

KENNETH C. BALDWIN

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Also admitted in Massachusetts
and New York

January 18, 2023

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-034-221124 – Cellco Partnership d/b/a Verizon Wireless – 144 Old Boston Post Road, Danbury, Connecticut**

Dear Attorney Bachman:

Pursuant to Condition No. 1 of the Siting Council's December 19, 2022 approval of the above referenced Exempt Modification, enclosed is a revised Structural Analysis referencing the recently updated Connecticut State Building Code effective October 1, 2022.

The Council's December 19, 2022 approval letter also requested an RF Analysis that includes a cumulative far-field analysis for all entities on the tower. The cumulative RF table and Cellco's far-field analysis, consistent with the Council's recent directive, was included in the November 3, 2022 filing. An additional copy of the analysis is attached for your convenience.

Please contact me if you have any questions regarding this proposal.

Sincerely,



Kenneth C. Baldwin

Attachments



AT&T Towers
 2180 Lake Blvd, 5th Floor (5B13)
 Brookhaven, GA 30319



GPD Engineering and Architecture
 Professional Corporation

Mac Risley
 520 South Main Street, Suite 2531
 Akron, OH 44311
 (678) 781-5067
 mrisley@gpdgroup.com

GPD# 2022723.01.60417.01 Rev. 1
 September 27, 2022

COMPREHENSIVE STRUCTURAL ANALYSIS REPORT

SITE DESIGNATION: Verizon Site Name: DANBURY_S_CT
 Verizon Site #: 467555
 AT&T Site Name: DANBURY- MOSES MTN.
 AT&T Site #: 10034995

ANALYSIS CRITERIA: Codes: TIA-222-H & 2022 Connecticut State Building Code
 115 mph (3-second gust) w/ 0" ice
 50 mph (3-second gust) w/ 1" ice

SITE DATA: Moses Mountain, Danbury, CT 6810, Fairfield County
 Latitude 41° 21' 34.27" N, Longitude 73° 27' 55.69" W
 Market: NEW ENGLAND
 64.3' Modified Self-Support Tower

To whom it may concern,

GPD is pleased to submit this Comprehensive Structural Analysis Report to determine the structural integrity of the aforementioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	71.5%	Pass
Foundation Ratio with Proposed Equipment:	52.4%	Pass

We at GPD appreciate the opportunity of providing our continuing professional services to you and AT&T Towers. If you have any questions or need further assistance on this or any other projects please do not hesitate to call.

Respectfully submitted,

Christopher J. Scheks

Christopher J. Scheks, P.E.
 Connecticut #: 0030026



9/27/2022

SUMMARY & RESULTS

The purpose of this analysis was to verify whether the existing structure is capable of carrying the proposed loading configuration as specified by Verizon and commissioned by AT&T Towers.

This analysis has been performed in accordance with the 2022 Connecticut State Building Code based upon a 3-second gust wind speed of 115 mph. Applicable Standard references and design criteria are listed in Appendices A & B.

Modifications by GPD (Project #: 2016723.01.SNET005.03, dated 10/28/2016) were considered in this analysis.

Seismic loads were determined from spreadsheet calculations. It was concluded from these calculations that the wind loads control the maximum loading on the structure. The seismic loading case will not control.

The proposed feedlines shall be installed as shown in Appendices A & B for the analysis results to be valid.

TOWER SUMMARY AND RESULTS

Member	Capacity	Results
Legs	56.0%	Pass
Bracing	65.1%	Pass
Bolt Checks	71.5%	Pass
Anchor Rods	37.3%	Pass
Foundation	52.4%	Pass

RECOMMENDATIONS

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

ANALYSIS METHOD

tnxTower (Version 8.1.1.0), a commercially available software program, was used to create a three-dimensional model of the tower and calculate primary member stresses for various load cases. Selected output from the analysis is included the report appendices. The following table details the information provided to complete this structural analysis. This analysis is solely based on this information.

DOCUMENTS PROVIDED

Document	Remarks	Source
Site Lease Application	Verizon Site Name: DANBURY_S_CT, updated 7/11/2022	AT&T
Construction Drawings	VZ Project Code: 20212246592 Rev. 4 CDs, dated 2/7/2022	AT&T
Mount Analysis	Maser Consulting Project #: 21781197, dated 2/3/2022	AT&T
AT&T Construction Drawings	AT&T Site #: CTL02133, Rev. B dated 7/15/2022	AT&T
Tower Design	Not Provided	N/A
Foundation Design	Not Provided	N/A
Geotechnical Report	GPD Project #: 2016712.71, dated 9/7/2016	AT&T
Foundation Mapping	GPD Project #: 2016712.71, dated 9/7/2016	AT&T
Tower Mapping	GPD Project #: 2016712.71, dated 9/12/2016	AT&T
Modification Design	GPD Project #: 2016723.01.SNET005.03, dated 10/28/2016	AT&T
Post Modification Inspection	GPD Project #: 2017506.02, dated 5/9/2017	AT&T
Mount Mapping	TEP Project #: 145551.185295, dated 10/8/2018	AT&T
Previous Mount Analysis	Hudson Design Group LLC Site #: CT2133, dated 7/8/2022	AT&T
Previous Tower Analysis	GPD Project #: 2022702.65, dated 5/20/2022	GPD

ASSUMPTIONS

This structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

1. The tower member sizes and shapes are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and as stated in the materials section.
2. The appurtenance configuration is as supplied, determined from available photos, and/or as modeled in the analysis. It is assumed to be complete and accurate. All antennas, mounts, coax and waveguides are assumed to be properly installed and supported as per manufacturer requirements.
3. All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
4. The soil parameters are as per data supplied or as assumed and stated in the calculations.
5. Foundations are properly designed and constructed to resist the original design loads indicated in the documents provided.
6. The tower and structures have been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.
7. All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
8. All prior structural modifications, if applicable, are assumed to be as per data supplied/available and to have been properly installed.
9. Loading interpreted from photos is accurate to $\pm 5'$ AGL, antenna size accurate to ± 3.3 sf, and coax equal to the number of existing antennas without reserve.
10. All existing and proposed loading has been taken from the available site photos as well as documents supplied to GPD at the time of generating this report. All such documents are listed in the Documents Provided Table and are assumed to be accurate. GPD is not responsible for loading scenarios outside those conveyed in the supplied documentation.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the tower.

DISCLAIMER OF WARRANTIES

GPD has not performed a recent site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Comprehensive Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

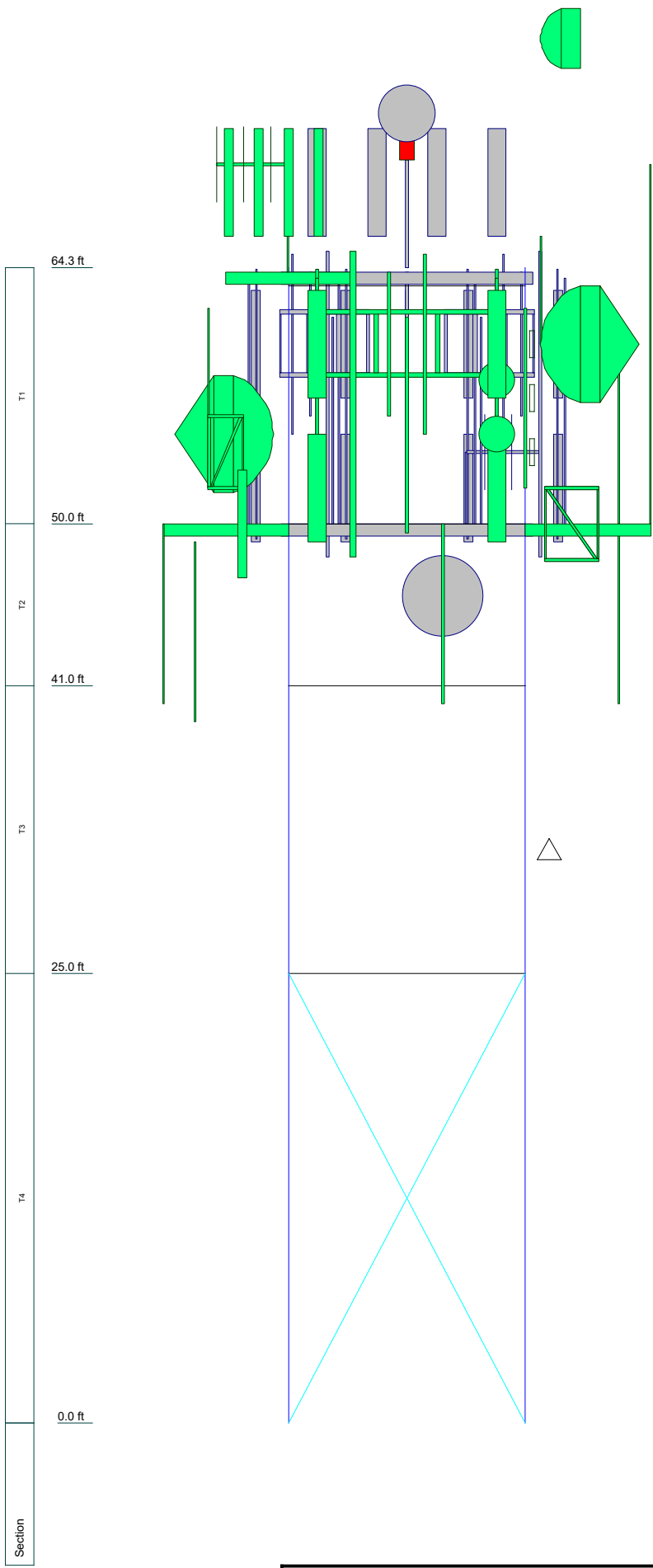
GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

Tower Analysis Summary Form

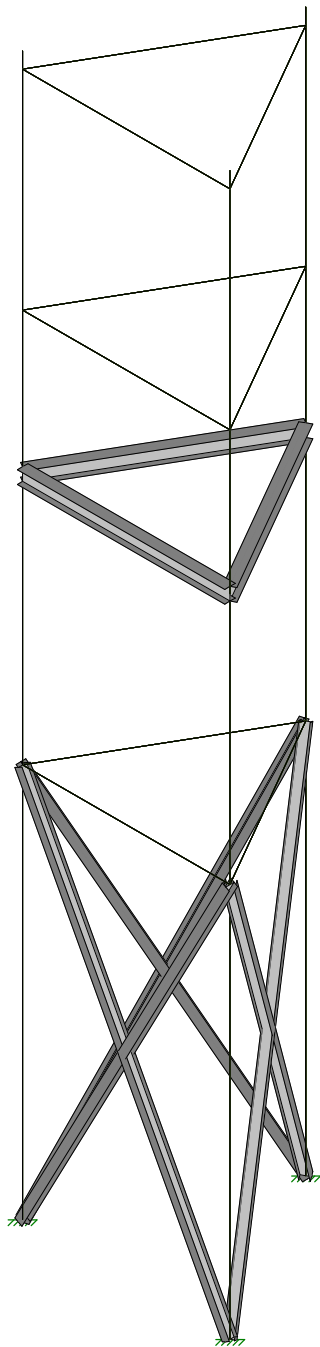
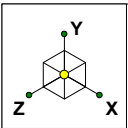
APPENDIX B

Tower Analysis Output File



GPD
 520 South Main Street Suite 2531
 Akron, Ohio 44311
 Phone: (330) 572-2100
 FAX: (330) 572-2101

Job: DANBURY_S_CT (467555)		
Project: 2022723.01.60417.01 (60417)		
Client: AT&T Towers	Drawn by: bfranczkowski	App'd:
Code: TIA-222-H	Date: 09/01/22	Scale: NTS
Path:		Dwg No. E-1



Envelope Only Solution

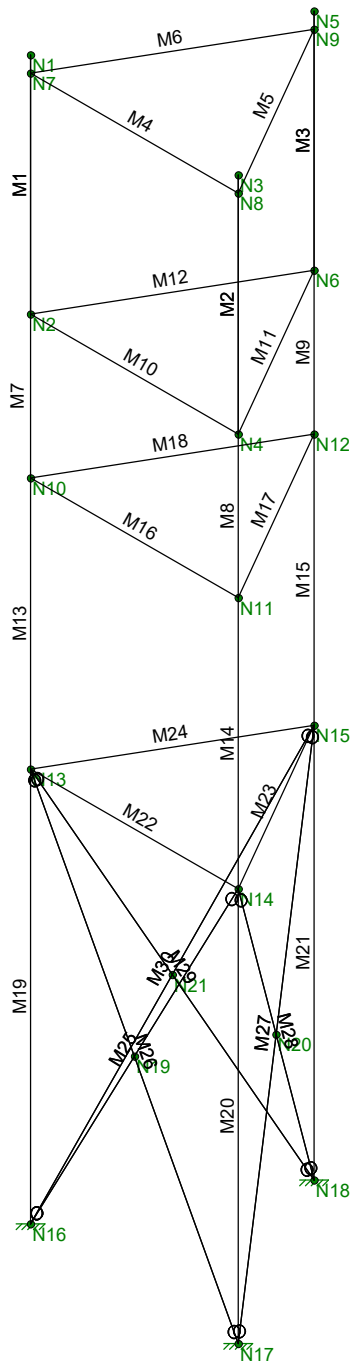
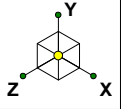
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bfranczkowski
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DANBURY_S_CT (467555)

SK - 1

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Envelope Only Solution

GPD

bfranczkowski

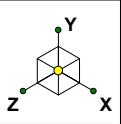
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DANBURY_S_CT (467555)

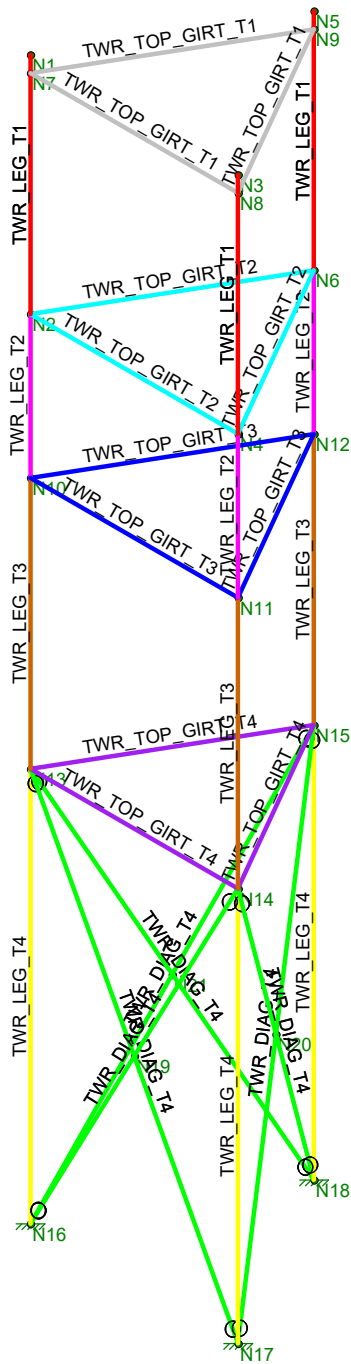
SK - 2

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Section Sets	
■	TWR_TOP_GIRT_T3
■	TWR_DIAG_T4
■	TWR_LEG_T1
■	TWR_TOP_GIRT_T1
■	TWR_LEG_T2
■	TWR_TOP_GIRT_T2
■	TWR_LEG_T3
■	TWR_LEG_T4
■	TWR_TOP_GIRT_T4

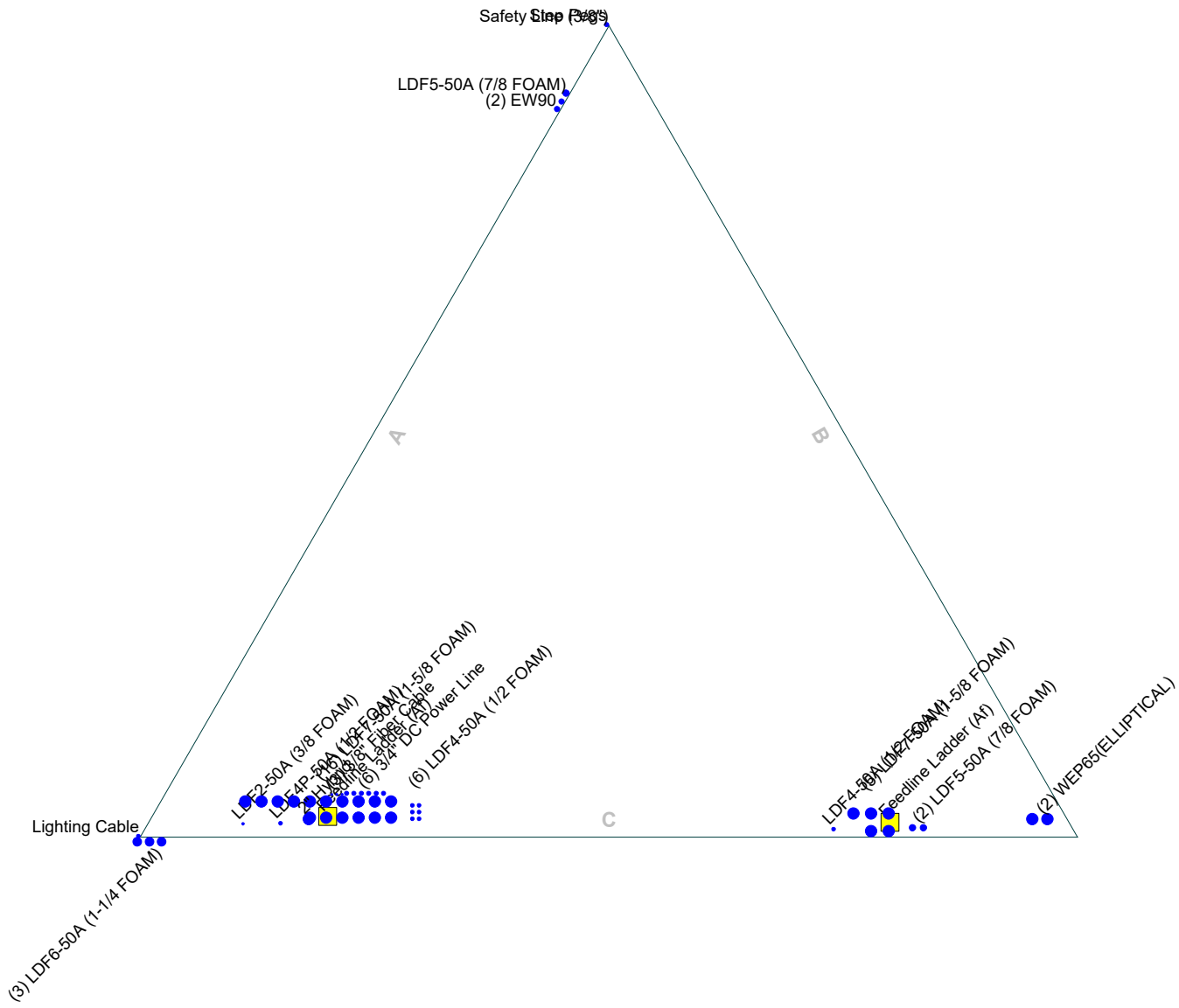


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bfranczkowski		Sept 1, 2022 at 6:46 PM
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Feed Line Plan

— Round
 — Flat
 — App In Face
 — App Out Face



<p>GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (330) 572-2100 FAX: (330) 572-2101</p>	Job: DANBURY_S_CT (467555)		
	Project: 2022723.01.60417.01 (60417)		
	Client: AT&T Towers	Drawn by: bfranczkowski	App'd:
	Code: TIA-222-H	Date: 09/01/22	Scale: NTS
	Path:		Dwg No. E-7

tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	Job DANBURY_S_CT (467555)	Page 1 of 10
	Project 2022723.01.60417.01 (60417)	Date 18:49:13 09/01/22
	Client AT&T Towers	Designed by bfranczkowski

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 64.25 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 13.17 ft at the top and 13.17 ft at the base.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

Tower is located in Fairfield County, Connecticut.

Tower base elevation above sea level: 980.00 ft.

Basic wind speed of 115 mph.

Risk Category II.

Exposure Category B.

Crest Height: 521.00 ft.

Rigorous Topographic Factor Procedure for wind speed-up calculations is used.

Topographic Feature: Hill.

Slope Distance L: 1580.00 ft.

Distance from Crest x: 0.00 ft.

Horizontal Distance Downwind: No.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

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

Pressures are calculated at each section.

Stress ratio used in tower member design is 1.

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

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 plf

Step Pegs	A	No	No	Ar (CaAa)	64.25 - 8.00	0.0000	0.5	1	1	0.8000	0.8000		2.720
Safety Line (3/8")	A	No	No	Ar (CaAa)	64.25 - 8.00	0.0000	0.5	1	1	0.3750	0.3750		0.220
Lighting Cable	A	No	No	Ar (CaAa)	64.25 - 8.00	0.0000	-0.5	1	1	0.5000 0.6300	0.6300		0.150

EW90	A	No	No	Ar (CaAa)	63.00 - 60.00	0.0000	0.4	1	1	0.5000	0.9869		0.320
EW90	A	No	No	Ar (CaAa)	60.00 - 8.00	0.0000	0.4	2	2	0.5000	0.9869		0.320
LDF5-50A (7/8 FOAM)	A	No	No	Ar (CaAa)	50.00 - 8.00	0.0000	0.415	1	1	1.0000	1.0900		0.330

Feedline Ladder (Af)	C	No	No	Af (CaAa)	64.25 - 8.00	-2.0000	0.3	1	1	3.0000	3.0000		8.400
LDF2-50A (3/8 FOAM)	C	No	No	Ar (CaAa)	64.00 - 60.00	-2.0000	0.39	1	1	0.4400	0.4400		0.080

Job	DANBURY_S_CT (467555)	Page	2 of 10
Project	2022723.01.60417.01 (60417)	Date	18:49:13 09/01/22
Client	AT&T Towers	Designed by	bfranczkowski

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 plf
LDF2-50A (3/8 FOAM)	C	No	No	Ar (CaAa)	60.00 - 8.00	-2.0000	0.39	1	1	0.4400	0.4400		0.080
3/4" DC Power Line	C	No	No	Ar (CaAa)	62.00 - 8.00	-7.0000	0.26	6	6	0.5000	0.7500		0.330
3/8" Fiber Cable	C	No	No	Ar (CaAa)	62.00 - 8.00	-7.0000	0.29	3	3	0.5000	0.3750		0.100
LDF4-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	58.00 - 53.00	-5.0000	0.206	1	1	0.5000	0.6300		0.150
LDF4-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	53.00 - 50.00	-5.0000	0.206	2	2	0.5000	0.6300		0.150
LDF4-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	50.00 - 46.00	-5.0000	0.206	5	2	0.5000	0.6300		0.150
LDF4-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	46.00 - 8.00	-5.0000	0.206	6	2	0.5000	0.6300		0.150

Feedline Ladder (Af)	C	No	No	Af (CaAa)	64.25 - 8.00	-1.0000	-0.3	1	1	3.0000	3.0000		8.400
LDF7-50A (1-5/8 FOAM)	C	No	No	Ar (CaAa)	50.00 - 8.00	-3.0000	-0.28	5	3	1.0000	1.9800		0.820
LDF5-50A (7/8 FOAM)	C	No	No	Ar (CaAa)	50.00 - 8.00	-1.0000	-0.33	2	2	0.7500	1.0900		0.330
LDF4-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	50.00 - 8.00	-1.0000	-0.24	1	1	0.6300	0.6300		0.150

LDF6-50A (1-1/4 FOAM)	C	No	No	Ar (CaAa)	57.00 - 50.00	0.0000	0.49	1	1	0.5000	1.5500		0.660
LDF6-50A (1-1/4 FOAM)	C	No	No	Ar (CaAa)	50.00 - 8.00	0.0000	0.49	3	3	0.5000	1.5500		0.660

WEP65(ELLIPTICAL)	C	No	No	Ar (CaAa)	60.00 - 55.00	-2.0000	-0.46	1	1	0.5000	2.0300		0.530
WEP65(ELLIPTICAL)	C	No	No	Ar (CaAa)	55.00 - 8.00	-2.0000	-0.46	2	2	0.5000	2.0300		0.530

LDF4P-50A (1/2 FOAM)	C	No	No	Ar (CaAa)	64.00 - 8.00	-2.0000	0.35	1	1	0.6300	0.6300		0.150

LDF7-50A (1-5/8 FOAM)	C	No	No	Ar (CaAa)	64.00 - 60.00	-2.0000	0.32	4	4	0.7500	1.9800		0.820
LDF7-50A (1-5/8 FOAM)	C	No	No	Ar (CaAa)	60.00 - 8.00	-5.0000	0.31	16	10	0.7500	1.9800		0.820

2" Hybrid	C	No	No	Ar (CaAa)	64.00 - 8.00	-2.0000	0.32	1	1	1.0000	2.0000		0.820

tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	Job	DANBURY_S_CT (467555)	Page	3 of 10
	Project	2022723.01.60417.01 (60417)	Date	18:49:13 09/01/22
	Client	AT&T Towers	Designed by	bfranczkowski

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
Pipe Mount 7'x4.5"	A	From Leg	0.00	0.00	0.000	64.25	No Ice	2.11	2.11	0.083
			0.000				1/2" Ice	3.21	3.21	0.105
			3.000				1" Ice	3.64	3.64	0.132
(2) Flash Beacon	A	From Leg	0.00	0.00	0.000	64.25	No Ice	3.00	3.00	0.100
			0.000				1/2" Ice	4.50	4.50	0.150
			6.000				1" Ice	6.00	6.00	0.200
14' I-Beam Mount	A	From Leg	0.00	0.00	0.000	64.00	No Ice	7.44	0.98	0.350
			0.000				1/2" Ice	10.60	1.54	0.568
			0.000				1" Ice	13.75	2.10	0.786
14' I-Beam Mount	C	From Leg	0.00	0.00	0.000	64.00	No Ice	7.44	0.98	0.350
			0.000				1/2" Ice	10.60	1.54	0.568
			0.000				1" Ice	13.75	2.10	0.786
Pipe Mount 6'x2.375"	C	From Leg	0.00	0.00	0.000	64.00	No Ice	1.43	1.43	0.026
			0.000				1/2" Ice	1.92	1.92	0.037
			3.000				1" Ice	2.29	2.29	0.052
GPS	C	From Leg	0.00	0.00	0.000	64.00	No Ice	0.11	0.11	0.001
			0.000				1/2" Ice	0.21	0.21	0.004
			9.700				1" Ice	0.28	0.28	0.008
2' Yagi	C	From Leg	0.00	0.00	0.000	64.00	No Ice	0.30	0.30	0.005
			0.000				1/2" Ice	0.43	0.43	0.008
			6.000				1" Ice	0.58	0.58	0.013
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	1.00	0.00	0.000	64.00	No Ice	7.27	7.82	0.047
			0.000				1/2" Ice	7.83	9.01	0.114
			5.000				1" Ice	8.35	9.91	0.189
(2) DB846F65ZAXY w/ Mount Pipe	C	From Leg	1.00	0.00	0.000	64.00	No Ice	7.27	7.82	0.047
			0.000				1/2" Ice	7.83	9.01	0.114
			5.000				1" Ice	8.35	9.91	0.189
(2) MX06FRO660-03 w/ Mount Pipe	A	From Leg	1.00	0.00	0.000	64.00	No Ice	10.11	8.99	0.085
			0.000				1/2" Ice	10.68	10.15	0.173
			5.000				1" Ice	11.22	11.03	0.268
(2) MX06FRO660-03 w/ Mount Pipe	C	From Leg	1.00	0.00	0.000	64.00	No Ice	10.11	8.99	0.085
			0.000				1/2" Ice	10.68	10.15	0.173
			5.000				1" Ice	11.22	11.03	0.268
MT6407-77A w/ Mount Pipe	A	From Leg	1.00	0.00	0.000	64.00	No Ice	4.91	2.68	0.096
			0.000				1/2" Ice	5.26	3.14	0.136
			5.000				1" Ice	5.61	3.62	0.180
MT6407-77A w/ Mount Pipe	C	From Leg	1.00	0.00	0.000	64.00	No Ice	4.91	2.68	0.096
			0.000				1/2" Ice	5.26	3.14	0.136
			5.000				1" Ice	5.61	3.62	0.180
(2) RF4439D-25A	A	From Leg	1.00	0.00	0.000	64.00	No Ice	1.87	1.25	0.075
			0.000				1/2" Ice	2.03	1.39	0.093
			5.000				1" Ice	2.21	1.54	0.114
RF4439D-25A	C	From Leg	1.00	0.00	0.000	64.00	No Ice	1.87	1.25	0.075
			0.000				1/2" Ice	2.03	1.39	0.093
			5.000				1" Ice	2.21	1.54	0.114
RF4440D-13A	A	From Leg	1.00	0.00	0.000	64.00	No Ice	1.87	1.13	0.072
			0.000				1/2" Ice	2.03	1.27	0.090
			5.000				1" Ice	2.21	1.41	0.110
(2) RF4440D-13A	C	From Leg	1.00	0.00	0.000	64.00	No Ice	1.87	1.13	0.072
			0.000				1/2" Ice	2.03	1.27	0.090
			5.000				1" Ice	2.21	1.41	0.110
FE-16148-OVP-B12	A	From Leg	1.00	0.00	0.000	64.00	No Ice	2.25	0.92	0.020
			0.000				1/2" Ice	2.44	1.05	0.036
			5.000				1" Ice	2.63	1.19	0.056

tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	Job	DANBURY_S_CT (467555)	Page	4 of 10
	Project	2022723.01.60417.01 (60417)	Date	18:49:13 09/01/22
	Client	AT&T Towers	Designed by	bfranczkowski

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						ft
			Lateral		°	ft	ft ²	ft ²	K	
FE-16148-OVP-B12	C	From Leg	1.00		0.000	64.00	No Ice	2.25	0.92	0.020
			0.000				1/2" Ice	2.44	1.05	0.036
			5.000				1" Ice	2.63	1.19	0.056

Pipe Mount 6'x2.375"	B	From Leg	1.00		0.000	63.00	No Ice	1.43	1.43	0.026
			0.000				1/2" Ice	1.92	1.92	0.037
			0.000				1" Ice	2.29	2.29	0.052

10' T-Boom [SM 601-1]	A	From Face	1.50		0.000	60.00	No Ice	17.48	8.53	0.474
			0.000				1/2" Ice	21.12	11.09	0.652
			0.000				1" Ice	24.94	13.63	0.871
10' T-Boom [SM 601-1]	B	From Face	1.50		0.000	60.00	No Ice	17.48	8.53	0.474
			0.000				1/2" Ice	21.12	11.09	0.652
			0.000				1" Ice	24.94	13.63	0.871
10' T-Boom [SM 601-1]	C	From Face	1.50		0.000	60.00	No Ice	17.48	8.53	0.474
			0.000				1/2" Ice	21.12	11.09	0.652
			0.000				1" Ice	24.94	13.63	0.871
17' P4 STD	A	From Face	3.00		0.000	60.00	No Ice	5.52	5.52	0.184
			3.000				1/2" Ice	9.40	9.40	0.236
			-3.375				1" Ice	11.16	11.16	0.300
17' P4 STD	B	From Face	3.00		0.000	60.00	No Ice	5.52	5.52	0.184
			3.000				1/2" Ice	9.40	9.40	0.236
			-3.375				1" Ice	11.16	11.16	0.300
17' P4 STD	C	From Face	3.00		0.000	60.00	No Ice	5.52	5.52	0.184
			3.000				1/2" Ice	9.40	9.40	0.236
			-3.375				1" Ice	11.16	11.16	0.300
8' P2 STD	A	From Face	3.00		0.000	60.00	No Ice	1.90	1.90	0.029
			1.000				1/2" Ice	2.73	2.73	0.044
			0.000				1" Ice	3.40	3.40	0.063
8' P2 STD	B	From Face	3.00		0.000	60.00	No Ice	1.90	1.90	0.029
			1.000				1/2" Ice	2.73	2.73	0.044
			0.000				1" Ice	3.40	3.40	0.063
8' P2 STD	C	From Face	3.00		0.000	60.00	No Ice	1.90	1.90	0.029
			1.000				1/2" Ice	2.73	2.73	0.044
			0.000				1" Ice	3.40	3.40	0.063
10' P2 STD	A	From Face	3.00		0.000	60.00	No Ice	2.38	2.38	0.037
			-1.000				1/2" Ice	3.40	3.40	0.054
			0.000				1" Ice	4.45	4.45	0.079
10' P2 STD	B	From Face	3.00		0.000	60.00	No Ice	2.38	2.38	0.037
			-1.000				1/2" Ice	3.40	3.40	0.054
			0.000				1" Ice	4.45	4.45	0.079
10' P2 STD	C	From Face	3.00		0.000	60.00	No Ice	2.38	2.38	0.037
			-1.000				1/2" Ice	3.40	3.40	0.054
			0.000				1" Ice	4.45	4.45	0.079
15' P2.5 XX-STR	A	From Face	3.00		0.000	60.00	No Ice	4.31	4.31	0.205
			5.000				1/2" Ice	5.84	5.84	0.237
			-3.375				1" Ice	7.39	7.39	0.278
15' P2.5 XX-STR	B	From Face	3.00		0.000	60.00	No Ice	4.31	4.31	0.205
			5.000				1/2" Ice	5.84	5.84	0.237
			-3.375				1" Ice	7.39	7.39	0.278
15' P2.5 XX-STR	C	From Face	3.00		0.000	60.00	No Ice	4.31	4.31	0.205
			5.000				1/2" Ice	5.84	5.84	0.237
			-3.375				1" Ice	7.39	7.39	0.278
15' P2.5 XX-STR	A	From Face	3.00		0.000	60.00	No Ice	4.31	4.31	0.205
			-5.000				1/2" Ice	5.84	5.84	0.237
			-3.375				1" Ice	7.39	7.39	0.278
15' P2.5 XX-STR	B	From Face	3.00		0.000	60.00	No Ice	4.31	4.31	0.205

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	Client	AT&T Towers	Designed by	bfranczkowski

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz Lateral	Vert						°
15' P2.5 XX-STR	C	From Face	-5.000		0.000	60.00	1/2" Ice	5.84	5.84	0.237
			-3.375				1" Ice	7.39	7.39	0.278
			3.00				No Ice	4.31	4.31	0.205
14' P2 STD	A	From Face	-5.000		0.000	60.00	1/2" Ice	5.84	5.84	0.237
			-3.375				1" Ice	7.39	7.39	0.278
			3.50				No Ice	3.33	3.33	0.051
14' P2 STD	B	From Face	5.000		0.000	60.00	1/2" Ice	4.75	4.75	0.076
			-3.375				1" Ice	6.20	6.20	0.110
			3.50				No Ice	3.33	3.33	0.051
14' P2 STD	C	From Face	5.000		0.000	60.00	1/2" Ice	4.75	4.75	0.076
			-3.375				1" Ice	6.20	6.20	0.110
			3.50				No Ice	3.33	3.33	0.051
14' P2 STD	A	From Face	5.000		0.000	60.00	1/2" Ice	4.75	4.75	0.076
			-3.375				1" Ice	6.20	6.20	0.110
			3.50				No Ice	3.33	3.33	0.051
14' P2 STD	B	From Face	5.000		0.000	60.00	1/2" Ice	4.75	4.75	0.076
			-3.375				1" Ice	6.20	6.20	0.110
			3.50				No Ice	3.33	3.33	0.051
14' P2 STD	C	From Face	5.000		0.000	60.00	1/2" Ice	4.75	4.75	0.076
			-3.375				1" Ice	6.20	6.20	0.110
			3.50				No Ice	3.33	3.33	0.051
(8) 3' W6x20	A	From Face	5.000		0.000	60.00	1/2" Ice	4.75	4.75	0.076
			-3.375				1" Ice	6.20	6.20	0.110
			1.50				No Ice	0.04	2.09	0.060
(8) 3' W6x20	B	From Face	0.000		0.000	60.00	1/2" Ice	0.17	2.44	0.108
			0.000				1" Ice	0.30	2.79	0.156
			1.50				No Ice	0.04	2.09	0.060
(8) 3' W6x20	C	From Face	0.000		0.000	60.00	1/2" Ice	0.17	2.44	0.108
			0.000				1" Ice	0.30	2.79	0.156
			1.50				No Ice	0.04	2.09	0.060
OPA65R-BU6DA	A	From Face	0.000		0.000	60.00	1/2" Ice	0.17	2.44	0.108
			0.000				1" Ice	0.30	2.79	0.156
			3.00				No Ice	12.89	7.10	0.082
OPA65R-BU6DA	B	From Face	0.000		0.000	60.00	1/2" Ice	13.39	8.05	0.173
			0.000				1" Ice	13.90	8.88	0.272
			3.00				No Ice	12.89	7.10	0.082
OPA65R-BU6DA	C	From Face	0.000		0.000	60.00	1/2" Ice	13.39	8.05	0.173
			0.000				1" Ice	13.90	8.88	0.272
			3.00				No Ice	12.89	7.10	0.082
EPBQ-654L8H6	A	From Face	0.000		0.000	60.00	1/2" Ice	13.39	8.05	0.173
			0.000				1" Ice	13.90	8.88	0.272
			3.00				No Ice	8.80	7.04	0.088
EPBQ-654L8H6	B	From Face	0.000		0.000	60.00	1/2" Ice	9.29	7.53	0.147
			0.000				1" Ice	9.78	8.03	0.213
			3.00				No Ice	8.80	7.04	0.088
EPBQ-654L8H6	C	From Face	0.000		0.000	60.00	1/2" Ice	9.29	7.53	0.147
			0.000				1" Ice	9.78	8.03	0.213
			3.00				No Ice	8.80	7.04	0.088
4449 B5/B12	A	From Face	0.000		0.000	60.00	1/2" Ice	9.29	7.53	0.147
			0.000				1" Ice	9.78	8.03	0.213
			3.00				No Ice	1.97	1.41	0.071
4449 B5/B12	B	From Face	0.000		0.000	60.00	1/2" Ice	2.14	1.56	0.090
			0.000				1" Ice	2.33	1.73	0.111
			3.00				No Ice	1.97	1.41	0.071
4449 B5/B12	C	From Face	0.000		0.000	60.00	1/2" Ice	2.14	1.56	0.090
			0.000				1" Ice	2.33	1.73	0.111
			3.00				No Ice	1.97	1.41	0.071

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Project	2022723.01.60417.01 (60417)	Date	18:49:13 09/01/22
Client	AT&T Towers	Designed by	bfranczkowski

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	K
			0.000			1/2" Ice	2.14	1.56	0.090
			0.000			1" Ice	2.33	1.73	0.111
4478 B14	A	From Face	3.00	0.000	60.00	No Ice	1.96	1.25	0.059
			0.000			1/2" Ice	2.14	1.40	0.077
			0.000			1" Ice	2.32	1.55	0.097
4478 B14	B	From Face	3.00	0.000	60.00	No Ice	1.96	1.25	0.059
			0.000			1/2" Ice	2.14	1.40	0.077
			0.000			1" Ice	2.32	1.55	0.097
4478 B14	C	From Face	3.00	0.000	60.00	No Ice	1.96	1.25	0.059
			0.000			1/2" Ice	2.14	1.40	0.077
			0.000			1" Ice	2.32	1.55	0.097
RRUS-32 B2	A	From Face	3.00	0.000	60.00	No Ice	2.73	1.67	0.053
			0.000			1/2" Ice	2.95	1.86	0.074
			0.000			1" Ice	3.18	2.05	0.098
RRUS-32 B2	B	From Face	3.00	0.000	60.00	No Ice	2.73	1.67	0.053
			0.000			1/2" Ice	2.95	1.86	0.074
			0.000			1" Ice	3.18	2.05	0.098
RRUS-32 B2	C	From Face	3.00	0.000	60.00	No Ice	2.73	1.67	0.053
			0.000			1/2" Ice	2.95	1.86	0.074
			0.000			1" Ice	3.18	2.05	0.098
4426 B66	A	From Face	3.00	0.000	60.00	No Ice	2.74	1.67	0.053
			0.000			1/2" Ice	2.96	1.86	0.074
			0.000			1" Ice	3.19	2.05	0.098
4426 B66	B	From Face	3.00	0.000	60.00	No Ice	2.74	1.67	0.053
			0.000			1/2" Ice	2.96	1.86	0.074
			0.000			1" Ice	3.19	2.05	0.098
4426 B66	C	From Face	3.00	0.000	60.00	No Ice	2.74	1.67	0.053
			0.000			1/2" Ice	2.96	1.86	0.074
			0.000			1" Ice	3.19	2.05	0.098
RRUS-32 B30	A	From Face	3.00	0.000	60.00	No Ice	3.31	2.42	0.077
			0.000			1/2" Ice	3.56	2.64	0.105
			0.000			1" Ice	3.81	2.86	0.136
RRUS-32 B30	B	From Face	3.00	0.000	60.00	No Ice	3.31	2.42	0.077
			0.000			1/2" Ice	3.56	2.64	0.105
			0.000			1" Ice	3.81	2.86	0.136
RRUS-32 B30	C	From Face	3.00	0.000	60.00	No Ice	3.31	2.42	0.077
			0.000			1/2" Ice	3.56	2.64	0.105
			0.000			1" Ice	3.81	2.86	0.136
DC6-48-60-18-8F Surge Suppression Unit	A	From Face	3.00	0.000	60.00	No Ice	0.92	0.92	0.019
			0.000			1/2" Ice	1.46	1.46	0.037
			0.000			1" Ice	1.64	1.64	0.057
DC6-48-60-18-8F Surge Suppression Unit	B	From Face	3.00	0.000	60.00	No Ice	0.92	0.92	0.019
			0.000			1/2" Ice	1.46	1.46	0.037
			0.000			1" Ice	1.64	1.64	0.057
DC6-48-60-18-8F Surge Suppression Unit	C	From Face	3.00	0.000	60.00	No Ice	0.92	0.92	0.019
			0.000			1/2" Ice	1.46	1.46	0.037
			0.000			1" Ice	1.64	1.64	0.057
AIR6449 B77D	A	From Face	3.00	0.000	60.00	No Ice	4.11	2.79	0.093
			5.000			1/2" Ice	4.37	3.17	0.131
			-8.000			1" Ice	4.64	3.56	0.173
AIR6449 B77D	B	From Face	3.00	0.000	60.00	No Ice	4.11	2.79	0.093
			5.000			1/2" Ice	4.37	3.17	0.131
			-8.000			1" Ice	4.64	3.56	0.173
AIR6449 B77D	C	From Face	3.00	0.000	60.00	No Ice	4.11	2.79	0.093
			5.000			1/2" Ice	4.37	3.17	0.131
			-8.000			1" Ice	4.64	3.56	0.173
AIR6419 B77G	A	From Face	3.00	0.000	60.00	No Ice	5.01	3.56	0.095

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	Project	2022723.01.60417.01 (60417)	Date	18:49:13 09/01/22
	Client	AT&T Towers	Designed by	bfranczkowski

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
AIR6419 B77G	B	From Face	-5.000		0.000	60.00	1/2" Ice	5.84	4.58	0.142
			-8.000				1" Ice	6.57	5.45	0.194
			3.00				No Ice	5.01	3.56	0.095
AIR6419 B77G	C	From Face	-5.000		0.000	60.00	1/2" Ice	5.84	4.58	0.142
			-8.000				1" Ice	6.57	5.45	0.194
			3.00				No Ice	5.01	3.56	0.095
(6) 3' W6x20	A	From Face	-5.000		0.000	50.00	1/2" Ice	5.84	4.58	0.142
			-8.000				1" Ice	6.57	5.45	0.194
			1.50				No Ice	0.04	2.09	0.060
(6) 3' W6x20	B	From Face	0.000		0.000	50.00	1/2" Ice	0.17	2.44	0.108
			0.000				1" Ice	0.30	2.79	0.156
			1.50				No Ice	0.04	2.09	0.060
(6) 3' W6x20	C	From Face	0.000		0.000	50.00	1/2" Ice	0.17	2.44	0.108
			0.000				1" Ice	0.30	2.79	0.156
			1.50				No Ice	0.04	2.09	0.060
***			0.000				1/2" Ice	0.17	2.44	0.108
			0.000				1" Ice	0.30	2.79	0.156
Pipe Mount 6'x2.375"	B	From Leg	0.50		0.000	60.00	No Ice	1.43	1.43	0.026
			0.000				1/2" Ice	1.92	1.92	0.037
			0.000				1" Ice	2.29	2.29	0.052

Pipe Mount 6'x2.375"	A	From Leg	1.00		0.000	60.00	No Ice	1.43	1.43	0.026
			0.000				1/2" Ice	1.92	1.92	0.037
			0.000				1" Ice	2.29	2.29	0.052

12"x10"x4" ODU	C	From Face	0.50		0.000	58.00	No Ice	1.17	0.47	0.050
			-5.000				1/2" Ice	1.31	0.57	0.058
			0.000				1" Ice	1.47	0.69	0.067

Andrew Collar Mount	B	From Leg	0.50		0.000	57.00	No Ice	2.14	2.14	0.190
			0.000				1/2" Ice	2.35	2.35	0.247
			0.000				1" Ice	2.57	2.57	0.304
12' Omni	B	From Leg	1.00		0.000	57.00	No Ice	5.09	5.09	0.070
			0.000				1/2" Ice	7.09	7.09	0.109
			6.000				1" Ice	8.71	8.71	0.158

Pipe Mount 6'x2.375"	C	From Leg	0.50		0.000	55.00	No Ice	1.43	1.43	0.026
			0.000				1/2" Ice	1.92	1.92	0.037
			0.000				1" Ice	2.29	2.29	0.052

Pipe Mount 4'x2.375"	B	From Leg	0.00		0.000	53.00	No Ice	0.87	0.87	0.018
			0.000				1/2" Ice	1.11	1.11	0.026
			0.000				1" Ice	1.36	1.36	0.036
8' Dipole	B	From Leg	0.00		0.000	53.00	No Ice	1.60	1.60	0.015
			0.000				1/2" Ice	2.42	2.42	0.027
			4.000				1" Ice	3.24	3.24	0.045

14' I-Beam Mount	B	From Leg	4.00		0.000	50.00	No Ice	7.44	0.98	0.350
			0.000				1/2" Ice	10.60	1.54	0.568
			0.000				1" Ice	13.75	2.10	0.786
DB806D	C	From Leg	4.00		0.000	50.00	No Ice	1.14	1.14	0.021
			0.000				1/2" Ice	1.68	1.68	0.030
			7.000				1" Ice	2.03	2.03	0.043
BA80-41-DIN	B	From Leg	8.00		0.000	50.00	No Ice	6.81	6.81	0.068
			0.000				1/2" Ice	10.38	10.38	0.125
			10.000				1" Ice	12.50	12.50	0.196

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	Client	AT&T Towers	Designed by	bfranczkowski

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert</i> <i>ft ft ft</i>	<i>Azimuth Adjustment</i> <i>°</i>	<i>Placement</i> <i>ft</i>	<i>C_{AA} Front</i> <i>ft²</i>	<i>C_{AA} Side</i> <i>ft²</i>	<i>Weight</i> <i>K</i>

MTS 72" Standoff	B	From Leg	3.00 0.000 0.000	0.000	50.00	No Ice 0.98 1/2" Ice 1.70 1" Ice 2.42	3.03 5.22 7.41	0.053 0.079 0.105
10' Omni	B	From Leg	6.00 0.000 5.000	0.000	50.00	No Ice 2.00 1/2" Ice 3.02 1" Ice 4.07	2.00 3.02 4.07	0.025 0.041 0.062

Pipe Mount 6'x2.375"	A	From Leg	0.50 0.000 3.000	0.000	50.00	No Ice 1.43 1/2" Ice 1.92 1" Ice 2.29	1.43 1.92 2.29	0.026 0.037 0.052
6' Omni	A	From Leg	0.50 0.000 7.000	0.000	50.00	No Ice 1.77 1/2" Ice 2.13 1" Ice 2.50	1.77 2.13 2.50	0.025 0.038 0.056

Pipe Mount 12'x2.375"	A	From Leg	1.00 0.000 5.500	0.000	50.00	No Ice 2.85 1/2" Ice 4.08 1" Ice 5.32	2.85 4.08 5.32	0.046 0.067 0.096
8' Dipole	A	From Leg	1.00 0.000 4.000	0.000	50.00	No Ice 1.60 1/2" Ice 2.42 1" Ice 3.24	1.60 2.42 3.24	0.015 0.027 0.045

Pipe Mount 12'x2.375"	C	From Face	1.00 0.000 5.500	0.000	50.00	No Ice 2.85 1/2" Ice 4.08 1" Ice 5.32	2.85 4.08 5.32	0.046 0.067 0.096
LeBlanc 18" Standoff	C	From Face	2.00 0.000 0.000	0.000	50.00	No Ice 2.96 1/2" Ice 4.10 1" Ice 5.24	2.11 2.93 3.75	0.096 0.117 0.138
10' Omni	C	From Face	3.00 0.000 -5.000	0.000	50.00	No Ice 2.00 1/2" Ice 3.02 1" Ice 4.07	2.00 3.02 4.07	0.025 0.041 0.062
20"x8"x6" TMA	C	From Face	1.50 0.000 2.000	0.000	50.00	No Ice 1.33 1/2" Ice 1.49 1" Ice 1.66	1.03 1.17 1.32	0.030 0.042 0.056

Pipe Mount 4'x2.375"	B	From Face	0.00 0.000 2.000	0.000	50.00	No Ice 0.87 1/2" Ice 1.11 1" Ice 1.36	0.87 1.11 1.36	0.018 0.026 0.036
UHF450 Antenna	B	From Face	0.00 0.000 4.000	0.000	50.00	No Ice 5.59 1/2" Ice 7.66 1" Ice 9.74	5.59 7.66 9.74	0.030 0.071 0.124

14' I-Beam Mount	A	From Leg	4.00 0.000 0.000	0.000	50.00	No Ice 7.44 1/2" Ice 10.60 1" Ice 13.75	0.98 1.54 2.10	0.350 0.568 0.786
14' I-Beam Mount	C	From Leg	4.00 0.000 0.000	0.000	50.00	No Ice 7.44 1/2" Ice 10.60 1" Ice 13.75	0.98 1.54 2.10	0.350 0.568 0.786
LeBlanc 18" Standoff	C	From Leg	4.00 0.000 2.000	0.000	50.00	No Ice 2.96 1/2" Ice 4.10 1" Ice 5.24	2.11 2.93 3.75	0.096 0.117 0.138
MTS 72" Standoff	B	From Leg	3.00 0.000 0.000	0.000	50.00	No Ice 0.98 1/2" Ice 1.70 1" Ice 2.42	3.03 5.22 7.41	0.053 0.079 0.105
Pipe Mount 12'x2.375"	B	From Face	1.00 0.000 5.500	0.000	50.00	No Ice 2.85 1/2" Ice 4.08 1" Ice 5.32	2.85 4.08 5.32	0.046 0.067 0.096

tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	Job	DANBURY_S_CT (467555)	Page	10 of 10
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	Client	AT&T Towers	Designed by	bfranczkowski

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				Horz Lateral Vert ft	°						
VHLP3-11W-6GR	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.000 14.000	0.000			63.00	3.28	No Ice 1/2" Ice 1" Ice	8.47 8.90 9.34 0.053 0.100 0.140
VHLP3-11W-6GR	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.000 12.900	0.000			60.00	3.28	No Ice 1/2" Ice 1" Ice	8.47 8.90 9.34 0.053 0.100 0.140
PA6-65	B	Paraboloid w/Radome	From Leg	1.00 0.000 0.000	0.000			60.00	6.58	No Ice 1/2" Ice 1" Ice	34.04 34.91 35.77 0.140 0.320 0.500
SPD2-5.8NS	C	Paraboloid w/Radome	From Face	1.00 -5.000 0.000	0.000			58.00	2.00	No Ice 1/2" Ice 1" Ice	3.14 3.41 3.68 0.022 0.040 0.060
PA6-65	C	Paraboloid w/Radome	From Leg	1.00 0.000 0.000	0.000			55.00	6.58	No Ice 1/2" Ice 1" Ice	34.04 34.91 35.77 0.140 0.320 0.500
PRFTV 48/75	A	Grid	From Leg	2.00 2.000 0.000	0.000			46.00	4.65	No Ice 1/2" Ice 1" Ice	6.35 17.60 18.21 0.040 0.090 0.140
SPD2-5.8NS	C	Paraboloid w/Radome	From Face	3.00 -5.000 -5.000	0.000			60.00	2.00	No Ice 1/2" Ice 1" Ice	3.14 3.41 3.68 0.022 0.040 0.060



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 Designer : bfranczkowski
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Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A572-50	29000	11200	.295	.65	.49	50	1.1	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	TWR_TOP_GIRT_T3	W10X33	Beam	Wide Flange	A572-50	Typical	9.71	36.6	171	.583
2	TWR_DIAG_T4	W6X25	Column	Wide Flange	A572-50	Typical	7.34	17.1	53.4	.461

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(...
1	Dead	None		-1		24	361	12	
2	No Ice Wind 0 deg	None				24	849	32	
3	No Ice Wind 30 deg	None				48	906	44	
4	No Ice Wind 60 deg	None				48	947	44	
5	No Ice Wind 90 deg	None				24	821	32	
6	No Ice Wind 120 deg	None				48	946	44	
7	No Ice Wind 150 deg	None				48	897	44	
8	No Ice Wind 180 deg	None				24	849	32	
9	No Ice Wind 210 deg	None				48	905	44	
10	No Ice Wind 240 deg	None				48	947	44	
11	No Ice Wind 270 deg	None				24	821	32	
12	No Ice Wind 300 deg	None				48	946	44	
13	No Ice Wind 330 deg	None				48	895	44	
14	Ice	None				24	361	42	
15	Temperature Drop	None						30	
16	Ice Wind 0 deg	None				24	845	32	
17	Ice Wind 30 deg	None				48	904	44	
18	Ice Wind 60 deg	None				48	945	44	
19	Ice Wind 90 deg	None				24	820	32	
20	Ice Wind 120 deg	None				48	945	44	
21	Ice Wind 150 deg	None				48	895	44	
22	Ice Wind 180 deg	None				24	845	32	
23	Ice Wind 210 deg	None				48	903	44	
24	Ice Wind 240 deg	None				48	945	44	
25	Ice Wind 270 deg	None				24	820	32	
26	Ice Wind 300 deg	None				48	945	44	
27	Ice Wind 330 deg	None				48	895	44	
28	Service Wind 0 deg	None				24	846	32	
29	Service Wind 30 deg	None				48	901	44	
30	Service Wind 60 deg	None				48	942	44	
31	Service Wind 90 deg	None				24	821	32	
32	Service Wind 120 deg	None				48	941	44	
33	Service Wind 150 deg	None				48	894	44	
34	Service Wind 180 deg	None				24	846	32	
35	Service Wind 210 deg	None				48	900	44	
36	Service Wind 240 deg	None				48	943	44	
37	Service Wind 270 deg	None				24	821	32	
38	Service Wind 300 deg	None				48	941	44	
39	Service Wind 330 deg	None				48	892	44	



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Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	
1	Dead Only	Yes	Y		1	1	40	1	41	1	0		0		0		0		0		0		0
2	1.2 Dead+1.0 Wind 0 deg...	Yes	Y		1	1.2	2	1	40	1.2	41	1	0		0		0		0		0		0
3	0.9 Dead+1.0 Wind 0 deg...	Yes	Y		1	.9	2	1	40	.9	41	1	0		0		0		0		0		0
4	1.2 Dead+1.0 Wind 30 de...	Yes	Y		1	1.2	3	1	40	1.2	41	1	0		0		0		0		0		0
5	0.9 Dead+1.0 Wind 30 de...	Yes	Y		1	.9	3	1	40	.9	41	1	0		0		0		0		0		0
6	1.2 Dead+1.0 Wind 60 de...	Yes	Y		1	1.2	4	1	40	1.2	41	1	0		0		0		0		0		0
7	0.9 Dead+1.0 Wind 60 de...	Yes	Y		1	.9	4	1	40	.9	41	1	0		0		0		0		0		0
8	1.2 Dead+1.0 Wind 90 de...	Yes	Y		1	1.2	5	1	40	1.2	41	1	0		0		0		0		0		0
9	0.9 Dead+1.0 Wind 90 de...	Yes	Y		1	.9	5	1	40	.9	41	1	0		0		0		0		0		0
10	1.2 Dead+1.0 Wind 120 d...	Yes	Y		1	1.2	6	1	40	1.2	41	1	0		0		0		0		0		0
11	0.9 Dead+1.0 Wind 120 d...	Yes	Y		1	.9	6	1	40	.9	41	1	0		0		0		0		0		0
12	1.2 Dead+1.0 Wind 150 d...	Yes	Y		1	1.2	7	1	40	1.2	41	1	0		0		0		0		0		0
13	0.9 Dead+1.0 Wind 150 d...	Yes	Y		1	.9	7	1	40	.9	41	1	0		0		0		0		0		0
14	1.2 Dead+1.0 Wind 180 d...	Yes	Y		1	1.2	8	1	40	1.2	41	1	0		0		0		0		0		0
15	0.9 Dead+1.0 Wind 180 d...	Yes	Y		1	.9	8	1	40	.9	41	1	0		0		0		0		0		0
16	1.2 Dead+1.0 Wind 210 d...	Yes	Y		1	1.2	9	1	40	1.2	41	1	0		0		0		0		0		0
17	0.9 Dead+1.0 Wind 210 d...	Yes	Y		1	.9	9	1	40	.9	41	1	0		0		0		0		0		0
18	1.2 Dead+1.0 Wind 240 d...	Yes	Y		1	1.2	10	1	40	1.2	41	1	0		0		0		0		0		0
19	0.9 Dead+1.0 Wind 240 d...	Yes	Y		1	.9	10	1	40	.9	41	1	0		0		0		0		0		0
20	1.2 Dead+1.0 Wind 270 d...	Yes	Y		1	1.2	11	1	40	1.2	41	1	0		0		0		0		0		0
21	0.9 Dead+1.0 Wind 270 d...	Yes	Y		1	.9	11	1	40	.9	41	1	0		0		0		0		0		0
22	1.2 Dead+1.0 Wind 300 d...	Yes	Y		1	1.2	12	1	40	1.2	41	1	0		0		0		0		0		0
23	0.9 Dead+1.0 Wind 300 d...	Yes	Y		1	.9	12	1	40	.9	41	1	0		0		0		0		0		0
24	1.2 Dead+1.0 Wind 330 d...	Yes	Y		1	1.2	13	1	40	1.2	41	1	0		0		0		0		0		0
25	0.9 Dead+1.0 Wind 330 d...	Yes	Y		1	.9	13	1	40	.9	41	1	0		0		0		0		0		0
26	1.2 Dead+1.0 Ice+1.0 Temp	Yes	Y		1	1.2	14	1	15	1	40	1.2	41	1	0		0		0		0		0
27	1.2 Dead+1.0 Wind 0 deg...	Yes	Y		1	1.2	16	1	14	1	15	1	40	1.2	41	1	0		0		0		0
28	1.2 Dead+1.0 Wind 30 de...	Yes	Y		1	1.2	17	1	14	1	15	1	40	1.2	41	1	0		0		0		0
29	1.2 Dead+1.0 Wind 60 de...	Yes	Y		1	1.2	18	1	14	1	15	1	40	1.2	41	1	0		0		0		0
30	1.2 Dead+1.0 Wind 90 de...	Yes	Y		1	1.2	19	1	14	1	15	1	40	1.2	41	1	0		0		0		0
31	1.2 Dead+1.0 Wind 120 d...	Yes	Y		1	1.2	20	1	14	1	15	1	40	1.2	41	1	0		0		0		0
32	1.2 Dead+1.0 Wind 150 d...	Yes	Y		1	1.2	21	1	14	1	15	1	40	1.2	41	1	0		0		0		0
33	1.2 Dead+1.0 Wind 180 d...	Yes	Y		1	1.2	22	1	14	1	15	1	40	1.2	41	1	0		0		0		0
34	1.2 Dead+1.0 Wind 210 d...	Yes	Y		1	1.2	23	1	14	1	15	1	40	1.2	41	1	0		0		0		0
35	1.2 Dead+1.0 Wind 240 d...	Yes	Y		1	1.2	24	1	14	1	15	1	40	1.2	41	1	0		0		0		0
36	1.2 Dead+1.0 Wind 270 d...	Yes	Y		1	1.2	25	1	14	1	15	1	40	1.2	41	1	0		0		0		0
37	1.2 Dead+1.0 Wind 300 d...	Yes	Y		1	1.2	26	1	14	1	15	1	40	1.2	41	1	0		0		0		0
38	1.2 Dead+1.0 Wind 330 d...	Yes	Y		1	1.2	27	1	14	1	15	1	40	1.2	41	1	0		0		0		0
39	Dead+Wind 0 deg - Service	Yes	Y		1	1	28	1	40	1	41	1	0		0		0		0		0		0
40	Dead+Wind 30 deg - Serv...	Yes	Y		1	1	29	1	40	1	41	1	0		0		0		0		0		0
41	Dead+Wind 60 deg - Serv...	Yes	Y		1	1	30	1	40	1	41	1	0		0		0		0		0		0
42	Dead+Wind 90 deg - Serv...	Yes	Y		1	1	31	1	40	1	41	1	0		0		0		0		0		0
43	Dead+Wind 120 deg - Ser...	Yes	Y		1	1	32	1	40	1	41	1	0		0		0		0		0		0
44	Dead+Wind 150 deg - Ser...	Yes	Y		1	1	33	1	40	1	41	1	0		0		0		0		0		0
45	Dead+Wind 180 deg - Ser...	Yes	Y		1	1	34	1	40	1	41	1	0		0		0		0		0		0
46	Dead+Wind 210 deg - Ser...	Yes	Y		1	1	35	1	40	1	41	1	0		0		0		0		0		0
47	Dead+Wind 240 deg - Ser...	Yes	Y		1	1	36	1	40	1	41	1	0		0		0		0		0		0
48	Dead+Wind 270 deg - Ser...	Yes	Y		1	1	37	1	40	1	41	1	0		0		0		0		0		0
49	Dead+Wind 300 deg - Ser...	Yes	Y		1	1	38	1	40	1	41	1	0		0		0		0		0		0
50	Dead+Wind 330 deg - Ser...	Yes	Y		1	1	39	1	40	1	41	1	0		0		0		0		0		0



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Envelope AISC 15th(360-16): LRFD Steel Code Checks

Member	Shape	Code Check	Loc[ft]	LC	Shear	CheckLo	phi*Pnc	phi*Pnt	phi*	phi*	Eqn
1	M18	W10X33	.651	0	4	.145	1... y 4	269.23	436.95	52.5	122... 1 H1...
2	M16	W10X33	.607	0	20	.136	.96 y ...	269.23	436.95	52.5	122... 1 H1...
3	M17	W10X33	.597	13.167	24	.134	13... y ...	269.23	436.95	52.5	122... 1 H1...
4	M29	W6X25	.306	6.181	2	.001	14... z ...	134.017	330.3	32.1	58.036 1 H1...
5	M26	W6X25	.284	6.181	10	.001	14... z ...	134.017	330.3	32.1	58.036 1 H1...
6	M25	W6X25	.278	5.887	18	.001	14... z ...	134.017	330.3	32.1	58.036 1 H1...
7	M28	W6X25	.277	6.181	2	.001	14... z ...	134.017	330.3	32.1	58.036 1 H1...
8	M30	W6X25	.271	6.181	18	.001	14... z ...	134.017	330.3	32.1	58.036 1 H1...
9	M27	W6X25	.258	6.181	10	.001	14... z ...	134.017	330.3	32.1	58.036 1 H1...

Envelope Joint Reactions

Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC	
1	N16	max	24.901	18	166.627	18	11.542	7	10.633	12	.006	24	6.704	23
2		min	-20.715	7	-137.256	7	-14.01	18	-11.078	24	-.006	12	-6.919	10
3	N17	max	20.764	23	163.203	10	11.146	23	9.865	16	.007	24	6.678	18
4		min	-24.81	10	-136.995	23	-13.39	10	-10.274	4	-.007	12	-6.535	7
5	N18	max	1.898	8	174.621	2	30.357	2	4.424	14	.007	24	11.244	20
6		min	-2.037	22	-144.741	15	-25.193	15	-4.101	3	-.007	12	-11.193	8
7	Totals:	max	35.076	21	81.398	35	40.221	3						
8		min	-34.986	8	30.646	7	-38.28	14						



Member Stress Results
DANBURY_S_CT (467555)
2022723.01.60417.01 (60417)

Section Number	Elevation (ft)	Component Type	Size	Pu (k)	ΦPn (K)	% Capacity	Pass/Fail
T1	50 - 64.3	LEG	POLY15.50x1/4 (GPD)	17.794	569.588	20.1%	Pass
T1	50 - 64.3	TOP GIRT	POLY12.45x1/4 (GPD)	2.954	455.67	26.3%	Pass
T2	41 - 50	LEG	POLY15.50x1/4 (GPD)	41.68	569.588	37.3%	Pass
T2	41 - 50	TOP GIRT	POLY12.45x1/4 (GPD)	2.537	455.67	49.7%	Pass
T3	25 - 41	LEG	POLY15.50x1/4 (GPD)	63.88	569.588	56.0%	Pass
T4	0 - 25	LEG	POLY15.50x1/4 (GPD)	107.103	569.588	31.3%	Pass
T4	0 - 25	TOP GIRT	POLY12.45x1/4 (GPD)	4.019	455.67	34.6%	Pass
T3	25 - 41	TOP GIRT	W10x33	175.269	269.23	65.1%	Pass
T4	0 - 25	DIAG	W6x25	41.01	134.02	30.6%	Pass
Summary							
Leg (T3)						56.0%	Pass
Diagonal (T4)						30.6%	Pass
Top Girt (T3)						65.1%	Pass
Rating =						65.1%	Pass

APPENDIX C

Additional Calculations



Existing Flange Connection @
DANBURY_S_CT (467555)
 2022723.01.60417.01 (60417)

GIRT CONNECTIONS

Moment =	82.1	k-ft
Axial =	0.131	k
Shear =	12.668	k

Maximum Capacity	100%
Apply TIA-222-H Section 15.5?	No

Flange Bolts	
# Bolts =	4
Bolt Type =	A325
Threads Included? =	Yes
Bolt Diameter =	1.25 in
Bolt Circle =	18 in
ϕ_t =	0.75
ϕ_v =	0.75
F_{ub} =	105 ksi
A_b =	1.227 in ²
A_n =	0.969 in ²
ϕR_{nv} =	48.32 k
ϕR_{nt} =	76.31 k
ϕR_{nt} (adjusted) =	76.14 k
V_{ub} =	3.17 k
T_{ub} =	54.57 k
Max Comp. on Bolt =	54.63 k
<i>Prying Action Check</i>	
N/A, top flange thickness > t_c	
Shear Capacity =	6.6%
Tensile Capacity =	71.5%
Interaction Capacity =	51.6%
Bolt Capacity =	71.5% OK

Upper Flange Plate	
Location =	External
Plate Strength (F_y) =	36 ksi
Plate Tensile (F_u) =	58 ksi
Plate Thickness =	1.5 in
Outer Diameter =	16 in
ϕ_t =	0.9
wcalc =	13.00 in
wmax =	15.00 in
w =	13.00 in
Z =	7.31 in ³
M_u =	151.61 k-in
ϕM_n =	236.92 k-in
Upper Plate Capacity =	64.0% OK

Upper Stiffeners	
Configuration =	None

Pole Information	
Shaft Diam. (Upper) =	12.45 in
Thickness (Upper) =	0.25 in
# of Sides (Upper) =	8
F_y (Upper) =	50 ksi
Shaft Diam. (Lower) =	12.45 in
Thickness (Lower) =	0.25 in
# of Sides (Lower) =	8
F_y (Lower) =	50 ksi

Lower Flange Plate	
Location =	External
Plate Strength (F_y) =	36 ksi
Plate Thickness =	1.5 in
Outer Diameter =	16 in
wcalc =	13.00 in
wmax =	15.00 in
w =	13.00 in
Z =	7.31 in ³
M_u =	151.61 k-in
ϕM_n =	236.92 k-in
Lower Plate Capacity =	64.0% OK

Lower Stiffeners	
Configuration =	None



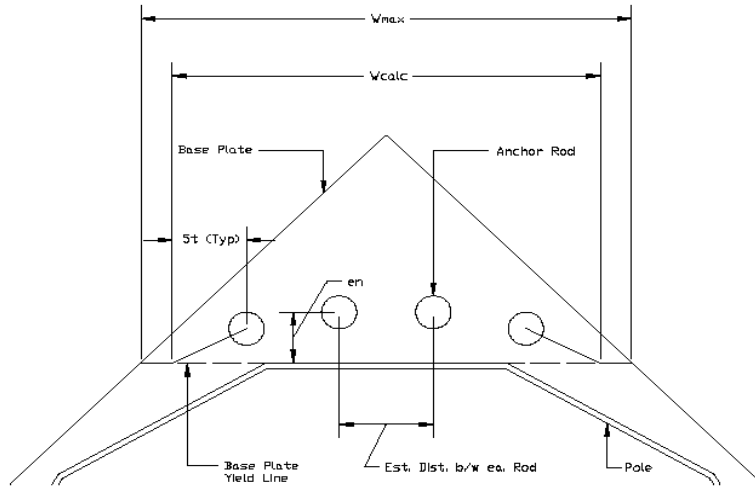
Anchor Rod and Base Plate Stresses, TIA-222-H-1
DANBURY_S_CT (467555)
2022723.01.60417.01 (60417)

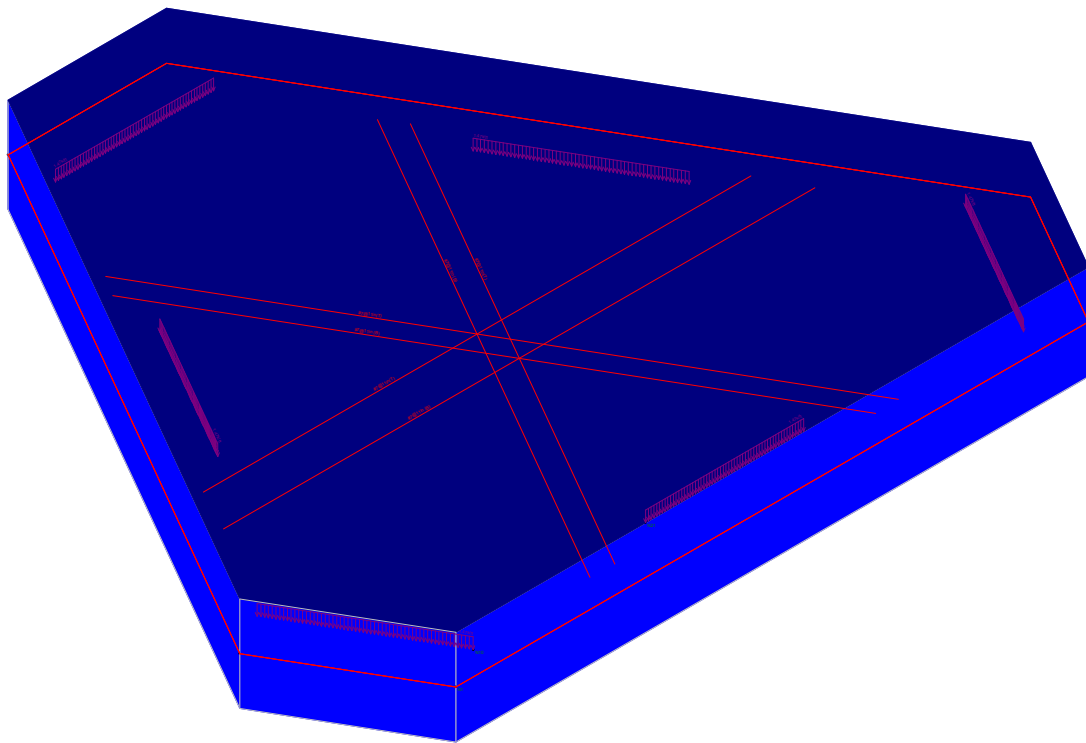
Overturing Moment =	4.16	k*ft
Axial Force =	174.62	k
Shear Force =	30.37	k

Maximum Capacity	100%
Apply TIA-222-H Section 15.5?	No

Anchor Rods		
Pole Diameter =	15.5	in
Number of Rods =	4	
Rod Yield Strength, F_y =	36	ksi
Rod Ultimate Strength, F_u =	58	ksi
Rod Circle =	22.6	in
Rod Diameter =	2.25	in
Rod Projection, l_{ar} =	2.25	in
Is grout present?	No	
Max Tension on Rod, P_{ut} =	-41.46	k
Max Compression on Rod, P_{uc} =	45.85	k
Shear on Rod, V_u =	7.59	k
Moment on Rod, M_u =	0.00	k-in
Tension Interaction =	9.4%	OK
Compression Interaction =	37.3%	OK

Base Plate		
Plate Yield Strength, F_y =	36	ksi
ϕ =	0.9	
Plate Thickness =	2.5	in
Plate Width =	22	in
Est. Dist. b/w ea. Rod =		in
W_{calc} =	16.45	in
W_{max} =	15.61	in
w =	15.61	in
Z =	24.39	in ³
M_u =	162.77	k-in
ϕM_n =	790.39	k-in
Base Plate Capacity =	20.6%	OK





GPD	DANBURY_S_CT (467555)	SK - 4
BF		Sept 1, 2022 at 7:13 PM
2022723.01.60417.01 (60...		RISA FOUNDATION_60417_4675...



Company : GPD
 Designer : BF
 Job Number : 2022723.01.60417.01 (60417)
 Model Name : DANBURY_S_CT (467555)

Sept 1, 2022
 7:14 PM
 Checked By: _____

Slabs

	Label	Thickness [in]	Material	Local Axis Angle...	Analysis Offset [in]	Passive Pressur...	Soil Overburden ...	lcr Factor
1	S1	36	Conc3000NW	0	0	0	0	1

General Design Parameters

	Label	Max Bending Chk	Max Shear Chk	Top Cover[in]	Bottom Cover[in]
1	Typical	2	2	3	3

Slab Rebar Parameters

	Label	Top Bar	Bottom Bar	Max Top Bar S...	Min Top Bar S...	Max Bot Bar S...	Min Bot Bar S...	Spacing In...	Rebar Options
1	Typical	#7	#7	11	11	11	11	11	Force Top and Bottom

Envelope Slab Soil Pressures

	Label	UC	LC	Soil Pressure[ksf]	Allowable Bearing[ksf]	Point
1	S1	0.524	40	11.962	22.83	N6

Slab Overturning Safety Factors

	LC	Slab	Angle[deg]	Mo-xx[k-ft]	Ms-xx[k-ft]	Mo-zz[k-ft]	Ms-zz[k-ft]	Ms-xx/Mo-xx	Ms-zz/Mo-zz
1	26	S1	0	0	4003.724	0	2774.512	9.99+	9.99+
2	27	S1	0	0	3698.427	1305.269	3193.221	9.99+	2.446
3	28	S1	0	0	2804.575	1437.209	2394.916	9.99+	1.666
4	29	S1	0	458.799	3072.769	1077.689	3193.221	6.697	2.963
5	30	S1	0	587.612	2304.577	1209.942	2394.916	3.922	1.979
6	31	S1	0	986.541	3072.769	425.872	3193.221	3.115	7.498
7	32	S1	0	1114.717	2304.577	558.821	2394.916	2.067	4.286
8	33	S1	0	1135.949	3072.769	0	2598.426	2.705	9.99+
9	34	S1	0	1263.92	2304.577	0	1978.932	1.823	9.99+
10	35	S1	0	901.042	3072.769	419.922	2128.814	3.41	5.07
11	36	S1	0	1029.213	2304.577	506.279	1596.611	2.239	3.154
12	37	S1	0	246.296	3072.769	1114.348	2128.814	9.99+	1.91
13	38	S1	0	375.109	2304.577	1200.013	1596.611	6.144	1.33
14	39	S1	0	0	3453.546	1416.58	2128.814	9.99+	1.503
15	40	S1	0	0	2559.717	1501.986	1596.611	9.99+	1.063
16	41	S1	0	475.795	3072.769	1242.493	2128.814	6.458	1.713
17	42	S1	0	600.498	2304.577	1328.122	1596.611	3.838	1.202
18	43	S1	0	1050.236	3072.769	626.229	2128.814	2.926	3.399
19	44	S1	0	1174.283	2304.577	712.555	1596.611	1.963	2.241
20	45	S1	0	1160.447	3072.769	0	2370.639	2.648	9.99+
21	46	S1	0	1284.325	2304.577	0	1751.163	1.794	9.99+
22	47	S1	0	885.475	3072.769	227.852	3193.221	3.47	9.99+
23	48	S1	0	1009.597	2304.577	360.835	2394.916	2.283	6.637
24	49	S1	0	258.209	3072.769	960.397	3193.221	9.99+	3.325
25	50	S1	0	382.957	2304.577	1092.634	2394.916	6.018	2.192

Strip Reinforcing

	Label	UC Top	LC	Top Bars	Governin...	UC Bot	LC	Bot Bars/...	Governin...	UC Shear	LC	Governin...
1	DS1	0.199	15	#7@11in	DS1-X24	0.208	21	#7@11in	DS1-X12	0.243	21	DS1-X10
2	DS2	0.187	7	#7@11in	DS2-X25	0.246	25	#7@11in	DS2-X12	0.285	25	DS2-X9
3	DS3	0.184	23	#7@11in	DS3-X24	0.256	17	#7@11in	DS3-X37	0.289	17	DS3-X39

CUMULATIVE MPE TABLE

Carrier		MPE %
AT&T and Various Unknow Antennas		3.57 %
*Verizon Wireless		5.7 %
<i>Site Total</i>		<i>9.27 %</i>

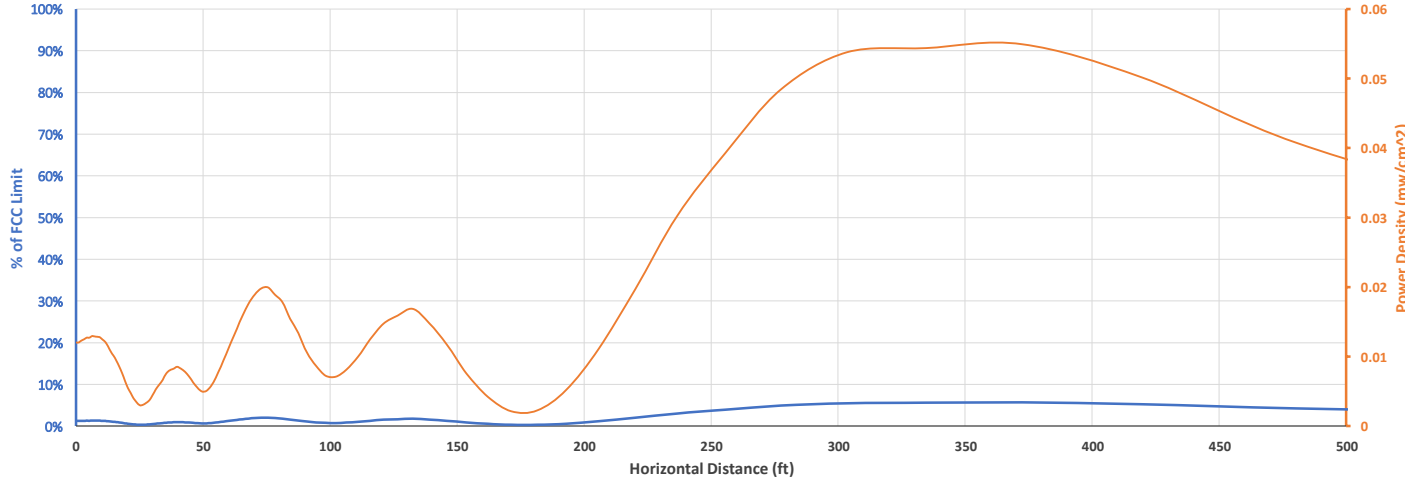
*See attached Verizon Wireless General Power Density table.

Note: MPE percentages for the carriers in the above table was compiled from the Centerline Communications Radio Frequency Exposure Analysis Report, dated August 23, 2022 submitted by New Cingular Wireless, PCS, LLC (AT&T) regarding EM-CING-034-220725.

Location	DANBURY S CT					
Date	10/19/2022					
Band	C-Band	AWS	PCS	850-LTE	850-CDMA	700
Operating Frequency (MHz)	3,700	2,145	1,970	880	869	746
General Population MPE (mW/cm ²)	1	1	1	0.586666667	0.579333333	0.497333333
ERP Per Transmitter (Watts)	13,335	1,566	1,134	767	0	507
Number of Transmitters	2	2	2	2	2	2
Antenna Centerline (feet)	69	69	69	69	69	69
Total ERP (Watts)	26,670	3,132	2,269	1,534	0	1,014
Total ERP (dBm)	74	65	64	62	#N/A	60
Maximum % of General Population Limit	5.7%					

RF Exposure 6ft Above Ground Level Far Field Formula (per FCC OET65)

— Total % General Pop MPE — Total Pwr Density (mW/cm²)



Angle Below Horizon	Power Density (mW/cm ²)						Percent of General Population MPE							Distance	Total Pwr Density (mW/cm ²)	Total % General Pop MPE		
	C-Band	AWS	PCS	850-LTE	850-CDMA	700 MHz	39GHz	28GHz	C-Band	CBRS	AWS	PCS	Cellular				CDMA	700 MHz
90	0.011945177	1.50658E-06	3.50747E-07	6.76073E-05	0	2.71016E-05	0.00%	0.00%	1.19%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0	0.012041743	1.21%
89	0.011941986	2.72193E-06	6.09365E-08	6.63556E-05	0	2.77255E-05	0.00%	0.00%	1.19%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	1.029848831	0.01203885	1.21%
88	0.012210357	6.46441E-06	2.92098E-07	6.44955E-05	0	2.63956E-05	0.00%	0.00%	1.22%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	2.0603254	0.012308004	1.24%
87	0.012363678	1.23865E-05	1.12189E-06	6.1369E-05	0	2.36021E-05	0.00%	0.00%	1.24%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	3.092058978	0.012462158	1.25%
86	0.012627986	1.84984E-05	2.224E-06	5.66416E-05	0	2.02366E-05	0.00%	0.00%	1.26%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	4.125681905	0.012725586	1.28%
85	0.012597572	2.21354E-05	3.41262E-06	5.07093E-05	0	1.71431E-05	0.00%	0.00%	1.26%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	5.161831148	0.012690972	1.27%
84	0.012853018	2.137E-05	5.29427E-06	4.45458E-05	0	1.46828E-05	0.00%	0.00%	1.29%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	6.201149881	0.012938911	1.30%
83	0.012808191	1.66069E-05	8.45841E-06	3.92003E-05	0	1.29506E-05	0.00%	0.00%	1.28%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	7.244289093	0.012885408	1.29%
82	0.012756562	1.07779E-05	1.23178E-05	3.57713E-05	0	1.20098E-05	0.00%	0.00%	1.28%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	8.291909247	0.012827439	1.29%
81	0.01269817	7.20346E-06	1.533E-05	3.5119E-05	0	1.18999E-05	0.00%	0.00%	1.27%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	9.344681979	0.012767723	1.28%
80	0.012345499	7.28298E-06	1.69945E-05	3.75241E-05	0	1.24541E-05	0.00%	0.00%	1.23%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	10.40329186	0.012419754	1.25%
79	0.011995938	9.35049E-06	1.83584E-05	4.33347E-05	0	1.34846E-05	0.00%	0.00%	1.20%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	11.46843824	0.012080466	1.21%

9	0.052643793	8.45566E-05	0.000192818	0.001143269	0	0.00086926	0.00%	0.00%	5.26%	0.00%	0.01%	0.02%	0.19%	0.00%	0.17%	372.5113394	0.054933697	5.66%
8	0.047435405	0.000232222	0.000229564	0.001314933	0	0.00092237	0.00%	0.00%	4.74%	0.00%	0.02%	0.02%	0.22%	0.00%	0.19%	419.8068136	0.050134494	5.20%
7	0.038111435	0.000238153	0.000130875	0.001348517	0	0.000897135	0.00%	0.00%	3.81%	0.00%	0.02%	0.01%	0.23%	0.00%	0.18%	480.5164393	0.040726114	4.26%
6	0.030058969	0.000101572	1.93097E-05	0.001235308	0	0.000799423	0.00%	0.00%	3.01%	0.00%	0.01%	0.00%	0.21%	0.00%	0.16%	561.3475028	0.032214582	3.39%
5	0.020668048	1.59625E-05	2.81255E-05	0.001009487	0	0.00064432	0.00%	0.00%	2.07%	0.00%	0.00%	0.00%	0.17%	0.00%	0.13%	674.3730859	0.022365943	2.37%
4	0.012648603	9.70159E-05	0.000144492	0.000720848	0	0.000459034	0.00%	0.00%	1.26%	0.00%	0.01%	0.01%	0.12%	0.00%	0.09%	843.7393091	0.014069993	1.50%
3	0.006600902	0.000226154	0.000230358	0.000429937	0	0.000277591	0.00%	0.00%	0.66%	0.00%	0.02%	0.02%	0.07%	0.00%	0.06%	1125.787065	0.007764942	0.83%
2	0.002493066	0.000220564	0.000186868	0.00019299	0	0.000127508	0.00%	0.00%	0.25%	0.00%	0.02%	0.02%	0.03%	0.00%	0.03%	1689.538944	0.003220996	0.35%
1	0.000506829	8.42679E-05	6.45153E-05	4.65225E-05	0	3.18174E-05	0.00%	0.00%	0.05%	0.00%	0.01%	0.01%	0.01%	0.00%	0.01%	3380.107736	0.000733952	0.08%

degree below horizon	AT1K02 (39GHz)	AT1K01 (28GHz)	MT6407-77A (3,730MHz)	XXDWMM- 12.5-65 (3,550MHz)	AWS (2,155MHz)	PCS (1,962MHz)
0	0.08	0.08	3.28	1.8	0	0
1	0.39	0.39	2.19	1.3	0.68	0.44
2	0.3	0.3	1.29	0.8	2.52	1.84
3	0	0	0.58	0.5	5.93	4.45
4	0.31	0.31	0.25	0.2	12.1	8.97
5	0.42	0.42	0.05	0.1	21.87	18.01
6	0.13	0.13	0	0	15.41	21.22
7	0.44	0.44	0.3	0	13.04	14.24
8	0.36	0.36	0.5	0.1	14.3	12.95
9	0.09	0.09	1.06	0.2	19.7	14.72
10	0.4	0.4	1.96	0.3	40.58	20.5
11	0.52	0.52	2.79	0.7	20.32	28.34
12	0.26	0.26	3.98	1	17.09	18.39
13	0.57	0.57	5.58	1.5	17.87	15.1
14	0.51	0.51	7.33	2	23.04	14.76
15	0.26	0.26	9.78	2.6	34.06	16.83
16	0.58	0.58	12.92	3.3	20.88	22.63
17	1.07	1.07	17.49	4.2	17.14	43.39
18	0.55	0.55	26.19	5.3	16.55	22.35
19	0.58	0.58	31.65	6.7	18.33	18.53
20	1.08	1.08	21.32	8.2	22.99	17.99
21	0.59	0.59	17.7	9.9	29.47	19.88
22	0.65	0.65	15.7	11.8	24.59	24.9
23	1.22	1.22	14.89	14.5	21.68	30.64
24	0.99	0.99	14.59	18.2	21.39	24.21
25	0.8	0.8	15.18	23.8	22.04	21.17
26	1.11	1.11	15.83	33.9	21.32	21.01
27	1.12	1.12	16.93	27.7	19.41	23.56
28	0.95	0.95	18.33	21.5	18.2	30.74
29	1.25	1.25	19.62	18	18.43	29.74
30	2.03	2.03	20.49	15.7	20.6	22.7
31	3.32	3.32	20.49	14.1	26.47	19.86
32	5.21	5.21	19.83	13	36.14	19.27
33	7.88	7.88	19.23	12.3	23	20.67
34	11.74	11.74	18.52	12.1	18.36	25.02
35	16.19	16.19	18.29	11.9	16.07	40.4
36	14.94	14.94	18.06	11.7	15	25.76
37	15.07	15.07	18.29	11.7	14.65	19.64
38	16.33	16.33	18.49	11.8	14.73	16.6
39	15.38	15.38	19.03	12	15.01	14.96

40	15.03	15.03	19.78	12.5	15.31	14.19
41	15.75	15.75	20.69	13.1	15.55	13.99
42	17.49	17.49	21.79	13.7	15.71	14.2
43	20.55	20.55	23.18	14.2	15.89	14.64
44	21.87	21.87	24.78	14.5	16.21	15.21
45	20.56	20.56	26.65	15.1	16.82	15.8
46	20.35	20.35	28.85	15.9	17.86	16.38
47	21.02	21.02	31.4	16.8	19.49	16.91
48	21.62	21.62	33.3	17.8	21.96	17.38
49	20.49	20.49	33	18.7	25.7	17.81
50	20.28	20.28	31	19.7	31.64	18.21
51	20.83	20.83	28.8	20.7	36.07	18.66
52	22.1	22.1	27.2	21.6	30.89	19.22
53	22.84	22.84	25.96	22.4	27.7	20
54	23.96	23.96	25.16	22.9	26.24	21.09
55	25.61	25.61	24.59	23.3	25.78	22.57
56	24.75	24.75	24.19	23.4	25.98	24.57
57	24.54	24.54	24.19	23.3	26.63	27.31
58	24.84	24.84	24.18	22.7	27.62	31.29
59	25.6	25.6	24.38	21.9	28.97	38
60	25.03	25.03	24.98	21.2	30.76	44.15
61	24.18	24.18	25.49	20.7	33.15	35.84
62	23.83	23.83	26.09	20.5	36.26	31.74
63	23.88	23.88	26.99	20.3	39.9	29.52
64	24.25	24.25	27.98	20.3	43.26	28.28
65	24.7	24.7	28.58	20.5	46.03	27.64
66	24.47	24.47	29.08	20.9	49.78	27.45
67	24.47	24.47	29.18	21.3	53.69	27.61
68	24.68	24.68	28.55	21.7	49.39	28.06
69	25.07	25.07	27.75	21.8	45.95	28.78
70	25.64	25.64	26.95	21.6	44.9	29.72
71	26.36	26.36	26.25	21.2	45.62	30.87
72	27.24	27.24	25.5	21	47.63	32.27
73	28.26	28.26	24.8	21	49.73	33.91
74	28.68	28.68	24.3	21.2	49.74	35.67
75	28.98	28.98	23.9	21.6	47.91	37.23
76	29.37	29.37	23.6	22.1	45.94	38.36
77	29.83	29.83	23.4	22.8	44.58	39.16
78	30.36	30.36	23.1	23.5	44.13	39.83
79	30.94	30.94	22.9	24.5	44.68	40.35
80	30.89	30.89	22.8	25.6	45.79	40.71
81	30.44	30.44	22.7	26.8	45.86	41.18
82	30.13	30.13	22.7	28.2	44.13	42.15

83	29.93	29.93	22.7	29.7	42.27	43.8
84	29.81	29.81	22.7	31.1	41.19	45.85
85	29.76	29.76	22.8	31.9	41.05	47.77
86	29.78	29.78	22.8	32.5	41.84	49.64
87	29.85	29.85	22.9	32.9	43.59	52.62
88	29.97	29.97	22.96	33.3	46.42	58.47
89	30.13	30.13	23.06	33.6	50.18	65.28
90	30.33	30.33	23.06	34.4	52.75	57.68

850-LTE (880MHz)	850-CDMA (869MHz)	700-LTE (746MHz)
0.51	0	0.18
0.16	0	0.01
0	0.2	0
0.04	0.5	0.14
0.29	1.1	0.45
0.76	1.8	0.91
1.46	2.7	1.55
2.41	3.9	2.38
3.67	5.3	3.41
5.29	7	4.68
7.38	9.1	6.24
10.13	11.6	8.15
13.92	14.6	10.53
19.69	18.9	13.51
25.81	25.2	17.19
20.83	35.1	21.89
16.74	30.3	27.2
14.53	26	23.57
13.37	24.5	18.91
12.89	24.5	16.71
12.93	25.7	15.63
13.41	28.4	15.2
14.28	33.4	15.26
15.53	36.4	15.73
17.16	30.9	16.55
19.16	26.6	17.67
21.48	24	18.97
24.2	22.5	20.26
27.53	21.5	21.39
30.94	21	22.32
31.36	21	23.11
29.8	21.4	23.83
28.9	22	24.58
29.01	23.1	25.48
30.04	24.4	26.85
31.52	26.2	30.81
31.7	27.9	30.52
30.05	29.2	28.11
28.99	29.4	27.22
26.02	28.4	26.77

23.12	27	26.29
21.23	25.8	25.77
19.92	24.9	25.33
19.01	24.3	24.19
18.44	23.9	22.55
18.15	23.8	21.12
18.12	23.9	20.01
18.32	24.2	19.16
18.75	24.6	18.52
19.41	25.3	18.06
20.31	26.1	17.76
21.47	27.1	17.61
22.92	28.4	17.61
24.72	30	17.74
26.92	32	18
29.57	34.1	18.4
32.53	37.2	18.91
34.89	40	19.54
35.14	40	20.29
34.08	40	21.15
33	40	22.12
32.19	39.6	23.19
31.61	38.2	24.38
31.19	37.2	25.69
30.88	36.5	27.15
30.62	36	28.82
30.36	35.5	30.76
30.1	35.3	33.13
29.84	35.2	36.08
29.59	35.2	38.79
29.42	35.4	40.04
29.38	35.6	39.98
29.52	35.8	39.14
29.87	36	38.15
30.42	36.5	37.47
31.16	36.6	37.17
32.06	37	37.17
33.05	37.4	37.4
34.04	38	37.77
34.92	38.5	38.19
35.57	38.9	38.56
35.88	39.4	38.78
35.82	40	38.76

35.44	40	38.45
34.9	40	37.92
34.35	40	37.26
33.88	40	36.55
33.54	40	35.89
33.33	40	35.41
33.21	40	35.2
33.13	40	35.3