

Date: **February 4, 2025**

Nicole Hoffman
Vertical Bridge
750 Park of Commerce Drive, Suite 200
Boca Raton, FL 33487

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
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Subject:	Structural Analysis Report	
Carrier Designation:	T-Mobile Co-Locate	
	Site Number:	9JK2254a
	Site Name:	9JK2254a
Vertical Bridge Designation:	Site Number:	US-FL-5391
	Site Name:	Ebenezer
Engineering Firm Designation:	B+T Group Project Number:	174774.001.01.0001
Site Data:	6295 SE County Rd 245, Lake City, FL 32025, Columbia County Latitude 30° 6' 10.7892", Longitude -82° 34' 26.9508" 250 Foot - Self Support Tower	

Dear Nicole,

B+T Group 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:

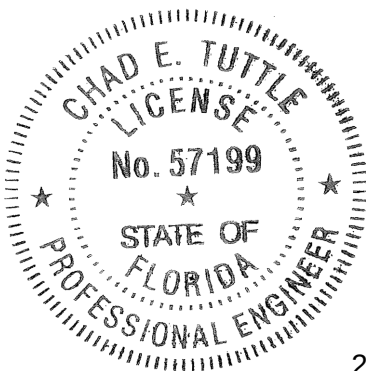
Proposed Equipment Configuration

Sufficient Capacity

The jurisdiction has adopted the 2021 International Building Code. This analysis has been performed in accordance with the TIA-222-H Standard.

Structural analysis prepared by: Colton Jung

Respectfully submitted by: B+T Engineering, Inc.



2/4/2025

Chad E. Tuttle, P.E.

tnxTower Report - version 8.2.4.3

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1) INTRODUCTION

This tower is a 250 ft. Self-Support tower designed by Arcosa Telecom Structures.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	120 mph
Exposure Category:	C
Topographic Factor:	1
Seismic Ss:	0.13
Seismic S1:	0.058
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)
230.0	230.0	1	Andrew	Crgn & Stnd UBR100 Int	3 2	2" Hybrid 0.325"
		3	Commscope	FFVV-65C-R3-V1 (Octo)		
		3	Ericsson	4460		
		3	Ericsson	4480		
		3	Ericsson	AIR 6419 B41		
		3	Site Pro1	VFA12-HD Sector Mount		

Note: Remaining Rights up to 30,000 sq. inches have been considered in the analysis results.

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)
245.0	245.0	6	Commscope	NHH-65C-R2B	2	Hybrid
		3	Generic	Unknown Antenna		
		3	Ericsson	RRUS 4449		
		3	Ericsson	RRUS 8843		
		2	Raycap	RVZDC-6627-PF-48		
		3	Site Pro1	VFA12-HD Sector Mount		
200.0	200.0	2	Generic	ODU	2	LMR-400
		1	Commscope	VHLPX3-11W		
		1	--	Side Arm Mount		

Note: Remaining Rights up to 42,000 sq. inches have been considered in the analysis results.

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Tower Data	Tower Manufacturer Drawing by Arcosa Telecom Structures, Job No. 9749	Date: 09/21/2022	Vertical Bridge
Foundation Data	Foundation Drawing by Arcosa Telecom Structures, Project No. 165690.001.01	Date: 09/21/2022	Vertical Bridge
Soil Properties	Geotechnical Report by EGSci, Project No. 20-US-FL-5391	Date: 01/22/2020	Vertical Bridge
Existing Loading	CDs by Foresite Group, Job No. 1304.002	Date: 10/19/2022	Vertical Bridge
Proposed Loading	Colocation Application	Date: 01/09/2025	Vertical Bridge

3.1) Analysis Method

tnxTower (version 8.2.4.3), 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.

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.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group 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
T1	250 - 240	Leg	1 3/4	2	-11.595	35.601	32.6	Pass
T2	240 - 220	Leg	2 1/4	20	-78.031	84.331	92.5	Pass
T3	220 - 200	Leg	2 3/4	47	-136.514	161.540	84.5	Pass
T4	200 - 180	Leg	3 1/4	74	-183.744	260.312	70.6	Pass
T5	180 - 160	Leg	3 1/2	101	-224.643	317.273	70.8	Pass
T6	160 - 140	Leg	3 1/2	128	-261.889	317.273	82.5	Pass
T7	140 - 120	Leg	3 3/4	155	-297.579	379.106	78.5	Pass
T8	120 - 100	Leg	4	182	-332.759	445.717	74.7	Pass
T9	100 - 80	Leg	4 1/4	210	-368.356	517.034	71.2	Pass
T10	80 - 60	Leg	4 1/4	237	-403.942	517.034	78.1	Pass
T11	60 - 40	Leg	4 1/2	264	-434.792	593.004	73.3	Pass
T12	40 - 20	Leg	4 3/4	303	-469.054	673.582	69.6	Pass
T13	20 - 0	Leg	4 3/4	342	-502.511	673.582	74.6	Pass
T1	250 - 240	Diagonal	L 1 3/4x1 3/4x3/16	7	-6.583	15.362	42.9 74.7 (b)	Pass
T2	240 - 220	Diagonal	L 1 3/4x1 3/4x3/16	25	-8.249	11.425	72.2 93.4 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T3	220 - 200	Diagonal	L2x2x3/16	70	-9.102	15.479	58.8 77.8 (b)	Pass
T4	200 - 180	Diagonal	L2x2x3/16	80	-6.861	9.679	70.9	Pass
T5	180 - 160	Diagonal	L2 1/2x2 1/2x3/16	107	-6.903	14.870	46.4 54.5 (b)	Pass
T6	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	134	-6.988	11.709	59.7	Pass
T7	140 - 120	Diagonal	L3x3x3/16	161	-7.463	16.564	45.1 53.7 (b)	Pass
T8	120 - 100	Diagonal	L3x3x3/16	187	-8.029	13.622	58.9	Pass
T9	100 - 80	Diagonal	L3x3x1/4	214	-8.810	14.834	59.4	Pass
T10	80 - 60	Diagonal	L3x3x1/4	241	-9.369	12.533	74.8	Pass
T11	60 - 40	Diagonal	2L2 1/2x2 1/2x3/16x3/8	269	-10.681	19.794	54.0	Pass
T12	40 - 20	Diagonal	2L2 1/2x2 1/2x3/16x3/8	308	-11.111	17.534	63.4	Pass
T13	20 - 0	Diagonal	2L3x3x3/16x3/8	347	-11.466	26.343	43.5	Pass
T11	60 - 40	Horizontal	2L2x2x3/16x3/8	268	-7.698	12.584	61.2	Pass
T12	40 - 20	Horizontal	2L2 1/2x2 1/2x3/16x3/8	307	-8.292	21.141	39.2	Pass
T13	20 - 0	Horizontal	2L2 1/2x2 1/2x3/16x3/8	349	-8.873	18.392	48.2	Pass
T1	250 - 240	Top Girt	L1 3/4x1 3/4x3/16	6	-2.954	12.811	23.1 31.0 (b)	Pass
T11	60 - 40	Inner Bracing	L1 3/4x1 3/4x3/16	293	-0.005	1.722	0.3	Pass
T12	40 - 20	Inner Bracing	L1 3/4x1 3/4x3/16	315	-0.005	1.372	0.4	Pass
T13	20 - 0	Inner Bracing	L1 3/4x1 3/4x3/16	371	-0.007	1.273	0.5	Pass
							Summary	
						Leg (T2)	92.5	Pass
						Diagonal (T2)	93.4	Pass
						Horizontal (T11)	61.2	Pass
						Top Girt (T1)	31.0	Pass
						Inner Bracing (T13)	0.5	Pass
						Bolt Checks	93.4	Pass
						Rating =	93.4	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	52.4	Pass
1	Base Foundation (Structure)	Base	54.2	Pass
1	Base Foundation (Soil Interaction)	Base	76.8	Pass

Structure Rating (max from all components) =	93.4%
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Notes:

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

4.1) Recommendations

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

The results of the tilt and twist values for a 60 mph 3-second gust service wind speed per the TIA-222-H Standard are given below:

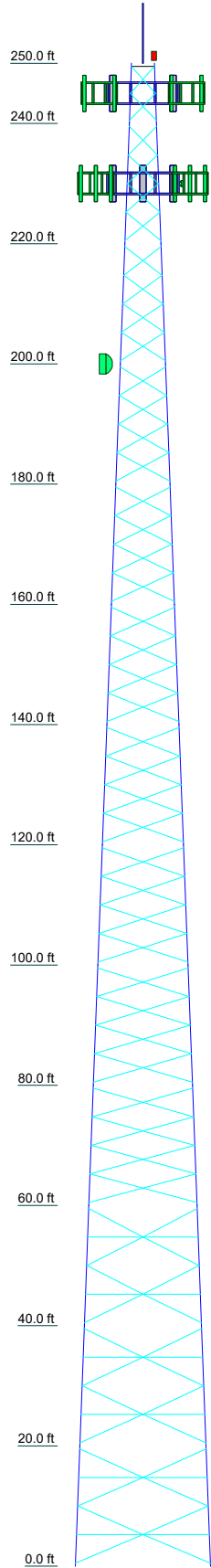
Table 6 – Proposed Loading Tilt-Sway Results for 60 mph Service Wind

<i>Elevation (ft)</i>	<i>Dish Model</i>	<i>Diameter (ft)</i>	<i>Tilt (°)</i>	<i>Twist (°)</i>
230.0	Crgn & Stnd UBR100 Int	1.047	0.363	0.037

APPENDIX A

TNXTOWER OUTPUT

Section	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	SR 4 3/4		SR 4 1/2		SR 4 1/4		SR 3 3/4		SR 3 1/2		SR 2 3/4		SR 1 3/4
Leg Grade	2L3x3x3/16x3/8	2L2 1/2x2 1/2x3/16x3/8											
Diagonals													
Diagonal Grade													
Top Girts													
Horizontals													
Inner Bracing													
Face Width (ft)	22.5	21	19.5	18	16.5	15	13.5	12	10.5	9	7.5	6	4.5
# Panels @ (ft)							48 @ 4.75						2 @ 4.5
Weight (K)	49.0	7.0	6.4	5.7	5.3	5.1	3.6	3.0	2.9	2.4	1.8	1.2	0.4



ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:

DOWN: 511 K
SHEAR: 37 K

UPLIFT: -436 K
SHEAR: 32 K

AXIAL
79 K

SHEAR
61 K

MOMENT
9442 kip-ft

TORQUE 9 kip-ft
REACTIONS - 120 mph WIND

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L1 3/4x1 3/4x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A529-50	50 ksi	65 ksi	A36M-50	50 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower is located in Columbia County, Florida.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 120 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. TOWER RATING: 93.4%



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Job: 174774.001.01.0001 - Ebenezer, FL (Site# US-FL-539)

Project:

Client: Vertical Bridge

Code: TIA-222-H

Path:

Drawn by: Akshay Kumar

Date: 01/30/25

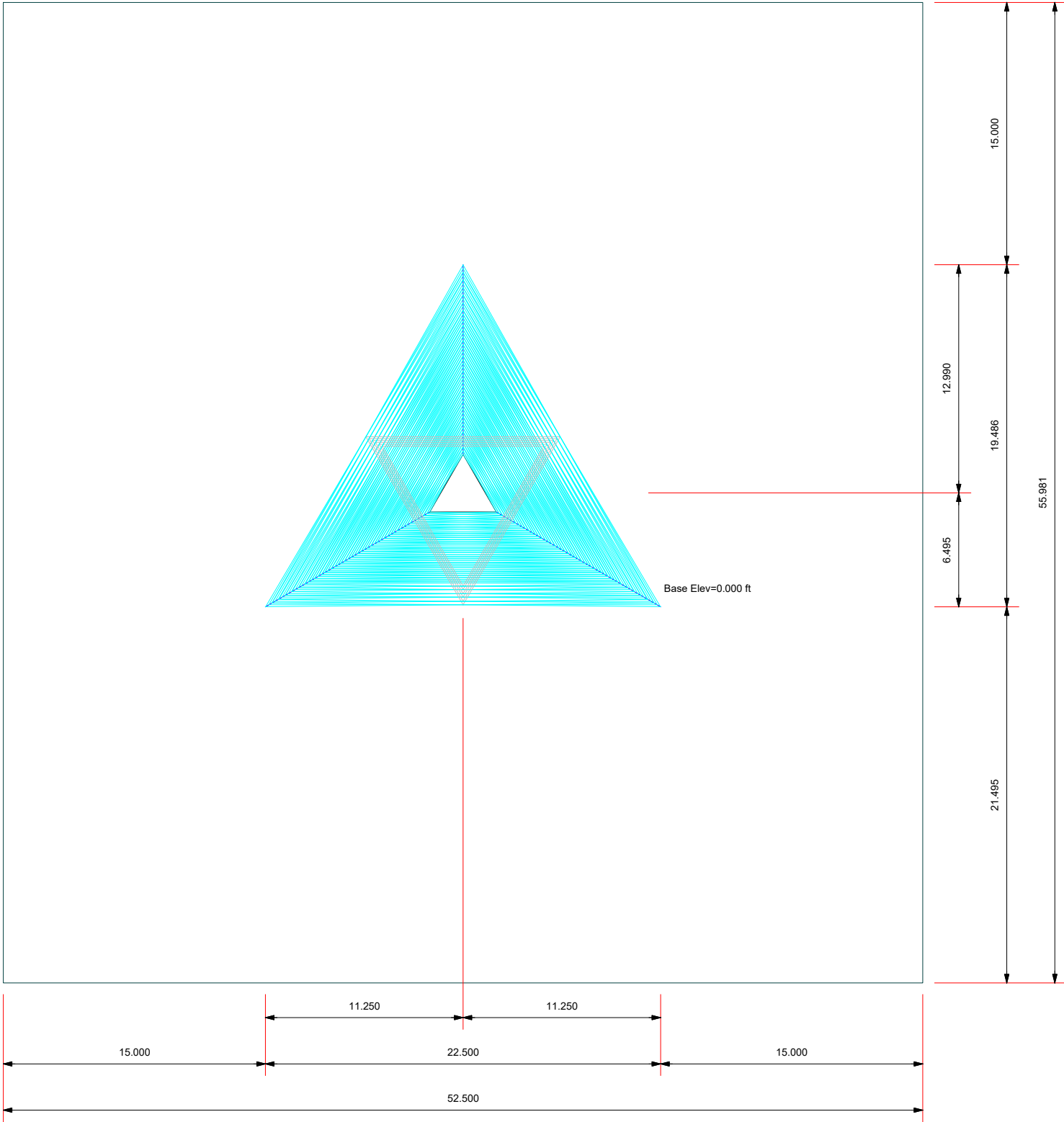
App'd:

Scale: NTS

Dwg No. E-1

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Plot Plan
Total Area - 0.07 Acres



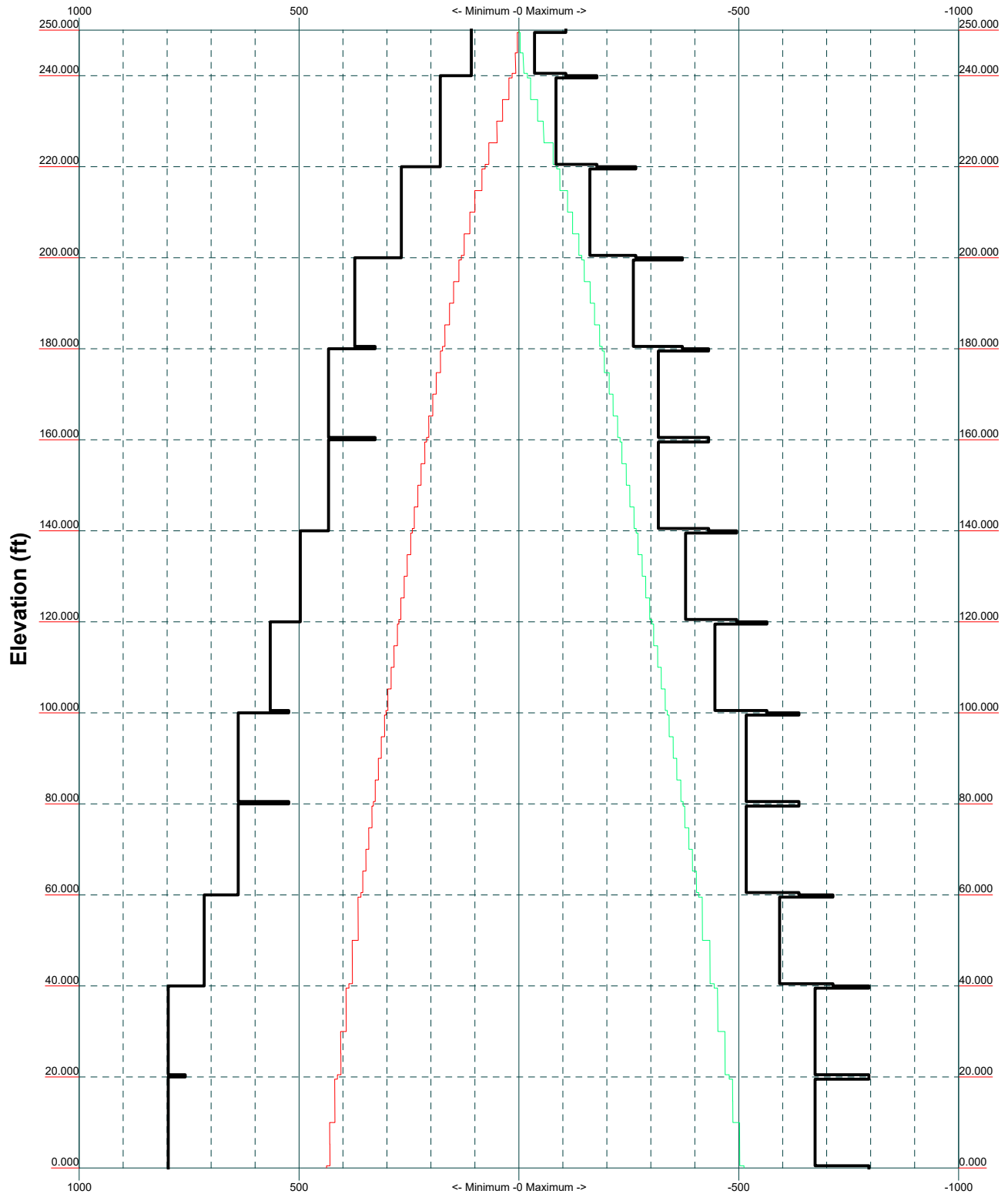
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Job: **174774.001.01.0001 - Ebenezer, FL (Site# US-FL-539)**
Project:
Client: Vertical Bridge
Code: TIA-222-H
Path:
Drawn by: Akshay Kumar
Date: 01/30/25
App'd:
Scale: NTS
Dwg No. E-2

TIA-222-H - 120 mph Exposure C

Leg Capacity ———

Leg Compression (K)



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Project:		
Client: Vertical Bridge	Drawn by: Akshay Kumar	App'd:
Code: TIA-222-H	Date: 01/30/25	Scale: NTS
Path:	Dwg No. E-3	

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TIA-222-H - 120 mph Exposure C

Maximum Values

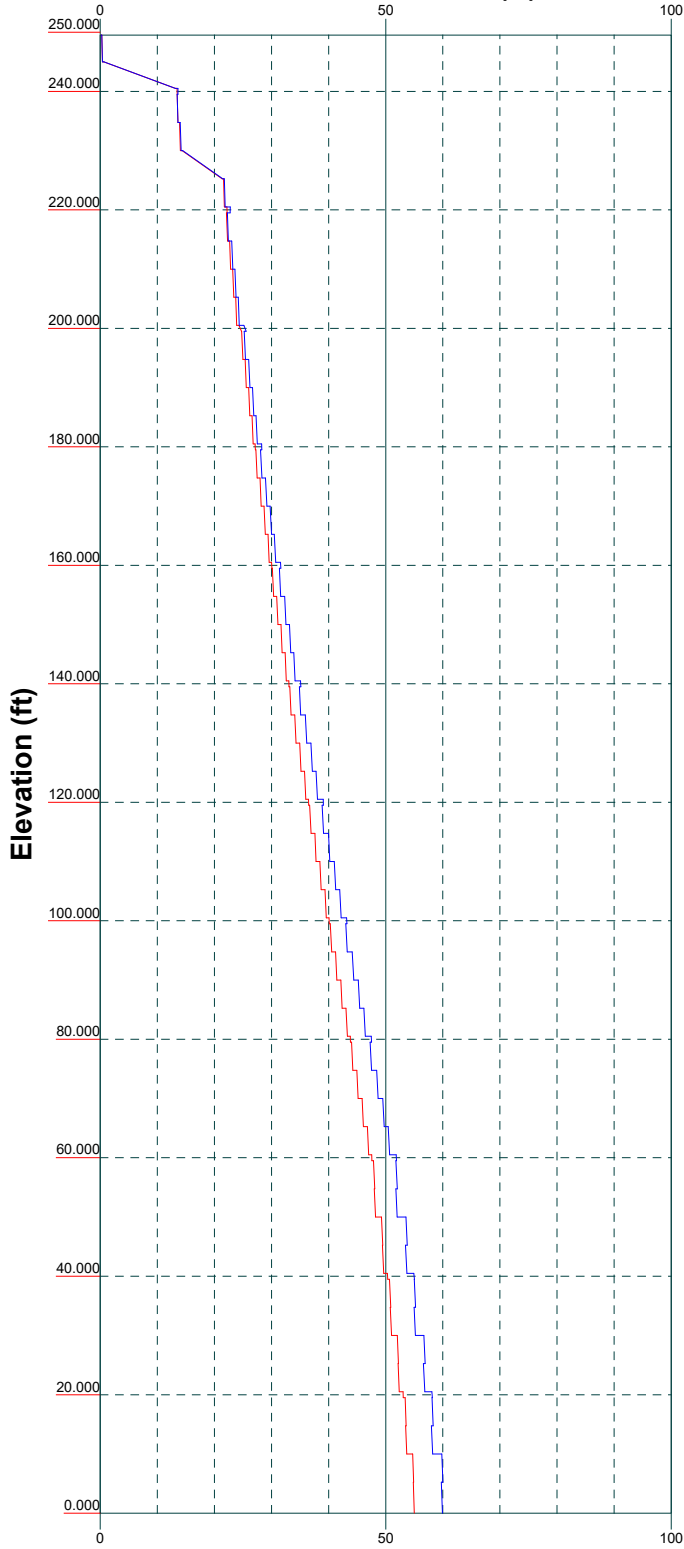
Vx

Vz

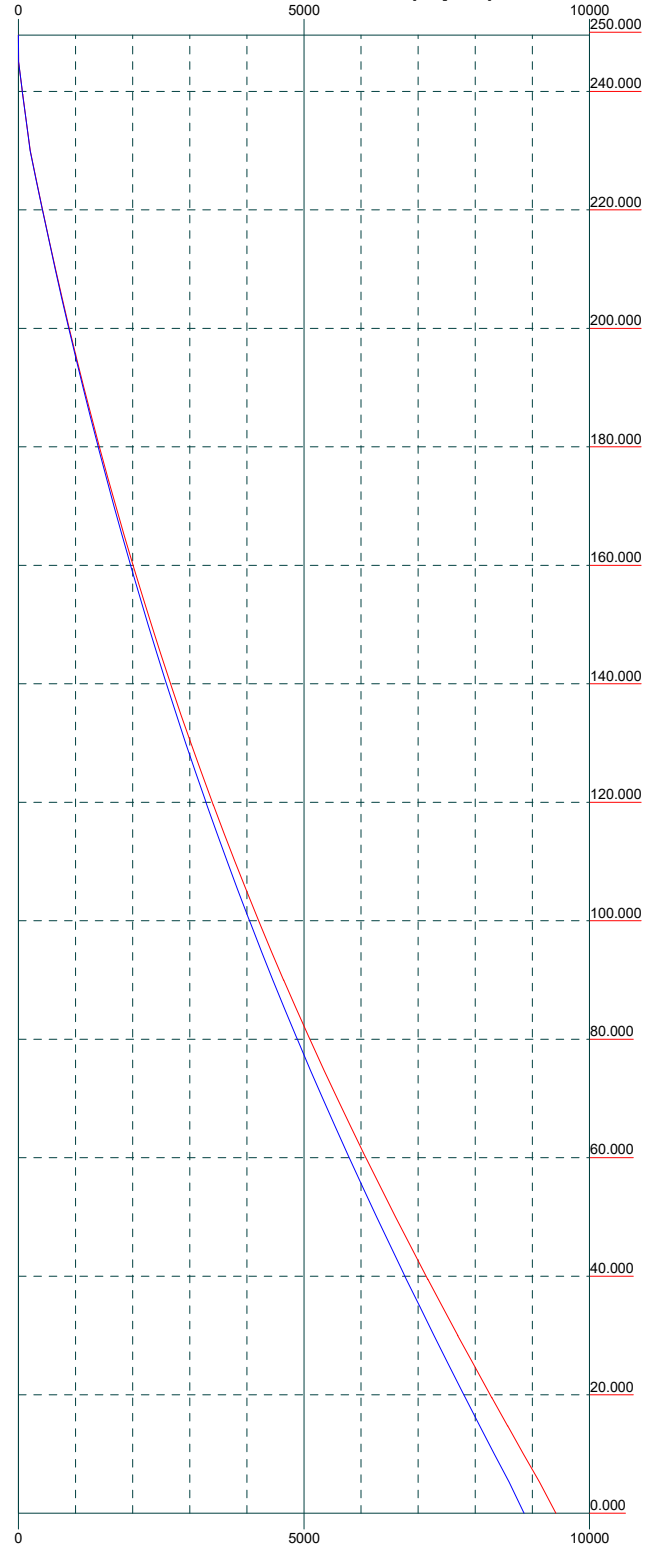
Mx

Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



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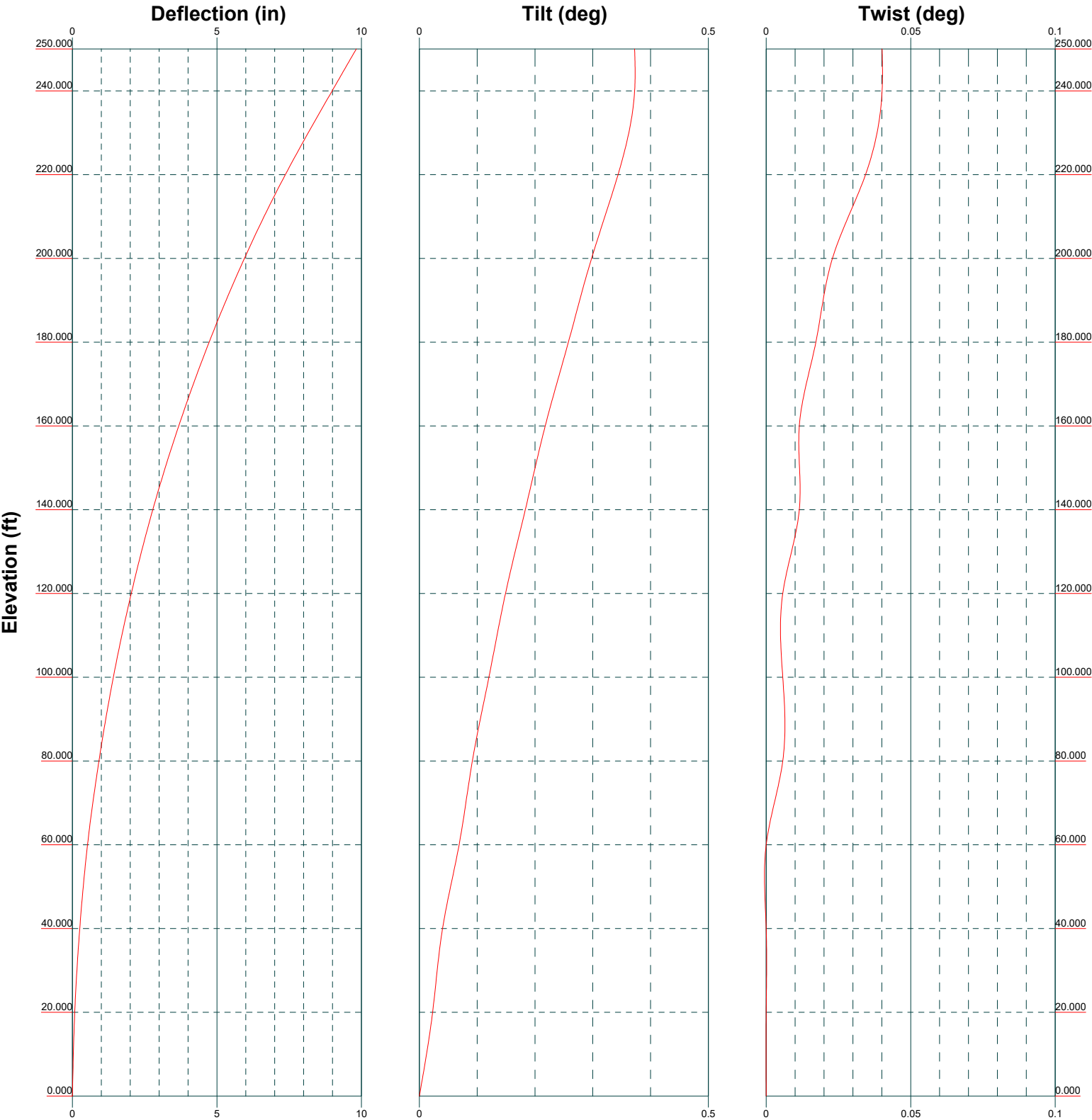
Project:

Client: Vertical Bridge Drawn by: Akshay Kumar App'd:

Code: TIA-222-H Date: 01/30/25 Scale: NTS

Path: Dwg No. E-4

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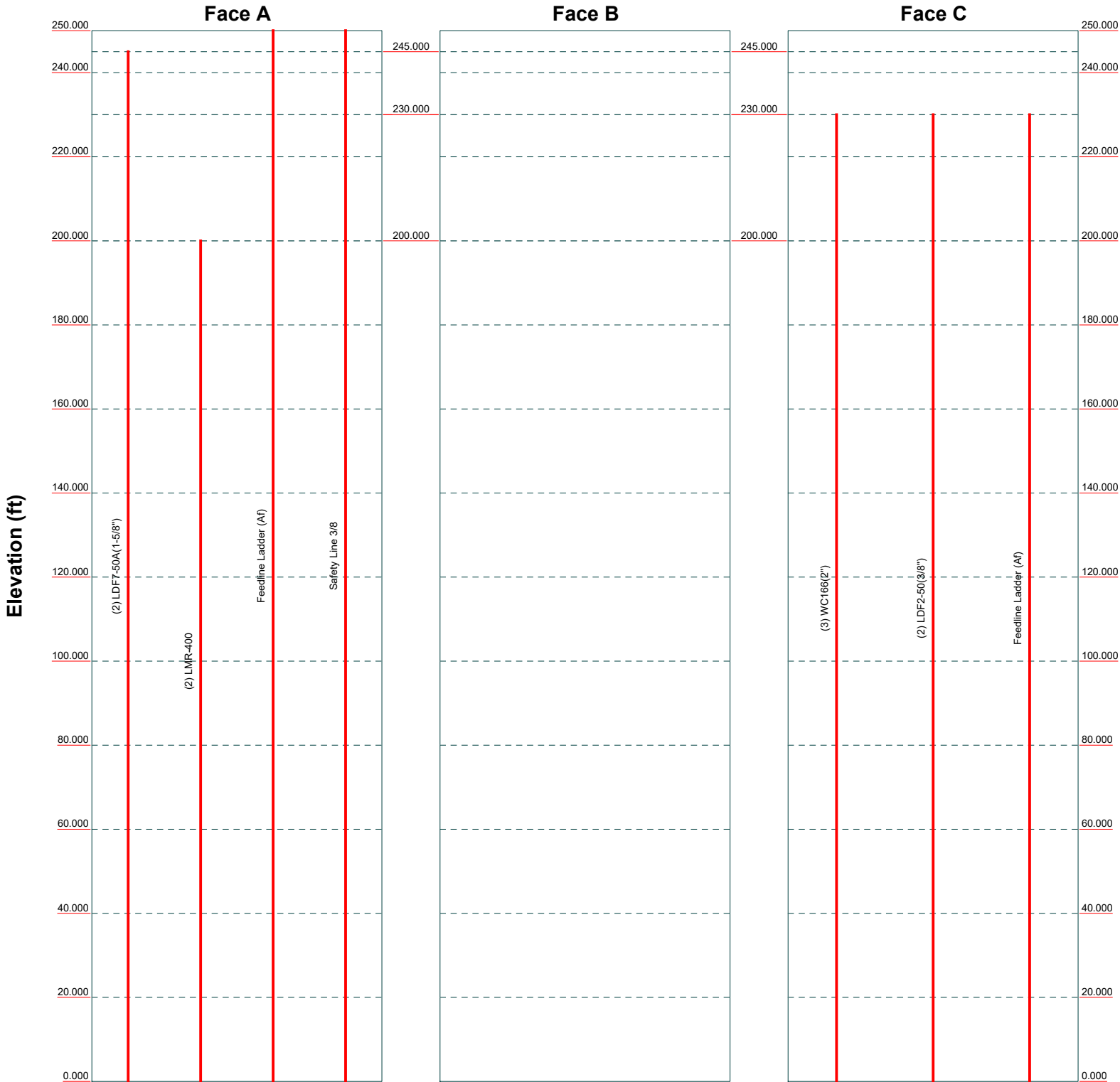


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Job: 174774.001.01.0001 - Ebenezer, FL (Site# US-FL-5392)		
Project:		
Client: Vertical Bridge	Drawn by: Akshay Kumar	App'd:
Code: TIA-222-H	Date: 01/30/25	Scale: NTS
Path:	Dwg No. E-5	

Feed Line Distribution Chart
0' - 250'

Round Flat App In Face App Out Face Truss Leg



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Job: 174774.001.01.0001 - Ebenezer, FL (Site# US-FL-539)		
Project:		
Client: Vertical Bridge	Drawn by: Akshay Kumar	App'd:
Code: TIA-222-H	Date: 01/30/25	Scale: NTS
Path:	Dwg No. E-7	

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tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 174774.001.01.0001 - Ebenezer, FL (Site# US-FL-5391)	Page 1 of 31
	Project	Date 14:32:56 01/30/25
	Client Vertical Bridge	Designed by Akshay Kumar

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 250.000 ft above the ground line.

The base of the tower is set at an elevation of 0.000 ft above the ground line.

The face width of the tower is 3.750 ft at the top and 22.500 ft at the base.

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: 148.000 ft.

Basic wind speed of 120 mph.

Risk Category II.

Exposure Category C.

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.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in tower member design is 1.

Tower analysis based on target reliabilities in accordance with Annex S.

Load Modification Factors used: $K_{es}(F_w) = 0.95$.

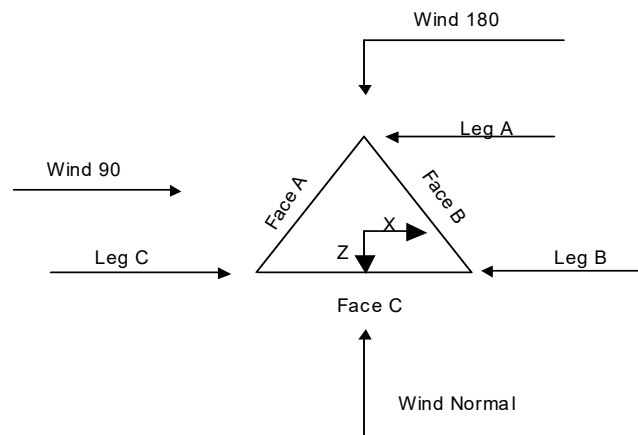
Maximum demand-capacity ratio is: 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

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	Project	Date 14:32:56 01/30/25
	Client Vertical Bridge	Designed by Akshay Kumar



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	250.000-240.000			3.750	1	10.000
T2	240.000-220.000			4.500	1	20.000
T3	220.000-200.000			6.000	1	20.000
T4	200.000-180.000			7.500	1	20.000
T5	180.000-160.000			9.000	1	20.000
T6	160.000-140.000			10.500	1	20.000
T7	140.000-120.000			12.000	1	20.000
T8	120.000-100.000			13.500	1	20.000
T9	100.000-80.000			15.000	1	20.000
T10	80.000-60.000			16.500	1	20.000
T11	60.000-40.000			18.000	1	20.000
T12	40.000-20.000			19.500	1	20.000
T13	20.000-0.000			21.000	1	20.000

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	250.000-240.000	4.500	X Brace	No	No	6.000	6.000
T2	240.000-220.000	4.750	X Brace	No	No	6.000	6.000

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	Project	Date
	Client	Designed by
	Vertical Bridge	Akshay Kumar

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T3	220.000-200.000	4.750	X Brace	No	No	6.000	6.000
T4	200.000-180.000	4.750	X Brace	No	No	6.000	6.000
T5	180.000-160.000	4.750	X Brace	No	No	6.000	6.000
T6	160.000-140.000	4.750	X Brace	No	No	6.000	6.000
T7	140.000-120.000	4.750	X Brace	No	No	6.000	6.000
T8	120.000-100.000	4.750	X Brace	No	No	6.000	6.000
T9	100.000-80.000	4.750	X Brace	No	No	6.000	6.000
T10	80.000-60.000	4.750	X Brace	No	No	6.000	6.000
T11	60.000-40.000	4.750	Double K	No	Yes	6.000	6.000
T12	40.000-20.000	4.750	Double K	No	Yes	6.000	6.000
T13	20.000-0.000	4.750	Double K	No	Yes	6.000	6.000

Tower Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						
T1	Solid Round	1 3/4	A529-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36M-50 (50 ksi)
250.000-240.000						
T2	Solid Round	2 1/4	A529-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36M-50 (50 ksi)
240.000-220.000						
T3	Solid Round	2 3/4	A529-50 (50 ksi)	Equal Angle	L2x2x3/16	A36M-50 (50 ksi)
220.000-200.000						
T4	Solid Round	3 1/4	A529-50 (50 ksi)	Equal Angle	L2x2x3/16	A36M-50 (50 ksi)
200.000-180.000						
T5	Solid Round	3 1/2	A529-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36M-50 (50 ksi)
180.000-160.000						
T6	Solid Round	3 1/2	A529-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36M-50 (50 ksi)
160.000-140.000						
T7	Solid Round	3 3/4	A529-50 (50 ksi)	Equal Angle	L3x3x3/16	A36M-50 (50 ksi)
140.000-120.000						
T8	Solid Round	4	A529-50 (50 ksi)	Equal Angle	L3x3x3/16	A36M-50 (50 ksi)
120.000-100.000						
T9	Solid Round	4 1/4	A529-50 (50 ksi)	Equal Angle	L3x3x1/4	A36M-50 (50 ksi)
100.000-80.000						
T10	Solid Round	4 1/4	A529-50 (50 ksi)	Equal Angle	L3x3x1/4	A36M-50 (50 ksi)
80.000-60.000						
T11	Solid Round	4 1/2	A529-50 (50 ksi)	Double Angle	2L2 1/2x2 1/2x3/16x3/8	A36M-50 (50 ksi)
60.000-40.000						
T12	Solid Round	4 3/4	A529-50 (50 ksi)	Double Angle	2L2 1/2x2 1/2x3/16x3/8	A36M-50 (50 ksi)
40.000-20.000						
T13	Solid Round	4 3/4	A529-50 (50 ksi)	Double Angle	2L3x3x3/16x3/8	A36M-50 (50 ksi)
20.000-0.000						

Tower Section Geometry (cont'd)

Tower Elevation	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
ft						
T1	Equal Angle	L1 3/4x1 3/4x3/16	A36M-50 (50 ksi)	Solid Round		A529-50 (50 ksi)
250.000-240.000						

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Tower Section Geometry (cont'd)

Tower Elevation	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
ft							
T11 60.000-40.000	None	Flat Bar		A36 (36 ksi)	Double Angle	2L2x2x3/16x3/8	A36M-50 (50 ksi)
T12 40.000-20.000	None	Flat Bar		A36 (36 ksi)	Double Angle	2L2 1/2x2 1/2x3/16x3/8	A36M-50 (50 ksi)
T13 20.000-0.000	None	Flat Bar		A36 (36 ksi)	Double Angle	2L2 1/2x2 1/2x3/16x3/8	A36M-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
ft						
T11 60.000-40.000	Solid Round		A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36M-50 (50 ksi)
T12 40.000-20.000	Solid Round		A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36M-50 (50 ksi)
T13 20.000-0.000	Solid Round		A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36M-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
T1 250.000-240.000	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T2 240.000-220.000	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T3 220.000-200.000	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T4 200.000-180.000	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T5 180.000-160.000	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T6	0.000	0.375	A36M-50	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt

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Tower Elevation	Gusset Area (per face)	Gusset Thickness	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
ft	ft ²	in							
160.000-140.000			(50 ksi)						
T7	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
140.000-120.000									
T8	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
120.000-100.000									
T9	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
100.000-80.000									
T10	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
80.000-60.000									
T11	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
60.000-40.000									
T12	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
40.000-20.000									
T13	0.000	0.375	A36M-50 (50 ksi)	1.05	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
20.000-0.000									

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
250.000-240.000				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
240.000-220.000				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
220.000-200.000				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
200.000-180.000				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
180.000-160.000				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
160.000-140.000				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
140.000-120.000				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
120.000-100.000				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
100.000-80.000				1	1	1	1	1	1	1

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Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T13 20.000-0.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical	Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	Net Width Deduct in	U	Net Width Deduct in	U
T1 250.000-240.000	0.000	0.75 (1)	0.000	0.75 (1)	0.000	0.75	0.000	0.75	0.000	0.75		0.000	0.75 (1)
	0.000	0.75 (2)	0.000	0.75 (2)						0.000	0.75 (2)	0.000	0.75 (2)
	0.000	0.75 (3)	0.000	0.75 (3)						0.000	0.75 (3)	0.000	0.75 (3)
	0.000	0.75 (4)	0.000	0.75 (4)						0.000	0.75 (4)	0.000	0.75 (4)
T2 240.000-220.000	0.000	0.75 (1)	0.000	0.75 (1)	0.000	0.75	0.000	0.75	0.000	0.75		0.000	0.75 (1)
	0.000	0.75 (2)	0.000	0.75 (2)						0.000	0.75 (2)	0.000	0.75 (2)
	0.000	0.75 (3)	0.000	0.75 (3)						0.000	0.75 (3)	0.000	0.75 (3)
	0.000	0.75 (4)	0.000	0.75 (4)						0.000	0.75 (4)	0.000	0.75 (4)
T3 220.000-200.000	0.000	0.75 (1)	0.000	0.75 (1)	0.000	0.75	0.000	0.75	0.000	0.75		0.000	0.75 (1)
	0.000	0.75 (2)	0.000	0.75 (2)						0.000	0.75 (2)	0.000	0.75 (2)
	0.000	0.75 (3)	0.000	0.75 (3)						0.000	0.75 (3)	0.000	0.75 (3)
	0.000	0.75 (4)	0.000	0.75 (4)						0.000	0.75 (4)	0.000	0.75 (4)
T4 200.000-180.000	0.000	0.75 (1)	0.000	0.75 (1)	0.000	0.75	0.000	0.75	0.000	0.75		0.000	0.75 (1)
	0.000	0.75 (2)	0.000	0.75 (2)						0.000	0.75 (2)	0.000	0.75 (2)
	0.000	0.75 (3)	0.000	0.75 (3)						0.000	0.75 (3)	0.000	0.75 (3)
	0.000	0.75 (4)	0.000	0.75 (4)						0.000	0.75 (4)	0.000	0.75 (4)
T5 180.000-160.000	0.000	0.75 (1)	0.000	0.75 (1)	0.000	0.75	0.000	0.75	0.000	0.75		0.000	0.75 (1)
	0.000	0.75 (2)	0.000	0.75 (2)						0.000	0.75 (2)	0.000	0.75 (2)
	0.000	0.75 (3)	0.000	0.75 (3)						0.000	0.75 (3)	0.000	0.75 (3)
	0.000	0.75 (4)	0.000	0.75 (4)						0.000	0.75 (4)	0.000	0.75 (4)

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Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical	Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	Net Width Deduct in	U	Net Width Deduct in	U
T13 20.000-0.000	0.000	0.75 (3)	0.000	0.75 (3)						0.000	0.75 (3)	0.000	0.75 (3)
	0.000	0.75 (4)	0.000	0.75 (4)						0.000	0.75 (4)	0.000	0.75 (4)
	0.000	0.75 (1)	0.000	0.75 (1)	0.000	0.75	0.000	0.75	0.000	0.75	0.75 (1)	0.000	0.75 (1)
	0.000	0.75 (2)	0.000	0.75 (2)						0.000	0.75 (2)	0.000	0.75 (2)
	0.000	0.75 (3)	0.000	0.75 (3)						0.000	0.75 (3)	0.000	0.75 (3)
	0.000	0.75 (4)	0.000	0.75 (4)						0.000	0.75 (4)	0.000	0.75 (4)

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 250.000-240.000	Flange	0.750 A325N	6	0.625 A325X	1	0.625 A325X	1	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T2 240.000-220.000	Flange	0.750 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T3 220.000-200.000	Flange	1.000 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T4 200.000-180.000	Flange	1.000 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T5 180.000-160.000	Flange	1.000 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T6 160.000-140.000	Flange	1.250 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T7 140.000-120.000	Flange	1.250 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T8 120.000-100.000	Flange	1.250 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T9 100.000-80.00 0	Flange	1.250 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T10 80.000-60.000	Flange	1.500 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.000 A325X	0	0.625 A325N	0
T11 60.000-40.000	Flange	1.500 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	1	0.625 A325N	0
T12 40.000-20.000	Flange	1.500 A325N	6	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	1	0.625 A325N	0
T13 20.000-0.000	Flange	0.000 F1554-105	0	0.625 A325X	1	0.000 A325X	0	0.000 A325N	0	0.625 A325N	0	0.625 A325X	1	0.625 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
LDF7-50A(1- 5/8")	A	No	No	Ar (CaAa)	245.000 - 0.000	0.000	0.45	2	2	0.850 0.750	1.980		0.001
LMR-400	A	No	No	Ar (CaAa)	200.000 - 0.000	0.000	0.43	2	2	0.400	0.405		0.000
Feedline Ladder (Af) *	A	No	No	Af (CaAa)	250.000 - 0.000	0.000	0.4	1	1	3.000	3.000		0.008
WC166(2")	C	No	No	Ar (CaAa)	230.000 - 0.000	0.000	0	3	3	0.850 0.750	2.000		0.003
LDF2-50(3/8")	C	No	No	Ar (CaAa)	230.000 - 0.000	0.000	0.03	2	2	0.400	0.440		0.000
Feedline Ladder (Af) *	C	No	No	Af (CaAa)	230.000 - 0.000	0.000	-0.03	1	1	3.000	3.000		0.008
Safety Line 3/8 *	A	No	No	Ar (CaAa)	250.000 - 0.000	0.000	0.5	1	1	0.375	0.375		0.000

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight klf
*								

Feed Line/Linear Appurtenances Section Areas

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Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	250.000-240.000	A	0.000	0.000	7.355	0.000	0.094
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
T2	240.000-220.000	A	0.000	0.000	18.670	0.000	0.205
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	11.880	0.000	0.170
T3	220.000-200.000	A	0.000	0.000	18.670	0.000	0.205
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T4	200.000-180.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T5	180.000-160.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T6	160.000-140.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T7	140.000-120.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T8	120.000-100.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T9	100.000-80.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T10	80.000-60.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T11	60.000-40.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T12	40.000-20.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339
T13	20.000-0.000	A	0.000	0.000	20.290	0.000	0.208
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	23.760	0.000	0.339

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
T1	250.000-240.000	-0.554	-5.411	-0.554	-5.411
T2	240.000-220.000	-0.523	-5.206	-0.523	-5.206
T3	220.000-200.000	-0.407	-3.579	-0.407	-3.579
T4	200.000-180.000	-0.456	-4.604	-0.456	-4.604
T5	180.000-160.000	-0.428	-4.544	-0.427	-4.527
T6	160.000-140.000	-0.441	-4.857	-0.440	-4.843
T7	140.000-120.000	-0.409	-4.638	-0.407	-4.614
T8	120.000-100.000	-0.414	-4.805	-0.412	-4.767
T9	100.000-80.000	-0.419	-4.948	-0.415	-4.897
T10	80.000-60.000	-0.424	-5.086	-0.421	-5.044
T11	60.000-40.000	-0.564	-6.803	-0.557	-6.705
T12	40.000-20.000	-0.551	-6.730	-0.545	-6.637

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Section	Elevation	CP _x	CP _z	CP _x	CP _z
	ft	in	in	Ice in	Ice in
T13	20.000-0.000	-0.518	-6.406	-0.515	-6.361

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T1	1	LDF7-50A(1-5/8")	240.00 - 245.00	0.6000	0.6000
T1	3	Feedline Ladder (Af)	240.00 - 250.00	0.6000	0.6000
T1	9	Safety Line 3/8	240.00 - 250.00	0.6000	0.6000
T2	1	LDF7-50A(1-5/8")	220.00 - 240.00	0.6000	0.6000
T2	3	Feedline Ladder (Af)	220.00 - 240.00	0.6000	0.6000
T2	5	WC166(2")	220.00 - 230.00	0.6000	0.6000
T2	6	LDF2-50(3/8")	220.00 - 230.00	0.6000	0.6000
T2	7	Feedline Ladder (Af)	220.00 - 230.00	0.6000	0.6000
T2	9	Safety Line 3/8	220.00 - 240.00	0.6000	0.6000
T3	1	LDF7-50A(1-5/8")	200.00 - 220.00	0.6000	0.6000
T3	3	Feedline Ladder (Af)	200.00 - 220.00	0.6000	0.6000
T3	5	WC166(2")	200.00 - 220.00	0.6000	0.6000
T3	6	LDF2-50(3/8")	200.00 - 220.00	0.6000	0.6000
T3	7	Feedline Ladder (Af)	200.00 - 220.00	0.6000	0.6000
T3	9	Safety Line 3/8	200.00 - 220.00	0.6000	0.6000
T4	1	LDF7-50A(1-5/8")	180.00 - 200.00	0.6000	0.6000
T4	2	LMR-400	180.00 - 200.00	0.6000	0.6000
T4	3	Feedline Ladder (Af)	180.00 - 200.00	0.6000	0.6000
T4	5	WC166(2")	180.00 - 200.00	0.6000	0.6000
T4	6	LDF2-50(3/8")	180.00 - 200.00	0.6000	0.6000
T4	7	Feedline Ladder (Af)	180.00 - 200.00	0.6000	0.6000
T4	9	Safety Line 3/8	180.00 - 200.00	0.6000	0.6000
T5	1	LDF7-50A(1-5/8")	160.00 - 180.00	0.6000	0.6000
T5	2	LMR-400	160.00 - 180.00	0.6000	0.6000
T5	3	Feedline Ladder (Af)	160.00 -	0.6000	0.6000

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _o No Ice	K _o Ice
T5	5	WC166(2")	180.00 - 160.00	0.6000	0.6000
T5	6	LDF2-50(3/8")	180.00 - 160.00	0.6000	0.6000
T5	7	Feedline Ladder (Af)	180.00 - 160.00	0.6000	0.6000
T5	9	Safety Line 3/8	180.00 - 160.00	0.6000	0.6000
T6	1	LDF7-50A(1-5/8")	140.00 - 160.00	0.6000	0.6000
T6	2	LMR-400	140.00 - 160.00	0.6000	0.6000
T6	3	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T6	5	WC166(2")	140.00 - 160.00	0.6000	0.6000
T6	6	LDF2-50(3/8")	140.00 - 160.00	0.6000	0.6000
T6	7	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T6	9	Safety Line 3/8	140.00 - 160.00	0.6000	0.6000
T7	1	LDF7-50A(1-5/8")	120.00 - 140.00	0.6000	0.6000
T7	2	LMR-400	120.00 - 140.00	0.6000	0.6000
T7	3	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T7	5	WC166(2")	120.00 - 140.00	0.6000	0.6000
T7	6	LDF2-50(3/8")	120.00 - 140.00	0.6000	0.6000
T7	7	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T7	9	Safety Line 3/8	120.00 - 140.00	0.6000	0.6000
T8	1	LDF7-50A(1-5/8")	100.00 - 120.00	0.6000	0.6000
T8	2	LMR-400	100.00 - 120.00	0.6000	0.6000
T8	3	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T8	5	WC166(2")	100.00 - 120.00	0.6000	0.6000
T8	6	LDF2-50(3/8")	100.00 - 120.00	0.6000	0.6000
T8	7	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T8	9	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T9	1	LDF7-50A(1-5/8")	80.00 - 100.00	0.6000	0.6000
T9	2	LMR-400	80.00 - 100.00	0.6000	0.6000
T9	3	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T9	5	WC166(2")	80.00 - 100.00	0.6000	0.6000
T9	6	LDF2-50(3/8")	80.00 - 100.00	0.6000	0.6000
T9	7	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T9	9	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T10	1	LDF7-50A(1-5/8")	60.00 - 80.00	0.6000	0.6000
T10	2	LMR-400	60.00 - 80.00	0.6000	0.6000
T10	3	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T10	5	WC166(2")	60.00 - 80.00	0.6000	0.6000

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _o No Ice	K _o Ice
T10	6	LDF2-50(3/8")	60.00 - 80.00	0.6000	0.6000
T10	7	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T10	9	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T11	1	LDF7-50A(1-5/8")	40.00 - 60.00	0.6000	0.6000
T11	2	LMR-400	40.00 - 60.00	0.6000	0.6000
T11	3	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T11	5	WC166(2")	40.00 - 60.00	0.6000	0.6000
T11	6	LDF2-50(3/8")	40.00 - 60.00	0.6000	0.6000
T11	7	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T11	9	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T12	1	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T12	2	LMR-400	20.00 - 40.00	0.6000	0.6000
T12	3	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T12	5	WC166(2")	20.00 - 40.00	0.6000	0.6000
T12	6	LDF2-50(3/8")	20.00 - 40.00	0.6000	0.6000
T12	7	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T12	9	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T13	1	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T13	2	LMR-400	0.00 - 20.00	0.6000	0.6000
T13	3	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T13	5	WC166(2")	0.00 - 20.00	0.6000	0.6000
T13	6	LDF2-50(3/8")	0.00 - 20.00	0.6000	0.6000
T13	7	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T13	9	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
Lightning Rod 1"x10'	A	From Leg	0.000 0.000 5.000	0.000	250.000	No Ice	1.000	1.000	0.040
Flash Beacon Lighting	B	From Leg	0.000 0.000 0.500	0.000	250.000	No Ice	2.700	2.700	0.050
*									
(2) NHH-65C-R2B_TIA w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	245.000	No Ice	11.626	9.793	0.084
(2) NHH-65C-R2B_TIA w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	245.000	No Ice	11.626	9.793	0.084
(2) NHH-65C-R2B_TIA w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	245.000	No Ice	11.626	9.793	0.084
Unknown Antenna	A	From Leg	4.000 0.000 0.000	0.000	245.000	No Ice	0.000	0.000	0.000
Unknown Antenna	B	From Leg	4.000 0.000 0.000	0.000	245.000	No Ice	0.000	0.000	0.000

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
Unknown Antenna	C	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	0.000	0.000	0.000
RRUS 4449	A	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.980	1.410	0.070
RRUS 4449	B	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.980	1.410	0.070
RRUS 4449	C	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.980	1.410	0.070
RRUS 8843	A	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.639	1.353	0.072
RRUS 8843	B	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.639	1.353	0.072
RRUS 8843	C	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.639	1.353	0.072
RVZDC-6627-PF-48	B	From Leg	0.000 2.000 0.000 0.000	0.000	245.000	No Ice	3.792	2.514	0.032
RVZDC-6627-PF-48	C	From Leg	0.000 2.000 0.000 0.000	0.000	245.000	No Ice	3.792	2.514	0.032
5' x 2" Pipe Mount	B	From Leg	0.000 2.000 0.000 0.000	0.000	245.000	No Ice	1.188	1.188	0.018
5' x 2" Pipe Mount	C	From Leg	0.000 2.000 0.000 0.000	0.000	245.000	No Ice	1.188	1.188	0.018
(2) 8' x 2" Mount Pipe	A	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.900	1.900	0.029
(2) 8' x 2" Mount Pipe	B	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.900	1.900	0.029
(2) 8' x 2" Mount Pipe	C	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	1.900	1.900	0.029
Site Pro1 VFA12-HD	A	From Leg	0.000 2.000 0.000 0.000	0.000	245.000	No Ice	13.200	9.200	0.658
Site Pro1 VFA12-HD	B	From Leg	0.000 2.000 0.000 0.000	0.000	245.000	No Ice	13.200	9.200	0.658
Site Pro1 VFA12-HD	C	From Leg	0.000 2.000 0.000 0.000	0.000	245.000	No Ice	13.200	9.200	0.658
*									
1/3 Remaining Reserved Rights	A	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	72.970	72.970	0.778
1/3 Remaining Reserved	B	From Leg	0.000 4.000 0.000 0.000	0.000	245.000	No Ice	72.970	72.970	0.778

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
Rights			0.000 0.000						
1/3 Remaining Reserved Rights	C	From Leg	4.000 0.000 0.000	0.000	245.000	No Ice	72.970	72.970	0.778
*									
FFVV-65C-R3-V1 (Octo)_TIA w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	21.360	11.457	0.183
FFVV-65C-R3-V1 (Octo)_TIA w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	21.360	11.457	0.183
FFVV-65C-R3-V1 (Octo)_TIA w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	21.360	11.457	0.183
AIR 6419 B41 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	6.048	3.336	0.083
AIR 6419 B41 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	6.048	3.336	0.083
AIR 6419 B41 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	6.048	3.336	0.083
4460	A	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	2.125	1.700	0.109
4460	B	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	2.125	1.700	0.109
4460	C	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	2.125	1.700	0.109
4480	A	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	2.750	2.200	0.093
4480	B	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	2.750	2.200	0.093
4480	C	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	2.750	2.200	0.093
6' x 2" Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	230.000	No Ice	1.425	1.425	0.022
Site Pro1 VFA12-HD	A	From Leg	2.000 0.000 0.000	0.000	230.000	No Ice	13.200	9.200	0.658
Site Pro1 VFA12-HD	B	From Leg	2.000 0.000 0.000	0.000	230.000	No Ice	13.200	9.200	0.658
Site Pro1 VFA12-HD	C	From Leg	2.000 0.000 0.000	0.000	230.000	No Ice	13.200	9.200	0.658
*									
1/3 Remaining Reserved Rights	A	From Leg	4.000 0.000	0.000	230.000	No Ice	29.660	29.660	0.316

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
1/3 Remaining Reserved Rights	B	From Leg	0.000 4.000 0.000 0.000	0.000	230.000	No Ice	29.660	29.660	0.316
1/3 Remaining Reserved Rights	C	From Leg	0.000 4.000 0.000 0.000	0.000	230.000	No Ice	29.660	29.660	0.316
* (2) ODU	C	From Leg	0.000 1.500 0.000 0.000	0.000	200.000	No Ice	0.800	0.500	0.010
Side Arm Mount [SO 201-1]	C	From Leg	0.000 0.750 0.000 0.000	0.000	200.000	No Ice	1.780	2.610	0.096
*									

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 ft ²	Weight K
Crngn & Stnd UBR100 Int	B	Paraboloid w/Shroud (HP)	From Leg	4.000 0.000 0.000	-10.000		230.000	1.047	No Ice	0.860	0.027
* Commscope VHLPX3-11W	C	Paraboloid w/Shroud (HP)	From Leg	0.000 1.500 0.000 0.000	74.500		200.000	3.283	No Ice	8.467	0.053
*											

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

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Comb. No.	Description
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
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		
T1	250 - 240	Leg	Max Tension	7	15.317	1.702	0.016		
			Max. Compression	10	-19.218	1.146	-0.000		
			Max. Mx	10	-19.215	-1.862	0.010		
			Max. My	4	-2.349	0.000	0.654		
			Max. Vy	10	-6.012	1.146	-0.000		
		Diagonal	Max. Vx	24	4.195	0.003	0.039		
			Max Tension	20	7.168	0.000	0.000		
			Max. Compression	20	-6.583	0.000	0.000		
			Max. Mx	10	-0.718	0.058	-0.002		
			Max. My	20	-6.574	-0.006	0.060		
		Top Girt	Max. Vy	10	0.021	0.058	-0.002		
			Max. Vx	20	-0.020	0.000	0.000		
			Max Tension	22	2.978	0.000	0.000		
			Max. Compression	10	-2.954	0.000	0.000		
			Max. Mx	10	-2.954	-0.005	0.000		
			Max. My	16	-2.499	0.000	0.000		
			Max. Vy	10	0.005	0.000	0.000		
			Max. Vx	16	-0.000	0.000	0.000		
		T2	240 - 220	Leg	Max Tension	23	76.857	2.149	0.006
					Max. Compression	10	-85.868	1.507	0.010
Max. Mx	10				-19.240	4.132	-0.010		
Max. My	16				-2.336	-0.021	1.696		
Max. Vy	10				-8.488	1.507	0.010		
Diagonal	Max. Vx			22	3.426	0.700	-0.487		
	Max Tension			24	8.967	0.000	0.000		
	Max. Compression			24	-8.634	0.000	0.000		
	Max. Mx			10	0.792	0.030	-0.001		
	Max. My			20	-7.236	-0.002	0.029		

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	Vertical Bridge	Akshay Kumar

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T8	120 - 100	Leg	Max. Vx	4	-0.002	0.000	0.000
			Max Tension	15	302.269	3.651	0.036
			Max. Compression	2	-337.667	1.023	0.008
			Max. Mx	2	-302.302	5.993	0.059
			Max. My	12	-10.878	0.012	-2.085
			Max. Vy	2	-11.404	1.023	0.008
		Diagonal	Max. Vx	20	3.637	0.010	-0.588
			Max Tension	24	8.086	0.000	0.000
			Max. Compression	24	-8.029	0.000	0.000
			Max. Mx	12	3.562	0.056	0.004
			Max. My	4	-7.891	0.009	0.010
			Max. Vy	12	0.025	0.056	0.004
			Max. Vx	4	-0.002	0.000	0.000
			Max Tension	15	331.008	4.623	0.043
T9	100 - 80	Leg	Max. Compression	2	-373.394	0.286	-0.002
			Max. Mx	2	-337.700	6.709	0.060
			Max. My	20	-14.511	0.068	-2.410
			Max. Vy	2	-12.526	0.286	-0.002
			Max. Vx	20	3.999	0.002	-0.270
		Diagonal	Max Tension	12	8.947	0.000	0.000
			Max. Compression	24	-8.810	0.000	0.000
			Max. Mx	12	3.883	0.078	0.006
			Max. My	4	-8.536	0.034	0.011
			Max. Vy	12	0.034	0.078	0.006
			Max. Vx	4	-0.002	0.000	0.000
		Leg	Max Tension	15	359.155	4.458	0.032
			Max. Compression	2	-408.879	0.811	0.011
			Max. Mx	2	-373.425	6.548	0.048
			Max. My	20	-16.878	0.077	-2.273
			Max. Vy	2	-13.395	0.811	0.011
			Max. Vx	20	4.668	-0.012	-1.048
T10	80 - 60	Diagonal	Max Tension	12	9.423	0.000	0.000
			Max. Compression	24	-9.369	0.000	0.000
			Max. Mx	12	3.876	0.089	0.007
			Max. My	4	-9.298	0.046	0.014
			Max. Vy	12	0.037	0.089	0.007
			Max. Vx	4	-0.002	0.000	0.000
		Leg	Max Tension	15	386.592	5.500	0.038
			Max. Compression	2	-444.113	-0.034	0.004
			Max. Mx	2	-408.915	7.501	0.059
			Max. My	20	-19.547	0.081	-3.385
			Max. Vy	2	-14.010	-0.034	0.004
			Max. Vx	20	4.674	0.081	-3.385
		Diagonal	Max Tension	13	10.546	0.000	0.000
			Max. Compression	12	-10.681	0.000	0.000
			Max. Mx	12	10.504	0.102	0.000
			Max. My	18	-0.021	0.000	-0.003
			Max. Vy	12	-0.038	0.000	0.000
			Max. Vx	18	-0.001	0.000	0.000
		Horizontal	Max Tension	10	1.622	-0.071	0.001
			Max. Compression	15	-1.570	-0.052	0.002
			Max. Mx	14	0.659	-0.072	0.000
			Max. My	14	0.737	-0.060	0.006
			Max. Vy	14	0.037	-0.072	0.000
			Max. Vx	14	0.001	-0.060	0.006
		Inner Bracing	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-0.005	0.000	0.000
			Max. Mx	6	-0.002	-0.030	0.000
			Max. My	2	-0.005	0.000	-0.000
			Max. Vy	6	0.013	0.000	0.000
			Max. Vx	2	0.000	0.000	0.000

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T12	40 - 20	Leg	Max Tension	15	412.649	6.184	0.039
			Max. Compression	2	-478.412	-0.560	0.002
			Max. Mx	2	-478.373	-8.000	-0.044
			Max. My	20	-21.919	0.070	-3.097
			Max. Vy	2	-14.869	-0.560	0.002
			Max. Vx	20	4.651	0.070	-3.097
		Diagonal	Max Tension	25	10.824	0.000	0.000
			Max. Compression	12	-11.111	0.000	0.000
			Max. Mx	12	10.763	0.116	0.000
			Max. My	18	0.296	0.000	-0.003
			Max. Vy	12	-0.040	0.000	0.000
			Max. Vx	18	0.001	0.000	0.000
		Horizontal	Max Tension	10	1.842	-0.104	0.001
			Max. Compression	15	-1.696	-0.076	0.003
			Max. Mx	14	0.730	-0.106	0.000
			Max. My	14	0.713	-0.088	0.007
			Max. Vy	14	0.050	-0.106	0.000
			Max. Vx	14	0.002	-0.088	0.007
		Inner Bracing	Max Tension	1	0.000	0.000	0.000
			Max. Compression	2	-0.005	0.000	0.000
			Max. Mx	6	-0.003	-0.035	0.000
			Max. My	2	-0.005	0.000	-0.000
			Max. Vy	6	0.014	0.000	0.000
			Max. Vx	2	0.000	0.000	0.000
T13	20 - 0	Leg	Max Tension	15	437.507	6.162	0.040
			Max. Compression	2	-511.899	0.000	-0.000
			Max. Mx	2	-511.860	-8.015	-0.045
			Max. My	21	-18.956	0.063	-2.938
			Max. Vy	2	-16.018	0.000	-0.000
			Max. Vx	21	4.621	0.063	-2.938
		Diagonal	Max Tension	25	11.054	0.000	0.000
			Max. Compression	12	-11.466	0.000	0.000
			Max. Mx	2	9.981	0.160	0.000
			Max. My	2	0.633	0.000	0.004
			Max. Vy	2	-0.052	0.000	0.000
			Max. Vx	2	-0.001	0.000	0.000
		Horizontal	Max Tension	10	1.853	-0.121	0.002
			Max. Compression	15	-1.698	-0.085	0.003
			Max. Mx	14	0.700	-0.125	0.001
			Max. My	14	0.785	-0.101	0.007
			Max. Vy	14	0.054	-0.125	0.001
			Max. Vx	14	0.002	-0.101	0.007
		Inner Bracing	Max Tension	1	0.000	0.000	0.000
			Max. Compression	2	-0.007	0.000	0.000
			Max. Mx	16	-0.005	-0.041	0.000
			Max. My	2	-0.007	0.000	-0.000
			Max. Vy	16	0.015	0.000	0.000
			Max. Vx	2	0.000	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	505.731	31.309	-18.299
	Max. H _x	18	505.731	31.309	-18.299
	Max. H _z	5	-377.179	-23.086	16.097

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Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg B	Min. Vert	7	-430.600	-27.360	16.036
	Min. H _x	7	-430.600	-27.360	16.036
	Min. H _z	18	505.731	31.309	-18.299
	Max. Vert	10	509.620	-31.571	-18.409
	Max. H _x	23	-434.130	27.596	16.151
	Max. H _z	25	-383.814	23.557	16.324
Leg A	Min. Vert	23	-434.130	27.596	16.151
	Min. H _x	10	509.620	-31.571	-18.409
	Min. H _z	10	509.620	-31.571	-18.409
	Max. Vert	2	510.833	-0.078	36.704
	Max. H _x	21	21.221	4.347	1.018
	Max. H _z	2	510.833	-0.078	36.704
	Min. Vert	15	-436.465	0.089	-32.221
	Min. H _x	9	17.757	-4.340	0.811
	Min. H _z	15	-436.465	0.089	-32.221

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	65.621	0.000	0.000	-0.322	1.394	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	78.745	-0.154	-60.524	-9442.397	33.167	-3.436
0.9 Dead+1.0 Wind 0 deg - No Ice	59.059	-0.154	-60.524	-9423.510	32.678	-3.432
1.2 Dead+1.0 Wind 30 deg - No Ice	78.745	28.036	-48.717	-7765.703	-4463.600	-7.302
0.9 Dead+1.0 Wind 30 deg - No Ice	59.059	28.036	-48.717	-7749.960	-4455.033	-7.298
1.2 Dead+1.0 Wind 60 deg - No Ice	78.745	47.430	-27.246	-4375.596	-7625.383	-7.946
0.9 Dead+1.0 Wind 60 deg - No Ice	59.059	47.430	-27.246	-4366.644	-7610.369	-7.945
1.2 Dead+1.0 Wind 90 deg - No Ice	78.745	55.496	0.187	37.587	-8882.786	-8.742
0.9 Dead+1.0 Wind 90 deg - No Ice	59.059	55.496	0.187	37.601	-8865.260	-8.743
1.2 Dead+1.0 Wind 120 deg - No Ice	78.745	52.124	30.158	4719.447	-8151.084	-6.415
0.9 Dead+1.0 Wind 120 deg - No Ice	59.059	52.124	30.158	4710.135	-8135.258	-6.418
1.2 Dead+1.0 Wind 150 deg - No Ice	78.745	28.674	49.512	7875.465	-4563.708	-3.936
0.9 Dead+1.0 Wind 150 deg - No Ice	59.059	28.674	49.512	7859.727	-4554.947	-3.940
1.2 Dead+1.0 Wind 180 deg - No Ice	78.745	0.195	55.562	8906.251	-37.926	3.690
0.9 Dead+1.0 Wind 180 deg - No Ice	59.059	0.195	55.562	8888.362	-38.270	3.686
1.2 Dead+1.0 Wind 210 deg - No Ice	78.745	-28.021	48.713	7764.254	4464.033	7.264
0.9 Dead+1.0 Wind 210 deg - No Ice	59.059	-28.021	48.713	7748.709	4454.613	7.260
1.2 Dead+1.0 Wind 240 deg - No Ice	78.745	-51.780	29.769	4650.789	8103.225	8.105
0.9 Dead+1.0 Wind 240 deg - No Ice	59.059	-51.780	29.769	4641.610	8086.641	8.103

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
No Ice						
1.2 Dead+1.0 Wind 270 deg - No Ice	78.745	-55.449	-0.146	-30.060	8877.060	9.238
0.9 Dead+1.0 Wind 270 deg - No Ice	59.059	-55.449	-0.146	-29.910	8858.703	9.239
1.2 Dead+1.0 Wind 300 deg - No Ice	78.745	-47.726	-27.597	-4436.455	7670.647	6.943
0.9 Dead+1.0 Wind 300 deg - No Ice	59.059	-47.726	-27.597	-4427.386	7654.710	6.946
1.2 Dead+1.0 Wind 330 deg - No Ice	78.745	-28.622	-49.453	-7864.542	4556.927	4.345
0.9 Dead+1.0 Wind 330 deg - No Ice	59.059	-28.623	-49.453	-7848.629	4547.346	4.349
Dead+Wind 0 deg - Service	65.621	-0.040	-15.990	-2486.655	9.673	-0.904
Dead+Wind 30 deg - Service	65.621	7.409	-12.874	-2045.301	-1174.542	-1.914
Dead+Wind 60 deg - Service	65.621	12.536	-7.201	-1152.569	-2007.231	-2.091
Dead+Wind 90 deg - Service	65.621	14.667	0.049	9.658	-2338.343	-2.307
Dead+Wind 120 deg - Service	65.621	13.771	7.968	1242.537	-2145.445	-1.689
Dead+Wind 150 deg - Service	65.621	7.577	13.084	2073.725	-1200.843	-1.030
Dead+Wind 180 deg - Service	65.621	0.051	14.684	2345.249	-9.012	0.970
Dead+Wind 210 deg - Service	65.621	-7.405	12.873	2044.491	1176.558	1.904
Dead+Wind 240 deg - Service	65.621	-13.680	7.865	1224.493	2134.783	2.133
Dead+Wind 270 deg - Service	65.621	-14.654	-0.038	-8.121	2338.759	2.438
Dead+Wind 300 deg - Service	65.621	-12.614	-7.294	-1168.567	2021.051	1.828
Dead+Wind 330 deg - Service	65.621	-7.564	-13.068	-2071.288	1200.991	1.137

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	0.000	-65.621	0.000	0.000	65.621	0.000	0.000%
2	-0.154	-78.745	-60.524	0.154	78.745	60.524	0.000%
3	-0.154	-59.059	-60.524	0.154	59.059	60.524	0.000%
4	28.036	-78.745	-48.717	-28.036	78.745	48.717	0.000%
5	28.036	-59.059	-48.717	-28.036	59.059	48.717	0.000%
6	47.430	-78.745	-27.246	-47.430	78.745	27.246	0.000%
7	47.430	-59.059	-27.246	-47.430	59.059	27.246	0.000%
8	55.496	-78.745	0.187	-55.496	78.745	-0.187	0.000%
9	55.496	-59.059	0.187	-55.496	59.059	-0.187	0.000%
10	52.125	-78.745	30.158	-52.124	78.745	-30.158	0.000%
11	52.125	-59.059	30.158	-52.124	59.059	-30.158	0.000%
12	28.674	-78.745	49.512	-28.674	78.745	-49.512	0.000%
13	28.674	-59.059	49.512	-28.674	59.059	-49.512	0.000%
14	0.195	-78.745	55.562	-0.195	78.745	-55.562	0.000%
15	0.195	-59.059	55.562	-0.195	59.059	-55.562	0.000%
16	-28.021	-78.745	48.714	28.021	78.745	-48.713	0.000%
17	-28.021	-59.059	48.714	28.021	59.059	-48.713	0.000%
18	-51.780	-78.745	29.769	51.780	78.745	-29.769	0.000%
19	-51.780	-59.059	29.769	51.780	59.059	-29.769	0.000%
20	-55.450	-78.745	-0.146	55.449	78.745	0.146	0.000%
21	-55.450	-59.059	-0.146	55.449	59.059	0.146	0.000%
22	-47.726	-78.745	-27.597	47.726	78.745	27.597	0.000%
23	-47.726	-59.059	-27.597	47.726	59.059	27.597	0.000%
24	-28.623	-78.745	-49.453	28.622	78.745	49.453	0.000%
25	-28.623	-59.059	-49.453	28.623	59.059	49.453	0.000%
26	-0.040	-65.621	-15.990	0.040	65.621	15.990	0.000%
27	7.409	-65.621	-12.874	-7.409	65.621	12.874	0.000%

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		Akshay Kumar

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
28	12.536	-65.621	-7.201	-12.536	65.621	7.201	0.000%
29	14.667	-65.621	0.049	-14.667	65.621	-0.049	0.000%
30	13.771	-65.621	7.968	-13.771	65.621	-7.968	0.000%
31	7.577	-65.621	13.084	-7.577	65.621	-13.084	0.000%
32	0.051	-65.621	14.684	-0.051	65.621	-14.684	0.000%
33	-7.405	-65.621	12.873	7.405	65.621	-12.873	0.000%
34	-13.680	-65.621	7.865	13.680	65.621	-7.865	0.000%
35	-14.654	-65.621	-0.038	14.654	65.621	0.038	0.000%
36	-12.614	-65.621	-7.294	12.614	65.621	7.294	0.000%
37	-7.564	-65.621	-13.068	7.564	65.621	13.068	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000958
3	Yes	4	0.00000001	0.00000888
4	Yes	4	0.00000001	0.00000751
5	Yes	4	0.00000001	0.00000703
6	Yes	4	0.00000001	0.00000715
7	Yes	4	0.00000001	0.00000692
8	Yes	4	0.00000001	0.00000758
9	Yes	4	0.00000001	0.00000710
10	Yes	4	0.00000001	0.00000963
11	Yes	4	0.00000001	0.00000892
12	Yes	4	0.00000001	0.00000761
13	Yes	4	0.00000001	0.00000712
14	Yes	4	0.00000001	0.00000720
15	Yes	4	0.00000001	0.00000696
16	Yes	4	0.00000001	0.00000751
17	Yes	4	0.00000001	0.00000703
18	Yes	4	0.00000001	0.00000956
19	Yes	4	0.00000001	0.00000885
20	Yes	4	0.00000001	0.00000755
21	Yes	4	0.00000001	0.00000707
22	Yes	4	0.00000001	0.00000720
23	Yes	4	0.00000001	0.00000697
24	Yes	4	0.00000001	0.00000760
25	Yes	4	0.00000001	0.00000711
26	Yes	4	0.00000001	0.00000096
27	Yes	4	0.00000001	0.00000094
28	Yes	4	0.00000001	0.00000091
29	Yes	4	0.00000001	0.00000094
30	Yes	4	0.00000001	0.00000096
31	Yes	4	0.00000001	0.00000093
32	Yes	4	0.00000001	0.00000091
33	Yes	4	0.00000001	0.00000094
34	Yes	4	0.00000001	0.00000096
35	Yes	4	0.00000001	0.00000094
36	Yes	4	0.00000001	0.00000091
37	Yes	4	0.00000001	0.00000093

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Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	250 - 240	9.822	26	0.373	0.042
T2	240 - 220	8.987	26	0.374	0.041
T3	220 - 200	7.368	26	0.342	0.032
T4	200 - 180	5.951	26	0.296	0.024
T5	180 - 160	4.730	26	0.257	0.017
T6	160 - 140	3.679	26	0.220	0.013
T7	140 - 120	2.781	26	0.182	0.009
T8	120 - 100	2.036	26	0.149	0.007
T9	100 - 80	1.416	26	0.119	0.005
T10	80 - 60	0.918	26	0.093	0.003
T11	60 - 40	0.523	26	0.067	0.002
T12	40 - 20	0.254	26	0.043	0.001
T13	20 - 0	0.080	26	0.021	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
250.000	Lightning Rod 1"x10'	26	9.822	0.373	0.042	410732
245.000	(2) NHH-65C-R2B_TIA w/ Mount Pipe	26	9.404	0.375	0.042	410732
230.000	Crgn & Stnd UBR100 Int	26	8.160	0.363	0.037	34968
200.000	Commscope VHLPX3-11W	26	5.951	0.296	0.024	25297

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	250 - 240	37.386	2	1.421	0.163
T2	240 - 220	34.199	2	1.426	0.156
T3	220 - 200	28.034	2	1.300	0.121
T4	200 - 180	22.638	2	1.128	0.091
T5	180 - 160	17.987	2	0.977	0.065
T6	160 - 140	13.989	2	0.837	0.049
T7	140 - 120	10.572	2	0.693	0.036
T8	120 - 100	7.736	2	0.565	0.026
T9	100 - 80	5.379	2	0.453	0.018
T10	80 - 60	3.487	2	0.353	0.012
T11	60 - 40	1.985	2	0.253	0.007
T12	40 - 20	0.965	2	0.162	0.005
T13	20 - 0	0.304	2	0.081	0.002

Critical Deflections and Radius of Curvature - Design Wind

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	Vertical Bridge	Akshay Kumar

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
250.000	Lightning Rod 1"x10'	2	37.386	1.421	0.163	94473
245.000	(2) NHH-65C-R2B_TIA w/ Mount Pipe	2	35.791	1.428	0.160	94473
230.000	Crgn & Stnd UBR100 Int	2	31.051	1.381	0.141	9098
200.000	Commscope VHLPX3-11W	2	22.638	1.128	0.091	6631

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	250	Leg	A325N	0.750	6	2.553	30.101	0.085	1	Bolt Tension
		Diagonal	A325X	0.625	1	7.168	9.598	0.747	1	Member Block Shear
		Top Girt	A325X	0.625	1	2.978	9.598	0.310	1	Member Block Shear
T2	240	Leg	A325N	0.750	6	12.809	30.101	0.426	1	Bolt Tension
		Diagonal	A325X	0.625	1	8.967	9.598	0.934	1	Member Block Shear
T3	220	Leg	A325N	1.000	6	21.812	54.517	0.400	1	Bolt Tension
		Diagonal	A325X	0.625	1	8.355	10.740	0.778	1	Member Block Shear
T4	200	Leg	A325N	1.000	6	28.951	54.517	0.531	1	Bolt Tension
		Diagonal	A325X	0.625	1	7.396	10.740	0.689	1	Member Block Shear
T5	180	Leg	A325N	1.000	6	34.989	54.517	0.642	1	Bolt Tension
		Diagonal	A325X	0.625	1	7.100	13.025	0.545	1	Member Block Shear
T6	160	Leg	A325N	1.250	6	40.397	87.220	0.463	1	Bolt Tension
		Diagonal	A325X	0.625	1	7.145	13.025	0.549	1	Member Block Shear
T7	140	Leg	A325N	1.250	6	45.479	87.220	0.521	1	Bolt Tension
		Diagonal	A325X	0.625	1	7.609	14.168	0.537	1	Member Block Shear
T8	120	Leg	A325N	1.250	6	50.378	87.220	0.578	1	Bolt Tension
		Diagonal	A325X	0.625	1	8.086	14.168	0.571	1	Member Block Shear
T9	100	Leg	A325N	1.250	6	55.168	87.220	0.633	1	Bolt Tension
		Diagonal	A325X	0.625	1	8.947	17.257	0.518	1	Bolt Shear
T10	80	Leg	A325N	1.500	6	59.859	126.472	0.473	1	Bolt Tension
		Diagonal	A325X	0.625	1	9.423	17.257	0.546	1	Bolt Shear
T11	60	Leg	A325N	1.500	6	64.432	126.472	0.509	1	Bolt Tension
		Diagonal	A325X	0.625	1	10.546	26.051	0.405	1	Member Block Shear
		Horizontal	A325X	0.625	1	7.698	21.480	0.358	1	Member Block Shear
T12	40	Leg	A325N	1.500	6	68.775	126.472	0.544	1	Bolt Tension
		Diagonal	A325X	0.625	1	10.824	26.051	0.416	1	Member Block Shear
		Horizontal	A325X	0.625	1	8.292	26.051	0.318	1	Member Block Shear
T13	20	Diagonal	A325X	0.625	1	11.466	29.250	0.392	1	Gusset Bearing
		Horizontal	A325X	0.625	1	8.873	26.051	0.341	1	Member Block Shear

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Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	1 3/4	10.009	4.504	123.5 K=1.00	2.405	-11.595	35.601	0.326 ¹
T2	240 - 220	2 1/4	20.019	4.754	101.4 K=1.00	3.976	-78.031	84.331	0.925 ¹
T3	220 - 200	2 3/4	20.019	4.754	83.0 K=1.00	5.940	-136.514	161.540	0.845 ¹
T4	200 - 180	3 1/4	20.019	4.754	70.2 K=1.00	8.296	-183.744	260.312	0.706 ¹
T5	180 - 160	3 1/2	20.019	4.754	65.2 K=1.00	9.621	-224.643	317.273	0.708 ¹
T6	160 - 140	3 1/2	20.019	4.754	65.2 K=1.00	9.621	-261.889	317.273	0.825 ¹
T7	140 - 120	3 3/4	20.019	4.754	60.9 K=1.00	11.045	-297.579	379.106	0.785 ¹
T8	120 - 100	4	20.019	4.754	57.1 K=1.00	12.566	-332.759	445.717	0.747 ¹
T9	100 - 80	4 1/4	20.019	4.754	53.7 K=1.00	14.186	-368.356	517.034	0.712 ¹
T10	80 - 60	4 1/4	20.019	4.754	53.7 K=1.00	14.186	-403.942	517.034	0.781 ¹
T11	60 - 40	4 1/2	20.019	4.754	50.7 K=1.00	15.904	-434.792	593.004	0.733 ¹
T12	40 - 20	4 3/4	20.019	4.754	48.0 K=1.00	17.721	-469.054	673.582	0.696 ¹
T13	20 - 0	4 3/4	20.019	4.754	48.0 K=1.00	17.721	-502.511	673.582	0.746 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	L1 3/4x1 3/4x3/16	6.221	2.960	107.6 K=1.04	0.621	-6.583	15.362	0.429 ¹
T2	240 - 220	L1 3/4x1 3/4x3/16	7.485	3.570	124.7 K=1.00	0.621	-8.249	11.425	0.722 ¹
T3	220 - 200	L2x2x3/16	7.823	3.720	115.0 K=1.01	0.715	-9.102	15.479	0.588 ¹
T4	200 - 180	L2x2x3/16	9.987	4.774	145.4 K=1.00	0.715	-6.861	9.679	0.709 ¹
T5	180 - 160	L2 1/2x2 1/2x3/16	11.329	5.435	131.8 K=1.00	0.902	-6.903	14.870	0.464 ¹
T6	160 - 140	L2 1/2x2 1/2x3/16	12.706	6.125	148.5	0.902	-6.988	11.709	0.597 ¹

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	Vertical Bridge	Akshay Kumar

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T7	140 - 120	L3x3x3/16	14.108	6.816	K=1.00 137.2	1.090	-7.463	16.564	0.451 ¹
T8	120 - 100	L3x3x3/16	15.529	7.516	K=1.00 151.3	1.090	-8.029	13.622	0.589 ¹
T9	100 - 80	L3x3x1/4	16.963	8.223	K=1.00 166.7	1.440	-8.810	14.834	0.594 ¹
T10	80 - 60	L3x3x1/4	18.408	8.946	K=1.00 181.3	1.440	-9.369	12.533	0.748 ¹
T11	60 - 40	2L2 1/2x2 1/2x3/16x3/8	10.829	10.287	K=1.00 158.4	1.800	-10.681	19.794	0.540 ¹
T12	40 - 20	ai/ri > 0.75(KL/r) _o - 269 2L2 1/2x2 1/2x3/16x3/8	11.508	10.957	K=1.00 168.7	1.800	-11.111	17.534	0.634 ¹
T13	20 - 0	ai/ri > 0.75(KL/r) _o - 308 2L3x3x3/16x3/8 ai/ri > 0.75(KL/r) _o - 347	12.195	11.647	K=1.00 148.8	2.180	-11.466	26.343	0.435 ¹

¹ P_u / φP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T11	60 - 40	2L2x2x3/16x3/8	19.106	9.199	K=1.00 178.8	1.430	-7.698	12.584	0.612 ¹
T12	40 - 20	ai/ri > 0.75(KL/r) _o - 268 2L2 1/2x2 1/2x3/16x3/8	20.606	9.939	K=1.00 153.0	1.800	-8.292	21.141	0.392 ¹
T13	20 - 0	ai/ri > 0.75(KL/r) _o - 307 2L2 1/2x2 1/2x3/16x3/8 ai/ri > 0.75(KL/r) _o - 346	22.106	10.688	K=1.00 164.6	1.800	-8.873	18.392	0.482 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	L1 3/4x1 3/4x3/16	3.788	3.308	K=1.02 117.8	0.621	-2.954	12.811	0.231 ¹

¹ P_u / φP_n controls

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	Vertical Bridge	Akshay Kumar

Inner Bracing Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in ²	K	K	$\frac{P_u}{\phi P_n}$
T11	60 - 40	L1 3/4x1 3/4x3/16	9.197	9.197	321.3 K=1.00	0.621	-0.005	1.722	0.003 ¹
T12	40 - 20	KL/R > 250 (C) - 293 L1 3/4x1 3/4x3/16	10.303	10.303	360.0 K=1.00	0.621	-0.005	1.372	0.004 ¹
T13	20 - 0	KL/R > 250 (C) - 315 L1 3/4x1 3/4x3/16	10.697	10.697	373.7 K=1.00	0.621	-0.007	1.273	0.005 ¹
		KL/R > 250 (C) - 371							

¹ P_u / φP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in ²	K	K	$\frac{P_u}{\phi P_n}$
T1	250 - 240	1 3/4	10.009	0.500	13.7	2.405	15.317	108.238	0.142 ¹
T2	240 - 220	2 1/4	20.019	0.500	10.7	3.976	76.857	178.924	0.430 ¹
T3	220 - 200	2 3/4	20.019	0.500	8.7	5.940	130.873	267.281	0.490 ¹
T4	200 - 180	3 1/4	20.019	0.500	7.4	8.296	173.705	373.310	0.465 ¹
T5	180 - 160	3 1/2	20.019	0.500	6.9	9.621	209.934	432.951	0.485 ¹
T6	160 - 140	3 1/2	20.019	0.500	6.9	9.621	242.382	432.951	0.560 ¹
T7	140 - 120	3 3/4	20.019	0.500	6.4	11.045	272.873	497.010	0.549 ¹
T8	120 - 100	4	20.019	0.500	6.0	12.566	302.269	565.487	0.535 ¹
T9	100 - 80	4 1/4	20.019	0.500	5.7	14.186	331.008	638.381	0.519 ¹
T10	80 - 60	4 1/4	20.019	0.500	5.7	14.186	359.155	638.381	0.563 ¹
T11	60 - 40	4 1/2	20.019	0.500	5.3	15.904	386.592	715.694	0.540 ¹
T12	40 - 20	4 3/4	20.019	0.500	5.1	17.721	412.649	797.425	0.517 ¹
T13	20 - 0	4 3/4	20.019	0.500	5.1	17.721	437.507	797.425	0.549 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in ²	K	K	$\frac{P_u}{\phi P_n}$
T1	250 - 240	L1 3/4x1 3/4x3/16	6.221	2.960	69.9	0.360	7.168	17.567	0.408 ¹
T2	240 - 220	L1 3/4x1 3/4x3/16	7.485	3.570	83.5	0.360	8.967	17.567	0.510 ¹
T3	220 - 200	L2x2x3/16	7.823	3.720	75.6	0.431	8.355	21.001	0.398 ¹
T4	200 - 180	L2x2x3/16	9.061	4.315	87.2	0.431	7.396	21.001	0.352 ¹
T5	180 - 160	L2 1/2x2 1/2x3/16	11.329	5.435	86.4	0.571	7.100	27.838	0.255 ¹
T6	160 - 140	L2 1/2x2 1/2x3/16	12.706	6.125	97.0	0.571	7.145	27.838	0.257 ¹

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	Client Vertical Bridge	Designed by Akshay Kumar

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T7	140 - 120	L3x3x3/16	14.108	6.816	89.2	0.712	7.609	34.712	0.219 ¹
T8	120 - 100	L3x3x3/16	15.529	7.516	98.2	0.712	8.086	34.712	0.233 ¹
T9	100 - 80	L3x3x1/4	16.963	8.223	108.3	0.939	8.947	45.794	0.195 ¹
T10	80 - 60	L3x3x1/4	18.408	8.946	117.6	0.939	9.423	45.794	0.206 ¹
T11	60 - 40	2L2 1/2x2 1/2x3/16x3/8 ai/ri > 0.75(KL/r) _o - 270	10.829	10.287	163.8	1.139	10.546	55.529	0.190 ¹
T12	40 - 20	2L2 1/2x2 1/2x3/16x3/8 ai/ri > 0.75(KL/r) _o - 308	11.508	10.957	174.1	1.139	10.824	55.529	0.195 ¹
T13	20 - 0	2L3x3x3/16x3/8 ai/ri > 0.75(KL/r) _o - 347	12.195	11.647	153.1	1.424	11.054	69.423	0.159 ¹

¹ P_u / φP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T11	60 - 40	2L2x2x3/16x3/8 ai/ri > 0.75(KL/r) _o - 268	19.106	9.199	182.2	0.862	7.698	42.001	0.183 ¹
T12	40 - 20	2L2 1/2x2 1/2x3/16x3/8 ai/ri > 0.75(KL/r) _o - 310	20.606	9.939	155.9	1.139	8.292	55.529	0.149 ¹
T13	20 - 0	2L2 1/2x2 1/2x3/16x3/8 ai/ri > 0.75(KL/r) _o - 346	22.106	10.688	167.4	1.139	8.873	55.529	0.160 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	L1 3/4x1 3/4x3/16	3.788	3.308	81.4	0.360	2.978	17.567	0.170 ¹

¹ P_u / φP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
T1	250 - 240	Leg	1 3/4	2	-11.595	35.601	32.6	Pass
T2	240 - 220	Leg	2 1/4	20	-78.031	84.331	92.5	Pass
T3	220 - 200	Leg	2 3/4	47	-136.514	161.540	84.5	Pass
T4	200 - 180	Leg	3 1/4	74	-183.744	260.312	70.6	Pass
T5	180 - 160	Leg	3 1/2	101	-224.643	317.273	70.8	Pass
T6	160 - 140	Leg	3 1/2	128	-261.889	317.273	82.5	Pass
T7	140 - 120	Leg	3 3/4	155	-297.579	379.106	78.5	Pass

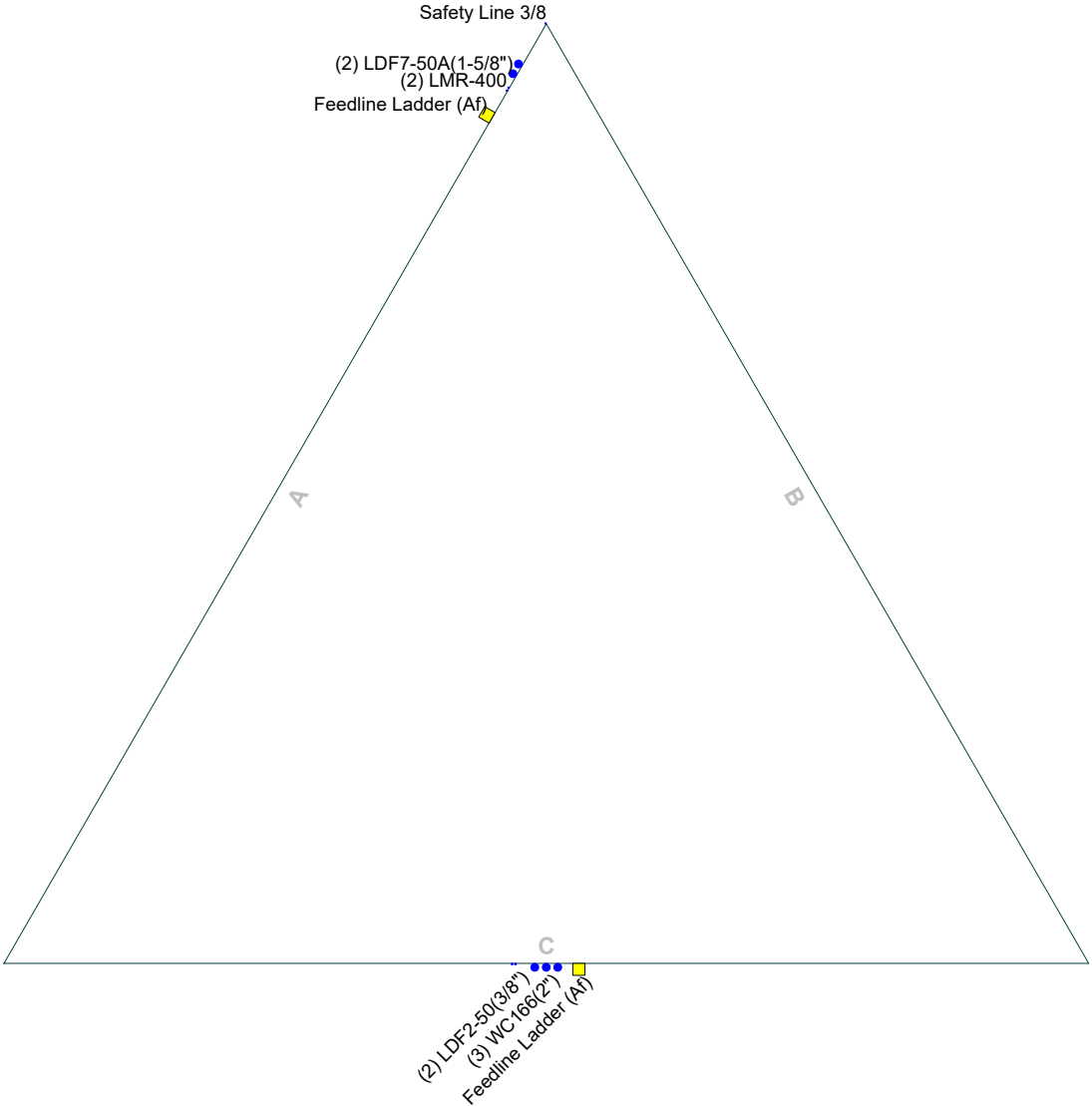
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	Vertical Bridge	Akshay Kumar

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T8	120 - 100	Leg	4	182	-332.759	445.717	74.7	Pass
T9	100 - 80	Leg	4 1/4	210	-368.356	517.034	71.2	Pass
T10	80 - 60	Leg	4 1/4	237	-403.942	517.034	78.1	Pass
T11	60 - 40	Leg	4 1/2	264	-434.792	593.004	73.3	Pass
T12	40 - 20	Leg	4 3/4	303	-469.054	673.582	69.6	Pass
T13	20 - 0	Leg	4 3/4	342	-502.511	673.582	74.6	Pass
T1	250 - 240	Diagonal	L1 3/4x1 3/4x3/16	7	-6.583	15.362	42.9	Pass
							74.7 (b)	
T2	240 - 220	Diagonal	L1 3/4x1 3/4x3/16	25	-8.249	11.425	72.2	Pass
							93.4 (b)	
T3	220 - 200	Diagonal	L2x2x3/16	70	-9.102	15.479	58.8	Pass
							77.8 (b)	
T4	200 - 180	Diagonal	L2x2x3/16	80	-6.861	9.679	70.9	Pass
T5	180 - 160	Diagonal	L2 1/2x2 1/2x3/16	107	-6.903	14.870	46.4	Pass
							54.5 (b)	
T6	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	134	-6.988	11.709	59.7	Pass
T7	140 - 120	Diagonal	L3x3x3/16	161	-7.463	16.564	45.1	Pass
							53.7 (b)	
T8	120 - 100	Diagonal	L3x3x3/16	187	-8.029	13.622	58.9	Pass
T9	100 - 80	Diagonal	L3x3x1/4	214	-8.810	14.834	59.4	Pass
T10	80 - 60	Diagonal	L3x3x1/4	241	-9.369	12.533	74.8	Pass
T11	60 - 40	Diagonal	2L2 1/2x2 1/2x3/16x3/8	269	-10.681	19.794	54.0	Pass
T12	40 - 20	Diagonal	2L2 1/2x2 1/2x3/16x3/8	308	-11.111	17.534	63.4	Pass
T13	20 - 0	Diagonal	2L3x3x3/16x3/8	347	-11.466	26.343	43.5	Pass
T11	60 - 40	Horizontal	2L2x2x3/16x3/8	268	-7.698	12.584	61.2	Pass
T12	40 - 20	Horizontal	2L2 1/2x2 1/2x3/16x3/8	307	-8.292	21.141	39.2	Pass
T13	20 - 0	Horizontal	2L2 1/2x2 1/2x3/16x3/8	349	-8.873	18.392	48.2	Pass
T1	250 - 240	Top Girt	L1 3/4x1 3/4x3/16	6	-2.954	12.811	23.1	Pass
							31.0 (b)	
T11	60 - 40	Inner Bracing	L1 3/4x1 3/4x3/16	293	-0.005	1.722	0.3	Pass
T12	40 - 20	Inner Bracing	L1 3/4x1 3/4x3/16	315	-0.005	1.372	0.4	Pass
T13	20 - 0	Inner Bracing	L1 3/4x1 3/4x3/16	371	-0.007	1.273	0.5	Pass
							Summary	
						Leg (T2)	92.5	Pass
						Diagonal (T2)	93.4	Pass
						Horizontal (T11)	61.2	Pass
						Top Girt (T1)	31.0	Pass
						Inner Bracing (T13)	0.5	Pass
						Bolt Checks	93.4	Pass
						RATING =	93.4	Pass

APPENDIX B
BASE LEVEL DRAWING

Feed Line Plan

Round Flat App In Face App Out Face





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Job: 174774.001.01.0001 - Ebenezer, FL (Site# US-FL-5391)		
Project:		
Client: Vertical Bridge	Drawn by: Akshay Kumar	App'd:
Code: TIA-222-H	Date: 01/30/25	Scale: NTS
Path:	Dwg No. E-7	

APPENDIX C
ADDITIONAL CALCULATIONS

Self Support Anchor Rod Capacity

Site Info		
Site #	US-FL-5391	
Site Name	Ebenezer, FL	
Project #	174774.001.01.0001	

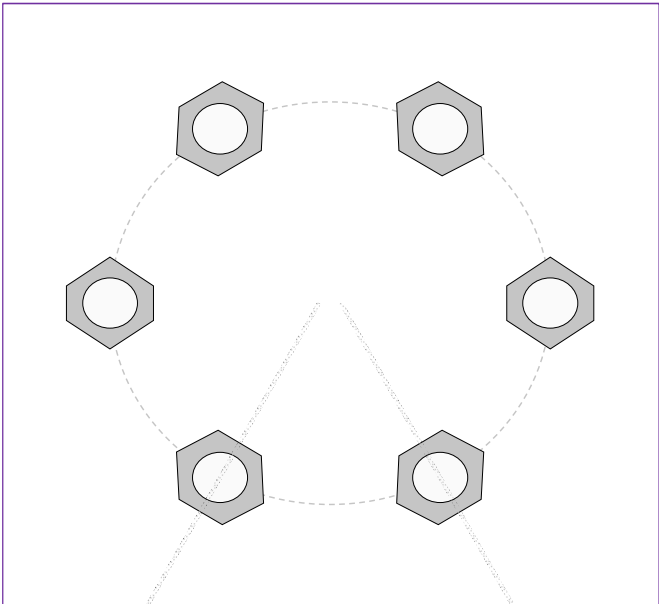
Analysis Considerations		
TIA-222 Revision	H	
Grout Considered:	No	
<i>l_{ar}</i> (in)	1.5	

Applied Loads		
	Comp.	Uplift
Axial Force (kips)	510.83	436.47
Shear Force (kips)	36.70	32.22

*TIA-222-H Section 15.5 Applied

Considered Eccentricity		
Leg Mod Eccentricity (in)	0.000	
Anchor Rod N.A Shift (in)	0.000	
Total Eccentricity (in)	0.000	

*Anchor Rod Eccentricity Applied



Connection Properties		Analysis Results	
Anchor Rod Data		Anchor Rod Summary	
(6) 1-1/2" $\varnothing$ bolts (F1554-105 N; Fy=105 ksi, Fu=125 ksi)		(units of kips, kip-in)	
<i>l_{ar}</i> (in): 1.5		Pu _t = 72.74	ϕ Pn _t = 132.19
		Vu = 5.37	ϕ Vn = 82.83
		Mu = n/a	ϕ Mn = n/a
			Stress Rating
			52.4%
			Pass

Drilled Pier Foundation

Site #	US-FL-5391
Site Name:	Ebenezer, FL
Project #	174774.001.01.0001
TIA-222 Revision:	H
Tower Type:	Self Support

Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	0	0
Axial Force (kips)	510.83	436.46
Shear Force (kips)	36.7	32.22

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

Pier Design Data		
Depth	48	ft
Ext. Above Grade	0.5	ft
Pier Section 1		
From 0.5' above grade to 48' below grade		
Pier Diameter	4.5	ft
Rebar Quantity	12	
Rebar Size	9	
Clear Cover to Ties	3	in
Tie Size	4	
Tie Spacing	12	in

Rebar & Pier Options

Embedded Pole Inputs

Belled Pier Inputs

Analysis Results		
Soil Lateral Check	Compression	Uplift
D _{v=0} (ft from TOC)	20.22	20.22
Soil Safety Factor	28.53	32.50
Max Moment (kip-ft)	497.98	437.19
Rating	4.7%	4.1%

Soil Vertical Check	Compression	Uplift
Skin Friction (kips)	563.62	563.62
End Bearing (kips)	212.92	-
Weight of Concrete (kips)	85.82	64.37
Total Capacity (kips)	776.54	627.98
Axial (kips)	596.65	436.46
Rating	76.8%	69.5%

Reinforced Concrete Flexure	Compression	Uplift
Critical Depth (ft from TOC)	21.24	14.89
Critical Moment (kip-ft)	496.76	403.16
Critical Moment Capacity	1695.68	743.99
Rating	29.3%	54.2%

Reinforced Concrete Shear	Compression	Uplift
Critical Depth (ft from TOC)	38.22	0.00
Critical Shear (kip)	36.99	32.22
Critical Shear Capacity	402.54	158.51
Rating	9.2%	20.3%

Structural Foundation Rating	54.2%
Soil Interaction Rating	76.8%

Check Limitation	
Apply TIA-222-H Section 15.5:	☐
N/A	☐
Design Options	
Input Effective Depths (else Actual):	☐
Consider non-tapered moment capacity:	☐
Check Shear along Depth of Pier:	☒
Utilize Shear-Friction Methodology:	☐
Override Critical Depth:	☐

[Go to Soil Calculations](#)

Soil Profile			
Groundwater Depth	3.5	# of Layers	24

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	Y _{soil} (pcf)	Y _{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	3	110	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	3	3.5	0.5	120	150	0	34	0.000	0.000	0.50	0.50			Cohesionless
3	3.5	6.3	2.8	57.6	87.6	0	34	0.000	0.000	0.50	0.50			Cohesionless
4	6.3	7.3	1	57.6	87.6	2	0	1.100	1.100	1.10	1.10			Cohesive
5	7.3	9	1.7	62.6	87.6	0	36	0.000	0.000	1.50	1.50			Cohesionless
6	9	11.5	2.5	67.6	87.6	0	40	0.000	0.000	2.00	2.00			Cohesionless
7	11.5	12.8	1.3	67.6	87.6	0	37	0.00	0.00	1.75	1.75			Cohesionless
8	12.8	14.8	2	67.6	87.6	3.75	0	1.96	1.96	1.90	1.90			Cohesive
9	14.8	16.3	1.5	67.6	87.6	0	39	0.00	0.00	2.00	2.00			Cohesionless
10	16.3	17.2	0.9	62.6	87.6	3	0	1.65	1.65	1.65	1.65			Cohesive
11	17.2	18.5	1.3	67.6	87.6	0	40	0.00	0.00	2.25	2.25			Cohesionless
12	18.5	20	1.5	57.6	87.6	0	34	0.00	0.00	1.10	1.10			Cohesionless
13	20	22.2	2.2	47.6	87.6	0	32	0.00	0.00	0.85	0.85			Cohesionless
14	22.2	23.3	1.1	32.6	87.6	0	27	0.00	0.00	0.41	0.41			Cohesionless
15	23.3	24	0.7	37.6	87.6	0.75	0	0.41	0.41	0.41	0.41			Cohesive
16	24	26.2	2.2	27.6	87.6	0	25	0.00	0.00	0.41	0.41			Cohesionless
17	26.2	28	1.8	37.6	87.6	0.5	0	0.28	0.28	0.28	0.28			Cohesive
18	28	29.5	1.5	57.6	87.6	0	35	0.00	0.00	1.10	1.10			Cohesionless
19	29.5	35.2	5.7	47.6	87.6	1.5	0	0.83	0.83	0.83	0.83			Cohesive
20	35.2	35.8	0.6	57.6	87.6	0	35	0.00	0.00	1.24	1.24			Cohesionless
21	35.8	39.1	3.3	57.6	87.6	2.25	0	1.24	1.24	1.24	1.24			Cohesive
22	39.1	42.6	3.5	62.6	87.6	0	37	0.00	0.00	1.60	1.60			Cohesionless
23	42.6	47.4	4.8	57.6	87.6	2.25	0	1.24	1.24	1.24	1.24			Cohesive
24	47.4	48	0.6	62.6	87.6	0	37	0.00	0.00	1.70	1.70	15		Cohesionless

Site # US-FL-5391
Name: Ebenezer, FL
County: Columbia

Structure: A
Rev:

Location				
	Decimal Degrees	Deg	Min	Sec
Lat:	30.102997	+	30	6
Long:	-82.574153	-	82	34
				10.79
				26.95
Code and Site Parameters				
Seismic Design Code:		TIA-222-H-1		
Site Soil:		D (Default) Default		
Risk Category:		II		
<u>USGS Seismic Reference</u>				
	S _s :	0.1300	g	
	S ₁ :	0.0580	g	
	T _L :	8	s	
Seismic Design Category Determination				
Importance Factor, I _e :		1		
Acceleration-based site coefficient, F _a :		1.6000		
Velocity-based site coefficient, F _v :		2.4000		
Design spectral response acceleration short period, S _{DS} :		0.1387	g	
Design spectral response acceleration 1 s period, S _{D1} :		0.0928	g	
		T _s :	0.6692	
Seismic Design Category Based on S _{DS} :		A		
Seismic Design Category Based on S _{D1} :		B		
Seismic Design Category Based on S ₁ :		N/A		
Controlling Seismic Design Category:		B		

Site# US-FL-5391
Name: Ebenezer, FL
County: Columbia

Structure: A
Rev:

Tower Details			
Tower Type:	Self-Support		
Height, h:	250	ft	
Effective Seismic Weight, W:	65.62	kips	
Amplification Factor, A _s :	1.0		2.7.8.1

Seismic Base Shear			
Response Modification Factor, R:	3		
	w _a :	13.1250	ft
	w ₀ :	22.5000	ft
	W ₁ :	32.1726	kips
Weight of Structure and Appurtenances within top 5%, W ₂ :	6.3218	kips	
	K _r :	4540	ft
	F _a :	0.8716	hz
Approximate Fundamental Period Self-Support, T _a :	1.1473	s	2.7.7.1.3.2
	Seismic Response Coefficient, C _s	0.0462	2.7.7.1.1
	Seismic Response Coefficient Max 1, C _{smax}	0.0270	2.7.7.1.1
	Seismic Response Coefficient Max 2, C _{smax}	N/A	2.7.7.1.1
	Seismic Response Coefficient Min 1, C _{smin}	0.0300	2.7.7.1.1
	Seismic Response Coefficient Min 2, C _{smin}	N/A	2.7.7.1.1
	Controlling Seismic Response Coefficient, C _{sc}	0.0300	
	Seismic Base Shear, V	1.969	kips 2.7.7.1.1

Vertical Distribution Factors	
Period Related Exponent, k:	1.324
Sum of w _i h _i ^k	39332.10

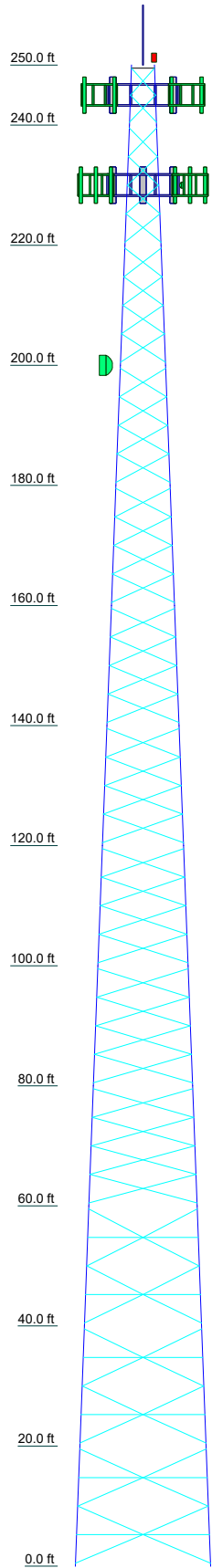
Tower Section Loads								
Section Number	Length	Top Height	Mid Height, h_x	Section Weight, w_x	$w_x h_x^k$	C_{vx}	F_{xh}	F_{xv}
1	10.00	250.00	245.00	0.4459	648.12	0.0165	0.0324	0.0124
2	20.00	240.00	230.00	1.2306	1645.17	0.0418	0.0823	0.0341
3	20.00	220.00	210.00	1.7808	2110.70	0.0537	0.1056	0.0494
4	20.00	200.00	190.00	2.3639	2454.22	0.0624	0.1228	0.0656
5	20.00	180.00	170.00	2.9035	2601.73	0.0661	0.1302	0.0805
6	20.00	160.00	150.00	3.0091	2284.71	0.0581	0.1144	0.0835
7	20.00	140.00	130.00	3.6418	2287.92	0.0582	0.1145	0.1010
8	20.00	120.00	110.00	4.1005	2065.07	0.0525	0.1034	0.1137
9	20.00	100.00	90.00	5.0755	1959.83	0.0498	0.0981	0.1408
10	20.00	80.00	70.00	5.2534	1454.51	0.0370	0.0728	0.1457
11	20.00	60.00	50.00	5.7347	1017.08	0.0259	0.0509	0.1590
12	20.00	40.00	30.00	6.4450	581.33	0.0148	0.0291	0.1787
13	20.00	20.00	10.00	7.0050	147.59	0.0038	0.0074	0.1943
Sum				48.9896	21257.99			

Discrete Loads						
Name	h_x	w_x	$w_x h_x^k$	C_{vx}	F_{xh}	F_{xv}
tower mounts Lightning Rod 1"x10'	250.00	0.0400	59.72	0.0015	0.0030	0.0011
misc Flash Beacon Lighting	250.00	0.0500	74.65	0.0019	0.0037	0.0014
(2) commscope NHH-65C-R2B_TIA w/ Mount Pipe	245.00	0.1680	244.20	0.0062	0.0122	0.0047
(2) commscope NHH-65C-R2B_TIA w/ Mount Pipe	245.00	0.1680	244.20	0.0062	0.0122	0.0047
(2) commscope NHH-65C-R2B_TIA w/ Mount Pipe	245.00	0.1680	244.20	0.0062	0.0122	0.0047
ericsson RRUS 4449	245.00	0.0700	101.75	0.0026	0.0051	0.0019
ericsson RRUS 4449	245.00	0.0700	101.75	0.0026	0.0051	0.0019
ericsson RRUS 4449	245.00	0.0700	101.75	0.0026	0.0051	0.0019
ericsson RRUS 8843	245.00	0.0720	104.66	0.0027	0.0052	0.0020
ericsson RRUS 8843	245.00	0.0720	104.66	0.0027	0.0052	0.0020
ericsson RRUS 8843	245.00	0.0720	104.66	0.0027	0.0052	0.0020
raycap RVZDC-6627-PF-48	245.00	0.0320	46.51	0.0012	0.0023	0.0009
raycap RVZDC-6627-PF-48	245.00	0.0320	46.51	0.0012	0.0023	0.0009
tower mounts 5' x 2" Pipe Mount	245.00	0.0180	26.16	0.0007	0.0013	0.0005
tower mounts 5' x 2" Pipe Mount	245.00	0.0180	26.16	0.0007	0.0013	0.0005
(2) tower mounts 8' x 2" Mount Pipe	245.00	0.0580	84.31	0.0021	0.0042	0.0016
(2) tower mounts 8' x 2" Mount Pipe	245.00	0.0580	84.31	0.0021	0.0042	0.0016
(2) tower mounts 8' x 2" Mount Pipe	245.00	0.0580	84.31	0.0021	0.0042	0.0016
Site Pro1 VFA12-HD	245.00	0.6580	956.44	0.0243	0.0479	0.0182
Site Pro1 VFA12-HD	245.00	0.6580	956.44	0.0243	0.0479	0.0182
Site Pro1 VFA12-HD	245.00	0.6580	956.44	0.0243	0.0479	0.0182
1/3 Remaining Reserved Rights	245.00	0.7780	1130.86	0.0288	0.0566	0.0216
1/3 Remaining Reserved Rights	245.00	0.7780	1130.86	0.0288	0.0566	0.0216
1/3 Remaining Reserved Rights	245.00	0.7780	1130.86	0.0288	0.0566	0.0216
commscope FFVV-65C-R3-V1 (Octo)_TIA w/ Mount Pipe	230.00	0.1830	244.66	0.0062	0.0122	0.0051
commscope FFVV-65C-R3-V1 (Octo)_TIA w/ Mount Pipe	230.00	0.1830	244.66	0.0062	0.0122	0.0051
commscope FFVV-65C-R3-V1 (Octo)_TIA w/ Mount Pipe	230.00	0.1830	244.66	0.0062	0.0122	0.0051
ericsson AIR 6419 B41 w/ Mount Pipe	230.00	0.0830	110.97	0.0028	0.0056	0.0023
ericsson AIR 6419 B41 w/ Mount Pipe	230.00	0.0830	110.97	0.0028	0.0056	0.0023
ericsson AIR 6419 B41 w/ Mount Pipe	230.00	0.0830	110.97	0.0028	0.0056	0.0023
ericsson 4460	230.00	0.1090	145.73	0.0037	0.0073	0.0030
ericsson 4460	230.00	0.1090	145.73	0.0037	0.0073	0.0030
ericsson 4460	230.00	0.1090	145.73	0.0037	0.0073	0.0030
ericsson 4480	230.00	0.0930	124.34	0.0032	0.0062	0.0026
ericsson 4480	230.00	0.0930	124.34	0.0032	0.0062	0.0026
ericsson 4480	230.00	0.0930	124.34	0.0032	0.0062	0.0026
tower mounts 6' x 2" Mount Pipe	230.00	0.0220	29.41	0.0007	0.0015	0.0006
Site Pro1 VFA12-HD	230.00	0.6580	879.71	0.0224	0.0440	0.0182
Site Pro1 VFA12-HD	230.00	0.6580	879.71	0.0224	0.0440	0.0182
Site Pro1 VFA12-HD	230.00	0.6580	879.71	0.0224	0.0440	0.0182
1/3 Remaining Reserved Rights	230.00	0.3160	422.47	0.0107	0.0211	0.0088
1/3 Remaining Reserved Rights	230.00	0.3160	422.47	0.0107	0.0211	0.0088
1/3 Remaining Reserved Rights	230.00	0.3160	422.47	0.0107	0.0211	0.0088
(2) ODU	200.00	0.0200	22.22	0.0006	0.0011	0.0006
tower mounts Side Arm Mount [SO 201-1]	200.00	0.0960	106.67	0.0027	0.0053	0.0027
andrew Crgn & Stnd UBR100 Int	230.00	0.0270	36.10	0.0009	0.0018	0.0007
Commscope VHLPX3-11W	200.00	0.0530	58.89	0.0015	0.0029	0.0015
Sum		10.1460	14183.22			

Linear Loads								
Name	Start Height	End Height	h_x	w_x	$w_x h_x^k$	C_{vx}	F_{xh}	F_{xv}
(2) andrew LDF7-50A(1-5/8") From 0 to 245	240.00	245.00	242.50	0.0082	11.76	0.0003	0.0006	0.0002
(2) andrew LDF7-50A(1-5/8") From 0 to 245	220.00	240.00	230.00	0.0328	43.85	0.0011	0.0022	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	200.00	220.00	210.00	0.0328	38.88	0.0010	0.0019	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	180.00	200.00	190.00	0.0328	34.05	0.0009	0.0017	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	160.00	180.00	170.00	0.0328	29.39	0.0007	0.0015	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	140.00	160.00	150.00	0.0328	24.90	0.0006	0.0012	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	120.00	140.00	130.00	0.0328	20.61	0.0005	0.0010	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	100.00	120.00	110.00	0.0328	16.52	0.0004	0.0008	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	80.00	100.00	90.00	0.0328	12.67	0.0003	0.0006	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	60.00	80.00	70.00	0.0328	9.08	0.0002	0.0005	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	40.00	60.00	50.00	0.0328	5.82	0.0001	0.0003	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	20.00	40.00	30.00	0.0328	2.96	0.0001	0.0001	0.0009
(2) andrew LDF7-50A(1-5/8") From 0 to 245	0.00	20.00	10.00	0.0328	0.69	0.0000	0.0000	0.0009
(2) times microwave LMR-400 From 0 to 200	180.00	200.00	190.00	0.0028	2.91	0.0001	0.0001	0.0001
(2) times microwave LMR-400 From 0 to 200	160.00	180.00	170.00	0.0028	2.51	0.0001	0.0001	0.0001
(2) times microwave LMR-400 From 0 to 200	140.00	160.00	150.00	0.0028	2.13	0.0001	0.0001	0.0001
(2) times microwave LMR-400 From 0 to 200	120.00	140.00	130.00	0.0028	1.76	0.0000	0.0001	0.0001
(2) times microwave LMR-400 From 0 to 200	100.00	120.00	110.00	0.0028	1.41	0.0000	0.0001	0.0001
(2) times microwave LMR-400 From 0 to 200	80.00	100.00	90.00	0.0028	1.08	0.0000	0.0001	0.0001
(2) times microwave LMR-400 From 0 to 200	60.00	80.00	70.00	0.0028	0.78	0.0000	0.0000	0.0001
(2) times microwave LMR-400 From 0 to 200	40.00	60.00	50.00	0.0028	0.50	0.0000	0.0000	0.0001
(2) times microwave LMR-400 From 0 to 200	20.00	40.00	30.00	0.0028	0.25	0.0000	0.0000	0.0001
(2) times microwave LMR-400 From 0 to 200	0.00	20.00	10.00	0.0028	0.06	0.0000	0.0000	0.0001
misc1 Feedline Ladder (Af) From 0 to 250	240.00	250.00	245.00	0.0840	122.10	0.0031	0.0061	0.0023
misc1 Feedline Ladder (Af) From 0 to 250	220.00	240.00	230.00	0.1680	224.61	0.0057	0.0112	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	200.00	220.00	210.00	0.1680	199.12	0.0051	0.0100	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	180.00	200.00	190.00	0.1680	174.42	0.0044	0.0087	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	160.00	180.00	170.00	0.1680	150.54	0.0038	0.0075	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	140.00	160.00	150.00	0.1680	127.56	0.0032	0.0064	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	120.00	140.00	130.00	0.1680	105.55	0.0027	0.0053	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	100.00	120.00	110.00	0.1680	84.61	0.0022	0.0042	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	80.00	100.00	90.00	0.1680	64.87	0.0016	0.0032	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	60.00	80.00	70.00	0.1680	46.51	0.0012	0.0023	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	40.00	60.00	50.00	0.1680	29.80	0.0008	0.0015	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	20.00	40.00	30.00	0.1680	15.15	0.0004	0.0008	0.0047
misc1 Feedline Ladder (Af) From 0 to 250	0.00	20.00	10.00	0.1680	3.54	0.0001	0.0002	0.0047
(3) andrew WC166(2") From 0 to 230	220.00	230.00	225.00	0.0840	109.08	0.0028	0.0055	0.0023
(3) andrew WC166(2") From 0 to 230	200.00	220.00	210.00	0.1680	199.12	0.0051	0.0100	0.0047
(3) andrew WC166(2") From 0 to 230	180.00	200.00	190.00	0.1680	174.42	0.0044	0.0087	0.0047
(3) andrew WC166(2") From 0 to 230	160.00	180.00	170.00	0.1680	150.54	0.0038	0.0075	0.0047
(3) andrew WC166(2") From 0 to 230	140.00	160.00	150.00	0.1680	127.56	0.0032	0.0064	0.0047
(3) andrew WC166(2") From 0 to 230	120.00	140.00	130.00	0.1680	105.55	0.0027	0.0053	0.0047
(3) andrew WC166(2") From 0 to 230	100.00	120.00	110.00	0.1680	84.61	0.0022	0.0042	0.0047
(3) andrew WC166(2") From 0 to 230	80.00	100.00	90.00	0.1680	64.87	0.0016	0.0032	0.0047
(3) andrew WC166(2") From 0 to 230	60.00	80.00	70.00	0.1680	46.51	0.0012	0.0023	0.0047
(3) andrew WC166(2") From 0 to 230	40.00	60.00	50.00	0.1680	29.80	0.0008	0.0015	0.0047
(3) andrew WC166(2") From 0 to 230	20.00	40.00	30.00	0.1680	15.15	0.0004	0.0008	0.0047
(3) andrew WC166(2") From 0 to 230	0.00	20.00	10.00	0.1680	3.54	0.0001	0.0002	0.0047
(2) andrew LDF2-50(3/8") From 0 to 230	220.00	230.00	225.00	0.0016	2.08	0.0001	0.0001	0.0000
(2) andrew LDF2-50(3/8") From 0 to 230	200.00	220.00	210.00	0.0032	3.79	0.0001	0.0002	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	180.00	200.00	190.00	0.0032	3.32	0.0001	0.0002	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	160.00	180.00	170.00	0.0032	2.87	0.0001	0.0001	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	140.00	160.00	150.00	0.0032	2.43	0.0001	0.0001	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	120.00	140.00	130.00	0.0032	2.01	0.0001	0.0001	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	100.00	120.00	110.00	0.0032	1.61	0.0000	0.0001	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	80.00	100.00	90.00	0.0032	1.24	0.0000	0.0001	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	60.00	80.00	70.00	0.0032	0.89	0.0000	0.0000	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	40.00	60.00	50.00	0.0032	0.57	0.0000	0.0000	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	20.00	40.00	30.00	0.0032	0.29	0.0000	0.0000	0.0001
(2) andrew LDF2-50(3/8") From 0 to 230	0.00	20.00	10.00	0.0032	0.07	0.0000	0.0000	0.0001
misc1 Feedline Ladder (Af) From 0 to 230	220.00	230.00	225.00	0.0840	109.08	0.0028	0.0055	0.0023
misc1 Feedline Ladder (Af) From 0 to 230	200.00	220.00	210.00	0.1680	199.12	0.0051	0.0100	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	180.00	200.00	190.00	0.1680	174.42	0.0044	0.0087	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	160.00	180.00	170.00	0.1680	150.54	0.0038	0.0075	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	140.00	160.00	150.00	0.1680	127.56	0.0032	0.0064	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	120.00	140.00	130.00	0.1680	105.55	0.0027	0.0053	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	100.00	120.00	110.00	0.1680	84.61	0.0022	0.0042	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	80.00	100.00	90.00	0.1680	64.87	0.0016	0.0032	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	60.00	80.00	70.00	0.1680	46.51	0.0012	0.0023	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	40.00	60.00	50.00	0.1680	29.80	0.0008	0.0015	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	20.00	40.00	30.00	0.1680	15.15	0.0004	0.0008	0.0047
misc1 Feedline Ladder (Af) From 0 to 230	0.00	20.00	10.00	0.1680	3.54	0.0001	0.0002	0.0047
misc1 Safety Line 3/8 From 0 to 250	240.00	250.00	245.00	0.0022	3.20	0.0001	0.0002	0.0001
misc1 Safety Line 3/8 From 0 to 250	220.00	240.00	230.00	0.0044	5.88	0.0001	0.0003	0.0001
misc1 Safety Line 3/8 From 0 to 250	200.00	220.00	210.00	0.0044	5.22	0.0001	0.0003	0.0001
misc1 Safety Line 3/8 From 0 to 250	180.00	200.00	190.00	0.0044	4.57	0.0001	0.0002	0.0001
misc1 Safety Line 3/8 From 0 to 250	160.00	180.00	170.00	0.0044	3.94	0.0001	0.0002	0.0001
misc1 Safety Line 3/8 From 0 to 250	140.00	160.00	150.00	0.0044	3.34	0.0001	0.0002	0.0001
misc1 Safety Line 3/8 From 0 to 250	120.00	140.00	130.00	0.0044	2.76	0.0001	0.0001	0.0001
misc1 Safety Line 3/8 From 0 to 250	100.00	120.00	110.00	0.0044	2.22	0.0001	0.0001	0.0001
misc1 Safety Line 3/8 From 0 to 250	80.00	100.00	90.00	0.0044	1.70	0.0000	0.0001	0.0001

misc1 Safety Line 3/8 From 0 to 250	60.00	80.00	70.00	0.0044	1.22	0.0000	0.0001	0.0001
misc1 Safety Line 3/8 From 0 to 250	40.00	60.00	50.00	0.0044	0.78	0.0000	0.0000	0.0001
misc1 Safety Line 3/8 From 0 to 250	20.00	40.00	30.00	0.0044	0.40	0.0000	0.0000	0.0001
misc1 Safety Line 3/8 From 0 to 250	0.00	20.00	10.00	0.0044	0.09	0.0000	0.0000	0.0001
Sum				6.4856	3890.89			

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	
Legs	SR 1 3/4	SR 2 1/4	SR 2 3/4	SR 3 1/4	SR 3 1/2		SR 3 3/4	SR 4	SR 4 1/4		SR 4 1/2	SR 4 3/4		
Leg Grade	A529-50													
Diagonals	L1 3/4x1 3/4x3/16													
Diagonal Grade	A36M-50													
Top Girts	N.A.													
Horizontals	N.A.													
Inner Bracing	N.A.													
Face Width (ft)	22.5	24.5	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21	
# Panels @ (ft)	2 @ 4.5													
Weight (K)	49.0	1.2	1.8	2.4	2.9	3.0	3.6	4.1	5.1	5.3	5.7	6.4	7.0	



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L1 3/4x1 3/4x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A529-50	50 ksi	65 ksi	A36M-50	50 ksi	65 ksi

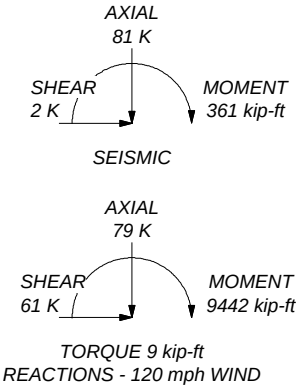
TOWER DESIGN NOTES

1. Tower is located in Columbia County, Florida.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 120 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. Seismic Note: Seismic loads generated by Seismic 4.0.2
8. Seismic Note: Seismic calculations are in accordance with TIA-222-H-1
9. TOWER RATING: 93.4%

ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 511 K
SHEAR: 37 K

UPLIFT: -436 K
SHEAR: 32 K





B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

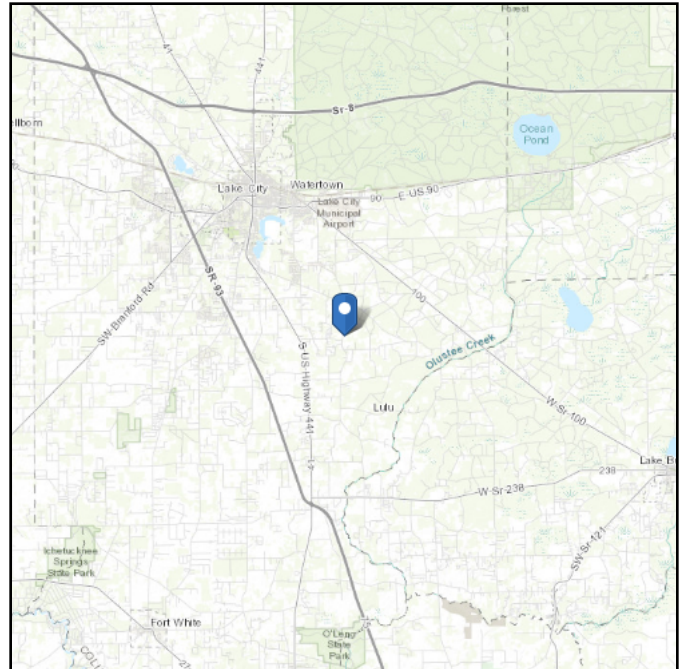
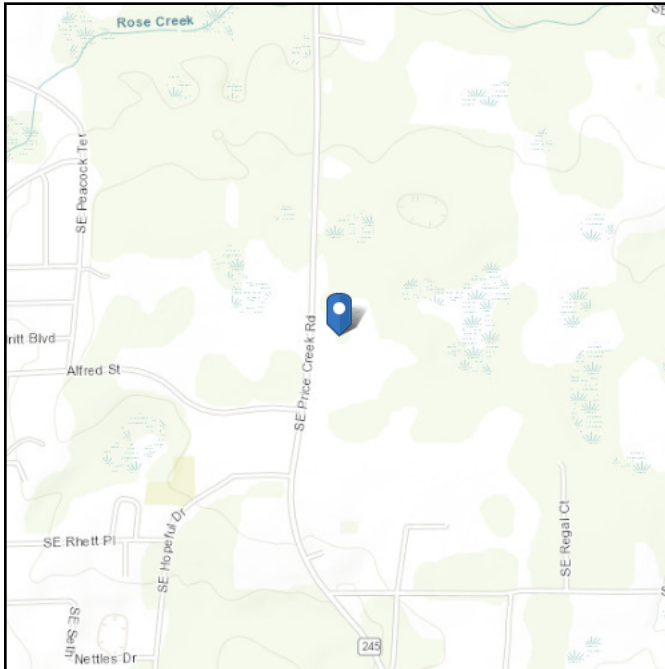
Job: 174774.001.01.0001 - Ebenezer, FL (Site# US-FL-539)		
Project:		
Client: Vertical Bridge	Drawn by: Akshay Kumar	App'd:
Code: TIA-222-H	Date: 01/30/25	Scale: NTS
Path:		Dwg No. E-1

ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: Default

Latitude: 30.102997
Longitude: -82.574153
Elevation: 147.97821919068346 ft (NAVD 88)



Wind

Results:

Wind Speed	120 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	90 Vmph
100-year MRI	98 Vmph
300-year MRI	110 Vmph
700-year MRI	120 Vmph
1,700-year MRI	129 Vmph
3,000-year MRI	135 Vmph
10,000-year MRI	144 Vmph
100,000-year MRI	154 Vmph
1,000,000-year MRI	167 Vmph

Data Source: ASCE/SEI 7-22, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Thu Jan 23 2025



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 7-22 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years). Values for 10-year MRI, 25-year MRI, 50-year MRI and 100-year MRI are Service Level wind speeds, all other wind speeds are Ultimate wind speeds.

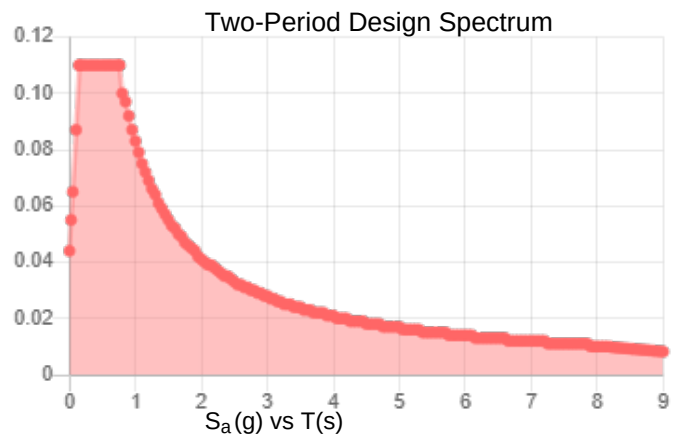
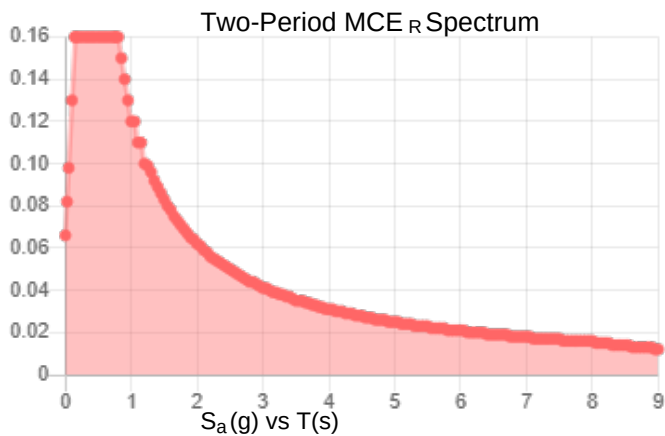
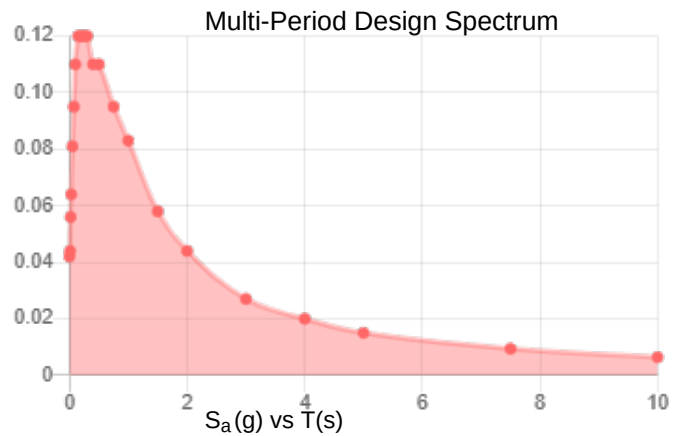
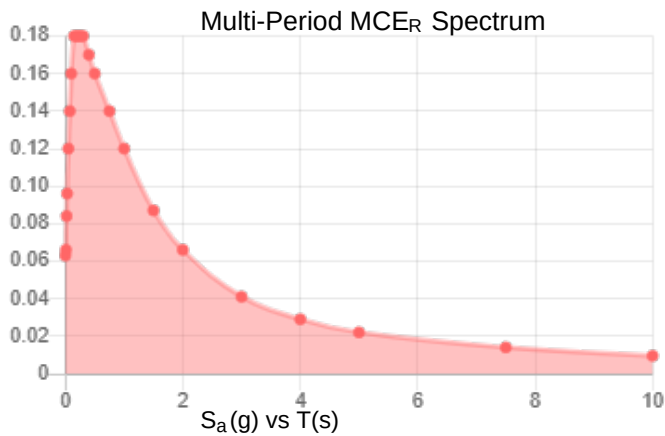
Site is in a hurricane-prone region as defined in ASCE/SEI 7-22 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Site Soil Class: Default

Results:

PGA _M :	0.059	T _L :	8
S _{MS} :	0.16	S _S :	0.13
S _{M1} :	0.12	S ₁ :	0.058
S _{DS} :	0.11	V _{S30} :	260
S _{D1} :	0.083		

Seismic Design Category: B



MCE_R Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Data Accessed: Thu Jan 23 2025

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

Results:

Ice Thickness: N/A
Concurrent Temperature: N/A
3-s Gust Speed N/A

Data Source: Standard ASCE/SEI 7-22, Figs. 10-2 through 10-8

Date Accessed: Thu Jan 23 2025

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 for 250, 500, 1,000, and 1,400-year mean recurrence intervals along with concurrent 3-s gust speeds and concurrent air temperatures. The shading indicates special icing regions, with elevations above 2,100 ft (640 m) in the east, 6,000 ft (1829 m) in the west, and 1,600 ft (488 m) in Alaska, with sparse weather station data for determining design ice loads. In these regions, as well as in regions with complex terrain causing unusual icing conditions and regions where snow or in-cloud icing results in larger loads, the mapped values should be adjusted based on a combination of local historical records and experience, reanalysis data, and numerical weather prediction systems.

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

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COLOCATION APPLICATION - P-066320
US-FL-5391
Version 2
T-Mobile South, LLC

Vertical Bridge REIT, LLC.
750 Park of Commerce Dr, ste 200
Boca Raton, FL 33487

SUMMARY

PRIMARY INFO

Application #: P-066320
Application Version: 2 (Submitted: 1/9/2025 7:25:00 PM)
Application Type: Broadband
Application Name: 9JK2254a
Lease Type: New Lease
ASR Number:
Description: Collocation

VERTICAL BRIDGE SITE INFO

VB Site #: US-FL-5391
VB Site Name: Ebenezer
Latitude: 30.10299700
Longitude: -82.57415300
Structure Type: SST
Structure Height: 250.0000
Site Address: 6295 SE County Rd 245 -
Lake City, FL 32025

VERTICAL BRIDGE DEAL TEAM

RLM: Jamie Harris Jamie.Harris@verticalbridge.com (941) 374-5513	LPM: Darlene Martin Darlene.Martin@verticalbridge.com (561) 923-0685	ROM: Tavares Nunn Tavares.Nunn@verticalbridge.com (678) 709-3525
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TENANT LEGAL INFO

Tenant Legal Name: T-Mobile South, LLC
State of Registration: South Carolina
Type of Entity: LLC
Carrier NOC #: 8776115858
Tenant Site #: 9JK2254a
Tenant Site Name: 9JK2254a

APPLICANT

Name: Nick Windham
Address: 10 Church Circle
Annapolis, MD 21401
Phone Number: (843) 696-2817
Email Address: nick.windham@smartlinkgroup.com

FINAL LEASED RIGHTS CONFIGURATION TOTALS

This is a summary of your remaining existing equipment plus the new equipment.

FINAL EQUIPMENT

QTY	Equipment Type
1	Microwave Dish
6	RRU
6	GPS Antenna

FINAL LINES

QTY	Line Type
2	Other
3	Hybrid

FREQUENCY & TECHNOLOGY INFO



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Type of Tehnology:	Broadband Wireless
Is TX Frequency Licensed:	No
TX Frequency:	2496-2690,1695-2690,698-715,663-698,612-652,698-704
Is RX Frequency Licensed:	No
RX Frequency:	2496-2690,617-894,617-652,728-745,663-698,728-734

MOUNT & STRUCTURAL ANALYSIS

MOUNT ANALYSIS

Provided by Tenant:	No
To Be Run by VB:	No
Include Mount Mapping:	No

STRUCTURAL HARD COPIES

Required:	No
Number of Hard Copies:	

CONTACTS

INVOICE CONTACT

Attention To	Name	Address	Phone Number 1	Phone Number 2	Email 1	Email 2
Noelle Moeller	Noelle Moeller	12920 SE 38TH St Bellevue, WA 98006	8138413		Noelle.Moeller @t-mobile.com	

PO CONTACT

Name	Phone	Email
Noelle Moeller	(813) 934-8413	Noelle.Moeller@t-mobile.com

LEASING CONTACT

Name	Phone	Email
Nick Windham	(843) 696-2817	nick.windham@smartlinkgroup.com

STRUCTURAL HARD COPIES CONTACT

Name	Address
Nick Windham	10 Church Circle Annapolis, MD 21401

NOTICE CONTACT

Notice To	Attention To	Name	Address
	Noelle Moeller	Noelle Moeller	12920 SE 38TH St Bellevue, WA 98006



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RF CONTACT

Name	Phone	Email
Max Shuman	(000) 000-0000	Ernest.Shuman@T-Mobile.com

TENANT CONSTRUCTION MANAGER CONTACT

Name	Phone	Email
Andrew Demara	(000) 000-0000	Andrew.Demara1@t-mobile.com

EMERGENCY CONTACT

Name	Phone	Email
Noelle Moeller	(813) 934-8413	Noelle.Moeller@t-mobile.com

LINE & EQUIPMENT

NEW LINE(S)

Qty	Line Type	Line Diameter(In.)	Line Location	Comments
3	Hybrid	2	Exterior	
2	Other	0.325	Exterior	1

NEW EQUIPMENT

Qty	Equipment Type	Mount RAD Height	Equipment RAD Height (H')	Mount Type	Manufacturer	Model Number	Dimensions (H"xW"xD")	Weight (Lbs.)	Azimuth	Comments
3	RRU	230.00	230.00	Platform	Ericsson	4460	17.00 x 15.00 x 12.00	109.00	110, 230, 350	
3	RRU	230.00	230.00	Platform	Ericsson	4480	22.00 x 15.00 x 12.00	93.00	110, 230, 350	
1	Microwave Dish	230.00	230.00	Pipe Mount	Andrew	Crn & Stnd UBR100 Int	12.56 x 11.26 x 4.21	26.50	110	
3	GPS Antenna	230.00	230.00	Platform	Ericsson	AIR 6419 B41 (Active Antenna - Massive MIMO)	35.00 x 20.00 x 8.00	68.50	110, 240, 350	Site Pro 1 VFA-12HD
3	GPS Antenna	230.00	230.00	Platform (Handrail)	Commscope	FFVV- 65C-R3- V1 (Octo)	96.00 x 26.00 x 9.00	118.00	110, 240, 350	Site Pro 1 VFA-12HD

ADDITIONAL SITE REQUIREMENTS

GROUND & INTERIOR SPACE REQUIREMENTS

Requirement Type	Total Lease Area (L x W)	Cabinet Required	Cabinet Area (L x W)	Shelter Required	Shelter Pad (L x W)	Comments
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COLOCATION APPLICATION - P-066320

US-FL-5391

Version 2

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Vertical Bridge REIT, LLC.

750 Park of Commerce Dr, ste 200

Boca Raton, FL 33487

New	15.00 x 20.00					
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GENERATOR REQUIREMENTS

Requirement Type	Fuel Type	Kilowatt Size	Pad Dimensions (L x D)	Generator Manufacturer	Fuel Tank Manufacturer	Comments
New	Diesel	48	4.00 x 7.00	Generac	Generac	

AC POWER REQUIREMENTS

Meter Type	Additional Details	Comments
New Tenant Meter		

BACKHAUL REQUIREMENTS

Requirement Type	Cable Type	Number of Points of Entry	Riser Size (Inches)	Comments
New	Fiber	2	0.00	TBD