



NEW CINGULAR WIRELESS PCS, LLC (AT&T)

**Application to the
State of Connecticut Siting Council**

**For a Certificate of
Environmental Compatibility and Public Need**

-MIDDLETOWN FACILITY-

Docket No. 506

BULK FILING

**RESPONSES TO CONNECTICUT SITING
COUNCIL PRE-HEARING INTERROGATORIES,
SET ONE**

**NEW CINGULAR WIRELESS PCS, LLC (AT&T)
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT 06067**

Attachment 1

STRUCTURAL CALCULATIONS

Prepared for: Smartlink / AT&T

New Antenna and Equipment Installation on Self-Support Tower

Site No: CT3470A

FA No: 10578361

USID: 221794

Site Name: Mile LN_Middletown
499 Mile Lane
Middletown, CT 06457

January 7, 2019

Tower Modification Required

Henry M. Bellagamba, P.E.

FULLERTON
ENGINEERING • DESIGN

Fullerton Engineering Consultants, Inc.
1100 E. Woodfield Road, Suite 500
Schaumburg, IL 60173
Tel: 847.908.8400
www.fullertonengineering.com
Project Number: 2018.0265.E023

Summary

A structural analysis was performed by Fullerton, as requested by the client, to determine the conformance of existing structure with the governing building code, 2018 Connecticut State Building Code (2015 International Building Code) and the industry standard, ANSI/TIA-222-G (Structural Standard for Steel Antenna Supporting Structures and Antennas). The analysis considers the tower properties, existing and proposed appurtenances and the required loading criteria.

Conclusion

- The tower member stresses are **NOT** in conformance for the loading considered.
- The tower foundation was not analyzed due to a lack of geotechnical information.

Analysis Data

The following is based on information provided by the client, field investigation, and other determination by Fullerton Engineering Consultants or third parties.

Configuration 180 ft. Self-Support tower with a 5' top and 13' bottom face width.

References RF Design Sheet by AT&T, dated 10/3/2018.

Original Tower Construction Drawings by Valmont Structures, Eng. File No. 337273, Drawings No. 276371T & 276371F, dated 9/18/2017.

Appurtenance Loading Schedule

ELEV. (FT.=AGL)	APPURTENANCE	TRANSMISSION LINES
	Proposed AT&T	
180'	(6) KMW EPBQ-654L8H8-L2 antennas (3) CCI HPA65R-BU8A antennas (3) Ericsson RRUS-4478 B14 units (3) Ericsson RRUS-4415 B30 units (3) Ericsson RRUS-4449 B5/B12 units (3) Ericsson RRUS-8843 B2/B66A units (3) Ericsson RRUS-E2 units (3) Raycap DC6-48-60-18-8F units Mounted on proposed (3) Sector Frames	(2) 3/8" Fiber (6) 3/4" DC Power
	Existing (to remain)	
182'	(1) Lightning Rod Mounted on tower leg	
157.225' 150'	(1) Sinclair SC479-HF1LDF RX antenna (1) Motorola TTA (DS428E83I01T) unit Mounted on existing (1) 6' Standoff Mount Frame with Stiff Arm	(1) 1/2" coax (1) 7/8" coax
137.225' 130'	(1) Sinclair SC479-HF1LDF TX antenna Mounted on existing (1) 6' Standoff Mount Frame with Stiff Arm	(1) 7/8" coax
130'	(1) Radiowaves HP3-11 dish Mounted on existing (1) Pipe Mount to Tower Leg	(1) EW90
121.58' 110'	(1) Sinclair SC229-DFLN VHF antenna Mounted on existing (1) 6' Standoff Mount Frame with Stiff Arm	(1) 7/8" coax
95'	(1) Radiowaves HP3-11 dish Mounted on existing (1) Pipe Mount to Tower Leg	(1) EW90

Results

The results of the structural analysis are summarized as follows:

Tower mast The tower leg members are **NOT adequate** for new loads, with a maximum stress ratio of 252.3% @ Elev. 120'-140' AGL.
The tower leg bolts are **NOT adequate** for new loads, with a maximum stress ratio of 120.2% @ Elev. 80' AGL.
The tower main diagonal members are **NOT adequate** for new loads, with a maximum stress ratio of 111.5% @ Elev. 80'-100' AGL.
The tower diagonal bolts are **NOT adequate** for new loads, with a maximum stress ratio of 124.9% @ Elev. 140'-160' AGL.
The tower top girt members are **adequate** for new loads, with a maximum stress ratio of 14.8% @ Elev. 180' AGL.

Anchor Rods The anchor rods are **NOT adequate** for new loads, with a maximum stress ratio of 109.73%.

Foundation The tower foundations were **NOT analyzed** due to a lack of geotechnical information.

Assumptions

This analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. The analysis is based solely on the information supplied, and the results, in turn, are only as accurate as data extracted from this information. Fullerton has been instructed by the client to assume the information supplied is accurate, and Fullerton has made no independent determination of its accuracy. The exception to the previous statement is if Fullerton has been contracted by the client to provide an independent structural mapping report of the tower and related appurtenances, in which case Fullerton has made an independent determination of the accuracy of the information resulting from the mapping report.

- The tower member sizes and geometry are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and stated in the materials section.
- The existing tower is assumed to have been properly maintained in accordance with the TIA/EIA standard and/or its original manufacturer's recommendations. The existing tower is assumed to be in good condition with no structural defects and with no deterioration to its member capacities.
- The antenna configuration is as supplied and/or stated in the analysis section. It is assumed to be complete and accurate. All antennas, mounts, remote radios, cables and cable supports are assumed to be properly installed and supported as per the manufacturer's requirements.
- The antennas, mounts, remote radios, cables and cable supports and lines stated in the appurtenance loading schedule represent Fullerton's understanding of the overall antenna configuration. If the actual configuration is different than above, then this analysis is invalid. Please refer to this report for the projected wind areas used in the calculations for antennas and mounts. If variations or discrepancies are identified, please inform Fullerton.
- Some assumptions are made regarding antenna and mount sizes and their projected areas based on a best interpretation of the data supplied and a best knowledge of antenna type and industry practice.
- The existing foundation is assumed to be in good condition with no structural defects and with no deterioration to its member capacities.
- The soil parameters are as per data supplied, or as assumed, and stated in the calculations.
- All welds and connections are assumed to develop at least the member capacity, unless determined otherwise and explicitly stated in this report.
- All prior structural modifications, if any, are assumed to be as per date supplied/ available, to be properly installed and to be fully effective.

Scope and Limitations

The engineering services rendered by Fullerton Engineering Consultants, Inc. (Fullerton) in connection with this structural analysis are limited to an analysis of the structure, size and capacity of its members. Fullerton does not analyze the fabrication, including welding and connection capacities, except as included in this report.

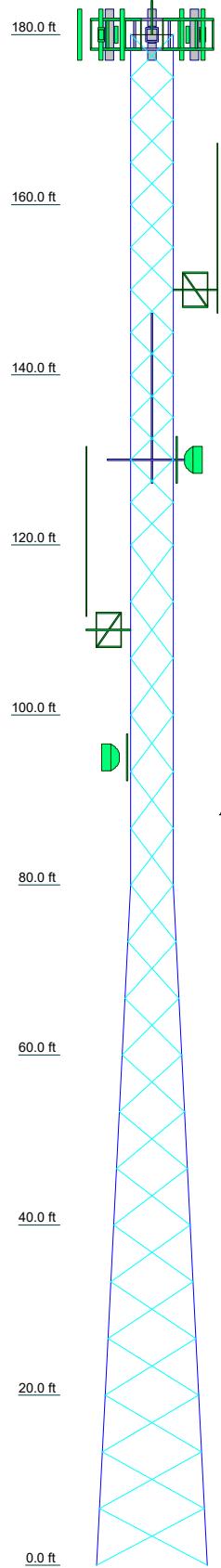
The information and conclusions contained in this report were determined by application of the current engineering standards and analysis procedures and formulae, and Fullerton assumes no obligation to revise any of the information or conclusions contained in this report in the event such engineering and analysis procedures and formulae are hereafter modified or revised.

Fullerton makes no warranties, expressed or implied in connection with this report and disclaims any liability arising from original design, material, fabrication and erection deficiencies or the "as-built" condition of this tower. Fullerton 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.

Installation procedures and loading are not within the scope of this report and should be performed and evaluated by a competent tower erection contractor.

Section I

Structural Calculations



DESIGNED APPURTEANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 4"x.5"	182	Raycap DC6-48-60-18-8F	180
(2) KMW EPBQ-654L8H8-L2	180	Raycap DC6-48-60-18-8F	180
(2) KMW EPBQ-654L8H8-L2	180	Sabre 12' V-Boom Assembly w/ Tieback (1)	180
(2) KMW EPBQ-654L8H8-L2	180	Sabre 12' V-Boom Assembly w/ Tieback (1)	180
CCI HPA65R-BU8A	180	Sabre 12' V-Boom Assembly w/ Tieback (1)	180
CCI HPA65R-BU8A	180	Sabre 12' V-Boom Assembly w/ Tieback (1)	180
CCI HPA65R-BU8A	180	Sabre 12' V-Boom Assembly w/ Tieback (1)	180
RRUS-4478 B14	180	Sinclair SC479-HF1LDF	157.225
RRUS-4478 B14	180	SO602-1	150
RRUS-4478 B14	180	2" STD x 10.5' Stiff Arm	150
RRUS-8843 B2/B66A	180	Motorola TTA (DS428E83101T)	150
RRUS-8843 B2/B66A	180	Sinclair SC479-HF1LDF	137.225
RRUS-8843 B2/B66A	180	SO602-1	130
RRUS-E2	180	2" STD x 10.5' Stiff Arm	130
RRUS-E2	180	4 STD x 66" Dish Pipe Mount	130
RRUS-E2	180	Radiowaves HP3-11	130
RRUS-4415 B30	180	Sinclair SC229-DFLN	121.58
RRUS-4415 B30	180	2" STD x 10.5' Stiff Arm	110
RRUS-4449 B5/B12	180	SO602-1	110
RRUS-4449 B5/B12	180	4 STD x 66" Dish Pipe Mount	95
RRUS-4449 B5/B12	180	Radiowaves HP3-11	95
Raycap DC6-48-60-18-8F	180		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class III.
7. Topographic Category 1 with Crest Height of 0.00 ft

ALL REACTIONS ARE FACtORED

MAX. CORNER REACTIONS AT BASE:
 DOWN: 310418 lb
 SHEAR: 21234 lb

UPLIFT: -283024 lb
 SHEAR: 19223 lb

AXIAL 81590 lb
 SHEAR 9864 lb
 MOMENT 1155917 lb-ft

TORQUE 2565 lb-ft
 50 mph WIND - 0.7500 in ICE
 AXIAL 21020 lb
 SHEAR 30104 lb
 MOMENT 3415907 lb-ft

TORQUE 8812 lb-ft
 REACTIONS - 97 mph WIND

Fullerton Engineering Consultants

1100 E. Woodfield Road, Suite 500

Schaumburg, IL 60173

Phone: (847) 908-8400

FAX: fax@fullertonengineering.com

Job: CT3470A

Project: 180 ft. Self-Support Tower

Client: Smartlink / AT&T Drawn by: VY App'd:

Code: TIA-222-G Page 8 of 14/19 Scale: NTS

Path: /files/fullertonengineering.com/Drive/Dept 400/SMLINK/SMLINK-ATT-NSB NECTCT3470A/StructuralAnalysis/lnxTower/CT3470A.dwg Dwg No. E-1

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	Client Smartlink / AT&T	Designed by VY

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 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 5.00 ft at the top and 13.00 ft at the base.

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

The following design criteria apply:

Tower is located in Middlesex County, Connecticut.

Basic wind speed of 97 mph.

Structure Class III.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.7500 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.

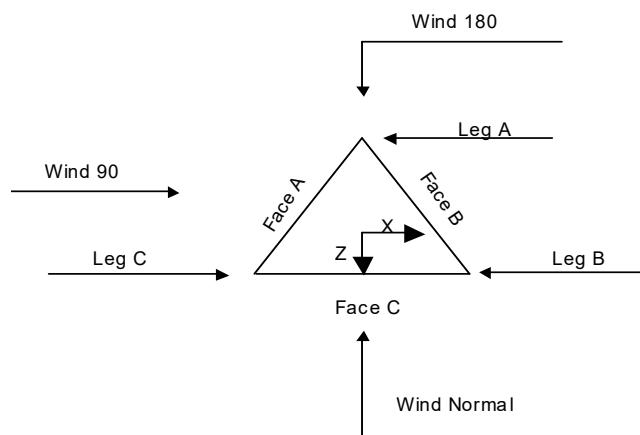
Deflections calculated using a wind speed of 60 mph.

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.



Triangular Tower

tnxTower Fullerton Engineering Consultants <i>1100 E. Woodfield Road, Suite 500</i> <i>Schaumburg, IL 60173</i> <i>Phone: (847) 908-8400</i> <i>FAX: fax@fullertonengineering.com</i>	Job	CT3470A	Page
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	Client	Smartlink / AT&T	Designed by VY

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
				ft		ft
T1	180.00-160.00			5.00	1	20.00
T2	160.00-140.00			5.00	1	20.00
T3	140.00-120.00			5.00	1	20.00
T4	120.00-100.00			5.00	1	20.00
T5	100.00-80.00			5.00	1	20.00
T6	80.00-60.00			5.00	1	20.00
T7	60.00-40.00			7.00	1	20.00
T8	40.00-20.00			9.00	1	20.00
T9	20.00-0.00			11.00	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace	Has Horizontals	Top Girt Offset	Bottom Girt Offset
				End Panels		in	in
T1	180.00-160.00	5.00	X Brace	No	No	0.0000	0.0000
T2	160.00-140.00	5.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T7	60.00-40.00	6.67	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						
T1 180.00-160.00	Pipe	PIPE 2.5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T2 160.00-140.00	Pipe	PIPE 2.5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T3 140.00-120.00	Pipe	PIPE 2.5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T4 120.00-100.00	Pipe	PIPE 4 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T5 100.00-80.00	Pipe	PIPE 5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T6 80.00-60.00	Pipe	PIPE 5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T7 60.00-40.00	Pipe	PIPE 6 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T8 40.00-20.00	Pipe	PIPE 6 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T9 20.00-0.00	Pipe	PIPE 6 STD	A572-50	Equal Angle	L2 1/2x2 1/2x3/16	A36

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Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade				
				(50 ksi)						(36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
180.00-160.00 T2 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
160.00-140.00 T3 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
140.00-120.00 T4 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
120.00-100.00 T5 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
100.00-80.00 T6 80.00-60.00 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
T7 60.00-40.00 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
T8 40.00-20.00 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000
T9 20.00-0.00 0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ^l								
				X Brace Diags	X Brace Diags	K Brace Diags	Single Diags	Girts		Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
								X	Y			
T1 180.00-160.00	Yes	Yes	1	1	1	1	1			1	1	1
T2 160.00-140.00	Yes	Yes	1	1	1	1	1			1	1	1

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Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹							
				X Brace Diags		K Brace Diags		Single Diags		Girts	
				X	Y	X	Y	X	Y	X	Y
T3	Yes	Yes	1	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1
T9 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal		
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
180.00-160.00															
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
160.00-140.00															
T3	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
140.00-120.00															
T4	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
120.00-100.00															
T5	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
100.00-80.00															
T6 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
T7 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
T8 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	
T9 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.										
T1	Flange	0.7500	4	0.7500	1	0.7500	1	0.7500	0	0.6250	0	0.6250	0	0.6250	0
180.00-160.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal		
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.									
T2	Flange	0.7500	4	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	
160.00-140.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N		
T3	Flange	0.7500	4	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	
140.00-120.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N		
T4	Flange	1.0000	6	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	
120.00-100.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N		
T5	Flange	0.7500	8	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	
100.00-80.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N		
T6	80.00-60.00	Flange	0.7500	8	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
			A325N		A325N		A325N									
T7	60.00-40.00	Flange	0.7500	8	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
			A325N		A325N		A325N									
T8	40.00-20.00	Flange	0.7500	8	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
			A325N		A325N		A325N									
T9	20.00-0.00	Flange	0.7500	0	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
			A325N		A325N		A325N									

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Feedline Ladder (Af) *****	C	No	Af (CaAa)	180.00 - 8.00	1	1	3.0000	3.0000		8.40
LDF4-50A (1/2 FOAM)	C	No	Ar (CaAa)	150.00 - 8.00	1	1	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM)	C	No	Ar (CaAa)	150.00 - 8.00	1	1	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM)	C	No	Ar (CaAa)	130.00 - 8.00	1	1	1.0900	1.0900		0.33
EW90	C	No	Ar (CaAa)	130.00 - 8.00	1	1	0.9869	0.9869		0.32
LDF5-50A (7/8 FOAM)	C	No	Ar (CaAa)	110.00 - 8.00	1	1	1.0900	1.0900		0.33
EW90	C	No	Ar (CaAa)	95.00 - 8.00	1	1	0.9869	0.9869		0.32
proposed										
3/8" Fiber	C	No	Ar (CaAa)	180.00 - 6.00	2	2	0.4000	0.4000		0.08
3/4" DC power cable	C	No	Ar (CaAa)	180.00 - 6.00	6	3	0.7500	0.7500		0.40

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	CaAa	Weight
						ft ² /ft	plf
Climbing Pegs	C	No	CaAa (Out Of Face)	60.00 - 8.00	1	No Ice	0.01
						1/2" Ice	0.12
						1" Ice	0.23
Climbing Pegs	B	No	CaAa (Out Of Face)	60.00 - 8.00	1	No Ice	0.01
						1/2" Ice	0.12
						1" Ice	0.23
Climbing Pegs	A	No	CaAa (Out Of Face)	160.00 - 8.00	1	No Ice	0.01
						1/2" Ice	0.12
						1" Ice	0.23
Safety Line 3/8	A	No	CaAa (Out Of Face)	180.00 - 0.00	1	No Ice	0.04
						1/2" Ice	0.14
						1" Ice	0.24
							1.28

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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight lb
T1	180.00-160.00	A	0.000	0.000	0.000	0.750	4.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	20.600	0.000	219.20
T2	160.00-140.00	A	0.000	0.000	0.000	0.950	10.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	22.320	0.000	224.00
T3	140.00-120.00	A	0.000	0.000	0.000	0.950	10.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	26.117	0.000	235.30
T4	120.00-100.00	A	0.000	0.000	0.000	0.950	10.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	29.284	0.000	245.10
T5	100.00-80.00	A	0.000	0.000	0.000	0.950	10.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	31.854	0.000	253.20
T6	80.00-60.00	A	0.000	0.000	0.000	0.950	10.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	32.348	0.000	254.80
T7	60.00-40.00	A	0.000	0.000	0.000	0.950	10.60
		B	0.000	0.000	0.000	0.200	6.20
		C	0.000	0.000	32.348	0.200	261.00
T8	40.00-20.00	A	0.000	0.000	0.000	0.950	10.60
		B	0.000	0.000	0.000	0.200	6.20
		C	0.000	0.000	32.348	0.200	261.00
T9	20.00-0.00	A	0.000	0.000	0.000	0.870	8.12
		B	0.000	0.000	0.000	0.120	3.72
		C	0.000	0.000	20.469	0.120	161.72

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight lb
T1	180.00-160.00	A	2.209	0.000	0.000	0.000	9.586	51.23
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	63.699	0.000	1097.28	
T2	160.00-140.00	A	2.182	0.000	0.000	0.000	19.275	91.75
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	73.648	0.000	1249.16	
T3	140.00-120.00	A	2.151	0.000	0.000	0.000	19.014	90.60
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	93.965	0.000	1565.46	
T4	120.00-100.00	A	2.115	0.000	0.000	0.000	18.715	89.27
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	108.749	0.000	1788.32	
T5	100.00-80.00	A	2.073	0.000	0.000	0.000	18.362	87.71
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	120.168	0.000	1946.60	
T6	80.00-60.00	A	2.021	0.000	0.000	0.000	17.930	85.80
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	120.569	0.000	1921.70	
T7	60.00-40.00	A	1.955	0.000	0.000	0.000	17.368	83.31

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight lb
T8	40.00-20.00	B		0.000	0.000	0.000	8.800	37.47
		C		0.000	0.000	117.755	8.800	1876.12
		A	1.857	0.000	0.000	0.000	16.551	79.69
T9	20.00-0.00	B		0.000	0.000	0.000	8.372	35.92
		C		0.000	0.000	113.660	8.372	1757.30
		A	1.664	0.000	0.000	0.000	11.919	59.37
		B		0.000	0.000	0.000	4.513	19.69
		C		0.000	0.000	67.038	4.513	962.03

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
T1	180.00-160.00	0.0000	14.2523	0.0000	3.1424
T2	160.00-140.00	0.0000	13.6654	0.0000	-2.2914
T3	140.00-120.00	0.0000	14.4076	0.0000	1.5403
T4	120.00-100.00	0.0000	14.8544	0.0000	3.6313
T5	100.00-80.00	0.0000	15.1387	0.0000	4.7250
T6	80.00-60.00	0.0000	18.0515	0.0000	7.1365
T7	60.00-40.00	0.0000	23.8743	0.0000	13.1702
T8	40.00-20.00	0.0000	29.6324	0.0000	16.4680
T9	20.00-0.00	0.0000	31.2132	0.0000	14.2119

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.5037
T1	15	3/8" Fiber	160.00 - 180.00	0.6000	0.5037
T1	16	3/4" DC power cable	160.00 - 180.00	0.6000	0.5037
T2	2	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.5299
T2	8	LDF4-50A (1/2 FOAM)	140.00 - 150.00	0.6000	0.5299
T2	9	LDF5-50A (7/8 FOAM)	140.00 - 150.00	0.6000	0.5299
T2	15	3/8" Fiber	140.00 - 160.00	0.6000	0.5299
T2	16	3/4" DC power cable	140.00 - 160.00	0.6000	0.5299
T3	2	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.5338
T3	8	LDF4-50A (1/2 FOAM)	120.00 - 140.00	0.6000	0.5338
T3	9	LDF5-50A (7/8 FOAM)	120.00 - 140.00	0.6000	0.5338
T3	10	LDF5-50A (7/8 FOAM)	120.00 -	0.6000	0.5338

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T3	11	EW90	130.00		
			120.00 -	0.6000	0.5338
			130.00		
T3	15	3/8" Fiber	120.00 -	0.6000	0.5338
			140.00		
T3	16	3/4" DC power cable	120.00 -	0.6000	0.5338
			140.00		
T4	2	Feedline Ladder (Af)	100.00 -	0.6000	0.5353
			120.00		
T4	8	LDF4-50A (1/2 FOAM)	100.00 -	0.6000	0.5353
			120.00		
T4	9	LDF5-50A (7/8 FOAM)	100.00 -	0.6000	0.5353
			120.00		
T4	10	LDF5-50A (7/8 FOAM)	100.00 -	0.6000	0.5353
			120.00		
T4	11	EW90	100.00 -	0.6000	0.5353
			120.00		
T4	12	LDF5-50A (7/8 FOAM)	100.00 -	0.6000	0.5353
			110.00		
T4	15	3/8" Fiber	100.00 -	0.6000	0.5353
			120.00		
T4	16	3/4" DC power cable	100.00 -	0.6000	0.5353
			120.00		
T5	2	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.5208
T5	8	LDF4-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.5208
T5	9	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.5208
T5	10	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.5208
T5	11	EW90	80.00 - 100.00	0.6000	0.5208
T5	12	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.5208
T5	13	EW90	80.00 - 95.00	0.6000	0.5208
T5	15	3/8" Fiber	80.00 - 100.00	0.6000	0.5208
T5	16	3/4" DC power cable	80.00 - 100.00	0.6000	0.5208
T6	2	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.5802
T6	8	LDF4-50A (1/2 FOAM)	60.00 - 80.00	0.6000	0.5802
T6	9	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.5802
T6	10	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.5802
T6	11	EW90	60.00 - 80.00	0.6000	0.5802
T6	12	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.5802
T6	13	EW90	60.00 - 80.00	0.6000	0.5802
T6	15	3/8" Fiber	60.00 - 80.00	0.6000	0.5802
T6	16	3/4" DC power cable	60.00 - 80.00	0.6000	0.5802
T7	2	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	8	LDF4-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.6000
T7	9	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T7	10	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T7	11	EW90	40.00 - 60.00	0.6000	0.6000
T7	12	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T7	13	EW90	40.00 - 60.00	0.6000	0.6000
T7	15	3/8" Fiber	40.00 - 60.00	0.6000	0.6000
T7	16	3/4" DC power cable	40.00 - 60.00	0.6000	0.6000
T8	2	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	8	LDF4-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T8	9	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T8	10	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T8	11	EW90	20.00 - 40.00	0.6000	0.6000
T8	12	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T8	13	EW90	20.00 - 40.00	0.6000	0.6000
T8	15	3/8" Fiber	20.00 - 40.00	0.6000	0.6000
T8	16	3/4" DC power cable	20.00 - 40.00	0.6000	0.6000
T9	2	Feedline Ladder (Af)	8.00 - 20.00	0.6000	0.6000
T9	8	LDF4-50A (1/2 FOAM)	8.00 - 20.00	0.6000	0.6000
T9	9	LDF5-50A (7/8 FOAM)	8.00 - 20.00	0.6000	0.6000

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	10	LDF5-50A (7/8 FOAM)	8.00 - 20.00	0.6000	0.6000
T9	11	EW90	8.00 - 20.00	0.6000	0.6000
T9	12	LDF5-50A (7/8 FOAM)	8.00 - 20.00	0.6000	0.6000
T9	13	EW90	8.00 - 20.00	0.6000	0.6000
T9	15	3/8" Fiber	6.00 - 20.00	0.6000	0.6000
T9	16	3/4" DC power cable	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Vert ft ft ft	Azimuth Adjustment °	Placement ft	C_{AA} Front	C_{AA} Side	Weight lb
Lightning Rod 4"x.5"	C	None		0.0000	182.00	No Ice 1/2" Ice 1" Ice	0.20 0.61 0.95	0.20 0.61 0.95
				0.0000		No Ice 1/2" Ice 1" Ice	2.72 4.11 5.50	145.70 223.26 300.82
SO602-1	B	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.72 4.11 5.50	145.70 223.26 300.82
2" STD x 10.5' Stiff Arm	B	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.04 2.08 2.72	38.43 464.25 903.17
Sinclair SC479-HF1LDF	B	From Leg	6.00 0.00 0.00	0.0000	157.23	No Ice 1/2" Ice 1" Ice	4.52 6.54 8.04	34.00 69.82 114.98
Motorola TTA (DS428E83101T)	B	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.46 0.55 0.64	8.90 13.94 20.50
SO602-1	A	From Leg	3.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice	2.72 4.11 5.50	145.70 223.26 300.82
2" STD x 10.5' Stiff Arm	A	From Leg	3.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice	1.04 2.08 2.72	38.43 464.25 903.17
Sinclair SC479-HF1LDF	A	From Leg	6.00 0.00 0.00	0.0000	137.23	No Ice 1/2" Ice 1" Ice	4.59 6.54 8.04	34.00 69.82 114.98
4 STD x 66" Dish Pipe Mount	B	From Leg	0.50 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice 1" Ice	1.57 2.34 2.69	59.40 76.97 98.51
SO602-1	C	From Leg	3.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	2.72 4.11 5.50	145.70 223.26 300.82
2" STD x 10.5' Stiff Arm	C	From Leg	3.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	1.04 2.08 2.72	38.43 464.25 903.17
Sinclair SC229-DFLN	C	From Leg	6.00 0.00 0.00	0.0000	121.58	No Ice 1/2" Ice 1" Ice	6.67 9.02 11.39	32.00 80.22 143.03
4 STD x 66" Dish Pipe Mount	C	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice 1" Ice	1.61 2.34 2.69	59.40 76.97 98.51

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement	<i>C_{AA}</i> _{Front}	<i>C_{AA}</i> _{Side}	Weight
				°	ft	ft ²	ft ²	lb
Proposed								
(2) KMW EPBQ-654L8H8-L2	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	18.09 18.72 19.36	7.03 7.62 8.21
(2) KMW EPBQ-654L8H8-L2	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	18.09 18.72 19.36	104.50 197.75 299.18
(2) KMW EPBQ-654L8H8-L2	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	18.09 18.72 19.36	104.50 197.75 299.18
CCI HPA65R-BU8A	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	11.23 11.85 12.47	9.94 11.37 12.64
CCI HPA65R-BU8A	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	11.23 11.85 12.47	104.80 192.59 290.14
CCI HPA65R-BU8A	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	11.23 11.85 12.47	9.94 11.37 12.64
RRUS-4478 B14	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.84 2.01 2.19	1.06 1.20 1.34
RRUS-4478 B14	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.84 2.01 2.19	60.00 75.88 94.39
RRUS-4478 B14	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.84 2.01 2.19	1.06 1.20 1.34
RRUS-8843 B2/B66A	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.35 1.50 1.65
RRUS-8843 B2/B66A	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	72.00 89.60 109.91
RRUS-8843 B2/B66A	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.35 1.50 1.65
RRUS-E2	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60
RRUS-E2	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	52.90 76.12 102.54
RRUS-E2	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60
RRUS-4415 B30	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	0.68 0.79 0.91
RRUS-4415 B30	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	0.68 0.79 0.91
RRUS-4415 B30	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	46.00 58.43 73.23
RRUS-4449 B5/B12	A	From Leg	4.00 0.00	0.0000	180.00	No Ice 1/2" Ice	1.64 1.80	0.68 0.79

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	Project 180 ft. Self-Support Tower							Date 07:43:54 01/07/19
	Client Smartlink / AT&T							Designed by VY

Description		Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement	<i>C_{AA}</i> _{Front}	<i>C_{AA}</i> _{Side}	Weight	
RRUS-4449 B5/B12	B	From Leg		0.00 4.00 0.00 0.00	0.0000	180.00	1" Ice No Ice 1/2" Ice 1" Ice	1.97 1.64 1.80 1.97	1.60 1.30 1.45 1.60	110.08 73.00 90.19 110.08
RRUS-4449 B5/B12	C	From Leg		4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.30 1.45 1.60	73.00 90.19 110.08
Raycap DC6-48-60-18-8F	A	From Leg		2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	0.83 1.34 1.52	0.83 1.34 1.52	22.00 37.91 56.21
Raycap DC6-48-60-18-8F	B	From Leg		2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	0.83 1.34 1.52	0.83 1.34 1.52	22.00 37.91 56.21
Raycap DC6-48-60-18-8F	C	From Leg		2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	0.83 1.34 1.52	0.83 1.34 1.52	22.00 37.91 56.21
Sabre 12' V-Boom Assembly w/ Tieback (1)	A	From Leg		2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	20.32 24.20 28.08	12.90 20.63 28.36	450.00 795.00 1140.00
Sabre 12' V-Boom Assembly w/ Tieback (1)	B	From Leg		2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	20.32 24.20 28.08	12.90 20.63 28.36	450.00 795.00 1140.00
Sabre 12' V-Boom Assembly w/ Tieback (1)	C	From Leg		2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	20.32 24.20 28.08	12.90 20.63 28.36	450.00 795.00 1140.00

Dishes

Description		Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
Radiowaves HP3-11	B	Paraboloid w/Shroud (HP)	From Leg	1.50 0.00 0.00	0.0000		130.00	3.20	No Ice 1/2" Ice 1" Ice	8.04 8.47 8.89	50.00 93.48 136.96
Radiowaves HP3-11	C	Paraboloid w/Shroud (HP)	From Leg	1.50 0.00 0.00	0.0000		95.00	3.20	No Ice 1/2" Ice 1" Ice	8.04 8.47 8.89	50.00 93.48 136.96

Tower Pressures - No Ice

$$G_H = 0.850$$

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	Project	180 ft. Self-Support Tower	Date 07:43:54 01/07/19
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Section Elevation	z	K _Z	q _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	
ft	ft		psf	ft ²	e	ft ²	ft ²	ft ²				
180.00-160.00	T1	170.00	1.415	33	104.792	A	9.770	9.583	9.583	49.52	0.000	0.750
						B	9.770	9.583		49.52	0.000	0.000
						C	9.770	9.583		49.52	20.600	0.000
160.00-140.00	T2	150.00	1.378	32	104.792	A	8.976	9.583	9.583	51.64	0.000	0.950
						B	8.976	9.583		51.64	0.000	0.000
						C	8.976	9.583		51.64	22.320	0.000
140.00-120.00	T3	130.00	1.337	31	104.792	A	8.976	9.583	9.583	51.64	0.000	0.950
						B	8.976	9.583		51.64	0.000	0.000
						C	8.976	9.583		51.64	26.117	0.000
120.00-100.00	T4	110.00	1.291	30	107.500	A	7.746	15.000	15.000	65.95	0.000	0.950
						B	7.746	15.000		65.95	0.000	0.000
						C	7.746	15.000		65.95	29.284	0.000
100.00-80.00	T5	90.00	1.238	29	109.271	A	7.585	18.542	18.542	70.97	0.000	0.950
						B	7.585	18.542		70.97	0.000	0.000
						C	7.585	18.542		70.97	31.854	0.000
80.00-60.00	T6	70.00	1.174	28	129.282	A	8.284	18.573	18.573	69.16	0.000	0.950
						B	8.284	18.573		69.16	0.000	0.000
						C	8.284	18.573		69.16	32.348	0.000
60.00-40.00	T7	50.00	1.094	26	171.055	A	9.721	22.120	22.120	69.47	0.000	0.950
						B	9.721	22.120		69.47	0.000	0.200
						C	9.721	22.120		69.47	32.348	0.200
40.00-20.00	T8	30.00	0.982	23	211.055	A	11.360	22.120	22.120	66.07	0.000	0.950
						B	11.360	22.120		66.07	0.000	0.200
						C	11.360	22.120		66.07	32.348	0.200
20.00-0.00	T9	10.00	0.85	20	251.055	A	16.374	22.120	22.120	57.46	0.000	0.870
						B	16.374	22.120		57.46	0.000	0.120
						C	16.374	22.120		57.46	20.469	0.120

Tower Pressure - With Ice

G_H = 0.850

Section Elevation	z	K _Z	q _z	t _Z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	
ft	ft		psf	in	ft ²	e	ft ²	ft ²	ft ²				
180.00-160.00	T1	170.00	1.415	8	2.2090	112.155	A	9.770	45.891	24.310	43.68	0.000	9.586
							B	9.770	45.891		43.68	0.000	0.000
							C	9.770	45.891		43.68	63.699	0.000
160.00-140.00	T2	150.00	1.378	7	2.1815	112.063	A	8.976	43.709	24.127	45.79	0.000	19.275
							B	8.976	43.709		45.79	0.000	0.000
							C	8.976	43.709		45.79	73.648	0.000
140.00-120.00	T3	130.00	1.337	7	2.1505	111.960	A	8.976	43.224	23.920	45.82	0.000	19.014
							B	8.976	43.224		45.82	0.000	0.000
							C	8.976	43.224		45.82	93.965	0.000
120.00-100.00	T4	110.00	1.291	7	2.1149	114.550	A	7.746	45.481	29.099	54.67	0.000	18.715
							B	7.746	45.481		54.67	0.000	0.000
							C	7.746	45.481		54.67	108.749	0.000
100.00-80.00	T5	90.00	1.238	7	2.0729	116.180	A	7.585	48.084	32.361	58.13	0.000	18.362
							B	7.585	48.084		58.13	0.000	0.000
							C	7.585	48.084		58.13	120.168	0.000
80.00-60.00	T6	70.00	1.174	6	2.0214	136.029	A	8.284	48.816	32.071	56.17	0.000	17.930
							B	8.284	48.816		56.17	0.000	0.000
							C	8.284	48.816		56.17	120.569	0.000
60.00-40.00	T7	50.00	1.094	6	1.9546	177.579	A	9.721	54.172	35.172	55.05	0.000	17.368
							B	9.721	54.172		55.05	0.000	8.800

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Section Elevation	<i>z</i> ft	<i>K_Z</i>	<i>q_z</i> psf	<i>t_z</i> in	<i>A_G</i> ft ²	<i>F a c e</i>	<i>A_F</i> ft ²	<i>A_R</i> ft ²	<i>A_{leg}</i> ft ²	<i>Leg %</i>	<i>C_AA_A In Face</i> ft ²	<i>C_AA_A Out Face</i> ft ²
T8 40.00-20.00	30.00	0.982	5	1.8572	217.254	C	9.721	54.172		55.05	117.755	8.800
						A	11.360	55.619	34.522	51.54	0.000	16.551
						B	11.360	55.619		51.54	0.000	8.372
T9 20.00-0.00	10.00	0.85	5	1.6640	256.609	C	11.360	55.619		51.54	113.660	8.372
						A	16.374	55.029	33.232	46.54	0.000	11.919
						B	16.374	55.029		46.54	0.000	4.513
						C	16.374	55.029		46.54	67.038	4.513

Tower Pressure - Service

$$G_H = 0.850$$

Section Elevation	<i>z</i> ft	<i>K_Z</i>	<i>q_z</i> psf	<i>A_G</i> ft ²	<i>F a c e</i>	<i>A_F</i> ft ²	<i>A_R</i> ft ²	<i>A_{leg}</i> ft ²	<i>Leg %</i>	<i>C_AA_A In Face</i> ft ²	<i>C_AA_A Out Face</i> ft ²
T1 180.00-160.00	170.00	1.415	11	104.792	A	9.770	9.583	9.583	49.52	0.000	0.750
					B	9.770	9.583		49.52	0.000	0.000
					C	9.770	9.583		49.52	20.600	0.000
T2 160.00-140.00	150.00	1.378	11	104.792	A	8.976	9.583	9.583	51.64	0.000	0.950
					B	8.976	9.583		51.64	0.000	0.000
					C	8.976	9.583		51.64	22.320	0.000
T3 140.00-120.00	130.00	1.337	10	104.792	A	8.976	9.583	9.583	51.64	0.000	0.950
					B	8.976	9.583		51.64	0.000	0.000
					C	8.976	9.583		51.64	26.117	0.000
T4 120.00-100.00	110.00	1.291	10	107.500	A	7.746	15.000	15.000	65.95	0.000	0.950
					B	7.746	15.000		65.95	0.000	0.000
					C	7.746	15.000		65.95	29.284	0.000
T5 100.00-80.00	90.00	1.238	10	109.271	A	7.585	18.542	18.542	70.97	0.000	0.950
					B	7.585	18.542		70.97	0.000	0.000
					C	7.585	18.542		70.97	31.854	0.000
T6 80.00-60.00	70.00	1.174	9	129.282	A	8.284	18.573	18.573	69.16	0.000	0.950
					B	8.284	18.573		69.16	0.000	0.000
					C	8.284	18.573		69.16	32.348	0.000
T7 60.00-40.00	50.00	1.094	9	171.055	A	9.721	22.120	22.120	69.47	0.000	0.950
					B	9.721	22.120		69.47	0.000	0.200
					C	9.721	22.120		69.47	32.348	0.200
T8 40.00-20.00	30.00	0.982	8	211.055	A	11.360	22.120	22.120	66.07	0.000	0.950
					B	11.360	22.120		66.07	0.000	0.200
					C	11.360	22.120		66.07	32.348	0.200
T9 20.00-0.00	10.00	0.85	7	251.055	A	16.374	22.120	22.120	57.46	0.000	0.870
					B	16.374	22.120		57.46	0.000	0.120
					C	16.374	22.120		57.46	20.469	0.120

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	<i>Add Weight</i> ft lb	<i>Self Weight</i> ft lb	<i>F a c e</i>	<i>e</i>	<i>C_F</i>	<i>q_z</i> psf	<i>D_F</i>	<i>D_R</i>	<i>A_E</i>	<i>F</i> lb	<i>w</i> plf	<i>Ctrl. Face</i>
T1 180.00-160.00	223.60	697.32	A	0.185	2.648	33	1	1	15.251	1472.63	73.63	C
			B	0.185	2.648		1	1	15.251			

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	Project 180 ft. Self-Support Tower										Date 07:43:54 01/07/19
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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
T2 160.00-140.00	234.60	659.01	C A B C	0.185 0.177 0.177 0.177	2.648 2.674 2.674 2.674	32	1 1 1 1	1 1 1 1	15.251 14.447 14.447 14.447	1420.05	71.00	C
T3 140.00-120.00	245.90	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	31	1 1 1	1 1 1	14.447 14.447 14.447	1438.89	71.94	C
T4 120.00-100.00	255.70	1063.63	A B C	0.212 0.212 0.212	2.558 2.558 2.558	30	1 1 1	1 1 1	15.678 15.678 15.678	1476.13	73.81	C
T5 100.00-80.00	263.80	1304.90	A B C	0.239 0.239 0.239	2.471 2.471 2.471	29	1 1 1	1 1 1	16.962 16.962 16.962	1498.02	74.90	C
T6 80.00-60.00	265.40	1336.18	A B C	0.208 0.208 0.208	2.57 2.57 2.57	28	1 1 1	1 1 1	17.503 17.503 17.503	1500.21	75.01	C
T7 60.00-40.00	277.80	1677.71	A B C	0.186 0.186 0.186	2.643 2.643 2.643	26	1 1 1	1 1 1	19.774 19.774 19.774	1565.57	78.28	C
T8 40.00-20.00	277.80	1751.40	A B C	0.159 0.159 0.159	2.74 2.74 2.74	23	1 1 1	1 1 1	21.431 21.431 21.431	1532.93	76.65	C
T9 20.00-0.00	173.56	1995.06	A B C	0.153 0.153 0.153	2.759 2.759 2.759	20	1 1 1	1 1 1	26.801 26.801 26.801	1470.48	73.52	C
Sum Weight:	2218.16	11144.21					OTM		1191591.6 0 lb-ft	13374.91		

Tower Forces - No Ice - Wind 60 To Face												
Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
T1 180.00-160.00	223.60	697.32	A B C	0.185 0.185 0.185	2.648 2.648 2.648	33	0.8 0.8 0.8	1 1 1	13.297 13.297 13.297	1326.09	66.30	A
T2 160.00-140.00	234.60	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	32	0.8 0.8 0.8	1 1 1	12.652 12.652 12.652	1287.61	64.38	A
T3 140.00-120.00	245.90	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	31	0.8 0.8 0.8	1 1 1	12.652 12.652 12.652	1310.38	65.52	A
T4 120.00-100.00	255.70	1063.63	A B C	0.212 0.212 0.212	2.558 2.558 2.558	30	0.8 0.8 0.8	1 1 1	14.129 14.129 14.129	1373.73	68.69	A
T5 100.00-80.00	263.80	1304.90	A B C	0.239 0.239 0.239	2.471 2.471 2.471	29	0.8 0.8 0.8	1 1 1	15.445 15.445 15.445	1405.17	70.26	A
T6 80.00-60.00	265.40	1336.18	A B C	0.208 0.208 0.208	2.57 2.57 2.57	28	0.8 0.8 0.8	1 1 1	15.846 15.846 15.846	1400.15	70.01	A
T7 60.00-40.00	277.80	1677.71	A B	0.186 0.186	2.643 2.643	26	0.8 0.8	1 1	17.830 17.830	1453.09	72.65	A

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w plf	Ctrl. Face
T8 40.00-20.00	277.80	1751.40	C A B C	0.186 0.159 0.159 0.159	2.643 2.74 2.74 2.74	23	0.8 0.8 0.8 0.8	1 1 1 1	17.830 19.159 19.159 19.159	1410.56	70.53	A
T9 20.00-0.00	173.56	1995.06	A B C	0.153 0.153 0.153	2.759 2.759 2.759	20	0.8 0.8 0.8	1 1 1	23.526 23.526 23.526	1316.76	65.84	A
Sum Weight:	2218.16	11144.21						OTM	1092649.7 9 lb-ft	12283.54		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w plf	Ctrl. Face
T1 180.00-160.00	223.60	697.32	A B C	0.185 0.185 0.185	2.648 2.648 2.648	33	0.85 0.85 0.85	1 1 1	13.786 13.786 13.786	1353.16	67.66	B
T2 160.00-140.00	234.60	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	32	0.85 0.85 0.85	1 1 1	13.101 13.101 13.101	1311.41	65.57	B
T3 140.00-120.00	245.90	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	31	0.85 0.85 0.85	1 1 1	13.101 13.101 13.101	1333.47	66.67	B
T4 120.00-100.00	255.70	1063.63	A B C	0.212 0.212 0.212	2.558 2.558 2.558	30	0.85 0.85 0.85	1 1 1	14.516 14.516 14.516	1390.61	69.53	B
T5 100.00-80.00	263.80	1304.90	A B C	0.239 0.239 0.239	2.471 2.471 2.471	29	0.85 0.85 0.85	1 1 1	15.824 15.824 15.824	1420.02	71.00	B
T6 80.00-60.00	265.40	1336.18	A B C	0.208 0.208 0.208	2.57 2.57 2.57	28	0.85 0.85 0.85	1 1 1	16.260 16.260 16.260	1417.23	70.86	B
T7 60.00-40.00	277.80	1677.71	A B C	0.186 0.186 0.186	2.643 2.643 2.643	26	0.85 0.85 0.85	1 1 1	18.316 18.316 18.316	1473.82	73.69	B
T8 40.00-20.00	277.80	1751.40	A B C	0.159 0.159 0.159	2.74 2.74 2.74	23	0.85 0.85 0.85	1 1 1	19.727 19.727 19.727	1434.52	71.73	B
T9 20.00-0.00	173.56	1995.06	A B C	0.153 0.153 0.153	2.759 2.759 2.759	20	0.85 0.85 0.85	1 1 1	24.344 24.344 24.344	1351.18	67.56	B
Sum Weight:	2218.16	11144.21						OTM	1110313.5 9 lb-ft	12485.42		

Tower Forces - With Ice - Wind Normal To Face

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	Client Smartlink / AT&T											Designed by VY

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
T1 180.00-160.00	1148.51	4031.63	A B C	0.496 0.496 0.496	1.905 1.905 1.905	8	1 1 1	1 1 1	41.114 41.114 41.114	749.96	37.50	C
T2 160.00-140.00	1340.91	3733.63	A B C	0.47 0.47 0.47	1.942 1.942 1.942	7	1 1 1	1 1 1	38.232 38.232 38.232	808.95	40.45	C
T3 140.00-120.00	1656.06	3671.24	A B C	0.466 0.466 0.466	1.948 1.948 1.948	7	1 1 1	1 1 1	37.822 37.822 37.822	848.69	42.43	C
T4 120.00-100.00	1877.59	4005.05	A B C	0.465 0.465 0.465	1.95 1.95 1.95	7	1 1 1	1 1 1	38.062 38.062 38.062	869.31	43.47	C
T5 100.00-80.00	2034.31	4326.98	A B C	0.479 0.479 0.479	1.929 1.929 1.929	7	1 1 1	1 1 1	39.993 39.993 39.993	874.20	43.71	C
T6 80.00-60.00	2007.50	4397.93	A B C	0.42 0.42 0.42	2.026 2.026 2.026	6	1 1 1	1 1 1	39.771 39.771 39.771	882.77	44.14	C
T7 60.00-40.00	1996.90	5051.47	A B C	0.36 0.36 0.36	2.149 2.149 2.149	6	1 1 1	1 1 1	43.296 43.296 43.296	974.73	48.74	C
T8 40.00-20.00	1872.90	5209.13	A B C	0.308 0.308 0.308	2.274 2.274 2.274	5	1 1 1	1 1 1	44.817 44.817 44.817	897.70	44.89	C
T9 20.00-0.00	1041.10	5620.42	A B C	0.278 0.278 0.278	2.355 2.355 2.355	5	1 1 1	1 1 1	48.977 48.977 48.977	679.15	33.96	C
Sum Weight:	14975.78	40047.48						OTM	677719.87 lb-ft	7585.46		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
T1 180.00-160.00	1148.51	4031.63	A B C	0.496 0.496 0.496	1.905 1.905 1.905	8	0.8 0.8 0.8	1 1 1	39.160 39.160 39.160	725.60	36.28	A
T2 160.00-140.00	1340.91	3733.63	A B C	0.47 0.47 0.47	1.942 1.942 1.942	7	0.8 0.8 0.8	1 1 1	36.437 36.437 36.437	786.73	39.34	A
T3 140.00-120.00	1656.06	3671.24	A B C	0.466 0.466 0.466	1.948 1.948 1.948	7	0.8 0.8 0.8	1 1 1	36.027 36.027 36.027	827.07	41.35	A
T4 120.00-100.00	1877.59	4005.05	A B C	0.465 0.465 0.465	1.95 1.95 1.95	7	0.8 0.8 0.8	1 1 1	36.512 36.512 36.512	851.27	42.56	A
T5 100.00-80.00	2034.31	4326.98	A B C	0.479 0.479 0.479	1.929 1.929 1.929	7	0.8 0.8 0.8	1 1 1	38.476 38.476 38.476	857.45	42.87	A
T6 80.00-60.00	2007.50	4397.93	A B C	0.42 0.42 0.42	2.026 2.026 2.026	6	0.8 0.8 0.8	1 1 1	38.114 38.114 38.114	864.54	43.23	A

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	Project 180 ft. Self-Support Tower										Date 07:43:54 01/07/19
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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
									ft ²	lb	plf	
T7 60.00-40.00	1996.90	5051.47	A	0.36	2.149	6	0.8	1	41.352	953.60	47.68	A
			B	0.36	2.149		0.8	1	41.352			
			C	0.36	2.149		0.8	1	41.352			
T8 40.00-20.00	1872.90	5209.13	A	0.308	2.274	5	0.8	1	42.545	874.24	43.71	A
			B	0.308	2.274		0.8	1	42.545			
			C	0.308	2.274		0.8	1	42.545			
T9 20.00-0.00	1041.10	5620.42	A	0.278	2.355	5	0.8	1	45.702	648.83	32.44	A
			B	0.278	2.355		0.8	1	45.702			
			C	0.278	2.355		0.8	1	45.702			
Sum Weight:	14975.78	40047.48					OTM	660603.99 lb-ft		7389.33		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
									ft ²	lb	plf	
T1 180.00-160.00	1148.51	4031.63	A	0.496	1.905	8	0.85	1	39.648	726.95	36.35	B
			B	0.496	1.905		0.85	1	39.648			
			C	0.496	1.905		0.85	1	39.648			
T2 160.00-140.00	1340.91	3733.63	A	0.47	1.942	7	0.85	1	36.885	787.43	39.37	B
			B	0.47	1.942		0.85	1	36.885			
			C	0.47	1.942		0.85	1	36.885			
T3 140.00-120.00	1656.06	3671.24	A	0.466	1.948	7	0.85	1	36.475	827.73	41.39	B
			B	0.466	1.948		0.85	1	36.475			
			C	0.466	1.948		0.85	1	36.475			
T4 120.00-100.00	1877.59	4005.05	A	0.465	1.95	7	0.85	1	36.900	851.19	42.56	B
			B	0.465	1.95		0.85	1	36.900			
			C	0.465	1.95		0.85	1	36.900			
T5 100.00-80.00	2034.31	4326.98	A	0.479	1.929	7	0.85	1	38.855	857.35	42.87	B
			B	0.479	1.929		0.85	1	38.855			
			C	0.479	1.929		0.85	1	38.855			
T6 80.00-60.00	2007.50	4397.93	A	0.42	2.026	6	0.85	1	38.528	864.57	43.23	B
			B	0.42	2.026		0.85	1	38.528			
			C	0.42	2.026		0.85	1	38.528			
T7 60.00-40.00	1996.90	5051.47	A	0.36	2.149	6	0.85	1	41.838	954.52	47.73	B
			B	0.36	2.149		0.85	1	41.838			
			C	0.36	2.149		0.85	1	41.838			
T8 40.00-20.00	1872.90	5209.13	A	0.308	2.274	5	0.85	1	43.113	876.19	43.81	B
			B	0.308	2.274		0.85	1	43.113			
			C	0.308	2.274		0.85	1	43.113			
T9 20.00-0.00	1041.10	5620.42	A	0.278	2.355	5	0.85	1	46.521	654.04	32.70	B
			B	0.278	2.355		0.85	1	46.521			
			C	0.278	2.355		0.85	1	46.521			
Sum Weight:	14975.78	40047.48					OTM	661164.89 lb-ft		7399.96		

Tower Forces - Service - Wind Normal To Face

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	Client Smartlink / AT&T										Designed by VY

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
T1 180.00-160.00	223.60	697.32	A B C	0.185 0.185 0.185	2.648 2.648 2.648	11	1	1	15.251	489.95	24.50	C
T2 160.00-140.00	234.60	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	11	1	1	15.251	472.46	23.62	C
T3 140.00-120.00	245.90	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	10	1	1	14.447	478.73	23.94	C
T4 120.00-100.00	255.70	1063.63	A B C	0.212 0.212 0.212	2.558 2.558 2.558	10	1	1	14.447	491.12	24.56	C
T5 100.00-80.00	263.80	1304.90	A B C	0.239 0.239 0.239	2.471 2.471 2.471	10	1	1	15.678	498.40	24.92	C
T6 80.00-60.00	265.40	1336.18	A B C	0.208 0.208 0.208	2.57 2.57 2.57	9	1	1	16.962	499.13	24.96	C
T7 60.00-40.00	277.80	1677.71	A B C	0.186 0.186 0.186	2.643 2.643 2.643	9	1	1	16.962	520.87	26.04	C
T8 40.00-20.00	277.80	1751.40	A B C	0.159 0.159 0.159	2.74 2.74 2.74	8	1	1	19.774	510.02	25.50	C
T9 20.00-0.00	173.56	1995.06	A B C	0.153 0.153 0.153	2.759 2.759 2.759	7	1	1	21.431	489.24	24.46	C
Sum Weight:	2218.16	11144.21						OTM	396450.18 lb-ft	4449.92		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
T1 180.00-160.00	223.60	697.32	A B C	0.185 0.185 0.185	2.648 2.648 2.648	11	0.8	1	13.297	441.20	22.06	A
T2 160.00-140.00	234.60	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	11	0.8	1	13.297	428.40	21.42	A
T3 140.00-120.00	245.90	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	10	0.8	1	12.652	435.97	21.80	A
T4 120.00-100.00	255.70	1063.63	A B C	0.212 0.212 0.212	2.558 2.558 2.558	10	0.8	1	14.129	457.05	22.85	A
T5 100.00-80.00	263.80	1304.90	A B C	0.239 0.239 0.239	2.471 2.471 2.471	10	0.8	1	15.445	467.51	23.38	A
T6 80.00-60.00	265.40	1336.18	A B	0.208 0.208	2.57 2.57	9	0.8	1	15.846	465.84	23.29	A

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	Project 180 ft. Self-Support Tower										Date 07:43:54 01/07/19
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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
									ft ²	lb	plf	
T7 60.00-40.00	277.80	1677.71	C A B C	0.208 0.186 0.186 0.186	2.57 2.643 2.643 2.643	9	0.8 0.8 0.8 0.8	1 1 1 1	15.846 17.830 17.830 17.830	483.45	24.17	A
T8 40.00-20.00	277.80	1751.40	A B C	0.159 0.159 0.159	2.74 2.74 2.74	8	0.8 0.8 0.8	1 1 1	19.159 19.159 19.159	469.30	23.47	A
T9 20.00-0.00	173.56	1995.06	A B C	0.153 0.153 0.153	2.759 2.759 2.759	7	0.8 0.8 0.8	1 1 1	23.526 23.526 23.526	438.10	21.90	A
Sum Weight:	2218.16	11144.21						OTM	363531.61 lb-ft	4086.81		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
									ft ²	lb	plf	
T1 180.00-160.00	223.60	697.32	A B C	0.185 0.185 0.185	2.648 2.648 2.648	11	0.85 0.85 0.85	1 1 1	13.786 13.786 13.786	450.21	22.51	B
T2 160.00-140.00	234.60	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	11	0.85 0.85 0.85	1 1 1	13.101 13.101 13.101	436.31	21.82	B
T3 140.00-120.00	245.90	659.01	A B C	0.177 0.177 0.177	2.674 2.674 2.674	10	0.85 0.85 0.85	1 1 1	13.101 13.101 13.101	443.65	22.18	B
T4 120.00-100.00	255.70	1063.63	A B C	0.212 0.212 0.212	2.558 2.558 2.558	10	0.85 0.85 0.85	1 1 1	14.516 14.516 14.516	462.67	23.13	B
T5 100.00-80.00	263.80	1304.90	A B C	0.239 0.239 0.239	2.471 2.471 2.471	10	0.85 0.85 0.85	1 1 1	15.824 15.824 15.824	472.45	23.62	B
T6 80.00-60.00	265.40	1336.18	A B C	0.208 0.208 0.208	2.57 2.57 2.57	9	0.85 0.85 0.85	1 1 1	16.260 16.260 16.260	471.52	23.58	B
T7 60.00-40.00	277.80	1677.71	A B C	0.186 0.186 0.186	2.643 2.643 2.643	9	0.85 0.85 0.85	1 1 1	18.316 18.316 18.316	490.35	24.52	B
T8 40.00-20.00	277.80	1751.40	A B C	0.159 0.159 0.159	2.74 2.74 2.74	8	0.85 0.85 0.85	1 1 1	19.727 19.727 19.727	477.27	23.86	B
T9 20.00-0.00	173.56	1995.06	A B C	0.153 0.153 0.153	2.759 2.759 2.759	7	0.85 0.85 0.85	1 1 1	24.344 24.344 24.344	449.54	22.48	B
Sum Weight:	2218.16	11144.21						OTM	369408.47 lb-ft	4153.98		

tnxTower Fullerton Engineering Consultants 1100 E. Woodfield Road, Suite 500 Schaumburg, IL 60173 Phone: (847) 908-8400 FAX: fax@fullertoneengineering.com	Job	CT3470A	Page
	Project	180 ft. Self-Support Tower	Date
	Client	Smartlink / AT&T	Designed by VY

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	7216.80					
Bracing Weight	3927.41					
Total Member Self-Weight	11144.21			4412.79	-60.77	
Total Weight	17516.56			4412.79	-60.77	
Wind 0 deg - No Ice		-3.15	-18815.16	-2096816.20	1059.31	-138.54
Wind 30 deg - No Ice		9078.80	-15509.15	-1743986.94	-1024530.09	3232.87
Wind 60 deg - No Ice		15190.19	-8674.09	-978774.30	-1720721.80	4996.21
Wind 90 deg - No Ice		17599.02	-16.45	1345.00	-1987834.21	5343.80
Wind 120 deg - No Ice		16121.26	9156.10	1027806.61	-1801446.40	4990.89
Wind 150 deg - No Ice		8997.16	15491.79	1748285.98	-1012423.75	3433.70
Wind 180 deg - No Ice		-0.12	17700.32	2004047.56	923.97	129.35
Wind 210 deg - No Ice		-8999.64	15496.89	1752471.68	1015460.72	-3211.37
Wind 240 deg - No Ice		-16128.53	9156.66	1029733.59	1806902.64	-4852.35
Wind 270 deg - No Ice		-17602.45	-15.31	3889.88	1989915.20	-5342.33
Wind 300 deg - No Ice		-15188.16	-8672.77	-976360.90	1718389.60	-5125.56
Wind 330 deg - No Ice		-9076.35	-15508.00	-1742338.63	1021260.22	-3456.66
Member Ice	28903.27					
Total Weight Ice	78086.81			27527.52	-34.60	
Wind 0 deg - Ice		1.79	-9864.36	-1024881.83	-1206.92	-76.66
Wind 30 deg - Ice		4873.50	-8379.44	-870038.86	-523180.11	1242.66
Wind 60 deg - Ice		8306.90	-4771.32	-485282.28	-891560.48	2011.43
Wind 90 deg - Ice		9592.11	-7.20	25205.85	-1027613.83	2248.52
Wind 120 deg - Ice		8470.11	4847.32	543797.41	-903536.72	2048.80
Wind 150 deg - Ice		4846.51	8371.94	922369.17	-517304.37	1364.45
Wind 180 deg - Ice		-2.75	9661.84	1062098.10	1718.38	73.98
Wind 210 deg - Ice		-4851.93	8376.14	925005.24	520672.25	-1236.82
Wind 240 deg - Ice		-8474.95	4852.18	546894.74	906487.63	-1972.14
Wind 270 deg - Ice		-9593.12	-1.45	28870.57	1028152.25	-2248.09
Wind 300 deg - Ice		-8303.60	-4766.23	-482050.75	889400.08	-2085.40
Wind 330 deg - Ice		-4868.08	-8376.39	-868102.81	519676.62	-1370.72
Total Weight	17516.56			4412.79	-60.77	
Wind 0 deg - Service		-1.05	-6259.92	-698654.57	311.89	-46.09
Wind 30 deg - Service		3020.58	-5160.00	-581266.01	-340908.30	1075.60
Wind 60 deg - Service		5053.87	-2885.92	-326674.84	-572535.75	1662.27
Wind 90 deg - Service		5855.31	-5.47	-582.85	-661405.77	1777.92
Wind 120 deg - Service		5363.65	3046.29	340927.52	-599393.34	1660.50
Wind 150 deg - Service		2993.41	5154.22	580635.64	-336880.44	1142.41
Wind 180 deg - Service		-0.04	5889.01	665729.16	266.86	43.03
Wind 210 deg - Service		-2994.24	5155.92	582028.25	337809.76	-1068.44
Wind 240 deg - Service		-5366.07	3046.48	341568.64	601127.57	-1614.41
Wind 270 deg - Service		-5856.45	-5.09	263.85	662017.03	-1777.43
Wind 300 deg - Service		-5053.20	-2885.49	-325871.89	571678.72	-1705.31
Wind 330 deg - Service		-3019.76	-5159.61	-580717.61	339739.29	-1150.05

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	1.2D+1.6W (pattern 1) 0 deg - No Ice
4	1.2D+1.6W (pattern 2) 0 deg - No Ice
5	0.9 Dead+1.6 Wind 0 deg - No Ice

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	Client Smartlink / AT&T	Designed by VY

<i>Comb. No.</i>	<i>Description</i>
6	1.2 Dead+1.6 Wind 30 deg - No Ice
7	1.2D+1.6W (pattern 1) 30 deg - No Ice
8	1.2D+1.6W (pattern 2) 30 deg - No Ice
9	0.9 Dead+1.6 Wind 30 deg - No Ice
10	1.2 Dead+1.6 Wind 60 deg - No Ice
11	1.2D+1.6W (pattern 1) 60 deg - No Ice
12	1.2D+1.6W (pattern 2) 60 deg - No Ice
13	0.9 Dead+1.6 Wind 60 deg - No Ice
14	1.2 Dead+1.6 Wind 90 deg - No Ice
15	1.2D+1.6W (pattern 1) 90 deg - No Ice
16	1.2D+1.6W (pattern 2) 90 deg - No Ice
17	0.9 Dead+1.6 Wind 90 deg - No Ice
18	1.2 Dead+1.6 Wind 120 deg - No Ice
19	1.2D+1.6W (pattern 1) 120 deg - No Ice
20	1.2D+1.6W (pattern 2) 120 deg - No Ice
21	0.9 Dead+1.6 Wind 120 deg - No Ice
22	1.2 Dead+1.6 Wind 150 deg - No Ice
23	1.2D+1.6W (pattern 1) 150 deg - No Ice
24	1.2D+1.6W (pattern 2) 150 deg - No Ice
25	0.9 Dead+1.6 Wind 150 deg - No Ice
26	1.2 Dead+1.6 Wind 180 deg - No Ice
27	1.2D+1.6W (pattern 1) 180 deg - No Ice
28	1.2D+1.6W (pattern 2) 180 deg - No Ice
29	0.9 Dead+1.6 Wind 180 deg - No Ice
30	1.2 Dead+1.6 Wind 210 deg - No Ice
31	1.2D+1.6W (pattern 1) 210 deg - No Ice
32	1.2D+1.6W (pattern 2) 210 deg - No Ice
33	0.9 Dead+1.6 Wind 210 deg - No Ice
34	1.2 Dead+1.6 Wind 240 deg - No Ice
35	1.2D+1.6W (pattern 1) 240 deg - No Ice
36	1.2D+1.6W (pattern 2) 240 deg - No Ice
37	0.9 Dead+1.6 Wind 240 deg - No Ice
38	1.2 Dead+1.6 Wind 270 deg - No Ice
39	1.2D+1.6W (pattern 1) 270 deg - No Ice
40	1.2D+1.6W (pattern 2) 270 deg - No Ice
41	0.9 Dead+1.6 Wind 270 deg - No Ice
42	1.2 Dead+1.6 Wind 300 deg - No Ice
43	1.2D+1.6W (pattern 1) 300 deg - No Ice
44	1.2D+1.6W (pattern 2) 300 deg - No Ice
45	0.9 Dead+1.6 Wind 300 deg - No Ice
46	1.2 Dead+1.6 Wind 330 deg - No Ice
47	1.2D+1.6W (pattern 1) 330 deg - No Ice
48	1.2D+1.6W (pattern 2) 330 deg - No Ice
49	0.9 Dead+1.6 Wind 330 deg - No Ice
50	1.2 Dead+1.0 Ice+1.0 Temp
51	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
52	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
53	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
54	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
55	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
56	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
57	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
58	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
59	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
60	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
61	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
62	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
63	Dead+Wind 0 deg - Service
64	Dead+Wind 30 deg - Service
65	Dead+Wind 60 deg - Service
66	Dead+Wind 90 deg - Service
67	Dead+Wind 120 deg - Service

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<i>Comb. No.</i>	<i>Description</i>
68	Dead+Wind 150 deg - Service
69	Dead+Wind 180 deg - Service
70	Dead+Wind 210 deg - Service
71	Dead+Wind 240 deg - Service
72	Dead+Wind 270 deg - Service
73	Dead+Wind 300 deg - Service
74	Dead+Wind 330 deg - Service

Maximum Member Forces

<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Axial</i>	<i>Major Axis Moment lb-ft</i>	<i>Minor Axis Moment lb-ft</i>
T1	180 - 160	Leg	Max Tension	26	30540.57	15.75	-76.59
			Max. Compression	18	-33591.58	-118.34	-63.28
			Max. Mx	34	-33577.35	149.31	-19.66
			Max. My	4	14525.38	-18.63	156.22
			Max. Vy	38	2337.32	0.00	-0.00
		Diagonal	Max. Vx	2	2340.61	0.00	0.00
			Max Tension	14	4213.30	0.00	0.00
			Max. Compression	38	-4246.21	0.00	0.00
			Max. Mx	2	114.28	77.63	6.13
			Max. My	34	20.95	75.49	6.64
T2	160 - 140	Leg	Max. Vy	58	-28.14	28.20	0.27
			Max. Vx	34	2.03	0.00	0.00
			Max Tension	2	1297.32	0.00	0.00
			Max. Compression	26	-1280.09	0.00	0.00
			Max. Mx	55	402.50	-52.06	0.00
		Diagonal	Max. My	36	-643.20	0.00	-0.00
			Max. Vy	55	41.65	0.00	0.00
			Max. Vx	36	0.00	0.00	0.00
			Max Tension	2	77649.53	-0.89	-172.60
			Max. Compression	2	-82036.39	-2.69	242.18
T3	140 - 120	Leg	Max. Mx	16	-1531.87	-254.86	2.77
			Max. My	2	-82036.39	-2.69	242.18
			Max. Vy	34	293.33	106.20	-34.84
			Max. Vx	30	-482.87	40.41	-78.16
		Diagonal	Max Tension	38	5773.02	0.00	0.00
			Max. Compression	14	-6045.47	0.00	0.00
			Max. Mx	30	3705.29	86.27	-0.57
			Max. My	6	-3362.64	44.01	-12.79
			Max. Vy	55	-31.24	40.59	1.64
T4	120 - 100	Leg	Max. Vx	6	-3.74	0.00	0.00
			Max Tension	26	136877.40	106.96	-497.58
			Max. Compression	2	-144318.66	-41.78	296.23
			Max. Mx	14	-120799.87	-565.90	89.51
			Max. My	26	-71871.53	-75.43	-649.24
		Diagonal	Max. Vy	38	622.52	196.55	2.21
			Max. Vx	43	364.32	216.37	117.92
			Max Tension	46	6957.88	0.00	0.00
			Max. Compression	46	-7818.94	0.00	0.00
			Max. Mx	6	4221.50	108.94	0.58

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T5	100 - 80	Leg	Max. Vy	42	-194.93	1081.22	804.85
			Max. Vx	22	315.71	-695.14	-1259.35
			Max Tension	38	9142.41	105.70	-0.05
			Max. Compression	38	-10730.74	0.00	0.00
			Max. Mx	26	7637.62	126.62	1.79
			Max. My	10	-8843.96	-36.26	-20.18
			Max. Vy	55	-36.91	69.45	0.55
			Max. Vx	10	-4.96	0.00	0.00
			Max Tension	26	286798.52	-5.82	-1409.76
			Max. Compression	2	-300466.74	-0.83	5177.85
T6	80 - 60	Leg	Max. Mx	34	-299197.97	4511.10	-2503.00
			Max. My	2	-300466.74	-0.83	5177.85
			Max. Vy	30	-642.51	3595.61	-2580.66
			Max. Vx	2	-685.05	-0.83	5177.85
			Max Tension	42	10460.61	114.88	-0.67
			Max. Compression	18	-13143.41	0.00	0.00
			Max. Mx	2	7381.11	137.74	-8.26
			Max. My	46	-11585.82	-102.61	56.03
			Max. Vy	59	-38.16	77.08	-2.05
			Max. Vx	46	-13.46	-102.61	56.03
T7	60 - 40	Leg	Max Tension	26	297096.61	-4550.10	-1.56
			Max. Compression	2	-312070.53	1123.51	-0.74
			Max. Mx	2	-311977.15	5177.85	1.14
			Max. My	30	-3966.63	-198.03	3865.98
			Max. Vy	2	670.87	5177.85	1.14
			Max. Vx	30	456.99	-198.37	3865.95
			Max Tension	16	5242.84	0.00	0.00
			Max. Compression	36	-6927.10	97.35	-15.32
			Max. Mx	26	-1663.75	126.11	18.17
			Max. My	38	-3582.68	104.72	27.20
T8	40 - 20	Leg	Max. Vy	59	-38.05	70.07	-5.22
			Max. Vx	38	-6.98	99.03	27.20
			Max Tension	26	282928.25	-1919.88	-2.12
			Max. Compression	2	-302482.15	2717.99	-0.95
			Max. Mx	2	-300337.97	2717.99	-0.95
			Max. My	30	-4498.58	-104.65	2379.98
			Max. Vy	2	-199.87	2717.99	-0.95
			Max. Vx	30	127.15	-38.74	2280.96
			Max Tension	36	2068.90	0.00	0.00
			Max. Compression	32	-2657.84	0.00	0.00
T9	20 - 0	Leg	Max. Mx	2	-1053.22	65.94	-3.03
			Max. My	12	-2494.41	54.39	-7.94
			Max. Vy	57	42.78	57.41	6.90
			Max. Vx	59	2.61	0.00	0.00
			Max Tension	26	278844.12	-1717.93	-1.02
			Max. Compression	2	-302795.07	1618.03	-0.24
			Max. Mx	2	-300340.64	2075.37	-0.95
			Max. My	30	-5030.61	11.54	1930.25
			Max. Vy	53	-162.14	-871.11	-18.42
			Max. Vx	46	-107.11	-27.23	1912.99
T10	0 - 0	Leg	Max Tension	19	1063.31	0.00	0.00
			Max. Compression	19	-1436.74	0.00	0.00
			Max. Mx	57	-226.63	70.20	8.76
			Max. My	59	-314.45	64.60	9.37
			Max. Vy	57	48.51	70.20	8.76
			Max. Vx	59	2.76	0.00	0.00
			Max Tension	29	281938.33	-1393.28	-1.39
			Max. Compression	2	-308527.07	-0.00	0.34
			Max. Mx	2	-306844.91	1792.16	-0.51
			Max. My	6	-8929.90	-53.86	-2927.15
			Max. Vy	53	-373.31	-1578.24	-8.32

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
		Diagonal	Max. Vx	6	-501.03	-54.02	-2927.14
			Max Tension	47	2312.79	0.00	0.00
			Max. Compression	19	-2930.49	0.00	0.00
			Max. Mx	57	-861.77	104.10	-10.90
			Max. My	53	-1380.41	78.71	-13.25
			Max. Vy	57	59.26	104.10	-10.90
			Max. Vx	53	3.37	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	34	307725.30	18330.43	-10191.79
	Max. H _x	34	307725.30	18330.43	-10191.79
	Max. H _z	13	-279927.87	-16635.57	9180.62
	Min. Vert	13	-279927.87	-16635.57	9180.62
	Min. H _x	13	-279927.87	-16635.57	9180.62
	Min. H _z	34	307725.30	18330.43	-10191.79
	Max. Vert	18	306889.96	-18316.37	-10173.44
Leg B	Max. H _x	45	-279461.57	16629.14	9170.89
	Max. H _z	45	-279461.57	16629.14	9170.89
	Min. Vert	45	-279461.57	16629.14	9170.89
	Min. H _x	18	306889.96	-18316.37	-10173.44
	Min. H _z	18	306889.96	-18316.37	-10173.44
	Max. Vert	2	310418.07	-8.84	21233.72
	Max. H _x	16	7633.90	1299.46	505.07
Leg A	Max. H _z	2	310418.07	-8.84	21233.72
	Min. Vert	29	-283024.31	5.21	-19222.88
	Min. H _x	40	5719.15	-1303.08	406.33
	Min. H _z	29	-283024.31	5.21	-19222.88

Tower Mast Reaction Summary

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Only	17516.56	0.00	0.00	4449.62	-80.05	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	21019.87	-5.03	-30104.25	-3415906.26	1666.48	-158.51
1.2D+1.6W (pattern 1) 0 deg - No Ice	21019.87	-67.11	-28394.95	-3140231.18	11236.85	-1698.85
1.2D+1.6W (pattern 2) 0 deg - No Ice	21019.87	59.06	-24616.48	-3016265.97	-8626.94	1460.76
0.9 Dead+1.6 Wind 0 deg - No Ice	15764.90	-5.04	-30104.25	-3401317.72	1699.00	-173.38
1.2 Dead+1.6 Wind 30 deg - No Ice	21019.87	14526.14	-24814.64	-2841976.77	-1668732.33	5657.37
1.2D+1.6W (pattern 1) 30 deg - No Ice	21019.87	13720.52	-23419.28	-2617437.48	-1538995.29	4075.09
1.2D+1.6W (pattern 2) 30 deg - No Ice	21019.87	11920.91	-20440.38	-2523867.83	-1475363.98	6760.75
0.9 Dead+1.6 Wind 30 deg - No	15764.90	14526.11	-24814.65	-2829942.57	-1660800.93	5611.34

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<i>Load Combination</i>	<i>Vertical</i> <i>lb</i>	<i>Shear_x</i> <i>lb</i>	<i>Shear_z</i> <i>lb</i>	<i>Overturning Moment, M_x</i> <i>lb-ft</i>	<i>Overturning Moment, M_z</i> <i>lb-ft</i>	<i>Torque</i> <i>lb-ft</i>
Ice						
1.2 Dead+1.6 Wind 60 deg - No Ice	21019.87	24304.33	-13878.53	-1596021.05	-2802840.72	8171.08
1.2D+1.6W (pattern 1) 60 deg - No Ice	21019.87	23009.69	-13059.40	-1464547.91	-2593980.84	7116.73
1.2D+1.6W (pattern 2) 60 deg - No Ice	21019.87	19895.39	-11466.13	-1423138.67	-2472987.81	8767.09
0.9 Dead+1.6 Wind 60 deg - No Ice	15764.90	24304.32	-13878.53	-1589765.09	-2789525.60	8121.99
1.2 Dead+1.6 Wind 90 deg - No Ice	21019.87	28158.45	-26.32	434.66	-3237545.22	8408.85
1.2D+1.6W (pattern 1) 90 deg - No Ice	21019.87	26654.73	35.74	9894.77	-2994610.66	8155.11
1.2D+1.6W (pattern 2) 90 deg - No Ice	21019.87	22922.50	-77.87	-7062.13	-2846219.74	8315.74
0.9 Dead+1.6 Wind 90 deg - No Ice	15764.90	28158.45	-26.30	-855.46	-3222246.47	8367.73
1.2 Dead+1.6 Wind 120 deg - No Ice	21019.87	25794.01	14649.78	1672010.22	-2933147.77	8119.60
1.2D+1.6W (pattern 1) 120 deg - No Ice	21019.87	24406.82	13848.88	1542368.13	-2708594.91	8596.83
1.2D+1.6W (pattern 2) 120 deg - No Ice	21019.87	20881.76	11910.65	1471251.28	-2566874.10	7188.32
0.9 Dead+1.6 Wind 120 deg - No Ice	15764.90	25794.01	14649.78	1662832.20	-2919446.24	8081.11
1.2 Dead+1.6 Wind 150 deg - No Ice	21019.87	14395.44	24786.90	2845544.39	-1648605.63	5879.72
1.2D+1.6W (pattern 1) 150 deg - No Ice	21019.87	13697.33	23453.61	2630449.81	-1535325.97	6958.90
1.2D+1.6W (pattern 2) 150 deg - No Ice	21019.87	11734.98	20361.68	2520917.09	-1446749.71	4205.24
0.9 Dead+1.6 Wind 150 deg - No Ice	15764.90	14395.46	24786.88	2830781.21	-1640872.41	5858.27
1.2 Dead+1.6 Wind 180 deg - No Ice	21019.87	-0.19	28320.53	3262328.74	1540.12	161.59
1.2D+1.6W (pattern 1) 180 deg - No Ice	21019.87	61.88	26789.78	3015736.06	-7881.56	1694.46
1.2D+1.6W (pattern 2) 180 deg - No Ice	21019.87	-62.18	23367.70	2899324.62	10291.87	-1453.65
0.9 Dead+1.6 Wind 180 deg - No Ice	15764.90	-0.19	28320.53	3245543.24	1546.69	175.34
1.2 Dead+1.6 Wind 210 deg - No Ice	21019.87	-14399.39	24795.07	2852476.95	1653627.04	-5615.29
1.2D+1.6W (pattern 1) 210 deg - No Ice	21019.87	-13593.78	23399.70	2627857.55	1524030.64	-4033.79
1.2D+1.6W (pattern 2) 210 deg - No Ice	21019.87	-11844.84	20428.66	2534624.34	1465981.91	-6735.71
0.9 Dead+1.6 Wind 210 deg - No Ice	15764.90	-14399.41	24795.05	2837646.99	1645895.52	-5569.32
1.2 Dead+1.6 Wind 240 deg - No Ice	21019.87	-25805.64	14650.68	1675272.50	2942123.81	-7961.47
1.2D+1.6W (pattern 1) 240 deg - No Ice	21019.87	-24356.38	13742.27	1529143.87	2708149.87	-6898.85
1.2D+1.6W (pattern 2) 240 deg - No Ice	21019.87	-20950.80	12018.70	1489715.69	2581605.01	-8648.79
0.9 Dead+1.6 Wind 240 deg - No Ice	15764.90	-25805.64	14650.67	1666045.56	2928402.74	-7908.00
1.2 Dead+1.6 Wind 270 deg - No Ice	21019.87	-28163.94	-24.50	4718.31	3240963.24	-8413.53
1.2D+1.6W (pattern 1) 270 deg - No Ice	21019.87	-26660.22	-86.58	-4802.75	2998032.82	-8159.18

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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _z lb-ft	Torque lb-ft
1.2D+1.6W (pattern 2) 270 deg - No Ice	21019.87	-22925.79	47.36	14494.81	2848189.64	-8319.14
0.9 Dead+1.6 Wind 270 deg - No Ice	15764.90	-28163.93	-24.48	3369.68	3225698.40	-8371.84
1.2 Dead+1.6 Wind 300 deg - No Ice	21019.87	-24301.08	-13876.43	-1592007.62	2798963.78	-8333.28
1.2D+1.6W (pattern 1) 300 deg - No Ice	21019.87	-23068.51	-13164.81	-1476893.00	2599608.21	-8811.99
1.2D+1.6W (pattern 2) 300 deg - No Ice	21019.87	-19831.37	-11357.37	-1404376.92	2461064.11	-7313.88
0.9 Dead+1.6 Wind 300 deg - No Ice	15764.90	-24301.07	-13876.43	-1585803.10	2785751.06	-8297.80
1.2 Dead+1.6 Wind 330 deg - No Ice	21019.87	-14522.20	-24812.80	-2839267.76	1663241.59	-5917.92
1.2D+1.6W (pattern 1) 330 deg - No Ice	21019.87	-13824.09	-23479.50	-2624124.52	1550040.99	-6997.39
1.2D+1.6W (pattern 2) 330 deg - No Ice	21019.87	-11811.03	-20377.22	-2512852.53	1455422.24	-4227.06
0.9 Dead+1.6 Wind 330 deg - No Ice	15764.90	-14522.17	-24812.81	-2827265.31	1655436.65	-5896.81
1.2 Dead+1.0 Ice+1.0 Temp	81590.12	0.00	0.00	31120.10	-1276.72	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	81590.12	1.79	-9864.36	-1112465.38	-2740.52	70.41
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	81590.12	4873.50	-8379.44	-944506.20	-570157.34	1547.71
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	81590.12	8306.91	-4771.32	-526528.08	-970590.61	2366.83
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	81590.12	9592.12	-7.21	28392.21	-1118250.41	2563.08
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	81590.12	8470.12	4847.32	592198.13	-982983.85	2264.53
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	81590.12	4846.51	8371.94	1003847.61	-563222.15	1419.37
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	81590.12	-2.75	9661.85	1155917.18	822.85	-69.26
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	81590.12	-4851.93	8376.15	1006984.37	564767.40	-1541.15
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	81590.12	-8474.95	4852.18	595935.73	983989.61	-2334.67
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	81590.12	-9593.12	-1.45	32796.28	1116392.55	-2564.99
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	81590.12	-8303.61	-4766.24	-522659.18	965525.91	-2298.42
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	81590.12	-4868.09	-8376.39	-942196.86	563460.00	-1424.23
Dead+Wind 0 deg - Service	17516.56	-1.05	-6259.92	-705411.40	287.93	-36.06
Dead+Wind 30 deg - Service	17516.56	3020.58	-5160.00	-586270.07	-346240.79	1103.85
Dead+Wind 60 deg - Service	17516.56	5053.87	-2885.92	-327748.54	-581504.93	1695.97
Dead+Wind 90 deg - Service	17516.56	5855.31	-5.47	3444.92	-671737.22	1808.57
Dead+Wind 120 deg - Service	17516.56	5363.65	3046.29	350266.95	-608670.89	1685.42
Dead+Wind 150 deg - Service	17516.56	2993.41	5154.22	593718.05	-342117.66	1153.87
Dead+Wind 180 deg - Service	17516.56	-0.04	5889.01	680166.18	260.33	33.74
Dead+Wind 210 deg - Service	17516.56	-2994.24	5155.92	595156.61	343042.29	-1096.30
Dead+Wind 240 deg - Service	17516.56	-5366.07	3046.48	350942.01	610416.01	-1649.43
Dead+Wind 270 deg - Service	17516.56	-5856.45	-5.09	4331.11	672323.67	-1808.50
Dead+Wind 300 deg - Service	17516.56	-5053.20	-2885.49	-326911.83	580576.29	-1729.78
Dead+Wind 330 deg - Service	17516.56	-3019.76	-5159.61	-585701.09	344982.98	-1161.55

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Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-17516.56	0.00	-0.00	17516.56	-0.00	0.000%
2	-5.04	-21019.87	-30104.25	5.03	21019.87	30104.25	0.000%
3	-67.11	-21019.87	-28394.95	67.11	21019.87	28394.95	0.000%
4	59.04	-21019.87	-24616.48	-59.06	21019.87	24616.48	0.000%
5	-5.04	-15764.90	-30104.25	5.04	15764.90	30104.25	0.000%
6	14526.09	-21019.87	-24814.65	-14526.14	21019.87	24814.64	0.000%
7	13720.47	-21019.87	-23419.29	-13720.52	21019.87	23419.28	0.000%
8	11920.87	-21019.87	-20440.40	-11920.91	21019.87	20440.38	0.000%
9	14526.09	-15764.90	-24814.65	-14526.11	15764.90	24814.65	0.000%
10	24304.31	-21019.87	-13878.54	-24304.33	21019.87	13878.53	0.000%
11	23009.67	-21019.87	-13059.41	-23009.69	21019.87	13059.40	0.000%
12	19895.38	-21019.87	-11466.14	-19895.39	21019.87	11466.13	0.000%
13	24304.31	-15764.90	-13878.54	-24304.32	15764.90	13878.53	0.000%
14	28158.44	-21019.87	-26.32	-28158.45	21019.87	26.32	0.000%
15	26654.72	-21019.87	35.75	-26654.73	21019.87	-35.74	0.000%
16	22922.49	-21019.87	-77.86	-22922.50	21019.87	77.87	0.000%
17	28158.44	-15764.90	-26.32	-28158.45	15764.90	26.30	0.000%
18	25794.02	-21019.87	14649.76	-25794.01	21019.87	-14649.78	0.000%
19	24406.83	-21019.87	13848.87	-24406.82	21019.87	-13848.88	0.000%
20	20881.76	-21019.87	11910.64	-20881.76	21019.87	-11910.65	0.000%
21	25794.02	-15764.90	14649.76	-25794.01	15764.90	-14649.78	0.000%
22	14395.46	-21019.87	24786.87	-14395.44	21019.87	-24786.90	0.000%
23	13697.36	-21019.87	23453.58	-13697.33	21019.87	-23453.61	0.000%
24	11734.99	-21019.87	20361.66	-11734.98	21019.87	-20361.68	0.000%
25	14395.46	-15764.90	24786.87	-14395.46	15764.90	-24786.88	0.000%
26	-0.20	-21019.87	28320.52	0.19	21019.87	-28320.53	0.000%
27	61.87	-21019.87	26789.77	-61.88	21019.87	-26789.78	0.000%
28	-62.19	-21019.87	23367.69	62.18	21019.87	-23367.70	0.000%
29	-0.20	-15764.90	28320.52	0.19	15764.90	-28320.53	0.000%
30	-14399.42	-21019.87	24795.03	14399.39	21019.87	-24795.07	0.000%
31	-13593.81	-21019.87	23399.67	13593.78	21019.87	-23399.70	0.000%
32	-11844.87	-21019.87	20428.63	11844.84	21019.87	-20428.66	0.000%
33	-14399.42	-15764.90	24795.03	14399.41	15764.90	-24795.05	0.000%
34	-25805.65	-21019.87	14650.66	25805.64	21019.87	-14650.68	0.000%
35	-24356.39	-21019.87	13742.25	24356.38	21019.87	-13742.27	0.000%
36	-20950.81	-21019.87	12018.68	20950.80	21019.87	-12018.70	0.000%
37	-25805.65	-15764.90	14650.66	25805.64	15764.90	-14650.67	0.000%
38	-28163.92	-21019.87	-24.49	28163.94	21019.87	24.50	0.000%
39	-26660.21	-21019.87	-86.56	26660.22	21019.87	86.58	0.000%
40	-22925.78	-21019.87	47.37	22925.79	21019.87	-47.36	0.000%
41	-28163.92	-15764.90	-24.49	28163.93	15764.90	24.48	0.000%
42	-24301.06	-21019.87	-13876.44	24301.08	21019.87	13876.43	0.000%
43	-23068.49	-21019.87	-13164.82	23068.51	21019.87	13164.81	0.000%
44	-19831.36	-21019.87	-11357.37	19831.37	21019.87	11357.37	0.000%
45	-24301.06	-15764.90	-13876.44	24301.07	15764.90	13876.43	0.000%
46	-14522.15	-21019.87	-24812.80	14522.20	21019.87	24812.80	0.000%
47	-13824.05	-21019.87	-23479.51	13824.09	21019.87	23479.50	0.000%
48	-11811.01	-21019.87	-20377.22	11811.03	21019.87	20377.22	0.000%
49	-14522.15	-15764.90	-24812.80	14522.17	15764.90	24812.81	0.000%
50	0.00	-81590.12	0.00	-0.00	81590.12	-0.00	0.000%
51	1.79	-81590.12	-9864.36	-1.79	81590.12	9864.36	0.000%
52	4873.50	-81590.12	-8379.44	-4873.50	81590.12	8379.44	0.000%
53	8306.90	-81590.12	-4771.32	-8306.91	81590.12	4771.32	0.000%
54	9592.11	-81590.12	-7.20	-9592.12	81590.12	7.21	0.000%
55	8470.11	-81590.12	4847.32	-8470.12	81590.12	-4847.32	0.000%
56	4846.51	-81590.12	8371.94	-4846.51	81590.12	-8371.94	0.000%
57	-2.75	-81590.12	9661.84	2.75	81590.12	-9661.85	0.000%
58	-4851.93	-81590.12	8376.14	4851.93	81590.12	-8376.15	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
59	-8474.95	-81590.12	4852.18	8474.95	81590.12	-4852.18	0.000%
60	-9593.12	-81590.12	-1.45	9593.12	81590.12	1.45	0.000%
61	-8303.60	-81590.12	-4766.23	8303.61	81590.12	4766.24	0.000%
62	-4868.08	-81590.12	-8376.39	4868.09	81590.12	8376.39	0.000%
63	-1.05	-17516.56	-6259.92	1.05	17516.56	6259.92	0.000%
64	3020.58	-17516.56	-5160.00	-3020.58	17516.56	5160.00	0.000%
65	5053.87	-17516.56	-2885.92	-5053.87	17516.56	2885.92	0.000%
66	5855.31	-17516.56	-5.47	-5855.31	17516.56	5.47	0.000%
67	5363.65	-17516.56	3046.29	-5363.65	17516.56	-3046.29	0.000%
68	2993.41	-17516.56	5154.22	-2993.41	17516.56	-5154.22	0.000%
69	-0.04	-17516.56	5889.01	0.04	17516.56	-5889.01	0.000%
70	-2994.24	-17516.56	5155.92	2994.24	17516.56	-5155.92	0.000%
71	-5366.07	-17516.56	3046.48	5366.07	17516.56	-3046.48	0.000%
72	-5856.45	-17516.56	-5.09	5856.45	17516.56	5.09	0.000%
73	-5053.20	-17516.56	-2885.49	5053.20	17516.56	2885.49	0.000%
74	-3019.76	-17516.56	-5159.61	3019.76	17516.56	5159.61	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00001588
3	Yes	4	0.00000001	0.00000974
4	Yes	4	0.00000001	0.00001405
5	Yes	4	0.00000001	0.00001802
6	Yes	4	0.00000001	0.00009273
7	Yes	4	0.00000001	0.00006981
8	Yes	4	0.00000001	0.00008550
9	Yes	4	0.00000001	0.00008856
10	Yes	4	0.00000001	0.00001810
11	Yes	4	0.00000001	0.00001603
12	Yes	4	0.00000001	0.00001645
13	Yes	4	0.00000001	0.00001813
14	Yes	4	0.00000001	0.00008351
15	Yes	4	0.00000001	0.00006257
16	Yes	4	0.00000001	0.00007578
17	Yes	4	0.00000001	0.00008230
18	Yes	4	0.00000001	0.00001510
19	Yes	4	0.00000001	0.00000983
20	Yes	4	0.00000001	0.00001243
21	Yes	4	0.00000001	0.00001732
22	Yes	4	0.00000001	0.00009002
23	Yes	4	0.00000001	0.00006873
24	Yes	4	0.00000001	0.00008117
25	Yes	4	0.00000001	0.00008741
26	Yes	4	0.00000001	0.00001812
27	Yes	4	0.00000001	0.00001577
28	Yes	4	0.00000001	0.00001647
29	Yes	4	0.00000001	0.00001866
30	Yes	4	0.00000001	0.00009152
31	Yes	4	0.00000001	0.00006879
32	Yes	4	0.00000001	0.00008456
33	Yes	4	0.00000001	0.00008768
34	Yes	4	0.00000001	0.00001649
35	Yes	4	0.00000001	0.00001028

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36	Yes	4	0.00000001	0.00001468
37	Yes	4	0.00000001	0.00001819
38	Yes	4	0.00000001	0.00008416
39	Yes	4	0.00000001	0.00006329
40	Yes	4	0.00000001	0.00007586
41	Yes	4	0.00000001	0.00008284
42	Yes	4	0.00000001	0.00001751
43	Yes	4	0.00000001	0.00001606
44	Yes	4	0.00000001	0.00001563
45	Yes	4	0.00000001	0.00001747
46	Yes	4	0.00000001	0.00009206
47	Yes	4	0.00000001	0.00007076
48	Yes	4	0.00000001	0.00008226
49	Yes	4	0.00000001	0.00008896
50	Yes	4	0.00000001	0.00028714
51	Yes	5	0.00005224	0.00032835
52	Yes	5	0.00005501	0.00034319
53	Yes	5	0.00005685	0.00035350
54	Yes	5	0.00005449	0.00034229
55	Yes	5	0.00005238	0.00033191
56	Yes	5	0.00005448	0.00034168
57	Yes	5	0.00005646	0.00035079
58	Yes	5	0.00005465	0.00034057
59	Yes	5	0.00005216	0.00032729
60	Yes	5	0.00005380	0.00033395
61	Yes	5	0.00005594	0.00034392
62	Yes	5	0.00005409	0.00033563
63	Yes	4	0.00000001	0.00001693
64	Yes	4	0.00000001	0.00001859
65	Yes	4	0.00000001	0.00001967
66	Yes	4	0.00000001	0.00001840
67	Yes	4	0.00000001	0.00001696
68	Yes	4	0.00000001	0.00001844
69	Yes	4	0.00000001	0.00001959
70	Yes	4	0.00000001	0.00001852
71	Yes	4	0.00000001	0.00001696
72	Yes	4	0.00000001	0.00001835
73	Yes	4	0.00000001	0.00001960
74	Yes	4	0.00000001	0.00001846

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt °	Twist °
	ft	in			
T1	180 - 160	19.963	71	1.0765	0.0703
T2	160 - 140	15.473	71	1.0468	0.0695
T3	140 - 120	11.243	71	0.9441	0.0571
T4	120 - 100	7.612	71	0.7502	0.0440
T5	100 - 80	4.751	71	0.5830	0.0355
T6	80 - 60	2.618	63	0.4049	0.0229
T7	60 - 40	1.317	63	0.2335	0.0130
T8	40 - 20	0.551	63	0.1386	0.0072
T9	20 - 0	0.132	63	0.0634	0.0029

Critical Deflections and Radius of Curvature - Service Wind

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Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.00	Lightning Rod 4"x.5"	71	19.963	1.0765	0.0703	83162
180.00	(2) KMW EPBQ-654L8H8-L2	71	19.963	1.0765	0.0703	83162
157.23	Sinclair SC479-HF1LDF	71	14.864	1.0385	0.0684	16576
150.00	SO602-1	71	13.304	1.0088	0.0643	10912
137.23	Sinclair SC479-HF1LDF	71	10.697	0.9206	0.0551	7114
130.00	Radiowaves HP3-11	71	9.336	0.8508	0.0501	6443
121.58	Sinclair SC229-DFLN	71	7.871	0.7655	0.0449	5835
110.00	SO602-1	71	6.090	0.6635	0.0398	6507
95.00	Radiowaves HP3-11	71	4.145	0.5408	0.0326	6666

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	96.466	2	5.2014	0.3758
T2	160 - 140	74.771	2	5.0587	0.3715
T3	140 - 120	54.321	2	4.5679	0.3116
T4	120 - 100	36.784	2	3.6222	0.2427
T5	100 - 80	22.982	2	2.8146	0.1847
T6	80 - 60	12.668	2	1.9571	0.1167
T7	60 - 40	6.372	2	1.1302	0.0649
T8	40 - 20	2.667	2	0.6715	0.0356
T9	20 - 0	0.638	2	0.3068	0.0140

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.00	Lightning Rod 4"x.5"	2	96.466	5.2014	0.3758	17555
180.00	(2) KMW EPBQ-654L8H8-L2	2	96.466	5.2014	0.3758	17555
157.23	Sinclair SC479-HF1LDF	2	71.823	5.0193	0.3662	3513
150.00	SO602-1	2	64.285	4.8788	0.3467	2320
137.23	Sinclair SC479-HF1LDF	2	51.681	4.4531	0.3015	1506
130.00	Radiowaves HP3-11	2	45.106	4.1124	0.2756	1354
121.58	Sinclair SC229-DFLN	2	38.035	3.6962	0.2476	1219
110.00	SO602-1	2	29.438	3.2023	0.2141	1356
95.00	Radiowaves HP3-11	2	20.054	2.6115	0.1680	1394

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load Allowable	Allowable Ratio	Criteria	
T1	180	Leg	A325N	0.7500	4	7635.14	29820.60	0.256	✓	1	Bolt Tension

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load Allowable	Allowable Ratio	Criteria
T2	160	Diagonal	A325N	0.7500	1	4213.30	4621.88	0.912 ✓	1	Member Block Shear
		Top Girt	A325N	0.7500	1	1297.32	6932.81	0.187 ✓	1	Member Block Shear
		Leg	A325N	0.7500	4	19412.40	29820.60	0.651 ✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	5773.02	4621.88	1.249 ✗	1	Member Block Shear
T3	140	Leg	A325N	0.7500	4	34219.30	29820.60	1.148 ✗	1	Bolt Tension
		Diagonal	A325N	0.7500	1	6957.88	4621.88	1.505 ✗	1	Member Block Shear
T4	120	Leg	A325N	1.0000	6	34249.10	53014.40	0.646 ✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	9142.41	6932.81	1.319 ✗	1	Member Block Shear
T5	100	Leg	A325N	0.7500	8	35849.80	29820.60	1.202 ✗	1	Bolt Tension
		Diagonal	A325N	0.7500	1	10460.60	6932.81	1.509 ✗	1	Member Block Shear
T6	80	Leg	A325N	0.7500	8	35778.30	29820.60	1.200 ✗	1	Bolt Tension
		Diagonal	A325N	0.7500	1	5242.84	6932.81	0.756 ✓	1	Member Block Shear
T7	60	Leg	A325N	0.7500	8	34865.10	29820.60	1.169 ✗	1	Bolt Tension
		Diagonal	A325N	0.7500	1	2068.90	6932.81	0.298 ✓	1	Member Block Shear
T8	40	Leg	A325N	0.7500	8	34855.50	29820.60	1.169 ✗	1	Bolt Tension
		Diagonal	A325N	0.7500	1	1063.31	6932.81	0.153 ✓	1	Member Block Shear
T9	20	Diagonal	A325N	0.7500	1	2312.79	8971.88	0.258 ✓	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	ϕP _n lb	Ratio P _u /ϕP _n
T1	180 - 160	PIPE 2.5 STD	20.00	5.00	63.3 K=1.00	1.7040	-33591.60	57192.30	0.587 ¹ ✓
T2	160 - 140	PIPE 2.5 STD	20.00	5.00	63.3 K=1.00	1.7040	-82036.40	57192.30	1.434 ¹ ✗
T3	140 - 120	4.8.1 (1.43 CR) - 33 PIPE 2.5 STD	20.00	5.00	63.3 K=1.00	1.7040	-144319.00	57192.30	2.523 ¹ ✗
T4	120 - 100	4.8.1 (2.52 CR) - 60 PIPE 4 STD	20.00	6.67	53.0 K=1.00	3.1741	-215605.00	116316.00	1.854 ¹ ✗
T5	100 - 80	4.8.1 (1.85 CR) - 87 PIPE 5 STD	20.00	6.67	42.6 K=1.00	4.2995	-300467.00	169427.00	1.773 ¹ ✗
		4.8.1 (1.77 CR) - 108							

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Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
T6	80 - 60	PIPE 5 STD	20.03	6.68	42.7 K=1.00	4.2995	-312071.00	169352.00	1.843 ¹ X
T7	60 - 40	4.8.1 (1.84 CR) - 129/2 PIPE 6 STD	20.03	6.68	35.7 K=1.00	5.5813	-302482.00	228830.00	1.322 ¹ X
T8	40 - 20	4.8.1 (1.32 CR) - 150/2 PIPE 6 STD	20.03	6.68	35.7 K=1.00	5.5813	-302795.00	228830.00	1.323 ¹ X
T9	20 - 0	4.8.1 (1.32 CR) - 171 PIPE 6 STD	20.03	6.68	35.7 K=1.00	5.5813	-308527.00	228830.00	1.348 ¹ X
		4.8.1 (1.35 CR) - 192							

¹ P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	7.07	3.23	103.1 K=1.06	0.4844	-4246.21	8826.48	0.481 ¹ ✓
T2	160 - 140	L2x2x1/8	7.07	3.23	103.1 K=1.06	0.4844	-6045.47	8826.48	0.685 ¹ ✓
T3	140 - 120	L2x2x1/8	7.07	3.23	103.1 K=1.06	0.4844	-7818.94	8826.48	0.886 ¹ ✓
T4	120 - 100	L2x2x3/16	8.33	3.72	114.9 K=1.01	0.7150	-10730.70	11555.00	0.929 ¹ ✓
T5	100 - 80	L2x2x3/16	8.33	3.64	113.3 K=1.02	0.7150	-13143.40	11791.30	1.115 ¹ X
T6	80 - 60	bolt (1.51 CR) - 110 L2x2x3/16	8.54	4.07	124.1 K=1.00	0.7150	-6927.10	10301.90	0.672 ¹ ✓
T7	60 - 40	L2x2x3/16	9.91	4.70	143.1 K=1.00	0.7150	-2657.84	7889.75	0.337 ¹ ✓
T8	40 - 20	L2x2x3/16	12.58	6.03	183.5 K=1.00	0.7150	-1436.74	4795.80	0.300 ¹ ✓
T9	20 - 0	L2 1/2x2 1/2x3/16	14.32	6.90	167.2 K=1.00	0.9020	-2930.49	7285.66	0.402 ¹ ✓

¹ P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x3/16	5.00	4.49	136.7	0.7150	-1280.09	8639.01	0.148 ¹

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Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
K=1.00									

¹ $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
T1	180 - 160	PIPE 2.5 STD	20.00	5.00	63.3	1.7040	30540.60	76682.30	0.398 ¹ ✓
T2	160 - 140	PIPE 2.5 STD	20.00	5.00	63.3	1.7040	77649.50	76682.30	1.013 ¹ ✗
T3	140 - 120	4.8.1 (1.43 CR) - 33 PIPE 2.5 STD	20.00	5.00	63.3	1.7040	136877.00	76682.30	1.785 ¹ ✗
T4	120 - 100	4.8.1 (2.52 CR) - 60 PIPE 4 STD	20.00	6.67	53.0	3.1741	205495.00	142832.00	1.439 ¹ ✗
T5	100 - 80	4.8.1 (1.85 CR) - 87 PIPE 5 STD	20.00	6.67	42.6	4.2995	286799.00	193476.00	1.482 ¹ ✗
T6	80 - 60	4.8.1 (1.77 CR) - 108 PIPE 5 STD	20.03	6.68	42.7	4.2995	297097.00	193476.00	1.536 ¹ ✗
T7	60 - 40	4.8.1 (1.84 CR) - 129/2 PIPE 6 STD	20.03	6.68	35.7	5.5813	282928.00	251161.00	1.126 ¹ ✗
T8	40 - 20	4.8.1 (1.32 CR) - 150/2 PIPE 6 STD	20.03	6.68	35.7	5.5813	278844.00	251161.00	1.110 ¹ ✗
T9	20 - 0	4.8.1 (1.32 CR) - 171 PIPE 6 STD	20.03	6.68	35.7	5.5813	281938.00	251161.00	1.123 ¹ ✗
		4.8.1 (1.35 CR) - 192							

¹ $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	7.07	3.23	64.5	0.2813	4213.30	12234.40	0.344 ¹ ✓
T2	160 - 140	L2x2x1/8	7.07	3.23	64.5	0.2813	5773.02	12234.40	0.472 ¹ ✓

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Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
T3	140 - 120	L2x2x1/8	7.07	3.23	64.5	0.2813	6957.88	12234.40	0.569 ¹ ✓
T4	120 - 100	L2x2x3/16	8.33	3.72	75.0	0.4132	9142.41	17974.30	0.509 ¹ ✓
T5	100 - 80	L2x2x3/16	8.33	3.64	73.5	0.4132	10460.60	17974.30	0.582 ¹ ✓
T6	80 - 60	bolt (1.51 CR) - 110 L2x2x3/16	8.54	4.07	81.9	0.4132	5242.84	17974.30	0.292 ¹ ✓
T7	60 - 40		9.91	4.70	94.0	0.4132	2068.90	17974.30	0.115 ¹ ✓
T8	40 - 20	L2x2x3/16	12.58	6.03	119.8	0.4132	1063.31	17974.30	0.059 ¹ ✓
T9	20 - 0	L2 1/2x2 1/2x3/16	14.32	6.90	108.5	0.5535	2312.79	24075.20	0.096 ¹ ✓

¹ P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	ϕP _n	Ratio
			ft	ft		in ²	lb	lb	$\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x3/16	5.00	4.49	92.6	0.4132	1297.32	17974.30	0.072 ¹ ✓

¹ P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation	Component Type	Size	Critical Element	P lb	ϕP _{allow} lb	% Capacity	Pass Fail
	ft				lb	lb		
T1	180 - 160	Leg	PIPE 2.5 STD	2	-33591.60	57192.30	58.7	Pass
T2	160 - 140	Leg	PIPE 2.5 STD	33	-82036.40	57192.30	143.4	Fail ✗
T3	140 - 120	Leg	PIPE 2.5 STD	60	-144319.00	57192.30	252.3	Fail ✗
T4	120 - 100	Leg	PIPE 4 STD	87	-215605.00	116316.00	185.4	Fail ✗
T5	100 - 80	Leg	PIPE 5 STD	108	-300467.00	169427.00	177.3	Fail ✗
T6	80 - 60	Leg	PIPE 5 STD	129	-312071.00	169352.00	184.3	Fail ✗
T7	60 - 40	Leg	PIPE 6 STD	150	-302482.00	228830.00	132.2	Fail ✗
T8	40 - 20	Leg	PIPE 6 STD	171	-302795.00	228830.00	132.3	Fail ✗
T9	20 - 0	Leg	PIPE 6 STD	192	-308527.00	228830.00	134.8	Fail ✗
T1	180 - 160	Diagonal	L2x2x1/8	7	-4246.21	8826.48	48.1	Pass
T2	160 - 140	Diagonal	L2x2x1/8	35	-6045.47	8826.48	68.5	Pass
T3	140 - 120	Diagonal	L2x2x1/8	64	-7818.94	8826.48	88.6	Pass
T4	120 - 100	Diagonal	L2x2x3/16	88	-10730.70	11555.00	92.9	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T5	100 - 80	Diagonal	L2x2x3/16	110	-13143.40	11791.30	111.5	Fail X
T6	80 - 60	Diagonal	L2x2x3/16	146	-6927.10	10301.90	67.2	Pass
T7	60 - 40	Diagonal	L2x2x3/16	167	-2657.84	7889.75	33.7	Pass
T8	40 - 20	Diagonal	L2x2x3/16	173	-1436.74	4795.80	30.0	Pass
T9	20 - 0	Diagonal	L2 1/2x2 1/2x3/16	194	-2930.49	7285.66	40.2	Pass
T1	180 - 160	Top Girt	L2x2x3/16	4	-1280.09	8639.01	14.8	Pass
Summary								
Leg (T3) 252.3								
Diagonal (T5) 111.5								
Top Girt (T1) 14.8								
Bolt Checks 150.9								
RATING = 252.3								
Fail X								
Fail X								
Pass								
Fail X								
Fail X								

Program Version 8.0.1.0 - 2/8/2018 File://files.fullertonengineering.com/PDrive/Dept 400/SMLINK/SMLINK-ATT-NSB
 NE/CT3470A/Structural/Analysis/tnxTower/CT3470A.eri

Site No: CT3470A
Site Name: CT3470A
Prepared By: VY
Checked By: AJR

**Fullerton Engineering
Consultants, Inc.**

Date: 1/7/2019

Self Support Tower Anchor Rod Check

Factored Leg Reactions (based on Tnx calculations)

Maximum Factored Reactions

$$C := 310.418 \text{ kip} \quad \text{Max Total Download Reaction}$$
$$S := 21.234 \text{ kip} \quad \text{Max Total Shear Reaction}$$

Anchor Rods: (8) 3/4"φ ASTM F1554 Grade 105 Bolts

Specifications

$\phi := 0.8$	<i>Strength Reduction Factor</i>	
$F_{ub} := 150 \text{ ksi}$	<i>Ultimate Strength</i>	
$D_{bolt} := 0.75 \text{ in}$	<i>Nominal Diameter of Anchor Bolt</i>	
$A_{net} := 0.75 \left(\frac{\pi}{4} \right) \cdot (D_{bolt})^2$	$A_{net} = 0.33 \cdot \text{in}^2$	<i>Net Area of Bolt taken as 0.75 x unthreaded Area</i>
$N_{bolt} := 8$	<i>Total Number of Anchor Bolts per Leg</i>	
$\eta := 0.55$	<i>η is dependent on the Anchor Rod Detail Type per Figure 4-4 of TIA Rev. G</i>	
$R_{nt} := F_{ub} \cdot A_{net}$	$R_{nt} = 49.7 \text{ kip}$	<i>Nominal Tensile Strength of Anchor Rod per Section 4.9.6.1</i>
$\frac{\left(C + \frac{S}{\eta} \right)}{N_{bolt}} = 109.73\% \text{ of } R_{nt}$	$>100\% \text{ NOT OK.}$	<i>Interaction Equation</i>

AnchorBoltCapacityCheck = "Anchor Bolts are NOT adequate. Modification is required."

Attachment 2

Market: New England
Cell Site Number: S3470A
Cell Site Name: Middletown – Mile Lane
Search Ring Name: NSB at Middletown
Fixed Asset Number: [REDACTED]

OPTION AND LAND LEASE AGREEMENT

THIS OPTION AND LAND LEASE AGREEMENT (“**Agreement**”), dated as of the latter of the signature dates below (the “**Effective Date**”), is entered into by City of Middletown, a municipal corporation and political subdivision of the State of Connecticut, having a mailing address of 245 deKoven Drive Middletown, CT 06457 (“**Landlord**”) and New Cingular Wireless PCS, LLC, a Delaware limited liability company, having a mailing address of 1025 Lenox Park Blvd NE, 3rd Floor, Atlanta, GA 30319 (“**Tenant**”).

BACKGROUND

Landlord owns or controls that certain plot, parcel or tract of land, as described on **Exhibit 1**, together with all rights and privileges arising in connection therewith, located at 499 Mile Lane, in the City of Middletown, County of Middlesex, State of Connecticut (collectively, the “**Property**”). Landlord desires to grant to Tenant the right to use a portion of the Property in accordance with this Agreement.

The parties agree as follows:

1. **OPTION TO LEASE.**

(a) Landlord hereby grants to Tenant an option (the “**Option**”) to lease a portion of the Property consisting of:

- (i) approximately 2,500 square feet including the air space above such space, as described on attached **Exhibit 1**, for the placement of Tenant’s Communication Facility;
- (ii) space for any structural steel or other improvements to support Tenant’s equipment (collectively, the space referenced in (a) and (b) is the “**Equipment Space**”);
- (iii) that certain space on the Structure (as hereinafter defined), as generally depicted on **Exhibit 1**, each measuring twenty (20) contiguous linear feet wide and ten (10) contiguous linear feet deep, including the air space above same, where Tenant shall have the right to install its antennas and other equipment (collectively, the “**Antenna Space**”); and
- (iv) those certain areas where Tenant’s conduits, wires, cables, cable trays and other necessary connections are located between the Equipment Space and the Antenna Space, and between the Equipment Space and the electric power, telephone, and fuel sources for the Property (hereinafter collectively referred to as the “**Connection Space**”). Landlord agrees that Tenant shall have the right to install connections between Tenant’s equipment in the Equipment Space and Antenna Space; and between Tenant’s equipment in the Equipment Space and the electric power, telephone, and fuel sources for the Property, and any other improvements. Landlord further agrees that Tenant shall have the right to install, replace and maintain utility lines, wires, poles, cables, conduits, pipes and other necessary connections over or along any right-of-way extending from the aforementioned public right-of-way to the Premises. The Equipment Space, Antenna Space, and Connection Space, are hereinafter collectively referred to as the “**Premises**.”

(b) During the Option period and any extension thereof, and during the term of this Agreement, Tenant and its agents, engineers, surveyors and other representatives will have the right to enter upon the Property, with the written consent of the Landlord, which consent shall not be unreasonably withheld, conditioned or delayed, to inspect, examine, conduct soil borings, drainage testing, material sampling, radio frequency testing and other geological or engineering tests or studies of the Property (collectively, the “**Tests**”), to apply for and obtain licenses, permits, approvals, or other relief required of or deemed necessary or appropriate at Tenant’s sole discretion for its use of the Premises and include, without limitation, applications for zoning variances, zoning ordinances,

amendments, special use permits, and construction permits (collectively, the "**Government Approvals**"), initiate the ordering and/or scheduling of necessary utilities, and otherwise to do those things on or off the Property that, in the opinion of Tenant, are necessary in Tenant's sole discretion to determine the physical condition of the Property, the environmental history of the Property, Landlord's title to the Property and the feasibility or suitability of the Property for Tenant's Permitted Use, at Tenant's sole expense. Tenant will not be liable to Landlord or any third party on account of any pre-existing defect or condition on or with respect to the Property, whether or not such defect or condition is disclosed by Tenant's inspection. Tenant will restore the Property to its condition as it existed at the commencement of the Initial Option Term (as defined below), reasonable wear and tear and casualty not caused by Tenant excepted. In addition, Tenant shall indemnify, defend and hold Landlord harmless from and against any and all injury, loss, damage or claims arising directly out of Tenant's Tests.

(c) In consideration of Landlord granting Tenant the Option, Tenant agrees to pay Landlord the sum of [REDACTED] within thirty (30) business days of the Effective Date. The Option will be for an initial term of one (1) year commencing on the Effective Date (the "**Initial Option Term**") and may be renewed by Tenant for an additional one (1) year upon written notification to Landlord and the payment of an additional [REDACTED] no later than ten (10) days prior to the expiration date of the Initial Option Term.

(d) The Option may be sold, assigned or transferred at any time by Tenant to Tenant's parent company or member if Tenant is a limited liability company or any affiliate or subsidiary of, or partner in, Tenant or its parent company or member. Otherwise, the Option may not be sold, assigned or transferred without the approval of the Common Council for the City of Middletown. Any attempt to assign the Option or this Agreement without such approval will render such assignment null and void, unless such assignment is otherwise permitted under this Section 1(d) or Section 16 of this Agreement. From and after the date the Option has been sold, assigned or transferred by Tenant in accordance with this Section or Section 16 of this Agreement, Tenant shall immediately be released from any and all liability under this Agreement, including the payment of any rental or other sums due after the date of assignment, without any further action.

(e) During the Initial Option Term and any extension thereof, Tenant may exercise the Option by notifying Landlord in writing. If Tenant exercises the Option, then Landlord leases the Premises to the Tenant subject to the terms and conditions of this Agreement. If Tenant does not exercise the Option during the Initial Option Term or any extension thereof, this Agreement will terminate, and the parties will have no further liability to each other.

(f) If during the Initial Option Term or any extension thereof, or during the term of this Agreement if the Option is exercised, Landlord decides to subdivide, sell, or change the status of the zoning of the Premises or Property or in the event of foreclosure, Landlord shall immediately notify Tenant in writing. Any sale of the Property shall be subject to Tenant's rights under this Agreement.

2. **PERMITTED USE.**

Tenant may use the Premises for the transmission and reception of communications signals and the installation, construction, maintenance, operation, repair, replacement and upgrade of communications fixtures and related equipment, cables, accessories and improvements, which may include a suitable support structure ("**Structure**"), associated antennas, equipment shelters or cabinets and fencing and any other items necessary to the successful and secure use of the Premises (the "**Communication Facility**") as well as the right to test, survey and review title on the Property; Tenant further has the right but not the obligation to add, modify and/or replace equipment in order to be in compliance with any current or future federal, state or local mandated application, including, but not limited to, emergency 911 communication services, (collectively, the "**Permitted Use**"). Landlord and Tenant agree that any portion of the Communication Facility that may be conceptually described on **Exhibit 1** will not be deemed to limit Tenant's Permitted Use. If **Exhibit 1** includes drawings of the initial installation of the Communication Facility, Landlord's execution of this Agreement will signify Landlord's approval of **Exhibit 1**. For a period of one hundred eighty (180) days following the start of construction, Landlord grants Tenant, its subtenants, licensees and sublicensees, the right to use Landlord's contiguous, adjoining or surrounding property (the "**Surrounding Property**") as may reasonably be required during construction and installation of the Communication Facility, as designated in **Exhibit 1**. Tenant has the

right to install and operate transmission cables from the equipment shelter or cabinet to the antennas, electric lines from the main feed to the equipment shelter or cabinet and communication lines from the Property's main entry point to the equipment shelter or cabinet, install a generator and to make other improvements, alterations, upgrades or additions appropriate for Tenant's Permitted use, including the right to construct a fence around the Premises or equipment, install warning signs to make individuals aware of risks, install protective barriers, install any other control measures reasonably required by Tenant's safety procedures or applicable law, and undertake any other appropriate means to secure the Premises or equipment at Tenant's expense. Tenant has the right to modify, supplement, replace, upgrade, expand the Communication Facility (including, for example, increasing the number of antennas or adding microwave dishes) or relocate the Communication Facility within the Premises at any time during the Term. Tenant will be allowed to make such alterations to the Property, with the written consent of the Landlord in order to ensure that the Communication Facility complies with all applicable federal, state or local laws, rules or regulations.

3. TERM.

(a) The initial lease term will be five (5) years (the "**Initial Term**"), commencing on the Effective Date. The Initial Term will terminate on the fifth (5th) anniversary of the Effective Date.

(b) This Agreement will automatically renew for five (5) additional five (5) year term(s) (each additional five (5) year term shall be defined as an "**Extension Term**"), upon the same terms and conditions set forth herein unless Tenant notifies Landlord in writing of Tenant's intention not to renew this Agreement at least sixty (60) days prior to the expiration of the Initial Term or the then-existing Extension Term.

(c) Unless (i) Landlord or Tenant notifies the other in writing of its intention to terminate this Agreement at least six (6) months prior to the expiration of the final Extension Term, or (ii) the Agreement is terminated as otherwise permitted by this Agreement prior to the end of the final Extension Term, this Agreement shall continue in force upon the same covenants, terms and conditions for a further term of one (1) year, and for annual terms thereafter ("**Annual Term**") until terminated by either party hereto by giving to the other party hereto written notice of its intention to so terminate at least six (6) months prior to the end of any such Annual Term. Monthly rent during such Annual Terms shall be equal to the Rent paid for the last month of the final Extension Term. If Tenant remains in possession of the Premises after the termination of this Agreement, then Tenant will be deemed to be occupying the Premises on a month-to-month basis (the "**Holdover Term**"), subject to the terms and conditions of this Agreement.

(d) The Initial Term, any Extension Terms, any Annual Terms and any Holdover Term are collectively referred to as the "**Term**."

4. RENT.

(a) Commencing on the first day of the month following the date that Tenant commences construction (the "**Rent Commencement Date**"), Tenant will pay Landlord on or before the fifth (5th) day of each calendar month in advance, [REDACTED] (the "**Rent**"), at the address set forth above. In any partial month occurring **prior to or** after the Rent Commencement Date, the Rent will be prorated. The initial Rent payment will be forwarded by Tenant to Landlord within forty-five (45) days after the Rent Commencement Date.

(b) Upon the commencement of each Extension Term, the monthly Rent will increase by two percent (2%) over the Rent paid during the previous five (5) year term.

(c) All charges payable under this Agreement such as utilities and taxes shall be billed by Landlord

5. APPROVALS.

(a) Landlord agrees that Tenant's ability to use the Premises is contingent upon the suitability of the Premises and Property for the Permitted Use and Tenant's ability to obtain and maintain all Government Approvals. Landlord authorizes Tenant to prepare, execute and file all required applications to obtain Government Approvals for the Permitted Use and agrees to reasonably assist Tenant with such applications and with obtaining and maintaining the Government Approvals.

(b) Tenant has the right to obtain a title report or commitment for a leasehold title policy from a title insurance company of its choice and to have the Property surveyed by a surveyor of its choice, at Tenant's sole expense.

(c) Tenant may also perform and obtain, at Tenant's sole cost and expense, soil borings, percolation tests, engineering procedures, environmental investigation or other tests or reports on, over, and under the Property, necessary to determine if Tenant's use of the Premises will be compatible with Tenant's engineering specifications, system, design, operations or Government Approvals.

6. TERMINATION. This Agreement may be terminated, without penalty or further liability, as follows:

(a) by either party on thirty (30) days prior written notice, if the other party remains in default under Section 155 of this Agreement after the applicable cure periods;

(b) by Tenant upon written notice to Landlord, if Tenant is unable to obtain, or maintain, any required approval(s) or the issuance of a license or permit by any agency, board, court or other governmental authority necessary for the construction or operation of the Communication Facility as now or hereafter intended by Tenant; or if Tenant determines, in its sole discretion that the cost of or delay in obtaining or retaining the same is commercially unreasonable;

(c) by Tenant, upon written notice to Landlord, if Tenant determines, in its sole discretion, due to the title report results or survey results, that the condition of the Premises is unsatisfactory for its intended uses;

(d) by Tenant upon written notice to Landlord for any reason or no reason, at any time prior to commencement of construction by Tenant; or

(e) by Tenant upon sixty (60) days' prior written notice to Landlord for any reason or no reason, so long as Tenant pays Landlord a termination fee equal to three (3) months' Rent, at the then-current rate, provided, however, that no such termination fee will be payable on account of the termination of this Agreement by Tenant under any termination provision contained in any other Section of this Agreement, including the following: Section 5 Approvals, Section 6(a) Termination, Section 6(b) Termination, Section 6(c) Termination, Section 6(d) Termination, Section 11(d) Environmental, Section 08 Condemnation or Section 19 Casualty.

7. INSURANCE. During the Term, Tenant will purchase and maintain in full force and the insurance described in attached Exhibit 2.

8. INTERFERENCE.

(a) Prior to or concurrent with the execution of this Agreement, Landlord has provided or will provide Tenant with a list of radio frequency user(s) and frequencies used on the Property as of the Effective Date. Tenant warrants that its use of the Premises will not interfere with those existing radio frequency uses on the Property, as long as the existing radio frequency user(s) operate and continue to operate within their respective frequencies and in accordance with all applicable laws and regulations.

(b) Landlord will not grant, after the Effective Date, a lease, license or any other right to any third party, if the exercise of such grant may in any way adversely affect or interfere with the Communication Facility, the operations of Tenant or the rights of Tenant under this Agreement. Landlord will notify Tenant in writing prior to granting any third party the right to install and operate communications equipment on the Property.

(c) Landlord will not, nor will Landlord permit its employees, tenants, licensees, invitees, agents or independent contractors to interfere in any way with the Communication Facility, the operations of Tenant or the rights of Tenant under this Agreement. Landlord will cause such interference to cease within twenty-four (24) hours after receipt of notice of interference from Tenant. In the event any such interference does not cease within the aforementioned cure period, Landlord shall cease all operations which are suspected of causing interference (except for intermittent testing to determine the cause of such interference) until the interference has been corrected.

(d) For the purposes of this Agreement, "interference" may include, but is not limited to, any use on the Property or Surrounding Property that causes electronic or physical obstruction with, or degradation of, the communications signals from the Communication Facility.

(e) Notwithstanding the foregoing, Tenant's equipment shall not cause any harmful interference to any equipment of the Landlord used for emergency services, regardless of whether any such equipment is currently in existence prior to the execution of this Agreement or hereafter used by Landlord in the future, as long as such equipment is used in accordance with manufacturers' specifications and in accordance with applicable laws and regulations. In the event that Tenant or Tenant's equipment causes any harmful interference to any of Landlord's equipment used to provide emergency services, then the Landlord shall immediately notify Tenant by contacting Tenant's Network Operations Center (at 800-638-2822) and Tenant agrees to either correct the harmful interference or power down the equipment causing such interference (until the harmful interference has been eliminated), within twenty-four (24) hours of such notice.

9. INDEMNIFICATION.

(a) Tenant agrees to indemnify, defend and hold Landlord harmless from and against any and all injury, loss, damage or liability, costs or expenses in connection with a third party claim (including reasonable attorneys' fees and court costs) arising directly from the installation, use, maintenance, repair or removal of the Communication Facility, Tenant's use of the Premises, or Tenant's breach of any provision of this Agreement, except to the extent attributable to the negligent or intentional act or omission of Landlord, its employees, invitees, agents or independent contractors.

(b) Landlord agrees to indemnify, defend and hold Tenant harmless from and against any and all injury, loss, damage or liability, costs or expenses in connection with a third party claim (including reasonable attorneys' fees and court costs) arising directly from the actions or failure to act of Landlord, its employees, invitees, agents or independent contractors, or Landlord's breach of any provision of this Agreement, except to the extent attributable to the negligent or intentional act or omission of Tenant, its employees, agents or independent contractors.

(c) The indemnified party: (i) shall promptly provide the indemnifying party with written notice of any claim, demand, lawsuit, or the like for which it seeks indemnification pursuant to this Section 9 and provide the indemnifying party with copies of any demands, notices, summonses, or legal papers received in connection with such claim, demand, lawsuit, or the like; (ii) shall not settle any such claim, demand, lawsuit, or the like without the prior written consent of the indemnifying party; and (iii) shall fully cooperate with the indemnifying party in the defense of the claim, demand, lawsuit, or the like. A delay in notice shall not relieve the indemnifying party of its indemnity obligation, except (1) to the extent the indemnifying party can show it was prejudiced by the delay; and (2) the indemnifying party shall not be liable for any settlement or litigation expenses incurred before the time when notice is given.

10. WARRANTIES.

(a) Each of Tenant and Landlord (to the extent not a natural person) each acknowledge and represent that it is duly organized, validly existing and in good standing and has the right, power, and authority or capacity, as applicable, to enter into this Agreement and bind itself hereto through the party or individual set forth as signatory for the party below.

(b) Landlord represents, warrants and agrees that: (i) Landlord solely owns the Property as a legal lot in fee simple; (ii) Landlord grants to Tenant sole, actual, quiet and peaceful use, enjoyment and possession of the Premises in accordance with the terms of this Agreement without hindrance or ejection by any persons lawfully claiming under Landlord; and (iii) Landlord's execution and performance of this Agreement will not violate any laws, ordinances, covenants or the provisions of any mortgage, lease or other agreement binding on Landlord.

11. ENVIRONMENTAL.

(a) .

In the event Tenant becomes aware of any hazardous materials on the Property, or any environmental, health or safety condition or matter relating to the Property, that, in Tenant's sole determination, renders the

condition of the Premises or Property unsuitable for Tenant's use, or if Tenant believes that the leasing or continued leasing of the Premises would expose Tenant to undue risks of liability to a government agency or other third party, then Tenant will have the right, in addition to any other rights it may have at law or in equity, to terminate this Agreement upon written notice to Landlord.

12. ACCESS. At all times throughout the Term of this Agreement, and at no additional charge to Tenant, Tenant and its employees, agents, and subcontractors, will have twenty-four (24) hour per day, seven (7) day per week pedestrian and vehicular access ("Access") to and over the Property, from an open and improved public road to the Premises, for the installation, maintenance and operation of the Communication Facility and any utilities serving the Premises. Landlord agrees to provide to Tenant such codes, keys and other instruments necessary for such Access at no additional cost to Tenant. Landlord shall execute a letter granting Tenant Access to the Property substantially in the form attached as **Exhibit 12**; upon Tenant's request, Landlord shall execute additional letters during the Term. If Tenant elects to utilize an Unmanned Aircraft System ("UAS") in connection with its installation, construction, monitoring, site audits, inspections, maintenance, repair, modification, or alteration activities at the Property, Landlord hereby grants Tenant, or any UAS operator acting on Tenant's behalf, express permission to fly over the applicable Property and Premises provided that prior written notice is provided to Landlord at least 24 hours prior to the Tenant's using of an UAS, and consents to the use of audio and video navigation and recording in connection with the use of the UAS. Landlord acknowledges that in the event Tenant cannot obtain Access to the Premises, Tenant shall incur significant damage. If Landlord fails to provide the Access granted by this Section 12, such failure shall be a default under this Agreement.

13. REMOVAL/RESTORATION. All portions of the Communication Facility brought onto the Property by Tenant will be and remain Tenant's personal property and, at Tenant's option, may be removed by Tenant at any time during or after the Term. Landlord covenants and agrees that no part of the Communication Facility constructed, erected or placed on the Premises by Tenant will become, or be considered as being affixed to or a part of, the Property, it being the specific intention of Landlord that all improvements of every kind and nature constructed, erected or placed by Tenant on the Premises will be and remain the property of Tenant and may be removed by Tenant at any time during or after the Term. Tenant will repair any damage to the Property to the extent resulting directly from Tenant's removal activities. Any portions of the Communication Facility that Tenant does not remove within one hundred twenty (120) days after the later of the end of the Term and cessation of Tenant's operations at the Premises shall be deemed abandoned and owned by Landlord. Notwithstanding the foregoing, Tenant will not be responsible for the replacement of any trees, shrubs or other vegetation.

14. MAINTENANCE/UTILITIES.

(a) Tenant will keep and maintain the Premises in good condition, reasonable wear and tear and damage from the elements excepted. Landlord will maintain and repair the Property and access thereto and all areas of the Premises where Tenant does not have exclusive control, in good and tenantable condition, subject to reasonable wear and tear and damage from the elements. Landlord will be responsible for maintenance of landscaping on the Property, including any landscaping installed by Tenant as a condition of this Agreement or any required permit.

(b) Tenant will be responsible for paying on a monthly or quarterly basis all utilities charges for electricity, telephone service or any other utility used or consumed by Tenant on the Premises.

(c)

(d) Tenant will have the right to install utilities, at Tenant's expense, and to improve present utilities on the Property and the Premises. Landlord hereby grants to any service company providing utility or similar services, including electric power and telecommunications, to Tenant an easement over the Property, from an open and improved public road to the Premises, and upon the Premises, for the purpose of constructing, operating and maintaining such lines, wires, circuits, and conduits, associated equipment cabinets and such appurtenances thereto, as such service companies may from time to time require in order to provide such services to the Premises.

15. DEFAULT AND RIGHT TO CURE.

(a) The following will be deemed a default by Tenant and a breach of this Agreement: (i) non-payment of Rent if such Rent remains unpaid for more than thirty (30) days after written notice from Landlord of such failure to pay; (ii) Tenant's failure to cure an interference problem as required by Section 9 within twenty-four (24) hours after written notice of such failure; or (iii) Tenant's failure to perform any other term or condition under this Agreement within forty-five (45) days after written notice from Landlord specifying the failure. No such failure, however, will be deemed to exist if Tenant has cured such default within such cure period and provided that such efforts are prosecuted to completion with reasonable diligence. Delay in curing a default will be excused if due to causes beyond the reasonable control of Tenant. If Tenant remains in default beyond any applicable cure period, then Landlord will have the right to exercise any and all rights and remedies available to it under law and equity.

(b) The following will be deemed a default by Landlord and a breach of this Agreement: (i) Landlord's failure to provide Access to the Premises as required by Section 12 within twenty-four (24) hours after written notice of such failure; (ii) Landlord's failure to cure an interference problem as required by Section 8 within twenty-four (24) hours after written notice of such failure; or (iii) Landlord's failure to perform any term, condition or breach of any warranty or covenant under this Agreement within forty-five (45) days after written notice from Tenant specifying the failure. No such failure, however, will be deemed to exist if Landlord has commenced to cure the default within such period and provided such efforts are prosecuted to completion with reasonable diligence. Delay in curing a default will be excused if due to causes beyond the reasonable control of Landlord. If Landlord remains in default beyond any applicable cure period, Tenant will have: (i) the right to cure Landlord's default and to deduct the costs of such cure from any monies due to Landlord from Tenant, and (ii) any and all other rights available to it under law and equity.

16. ASSIGNMENT/SUBLEASE. In addition to the rights granted to Tenant under Section 1(d) of this Agreement, Tenant will have the right to assign, sell or transfer its interest under this Agreement, in whole or part, without Landlord's consent, to: (a) Tenant's Affiliate, (b) to any entity with a [REDACTED]

[REDACTED] or (c) any entity that acquires all or substantially all of the Tenant's assets in the market as defined by the Federal Communications Commission in which the Property is located. Upon notification to Landlord of such assignment, transfer or sale, Tenant will be relieved of all future performance, liabilities and obligations under this Agreement. Tenant shall have the right to sublease the Premises, in whole or in part, without Landlord's consent. Tenant may not otherwise assign this Agreement without Landlord's consent, Landlord's consent not to be unreasonably withheld, conditioned or delayed.

17. NOTICES. All notices, requests and demands hereunder will be given by first class certified or registered mail, return receipt requested, or by a nationally recognized overnight courier, postage prepaid, to be effective when properly sent and received, refused or returned undelivered. Notices will be addressed to the parties hereto as follows:

If to Tenant: New Cingular Wireless PCS, LLC
Attn: Tower Asset Group - Lease Administration
Re: Cell Site #: S3470A; Cell Site Name: Middletown – Mile Lane (CT)
Fixed Asset #: 10578361
1025 Lenox Park Blvd NE 3rd Floor
Atlanta, Georgia 30319

With a copy to: New Cingular Wireless PCS, LLC
Attn.: Legal Dept – Network Operations
Re: Cell Site #: S3470A; Cell Site Name: Middletown – Mile Lane (CT)
Fixed Asset #: 10578361
208 S. Akard Street
Dallas, TX 75202-4206

The copy sent to the Legal Department is an administrative step which alone does not constitute legal notice.

If to Landlord: City of Middletown - Office of the General Counsel
 245 deKoven Drive
 Middletown, CT 06457

Either party hereto may change the place for the giving of notice to it by thirty (30) days' prior written notice to the other party hereto as provided herein.

18. CONDEMNATION. In the event Landlord receives notification of any condemnation proceedings affecting the Property, Landlord will provide notice of the proceeding to Tenant within twenty-four (24) hours. If a condemning authority takes all of the Property, or a portion sufficient, in Tenant's sole determination, to render the Premises unsuitable for Tenant, this Agreement will terminate as of the date the title vests in the condemning authority. The parties will each be entitled to pursue their own separate awards in the condemnation proceeds, which for Tenant will include, where applicable, the value of its Communication Facility, moving expenses, prepaid Rent, and business dislocation expenses. Tenant will be entitled to reimbursement for any prepaid Rent on a *pro rata* basis.

19. CASUALTY. Landlord will provide notice to Tenant of any casualty or other harm affecting the Property within twenty-four (24) hours of the casualty or other harm. If any part of the Communication Facility or the Property is damaged by casualty or other harm as to render the Premises unsuitable, in Tenant's sole determination, then Tenant may terminate this Agreement by providing written notice to Landlord, which termination will be effective as of the date of such casualty or other harm. Upon such termination, Tenant will be entitled to collect all insurance proceeds payable to Tenant on account thereof and to be reimbursed for any prepaid Rent on a *pro rata* basis. Landlord agrees to permit Tenant to place temporary transmission and reception facilities on the Property, but only until such time as Tenant is able to activate a replacement transmission facility at another location; notwithstanding the termination of this Agreement, such temporary facilities will be governed by all of the terms and conditions of this Agreement, including Rent. If Landlord or Tenant undertakes to rebuild or restore the Premises and/or the Communication Facility, as applicable, Landlord agrees to permit Tenant to place temporary transmission and reception facilities on the Property in an area agreed upon in writing by the Landlord, until the reconstruction of the Premises and/or the Communication Facility is completed. If Landlord determines not to rebuild or restore the Property, Landlord will notify Tenant of such determination within thirty (30) days after the casualty or other harm.

20. WAIVER OF LANDLORD'S LIENS.

Intentionally omitted.

21. TAXES.

(a) Tenant shall be responsible for (i) all taxes, and assessments, levied upon the lands, improvements and other property of Tenant including any such taxes, both real and personal, that may be calculated by a taxing authority using any method, as provided by Connecticut law, (ii) all sales, use, license, value added, documentary, stamp, gross receipts, registration, real estate transfer, conveyance, excise, recording, and other similar taxes and fees imposed in connection with this Agreement, and (iii) all sales, use, license, value added, documentary, stamp, gross receipts, registration, real estate transfer, conveyance, excise, recording, and other similar taxes and fees imposed in connection with a sale of the Property or assignment of Rent payments by Tenant. Tenant shall be responsible for (y) any taxes and assessments attributable to and levied upon Tenant's leasehold improvements on the Premises if and as set forth in this Section 21 and (z) all sales, use, license, value added, documentary,

stamp, gross receipts, registration, real estate transfer, conveyance, excise, recording, and other similar taxes and fees imposed in connection with an assignment of this Agreement or sublease by Tenant.

(b) For any tax amount for which Tenant is responsible under this Agreement, Tenant shall have the right to contest, in good faith, the validity or the amount thereof using such administrative, appellate or other proceedings as may be appropriate in the jurisdiction, or take such other steps as permitted by law.

(c) Any tax-related notices shall be sent to Tenant in the manner set forth in Section 17. Promptly after the Effective Date, Tenant shall provide the following address to the taxing authority for the authority's use in the event the authority needs to communicate with Tenant. In the event that Tenant's tax address changes by notice to Landlord, Tenant shall be required to provide Tenant's new tax address to the taxing authority or authorities.

(d) Notwithstanding anything to the contrary contained in this Section 21, Tenant shall have no obligation to reimburse any tax or assessment for which the Landlord is reimbursed or rebated by a third party.

22. SALE OF PROPERTY. Intentionally omitted.

23. RIGHT OF FIRST REFUSAL. Intentionally omitted.

24. MISCELLANEOUS.

(a) **Amendment/Waiver.** This Agreement cannot be amended, modified or revised unless done in writing and signed by Landlord and Tenant. No provision may be waived except in a writing signed by both parties. The failure by a party to enforce any provision of this Agreement or to require performance by the other party will not be construed to be a waiver, or in any way affect the right of either party to enforce such provision thereafter.

(b) **Memorandum of Lease.** Contemporaneously with the execution of this Agreement, the parties may execute a recordable Memorandum of Lease substantially in the form attached as **Exhibit 24(b)**. Either party may record this Memorandum of Lease at any time during the Term, in its absolute discretion. Thereafter during the Term, either party will, at any time upon fifteen (15) business days' prior written notice from the other, execute, acknowledge and deliver to the other a recordable Memorandum of Lease.

(c) **Limitation of Liability.** Except for the indemnity obligations set forth in this Agreement, and otherwise notwithstanding anything to the contrary in this Agreement, Tenant and Landlord each waives any claims that each may have against the other with respect to consequential, incidental or special damages, however caused, based on any theory of liability.

(d) **Compliance with Law.** Tenant agrees to comply with all federal, state and local laws, orders, rules and regulations ("Laws") applicable to Tenant's use of the Communication Facility on the Property. Landlord agrees to comply with all Laws relating to Landlord's ownership and use of the Property and any improvements on the Property.

(e) **Bind and Benefit.** The terms and conditions contained in this Agreement will run with the Property and bind and inure to the benefit of the parties, their respective heirs, executors, administrators, successors and assigns.

(f) **Entire Agreement.** This Agreement and the exhibits attached hereto, all being a part hereof, constitute the entire agreement of the parties hereto and will supersede all prior offers, negotiations and agreements with respect to the subject matter of this Agreement. Exhibits are numbered to correspond to the Section wherein they are first referenced. Except as otherwise stated in this Agreement, each party shall bear its own fees and expenses (including the fees and expenses of its agents, brokers, representatives, attorneys, and accountants) incurred in connection with the negotiation, drafting, execution and performance of this Agreement and the transactions it contemplates.

(g) **Governing Law.** This Agreement will be governed by the laws of the state of Connecticut, without regard to conflicts of law.

(h) **Interpretation.** Unless otherwise specified, the following rules of construction and interpretation apply: (i) captions are for convenience and reference only and in no way define or limit the

construction of the terms and conditions hereof; (ii) use of the term "including" will be interpreted to mean "including but not limited to"; (iii) whenever a party's consent is required under this Agreement, except as otherwise stated in the Agreement or as same may be duplicative, such consent will not be unreasonably withheld, conditioned or delayed; (iv) exhibits are an integral part of this Agreement and are incorporated by reference into this Agreement; (v) use of the terms "termination" or "expiration" are interchangeable; (vi) reference to a default will take into consideration any applicable notice, grace and cure periods; (vii) to the extent there is any issue with respect to any alleged, perceived or actual ambiguity in this Agreement, the ambiguity shall not be resolved on the basis of who drafted the Agreement; (viii) the singular use of words includes the plural where appropriate; and (ix) if any provision of this Agreement is held invalid, illegal or unenforceable, the remaining provisions of this Agreement shall remain in full force if the overall purpose of the Agreement is not rendered impossible and the original purpose, intent or consideration is not materially impaired.

(i) **Affiliates.** All references to "Tenant" shall be deemed to include any Affiliate of New Cingular Wireless PCS, LLC using the Premises for any Permitted Use or otherwise exercising the rights of Tenant pursuant to this Agreement. "Affiliate" means with respect to a party to this Agreement, any person or entity that (directly or indirectly) controls, is controlled by, or under common control with, that party. "Control" of a person or entity means the power (directly or indirectly) to direct the management or policies of that person or entity, whether through the ownership of voting securities, by contract, by agency or otherwise.

(j) **Survival.** Any provisions of this Agreement relating to indemnification shall survive the termination or expiration hereof. In addition, any terms and conditions contained in this Agreement that by their sense and context are intended to survive the termination or expiration of this Agreement shall so survive.

(k) **W-9.** As a condition precedent to payment, Landlord agrees to provide Tenant with a completed IRS Form W-9, or its equivalent, upon execution of this Agreement and at such other times as may be reasonably requested by Tenant, including any change in Landlord's name or address.

(l) **Execution/No Option.** The submission of this Agreement to any party for examination or consideration does not constitute an offer, reservation of or option for the Premises based on the terms set forth herein. This Agreement will become effective as a binding Agreement only upon the handwritten legal execution, acknowledgment and delivery hereof by Landlord and Tenant. This Agreement may be executed in two (2) or more counterparts, all of which shall be considered one and the same agreement and shall become effective when one or more counterparts have been signed by each of the parties. All parties need not sign the same counterpart.

(m) **Attorneys' Fees.** Intentionally omitted.

(n) **WAIVER OF JURY TRIAL.** EACH PARTY, TO THE EXTENT PERMITTED BY LAW, KNOWINGLY, VOLUNTARILY AND INTENTIONALLY WAIVES ITS RIGHT TO A TRIAL BY JURY IN ANY ACTION OR PROCEEDING UNDER ANY THEORY OF LIABILITY ARISING OUT OF OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR THE TRANSACTIONS IT CONTEMPLATES.

(o) **No Additional Fees/Incidental Fees.** Unless otherwise specified in this Agreement, all rights and obligations set forth in the Agreement shall be provided by Landlord and/or Tenant, as the case may be, at no additional cost. No unilateral fees or additional costs or expenses are to be applied by either party to the other party, for any task or service including, but not limited to, review of plans, structural analyses, consents, provision of documents or other communications between the parties.

(p) **Further Acts.** Upon request, Landlord will cause to be promptly and duly taken, executed, acknowledged and delivered all such further acts, documents, and assurances as Tenant may request from time to time in order to effectuate, carry out and perform all of the terms, provisions and conditions of this Agreement and all transactions and permitted use contemplated by this Agreement.

[SIGNATURES APPEAR ON NEXT PAGE]

IN WITNESS WHEREOF, the parties have caused this Agreement to be effective as of the Effective Date.

“LANDLORD”

the State of Connecticut
City of Middletown
a municipal corporation and political subdivision of

By: _____
Print Name: _____
Its: _____ [Insert Title]
Date: _____ [Insert Date]

“TENANT”

New Cingular Wireless PCS, LLC,
a Delaware limited liability company

By: AT&T Mobility Corporation
Its: Manager

By: _____
Print Name: _____
Its: _____ [Insert Title]
Date: _____ [Insert Date]

[ACKNOWLEDGMENTS APPEAR ON NEXT PAGE]

LANDLORD ACKNOWLEDGMENT

State of Connecticut

County _____

1. Individual:

On this ____ day of _____, 20 __, before me personally appeared Benjamin Florsheim, Mayor of the City of Middletown, , to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he/she/they executed the same as his/her/their free act and deed.

Notary Public

Print Name: _____

My commission expires: _____

TENANT ACKNOWLEDGMENT

State of Massachusetts

County _____

On this _____ day of _____, 20 __, before me personally appeared _____ (or _____ and _____), to me known to be the person (or persons) described in and who executed the foregoing instrument, and acknowledged that he/she/they executed the same as his/her/their free act and deed.

Notary Public

Print Name: _____

My commission expires: _____

EXHIBIT 1
DESCRIPTION OF PROPERTY AND PREMISES

Page 1 of 2

to the Option and Land Lease Agreement dated [Insert Date], 2021, by and between City of Middletown, a municipal corporation and subdivision of the State of Connecticut, as Landlord, and New Cingular Wireless PCS, LLC, a Delaware limited liability company, as Tenant.

The Property is legally described as follows:

The Premises are described and/or depicted as follows:

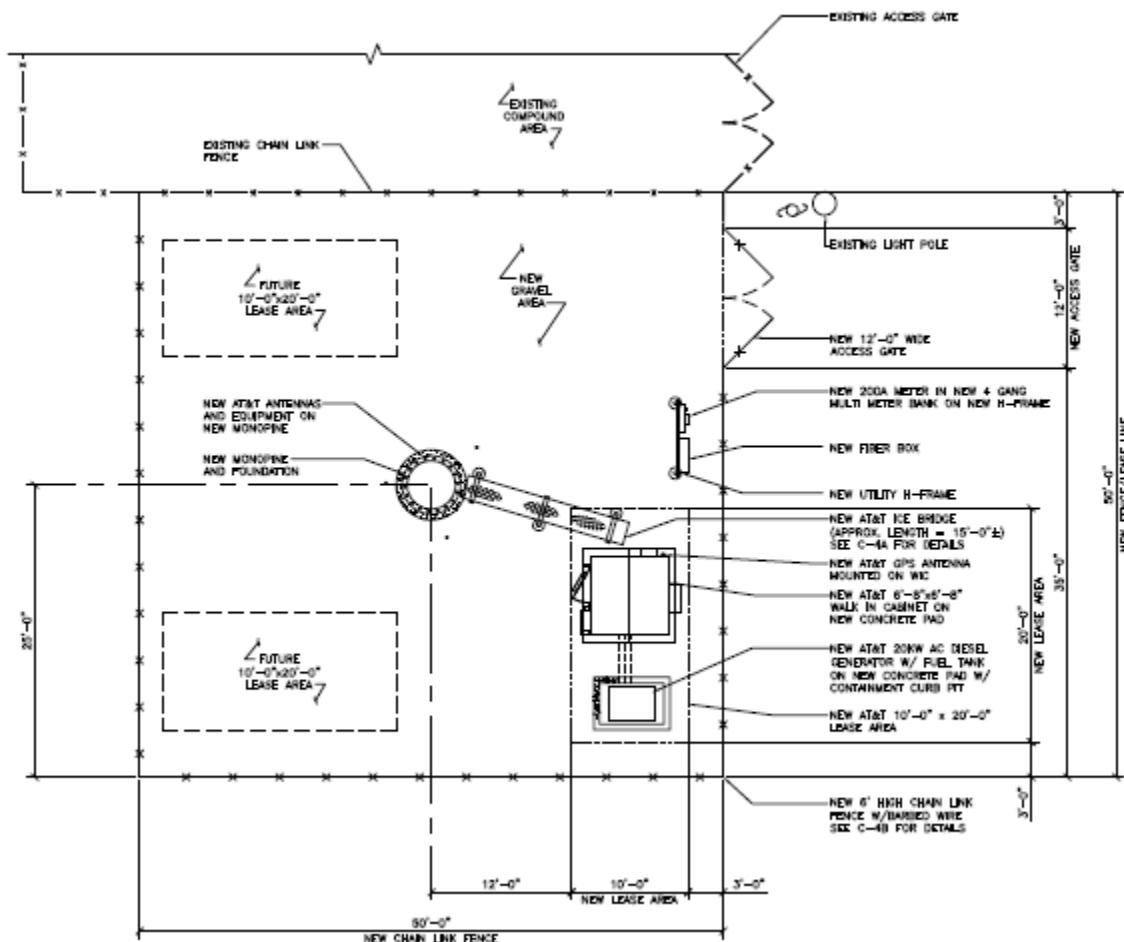
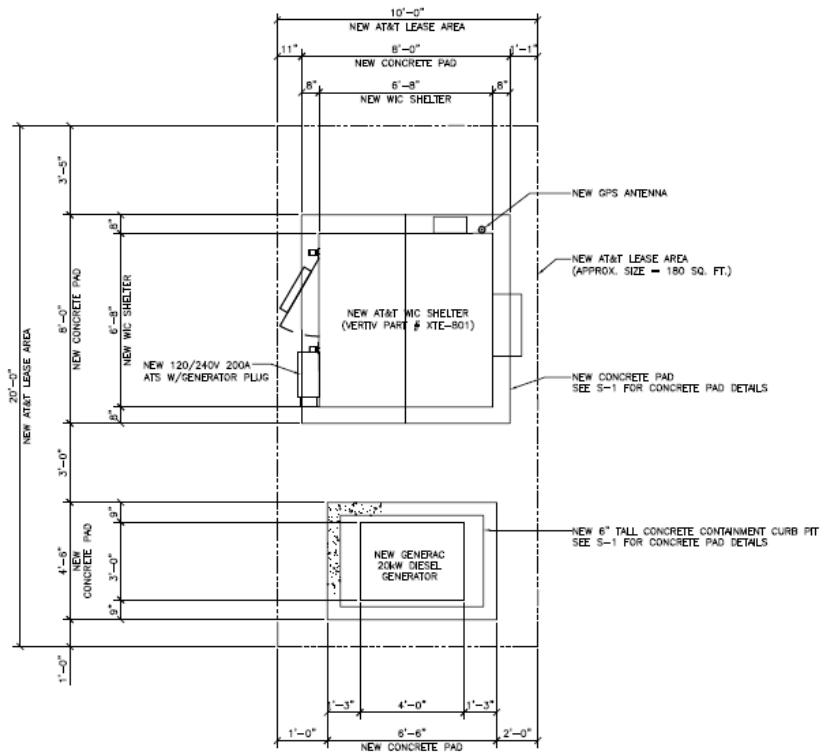


EXHIBIT 1
DESCRIPTION OF PROPERTY AND PREMISES

Page 2 of 2



Notes:

1. THIS EXHIBIT MAY BE REPLACED BY A LAND SURVEY AND/OR CONSTRUCTION DRAWINGS OF THE PREMISES ONCE RECEIVED BY TENANT.
2. ANY SETBACK OF THE PREMISES FROM THE PROPERTY'S BOUNDARIES SHALL BE THE DISTANCE REQUIRED BY THE APPLICABLE GOVERNMENT AUTHORITIES.
3. WIDTH OF ACCESS ROAD SHALL BE THE WIDTH REQUIRED BY THE APPLICABLE GOVERNMENT AUTHORITIES, INCLUDING POLICE AND FIRE DEPARTMENTS.
4. THE TYPE, NUMBER AND MOUNTING POSITIONS AND LOCATIONS OF ANTENNAS AND TRANSMISSION LINES ARE ILLUSTRATIVE ONLY. ACTUAL TYPES, NUMBERS AND MOUNTING POSITIONS MAY VARY FROM WHAT IS SHOWN ABOVE.

EXHIBIT 2

EXHIBIT 11
ENVIRONMENTAL DISCLOSURE

Landlord represents and warrants that the Property, as of the Effective Date, is free of hazardous substances except as follows:

[INSERT AS APPLICABLE]

EXHIBIT 12
STANDARD ACCESS LETTER
[FOLLOWS ON NEXT PAGE]

{This Letter Goes On Landlord's Letterhead}

[Insert Date]

Building Staff / Security Staff
City of Middletown
245 deKoven Drive
Middletown, CT 06457

Re: Authorized Access granted to AT&T

Dear Building and Security Staff,

Please be advised that we have signed a lease with [] permitting [] to install, operate and maintain telecommunications equipment at the property. The terms of the lease grant [] and its representatives, employees, agents and subcontractors ("representatives") 24 hour per day, 7 day per week access to the leased area.

To avoid impact on telephone service during the day, [] representatives may be seeking access to the property outside of normal business hours. [] representatives have been instructed to keep noise levels at a minimum during their visit.

Please grant the bearer of a copy of this letter access to the property and to leased area. Thank you for your assistance.

Landlord Signature

EXHIBIT 24(b)
MEMORANDUM OF LEASE
[FOLLOWS ON NEXT PAGE]

**MEMORANDUM
OF
LEASE**

This Memorandum of Lease is entered into on this day of , 20 , by and City of Middletown between , a municipal corporation and subdivision of the State of Connecticut having its principal office/residing at 245 deKoven Drive Middletown, CT 06457 (hereinafter called "**Landlord**"), and New Cingular Wireless PCS, LLC, a Delaware limited liability company, having a mailing address of 1025 Lenox Park Blvd NE, 3rd Floor, Atlanta, GA 30319 ("Tenant").

1. Landlord and Tenant entered into a certain Land Lease Agreement ("Agreement") on the day of , 20 , for the purpose of installing, operating and maintaining a communication facility and other improvements. All of the foregoing is set forth in the Agreement.
2. The initial lease term will be five (5) years commencing on the Effective Date, with five (5) successive automatic five (5) year options to renew.
3. The portion of the land being leased to Tenant and associated easements are described in **Exhibit 1** annexed hereto.
4. This Memorandum of Lease is not intended to amend or modify, and shall not be deemed or construed as amending or modifying, any of the terms, conditions or provisions of the Agreement, all of which are hereby ratified and affirmed. In the event of a conflict between the provisions of this Memorandum of Lease and the provisions of the Agreement, the provisions of the Agreement shall control. The Agreement shall be binding upon and inure to the benefit of the parties and their respective heirs, successors, and assigns, subject to the provisions of the Agreement.
5. The Agreement shall be on file in the Office of the Town and City Clerk of the City of Middletown.

IN WITNESS WHEREOF, the parties have executed this Memorandum of Lease as of the day and year first above written.

LANDLORD:

City of Middletown, a
a municipal corporation and subdivision of the State
of Connecticut

By: _____
Print Name: _____
Its: _____ [Insert Title]
Date: _____ [Insert Date]

TENANT:

New Cingular Wireless PCS, LLC,
a Delaware limited liability company

By: _____
Print Name: _____
Its: _____ [Insert Title]
Date: _____ [Insert Date]

[ACKNOWLEDGMENTS APPEAR ON NEXT PAGE]

ACKNOWLEDGEMENTS

LANDLORD ACKNOWLEDGMENT

State of Connecticut

County _____

1. Individual:

On this ____ day of _____, 20____, before me personally appeared Benjamin Florsheim, Mayor of the City of Middletown, , to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he/she/they executed the same as his/her/their free act and deed.

Notary Public

Print Name: _____

My commission expires: _____

TENANT ACKNOWLEDGMENT

State of Massachusetts

County _____

On this _____ day of _____, 20 ___, before me personally appeared _____ (or _____ and _____), to me known to be the person (or persons) described in and who executed the foregoing instrument, and acknowledged that he/she/they executed the same as his/her/their free act and deed.

Notary Public

Print Name: _____

My commission expires: _____

EXHIBIT 1 TO MEMORANDUM OF LEASE

DESCRIPTION OF PROPERTY AND PREMISES

Page of

to the Memorandum of Lease dated , 20 , by and between City of Middletown, a municipal corporation and subdivision of the State of Connecticut, as Landlord, and New Cingular Wireless PCS, LLC, a Delaware limited liability company, as Tenant.

The Property is legally described as follows:

The Premises are described and/or depicted as follows:

W-9 FORM

[FOLLOWS ON NEXT PAGE]

Request for Taxpayer Identification Number and Certification

► Go to www.irs.gov/FormW9 for instructions and the latest information.

Give Form to the requester. Do not send to the IRS.

Print or type.
 See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.						
2 Business name/disregarded entity name, if different from above						
3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes.						
<input type="checkbox"/> Individual/sole proprietor or <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate single-member LLC <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ► _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner. <input type="checkbox"/> Other (see instructions) ► _____						
5 Address (number, street, and apt. or suite no.) See instructions.	Requester's name and address (optional)					
6 City, state, and ZIP code						
7 List account number(s) here (optional)						

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number						
<input type="text"/>	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	<input type="text"/>
or						
Employer identification number						
<input type="text"/>	-	<input type="text"/>				

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person ►	Date ►
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

*If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding, later.**