



Structural Analysis Report

July 1, 2022

FA:	14652325
AT&T Site Name:	Chester II
PACE:	MRNYJ013215
PTN:	2191A0YB3M
Airosmith Project ID:	ATT NSB NYC 202103
Site Location	60 Evan Road Warwick, NY 10990 Orange County 41° 18' 05.74" N NAD83 74° 17' 38.93" W NAD83
Applicable Code	2020 Building Code of NY State / 2018 IBC
Applicable Design Standard	ASCE 7-16 / ANSI/TIA-222-H / AWWA D100-11
Structure	95 ft Water Tank
Overall Result	Pass

PREPARED FOR:



7/1/2022

APPROVED BY: Joseph R. Johnston, P.E.
NY License #: 091187

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1.0 Scope

Airosmith Engineering has been requested to perform a structural analysis on the existing 95 ft water tank for AT&T Mobility's New Site Build project. The structure was analyzed using a comparative analysis to the design vertical and lateral loads.

2.0 Supporting Documentation

Mount Design Report	Airosmith Engineering Project ATT NSB NYC 202103, dated 07/01/22
Design Visit Photos	Airosmith Engineering, dated 05/06/22
RFDS	Preliminary/In Progress RFDS ID: 5156679 v1.00, dated 04/27/22
Site Survey	Tectonic Project Number 20141058769, dated 07/13/16
TMO Construction Drawings	Tectonic Project Number 11072.NY10152A, Rev 0, dated 04/29/22
VZW Construction Drawings	Tectonic Work Order 8103.18, dated 05/28/19
Tank Mapping Sketches & Photos	Airosmith Engineering, dated 06/07/22
Tank Design Drawings	Lawler, Matusky & Skelly Engineers Dwg No. 487-005-T, dated 12/12/86

3.0 Analysis Code Requirements

Tank – Original Design:

Wind Speed	100 mph (3-Second Gust)
Design Standard	AWWA-D100-11
Adopted Building Code	2018 IBC / 2020 Building Code of NY State
Structure Class	III
Exposure Category	C

Appurtenances:

Wind Speed	120 mph (3-Second Gust)
Wind Speed with Ice	40 mph (3-Second Gust) w/ 1.0" ice
Design Standard	ASCE 7-16 / ANSI/TIA-222-H
Adopted Building Code	2018 IBC / 2020 Building Code of NY State
Risk Category	III
Exposure Category	C
Topographic Factor Procedure	Method 1, Category 1
Calculated Crest Height	0 ft.
HMSL (ft.)	718.2 ft.

4.0 Existing & Reserved Loading

RAD Center (ft.)	Qty.	Appurtenance	Mount Type	Lines	Carrier
88.8	4	RFS APXVAALL24_43-U-NA20	Pipe	(4) Hybriflex	T-Mobile
	4	COMMSCOPE W-65A-R1			
	4	RADIO-4480 B71+B85			
	4	RADIO-4460 B25+B66			
88.5	6	700/850/AWS ANTENNA	Custom Frame	(3) Hybrid	Verizon Wireless
	3	AWS/PCS DUAL BAND RRH			
	3	700/850 DUAL BAND RRH			
	3	OVP			

5.0 To Be Removed Loading

RAD Center (ft.)	Qty.	Appurtenance	Mount Type	Lines	Carrier
No loading is considered to be removed					

6.0 Proposed Loading

RAD Center (ft.)	Qty.	Appurtenance	Mount Type	Lines	Carrier
105.0	12	COMMSCOPE NNHH-65A-R4	Custom Frames	(9) DC Cables (3) 24p Fiber	AT&T Mobility
	3	NOKIA AHLBBA			
	3	NOKIA AHFIB			
	3	NOKIA AHCA			
	3	NOKIA AHNA			
	3	RAYCAP DC9			

7.0 Final Configuration

RAD Center (ft.)	Qty.	Appurtenance	Mount Type	Lines	Carrier
105.0	12	COMMSCOPE NNHH-65A-R4	Custom Frames	(9) DC Cables (3) 24p Fiber	AT&T Mobility
	3	NOKIA AHLBBA			
	3	NOKIA AHFIB			
	3	NOKIA AHCA			
	3	NOKIA AHNA			
	3	RAYCAP DC9			
88.8	4	RFS APXVAALL24_43-U-NA20	Pipe	(4) Hybriflex	T-Mobile
	4	COMMSCOPE W-65A-R1			
	4	RADIO-4480 B71+B85			
	4	RADIO-4460 B25+B66			
88.5	6	700/850/AWS ANTENNA	Custom Frame	(3) Hybrid	Verizon Wireless
	3	AWS/PCS DUAL BAND RRH			
	3	700/850 DUAL BAND RRH			
	3	OVP			

8.0 Results and Conclusions

The proposed loading results in an increase of less than 5% gravity and less than 10% lateral loads. Therefore, the structure is deemed adequate to support the proposed loading per 2018 IEBC Sections 503.3 and 503.4.

Upon reviewing the results of this analysis, it is our opinion that the existing structure meets the specified code requirements. **The structure and foundation are considered acceptable to support the final loading configuration** as listed within in this report.

We appreciate the opportunity to be of service on this project. If you have any questions, require additional information, or actual conditions differ from those as detailed in this report, please contact me via the information below:

Andrew D. Vargo, P.E.
engineering@airosmithdevelopment.com

9.0 Assumptions & Limitations

The following assumptions have been made for this analysis:

- Structural calculations are completed assuming all information provided to Airosmith Development is accurate and applicable to this site.
- The existing structures were designed, manufactured, and constructed in accordance with the applicable codes and standards in effect at that time
- The existing structures have been properly maintained in accordance with industry standards.
- All structural and foundation elements, unless otherwise noted, are in good condition, and are capable of supporting their original design capacity.
- Steel grades have been assumed as follows, unless otherwise noted
 - Channel, Solid Round, Angle & Plate ASTM A36 Gr. 36
 - HSS (Rectangular) ASTM A500 Gr. B
 - HSS (Pipe) ASTM A53 Gr. B
 - Threaded Rods ASTM A36 Gr. 36
- Calculation-specific assumptions are as noted in the attached appendix

Design Criteria		
Standard:	AWWA D100-11	TIA-222-H
Wind Speed (mph):	100	120
Exposure Category:	C	C
Wind Importance Factor:	1.15	N/A
Gust-Effect Factor:	1.00	0.85

Wind Load Comparison Summary					
Force Component	Bare Tank	Fully Loaded	Increase	Result*	AT&T Contribution
Base Shear (k):	76.26	80.08	5.0%	OK	4.11 107.6%
Base OIM (kip-ft):	3,622.38	3,980.24	9.9%	OK	413.10 115.4%
Total Weight (k):	252.78	264.97	4.8%	OK	8.21 67.4%

*The proposed loading results in an increase of less than 5% gravity and less than 10% lateral loads. Therefore, the structure is deemed adequate to support the proposed loading per 2018 IBC Sections 503.3 and 503.4.

Critical Wind Direction	
60 deg	

Tank (Ground Supported Flat Bottom Tank)															
Section	Elevation to Top of Section (ft)	Outer Diameter/ Face Width @ Base of Section (ft)	Outer Diameter/ Face Width @ Top of Section (ft)	Thickness (in)	Shape	Projected Area (ft ²)	C.O.G. Elevation (ft)	K _z	q _z (psf)	Force Coefficient C _f	Wind Pressure (psf)	Wind Load (k)	Base Moment (kip-ft)	Total Weight (k)	
Pedestal	95	42	42	0.35	Cylindrical	3,990.00	47.50	1.08	31.85	0.60	19.11	76.26	3,622.38	252.78	
												Total:	76.26	3,622.38	252.78

Discrete Appurtenances														
Carrier	Antenna Model	Qty.	Height (in)	Width (in)	Depth (in)	Shape	Azimuth (deg)	Projection	RAD Center (ft)	K _s	q _s (psf)	Wind Load (k)	Base Moment (kip-ft)	Total Weight (k)
AT&T	AT&T Mount	1	--	--	--	--	30	Transverse	105	1.28	39.04	0.00	0.00	0.70
AT&T	COMMSCOPE NNHH-65A-R4	4	55.10	19.60	7.80	Flat	30	Transverse	105	1.28	39.04	0.56	58.32	0.31
AT&T	NOKIA AHLBBA	1	24.00	14.90	12.70	Flat	30	Transverse	105	1.28	39.04	0.08	8.85	0.10
AT&T	NOKIA AHFIB	1	28.70	15.40	9.40	Flat	30	Transverse	105	1.28	39.04	0.08	7.99	0.09
AT&T	NOKIA AHCA	1	13.27	12.76	7.22	Flat	30	Transverse	105	1.28	39.04	0.03	2.78	0.04
AT&T	NOKIA AHNA	1	13.25	12.76	7.22	Flat	30	Transverse	105	1.28	39.04	0.03	2.78	0.04
AT&T	RAYCAP DC9-48-60-24-8C-EV	1	31.41	10.24	18.28	Round	30	Transverse	105	1.28	39.04	0.07	6.95	0.03
AT&T	AT&T Mount	1	--	--	--	--	150	Normal	105	1.28	39.04	0.00	0.00	0.70
AT&T	COMMSCOPE NNHH-65A-R4	4	55.10	19.60	7.80	Flat	150	Normal	105	1.28	39.04	1.05	109.73	0.31
AT&T	NOKIA AHLBBA	1	24.00	14.90	12.70	Flat	150	Normal	105	1.28	39.04	0.10	10.00	0.10
AT&T	NOKIA AHFIB	1	28.70	15.40	9.40	Flat	150	Normal	105	1.28	39.04	0.11	11.62	0.09
AT&T	NOKIA AHCA	1	13.27	12.76	7.22	Flat	150	Normal	105	1.28	39.04	0.04	4.38	0.04
AT&T	NOKIA AHNA	1	13.25	12.76	7.22	Flat	150	Normal	105	1.28	39.04	0.04	4.38	0.04
AT&T	RAYCAP DC9-48-60-24-8C-EV	1	31.41	10.24	18.28	Round	150	Normal	105	1.28	39.04	0.05	4.73	0.03
AT&T	AT&T Mount	1	--	--	--	--	300	Normal	105	1.28	39.04	0.00	0.00	0.70
AT&T	COMMSCOPE NNHH-65A-R4	4	55.10	19.60	7.80	Flat	300	Normal	105	1.28	39.04	1.21	126.87	0.31
AT&T	NOKIA AHLBBA	1	24.00	14.90	12.70	Flat	300	Normal	105	1.28	39.04	0.10	10.38	0.10
AT&T	NOKIA AHFIB	1	28.70	15.40	9.40	Flat	300	Normal	105	1.28	39.04	0.12	12.83	0.09
AT&T	NOKIA AHCA	1	13.27	12.76	7.22	Flat	300	Normal	105	1.28	39.04	0.05	4.92	0.04
AT&T	NOKIA AHNA	1	13.25	12.76	7.22	Flat	300	Normal	105	1.28	39.04	0.05	4.91	0.04
AT&T	RAYCAP DC9-48-60-24-8C-EV	1	31.41	10.24	18.28	Round	300	Normal	105	1.28	39.04	0.04	3.99	0.03
TMO	TMO Mount	1	--	--	--	--	20	Shielded	88.83	1.23	37.69	0.00	0.00	0.27
TMO	RFS APXVAALL24 43-U-NA20	1	95.90	24.00	8.50	Flat	20	Shielded	88.83	1.23	37.69	0.00	0.00	0.12
TMO	COMMSCOPE W-65A-R1	1	54.72	112.09	4.65	Flat	20	Shielded	88.83	1.23	37.69	0.00	0.00	0.02
TMO	RADIO-4480 B71+B85	1	21.90	15.70	7.50	Flat	20	Shielded	88.83	1.23	37.69	0.00	0.00	0.08
TMO	RADIO-4460 B25+B66	1	16.50	13.40	5.90	Flat	20	Shielded	88.83	1.23	37.69	0.00	0.00	0.05
TMO	TMO Mount	1	--	--	--	--	120	Shielded	88.83	1.23	37.69	0.00	0.00	0.27
TMO	RFS APXVAALL24 43-U-NA20	1	95.90	24.00	8.50	Flat	120	Shielded	88.83	1.23	37.69	0.00	0.00	0.12
TMO	COMMSCOPE W-65A-R1	1	54.72	112.09	4.65	Flat	120	Shielded	88.83	1.23	37.69	0.00	0.00	0.02
TMO	RADIO-4480 B71+B85	1	21.90	15.70	7.50	Flat	120	Shielded	88.83	1.23	37.69	0.00	0.00	0.08
TMO	RADIO-4460 B25+B66	1	16.50	13.40	5.90	Flat	120	Shielded	88.83	1.23	37.69	0.00	0.00	0.05
TMO	TMO Mount	1	--	--	--	--	210	Transverse	88.83	1.23	37.69	0.00	0.00	0.27
TMO	RFS APXVAALL24 43-U-NA20	1	95.90	24.00	8.50	Flat	210	Transverse	88.83	1.23	37.69	0.28	24.85	0.12
TMO	COMMSCOPE W-65A-R1	1	54.72	112.09	4.65	Flat	210	Transverse	88.83	1.23	37.69	0.09	7.83	0.02
TMO	RADIO-4480 B71+B85	1	21.90	15.70	7.50	Flat	210	Transverse	88.83	1.23	37.69	0.04	3.96	0.08
TMO	RADIO-4460 B25+B66	1	16.50	13.40	5.90	Flat	210	Transverse	88.83	1.23	37.69	0.03	2.33	0.05
TMO	TMO Mount	1	--	--	--	--	300	Shielded	88.83	1.23	37.69	0.00	0.00	0.27
TMO	RFS APXVAALL24 43-U-NA20	1	95.90	24.00	8.50	Flat	300	Shielded	88.83	1.23	37.69	0.00	0.00	0.12
TMO	COMMSCOPE W-65A-R1	1	54.72	112.09	4.65	Flat	300	Shielded	88.83	1.23	37.69	0.00	0.00	0.02
TMO	RADIO-4480 B71+B85	1	21.90	15.70	7.50	Flat	300	Shielded	88.83	1.23	37.69	0.00	0.00	0.08
TMO	RADIO-4460 B25+B66	1	16.50	13.40	5.90	Flat	300	Shielded	88.83	1.23	37.69	0.00	0.00	0.05
VZW	VZW Mount	1	--	--	--	--	30	Transverse	88.5	1.23	37.66	0.00	0.00	0.09
VZW	8' Antenna	2	96.00	12.00	7.00	Flat	30	Transverse	88.5	1.23	37.66	0.49	42.93	0.12
VZW	Dual Band Radio	2	28.70	15.35	9.45	Flat	30	Transverse	88.5	1.23	37.66	0.15	13.06	0.20
VZW	OVP	1	31.25	11.00	11.00	Round	30	Transverse	88.5	1.23	37.66	0.04	3.43	0.03
VZW	VZW Mount	1	--	--	--	--	180	Transverse	88.5	1.23	37.66	0.00	0.00	0.09
VZW	8' Antenna	2	96.00	12.00	7.00	Flat	180	Transverse	88.5	1.23	37.66	0.55	48.44	0.12
VZW	Dual Band Radio	2	28.70	15.35	9.45	Flat	180	Transverse	88.5	1.23	37.66	0.17	14.99	0.20
VZW	OVP	1	31.25	11.00	11.00	Round	180	Transverse	88.5	1.23	37.66	0.04	3.43	0.03
VZW	VZW Mount	1	--	--	--	--	280	Shielded	88.5	1.23	37.66	0.00	0.00	0.09
VZW	8' Antenna	2	96.00	12.00	7.00	Flat	280	Shielded	88.5	1.23	37.66	0.00	0.00	0.12
VZW	Dual Band Radio	2	28.70	15.35	9.45	Flat	280	Shielded	88.5	1.23	37.66	0.00	0.00	0.20
VZW	OVP	1	31.25	11.00	11.00	Round	280	Shielded	88.5	1.23	37.66	0.00	0.00	0.03
Total:												3.38	337.01	7.42

*TIA-222-H wind loads have been factored by 0.6 to compare directly with AWWA wind loads

Linear Appurtenances													
Carrier	Feedline Model	Qty.	Diameter (in)	Weight (p/l)	Start Height (ft)	End Height (ft)	Azimuth (deg)	Grouping	% Exposed (Block)	Cluster Diameter (in)	Wind Load (k)	Base Moment (kip-ft)	Total Weight (k)
AT&T	0.89" Power	9	0.89	5.00	0.00	95.00	170	Individual	--	--	0.23	11.60	4.28
AT&T	0.39" Fiber	3	0.39	0.09	0.00	95.00	170	Individual	--	--	0.10	5.08	0.03
TMO	0.51" Hybrid	4	0.51	0.57	0.00	88.83	135	Individual	--	--	0.00	0.00	0.20
VZW	1 5/8" Hybrid	3	1.63	1.00	0.00	88.50	150	Individual	--	--	0.39	18.06	0.27
Total:											0.44	20.85	4.77

*TIA-222-H wind loads have been factored by 0.6 to compare directly with AWWA wind loads

*TIA-222-H wind loads have been factored by 0.6 to compare directly with AWWA wind loads

ANCHOR BOLT CHECK



AWWA D100-11

Date: 6/24/2022
Carrier: AT&T
Engineer: AV
Site ID: 14652325

Anchor Bolt Data

Anchor Bolt Qty	n	45	
Anchor Bolt Diameter	D	2	in
Grade		F1554-36	
Min. Root Area	A _r	2.300	in ²
Base Radius		21.00	ft

Loading Data

Tank Forces:

Applied Shear	V	76	k
Applied Moment	M	3,622	k-ft
Applied Vertical Load	P	253	k

Antenna Forces:

Applied Shear	V	4	k
Applied Moment	M	358	k-ft
Applied Vertical Load	P	12	k

Factored Loads:

Maximum Tensile Force/Bolt	5	k	1.0W - 0.6D
Maximum Shear Force/Bolt	2	k	1.0W

Maximum Tensile Stress/Bolt	2.289	ksi
Maximum Shear Stress/Bolt	0.774	ksi

Allowable Stress

Allowable Stress Increase Factor	1.33	AWWA Section 3.3.3
Allowable Unit Stress	15.000	ksi AWWA Table 5
Combined Unit Stress	3.063	ksi AWWA Section 3.3.2
Usage	20%	

Combined Unit Stress / Allowable Unit Stress < 1.0 **OK**

Notes:

- Tank assumed empty for worst case anchor reactions