Date: **August 3, 2021**

FL COA# 31011

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351

Subject: Structural Analysis Report

Carrier Designation:	***T-Mobile* Co-Locate**	
	Site Number:	9JK0371A
	Site Name:	N/A
Crown Castle Designation:	**BU Number:**	825403
	Site Name:	Little Gum Swamp
	JDE Job Number:	674809
	Work Order Number:	2003394
	Order Number:	576211 Rev. 0
Engineering Firm Designation:	**TEP Project Number:**	26551.577181
Site Data:	**8381 Ne Molino Rd, Lake City, Columbia County, FL 32055** **Latitude *30° 15' 39.98"*, Longitude *-82° 28' 25.07"*** **150 Foot - Monopole Tower**	

Tower Engineering Professionals is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above-mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 118 mph as required by the 2020 Florida Building Code 7th Edition. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

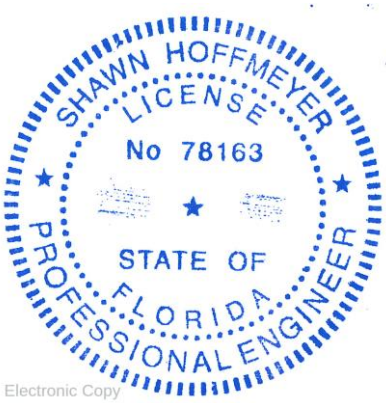
Structural analysis prepared by: Dennis Luna / WAT

Respectfully submitted by:

Shawn Hoffmeyer, P.E.

This item has been electronically signed and sealed by Shawn Hoffmeyer, P.E. on 8/3/2021 using a Digital Signature.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



Digitally signed by Shawn O Hoffmeyer
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Date: 2021.08.03 18:16:46 -04'00'

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1) INTRODUCTION

This tower is a 150-ft monopole tower designed by Transamerican Power Products.

2) ANALYSIS CRITERIA

TIA-222 Revision: TIA-222-H
Risk Category: II
Wind Speed: 118 mph
Exposure Category: B
Topographic Factor: 1.0
Service Wind Speed: 60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
146.0	146.0	1	RFS Celwave	UXA4-59AC	12 1	1-5/8 7/8
		3	Commscope	FFVV-65C-R3-V1_TMO w/ Mount Pipe		
		4	Ericsson	RADIO 4460 B2/B25 B66_TMO		
		3	Ericsson	RADIO 4480 B71_TMO		
		1	Ceragon	FIBEAIR IP-10		
		1	Tower Mounts	Pipe Mount [PM 601-1]		
		1	Kenwood	T1507KTHD-996C9-M-H		

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)
135.0	136.0	4	Csa Wireless	PCSA030-19-2 w/ Mount Pipe	12	1-5/8
		3	Jma Wireless	X7CQAP-665-VR0 w/ Mount Pipe		
		2	Csa Wireless	PCSA090-19-2 w/ Mount Pipe		
		3	Commscope	ATSBT-TOP-FM		
	135.0	1	Tower Mounts	T-Arm Mount [TA 602-3]		
131.0	131.0	1	Andrew	PAR6-59	1	EW52
		1	Tower Mounts	Pipe Mount [PM 601-1]		
114.0	114.0	1	Andrew	VHLPX4-6W	1	EW52
		2	Tower Mounts	Pipe Mount [PM 601-1]		
110.0	110.0	1	Andrew	TMBX-6517-R2M w/ Mount Pipe	2	1-5/8
		1	Cellmax Technologies	CMA-B/3324 w/ Mount Pipe		
		1	Tower Mounts	Side Arm Mount [SO 104-3]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
Geotechnical Report	3481778	CCISites
Tower Foundation Drawings	3481777	CCISites
Tower Manufacturer Drawings	3481780	CCISites
Tower Manufacturer Drawings	3773245	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) The 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.
3) The foundation steel reinforcement was assumed to be the minimum required per ACI 318.
4) The following material grades were assumed:
   a) Concrete compressive strength: f'c = 4 ksi
   b) Foundation flexural reinforcement: fy = 60 ksi

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals 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)	ϕP_{allow} (k)	% Capacity	Pass / Fail
L1	150 - 109.75	Pole	TP31.111x24x0.188	1	-8.436	1104.589	34.0	Pass
L2	109.75 - 70.75	Pole	TP37.626x30.029x0.25	2	-14.489	1780.831	47.4	Pass
L3	70.75 - 37.5	Pole	TP43x36.287x0.313	3	-21.264	2541.577	46.6	Pass
L4	37.5 - 0	Pole	TP49x41.403x0.375	4	-33.079	3555.027	45.5	Pass
							Summary	
						Pole (L2)	47.4	Pass
						RATING =	**47.4**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	--	42.8	Pass
1,2	Base Plate	--	26.6	Pass
1,2	Base Foundation Structural	--	22.9	Pass
1,2	Base Foundation Soil Interaction	--	47.6	Pass

Structure Rating (max from all components) =	47.6%

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

Table 6 - Dish Twist/Sway Results for 60 mph Service Wind Speed

Elevation (ft)	Dish Model	Beam Deflection		
		Deflection (in)	Tilt (deg)	Twist (deg)
146.0	UXA4-59AC	17.119	1.034	0.018

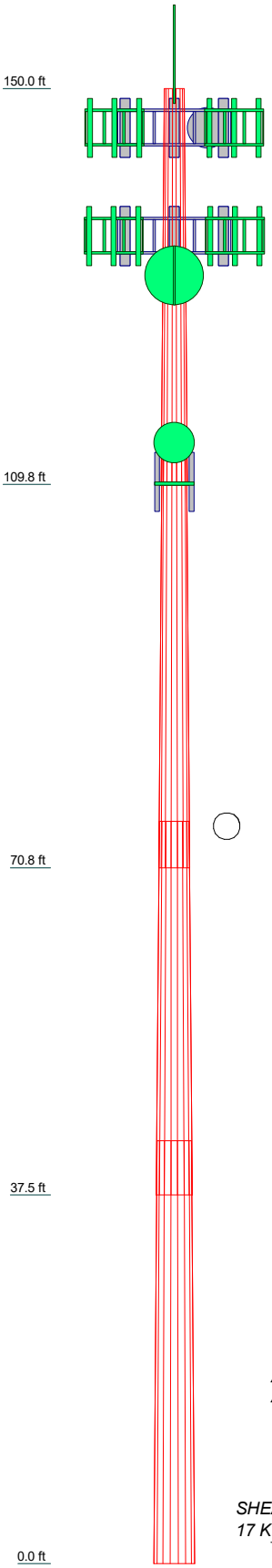
4.1) Recommendations

1) 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	4	3	2	1	
Length (ft)	43.000	38.000	43.000	40.250	
Number of Sides	18	18	18	18	
Thickness (in)	0.375	0.313	0.250	0.188	
Socket Length (ft)		5.500	4.750	4.000	
Top Dia (in)	41.403	36.287	30.029	24.000	
Bot Dia (in)	49.000	43.000	37.626	31.111	
Grade			A572-65		
Weight (K)	7.8	5.0	3.9	2.2	19.0



ALL REACTIONS ARE FACTORED

AXIAL 33 K

SHEAR 17 K

MOMENT 1836 kip-ft

TORQUE 7 kip-ft

REACTIONS - 118 mph WIND

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Columbia County, Florida.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 118 mph basic wind in accordance with the TIA-222-H Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.000 ft
7. TIA-222-H Annex S
8. TOWER RATING: 47.4%

Tower Engineering Professionals

Tower Engineering Professionals, Inc.
326 Tyron Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job: ***Little Gum Swamp (BU# 825403)***			
Project: ***26551.577181***			
Client: Crown Castle	Drawn by: dluna		App'd:
Code: TIA-222-H	Date: 08/03/21		Scale: NTS
Path:			Dwg No. E-1

Tower Input Data

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

Tower is located in Columbia County, Florida.
Tower base elevation above sea level: 154.000 ft.
Basic wind speed of 118 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.000 ft.
Deflections calculated using a wind speed of 60 mph.
TIA-222-H Annex S.
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: $K_{es}(F_w) = 0.95$.
Maximum demand-capacity ratio is: 1.05.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs	√	Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

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

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	150.000-109.750	40.250	4.000	18	24.000	31.111	0.188	0.750	A572-65 (65 ksi)
L2	109.750-70.750	43.000	4.750	18	30.029	37.626	0.250	1.000	A572-65 (65 ksi)
L3	70.750-37.500	38.000	5.500	18	36.287	43.000	0.313	1.250	A572-65 (65 ksi)
L4	37.500-0.000	43.000		18	41.403	49.000	0.375	1.500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	24.341	14.171	1015.221	8.453	12.192	83.269	2031.778	7.087	3.894	20.768
	31.562	18.403	2223.369	10.978	15.804	140.680	4449.664	9.203	5.146	27.443
L2	31.172	23.630	2647.455	10.572	15.255	173.548	5298.393	11.817	4.845	19.381
	38.168	29.658	5234.351	13.268	19.114	273.849	10475.590	14.832	6.182	24.729
L3	37.650	35.682	5834.083	12.771	18.434	316.490	11675.842	17.844	5.836	18.677
	43.615	42.341	9747.574	15.154	21.844	446.236	19507.975	21.174	7.018	22.458
L4	42.971	48.834	10385.515	14.565	21.033	493.775	20784.695	24.422	6.627	17.672
	49.698	57.876	17288.387	17.262	24.892	694.536	34599.523	28.943	7.964	21.237

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 150.000-109.750				1	1	1			
L2 109.750-70.750				1	1	1			
L3 70.750-37.500				1	1	1			
L4 37.500-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

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_A ft^2/ft	Weight klf
Safety Line 3/8	A	No	No	CaAa (Out Of Face)	150.000 - 0.000	1	No Ice	0.037	0.000
LDF5-50A(7/8")	B	No	No	Inside Pole	146.000 - 0.000	1	No Ice	0.000	0.000
LDF7-50A(1-5/8") ***	B	No	No	Inside Pole	146.000 - 0.000	12	No Ice	0.000	0.001
LDF7-50A(1-5/8") ***	B	No	No	Inside Pole	135.000 - 0.000	12	No Ice	0.000	0.001
EW52(ELLIPTICAL) ***	B	No	No	Inside Pole	131.000 - 0.000	1	No Ice	0.000	0.001
EW52(ELLIPTICAL) ***	B	No	No	Inside Pole	114.000 - 0.000	1	No Ice	0.000	0.001
LDF7-50A(1-5/8") ***	B	No	No	Inside Pole	110.000 - 0.000	2	No Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.000-109.750	A	0.000	0.000	0.000	1.509	0.009
		B	0.000	0.000	0.000	0.000	0.633
		C	0.000	0.000	0.000	0.000	0.000
L2	109.750-70.750	A	0.000	0.000	0.000	1.462	0.009
		B	0.000	0.000	0.000	0.000	0.890
		C	0.000	0.000	0.000	0.000	0.000
L3	70.750-37.500	A	0.000	0.000	0.000	1.247	0.007
		B	0.000	0.000	0.000	0.000	0.759
		C	0.000	0.000	0.000	0.000	0.000
L4	37.500-0.000	A	0.000	0.000	0.000	1.406	0.008
		B	0.000	0.000	0.000	0.000	0.856
		C	0.000	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.000-109.750	0.000	-0.343	0.000	-0.199
L2	109.750-70.750	0.000	-0.345	0.000	-0.199
L3	70.750-37.500	0.000	-0.346	0.000	-0.200
L4	37.500-0.000	0.000	-0.347	0.000	-0.200

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

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning rod (5/8"x7') ***	C	None		0.000	153.500	No Ice	0.438	0.438	0.007
FFVV-65C-R3-V1_TMO w/ Mount Pipe	A	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	12.970	6.200	0.157
FFVV-65C-R3-V1_TMO w/ Mount Pipe	B	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	12.970	6.200	0.157
FFVV-65C-R3-V1_TMO w/ Mount Pipe	C	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	12.970	6.200	0.157
RADIO 4460 B2/B25 B66_TMO	A	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	2.139	1.686	0.109
RADIO 4460 B2/B25 B66_TMO	A	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	2.139	1.686	0.109
RADIO 4460 B2/B25 B66_TMO	B	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	2.139	1.686	0.109
RADIO 4460 B2/B25 B66_TMO	C	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	2.139	1.686	0.109
RADIO 4480 B71_TMO	A	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	2.852	1.383	0.093
RADIO 4480 B71_TMO	B	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	2.852	1.383	0.093
RADIO 4480 B71_TMO	C	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	2.852	1.383	0.093
FIBEAIR IP-10	A	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	0.242	0.104	0.005
(2) 2.4" x 8' Pipe	A	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	1.900	1.900	0.029
(2) 2.4" x 8' Pipe	B	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	1.900	1.900	0.029
(2) 2.4" x 8' Pipe	C	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	1.900	1.900	0.029
Pipe Mount [PM 601-1]	B	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	1.320	1.320	0.065
Kenwood T1516KT Platform ***	C	From Centroid-Face	4.000 0.000 0.000	0.000	146.000	No Ice	24.330	24.330	1.645
(2) PCSA030-19-2 w/ Mount Pipe	A	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	9.346	8.614	0.059

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
PCSA030-19-2 w/ Mount Pipe	B	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	9.346	8.614	0.059
PCSA030-19-2 w/ Mount Pipe	C	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	9.346	8.614	0.059
X7CQAP-665-VR0 w/ Mount Pipe	A	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	9.510	6.340	0.083
X7CQAP-665-VR0 w/ Mount Pipe	B	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	9.510	6.340	0.083
X7CQAP-665-VR0 w/ Mount Pipe	C	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	9.510	6.340	0.083
PCSA090-19-2 w/ Mount Pipe	B	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	7.312	6.852	0.050
PCSA090-19-2 w/ Mount Pipe	C	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	7.312	6.852	0.050
ATSBT-TOP-FM	A	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	0.174	0.095	0.002
ATSBT-TOP-FM	B	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	0.174	0.095	0.002
ATSBT-TOP-FM	C	From Centroid-Face	6.000 0.000 1.000	0.000	135.000	No Ice	0.174	0.095	0.002
T-Arm Mount [TA 602-3] ***	C	None		0.000	135.000	No Ice	13.400	13.400	0.774
Pipe Mount [PM 601-1] ***	C	From Centroid-Face	2.000 0.000 0.000	0.000	131.000	No Ice	1.320	1.320	0.065
(2) Pipe Mount [PM 601-1] ***	C	From Centroid-Face	2.000 0.000 0.000	0.000	114.000	No Ice	1.320	1.320	0.065
TMBX-6517-R2M w/ Mount Pipe	A	From Centroid-Face	2.000 0.000 0.000	0.000	110.000	No Ice	3.220	2.800	0.041
CMA-B/3324 w/ Mount Pipe	B	From Centroid-Face	2.000 0.000 0.000	0.000	110.000	No Ice	7.760	5.170	0.082
6' x 2" Mount Pipe	C	From Centroid-Face	2.000 0.000 0.000	0.000	110.000	No Ice	1.425	1.425	0.022
Side Arm Mount [SO 104-3] ***	C	None		0.000	110.000	No Ice	2.620	2.620	0.288

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
UXA4-59AC	B	Paraboloid w/Shroud (HP)	From Centroid -Face	4.000 0.000 0.000	-30.000		146.000	4.308	No Ice	14.580	0.099
***											
PAR6-59	C	Paraboloid w/Radome	From Centroid -Face	2.000 0.000 0.000	30.000		131.000	6.000	No Ice	28.274	0.143
***											
VHLPX4-6W	C	Paraboloid w/Shroud (HP)	From Centroid -Face	2.000 0.000 0.000	30.000		114.000	4.233	No Ice	14.075	0.101
***											

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	Dead+Wind 0 deg - Service
27	Dead+Wind 30 deg - Service
28	Dead+Wind 60 deg - Service
29	Dead+Wind 90 deg - Service
30	Dead+Wind 120 deg - Service
31	Dead+Wind 150 deg - Service
32	Dead+Wind 180 deg - Service
33	Dead+Wind 210 deg - Service
34	Dead+Wind 240 deg - Service
35	Dead+Wind 270 deg - Service
36	Dead+Wind 300 deg - Service

Comb. No.	Description
37	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 - 109.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	22	-8.540	185.319	104.126
			Max. Mx	8	-8.492	-223.623	1.513
			Max. My	14	-8.459	7.852	-238.673
			Max. Vy	8	9.656	-223.623	1.513
			Max. Vx	2	-10.185	-6.659	222.596
			Max. Torque	20			7.031
L2	109.75 - 70.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	22	-14.564	541.828	315.337
			Max. Mx	8	-14.528	-655.031	28.449
			Max. My	14	-14.508	25.023	-678.062
			Max. Vy	8	12.508	-655.031	28.449
			Max. Vx	2	-12.998	-24.005	672.921
			Max. Torque	20			6.874
L3	70.75 - 37.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	22	-21.306	907.586	530.924
			Max. Mx	8	-21.286	-1094.000	51.386
			Max. My	2	-21.266	-38.662	1127.840
			Max. Vy	8	14.445	-1094.000	51.386
			Max. Vx	2	-14.933	-38.662	1127.840
			Max. Torque	20			6.793
L4	37.5 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	22	-33.080	1468.583	860.644
			Max. Mx	8	-33.080	-1763.341	81.267
			Max. My	2	-33.079	-57.621	1817.957
			Max. Vy	8	16.633	-1763.341	81.267
			Max. Vx	2	-17.108	-57.621	1817.957
			Max. Torque	20			6.727

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	33.088	0.433	-16.809
	Max. H_x	20	33.088	16.345	-0.542
	Max. H_z	2	33.088	-0.431	17.091
	Max. M_x	2	1817.957	-0.431	17.091
	Max. M_z	8	1763.341	-16.617	0.681
	Max. Torsion	20	6.658	16.345	-0.542
	Min. Vert	23	24.816	13.966	8.196
	Min. H_x	8	33.088	-16.617	0.681
	Min. H_z	14	33.088	0.433	-16.809
	Min. M_x	14	-1801.608	0.433	-16.809
	Min. M_z	20	-1726.829	16.345	-0.542
	Min. Torsion	8	-5.353	-16.617	0.681

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	27.573	0.000	0.000	7.157	-0.209	-0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	33.088	0.431	-17.091	-1817.957	-57.621	2.665
0.9 Dead+1.0 Wind 0 deg - No Ice	24.816	0.431	-17.091	-1802.130	-56.956	2.661
1.2 Dead+1.0 Wind 30 deg - No Ice	33.088	8.638	-14.898	-1586.076	-925.205	4.314
0.9 Dead+1.0 Wind 30 deg - No Ice	24.816	8.638	-14.898	-1572.542	-915.960	4.276
1.2 Dead+1.0 Wind 60 deg - No Ice	33.088	14.649	-8.919	-954.323	-1560.794	5.132
0.9 Dead+1.0 Wind 60 deg - No Ice	24.816	14.649	-8.919	-947.039	-1545.262	5.071
1.2 Dead+1.0 Wind 90 deg - No Ice	33.088	16.617	-0.681	-81.268	-1763.341	5.353
0.9 Dead+1.0 Wind 90 deg - No Ice	24.816	16.617	-0.681	-82.632	-1745.811	5.285
1.2 Dead+1.0 Wind 120 deg - No Ice	33.088	14.113	7.941	839.751	-1491.211	4.352
0.9 Dead+1.0 Wind 120 deg - No Ice	24.816	14.113	7.941	829.256	-1476.385	4.295
1.2 Dead+1.0 Wind 150 deg - No Ice	33.088	7.703	14.362	1534.787	-798.530	1.841
0.9 Dead+1.0 Wind 150 deg - No Ice	24.816	7.703	14.362	1517.339	-790.625	1.812
1.2 Dead+1.0 Wind 180 deg - No Ice	33.088	-0.433	16.809	1801.608	58.742	-1.456
0.9 Dead+1.0 Wind 180 deg - No Ice	24.816	-0.433	16.809	1781.501	58.177	-1.451
1.2 Dead+1.0 Wind 210 deg - No Ice	33.088	-8.554	14.752	1587.486	915.491	-4.282
0.9 Dead+1.0 Wind 210 deg - No Ice	24.816	-8.554	14.752	1569.489	906.454	-4.245
1.2 Dead+1.0 Wind 240 deg - No Ice	33.088	-14.405	8.780	956.228	1530.268	-6.140
0.9 Dead+1.0 Wind 240 deg - No Ice	24.816	-14.405	8.780	944.478	1515.158	-6.080
1.2 Dead+1.0 Wind 270 deg - No Ice	33.088	-16.345	0.542	84.060	1726.829	-6.658
0.9 Dead+1.0 Wind 270 deg - No Ice	24.816	-16.345	0.542	80.942	1709.804	-6.591
1.2 Dead+1.0 Wind 300 deg - No Ice	33.088	-13.966	-8.196	-860.645	1468.583	-3.933
0.9 Dead+1.0 Wind 300 deg - No Ice	24.816	-13.966	-8.196	-854.321	1454.143	-3.877
1.2 Dead+1.0 Wind 330 deg - No Ice	33.088	-7.718	-14.667	-1555.849	803.388	-0.287
0.9 Dead+1.0 Wind 330 deg - No Ice	24.816	-7.718	-14.667	-1542.628	795.532	-0.258
Dead+Wind 0 deg - Service	27.573	0.105	-4.162	-434.978	-14.095	0.652
Dead+Wind 30 deg - Service	27.573	2.103	-3.628	-378.851	-224.113	1.050
Dead+Wind 60 deg - Service	27.573	3.567	-2.172	-225.919	-377.968	1.247
Dead+Wind 90 deg - Service	27.573	4.046	-0.166	-14.578	-426.975	1.299
Dead+Wind 120 deg - Service	27.573	3.437	1.934	208.348	-361.088	1.056
Dead+Wind 150 deg - Service	27.573	1.876	3.497	376.572	-193.440	0.447
Dead+Wind 180 deg - Service	27.573	-0.105	4.093	441.182	14.063	-0.355

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 210 deg - Service	27.573	-2.083	3.592	389.360	221.457	-1.043
Dead+Wind 240 deg - Service	27.573	-3.508	2.138	236.547	370.270	-1.495
Dead+Wind 270 deg - Service	27.573	-3.980	0.132	25.425	417.830	-1.620
Dead+Wind 300 deg - Service	27.573	-3.401	-1.996	-203.227	355.319	-0.953
Dead+Wind 330 deg - Service	27.573	-1.879	-3.571	-371.512	194.319	-0.065

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-27.573	0.000	0.000	27.573	-0.000	0.000%
2	0.431	-33.088	-17.091	-0.431	33.088	17.091	0.000%
3	0.431	-24.816	-17.091	-0.431	24.816	17.091	0.000%
4	8.638	-33.088	-14.898	-8.638	33.088	14.898	0.000%
5	8.638	-24.816	-14.898	-8.638	24.816	14.898	0.000%
6	14.649	-33.088	-8.919	-14.649	33.088	8.919	0.000%
7	14.649	-24.816	-8.919	-14.649	24.816	8.919	0.000%
8	16.617	-33.088	-0.681	-16.617	33.088	0.681	0.000%
9	16.617	-24.816	-0.681	-16.617	24.816	0.681	0.000%
10	14.113	-33.088	7.941	-14.113	33.088	-7.941	0.000%
11	14.113	-24.816	7.941	-14.113	24.816	-7.941	0.000%
12	7.703	-33.088	14.362	-7.703	33.088	-14.362	0.000%
13	7.703	-24.816	14.362	-7.703	24.816	-14.362	0.000%
14	-0.433	-33.088	16.809	0.433	33.088	-16.809	0.000%
15	-0.433	-24.816	16.809	0.433	24.816	-16.809	0.000%
16	-8.554	-33.088	14.752	8.554	33.088	-14.752	0.000%
17	-8.554	-24.816	14.752	8.554	24.816	-14.752	0.000%
18	-14.405	-33.088	8.780	14.405	33.088	-8.780	0.000%
19	-14.405	-24.816	8.780	14.405	24.816	-8.780	0.000%
20	-16.345	-33.088	0.542	16.345	33.088	-0.542	0.000%
21	-16.345	-24.816	0.542	16.345	24.816	-0.542	0.000%
22	-13.966	-33.088	-8.196	13.966	33.088	8.196	0.000%
23	-13.966	-24.816	-8.196	13.966	24.816	8.196	0.000%
24	-7.718	-33.088	-14.667	7.718	33.088	14.667	0.000%
25	-7.718	-24.816	-14.667	7.718	24.816	14.667	0.000%
26	0.105	-27.573	-4.162	-0.105	27.573	4.162	0.000%
27	2.103	-27.573	-3.628	-2.103	27.573	3.628	0.000%
28	3.567	-27.573	-2.172	-3.567	27.573	2.172	0.000%
29	4.046	-27.573	-0.166	-4.046	27.573	0.166	0.000%
30	3.437	-27.573	1.934	-3.437	27.573	-1.934	0.000%
31	1.876	-27.573	3.497	-1.876	27.573	-3.497	0.000%
32	-0.105	-27.573	4.093	0.105	27.573	-4.093	0.000%
33	-2.083	-27.573	3.592	2.083	27.573	-3.592	0.000%
34	-3.508	-27.573	2.138	3.508	27.573	-2.138	0.000%
35	-3.980	-27.573	0.132	3.980	27.573	-0.132	0.000%
36	-3.401	-27.573	-1.996	3.401	27.573	1.996	0.000%
37	-1.879	-27.573	-3.571	1.879	27.573	3.571	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	0.00014109
3	Yes	5	0.00000001	0.00006927
4	Yes	5	0.00000001	0.00062231
5	Yes	5	0.00000001	0.00029805
6	Yes	5	0.00000001	0.00046849
7	Yes	5	0.00000001	0.00022196
8	Yes	5	0.00000001	0.00015874
9	Yes	5	0.00000001	0.00007719
10	Yes	5	0.00000001	0.00054430
11	Yes	5	0.00000001	0.00026276
12	Yes	5	0.00000001	0.00039449
13	Yes	5	0.00000001	0.00018704
14	Yes	4	0.00000001	0.00044803
15	Yes	4	0.00000001	0.00028124
16	Yes	5	0.00000001	0.00046778
17	Yes	5	0.00000001	0.00021843
18	Yes	5	0.00000001	0.00067460
19	Yes	5	0.00000001	0.00032269
20	Yes	5	0.00000001	0.00031426
21	Yes	5	0.00000001	0.00015378
22	Yes	5	0.00000001	0.00037832
23	Yes	5	0.00000001	0.00018239
24	Yes	5	0.00000001	0.00043890
25	Yes	5	0.00000001	0.00021070
26	Yes	4	0.00000001	0.00014205
27	Yes	4	0.00000001	0.00032696
28	Yes	4	0.00000001	0.00023933
29	Yes	4	0.00000001	0.00025602
30	Yes	4	0.00000001	0.00031272
31	Yes	4	0.00000001	0.00013810
32	Yes	4	0.00000001	0.00007261
33	Yes	4	0.00000001	0.00022065
34	Yes	4	0.00000001	0.00042455
35	Yes	4	0.00000001	0.00034460
36	Yes	4	0.00000001	0.00016921
37	Yes	4	0.00000001	0.00015443

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* ft	*Horz. Deflection* in	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	150 - 109.75	17.992	33	1.048	0.015
L2	113.75 - 70.75	10.439	33	0.888	0.008
L3	75.5 - 37.5	4.481	33	0.568	0.003
L4	43 - 0	1.445	33	0.306	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	*Appurtenance*	*Gov. Load Comb.*	*Deflection* in	*Tilt* °	*Twist* °	*Radius of Curvature* ft
153.500	Lightning rod (5/8"x7')	33	17.992	1.048	0.019	51698
146.000	UXA4-59AC	33	17.119	1.034	0.018	51698
135.000	(2) PCSA030-19-2 w/ Mount Pipe	33	14.741	0.995	0.015	17232

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
131.000	PAR6-59	33	13.894	0.978	0.014	13604
114.000	VHLPX4-6W	33	10.486	0.890	0.010	7323
110.000	TMBX-6517-R2M w/ Mount Pipe	33	9.746	0.862	0.009	7123

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 109.75	72.625	16	4.154	0.063
L2	113.75 - 70.75	42.442	16	3.589	0.034
L3	75.5 - 37.5	18.285	16	2.315	0.014
L4	43 - 0	5.908	4	1.250	0.006

Critical Deflections and Radius of Curvature - Design Wind

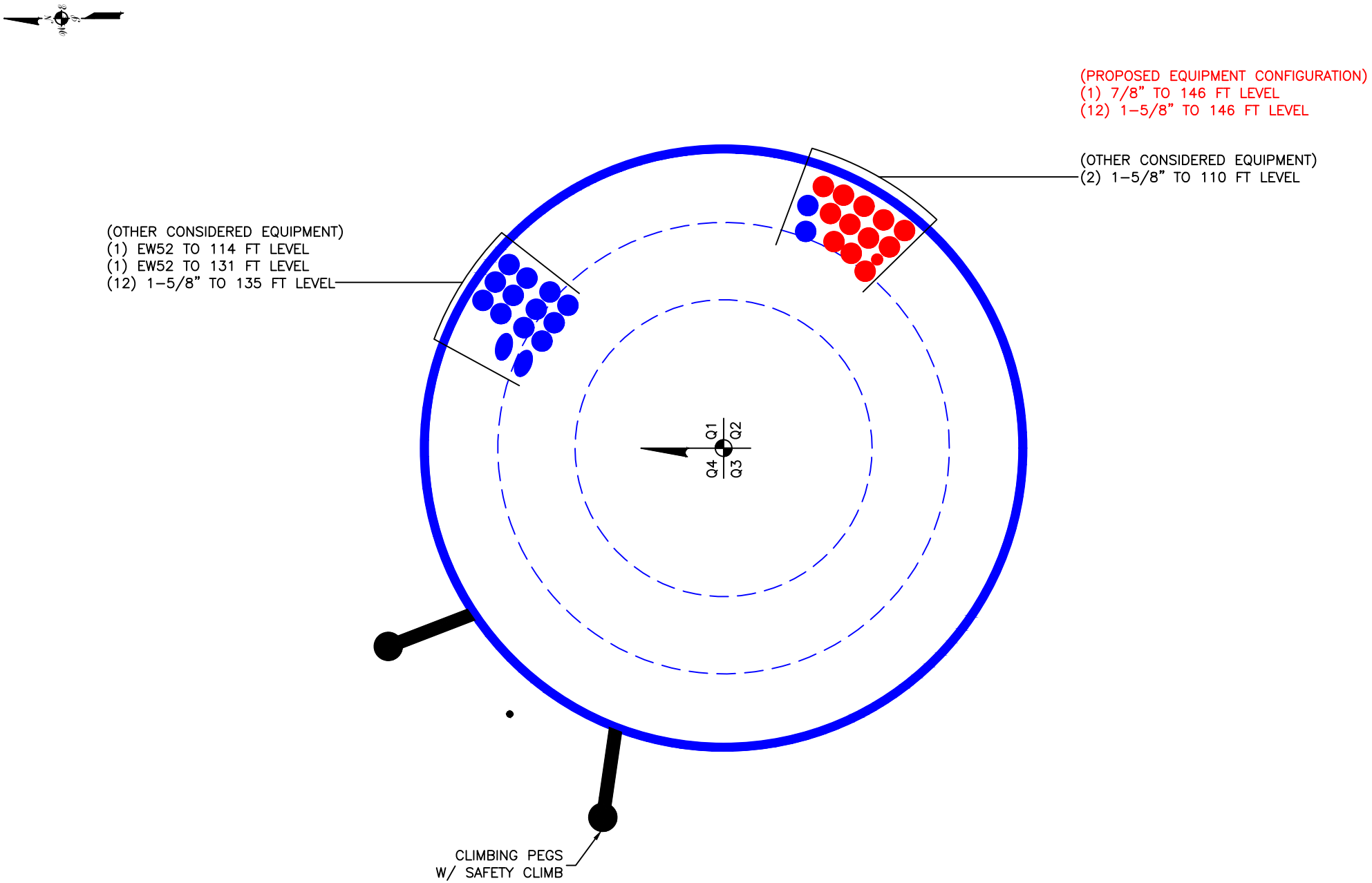
Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
153.500	Lightning rod (5/8"x7')	16	72.625	4.154	0.078	13945
146.000	UXA4-59AC	16	69.144	4.110	0.073	13945
135.000	(2) PCSA030-19-2 w/ Mount Pipe	16	59.663	3.977	0.062	4647
131.000	PAR6-59	16	56.281	3.921	0.058	3668
114.000	VHLPX4-6W	16	42.631	3.595	0.042	1968
110.000	TMBX-6517-R2M w/ Mount Pipe	16	39.649	3.490	0.039	1897

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	150 - 109.75	Pole	TP31.111x24x0.188	1	-8.436	1104.589	34.0	Pass
L2	109.75 - 70.75	Pole	TP37.626x30.029x0.25	2	-14.489	1780.831	47.4	Pass
L3	70.75 - 37.5	Pole	TP43x36.287x0.313	3	-21.264	2541.577	46.6	Pass
L4	37.5 - 0	Pole	TP49x41.403x0.375	4	-33.079	3555.027	45.5	Pass
							Summary	
						Pole (L2)	47.4	Pass
						RATING =	**47.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED EQUIPMENT CONFIGURATION)
(1) 7/8" TO 146 FT LEVEL
(12) 1-5/8" TO 146 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(2) 1-5/8" TO 110 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) EW52 TO 114 FT LEVEL
(1) EW52 TO 131 FT LEVEL
(12) 1-5/8" TO 135 FT LEVEL
Q1
Q2
Q3
Q4
CLIMBING PEGS
W/ SAFETY CLIMB

APPENDIX C

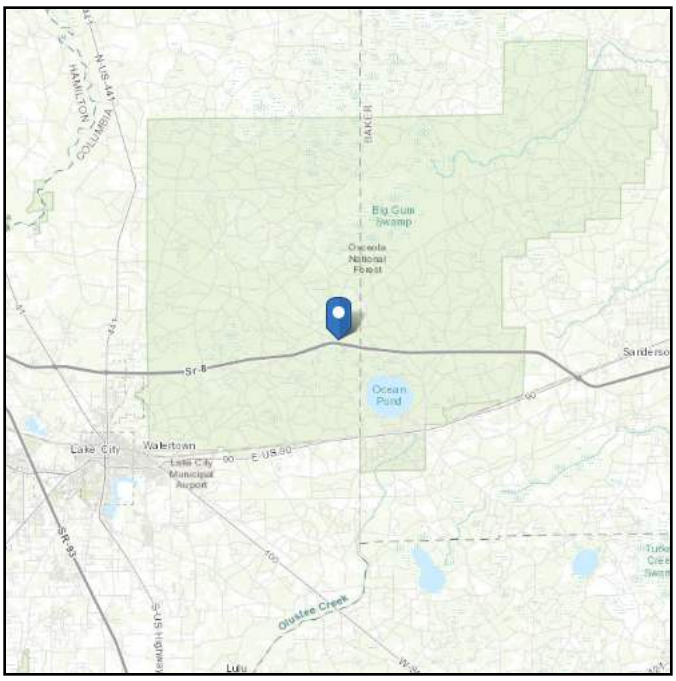
ADDITIONAL CALCULATIONS

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 153.67 ft (NAVD 88)
Latitude: 30.261106
Longitude: -82.473631



Wind

Results:

Wind Speed:	118 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	97 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri Jul 23 2021

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

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

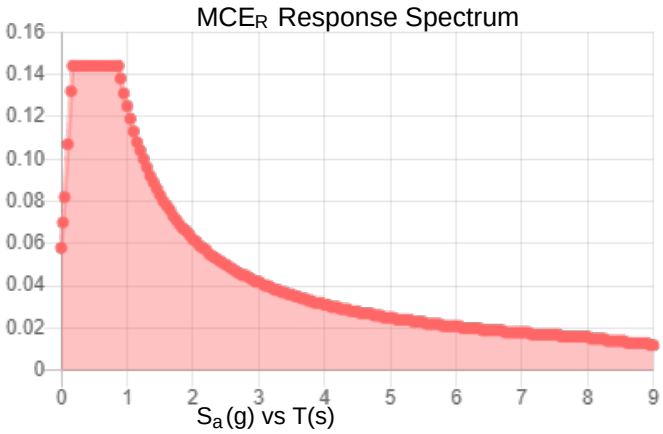
Seismic

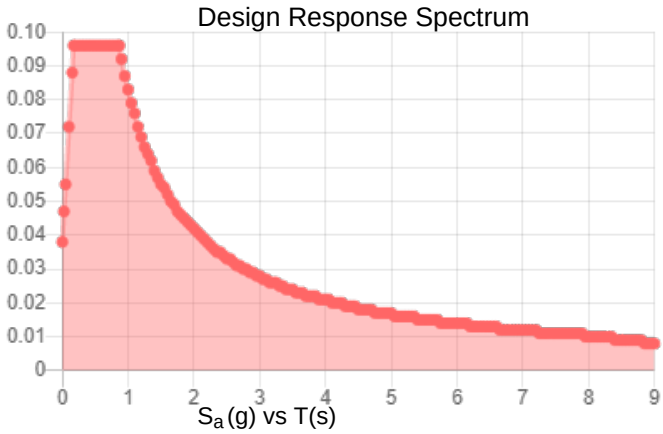
Site Soil Class: D - Default (see Section 11.4.3)

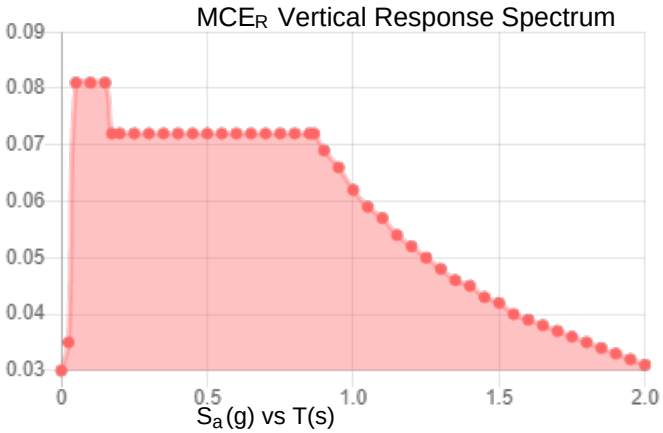
Results:

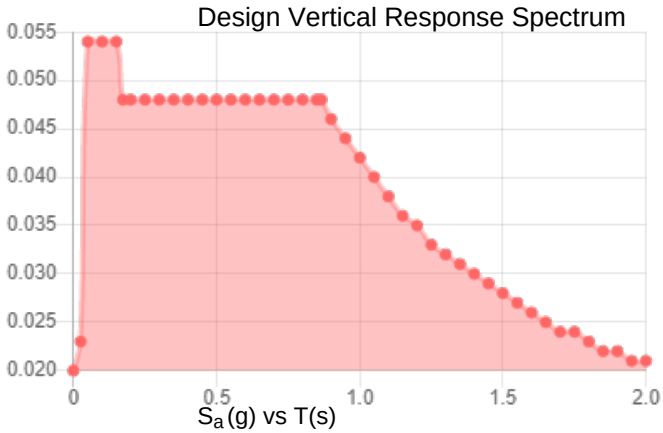
S_S :	0.09	S_{D1} :	0.083
S_1 :	0.052	T_L :	8
F_a :	1.6	PGA :	0.043
F_v :	2.4	PGA_M :	0.069
S_{MS} :	0.144	F_{PGA} :	1.6
S_{M1} :	0.125	I_e :	1
S_{DS} :	0.096	C_v :	0.7

Seismic Design Category B









Data Accessed: Fri Jul 23 2021

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	0.25 in. (Used an ice thickness of 0.00 in.)
Concurrent Temperature:	25 F
Gust Speed:	30 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Fri Jul 23 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

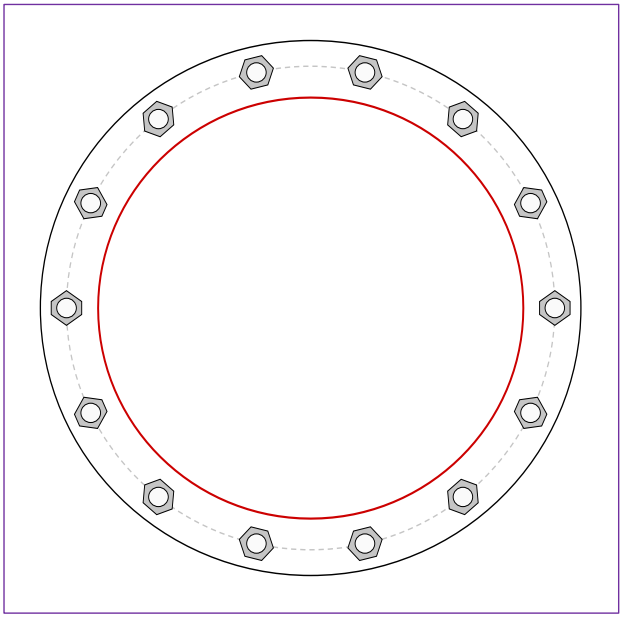
Monopole Base Plate Connection

Site Info	
BU #	825403
Site Name	Little Gum Swamp
Order #	576211

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	0.75

Applied Loads	
Moment (kip-ft)	1836.20
Axial Force (kips)	33.08
Shear Force (kips)	17.24

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(14) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 56.25" BC

Base Plate Data

62.25" OD x 2.5" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

49" x 0.375" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_t = 109.48	ϕPn_t = 243.75	**Stress Rating**
Vu = 1.23	ϕVn = 149.1	**42.8%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	15.07	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**26.6%**	**Pass**

Drilled Pier Foundation

BU # :	825403
Site Name:	Little Gum Swamp
Order Number:	576211
TIA-222 Revison:	H
Tower Type:	Monopole

Check Limitation	
Apply TIA-222-H Section 15.5:	☑
N/A	☐
Additional Longitudinal Rebar	
Input Effective Depths (else Actual):	☐
Shear Design Options	
Check Shear along Depth of Pier:	☑
Utilize Shear-Friction Methodology:	☐
Override Critical Depth:	☐

Go to Soil Calculations

Applied Loads	Comp.	Uplift
Moment (kip-ft)	1836.2	
Axial Force (kips)	33.09	
Shear Force (kips)	17.22	

Material Properties		
Concrete Strength, f'c:	4	ksi
Rebar Strength, Fy:	60	ksi
Tie Yield Strength, Fyt:	40	ksi

Pier Design Data		
Depth	22.83	ft
Ext. Above Grade	1.67	ft
Pier Section 1		
From 1.67' above grade to 22.83' below grade		
Pier Diameter	9.5	ft
Rebar Quantity	44	
Rebar Size	8	
Clear Cover to Ties	3	in
Tie Size	3	
Tie Spacing	12.5	in

Rebar & Pier Options
Embedded Pole Inputs
Belled Pier Inputs

Analysis Results		
Soil Lateral Check	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	8.58	-
Soil Safety Factor	2.67	-
Max Moment (kip-ft)	1989.33	-
Rating*	*47.5%*	-
Soil Vertical Check	*Compression*	*Uplift*
Skin Friction (kips)	88.77	-
End Bearing (kips)	397.18	-
Weight of Concrete (kips)	209.99	-
Total Capacity (kips)	485.95	-
Axial (kips)	243.08	-
Rating*	*47.6%*	-
Reinforced Concrete Flexure	*Compression*	*Uplift*
Critical Depth (ft from TOC)	8.48	-
Critical Moment (kip-ft)	1989.24	-
Critical Moment Capacity	8289.28	-
Rating*	*22.9%*	-
Reinforced Concrete Shear	*Compression*	*Uplift*
Critical Depth (ft from TOC)	17.57	-
Critical Shear (kip)	242.41	-
Critical Shear Capacity	1069.66	-
Rating*	*21.6%*	-

Structural Foundation Rating*	**22.9%**
Soil Interaction Rating*	**47.6%**

Min. Steel is assumed

*Rating per TIA-222-H Section 15.5

Soil Profile

Groundwater Depth	3.5

# of Layers	4

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (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. Net Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.5	3.5	117	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	3.5	6	2.5	54.6	87.6	0	0	0.000	0.000	0.00	0.00			Cohesionless
3	6	12	6	54.6	87.6	0	31	0.000	0.000	0.30	0.23			Cohesionless
4	12	22.83	10.83	54.6	87.6	0	29	0.000	0.000	0.20	0.15	4.8		Cohesionless