



Date: **June 29, 2021**

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

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

**Carrier Designation:** **American Electric Power Co Inc (AEP) Co-Locate**  
**Site Number:** S-CMHFRK0237-A  
**Site Name:** S-CMHFRK0237-A

**Crown Castle Designation:** **BU Number:** 826150  
**Site Name:** N. Riverside / Dublin HS  
**JDE Job Number:** 664345  
**Work Order Number:** 1990268  
**Order Number:** 565735 Rev. 0

**Engineering Firm Designation:** **Crown Castle Project Number:** 1990268

**Site Data:** **4000 Hard Rd, Dublin, Franklin County, OH**  
**Latitude 40° 7' 25.58", Longitude -83° 5' 48.12"**  
**150.75 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

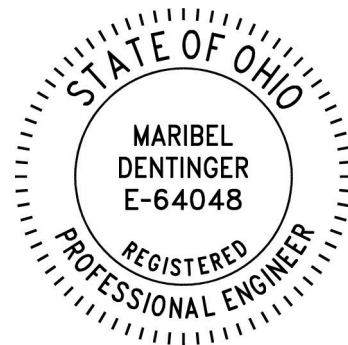
**Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 115 mph as required by the 2017 Ohio Building Code. Applicable Standard references and design criteria are listed in Section 2 - "Analysis Criteria".

Structural analysis prepared by: Nicholas Cvetic, E.I.T.

Respectfully submitted by:

*Maribel Dentinger*  
Maribel Dentinger, P.E.  
Senior Project Engineer



## TABLE OF CONTENTS

### 1) INTRODUCTION

### 2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Other Considered Equipment

### 3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

### 4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Table 5 - Tower Component Stresses vs. Capacity - LC7

4.1) Recommendations

### 5) APPENDIX A

tnxTower Output

### 6) APPENDIX B

Base Level Drawing

### 7) APPENDIX C

Additional Calculations

## 1) INTRODUCTION

This tower is a 150.75 ft monopole tower mapped by TEP. The tower has been modified to accommodate additional loading.

## 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	II
<b>Wind Speed:</b>	115 mph
<b>Exposure Category:</b>	C
<b>Topographic Factor:</b>	1
<b>Ice Thickness:</b>	1.5 in
<b>Wind Speed with Ice:</b>	40 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)
110.0	110.0	3	commscope	VHLPX2-80_A	2 1	2-1/4 1/4
		3	hammond	PCJ12106HF		
		1	integra	H161407HLL		
		1	site pro 1	UDS-NPL		
		4	starry inc	TITAN 24X90 w/ Mount Pipe		

**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)
151.0	158.0	1	decibel	DB810M-XC	18 2 1 1 1	1-5/8 1-1/2 1-1/4 7/8 1/2
	153.0	3	commscope	FFHH-65C-R3 w/ Mount Pipe		
		2	commscope	HCS 2.0 Part 1		
		3	nokia	AEHC w/ Mount Pipe		
		3	nokia	AHFIG		
		3	nokia	AHLOA		
	151.0	1	tower mounts	Platform Mount [LP 602-1]		
	144.0	1	decibel	DB810M-XC		
132.0	134.0	3	commscope	VVSSP-65S-R1BV2 w/ Mount Pipe	2 1	1-5/8 5/8
		3	nokia	AEUB w/ Mount Pipe		
		3	nokia	AIRSCALE DUAL RRH 4T4R B2/66A 320W		
		3	nokia	AIRSCALE DUAL RRH 4T4R B5/13 320W		
		3	nokia	AZQC		
		1	nokia	UBT-T_CCIV2		
		9	quintel technology	QS8656-3 w/ Mount Pipe		
		2	raycap	RC3DC-3315-PF-48		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		1	rfs celwave	SBX1-220CB		
	132.0	1	tower mounts	Platform Mount [LP 602-1]		
122.0	122.0	3	fujitsu	TA08025-B604	1	1-1/2
		3	fujitsu	TA08025-B605		
		3	jma wireless	MX08FRO665-20 w/ Mount Pipe		
		1	raycap	RDIDC-9181-PF-48		
		1	tower mounts	Valmont SNP8HR-396		
88.0	88.0	1	north star lighting	STARBEAM-19	4	3/8
		1	tower mounts	T-Arm Mount [TA 602-1]	3	1/4

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

Document	Reference	Source
4-GEOTECHNICAL REPORTS	3486717	CCISITES
4-POST-MODIFICATION INSPECTION	6193826	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	3486716	CCISITES
4-TOWER MANUFACTURER DRAWINGS	3773012	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	6070418	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	150.75 - 124.25	Pole	TP21.27x14.18x0.1875	1	-7.7203	686.5719	54.1	Pass
L2	124.25 - 82.5	Pole	TP29.77x20.1592x0.3125	2	-17.7828	1611.1199	73.2	Pass
L3	82.5 - 40.67	Pole	TP37.57x28.3351x0.375	3	-27.1993	2445.2399	78.4	Pass
L4	40.67 - 0	Pole	TP43.24x35.8576x0.4375	4	-40.6946	3370.0588	78.4	Pass
							Summary	
						Pole (L4)	78.4	Pass
						Rating =	78.4	Pass

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

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	68.1	Pass
1	Base Plate	0	79.6	Pass
1	Base Foundation (Structure)	0	89.6	Pass
1	Base Foundation (Soil Interaction)	0	75.6	Pass

<b>Structure Rating (max from all components) =</b>	<b>89.6%</b>
---	--------------

Notes:

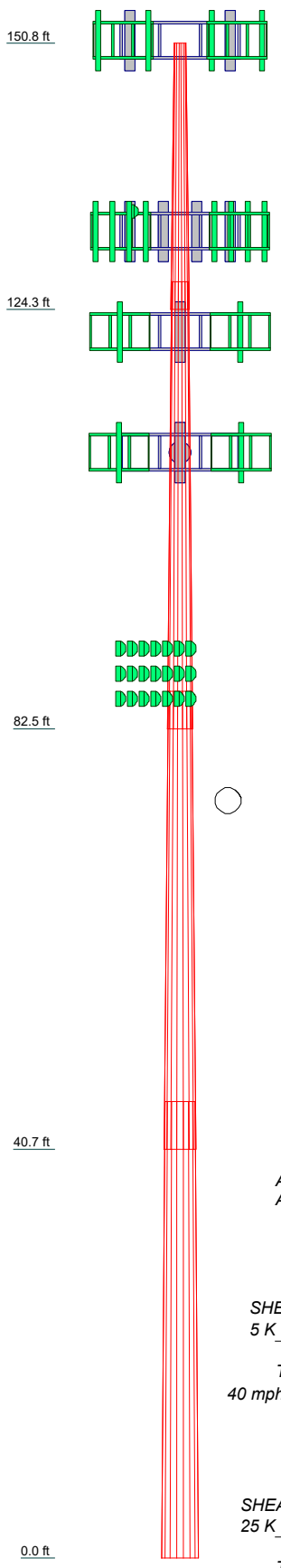
- 1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity consumed.

#### 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	19.1
Length (ft)	26.5000	44.5000	45.5800	45.4200	8.4
Number of Sides	18	18	18	18	
Thickness (in)	0.1875	0.3125	0.3750	0.4375	
Socket Length (ft)	2.7500	3.7500	4.7500		
Top Dia (in)	14.1800	20.1592	28.3351	35.8576	
Bot Dia (in)	21.2700	29.7700	37.5700	43.2400	
Grade			A572-60		
Weight (K)	0.9	3.7	6.0	8.4	



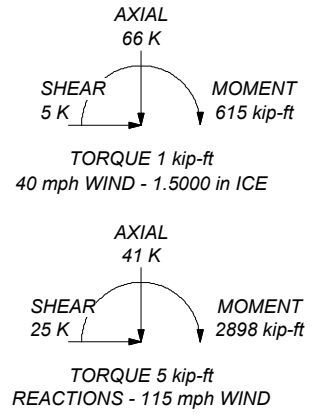
**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-60	60 ksi	75 ksi			

**TOWER DESIGN NOTES**

1. Tower is located in Franklin County, Ohio.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 115 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 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 0.0000 ft
8. TOWER RATING: 78.4%

ALL REACTIONS ARE FACTORED



<b>Crown Castle</b>		
2000 Corporate Drive Canonsburg, PA 15317		
Phone: (724) 416-2000 FAX:		
Job: <b>BU# 826150</b>	Project:	App'd:
Client: Crown Castle	Drawn by: NCvetic	Scale: NTS
Code: TIA-222-H	Date: 06/29/21	Dwg No. E-1
Path:	\\netapp4\cad\Structural Work Area\820000-829999\826150\WO 1990268 - SAIProd\826150.dwg	

## 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 Franklin County, Ohio.
- Tower base elevation above sea level: 904.0000 ft.
- Basic wind speed of 115 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.0000 ft.
- Nominal ice thickness of 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56.0000 pcf.
- A wind speed of 40 mph is used in combination with ice.
- Temperature drop of 50.0000 °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
--	---	---

## 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	150.7500- 124.2500	26.5000	2.7500	18	14.1800	21.2700	0.1875	0.7500	A572-60 (60 ksi)
L2	124.2500- 82.5000	44.5000	3.7500	18	20.1592	29.7700	0.3125	1.2500	A572-60 (60 ksi)
L3	82.5000- 40.6700	45.5800	4.7500	18	28.3351	37.5700	0.3750	1.5000	A572-60 (60 ksi)
L4	40.6700- 0.0000	45.4200		18	35.8576	43.2400	0.4375	1.7500	A572-60 (60 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	14.3698	8.3273	205.9831	4.9673	7.2034	28.5951	412.2372	4.1644	2.1657	11.55
	21.5692	12.5467	704.5502	7.4843	10.8052	65.2050	1410.0276	6.2746	3.4135	18.205
L2	21.0251	19.6855	979.6305	7.0456	10.2409	95.6587	1960.5500	9.8446	2.9980	9.594
	30.1810	29.2182	3203.1852	10.4574	15.1232	211.8066	6410.5853	14.6119	4.6895	15.006
L3	29.4859	33.2795	3286.9419	9.9258	14.3942	228.3513	6578.2089	16.6429	4.3270	11.539
	38.0917	44.2713	7738.0108	13.2042	19.0856	405.4380	15486.2034	22.1399	5.9523	15.873
L4	37.1272	49.1852	7796.0055	12.5741	18.2157	427.9836	15602.2691	24.5973	5.5409	12.665
	43.8396	59.4366	13757.1932	15.1949	21.9659	626.2972	27532.4886	29.7240	6.8402	15.635

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 150.7500- 124.2500				1	1	1			
L2 124.2500- 82.5000				1	1	1			
L3 82.5000- 40.6700				1	1	1			
L4 40.6700- 0.0000				1	1	1			

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

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

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

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t 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)	150.7500 -	1	No Ice	0.0375	0.2200

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
				Of Face)	0.0000		1/2" Ice	0.1375	0.7500
							1" Ice	0.2375	1.2800
							2" Ice	0.4375	2.3400
5/8 rod/step	A	No	No	CaAa (Out Of Face)	150.7500 - 0.0000	1	No Ice	0.0200	0.2740
							1/2" Ice	0.1200	0.7016
							1" Ice	0.2200	1.7401
							2" Ice	0.4200	5.6496
**									
**									
**									
**									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	150.7500 - 0.0000	18	No Ice	0.0000	0.8200
							1/2" Ice	0.0000	0.8200
							1" Ice	0.0000	0.8200
							2" Ice	0.0000	0.8200
HCS 2.0 Part 3(1-1/2)	C	No	No	Inside Pole	150.7500 - 0.0000	2	No Ice	0.0000	1.7100
							1/2" Ice	0.0000	1.7100
							1" Ice	0.0000	1.7100
							2" Ice	0.0000	1.7100
**									
LDF4-50A(1/2)	C	No	No	Inside Pole	150.7500 - 0.0000	1	No Ice	0.0000	0.1500
							1/2" Ice	0.0000	0.1500
							1" Ice	0.0000	0.1500
							2" Ice	0.0000	0.1500
LDF5-50A(7/8)	C	No	No	Inside Pole	150.7500 - 0.0000	1	No Ice	0.0000	0.3300
							1/2" Ice	0.0000	0.3300
							1" Ice	0.0000	0.3300
							2" Ice	0.0000	0.3300
LDF6-50A(1-1/4)	C	No	No	Inside Pole	150.7500 - 0.0000	1	No Ice	0.0000	0.6000
							1/2" Ice	0.0000	0.6000
							1" Ice	0.0000	0.6000
							2" Ice	0.0000	0.6000
**									
HFT1206-24SVL-XXX(1-5/8)	C	No	No	Inside Pole	132.0000 - 0.0000	2	No Ice	0.0000	1.9200
							1/2" Ice	0.0000	1.9200
							1" Ice	0.0000	1.9200
							2" Ice	0.0000	1.9200
942-98939-1FXXX(5/8)	C	No	No	Inside Pole	132.0000 - 0.0000	1	No Ice	0.0000	0.4200
							1/2" Ice	0.0000	0.4200
							1" Ice	0.0000	0.4200
							2" Ice	0.0000	0.4200
**									
LDF1-50A(1/4)	C	No	No	Inside Pole	88.0000 - 0.0000	3	No Ice	0.0000	0.0600
							1/2" Ice	0.0000	0.0600
							1" Ice	0.0000	0.0600
							2" Ice	0.0000	0.0600
LDF2-50(3/8)	C	No	No	Inside Pole	88.0000 - 0.0000	4	No Ice	0.0000	0.0800
							1/2" Ice	0.0000	0.0800
							1" Ice	0.0000	0.0800
							2" Ice	0.0000	0.0800
**									
CU12PSM9P6XXX(1-1/2)	C	No	No	Inside Pole	122.0000 - 0.0000	1	No Ice	0.0000	2.3500
							1/2" Ice	0.0000	2.3500
							1" Ice	0.0000	2.3500
							2" Ice	0.0000	2.3500
**									
CAT6(1/4)	A	No	No	Inside Pole	110.0000 - 0.0000	1	No Ice	0.0000	0.0500
							1/2" Ice	0.0000	0.0500
							1" Ice	0.0000	0.0500
							2" Ice	0.0000	0.0500
PC200(2-1/4)	A	No	No	Inside Pole	110.0000 - 0.0000	2	No Ice	0.0000	0.1900
							1/2" Ice	0.0000	0.1900
							1" Ice	0.0000	0.1900
							2" Ice	0.0000	0.1900
**									

### Feed Line/Linear Appurtenances Section Areas

Tower Sectio n	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
L1	150.7500- 124.2500	A	0.000	0.000	0.000	1.524	0.0131
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.000	0.5434
L2	124.2500- 82.5000	A	0.000	0.000	0.000	2.401	0.0324
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.000	1.0775
L3	82.5000-40.6700	A	0.000	0.000	0.000	2.405	0.0387
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.000	1.1031
L4	40.6700-0.0000	A	0.000	0.000	0.000	2.339	0.0376
		B	0.000	0.000	0.000	0.000	0.0000
		C	0.000	0.000	0.000	0.000	1.0725

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

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
L1	150.7500- 124.2500	A	1.470	0.000	0.000	0.000	17.102	0.1419
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.000	0.5434
L2	124.2500- 82.5000	A	1.428	0.000	0.000	0.000	26.943	0.2354
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.000	1.0775
L3	82.5000-40.6700	A	1.356	0.000	0.000	0.000	26.295	0.2332
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.000	1.1031
L4	40.6700-0.0000	A	1.216	0.000	0.000	0.000	24.397	0.2123
		B		0.000	0.000	0.000	0.000	0.0000
		C		0.000	0.000	0.000	0.000	1.0725

### Feed Line Center of Pressure

Section	Elevation ft	$CP_x$ in	$CP_z$ in	$CP_x$ Ice in	$CP_z$ Ice in
L1	150.7500- 124.2500	0.0000	-0.5091	0.0000	-2.2324
L2	124.2500-82.5000	0.0000	-0.5182	0.0000	-2.5050
L3	82.5000-40.6700	0.0000	-0.5233	0.0000	-2.6360
L4	40.6700-0.0000	0.0000	-0.5260	0.0000	-2.6420

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

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz Lateral ft ft ft	Vert ft ft ft						°
AEHC w/ Mount Pipe	A	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	6.9559	3.4517	0.1100
							1/2"	7.3446	3.9322	0.1682
							Ice	7.7430	4.4289	0.2285
							1" Ice	8.5690	5.4712	0.3690
							2" Ice			
AEHC w/ Mount Pipe	B	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	6.9559	3.4517	0.1100
							1/2"	7.3446	3.9322	0.1682
							Ice	7.7430	4.4289	0.2285
							1" Ice	8.5690	5.4712	0.3690
							2" Ice			
AEHC w/ Mount Pipe	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	6.9559	3.4517	0.1100
							1/2"	7.3446	3.9322	0.1682
							Ice	7.7430	4.4289	0.2285
							1" Ice	8.5690	5.4712	0.3690
							2" Ice			
FFHH-65C-R3 w/ Mount Pipe	A	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	12.9700	6.2000	0.1605
							1/2"	13.6200	6.7700	0.2957
							Ice	14.2700	7.3600	0.4453
							1" Ice	15.6200	8.5700	0.7897
							2" Ice			
FFHH-65C-R3 w/ Mount Pipe	B	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	12.9700	6.2000	0.1605
							1/2"	13.6200	6.7700	0.2957
							Ice	14.2700	7.3600	0.4453
							1" Ice	15.6200	8.5700	0.7897
							2" Ice			
FFHH-65C-R3 w/ Mount Pipe	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	12.9700	6.2000	0.1605
							1/2"	13.6200	6.7700	0.2957
							Ice	14.2700	7.3600	0.4453
							1" Ice	15.6200	8.5700	0.7897
							2" Ice			
(3) AHLOA	A	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	2.2289	1.3906	0.0800
							1/2"	2.4225	1.5518	0.1021
							Ice	2.6235	1.7200	0.1233
							1" Ice	3.0477	2.0817	0.1751
							2" Ice			
HCS 2.0 Part 1	A	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	1.8667	0.9333	0.0200
							1/2"	2.0370	1.0593	0.0398
							Ice	2.2148	1.1926	0.0588
							1" Ice	2.5926	1.4815	0.1054
							2" Ice			
HCS 2.0 Part 1	B	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	1.8667	0.9333	0.0200
							1/2"	2.0370	1.0593	0.0398
							Ice	2.2148	1.1926	0.0588
							1" Ice	2.5926	1.4815	0.1054
							2" Ice			
AHFIG	A	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	3.0820	1.4039	0.0800
							1/2"	3.3135	1.5861	0.1004
							Ice	3.5524	1.7753	0.1246
							1" Ice	4.0524	2.1747	0.1833
							2" Ice			
AHFIG	B	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	3.0820	1.4039	0.0800
							1/2"	3.3135	1.5861	0.1004
							Ice	3.5524	1.7753	0.1246
							1" Ice	4.0524	2.1747	0.1833
							2" Ice			
AHFIG	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	3.0820	1.4039	0.0800
							1/2"	3.3135	1.5861	0.1004
							Ice	3.5524	1.7753	0.1246
							1" Ice	4.0524	2.1747	0.1833
							2" Ice			
DB810M-XC	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	2.1150	2.1150	0.0300
							1/2"	3.1410	3.1410	0.0462
							Ice	4.1836	4.1836	0.0689
							1" Ice	5.7663	5.7663	0.1344
							2" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
DB810M-XC	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	2.1150	2.1150	0.0300
			0.0000				1/2"	3.1410	3.1410	0.0462
			-7.0000				Ice	4.1836	4.1836	0.0689
							1" Ice	5.7663	5.7663	0.1344
							2" Ice			
Platform Mount [LP 602-1]	C	None			0.0000	151.0000	No Ice	31.0700	31.0700	1.3433
							1/2"	34.8200	34.8200	1.9669
							Ice	38.4800	38.4800	2.6693
							1" Ice	45.6000	45.6000	4.3136
							2" Ice			
2.375" OD x 5' Mount Pipe	A	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	1.1875	1.1875	0.0200
			0.0000				1/2"	1.4956	1.4956	0.0271
			0.0000				Ice	1.8071	1.8071	0.0396
							1" Ice	2.4580	2.4580	0.0756
							2" Ice			
2.375" OD x 5' Mount Pipe	B	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	1.1875	1.1875	0.0200
			0.0000				1/2"	1.4956	1.4956	0.0271
			0.0000				Ice	1.8071	1.8071	0.0396
							1" Ice	2.4580	2.4580	0.0756
							2" Ice			
2.375" OD x 5' Mount Pipe	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	1.1875	1.1875	0.0200
			0.0000				1/2"	1.4956	1.4956	0.0271
			0.0000				Ice	1.8071	1.8071	0.0396
							1" Ice	2.4580	2.4580	0.0756
							2" Ice			
8-ft Ladder	C	From Leg	2.0000	0.0000	0.0000	151.0000	No Ice	7.0700	7.0700	0.0370
			0.0000				1/2"	9.7300	9.7300	0.0730
			-2.0000				Ice	11.1900	11.1900	0.0830
							1" Ice	13.9800	13.9800	0.1100
							2" Ice			
2L 4"x7"x3/8" (5'-9")	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	7.6700	7.6700	0.1564
			0.0000				1/2"	8.4300	8.4300	0.1720
			0.0000				Ice	9.2800	9.1900	0.1892
							1" Ice	10.2040	10.7100	0.2082
							2" Ice			
2.375" OD x 8' Mount Pipe	C	From Leg	4.0000	0.0000	0.0000	151.0000	No Ice	1.9000	1.9000	0.0300
			0.0000				1/2"	2.7281	2.7281	0.0433
			0.0000				Ice	3.4009	3.4009	0.0630
							1" Ice	4.3962	4.3962	0.1187
							2" Ice			
** (3) QS8656-3 w/ Mount Pipe	A	From Leg	4.0000	0.0000	0.0000	132.0000	No Ice	5.7800	5.4700	0.1429
			0.0000				1/2"	6.3100	6.0000	0.2315
			2.0000				Ice	6.8500	6.5500	0.3338
							1" Ice	7.9700	7.6600	0.5808
							2" Ice			
(3) QS8656-3 w/ Mount Pipe	B	From Leg	4.0000	0.0000	0.0000	132.0000	No Ice	5.7800	5.4700	0.1429
			0.0000				1/2"	6.3100	6.0000	0.2315
			2.0000				Ice	6.8500	6.5500	0.3338
							1" Ice	7.9700	7.6600	0.5808
							2" Ice			
(3) QS8656-3 w/ Mount Pipe	C	From Leg	4.0000	0.0000	0.0000	132.0000	No Ice	5.7800	5.4700	0.1429
			0.0000				1/2"	6.3100	6.0000	0.2315
			2.0000				Ice	6.8500	6.5500	0.3338
							1" Ice	7.9700	7.6600	0.5808
							2" Ice			
VVSSP-65S-R1BV2 w/ Mount Pipe	A	From Leg	4.0000	0.0000	0.0000	132.0000	No Ice	1.8800	1.1700	0.0398
			0.0000				1/2"	2.1100	1.3700	0.0609
			2.0000				Ice	2.3500	1.5800	0.0871
							1" Ice	2.8600	2.0300	0.1559
							2" Ice			
VVSSP-65S-R1BV2 w/ Mount Pipe	B	From Leg	4.0000	0.0000	0.0000	132.0000	No Ice	1.8800	1.1700	0.0398
			0.0000				1/2"	2.1100	1.3700	0.0609
			2.0000				Ice	2.3500	1.5800	0.0871
							1" Ice	2.8600	2.0300	0.1559
							2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
VVSSP-65S-R1BV2 w/ Mount Pipe	C	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	2" Ice			
						No Ice	1.8800	1.1700	0.0398
						1/2"	2.1100	1.3700	0.0609
						Ice	2.3500	1.5800	0.0871
AEUB w/ Mount Pipe	A	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	1" Ice	2.8600	2.0300	0.1559
						2" Ice			
						No Ice	3.5201	1.3778	0.0500
						1/2"	3.8092	1.6839	0.0779
AEUB w/ Mount Pipe	B	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	Ice	4.1091	2.0062	0.1101
						1" Ice	4.7416	2.6997	0.1890
						2" Ice			
						No Ice	3.5201	1.3778	0.0500
AEUB w/ Mount Pipe	C	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	1/2"	3.8092	1.6839	0.0779
						Ice	4.1091	2.0062	0.1101
						1" Ice	4.7416	2.6997	0.1890
						2" Ice			
AIRSCALE DUAL RRH 4T4R B2/66A 320W	B	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	No Ice	2.2289	1.3389	0.0800
						1/2"	2.4225	1.4986	0.0973
						Ice	2.6235	1.6652	0.1181
						1" Ice	3.0477	2.0196	0.1691
(2) AIRSCALE DUAL RRH 4T4R B2/66A 320W	C	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	2" Ice			
						No Ice	2.2289	1.3389	0.0800
						1/2"	2.4225	1.4986	0.0973
						Ice	2.6235	1.6652	0.1181
(2) AIRSCALE DUAL RRH 4T4R B5/13 320W	A	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	1" Ice	3.0477	2.0196	0.1691
						2" Ice			
						No Ice	2.2289	1.3906	0.0700
						1/2"	2.4225	1.5518	0.0910
AIRSCALE DUAL RRH 4T4R B5/13 320W	B	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	Ice	2.6235	1.7200	0.1122
						1" Ice	3.0477	2.0817	0.1640
						2" Ice			
						No Ice	2.2289	1.3906	0.0700
RC3DC-3315-PF-48	A	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	1/2"	4.0441	2.7247	0.0635
						Ice	4.3033	2.9449	0.0987
						1" Ice	4.8439	3.4142	0.1812
						2" Ice			
RC3DC-3315-PF-48	C	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	No Ice	3.7922	2.5116	0.0300
						1/2"	4.0441	2.7247	0.0635
						Ice	4.3033	2.9449	0.0987
						1" Ice	4.8439	3.4142	0.1812
UBT-T_CCIV2	A	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	2" Ice			
						No Ice	0.8003	0.3430	0.0100
						1/2"	0.9129	0.4245	0.0200
						Ice	1.0329	0.5134	0.0283
AZQC	A	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	1" Ice	1.2951	0.7134	0.0510
						2" Ice			
						No Ice	1.0285	0.3006	0.0200
						1/2"	1.1557	0.3823	0.0235
AZQC	B	From Leg	4.0000 0.0000 2.0000	0.0000	132.0000	Ice	1.2904	0.4709	0.0323
						1" Ice	1.5819	0.6693	0.0562
						2" Ice			
						No Ice	1.0285	0.3006	0.0200
AZQC						1/2"	1.1557	0.3823	0.0235
						Ice	1.2904	0.4709	0.0323
						1" Ice	1.5819	0.6693	0.0562
						2" Ice			

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral	Vert						ft
			ft	ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
AZQC	C	From Leg	4.0000	0.0000	0.0000	0.0000	132.0000	2" Ice	1.0285	0.3006	0.0200
			0.0000					No Ice	1.1557	0.3823	0.0235
			2.0000					1/2"	1.2904	0.4709	0.0323
								Ice	1.5819	0.6693	0.0562
Platform Mount [LP 602-1]	C	None				0.0000	132.0000	2" Ice	31.0700	31.0700	1.3433
								No Ice	34.8200	34.8200	1.9669
								1/2"	38.4800	38.4800	2.6693
								Ice	45.6000	45.6000	4.3136
** MX08FRO665-20 w/ Mount Pipe	A	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	8.0100	4.2300	0.0976
			0.0000					No Ice	8.5200	4.6900	0.1838
			0.0000					1/2"	9.0400	5.1600	0.2814
								Ice	10.1100	6.1200	0.5120
MX08FRO665-20 w/ Mount Pipe	B	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	8.0100	4.2300	0.0976
			0.0000					No Ice	8.5200	4.6900	0.1838
			0.0000					1/2"	9.0400	5.1600	0.2814
								Ice	10.1100	6.1200	0.5120
MX08FRO665-20 w/ Mount Pipe	C	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	8.0100	4.2300	0.0976
			0.0000					No Ice	8.5200	4.6900	0.1838
			0.0000					1/2"	9.0400	5.1600	0.2814
								Ice	10.1100	6.1200	0.5120
TA08025-B604	A	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	1.9635	0.9811	0.0600
			0.0000					No Ice	2.1378	1.1117	0.0807
			0.0000					1/2"	2.3195	1.2496	0.1001
								Ice	2.7052	1.5477	0.1479
TA08025-B604	B	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	1.9635	0.9811	0.0600
			0.0000					No Ice	2.1378	1.1117	0.0807
			0.0000					1/2"	2.3195	1.2496	0.1001
								Ice	2.7052	1.5477	0.1479
TA08025-B604	C	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	1.9635	0.9811	0.0600
			0.0000					No Ice	2.1378	1.1117	0.0807
			0.0000					1/2"	2.3195	1.2496	0.1001
								Ice	2.7052	1.5477	0.1479
TA08025-B605	A	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	1.9635	1.1295	0.0800
			0.0000					No Ice	2.1378	1.2666	0.0930
			0.0000					1/2"	2.3195	1.4112	0.1137
								Ice	2.7052	1.7225	0.1643
TA08025-B605	B	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	1.9635	1.1295	0.0800
			0.0000					No Ice	2.1378	1.2666	0.0930
			0.0000					1/2"	2.3195	1.4112	0.1137
								Ice	2.7052	1.7225	0.1643
TA08025-B605	C	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	1.9635	1.1295	0.0800
			0.0000					No Ice	2.1378	1.2666	0.0930
			0.0000					1/2"	2.3195	1.4112	0.1137
								Ice	2.7052	1.7225	0.1643
RDIDC-9181-PF-48	A	From Leg	4.0000	0.0000	0.0000	0.0000	122.0000	2" Ice	2.3118	1.2931	0.0200
			0.0000					No Ice	2.5022	1.4479	0.0411
			0.0000					1/2"	2.7000	1.6101	0.0633
								Ice	3.1179	1.9566	0.1170
Valmont SNP8HR-396	C	None				0.0000	122.0000	2" Ice	26.8000	26.8000	1.5090
								No Ice	32.2000	32.2000	1.8110
								1/2"	37.6000	37.6000	2.1130

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
						1" Ice 48.4000	48.4000	2.7170
(2) 8' x 2" Mount Pipe	A	From Leg	4.0000 0.0000 0.0000	0.0000	122.0000	2" Ice 1.9000 No Ice 2.7281 1/2" Ice 3.4009	1.9000 2.7281 3.4009	0.0293 0.0436 0.0632
(2) 8' x 2" Mount Pipe	B	From Leg	4.0000 0.0000 0.0000	0.0000	122.0000	1" Ice 4.3962 2" Ice 1.9000 No Ice 2.7281 1/2" Ice 3.4009	4.3962 1.9000 2.7281 3.4009	0.1189 0.0293 0.0436 0.0632
(2) 8' x 2" Mount Pipe	C	From Leg	4.0000 0.0000 0.0000	0.0000	122.0000	1" Ice 4.3962 2" Ice 1.9000 No Ice 2.7281 1/2" Ice 3.4009	4.3962 1.9000 2.7281 3.4009	0.1189 0.0293 0.0436 0.0632
**								
TITAN 24X90 w/ Mount Pipe	A	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	No Ice 2.6732 1/2" 2.9326 Ice 3.2032 1" Ice 3.7776	1.5729 1.8766 2.1970 2.8878	0.0600 0.0816 0.1117 0.1855
(2) TITAN 24X90 w/ Mount Pipe	B	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	2" Ice 2.6732 No Ice 2.9326 1/2" Ice 3.2032 Ice 3.7776	1.5729 1.8766 2.1970 2.8878	0.0600 0.0816 0.1117 0.1855
TITAN 24X90 w/ Mount Pipe	C	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	2" Ice 2.6732 No Ice 2.9326 1/2" Ice 3.2032 Ice 3.7776	1.5729 1.8766 2.1970 2.8878	0.0600 0.0816 0.1117 0.1855
PCJ12106HF	A	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	2" Ice 1.0000 No Ice 1.1259 1/2" Ice 1.2593 Ice 1.5481	0.6000 0.7037 0.8148 1.0593	0.0060 0.0151 0.0262 0.0553
PCJ12106HF	B	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	1" Ice 1.0000 2" Ice 1.1259 No Ice 1.2593 Ice 1.5481	0.6000 0.7037 0.8148 1.0593	0.0060 0.0151 0.0262 0.0553
PCJ12106HF	C	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	2" Ice 1.0000 No Ice 1.1259 1/2" Ice 1.2593 Ice 1.5481	0.6000 0.7037 0.8148 1.0593	0.0060 0.0151 0.0262 0.0553
H161407HLL	A	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	2" Ice 1.8667 No Ice 2.0370 1/2" Ice 2.2148 Ice 2.5926	0.9333 1.0648 1.2037 1.5037	0.0100 0.0263 0.0442 0.0885
T-Arm Mount [TA 702-3]	C	None		0.0000	110.0000	2" Ice 4.7500 No Ice 5.8200 1/2" Ice 6.9800 Ice 9.7200	4.7500 5.8200 6.9800 9.7200	0.3390 0.4316 0.5495 0.8685
(3) 8' x 2" Mount Pipe	A	From Leg	4.0000 0.0000 0.0000	0.0000	110.0000	2" Ice 1.9000 No Ice 2.7281 1/2" Ice 3.4009 Ice 4.3962	1.9000 2.7281 3.4009 4.3962	0.0300 0.0436 0.0632 0.1189
8' x 2" Mount Pipe	B	From Leg	4.0000 0.0000	0.0000	110.0000	1" Ice 1.9000 2" Ice 2.7281	1.9000 2.7281	0.0300 0.0436



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>A</sub> Front	C <sub>A</sub> A <sub>A</sub> Side	Weight
			Horz	Lateral					
				0.0000					
						Ice	3.4009	3.4009	0.0632
						1" Ice	4.3962	4.3962	0.1189
						2" Ice			
(2) 8' x 2" Mount Pipe	C	From Leg	4.0000	0.0000	110.0000	No Ice	1.9000	1.9000	0.0300
			0.0000			1/2"	2.7281	2.7281	0.0436
			0.0000			Ice	3.4009	3.4009	0.0632
						1" Ice	4.3962	4.3962	0.1189
						2" Ice			
**									
T-Arm Mount [TA 602-1]	C	None		0.0000	90.5000	No Ice	8.6700	2.5000	0.2581
						1/2"	10.5000	3.2000	0.3347
						Ice	12.4000	4.0200	0.4305
						1" Ice	15.5600	5.9900	0.6842
						2" Ice			
**									
T-Arm Mount [TA 602-1]	C	None		0.0000	88.0000	No Ice	8.6700	2.5000	0.2581
						1/2"	10.5000	3.2000	0.3347
						Ice	12.4000	4.0200	0.4305
						1" Ice	15.5600	5.9900	0.6842
						2" Ice			
**									
T-Arm Mount [TA 602-1]	C	None		0.0000	85.5000	No Ice	8.6700	2.5000	0.2581
						1/2"	10.5000	3.2000	0.3347
						Ice	12.4000	4.0200	0.4305
						1" Ice	15.5600	5.9900	0.6842
						2" Ice			
**									

**Dishes**

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz	Lateral							ft
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		90.5000	1.5000	No Ice	1.7700	0.0200
				-7.0000						1/2" Ice	1.9700	0.0300
				0.0000						1" Ice	2.1700	0.0400
										2" Ice	2.5700	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		90.5000	1.5000	No Ice	1.7700	0.0200
				-4.6700						1/2" Ice	1.9700	0.0300
				0.0000						1" Ice	2.1700	0.0400
										2" Ice	2.5700	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		90.5000	1.5000	No Ice	1.7700	0.0200
				-2.3300						1/2" Ice	1.9700	0.0300
				0.0000						1" Ice	2.1700	0.0400
										2" Ice	2.5700	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		90.5000	1.5000	No Ice	1.7700	0.0200
				2.3300						1/2" Ice	1.9700	0.0300
				0.0000						1" Ice	2.1700	0.0400
										2" Ice	2.5700	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		90.5000	1.5000	No Ice	1.7700	0.0200
				4.6700						1/2" Ice	1.9700	0.0300
				0.0000						1" Ice	2.1700	0.0400
										2" Ice	2.5700	0.0600

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				Horz Lateral	Vert						
				ft	ft	°	°	ft	ft	ft <sup>2</sup>	K
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		90.5000	1.5000	No Ice	0.0200
				7.0000						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
**											
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		88.0000	1.5000	No Ice	0.0200
				-7.0000						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		88.0000	1.5000	No Ice	0.0200
				-4.6700						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		88.0000	1.5000	No Ice	0.0200
				-2.3300						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		88.0000	1.5000	No Ice	0.0200
				0.0000						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		88.0000	1.5000	No Ice	0.0200
				2.3300						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		88.0000	1.5000	No Ice	0.0200
				4.6700						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		88.0000	1.5000	No Ice	0.0200
				7.0000						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
**											
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		85.5000	1.5000	No Ice	0.0200
				-7.0000						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		85.5000	1.5000	No Ice	0.0200
				-4.6700						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		85.5000	1.5000	No Ice	0.0200
				-2.3300						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		85.5000	1.5000	No Ice	0.0200
				0.0000						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		85.5000	1.5000	No Ice	0.0200
				2.3300						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		85.5000	1.5000	No Ice	0.0200
				4.6700						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
18" Stadium Lights	C	Paraboloid w/Shroud (HP)	From Leg	1.0000	0.0000	0.0000		85.5000	1.5000	No Ice	0.0200
				7.0000						1/2" Ice	0.0300
				0.0000						1" Ice	0.0400
										2" Ice	0.0600
**											
SBX1-220CB	C	Paraboloid w/Shroud (HP)	From Leg	4.0000	0.0000	0.0000		132.0000	1.2750	No Ice	0.0100
				0.0000						1/2" Ice	0.0200
				2.0000						1" Ice	0.0300
										2" Ice	0.0400

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft <sup>2</sup>	Weight K	
**											
VHLPX2-80_A	A	Paraboloid w/Shroud (HP)	From Leg	4.0000 0.0000 0.0000	0.0000		110.0000	2.1670	No Ice 1/2" Ice 1" Ice 2" Ice	3.6900 3.9800 4.2700 4.8400	0.0200 0.0400 0.0600 0.1000
VHLPX2-80_A	A	Paraboloid w/Shroud (HP)	From Leg	4.0000 0.0000 0.0000	0.0000		110.0000	2.1670	No Ice 1/2" Ice 1" Ice 2" Ice	3.6900 3.9800 4.2700 4.8400	0.0200 0.0400 0.0600 0.1000
VHLPX2-80_A	A	Paraboloid w/Shroud (HP)	From Leg	4.0000 0.0000 0.0000	0.0000		110.0000	2.1670	No Ice 1/2" Ice 1" Ice 2" Ice	3.6900 3.9800 4.2700 4.8400	0.0200 0.0400 0.0600 0.1000
**											

## Load Combinations

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

Comb. No.	Description
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	150.75 - 124.25	Pole	Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	26	-21.4393	3.0998	1.8109
			Max. Mx	20	-7.7721	183.6744	0.9033
			Max. My	2	-7.7203	0.8692	186.8158
			Max. Vy	8	11.6348	-180.9235	0.8623
			Max. Vx	2	-11.7978	0.8692	186.8158
L2	124.25 - 82.5	Pole	Max. Torque	2			3.6640
			Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	26	-38.7687	4.8544	4.1065
			Max. Mx	20	-17.8454	846.8736	0.2828
			Max. My	14	-17.7828	4.5485	-863.3626
			Max. Vy	8	20.1768	-844.7733	5.0735
L3	82.5 - 40.67	Pole	Max. Vx	14	20.2522	4.5485	-863.3626
			Max. Torque	14			-4.7752
			Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	26	-50.5995	5.9666	4.2957
			Max. Mx	8	-27.2295	-	33.0316
			Max. My	14	-27.2318	1752.9554	-
			Max. Vy	8	23.3278	30.4901	1766.3822
			Max. Vx	14	23.1806	-	33.0316
			Max. Torque	14		1752.9554	-
			Max. Vy	8	23.3278	30.4901	1766.3822
L4	40.67 - 0	Pole	Max. Torque	14			-5.3172
			Max Tension	1	0.0000	0.0000	0.0000
			Max. Compression	26	-66.2850	6.0498	4.7235
			Max. Mx	8	-40.6953	-	63.7643
			Max. My	14	-40.6954	2856.5246	-
			Max. Vy	8	25.0269	58.4163	2863.0865
			Max. Vx	14	24.8739	-	63.7643
			Max. Torque	14		2856.5246	-
			58.4163	2863.0865			
				-5.2797			

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	28	66.2850	-2.6562	4.4753
	Max. H <sub>x</sub>	20	40.7231	24.5966	-0.4394
	Max. H <sub>z</sub>	2	40.7231	-0.9676	24.8012
	Max. M <sub>x</sub>	2	2859.8929	-0.9676	24.8012
	Max. M <sub>z</sub>	8	2856.5246	-24.9817	0.6589
	Max. Torsion	2	4.8651	-0.9676	24.8012
	Min. Vert	25	30.5423	12.1678	21.2153
	Min. H <sub>x</sub>	8	40.7231	-24.9817	0.6589

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H <sub>z</sub>	15	30.5423	0.5995	-24.8287
	Min. M <sub>x</sub>	14	-2863.0865	0.5995	-24.8287
	Min. M <sub>z</sub>	20	-2825.2997	24.5966	-0.4394
	Min. Torsion	14	-5.2682	0.5995	-24.8287

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturing Moment, M <sub>x</sub> kip-ft	Overturing Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	33.9359	-0.0000	-0.0000	-0.7906	2.0113	-0.0000
1.2 Dead+1.0 Wind 0 deg - No Ice	40.7231	0.9676	-24.8012	-2859.8929	-88.4077	-4.8651
0.9 Dead+1.0 Wind 0 deg - No Ice	30.5423	0.9676	-24.8012	-2805.7889	-87.8029	-4.8003
1.2 Dead+1.0 Wind 30 deg - No Ice	40.7231	12.9539	-21.6987	-2498.0324	-1468.6971	-4.5838
0.9 Dead+1.0 Wind 30 deg - No Ice	30.5423	12.9539	-21.6987	-2450.8482	-1442.0537	-4.5156
1.2 Dead+1.0 Wind 60 deg - No Ice	40.7231	21.7078	-12.8470	-1474.1737	-2478.8621	-3.4125
0.9 Dead+1.0 Wind 60 deg - No Ice	30.5423	21.7078	-12.8470	-1446.3547	-2433.1337	-3.3594
1.2 Dead+1.0 Wind 90 deg - No Ice	40.7231	24.9817	-0.6589	-63.7638	-2856.5246	-1.3970
0.9 Dead+1.0 Wind 90 deg - No Ice	30.5423	24.9817	-0.6589	-62.6043	-2803.6814	-1.3733
1.2 Dead+1.0 Wind 120 deg - No Ice	40.7231	21.5494	11.7661	1373.7728	-2464.0358	1.7360
0.9 Dead+1.0 Wind 120 deg - No Ice	30.5423	21.5494	11.7661	1347.8201	-2418.5006	1.7248
1.2 Dead+1.0 Wind 150 deg - No Ice	40.7231	11.9023	21.5024	2481.0563	-1371.1802	4.6787
0.9 Dead+1.0 Wind 150 deg - No Ice	30.5423	11.9023	21.5024	2434.5678	-1345.8641	4.6383
1.2 Dead+1.0 Wind 180 deg - No Ice	40.7231	-0.5995	24.8287	2863.0865	58.4145	5.2682
0.9 Dead+1.0 Wind 180 deg - No Ice	30.5423	-0.5995	24.8287	2809.4130	56.9824	5.2081
1.2 Dead+1.0 Wind 210 deg - No Ice	40.7231	-12.6866	21.5422	2484.1059	1448.9528	4.5745
0.9 Dead+1.0 Wind 210 deg - No Ice	30.5423	-12.6866	21.5422	2437.5694	1421.3082	4.5097
1.2 Dead+1.0 Wind 240 deg - No Ice	40.7231	-21.3457	12.7658	1467.1666	2448.9809	3.1288
0.9 Dead+1.0 Wind 240 deg - No Ice	30.5423	-21.3457	12.7658	1439.9017	2402.3823	3.0757
1.2 Dead+1.0 Wind 270 deg - No Ice	40.7231	-24.5966	0.4394	38.7621	2825.2997	1.4051
0.9 Dead+1.0 Wind 270 deg - No Ice	30.5423	-24.5966	0.4394	38.5053	2771.5762	1.3793
1.2 Dead+1.0 Wind 300 deg - No Ice	40.7231	-21.3227	-11.9324	-1389.1093	2448.3577	-1.8600
0.9 Dead+1.0 Wind 300 deg - No Ice	30.5423	-21.3227	-11.9324	-1362.4280	2401.7350	-1.8528
1.2 Dead+1.0 Wind 330 deg - No Ice	40.7231	-12.1678	-21.2153	-2453.3788	1400.5411	-4.6806
0.9 Dead+1.0 Wind 330 deg - No Ice	30.5423	-12.1678	-21.2153	-2406.7641	1373.5615	-4.6412
1.2 Dead+1.0 Ice+1.0 Temp	66.2850	-0.0001	-0.0000	-4.7235	6.0498	-0.0008
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	66.2850	0.1548	-5.1273	-611.4466	-9.3158	-1.0282
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	66.2850	2.6562	-4.4753	-533.7397	-304.7500	-1.1675
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	66.2850	4.4832	-2.6341	-315.4312	-520.8826	-1.0475

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						
1.2 Dead+1.0 Wind 90	66.2850	5.1625	-0.1049	-15.3872	-601.2682	-0.6587
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	66.2850	4.4580	2.4597	288.9924	-518.3666	0.0210
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 150	66.2850	2.4874	4.4423	521.4517	-288.1268	0.7566
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	66.2850	-0.0960	5.1304	602.6277	15.6313	1.1053
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	66.2850	-2.6131	4.4489	521.9845	312.7625	1.1751
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	66.2850	-4.4257	2.6198	304.8635	527.2252	1.0038
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	66.2850	-5.1009	0.0710	2.0300	607.3338	0.6492
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	66.2850	-4.4214	-2.4875	-300.9476	527.0584	-0.0602
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	66.2850	-2.5302	-4.3978	-526.1001	304.5548	-0.7598
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	33.9359	0.2481	-6.3585	-726.9520	-21.0349	-1.2585
Dead+Wind 30 deg - Service	33.9359	3.3211	-5.5631	-635.0845	-371.6318	-1.1854
Dead+Wind 60 deg - Service	33.9359	5.5654	-3.2937	-375.0141	-628.1883	-0.8855
Dead+Wind 90 deg - Service	33.9359	6.4047	-0.1689	-16.7879	-724.0609	-0.3682
Dead+Wind 120 deg - Service	33.9359	5.5248	3.0166	348.3028	-624.3605	0.4446
Dead+Wind 150 deg - Service	33.9359	3.0515	5.5127	629.5785	-346.7853	1.2243
Dead+Wind 180 deg - Service	33.9359	-0.1537	6.3655	726.6372	16.3226	1.3835
Dead+Wind 210 deg - Service	33.9359	-3.2525	5.5229	630.3711	369.5023	1.2001
Dead+Wind 240 deg - Service	33.9359	-5.4726	3.2728	372.0619	623.4428	0.8134
Dead+Wind 270 deg - Service	33.9359	-6.3060	0.1127	9.2969	718.9519	0.3570
Dead+Wind 300 deg - Service	33.9359	-5.4666	-3.0592	-353.3125	623.2453	-0.4982
Dead+Wind 330 deg - Service	33.9359	-3.1195	-5.4391	-623.6328	357.1588	-1.2282

## 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	0.0000	-33.9359	0.0000	0.0000	33.9359	0.0000	0.000%
2	0.9676	-40.7231	-24.8012	-0.9676	40.7231	24.8012	0.000%
3	0.9676	-30.5423	-24.8012	-0.9676	30.5423	24.8012	0.000%
4	12.9539	-40.7231	-21.6987	-12.9539	40.7231	21.6987	0.000%
5	12.9539	-30.5423	-21.6987	-12.9539	30.5423	21.6987	0.000%
6	21.7078	-40.7231	-12.8470	-21.7078	40.7231	12.8470	0.000%
7	21.7078	-30.5423	-12.8470	-21.7078	30.5423	12.8470	0.000%
8	24.9817	-40.7231	-0.6589	-24.9817	40.7231	0.6589	0.000%
9	24.9817	-30.5423	-0.6589	-24.9817	30.5423	0.6589	0.000%
10	21.5494	-40.7231	11.7661	-21.5494	40.7231	-11.7661	0.000%
11	21.5494	-30.5423	11.7661	-21.5494	30.5423	-11.7661	0.000%
12	11.9023	-40.7231	21.5024	-11.9023	40.7231	-21.5024	0.000%
13	11.9023	-30.5423	21.5024	-11.9023	30.5423	-21.5024	0.000%
14	-0.5995	-40.7231	24.8287	0.5995	40.7231	-24.8287	0.000%
15	-0.5995	-30.5423	24.8287	0.5995	30.5423	-24.8287	0.000%
16	-12.6866	-40.7231	21.5422	12.6866	40.7231	-21.5422	0.000%
17	-12.6866	-30.5423	21.5422	12.6866	30.5423	-21.5422	0.000%
18	-21.3457	-40.7231	12.7658	21.3457	40.7231	-12.7658	0.000%
19	-21.3457	-30.5423	12.7658	21.3457	30.5423	-12.7658	0.000%
20	-24.5966	-40.7231	0.4394	24.5966	40.7231	-0.4394	0.000%
21	-24.5966	-30.5423	0.4394	24.5966	30.5423	-0.4394	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
22	-21.3227	-40.7231	-11.9324	21.3227	40.7231	11.9324	0.000%
23	-21.3227	-30.5423	-11.9324	21.3227	30.5423	11.9324	0.000%
24	-12.1678	-40.7231	-21.2153	12.1678	40.7231	21.2153	0.000%
25	-12.1678	-30.5423	-21.2153	12.1678	30.5423	21.2153	0.000%
26	0.0000	-66.2850	0.0000	0.0001	66.2850	0.0000	0.000%
27	0.1548	-66.2850	-5.1272	-0.1548	66.2850	5.1273	0.000%
28	2.6561	-66.2850	-4.4752	-2.6562	66.2850	4.4753	0.000%
29	4.4831	-66.2850	-2.6340	-4.4832	66.2850	2.6341	0.000%
30	5.1624	-66.2850	-0.1049	-5.1625	66.2850	0.1049	0.000%
31	4.4579	-66.2850	2.4597	-4.4580	66.2850	-2.4597	0.000%
32	2.4874	-66.2850	4.4422	-2.4874	66.2850	-4.4423	0.000%
33	-0.0960	-66.2850	5.1303	0.0960	66.2850	-5.1304	0.000%
34	-2.6131	-66.2850	4.4488	2.6131	66.2850	-4.4489	0.000%
35	-4.4256	-66.2850	2.6198	4.4257	66.2850	-2.6198	0.000%
36	-5.1008	-66.2850	0.0710	5.1009	66.2850	-0.0710	0.000%
37	-4.4213	-66.2850	-2.4875	4.4214	66.2850	2.4875	0.000%
38	-2.5301	-66.2850	-4.3977	2.5302	66.2850	4.3978	0.000%
39	0.2481	-33.9359	-6.3585	-0.2481	33.9359	6.3585	0.000%
40	3.3211	-33.9359	-5.5631	-3.3211	33.9359	5.5631	0.000%
41	5.5654	-33.9359	-3.2937	-5.5654	33.9359	3.2937	0.000%
42	6.4047	-33.9359	-0.1689	-6.4047	33.9359	0.1689	0.000%
43	5.5248	-33.9359	3.0166	-5.5248	33.9359	-3.0166	0.000%
44	3.0515	-33.9359	5.5127	-3.0515	33.9359	-5.5127	0.000%
45	-0.1537	-33.9359	6.3655	0.1537	33.9359	-6.3655	0.000%
46	-3.2525	-33.9359	5.5229	3.2525	33.9359	-5.5229	0.000%
47	-5.4726	-33.9359	3.2728	5.4726	33.9359	-3.2728	0.000%
48	-6.3060	-33.9359	0.1127	6.3060	33.9359	-0.1127	0.000%
49	-5.4666	-33.9359	-3.0592	5.4666	33.9359	3.0592	0.000%
50	-3.1195	-33.9359	-5.4391	3.1195	33.9359	5.4391	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	5	0.00000001	0.00090641
3	Yes	5	0.00000001	0.00041685
4	Yes	6	0.00000001	0.00089671
5	Yes	6	0.00000001	0.00026192
6	Yes	7	0.00000001	0.00008032
7	Yes	6	0.00000001	0.00030150
8	Yes	5	0.00000001	0.00079165
9	Yes	5	0.00000001	0.00034925
10	Yes	6	0.00000001	0.00095989
11	Yes	6	0.00000001	0.00029014
12	Yes	6	0.00000001	0.00086017
13	Yes	6	0.00000001	0.00025355
14	Yes	6	0.00000001	0.00017593
15	Yes	5	0.00000001	0.00095159
16	Yes	7	0.00000001	0.00008327
17	Yes	6	0.00000001	0.00031360
18	Yes	6	0.00000001	0.00091340
19	Yes	6	0.00000001	0.00026902
20	Yes	5	0.00000001	0.00012519
21	Yes	5	0.00000001	0.00005912
22	Yes	6	0.00000001	0.00089892
23	Yes	6	0.00000001	0.00026661
24	Yes	7	0.00000001	0.00008252
25	Yes	6	0.00000001	0.00031177
26	Yes	4	0.00000001	0.00014811
27	Yes	6	0.00000001	0.00024379
28	Yes	6	0.00000001	0.00034814
29	Yes	6	0.00000001	0.00038019
30	Yes	6	0.00000001	0.00021827
31	Yes	6	0.00000001	0.00034227

32	Yes	6	0.00000001	0.00032530
33	Yes	6	0.00000001	0.00024293
34	Yes	6	0.00000001	0.00039362
35	Yes	6	0.00000001	0.00034982
36	Yes	6	0.00000001	0.00022409
37	Yes	6	0.00000001	0.00036529
38	Yes	6	0.00000001	0.00040121
39	Yes	5	0.00000001	0.00010805
40	Yes	5	0.00000001	0.00023000
41	Yes	5	0.00000001	0.00030000
42	Yes	4	0.00000001	0.00055065
43	Yes	5	0.00000001	0.00027281
44	Yes	5	0.00000001	0.00021210
45	Yes	5	0.00000001	0.00013457
46	Yes	5	0.00000001	0.00032905
47	Yes	5	0.00000001	0.00023767
48	Yes	4	0.00000001	0.00045025
49	Yes	5	0.00000001	0.00023441
50	Yes	5	0.00000001	0.00032696

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150.75 - 124.25	39.8612	40	2.5089	0.0344
L2	127 - 82.5	28.0913	40	2.1738	0.0145
L3	86.25 - 40.67	12.4911	40	1.4197	0.0062
L4	45.42 - 0	3.3828	40	0.6871	0.0021

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
151.0000	AEHC w/ Mount Pipe	40	39.8612	2.5089	0.0344	13691
134.0000	SBX1-220CB	40	31.4255	2.2797	0.0194	4086
132.0000	(3) QS8656-3 w/ Mount Pipe	40	30.4561	2.2501	0.0179	3650
122.0000	MX08FRO665-20 w/ Mount Pipe	40	25.8240	2.0931	0.0119	2913
110.0000	VHLPX2-80_A	40	20.7904	1.8797	0.0082	2994
90.5000	18" Stadium Lights	40	13.8166	1.5024	0.0064	3125
88.0000	18" Stadium Lights	40	13.0286	1.4536	0.0063	3138
85.5000	18" Stadium Lights	40	12.2643	1.4052	0.0062	3139

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150.75 - 124.25	156.5949	4	9.8440	0.1377
L2	127 - 82.5	110.5035	4	8.5760	0.0593
L3	86.25 - 40.67	49.2169	4	5.6045	0.0246
L4	45.42 - 0	13.3322	4	2.7101	0.0081

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



Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
151.0000	AEHC w/ Mount Pipe	4	156.5949	9.8440	0.1377	3729
134.0000	SBX1-220CB	4	123.5680	8.9825	0.0785	1109
132.0000	(3) QS8656-3 w/ Mount Pipe	4	119.7704	8.8704	0.0725	990
122.0000	MX08FRO665-20 w/ Mount Pipe	4	101.6130	8.2585	0.0490	783
110.0000	VHLPX2-80_A	4	81.8547	7.4185	0.0337	793
90.5000	18" Stadium Lights	4	54.4340	5.9309	0.0256	810
88.0000	18" Stadium Lights	4	51.3325	5.7385	0.0251	811
85.5000	18" Stadium Lights	4	48.3242	5.5473	0.0244	809

### 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	150.75 - 124.25 (1)	TP21.27x14.18x0.1875	26.500	0.0000	0.0	12.108 9	-7.7203	653.8780	0.012
L2	124.25 - 82.5 (2)	TP29.77x20.1592x0.3125	44.500	0.0000	0.0	28.414 8	-17.7828	1534.4000	0.012
L3	82.5 - 40.67 (3)	TP37.57x28.3351x0.375	45.580	0.0000	0.0	43.125 9	-27.1993	2328.8000	0.012
L4	40.67 - 0 (4)	TP43.24x35.8576x0.4375	45.420 0	0.0000	0.0	59.436 6	-40.6946	3209.5800	0.013

### Pole Bending Design Data

Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{nx}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	$M_{uy}$ kip-ft	$\phi M_{ny}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	150.75 - 124.25 (1)	TP21.27x14.18x0.1875	186.8175	338.8417	0.551	0.0000	338.8417	0.000
L2	124.25 - 82.5 (2)	TP29.77x20.1592x0.3125	863.3750	1144.4917	0.754	0.0000	1144.4917	0.000
L3	82.5 - 40.67 (3)	TP37.57x28.3351x0.375	1780.5667	2198.1417	0.810	0.0000	2198.1417	0.000
L4	40.67 - 0 (4)	TP43.24x35.8576x0.4375	2897.8000	3579.2917	0.810	0.0000	3579.2917	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	150.75 - 124.25 (1)	TP21.27x14.18x0.1875	11.7979	196.1630	0.060	3.6615	349.5367	0.010
L2	124.25 - 82.5 (2)	TP29.77x20.1592x0.3125	20.2570	460.3200	0.044	4.7752	1154.8583	0.004
L3	82.5 - 40.67 (3)	TP37.57x28.3351x0.375	23.6374	698.6390	0.034	4.5305	2216.8333	0.002
L4	40.67 - 0 (4)	TP43.24x35.8576x0.4375	25.3172	962.8730	0.026	4.5837	3609.2583	0.001

### Pole Interaction Design Data

Section No.	Elevation ft	Ratio $P_u$	Ratio $M_{ux}$	Ratio $M_{uy}$	Ratio $V_u$	Ratio $T_u$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$\phi P_n$	$\phi M_{nx}$	$\phi M_{ny}$	$\phi V_n$	$\phi T_n$			
L1	150.75 - 124.25 (1)	0.012	0.551	0.000	0.060	0.010	0.568	1.050	4.8.2
L2	124.25 - 82.5 (2)	0.012	0.754	0.000	0.044	0.004	0.768	1.050	4.8.2
L3	82.5 - 40.67 (3)	0.012	0.810	0.000	0.034	0.002	0.823	1.050	4.8.2
L4	40.67 - 0 (4)	0.013	0.810	0.000	0.026	0.001	0.823	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	150.75 - 124.25	Pole	TP21.27x14.18x0.1875	1	-7.7203	686.5719	54.1	Pass
L2	124.25 - 82.5	Pole	TP29.77x20.1592x0.3125	2	-17.7828	1611.1199	73.2	Pass
L3	82.5 - 40.67	Pole	TP37.57x28.3351x0.375	3	-27.1993	2445.2399	78.4	Pass
L4	40.67 - 0	Pole	TP43.24x35.8576x0.4375	4	-40.6946	3370.0588	78.4	Pass
Summary								
Pole (L4)							78.4	Pass
<b>RATING =</b>							<b>78.4</b>	<b>Pass</b>

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



(CONSIDERED)  
(1) 1/2" TO 151 FT LEVEL  
(1) 7/8" TO 151 FT LEVEL  
(1) 1-1/4" TO 151 FT LEVEL

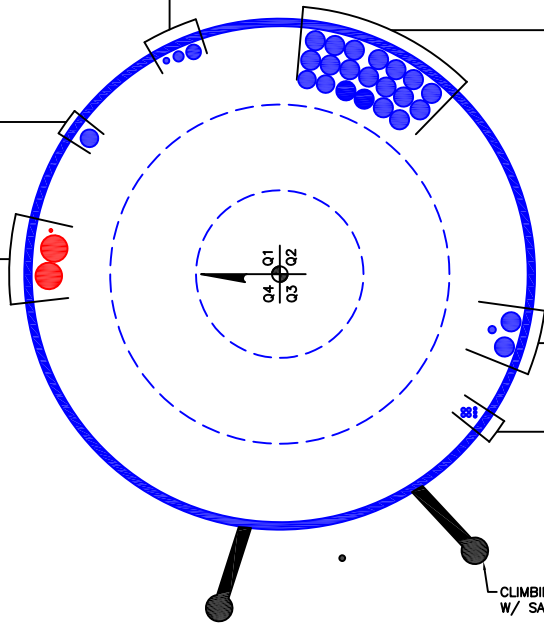
(CONSIDERED)  
(1) 1-1/2" TO 122 FT LEVEL

(PROPOSED)  
(1) 1/4" TO 110 FT LEVEL  
(2) 2-1/4" TO 110 FT LEVEL

(CONSIDERED)  
(2) 1-1/2" TO 151 FT LEVEL  
(18) 1-5/8" TO 151 FT LEVEL

(CONSIDERED)  
(1) 5/8" TO 132 FT LEVEL  
(2) 1-5/8" TO 132 FT LEVEL

(CONSIDERED)  
(3) 1/4" TO 88 FT LEVEL  
(4) 3/8" TO 88 FT LEVEL



CLIMBING PEGS  
W/ SAFETY CLIMB

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

# Monopole Base Plate Connection

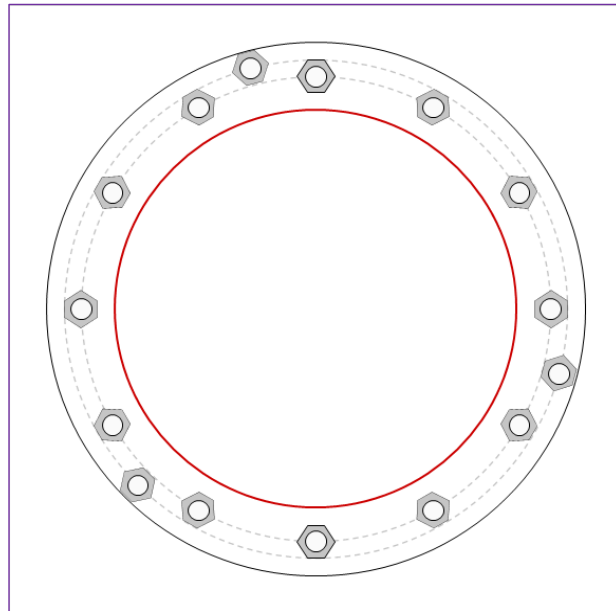


Site Info	
BU #	826150
Site Name	N. Riverside / Dublin HS
Order #	565735 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	See Custom Sheet
$I_{ar}$ (in)	See Custom Sheet

Applied Loads	
Moment (kip-ft)	2897.80
Axial Force (kips)	40.69
Shear Force (kips)	25.32

\*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results		
<b>Anchor Rod Data</b> <hr/> GROUP 1: (12) 2-1/4" $\phi$ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 50.62" BC GROUP 2: (3) 2-1/4" $\phi$ bolts (A193 Gr. B7 N; $F_y=105$ ksi, $F_u=125$ ksi) on 54.24" BC	<b>Anchor Rod Summary</b> <span style="float: right;"><i>(units of kips, kip-in)</i></span>		
<b>Base Plate Data</b> <hr/> 58" OD x 2" Plate (A572-50; $F_y=50$ ksi, $F_u=65$ ksi)	GROUP 1: $P_u_t = 174.39$ $\phi P_n_t = 243.75$ <b>Stress Rating</b> $V_u = 2.11$ $\phi V_n = 149.1$ <b>68.1%</b> $M_u = n/a$ $\phi M_n = n/a$ <b>Pass</b>		
<b>Stiffener Data</b> <hr/> N/A	GROUP 2: $P_u_t = 190.49$ $\phi P_n_t = 304.69$ <b>Stress Rating</b> $V_u = 0$ $\phi V_n = 186.38$ <b>59.5%</b> $M_u = n/a$ $\phi M_n = n/a$ <b>Pass</b>		
<b>Pole Data</b> <hr/> 43.24" x 0.4375" 18-sided pole (A572-60; $F_y=60$ ksi, $F_u=75$ ksi)	<b>Base Plate Summary</b> <hr/> Max Stress (ksi): 37.63 (Flexural) Allowable Stress (ksi): 45 Stress Rating: <b>79.6%</b> <b>Pass</b>		

# CClplate

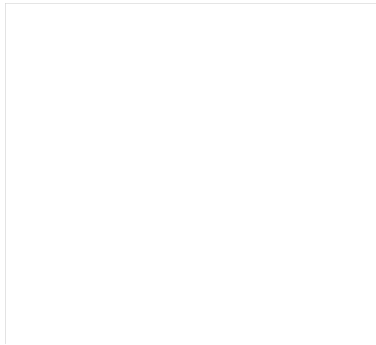
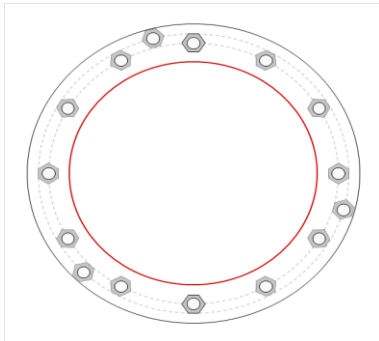
Elevation (ft)	0	(Base)
----------------	---	--------

note: Bending interaction not considered when Grout Considered = "Yes"

Bolt Group	Resist Axial	Resist Shear	Induce Plate Bending	Grout Considered	Apply at BARB Elevation	BARB CL Elevation (ft)
1	Yes	Yes	Yes	No	No	
2	No	No	No	No	No	

Custom Bolt Connection										
Bolt	Bolt Group ID	Location (deg.)	Diameter (in)	Material	Bolt Circle (in)	Eta Factor, n:	$l_{ar}$ (in):	Thread Type	Area Override, in <sup>2</sup>	Tension Only
1	1	0	2.25	A615-75	50.62	0.5	0.75	N-Included		No
2	1	30	2.25	A615-75	50.62	0.5	0.75	N-Included		No
3	1	60	2.25	A615-75	50.62	0.5	0.75	N-Included		No
4	1	90	2.25	A615-75	50.62	0.5	0.75	N-Included		No
5	1	120	2.25	A615-75	50.62	0.5	0.75	N-Included		No
6	1	150	2.25	A615-75	50.62	0.5	0.75	N-Included		No
7	1	180	2.25	A615-75	50.62	0.5	0.75	N-Included		No
8	1	210	2.25	A615-75	50.62	0.5	0.75	N-Included		No
9	1	240	2.25	A615-75	50.62	0.5	0.75	N-Included		No
10	1	270	2.25	A615-75	50.62	0.5	0.75	N-Included		No
11	1	300	2.25	A615-75	50.62	0.5	0.75	N-Included		No
12	1	330	2.25	A615-75	50.62	0.5	0.75	N-Included		No
13	2	105	2.25	A193 Gr. B7	54.24	0.5	0	N-Included		No
14	2	225	2.25	A193 Gr. B7	54.24	0.5	0	N-Included		No
15	2	345	2.25	A193 Gr. B7	54.24	0.5	0	N-Included		No

## Plot Graphic



## Drilled Pier Foundation

BU # :	826150
Site Name:	N. Riverside / Dublin HS
Order Number:	565735 Rev. 0
TIA-222 Revision:	H
Tower Type:	Monopole



Applied Loads	
Comp.	Uplift
Moment (kip-ft)	2897.8
Axial Force (kips)	40.72
Shear Force (kips)	25.27

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

Pier Design Data	
Depth	17 ft
Ext. Above Grade	1 ft
Pier Section 1	
<i>From 1' above grade to 5' below grade</i>	
Pier Diameter	11 ft
Rebar Quantity	18
Rebar Size	11
Clear Cover to Ties	36 in
Tie Size	4
Tie Spacing	in

Rebar & Pier Options

Embedded Pole Inputs

Belled Pier Inputs

Pier Section 2	
<i>From 5' below grade to 17' below grade</i>	
Pier Diameter	6 ft
Rebar Quantity	18
Rebar Size	11
Clear Cover to Ties	6 in
Tie Size	4
Tie Spacing	in

Analysis Results		
<b>Soil Lateral Check</b>		
<i>Compression</i>		<i>Uplift</i>
D <sub>v=0</sub> (ft from TOC)	1.65	-
Soil Safety Factor	1.67	-
Max Moment (kip-ft)	2931.61	-
Rating*	75.6%	-
<b>Soil Vertical Check</b>		
<i>Compression</i>		<i>Uplift</i>
Skin Friction (kips)	171.26	-
End Bearing (kips)	162.22	-
Weight of Concrete (kips)	163.64	-
Total Capacity (kips)	333.49	-
Axial (kips)	204.36	-
Rating*	58.4%	-
<b>Reinforced Concrete Flexure</b>		
<i>Compression</i>		<i>Uplift</i>
Critical Depth (ft from TOC)	6.00	-
Critical Moment (kip-ft)	2476.55	-
Critical Moment Capacity	3683.91	-
Rating*	64.0%	-
<b>Reinforced Concrete Shear</b>		
<i>Compression</i>		<i>Uplift</i>
Critical Depth (ft from TOC)	8.39	-
Critical Shear (kip)	354.04	-
Critical Shear Capacity	376.11	-
Rating*	89.6%	-
<b>Structural Foundation Rating*</b>		<b>89.6%</b>
<b>Soil Interaction Rating*</b>		<b>75.6%</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"/>
Additional Longitudinal Rebar	
Input Effective Depths (else Actual):	<input type="checkbox"/>
Shear Design Options	
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	N/A			# of Layers	7								

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	2	2	115	150	0.75	0	0.413	0.413	0.00	0.00			Cohesive
2	2	3.33	1.33	115	150	0.85	0	0.468	0.468	0.00	0.00			Cohesive
3	3.33	4.5	1.17	115	150	1.7	0	0.935	0.935	0.85	0.00			Cohesive
4	4.5	7.5	3	115	150	1.7	0	0.935	0.935	0.85	0.00			Cohesive
5	7.5	10	2.5	115	150	1.2	0	0.660	0.660	0.78	0.00			Cohesive
6	10	15	5	115	150	1.3	0	0.715	0.715	0.78	0.00			Cohesive
7	15	17	2	115	150	1.4	0	0.77	0.77	0.77	0.00	7.65		Cohesive

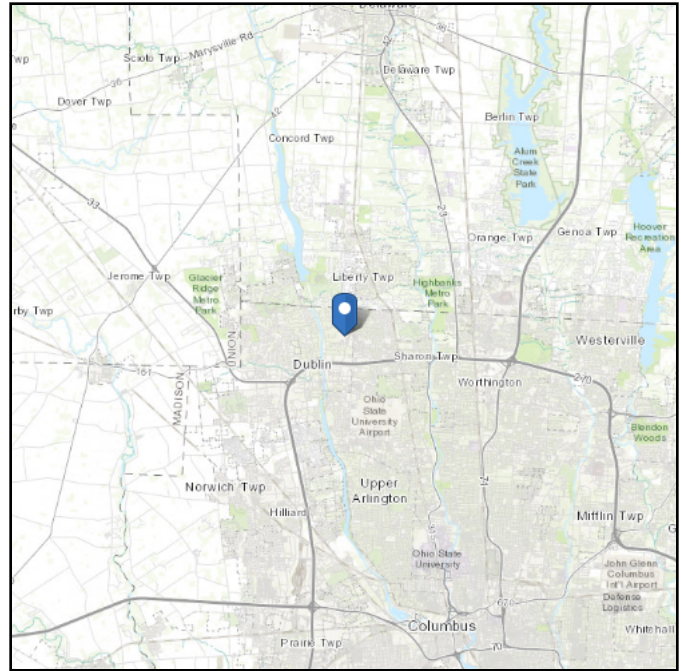
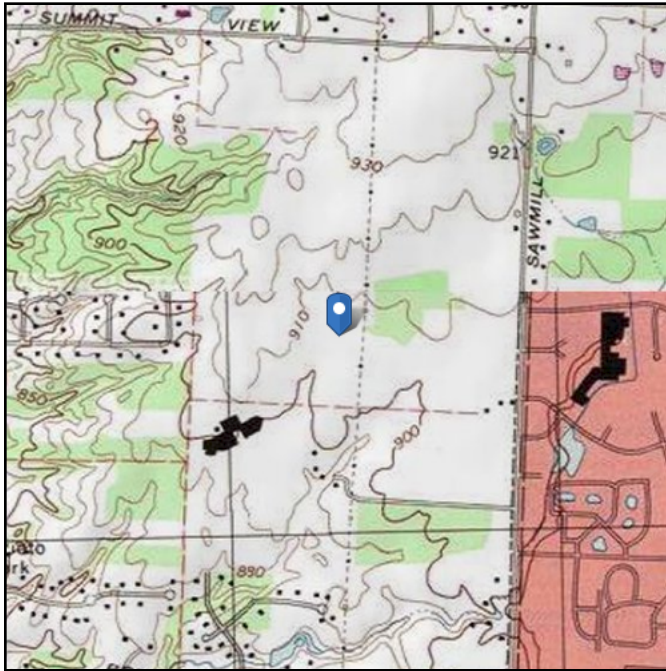


# ASCE 7 Hazards Report

**Address:**  
No Address at This Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** II  
**Soil Class:** D - Stiff Soil

**Elevation:** 903.91 ft (NAVD 88)  
**Latitude:** 40.123772  
**Longitude:** -83.0967



## Wind

### Results:

Wind Speed:	115 Vmph
10-year MRI	76 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 Vmph

**Data Source:** ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

**Date Accessed:** Wed Sep 09 2020

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 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2.

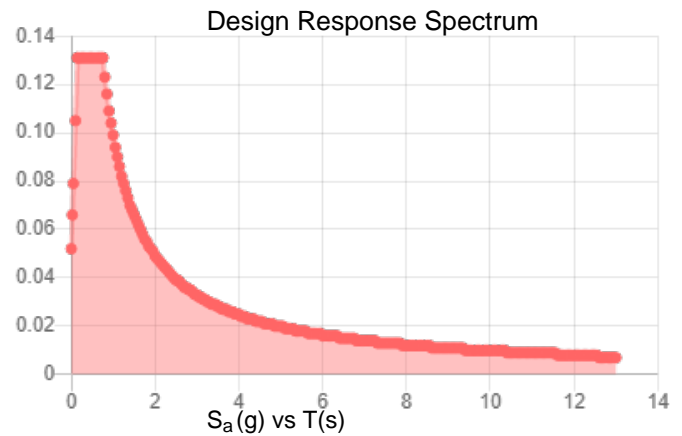
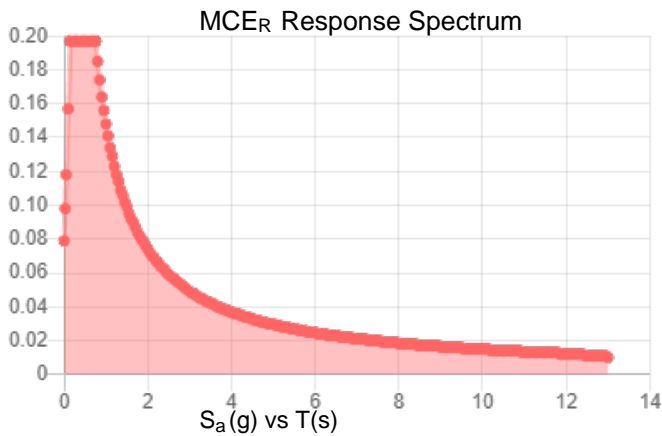
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

**Site Soil Class:** D - Stiff Soil

**Results:**

$S_S$ :	0.123	$S_{DS}$ :	0.131
$S_1$ :	0.062	$S_{D1}$ :	0.099
$F_a$ :	1.6	$T_L$ :	12
$F_v$ :	2.4	PGA :	0.059
$S_{MS}$ :	0.197	PGA <sub>M</sub> :	0.094
$S_{M1}$ :	0.148	F <sub>PGA</sub> :	1.6
		$I_e$ :	1

**Seismic Design Category** B



**Data Accessed:**

Wed Sep 09 2020

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

## Ice

---

**Results:**

Ice Thickness: 0.75 in.  
Concurrent Temperature: 5 F  
Gust Speed: 40 mph

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

**Date Accessed:** Wed Sep 09 2020

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 50-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.

---

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.