

# STRUCTURAL ANALYSIS REPORT

For

**FA NUMBER: 10071211**  
**SITE NUMBER: CTL05626**  
**SITE NAME: PROSPECT NORTH**

151 WATERBURY ROAD  
PROSPECT, CT 06712

## Antennas Mounted to the Monopole



Prepared for:

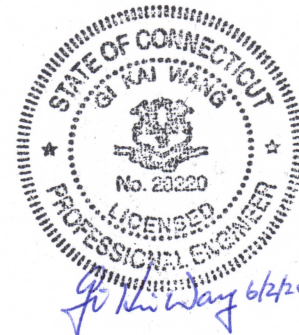


Dated: June 2, 2016

Prepared by:



1600 Osgood Street Bldg. 20N Suite 3090  
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### **SCOPE OF WORK:**

Hudson Design Group LLC (HDG) has been authorized by AT&T to conduct a structural evaluation of the 150' monopole supporting the proposed AT&T's antennas located at elevation 154' above ground level.

This report represents this office's findings, conclusions and recommendations pertaining to the support of AT&T's existing and proposed antennas listed below.

Record drawings of the existing monopole were not available for our use. The previous structural analysis report prepared by GPD Group, dated May 17, 2012, was available and obtained for our use. The previous structural analysis report prepared by American Tower Corporation, dated May 10, 2016, was also available for our use.

### **CONCLUSION SUMMARY:**

Based on our evaluation, we have determined that the existing monopole and foundation are in conformance with the ANSI/TIA-222-F Standard for the loading considered under the criteria listed in this report. The monopole structure is rated at 99.2% - (Pole section L7 from EL.20' to EL.40' Controlling).



**APPURTENANCES CONFIGURATION:**

Tenant	Appurtenances	Elev.	Mount
<i>AT&amp;T</i>	(3) 7770 Antennas	154'	Low Profile Platform
<i>AT&amp;T</i>	(2) SBNH-1D6565C Antennas	154'	Low Profile Platform
<i>AT&amp;T</i>	(1) AM-X-CD-16-65 Antenna	154'	Low Profile Platform
<i>AT&amp;T</i>	(3) RRUS-11	154'	Low Profile Platform
<i>AT&amp;T</i>	(3) RRUS-12	154'	Low Profile Platform
<i>AT&amp;T</i>	(6) TT08-19DB111-001 TMA	154'	Low Profile Platform
<i>AT&amp;T</i>	(1) DC6-48-60-18-8F	154'	Low Profile Platform
<i>AT&amp;T</i>	<b>(3) HPA-65R-BUU-H8 Antennas</b>	154'	Low Profile Platform
<i>AT&amp;T</i>	<b>(3) RRUS-32</b>	154'	Low Profile Platform
<i>AT&amp;T</i>	<b>(1) DC6-48-60-18-8F</b>	154'	Low Profile Platform
	(3) AIR21 B2A B4P Antennas	138'	Low Profile Platform
	(3) AIR21 B4A B2P Antennas	138'	Low Profile Platform
	(3) LNX-6515DS-VTM Antennas	138'	Low Profile Platform
	(3) RRUS-11	137'	Low Profile Platform
	(3) KRY 112 144/1	137'	Low Profile Platform

*\*Proposed AT&T Appurtenances shown in Bold.*

**AT&T EXISTING/PROPOSED COAX CABLES:**

Tenant	Coax Cables	Elev.	Mount
<i>AT&amp;T</i>	(12) 1 5/8" Cables	150'	Inside Monopole
<i>AT&amp;T</i>	(1) Fiber Cable	150'	Inside Monopole
<i>AT&amp;T</i>	(2) DC Power Cables	150'	Inside Monopole
<i>AT&amp;T</i>	<b>(1) Fiber Cable</b>	150'	Inside Monopole
<i>AT&amp;T</i>	<b>(2) DC Power Cables</b>	150'	Inside Monopole

*\*Proposed AT&T Coax Cables shown in Bold.*



**ANALYSIS RESULTS SUMMARY:**

Component	Max. Stress Ratio	Elev. of Component (ft)	Pass/Fail	Notes/Comments
Pole Section-L1	39.6 %	130 – 150	PASS	
Pole Section-L2	42.0 %	115 – 130	PASS	
Pole Section-L3	66.3 %	100 – 115	PASS	
Pole Section-L4	78.9 %	80 – 100	PASS	
Pole Section-L5	87.8 %	60 – 80	PASS	
Pole Section-L6	94.3 %	40 – 60	PASS	
Pole Section-L7	<b>99.2 %</b>	20 – 40	PASS	<b>Controlling</b>
Pole Section-L8	86.9 %	0 – 20	PASS	



**DESIGN CRITERIA:**

1. EIA/TIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

City/Town: Prospect  
County: New Haven  
Wind Load: 85 mph (fastest mile)  
                  105 mph (3 second gust)  
Nominal Ice Thickness: 1/2 inch

2. Approximate height above grade to proposed antennas: 154'

\*Calculations and referenced documents are attached\*

**ASSUMPTIONS:**

1. The monopole dimensions, member sizes and strength of material are as indicated in the previous structural analysis report prepared by GPD Group, dated May 17, 2012.
2. The existing appurtenances configuration is as stated in the previous structural analysis report prepared by American Tower Corporation, dated May 10, 2016. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.
3. The monopole and foundation are properly constructed and maintained. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.
4. The support mounts and platforms are not analyzed and are considered adequate to the support the loading. The analysis is limited to the primary support structure itself.
5. All prior structural modification, if any, are assumed to be as per the data supplied (if available), and installed properly.



**SUPPORT RECOMMENDATIONS:**

HDG recommends that the proposed antennas, RRHs and surge arrestor be mounted on the existing steel platform supported by the monopole.

**ONGOING AND PERIODIC INSPECTION AND MAINTENANCE:**

After the Contractor has successfully completed the installation and the work has been accepted, the Owner will be responsible for the ongoing and periodic inspection and maintenance of the monopole.

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire monopole structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.



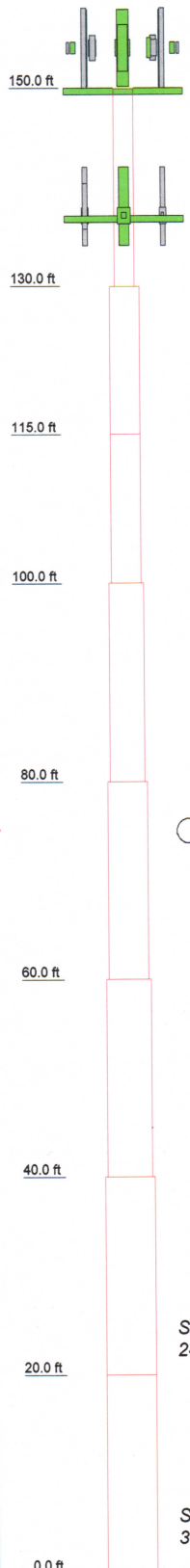
**Photo 1:** Photo illustrating the monopole with Appurtenances shown.



CALCULATIONS



Section	Size	Length (ft)	Grade	Weight (lb)
1	P24x3/8	20.00	A139-45	1894.2
2	P36x3/8	15.00	A139-45	2142.2
3	P36x3/8	15.00	A139-45	2142.2
4	P42x3/8	20.00	A139-45	3337.3
5	P48x3/8	20.00	A139-45	3818.4
6	P54x3/8	20.00	A139-45	4299.5
7	P60x3/8	20.00	A139-45	4780.5
8	P60x1/2	20.00	A139-45	6380.7
				28775.0



### DESIGNED APPURTENANCE LOADING

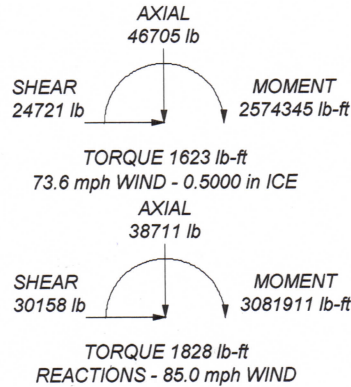
TYPE	ELEVATION	TYPE	ELEVATION
Powerwave 7770 w/mount pipe	154	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	138
Powerwave 7770 w/mount pipe	154	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	138
Powerwave 7770 w/mount pipe	154	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	138
SBNH-1D6565C w/ Mount Pipe	154	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	138
SBNH-1D6565C w/ Mount Pipe	154	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	138
KMW AM-X-CD-16-65-00T-RET w/mount pipe	154	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	138
Ericsson RRUS-11	154	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	138
Ericsson RRUS-11	154	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	138
Ericsson RRUS-11	154	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	138
Ericsson RRUS-12	154	Andrew LNX-6515DS-VTM w/mount pipe	138
Ericsson RRUS-12	154	Andrew LNX-6515DS-VTM w/mount pipe	138
Ericsson RRUS-12	154	Andrew LNX-6515DS-VTM w/mount pipe	138
(2) Powerwave TT08-19DB111-001	154	Andrew LNX-6515DS-VTM w/mount pipe	138
(2) Powerwave TT08-19DB111-001	154	Andrew LNX-6515DS-VTM w/mount pipe	138
(2) Powerwave TT08-19DB111-001	154	Andrew LNX-6515DS-VTM w/mount pipe	138
Surge Arrestor DC6-48-60-18-8F	154	PIROD 13' Low Profile Platform (T-Mobile)	137
HPA-65R-BUU-H8 w/mount pipe (ATI - Proposed)	154	RRUS 11	137
HPA-65R-BUU-H8 w/mount pipe	154	RRUS 11	137
HPA-65R-BUU-H8 w/mount pipe	154	RRUS 11	137
Ericsson RRUS-32	154	KRY 112 144/1	137
Ericsson RRUS-32	154	KRY 112 144/1	137
Ericsson RRUS-32	154	KRY 112 144/1	137
Surge Arrestor DC6-48-60-18-8F	154		
PIROD 13' Low Profile Platform (ATI - Existing)	150		

### MATERIAL STRENGTH


GRADE	Fy	Fu	GRADE	Fy	Fu
A139-45	45 ksi	60 ksi			

### TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85.0 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 73.6 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50.0 mph wind.
5. TOWER RATING: 99.2%



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	Project: <b>150 ft Monopole</b>			Client: <b>AT&amp;T</b>	Drawn by: <b>KW</b>	App'd:
			Code: <b>TIA/EIA-222-F</b>	Date: <b>06/02/16</b>	Scale: <b>NTS</b>	
			Path:		Dwg No. <b>E-1</b>	

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	<b>Client</b>	AT&T	<b>Designed by</b>	kw

## Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

Basic wind speed of 85.0 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56.0 pcf.

A wind speed of 73.6 mph is used in combination with ice.

Temperature drop of 50.0 °F.

Deflections calculated using a wind speed of 50.0 mph.

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

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

## Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	150.00-130.00	20.00	P24x3/8	A139-45 (45 ksi)	
L2	130.00-115.00	15.00	P36x3/8	A139-45 (45 ksi)	
L3	115.00-100.00	15.00	P36x3/8	A139-45 (45 ksi)	
L4	100.00-80.00	20.00	P42x3/8	A139-45 (45 ksi)	
L5	80.00-60.00	20.00	P48x3/8	A139-45 (45 ksi)	
L6	60.00-40.00	20.00	P54x3/8	A139-45 (45 ksi)	
L7	40.00-20.00	20.00	P60x3/8	A139-45 (45 ksi)	
L8	20.00-0.00	20.00	P60x1/2	A139-45 (45 ksi)	

## Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
step rungs	C	Surface Ar (CaAa)	150.00 - 8.00	1	1	0.000 0.000	12.0000		1.00
Safety Line 3/8	C	Surface Ar (CaAa)	150.00 - 8.00	1	1	0.000 0.000	0.3750		0.22

## Feed Line/Linear Appurtenances - Entered As Area



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<b>Project</b>	150 ft Monopole	<b>Date</b>	14:03:40 06/02/16
<b>Client</b>	AT&T	<b>Designed by</b>	kw

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
1 5/8	C	No	Inside Pole	137.00 - 8.00	18	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 1/4	C	No	Inside Pole	137.00 - 8.00	1	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
*****								
1 5/8 (AT&T - existing)	B	No	Inside Pole	150.00 - 8.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
FB-L98B-002	B	No	Inside Pole	150.00 - 8.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
WR-VG122ST-BRDA	B	No	Inside Pole	150.00 - 8.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
*****								
FB-L98B-002 (AT&T - proposed)	B	No	Inside Pole	150.00 - 8.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
WR-VG122ST-BRDA	B	No	Inside Pole	150.00 - 8.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight lb
PiROD 13' Low Profile Platform (AT&T - Existing)	A	None		0.0000	150.00	No Ice	15.70	15.70	1300.00
						1/2" Ice	20.10	20.10	1765.00
Powerwave 7770 w/mount pipe	A	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice	6.02	4.10	57.25
						1/2" Ice	6.47	4.75	103.17
Powerwave 7770 w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice	6.02	4.10	57.25
						1/2" Ice	6.47	4.75	103.17
Powerwave 7770 w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice	6.02	4.10	57.25
						1/2" Ice	6.47	4.75	103.17
SBNH-1D6565C w/ Mount Pipe	A	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice	11.68	9.84	99.07
						1/2" Ice	12.40	11.37	188.73
SBNH-1D6565C w/ Mount Pipe	B	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice	11.68	9.84	99.07
						1/2" Ice	12.40	11.37	188.73
KMW AM-X-CD-16-65-00T-RET w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice	8.50	6.30	74.05
						1/2" Ice	9.15	7.48	139.04
Ericsson RRUS-11	A	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice	3.26	1.38	50.70
						1/2" Ice	3.50	1.56	71.57
Ericsson RRUS-11	B	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice	3.26	1.38	50.70
						1/2" Ice	3.50	1.56	71.57
Ericsson RRUS-11	C	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice	3.26	1.38	50.70
						1/2" Ice	3.50	1.56	71.57



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<b>Project</b>	150 ft Monopole	<b>Date</b>	14:03:40 06/02/16
<b>Client</b>	AT&T	<b>Designed by</b>	kw

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb	
Ericsson RRUS-12	A	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.67 3.93	1.49 1.67	58.00 81.22	
Ericsson RRUS-12	B	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.67 3.93	1.49 1.67	58.00 81.22	
Ericsson RRUS-12	C	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.67 3.93	1.49 1.67	58.00 81.22	
(2) Powerwave TT08-19DB111-001	A	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 0.92 1.06	0.75 0.88	22.00 29.63	
(2) Powerwave TT08-19DB111-001	B	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 0.92 1.06	0.75 0.88	22.00 29.63	
(2) Powerwave TT08-19DB111-001	C	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 0.92 1.06	0.75 0.88	22.00 29.63	
Surge Arrestor DC6-48-60-18-8F	B	From Leg	2.00 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 1.27 1.46	1.27 1.46	20.00 35.12	
*****									
HPA-65R-BUU-H8 w/mount pipe (AT&T - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 13.67 14.50	10.10 11.61	120.11 221.82	
HPA-65R-BUU-H8 w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 13.67 14.50	10.10 11.61	120.11 221.82	
HPA-65R-BUU-H8 w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 13.67 14.50	10.10 11.61	120.11 221.82	
Ericsson RRUS-32	A	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.87 4.15	2.76 3.02	77.00 104.93	
Ericsson RRUS-32	B	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.87 4.15	2.76 3.02	77.00 104.93	
Ericsson RRUS-32	C	From Face	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.87 4.15	2.76 3.02	77.00 104.93	
Surge Arrestor DC6-48-60-18-8F	A	From Leg	2.50 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 1.27 1.46	1.27 1.46	20.00 35.12	
*****									
PiROD 13' Low Profile Platform (T-Mobile)	C	None		0.0000	137.00	No Ice 1/2" Ice 15.70 20.10	15.70 20.10	1300.00 1765.00	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	3.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice 6.85 7.41	5.78 6.70	104.90 162.69	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	3.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice 6.85 7.41	5.78 6.70	104.90 162.69	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	3.50 0.00 0.00	0.0000	138.00	No Ice 1/2" Ice 6.85 7.41	5.78 6.70	104.90 162.69	
ERICSSON AIR 21 B4A	A	From Face	3.50	0.0000	138.00	No Ice 6.92	5.75	112.30	



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<b>Client</b>	AT&T	<b>Designed by</b>	kw

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			ft ft ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
B2P w/ Mount Pipe			0.00		1/2" Ice	7.48	6.66	170.21	
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	3.50	0.0000	138.00	No Ice 1/2" Ice	6.92 7.48	5.75 6.66	112.30 170.21
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	3.50	0.0000	138.00	No Ice 1/2" Ice	6.92 7.48	5.75 6.66	112.30 170.21
Andrew LNX-6515DS-VTM w/mount pipe	A	From Face	3.50	0.0000	138.00	No Ice 1/2" Ice	11.72 12.44	10.28 11.81	102.41 196.22
Andrew LNX-6515DS-VTM w/mount pipe	B	From Face	3.50	0.0000	138.00	No Ice 1/2" Ice	11.72 12.44	10.28 11.81	102.41 196.22
Andrew LNX-6515DS-VTM w/mount pipe	C	From Face	3.50	0.0000	138.00	No Ice 1/2" Ice	11.72 12.44	10.28 11.81	102.41 196.22
RRUS 11	A	From Face	3.50	0.0000	137.00	No Ice 1/2" Ice	3.25 3.49	1.37 1.55	50.70 71.50
RRUS 11	B	From Face	3.50	0.0000	137.00	No Ice 1/2" Ice	3.25 3.49	1.37 1.55	50.70 71.50
RRUS 11	C	From Face	3.50	0.0000	137.00	No Ice 1/2" Ice	3.25 3.49	1.37 1.55	50.70 71.50
KRY 112 144/1	A	From Face	3.50	0.0000	137.00	No Ice 1/2" Ice	0.41 0.50	0.20 0.27	11.00 14.18
KRY 112 144/1	B	From Face	3.50	0.0000	137.00	No Ice 1/2" Ice	0.41 0.50	0.20 0.27	11.00 14.18
KRY 112 144/1	C	From Face	3.50	0.0000	137.00	No Ice 1/2" Ice	0.41 0.50	0.20 0.27	11.00 14.18

## Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice



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<b>Job</b>	CT5626 PROSPECT, CT	<b>Page</b>	5 of 8
<b>Project</b>	150 ft Monopole	<b>Date</b>	14:03:40 06/02/16
<b>Client</b>	AT&T	<b>Designed by</b>	kw

Comb. No.	Description
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	21	46704.71	0.00	-24721.03
	Max. H <sub>x</sub>	11	38710.69	30141.03	-0.00
	Max. H <sub>z</sub>	2	38710.69	-0.00	30158.13
	Max. M <sub>x</sub>	2	3081421.90	-0.00	30158.13
	Max. M <sub>z</sub>	5	3079032.57	-30141.03	-0.00
	Max. Torsion	11	1828.21	30141.03	-0.00
	Min. Vert	33	38710.69	0.00	-10435.34
	Min. H <sub>x</sub>	5	38710.69	-30141.03	-0.00
	Min. H <sub>z</sub>	8	38710.69	-0.00	-30158.13
	Min. M <sub>x</sub>	8	-3081910.56	-0.00	-30158.13
	Min. M <sub>z</sub>	11	-3078925.03	30141.03	-0.00
	Min. Torsion	5	-1828.21	-30141.03	-0.00

### Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> lb-ft	Overturning Moment, M <sub>z</sub> lb-ft	Torque lb-ft
Dead Only	38710.69	0.00	0.00	242.20	-51.96	0.00
Dead+Wind 0 deg - No Ice	38710.69	0.00	-30158.13	-3081421.90	-53.51	161.76
Dead+Wind 30 deg - No Ice	38710.69	15070.51	-26117.70	-2668558.36	-1539541.77	1053.30
Dead+Wind 60 deg - No Ice	38710.69	26102.89	-15079.06	-1540591.05	-2666526.96	1663.26
Dead+Wind 90 deg - No Ice	38710.69	30141.03	0.00	243.09	-3079032.57	1828.21



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Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturning Moment, M <sub>x</sub>	Overturning Moment, M <sub>z</sub>	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 120 deg - No Ice	38710.69	26102.89	15079.06	1541077.85	-2666528.04	1503.29
Dead+Wind 150 deg - No Ice	38710.69	15070.51	26117.70	2669046.40	-1539542.85	774.91
Dead+Wind 180 deg - No Ice	38710.69	0.00	30158.13	3081910.56	-53.51	-161.76
Dead+Wind 210 deg - No Ice	38710.69	-15070.51	26117.70	2669046.18	1539435.71	-1055.09
Dead+Wind 240 deg - No Ice	38710.69	-26102.89	15079.06	1541077.62	2666420.64	-1665.05
Dead+Wind 270 deg - No Ice	38710.69	-30141.03	0.00	243.09	3078925.03	-1828.21
Dead+Wind 300 deg - No Ice	38710.69	-26102.89	-15079.06	-1540590.83	2666419.56	-1501.50
Dead+Wind 330 deg - No Ice	38710.69	-15070.51	-26117.70	-2668558.14	1539434.63	-773.12
Dead+Ice+Temp	46704.71	0.00	0.00	2809.40	-91.23	0.00
Dead+Wind 0 deg+Ice+Temp	46704.71	-0.00	-24721.03	-2568596.67	-95.34	141.25
Dead+Wind 30 deg+Ice+Temp	46704.71	12349.02	-21409.04	-2224085.47	-1284011.33	933.04
Dead+Wind 60 deg+Ice+Temp	46704.71	21389.13	-12360.51	-1282862.06	-2223904.13	1475.57
Dead+Wind 90 deg+Ice+Temp	46704.71	24698.04	-0.00	2874.47	-2567929.09	1623.47
Dead+Wind 120 deg+Ice+Temp	46704.71	21389.13	12360.51	1288610.91	-2223903.97	1336.36
Dead+Wind 150 deg+Ice+Temp	46704.71	12349.02	21409.04	2229834.13	-1284011.17	690.43
Dead+Wind 180 deg+Ice+Temp	46704.71	-0.00	24721.03	2574345.23	-95.33	-141.26
Dead+Wind 210 deg+Ice+Temp	46704.71	-12349.02	21409.04	2229833.93	1283820.38	-935.09
Dead+Wind 240 deg+Ice+Temp	46704.71	-21389.13	12360.51	1288610.72	2223712.96	-1477.63
Dead+Wind 270 deg+Ice+Temp	46704.71	-24698.04	-0.00	2874.47	2567737.96	-1623.49
Dead+Wind 300 deg+Ice+Temp	46704.71	-21389.13	-12360.51	-1282861.87	2223713.11	-1334.33
Dead+Wind 330 deg+Ice+Temp	46704.71	-12349.02	-21409.04	-2224085.27	1283820.54	-688.40
Dead+Wind 0 deg - Service	38710.69	-0.00	-10435.34	-1066414.89	-53.82	56.13
Dead+Wind 30 deg - Service	38710.69	5214.71	-9037.27	-923509.70	-532917.90	365.04
Dead+Wind 60 deg - Service	38710.69	9032.14	-5217.67	-533085.35	-923001.57	576.22
Dead+Wind 90 deg - Service	38710.69	10429.42	-0.00	244.37	-1065782.19	633.07
Dead+Wind 120 deg - Service	38710.69	9032.14	5217.67	533574.17	-923001.70	520.30
Dead+Wind 150 deg - Service	38710.69	5214.71	9037.27	923998.66	-532918.03	268.03
Dead+Wind 180 deg - Service	38710.69	-0.00	10435.34	1066903.93	-53.82	-56.13
Dead+Wind 210 deg - Service	38710.69	-5214.71	9037.27	923998.64	532810.36	-365.26
Dead+Wind 240 deg - Service	38710.69	-9032.14	5217.67	533574.14	922894.01	-576.43
Dead+Wind 270 deg - Service	38710.69	-10429.42	-0.00	244.37	1065674.48	-633.08
Dead+Wind 300 deg - Service	38710.69	-9032.14	-5217.67	-533085.32	922893.88	-520.09
Dead+Wind 330 deg - Service	38710.69	-5214.71	-9037.27	-923509.67	532810.23	-267.82

## 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	-38710.69	0.00	0.00	38710.69	0.00	0.000%
2	0.00	-38710.69	-30158.13	-0.00	38710.69	30158.13	0.000%
3	15070.51	-38710.69	-26117.70	-15070.51	38710.69	26117.70	0.000%
4	26102.89	-38710.69	-15079.06	-26102.89	38710.69	15079.06	0.000%
5	30141.02	-38710.69	0.00	-30141.03	38710.69	-0.00	0.000%
6	26102.89	-38710.69	15079.06	-26102.89	38710.69	-15079.06	0.000%
7	15070.51	-38710.69	26117.70	-15070.51	38710.69	-26117.70	0.000%
8	0.00	-38710.69	30158.13	-0.00	38710.69	-30158.13	0.000%
9	-15070.51	-38710.69	26117.70	15070.51	38710.69	-26117.70	0.000%
10	-26102.89	-38710.69	15079.06	26102.89	38710.69	-15079.06	0.000%
11	-30141.02	-38710.69	0.00	30141.03	38710.69	-0.00	0.000%
12	-26102.89	-38710.69	-15079.06	26102.89	38710.69	15079.06	0.000%
13	-15070.51	-38710.69	-26117.70	15070.51	38710.69	26117.70	0.000%
14	0.00	-46704.71	0.00	0.00	46704.71	0.00	0.000%
15	0.00	-46704.71	-24721.02	0.00	46704.71	24721.03	0.000%
16	12349.02	-46704.71	-21409.03	-12349.02	46704.71	21409.04	0.000%
17	21389.13	-46704.71	-12360.51	-21389.13	46704.71	12360.51	0.000%
18	24698.03	-46704.71	0.00	-24698.04	46704.71	0.00	0.000%



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<b>Client</b>	AT&T	<b>Designed by</b>	kw

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
19	21389.13	-46704.71	12360.51	-21389.13	46704.71	-12360.51	0.000%
20	12349.02	-46704.71	21409.03	-12349.02	46704.71	-21409.04	0.000%
21	0.00	-46704.71	24721.02	0.00	46704.71	-24721.03	0.000%
22	-12349.02	-46704.71	21409.03	12349.02	46704.71	-21409.04	0.000%
23	-21389.13	-46704.71	12360.51	21389.13	46704.71	-12360.51	0.000%
24	-24698.03	-46704.71	0.00	24698.04	46704.71	0.00	0.000%
25	-21389.13	-46704.71	-12360.51	21389.13	46704.71	12360.51	0.000%
26	-12349.02	-46704.71	-21409.03	12349.02	46704.71	21409.04	0.000%
27	0.00	-38710.69	-10435.34	0.00	38710.69	10435.34	0.000%
28	5214.71	-38710.69	-9037.27	-5214.71	38710.69	9037.27	0.000%
29	9032.14	-38710.69	-5217.67	-9032.14	38710.69	5217.67	0.000%
30	10429.42	-38710.69	0.00	-10429.42	38710.69	0.00	0.000%
31	9032.14	-38710.69	5217.67	-9032.14	38710.69	-5217.67	0.000%
32	5214.71	-38710.69	9037.27	-5214.71	38710.69	-9037.27	0.000%
33	0.00	-38710.69	10435.34	0.00	38710.69	-10435.34	0.000%
34	-5214.71	-38710.69	9037.27	5214.71	38710.69	-9037.27	0.000%
35	-9032.14	-38710.69	5217.67	9032.14	38710.69	-5217.67	0.000%
36	-10429.42	-38710.69	0.00	10429.42	38710.69	0.00	0.000%
37	-9032.14	-38710.69	-5217.67	9032.14	38710.69	5217.67	0.000%
38	-5214.71	-38710.69	-9037.27	5214.71	38710.69	9037.27	0.000%

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 130	16.9890	33	1.0276	0.0008
L2	130 - 115	12.8358	33	0.9258	0.0004
L3	115 - 100	10.0241	33	0.8564	0.0005
L4	100 - 80	7.5088	33	0.7359	0.0005
L5	80 - 60	4.7334	33	0.5777	0.0004
L6	60 - 40	2.6208	33	0.4221	0.0003
L7	40 - 20	1.1498	33	0.2733	0.0002
L8	20 - 0	0.2877	33	0.1327	0.0001

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
154.00	Powerwave 7770 w/mount pipe	33	16.9890	1.0276	0.0008	32218
150.00	PIROD 13' Low Profile Platform	33	16.9890	1.0276	0.0008	32218
138.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	33	14.4592	0.9633	0.0004	13424
137.00	PIROD 13' Low Profile Platform	33	14.2523	0.9583	0.0004	12391

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P <sub>allow</sub> lb	% Capacity	Pass Fail
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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P <sub>allow</sub> lb	% Capacity	Pass Fail	
L1	150 - 130	Pole	P24x3/8	1	-6996.41	1001721.47	39.6	Pass	
L2	130 - 115	Pole	P36x3/8	2	-9613.73	1392811.65	42.0	Pass	
L3	115 - 100	Pole	P36x3/8	3	-12291.10	1392811.65	66.3	Pass	
L4	100 - 80	Pole	P42x3/8	4	-16376.10	1562995.76	78.9	Pass	
L5	80 - 60	Pole	P48x3/8	5	-20983.30	1733033.23	87.8	Pass	
L6	60 - 40	Pole	P54x3/8	6	-26107.40	1902977.39	94.3	Pass	
L7	40 - 20	Pole	P60x3/8	7	-31742.40	2072854.90	99.2	Pass	
L8	20 - 0	Pole	P60x1/2	8	-38705.10	2929827.24	86.9	Pass	
							Summary		
							Pole (L7)	99.2	Pass
							<b>RATING =</b>	<b>99.2</b>	<b>Pass</b>

# Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

## TIA Rev F

### Site Data

BU#: CT5626
Site Name: 0
App #: N/A
Pole Manufacturer: <i>Other</i>

### Anchor Rod Data

Qty:	36	
Diam:	1.5	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	66	in

### Plate Data

Diam:	72	in
Thick:	2.25	in
Grade:	36	ksi
Single-Rod B-eff:	5.24	in

### Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

### Pole Data

Diam:	60	in
Thick:	0.5	in
Grade:	45	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

### Stress Increase Factor

ASIF:	1.333
-------	-------

### Reactions

Moment:	3082	ft-kips
Axial:	39	kips
Shear:	30	kips

If No stiffeners, Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

### Anchor Rod Results

Maximum Rod Tension: 61.2 Kips  
 Allowable Tension: 84.6 Kips  
 Anchor Rod Stress Ratio: 72.3% **Pass**

<b>Rigid</b>
Service ASD
F <sub>t</sub> *ASIF

### Base Plate Results

Base Plate Stress: 26.8 ksi  
 Allowable Plate Stress: 36.0 ksi  
 Base Plate Stress Ratio: 74.5% **Pass**

Flexural Check

<b>Rigid</b>
Service ASD
0.75*F <sub>y</sub> *ASIF
Y.L. Length: 27.50

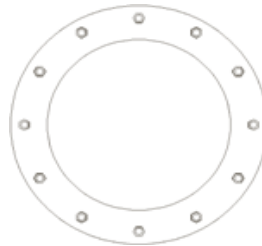
n/a

### Stiffener Results

Horizontal Weld : n/a  
 Vertical Weld: n/a  
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a  
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: n/a  
 Plate Comp. (AISC Bracket): n/a

### Pole Results

Pole Punching Shear Check: n/a



\* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

\*\* Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

# Monopole Pier and Pad Foundation

BU # : CT5626

Site Name:

App. Number:

TIA-222 Revision: F

Design Reactions		
Shear, <b>S:</b>	30.2	kips
Moment, <b>M:</b>	3082	ft-kips
Tower Height, <b>H:</b>	150	ft
Tower Weight, <b>Wt:</b>	38.7	kips
Base Diameter, <b>BD:</b>	5.00	ft

Foundation Dimensions		
Depth, <b>D:</b>	4	ft
Pad Width, <b>W:</b>	25	ft
Neglected Depth, <b>N:</b>	0	ft
Thickness, <b>T:</b>	2.00	ft
Pier Diameter, <b>Pd:</b>	7.00	ft
Ext. Above Grade, <b>E:</b>	1.00	ft
BP Dist. Above Pier:	3	in.
Clear Cover, <b>Cc:</b>	3.0	in

Soil Properties		
Soil Unit Weight, $\gamma$ :	0.130	kcf
Ult. Bearing Capacity, $B_c$ :	15.0	ksf
Angle of Friction, $\Phi$ :	40	deg
Cohesion, $C_o$ :	0.000	ksf
Passive Pressure, $P_p$ :	0.000	ksf
Base Friction, $\mu$ :	0.45	

Material Properties		
Rebar Yield Strength, $F_y$ :	60000	psi
Concrete Strength, $F'_c$ :	4000	psi
Concrete Unit Weight, $\delta_c$ :	0.150	kcf
Seismic Zone, $z$ :	1	

Rebar Properties		
Pier Rebar Size, $S_p$ :		
Pier Rebar Quantity, $mp$ :	24	#N/A
Pad Rebar Size, $S_{pad}$ :		
Pad Rebar Quantity, $mpad$ :	13	#N/A
Pier Tie Size, $St$ :		3
Tie Quantity, $mt$ :	5	#N/A

Design Checks			
	Capacity/ Availability	Demand/ Limits	Check
<i>Req'd Pier Diam.(ft)</i>	7	7	<b>OK</b>
<i>Overturning (ft-kips)</i>	3178.97	3082.00	<b>96.9%</b>
<i>Shear Capacity (kips)</i>	94.23	30.20	<b>32.0%</b>
<i>Bearing (ksf)</i>	11.25	3.25	<b>28.9%</b>
<i>Pad Shear - 1-way (kips)</i>	#N/A	#N/A	<b>#N/A</b>
<i>Pad Shear - 2-way (kips)</i>	#N/A	87.83	<b>#N/A</b>
<i>Pad Moment Capacity (k-ft)</i>	#N/A	1631.29	<b>#N/A</b>
<i>Pier Moment Capacity (k-ft)</i>	9815.92	3172.60	<b>32.3%</b>