



MORRISON HERSHFIELD

Morrison Hershfield  
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Atlanta, GA 30346  
(770) 379-8500

Date: **January 12, 2023**

**Subject: Structural Analysis Report**

**Carrier Designation: AT&T Mobility Co-Locate**  
**Site Number:** CT5845  
**Site Name:** AWE Suffield West  
**FA Number:** 10092225

**Crown Castle Designation:**  
**BU Number:** 801485  
**Site Name:** CT Suffield 1 CAC 801485  
**JDE Job Number:** 726255  
**Work Order Number:** 2175969  
**Order Number:** 627244 Rev. 1

**Engineering Firm Designation: Morrison Hershfield Project Number: CN9-727R2 / 2300001**

**Site Data: 2715 Mountain Rd., Suffield, Hartford County, CT 06093**  
**Latitude 42° 0' 41.8", Longitude -72° 43' 43.6"**  
**190.5 Foot - FWT Monopole Tower**

Morrison Hershfield 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:

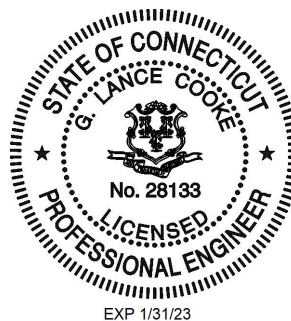
LC7: Proposed Equipment Configuration

**Sufficient Capacity - 81.6%**

This analysis utilizes an ultimate 3-second gust wind speed of 115 mph as required by the 2022 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:

G. Lance Cooke, P.E. (CT License No. PEN.0028133)  
Senior Engineer



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## 1) INTRODUCTION

This tower is a 190.5 ft monopole tower designed by FWT, Inc.

The tower was modified per reinforcement drawings prepared by Tower Engineering Professionals, Inc., in March of 2013. Modification consists of addition of concrete to the foundation. Per the post modification inspection completed by Tower Engineering Professionals, Inc., in March of 2013, modifications was properly installed and is considered in this analysis.

## 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>	50 mph
<b>Service Wind Speed:</b>	60 mph

**Table 1 - Proposed Equipment Configuration**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
168.0	170.0	2	cci antennas	OPA65R-BU4D	6 2 2 2 1	1-5/8 7/8 3/8 3/4 2C
		4	cci antennas	OPA65R-BU8D		
		2	powerwave technologies	P65-17-XLH-RR		
		1	kmw communications	AM-X-CD-14-65-00T-RET		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 4478 B14_CCIV2		
		3	ericsson	RRUS 8843 B2/B66A_CCIV2		
	1	raycap	DC6-48-60-18-8C-EV			
	168.0	1	site pro 1	12' Fortress Mount [#F3P-12-WLL]		
		1	site pro 1	Hand Rail Kit [#F3P-HRK12]		
1		raycap	DC6-48-60-18-8F			

**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)
191.0	192.0	12	decibel	DB844H90-XY w/ Mount Pipe	12	1-5/8
	191.0	1	-	Platform Mount [LP 712-1]		
180.0	182.0	3	ericsson	AIR 6419 B41_TMO w/ Mount Pipe	3	1-5/8
		3	ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	ericsson	RADIO 4460 B2/B25 B66_TMO		
		3	rfs/celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180.0	180.0	1	-	T-Arm Mount [TA 701-3]	-	-
160.0	160.0	6	commscope	SBNHH-1D65B w/ Mount Pipe	13	1-5/8
		3	samsung telecommunications	MT6407-77A w/ Mount Pipe		
		1	raycap	RVZDC-6627-PF-48_CCIV2		
		3	samsung telecommunications	RF4439D-25A		
		3	samsung telecommunications	RF4440D-13A		
		1	-	Platform Mount [LP 712-1]		

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

Document	Reference	Source
4-GEOTECHNICAL REPORTS	2240855	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	1118796	CCISITES
4-TOWER MANUFACTURER DRAWINGS	942443	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	3268394	CCISITES
4-POST-MODIFICATION INSPECTION	3770639	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. Morrison Hershfield 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	190.5 - 143.17	Pole	TP27.778x14.75x0.25	1	-17.31	1293.66	74.5	Pass
L2	143.17 - 93.753	Pole	TP40.88x26.2917x0.375	2	-28.31	2854.11	67.2	Pass
L3	93.753 - 46.083	Pole	TP53.251x38.6629x0.375	3	-42.59	3726.63	75.4	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L4	46.083 - 0	Pole	TP65.185x50.5971x0.375	4	-62.76	4738.33	81.6	Pass
							Summary	
						Pole (L4)	81.6	Pass
						Rating =	81.6	Pass

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

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	66.3	Pass
1	Base Plate		35.1	Pass
1	Base Foundation (Structure)	0	63.5	Pass
1	Base Foundation (Soil Interaction)		41.5	Pass

<b>Structure Rating (max from all components) =</b>	<b>81.6%</b>
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Notes:

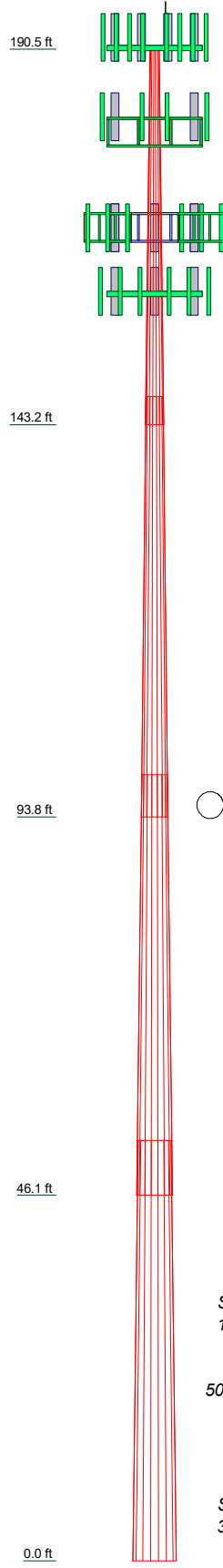
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) \*Rating per TIA-222-H, Section 15.5.

#### 4.1) Recommendations

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

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

Section	1	2	3	4	
Length (ft)	47.33	53.00	53.00	53.00	
Number of Sides	18	18	18	18	
Thickness (in)	0.2500	0.3750	0.3750	0.3750	
Socket Length (ft)	3.58	5.33	6.92		
Top Dia (in)	14.7500	26.2917	38.6629	50.5971	
Bot Dia (in)	27.7780	40.8800	53.2510	65.1850	
Grade		A572-65			
Weight (K)	2.7	7.1	9.8	12.3	31.9



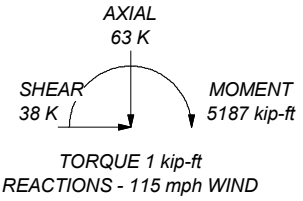
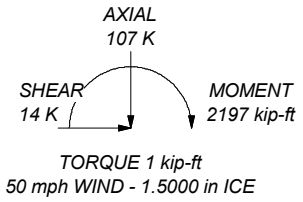
**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	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 115 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: 81.6%

ALL REACTIONS ARE FACTORED



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Job: <b>CN9-727R2 / 2300001</b>		
Project: <b>801485 / CT Suffield 1 CAC 801485</b>		
Client: <b>Crown Castle USA</b>	Drawn by: <b>RA</b>	App'd:
Code: <b>TIA-222-H</b>	Date: <b>01/12/23</b>	Scale: <b>NTS</b>
Path:		Dwg No. <b>E-1</b>

## 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: 371.00 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: 0.00 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.  
 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

- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>Include Bolts In Member Capacity</li> <li>Leg Bolts Are At Top Of Section</li> <li>Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>SR Members Have Cut Ends</li> <li>SR Members Are Concentric</li> </ul> | <ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>Use Clear Spans For KL/r</li> <li>Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> <li>Ignore KL/ry For 60 Deg. Angle Legs</li> </ul> | <ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>SR Leg Bolts Resist Compression</li> <li>All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feed Line Torque</li> <li>Include Angle Block Shear Check</li> <li>Use TIA-222-H Bracing Resist. Exemption</li> <li>Use TIA-222-H Tension Splice Exemption</li> </ul> <div style="text-align: center; background-color: #f0f0f0; padding: 2px;"><b>Poles</b></div> <ul style="list-style-type: none"> <li>√ Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> <li>Pole Without Linear Attachments</li> <li>Pole With Shroud Or No Appurtenances</li> <li>Outside and Inside Corner Radii Are Known</li> </ul> |
|--|---|--|

## 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	190.50-143.17	47.33	3.58	18	14.7500	27.7780	0.2500	1.0000	A572-65 (65 ksi)
L2	143.17-93.75	53.00	5.33	18	26.2917	40.8800	0.3750	1.5000	A572-65 (65 ksi)



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
L3	93.75-46.08	53.00	6.92	18	38.6629	53.2510	0.3750	1.5000	A572-65 (65 ksi)
L4	46.08-0.00	53.00		18	50.5971	65.1850	0.3750	1.5000	A572-65 (65 ksi)

### Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L1	14.9390	11.5057	305.6247	5.1475	7.4930	40.7880	611.6515	5.7540	2.1560	8.624
	28.1680	21.8435	2091.2616	9.7724	14.1112	148.1985	4185.2749	10.9238	4.4489	17.796
L2	27.6409	30.8474	2617.6836	9.2004	13.3562	195.9900	5238.8117	15.4266	3.9673	10.58
	41.4528	48.2111	9993.1303	14.3793	20.7670	481.2015	19999.4098	24.1101	6.5349	17.426
L3	40.6912	45.5722	8440.3578	13.5922	19.6408	429.7368	16891.8217	22.7904	6.1447	16.386
	54.0146	62.9357	22230.6122	18.7710	27.0515	821.7883	44490.4759	31.4738	8.7122	23.232
L4	53.2530	59.7769	19048.4969	17.8289	25.7033	741.0905	38122.0584	29.8941	8.2451	21.987
	66.1327	77.1401	40935.6513	23.0075	33.1140	1236.2045	81925.1668	38.5774	10.8126	28.833

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 190.50-143.17				1	1	1			
L2 143.17-93.75				1	1	1			
L3 93.75-46.08				1	1	1			
L4 46.08-0.00				1	1	1			

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

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter r in	Perimeter r in	Weight plf
*****										
Safety Line 3/8	A	No	Surface Ar (CaAa)	190.50 - 6.00	1	1	0.350 0.350	0.3750		0.22
Climbing Pegs	A	No	Surface Ar (CaAa)	190.50 - 6.00	1	1	0.300 0.400	0.7050		1.80
HCS 6X12 4AWG(1-5/8)	B	No	Surface Ar (CaAa)	180.00 - 3.00	1	1	-0.200 -0.200	1.6600		2.40
*****										
HB158-21U6S24-xxM_TMO(1-5/8)	B	No	Surface Ar (CaAa)	180.00 - 3.00	2	1	-0.350 -0.300	1.9960		2.50
FB-L98B-002-75000(3/8)	B	No	Surface Ar (CaAa)	168.00 - 6.00	1	1	0.080 0.080	0.0000		0.06
WR-VG86ST-BRD(3/4)	B	No	Surface Ar (CaAa)	168.00 - 6.00	2	2	0.080 0.080	0.0000		0.58
2" Conduit	B	No	Surface Ar (CaAa)	168.00 - 6.00	1	1	0.080 0.080	2.0000		2.80
*****										
FB-L98B-034-XXX(3/8)	B	No	Surface Ar (CaAa)	168.00 - 6.00	1	1	0.380 0.380	0.3937		0.06
WR-VG66ST-BRD_CCIV2(7/8)	B	No	Surface Ar (CaAa)	168.00 - 6.00	2	2	0.350 0.370	0.9570		0.88
LDF7-50A(1-5/8)	C	No	Surface Ar (CaAa)	160.00 - 6.00	5	5	-0.150 0.000	1.9800		0.82
*****										

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

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		$C_{AA}$ ft <sup>2</sup> /ft	Weight plf
*****									
LDF7-50A(1-5/8)	B	No	No	Inside Pole	190.50 - 0.00	12	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.82 0.82 0.82 0.82
*****									
*****									
AVA7-50(1-5/8)	B	No	No	Inside Pole	168.00 - 6.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.70 0.70 0.70 0.70
*****									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	160.00 - 6.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.82 0.82 0.82 0.82
HB158-1-08U8-S8J18(1-5/8)	C	No	No	Inside Pole	160.00 - 6.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.30 1.30 1.30 1.30
***									
HB158-21U6S12-XXXM-01(1-5/8)	C	No	No	Inside Pole	160.00 - 6.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	1.90 1.90 1.90 1.90
*****									

### Feed Line/Linear Appurtenances Section Areas

Tower Section	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	190.50-143.17	A	0.000	0.000	5.112	0.000	0.10
		B	0.000	0.000	24.161	0.000	0.99
		C	0.000	0.000	16.662	0.000	0.21
L2	143.17-93.75	A	0.000	0.000	5.337	0.000	0.10
		B	0.000	0.000	39.354	0.000	1.35
		C	0.000	0.000	48.923	0.000	0.60
L3	93.75-46.08	A	0.000	0.000	5.148	0.000	0.10
		B	0.000	0.000	37.963	0.000	1.30
		C	0.000	0.000	47.193	0.000	0.58
L4	46.08-0.00	A	0.000	0.000	4.329	0.000	0.08
		B	0.000	0.000	33.018	0.000	1.17
		C	0.000	0.000	39.682	0.000	0.49

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

Tower Section	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	190.50-143.17	A	1.497	0.000	0.000	33.458	0.000	0.45
		B		0.000	0.000	88.302	0.000	2.19
		C		0.000	0.000	27.127	0.000	0.49
L2	143.17-93.75	A	1.447	0.000	0.000	34.933	0.000	0.47
		B		0.000	0.000	152.704	0.000	3.30
		C		0.000	0.000	79.651	0.000	1.44
L3	93.75-46.08	A	1.373	0.000	0.000	32.742	0.000	0.43
		B		0.000	0.000	143.721	0.000	3.09
		C		0.000	0.000	76.238	0.000	1.36

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
L4	46.08-0.00	A	1.231	0.000	0.000	26.343	0.000	0.34
		B		0.000	0.000	119.138	0.000	2.61
		C		0.000	0.000	63.362	0.000	1.11

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>X</sub> in	CP <sub>Z</sub> in	CP <sub>X</sub> Ice in	CP <sub>Z</sub> Ice in
L1	190.50-143.17	2.1208	0.1385	2.6538	-1.4589
L2	143.17-93.75	3.1578	2.4005	4.1672	-0.1553
L3	93.75-46.08	3.5701	2.7207	4.9986	-0.1332
L4	46.08-0.00	3.5177	2.4999	5.1799	-0.1930

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

### Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
L1	2	Safety Line 3/8	143.17 - 190.50	1.0000	1.0000
L1	3	Climbing Pegs	143.17 - 190.50	1.0000	1.0000
L1	9	HCS 6X12 4AWG(1-5/8)	143.17 - 180.00	1.0000	1.0000
L1	11	HB158-21U6S24-xxM_TMO(1-5/8)	143.17 - 180.00	1.0000	1.0000
L1	15	FB-L98B-002-75000(3/8)	143.17 - 168.00	1.0000	1.0000
L1	16	WR-VG86ST-BRD(3/4)	143.17 - 168.00	1.0000	1.0000
L1	17	2" Conduit	143.17 - 168.00	1.0000	1.0000
L1	19	FB-L98B-034-XXX(3/8)	143.17 - 168.00	1.0000	1.0000
L1	20	WR-VG66ST-BRD_CCIV2(7/8)	143.17 - 168.00	1.0000	1.0000
L1	24	LDF7-50A(1-5/8)	143.17 - 160.00	1.0000	1.0000
L2	2	Safety Line 3/8	93.75 - 143.17	1.0000	1.0000
L2	3	Climbing Pegs	93.75 - 143.17	1.0000	1.0000
L2	9	HCS 6X12 4AWG(1-5/8)	93.75 - 143.17	1.0000	1.0000
L2	11	HB158-21U6S24-xxM_TMO(1-5/8)	93.75 - 143.17	1.0000	1.0000
L2	15	FB-L98B-002-75000(3/8)	93.75 - 143.17	1.0000	1.0000
L2	16	WR-VG86ST-BRD(3/4)	93.75 - 143.17	1.0000	1.0000
L2	17	2" Conduit	93.75 - 143.17	1.0000	1.0000
L2	19	FB-L98B-034-XXX(3/8)	93.75 - 143.17	1.0000	1.0000
L2	20	WR-VG66ST-BRD_CCIV2(7/8)	93.75 - 143.17	1.0000	1.0000
L2	24	LDF7-50A(1-5/8)	93.75 - 143.17	1.0000	1.0000
L3	2	Safety Line 3/8	46.08 - 93.75	1.0000	1.0000
L3	3	Climbing Pegs	46.08 - 93.75	1.0000	1.0000
L3	9	HCS 6X12 4AWG(1-5/8)	46.08 - 93.75	1.0000	1.0000
L3	11	HB158-21U6S24-xxM_TMO(1-5/8)	46.08 - 93.75	1.0000	1.0000
L3	15	FB-L98B-002-75000(3/8)	46.08 - 93.75	1.0000	1.0000
L3	16	WR-VG86ST-BRD(3/4)	46.08 - 93.75	1.0000	1.0000
L3	17	2" Conduit	46.08 - 93.75	1.0000	1.0000
L3	19	FB-L98B-034-XXX(3/8)	46.08 - 93.75	1.0000	1.0000
L3	20	WR-VG66ST-BRD_CCIV2(7/8)	46.08 - 93.75	1.0000	1.0000
L3	24	LDF7-50A(1-5/8)	46.08 - 93.75	1.0000	1.0000
L4	2	Safety Line 3/8	6.00 - 46.08	1.0000	1.0000
L4	3	Climbing Pegs	6.00 - 46.08	1.0000	1.0000
L4	9	HCS 6X12 4AWG(1-5/8)	3.00 - 46.08	1.0000	1.0000
L4	11	HB158-21U6S24-xxM_TMO(1-5/8)	3.00 - 46.08	1.0000	1.0000
L4	15	FB-L98B-002-75000(3/8)	6.00 - 46.08	1.0000	1.0000
L4	16	WR-VG86ST-BRD(3/4)	6.00 - 46.08	1.0000	1.0000
L4	17	2" Conduit	6.00 - 46.08	1.0000	1.0000
L4	19	FB-L98B-034-XXX(3/8)	6.00 - 46.08	1.0000	1.0000
L4	20	WR-VG66ST-BRD_CCIV2(7/8)	6.00 - 46.08	1.0000	1.0000
L4	24	LDF7-50A(1-5/8)	6.00 - 46.08	1.0000	1.0000

### Discrete Tower Loads

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	
Lightning Rod 5/8" x 6'	B	From Leg	1.00	0.0000	190.50	No Ice	0.38	0.38	0.01
			0.00			1/2"	0.99	0.99	0.01
			3.00			Ice	1.62	1.62	0.02
						1" Ice	2.46	2.46	0.05
						2" Ice			
*****									
(4) DB844H90-XY w/ Mount Pipe	A	From Leg	4.00	0.0000	191.00	No Ice	2.24	3.34	0.04
			0.00			1/2"	2.61	3.73	0.07
			1.00			Ice	2.99	4.13	0.12
						1" Ice	3.78	4.97	0.23
						2" Ice			
(4) DB844H90-XY w/ Mount Pipe	B	From Leg	4.00	0.0000	191.00	No Ice	2.24	3.34	0.04
			0.00			1/2"	2.61	3.73	0.07
			1.00			Ice	2.99	4.13	0.12
						1" Ice	3.78	4.97	0.23
						2" Ice			
(4) DB844H90-XY w/ Mount Pipe	C	From Leg	4.00	0.0000	191.00	No Ice	2.24	3.34	0.04
			0.00			1/2"	2.61	3.73	0.07
			1.00			Ice	2.99	4.13	0.12
						1" Ice	3.78	4.97	0.23
						2" Ice			
Platform Mount [LP 712-1]	C	None		0.0000	191.00	No Ice	24.56	24.56	1.34
						1/2"	27.92	27.92	1.91
						Ice	31.27	31.27	2.55
						1" Ice	37.98	37.98	3.97
						2" Ice			
*****									
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.00	0.0000	180.00	No Ice	14.69	6.87	0.19
			0.00			1/2"	15.46	7.55	0.31
			2.00			Ice	16.23	8.25	0.46
						1" Ice	17.82	9.67	0.79
						2" Ice			
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.00	0.0000	180.00	No Ice	14.69	6.87	0.19
			0.00			1/2"	15.46	7.55	0.31
			2.00			Ice	16.23	8.25	0.46
						1" Ice	17.82	9.67	0.79
						2" Ice			
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.00	0.0000	180.00	No Ice	14.69	6.87	0.19
			0.00			1/2"	15.46	7.55	0.31
			2.00			Ice	16.23	8.25	0.46
						1" Ice	17.82	9.67	0.79
						2" Ice			
6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	180.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	180.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	180.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
(2) Miscellaneous [NA 509-1]	A	From Leg	2.00	0.0000	180.00	No Ice	6.32	4.85	0.09
			0.00			1/2"	7.79	6.36	0.14
			0.00			Ice	9.36	7.94	0.20
						1" Ice	12.81	11.32	0.36
						2" Ice			

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
(2) Miscellaneous [NA 509-1]	B	From Leg	2.00 0.00 0.00	0.0000	180.00	No Ice	6.32	4.85	0.09
						1/2" Ice	7.79	6.36	0.14
						Ice	9.36	7.94	0.20
						1" Ice	12.81	11.32	0.36
						2" Ice			
(2) Miscellaneous [NA 509-1]	C	From Leg	2.00 0.00 0.00	0.0000	180.00	No Ice	6.32	4.85	0.09
						1/2" Ice	7.79	6.36	0.14
						Ice	9.36	7.94	0.20
						1" Ice	12.81	11.32	0.36
						2" Ice			
Miscellaneous [NA 507-1]	C	None		0.0000	180.00	No Ice	4.56	4.56	0.25
						1/2" Ice	6.39	6.39	0.31
						Ice	8.18	8.18	0.40
						1" Ice	11.66	11.66	0.66
						2" Ice			
(2) Side Arm Mount [SO 102-3]	C	None		0.0000	180.00	No Ice	3.60	3.60	0.07
						1/2" Ice	4.18	4.18	0.11
						Ice	4.75	4.75	0.14
						1" Ice	5.90	5.90	0.20
						2" Ice			
T-Arm Mount [TA 701-3]	C	None		0.0000	180.00	No Ice	23.94	23.94	1.09
						1/2" Ice	30.04	30.04	1.48
						Ice	36.16	36.16	1.95
						1" Ice	48.72	48.72	3.16
						2" Ice			
***									
AIR 6419 B41_TMO w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	6.58	3.50	0.11
						1/2" Ice	7.06	3.90	0.16
						Ice	7.57	4.32	0.22
						1" Ice	8.62	5.20	0.36
						2" Ice			
AIR 6419 B41_TMO w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	6.58	3.50	0.11
						1/2" Ice	7.06	3.90	0.16
						Ice	7.57	4.32	0.22
						1" Ice	8.62	5.20	0.36
						2" Ice			
AIR 6419 B41_TMO w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	6.58	3.50	0.11
						1/2" Ice	7.06	3.90	0.16
						Ice	7.57	4.32	0.22
						1" Ice	8.62	5.20	0.36
						2" Ice			
RADIO 4449 B71 B85A_T-MOBILE	A	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	1.97	1.59	0.07
						1/2" Ice	2.15	1.75	0.09
						Ice	2.33	1.92	0.12
						1" Ice	2.72	2.28	0.17
						2" Ice			
RADIO 4449 B71 B85A_T-MOBILE	B	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	1.97	1.59	0.07
						1/2" Ice	2.15	1.75	0.09
						Ice	2.33	1.92	0.12
						1" Ice	2.72	2.28	0.17
						2" Ice			
RADIO 4449 B71 B85A_T-MOBILE	C	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	1.97	1.59	0.07
						1/2" Ice	2.15	1.75	0.09
						Ice	2.33	1.92	0.12
						1" Ice	2.72	2.28	0.17
						2" Ice			
RADIO 4460 B2/B25 B66_TMO	A	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	2.14	1.69	0.11
						1/2" Ice	2.32	1.85	0.13
						Ice	2.51	2.02	0.16
						1" Ice	2.91	2.39	0.22
						2" Ice			
RADIO 4460 B2/B25 B66_TMO	B	From Leg	4.00 0.00 2.00	0.0000	180.00	No Ice	2.14	1.69	0.11
						1/2" Ice	2.32	1.85	0.13
						Ice	2.51	2.02	0.16
						1" Ice	2.91	2.39	0.22
						2" Ice			

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	Vert					
			ft	ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
RADIO 4460 B2/B25 B66_TMO	C	From Leg	4.00	0.0000	180.00		2" Ice			
			0.00				No Ice	2.14	1.69	0.11
			2.00				1/2"	2.32	1.85	0.13
							Ice	2.51	2.02	0.16
							1" Ice	2.91	2.39	0.22
						2" Ice				
*****										
P65-17-XLH-RR	A	From Leg	4.00	0.0000	168.00		No Ice	7.58	3.80	0.06
			0.00				1/2"	8.29	4.48	0.12
			2.00				Ice	9.02	5.17	0.19
							1" Ice	10.52	6.59	0.36
							2" Ice			
P65-17-XLH-RR	B	From Leg	4.00	0.0000	168.00		No Ice	7.58	3.80	0.06
			0.00				1/2"	8.29	4.48	0.12
			2.00				Ice	9.02	5.17	0.19
							1" Ice	10.52	6.59	0.36
							2" Ice			
AM-X-CD-14-65-00T-RET	C	From Leg	4.00	0.0000	168.00		No Ice	3.01	1.50	0.04
			0.00				1/2"	3.33	1.79	0.07
			2.00				Ice	3.66	2.09	0.10
							1" Ice	4.36	2.73	0.19
							2" Ice			
DC6-48-60-18-8F	B	From Leg	4.00	0.0000	168.00		No Ice	0.92	0.92	0.02
			0.00				1/2"	1.46	1.46	0.04
			0.00				Ice	1.64	1.64	0.06
							1" Ice	2.04	2.04	0.11
							2" Ice			
*****										
(2) OPA65R-BU8D	A	From Leg	4.00	0.0000	168.00		No Ice	17.42	6.48	0.08
			0.00				1/2"	18.44	7.38	0.18
			2.00				Ice	19.47	8.30	0.28
							1" Ice	21.59	10.19	0.52
							2" Ice			
(2) OPA65R-BU8D	B	From Leg	4.00	0.0000	168.00		No Ice	17.42	6.48	0.08
			0.00				1/2"	18.44	7.38	0.18
			2.00				Ice	19.47	8.30	0.28
							1" Ice	21.59	10.19	0.52
							2" Ice			
(2) OPA65R-BU4D	C	From Leg	4.00	0.0000	168.00		No Ice	8.06	2.99	0.06
			0.00				1/2"	8.62	3.45	0.11
			2.00				Ice	9.19	3.91	0.17
							1" Ice	10.38	4.90	0.30
							2" Ice			
RRUS 4449 B5/B12	A	From Leg	4.00	0.0000	168.00		No Ice	1.97	1.41	0.07
			0.00				1/2"	2.14	1.56	0.09
			2.00				Ice	2.33	1.73	0.11
							1" Ice	2.72	2.07	0.16
							2" Ice			
RRUS 4449 B5/B12	B	From Leg	4.00	0.0000	168.00		No Ice	1.97	1.41	0.07
			0.00				1/2"	2.14	1.56	0.09
			2.00				Ice	2.33	1.73	0.11
							1" Ice	2.72	2.07	0.16
							2" Ice			
RRUS 4449 B5/B12	C	From Leg	4.00	0.0000	168.00		No Ice	1.97	1.41	0.07
			0.00				1/2"	2.14	1.56	0.09
			2.00				Ice	2.33	1.73	0.11
							1" Ice	2.72	2.07	0.16
							2" Ice			
RRUS 4478 B14_CCIV2	A	From Leg	4.00	0.0000	168.00		No Ice	2.02	1.25	0.06
			0.00				1/2"	2.20	1.40	0.08
			2.00				Ice	2.39	1.55	0.10
							1" Ice	2.78	1.89	0.15
							2" Ice			
RRUS 4478 B14_CCIV2	B	From Leg	4.00	0.0000	168.00		No Ice	2.02	1.25	0.06
			0.00				1/2"	2.20	1.40	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
			2.00			Ice 2.39	1.55	0.10
						1" Ice 2.78	1.89	0.15
						2" Ice		
RRUS 4478 B14_CCIV2	C	From Leg	4.00	0.0000	168.00	No Ice 2.02	1.25	0.06
			0.00			1/2" 2.20	1.40	0.08
			2.00			Ice 2.39	1.55	0.10
						1" Ice 2.78	1.89	0.15
						2" Ice		
RRUS 8843 B2/B66A_CCIV2	A	From Leg	4.00	0.0000	168.00	No Ice 1.98	1.70	0.08
			0.00			1/2" 2.16	1.86	0.10
			2.00			Ice 2.34	2.04	0.12
						1" Ice 2.73	2.41	0.18
						2" Ice		
RRUS 8843 B2/B66A_CCIV2	B	From Leg	4.00	0.0000	168.00	No Ice 1.98	1.70	0.08
			0.00			1/2" 2.16	1.86	0.10
			2.00			Ice 2.34	2.04	0.12
						1" Ice 2.73	2.41	0.18
						2" Ice		
RRUS 8843 B2/B66A_CCIV2	C	From Leg	4.00	0.0000	168.00	No Ice 1.98	1.70	0.08
			0.00			1/2" 2.16	1.86	0.10
			2.00			Ice 2.34	2.04	0.12
						1" Ice 2.73	2.41	0.18
						2" Ice		
DC6-48-60-18-8C-EV	C	From Leg	4.00	0.0000	168.00	No Ice 2.74	2.74	0.03
			0.00			1/2" 2.96	2.96	0.05
			2.00			Ice 3.20	3.20	0.08
						1" Ice 3.68	3.68	0.15
						2" Ice		
12' Fortress Mount [#F3P-12-WLL]	C	None		0.0000	168.00	No Ice 26.20	25.00	2.79
						1/2" 32.70	31.90	3.21
						Ice 41.30	39.20	3.79
						1" Ice 58.50	53.80	4.96
						2" Ice		
Hand Rail Kit [#F3P-HRK12]	C	None		0.0000	168.00	No Ice 5.38	4.64	0.41
						1/2" 7.22	6.35	0.50
						Ice 8.88	8.13	0.63
						1" Ice 12.20	11.69	0.88
						2" Ice		
(5) 10' x 2.875" Mount Pipe	A	From Leg	4.00	0.0000	168.00	No Ice 2.88	2.88	0.06
			0.00			1/2" 3.91	3.91	0.08
			0.00			Ice 4.96	4.96	0.11
						1" Ice 6.19	6.19	0.18
						2" Ice		
(5) 10' x 2.875" Mount Pipe	B	From Leg	4.00	0.0000	168.00	No Ice 2.88	2.88	0.06
			0.00			1/2" 3.91	3.91	0.08
			0.00			Ice 4.96	4.96	0.11
						1" Ice 6.19	6.19	0.18
						2" Ice		
(5) 10' x 2.875" Mount Pipe	C	From Leg	4.00	0.0000	168.00	No Ice 2.88	2.88	0.06
			0.00			1/2" 3.91	3.91	0.08
			0.00			Ice 4.96	4.96	0.11
						1" Ice 6.19	6.19	0.18
						2" Ice		
***								
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.0000	160.00	No Ice 4.09	3.30	0.07
			0.00			1/2" 4.49	3.68	0.13
			0.00			Ice 4.89	4.07	0.20
						1" Ice 5.72	4.87	0.39
						2" Ice		
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.0000	160.00	No Ice 4.09	3.30	0.07
			0.00			1/2" 4.49	3.68	0.13
			0.00			Ice 4.89	4.07	0.20
						1" Ice 5.72	4.87	0.39
						2" Ice		
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	0.0000	160.00	No Ice 4.09	3.30	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
			0.00			1/2"	4.49	3.68	0.13
			0.00			Ice	4.89	4.07	0.20
						1" Ice	5.72	4.87	0.39
						2" Ice			
6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	160.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	160.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	160.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
Platform Mount [LP 712-1]	C	None		0.0000	160.00	No Ice	24.56	24.56	1.34
						1/2"	27.92	27.92	1.91
						Ice	31.27	31.27	2.55
						1" Ice	37.98	37.98	3.97
						2" Ice			
***									
MT6407-77A w/ Mount Pipe	A	From Leg	4.00	0.0000	160.00	No Ice	4.91	2.68	0.10
			0.00			1/2"	5.26	3.14	0.14
			0.00			Ice	5.61	3.62	0.18
						1" Ice	6.36	4.63	0.29
						2" Ice			
MT6407-77A w/ Mount Pipe	B	From Leg	4.00	0.0000	160.00	No Ice	4.91	2.68	0.10
			0.00			1/2"	5.26	3.14	0.14
			0.00			Ice	5.61	3.62	0.18
						1" Ice	6.36	4.63	0.29
						2" Ice			
MT6407-77A w/ Mount Pipe	C	From Leg	4.00	0.0000	160.00	No Ice	4.91	2.68	0.10
			0.00			1/2"	5.26	3.14	0.14
			0.00			Ice	5.61	3.62	0.18
						1" Ice	6.36	4.63	0.29
						2" Ice			
RF4439D-25A	A	From Leg	4.00	0.0000	160.00	No Ice	1.87	1.25	0.07
			0.00			1/2"	2.03	1.39	0.09
			0.00			Ice	2.21	1.54	0.11
						1" Ice	2.59	1.87	0.17
						2" Ice			
RF4439D-25A	B	From Leg	4.00	0.0000	160.00	No Ice	1.87	1.25	0.07
			0.00			1/2"	2.03	1.39	0.09
			0.00			Ice	2.21	1.54	0.11
						1" Ice	2.59	1.87	0.17
						2" Ice			
RF4439D-25A	C	From Leg	4.00	0.0000	160.00	No Ice	1.87	1.25	0.07
			0.00			1/2"	2.03	1.39	0.09
			0.00			Ice	2.21	1.54	0.11
						1" Ice	2.59	1.87	0.17
						2" Ice			
RF4440D-13A	A	From Leg	4.00	0.0000	160.00	No Ice	1.87	1.13	0.07
			0.00			1/2"	2.03	1.27	0.09
			0.00			Ice	2.21	1.41	0.11
						1" Ice	2.59	1.72	0.16
						2" Ice			
RF4440D-13A	B	From Leg	4.00	0.0000	160.00	No Ice	1.87	1.13	0.07
			0.00			1/2"	2.03	1.27	0.09
			0.00			Ice	2.21	1.41	0.11
						1" Ice	2.59	1.72	0.16
						2" Ice			



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
RF4440D-13A	C	From Leg	4.00 0.00 0.00	0.0000	160.00	No Ice	1.87	1.13	0.07
						1/2" Ice	2.03	1.27	0.09
						Ice	2.21	1.41	0.11
						1" Ice	2.59	1.72	0.16
RVZDC-6627-PF-48_CCIV2	C	From Leg	4.00 0.00 0.00	0.0000	160.00	No Ice	4.06	3.10	0.03
						1/2" Ice	4.32	3.34	0.07
						Ice	4.58	3.58	0.11
						1" Ice	5.14	4.09	0.20
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	160.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	160.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	160.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
*****						2" Ice			

## 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

Comb. No.	Description
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	190.5 - 143.17	Pole	Max Tension	42	0.00	0.00	0.00
			Max. Compression	26	-43.64	-2.94	1.07
			Max. Mx	8	-17.48	-618.02	-5.56
			Max. My	2	-17.54	5.27	615.71
			Max. Vy	8	23.09	-618.02	-5.56
			Max. Vx	2	-22.95	5.27	615.71
			Max. Torque	25			-1.28
L2	143.17 - 93.753	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-59.93	-6.51	2.10
			Max. Mx	8	-28.44	-1825.06	-16.34
			Max. My	2	-28.53	15.46	1802.12
			Max. Vy	8	27.69	-1825.06	-16.34
			Max. Vx	2	-26.96	15.46	1802.12
			Max. Torque	38			0.95
L3	93.753 - 46.083	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.16	-10.58	3.20
			Max. Mx	8	-42.66	-3207.92	-26.48
			Max. My	2	-42.71	24.86	3145.71
			Max. Vy	8	32.20	-3207.92	-26.48
			Max. Vx	2	-31.32	24.86	3145.71
			Max. Torque	38			0.95
L4	46.083 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-107.30	-15.02	4.41
			Max. Mx	8	-62.76	-5042.20	-37.59
			Max. My	2	-62.76	35.06	4932.09
			Max. Vy	8	36.68	-5042.20	-37.59
			Max. Vx	2	-35.81	35.06	4932.09
			Max. Torque	38			0.94

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	30	107.30	-14.09	-0.01

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H <sub>x</sub>	20	62.79	36.63	0.21
	Max. H <sub>z</sub>	2	62.79	0.21	35.76
	Max. M <sub>x</sub>	2	4932.09	0.21	35.76
	Max. M <sub>z</sub>	8	5042.20	-36.63	-0.21
	Max. Torsion	38	0.94	7.06	12.22
	Min. Vert	13	47.09	-17.94	-31.08
	Min. H <sub>x</sub>	8	62.79	-36.63	-0.21
	Min. H <sub>z</sub>	14	62.79	-0.21	-35.76
	Min. M <sub>x</sub>	14	-4929.25	-0.21	-35.76
	Min. M <sub>z</sub>	20	-5034.29	36.63	0.21
	Min. Torsion	32	-0.94	-7.06	-12.22

### 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	52.32	0.00	0.00	-1.12	-3.12	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	62.79	-0.21	-35.76	-4932.09	35.06	0.69
0.9 Dead+1.0 Wind 0 deg - No Ice	47.09	-0.21	-35.76	-4844.53	35.34	0.69
1.2 Dead+1.0 Wind 30 deg - No Ice	62.79	17.57	-30.86	-4252.28	-2413.14	0.49
0.9 Dead+1.0 Wind 30 deg - No Ice	47.09	17.57	-30.86	-4176.75	-2369.58	0.49
1.2 Dead+1.0 Wind 60 deg - No Ice	62.79	30.65	-17.70	-2433.21	-4215.93	0.17
0.9 Dead+1.0 Wind 60 deg - No Ice	47.09	30.65	-17.70	-2389.87	-4140.48	0.17
1.2 Dead+1.0 Wind 90 deg - No Ice	62.79	36.63	0.21	37.59	-5042.20	-0.20
0.9 Dead+1.0 Wind 90 deg - No Ice	47.09	36.63	0.21	37.21	-4952.52	-0.21
1.2 Dead+1.0 Wind 120 deg - No Ice	62.79	32.43	18.97	2624.26	-4473.77	-0.52
0.9 Dead+1.0 Wind 120 deg - No Ice	47.09	32.43	18.97	2578.41	-4394.17	-0.52
1.2 Dead+1.0 Wind 150 deg - No Ice	62.79	17.94	31.08	4288.04	-2480.48	-0.70
0.9 Dead+1.0 Wind 150 deg - No Ice	47.09	17.94	31.08	4212.54	-2435.63	-0.70
1.2 Dead+1.0 Wind 180 deg - No Ice	62.79	0.21	35.76	4929.25	-42.97	-0.69
0.9 Dead+1.0 Wind 180 deg - No Ice	47.09	0.21	35.76	4842.44	-41.17	-0.69
1.2 Dead+1.0 Wind 210 deg - No Ice	62.79	-17.57	30.86	4249.44	2405.23	-0.50
0.9 Dead+1.0 Wind 210 deg - No Ice	47.09	-17.57	30.86	4174.65	2363.75	-0.50
1.2 Dead+1.0 Wind 240 deg - No Ice	62.79	-30.65	17.70	2430.37	4208.02	-0.17
0.9 Dead+1.0 Wind 240 deg - No Ice	47.09	-30.65	17.70	2387.78	4134.65	-0.17
1.2 Dead+1.0 Wind 270 deg - No Ice	62.79	-36.63	-0.21	-40.43	5034.29	0.21
0.9 Dead+1.0 Wind 270 deg - No Ice	47.09	-36.63	-0.21	-39.30	4946.69	0.21
1.2 Dead+1.0 Wind 300 deg - No Ice	62.79	-32.43	-18.97	-2627.10	4465.86	0.53
0.9 Dead+1.0 Wind 300 deg - No Ice	47.09	-32.43	-18.97	-2580.50	4388.34	0.53
1.2 Dead+1.0 Wind 330 deg - No Ice	62.79	-17.94	-31.08	-4290.89	2472.57	0.70
0.9 Dead+1.0 Wind 330 deg - No Ice	47.09	-17.94	-31.08	-4214.63	2429.80	0.70
1.2 Dead+1.0 Ice+1.0 Temp	107.30	0.00	-0.00	-4.41	-15.02	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	107.30	-0.01	-14.10	-2189.92	-12.36	-0.78
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	107.30	7.03	-12.21	-1895.74	-1103.83	-0.40
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	107.30	12.20	-7.04	-1094.73	-1903.61	0.08
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	107.30	14.09	0.01	-1.60	-2197.34	0.54
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	107.30	12.21	7.06	1090.77	-1906.51	0.86
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	107.30	7.06	12.22	1889.69	-1108.84	0.94
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	107.30	0.01	14.10	2181.01	-18.13	0.78
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	107.30	-7.03	12.21	1886.85	1073.39	0.40
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	107.30	-12.20	7.04	1085.82	1873.22	-0.08
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	107.30	-14.09	-0.01	-7.37	2166.95	-0.54
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	107.30	-12.21	-7.06	-1099.77	1876.07	-0.86

Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturing Moment, M <sub>x</sub>	Overturing Moment, M <sub>z</sub>	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	107.30	-7.06	-12.22	-1898.66	1078.36	-0.94
Dead+Wind 0 deg - Service	52.32	-0.05	-9.17	-1253.92	6.62	0.19
Dead+Wind 30 deg - Service	52.32	4.51	-7.91	-1081.16	-615.38	0.13
Dead+Wind 60 deg - Service	52.32	7.86	-4.54	-618.99	-1073.37	0.05
Dead+Wind 90 deg - Service	52.32	9.39	0.05	8.72	-1283.51	-0.05
Dead+Wind 120 deg - Service	52.32	8.31	4.86	666.13	-1139.29	-0.14
Dead+Wind 150 deg - Service	52.32	4.60	7.97	1088.70	-632.53	-0.19
Dead+Wind 180 deg - Service	52.32	0.05	9.17	1251.56	-13.19	-0.19
Dead+Wind 210 deg - Service	52.32	-4.51	7.91	1078.81	608.81	-0.13
Dead+Wind 240 deg - Service	52.32	-7.86	4.54	616.63	1066.80	-0.05
Dead+Wind 270 deg - Service	52.32	-9.39	-0.05	-11.08	1276.94	0.05
Dead+Wind 300 deg - Service	52.32	-8.31	-4.86	-668.48	1132.72	0.14
Dead+Wind 330 deg - Service	52.32	-4.60	-7.97	-1091.06	625.96	0.19

## 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	-52.32	0.00	0.00	52.32	0.00	0.000%
2	-0.21	-62.79	-35.76	0.21	62.79	35.76	0.000%
3	-0.21	-47.09	-35.76	0.21	47.09	35.76	0.000%
4	17.57	-62.79	-30.86	-17.57	62.79	30.86	0.000%
5	17.57	-47.09	-30.86	-17.57	47.09	30.86	0.000%
6	30.65	-62.79	-17.70	-30.65	62.79	17.70	0.000%
7	30.65	-47.09	-17.70	-30.65	47.09	17.70	0.000%
8	36.63	-62.79	0.21	-36.63	62.79	-0.21	0.000%
9	36.63	-47.09	0.21	-36.63	47.09	-0.21	0.000%
10	32.43	-62.79	18.97	-32.43	62.79	-18.97	0.000%
11	32.43	-47.09	18.97	-32.43	47.09	-18.97	0.000%
12	17.94	-62.79	31.08	-17.94	62.79	-31.08	0.000%
13	17.94	-47.09	31.08	-17.94	47.09	-31.08	0.000%
14	0.21	-62.79	35.76	-0.21	62.79	-35.76	0.000%
15	0.21	-47.09	35.76	-0.21	47.09	-35.76	0.000%
16	-17.57	-62.79	30.86	17.57	62.79	-30.86	0.000%
17	-17.57	-47.09	30.86	17.57	47.09	-30.86	0.000%
18	-30.65	-62.79	17.70	30.65	62.79	-17.70	0.000%
19	-30.65	-47.09	17.70	30.65	47.09	-17.70	0.000%
20	-36.63	-62.79	-0.21	36.63	62.79	0.21	0.000%
21	-36.63	-47.09	-0.21	36.63	47.09	0.21	0.000%
22	-32.43	-62.79	-18.97	32.43	62.79	18.97	0.000%
23	-32.43	-47.09	-18.97	32.43	47.09	18.97	0.000%
24	-17.94	-62.79	-31.08	17.94	62.79	31.08	0.000%
25	-17.94	-47.09	-31.08	17.94	47.09	31.08	0.000%
26	0.00	-107.30	0.00	-0.00	107.30	0.00	0.000%
27	-0.01	-107.30	-14.10	0.01	107.30	14.10	0.000%
28	7.03	-107.30	-12.21	-7.03	107.30	12.21	0.000%
29	12.20	-107.30	-7.04	-12.20	107.30	7.04	0.000%
30	14.09	-107.30	0.01	-14.09	107.30	-0.01	0.000%
31	12.21	-107.30	7.06	-12.21	107.30	-7.06	0.000%
32	7.06	-107.30	12.22	-7.06	107.30	-12.22	0.000%
33	0.01	-107.30	14.10	-0.01	107.30	-14.10	0.000%
34	-7.03	-107.30	12.21	7.03	107.30	-12.21	0.000%
35	-12.20	-107.30	7.04	12.20	107.30	-7.04	0.000%
36	-14.09	-107.30	-0.01	14.09	107.30	0.01	0.000%
37	-12.21	-107.30	-7.06	12.21	107.30	7.06	0.000%
38	-7.06	-107.30	-12.22	7.06	107.30	12.22	0.000%
39	-0.05	-52.32	-9.17	0.05	52.32	9.17	0.000%
40	4.51	-52.32	-7.91	-4.51	52.32	7.91	0.000%
41	7.86	-52.32	-4.54	-7.86	52.32	4.54	0.000%
42	9.39	-52.32	0.05	-9.39	52.32	-0.05	0.000%
43	8.31	-52.32	4.86	-8.31	52.32	-4.86	0.000%
44	4.60	-52.32	7.97	-4.60	52.32	-7.97	0.000%
45	0.05	-52.32	9.17	-0.05	52.32	-9.17	0.000%
46	-4.51	-52.32	7.91	4.51	52.32	-7.91	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
47	-7.86	-52.32	4.54	7.86	52.32	-4.54	0.000%
48	-9.39	-52.32	-0.05	9.39	52.32	0.05	0.000%
49	-8.31	-52.32	-4.86	8.31	52.32	4.86	0.000%
50	-4.60	-52.32	-7.97	4.60	52.32	7.97	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	0.00006886
3	Yes	5	0.00000001	0.00002889
4	Yes	6	0.00000001	0.00048939
5	Yes	6	0.00000001	0.00015198
6	Yes	6	0.00000001	0.00048482
7	Yes	6	0.00000001	0.00015049
8	Yes	5	0.00000001	0.00012117
9	Yes	5	0.00000001	0.00005313
10	Yes	6	0.00000001	0.00053093
11	Yes	6	0.00000001	0.00015967
12	Yes	6	0.00000001	0.00050493
13	Yes	6	0.00000001	0.00015550
14	Yes	5	0.00000001	0.00022796
15	Yes	5	0.00000001	0.00010234
16	Yes	6	0.00000001	0.00048240
17	Yes	6	0.00000001	0.00014969
18	Yes	6	0.00000001	0.00048515
19	Yes	6	0.00000001	0.00015087
20	Yes	5	0.00000001	0.00017225
21	Yes	5	0.00000001	0.00007642
22	Yes	6	0.00000001	0.00053604
23	Yes	6	0.00000001	0.00016164
24	Yes	6	0.00000001	0.00049646
25	Yes	6	0.00000001	0.00015254
26	Yes	4	0.00000001	0.00009698
27	Yes	6	0.00004752	0.00043554
28	Yes	7	0.00000001	0.00022221
29	Yes	7	0.00000001	0.00022261
30	Yes	6	0.00004750	0.00043671
31	Yes	7	0.00000001	0.00022606
32	Yes	7	0.00000001	0.00022054
33	Yes	6	0.00004754	0.00043323
34	Yes	7	0.00000001	0.00021679
35	Yes	7	0.00000001	0.00021599
36	Yes	6	0.00004757	0.00042986
37	Yes	7	0.00000001	0.00021662
38	Yes	7	0.00000001	0.00022249
39	Yes	4	0.00000001	0.00030261
40	Yes	5	0.00000001	0.00012279
41	Yes	5	0.00000001	0.00011952
42	Yes	4	0.00000001	0.00030806
43	Yes	5	0.00000001	0.00014078
44	Yes	5	0.00000001	0.00012974
45	Yes	4	0.00000001	0.00031702
46	Yes	5	0.00000001	0.00011697
47	Yes	5	0.00000001	0.00011903
48	Yes	4	0.00000001	0.00030995
49	Yes	5	0.00000001	0.00014397
50	Yes	5	0.00000001	0.00012326

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190.5 - 143.17	47.077	43	2.5035	0.0026
L2	146.753 - 93.753	26.040	43	1.9020	0.0010
L3	99.083 - 46.083	10.937	43	1.1217	0.0003
L4	53 - 0	2.959	43	0.5245	0.0001

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
191.00	(4) DB844H90-XY w/ Mount Pipe	43	47.077	2.5035	0.0026	22484
190.50	Lightning Rod 5/8" x 6'	43	47.077	2.5035	0.0026	22484
180.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	43	41.690	2.3677	0.0022	10706
168.00	P65-17-XLH-RR	43	35.692	2.2084	0.0017	4995
160.00	(2) SBNHH-1D65B w/ Mount Pipe	43	31.875	2.0977	0.0014	3684

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190.5 - 143.17	184.634	10	9.8584	0.0098
L2	146.753 - 93.753	102.342	10	7.4947	0.0052
L3	99.083 - 46.083	43.022	10	4.4184	0.0018
L4	53 - 0	11.637	10	2.0643	0.0006

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
191.00	(4) DB844H90-XY w/ Mount Pipe	10	184.634	9.8584	0.0103	6034
190.50	Lightning Rod 5/8" x 6'	10	184.634	9.8584	0.0103	6034
180.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	10	163.574	9.3251	0.0084	2871
168.00	P65-17-XLH-RR	10	140.122	8.6997	0.0065	1336
160.00	(2) SBNHH-1D65B w/ Mount Pipe	10	125.188	8.2644	0.0060	982

### 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	190.5 - 143.17 (1)	TP27.778x14.75x0.25	47.33	0.00	0.0	21.0609	-17.31	1232.06	0.014
L2	143.17 - 93.753 (2)	TP40.88x26.2917x0.375	53.00	0.00	0.0	46.4649	-28.31	2718.20	0.010
L3	93.753 - 46.083 (3)	TP53.251x38.6629x0.375	53.00	0.00	0.0	60.6696	-42.59	3549.17	0.012
L4	46.083 - 0 (4)	TP65.185x50.5971x0.375	53.00	0.00	0.0	77.1401	-62.76	4512.70	0.014

### 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	190.5 - 143.17 (1)	TP27.778x14.75x0.25	633.02	828.94	0.764	0.00	828.94	0.000
L2	143.17 - 93.753 (2)	TP40.88x26.2917x0.375	1877.33	2703.68	0.694	0.00	2703.68	0.000
L3	93.753 - 46.083 (3)	TP53.251x38.6629x0.375	3301.92	4242.49	0.778	0.00	4242.49	0.000
L4	46.083 - 0 (4)	TP65.185x50.5971x0.375	5186.65	6161.17	0.842	0.00	6161.17	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual $V_u$ K	$\phi V_n$ K	Ratio $\frac{V_u}{\phi V_n}$	Actual $T_u$ kip-ft	$\phi T_n$ kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	190.5 - 143.17 (1)	TP27.778x14.75x0.25	23.78	369.62	0.064	0.53	859.14	0.001
L2	143.17 - 93.753 (2)	TP40.88x26.2917x0.375	28.55	815.46	0.035	0.52	2787.84	0.000
L3	93.753 - 46.083 (3)	TP53.251x38.6629x0.375	33.16	1064.75	0.031	0.52	4752.93	0.000
L4	46.083 - 0 (4)	TP65.185x50.5971x0.375	37.62	1353.81	0.028	0.52	7683.86	0.000

### Pole Interaction Design Data

Section No.	Elevation ft	Ratio $P_u$ $\phi P_n$	Ratio $M_{ux}$ $\phi M_{nx}$	Ratio $M_{uy}$ $\phi M_{ny}$	Ratio $V_u$ $\phi V_n$	Ratio $T_u$ $\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	190.5 - 143.17 (1)	0.014	0.764	0.000	0.064	0.001	0.782	1.050	4.8.2
L2	143.17 - 93.753 (2)	0.010	0.694	0.000	0.035	0.000	0.706	1.050	4.8.2
L3	93.753 - 46.083 (3)	0.012	0.778	0.000	0.031	0.000	0.791	1.050	4.8.2
L4	46.083 - 0 (4)	0.014	0.842	0.000	0.028	0.000	0.857	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	190.5 - 143.17	Pole	TP27.778x14.75x0.25	1	-17.31	1293.66	74.5	Pass
L2	143.17 - 93.753	Pole	TP40.88x26.2917x0.375	2	-28.31	2854.11	67.2	Pass
L3	93.753 - 46.083	Pole	TP53.251x38.6629x0.375	3	-42.59	3726.63	75.4	Pass
L4	46.083 - 0	Pole	TP65.185x50.5971x0.375	4	-62.76	4738.33	81.6	Pass
Summary								
Pole (L4)							81.6	Pass
<b>RATING =</b>							<b>81.6</b>	<b>Pass</b>

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

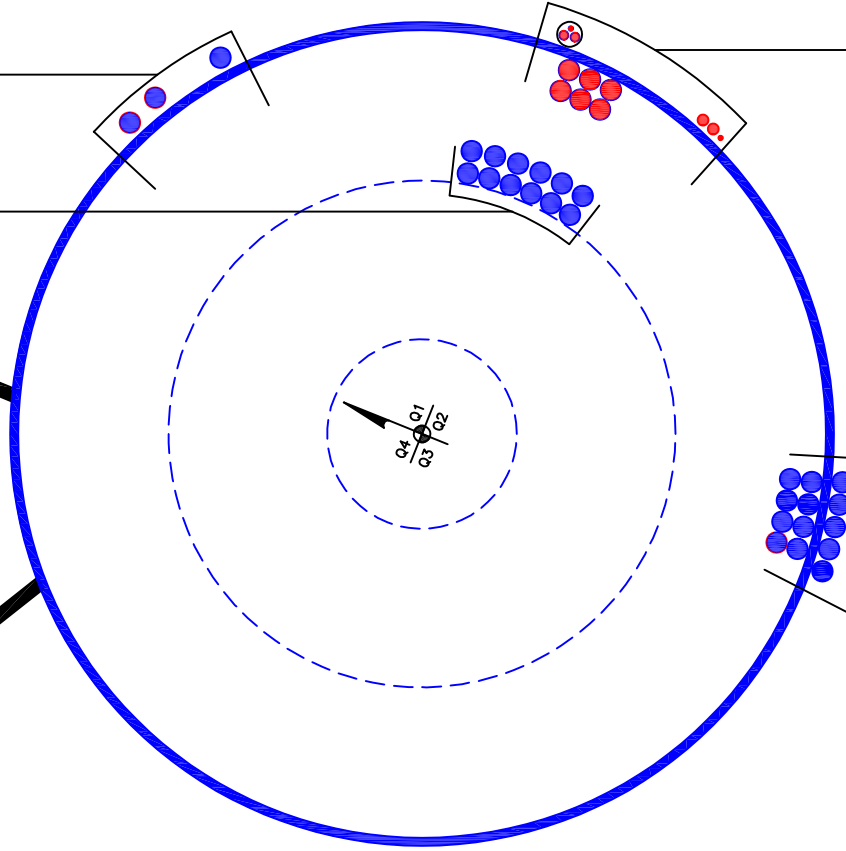




(OTHER CONSIDERED EQUIPMENT)  
(3) 1-5/8" TO 180 FT LEVEL  
(T-MOBILE)

(OTHER CONSIDERED EQUIPMENT)  
(12) 1-5/8" TO 191 FT LEVEL  
(SPRINT PCS)

CLIMBING PEGS  
W/ SAFETY CLIMB



(PROPOSED EQUIPMENT CONFIGURATION--IN  
CONDUIT)  
(1) 3/8" TO 168 FT LEVEL  
(2) 3/4" TO 168 FT LEVEL  
(PROPOSED EQUIPMENT CONFIGURATION)  
(1) 3/8" TO 168 FT LEVEL  
(2) 7/8" TO 168 FT LEVEL  
(6) 1-5/8" TO 168 FT LEVEL  
(AT&T MOBILITY)

(OTHER CONSIDERED EQUIPMENT)  
(13) 1-5/8" TO 160 FT LEVEL  
(VERIZON WIRELESS)

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

# Monopole Base Plate Connection

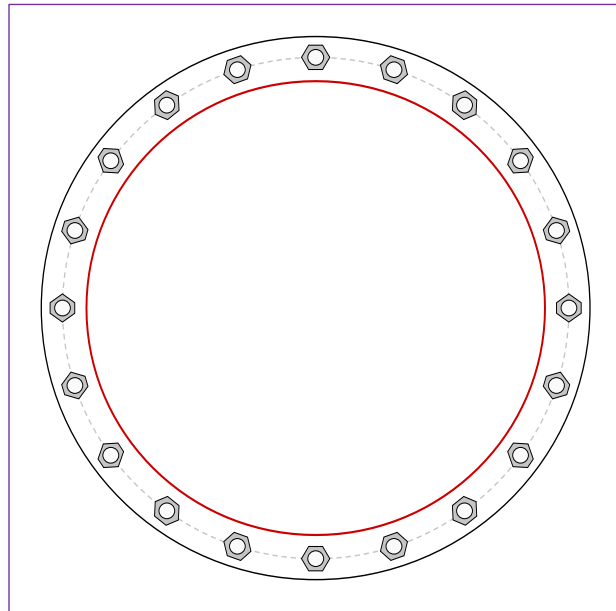


Site Info	
BU #	801485
Site Name	T Suffield 1 CAC 80148
Order #	627244 Rev. 1

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$l_{ar}$ (in)	1.5

Applied Loads	
Moment (kip-ft)	5186.65
Axial Force (kips)	62.76
Shear Force (kips)	37.62

\*TIA-222-H Section 15.5 Applied



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

Anchor Rod Data
(20) 2-1/4" $\phi$ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 72" BC
Base Plate Data
78" OD x 2.75" Plate (A633 Gr. E; $F_y=60$ ksi, $F_u=70$ ksi)
Stiffener Data
N/A
Pole Data
65.185" x 0.375" 18-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary	<i>(units of kips, kip-in)</i>	
$Pu_t = 169.68$	$\phi Pn_t = 243.75$	<b>Stress Rating</b>
$Vu = 1.88$	$\phi Vn = 149.1$	<b>66.3%</b>
$Mu = n/a$	$\phi Mn = n/a$	<b>Pass</b>
Base Plate Summary		
Max Stress (ksi):	19.91	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	<b>35.1%</b>	<b>Pass</b>

# Pier and Pad Foundation



**BU # :** 801485  
**Site Name:** CT Suffield 1 CAC  
**App. Number:** 627244 Rev. 1

**TIA-222 Revision:** H  
**Tower Type:** Monopole

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

Superstructure Analysis Reactions		
Compression, <b>P<sub>comp</sub></b> :	62.79	kips
Base Shear, <b>V<sub>u,comp</sub></b> :	37.57	kips
Moment, <b>M<sub>u</sub></b> :	5186.65	ft-kips
Tower Height, <b>H</b> :	190.5	ft
BP Dist. Above Fdn, <b>bp<sub>dist</sub></b> :	3.75	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	361.70	37.57	9.9%	Pass
<i>Bearing Pressure (ksf)</i>	9.00	1.89	20.0%	Pass
<i>Overtuning (kip*ft)</i>	13149.73	5461.38	41.5%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	7886.10	5261.79	63.5%	Pass
<i>Pier Compression (kip)</i>	23994.73	80.89	0.3%	Pass
<i>Pad Flexure (kip*ft)</i>	8302.75	1885.58	21.6%	Pass
<i>Pad Shear - 1-way (kips)</i>	1744.90	198.06	10.8%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.164	0.017	10.0%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	13203.03	3157.07	22.8%	Pass

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, <b>dpier</b> :	8	ft
Ext. Above Grade, <b>E</b> :	0.5	ft
Pier Rebar Size, <b>Sc</b> :	9	
Pier Rebar Quantity, <b>mc</b> :	43	
Pier Tie/Spiral Size, <b>St</b> :	5	
Pier Tie/Spiral Quantity, <b>mt</b> :	9	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, <b>cc<sub>pier</sub></b> :	3	in

\*Rating per TIA-222-H Section 15.5

Structural Rating*:	63.5%
Soil Rating*:	41.5%

Pad Properties		
Depth, <b>D</b> :	6.5	ft
Pad Width, <b>W<sub>1</sub></b> :	32	ft
Pad Thickness, <b>T</b> :	5	ft
Pad Rebar Size (Top dir. 2), <b>Sp<sub>top2</sub></b> :	9	
Pad Rebar Quantity (Top dir. 2), <b>mp<sub>top2</sub></b> :	42	
Pad Rebar Size (Bottom dir. 2), <b>Sp<sub>2</sub></b> :	9	
Pad Rebar Quantity (Bottom dir. 2), <b>mp<sub>2</sub></b> :	34	
Pad Clear Cover, <b>cc<sub>pad</sub></b> :	3	in

Material Properties		
Rebar Grade, <b>Fy</b> :	60	ksi
Concrete Compressive Strength, <b>F'c</b> :	3	ksi
Dry Concrete Density, <b>δc</b> :	150	pcf

Soil Properties		
Total Soil Unit Weight, <b>γ</b> :	120	pcf
Ultimate Gross Bearing, <b>Qult</b> :	12.000	ksf
Cohesion, <b>Cu</b> :	0.000	ksf
Friction Angle, <b>φ</b> :	30	degrees
SPT Blow Count, <b>N<sub>blows</sub></b> :	23	
Base Friction, <b>μ</b> :		
Neglected Depth, <b>N</b> :	4.00	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, <b>gw</b> :	7	ft

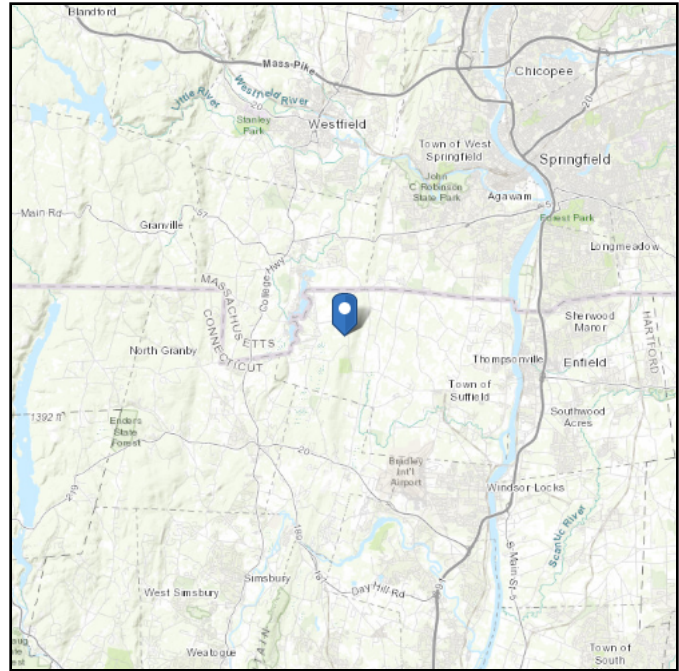
--Toggle between Gross and Net

# 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)

**Latitude:** 42.011611  
**Longitude:** -72.728778  
**Elevation:** 370.57 ft (NAVD 88)



## Wind

### Results:

Wind Speed	115 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	89 Vmph
100-year MRI	96 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 Jan 12 2023

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

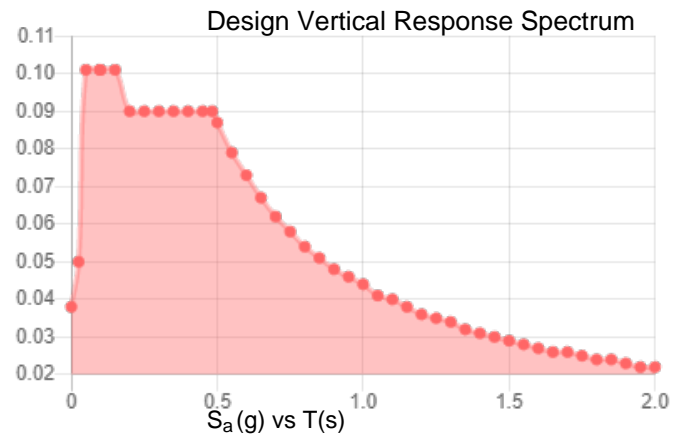
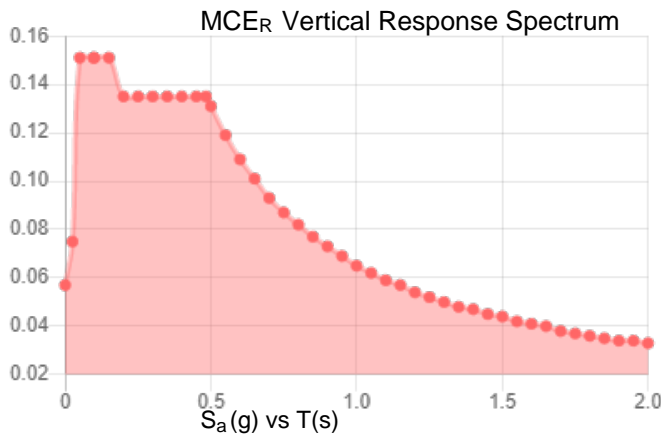
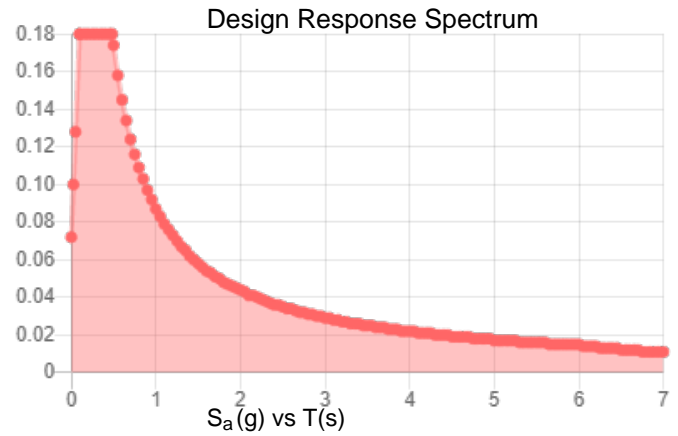
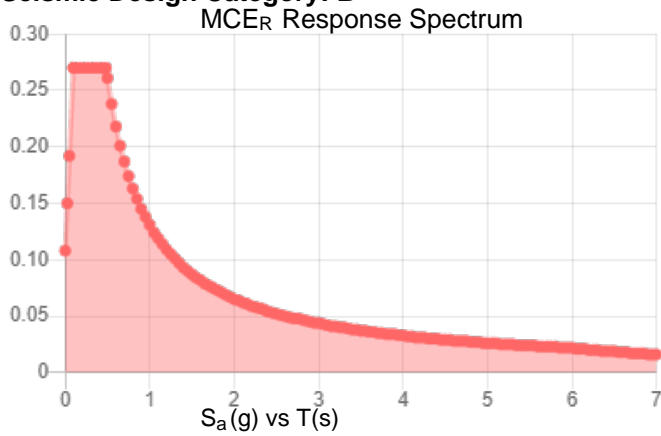
Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

**Site Soil Class:**

**Results:**

$S_s$ :	0.169	$S_{D1}$ :	0.087
$S_1$ :	0.054	$T_L$ :	6
$F_a$ :	1.6	PGA :	0.088
$F_v$ :	2.4	PGA <sub>M</sub> :	0.141
$S_{MS}$ :	0.27	$F_{PGA}$ :	1.6
$S_{M1}$ :	0.131	$I_e$ :	1
$S_{DS}$ :	0.18	$C_v$ :	0.7

**Seismic Design Category: B**



**Data Accessed:** Thu Jan 12 2023

**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: 5 F  
Gust Speed 50 mph

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

**Date Accessed:** Thu Jan 12 2023

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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