



STATE OF CONNECTICUT  
*CONNECTICUT SITING COUNCIL*

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**VIA ELECTRONIC MAIL**

August 10, 2022

Katie Adams  
SR Site Acquisition Specialist  
Network Building + Consulting  
100 Apollo Drive, Suite 303  
Chelmsford, MA 01824  
[kadams@nbcllc.com](mailto:kadams@nbcllc.com)

RE: **EM-VER-130-220708** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1432 Old Waterbury Road, Southbury, Connecticut.

Dear Ms. Adams:

The Connecticut Siting Council (Council) is in receipt of your correspondence of August 10, 2022 submitted in response to the Council's August 5, 2022 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

A handwritten signature in dark ink, appearing to read "Melanie A. Bachman".

Melanie A. Bachman  
Executive Director

MAB/MP

Date: **April 25, 2022**



Crown Castle  
2000 Corporate Drive  
Canonsburg, PA 15317  
724-416-2000

**Subject:** **Structural Analysis Report**

**Carrier Designation:** **T-Mobile Co-Locate**  
**Site Number:** CT11127A  
**Site Name:** Middlebury/ I-84 X16

**Crown Castle Designation:** **BU Number:** 806358  
**Site Name:** NHV 109 943107  
**JDE Job Number:** 614600  
**Work Order Number:** 2099514  
**Order Number:** 524459 Rev. 4

**Engineering Firm Designation:** **Crown Castle Project Number:** 2099514

**Site Data:** **1432 Old Waterbury Road, SOUTHURY, NEW HAVEN County, CT**  
**Latitude 41° 29' 36.92", Longitude -73° 9' 54.98"**  
**225.79 Foot - Monopole Tower**

Crown Castle 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:

LC7: Proposed Equipment Configuration

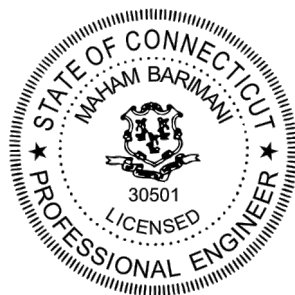
**Sufficient Capacity – 62.2%**

This analysis utilizes an ultimate 3-second gust wind speed of 116 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Carol Ng, E.I.T.

Respectfully submitted by:

Maham Barimani, P.E.  
Senior Project Engineer



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## 1) INTRODUCTION

This tower is a 225.79 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC.

The tower has been modified multiple times in the past to accommodate additional loading.

## 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	II
<b>Wind Speed:</b>	116 mph
<b>Exposure Category:</b>	B
<b>Topographic Factor:</b>	1
<b>Ice Thickness:</b>	1 in
<b>Wind Speed with Ice:</b>	50 mph
<b>Service Wind Speed:</b>	60 mph

**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)
205.0	207.0	3	commscope	VV-65A-R1_TMO w/ Mount Pipe	3	1-5/8
		3	ericsson	AIR6449 B41 w/ Mount Pipe		
		3	ericsson	RADIO 4460 B2/B25 B66_TMO		
		3	ericsson	Radio 4480_TMOV2		
		3	rfs celwave	APXVAALL24_43-U-NA20_TMO w/ Mount Pipe		
	205.0	1	tower mounts	Platform Mount [10.8' LP 712-1]		
		-	-	Mount Modifications		

**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)
228.0	230.0	2	raycap	RRFDC-3315-PF-48	14	1-5/8
	228.0	1	tower mounts	Platform Mount (10' LP 101-1)		
		6	jma wireless	MX06FRO660-03 w/ Mount Pipe		
		3	samsung telecommunications	MT6407-77A w/ Mount Pipe		
		3	samsung telecommunications	RF4439D-25A		
		3	samsung telecommunications	RF4440D-13A		
		1	tower mounts	Side Arm Mount [SO 203-3]		
218.0	218.0	3	fujitsu	TA08025-B604	1	1-3/4
		3	fujitsu	TA08025-B605		
		3	jma wireless	MX08FRO665-21 w/ Mount Pipe		
		1	raycap	RDIDC-9181-PF-48		
		1	tower mounts	Commscope MC-PK8-DSH		
196.0	196.0	1	Sabre	C10857333C [SM 504-3]	2	3/8

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		3	cci antennas	DTMABP7819VG12A	6 12 2	5/8 1-1/4 Conduit
		3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe		
		3	cci antennas	OPA65R-BU6D w/ Mount Pipe		
		3	ericsson	RRUS 11 B12		
		3	ericsson	RRUS 32 B2		
		3	ericsson	RRUS 4426 B66		
		3	ericsson	RRUS 4478 B14_CCIV2		
		3	kaelus	DBC0061F1V51-2		
		3	kathrein	800 10121 w/ Mount Pipe		
		3	kathrein	80010798 w/ Mount Pipe		
		6	kathrein	860 10025		
		3	raycap	DC6-48-60-18-8F		
185.0	187.0	3	decibel	978QNB120E-M w/ Mount Pipe	1 6	1/2 1-5/8
		6	ems wireless	FV90-16-02DP w/ Mount Pipe		
		3	nokia	CS72993.07		
		3	rfs celwave	APXV18-206517S-C w/ Mount Pipe		
	185.0	1	tower mounts	Platform Mount [LP 712-1]		
173.0	173.0	3	alcatel lucent	1900MHz RRH (65MHz)	-	-
		3	alcatel lucent	800 EXTERNAL NOTCH FILTER		
		3	alcatel lucent	800MHZ RRH		
		9	rfs celwave	ACU-A20-N		
		1	tower mounts	Side Arm Mount [SO 102-3]		
172.0	173.0	3	alcatel lucent	TD-RRH8x20-25	4	1-1/4
		3	rfs celwave	APXVSP18-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe		
	172.0	1	tower mounts	Platform Mount [LP 1201-1]		
72.0	73.0	1	gps	GPS_A	1	1/2
	72.0	1	tower mounts	Side Arm Mount [SO 701-1]		

**3) ANALYSIS PROCEDURE**

**Table 3 - Documents Provided**

Document	Reference	Source
4-GEOTECHNICAL REPORTS	217688	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	821496	CCISITES
4-TOWER MANUFACTURER DRAWINGS	821494	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	1276594	CCISITES
4-POST-MODIFICATION INSPECTION	1863184	CCISITES

Document	Reference	Source
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	4062841	CCISITES
4-POST-MODIFICATION INSPECTION	4062849	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. Crown Castle should be notified to determine the effect on the structural integrity of the tower.

## 4) ANALYSIS RESULTS

**Table 4 - Section Capacity (Summary)**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	225.79 - 197.75	Pole	TP28.6563x21.5x0.1875	1	-11.77	1002.63	42.4	Pass
L2	197.75 - 162.72	Pole	TP37.0938x27.24x0.375	2	-29.08	2589.87	45.0	Pass
L3	162.72 - 120.09	Pole	TP47.1563x35.0487x0.4375	3	-42.88	3846.79	54.7	Pass
L4	120.09 - 78.99	Pole	TP56.6563x44.6617x0.5	4	-60.37	5287.57	54.0	Pass
L5	78.99 - 38.92	Pole	TP65.7813x53.7418x0.5625	5	-82.50	6910.70	50.7	Pass
L6	38.92 - 0	Pole	TP74.5x62.453x0.5625	6	-113.61	8108.48	53.8	Pass
							Summary	
						Pole (L3)	54.7	Pass
						Rating =	54.7	Pass

**Table 5 - Tower Component Stresses vs. Capacity - LC7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	57.8	Pass
1	Base Plate	0	43.4	Pass
1,2	Base Foundation (Compared w/ Design Loads)	0	62.2	Pass

<b>Structure Rating (max from all components) =</b>	<b>62.2%</b>
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Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Foundation capacity determined by comparing analysis reactions to original design reactions.

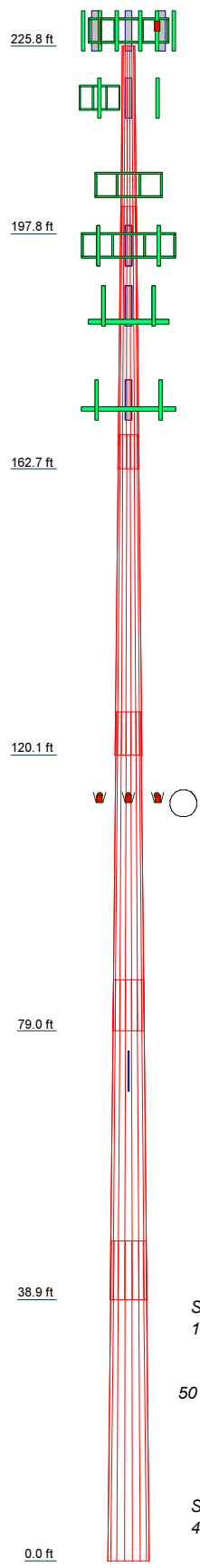
#### **4.1) Recommendations**

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	1	2	3	4	5	6
Length (ft)	28.04	39.11	47.77	47.49	47.65	47.64
Number of Sides	18	18	18	18	18	18
Thickness (in)	0.1875	0.3750	0.4375	0.5000	0.5625	0.5625
Socket Length (ft)	4.08	5.14	6.39	7.58	8.72	
Top Dia (in)	21.5000	27.2400	35.0487	44.6617	53.7418	62.4530
Bot Dia (in)	28.6563	37.0938	47.1563	56.6563	65.7913	74.5000
Grade	A572-65					
Weight (K)	1.4	5.0	9.2	12.9	17.1	19.7



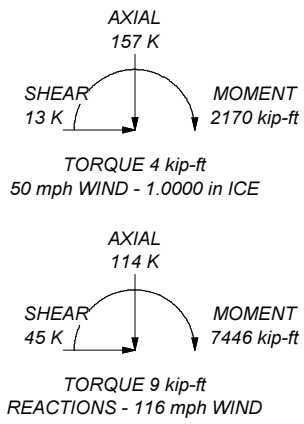
**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

**TOWER DESIGN NOTES**

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 116 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 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: 54.7%

ALL REACTIONS ARE FACTORED




**Crown Castle**  
 2000 Corporate Drive  
 Canonsburg, PA 15317  
 Pathway to Possible      Phone: 724-416-2000  
 FAX:

Job: <b>BU# 806358</b>		
Project:		
Client: Crown Castle	Drawn by: CNg	App'd:
Code: TIA-222-H	Date: 04/25/22	Scale: NTS
Path:	Dwg No. E-1	

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## Tower Input Data

The tower is a monopole.  
 This tower is designed using the TIA-222-H standard.  
 The following design criteria apply:

- Tower is located in New Haven County, Connecticut.
- Tower base elevation above sea level: 666.00 ft.
- Basic wind speed of 116 mph.
- Risk Category II.
- Exposure Category B.
- 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 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole 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 Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile  Include Bolts In Member Capacity  Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt.  Autocalc Torque Arm Areas  Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption  <div style="text-align: center; background-color: #e0e0e0; padding: 2px;"><b>Poles</b></div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known
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## Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	225.79-197.75	28.04	4.08	18	21.5000	28.6563	0.1875	0.7500	A572-65 (65 ksi)
L2	197.75-162.72	39.11	5.14	18	27.2400	37.0938	0.3750	1.5000	A572-65 (65 ksi)
L3	162.72-120.09	47.77	6.39	18	35.0487	47.1563	0.4375	1.7500	A572-65 (65 ksi)
L4	120.09-78.99	47.49	7.58	18	44.6617	56.6563	0.5000	2.0000	A572-65 (65 ksi)
L5	78.99-38.92	47.65	8.72	18	53.7418	65.7813	0.5625	2.2500	A572-65 (65 ksi)
L6	38.92-0.00	47.64		18	62.4530	74.5000	0.5625	2.2500	A572-65 (65 ksi)

### Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L1	21.8027	12.6836	727.8616	7.5659	10.9220	66.6418	1456.6810	6.3430	3.4540	18.421
	29.0694	16.9425	1734.8057	10.1064	14.5574	119.1702	3471.8941	8.4728	4.7135	25.139
L2	28.6462	31.9760	2915.6455	9.5371	13.8379	210.6999	5835.1275	15.9911	4.1342	11.025
	37.6081	43.7045	7444.5646	13.0352	18.8436	395.0707	14898.925	21.8564	5.8685	15.649
L3	36.8448	48.0620	7274.0008	12.2870	17.8048	408.5427	14557.572	24.0356	5.3986	12.34
	47.8162	64.8748	17889.412	16.5852	23.9554	746.7807	35802.363	32.4436	7.5295	17.21
L4	46.9123	70.0846	17268.355	15.6774	22.6881	761.1185	34559.433	35.0489	6.9805	13.961
	57.4531	89.1200	35506.566	19.9355	28.7814	1233.6647	71059.852	44.5685	9.0915	18.183
L5	56.4288	94.9449	33922.971	18.8786	27.3008	1242.5625	67890.580	47.4815	8.4686	15.055
	66.7093	116.4399	62572.615	23.1527	33.4169	1872.4856	125227.56	58.2310	10.5875	18.822
L6	65.5688	110.4978	53473.563	21.9711	31.7261	1685.4739	107017.48	55.2594	10.0017	17.781
	75.5625	132.0062	91171.937	26.2478	37.8460	2409.0244	182463.84	66.0156	12.1220	21.55

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>r</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 225.79-197.75				1	1	1			
L2 197.75-162.72				1	1	1			
L3 162.72-120.09				1	1	1			
L4 120.09-78.99				1	1	1			
L5 78.99-38.92				1	1	1			
L6 38.92-0.00				1	1	1			

### Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter r in	Perimeter r in	Weight plf
Safety Line 3/8	A	No	Surface Ar (CaAa)	225.78 - 8.00	1	1	-0.080 -0.070	0.3750		0.22
HB158-1-08U8-S8J18(1-5/8)	C	No	Surface Ar (CaAa)	225.79 - 8.00	2	1	0.220 0.260	1.9800		1.30
WR-VG82ST-BRDA(5/8)	A	No	Surface Ar (CaAa)	196.00 - 8.00	2	2	-0.300 -0.280	0.6450		0.31
WR-VG82ST-BRDA(5/8)	A	No	Surface Ar (CaAa)	196.00 - 8.00	2	2	-0.320 -0.300	0.6450		0.31
LDF6-50A(1-1/4)	A	No	Surface Ar (CaAa)	196.00 - 8.00	3	3	-0.410 -0.320	1.5500		0.60
LDF7-50A(1-5/8)	C	No	Surface Ar (CaAa)	185.00 - 8.00	6	6	-0.070 0.350	1.9800		0.82
LDF4-50A(1/2)	C	No	Surface Ar (CaAa)	185.00 - 8.00	1	1	0.480 0.490	0.6300		0.15
PL1x6 Reinforcement - Wind Area/Weight	A	No	Surface Af (CaAa)	134.00 - 124.00	1	1	0.000 0.000	6.0000	14.0000	20.41
PL1x6 Reinforcement - Wind Area/Weight	B	No	Surface Af (CaAa)	134.00 - 124.00	1	1	0.000 0.000	6.0000	14.0000	20.41
PL1x6 Reinforcement - Wind Area/Weight	C	No	Surface Af (CaAa)	134.00 - 124.00	1	1	0.000 0.000	6.0000	14.0000	20.41
CU12PSM6P4XXX(1-3/4)	A	No	Surface Ar (CaAa)	218.00 - 0.00	1	1	0.000 0.500	1.7500		2.72

**Feed Line/Linear Appurtenances - Entered As Area**

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Ice	C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
561(1-5/8)	C	No	No	Inside Pole	225.79 - 0.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.35 1.35 1.35
HCS 6X12 4AWG(1-5/8)	C	No	No	Inside Pole	205.00 - 0.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	2.40 2.40 2.40
LDF6-50A(1-1/4)	C	No	No	Inside Pole	196.00 - 0.00	9	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.60 0.60 0.60
WR-VG82ST-BRDA(5/8)	C	No	No	Inside Pole	196.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.31 0.31 0.31
FB-L98B-034-XXX(3/8)	C	No	No	Inside Pole	196.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.06 0.06 0.06
2" innerduct conduit	C	No	No	Inside Pole	196.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.20 0.20 0.20
HB114-21U3M12-XXXF(1-1/4)	C	No	No	Inside Pole	172.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.22 1.22 1.22
HB114-1-0813U4-M5J(1-1/4)	C	No	No	Inside Pole	172.00 - 0.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.20 1.20 1.20
LDF4-50A(1/2)	C	No	No	Inside Pole	72.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.15 0.15 0.15

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

**Feed Line/Linear Appurtenances Section Areas**

Tower Section n	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	225.79-197.75	A	0.000	0.000	4.595	0.000	0.06
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	5.552	0.000	0.58
L2	197.75-162.72	A	0.000	0.000	31.505	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	34.808	0.000	1.28
L3	162.72-120.09	A	0.000	0.000	49.002	0.000	0.46
		B	0.000	0.000	9.121	0.000	0.20
		C	0.000	0.000	70.892	0.000	2.00
L4	120.09-78.99	A	0.000	0.000	38.449	0.000	0.25
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	59.554	0.000	1.74
L5	78.99-38.92	A	0.000	0.000	37.485	0.000	0.24
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	58.061	0.000	1.70
L6	38.92-0.00	A	0.000	0.000	30.326	0.000	0.21
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	44.803	0.000	1.59

**Feed Line/Linear Appurtenances Section Areas - With Ice**

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	225.79-197.75	A	1.023	0.000	0.000	14.476	0.000	0.18
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.291	0.000	0.79
L2	197.75-162.72	A	1.007	0.000	0.000	77.402	0.000	0.76
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	58.855	0.000	1.88
L3	162.72-120.09	A	0.983	0.000	0.000	107.164	0.000	1.22
		B		0.000	0.000	10.215	0.000	0.27
		C		0.000	0.000	112.548	0.000	3.03
L4	120.09-78.99	A	0.949	0.000	0.000	92.323	0.000	0.89
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	98.012	0.000	2.63
L5	78.99-38.92	A	0.901	0.000	0.000	88.452	0.000	0.84
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	94.675	0.000	2.54
L6	38.92-0.00	A	0.804	0.000	0.000	69.382	0.000	0.66
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	72.088	0.000	2.20

**Feed Line Center of Pressure**

Section	Elevation ft	CP <sub>X</sub> in	CP <sub>Z</sub> in	CP <sub>X</sub> Ice in	CP <sub>Z</sub> Ice in
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Section	Elevation	CP <sub>x</sub>	CP <sub>z</sub>	CP <sub>x</sub> Ice	CP <sub>z</sub> Ice
	ft	in	in	in	in
L1	225.79-197.75	-1.4191	0.4324	-2.0724	0.1952
L2	197.75-162.72	-5.0829	4.1138	-5.1657	2.8228
L3	162.72-120.09	-5.1201	5.1651	-5.5851	3.8965
L4	120.09-78.99	-6.3149	6.3550	-6.6548	4.6564
L5	78.99-38.92	-6.7251	6.7569	-7.1816	5.0600
L6	38.92-0.00	-6.0343	5.7591	-6.6090	4.4345

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

### Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
L1	1	Safety Line 3/8	197.75 - 225.78	1.0000	1.0000
L1	4	HB158-1-08U8-S8J18(1-5/8)	197.75 - 225.79	1.0000	1.0000
L1	30	CU12PSM6P4XXX(1-3/4)	197.75 - 218.00	1.0000	1.0000
L2	1	Safety Line 3/8	162.72 - 197.75	1.0000	1.0000
L2	4	HB158-1-08U8-S8J18(1-5/8)	162.72 - 197.75	1.0000	1.0000
L2	10	WR-VG82ST-BRDA(5/8)	162.72 - 196.00	1.0000	1.0000
L2	11	WR-VG82ST-BRDA(5/8)	162.72 - 196.00	1.0000	1.0000
L2	12	LDF6-50A(1-1/4)	162.72 - 196.00	1.0000	1.0000
L2	18	LDF7-50A(1-5/8)	162.72 - 185.00	1.0000	1.0000
L2	19	LDF4-50A(1/2)	162.72 - 185.00	1.0000	1.0000
L2	30	CU12PSM6P4XXX(1-3/4)	162.72 - 197.75	1.0000	1.0000
L3	1	Safety Line 3/8	120.09 - 162.72	1.0000	1.0000
L3	4	HB158-1-08U8-S8J18(1-5/8)	120.09 - 162.72	1.0000	1.0000
L3	10	WR-VG82ST-BRDA(5/8)	120.09 - 162.72	1.0000	1.0000
L3	11	WR-VG82ST-BRDA(5/8)	120.09 - 162.72	1.0000	1.0000
L3	12	LDF6-50A(1-1/4)	120.09 - 162.72	1.0000	1.0000
L3	18	LDF7-50A(1-5/8)	120.09 - 162.72	1.0000	1.0000
L3	19	LDF4-50A(1/2)	120.09 - 162.72	1.0000	1.0000
L3	26	PL1x6 Reinforcement - Wind Area/Weight	124.00 - 134.00	1.0000	1.0000
L3	27	PL1x6 Reinforcement - Wind Area/Weight	124.00 - 134.00	1.0000	1.0000
L3	28	PL1x6 Reinforcement - Wind Area/Weight	124.00 - 134.00	1.0000	1.0000
L3	30	CU12PSM6P4XXX(1-3/4)	120.09 - 162.72	1.0000	1.0000
L4	1	Safety Line 3/8	78.99 - 120.09	1.0000	1.0000
L4	4	HB158-1-08U8-S8J18(1-5/8)	78.99 - 120.09	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
L4	10	WR-VG82ST-BRDA(5/8)	78.99 - 120.09	1.0000	1.0000
L4	11	WR-VG82ST-BRDA(5/8)	78.99 - 120.09	1.0000	1.0000
L4	12	LDF6-50A(1-1/4)	78.99 - 120.09	1.0000	1.0000
L4	18	LDF7-50A(1-5/8)	78.99 - 120.09	1.0000	1.0000
L4	19	LDF4-50A(1/2)	78.99 - 120.09	1.0000	1.0000
L4	30	CU12PSM6P4XXX(1-3/4)	78.99 - 120.09	1.0000	1.0000
L5	1	Safety Line 3/8	38.92 - 78.99	1.0000	1.0000
L5	4	HB158-1-08U8-S8J18(1-5/8)	38.92 - 78.99	1.0000	1.0000
L5	10	WR-VG82ST-BRDA(5/8)	38.92 - 78.99	1.0000	1.0000
L5	11	WR-VG82ST-BRDA(5/8)	38.92 - 78.99	1.0000	1.0000
L5	12	LDF6-50A(1-1/4)	38.92 - 78.99	1.0000	1.0000
L5	18	LDF7-50A(1-5/8)	38.92 - 78.99	1.0000	1.0000
L5	19	LDF4-50A(1/2)	38.92 - 78.99	1.0000	1.0000
L5	30	CU12PSM6P4XXX(1-3/4)	38.92 - 78.99	1.0000	1.0000
L6	1	Safety Line 3/8	8.00 - 38.92	1.0000	1.0000
L6	4	HB158-1-08U8-S8J18(1-5/8)	8.00 - 38.92	1.0000	1.0000
L6	10	WR-VG82ST-BRDA(5/8)	8.00 - 38.92	1.0000	1.0000
L6	11	WR-VG82ST-BRDA(5/8)	8.00 - 38.92	1.0000	1.0000
L6	12	LDF6-50A(1-1/4)	8.00 - 38.92	1.0000	1.0000
L6	18	LDF7-50A(1-5/8)	8.00 - 38.92	1.0000	1.0000
L6	19	LDF4-50A(1/2)	8.00 - 38.92	1.0000	1.0000
L6	30	CU12PSM6P4XXX(1-3/4)	0.00 - 38.92	1.0000	1.0000

### Effective Width of Flat Linear Attachments / Feed Lines

Tower Section	Attachment Record No.	Description	Attachment Segment Elev.	Ratio Calculation Method	Effective Width Ratio
L3	26	PL1x6 Reinforcement - Wind Area/Weight	124.00 - 134.00	Manual	1.0000
L3	27	PL1x6 Reinforcement - Wind Area/Weight	124.00 - 134.00	Manual	1.0000
L3	28	PL1x6 Reinforcement - Wind Area/Weight	124.00 - 134.00	Manual	1.0000

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
Lightning Rod 5/8"x5'	C	From Leg	4.00 0.00 2.00	0.00	226.00
Flash Beacon Lighting	B	From Leg	4.00 0.00 2.00	0.00	226.00
Beacon side markers	A	From Face	3.00 0.00 0.00	0.00	113.00
Beacon side markers	B	From Face	3.00 0.00 0.00	0.00	113.00
Beacon side markers	C	From Face	3.00 0.00 0.00	0.00	113.00
***					
(2) MX06FRO660-03 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	228.00
(2) MX06FRO660-03 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	228.00
(2) MX06FRO660-03 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	228.00
MT6407-77A w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	228.00
MT6407-77A w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	228.00
MT6407-77A w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	228.00
RF4439D-25A	A	From Leg	4.00 0.00 0.00	0.00	228.00
RF4439D-25A	B	From Leg	4.00 0.00 0.00	0.00	228.00
RF4439D-25A	C	From Leg	4.00 0.00 0.00	0.00	228.00
RF4440D-13A	A	From Leg	4.00 0.00 0.00	0.00	228.00
RF4440D-13A	B	From Leg	4.00 0.00 0.00	0.00	228.00
RF4440D-13A	C	From Leg	4.00 0.00 0.00	0.00	228.00
RRFDC-3315-PF-48	B	From Leg	4.00 0.00 2.00	0.00	228.00
RRFDC-3315-PF-48	C	From Leg	4.00 0.00 2.00	0.00	228.00
**					
Platform Mount (10' LP 101-1)	C	None		0.00	228.00
Side Arm Mount [SO 203-3]	C	None		0.00	228.00
Transition Ladder	C	From Leg	2.00 0.00 -2.00	0.00	228.00
Mount Reinforcement Specifications	C	None		0.00	228.00



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement
			Horz Lateral ft	Vert ft		
***						
MX08FRO665-21 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	218.00
			0.00			
MX08FRO665-21 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	218.00
			0.00			
MX08FRO665-21 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	218.00
			0.00			
TA08025-B604	A	From Leg	4.00	0.00	0.00	218.00
			0.00			
TA08025-B604	B	From Leg	4.00	0.00	0.00	218.00
			0.00			
TA08025-B604	C	From Leg	4.00	0.00	0.00	218.00
			0.00			
TA08025-B605	A	From Leg	4.00	0.00	0.00	218.00
			0.00			
TA08025-B605	B	From Leg	4.00	0.00	0.00	218.00
			0.00			
TA08025-B605	C	From Leg	4.00	0.00	0.00	218.00
			0.00			
RDIDC-9181-PF-48	A	From Leg	4.00	0.00	0.00	218.00
			0.00			
(2) 8' x 2" Mount Pipe	A	From Leg	4.00	0.00	0.00	218.00
			0.00			
(2) 8' x 2" Mount Pipe	B	From Leg	4.00	0.00	0.00	218.00
			0.00			
(2) 8' x 2" Mount Pipe	C	From Leg	4.00	0.00	0.00	218.00
			0.00			
Commscope MC-PK8-DSH	C	From Leg	4.00	0.00	0.00	218.00
			0.00			
*						
VV-65A-R1_TMO w/ Mount Pipe	A	From Leg	4.00	0.00	2.00	205.00
			0.00			
VV-65A-R1_TMO w/ Mount Pipe	B	From Leg	4.00	0.00	2.00	205.00
			0.00			
VV-65A-R1_TMO w/ Mount Pipe	C	From Leg	4.00	0.00	2.00	205.00
			0.00			
AIR6449 B41 w/ Mount Pipe	A	From Leg	4.00	0.00	2.00	205.00
			0.00			
AIR6449 B41 w/ Mount Pipe	B	From Leg	4.00	0.00	2.00	205.00
			0.00			
AIR6449 B41 w/ Mount Pipe	C	From Leg	4.00	0.00	2.00	205.00
			0.00			
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	A	From Leg	4.00	0.00	2.00	205.00
			0.00			
			2.00			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment  °	Placement  ft
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	205.00
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	205.00
RADIO 4460 B2/B25 B66_TMO	A	From Leg	4.00 0.00 2.00	0.00	205.00
RADIO 4460 B2/B25 B66_TMO	B	From Leg	4.00 0.00 2.00	0.00	205.00
RADIO 4460 B2/B25 B66_TMO	C	From Leg	4.00 0.00 2.00	0.00	205.00
Radio 4480_TMOV2	A	From Leg	4.00 0.00 2.00	0.00	205.00
Radio 4480_TMOV2	B	From Leg	4.00 0.00 2.00	0.00	205.00
Radio 4480_TMOV2	C	From Leg	4.00 0.00 2.00	0.00	205.00
Platform Mount [10.8' LP 712-1] Transition Ladder	C C	None From Leg	2.00 0.00 -4.50	0.00 0.00	205.00 205.00
12.5' x 2.375" Horizontal Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	205.00
12.5' x 2.375" Horizontal Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	205.00
12.5' x 2.375" Horizontal Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	205.00
6' x 2" Horizontal Mount Pipe	A	From Face	2.00 0.00 0.00	0.00	205.00
6' x 2" Horizontal Mount Pipe	B	From Face	2.00 0.00 0.00	0.00	205.00
6' x 2" Horizontal Mount Pipe	C	From Face	2.00 0.00 0.00	0.00	205.00
***					
800 10121 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	196.00
800 10121 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	196.00
800 10121 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	196.00
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	196.00
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	196.00
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	196.00

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment  °	Placement  ft
			Horz Lateral ft	Vert ft		
OPA65R-BU6D w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
OPA65R-BU6D w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
OPA65R-BU6D w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
80010798 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
80010798 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
80010798 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
DTMABP7819VG12A	A	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
DTMABP7819VG12A	B	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
DTMABP7819VG12A	C	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
(2) 860 10025	A	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
(2) 860 10025	B	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
(2) 860 10025	C	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
RRUS 11 B12	A	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
RRUS 11 B12	B	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
RRUS 11 B12	C	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
DC6-48-60-18-8F	B	From Leg	1.00	0.00	0.00	196.00
			0.00			
			0.00			
DC6-48-60-18-8F	A	From Leg	1.00	0.00	0.00	196.00
			0.00			
			0.00			
DC6-48-60-18-8F	B	From Leg	1.00	0.00	0.00	196.00
			0.00			
			0.00			
RRUS 4478 B14_CCIV2	A	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
RRUS 4478 B14_CCIV2	B	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
RRUS 4478 B14_CCIV2	C	From Leg	4.00	0.00	0.00	196.00
			0.00			
			0.00			
RRUS 32 B2	A	From Leg	4.00	0.00	0.00	196.00
			0.00			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment  °	Placement  ft
			Horz Lateral ft	Vert ft		
RRUS 32 B2	B	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
RRUS 32 B2	C	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
DBC0061F1V51-2	A	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
DBC0061F1V51-2	B	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
DBC0061F1V51-2	C	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
RRUS 4426 B66	A	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
RRUS 4426 B66	B	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
RRUS 4426 B66	C	From Leg	0.00	4.00	0.00	196.00
			0.00	0.00		
Sabre C10857333C [SM 504-3] Transition Ladder	C	None			0.00	196.00
	C	From Leg	2.00	0.00	0.00	196.00
			0.00			
			-2.00			
***						
APXV18-206517S-C w/ Mount Pipe	A	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
APXV18-206517S-C w/ Mount Pipe	B	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
APXV18-206517S-C w/ Mount Pipe	C	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
978QNB120E-M w/ Mount Pipe	A	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
978QNB120E-M w/ Mount Pipe	B	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
978QNB120E-M w/ Mount Pipe	C	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
FV90-16-02DP w/ Mount Pipe	A	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
FV90-16-02DP w/ Mount Pipe	B	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
FV90-16-02DP w/ Mount Pipe	C	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
FV90-16-02DP w/ Mount Pipe	A	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
FV90-16-02DP w/ Mount Pipe	B	From Leg	3.00	0.00	0.00	185.00
			0.00			
			2.00			
FV90-16-02DP w/ Mount Pipe	C	From Leg	3.00	0.00	0.00	185.00
			0.00			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement
			Horz Lateral ft	Vert ft		
CS72993.07	A	From Leg	2.00	3.00	0.00	185.00
			0.00	2.00		
CS72993.07	B	From Leg	2.00	3.00	0.00	185.00
			0.00	2.00		
CS72993.07	C	From Leg	2.00	3.00	0.00	185.00
			0.00	2.00		
Platform Mount [LP 712-1]	C	None			0.00	185.00
Transition Ladder	C	From Leg	2.00	0.00	0.00	185.00
			0.00	-2.00		
***						
800 EXTERNAL NOTCH FILTER	A	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
800 EXTERNAL NOTCH FILTER	B	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
800 EXTERNAL NOTCH FILTER	C	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
(3) ACU-A20-N	A	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
(3) ACU-A20-N	B	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
(3) ACU-A20-N	C	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
1900MHz RRH (65MHz)	A	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
1900MHz RRH (65MHz)	B	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
1900MHz RRH (65MHz)	C	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
800MHZ RRH	A	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
800MHZ RRH	B	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
800MHZ RRH	C	From Leg	1.00	0.00	0.00	173.00
			0.00	0.00		
6'x2" Mount Pipe	A	From Leg	0.50	0.00	0.00	173.00
			0.00	0.00		
6'x2" Mount Pipe	B	From Leg	0.50	0.00	0.00	173.00
			0.00	0.00		
6'x2" Mount Pipe	C	From Leg	0.50	0.00	0.00	173.00
			0.00	0.00		
Side Arm Mount [SO 102-3]	C	None			0.00	173.00
***						
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	172.00
			0.00	1.00		

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement
			Horz Lateral	Vert		
			ft	ft	°	ft
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
TD-RRH8x20-25	A	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
TD-RRH8x20-25	B	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
TD-RRH8x20-25	C	From Leg	4.00	0.00	0.00	172.00
			0.00			
			1.00			
Platform Mount [LP 1201-1]	C	None			0.00	172.00
6'x2" Mount Pipe	A	From Leg	4.00	0.00	0.00	172.00
			0.00			
			0.00			
6'x2" Mount Pipe	B	From Leg	4.00	0.00	0.00	172.00
			0.00			
			0.00			
6'x2" Mount Pipe	C	From Leg	4.00	0.00	0.00	172.00
			0.00			
			0.00			
6'x2" Mount Pipe	A	From Leg	4.00	0.00	0.00	172.00
			0.00			
			0.00			
6'x2" Mount Pipe	B	From Leg	4.00	0.00	0.00	172.00
			0.00			
			0.00			
6'x2" Mount Pipe	C	From Leg	4.00	0.00	0.00	172.00
			0.00			
			0.00			
***						
Side Arm Mount [SO 701-1]	A	From Leg	0.00	0.00	0.00	72.00
			0.00			
			0.00			
GPS_A	A	From Leg	3.00	0.00	0.00	72.00
			0.00			
			1.00			
***						

## 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

Comb. No.	Description
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
L1	225.79 - 197.75	Pole	Max Tension	26	0.00	-0.00	0.00
			Max. Compression	26	-26.27	14.44	-9.15
			Max. Mx	20	-11.76	255.55	-5.78
			Max. My	14	-11.78	9.49	-250.72
			Max. Vy	20	-14.74	255.55	-5.78
			Max. Vx	14	14.71	9.49	-250.72
			Max. Torque	24			8.37
L2	197.75 - 162.72	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-56.73	18.37	-11.85
			Max. Mx	20	-29.18	1031.00	-6.96
			Max. My	14	-29.22	11.32	-1022.14
			Max. Vy	20	-29.34	1031.00	-6.96

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	162.72 - 120.09	Pole	Max. Vx	14	29.13	11.32	-1022.14
			Max. Torque	24			9.64
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-74.07	21.21	-14.26
			Max. Mx	20	-42.97	2328.21	-7.79
			Max. My	14	-43.02	12.41	-2306.05
			Max. Vy	20	-33.29	2328.21	-7.79
L4	120.09 - 78.99	Pole	Max. Vx	14	32.86	12.41	-2306.05
			Max. Torque	24			9.62
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-95.30	23.79	-16.63
			Max. Mx	20	-60.44	3738.19	-8.54
			Max. My	14	-60.47	13.33	-3697.28
			Max. Vy	20	-37.15	3738.19	-8.54
L5	78.99 - 38.92	Pole	Max. Vx	14	36.68	13.33	-3697.28
			Max. Torque	24			9.59
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-121.41	26.23	-18.66
			Max. Mx	20	-82.54	5257.94	-9.07
			Max. My	14	-82.56	14.17	-5198.01
			Max. Vy	20	-40.68	5257.94	-9.07
L6	38.92 - 0	Pole	Max. Vx	14	40.19	14.17	-5198.01
			Max. Torque	24			9.57
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-157.04	28.44	-20.73
			Max. Mx	20	-113.61	7279.75	-9.74
			Max. My	14	-113.61	15.02	-7196.78
			Max. Vy	20	-43.96	7279.75	-9.74
			Max. Vx	14	43.49	15.02	-7196.78
			Max. Torque	24			9.48

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	35	157.04	10.94	-6.31
	Max. H <sub>x</sub>	20	113.63	43.91	-0.00
	Max. H <sub>z</sub>	2	113.63	0.00	43.44
	Max. M <sub>x</sub>	2	7177.26	0.00	43.44
	Max. M <sub>z</sub>	8	7249.67	-43.91	-0.00
	Max. Torsion	24	9.48	21.74	37.62
	Min. Vert	17	85.22	21.74	-37.62
	Min. H <sub>x</sub>	8	113.63	-43.91	-0.00
	Min. H <sub>z</sub>	14	113.63	0.00	-43.44
	Min. M <sub>x</sub>	14	-7196.78	0.00	-43.44
	Min. M <sub>z</sub>	20	-7279.75	43.91	-0.00
	Min. Torsion	12	-9.46	-21.74	-37.62

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	94.69	-0.00	0.00	7.93	12.22	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	113.63	-0.00	-43.44	-7177.26	15.03	-7.88
0.9 Dead+1.0 Wind 0 deg -	85.22	-0.00	-43.44	-7065.01	10.93	-7.85



Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
No Ice						
1.2 Dead+1.0 Wind 30 deg - No Ice	113.63	21.74	-37.62	-6214.39	-3581.53	-4.16
0.9 Dead+1.0 Wind 30 deg - No Ice	85.22	21.74	-37.62	-6117.52	-3528.12	-4.15
1.2 Dead+1.0 Wind 60 deg - No Ice	113.63	37.66	-21.72	-3583.76	-6214.38	0.66
0.9 Dead+1.0 Wind 60 deg - No Ice	85.22	37.66	-21.72	-3528.95	-6118.87	0.65
1.2 Dead+1.0 Wind 90 deg - No Ice	113.63	43.91	0.00	9.74	-7249.67	5.30
0.9 Dead+1.0 Wind 90 deg - No Ice	85.22	43.91	0.00	7.09	-7137.76	5.27
1.2 Dead+1.0 Wind 120 deg - No Ice	113.63	38.90	22.44	3726.34	-6427.63	8.51
0.9 Dead+1.0 Wind 120 deg - No Ice	85.22	38.90	22.44	3664.43	-6328.98	8.47
1.2 Dead+1.0 Wind 150 deg - No Ice	113.63	21.74	37.62	6233.90	-3581.55	9.46
0.9 Dead+1.0 Wind 150 deg - No Ice	85.22	21.74	37.62	6131.72	-3528.13	9.42
1.2 Dead+1.0 Wind 180 deg - No Ice	113.63	-0.00	43.44	7196.78	15.02	7.87
0.9 Dead+1.0 Wind 180 deg - No Ice	85.22	-0.00	43.44	7079.22	10.92	7.84
1.2 Dead+1.0 Wind 210 deg - No Ice	113.63	-21.74	37.62	6233.91	3611.60	4.18
0.9 Dead+1.0 Wind 210 deg - No Ice	85.22	-21.74	37.62	6131.73	3549.99	4.17
1.2 Dead+1.0 Wind 240 deg - No Ice	113.63	-37.66	21.72	3603.26	6244.48	-0.64
0.9 Dead+1.0 Wind 240 deg - No Ice	85.22	-37.66	21.72	3543.15	6140.76	-0.63
1.2 Dead+1.0 Wind 270 deg - No Ice	113.63	-43.91	0.00	9.73	7279.75	-5.29
0.9 Dead+1.0 Wind 270 deg - No Ice	85.22	-43.91	0.00	7.09	7159.64	-5.26
1.2 Dead+1.0 Wind 300 deg - No Ice	113.63	-38.90	-22.44	-3706.89	6457.67	-8.53
0.9 Dead+1.0 Wind 300 deg - No Ice	85.22	-38.90	-22.44	-3650.27	6350.83	-8.49
1.2 Dead+1.0 Wind 330 deg - No Ice	113.63	-21.74	-37.62	-6214.41	3611.59	-9.48
0.9 Dead+1.0 Wind 330 deg - No Ice	85.22	-21.74	-37.62	-6117.53	3549.98	-9.44
1.2 Dead+1.0 Ice+1.0 Temp	157.04	-0.00	0.00	20.73	28.44	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	157.04	-0.00	-12.62	-2113.02	28.68	-3.74
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	157.04	6.32	-10.93	-1827.12	-1039.03	-2.06
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	157.04	10.94	-6.31	-1046.05	-1820.65	0.17
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	157.04	12.64	0.00	20.91	-2106.75	2.35
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	157.04	10.94	6.31	1087.88	-1820.66	3.91
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	157.04	6.32	10.93	1868.97	-1039.05	4.42
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	157.04	-0.00	12.62	2154.87	28.68	3.74
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	157.04	-6.32	10.93	1868.98	1096.41	2.06
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	157.04	-10.94	6.31	1087.90	1878.05	-0.17
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	157.04	-12.64	0.00	20.91	2164.15	-2.36
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	157.04	-10.94	-6.31	-1046.07	1878.04	-3.91
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	157.04	-6.32	-10.93	-1827.14	1096.40	-4.42

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	94.69	-0.00	-10.95	-1786.85	12.43	-2.00
Dead+Wind 30 deg - Service	94.69	5.48	-9.48	-1546.40	-885.80	-1.06
Dead+Wind 60 deg - Service	94.69	9.49	-5.48	-889.39	-1543.33	0.17
Dead+Wind 90 deg - Service	94.69	11.07	0.00	8.06	-1801.93	1.35
Dead+Wind 120 deg - Service	94.69	9.80	5.66	936.36	-1596.75	2.17
Dead+Wind 150 deg - Service	94.69	5.48	9.48	1562.52	-885.80	2.41
Dead+Wind 180 deg - Service	94.69	-0.00	10.95	1802.97	12.43	2.00
Dead+Wind 210 deg - Service	94.69	-5.48	9.48	1562.52	910.66	1.06
Dead+Wind 240 deg - Service	94.69	-9.49	5.48	905.53	1568.21	-0.17
Dead+Wind 270 deg - Service	94.69	-11.07	0.00	8.06	1826.79	-1.35
Dead+Wind 300 deg - Service	94.69	-9.80	-5.66	-920.24	1621.61	-2.17
Dead+Wind 330 deg - Service	94.69	-5.48	-9.48	-1546.40	910.66	-2.41

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-94.69	0.00	0.00	94.69	-0.00	0.000%
2	0.00	-113.63	-43.44	0.00	113.63	43.44	0.000%
3	0.00	-85.22	-43.44	0.00	85.22	43.44	0.000%
4	21.74	-113.63	-37.62	-21.74	113.63	37.62	0.000%
5	21.74	-85.22	-37.62	-21.74	85.22	37.62	0.000%
6	37.66	-113.63	-21.72	-37.66	113.63	21.72	0.000%
7	37.66	-85.22	-21.72	-37.66	85.22	21.72	0.000%
8	43.91	-113.63	0.00	-43.91	113.63	-0.00	0.000%
9	43.91	-85.22	0.00	-43.91	85.22	-0.00	0.000%
10	38.90	-113.63	22.44	-38.90	113.63	-22.44	0.000%
11	38.90	-85.22	22.44	-38.90	85.22	-22.44	0.000%
12	21.74	-113.63	37.62	-21.74	113.63	-37.62	0.000%
13	21.74	-85.22	37.62	-21.74	85.22	-37.62	0.000%
14	0.00	-113.63	43.44	0.00	113.63	-43.44	0.000%
15	0.00	-85.22	43.44	0.00	85.22	-43.44	0.000%
16	-21.74	-113.63	37.62	21.74	113.63	-37.62	0.000%
17	-21.74	-85.22	37.62	21.74	85.22	-37.62	0.000%
18	-37.66	-113.63	21.72	37.66	113.63	-21.72	0.000%
19	-37.66	-85.22	21.72	37.66	85.22	-21.72	0.000%
20	-43.91	-113.63	0.00	43.91	113.63	-0.00	0.000%
21	-43.91	-85.22	0.00	43.91	85.22	-0.00	0.000%
22	-38.90	-113.63	-22.44	38.90	113.63	22.44	0.000%
23	-38.90	-85.22	-22.44	38.90	85.22	22.44	0.000%
24	-21.74	-113.63	-37.62	21.74	113.63	37.62	0.000%
25	-21.74	-85.22	-37.62	21.74	85.22	37.62	0.000%
26	0.00	-157.04	0.00	0.00	157.04	-0.00	0.000%
27	0.00	-157.04	-12.62	0.00	157.04	12.62	0.000%
28	6.32	-157.04	-10.93	-6.32	157.04	10.93	0.000%
29	10.94	-157.04	-6.31	-10.94	157.04	6.31	0.000%
30	12.64	-157.04	0.00	-12.64	157.04	-0.00	0.000%
31	10.94	-157.04	6.31	-10.94	157.04	-6.31	0.000%
32	6.32	-157.04	10.93	-6.32	157.04	-10.93	0.000%
33	0.00	-157.04	12.62	0.00	157.04	-12.62	0.000%
34	-6.32	-157.04	10.93	6.32	157.04	-10.93	0.000%
35	-10.94	-157.04	6.31	10.94	157.04	-6.31	0.000%
36	-12.64	-157.04	0.00	12.64	157.04	-0.00	0.000%
37	-10.94	-157.04	-6.31	10.94	157.04	6.31	0.000%
38	-6.32	-157.04	-10.93	6.32	157.04	10.93	0.000%
39	0.00	-94.69	-10.95	0.00	94.69	10.95	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
40	5.48	-94.69	-9.48	-5.48	94.69	9.48	0.000%
41	9.49	-94.69	-5.48	-9.49	94.69	5.48	0.000%
42	11.07	-94.69	0.00	-11.07	94.69	-0.00	0.000%
43	9.80	-94.69	5.66	-9.80	94.69	-5.66	0.000%
44	5.48	-94.69	9.48	-5.48	94.69	-9.48	0.000%
45	0.00	-94.69	10.95	0.00	94.69	-10.95	0.000%
46	-5.48	-94.69	9.48	5.48	94.69	-9.48	0.000%
47	-9.49	-94.69	5.48	9.49	94.69	-5.48	0.000%
48	-11.07	-94.69	0.00	11.07	94.69	-0.00	0.000%
49	-9.80	-94.69	-5.66	9.80	94.69	5.66	0.000%
50	-5.48	-94.69	-9.48	5.48	94.69	9.48	0.000%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000390
2	Yes	5	0.00000001	0.00079201
3	Yes	5	0.00000001	0.00039337
4	Yes	6	0.00000001	0.00037726
5	Yes	6	0.00000001	0.00013030
6	Yes	6	0.00000001	0.00038897
7	Yes	6	0.00000001	0.00013481
8	Yes	5	0.00000001	0.00055195
9	Yes	5	0.00000001	0.00027325
10	Yes	6	0.00000001	0.00045824
11	Yes	6	0.00000001	0.00015849
12	Yes	6	0.00000001	0.00036485
13	Yes	6	0.00000001	0.00012501
14	Yes	5	0.00000001	0.00079464
15	Yes	5	0.00000001	0.00039392
16	Yes	6	0.00000001	0.00041932
17	Yes	6	0.00000001	0.00014477
18	Yes	6	0.00000001	0.00040622
19	Yes	6	0.00000001	0.00013962
20	Yes	5	0.00000001	0.00055471
21	Yes	5	0.00000001	0.00027376
22	Yes	6	0.00000001	0.00039425
23	Yes	6	0.00000001	0.00013350
24	Yes	6	0.00000001	0.00043887
25	Yes	6	0.00000001	0.00015317
26	Yes	4	0.00000001	0.00030886
27	Yes	6	0.00000001	0.00018710
28	Yes	6	0.00000001	0.00022523
29	Yes	6	0.00000001	0.00022830
30	Yes	6	0.00000001	0.00017879
31	Yes	6	0.00000001	0.00025720
32	Yes	6	0.00000001	0.00023546
33	Yes	6	0.00000001	0.00019434
34	Yes	6	0.00000001	0.00026428
35	Yes	6	0.00000001	0.00025665
36	Yes	6	0.00000001	0.00018903
37	Yes	6	0.00000001	0.00023968
38	Yes	6	0.00000001	0.00026586
39	Yes	4	0.00000001	0.00068558
40	Yes	5	0.00000001	0.00007460
41	Yes	5	0.00000001	0.00008042
42	Yes	4	0.00000001	0.00049509
43	Yes	5	0.00000001	0.00012176
44	Yes	5	0.00000001	0.00007582
45	Yes	4	0.00000001	0.00070146
46	Yes	5	0.00000001	0.00010491
47	Yes	5	0.00000001	0.00009530
48	Yes	4	0.00000001	0.00051379
49	Yes	5	0.00000001	0.00008408

50                      Yes                      5                      0.00000001                      0.00011966

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	225.79 - 197.75	39.0896	49	1.77	0.02
L2	201.83 - 162.72	30.5617	49	1.59	0.01
L3	167.86 - 120.09	20.2016	49	1.29	0.01
L4	126.48 - 78.99	10.7567	49	0.87	0.00
L5	86.57 - 38.92	4.8204	49	0.53	0.00
L6	47.64 - 0	1.4536	49	0.28	0.00

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
228.00	(2) MX06FRO660-03 w/ Mount Pipe	49	39.0896	1.77	0.02	26088
226.00	Lightning Rod 5/8"x5'	49	39.0896	1.77	0.02	26088
218.00	MX08FRO665-21 w/ Mount Pipe	49	36.2601	1.71	0.02	16745
205.00	VV-65A-R1_TMO w/ Mount Pipe	49	31.6481	1.61	0.01	6287
196.00	800 10121 w/ Mount Pipe	49	28.6166	1.54	0.01	5528
185.00	APXV18-206517S-C w/ Mount Pipe	49	25.1353	1.45	0.01	5696
173.00	800 EXTERNAL NOTCH FILTER	49	21.6185	1.34	0.01	5891
172.00	APXVTM14-C-120 w/ Mount Pipe	49	21.3386	1.33	0.01	5908
113.00	Beacon side markers	49	8.4330	0.75	0.00	6471
72.00	Side Arm Mount [SO 701-1]	49	3.2898	0.43	0.00	7945

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	225.79 - 197.75	155.4220	22	6.97	0.08
L2	201.83 - 162.72	121.7866	22	6.32	0.05
L3	167.86 - 120.09	80.6334	22	5.14	0.02
L4	126.48 - 78.99	42.9741	22	3.48	0.01
L5	86.57 - 38.92	19.2621	22	2.14	0.00
L6	47.64 - 0	5.8078	22	1.10	0.00

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
228.00	(2) MX06FRO660-03 w/ Mount Pipe	22	155.4220	6.97	0.08	7577
226.00	Lightning Rod 5/8"x5'	22	155.4220	6.97	0.08	7577
218.00	MX08FRO665-21 w/ Mount Pipe	22	144.2747	6.77	0.07	4863
205.00	VV-65A-R1_TMO w/ Mount Pipe	22	126.0806	6.41	0.05	1823
196.00	800 10121 w/ Mount Pipe	22	114.0862	6.14	0.04	1570

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	APXV18-206517S-C w/ Mount Pipe	22	100.2700	5.77	0.03	1555
173.00	800 EXTERNAL NOTCH FILTER	22	86.2772	5.33	0.02	1525
172.00	APXVTM14-C-120 w/ Mount Pipe	22	85.1627	5.30	0.02	1523
113.00	Beacon side markers	22	33.6964	2.98	0.01	1632
72.00	Side Arm Mount [SO 701-1]	22	13.1455	1.73	0.00	1991

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$KI/r$	A $in^2$	$P_u$ K	$\phi P_n$ K	Ratio $\frac{P_u}{\phi P_n}$
L1	225.79 - 197.75 (1)	TP28.6563x21.5x0.1875	28.04	0.00	0.0	16.322 8	-11.77	954.88	0.012
L2	197.75 - 162.72 (2)	TP37.0938x27.24x0.375	39.11	0.00	0.0	42.163 1	-29.08	2466.54	0.012
L3	162.72 - 120.09 (3)	TP47.1563x35.0487x0.43 75	47.77	0.00	0.0	62.625 8	-42.88	3663.61	0.012
L4	120.09 - 78.99 (4)	TP56.6563x44.6617x0.5	47.49	0.00	0.0	86.081 7	-60.37	5035.78	0.012
L5	78.99 - 38.92 (5)	TP65.7813x53.7418x0.56 25	47.65	0.00	0.0	112.50 60	-82.50	6581.62	0.013
L6	38.92 - 0 (6)	TP74.5x62.453x0.5625	47.64	0.00	0.0	132.00 60	-113.61	7722.36	0.015

### Pole Bending Design Data

Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{rx}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	$M_{uy}$ kip-ft	$\phi M_{ry}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
L1	225.79 - 197.75 (1)	TP28.6563x21.5x0.1875	256.96	596.72	0.431	0.00	596.72	0.000
L2	197.75 - 162.72 (2)	TP37.0938x27.24x0.375	1043.45	2275.65	0.459	0.00	2275.65	0.000
L3	162.72 - 120.09 (3)	TP47.1563x35.0487x0.43 75	2369.72	4220.43	0.561	0.00	4220.43	0.000
L4	120.09 - 78.99 (4)	TP56.6563x44.6617x0.5	3816.48	6884.04	0.554	0.00	6884.04	0.000
L5	78.99 - 38.92 (5)	TP65.7813x53.7418x0.56 25	5376.29	10359.42	0.519	0.00	10359.42	0.000
L6	38.92 - 0 (6)	TP74.5x62.453x0.5625	7445.97	13554.17	0.549	0.00	13554.17	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual $V_u$ K	$\phi V_n$ K	Ratio $\frac{V_u}{\phi V_n}$	Actual $T_u$ kip-ft	$\phi T_n$ kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	225.79 - 197.75 (1)	TP28.6563x21.5x0.1875	14.73	286.46	0.051	0.71	688.08	0.001
L2	197.75 - 162.72 (2)	TP37.0938x27.24x0.375	29.91	739.96	0.040	8.74	2295.53	0.004

Section No.	Elevation ft	Size	Actual $V_u$ K	$\phi V_n$ K	Ratio $\frac{V_u}{\phi V_n}$	Actual $T_u$ kip-ft	$\phi T_n$ kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L3	162.72 - 120.09 (3)	TP47.1563x35.0487x0.43 75	34.13	1099.08	0.031	8.71	4340.89	0.002
L4	120.09 - 78.99 (4)	TP56.6563x44.6617x0.5	38.17	1510.73	0.025	8.69	7176.32	0.001
L5	78.99 - 38.92 (5)	TP65.7813x53.7418x0.56 25	41.70	1974.49	0.021	8.53	10896.33	0.001
L6	38.92 - 0 (6)	TP74.5x62.453x0.5625	44.95	2316.71	0.019	8.53	15000.83	0.001

### Pole Interaction Design Data

Section No.	Elevation ft	Ratio $P_u$ $\phi P_n$	Ratio $M_{ux}$ $\phi M_{nx}$	Ratio $M_{uy}$ $\phi M_{ny}$	Ratio $V_u$ $\phi V_n$	Ratio $T_u$ $\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	225.79 - 197.75 (1)	0.012	0.431	0.000	0.051	0.001	0.446	1.050	4.8.2
L2	197.75 - 162.72 (2)	0.012	0.459	0.000	0.040	0.004	0.472	1.050	4.8.2
L3	162.72 - 120.09 (3)	0.012	0.561	0.000	0.031	0.002	0.574	1.050	4.8.2
L4	120.09 - 78.99 (4)	0.012	0.554	0.000	0.025	0.001	0.567	1.050	4.8.2
L5	78.99 - 38.92 (5)	0.013	0.519	0.000	0.021	0.001	0.532	1.050	4.8.2
L6	38.92 - 0 (6)	0.015	0.549	0.000	0.019	0.001	0.564	1.050	4.8.2

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
L1	225.79 - 197.75	Pole	TP28.6563x21.5x0.1875	1	-11.77	1002.63	42.4	Pass
L2	197.75 - 162.72	Pole	TP37.0938x27.24x0.375	2	-29.08	2589.87	45.0	Pass
L3	162.72 - 120.09	Pole	TP47.1563x35.0487x0.4375	3	-42.88	3846.79	54.7	Pass
L4	120.09 - 78.99	Pole	TP56.6563x44.6617x0.5	4	-60.37	5287.57	54.0	Pass
L5	78.99 - 38.92	Pole	TP65.7813x53.7418x0.5625	5	-82.50	6910.70	50.7	Pass
L6	38.92 - 0	Pole	TP74.5x62.453x0.5625	6	-113.61	8108.48	53.8	Pass
Summary								
Pole (L3)							54.7	Pass
<b>RATING =</b>							<b>54.7</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**



(OTHER CONSIDERED EQUIPMENT)  
(1) 1-3/4" TO 218 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)  
(1) 1/2" TO 72 FT LEVEL

(OTHER CONSIDERED EQUIPMENT—IN CONDUIT)  
(2) 3/8" TO 196 FT LEVEL  
(4) 5/8" TO 196 FT LEVEL  
(OTHER CONSIDERED EQUIPMENT)  
(2) 5/8" TO 196 FT LEVEL  
(12) 1-1/4" TO 196 FT LEVEL

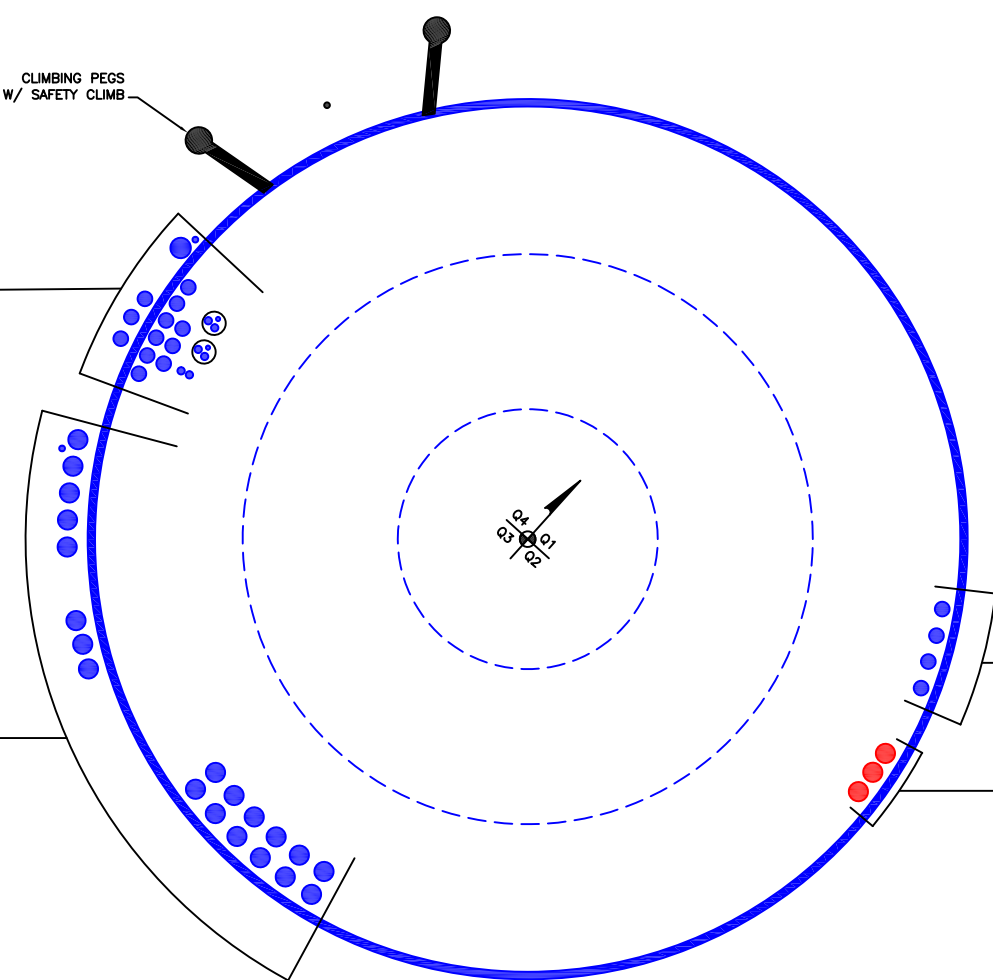
CLIMBING PEGS  
W/ SAFETY CLIMB

(OTHER CONSIDERED EQUIPMENT)  
(14) 1-5/8" TO 228 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)  
(1) 1/2" TO 185 FT LEVEL  
(6) 1-5/8" TO 185 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)  
(4) 1-1/4" TO 172 FT LEVEL

(PROPOSED EQUIPMENT CONFIGURATION)  
(3) 1-5/8" TO 205 FT LEVEL





**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

# Monopole Base Plate Connection

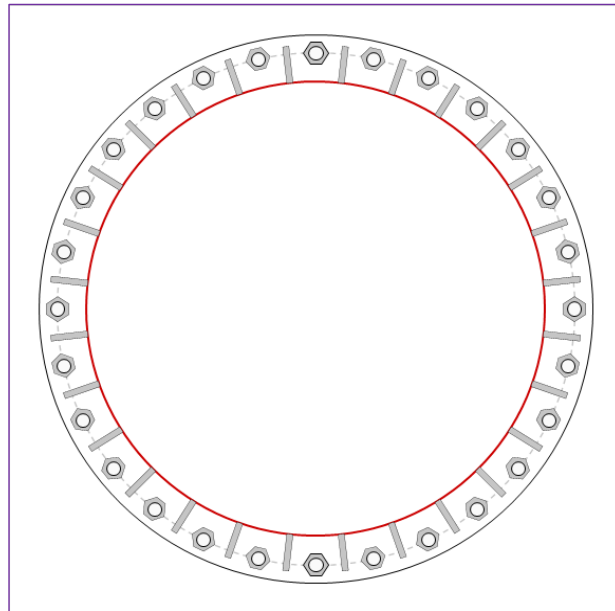


Site Info	
BU #	806358
Site Name	NHV 109 943107
Order #	524459 Rev. 4

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$l_{ar}$ (in)	1.5625

Applied Loads	
Moment (kip-ft)	7445.97
Axial Force (kips)	113.61
Shear Force (kips)	44.95

\*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

**Anchor Rod Data**  
 (28) 2-1/4"  $\phi$  bolts (A615-75 N;  $F_y=75$  ksi,  $F_u=100$  ksi) on 84" BC

**Base Plate Data**  
 90" OD x 2.5" Plate (A572-50;  $F_y=50$  ksi,  $F_u=65$  ksi)

**Stiffener Data**  
 (28) 18"H x 6"W x 1"T, Notch: 1"  
 plate:  $F_y= 50$  ksi ; weld:  $F_y= 70$  ksi  
 horiz. weld: 0.5" groove, 45° dbl bevel, 0.5" fillet  
 vert. weld: 0.5" fillet

**Pole Data**  
 74.5" x 0.5625" 18-sided pole (A572-65;  $F_y=65$  ksi,  $F_u=80$  ksi)

Anchor Rod Summary		<i>(units of kips, kip-in)</i>	
$Pu_t = 147.86$	$\phi Pn_t = 243.75$		<b>Stress Rating</b>
$Vu = 1.61$	$\phi Vn = 149.1$		<b>57.8%</b>
$Mu = n/a$	$\phi Mn = n/a$		<b>Pass</b>

Base Plate Summary		
Max Stress (ksi):	20.49	(Roark's Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	<b>43.4%</b>	<b>Pass</b>

Stiffener Summary		
Horizontal Weld:	<b>40.6%</b>	<b>Pass</b>
Vertical Weld:	<b>25.8%</b>	<b>Pass</b>
Plate Flexure+Shear:	<b>9.1%</b>	<b>Pass</b>
Plate Tension+Shear:	<b>40.9%</b>	<b>Pass</b>
Plate Compression:	<b>40.2%</b>	<b>Pass</b>

Pole Summary		
Punching Shear:	<b>6.3%</b>	<b>Pass</b>

## Monopole Base Reaction Comparison Test



BU # :	806358
Site Name:	NHV 109 943107
Order Number:	524459 Rev. 4
Design TIA:	TIA-222-F
Current TIA:	TIA-222-H
Component:	Monopole Base
Reference Doc ID:	821496

### TIA-222-F Compared To TIA-222-H

#### MONOPOLE BASE FOUNDATION REACTION COMPARISON

REACTIONS	DESIGN REACTIONS	*MODIFIED DESIGN REACTIONS	CURRENT REACTIONS	% CAPACITY
MOMENT (kip-ft)	8439.1	11392.8	7446.0	62.2%
SHEAR (kips)	50.8	68.6	45.0	62.5%

Design loads from: CCIsites Doc #821496

Although the shear capacity is at 62.5%, the moment reaction is the governing criteria for a monopole drilled pier foundation. Therefore, the overall capacity for this foundation is 62.2%.

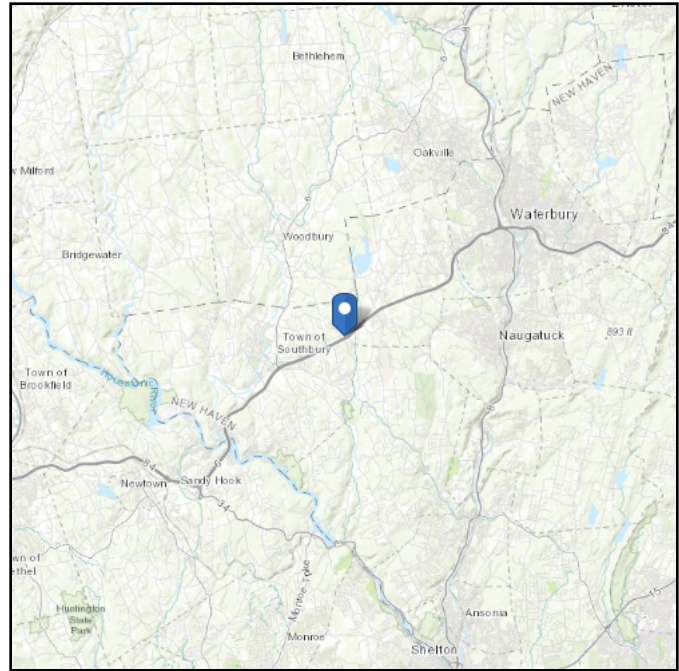
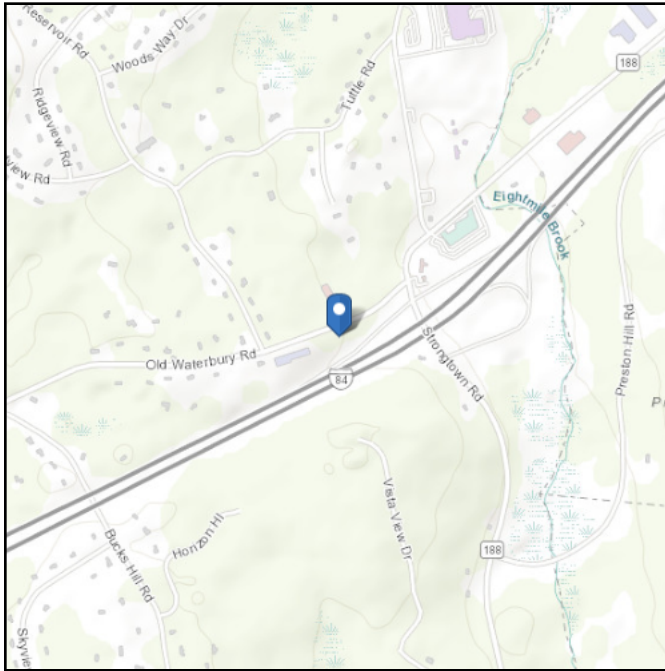
\*Design loads were multiplied by 1.35 for comparison as allowed by TIA-222-H, Section 15.6.

# 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:** 666.03 ft (NAVD 88)  
**Latitude:** 41.493589  
**Longitude:** -73.165272



## Wind

### Results:

Wind Speed	116 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	97 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: Fri Jan 14 2022

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).

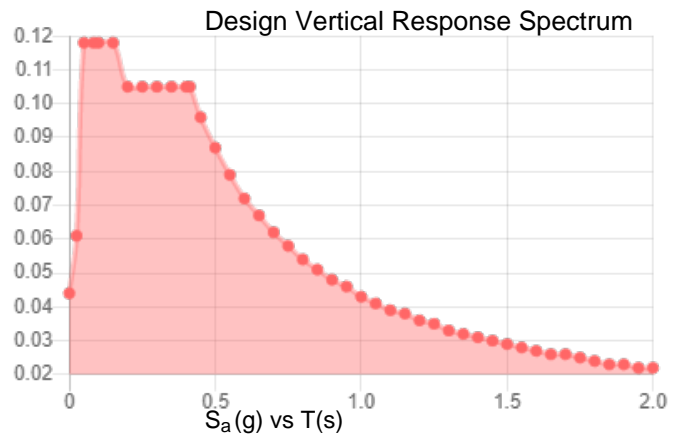
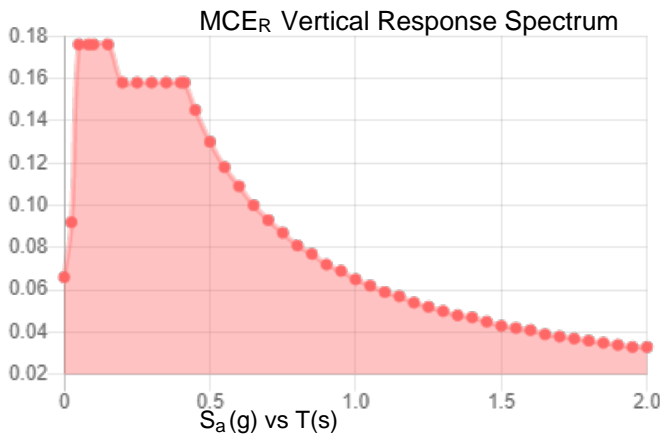
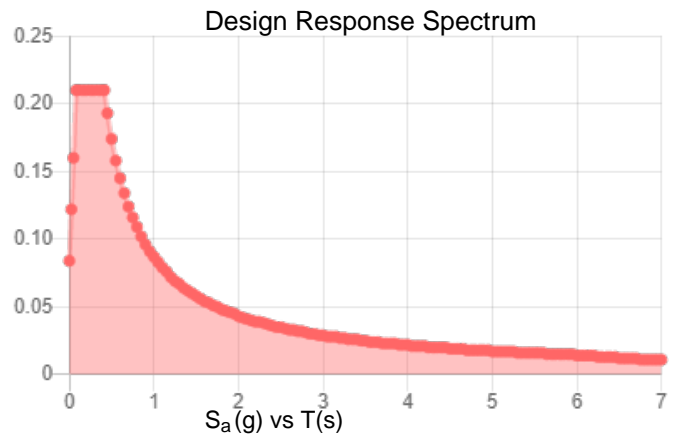
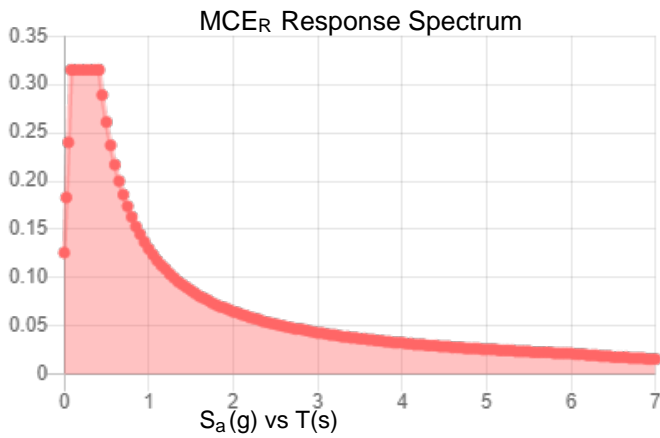
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

**Results:**

$S_s$ :	0.197	$S_{D1}$ :	0.087
$S_1$ :	0.054	$T_L$ :	6
$F_a$ :	1.6	PGA :	0.109
$F_v$ :	2.4	PGA <sub>M</sub> :	0.173
$S_{MS}$ :	0.315	$F_{PGA}$ :	1.581
$S_{M1}$ :	0.13	$I_e$ :	1
$S_{DS}$ :	0.21	$C_v$ :	0.7

**Seismic Design Category** B



**Data Accessed:** Fri Jan 14 2022

**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 50 mph

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

**Date Accessed:** Fri Jan 14 2022

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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