

**From:** [Joubert, Dionne \(Contractor\)](#)  
**To:** [Fontaine, Lisa](#)  
**Cc:** [CSC-DL Siting Council](#)  
**Subject:** RE: Council Incomplete Letter - EM-VER-119-250815 – Cromwell Avenue, Rocky Hill  
**Date:** Tuesday, September 16, 2025 10:45:11 AM  
**Attachments:** [image001.png](#)  
[801366\\_696217\\_SA.pdf](#)

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Hi Lisa,

Please see the Structural Analysis for this site attached.

Thank you,

**Dionne Joubert**

**Connecticut and New Hampshire Permitting Specialist – Tower Services**

Phone: (281)749-5071

[dionne.joubert.contractor@crowncastle.com](mailto:dionne.joubert.contractor@crowncastle.com)

CROWN CASTLE

8020 Katy Freeway, Houston, TX 77024

[CrownCastle.com](http://CrownCastle.com)



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**From:** Fontaine, Lisa <Lisa.Fontaine@ct.gov>  
**Sent:** Tuesday, September 16, 2025 9:34 AM  
**To:** Joubert, Dionne (Contractor) <Dionne.joubert.contractor@crowncastle.com>  
**Cc:** CSC-DL Siting Council <Siting.Council@ct.gov>  
**Subject:** Council Incomplete Letter - EM-VER-119-250815 – Cromwell Avenue, Rocky Hill

You don't often get email from [lisa.fontaine@ct.gov](mailto:lisa.fontaine@ct.gov). [Learn why this is important](#)

Good Morning,

Please see the attached correspondence.

Thank you.

Lisa Fontaine  
Fiscal Administrative Officer  
CONNECTICUT SITING COUNCIL  
Ten Franklin Square  
New Britain, CT 06051  
P: 860.827.2969(F: 860.827.2950(E: [lisa.fontaine@ct.gov](mailto:lisa.fontaine@ct.gov))

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Date: **May 06, 2025**



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

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

**Carrier Designation:** **Verizon Wireless Co-Locate**  
**Site Number:** 5000387852  
**Site Name:** ROCKY HILL 2 CT

**Crown Castle Designation:** **BU Number:** 801366  
**Site Name:** ROCKY HILL 2  
**JDE Job Number:** 2141707  
**Work Order Number:** 2385914  
**Order Number:** 696217 Rev. 0

**Engineering Firm Designation:** **Crown Castle Project Number** 2385914

**Site Data:** **1218 Cromwell Ave, Rocky Hill, Hartford County, CT**  
**Latitude: 41° 38' 16.5" Longitude: -72° 40' 24.2"**  
**173.0 ft - 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:

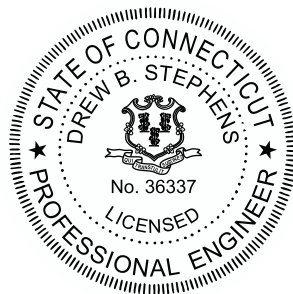
LC5: Proposed Equipment Configuration **Sufficient - 44.2% Capacity**

This analysis has been performed in accordance with the 2022 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 119 mph. Applicable Standard references and design criteria are listed in Section 2 – Analysis Criteria.

Structural analysis prepared by: Blake Jacobsen, EIT

Respectfully submitted by:

Drew B. Stephens, P.E.  
Senior Project Engineer



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**1) INTRODUCTION**

This tower is a 173.0 ft Monopole Tower designed by Summit.

**2) ANALYSIS CRITERIA**

TIA-222 Revision: TIA-222-H  
 Risk Category: II  
 Wind Speed: 119 mph  
 Exposure Category: C  
 Topographic Factor: 1  
 Ice Thickness: 1.50 in  
 Wind Speed with Ice: 50 mph  
 Service Wind Speed: 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)
150	150	6	commscope	SBNHH-1D65B w/ Mount Pipe	2	1-1/4
		6	kaelus	BSF0020F3V1		
		2	raycap	RVZDC-3315-PF-48		
		3	samsung telecommunications	MT6407-77A w/ Mount Pipe		
		3	samsung telecommunications	RFV01U-D1A		
		3	samsung telecommunications	RFV01U-D2A		
		1	tower mounts	Platform Mount [LP 602-1 KCKR]		

**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)
169	171	3	jma wireless	MX08FRO665-21 w/ Mount Pipe	1	1-3/4
	170	3	fujitsu	TA08025-B604		
		3	fujitsu	TA08025-B605		
		1	raycap	RDIDC-9181-PF-48		
	169	1	tower mounts	Commscope MC-PK8-DSH		

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

Document	Reference	Source
4-GEOTECHNICAL REPORTS	639257	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	679665	CCISITES
4-TOWER MANUFACTURER DRAWINGS	639263	CCISITES

#### 3.1) Analysis Method

tnxTower (version 8.3.0.5), 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	173 - 127	Pole	TP35.568x26x0.25	1	-10.60	1546.89	25.1	Pass
L2	127 - 86.5	Pole	TP43.493x34.132x0.3125	2	-17.51	2561.11	34.8	Pass
L3	86.5 - 42.5	Pole	TP52.02x41.7239x0.375	3	-28.54	3676.97	38.6	Pass
L4	42.5 - 0	Pole	TP60.11x49.918x0.4375	4	-46.03	5089.84	39.8	Pass
							Summary	
						Pole (L4)	39.8	Pass
						RATING =	39.8	Pass

**Table 5 - Tower Component Stresses vs. Capacity - LC5**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	37.8	Pass
1	Base Plate	0	30.3	Pass
1, 2	Base Foundation (Structural)	0	44.2	Pass
1, 2	Base Foundation (Soil)	0	35.9	Pass

<b>Structure Rating (max from all components) =</b>	<b>44.2%</b>
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Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed
- 2) It is unknown whether the foundation is a pier and pad or a drilled pier. Both designs were analyzed.

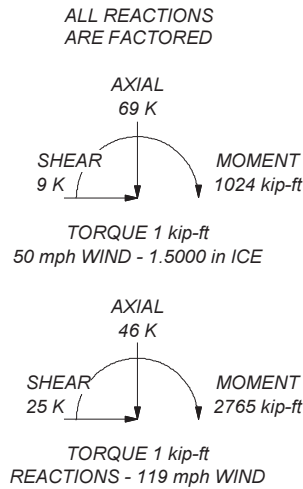
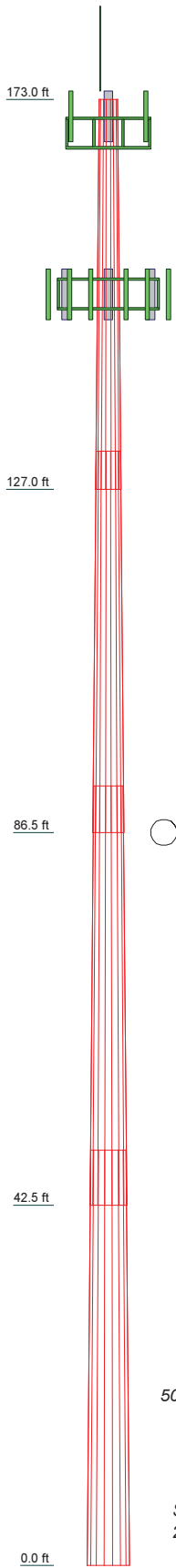
#### 4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the considered equipment configuration. No modifications are required at this time.

**APPENDIX A**  
**TNXTOWER OUTPUT**



Section	1	2	3	4
Length (ft)	46.00	45.00	49.50	49.00
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.4375
Socket Length (ft)	4.50	5.50	6.50	
Top Dia (in)	26.0000	34.1320	41.7239	49.9180
Bot Dia (in)	35.5680	43.4930	52.0200	60.1100
Grade	A607-60	A607-60	A607-65	A607-65
Weight (K)	3.8	5.8	9.3	12.6



### MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	A607-65	65 ksi	80 ksi

### TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 119 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 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: 39.8%

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

Job:	<b>801366</b>		
Project:			
Client:	Crown Castle	Drawn by:	DStephens
Code:	TIA-222-H	Date:	05/06/25
Path:	C:\SAPI Work Area\801366\WO 2385914 - SAIFA\801366.er	Scale:	NTS
		Dwg No.	E-1

## 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 Hartford County, Connecticut.

Tower base elevation above sea level: 148.00 ft.

Basic wind speed of 119 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 1.5000 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.

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 Kz In Exposure D Hurricane Region 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 Use Special Wind Profile	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 Appurtenances ✓ Alternative Appurt. EPA Calculation 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	173.00-127.00	46.00	4.50	18	26.0000	35.5680	0.2500	1.0000	A607-60 (60 ksi)
L2	127.00-86.50	45.00	5.50	18	34.1320	43.4930	0.3125	1.2500	A607-65 (65 ksi)
L3	86.50-42.50	49.50	6.50	18	41.7239	52.0200	0.3750	1.5000	A607-65 (65 ksi)
L4	42.50-0.00	49.00		18	49.9180	60.1100	0.4375	1.7500	A607-65 (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	26.3625	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
	36.0781	28.0248	4416.4436	12.5379	18.0685	244.4272	8838.6985	14.0151	5.8200	23.28
L2	35.5609	33.5447	4847.2558	12.0059	17.3391	279.5571	9700.8898	16.7755	5.4572	17.463
	44.1157	42.8297	10089.2154	15.3291	22.0944	456.6404	20191.7065	21.4189	7.1048	22.735
L3	43.4713	49.2155	10630.8216	14.6789	21.1957	501.5549	21275.6314	24.6124	6.6834	17.822
	52.7646	61.4705	20713.8337	18.3340	26.4262	783.8382	41454.9232	30.7411	8.4955	22.655
L4	51.9934	68.7098	21253.1960	17.5656	25.3583	838.1148	42534.3575	34.3614	8.0156	18.321
	60.9698	82.8627	37277.3584	21.1837	30.5359	1220.7724	74603.7673	41.4392	9.8094	22.421

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 Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
L1 173.00- 127.00				1	1	1			
L2 127.00- 86.50				1	1	1			
L3 86.50-42.50				1	1	1			
L4 42.50-0.00				1	1	1			

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

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***											
***											

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

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

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
Safety Line 3/8	A	No	No	CaAa (Out Of Face)	173.00 - 0.00	1	No Ice	0.04	0.22
							1/2" Ice	0.14	0.75
							1" Ice	0.24	1.28
							2" Ice	0.44	2.34
5/8 rod/step	A	No	No	CaAa (Out Of Face)	173.00 - 0.00	1	No Ice	0.02	0.27
							1/2" Ice	0.12	0.70
							1" Ice	0.22	1.74
							2" Ice	0.42	5.65
***									
CU12PSM6P4XXX(1-3/4)	C	No	No	Inside Pole	169.00 - 0.00	1	No Ice	0.00	2.72
							1/2" Ice	0.00	2.72
							1" Ice	0.00	2.72
							2" Ice	0.00	2.72
***									
RFF-24SM-1206-618-APE(1-1/4)	C	No	No	Inside Pole	150.00 - 0.00	2	No Ice	0.00	1.48
							1/2" Ice	0.00	1.48
							1" Ice	0.00	1.48
							2" Ice	0.00	1.48
***									
***									

### Feed Line/Linear Appurtenances Section Areas

Tower Section	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	173.00-127.00	A	0.000	0.000	0.000	2.645	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.18
L2	127.00-86.50	A	0.000	0.000	0.000	2.329	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.23
L3	86.50-42.50	A	0.000	0.000	0.000	2.530	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.25
L4	42.50-0.00	A	0.000	0.000	0.000	2.444	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.24

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

Tower Section	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	173.00-127.00	A	1.482	0.000	0.000	0.000	29.922	0.25
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.18
L2	127.00-86.50	A	1.433	0.000	0.000	0.000	26.344	0.22
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.23
L3	86.50-42.50	A	1.363	0.000	0.000	0.000	27.753	0.23
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.25

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_A A_A$ In Face ft <sup>2</sup>	$C_A A_A$ Out Face ft <sup>2</sup>	Weight K
L4	42.50-0.00	A	1.222	0.000	0.000	0.000	25.610	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.24

### Feed Line Center of Pressure

Section	Elevation ft	$CP_x$ in	$CP_z$ in	$CP_x$ Ice in	$CP_z$ Ice in
L1	173.00-127.00	0.0000	-0.5217	0.0000	-2.6458
L2	127.00-86.50	0.0000	-0.5255	0.0000	-2.7985
L3	86.50-42.50	0.0000	-0.5279	0.0000	-2.8277
L4	42.50-0.00	0.0000	-0.5297	0.0000	-2.7946

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

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
Lightning Rod 1"x10'	C	From Leg	0.00 0.00 5.00	0.0000	174.00
***					
MX08FRO665-21 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	169.00
MX08FRO665-21 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	169.00
MX08FRO665-21 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	169.00
TA08025-B604	A	From Leg	4.00 0.00 1.00	0.0000	169.00
TA08025-B604	B	From Leg	4.00 0.00 1.00	0.0000	169.00
TA08025-B604	C	From Leg	4.00 0.00 1.00	0.0000	169.00
TA08025-B605	A	From Leg	4.00 0.00 1.00	0.0000	169.00
TA08025-B605	B	From Leg	4.00 0.00 1.00	0.0000	169.00

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement
			Horz Lateral	Vert			
			ft	ft	ft	°	ft
TA08025-B605	C	From Leg	1.00	4.00	0.0000		169.00
			0.00	0.00			
RDIDC-9181-PF-48	B	From Leg	1.00	4.00	0.0000		169.00
			0.00	0.00			
6' x 2" Mount Pipe	B	From Leg	1.00	2.00	0.0000		169.00
			0.00	0.00			
(2) 2.4" Dia x 8-ft Mount Pipe	A	From Leg	0.00	4.00	0.0000		169.00
			0.00	0.00			
(2) 2.4" Dia x 8-ft Mount Pipe	B	From Leg	2.00	4.00	0.0000		169.00
			0.00	0.00			
(2) 2.4" Dia x 8-ft Mount Pipe	C	From Leg	2.00	4.00	0.0000		169.00
			0.00	0.00			
Commscope MC-PK8-DSH ***	C	None	2.00		0.0000		169.00
(2) BSF0020F3V1	A	From Leg	4.00	0.00	0.0000		150.00
			0.00	0.00			
(2) BSF0020F3V1	B	From Leg	4.00	0.00	0.0000		150.00
			0.00	0.00			
(2) BSF0020F3V1	C	From Leg	4.00	0.00	0.0000		150.00
			0.00	0.00			
RVZDC-3315-PF-48	A	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
RVZDC-3315-PF-48	B	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
MT6407-77A w/ Mount Pipe	A	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
MT6407-77A w/ Mount Pipe	B	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
MT6407-77A w/ Mount Pipe	C	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
RFV01U-D1A	A	From Leg	0.00	4.00	0.0000		150.00
			0.00	0.00			
RFV01U-D1A	B	From Leg	0.00	4.00	0.0000		150.00

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement  ft
			Horz Lateral ft	Vert ft	ft		
				0.00			
				0.00			
RFV01U-D1A	C	From Leg	4.00	0.0000	150.00		
			0.00				
			0.00				
RFV01U-D2A	A	From Leg	4.00	0.0000	150.00		
			0.00				
			0.00				
RFV01U-D2A	B	From Leg	4.00	0.0000	150.00		
			0.00				
			0.00				
RFV01U-D2A	C	From Leg	4.00	0.0000	150.00		
			0.00				
			0.00				
8' x 2" Mount Pipe	A	From Leg	4.00	0.0000	150.00		
			0.00				
			0.00				
8' x 2" Mount Pipe	B	From Leg	4.00	0.0000	150.00		
			0.00				
			0.00				
8' x 2" Mount Pipe	C	From Leg	4.00	0.0000	150.00		
			0.00				
			0.00				
Platform Mount [LP 602- 1_KCKR] ****	C	None		0.0000	150.00		

## 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
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

Comb. No.	Description
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	173 - 127	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-22.07	-1.22	0.31
			Max. Mx	8	-10.61	-306.10	-0.95
			Max. My	2	-10.61	0.68	305.53
			Max. Vy	8	12.10	-306.10	-0.95
			Max. Vx	2	-12.11	0.68	305.53
			Max. Torque	15			0.85
L2	127 - 86.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-32.24	-1.22	0.66
			Max. Mx	8	-17.51	-860.62	-2.27
			Max. My	2	-17.51	2.02	860.25
			Max. Vy	8	16.01	-860.62	-2.27
			Max. Vx	2	-16.01	2.02	860.25
			Max. Torque	13			0.93
L3	86.5 - 42.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-47.21	-1.22	1.10
			Max. Mx	8	-28.54	-1644.89	-3.70
			Max. My	2	-28.54	3.49	1644.75
			Max. Vy	8	20.44	-1644.89	-3.70
			Max. Vx	2	-20.44	3.49	1644.75
			Max. Torque	13			1.03
L4	42.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-69.30	-1.22	1.65
			Max. Mx	8	-46.03	-2760.55	-5.30
			Max. My	2	-46.03	5.15	2760.67
			Max. Vy	8	24.89	-2760.55	-5.30
			Max. Vx	2	-24.89	5.15	2760.67
			Max. Torque				



Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	36			-1.41

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	69.30	0.01	8.93
	Max. H <sub>x</sub>	20	46.04	24.87	0.03
	Max. H <sub>z</sub>	2	46.04	0.03	24.87
	Max. M <sub>x</sub>	2	2760.67	0.03	24.87
	Max. M <sub>z</sub>	8	2760.55	-24.87	-0.03
	Max. Torsion	30	1.41	-8.93	-0.01
	Min. Vert	19	34.53	21.52	-12.41
	Min. H <sub>x</sub>	8	46.04	-24.87	-0.03
	Min. H <sub>z</sub>	14	46.04	-0.03	-24.87
	Min. M <sub>x</sub>	14	-2760.36	-0.03	-24.87
	Min. M <sub>z</sub>	20	-2759.94	24.87	0.03
	Min. Torsion	36	-1.41	8.93	0.01

### 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	38.36	0.00	0.00	-0.13	-0.24	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	46.04	-0.03	-24.87	-2760.67	5.15	0.85
0.9 Dead+1.0 Wind 0 deg - No Ice	34.53	-0.03	-24.87	-2739.75	5.18	0.85
1.2 Dead+1.0 Wind 30 deg - No Ice	46.04	12.40	-21.52	-2388.12	-1375.71	0.33
0.9 Dead+1.0 Wind 30 deg - No Ice	34.53	12.40	-21.52	-2370.01	-1365.23	0.34
1.2 Dead+1.0 Wind 60 deg - No Ice	46.04	21.52	-12.41	-1375.70	-2388.03	-0.27
0.9 Dead+1.0 Wind 60 deg - No Ice	34.53	21.52	-12.41	-1365.26	-2369.88	-0.27
1.2 Dead+1.0 Wind 90 deg - No Ice	46.04	24.87	0.03	5.30	-2760.55	-0.80
0.9 Dead+1.0 Wind 90 deg - No Ice	34.53	24.87	0.03	5.29	-2739.59	-0.80
1.2 Dead+1.0 Wind 120 deg - No Ice	46.04	21.55	12.46	1384.82	-2393.47	-1.12
0.9 Dead+1.0 Wind 120 deg - No Ice	34.53	21.55	12.46	1374.38	-2375.28	-1.12
1.2 Dead+1.0 Wind 150 deg - No Ice	46.04	12.46	21.56	2393.25	-1385.15	-1.13
0.9 Dead+1.0 Wind 150 deg - No Ice	34.53	12.46	21.56	2375.17	-1374.58	-1.14
1.2 Dead+1.0 Wind 180 deg - No Ice	46.04	0.03	24.87	2760.36	-5.76	-0.85
0.9 Dead+1.0 Wind 180 deg - No Ice	34.53	0.03	24.87	2739.51	-5.63	-0.85
1.2 Dead+1.0 Wind 210 deg - No Ice	46.04	-12.40	21.52	2387.80	1375.10	-0.33

Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturning Moment, M <sub>x</sub>	Overturning Moment, M <sub>z</sub>	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
No Ice						
0.9 Dead+1.0 Wind 210 deg - No Ice	34.53	-12.40	21.52	2369.77	1364.78	-0.34
1.2 Dead+1.0 Wind 240 deg - No Ice	46.04	-21.52	12.41	1375.38	2387.42	0.27
0.9 Dead+1.0 Wind 240 deg - No Ice	34.53	-21.52	12.41	1365.02	2369.43	0.27
1.2 Dead+1.0 Wind 270 deg - No Ice	46.04	-24.87	-0.03	-5.61	2759.94	0.80
0.9 Dead+1.0 Wind 270 deg - No Ice	34.53	-24.87	-0.03	-5.52	2739.13	0.80
1.2 Dead+1.0 Wind 300 deg - No Ice	46.04	-21.55	-12.46	-1385.14	2392.86	1.12
0.9 Dead+1.0 Wind 300 deg - No Ice	34.53	-21.55	-12.46	-1374.61	2374.83	1.12
1.2 Dead+1.0 Wind 330 deg - No Ice	46.04	-12.46	-21.56	-2393.56	1384.54	1.13
0.9 Dead+1.0 Wind 330 deg - No Ice	34.53	-12.46	-21.56	-2375.40	1374.13	1.14
1.2 Dead+1.0 Ice+1.0 Temp	69.30	0.00	0.00	-1.65	-1.22	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	69.30	-0.01	-8.93	-1023.82	-0.26	0.18
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	69.30	4.46	-7.73	-886.34	-511.43	-0.55
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	69.30	7.73	-4.46	-511.84	-885.92	-1.13
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	69.30	8.93	0.01	-0.66	-1023.39	-1.41
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	69.30	7.73	4.47	510.23	-887.00	-1.31
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	69.30	4.47	7.73	883.93	-513.30	-0.86
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	69.30	0.01	8.93	1020.32	-2.43	-0.18
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	69.30	-4.46	7.73	882.85	508.74	0.55
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	69.30	-7.73	4.46	508.35	883.23	1.13
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	69.30	-8.93	-0.01	-2.83	1020.70	1.41
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	69.30	-7.73	-4.47	-513.72	884.32	1.31
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	69.30	-4.47	-7.73	-887.43	510.62	0.86
Dead+Wind 0 deg - Service	38.36	-0.01	-5.95	-658.02	1.04	0.20
Dead+Wind 30 deg - Service	38.36	2.97	-5.15	-569.23	-328.04	0.08
Dead+Wind 60 deg - Service	38.36	5.15	-2.97	-327.95	-569.29	-0.06
Dead+Wind 90 deg - Service	38.36	5.95	0.01	1.17	-658.08	-0.19
Dead+Wind 120 deg - Service	38.36	5.16	2.98	329.94	-570.59	-0.27
Dead+Wind 150 deg - Service	38.36	2.98	5.16	570.26	-330.29	-0.27
Dead+Wind 180 deg - Service	38.36	0.01	5.95	657.75	-1.55	-0.20
Dead+Wind 210 deg - Service	38.36	-2.97	5.15	568.96	327.53	-0.08
Dead+Wind 240 deg - Service	38.36	-5.15	2.97	327.69	568.79	0.06
Dead+Wind 270 deg - Service	38.36	-5.95	-0.01	-1.43	657.57	0.19
Dead+Wind 300 deg - Service	38.36	-5.16	-2.98	-330.20	570.08	0.27
Dead+Wind 330 deg - Service	38.36	-2.98	-5.16	-570.53	329.78	0.27

**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	-38.36	0.00	0.00	38.36	0.00	0.000%
2	-0.03	-46.04	-24.87	0.03	46.04	24.87	0.000%
3	-0.03	-34.53	-24.87	0.03	34.53	24.87	0.000%
4	12.40	-46.04	-21.52	-12.40	46.04	21.52	0.000%
5	12.40	-34.53	-21.52	-12.40	34.53	21.52	0.000%
6	21.52	-46.04	-12.41	-21.52	46.04	12.41	0.000%
7	21.52	-34.53	-12.41	-21.52	34.53	12.41	0.000%
8	24.87	-46.04	0.03	-24.87	46.04	-0.03	0.000%
9	24.87	-34.53	0.03	-24.87	34.53	-0.03	0.000%
10	21.55	-46.04	12.46	-21.55	46.04	-12.46	0.000%
11	21.55	-34.53	12.46	-21.55	34.53	-12.46	0.000%
12	12.46	-46.04	21.56	-12.46	46.04	-21.56	0.000%
13	12.46	-34.53	21.56	-12.46	34.53	-21.56	0.000%
14	0.03	-46.04	24.87	-0.03	46.04	-24.87	0.000%
15	0.03	-34.53	24.87	-0.03	34.53	-24.87	0.000%
16	-12.40	-46.04	21.52	12.40	46.04	-21.52	0.000%
17	-12.40	-34.53	21.52	12.40	34.53	-21.52	0.000%
18	-21.52	-46.04	12.41	21.52	46.04	-12.41	0.000%
19	-21.52	-34.53	12.41	21.52	34.53	-12.41	0.000%
20	-24.87	-46.04	-0.03	24.87	46.04	0.03	0.000%
21	-24.87	-34.53	-0.03	24.87	34.53	0.03	0.000%
22	-21.55	-46.04	-12.46	21.55	46.04	12.46	0.000%
23	-21.55	-34.53	-12.46	21.55	34.53	12.46	0.000%
24	-12.46	-46.04	-21.56	12.46	46.04	21.56	0.000%
25	-12.46	-34.53	-21.56	12.46	34.53	21.56	0.000%
26	0.00	-69.30	0.00	0.00	69.30	0.00	0.000%
27	-0.01	-69.30	-8.93	0.01	69.30	8.93	0.000%
28	4.46	-69.30	-7.73	-4.46	69.30	7.73	0.000%
29	7.73	-69.30	-4.46	-7.73	69.30	4.46	0.000%
30	8.93	-69.30	0.01	-8.93	69.30	-0.01	0.000%
31	7.73	-69.30	4.47	-7.73	69.30	-4.47	0.000%
32	4.47	-69.30	7.73	-4.47	69.30	-7.73	0.000%
33	0.01	-69.30	8.93	-0.01	69.30	-8.93	0.000%
34	-4.46	-69.30	7.73	4.46	69.30	-7.73	0.000%
35	-7.73	-69.30	4.46	7.73	69.30	-4.46	0.000%
36	-8.93	-69.30	-0.01	8.93	69.30	0.01	0.000%
37	-7.73	-69.30	-4.47	7.73	69.30	4.47	0.000%
38	-4.47	-69.30	-7.73	4.47	69.30	7.73	0.000%
39	-0.01	-38.36	-5.95	0.01	38.36	5.95	0.000%
40	2.97	-38.36	-5.15	-2.97	38.36	5.15	0.000%
41	5.15	-38.36	-2.97	-5.15	38.36	2.97	0.000%
42	5.95	-38.36	0.01	-5.95	38.36	-0.01	0.000%
43	5.16	-38.36	2.98	-5.16	38.36	-2.98	0.000%
44	2.98	-38.36	5.16	-2.98	38.36	-5.16	0.000%
45	0.01	-38.36	5.95	-0.01	38.36	-5.95	0.000%
46	-2.97	-38.36	5.15	2.97	38.36	-5.15	0.000%
47	-5.15	-38.36	2.97	5.15	38.36	-2.97	0.000%
48	-5.95	-38.36	-0.01	5.95	38.36	0.01	0.000%
49	-5.16	-38.36	-2.98	5.16	38.36	2.98	0.000%
50	-2.98	-38.36	-5.16	2.98	38.36	5.16	0.000%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00022779
3	Yes	4	0.00000001	0.00014704

4	Yes	5	0.00000001	0.00016413
5	Yes	5	0.00000001	0.00007848
6	Yes	5	0.00000001	0.00016101
7	Yes	5	0.00000001	0.00007690
8	Yes	4	0.00000001	0.00012820
9	Yes	4	0.00000001	0.00007549
10	Yes	5	0.00000001	0.00015927
11	Yes	5	0.00000001	0.00007590
12	Yes	5	0.00000001	0.00016857
13	Yes	5	0.00000001	0.00008061
14	Yes	4	0.00000001	0.00027030
15	Yes	4	0.00000001	0.00017586
16	Yes	5	0.00000001	0.00015837
17	Yes	5	0.00000001	0.00007560
18	Yes	5	0.00000001	0.00016139
19	Yes	5	0.00000001	0.00007712
20	Yes	4	0.00000001	0.00016424
21	Yes	4	0.00000001	0.00010172
22	Yes	5	0.00000001	0.00016756
23	Yes	5	0.00000001	0.00008012
24	Yes	5	0.00000001	0.00015837
25	Yes	5	0.00000001	0.00007547
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00015349
28	Yes	5	0.00000001	0.00018516
29	Yes	5	0.00000001	0.00018683
30	Yes	5	0.00000001	0.00015419
31	Yes	5	0.00000001	0.00018449
32	Yes	5	0.00000001	0.00018664
33	Yes	5	0.00000001	0.00015291
34	Yes	5	0.00000001	0.00018413
35	Yes	5	0.00000001	0.00018293
36	Yes	5	0.00000001	0.00015328
37	Yes	5	0.00000001	0.00018684
38	Yes	5	0.00000001	0.00018426
39	Yes	4	0.00000001	0.00002089
40	Yes	4	0.00000001	0.00007579
41	Yes	4	0.00000001	0.00007148
42	Yes	4	0.00000001	0.00001724
43	Yes	4	0.00000001	0.00006831
44	Yes	4	0.00000001	0.00008044
45	Yes	4	0.00000001	0.00002131
46	Yes	4	0.00000001	0.00006837
47	Yes	4	0.00000001	0.00007191
48	Yes	4	0.00000001	0.00001747
49	Yes	4	0.00000001	0.00007882
50	Yes	4	0.00000001	0.00006748

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	173 - 127	15.823	43	0.7742	0.0014
L2	131.5 - 86.5	9.353	43	0.6771	0.0008
L3	92 - 42.5	4.525	43	0.4692	0.0004
L4	49 - 0	1.279	43	0.2370	0.0002

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
174.00	Lightning Rod 1"x10'	43	15.823	0.7742	0.0014	102105
169.00	MX08FRO665-21 w/ Mount Pipe	43	15.173	0.7679	0.0013	102105
150.00	(2) BSF0020F3V1	43	12.130	0.7328	0.0011	22196

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	173 - 127	66.417	10	3.2507	0.0057
L2	131.5 - 86.5	39.269	10	2.8442	0.0034
L3	92 - 42.5	18.999	10	1.9708	0.0016
L4	49 - 0	5.368	10	0.9950	0.0007

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
174.00	Lightning Rod 1"x10'	10	66.417	3.2507	0.0057	24510
169.00	MX08FRO665-21 w/ Mount Pipe	10	63.689	3.2245	0.0055	24510
150.00	(2) BSF0020F3V1	10	50.921	3.0777	0.0044	5326

### Compression Checks

#### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio P <sub>u</sub> φP <sub>n</sub>
L1	173 - 127 (1)	TP35.568x26x0.25	46.00	0.00	0.0	27.2821	-10.60	1473.23	0.007
L2	127 - 86.5 (2)	TP43.493x34.132x0.3125	45.00	0.00	0.0	41.6948	-17.51	2439.15	0.007
L3	86.5 - 42.5 (3)	TP52.02x41.7239x0.375	49.50	0.00	0.0	59.8612	-28.54	3501.88	0.008
L4	42.5 - 0 (4)	TP60.11x49.918x0.4375	49.00	0.00	0.0	82.8627	-46.03	4847.47	0.009

#### Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>nx</sub> kip-ft	Ratio M <sub>ux</sub> φM <sub>nx</sub>	M <sub>uy</sub> kip-ft	φM <sub>ny</sub> kip-ft	Ratio M <sub>uy</sub> φM <sub>ny</sub>
L1	173 - 127 (1)	TP35.568x26x0.25	306.81	1200.03	0.256	0.00	1200.03	0.000

Section No.	Elevation ft	Size	$M_{ux}$	$\phi M_{nx}$	Ratio	$M_{uy}$	$\phi M_{ny}$	Ratio
			kip-ft	kip-ft	$\frac{M_{ux}}{\phi M_{nx}}$	kip-ft	kip-ft	$\frac{M_{uy}}{\phi M_{ny}}$
L2	127 - 86.5 (2)	TP43.493x34.132x0.3125	862.53	2413.78	0.357	0.00	2413.78	0.000
L3	86.5 - 42.5 (3)	TP52.02x41.7239x0.375	1648.11	4150.68	0.397	0.00	4150.68	0.000
L4	42.5 - 0 (4)	TP60.11x49.918x0.4375	2765.22	6774.75	0.408	0.00	6774.75	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual	$\phi V_n$	Ratio	Actual	$\phi T_n$	Ratio
			$V_u$	K	$\frac{V_u}{\phi V_n}$	$T_u$	$\frac{T_u}{\phi T_n}$	
			K	K		kip-ft	kip-ft	
L1	173 - 127 (1)	TP35.568x26x0.25	12.13	441.97	0.027	0.61	1330.78	0.000
L2	127 - 86.5 (2)	TP43.493x34.132x0.3125	16.04	731.74	0.022	0.76	2693.79	0.000
L3	86.5 - 42.5 (3)	TP52.02x41.7239x0.375	20.47	1050.56	0.019	0.93	4627.12	0.000
L4	42.5 - 0 (4)	TP60.11x49.918x0.4375	24.92	1454.24	0.017	1.12	7599.60	0.000

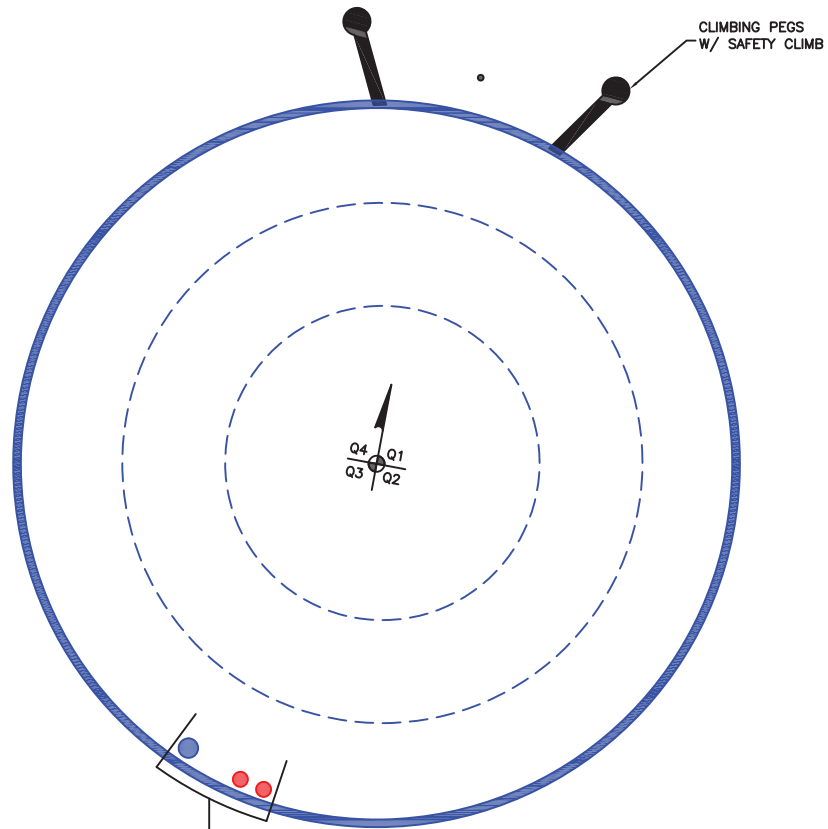
### Pole Interaction Design Data

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb.	Allow.	Criteria
		$P_u$	$M_{ux}$	$M_{uy}$	$V_u$	$T_u$	Stress	Stress	
		$\phi P_n$	$\phi M_{nx}$	$\phi M_{ny}$	$\phi V_n$	$\phi T_n$	Ratio	Ratio	
L1	173 - 127 (1)	0.007	0.256	0.000	0.027	0.000	0.264	1.050	
L2	127 - 86.5 (2)	0.007	0.357	0.000	0.022	0.000	0.365	1.050	
L3	86.5 - 42.5 (3)	0.008	0.397	0.000	0.019	0.000	0.406	1.050	
L4	42.5 - 0 (4)	0.009	0.408	0.000	0.017	0.000	0.418	1.050	

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
L1	173 - 127	Pole	TP35.568x26x0.25	1	-10.60	1546.89	25.1	Pass
L2	127 - 86.5	Pole	TP43.493x34.132x0.3125	2	-17.51	2561.11	34.8	Pass
L3	86.5 - 42.5	Pole	TP52.02x41.7239x0.375	3	-28.54	3676.97	38.6	Pass
L4	42.5 - 0	Pole	TP60.11x49.918x0.4375	4	-46.03	5089.84	39.8	Pass
Summary								
Pole (L4)							39.8	Pass
<b>RATING =</b>							<b>39.8</b>	<b>Pass</b>

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



CLIMBING PEGS  
W/ SAFETY CLIMB

(PROPOSED EQUIPMENT CONFIGURATION)  
(2) 1-1/4" TO 150 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)  
(1) 1-3/4" TO 169 FT LEVEL



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

## Monopole Base Plate Connection

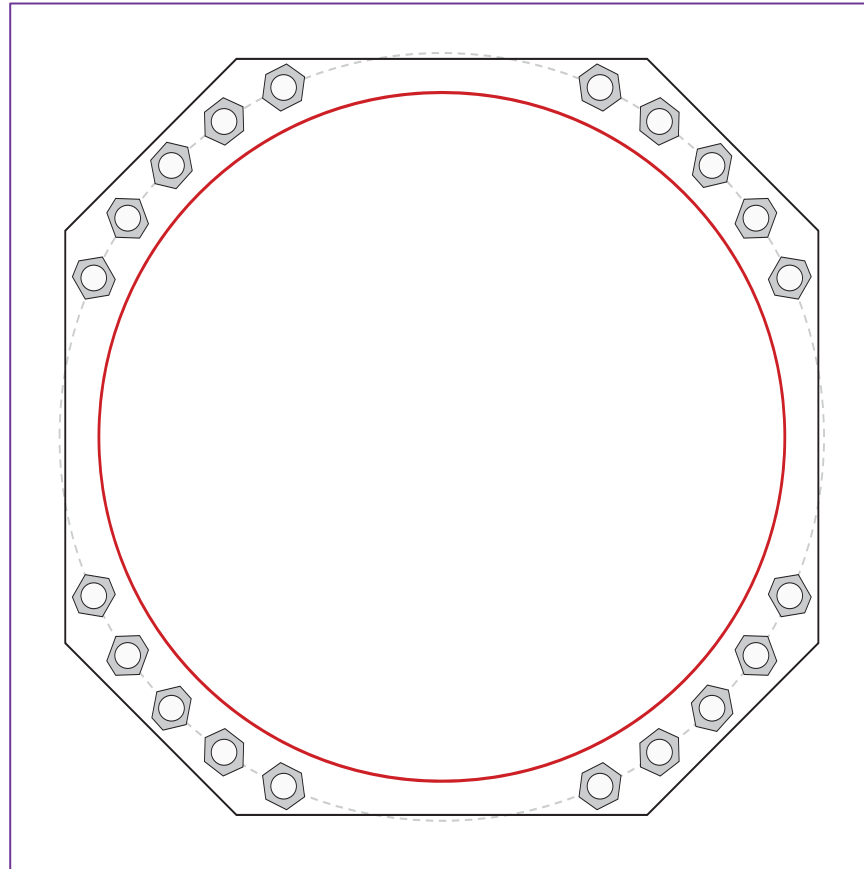


Site Info	
BU #	801366
Site Name	ROCKY HILL 2
Order #	696217 REV. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$l_{ar}$ (in)	1

Applied Loads	
Moment (kip-ft)	2765.22
Axial Force (kips)	46.03
Shear Force (kips)	24.92

\*TIA-222-H Section 15.5 Applied



Connection Properties		Analysis Results	
<b>Anchor Rod Data</b>		<b>Anchor Rod Summary</b> <i>(units of kips, kip-in)</i>	
(20) 2-1/4" $\phi$ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 67" BC Anchor Spacing: 6 in		$P_{u,t} = 96.71$	$\phi P_{n,t} = 243.75$ <b>Stress Rating</b>
<b>Base Plate Data</b>		$V_u = 1.25$	$\phi V_n = 149.1$ <b>37.8%</b>
66" W x 3" Plate (A572-55; $F_y=55$ ksi, $F_u=70$ ksi); Clip: 15 in		$M_u = n/a$	$\phi M_n = n/a$ <b>Pass</b>
<b>Stiffener Data</b>		<b>Base Plate Summary</b>	
N/A		Max Stress (ksi):	15.76 (Flexural)
<b>Pole Data</b>		Allowable Stress (ksi):	49.5
60.11" x 0.4375" 18-sided pole (A607-65; $F_y=65$ ksi, $F_u=80$ ksi)		Stress Rating:	<b>30.3%</b> <b>Pass</b>

## Pier and Pad Foundation



BU #: 801366  
 Site Name: ROCKY HILL 2  
 App. Number: 696217 REV. 0

TIA-222 Revision: H  
 Tower Type: Monopole

Top & Bot. Pad Rein. Different?:   
 Block Foundation?:   
 Rectangular Pad?:

Superstructure Analysis Reactions		
Compression, $P_{comp}$ :	46.04	kips
Base Shear, $V_u$ comp:	24.89	kips
Moment, $M_u$ :	2765.22	ft-kips
Tower Height, $H$ :	173	ft
BP Dist. Above Fdn, $b_{pdist}$ :	3.25	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	388.51	24.89	6.1%	Pass
<i>Bearing Pressure (ksf)</i>	6.75	2.08	29.3%	Pass
<i>Overtuning (kip*ft)</i>	8362.55	2983.53	35.7%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	10915.52	2889.67	25.2%	Pass
<i>Pier Compression (kip)</i>	23994.73	91.28	0.4%	Pass
<i>Pad Flexure (kip*ft)</i>	7630.08	916.43	11.4%	Pass
<i>Pad Shear - 1-way (kips)</i>	945.49	134.54	13.6%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.164	0.021	12.2%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	10768.44	1733.80	15.3%	Pass
<i>Pad Shear - 2-way (Uplift) (ksi)</i>	0.164	0.000	0.0%	Pass

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, $d_{pier}$ :	8	ft
Ext. Above Grade, $E$ :	0.5	ft
Pier Rebar Size, $S_c$ :	11	
Pier Rebar Quantity, $mc$ :	40	
Pier Tie/Spiral Size, $S_t$ :	5	
Pier Tie/Spiral Quantity, $mt$ :	10	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, $cc_{pier}$ :	3	in

\*Rating per TIA-222-H Section 15.5

Structural Rating*:	25.2%
Soil Rating*:	35.7%

Pad Properties		
Depth, $D$ :	8	ft
Pad Width, $W_1$ :	26	ft
Pad Thickness, $T$ :	3.5	ft
Pad Rebar Size (Bottom dir. 2), $S_{p2}$ :	11	
Pad Rebar Quantity (Bottom dir. 2), $mp_2$ :	31	
Pad Clear Cover, $cc_{pad}$ :	3	

Material Properties		
Pier Rebar Grade, $F_y$ :	60	ksi
Concrete Compressive Strength, $F'_c$ :	3	ksi
Dry Concrete Density, $\delta_c$ :	150	pcf

Soil Properties		
Total Soil Unit Weight, $\gamma$ :	120	pcf
Ultimate Gross Bearing, $Q_{ult}$ :	9.000	ksf
Cohesion, $C_u$ :	0.000	ksf
Friction Angle, $\phi$ :	33	degrees
SPT Blow Count, $N_{blows}$ :	24	
Base Friction, $\mu$ :		
Neglected Depth, $N$ :	4.00	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, $gw$ :	10	ft

<--Toggle between Gross and Net

## Drilled Pier Foundation

BU # :	801366
Site Name:	ROCKY HILL 2
Order Number:	696217 REV. 0
TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	2765.22	
Axial Force (kips)	46.04	
Shear Force (kips)	24.89	

Material Properties		
Concrete Strength, f'c:	3	ksi
Rebar Strength, Fy:	60	ksi
Tie Yield Strength, Fyt:	40	ksi

Pier Design Data		
Depth	27	ft
Ext. Above Grade	0.5	ft
Pier Section 1		
<i>From 0.5' above grade to 27' below grade</i>		
Pier Diameter	8	ft
Rebar Quantity	24	
Rebar Size	11	
Clear Cover to Ties	4	in
Tie Size	5	
Tie Spacing	18	in

[Rebar & Pier Options](#)

[Embedded Pole Inputs](#)

[Belled Pier Inputs](#)

### Analysis Results

Soil Lateral Check	Compression	Uplift
D <sub>v=0</sub> (ft from TOC)	6.33	-
Soil Safety Factor	3.53	-
Max Moment (kip-ft)	2949.16	-
Rating*	35.9%	-

Soil Vertical Check	Compression	Uplift
Skin Friction (kips)	429.07	-
End Bearing (kips)	226.19	-
Weight of Concrete (kips)	184.80	-
Total Capacity (kips)	655.26	-
Axial (kips)	230.84	-
Rating*	33.6%	-

Reinforced Concrete Flexure	Compression	Uplift
Critical Depth (ft from TOC)	6.30	-
Critical Moment (kip-ft)	2949.16	-
Critical Moment Capacity	6922.43	-
Rating*	40.6%	-

Reinforced Concrete Shear	Compression	Uplift
Critical Depth (ft from TOC)	17.61	-
Critical Shear (kip)	316.97	-
Critical Shear Capacity	683.57	-
Rating*	44.2%	-

<b>Structural Foundation Rating*</b>	<b>44.2%</b>
<b>Soil Interaction Rating*</b>	<b>35.9%</b>

\*Rating per TIA-222-H Section 15.5



Check Limitation	
Apply TIA-222-H Section 15.5:	<input checked="" type="checkbox"/>
N/A	<input type="checkbox"/>
Design Options	
Input Effective Depths (else Actual):	<input type="checkbox"/>
Consider non-tapered moment capacity:	<input type="checkbox"/>
Check Shear along Depth of Pier:	<input checked="" type="checkbox"/>
Utilize Shear-Friction Methodology:	<input type="checkbox"/>
Override Critical Depth:	<input type="checkbox"/>

[Go to Soil Calculations](#)

Soil Profile			
Groundwater Depth	10	# of Layers	5

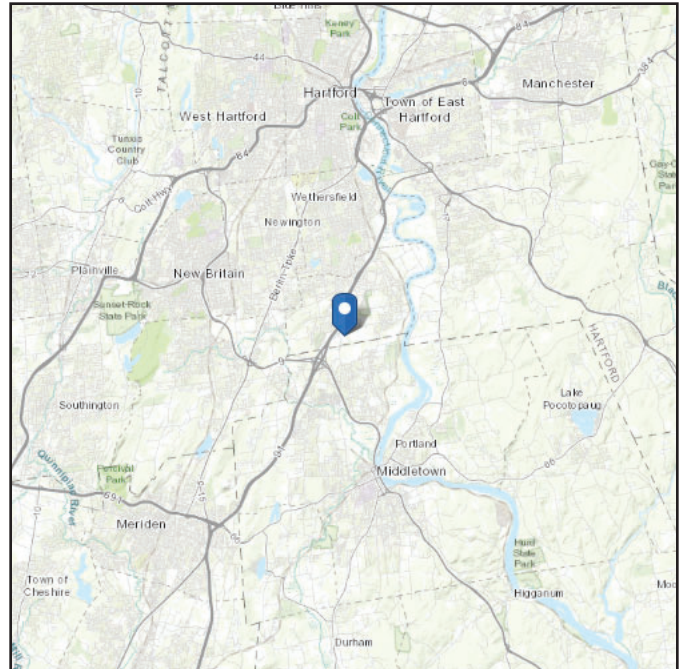
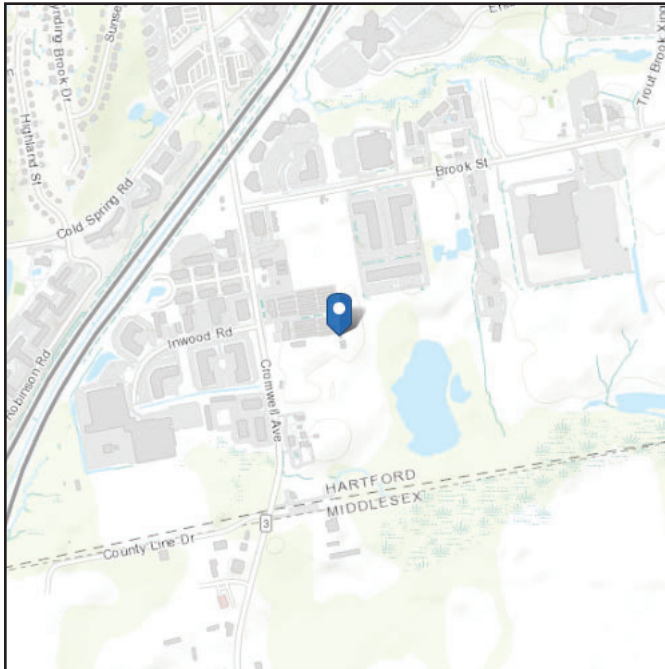
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ <sub>soil</sub> (pcf)	γ <sub>concrete</sub> (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	4	4	120	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	4	10	6	120	150	0	33	0.960	0.960				24	Cohesionless
3	10	13.5	3.5	57.6	87.6	0	33	1.349	1.349				15	Cohesionless
4	13.5	23.5	10	57.6	87.6	0	32	1.036	1.036				10	Cohesionless
5	23.5	27	3.5	52.6	87.6	1	0	0.550	0.550			6		Cohesive

# 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:** 147.94 ft (NAVD 88)  
**Latitude:** 41.637917  
**Longitude:** -72.673389



## Wind

### Results:

Wind Speed	119 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	98 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2  
Date Accessed: Thu Nov 03 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).

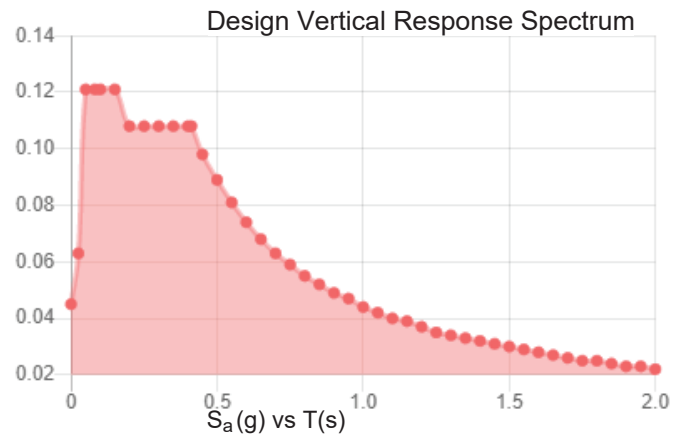
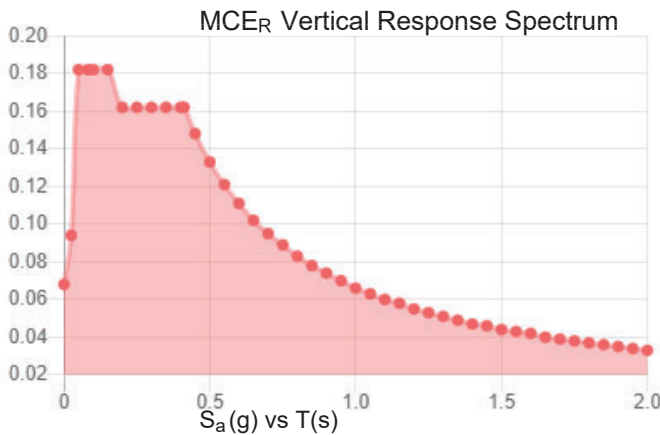
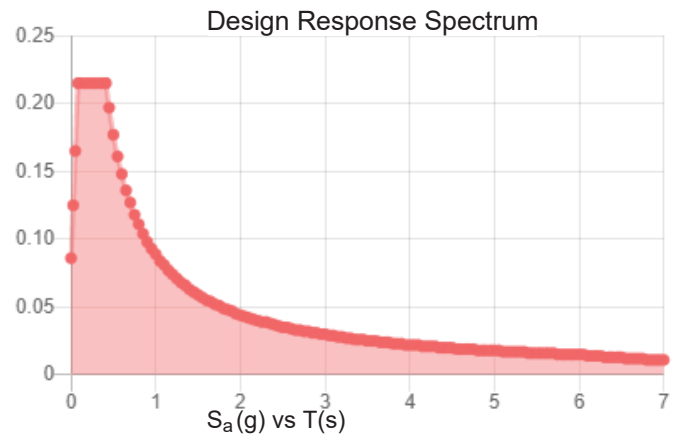
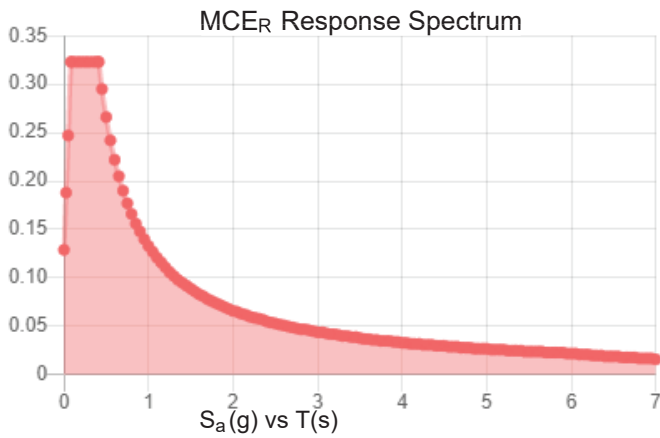
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

**Results:**

$S_s$ :	0.202	$S_{D1}$ :	0.089
$S_1$ :	0.055	$T_L$ :	6
$F_a$ :	1.6	PGA :	0.111
$F_v$ :	2.4	PGA <sub>M</sub> :	0.175
$S_{MS}$ :	0.323	$F_{PGA}$ :	1.578
$S_{M1}$ :	0.133	$I_e$ :	1
$S_{DS}$ :	0.215	$C_v$ :	0.704

**Seismic Design Category** B



**Data Accessed:** Thu Nov 03 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

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**Results:**

Ice Thickness: 1.50 in.  
Concurrent Temperature: 15 F  
Gust Speed 50 mph

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

**Date Accessed:** Thu Nov 03 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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