panels @ (ft)	4 @ 4.92188	C			15 @ 6.5625				6 @ 9.84375		D
Weight (K)	0.9	0.0	1.3	1.7	2.4	2.5	3.3	3.3	3.6	3.7	23.0



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P10x.593	C	1 @ 0.58333
B	N.A.	D	1 @ 1.32667

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A36	36 ksi	58 ksi

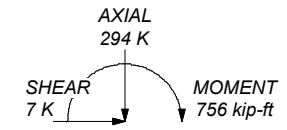
TOWER DESIGN NOTES

1. Tower is located in Sullivan County, New York.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 112 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 93.6%

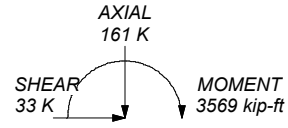
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 282 K
SHEAR: 21 K

UPLIFT: -184 K
SHEAR: 16 K



TORQUE 9 kip-ft
40 mph WIND - 1.0000 in ICE



TORQUE 29 kip-ft
REACTIONS - 112 mph WIND

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Job: ***Tusten (BU# 808716)***			
Project: ***406642 (808716.2055240)***			
Client: Crown Castle	Drawn by: Jumpon Uea-areevoraku	App'd:	
Code: TIA-222-H	Date: 12/15/21	Scale: NTS	
Path:		Dwg No. E-1	

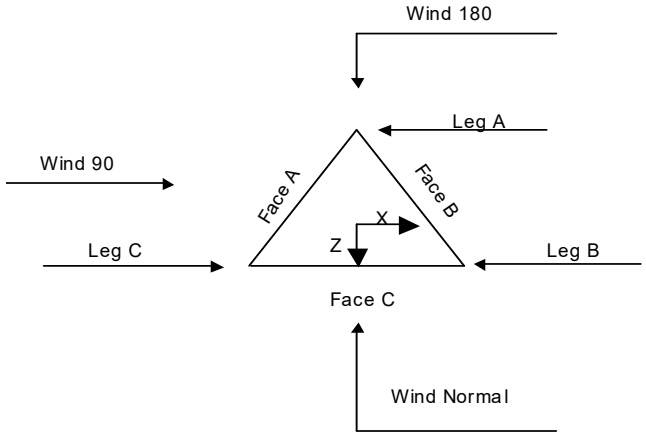
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 179.10 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 18.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in Sullivan County, New York.
- Tower base elevation above sea level: 1150.00 ft.
- Basic wind speed of 112 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 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 40 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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	179.10-159.41			4.00	1	19.69
T2	159.41-158.83			4.00	1	0.58
T3	158.83-139.14			4.00	1	19.69
T4	139.14-119.45			5.75	1	19.69
T5	119.45-99.76			7.50	1	19.69
T6	99.76-80.08			9.25	1	19.69
T7	80.08-60.39			11.00	1	19.69
T8	60.39-40.70			12.75	1	19.69
T9	40.70-21.01			14.50	1	19.69
T10	21.01-1.33			16.25	1	19.69
T11	1.33-0.00			18.00	1	1.33

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	179.10-159.41	4.92	X Brace	No	No	0.0000	0.0000
T2	159.41-158.83	0.58	X Brace	No	Yes	0.0000	0.0000
T3	158.83-139.14	6.56	X Brace	No	No	0.0000	0.0000
T4	139.14-119.45	6.56	X Brace	No	No	0.0000	0.0000
T5	119.45-99.76	6.56	X Brace	No	No	0.0000	0.0000
T6	99.76-80.08	6.56	X Brace	No	No	0.0000	0.0000
T7	80.08-60.39	6.56	X Brace	No	No	0.0000	0.0000
T8	60.39-40.70	9.84	X Brace	No	No	0.0000	0.0000
T9	40.70-21.01	9.84	X Brace	No	No	0.0000	0.0000
T10	21.01-1.33	9.84	X Brace	No	No	0.0000	0.0000
T11	1.33-0.00	1.33	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 179.10-159.41	Pipe	P3x.216	A500-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 159.41-158.83	Pipe	P5x.258	A500-50 (50 ksi)	Equal Angle		A36 (36 ksi)
T3 158.83-139.14	Pipe	P5x.258	A500-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T4 139.14-119.45	Pipe	P6x.28	A500-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T5 119.45-99.76	Pipe	P8x.322	A500-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 99.76-80.08	Pipe	P8x.322	A500-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 80.08-60.39	Pipe	P8x.406	A500-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T8 60.39-40.70	Pipe	P10x.365	A500-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T9 40.70-21.01	Pipe	P10x.365	A500-50 (50 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T10 21.01-1.33	Pipe	P10x.365	A500-50 (50 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T11 1.33-0.00	Pipe	P10x.593	A500-50 (50 ksi)	Equal Angle		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 179.10-159.41	Equal Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 179.10-159.41	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T2 159.41-158.83	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T3 158.83-139.14	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T4 139.14-119.45	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T5 119.45-99.76	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T6 99.76-80.08	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T7 80.08-60.39	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T8 60.39-40.70	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T9 40.70-21.01	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T10 21.01-1.33	0.00	0.3750	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000
T11 1.33-0.00	0.00	0.0000	A36 (36 ksi)	1.05	1	1.05	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 179.10-159.41	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 159.41-158.83	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 158.83-139.14	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 139.14-119.45	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T5 119.45-99.76	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T6 99.76-80.08	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T7 80.08-60.39	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T8 60.39-40.70	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T9 40.70-21.01	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T10 21.01-1.33	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T11 1.33-0.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 179.10-159.41	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 159.41-158.83	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 158.83-139.14	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 139.14-119.45	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 119.45-99.76	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower 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
T6 99.76-80.08	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.08-60.39	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.39-40.70	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.70-21.01	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 21.01-1.33	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 1.33-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	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 179.10-159.41	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 159.41-158.83	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 158.83-139.14	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 139.14-119.45	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 119.45-99.76	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 99.76-80.08	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.08-60.39	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.39-40.70	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.70-21.01	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 21.01-1.33	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 1.33-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 179.10-159.41	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T2 159.41-158.83	Flange	1.0000 A325N	4	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T3 158.83-139.14	Flange	1.0000 A325N	6	0.6250 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T4 139.14-119.45	Flange	1.0000 A325N	6	0.6250 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T5 119.45-99.76	Flange	1.0000 A325N	6	0.7500 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0

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.
T6 99.76-80.08	Flange	1.0000 A325N	6	0.7500 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T7 80.08-60.39	Flange	1.0000 A325N	10	0.7500 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T8 60.39-40.70	Flange	1.0000 A325N	10	0.7500 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T9 40.70-21.01	Flange	1.0000 A325N	10	0.7500 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T10 21.01-1.33	Flange	1.0000 A325N	10	0.7500 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	0	0.0000 A325N	0	0.6250 A325N	0
T11 1.33-0.00	Flange	1.0000 A325N	0	0.7500 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325X	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 ***	A	No	No	Ar (CaAa)	179.10 - 0.00	0.0000	-0.5	1	1	0.3750	0.3750		0.22
Feedline Ladder (Af)	C	No	No	Af (CaAa)	179.10 - 10.00	0.0000	0.35	1	1	3.0000	3.0000		8.40
AVA7-50(1-5/8)	C	No	No	Ar (CaAa)	176.00 - 10.00	0.0000	0.35	12	11	2.0100	2.0100		0.70
2" Rigid Conduit	C	No	No	Ar (CaAa)	176.00 - 10.00	0.0000	0.47	1	1	2.0000	2.0000		2.80
ATCB-B01-006(5/16")	C	No	No	Ar (CaAa)	176.00 - 10.00	0.0000	0.47	2	1	0.5000	0.0000		0.07
RFFT-36SM-001-xxM(3/8")	C	No	No	Ar (CaAa)	176.00 - 10.00	0.0000	0.47	2	1	0.5000	0.0000		0.09
PWRT-608-S(13/16")	C	No	No	Ar (CaAa)	176.00 - 10.00	0.0000	0.47	4	2	0.5000	0.0000		0.62
LDF4-50A(1/2") **	C	No	No	Ar (CaAa)	176.00 - 10.00	0.0000	0.23	1	1	0.5000	0.6300		0.15
04-001-54 (3/8" Cable) **	C	No	No	Ar (CaAa)	160.00 - 10.00	2.5000	0.35	1	1	0.5000	0.0001		0.06
Feedline Ladder (Af)	B	No	No	Af (CaAa)	152.00 - 6.00	0.0000	-0.4	1	1	3.0000	3.0000		8.40
CR 50 1873(1-5/8")	B	No	No	Ar (CaAa)	150.00 - 8.00	0.5000	-0.4	2	2	1.9800	1.9800		0.83

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	179.10-159.41	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	54.222	0.000	0.40
T2	159.41-158.83	A	0.000	0.000	0.022	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.852	0.000	0.01
T3	158.83-139.14	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	10.731	0.000	0.13

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	62.508	0.000	0.44
T4	139.14-119.45	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	17.640	0.000	0.20
		C	0.000	0.000	62.508	0.000	0.44
T5	119.45-99.76	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	17.640	0.000	0.20
		C	0.000	0.000	62.508	0.000	0.44
T6	99.76-80.08	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	17.640	0.000	0.20
		C	0.000	0.000	62.508	0.000	0.44
T7	80.08-60.39	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	17.640	0.000	0.20
		C	0.000	0.000	62.508	0.000	0.44
T8	60.39-40.70	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	17.640	0.000	0.20
		C	0.000	0.000	62.508	0.000	0.44
T9	40.70-21.01	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	17.640	0.000	0.20
		C	0.000	0.000	62.508	0.000	0.44
T10	21.01-1.33	A	0.000	0.000	0.738	0.000	0.00
		B	0.000	0.000	12.661	0.000	0.15
		C	0.000	0.000	34.970	0.000	0.25
T11	1.33-0.00	A	0.000	0.000	0.050	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	179.10-159.41	A	1.001	0.000	0.000	4.680	0.000	0.04
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	125.406	0.000	1.46
T2	159.41-158.83	A	0.995	0.000	0.000	0.138	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	4.431	0.000	0.05
T3	158.83-139.14	A	0.988	0.000	0.000	4.630	0.000	0.04
		B		0.000	0.000	17.567	0.000	0.28
		C		0.000	0.000	148.985	0.000	1.69
T4	139.14-119.45	A	0.974	0.000	0.000	4.575	0.000	0.04
		B		0.000	0.000	29.150	0.000	0.45
		C		0.000	0.000	147.819	0.000	1.66
T5	119.45-99.76	A	0.958	0.000	0.000	4.512	0.000	0.04
		B		0.000	0.000	28.961	0.000	0.45
		C		0.000	0.000	146.482	0.000	1.63
T6	99.76-80.08	A	0.940	0.000	0.000	4.438	0.000	0.03
		B		0.000	0.000	28.739	0.000	0.44
		C		0.000	0.000	144.907	0.000	1.60
T7	80.08-60.39	A	0.917	0.000	0.000	4.348	0.000	0.03
		B		0.000	0.000	28.468	0.000	0.43
		C		0.000	0.000	142.986	0.000	1.56
T8	60.39-40.70	A	0.887	0.000	0.000	4.231	0.000	0.03
		B		0.000	0.000	28.118	0.000	0.42
		C		0.000	0.000	140.501	0.000	1.51
T9	40.70-21.01	A	0.844	0.000	0.000	4.063	0.000	0.03
		B		0.000	0.000	27.613	0.000	0.41
		C		0.000	0.000	136.923	0.000	1.44
T10	21.01-1.33	A	0.763	0.000	0.000	3.742	0.000	0.03
		B		0.000	0.000	18.922	0.000	0.28
		C		0.000	0.000	72.779	0.000	0.74
T11	1.33-0.00	A	0.575	0.000	0.000	0.202	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	179.10-159.41	-7.8902	4.8892	-10.4211	6.4326
T2	159.41-158.83	-10.3690	6.6308	-12.6883	8.4593
T3	158.83-139.14	-8.7624	2.3992	-11.8620	4.3180
T4	139.14-119.45	-10.4498	0.8532	-14.3510	3.0137
T5	119.45-99.76	-11.3913	0.8129	-16.2694	3.2280
T6	99.76-80.08	-13.0611	0.8593	-18.6992	3.5966
T7	80.08-60.39	-14.5388	0.8990	-20.8489	3.9079
T8	60.39-40.70	-15.7354	0.9152	-22.8127	4.1601
T9	40.70-21.01	-17.0947	0.9567	-24.5777	4.3828
T10	21.01-1.33	-11.5836	-0.6603	-17.4089	1.6670
T11	1.33-0.00	-1.1461	0.6597	-2.9197	1.6806

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	159.41 - 179.10	0.6000	0.6000
T1	3	Feedline Ladder (Af)	159.41 - 179.10	0.6000	0.6000
T1	4	AVA7-50(1-5/8)	159.41 - 176.00	0.6000	0.6000
T1	5	2" Rigid Conduit	159.41 - 176.00	0.6000	0.6000
T1	6	ATCB-B01-006(5/16")	159.41 - 176.00	0.6000	0.6000
T1	7	RFFT-36SM-001-xxM(3/8")	159.41 - 176.00	0.6000	0.6000
T1	8	PWRT-608-S(13/16")	159.41 - 176.00	0.6000	0.6000
T1	9	LDF4-50A(1/2")	159.41 - 176.00	0.6000	0.6000
T1	11	04-001-54 (3/8" Cable)	159.41 - 160.00	0.6000	0.6000
T2	1	Safety Line 3/8	158.83 - 159.41	0.6000	0.6000
T2	3	Feedline Ladder (Af)	158.83 - 159.41	0.6000	0.6000
T2	4	AVA7-50(1-5/8)	158.83 - 159.41	0.6000	0.6000
T2	5	2" Rigid Conduit	158.83 - 159.41	0.6000	0.6000
T2	6	ATCB-B01-006(5/16")	158.83 - 159.41	0.6000	0.6000
T2	7	RFFT-36SM-001-xxM(3/8")	158.83 - 159.41	0.6000	0.6000
T2	8	PWRT-608-S(13/16")	158.83 - 159.41	0.6000	0.6000
T2	9	LDF4-50A(1/2")	158.83 - 159.41	0.6000	0.6000
T2	11	04-001-54 (3/8" Cable)	158.83 - 159.41	0.6000	0.6000
T3	1	Safety Line 3/8	139.14 - 158.83	0.6000	0.6000
T3	3	Feedline Ladder (Af)	139.14 - 158.83	0.6000	0.6000
T3	4	AVA7-50(1-5/8)	139.14 - 158.83	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	5	2" Rigid Conduit	139.14 - 158.83	0.6000	0.6000
T3	6	ATCB-B01-006(5/16")	139.14 - 158.83	0.6000	0.6000
T3	7	RFFT-36SM-001-xxM(3/8")	139.14 - 158.83	0.6000	0.6000
T3	8	PWRT-608-S(13/16")	139.14 - 158.83	0.6000	0.6000
T3	9	LDF4-50A(1/2")	139.14 - 158.83	0.6000	0.6000
T3	11	04-001-54 (3/8" Cable)	139.14 - 158.83	0.6000	0.6000
T3	13	Feedline Ladder (Af)	139.14 - 152.00	0.6000	0.6000
T3	14	CR 50 1873(1-5/8")	139.14 - 150.00	0.6000	0.6000
T4	1	Safety Line 3/8	119.45 - 139.14	0.6000	0.6000
T4	3	Feedline Ladder (Af)	119.45 - 139.14	0.6000	0.6000
T4	4	AVA7-50(1-5/8)	119.45 - 139.14	0.6000	0.6000
T4	5	2" Rigid Conduit	119.45 - 139.14	0.6000	0.6000
T4	6	ATCB-B01-006(5/16")	119.45 - 139.14	0.6000	0.6000
T4	7	RFFT-36SM-001-xxM(3/8")	119.45 - 139.14	0.6000	0.6000
T4	8	PWRT-608-S(13/16")	119.45 - 139.14	0.6000	0.6000
T4	9	LDF4-50A(1/2")	119.45 - 139.14	0.6000	0.6000
T4	11	04-001-54 (3/8" Cable)	119.45 - 139.14	0.6000	0.6000
T4	13	Feedline Ladder (Af)	119.45 - 139.14	0.6000	0.6000
T4	14	CR 50 1873(1-5/8")	119.45 - 139.14	0.6000	0.6000
T5	1	Safety Line 3/8	99.76 - 119.45	0.6000	0.6000
T5	3	Feedline Ladder (Af)	99.76 - 119.45	0.6000	0.6000
T5	4	AVA7-50(1-5/8)	99.76 - 119.45	0.6000	0.6000
T5	5	2" Rigid Conduit	99.76 - 119.45	0.6000	0.6000
T5	6	ATCB-B01-006(5/16")	99.76 - 119.45	0.6000	0.6000
T5	7	RFFT-36SM-001-xxM(3/8")	99.76 - 119.45	0.6000	0.6000
T5	8	PWRT-608-S(13/16")	99.76 - 119.45	0.6000	0.6000
T5	9	LDF4-50A(1/2")	99.76 - 119.45	0.6000	0.6000
T5	11	04-001-54 (3/8" Cable)	99.76 - 119.45	0.6000	0.6000
T5	13	Feedline Ladder (Af)	99.76 - 119.45	0.6000	0.6000
T5	14	CR 50 1873(1-5/8")	99.76 - 119.45	0.6000	0.6000
T6	1	Safety Line 3/8	80.08 - 99.76	0.6000	0.6000
T6	3	Feedline Ladder (Af)	80.08 - 99.76	0.6000	0.6000
T6	4	AVA7-50(1-5/8)	80.08 - 99.76	0.6000	0.6000
T6	5	2" Rigid Conduit	80.08 - 99.76	0.6000	0.6000
T6	6	ATCB-B01-006(5/16")	80.08 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	7	RFFT-36SM-001-xxM(3/8")	99.76 80.08 - 99.76	0.6000	0.6000
T6	8	PWRT-608-S(13/16")	80.08 - 99.76	0.6000	0.6000
T6	9	LDF4-50A(1/2")	80.08 - 99.76	0.6000	0.6000
T6	11	04-001-54 (3/8" Cable)	80.08 - 99.76	0.6000	0.6000
T6	13	Feedline Ladder (Af)	80.08 - 99.76	0.6000	0.6000
T6	14	CR 50 1873(1-5/8")	80.08 - 99.76	0.6000	0.6000
T7	1	Safety Line 3/8	60.39 - 80.08	0.6000	0.6000
T7	3	Feedline Ladder (Af)	60.39 - 80.08	0.6000	0.6000
T7	4	AVA7-50(1-5/8)	60.39 - 80.08	0.6000	0.6000
T7	5	2" Rigid Conduit	60.39 - 80.08	0.6000	0.6000
T7	6	ATCB-B01-006(5/16")	60.39 - 80.08	0.6000	0.6000
T7	7	RFFT-36SM-001-xxM(3/8")	60.39 - 80.08	0.6000	0.6000
T7	8	PWRT-608-S(13/16")	60.39 - 80.08	0.6000	0.6000
T7	9	LDF4-50A(1/2")	60.39 - 80.08	0.6000	0.6000
T7	11	04-001-54 (3/8" Cable)	60.39 - 80.08	0.6000	0.6000
T7	13	Feedline Ladder (Af)	60.39 - 80.08	0.6000	0.6000
T7	14	CR 50 1873(1-5/8")	60.39 - 80.08	0.6000	0.6000
T8	1	Safety Line 3/8	40.70 - 60.39	0.6000	0.6000
T8	3	Feedline Ladder (Af)	40.70 - 60.39	0.6000	0.6000
T8	4	AVA7-50(1-5/8)	40.70 - 60.39	0.6000	0.6000
T8	5	2" Rigid Conduit	40.70 - 60.39	0.6000	0.6000
T8	6	ATCB-B01-006(5/16")	40.70 - 60.39	0.6000	0.6000
T8	7	RFFT-36SM-001-xxM(3/8")	40.70 - 60.39	0.6000	0.6000
T8	8	PWRT-608-S(13/16")	40.70 - 60.39	0.6000	0.6000
T8	9	LDF4-50A(1/2")	40.70 - 60.39	0.6000	0.6000
T8	11	04-001-54 (3/8" Cable)	40.70 - 60.39	0.6000	0.6000
T8	13	Feedline Ladder (Af)	40.70 - 60.39	0.6000	0.6000
T8	14	CR 50 1873(1-5/8")	40.70 - 60.39	0.6000	0.6000
T9	1	Safety Line 3/8	21.01 - 40.70	0.6000	0.6000
T9	3	Feedline Ladder (Af)	21.01 - 40.70	0.6000	0.6000
T9	4	AVA7-50(1-5/8)	21.01 - 40.70	0.6000	0.6000
T9	5	2" Rigid Conduit	21.01 - 40.70	0.6000	0.6000
T9	6	ATCB-B01-006(5/16")	21.01 - 40.70	0.6000	0.6000
T9	7	RFFT-36SM-001-xxM(3/8")	21.01 - 40.70	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	8	PWRT-608-S(13/16")	21.01 - 40.70	0.6000	0.6000
T9	9	LDF4-50A(1/2")	21.01 - 40.70	0.6000	0.6000
T9	11	04-001-54 (3/8" Cable)	21.01 - 40.70	0.6000	0.6000
T9	13	Feedline Ladder (Af)	21.01 - 40.70	0.6000	0.6000
T9	14	CR 50 1873(1-5/8")	21.01 - 40.70	0.6000	0.6000
T10	1	Safety Line 3/8	1.33 - 21.01	0.6000	0.6000
T10	3	Feedline Ladder (Af)	10.00 - 21.01	0.6000	0.6000
T10	4	AVA7-50(1-5/8)	10.00 - 21.01	0.6000	0.6000
T10	5	2" Rigid Conduit	10.00 - 21.01	0.6000	0.6000
T10	6	ATCB-B01-006(5/16")	10.00 - 21.01	0.6000	0.6000
T10	7	RFFT-36SM-001-xxM(3/8")	10.00 - 21.01	0.6000	0.6000
T10	8	PWRT-608-S(13/16")	10.00 - 21.01	0.6000	0.6000
T10	9	LDF4-50A(1/2")	10.00 - 21.01	0.6000	0.6000
T10	11	04-001-54 (3/8" Cable)	10.00 - 21.01	0.6000	0.6000
T10	13	Feedline Ladder (Af)	6.00 - 21.01	0.6000	0.6000
T10	14	CR 50 1873(1-5/8")	8.00 - 21.01	0.6000	0.6000
T11	1	Safety Line 3/8	0.00 - 1.33	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment ° ft	Placement		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod 5/8"x8'	A	From Leg	0.00 0.00 4.00	0.00	179.00	No Ice 1/2" Ice 1" Ice	0.50 1.31 2.14	0.50 1.31 2.14	0.01 0.01 0.02
***									
6'x2" Mount Pipe	B	From Face	0.50 1.50 0.00	0.00	176.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
ANT150F2	B	From Face	0.50 1.50 1.00	0.00	176.00	No Ice 1/2" Ice 1" Ice	1.23 1.53 1.84	1.23 1.53 1.84	0.01 0.02 0.04
(2) ETD819G-12UB	B	From Face	0.50 1.50 1.00	0.00	176.00	No Ice 1/2" Ice 1" Ice	1.84 2.01 2.19	0.45 0.55 0.66	0.03 0.04 0.06
***									
Sector Mount [SM 201-3]	C	None		0.00	176.00	No Ice 1/2" Ice 1" Ice	24.76 33.89 43.00	24.76 33.89 43.00	1.08 1.52 2.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Modifications (3)	C	None		0.00	176.00	No Ice	5.00	5.00	50.00
						1/2" Ice	6.00	6.00	75.00
						1" Ice	7.00	7.00	100.00
(12) 4' Vertical Unistrut	C	None		0.00	176.00	No Ice	12.80	12.80	50.00
						1/2" Ice	19.20	19.20	75.00
						1" Ice	25.60	25.60	100.00
6'x4'' Mount Pipe	A	From Leg	0.50 0.00 0.00	0.00	176.00	No Ice	1.89	1.89	0.06
						1/2" Ice	2.62	2.62	0.08
						1" Ice	3.00	3.00	0.11
6'x4'' Mount Pipe	B	From Leg	0.50 0.00 0.00	0.00	176.00	No Ice	1.89	1.89	0.06
						1/2" Ice	2.62	2.62	0.08
						1" Ice	3.00	3.00	0.11
6'x4'' Mount Pipe	C	From Leg	0.50 0.00 0.00	0.00	176.00	No Ice	1.89	1.89	0.06
						1/2" Ice	2.62	2.62	0.08
						1" Ice	3.00	3.00	0.11
DBXLH-8585A-R2M	A	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	4.95	2.70	0.04
						1/2" Ice	5.47	3.18	0.07
						1" Ice	6.02	3.67	0.11
DBXLH-8585A-R2M	B	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	4.95	2.70	0.04
						1/2" Ice	5.47	3.18	0.07
						1" Ice	6.02	3.67	0.11
DBXLH-8585A-R2M	C	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	4.95	2.70	0.04
						1/2" Ice	5.47	3.18	0.07
						1" Ice	6.02	3.67	0.11
(4) ETD819G-12UB	A	From Leg	2.00 0.00 0.00	0.00	176.00	No Ice	1.84	0.45	0.03
						1/2" Ice	2.01	0.55	0.04
						1" Ice	2.19	0.66	0.06
(4) ETD819G-12UB	A	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	1.84	0.45	0.03
						1/2" Ice	2.01	0.55	0.04
						1" Ice	2.19	0.66	0.06
(2) ETD819G-12UB	B	From Leg	2.00 0.00 0.00	0.00	176.00	No Ice	1.84	0.45	0.03
						1/2" Ice	2.01	0.55	0.04
						1" Ice	2.19	0.66	0.06
(2) ETD819G-12UB	B	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	1.84	0.45	0.03
						1/2" Ice	2.01	0.55	0.04
						1" Ice	2.19	0.66	0.06
(2) NNHH-65A-R4	A	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	5.71	2.32	0.07
						1/2" Ice	6.11	2.66	0.12
						1" Ice	6.52	3.01	0.19
(2) NNHH-65A-R4	B	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	5.71	2.32	0.07
						1/2" Ice	6.11	2.66	0.12
						1" Ice	6.52	3.01	0.19
(2) NNHH-65A-R4	C	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	5.71	2.32	0.07
						1/2" Ice	6.11	2.66	0.12
						1" Ice	6.52	3.01	0.19
SBNHH-1D65C	A	From Leg	2.00 0.00 4.00	0.00	176.00	No Ice	5.67	3.40	0.05
						1/2" Ice	6.20	3.91	0.12
						1" Ice	6.74	4.43	0.19
SBNHH-1D65C	B	From Leg	2.00	0.00	176.00	No Ice	5.67	3.40	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	6.20	3.91	0.12
			4.00			Ice	6.74	4.43	0.19
						1" Ice			
SBNHH-1D65C	C	From Leg	2.00	0.00	176.00	No Ice	5.67	3.40	0.05
			0.00			1/2"	6.20	3.91	0.12
			4.00			Ice	6.74	4.43	0.19
						1" Ice			
(3) B25 RRH4x30-4R	A	From Leg	2.00	0.00	176.00	No Ice	2.14	1.31	0.05
			0.00			1/2"	2.33	1.46	0.07
			4.00			Ice	2.53	1.63	0.09
						1" Ice			
DC6-48-60-18-8F	A	From Leg	2.00	0.00	176.00	No Ice	0.92	0.92	0.02
			0.00			1/2"	1.46	1.46	0.04
			4.00			Ice	1.64	1.64	0.06
						1" Ice			
DC6-48-60-18-8F	B	From Leg	2.00	0.00	176.00	No Ice	0.92	0.92	0.02
			0.00			1/2"	1.46	1.46	0.04
			4.00			Ice	1.64	1.64	0.06
						1" Ice			
(2) RRH4X25-WCS	B	From Leg	2.00	0.00	176.00	No Ice	3.16	2.38	0.07
			0.00			1/2"	3.40	2.60	0.10
			4.00			Ice	3.65	2.82	0.13
						1" Ice			
RRH4X25-WCS	C	From Leg	2.00	0.00	176.00	No Ice	3.16	2.38	0.07
			0.00			1/2"	3.40	2.60	0.10
			4.00			Ice	3.65	2.82	0.13
						1" Ice			
RRH2X40-07-L-AT	B	From Leg	2.00	0.00	176.00	No Ice	2.38	1.26	0.05
			0.00			1/2"	2.58	1.43	0.07
			0.00			Ice	2.79	1.60	0.09
						1" Ice			
(2) RRH2X40-07-L-AT	C	From Leg	2.00	0.00	176.00	No Ice	2.38	1.26	0.05
			0.00			1/2"	2.58	1.43	0.07
			0.00			Ice	2.79	1.60	0.09
						1" Ice			
AIRSCALE RRH 4T4R B5 160W	A	From Leg	2.00	0.00	176.00	No Ice	1.29	0.72	0.04
			0.00			1/2"	1.43	0.83	0.05
			4.00			Ice	1.58	0.96	0.06
						1" Ice			
(2) AIRSCALE RRH 4T4R B5 160W	B	From Leg	2.00	0.00	176.00	No Ice	1.29	0.72	0.04
			0.00			1/2"	1.43	0.83	0.05
			4.00			Ice	1.58	0.96	0.06
						1" Ice			
jsource technologies 12128FM4SEC	B	From Leg	2.00	0.00	176.00	No Ice	1.20	0.80	0.01
			0.00			1/2"	1.34	0.91	0.02
			0.00			Ice	1.48	1.04	0.03
						1" Ice			
***									
Pipe Mount [PM 602-1]	A	From Leg	1.00	0.00	160.00	No Ice	2.78	2.78	0.09
			0.00			1/2"	3.21	3.21	0.11
			0.00			Ice	3.64	3.64	0.14
						1" Ice			
(2) 10' Tieback	A	From Face	2.00	0.00	160.00	No Ice	2.38	0.25	0.04
			0.00			1/2"	3.38	0.50	0.05
			0.00			Ice	4.38	0.75	0.07
						1" Ice			
10' Tieback	B	From Face	2.00	0.00	160.00	No Ice	2.38	0.25	0.04
			0.00			1/2"	3.38	0.50	0.05
			0.00			Ice	4.38	0.75	0.07
						1" Ice			
FIBEAIR IP-10	A	From Leg	2.00	0.00	160.00	No Ice	1.01	0.56	0.02
			0.00			1/2"	1.14	0.66	0.02
			0.00			Ice	1.28	0.77	0.03
						1" Ice			
***									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Sector Mount [SM 801-3]	C	None		0.00	150.00	No Ice 1/2" Ice 1" Ice	20.61 29.42 38.23	20.61 29.42 38.23	0.88 1.28 1.82
Mount Reinforcement Specifications	C	None		0.00	150.00	No Ice 1/2" Ice 1" Ice	28.63 34.69 40.75	28.63 34.69 40.75	0.00 0.00 0.00
(2) QS8656-5 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	5.42 5.92 6.43	5.62 6.12 6.63	0.12 0.21 0.31
(2) QS8656-5 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	5.42 5.92 6.43	5.62 6.12 6.63	0.12 0.21 0.31
(2) QS8656-5 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	5.42 5.92 6.43	5.62 6.12 6.63	0.12 0.21 0.31
RF4439D-25A	A	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.25 1.39 1.54	0.07 0.09 0.11
RF4439D-25A	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.25 1.39 1.54	0.07 0.09 0.11
RF4439D-25A	C	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.25 1.39 1.54	0.07 0.09 0.11
RF4440D-13A	A	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.13 1.27 1.41	0.07 0.09 0.11
RF4440D-13A	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.13 1.27 1.41	0.07 0.09 0.11
RF4440D-13A	C	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.13 1.27 1.41	0.07 0.09 0.11
MT6407-77A w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	4.91 5.26 5.61	2.68 3.14 3.62	0.10 0.14 0.18
MT6407-77A w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	4.91 5.26 5.61	2.68 3.14 3.62	0.10 0.14 0.18
MT6407-77A w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	4.91 5.26 5.61	2.68 3.14 3.62	0.10 0.14 0.18
RVZDC-6627-PF-48	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	3.79 4.04 4.30	2.51 2.73 2.95	0.03 0.06 0.10

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HPX8-59	A	Paraboloid w/Shroud (HP)	From Leg	2.00 0.00 0.00	41.00		160.00	8.38	No Ice 1/2" Ice 1" Ice	55.09 56.19 57.29	0.30 0.59 0.88

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+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
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	179.098 - 159.41	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	31	-81.63	0.28	0.15
			Max. Mx	20	-44.17	-1.21	-0.00
			Max. My	14	-43.88	0.04	1.36
			Max. Vy	9	1.38	-0.25	0.19
			Max. Vx	16	1.20	-0.05	-0.20
		Diagonal	Max Tension	24	3.35	0.00	0.00
			Max. Compression	16	-4.24	0.00	0.00
			Max. Mx	27	-1.01	0.08	0.00
			Max. My	12	2.39	-0.02	0.01
			Max. Vy	27	-0.03	0.08	0.00
			Max. Vx	12	0.00	-0.02	0.01
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	35	-0.55	0.00	0.00
			Max. Mx	26	-0.52	-0.03	0.00
			Max. Vy	26	0.03	0.00	0.00
T2	159.41 - 158.827	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	27	-84.37	-0.02	0.32
			Max. Mx	18	-69.14	2.22	-2.06
			Max. My	2	-71.74	-0.38	2.85
			Max. Vy	18	-3.89	2.22	-2.06
			Max. Vx	2	-4.91	-0.38	2.85
T3	158.827 - 139.139	Leg	Max Tension	15	24.58	-0.74	-0.03
			Max. Compression	2	-100.43	0.35	0.09
			Max. Mx	18	-72.64	2.95	-0.67
			Max. My	8	-41.35	0.97	1.51
			Max. Vy	22	-0.73	-0.94	0.11
			Max. Vx	24	0.67	-0.49	0.79
		Diagonal	Max Tension	16	5.90	0.00	0.00
			Max. Compression	16	-6.70	0.00	0.00
			Max. Mx	27	1.34	0.06	0.00
			Max. My	8	-4.25	0.00	0.01
			Max. Vy	27	-0.03	0.06	0.00
			Max. Vx	8	-0.00	0.00	0.00
T4	139.139 - 119.452	Leg	Max Tension	15	54.25	-0.82	-0.08
			Max. Compression	2	-131.98	1.02	0.05
			Max. Mx	2	-122.34	1.09	0.04
			Max. My	24	-41.31	-0.24	0.94
			Max. Vy	2	-0.16	1.09	0.04
			Max. Vx	13	0.14	-0.13	-0.94
		Diagonal	Max Tension	16	5.23	0.00	0.00
			Max. Compression	17	-5.01	0.00	0.00
			Max. Mx	27	0.75	0.05	0.00
			Max. My	14	2.60	0.03	-0.01
			Max. Vy	27	-0.02	0.05	0.00
			Max. Vx	14	0.00	0.00	0.00
T5	119.452 - 99.7642	Leg	Max Tension	15	78.55	-1.31	-0.08
			Max. Compression	2	-158.71	1.34	0.05
			Max. Mx	18	-149.58	1.58	-0.03
			Max. My	16	-44.25	-0.10	1.43
			Max. Vy	14	0.15	-1.35	-0.07
			Max. Vx	13	0.15	0.15	-1.12
		Diagonal	Max Tension	16	4.72	0.00	0.00
			Max. Compression	16	-4.76	0.00	0.00
			Max. Mx	27	0.65	0.05	0.00
			Max. My	14	2.35	0.02	-0.01
			Max. Vy	35	-0.03	0.05	-0.00
			Max. Vx	14	0.00	0.00	0.00
T6	99.7642 - 80.0767	Leg	Max Tension	15	100.70	-1.26	-0.06

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-183.39	1.71	0.15
			Max. Mx	2	-183.39	1.71	0.15
			Max. My	13	-41.51	0.11	-1.56
			Max. Vy	2	-0.15	1.71	0.15
			Max. Vx	12	0.13	0.12	-1.56
		Diagonal	Max Tension	16	4.83	0.00	0.00
			Max. Compression	16	-4.89	0.00	0.00
			Max. Mx	35	0.49	0.05	-0.00
			Max. My	14	-4.36	0.00	-0.01
			Max. Vy	35	-0.03	0.05	-0.00
			Max. Vx	33	0.00	0.00	0.00
T7	80.0767 - 60.3892	Leg	Max Tension	15	121.44	-1.21	-0.05
			Max. Compression	2	-207.78	1.64	0.05
			Max. Mx	2	-191.37	1.71	0.15
			Max. My	16	-47.08	-0.03	1.64
			Max. Vy	2	0.15	1.71	0.15
			Max. Vx	24	-0.19	-0.06	1.57
		Diagonal	Max Tension	16	5.24	0.00	0.00
			Max. Compression	16	-5.22	0.00	0.00
			Max. Mx	35	0.91	0.06	-0.01
			Max. My	33	-0.88	0.04	-0.01
			Max. Vy	35	-0.04	0.06	-0.01
			Max. Vx	33	0.00	0.00	0.00
T8	60.3892 - 40.7017	Leg	Max Tension	15	139.34	-2.15	-0.12
			Max. Compression	2	-228.91	2.88	0.22
			Max. Mx	2	-228.91	2.88	0.22
			Max. My	16	-47.97	-0.30	2.59
			Max. Vy	2	-0.22	2.88	0.22
			Max. Vx	24	-0.25	-0.34	2.49
		Diagonal	Max Tension	16	6.10	0.00	0.00
			Max. Compression	16	-6.03	0.00	0.00
			Max. Mx	35	0.93	0.09	-0.01
			Max. My	32	0.87	0.08	-0.01
			Max. Vy	35	-0.05	0.09	-0.01
			Max. Vx	32	0.00	0.00	0.00
T9	40.7017 - 21.0142	Leg	Max Tension	15	158.57	-2.39	-0.11
			Max. Compression	2	-251.81	0.93	0.03
			Max. Mx	2	-239.87	2.88	0.22
			Max. My	16	-49.07	-0.28	2.38
			Max. Vy	34	0.32	-1.90	-0.16
			Max. Vx	24	0.20	-0.32	2.30
		Diagonal	Max Tension	17	6.41	0.00	0.00
			Max. Compression	16	-6.59	0.00	0.00
			Max. Mx	35	1.27	0.12	-0.01
			Max. My	32	1.35	0.12	-0.01
			Max. Vy	33	0.06	0.10	-0.01
			Max. Vx	32	0.00	0.00	0.00
T10	21.0142 - 1.32667	Leg	Max Tension	15	177.86	-7.79	-0.32
			Max. Compression	2	-275.56	-27.81	-1.17
			Max. Mx	2	-275.56	-27.81	-1.17
			Max. My	12	-61.74	-3.59	5.31
			Max. Vy	2	3.80	8.83	0.26
			Max. Vx	12	-0.95	0.67	-3.08
		Diagonal	Max Tension	16	9.03	0.00	0.00
			Max. Compression	17	-8.73	0.00	0.00
			Max. Mx	35	-0.20	0.13	-0.01
			Max. My	32	0.39	0.09	-0.02
			Max. Vy	33	0.06	0.12	-0.01
			Max. Vx	32	0.00	0.00	0.00
T11	1.32667 - 0	Leg	Max Tension	15	183.80	-1.26	21.68
			Max. Compression	2	-282.24	0.00	0.00
			Max. Mx	18	-279.37	-23.42	13.91
			Max. My	2	-282.13	1.17	-27.81
			Max. Vy	18	-17.66	0.00	0.00
			Max. Vx	2	-20.97	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	279.48	17.66	-10.49
	Max. H_x	18	279.48	17.66	-10.49
	Max. H_z	5	-153.35	-11.11	8.86
	Min. Vert	7	-171.53	-13.26	7.92
	Min. H_x	7	-171.53	-13.26	7.92
	Min. H_z	16	252.98	14.73	-11.04
Leg B	Max. Vert	10	269.59	-17.54	-9.63
	Max. H_x	23	-168.44	13.37	7.21
	Max. H_z	25	-147.19	11.39	7.39
	Min. Vert	23	-168.44	13.37	7.21
	Min. H_x	10	269.59	-17.54	-9.63
	Min. H_z	10	269.59	-17.54	-9.63
Leg A	Max. Vert	2	282.24	-0.88	20.97
	Max. H_x	19	-75.88	2.94	-7.65
	Max. H_z	2	282.24	-0.88	20.97
	Min. Vert	15	-183.72	0.95	-16.35
	Min. H_x	8	60.17	-2.84	2.65
	Min. H_z	15	-183.72	0.95	-16.35

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	134.20	-0.00	-0.00	1.00	12.18	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	161.04	0.60	-32.95	-3562.92	-80.65	-26.14
0.9 Dead+1.0 Wind 0 deg - No Ice	120.78	0.60	-32.95	-3563.23	-84.31	-26.14
1.2 Dead+1.0 Wind 30 deg - No Ice	161.04	16.02	-27.64	-3019.90	-1737.63	-17.57
0.9 Dead+1.0 Wind 30 deg - No Ice	120.78	16.02	-27.64	-3020.20	-1741.28	-17.57
1.2 Dead+1.0 Wind 60 deg - No Ice	161.04	25.95	-15.31	-1695.66	-2829.45	-6.92
0.9 Dead+1.0 Wind 60 deg - No Ice	120.78	25.95	-15.31	-1695.96	-2833.11	-6.92
1.2 Dead+1.0 Wind 90 deg - No Ice	161.04	27.42	-0.65	-101.11	-3007.08	-5.25
0.9 Dead+1.0 Wind 90 deg - No Ice	120.78	27.42	-0.65	-101.41	-3010.73	-5.25
1.2 Dead+1.0 Wind 120 deg - No Ice	161.04	27.25	15.37	1649.23	-2934.13	12.56
0.9 Dead+1.0 Wind 120 deg - No Ice	120.78	27.25	15.37	1648.93	-2937.79	12.56
1.2 Dead+1.0 Wind 150 deg - No Ice	161.04	15.02	27.43	3010.02	-1590.37	28.96
0.9 Dead+1.0 Wind 150 deg - No Ice	120.78	15.02	27.43	3009.72	-1594.02	28.96
1.2 Dead+1.0 Wind 180 deg - No Ice	161.04	-0.78	31.71	3491.79	139.17	28.65
0.9 Dead+1.0 Wind 180 deg - No Ice	120.78	-0.78	31.71	3491.49	135.51	28.65
1.2 Dead+1.0 Wind 210 deg - No Ice	161.04	-16.31	27.97	3075.21	1811.91	19.54

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.0 Wind 210 deg - No Ice	120.78	-16.31	27.97	3074.91	1808.25	19.54
1.2 Dead+1.0 Wind 240 deg - No Ice	161.04	-27.62	16.41	1810.66	3019.00	7.16
0.9 Dead+1.0 Wind 240 deg - No Ice	120.78	-27.62	16.41	1810.36	3015.34	7.16
1.2 Dead+1.0 Wind 270 deg - No Ice	161.04	-27.65	0.93	148.30	3074.57	4.57
0.9 Dead+1.0 Wind 270 deg - No Ice	120.78	-27.65	0.93	148.00	3070.92	4.57
1.2 Dead+1.0 Wind 300 deg - No Ice	161.04	-25.81	-14.63	-1590.19	2842.01	-13.56
0.9 Dead+1.0 Wind 300 deg - No Ice	120.78	-25.81	-14.63	-1590.50	2838.35	-13.56
1.2 Dead+1.0 Wind 330 deg - No Ice	161.04	-15.20	-27.35	-2994.25	1648.89	-26.99
0.9 Dead+1.0 Wind 330 deg - No Ice	120.78	-15.20	-27.35	-2994.55	1645.23	-26.99
1.2 Dead+1.0 Ice+1.0 Temp	294.30	-0.00	0.00	17.87	46.85	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	294.30	0.08	-6.72	-704.21	34.65	-7.74
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	294.30	3.29	-5.67	-594.35	-307.96	-4.59
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	294.30	5.00	-2.92	-302.74	-497.24	-1.29
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	294.30	5.45	-0.08	4.74	-548.75	0.28
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	294.30	5.12	2.91	330.00	-506.78	3.78
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	294.30	3.14	5.62	626.21	-287.64	8.70
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	294.30	-0.10	6.58	732.51	62.93	8.07
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	294.30	-3.32	5.72	637.10	407.63	4.85
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	294.30	-5.20	3.06	352.25	610.19	1.32
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	294.30	-5.48	0.12	36.94	647.52	-0.37
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	294.30	-4.95	-2.82	-287.91	586.39	-3.92
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	294.30	-3.16	-5.61	-588.70	385.22	-8.44
Dead+Wind 0 deg - Service	134.20	0.18	-10.38	-1107.43	-16.60	-7.89
Dead+Wind 30 deg - Service	134.20	5.05	-8.72	-939.14	-533.02	-5.31
Dead+Wind 60 deg - Service	134.20	8.21	-4.84	-527.48	-874.47	-2.09
Dead+Wind 90 deg - Service	134.20	8.71	-0.19	-29.91	-932.38	-1.59
Dead+Wind 120 deg - Service	134.20	8.60	4.86	514.73	-906.10	3.79
Dead+Wind 150 deg - Service	134.20	4.75	8.66	937.43	-488.54	8.74
Dead+Wind 180 deg - Service	134.20	-0.24	10.01	1087.22	49.81	8.65
Dead+Wind 210 deg - Service	134.20	-5.14	8.82	957.12	571.00	5.90
Dead+Wind 240 deg - Service	134.20	-8.71	5.17	563.49	947.27	2.16
Dead+Wind 270 deg - Service	134.20	-8.78	0.28	45.44	968.31	1.38
Dead+Wind 300 deg - Service	134.20	-8.17	-4.63	-495.61	893.80	-4.09
Dead+Wind 330 deg - Service	134.20	-4.81	-8.63	-931.39	521.75	-8.15

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-134.20	0.00	0.00	134.20	0.00	0.000%
2	0.60	-161.04	-32.95	-0.60	161.04	32.95	0.000%
3	0.60	-120.78	-32.95	-0.60	120.78	32.95	0.000%
4	16.02	-161.04	-27.64	-16.02	161.04	27.64	0.000%
5	16.02	-120.78	-27.64	-16.02	120.78	27.64	0.000%
6	25.95	-161.04	-15.31	-25.95	161.04	15.31	0.000%
7	25.95	-120.78	-15.31	-25.95	120.78	15.31	0.000%
8	27.42	-161.04	-0.65	-27.42	161.04	0.65	0.000%
9	27.42	-120.78	-0.65	-27.42	120.78	0.65	0.000%
10	27.25	-161.04	15.37	-27.25	161.04	-15.37	0.000%
11	27.25	-120.78	15.37	-27.25	120.78	-15.37	0.000%
12	15.02	-161.04	27.43	-15.02	161.04	-27.43	0.000%
13	15.02	-120.78	27.43	-15.02	120.78	-27.43	0.000%
14	-0.78	-161.04	31.71	0.78	161.04	-31.71	0.000%
15	-0.78	-120.78	31.71	0.78	120.78	-31.71	0.000%
16	-16.31	-161.04	27.97	16.31	161.04	-27.97	0.000%
17	-16.31	-120.78	27.97	16.31	120.78	-27.97	0.000%
18	-27.62	-161.04	16.41	27.62	161.04	-16.41	0.000%
19	-27.62	-120.78	16.41	27.62	120.78	-16.41	0.000%
20	-27.65	-161.04	0.93	27.65	161.04	-0.93	0.000%
21	-27.65	-120.78	0.93	27.65	120.78	-0.93	0.000%
22	-25.81	-161.04	-14.63	25.81	161.04	14.63	0.000%
23	-25.81	-120.78	-14.63	25.81	120.78	14.63	0.000%
24	-15.20	-161.04	-27.35	15.20	161.04	27.35	0.000%
25	-15.20	-120.78	-27.35	15.20	120.78	27.35	0.000%
26	0.00	-294.30	0.00	0.00	294.30	-0.00	0.000%
27	0.08	-294.30	-6.72	-0.08	294.30	6.72	0.000%
28	3.29	-294.30	-5.67	-3.29	294.30	5.67	0.000%
29	5.00	-294.30	-2.92	-5.00	294.30	2.92	0.000%
30	5.45	-294.30	-0.08	-5.45	294.30	0.08	0.000%
31	5.12	-294.30	2.91	-5.12	294.30	-2.91	0.000%
32	3.14	-294.30	5.62	-3.14	294.30	-5.62	0.000%
33	-0.10	-294.30	6.58	0.10	294.30	-6.58	0.000%
34	-3.32	-294.30	5.72	3.32	294.30	-5.72	0.000%
35	-5.20	-294.30	3.06	5.20	294.30	-3.06	0.000%
36	-5.48	-294.30	0.12	5.48	294.30	-0.12	0.000%
37	-4.95	-294.30	-2.82	4.95	294.30	2.82	0.000%
38	-3.16	-294.30	-5.61	3.16	294.30	5.61	0.000%
39	0.18	-134.20	-10.38	-0.18	134.20	10.38	0.000%
40	5.05	-134.20	-8.72	-5.05	134.20	8.72	0.000%
41	8.21	-134.20	-4.84	-8.21	134.20	4.84	0.000%
42	8.71	-134.20	-0.19	-8.71	134.20	0.19	0.000%
43	8.60	-134.20	4.86	-8.60	134.20	-4.86	0.000%
44	4.75	-134.20	8.66	-4.75	134.20	-8.66	0.000%
45	-0.24	-134.20	10.01	0.24	134.20	-10.01	0.000%
46	-5.14	-134.20	8.82	5.14	134.20	-8.82	0.000%
47	-8.71	-134.20	5.17	8.71	134.20	-5.17	0.000%
48	-8.78	-134.20	0.28	8.78	134.20	-0.28	0.000%
49	-8.17	-134.20	-4.63	8.17	134.20	4.63	0.000%
50	-4.81	-134.20	-8.63	4.81	134.20	8.63	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	179.098 - 159.41	4.6699	46	0.27	0.08
T2	159.41 - 158.827	3.5990	46	0.24	0.08
T3	158.827 - 139.139	3.5670	46	0.24	0.08
T4	139.139 - 119.452	2.6418	46	0.19	0.05
T5	119.452 - 99.7642	1.9036	46	0.15	0.04
T6	99.7642 -	1.3149	46	0.12	0.03

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
	80.0767				
T7	80.0767 - 60.3892	0.8494	46	0.09	0.02
T8	60.3892 - 40.7017	0.5017	46	0.07	0.02
T9	40.7017 - 21.0142	0.2472	39	0.04	0.01
T10	21.0142 - 1.32667	0.0877	39	0.02	0.00
T11	1.32667 - 0	0.0108	39	0.00	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	Lightning Rod 5/8"x8'	46	4.6646	0.27	0.08	474775
176.00	6'x2" Mount Pipe	46	4.5021	0.26	0.09	474775
160.00	HPX8-59	46	3.6313	0.24	0.09	33561
150.00	Sector Mount [SM 801-3]	46	3.1193	0.22	0.06	17000

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	179.098 - 159.41	15.1664	16	0.86	0.28
T2	159.41 - 158.827	11.6537	16	0.77	0.28
T3	158.827 - 139.139	11.5491	16	0.77	0.27
T4	139.139 - 119.452	8.5303	16	0.63	0.17
T5	119.452 - 99.7642	6.1331	16	0.49	0.13
T6	99.7642 - 80.0767	4.2281	16	0.40	0.10
T7	80.0767 - 60.3892	2.7261	16	0.29	0.07
T8	60.3892 - 40.7017	1.6073	3	0.21	0.05
T9	40.7017 - 21.0142	0.7926	3	0.14	0.03
T10	21.0142 - 1.32667	0.2796	3	0.07	0.02
T11	1.32667 - 0	0.0342	2	0.00	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	Lightning Rod 5/8"x8'	16	15.1491	0.86	0.28	154904
176.00	6'x2" Mount Pipe	16	14.6156	0.85	0.29	154904
160.00	HPX8-59	16	11.7596	0.78	0.28	10407
150.00	Sector Mount [SM 801-3]	16	10.0861	0.71	0.20	5092

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	179.098	Leg	A325N	1.0000	4	6.75	54.52	0.124	1.05	Bolt Tension
		Diagonal	A325N	0.6250	1	3.35	5.51	0.609	1.05	Member Block Shear
		Top Girt	A325N	0.6250	1	0.55	13.81	0.040	1.05	Bolt Shear
T2	159.41	Leg	A325N	1.0000	4	7.03	54.52	0.129	1.05	Bolt Tension
T3	158.827	Leg	A325N	1.0000	6	5.58	54.52	0.102	1.05	Bolt Tension
		Diagonal	A325N	0.6250	1	5.90	6.53	0.905	1.05	Member Block Shear
T4	139.139	Leg	A325N	1.0000	6	9.04	54.52	0.166	1.05	Bolt Tension
		Diagonal	A325N	0.6250	1	5.23	8.70	0.601	1.05	Member Block Shear
T5	119.452	Leg	A325N	1.0000	6	13.09	54.52	0.240	1.05	Bolt Tension
		Diagonal	A325N	0.7500	1	4.72	8.16	0.579	1.05	Member Bearing
T6	99.7642	Leg	A325N	1.0000	6	16.78	54.52	0.308	1.05	Bolt Tension
		Diagonal	A325N	0.7500	1	4.83	8.16	0.592	1.05	Member Bearing
T7	80.0767	Leg	A325N	1.0000	10	12.14	54.52	0.223	1.05	Bolt Tension
		Diagonal	A325N	0.7500	1	5.24	10.88	0.482	1.05	Member Bearing
T8	60.3892	Leg	A325N	1.0000	10	13.93	54.52	0.256	1.05	Bolt Tension
		Diagonal	A325N	0.7500	2	3.05	8.05	0.379	1.05	Member Block Shear
T9	40.7017	Leg	A325N	1.0000	10	15.86	54.52	0.291	1.05	Bolt Tension
		Diagonal	A325N	0.7500	2	3.21	10.74	0.299	1.05	Member Block Shear
T10	21.0142	Leg	A325N	1.0000	10	17.79	54.52	0.326	1.05	Bolt Tension
		Diagonal	A325N	0.7500	2	4.51	10.74	0.420	1.05	Member Block Shear

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	179.098 - 159.41	P3x.216	19.69	4.92	50.8 K=1.00	2.2285	-81.63	83.06	0.983 [1]
T2	159.41 - 158.827	P5x.258	0.58	0.58	3.7 K=1.00	4.2999	-84.37	193.30	0.436
T3	158.827 - 139.139	P5x.258	19.71	6.57	42.0 K=1.00	4.2999	-100.43	170.09	0.590 [1]
T4	139.139 - 119.452	P6x.28	19.71	6.57	35.1 K=1.00	5.5813	-131.98	229.51	0.575 [1]
T5	119.452 - 99.7642	P8x.322	19.71	6.57	26.8 K=1.00	8.3993	-158.71	358.57	0.443 [1]
T6	99.7642 - 80.0767	P8x.322	19.71	6.57	26.8 K=1.00	8.3993	-183.39	358.57	0.511 [1]
T7	80.0767 - 60.3892	P8x.406	19.71	6.57	27.1 K=1.00	10.483 2	-207.78	447.08	0.465 [1]
T8	60.3892 - 40.7017	P10x.365	19.71	9.86	32.2 K=1.00	11.908 3	-228.91	496.76	0.461 [1]
T9	40.7017 -	P10x.365	19.71	9.86	32.2	11.908	-251.81	496.76	0.507 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	21.0142				K=1.00	3			
T10	21.0142 - 1.32667	P10x.365	19.71	9.86	32.2	11.908	-275.56	496.76	0.555 [1]
					K=1.00	3			
T11	1.32667 - 0	P10x.593	1.33	1.33	4.4	18.922	-282.19	850.28	0.332
					K=1.00	1			

[1] P_u / ϕP_n controls

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T1	179.098 - 159.41	P3x.216	0.00	8.75	0.000	0.00	8.75	0.000
T2	159.41 - 158.827	P5x.258	1.80	27.25	0.066	0.00	27.25	0.000
T3	158.827 - 139.139	P5x.258	0.00	27.25	0.000	0.00	27.25	0.000
T4	139.139 - 119.452	P6x.28	0.00	42.30	0.000	0.00	42.30	0.000
T5	119.452 - 99.7642	P8x.322	0.00	83.29	0.000	0.00	83.29	0.000
T6	99.7642 - 80.0767	P8x.322	0.00	83.29	0.000	0.00	83.29	0.000
T7	80.0767 - 60.3892	P8x.406	0.00	102.93	0.000	0.00	102.93	0.000
T8	60.3892 - 40.7017	P10x.365	0.00	147.68	0.000	0.00	147.68	0.000
T9	40.7017 - 21.0142	P10x.365	0.00	147.68	0.000	0.00	147.68	0.000
T10	21.0142 - 1.32667	P10x.365	0.00	147.68	0.000	0.00	147.68	0.000
T11	1.32667 - 0	P10x.593	27.83	229.67	0.121	0.00	229.67	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	179.098 - 159.41	P3x.216	0.983	0.000	0.000	0.983 [1]	1.050	4.8.1
T2	159.41 - 158.827	P5x.258	0.436	0.066	0.000	0.447	1.050	4.8.1
T3	158.827 - 139.139	P5x.258	0.590	0.000	0.000	0.590 [1]	1.050	4.8.1
T4	139.139 - 119.452	P6x.28	0.575	0.000	0.000	0.575 [1]	1.050	4.8.1
T5	119.452 - 99.7642	P8x.322	0.443	0.000	0.000	0.443 [1]	1.050	4.8.1
T6	99.7642 - 80.0767	P8x.322	0.511	0.000	0.000	0.511 [1]	1.050	4.8.1
T7	80.0767 - 60.3892	P8x.406	0.465	0.000	0.000	0.465 [1]	1.050	4.8.1
T8	60.3892 - 40.7017	P10x.365	0.461	0.000	0.000	0.461 [1]	1.050	4.8.1
T9	40.7017 - 21.0142	P10x.365	0.507	0.000	0.000	0.507 [1]	1.050	4.8.1
T10	21.0142 - 1.32667	P10x.365	0.555	0.000	0.000	0.555 [1]	1.050	4.8.1

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T11	1.32667 - 0	P10x.593	0.332	0.121	0.000	0.403	1.050	4.8.1

[1] P_u / ϕP_n controls

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	179.098 - 159.41	L1 3/4x1 3/4x3/16	6.34	2.82	103.9 K=1.05	0.6211	-4.24	14.77	0.287 [1]
T3	158.827 - 139.139	L2x2x3/16	7.84	3.71	114.7 K=1.02	0.7150	-6.70	15.10	0.443 [1]
T4	139.139 - 119.452	L2x2x1/4	9.75	4.58	140.5 K=1.00	0.9380	-4.83	13.59	0.355 [1]
T5	119.452 - 99.7642	L2 1/2x2 1/2x3/16	11.11	5.15	124.9 K=1.00	0.9020	-4.70	16.54	0.284 [1]
T6	99.7642 - 80.0767	L2 1/2x2 1/2x3/16	12.56	5.89	142.9 K=1.00	0.9020	-4.89	12.64	0.387 [1]
T7	80.0767 - 60.3892	L2 1/2x2 1/2x1/4	14.08	6.66	162.9 K=1.00	1.1900	-5.02	12.84	0.391 [1]
T8	60.3892 - 40.7017	L3x3x3/16	17.17	8.07	152.5 K=0.94	1.0900	-6.03	13.42	0.450 [1]
T9	40.7017 - 21.0142	L3x3x1/4	18.63	8.81	164.8 K=0.92	1.4400	-6.59	15.18	0.434 [1]
T10	21.0142 - 1.32667	L3x3x1/4	20.13	9.58	176.5 K=0.91	1.4400	-8.73	13.23	0.660 [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	179.098 - 159.41	L3x3x1/4	4.00	3.29	93.4 K=1.40	1.4400	-0.55	37.63	0.015 [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 $\frac{P_u}{\phi P_n}$
T3	158.827 - 139.139	P5x.258	19.71	6.57	42.0	4.2999	24.58	193.49	0.127 [1]
T4	139.139 - 119.452	P6x.28	19.71	6.57	35.1	5.5813	54.25	251.16	0.216 [1]
T5	119.452 - 99.7642	P8x.322	19.71	6.57	26.8	8.3993	78.55	377.97	0.208 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	99.7642 - 80.0767	P8x.322	19.71	6.57	26.8	8.3993	100.70	377.97	0.266 [1]
T7	80.0767 - 60.3892	P8x.406	19.71	6.57	27.1	10.4832	121.44	471.75	0.257 [1]
T8	60.3892 - 40.7017	P10x.365	19.71	9.86	32.2	11.9083	139.34	535.87	0.260 [1]
T9	40.7017 - 21.0142	P10x.365	19.71	9.86	32.2	11.9083	158.57	535.87	0.296 [1]
T10	21.0142 - 1.32667	P10x.365	19.71	9.86	32.2	11.9083	177.86	535.87	0.332 [1]
T11	1.32667 - 0	P10x.593	1.33	1.33	4.4	18.9221	183.80	851.50	0.216

[1] P_u / ϕP_n controls

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T3	158.827 - 139.139	P5x.258	0.00	27.25	0.000	0.00	27.25	0.000
T4	139.139 - 119.452	P6x.28	0.00	42.30	0.000	0.00	42.30	0.000
T5	119.452 - 99.7642	P8x.322	0.00	83.29	0.000	0.00	83.29	0.000
T6	99.7642 - 80.0767	P8x.322	0.00	83.29	0.000	0.00	83.29	0.000
T7	80.0767 - 60.3892	P8x.406	0.00	102.93	0.000	0.00	102.93	0.000
T8	60.3892 - 40.7017	P10x.365	0.00	147.68	0.000	0.00	147.68	0.000
T9	40.7017 - 21.0142	P10x.365	0.00	147.68	0.000	0.00	147.68	0.000
T10	21.0142 - 1.32667	P10x.365	0.00	147.68	0.000	0.00	147.68	0.000
T11	1.32667 - 0	P10x.593	21.72	229.67	0.095	0.00	229.67	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T3	158.827 - 139.139	P5x.258	0.127	0.000	0.000	0.127 [1]	1.050	4.8.1
T4	139.139 - 119.452	P6x.28	0.216	0.000	0.000	0.216 [1]	1.050	4.8.1
T5	119.452 - 99.7642	P8x.322	0.208	0.000	0.000	0.208 [1]	1.050	4.8.1
T6	99.7642 - 80.0767	P8x.322	0.266	0.000	0.000	0.266 [1]	1.050	4.8.1
T7	80.0767 - 60.3892	P8x.406	0.257	0.000	0.000	0.257 [1]	1.050	4.8.1
T8	60.3892 - 40.7017	P10x.365	0.260	0.000	0.000	0.260 [1]	1.050	4.8.1
T9	40.7017 - 21.0142	P10x.365	0.296	0.000	0.000	0.296 [1]	1.050	4.8.1
T10	21.0142 - 1.32667	P10x.365	0.332	0.000	0.000	0.332 [1]	1.050	4.8.1
T11	1.32667 - 0	P10x.593	0.216	0.095	0.000	0.276	1.050	4.8.1

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria

[1] $P_u / \phi P_n$ controls

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	179.098 - 159.41	L1 3/4x1 3/4x3/16	6.34	2.82	65.7	0.3604	3.35	15.68	0.214 [1]
T3	158.827 - 139.139	L2x2x3/16	8.18	3.85	77.2	0.4308	5.90	18.74	0.315 [1]
T4	139.139 - 119.452	L2x2x1/4	8.92	4.18	84.8	0.5629	5.23	24.49	0.214 [1]
T5	119.452 - 99.7642	L2 1/2x2 1/2x3/16	11.11	5.15	81.6	0.5535	4.72	24.08	0.196 [1]
T6	99.7642 - 80.0767	L2 1/2x2 1/2x3/16	12.07	5.65	89.2	0.5535	4.83	24.08	0.201 [1]
T7	80.0767 - 60.3892	L2 1/2x2 1/2x1/4	14.08	6.66	106.1	0.7284	5.24	31.69	0.165 [1]
T8	60.3892 - 40.7017	L3x3x3/16	17.17	8.07	106.1	0.6945	6.10	30.21	0.202 [1]
T9	40.7017 - 21.0142	L3x3x1/4	18.63	8.81	116.7	0.9159	6.41	39.84	0.161 [1]
T10	21.0142 - 1.32667	L3x3x1/4	20.13	9.58	126.5	0.9159	9.03	39.84	0.227 [1]

[1] $P_u / \phi P_n$ controls

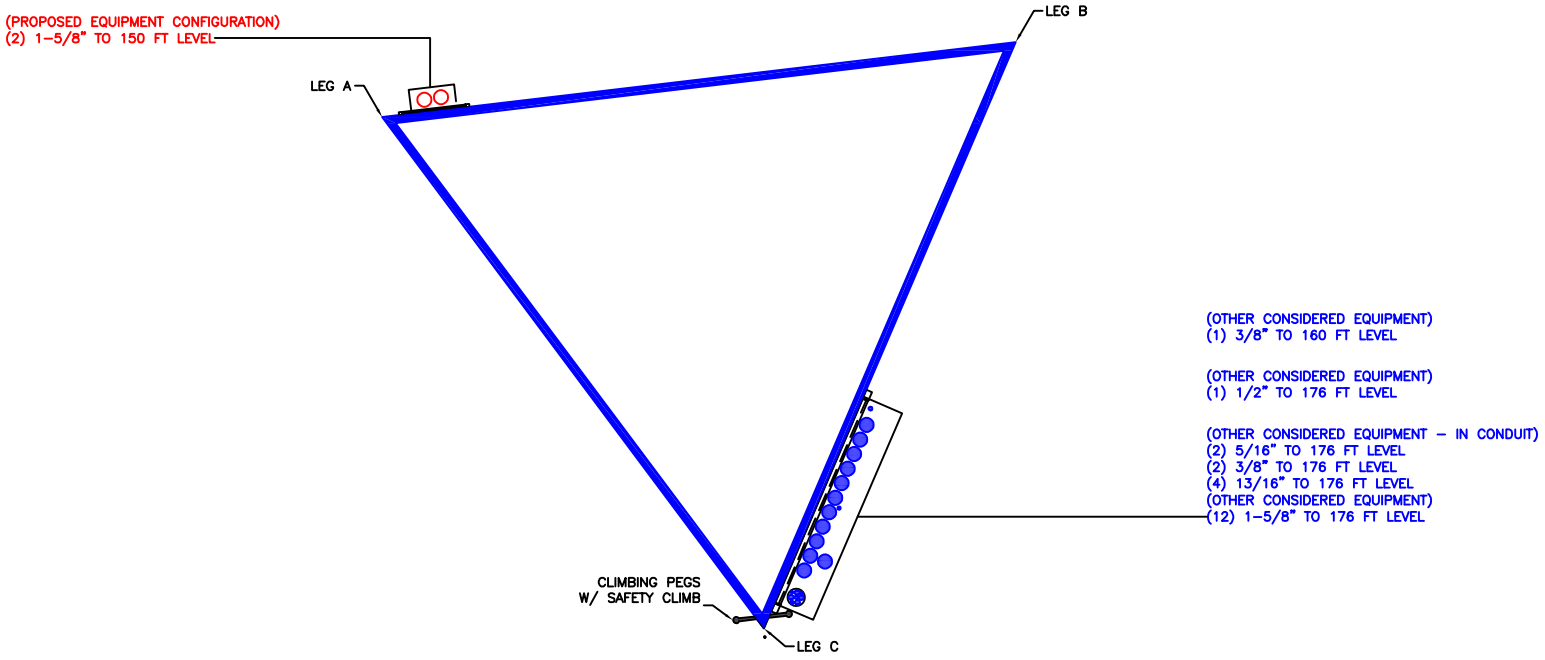
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	179.098 - 159.41	Leg	P3x.216	2	-81.63	87.22	93.6	Pass
T2	159.41 - 158.827	Leg	P5x.258	33	-84.37	202.96	42.5	Pass
T3	158.827 - 139.139	Leg	P5x.258	36	-100.43	178.59	56.2	Pass
T4	139.139 - 119.452	Leg	P6x.28	57	-131.98	240.98	54.8	Pass
T5	119.452 - 99.7642	Leg	P8x.322	78	-158.71	376.50	42.2	Pass
T6	99.7642 - 80.0767	Leg	P8x.322	99	-183.39	376.50	48.7	Pass
T7	80.0767 - 60.3892	Leg	P8x.406	120	-207.78	469.43	44.3	Pass
T8	60.3892 - 40.7017	Leg	P10x.365	141	-228.91	521.60	43.9	Pass
T9	40.7017 - 21.0142	Leg	P10x.365	156	-251.81	521.60	48.3	Pass
T10	21.0142 - 1.32667	Leg	P10x.365	171	-275.56	521.60	52.8	Pass
T11	1.32667 - 0	Leg	P10x.593	186	-282.19	892.79	38.4	Pass
T1	179.098 - 159.41	Diagonal	L1 3/4x1 3/4x3/16	12	-4.24	15.51	27.4	Pass
T3	158.827 - 139.139	Diagonal	L2x2x3/16	54	-6.70	15.86	42.2	Pass
T4	139.139 - 119.452	Diagonal	L2x2x1/4	63	-4.83	14.27	33.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T5	119.452 - 99.7642	Diagonal	L2 1/2x2 1/2x3/16	84	-4.70	17.36	27.0	Pass
T6	99.7642 - 80.0767	Diagonal	L2 1/2x2 1/2x3/16	105	-4.89	13.28	36.8	Pass
T7	80.0767 - 60.3892	Diagonal	L2 1/2x2 1/2x1/4	126	-5.02	13.48	37.2	Pass
T8	60.3892 - 40.7017	Diagonal	L3x3x3/16	147	-6.03	14.09	42.8	Pass
T9	40.7017 - 21.0142	Diagonal	L3x3x1/4	162	-6.59	15.94	41.3	Pass
T10	21.0142 - 1.32667	Diagonal	L3x3x1/4	177	-8.73	13.89	62.8	Pass
T1	179.098 - 159.41	Top Girt	L3x3x1/4	5	-0.55	39.51	1.4	Pass
							Summary	
						Leg (T1)	93.6	Pass
						Diagonal (T10)	62.8	Pass
						Top Girt (T1)	1.4	Pass
						Bolt Checks	86.2	Pass
						RATING =	**93.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED EQUIPMENT CONFIGURATION)
(2) 1-5/8" TO 150 FT LEVEL
LEG A
LEG B
(OTHER CONSIDERED EQUIPMENT)
(1) 3/8" TO 160 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 176 FT LEVEL
(OTHER CONSIDERED EQUIPMENT - IN CONDUIT)
(2) 5/16" TO 176 FT LEVEL
(2) 3/8" TO 176 FT LEVEL
(4) 13/16" TO 176 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(12) 1-5/8" TO 176 FT LEVEL
CLIMBING PEGS
W/ SAFETY CLIMB
LEG C

APPENDIX C

ADDITIONAL CALCULATIONS

Self Support Anchor Rod Capacity

Site Info	
BU #	808716
Site Name	Tusten
Order #	594303 Rev.0

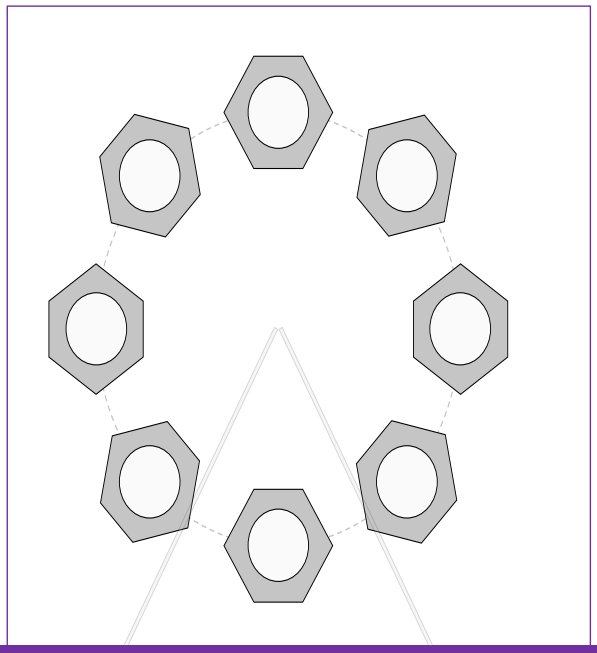
Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	Yes
l_{ar} (in)	2.5

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	282.24	183.72
Shear Force (kips)	20.99	16.38

**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

(8) 2" ø bolts (A36 N; Fy=36 ksi, Fu=58 ksi)

l_{ar} (in): 2.5

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_t = 22.97	ϕPn_t = 108.75	**Stress Rating**
Vu = 2.05	ϕVn = 68.33	**20.1%**
Mu = n/a	ϕMn = n/a	**Pass**

SST Unit Base Foundation

BU # :	808716
Site Name:	Tusten
App. Number:	594303 Rev.0
TIA-222 Revision:	H

Top & Bot. Pad Rein. Different?:	☐
Tower Centroid Offset?:	☑
Block Foundation?:	☐
Rectangular Pad?:	☐

Superstructure Analysis Reactions		
Global Moment, **M**:	3569.3	ft-kips
Global Axial, **P**:	161.04	kips
Global Shear, **V**:	32.38	kips
Leg Compression, P_{comp}:	282.24	kips
Leg Comp. Shear, V_{u_comp}:	20.99	kips
Leg Uplift, P_{uplift}:	183.72	kips
Leg Uplift. Shear, V_{u_uplift}:	16.38	kips
Tower Height, **H**:	179.1	ft
Base Face Width, **BW**:	18	ft
BP Dist. Above Fdn, bp_{dist}:	4.5	in

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, **dpier**:	5.0	ft
Ext. Above Grade, **E**:	1.00	ft
Pier Rebar Size, **Sc**:	9	
Pier Rebar Quantity, **mc**:	26	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	6	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	5	in

Pad Properties		
Depth, **D**:	6.50	ft
Pad Width, W_1:	27.00	ft
Pad Thickness, **T**:	2.00	ft
Pad Rebar Size (Bottom dir. 2), Sp_2:	9	
Pad Rebar Quantity (Bottom dir. 2), mp_2:	27	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	4	ksi
Dry Concrete Density, δc:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	115	pcf
Ultimate Gross Bearing, Qult:	16.000	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:		degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.6	
Neglected Depth, **N**:	4.2	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, **gw**:	15	ft

<-- Toggle between Gross and Net

Foundation Analysis Checks	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	330.53	32.38	**9.3%**	**Pass**
Bearing Pressure (ksf)	12.00	3.11	**24.7%**	**Pass**
*Overturning (kip*ft)*	8183.41	4251.72	**52.0%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	3112.24	115.45	**3.5%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	2436.18	90.09	**3.5%**	**Pass**
Pier Compression (kip)	11247.53	301.68	**2.6%**	**Pass**
*Pad Flexure (kip*ft)*	2256.58	215.83	**9.1%**	**Pass**
Pad Shear - 1-way (kips)	593.48	68.72	**11.0%**	**Pass**
Pad Shear - Comp 2-way (ksi)	0.190	0.064	**32.0%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	1482.16	69.27	**4.5%**	**Pass**
Pad Shear - Tension 2-way (ksi)	0.190	0.045	**22.8%**	**Pass**
*Flexural 2-way (Tension) (kip*ft)*	1482.16	54.05	**3.5%**	**Pass**

**Rating per TIA-222-H Section 15.5*

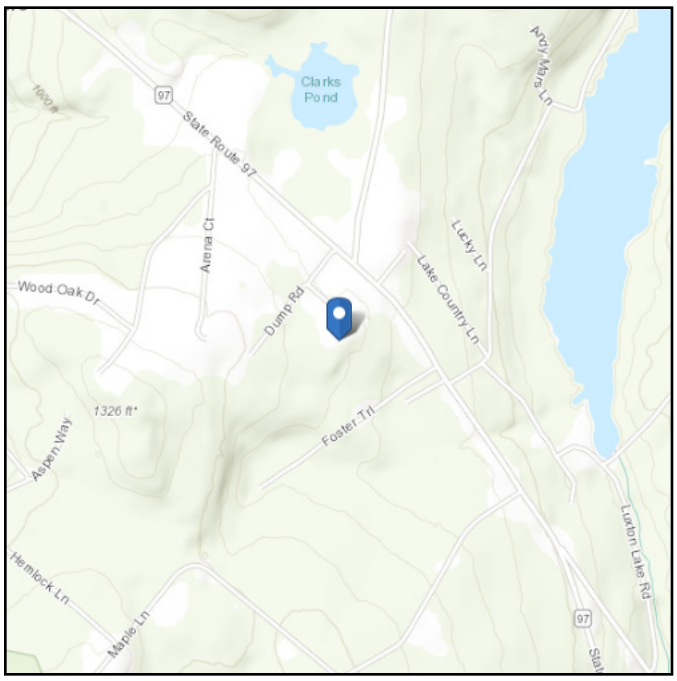
Structural Rating*:	**32.0%**
Soil Rating*:	**52.0%**

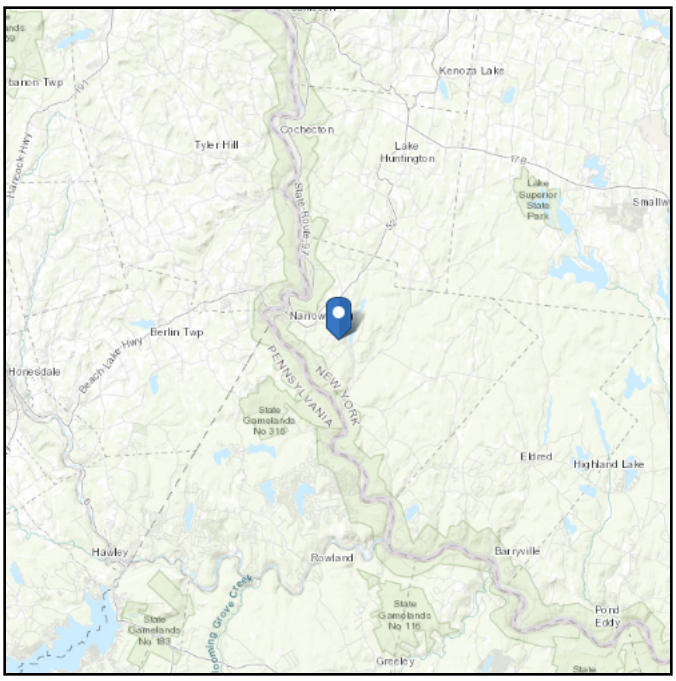
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 1150.28 ft (NAVD 88)
Latitude: 41.592806
Longitude: -75.021528





Wind

Results:

Wind Speed	112 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	88 Vmph
100-year MRI	94 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: Mon Dec 13 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 not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

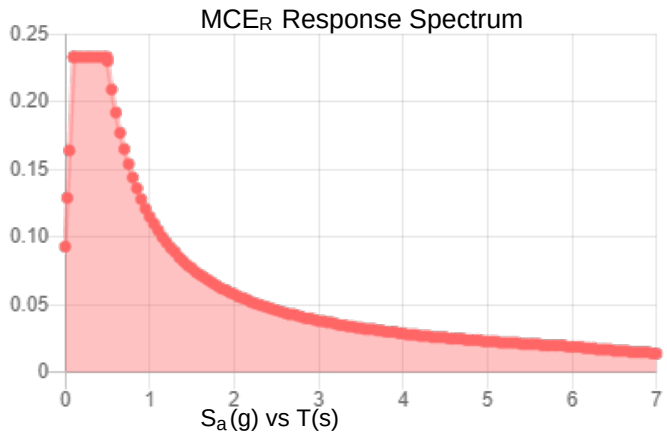
Seismic

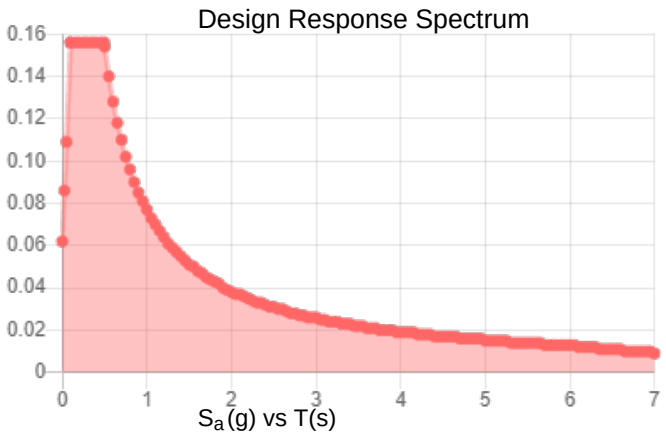
Site Soil Class: D - Stiff Soil

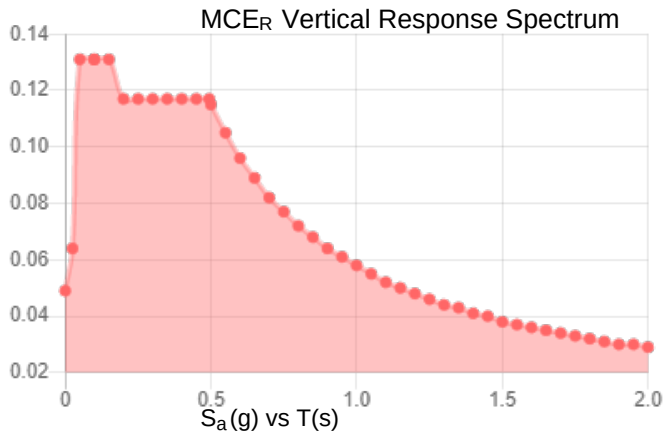
Results:

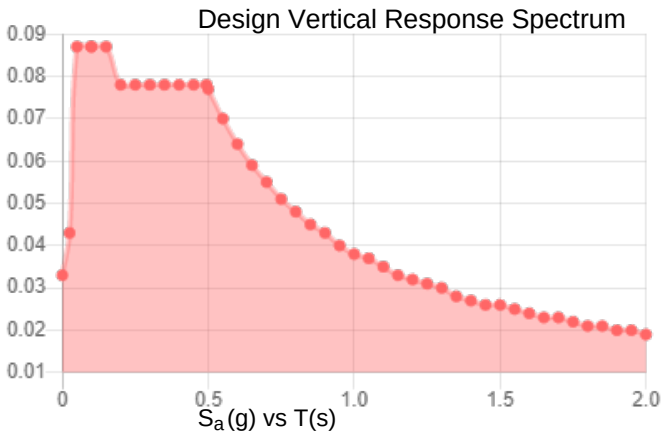
S_S :	0.146	S_{D1} :	0.077
S_1 :	0.048	T_L :	6
F_a :	1.6	PGA :	0.075
F_v :	2.4	PGA_M :	0.12
S_{MS} :	0.233	F_{PGA} :	1.6
S_{M1} :	0.115	I_e :	1
S_{DS} :	0.156	C_v :	0.7

Seismic Design Category B









Data Accessed: **Mon Dec 13 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.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Mon Dec 13 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.