



**AMERICAN TOWER®**  
CORPORATION

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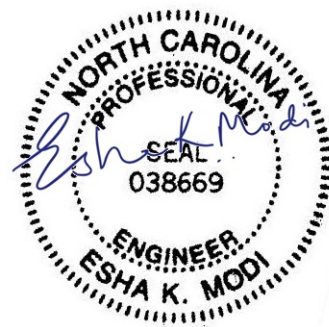
## Structural Analysis Report

**Structure** : 287.5 ft Guyed Self Supported Tower  
**ATC Site Name** : Angier, NC  
**ATC Asset Number** : 372926  
**Engineering Number** : 13250561\_C3\_03  
**Proposed Carrier** : AT&T MOBILITY  
**Carrier Site Name** : MRCAR033546  
**Carrier Site Number** : 368-754  
**Site Location** : 2135 Johnston County Road  
Angier, NC 27501-8209  
35.466400,-78.645600  
**County** : Harnett  
**Date** : January 7, 2021  
**Max Usage** : 83%  
**Result** : Pass

Prepared By:  
Adam Pittman  
Structural Engineer II

*Adam Pittman*

Reviewed By:



COA: P-1177



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## Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 287.5 ft Self Supported guyed tower to reflect the change in loading by AT&T MOBILITY.

## Supporting Documents

<b>Tower Drawings</b>	CSEI Analysis, dated September 17, 2013
<b>Foundation Drawing</b>	CSEI Analysis, dated September 17, 2013

## Analysis

The tower was analyzed using Power Lines Systems INC., tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

<b>Basic Wind Speed:</b>	91 mph (3-Second Gust, Vasd) / 117 mph (3-Second Gust, Vult)
<b>Basic Wind Speed w/ Ice:</b>	30 mph (3-Second Gust) w/ 3/4" radial ice concurrent
<b>Code:</b>	ANSI/TIA-222-G / 2015 IBC / 2018 North Carolina Building Code
<b>Structure Class:</b>	II
<b>Exposure Category:</b>	C
<b>Topographic Category:</b>	1
<b>Crest Height:</b>	0 ft

## Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at [Engineering@americantower.com](mailto:Engineering@americantower.com). Please include the American Tower site name, site number, and engineering number in the subject line for any questions.



**Existing and Reserved Equipment**

Elev. <sup>1</sup> (ft)	Qty	Antenna	Mount Type	Lines	Carrier
305.0	1	Generic 2' Omni	Pole Mount	(1) 7/8" Coax	CAROLINA 440 UHF LINK SYSTEM
	1	Generic 6' Dipole			
290.0	1	Generic 24" x 24" Panel	Pole Mount	-	
287.0	-	-	Sector Frame	(1) 0.39" (10mm) Fiber Trunk	AT&T MOBILITY
261.0	2	Generic 3' Grid Dish	Stand-Off	(11) 0.24" (6mm) Cat 5	CAROLINA 440 UHF LINK SYSTEM
258.0	2	Generic 3' Omni			
	3	Generic 24" x 24" Panel			
220.0	1	Generic 24" x 24" Panel	Pole Mount	-	
30.0	1	Generic 3' Yagi	Pole Mount	(1) 0.41" (10.3mm) LMR-400	

**Equipment to be Removed**

Elev. <sup>1</sup> (ft)	Qty	Antenna	Mount Type	Lines	Carrier
287.0	6	Ericsson RRUS-11	-	(4) 0.78" (19.7mm) 8 AWG 6 (2) 3/8" (0.38"-9.5mm) RET Control Cable	AT&T MOBILITY
	3	CellMax CMA-B/6521/E0-6			
	6	Andrew SBNHH-1D65C (49.6lb)			
	3	Ericsson RRUS-32 B30 (77 lbs)			
	3	Ericsson RRUS A2 Module (15.1" Height)			
	3	Ericsson RRUS-12 B2			
	2	Raycap DC6-48-60-18-8F (23.5" Height)			

**Proposed Equipment**

Elev. <sup>1</sup> (ft)	Qty	Antenna	Mount Type	Lines	Carrier
287.0	2	Raycap DC9-48-60-24-8C-EV	Sector Frame	(1) 0.39" (10mm) Fiber Trunk (6) 1.15" (29.2mm) Cable	AT&T MOBILITY
	6	Ace Technology XXQLH-654L8H8-iVT-V2			
	3	Ericsson RRUS 4426 B66			
	3	Ericsson RRUS 4478 B14			
	3	Ericsson RRUS 4415 B30			
	3	Ericsson RRUS 4415 B25			
	3	Ericsson 4478 B12A			

<sup>1</sup> Contracted elevations are shown for appurtenances within contracted installation tolerances. Appurtenances outside of contract limits are shown at installed elevations.



**Structure Usages**

Structural Component	Controlling Usage	Pass/Fail
Legs	61%	Pass
Diagonals	75%	Pass
Trussed Diagonals	83%	Pass
Horizontals	53%	Pass
Trussed Horizontals	64%	Pass
Guys	27%	Pass
Anchor Bolts	43%	Pass

**Foundations**

Reaction Component	Analysis Reactions	% of Usage
Base Axial (kips)	262.9	49%
Base Uplift (kips)	128.1	44%
Guy Anchor Uplift (kips)	40.6	30%
Guy Anchor Shear (kips)	27.2	36%

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.



## Standard Conditions

All engineering services performed by A.T. Engineering Services, PLLC are prepared on the basis that the information used is current and correct. This information may consist of, but is not limited to the following:

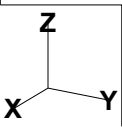
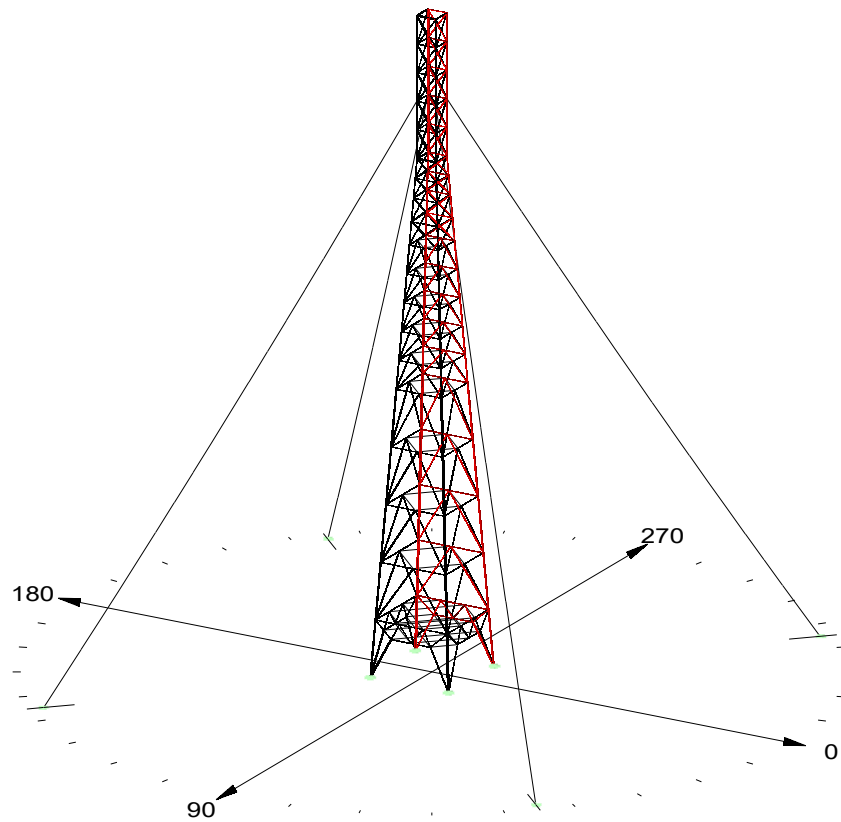
- Information supplied by the client regarding antenna, mounts and feed line loading
- Information from drawings, design and analysis documents, and field notes in the possession of A.T. Engineering Services, PLLC

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Services, PLLC and used in the performance of our engineering services is correct and complete.

All assets of American Tower Corporation, its affiliates and subsidiaries (collectively "American Tower") are inspected at regular intervals. Based upon these inspections and in the absence of information to the contrary, American Tower assumes that all structures were constructed in accordance with the drawings and specifications.

Unless explicitly agreed by both the client and A.T. Engineering Services, PLLC, all services will be performed in accordance with the current revision of ANSI/TIA-222.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Services, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information supplied herein.



Project Name : 372926  
 Project Notes:  
 Project File : X:\A-B\Angier, NC (372926)\13250561 AT&T MOBILITY\13250561\_03\_CUST\_STR\372926.TOW  
 Date run : 4:10:15 PM Thursday, January 7, 2021  
 By : Tower Version 16.01  
 Licensed to : American Tower Corp.

Successfully performed nonlinear analysis

Member check option: ANSI/TIA 222-G-1  
 Connection rupture check: Not Checked  
 Crossing diagonal check: Fixed  
 Included angle check: None  
 Climbing load check: None  
 Redundant members checked with: Actual Force  
 Loads from file: N:\L2 - ATC\372926\13250561\13250561.eia

\*\*\* Analysis Results:

Maximum element usage is 82.81% for Angle \*LD 1X\* in load case \*W -45\*

Foundation Design Forces For All Load Cases:

Note: loads are factored.

Load Case	Foundation Description	Axial Force (kips)	Shear Force (kips)	Bending Moment (ft-k)	Foundation Usage %
W 0	OP	196.32	29.28	2.96	0.00
W 0	OX	191.92	28.67	2.68	0.00
W 0	OXY	61.85	12.76	3.10	0.00
W 0	OY	-61.86	13.34	3.34	0.00
W 0	Sdnd1	-6.49	4.19	0.00	0.00
W 0	Sdnd2	-6.61	4.27	0.00	0.00
W 0	Sdnd3	-31.98	21.50	0.00	0.00
W 0	Sdnd4	-32.29	21.70	0.00	0.00
W 180	OP	-60.07	13.66	3.56	0.00
W 180	OX	-60.21	12.90	3.25	0.00
W 180	OXY	189.51	28.64	2.83	0.00
W 180	OY	193.71	29.48	3.16	0.00
W 180	Sdnd1	-30.98	20.86	0.00	0.00
W 180	Sdnd2	-31.29	21.06	0.00	0.00
W 180	Sdnd3	-6.70	4.33	0.00	0.00
W 180	Sdnd4	-6.83	4.41	0.00	0.00
W 45	OP	262.91	39.10	3.03	0.00
W 45	OX	64.43	11.88	3.26	0.00
W 45	OXY	-128.11	22.21	3.56	0.00
W 45	OY	64.39	11.68	3.11	0.00
W 45	Sdnd1	-0.59	0.29	0.00	0.00
W 45	Sdnd2	-17.45	11.70	0.00	0.00
W 45	Sdnd3	-17.82	11.94	0.00	0.00
W 45	Sdnd4	-40.59	27.16	0.00	0.00
W -45	OP	67.86	12.65	3.58	0.00
W -45	OX	258.94	38.82	3.11	0.00
W -45	OXY	63.87	11.50	2.96	0.00
W -45	OY	-127.56	22.39	3.65	0.00
W -45	Sdnd1	-17.14	11.51	0.00	0.00
W -45	Sdnd2	-0.61	0.30	0.00	0.00
W -45	Sdnd3	-40.19	26.91	0.00	0.00
W -45	Sdnd4	-18.01	12.06	0.00	0.00
W 90	OP	196.69	29.42	3.08	0.00
W 90	OX	-62.00	13.60	3.45	0.00
W 90	OXY	-61.84	12.68	3.06	0.00
W 90	OY	191.22	28.64	2.64	0.00
W 90	Sdnd1	-6.45	4.17	0.00	0.00
W 90	Sdnd2	-31.48	21.18	0.00	0.00
W 90	Sdnd3	-6.78	4.38	0.00	0.00
W 90	Sdnd4	-32.19	21.64	0.00	0.00
W -90	OP	60.08	13.75	3.60	0.00
W -90	OX	194.43	29.52	3.21	0.00
W -90	OXY	189.15	28.51	2.72	0.00
W -90	OY	-60.07	12.64	3.14	0.00
W -90	Sdnd1	-31.07	20.92	0.00	0.00
W -90	Sdnd2	-6.53	4.22	0.00	0.00
W -90	Sdnd3	-31.79	21.38	0.00	0.00
W -90	Sdnd4	-6.87	4.44	0.00	0.00
W 0 Ice	OP	88.89	10.24	1.47	0.00
W 0 Ice	OX	85.81	10.24	1.32	0.00
W 0 Ice	OXY	63.65	7.05	1.57	0.00
W 0 Ice	OY	66.16	7.23	1.62	0.00
W 0 Ice	Sdnd1	-11.20	7.98	0.00	0.00
W 0 Ice	Sdnd2	-11.47	8.15	0.00	0.00
W 0 Ice	Sdnd3	-14.39	10.19	0.00	0.00
W 0 Ice	Sdnd4	-14.69	10.37	0.00	0.00
W 180 Ice	OP	69.41	7.09	1.85	0.00
W 180 Ice	OX	66.73	7.20	1.70	0.00
W 180 Ice	OXY	82.66	10.13	1.23	0.00
W 180 Ice	OY	85.55	10.42	1.29	0.00
W 180 Ice	Sdnd1	-13.65	9.71	0.00	0.00
W 180 Ice	Sdnd2	-13.94	9.89	0.00	0.00
W 180 Ice	Sdnd3	-11.86	8.40	0.00	0.00
W 180 Ice	Sdnd4	-12.14	8.58	0.00	0.00
W 45 Ice	OP	95.13	11.21	1.36	0.00
W 45 Ice	OX	76.15	8.68	1.51	0.00
W 45 Ice	OXY	57.57	6.09	1.67	0.00
W 45 Ice	OY	75.74	8.79	1.44	0.00
W 45 Ice	Sdnd1	-10.60	7.57	0.00	0.00
W 45 Ice	Sdnd2	-12.77	9.06	0.00	0.00
W 45 Ice	Sdnd3	-13.19	9.34	0.00	0.00
W 45 Ice	Sdnd4	-15.28	10.78	0.00	0.00
W -45 Ice	OP	79.15	8.68	1.67	0.00
W -45 Ice	OX	92.10	11.24	1.22	0.00
W -45 Ice	OXY	73.17	8.60	1.41	0.00
W -45 Ice	OY	60.12	6.29	1.72	0.00
W -45 Ice	Sdnd1	-12.49	8.89	0.00	0.00
W -45 Ice	Sdnd2	-10.85	7.73	0.00	0.00
W -45 Ice	Sdnd3	-14.97	10.58	0.00	0.00
W -45 Ice	Sdnd4	-13.48	9.52	0.00	0.00
W 90 Ice	OP	88.91	10.25	1.48	0.00
W 90 Ice	OX	66.53	7.12	1.68	0.00
W 90 Ice	OXY	63.66	7.06	1.58	0.00
W 90 Ice	OY	85.36	10.34	1.25	0.00
W 90 Ice	Sdnd1	-11.20	7.98	0.00	0.00
W 90 Ice	Sdnd2	-13.95	9.90	0.00	0.00
W 90 Ice	Sdnd3	-11.88	8.41	0.00	0.00
W 90 Ice	Sdnd4	-14.68	10.37	0.00	0.00
W -90 Ice	OP	69.39	7.07	1.84	0.00
W -90 Ice	OX	86.01	10.33	1.35	0.00
W -90 Ice	OXY	82.65	10.12	1.22	0.00
W -90 Ice	OY	66.35	7.31	1.64	0.00
W -90 Ice	Sdnd1	-13.66	9.72	0.00	0.00
W -90 Ice	Sdnd2	-11.45	8.14	0.00	0.00
W -90 Ice	Sdnd3	-14.38	10.18	0.00	0.00
W -90 Ice	Sdnd4	-12.15	8.59	0.00	0.00

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kips)	Tran. Force (kips)	Vert. Force (kips)	Shear Force (kips)	Tran. Moment (ft-k)	Long. Moment (ft-k)	Bending Moment (ft-k)	Vert. Moment (ft-k)	Found. Usage %
W 0	OP	-24.53	196.32	29.28	-0.33	23.94	2.96	-11.10	0.00	0.00
W 0	OX	-23.48	16.45	-191.92	28.67	0.01	-2.68	2.68	1.09	0.00
W 0	OXY	-11.96	-4.45	61.85	12.76	0.32	-3.09	3.10	1.09	0.00
W 0	OY	-12.67	4.17	61.86	13.34	-0.23	-3.33	3.34	-1.07	0.00
W 0	Sdnd1	2.56	3.33	6.49	4.19	0.00	0.00	0.00	0.00	0.00
W 0	Sdnd2	2.61	-3.38	6.61	4.27	0.00	0.00	0.00	0.00	0.00
W 0	Sdnd3	-15.62	14.77	31.98	21.50	0.00	0.00	0.00	0.00	0.00
W 0	Sdnd4	-15.76	14.91	32.29	21.70	0.00	0.00	0.00	0.00	0.00
W 180	OP	13.03	4.09	60.07	13.66	-0.25	3.55	3.56	1.10	0.00
W 180	OX	12.20	-4.21	-60.21	12.90	0.28	3.23	3.25	-1.12	0.00
W 180	OXY	23.65	16.15	-189.51	28.64	0.04	2.83	2.83	-1.11	0.00
W 180	OY	24.86	-15.82	193.71	29.48	-0.30	3.14	3.16	1.12	0.00
W 180	Sdnd1	15.16	14.32	30.98	20.86	0.00	0.00	0.00	0.00	0.00
W 180	Sdnd2	15.30	-14.46	31.29	21.06	0.00	0.00	0.00	0.00	0.00
W 180	Sdnd3	-2.45	3.42	-6.70	4.33	0.00	0.00	0.00	0.00	0.00
W 180	Sdnd4	-2.71	-3.48	6.83	4.41	0.00	0.00	0.00	0.00	0.00
W 45	OP	-27.46	-27.83	-262.91	39.10	2.21	-2.07	3.03	0.00	0.00
W 45	OX	-11.88	-0.41	-64.43	11.88	2.54	-2.05	3.26	1.65	0.00
W 45	OXY	-15.80	-6.81	128.11	22.21	2.48	-2.55	3.56	-0.01	0.00
W 45	OY	-0.05	-11.68	-64.39	11.68	1.98	-2.40	3.11	-1.65	0.00
W 45	Sdnd1	0.20	0.20	0.59	0.29	0.00	0.00	0.00	0.00	0.00
W 45	Sdnd2	7.64	-8.87	17.45	11.70	0.00	0.00	0.00	0.00	0.00
W 45	Sdnd3	-9.04	7.80	17.82	11.94	0.00	0.00	0.00	0.00	0.00
W 45	Sdnd4	-19.21	-19.20	40.59	27.16	0.00	0.00	0.00	0.00	0.00
W -45	OP	-12.63	0.81	-67.86	12.65	-2.81	-2.22	3.58	-1.66	0.00
W -45	OX	-26.67	28.21	-258.94	38.82	-2.47	-1.89	3.11	-0.02	0.00
W -45	OXY	0.37	11.50	-63.87	11.50	-1.94	-2.24	2.96	1.67	0.00
W -45	OY	-16.22	15.43	127.56	22.39	-2.44	-2.71	3.65	0.03	0.00
W -45	Sdnd1	7.50	8.73	-17.14	11.51	0.00	0.00	0.00	0.00	0.00



W -45	\$Gnd2	0.21	-0.21	0.61	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -45	\$Gnd3	-1.19	19.02	40.19	26.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -45	\$Gnd4	-9.12	-7.89	18.01	12.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	OP	-15.74	-24.86	-196.69	29.42	3.05	0.43	3.08	1.11	0.00	0.00	0.00	0.00
W 90	OX	4.08	-12.98	62.00	13.60	3.44	0.20	3.45	1.07	0.00	0.00	0.00	0.00
W 90	OXY	5.54	-11.84	61.84	12.68	3.04	-0.35	3.06	-1.11	0.00	0.00	0.00	0.00
W 90	OY	16.67	-23.30	-191.22	28.64	2.64	0.09	2.64	-1.09	0.00	0.00	0.00	0.00
W 90	\$Gnd1	3.31	2.54	6.45	4.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	\$Gnd2	14.45	15.21	31.49	21.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	\$Gnd3	-3.46	2.69	6.78	4.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	\$Gnd4	-14.87	-15.71	32.19	21.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	OP	4.00	13.16	60.08	13.75	-3.59	0.22	3.60	-1.08	0.00	0.00	0.00	0.00
W -90	OX	-15.42	15.21	-31.49	21.18	-3.18	0.40	3.21	-1.12	0.00	0.00	0.00	0.00
W -90	OXY	16.40	23.32	-189.15	28.51	-2.72	0.06	2.72	1.11	0.00	0.00	0.00	0.00
W -90	OY	-4.30	11.89	60.07	12.64	-3.12	-0.32	3.14	1.12	0.00	0.00	0.00	0.00
W -90	\$Gnd1	14.07	15.21	31.49	21.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	\$Gnd2	3.35	-2.58	6.53	4.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	\$Gnd3	-14.69	15.53	31.79	21.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	\$Gnd4	-3.50	-2.73	6.87	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 0	Ice	OP	-7.45	-6.93	-88.89	10.24	-1.15	0.92	1.47	-0.83	0.00	0.00	0.00
W 0	Ice	OX	-7.30	7.18	-85.81	10.24	0.95	0.91	1.32	0.06	0.00	0.00	0.00
W 0	Ice	OXY	4.73	5.23	-63.65	7.05	1.02	-1.20	1.57	0.08	0.00	0.00	0.00
W 0	Ice	OY	4.99	-5.22	-66.15	7.23	-1.18	1.18	1.62	-0.96	0.00	0.00	0.00
W 0	Ice	\$Gnd1	5.58	5.70	11.20	7.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 0	Ice	\$Gnd2	5.70	-5.82	11.47	8.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 0	Ice	\$Gnd3	-7.26	7.14	-14.39	10.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 0	Ice	\$Gnd4	-7.40	-7.27	14.69	10.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 180	Ice	OP	-4.57	-5.41	-69.41	7.09	-1.14	1.46	1.85	0.09	0.00	0.00	0.00
W 180	Ice	OX	-4.51	5.61	-66.73	7.20	0.97	1.39	1.70	-0.11	0.00	0.00	0.00
W 180	Ice	OXY	7.52	6.79	-82.99	10.13	-0.99	-1.22	1.39	0.09	0.00	0.00	0.00
W 180	Ice	OY	7.95	-6.74	-85.55	10.42	-1.11	-0.65	1.29	0.11	0.00	0.00	0.00
W 180	Ice	\$Gnd1	6.93	6.81	13.65	9.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 180	Ice	\$Gnd2	7.58	-9.94	13.65	9.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 180	Ice	\$Gnd3	-5.88	6.00	11.86	8.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 180	Ice	\$Gnd4	-6.01	-6.13	12.14	8.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 45	Ice	OP	-7.85	-8.00	-95.13	11.21	-0.93	0.99	1.36	0.01	0.00	0.00	0.00
W 45	Ice	OX	-6.42	8.5	-76.15	8.68	1.16	0.68	1.11	0.11	0.00	0.00	0.00
W 45	Ice	OXY	4.36	4.26	-57.57	6.09	1.20	-1.16	1.67	-0.01	0.00	0.00	0.00
W 45	Ice	OY	5.95	-6.47	-75.74	8.79	-0.92	-1.11	1.44	-0.11	0.00	0.00	0.00
W 45	Ice	\$Gnd1	5.35	10.0	10.0	7.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 45	Ice	\$Gnd2	6.31	-6.50	12.77	9.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 45	Ice	\$Gnd3	-6.69	6.51	13.19	9.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 45	Ice	\$Gnd4	-7.62	-7.62	15.28	10.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -45	Ice	OP	-6.5	6.0	-78.15	8.68	-1.36	0.98	1.67	-0.13	0.00	0.00	0.00
W -45	Ice	OX	-7.64	8.24	-92.10	11.24	0.74	0.97	1.22	-0.02	0.00	0.00	0.00
W -45	Ice	OXY	5.66	6.48	-73.17	8.60	0.83	-1.13	1.41	0.13	0.00	0.00	0.00
W -45	Ice	OY	6.42	-6.25	-80.12	8.29	-1.23	-1.23	1.72	-0.13	0.00	0.00	0.00
W -45	Ice	\$Gnd1	6.19	6.37	12.49	8.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -45	Ice	\$Gnd2	5.46	-5.47	10.85	7.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -45	Ice	\$Gnd3	-7.48	7.48	14.97	10.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -45	Ice	\$Gnd4	-6.82	-6.64	14.48	9.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	Ice	OP	-6.80	-7.68	-88.91	10.25	-0.87	1.20	1.48	0.09	0.00	0.00	0.00
W 90	Ice	OX	-5.16	4.90	-66.53	7.12	1.24	1.14	1.68	0.06	0.00	0.00	0.00
W 90	Ice	OXY	5.33	6.53	-60.12	8.29	-1.25	-0.98	1.58	-0.09	0.00	0.00	0.00
W 90	Ice	OY	7.27	-7.35	-85.36	10.34	-0.87	-0.90	1.25	-0.06	0.00	0.00	0.00
W 90	Ice	\$Gnd1	5.70	5.58	11.20	7.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	Ice	\$Gnd2	6.94	-7.06	13.95	9.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	Ice	\$Gnd3	-6.4	8.9	11.88	8.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W 90	Ice	\$Gnd4	-7.27	-7.39	14.68	10.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	Ice	OP	-5.31	-4.67	-69.39	7.07	-1.42	1.18	1.84	-0.08	0.00	0.00	0.00
W -90	Ice	OX	-6.9	7.90	-86.01	8.33	0.69	1.16	1.61	0.11	0.00	0.00	0.00
W -90	Ice	OXY	6.93	7.38	-82.65	10.12	0.77	-0.94	1.22	0.08	0.00	0.00	0.00
W -90	Ice	OY	5.67	-4.61	-66.35	7.31	-1.34	-0.93	1.64	0.11	0.00	0.00	0.00
W -90	Ice	\$Gnd1	5.33	9.93	9.72	8.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	Ice	\$Gnd2	5.82	-5.70	11.45	8.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	Ice	\$Gnd3	-7.14	7.26	14.38	10.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W -90	Ice	\$Gnd4	-6.13	-6.01	12.15	8.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Summary of Joint Support Reactions For All Load Cases in Direction of Leg:

Load Case	Support Origin	Joint	Joint Member	Leg Force In Residual Shear	Perpendicular Residual Shear	Horizontal Residual Shear	Residual Shear	Total Long.	Total Tran.	Total Vert.	(kips)			
											To Leg	To Leg - Res.	To Leg - Long.	To Leg - Tran.
W 0	OP	IP	L IP	198.078	12.270	12.270	3.715	-24.53	15.99	-196.32				
W 0	OX	LX	L LX	193.664	12.280	12.280	11.485	-4.458	-23.48	16.45	-191.92			
W 0	OXY	LY	L LY	-62.634	8.099	8.117	8.096	0.580	-11.96	-4.45	61.85			
W 0	OY	LY	L LY	62.635	8.099	8.117	8.096	-0.580	11.96	4.45	-61.85			
W 180	OP	IP	L IP	-60.899	9.267	9.286	9.286	-0.335	13.03	4.09	60.07			
W 180	OX	LX	L LX	-60.997	8.429	8.447	8.435	0.445	12.20	-4.21	60.21			
W 180	OXY	LY	L LY	191.253	12.522	12.562	-11.801	-4.306	23.65	16.15	-189.51			
W 180	OY	LY	L LY	191.253	12.522	12.562	-11.801	4.306	-23.65	-16.15	189.51			
W 45	OP	IP	L IP	265.326	15.799	15.861	11.030	11.397	-27.46	-27.83	-262.91			
W 45	OX	LX	L LX	64.898	9.016	9.018	7.849	4.441	-11.88	-0.41	-64.43			
W 45	OXY	LY	L LY	118.868	10.845	10.848	7.794	7.602	-15.80	-15.61	128.11			
W 45	OY	LY	L LY	64.861	8.666	8.669	8.669	7.651	-0.05	-11.68	-64.39			
W -45	OP	IP	L IP	68.331	9.787	9.790	8.384	-5.054	-12.63	0.81	-67.86			
W -45	OX	LX	L LX	261.348	15.892	15.953	10.486	-12.023	-26.67	28.21	-258.94			
W -45	OXY	LY	L LY	64.330	8.330	8.330	8.621	-7.506	0.37	11.50	-63.87			
W -45	OY	LY	L LY	-129.030	11.077	11.120	8.252	-7.454	-16.22	15.43	127.56			
W 90	OP	IP	L IP	198.455	12.988	13.026	3.444	12.563	-15.74	-24.86	-196.69			
W 90	OX	LX	L LX	-62.822	9.213	9.213	8.002	9.101	4.08	-12.98	62.00			
W 90	OXY	LY	L LY	-62.623	7.984	8.002	0.673	7.974	-4.54	-11.84	61.84			
W 90	OY	LY	L LY	192.965	12.244	12.285	-4.716	11.344	16.67	-23.30	-191.22			
W -90	OP	IP	L IP	192.965	12.244	12.285	-4.716	-9.403	4.00	15.16	60.08			
W -90	OX	LX	L LX	196.206	13.316	13.355	3.468	-12.897	-15.62	25.05	-194.43			
W -90	OXY	LY	L LY	190.890	12.333	12.374	-4.578	-11.496	16.40	23.32	-189.15			
W -90	OY	LY	L LY	-60.846	8.134	8.152	0.543	-8.134	-4.30	11.89	60.07			
W 0	Ice	OP	IP	89.445	2.943	2.943	1.980	-1.378	-7.54	-6.93	-88.89			
W 0	Ice	OX	LX	86.382	2.650	2.660	1.939	-1.821	-7.30	7.18	-85.81			
W 0	Ice	OXY	LY	64.022	1.454	1.459	-0.756	-1.248	4.73	5.23	-63.65			
W 0	Ice	OY	LY	66.53										



W 0 Ice	32.46	L 11X	Angle
W 180 Ice	30.82	L 11X	Angle
W 45 Ice	32.41	L 11P	Angle
W -45 Ice	33.24	L 11X	Angle
W 90 Ice	31.63	L 11P	Angle
W -90 Ice	32.46	L 11X	Angle

Summary of Guy Usages by Load Case:

Load Case	Maximum Usage %	Guy Label
W 0	21.55	G4
W 180	20.91	G2
W 45	26.83	G4
W -45	26.58	G3
W 90	21.49	G4
W -90	21.23	G3
W 0 Ice	10.96	G4
W 180 Ice	10.48	G2
W 45 Ice	11.34	G4
W -45 Ice	11.14	G3
W 90 Ice	10.85	G4
W -90 Ice	10.76	G3

\*\*\* Weight of structure (lbs):  
 Weight of Guys: 7611.4  
 Weight of Angles\*Section DLF: 101896.2  
 Total: 109507.6

\*\*\* End of Report



**Legs**

<b>Site No.:</b>	372926
<b>Engineer:</b>	adam.pittman
<b>Date:</b>	01/07/2021
<b>Carrier:</b>	AT&T Mobility

When inputting thickness values, include all decimal places.

Tower Section #	Section Elevations (ft)	Type of Shape <sup>[1]</sup>	Diameter or Length (in)	Thickness <sup>[2]</sup> (in)	F <sub>y</sub> (ksi)
1	0.000-25.00	L	8	1	36
2	25.00-50.00	L	8	0.875	36
3	50.00-75.00	L	8	0.875	36
4	75.00-100.0	L	8	0.75	36
5	100.0-125.0	L	8	0.625	36
6	125.0-137.5	L	6	0.75	36
7	137.5-150.0	L	6	0.75	36
8	150.0-162.5	L	6	0.5625	36
9	162.5-175.0	L	6	0.5625	36
10	175.0-187.5	L	6	0.4375	36
11	187.5-197.7	L	5	0.4375	36
12	197.7-207.8	L	5	0.4375	36
13	207.8-216.4	L	5	0.3125	36
14	216.4-225.0	L	5	0.3125	36
15	225.0-237.5	L	6	0.5	36
16	237.5-250.0	L	6	0.5	36
17	250.0-262.5	L	6	0.375	36
18	262.5-275.0	L	6	0.375	36
19	275.0-287.5	L	6	0.375	36

**Notes:**

<sup>[1]</sup> Type of Leg Shape: **R** = Round or **P** = Bent Plate or **S** = Schifferized Angle. **L** = Even Leg

<sup>[2]</sup> For Solid Round Leg Shapes Thickness Equals Zero.

<sup>[3]</sup> Adjust for Bent Plate Leg Shapes.

**Diagonals**

Site No.:	372926
Engineer:	adam.pittman
Date:	01/07/2021
Carrier:	AT&T Mobility

When inputting thickness values, include all decimal places.

Tower Section #	Section Elevations (ft)	Type of Shape <sup>[1]</sup>	Diameter <sup>[2]</sup> (in)	Web Length <sup>[3]</sup> (in)	Flange Length <sup>[3]</sup> (in)	Thickness (in)	F <sub>y</sub> (ksi)	Is Diag. Tension Only? (Y/N)
1	0.000-25.00	2L		3	4	0.3125	36	
2	25.00-50.00	2L		2.5	3	0.25	36	
3	50.00-75.00	2L		2.5	3	0.25	36	
4	75.00-100.0	2L		2.5	3	0.25	36	
5	100.0-125.0	2L		2.5	3	0.25	36	
6	125.0-137.5	2L		2.5	2.5	0.25	36	
7	137.5-150.0	2L		2.5	2.5	0.25	36	
8	150.0-162.5	2L		2.5	2	0.25	36	
9	162.5-175.0	2L		2.5	2	0.25	36	
10	175.0-187.5	2L		2.5	2	0.25	36	
11	187.5-197.7	L		3.5	3.5	0.25	36	
12	197.7-207.8	L		3.5	3.5	0.25	36	
13	207.8-216.4	L		3	3	0.25	36	
14	216.4-225.0	L		3	3	0.25	36	
15	225.0-237.5	2L		3	3	0.3125	36	
16	237.5-250.0	2L		3	3	0.25	36	
17	250.0-262.5	2L		3	3	0.25	36	
18	262.5-275.0	L		3	3	0.25	36	
19	275.0-287.5	L		3	3	0.25	36	

**Notes:**

- <sup>[1]</sup> Type of Diagonal Shape: **R** = Round, **L** = Single-Angle or **2L** = Double-Angle.
- <sup>[2]</sup> Applies to Pipes and Solid Round Shapes only. For Solid Round Shapes Thickness Equals Zero.
- <sup>[3]</sup> Applies to Single-Angle and Double-Angle Shapes only.
- <sup>[4]</sup> Applies to Double-Angle Shapes only.
- <sup>[5]</sup> Applies to Single-Angle Shapes only.

**Horizontals**

Site No.:	372926
Engineer:	adam.pittman
Date:	01/07/2021
Carrier:	AT&T Mobility

When inputting thickness values, include all decimal places.

Tower Section #	Section Elevations (ft)	Type of Shape <sup>[1]</sup>	Diameter <sup>[2]</sup> (in)	Web Length <sup>[3]</sup> (in)	Flange Length <sup>[3]</sup> (in)	Thickness (in)	F <sub>y</sub> (ksi)
1	0.000-25.00	2L		3	2.5	0.25	36
2	25.00-50.00	2L		3	2.5	0.25	36
3	50.00-75.00	2L		3	2.5	0.25	36
4	75.00-100.0	2L		2.5	2.5	0.25	36
5	100.0-125.0	2L		2.5	2.5	0.25	36
6	125.0-137.5	2L		2.5	2.5	0.25	36
7	137.5-150.0	2L		2.5	2.5	0.25	36
8	150.0-162.5	2L		2.5	2.5	0.25	36
9	162.5-175.0	2L		2.5	2.5	0.25	36
10	175.0-187.5	2L		2.5	2.5	0.25	36
11	187.5-197.7	L		3	2.5	0.25	36
12	197.7-207.8	2L		3	2.5	0.25	36
13	207.8-216.4	2L		3	2.5	0.25	36
14	216.4-225.0	C		8	11.5		36
15	225.0-237.5	L		3	3	0.25	36
16	237.5-250.0	2L		3	3	0.25	36
17	250.0-262.5	L		3	3	0.25	36
18	262.5-275.0	2L		3	3	0.25	36
19	275.0-287.5	C		8	11.5		36

**Notes:**

<sup>[1]</sup> Type of Horizontal Shape: **R** = Round, **L** = Single-Angle, **2L** = Double-Angle, **C** = Channel, **W** = W Shape

<sup>[2]</sup> Applies to Pipes and Solid Round Shapes only. For Solid Round Shapes Thickness Equals Zero.

<sup>[3]</sup> Applies to Single-Angle and Double-Angle Shapes only.

<sup>[4]</sup> Applies to Double-Angle Shapes only.

<sup>[5]</sup> Applies to Single-Angle Shapes only.

## Built-up Diagonals

Site No.:	372926
Engineer:	adam.pittman
Date:	01/07/2021
Carrier:	AT&T Mobility

**When inputting thickness values, include all decimal places.**  
**Input diags. from left to center & from base section upward.**

Tower Built-up Diag. #	Section Elevations (ft)	Type of Shape <sup>[1]</sup>	Diameter <sup>[2]</sup> (in)	Web Length <sup>[3]</sup> (in)	Flange Length <sup>[3]</sup> (in)	Thickness (in)	F <sub>y</sub> (ksi)
1	0.000-25.00	2L		2.5	2	0.25	36
2	0.000-25.00	2L		2.5	2	0.25	36
3	0.000-25.00	2L		3	2	0.25	36

**Notes:**

- <sup>[1]</sup> Type of Diagonal Shape: **R** = Round, **L** = Single-Angle or **2L** = Double-Angle.
- <sup>[2]</sup> Applies to Pipes and Solid Round Shapes only. For Solid Round Shapes Thickness Equals Zero.
- <sup>[3]</sup> Applies to Single-Angle and Double-Angle Shapes only.
- <sup>[4]</sup> Applies to Double-Angle Shapes only.
- <sup>[5]</sup> Applies to Single-Angle Shapes only.



## Built-up Horizontals

Site No.:	372926
Engineer:	adam.pittman
Date:	01/07/2021
Carrier:	AT&T Mobility

When inputting thickness values, include all decimal places.

Tower Section #	Section Elevations (ft)	Type of Shape <sup>[1]</sup>	Diameter <sup>[2]</sup> (in)	Web Length <sup>[3]</sup> (in)	Flange Length <sup>[3]</sup> (in)	Thickness (in)	F <sub>y</sub> (ksi)	Is Horiz. Tension Only? (Y/N)
1	0.000-25.00	2L		2.5	3	0.25	36	

**Notes:**

<sup>[1]</sup> Type of Horizontal Shape: R = Round, L = Single-Angle or 2L = Double-Angle.

<sup>[2]</sup> Applies to Pipes and Solid Round Shapes only. For Solid Round Shapes Thickness Equals Zero.

<sup>[3]</sup> Applies to Single-Angle and Double-Angle Shapes only.

<sup>[4]</sup> Applies to Double-Angle Shapes only.

<sup>[5]</sup> Applies to Single-Angle Shapes only.

Site No.	372626
Engineer	adam pittman
Date	06/07/11
Carrier	AT&T Mobility

Site No.	372626
Engineer	adam pittman
Date	06/07/11
Carrier	AT&T Mobility

Exposure  C  D  
 Topo Cat:  1  
 9.5 k<sub>min</sub> 2.01  
 900 k<sub>min</sub> 0.85  
 1 k<sub>c</sub>

Description	From (ft)	To (ft)	Quantity	Shape	Width or Diameter (in)	Perimeter (in)	Unit Weight (lb/ft)	Part of Face Solidity Ratio (Yes/No)	Include in Wind Load (Yes/No)
1 Ladder	0	287.5	1	Flat	2	8.0	6	Yes	Yes
2 Coax Cage	8.3333	13.3333	2	Round	12	37.7	25	Yes	Yes
3 Coax Cage	8.3333	13.3333	2	Round	12	37.7	25	Yes	Yes
4 WG	8.3333	50	1	Flat	2	8.0	6	Yes	Yes
5 WG	8.3333	50	1	Flat	2	8.0	6	Yes	Yes
6 WG	8.3333	50	1	Flat	2	8.0	6	Yes	Yes
7 Carolina 440	8.3333	287	1	Round	1.09	3.4	0.33	Yes	Yes
8 AT&T	8.3333	287	6	Round	1.15	3.6	0.46	Yes	Yes
9 AT&T	8.3333	287	1	Round	0.39	1.2	0.37	Yes	Yes
10 Carolina 440	8.3333	361	11	Round	0.24	0.8	0.04	Yes	Yes
11 Carolina 440	8.3333	30	1	Round	0.41	1.3	0.09	Yes	Yes

Description	From (ft)	To (ft)	Quantity	Face # (1-4, A, D)	Coax Width (in)	Coax Shape (Block / Flat / Ind)	% Exposed	Spacing (in)	Shape (Round/Flat)	Block Width (ft coax)	Block Depth (ft coax)	Perimeter (in)	Unit Weight (lb/ft)	In Face Zone (Yes/No)	Include in Wind Load (Yes/No)
Ladder	0	287.5	1		2.00	Flat	100		Flat	1	1	8.0	6	Yes	Yes
Coax Cage	8.3333	13.3333	2		12.00	Ind	100		Round	2	1	37.7	25	Yes	Yes
WG	8.3333	50	1		2.00	Flat	100		Flat	1	1	8.0	6	Yes	Yes
WG	8.3333	50	1		2.00	Flat	100		Flat	1	1	8.0	6	Yes	Yes
WG	8.3333	50	1		2.00	Flat	100		Flat	1	1	8.0	6	Yes	Yes
Carolina 440	8.3333	287	1		1.09	Ind	100		Round	1	1	3.4	0.33	Yes	Yes
AT&T	8.3333	287	6		1.15	Ind	100		Round	2	1	3.6	0.46	Yes	Yes
AT&T	8.3333	287	1		0.39	Ind	100		Round	1	1	1.2	0.37	Yes	Yes
Carolina 440	8.3333	361	11		0.24	Ind	100		Round	1	1	0.8	0.04	Yes	Yes
Carolina 440	8.3333	30	1		0.41	Ind	100		Round	1	1	1.3	0.09	Yes	Yes

**Dishes**

Dish Types	
S	Standard
R	Standard w/ Radome
H	High Performance
G	Grid

Site No.:	372926
Engineer:	adam.pittman
Date:	01/07/21
Carrier:	AT&T Mobility

Dish Number	Dish Elevation (ft)	Dish Dia. (ft)	Dish Angle (deg)	Dish Type	Joint Orientation	Equipment Status
1	261	3	315	G	Y	
2	261	3	90	G	X	
3						
4						
5						
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43						
44						
45						
46						
47						
48						
49						
50						

Equipment Label	Attach Label	Equipment Property Set	EIA Antenna Orientation Angle (deg)
3' GRID 1 @ 261'	17Y	3 ft GRID Dish	315
3' GRID 2 @ 261'	17X	3 ft GRID Dish	90

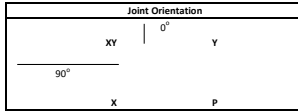


Table with 3 columns: Description, Value, Unit. Includes items like Contiguous Point Loads, Pressure Range, Wave Speed, Ice Velocity, etc.

Table with 2 columns: Description, Value. Includes items like Ice Thickness, Exposure Category, Structure Class, etc.

Table with 2 columns: Description, Value. Includes items like Site No., Date, etc.

Main data table with columns: No., Detail, Elevation, Quantity, # of Assemblies, Manufacturer, Model, Height, Width, Depth, Weight, Pallet/Bundle, Reduction, C.A., Weight, Ice. Contains multiple rows of assembly and system data.

Summary table with columns: No., Elevation, C.A., Force (lb), Area, Weight, etc. Includes sub-totals and grand totals for the entire assembly list.

## Foundation

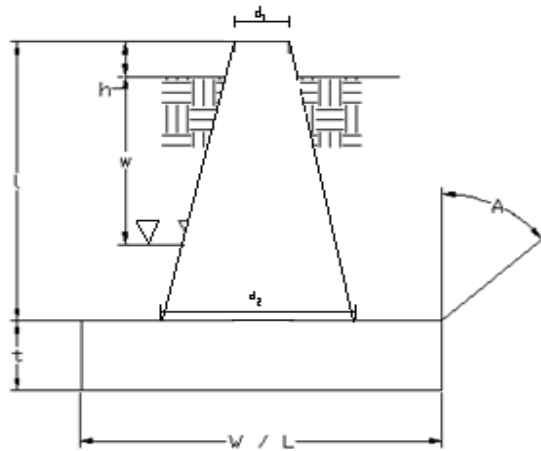
### Design Loads (Factored)

Compression/Leg:	262.91	k
Uplift/Leg:	128.11	k
Shear/Leg:	39.10	k

Face Width @ Top of Pier ( $d_1$ ):	3.50	ft
Face Width @ Bottom of Pier ( $d_2$ ):	7.25	ft
Total Length of Pier (l):	7.50	ft
Height of Pedestal Above Ground (h):	0.50	ft
Width of Pad (W):	17.00	ft
Length of Pad (L):	17.00	ft
Thickness of Pad (t):	2.50	ft
Water Table Depth (w):	30.00	ft
Unit Weight of Concrete:	150.0	pcf
Unit Weight of Soil (Above Water Table):	100.0	pcf
Unit Weight of Soil (Below Water Table):	37.6	pcf
Friction Angle of Uplift (A):	20	°
Ultimate Compressive Bearing Pressure:	2500	psf
Ultimate Skin Friction:		psf

Volume Pier (Total):	225.47	ft <sup>3</sup>
Volume Pad (Total):	722.50	ft <sup>3</sup>
Volume Soil (Total):	2458.06	ft <sup>3</sup>
Volume Pier (Buoyant):	0.00	ft <sup>3</sup>
Volume Pad (Buoyant):	0.00	ft <sup>3</sup>
Volume Soil (Buoyant):	0.00	ft <sup>3</sup>
Weight Pier:	33.82	k
Weight Pad:	108.38	k
Weight Soil:	245.81	k
Uplift Skin Friction:	0.00	k

Site No.:	372926
Engineer:	adam.pittman
Date:	01/07/21
Carrier:	AT&T Mobility



### Uplift Check

$\phi$ s Uplift Resistance (k)	Ratio	Result
291.00	0.44	<b>OK</b>

### Axial Check

$\phi$ s Axial Resistance (k)	Ratio	Result
541.88	0.49	<b>OK</b>

### Anchor Bolt Check

Bolt Diameter (in)	2
# of Bolts	4
Steel Grade	A36
Steel Fy	36
Steel Fu	58
Detail Type	C

Usage Ratio	Result
0.43	<b>OK</b>

Site Name: Angier, NC

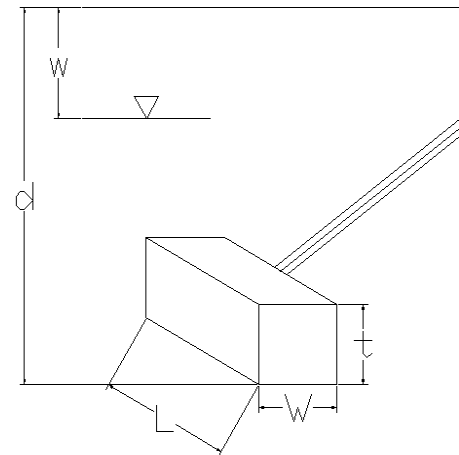
Site Number: 372926

Design Standard per TIA-222-G

## Guy Anchor Block Analysis

### Anchor Block Analysis Parameters

Anchor Radius:	116.7	ft
Uplift (Factored - $P_u$ ):	40.6	k
Shear (Factored - $V_u$ ):	27.2	k
Berm Present:	N	
Design Anchor Rod:	N	
Mapped Foundation:	Y	
Anchor Base Depth (d):	11.0	ft
Width of Anchor (W):	9.3	ft
Length of Anchor (L):	9.3	ft
Thickness of Anchor (t):	4.5	ft
Depth Below Ground Surface to Water Table (w):	99	ft
Soil Uplift at Base / Top of Anchor (B/T):	T	
Unit Weight of Concrete:	150	pcf
Unit Weight of Soil Above Water Table:	100	pcf
Unit Weight of Water:	62.4	pcf
Submerged Soil Unit Weight:	37.6	pcf
Internal Angle of Friction:	20	°
Cohesion:	0	psf
Ultimate Skin Friction of Pad Sides to Soil:	0	psf
Coefficient of Shear Friction:	0.3	
Maximum Top Conical Failure Angle:	30	°
Maximum Base Conical Failure Angle:	30	°
Allowable Capacity Increase (Transient Loads):	1	
Uplift Strength Reduction Factor ( $\phi_u$ ):	0.75	
Shear Strength Reduction Factor ( $\phi_v$ ):	0.75	
Concrete Uplift Strength Reduction Factor ( $\phi_u$ ):	0.9	



Design Anchor Shaft? N

### Soil Uplift Capacity

Ultimate Uplift Resistance from Skin Friction:	0.0	k
Nominal Factored Uplift Resistance ( $\phi_u P_n$ ):	135.9	k
$P_u / \phi_u P_n$ :	30%	Pass

### Soil Shear Capacity

Ultimate Shear Friction Resistance Due to Normal Force:	25.2	k
Passive Pressure:	1,785	psf
Ultimate Passive Pressure Resistance:	74.7	k
Nominal Shear Resistance ( $\phi_v V_n$ ):	74.9	k
$V_u / \phi_v V_n$ :	36%	Pass