T-Mobile – Colocation
Comprehensive Structural Analysis for

100' Self-Supporting Pole Structure (Monopole)
(Sabre Job #507253 w/ 15' Extension and 4' Lightning Rod)

March 6, 2025

Site Name:	**Otis**
Site Number:	**DC0002**
Carrier Site Number:	**7WDC540A**
Site Address:	**1800 Perry Street NE** **District of Columbia, DC 20018** **District of Columbia County**
Site Coordinates:	**38.935498°, -76.977808°**
Analysis Code:	**ANSI/TIA-222-H and 2017 DCBC**
TowerCo Jira Ticket:	KHA-3747
Kimley-Horn Project #:	012628109.20552
Kimley-Horn Jira Ticket:	KHRAL-20552

Analysis Results

Tower Usage	77%	**PASS (with Modifications*)**
Foundation Usage	34%	PASS

NOTE: For this analysis to be valid, the proposed extension shall be installed in accordance with the attached design drawings prior to the installation of the proposed carrier loading considered in this report.

Prepared by:
Ryan Doolittle

Signed by:
Avery V. Fann, PE
Lic. #PE40001630, Exp. 08/30/2026
Kimley-Horn of DC

Revision History:
0 – Initial Release
1 – Tower Height

KIMLEY-HORN OF DC, LLC CORPORATE SEAL DC

DISTRICT OF COLUMBIA
AVERY V. FANN
No. PE40001630
LICENSED PROFESSIONAL ENGINEER

03/10/2025

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SUPPORTING DOCUMENTATION

Information on the current tower geometry, member sizes, foundation dimensions, soil properties, and antenna loading was obtained from the sources listed in the attached project history (see appendix for details). It is assumed that all information provided to Kimley-Horn & Associates, Inc. is accurate. In the absence of information to the contrary, we assume the structure has been properly erected and maintained per the original design drawings and the capacity has not significantly changed from the "as new" condition.

ANALYSIS CRITERIA

The analysis utilizes *tnxTower v. 8.2*, an industry-standard finite element analysis program to create an elastic three-dimensional model and second-order effects per ANSI/TIA-222 requirements. The program calculates member stresses for various loading cases and the selected output from the analysis is included in the Appendix.

Code	ANSI/TIA-222-H / 2017 DCBC
Basic Wind Speed	113 mph (3-Second Gust, V_{ult})
Basic Wind Speed w/ Ice	40 mph (3-Second Gust) with 1.0" radial ice (ultimate)
Risk Category	II
Exposure Category	C
Topographic Factor	K_{zt} = 1.0
Elevation Factor	K_e = 0.997 *(Structure Base Elevation = ±77-ft AMSL)*
Seismic Design Criteria	S_S = 0.133g / S_1 = 0.043g / Site Class = D / SDC = B

Tower Owner	TowerCo 2013 LLC
FCC ASR #	N/A
Maintenance Program	Yes
Annex S Reductions	Included

APPURTENANCE LISTING

The tables below will show the existing/reserved and proposed equipment, equipment to be removed, and the final equipment configuration considered in the analysis. If the existing/reserved equipment in the field deviates from the information shown below, Kimley-Horn & Associates, Inc. should be contacted to perform an analysis revision immediately.

Existing & Reserved Equipment:

Antenna RAD (ft)	Description	Feedlines[1]	Mount Type	Mount Elev (ft)	Carrier[2]
82	(6) Commscope NNHH-65B-R4 (3) Nokia AEQK (3) Nokia AEQU (3) Nokia AHLBBA (3) Nokia AHFIB (3) Nokia AHCA (3) Nokia AHNA (3) Raycap DC9-48-60-24-8C-EV	(9) Power (3) Fiber	Site Pro 1 F3P-12W w/ F3P-HRK12	82	AT&T (E)
76	(4) 2'Ø Stadium Lights	(4) Power	Face Mount	76	--
74	(4) 2'Ø Stadium Lights	(4) Power	Face Mount	74	

1 – (E) Denotes existing loading. (R) Denotes reserved loading.
2 – AT&T loading per tenant lease dated 09/26/2022.

Existing & Reserved Equipment:

Antenna RAD (ft)	Description	Feedlines[1]	Mount Type	Mount Elev (ft)	Carrier[2]
94	(3) RFS APXVAALL24_43-U-NA20 (3) Commscope VV-65A-R1 (3) Ericsson AIR 6419 B41 (3) Ericsson RADIO 4480 B71/B85 (3) Ericsson RADIO 4460 B25/B66	(3) 1.75" Hybrid	Site Pro 1 RMQP-496-KH	94	T-Mobile

1 – T-Mobile loading per tenant application dated 07/03/2024.
2 – Equipment shall be installed on proposed extension in accordance with attached design drawings.

RESULTS

The tables below provide a summary of maximum usages for each primary load carrying member of the structure. The usage is a ratio of the force in the member compared to its calculated capacity per code requirements. A more detailed report of member usages can be found in the appendix at the end of this report. Usages greater than 100% indicate where the force in the member exceeds its capacity. Usages up to 105% are considered acceptable per industry standard practice.

Serviceability Requirements:

Component	Controlling Usage	Result
Tower Twist	1%	Pass
Tower Sway	44%	Pass
Tower Deflection	53%	Pass

Structure Usages:

Component	Controlling Usage	Result
Extension Shaft	37%	Pass
Extension Bolts	54%	Pass
Extension Flange	34%	Pass
Shaft	77%	Pass
Anchor Rods	59%	Pass
Base Plate	58%	Pass

Foundation Usages:

Foundation Type	Controlling Usage	Result
Drilled Shaft	34%	Pass

CONCLUSIONS AND RECOMMENDATIONS

Per our Comprehensive Structural Analysis, in accordance with the structural strength requirements of ANSI/TIA-222-H and 2017 DCBC, the structure has been found to **PASS**, **provided that the modifications detailed in the following attachments have been adequately installed.**

ASSUMPTIONS AND LIMITATIONS

This report is not a condition assessment of the tower and foundation; It is an engineering analysis based upon the theoretical capacity of the structure. Unless told otherwise, we assume the structure and foundation to be in “like new” condition. It is the responsibility of our client and the structure owner to verify that the structure modeled and loading considered is accurate. If these assumptions are not accurate, Kimley-Horn & Associates, Inc. should be notified immediately to perform a revised analysis. This analysis assumes all antenna mounts are adequate to support the existing and proposed loads. It is the carrier’s responsibility to ensure antenna mount meets the structural requirements of ANSI/TIA-222. Kimley-Horn & Associates, Inc. did not analyze antenna supporting mounts as part of this structural analysis report.

All services are performed, results obtained, and recommendation made in accordance with generally accepted engineering principles and practices. Kimley-Horn & Associates, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information in this report.

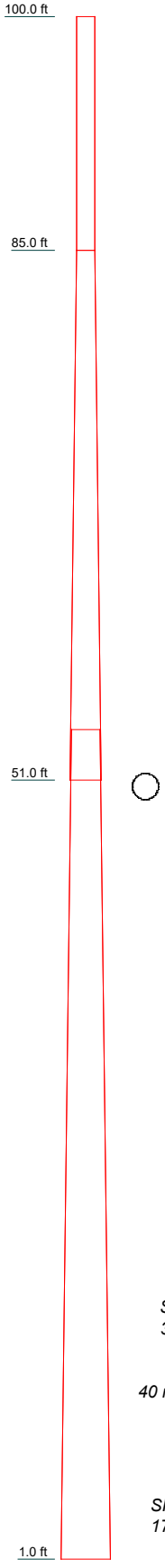
Kimley-Horn makes no warranties, expressed or implied in connection with this report and disclaims any liability arising from original design, material, fabrication, and section deficiencies or corrosion of the tower.

APPENDIX

Client ID
DC0002

Client ID	DM #	Doc ID	Issued By	Issued To	Date	Description	Tenant	Tenant ID	Comment
DC0002	3038110	3038110_DC0002 Otis Geotechnical Report - Otis Street - 2-4-22.pdf	ECS	Entrex	2/4/2022	Geotech Report			
DC0002	3037551	3037551_DC0002 Sabre 22-4630-JDS Tower and Foundation Design 2022-02-17 signed.pdf	Sabre	Smartlink	2/27/2022	Tower and Foundation Design Calculations			85' Monopole
DC0002	3080300	3080300_DC0002 Sabre 507253 Tower Erection FINAL Drawings R0 2022-08-02.pdf	Sabre	TowerCo	44770	Tower and Foundation Design Drawings			85' Monopole
DC0002	3042741	3042741_DC0002 Otis - AT&T Site Lease Agreement 9-26-22.pdf	AT&T	TowerCo	9/26/2022	Tenant Lease Agreement	AT&T	10127906	82' Elevation
DC0002	3044764	3044764_DC0002 OTIS CD REV 13 S&S 10-03-22.pdf	Entrex	AT&T	9/30/2022	Construction Drawings	AT&T	10127906	Rev 13
DC0002	3045430	3045430_DC0002 Otis foundation - Certification for permanent casing.pdf	Sabre	TowerCo	10/27/2022	Foundation Casing Letter			Casing to 8.5' below grade / 6" larger diameter
DC0002	20240703	20240703_DC0002 Otis T-Mobile Colo (7WDC540A) Colo App updated RAD 2024-07-03.doc	T-Mobile	TowerCo	45476	Tenant Colocation Application	T-Mobile	7WDC540A	90' Elevation (Revised)
DC0002	3080190	3080190_DC0002 KHA Passing T-Mobile Colo Extension SA R0 2024-07-23 Signed.pdf	Kimley-Horn	TowerCo	45496	Structural Analysis Report	T-Mobile	7WDC540A	PASS (70%) - Feasibility w/ Extension

Section	1	2	3
Length (ft)	15.00	34.00	53.25
Number of Sides	1	18	18
Thickness (in)	0.2500	0.2500	0.3750
Socket Length (ft)		3.25	
Top Dia (in)	14.0000	14.0000	22.1100
Bot Dia (in)	14.0000	23.5200	37.0200
Grade	A500-42		A572-65
Weight (K)	0.6	1.7	6.3



ALL REACTIONS ARE FACTORED

AXIAL 32 K

SHEAR 3 K — *MOMENT 233 kip-ft*

TORQUE 1 kip-ft
40 mph WIND - 1.0000 in ICE

AXIAL 22 K

SHEAR 17 K — *MOMENT 1316 kip-ft*

TORQUE 5 kip-ft
REACTIONS - 113 mph WIND

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A572-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in District Of Columbia County, District Of Columbia.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 113 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 77.1%

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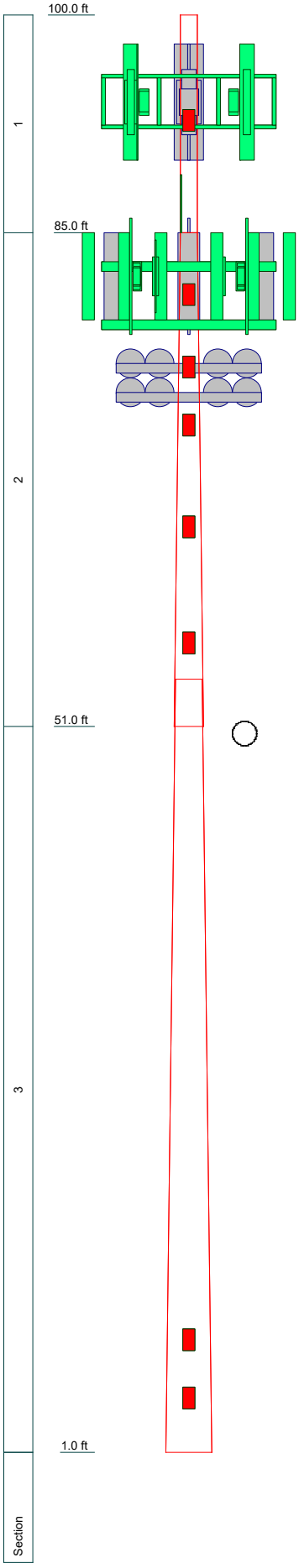
FAX:

Job: ***DC0002-ERP+EDD***		
Project: ***KHA-3747 (77%)***		
Client: TowerCo	Drawn by: ryan.doolittle	App'd:
Code: TIA-222-H	Date: 10/16/24	Scale: NTS
Path: C:\Users\ryan.doolittle\OneDrive - KH\Documents_LOCAL\20240415 - TCO Misc\DC0002\KHA-3747 (PSAR)\Models\ERP\DC0002-ERP.eri		Dwg No. E-1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
APXVAALL24_43-U-NA20 w/ MP (T-Mobile [P])	94
APXVAALL24_43-U-NA20 w/ MP (T-Mobile [P])	94
APXVAALL24_43-U-NA20 w/ MP (T-Mobile [P])	94
AIR 6419 B41 w/ MP (8') (T-Mobile [P])	94
AIR 6419 B41 w/ MP (8') (T-Mobile [P])	94
AIR 6419 B41 w/ MP (8') (T-Mobile [P])	94
VV-65A-R1 w/ MP (T-Mobile [P])	94
VV-65A-R1 w/ MP (T-Mobile [P])	94
VV-65A-R1 w/ MP (T-Mobile [P])	94
RADIO 4480 B71/B85 (TMO) (T-Mobile [P])	94
RADIO 4480 B71/B85 (TMO) (T-Mobile [P])	94
RADIO 4480 B71/B85 (TMO) (T-Mobile [P])	94
RADIO 4460 B25/B66 (TMO) (T-Mobile [P])	94
RADIO 4460 B25/B66 (TMO) (T-Mobile [P])	94
RADIO 4460 B25/B66 (TMO) (T-Mobile [P])	94
Breakout Pendant (T-Mobile [P])	94
Breakout Pendant (T-Mobile [P])	94
Breakout Pendant (T-Mobile [P])	94
Site Pro 1 RMQP-XXX-HK (w/o MP) (T-Mobile [P])	94
8' x 2" Pipe (T-Mobile [P])	94
8' x 2" Pipe (T-Mobile [P])	94
8' x 2" Pipe (T-Mobile [P])	94
(3) HHR (T-Mobile [P])	92
4' Lightning Rod	85
Site Pro 1 F3P-HRK12 (ATI)	83
(2) NNHH-65B-R4 w/ MP (ATI)	82
(2) NNHH-65B-R4 w/ MP (ATI)	82
(2) NNHH-65B-R4 w/ MP (ATI)	82
AEQK + AEQU (Stacked) w/ MP (ATI)	82
AEQK + AEQU (Stacked) w/ MP (ATI)	82

TYPE	ELEVATION
AEQK + AEQU (Stacked) w/ MP (ATI)	82
AHLBBA (ATT) (ATI)	82
AHLBBA (ATT) (ATI)	82
AHLBBA (ATT) (ATI)	82
AHFIB (ATT) (ATI)	82
AHFIB (ATT) (ATI)	82
AHFIB (ATT) (ATI)	82
AHCA (ATT) (ATI)	82
AHCA (ATT) (ATI)	82
AHCA (ATT) (ATI)	82
AHNA (ATT) (ATI)	82
AHNA (ATT) (ATI)	82
AHNA (ATT) (ATI)	82
DC9-48-60-24-8C-EV (ATI)	82
DC9-48-60-24-8C-EV (ATI)	82
DC9-48-60-24-8C-EV (ATI)	82
5' x 2" Pipe (ATI)	82
5' x 2" Pipe (ATI)	82
5' x 2" Pipe (ATI)	82
8' x 2" Mount Pipe (ATI)	82
8' x 2" Mount Pipe (ATI)	82
8' x 2" Mount Pipe (ATI)	82
(3) HHR (ATI)	80
Site Pro 1 F3P-12 (ATI)	79
96" x 4" Tube Mount (Lighting)	76
2' Stadium Light (Lighting)	76
2' Stadium Light (Lighting)	76
2' Stadium Light (Lighting)	76
2' Stadium Light (Lighting)	76
HHR (Lighting)	75
96" x 4" Tube Mount (Lighting)	74
2' Stadium Light (Lighting)	74
2' Stadium Light (Lighting)	74
2' Stadium Light (Lighting)	74
2' Stadium Light (Lighting)	74
HHR (Lighting)	71
(3) HHR (Vacant)	64
(3) HHR (Vacant)	56
Entry Port (ATI)	8
(2) Entry Port (T-Mobile [P])	4

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Job: ***DC0002-ERP+EDD***			
Project: ***KHA-3747 (77%)***			
Client: TowerCo	Drawn by: ryan.doolittle	App'd:	
Code: TIA-222-H	Date: 10/16/24	Scale: NTS	
Path: C:\Users\ryan.doolittle\OneDrive - KH\Documents_LOCAL\20240415 - TCO Misc\DC0002\KHA-3747 (PSAR)\Models\ERP\DC0002-ERP.eri		Dwg No. E-1	

Tower Input Data

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

Tower is located in District Of Columbia County, District Of Columbia.
Tower base elevation above sea level: 78.00 ft.
Basic wind speed of 113 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Maximum demand-capacity ratio is: 1.
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
Kz In Exposure D Hurricane Region	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
Use Special Wind Profile		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	100.00-85.00	15.00	0.00	Round	14.0000	14.0000	0.2500		A500-42 (42 ksi)
L2	85.00-51.00	34.00	3.25	18	14.0000	23.5200	0.2500	1.0000	A572-65 (65 ksi)
L3	51.00-1.00	53.25		18	22.1100	37.0200	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	14.0000	10.7992	255.3004	4.8622	7.0000	36.4715	510.6008	5.3964	0.0000	0
	14.0000	10.7992	255.3004	4.8622	7.0000	36.4715	510.6008	5.3964	0.0000	0
L2	14.1774	10.9106	260.6108	4.8812	7.1120	36.6438	521.5646	5.4563	2.0240	8.096
	23.8443	18.4647	1263.2041	8.2608	11.9482	105.7237	2528.0704	9.2341	3.6995	14.798
L3	23.3173	25.8701	1544.0259	7.7159	11.2319	137.4682	3090.0834	12.9375	3.2314	8.617
	37.5332	43.6167	7399.7972	13.0090	18.8062	393.4773	14809.3313	21.8125	5.8555	15.615

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1				1	1	1			
100.00-85.00									
L2 85.00-51.00				1	1	1			
L3 51.00-1.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	C	No	Surface Ar (CaAa)	85.00 - 10.00	1	1	0.000 0.000	0.3750		0.22
1.75" Hybrid (T-Mobile [P])	A	No	Surface Ar (CaAa)	94.00 - 92.00	1	1	0.000 0.000	1.7500		2.72
1.75" Hybrid (T-Mobile [P])	B	No	Surface Ar (CaAa)	94.00 - 92.00	1	1	0.000 0.000	1.7500		2.72
1.75" Hybrid (T-Mobile [P])	C	No	Surface Ar (CaAa)	94.00 - 92.00	1	1	0.000 0.000	1.7500		2.72
3/8" Fiber (AT&T)	A	No	Surface Ar (CaAa)	82.00 - 80.00	1	1	0.000 0.000	0.3750		0.03
3/8" Fiber (AT&T)	B	No	Surface Ar (CaAa)	82.00 - 80.00	1	1	0.000 0.000	0.3750		0.03
3/8" Fiber (AT&T)	C	No	Surface Ar (CaAa)	82.00 - 80.00	1	1	0.000 0.000	0.3750		0.03
3/4" Power (AT&T)	A	No	Surface Ar (CaAa)	82.00 - 80.00	3	3	0.000 0.000	0.7500		0.08
3/4" Power (AT&T)	B	No	Surface Ar (CaAa)	82.00 - 80.00	3	3	0.000 0.000	0.7500		0.08

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
3/4" Power (AT&T)	C	No	Surface Ar (CaAa)	82.00 - 80.00	3	3	0.000 0.000	0.7500		0.08
0.795" Power (Lighting)	A	No	Surface Ar (CaAa)	76.00 - 75.00	4	4	0.000 0.000	0.7950		0.08
0.795" Power (Lighting)	A	No	Surface Ar (CaAa)	74.00 - 71.00	4	4	0.000 0.000	0.7950		0.08

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
***									
1.75" Hybrid (T-Mobile [P])	C	No	No	Inside Pole	94.00 - 5.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	2.72 2.72 2.72
***									
3/8" Fiber (AT&T)	B	No	No	Inside Pole	80.00 - 5.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.03 0.03 0.03
3/4" Power (AT&T)	C	No	No	Inside Pole	80.00 - 5.00	9	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.08 0.08 0.08
***									
0.795" Power (Lighting)	A	No	No	Inside Pole	75.00 - 5.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.08 0.08 0.08
0.795" Power (Lighting)	A	No	No	Inside Pole	71.00 - 5.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.08 0.08 0.08
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	100.00-85.00	A	0.000	0.000	0.350	0.000	0.01
		B	0.000	0.000	0.350	0.000	0.01
		C	0.000	0.000	0.350	0.000	0.08
L2	85.00-51.00	A	0.000	0.000	1.797	0.000	0.02
		B	0.000	0.000	0.525	0.000	0.00
		C	0.000	0.000	1.800	0.000	0.31
L3	51.00-1.00	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.538	0.000	0.42

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	100.00-85.00	A	0.942	0.000	0.000	0.727	0.000	0.01
		B		0.000	0.000	0.727	0.000	0.01
		C		0.000	0.000	0.727	0.000	0.09
L2	85.00-51.00	A	0.912	0.000	0.000	3.960	0.000	0.04
		B		0.000	0.000	1.458	0.000	0.01
		C		0.000	0.000	8.936	0.000	0.36
L3	51.00-1.00	A	0.828	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	9.017	0.000	0.48

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	100.00-85.00	0.0000	0.0000	0.0000	0.0000
L2	85.00-51.00	-0.2293	0.1484	-0.2216	0.6810
L3	51.00-1.00	0.0000	0.2381	0.0000	0.7753

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	4	1.75" Hybrid	92.00 - 94.00	1.0000	1.0000
L1	5	1.75" Hybrid	92.00 - 94.00	1.0000	1.0000
L1	6	1.75" Hybrid	92.00 - 94.00	1.0000	1.0000
L2	1	Safety Line 3/8	51.00 - 85.00	1.0000	1.0000
L2	9	3/8" Fiber	80.00 - 82.00	1.0000	1.0000
L2	10	3/8" Fiber	80.00 - 82.00	1.0000	1.0000
L2	11	3/8" Fiber	80.00 - 82.00	1.0000	1.0000
L2	13	3/4" Power	80.00 - 82.00	1.0000	1.0000
L2	14	3/4" Power	80.00 - 82.00	1.0000	1.0000
L2	15	3/4" Power	80.00 - 82.00	1.0000	1.0000
L2	18	0.795" Power	75.00 - 76.00	1.0000	1.0000
L2	20	0.795" Power	71.00 - 74.00	1.0000	1.0000
L3	1	Safety Line 3/8	10.00 - 51.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
4' Lightning Rod	C	From Leg	0.00		0.0000	85.00	No Ice	0.30	0.30	0.03
			0.00				1/2" Ice	0.71	0.71	0.03
			2.00				1" Ice	1.00	1.00	0.04
(3) HHR (T-Mobile [P])	C	None			0.0000	92.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
(3) HHR (AT&T)	C	None			0.0000	80.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
HHR (Lighting)	C	None			0.0000	75.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
HHR (Lighting)	C	None			0.0000	71.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
(3) HHR (Vacant)	C	None			0.0000	64.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
(3) HHR (Vacant)	C	None			0.0000	56.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
Entry Port (AT&T)	C	None			0.0000	8.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
(2) Entry Port (T-Mobile [P])	C	None			0.0000	4.00	No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
							1" Ice	0.00	0.00	0.00
***										
APXVAALL24_43-U-NA20 w/ MP (T-Mobile [P])	A	From Leg	4.00		15.0000	94.00	No Ice	20.24	11.03	0.20
			0.00				1/2" Ice	20.89	12.46	0.33
			0.00				1" Ice	21.55	13.56	0.48
APXVAALL24_43-U-NA20 w/ MP (T-Mobile [P])	B	From Leg	4.00		15.0000	94.00	No Ice	20.24	11.03	0.20
			0.00				1/2" Ice	20.89	12.46	0.33
			0.00				1" Ice	21.55	13.56	0.48
APXVAALL24_43-U-NA20 w/ MP (T-Mobile [P])	C	From Leg	4.00		15.0000	94.00	No Ice	20.24	11.03	0.20
			0.00				1/2" Ice	20.89	12.46	0.33
			0.00				1" Ice	21.55	13.56	0.48
AIR 6419 B41 w/ MP (8') (T-Mobile [P])	A	From Leg	4.00		15.0000	94.00	No Ice	7.50	4.78	0.13
			0.00				1/2" Ice	8.34	5.85	0.19
			0.00				1" Ice	9.08	6.78	0.26
AIR 6419 B41 w/ MP (8') (T-Mobile [P])	B	From Leg	4.00		15.0000	94.00	No Ice	7.50	4.78	0.13
			0.00				1/2" Ice	8.34	5.85	0.19
			0.00				1" Ice	9.08	6.78	0.26
AIR 6419 B41 w/ MP (8') (T-Mobile [P])	C	From Leg	4.00		15.0000	94.00	No Ice	7.50	4.78	0.13
			0.00				1/2" Ice	8.34	5.85	0.19
			0.00				1" Ice	9.08	6.78	0.26
VV-65A-R1 w/ MP (T-Mobile [P])	A	From Leg	4.00		15.0000	94.00	No Ice	6.70	4.63	0.06
			0.00				1/2" Ice	7.42	5.80	0.12
			0.00				1" Ice	8.08	6.82	0.18
VV-65A-R1 w/ MP (T-Mobile [P])	B	From Leg	4.00		15.0000	94.00	No Ice	6.70	4.63	0.06
			0.00				1/2" Ice	7.42	5.80	0.12
			0.00				1" Ice	8.08	6.82	0.18
VV-65A-R1 w/ MP (T-Mobile [P])	C	From Leg	4.00		15.0000	94.00	No Ice	6.70	4.63	0.06
			0.00				1/2" Ice	7.42	5.80	0.12
			0.00				1" Ice	8.08	6.82	0.18
RADIO 4480 B71/B85 (TMO)	A	From Leg	3.00		15.0000	94.00	No Ice	2.88	1.40	0.08
			0.00				1/2" Ice	3.09	1.56	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(T-Mobile [P])			0.00				1" Ice	3.31	1.73	0.13
RADIO 4480 B71/B85 (TMO)	B	From Leg	3.00		15.0000	94.00	No Ice	2.88	1.40	0.08
			0.00				1/2" Ice	3.09	1.56	0.10
(T-Mobile [P])			0.00				1" Ice	3.31	1.73	0.13
RADIO 4480 B71/B85 (TMO)	C	From Leg	3.00		15.0000	94.00	No Ice	2.88	1.40	0.08
			0.00				1/2" Ice	3.09	1.56	0.10
(T-Mobile [P])			0.00				1" Ice	3.31	1.73	0.13
RADIO 4460 B25/B66 (TMO)	A	From Leg	3.00		15.0000	94.00	No Ice	2.14	1.69	0.11
			0.00				1/2" Ice	2.32	1.85	0.13
(T-Mobile [P])			0.00				1" Ice	2.51	2.02	0.16
RADIO 4460 B25/B66 (TMO)	B	From Leg	3.00		15.0000	94.00	No Ice	2.14	1.69	0.11
			0.00				1/2" Ice	2.32	1.85	0.13
(T-Mobile [P])			0.00				1" Ice	2.51	2.02	0.16
RADIO 4460 B25/B66 (TMO)	C	From Leg	3.00		15.0000	94.00	No Ice	2.14	1.69	0.11
			0.00				1/2" Ice	2.32	1.85	0.13
(T-Mobile [P])			0.00				1" Ice	2.51	2.02	0.16
Breakout Pendant (T-Mobile [P])	A	From Leg	2.00		15.0000	94.00	No Ice	1.36	0.47	0.01
			0.00				1/2" Ice	1.51	0.57	0.02
			0.00				1" Ice	1.67	0.69	0.03
Breakout Pendant (T-Mobile [P])	B	From Leg	2.00		15.0000	94.00	No Ice	1.36	0.47	0.01
			0.00				1/2" Ice	1.51	0.57	0.02
			0.00				1" Ice	1.67	0.69	0.03
Breakout Pendant (T-Mobile [P])	C	From Leg	2.00		15.0000	94.00	No Ice	1.36	0.47	0.01
			0.00				1/2" Ice	1.51	0.57	0.02
			0.00				1" Ice	1.67	0.69	0.03
Site Pro 1 RMQP-XXX-HK (w/o MP) (T-Mobile [P])	C	None			0.0000	94.00	No Ice	34.54	34.54	1.95
							1/2" Ice	42.04	42.04	2.33
							1" Ice	49.60	49.60	2.85
8' x 2" Pipe (T-Mobile [P])	A	From Leg	3.50		15.0000	94.00	No Ice	1.90	1.90	0.03
			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
8' x 2" Pipe (T-Mobile [P])	B	From Leg	3.50		15.0000	94.00	No Ice	1.90	1.90	0.03
			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
8' x 2" Pipe (T-Mobile [P])	C	From Leg	3.50		15.0000	94.00	No Ice	1.90	1.90	0.03
			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
***										
(2) NNHH-65B-R4 w/ MP (AT&T)	A	From Leg	4.50		0.0000	82.00	No Ice	12.51	7.41	0.10
			0.00				1/2" Ice	13.11	8.60	0.20
			0.00				1" Ice	13.67	9.50	0.29
(2) NNHH-65B-R4 w/ MP (AT&T)	B	From Leg	4.50		0.0000	82.00	No Ice	12.51	7.41	0.10
			0.00				1/2" Ice	13.11	8.60	0.20
			0.00				1" Ice	13.67	9.50	0.29
(2) NNHH-65B-R4 w/ MP (AT&T)	C	From Leg	4.50		0.0000	82.00	No Ice	12.51	7.41	0.10
			0.00				1/2" Ice	13.11	8.60	0.20
			0.00				1" Ice	13.67	9.50	0.29
AEQK + AEQU (Stacked) w/ MP (AT&T)	A	From Leg	4.50		0.0000	82.00	No Ice	11.81	9.04	0.25
			0.00				1/2" Ice	12.51	10.34	0.34
			0.00				1" Ice	13.12	11.29	0.45
AEQK + AEQU (Stacked) w/ MP (AT&T)	B	From Leg	4.50		0.0000	82.00	No Ice	11.81	9.04	0.25
			0.00				1/2" Ice	12.51	10.34	0.34
			0.00				1" Ice	13.12	11.29	0.45
AEQK + AEQU (Stacked) w/ MP (AT&T)	C	From Leg	4.50		0.0000	82.00	No Ice	11.81	9.04	0.25
			0.00				1/2" Ice	12.51	10.34	0.34
			0.00				1" Ice	13.12	11.29	0.45
AHLBBA (AT&T)	A	From Leg	3.50		0.0000	82.00	No Ice	2.82	1.60	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T)			0.00				1/2" Ice	3.03	1.77	0.12
			0.00				1" Ice	3.26	1.95	0.15
AHLBBA (AT&T)	B	From Leg	3.50	0.0000		82.00	No Ice	2.82	1.60	0.10
(AT&T)			0.00				1/2" Ice	3.03	1.77	0.12
			0.00				1" Ice	3.26	1.95	0.15
AHLBBA (AT&T)	C	From Leg	3.50	0.0000		82.00	No Ice	2.82	1.60	0.10
(AT&T)			0.00				1/2" Ice	3.03	1.77	0.12
			0.00				1" Ice	3.26	1.95	0.15
AHFIB (AT&T)	A	From Leg	3.50	0.0000		82.00	No Ice	2.23	1.13	0.09
(AT&T)			0.00				1/2" Ice	2.42	1.28	0.10
			0.00				1" Ice	2.62	1.44	0.12
AHFIB (AT&T)	B	From Leg	3.50	0.0000		82.00	No Ice	2.23	1.13	0.09
(AT&T)			0.00				1/2" Ice	2.42	1.28	0.10
			0.00				1" Ice	2.62	1.44	0.12
AHFIB (AT&T)	C	From Leg	3.50	0.0000		82.00	No Ice	2.23	1.13	0.09
(AT&T)			0.00				1/2" Ice	2.42	1.28	0.10
			0.00				1" Ice	2.62	1.44	0.12
AHCA (AT&T)	A	From Leg	3.50	0.0000		82.00	No Ice	1.53	0.82	0.04
(AT&T)			0.00				1/2" Ice	1.69	0.95	0.05
			0.00				1" Ice	1.85	1.08	0.06
AHCA (AT&T)	B	From Leg	3.50	0.0000		82.00	No Ice	1.53	0.82	0.04
(AT&T)			0.00				1/2" Ice	1.69	0.95	0.05
			0.00				1" Ice	1.85	1.08	0.06
AHCA (AT&T)	C	From Leg	3.50	0.0000		82.00	No Ice	1.53	0.82	0.04
(AT&T)			0.00				1/2" Ice	1.69	0.95	0.05
			0.00				1" Ice	1.85	1.08	0.06
AHNA (AT&T)	A	From Leg	3.50	0.0000		82.00	No Ice	1.40	0.64	0.04
(AT&T)			0.00				1/2" Ice	1.54	0.75	0.05
			0.00				1" Ice	1.70	0.87	0.06
AHNA (AT&T)	B	From Leg	3.50	0.0000		82.00	No Ice	1.40	0.64	0.04
(AT&T)			0.00				1/2" Ice	1.54	0.75	0.05
			0.00				1" Ice	1.70	0.87	0.06
AHNA (AT&T)	C	From Leg	3.50	0.0000		82.00	No Ice	1.40	0.64	0.04
(AT&T)			0.00				1/2" Ice	1.54	0.75	0.05
			0.00				1" Ice	1.70	0.87	0.06
DC9-48-60-24-8C-EV	A	From Leg	2.00	0.0000		82.00	No Ice	2.74	4.78	0.03
(AT&T)			0.00				1/2" Ice	2.96	5.06	0.06
			0.00				1" Ice	3.20	5.35	0.10
DC9-48-60-24-8C-EV	B	From Leg	2.00	0.0000		82.00	No Ice	2.74	4.78	0.03
(AT&T)			0.00				1/2" Ice	2.96	5.06	0.06
			0.00				1" Ice	3.20	5.35	0.10
DC9-48-60-24-8C-EV	C	From Leg	2.00	0.0000		82.00	No Ice	2.74	4.78	0.03
(AT&T)			0.00				1/2" Ice	2.96	5.06	0.06
			0.00				1" Ice	3.20	5.35	0.10
5' x 2" Pipe	A	From Leg	2.00	0.0000		82.00	No Ice	1.19	1.19	0.02
(AT&T)			0.00				1/2" Ice	1.50	1.50	0.03
			0.00				1" Ice	1.81	1.81	0.04
5' x 2" Pipe	B	From Leg	2.00	0.0000		82.00	No Ice	1.19	1.19	0.02
(AT&T)			0.00				1/2" Ice	1.50	1.50	0.03
			0.00				1" Ice	1.81	1.81	0.04
5' x 2" Pipe	C	From Leg	2.00	0.0000		82.00	No Ice	1.19	1.19	0.02
(AT&T)			0.00				1/2" Ice	1.50	1.50	0.03
			0.00				1" Ice	1.81	1.81	0.04
Site Pro 1 F3P-HRK12	C	None		0.0000		83.00	No Ice	8.07	6.95	0.41
(AT&T)							1/2" Ice	10.84	9.53	0.50
							1" Ice	13.32	12.19	0.62
Site Pro 1 F3P-12	C	None		0.0000		79.00	No Ice	38.09	37.93	2.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T)							1/2" Ice	47.38	48.17	2.60
							1" Ice	59.85	59.23	3.41
8' x 2" Mount Pipe	A	From Leg	4.00	0.0000		82.00	No Ice	1.90	1.90	0.03
(AT&T)			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
8' x 2" Mount Pipe	B	From Leg	4.00	0.0000		82.00	No Ice	1.90	1.90	0.03
(AT&T)			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
8' x 2" Mount Pipe	C	From Leg	4.00	0.0000		82.00	No Ice	1.90	1.90	0.03
(AT&T)			0.00				1/2" Ice	2.73	2.73	0.04
			0.00				1" Ice	3.40	3.40	0.06
***										
96" x 4" Tube Mount	A	From Leg	0.00	60.0000		76.00	No Ice	5.24	5.24	0.10
(Lighting)			0.00				1/2" Ice	5.82	5.82	0.12
			0.00				1" Ice	6.40	6.40	0.16
96" x 4" Tube Mount	A	From Leg	0.00	60.0000		74.00	No Ice	5.24	5.24	0.10
(Lighting)			0.00				1/2" Ice	5.82	5.82	0.12
			0.00				1" Ice	6.40	6.40	0.16
***										
***										

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		76.00	2.00	No Ice	3.14	0.03
(Lighting)		Radome	Leg	-4.00						1/2" Ice	3.41	0.02
				0.00						1" Ice	3.68	0.00
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		76.00	2.00	No Ice	3.14	0.03
(Lighting)		Radome	Leg	-2.00						1/2" Ice	3.41	0.02
				0.00						1" Ice	3.68	0.00
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		76.00	2.00	No Ice	3.14	0.03
(Lighting)		Radome	Leg	2.00						1/2" Ice	3.41	0.02
				0.00						1" Ice	3.68	0.00
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		76.00	2.00	No Ice	3.14	0.03
(Lighting)		Radome	Leg	4.00						1/2" Ice	3.41	0.02
				0.00						1" Ice	3.68	0.00
***												
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		74.00	2.00	No Ice	3.14	0.03
(Lighting)		Radome	Leg	-4.00						1/2" Ice	3.41	0.02
				0.00						1" Ice	3.68	0.00
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		74.00	2.00	No Ice	3.14	0.03
(Lighting)		Radome	Leg	-2.00						1/2" Ice	3.41	0.02
				0.00						1" Ice	3.68	0.00
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		74.00	2.00	No Ice	3.14	0.03
(Lighting)		Radome	Leg	2.00						1/2" Ice	3.41	0.02
				0.00						1" Ice	3.68	0.00
2' Stadium Light	A	Paraboloid w/o	From	0.50		60.0000		74.00	2.00	No Ice	3.14	0.03

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
(Lighting)		Radome	Leg	4.00					1/2" Ice	3.41	0.02
				0.00					1" Ice	3.68	0.00

Load Combinations

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

Comb. No.	Description
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 85	19.017	47	1.7796	0.0360
L2	85 - 51	13.471	47	1.7122	0.0306
L3	54.25 - 1	4.762	47	0.9059	0.0078

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
94.00	APXVAALL24_43-U-NA20 w/ MP	47	16.753	1.7732	0.0343	8341
92.00	(3) HHR	47	16.008	1.7671	0.0336	6255
85.00	4' Lightning Rod	47	13.471	1.7122	0.0306	3387
83.00	Site Pro 1 F3P-HRK12	47	12.774	1.6837	0.0295	3199
82.00	(2) NNHH-65B-R4 w/ MP	47	12.432	1.6671	0.0289	3133
80.00	(3) HHR	47	11.758	1.6299	0.0276	2999
79.00	Site Pro 1 F3P-12	47	11.427	1.6094	0.0269	2934
76.00	2' Stadium Light	47	10.459	1.5408	0.0247	2757
75.00	HHR	47	10.145	1.5159	0.0239	2702
74.00	2' Stadium Light	47	9.835	1.4901	0.0231	2650
71.00	HHR	47	8.934	1.4081	0.0207	2504
64.00	(3) HHR	47	7.003	1.1990	0.0150	2219
56.00	(3) HHR	47	5.123	0.9561	0.0089	1964
8.00	Entry Port	47	0.243	0.0807	0.0003	14565
4.00	(2) Entry Port	47	0.102	0.0344	0.0001	33984

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 85	72.184	18	6.7769	0.1388
L2	85 - 51	51.144	18	6.5196	0.1180
L3	54.25 - 1	18.080	18	3.4436	0.0291

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
94.00	APXVAALL24_43-U-NA20 w/ MP	18	63.598	6.7526	0.1322	2246

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
92.00	(3) HHR	18	60.770	6.7290	0.1297	1684
85.00	4' Lightning Rod	18	51.144	6.5196	0.1180	910
83.00	Site Pro 1 F3P-HRK12	18	48.500	6.4108	0.1136	858
82.00	(2) NNHH-65B-R4 w/ MP	18	47.200	6.3477	0.1113	840
80.00	(3) HHR	18	44.642	6.2056	0.1062	803
79.00	Site Pro 1 F3P-12	18	43.386	6.1272	0.1035	786
76.00	2' Stadium Light	18	39.712	5.8657	0.0949	738
75.00	HHR	18	38.520	5.7707	0.0920	723
74.00	2' Stadium Light	18	37.345	5.6723	0.0889	709
71.00	HHR	18	33.923	5.3593	0.0795	669
64.00	(3) HHR	18	26.591	4.5614	0.0571	590
56.00	(3) HHR	18	19.450	3.6350	0.0336	520
8.00	Entry Port	18	0.923	0.3058	0.0018	3835
4.00	(2) Entry Port	18	0.387	0.1302	0.0008	8948

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	100 - 85 (1)	TP14x14x0.25	15.00	0.00	0.0	10.7992	-4.71	408.21	0.012
L2	85 - 51 (2)	TP23.52x14x0.25	34.00	0.00	0.0	17.7427	-12.90	1037.95	0.012
L3	51 - 1 (3)	TP37.02x22.11x0.375	53.25	0.00	0.0	33.0924	-16.35	1935.91	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	100 - 85 (1)	TP14x14x0.25	50.80	144.21	0.352	0.00	144.21	0.000
L2	85 - 51 (2)	TP23.52x14x0.25	456.64	604.11	0.756	0.00	604.11	0.000
L3	51 - 1 (3)	TP37.02x22.11x0.375	792.92	1397.83	0.567	0.00	1397.83	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	100 - 85 (1)	TP14x14x0.25	5.72	122.46	0.047	1.53	148.04	0.010
L2	85 - 51 (2)	TP23.52x14x0.25	15.08	311.38	0.048	2.65	609.74	0.004
L3	51 - 1 (3)	TP37.02x22.11x0.375	15.97	580.77	0.027	2.65	1414.08	0.002

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	100 - 85 (1)	0.012	0.352	0.000	0.047	0.010	0.367 ✔	1.000	✔
L2	85 - 51 (2)	0.012	0.756	0.000	0.048	0.004	0.771 ✔	1.000	✔
L3	51 - 1 (3)	0.008	0.567	0.000	0.027	0.002	0.577 ✔	1.000	✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	100 - 85	Pole	TP14x14x0.25	1	-4.71	408.21	36.7	Pass
L2	85 - 51	Pole	TP23.52x14x0.25	2	-12.90	1037.95	77.1	Pass
L3	51 - 1	Pole	TP37.02x22.11x0.375	3	-16.35	1935.91	57.7	Pass
							Summary	
						Pole (L2)	77.1	Pass
						RATING =	**77.1**	**Pass**

Monopole Flange Plate Connection

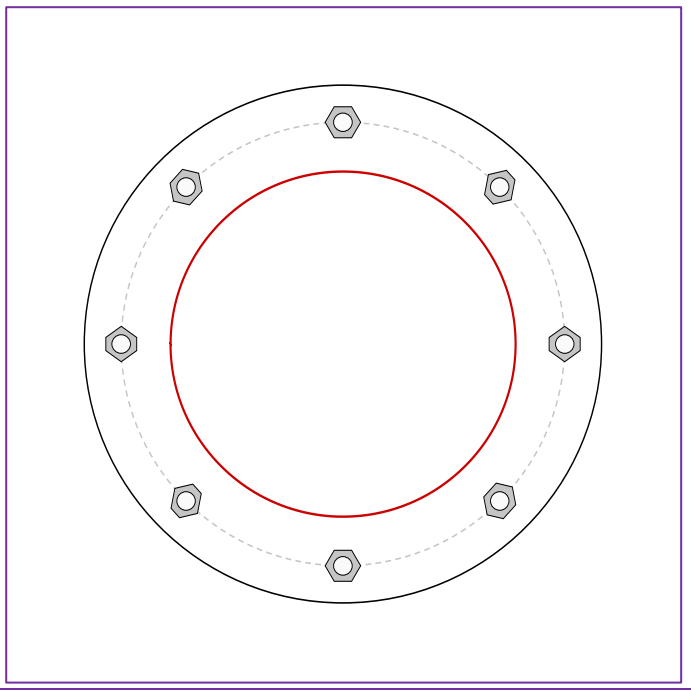
Elevation = 84 ft.

Site #	DC0002
Site Name	Otis
JIRA #	KHRAL-20552

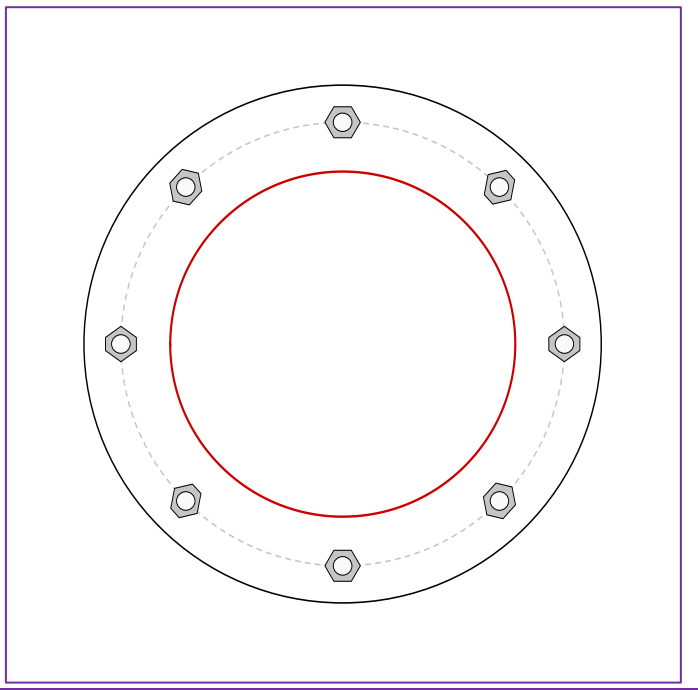
TIA-222 Revision	H

Applied Loads	
Moment (kip-ft)	50.88
Axial Force (kips)	4.75
Shear Force (kips)	5.73

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(8) 3/4" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 18" BC

Top Plate Data

21" OD x 1" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Bottom Plate Data

21" OD x 1" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

14" x 0.25" round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Bottom Pole Data

14" x 0.25" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	16.36	
Allowable (kips)	30.04	
Stress Rating:	**54.4%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	15.11	(Flexural)
Allowable Stress (ksi):	45.00	
Stress Rating:	**33.6%**	**Pass**
Tension Side Stress Rating:	**17.8%**	**Pass**

Bottom Plate Capacity

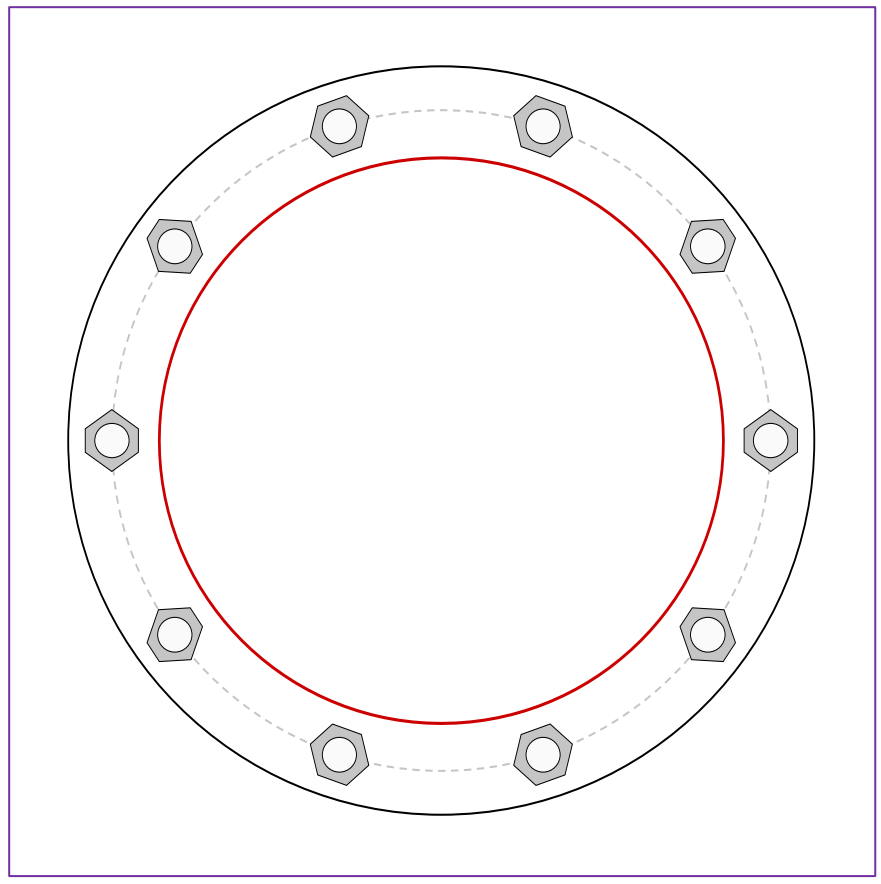
Max Stress (ksi):	15.11	(Flexural)
Allowable Stress (ksi):	45.00	
Stress Rating:	**33.6%**	**Pass**
Tension Side Stress Rating:	**17.8%**	**Pass**

Monopole Base Plate Connection

Site Info	
Site #	DC0002
Site Name	Otis
JIRA #	KHRAL-20552

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2

Applied Loads	
Moment (kip-ft)	1316.23
Axial Force (kips)	22.16
Shear Force (kips)	17.24



Connection Properties

Anchor Rod Data

(10) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 43.25" BC

Base Plate Data

49" OD x 2" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

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

Analysis Results

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

Pu_t = 143.7	ϕPn_t = 243.75	**Stress Rating**
Vu = 1.72	ϕVn = 149.1	**59.0%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	25.93	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	**57.6%**	**Pass**

Drilled Pier Foundation

Site #:	DC0002
Site Name:	Otis
JIRA #:	KHRAL-20552
TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads	Comp.	Uplift
Moment (kip-ft)	1316	
Axial Force (kips)	22	
Shear Force (kips)	17	

Material Properties		
Concrete Strength, f'c:	4.5	ksi
Rebar Strength, Fy:	60	ksi
Tie Yield Strength, Fyt:	60	ksi

Pier Design Data		
Depth	22	ft
Ext. Above Grade	0.5	ft
Pier Section 1		
From 0.5' above grade to 22' below grade		
Pier Diameter	6	ft
Rebar Quantity	32	
Rebar Size	9	
Clear Cover to Ties	3	in
Tie Size	5	
Tie Spacing	10	in

Rebar & Pier Options
Embedded Pole Inputs
Belled Pier Inputs

Analysis Results		
Soil Lateral Check	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	9.95	-
Soil Safety Factor	3.93	-
Max Moment (kip-ft)	1480.81	-
Rating	*33.9%*	-
Soil Vertical Check	*Compression*	*Uplift*
Skin Friction (kips)	427.30	-
End Bearing (kips)	636.17	-
Weight of Concrete (kips)	114.51	-
Total Capacity (kips)	1063.47	-
Axial (kips)	136.51	-
Rating	*12.8%*	-
Reinforced Concrete Flexure	*Compression*	*Uplift*
Critical Depth (ft from TOC)	9.89	-
Critical Moment (kip-ft)	1480.78	-
Critical Moment Capacity	4404.24	-
Rating	*33.6%*	-
Reinforced Concrete Shear	*Compression*	*Uplift*
Critical Depth (ft from TOC)	0.00	-
Critical Shear (kip)	17.00	-
Critical Shear Capacity	498.37	-
Rating	*3.4%*	-

Structural Foundation Rating	**33.6%**
Soil Interaction Rating	**33.9%**

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

Go to Soil Calculations

Soil Profile

Groundwater Depth	N/A	# of Layers	5

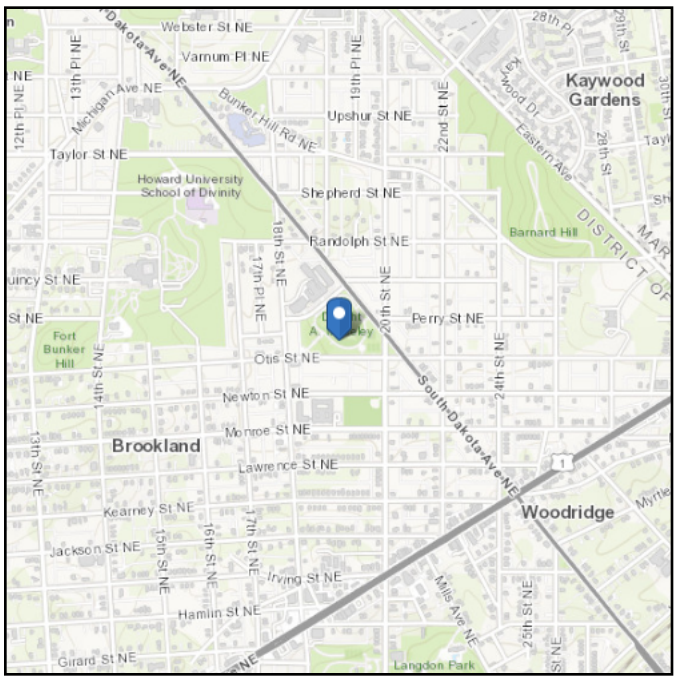
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	2	2	95	150			0.000	0.000	0.00	0.00			Cohesionless
2	2	8.5	6.5	115	150			0.000	0.000	0.00	0.00			Cohesionless
3	8.5	9	0.5	115	150		35	0.000	0.000	0.45	0.45			Cohesionless
4	9	14	5	125	150		39	0.000	0.000	1.20	1.20			Cohesionless
5	14	22	8	125	150	4.115		2.082	2.082	3.00	3.00	30		Cohesive

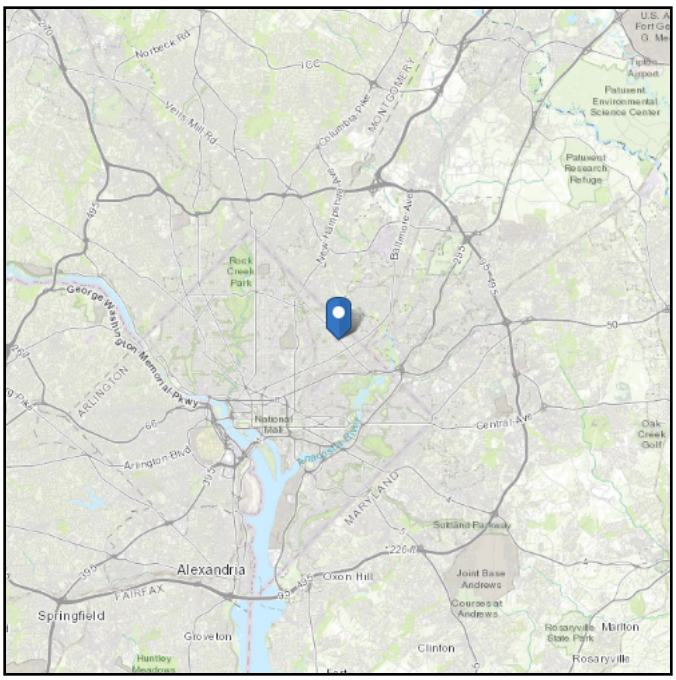
ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 38.935538
Longitude: -76.977874
Elevation: 77.83610300256625 ft (NAVD 88)





Wind

Results:

Wind Speed	113 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Wed Oct 16 2024

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

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

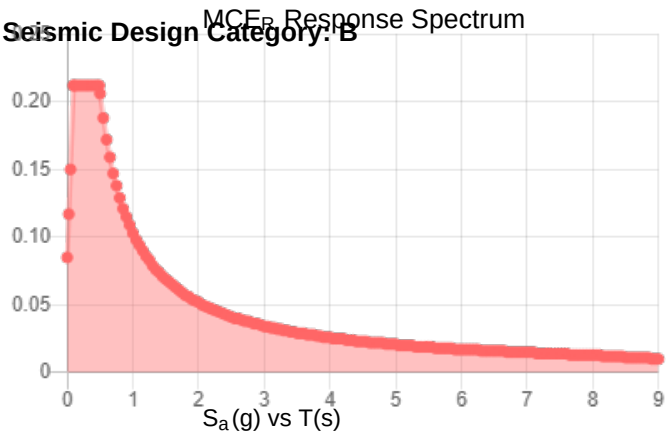
Seismic

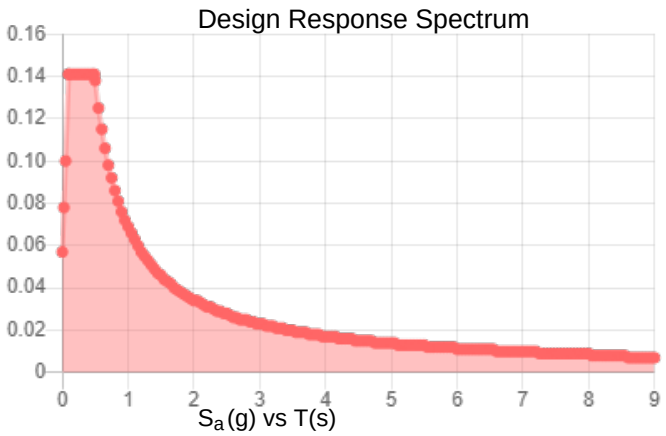
Site Soil Class: D - Stiff Soil

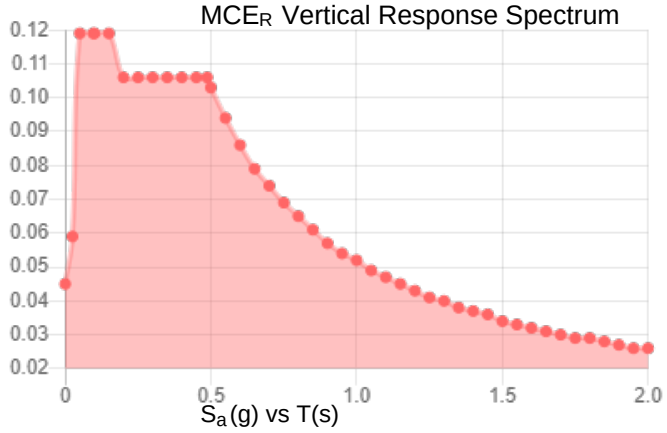
Results:

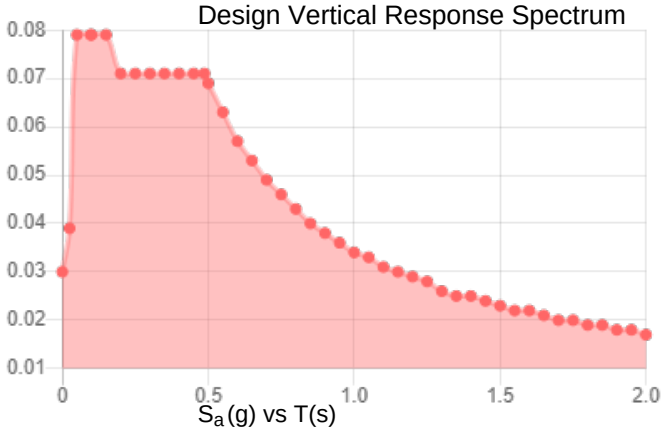
S_S :	0.133	S_{D1} :	0.069
S_1 :	0.043	T_L :	8
F_a :	1.6	PGA :	0.068
F_v :	2.4	PGA_M :	0.11
S_{MS} :	0.212	F_{PGA} :	1.6
S_{M1} :	0.103	I_e :	1
S_{DS} :	0.141	C_v :	0.7

Seismic Design Category: B









Data Accessed: **Wed Oct 16 2024**

Date Source:

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

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Wed Oct 16 2024

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

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

Colocation Application

RETURN THIS APPLICATION TO: (E-MAIL IS PREFERRED)			*Application Fee: (Please contact TowerCo)*	
TowerCo			Date Rec by TowerCo:	**06/17/2024**
5000 Valleystone Dr., Ste. 200	**e-mail:**	colocation@towerco.com	Revision Dates:	**Rev 07/03/2024**
Cary, NC 27519	**office:**	**919-469-5559**	TowerCo Site Name:	**Otis**
Attn: Colocation	**fax:**	**919-469-5530**	TowerCo Site Number:	**DC0002**

TOWERCO SITE INFORMATION

Latitude:	38	56	7	7928	Existing Structure Type:	Monopole
Longitude:	76	58	40	1082	Existing Structure Height (ft. AGL):	85'(to be extended to 95')
Site Address: TowerCo to provide					County: Washington	State: DC

APPLICANT INFORMATION

Applicant (Carrier):	T-Mobile	Primary Contact Name:	Eric Lim
Applicant Site Name:	Forced Relo - DC002 Dwight Mosley Park	Company Name:	Site Link Wireless
Applicant Site Number:	**7WDC540A**	Primary Contact Number:	443.622.9386
Req. Date For Receipt of Agreement:	**TBD**	Primary Contact Fax:	
Proposed Installation Date:	**TBD**	Primary Contact Address:	3620 Commerce Drive, Suite 707 Baltimore, MD 21227
Proposed ON AIR Date:	**2025**		
Applicant Entity Name on SA:	T-Mobile Northeast LLC	Primary Contact Email:	elim@sitelinkwireless.com
Notice Address for Lease:	12920 SE 38th St. B Bellevue, WA, 980006		
Billing Address:	Same as above		

ADDITIONAL CARRIER INFORMATION

Leasing Contact Name/Number/Email	Shaya Samuel / 301.728.0707 / shaya.samuel12@t-mobile.com
RF Contact Name/Number/E mail	
Legal Review Contact Name/Number:	
Zoning Contact Name/Number	
Construction Contact Name/Number:	
Site Tech Contact Name/Number:	
Emergency Contact Name/Number:	

ANTENNAS

	Sector 1	**Sector 2**	**Sector 3**	**AUX /Other**
Desired Rad Center (ft AGL)	94'	94'	94'	
Antenna Quantity	3	3	3	
Antenna Manufacturer	RFS, Ericsson, Commscope	RFS, Ericsson, Commscope	RFS, Ericsson, Commscope	
Antenna Model (Attach Spec Sheet)	APXVAALL24_43-U- NA20, AIR 6419 B41, VV- 65A- R1	APXVAALL24_43-U- NA20, AIR 6419 B41, VV- 65A- R1	APXVAALL24_43-U- NA20, AIR 6419 B41, VV- 65A- R1	
Antenna Weight (lbs per antenna)	136.00, 83.00, 24.70	136.00, 83.00, 24.70	136.00, 83.00, 24.70	
Antenna Dimensions (HxWxD) (in)	95.90 x 24.00 x 8.90, 35.20 x 20.90 x 7.00, 54.70 x 12.00 x 4.60	95.90 x 24.00 x 8.90, 35.20 x 20.90 x 7.00, 54.70 x 12.00 x 4.60	95.90 x 24.00 x 8.90, 35.20 x 20.90 x 7.00, 54.70 x 12.00 x 4.60	
ERP (watts)	1611	1611	1611	

TowerCo

Colocation Application

Antenna Gain (dB)	TBD	TBD	TBD	
Orientation/Azimuth (Degrees)	15/135/255	15/135/255	15/135/255	
Mechanical Tilt	TBD	TBD	TBD	
RRU Quantity	2	2	2	
RRU Manufacturer & Model	Ericsson 4480 B71/B85, Ericsson 4460 B25/B66	Ericsson 4480 B71/B85, Ericsson 4460 B25/B66	Ericsson 4480 B71/B85, Ericsson 4460 B25/B66	
RRU Dimensions (HxWxD) (in)	21.80 x 15.70 x 7.50, 19.60 x 15.70 x 12.10	21.80 x 15.70 x 7.50, 19.60 x 15.70 x 12.10	21.80 x 15.70 x 7.50, 19.60 x 15.70 x 12.10	
RRU Weight	84.00, 109.00	84.00, 109.00	84.00, 109.00	
Surge Suppressor Quantity	NA	NA	NA	
Surge Suppressor Manufacturer & Model	NA	NA	NA	
Surge Suppressor Dimensions (HxWxD)	NA	NA	NA	
Surge Suppressor Weight	NA	NA	NA	
TMA Quantity	NA	NA	NA	
TMA Manufacturer & Model	NA	NA	NA	
TMA Dimensions (HxWxD)	NA	NA	NA	
TMA Weight	NA	NA	NA	
RET Quantity	NA	NA	NA	
RET Manufacturer and Model	NA	NA	NA	
RET Dimensions (HxWxD)	NA	NA	NA	
RET Weight	NA	NA	NA	
Mount Type /Mfg /Model (Attach spec sheet)	SitePro / RMQP-496-HK			
Tower Mount Mounting Height	94’	94’	94’	
Coax Cables Quantity ***(Please specify “PER ANTENNA” or “PER SECTOR” for all coax / lines)***	NA	NA	NA	
Diameter of Coax Cables (in)	NA	NA	NA	
Hybrid Fiber/Power Cables Quantity	1	1	1	
Diameter of Hybrid Fiber/Power Cables (in)	1.75	1.75	1.75	
RET Control Cable Quantity	NA	NA	NA	
RET Control Cable Diameter	NA	NA	NA	
Transmit Frequency (MHz)	1930-1945, 1965-1970, 1970-1975, 2135-2140, 2140-2145, 2145-2150, 2150-2155, 668-673, 673-678, 678-683, 683-688, 728-734, 2496-2690, 1990-1995	1930-1945, 1965-1970, 1970-1975, 2135-2140, 2140-2145, 2145-2150, 2150-2155, 668-673, 673-678, 678-683, 683-688, 728-734, 2496-2690, 1990-1995	1930-1945, 1965-1970, 1970-1975, 2135-2140, 2140-2145, 2145-2150, 2150-2155, 668-673, 673-678, 678-683, 683-688, 728-734, 2496-2690, 1990-1995	
Receive Frequency (MHz)	1850-1865, 1885-1890, 1890-1895, 1735-1740, 1740-1745, 1745-1750, 1750-1755, 622-627, 627-632, 632-637, 637-642, 698-704, 2496-2690, 1910-1915	1850-1865, 1885-1890, 1890-1895, 1735-1740, 1740-1745, 1745-1750, 1750-1755, 622-627, 627-632, 632-637, 637-642, 698-704, 2496-2690, 1910-1915	1850-1865, 1885-1890, 1890-1895, 1735-1740, 1740-1745, 1745-1750, 1750-1755, 622-627, 627-632, 632-637, 637-642, 698-704, 2496-2690, 1910-1915	

TowerCo

Colocation Application

Type of Service (i.e. LTE, CDMA,GSM)	5G
Is FirstNet being added to this site? ☐ ***YES*** ☐ ***NO***	

GROUND SPACE REQUIREMENTS

Equipment Enclosure Type:	_x_ BTS Cabinets/Number of BTS Cabinets: 2 __ Outdoor Shelter __ Other:
Total Leased Area Dimensions (WxD) (ft)	10 x 20
Cabinet/BTS/Shelter Dimensions (HxWxD)(ft):	
Concrete Pad Dimensions (WxD)(ft):	10 x 20
Cabinet/Shelter Manufacturer/Model:	Ericsson

POWER REQUIREMENTS

AC Power: 240/120	Required Voltage and Total Amperage: 200

GENERATOR INFORMATION

Generator Ground Space Requirement (HxWxD) (ft):	83” x 38”	Fuel Type: __ Propane __x_ Diesel	
Fuel Tank Size (Gallons):	130	Fuel Tank Location: __Attached __Separate __None TBD	
Capacity (KW):	125		

ADDITIONAL INFORMATION/COMMENTS

T-Mobile’s RF requirements are RAD center of 94’. The tower will need to be extended to 99’ to accommodate.

- Ground lessor consent may be required as a condition to the execution of your lease.
- Modifications to the tower site may be subject to local zoning approval.
- If available, attach manufacturer’s equipment specifications for antennas, mounts, cabinets, shelters, etc.
- When requesting ground space, do not include a buffer around your desired physical footprint. TowerCo , at its sole discretion, will provide a non-exclusive buffer between your installation and other proposed and/or existing tenants to allow for access and maintenance