

**STRUCTURAL ANALYSIS REPORT
MONOPOLE**



Prepared For:
Com-Ex Consultants, LLC
4 Second Avenue – Suite 204
Denville, NJ 07834



Structure Rating:

Monopole: Pass

Sincerely,
Destek Engineering, LLC

05-20-2015



Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057

AT&T Site ID: CT2112
FA Number: 10071312
Site Name: West Bridgeport
623 Honeyspot Road
Stratford, Fairfield County, CT 06615

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1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the existing telecommunication installation on the monopole at 623 Honeyspot Road, Stratford, CT 06615 for the additions and alterations proposed by AT&T.

The structural analysis is based on the following information provided to Destek Engineering, LLC (Destek):

- Construction Drawings prepared by Com-Ex Consultants, dated 4/16/2015.
- Structural Analysis Report prepared by GPD Group, Project Number 2011147.14 dates June 16, 2011

1.1 STRUCTURE

The structure is a 102'-0" (18) sided monopole, which is attached to the foundation with anchor bolts and base plate. Please refer to the software output in Appendix A, for tower geometry, member sizes, and other details.

ELEVATION (FEET)	SECTION LENGTH (FEET)	LAP SPLICE (IN)	SHAFT THICKNESS (IN)	TOP DIAMETER (IN)	BOTTOM DIAMETER (IN)	YIELD STRENGTH (KSI)
102.70-89.80	12.92	-	0.2500	13.0000	13.0000	35
89.80-45.00	44.80	3.80	0.2500	13.0000	26.7925	65
45.00-0.00	48.78	-	0.3125	25.1226	40.0000	65

2.0 PROPOSED ADDITION

Existing Configuration of AT&T Appurtenances:

Rad. Center (ft)	Antenna & TMA	Mount	Cables
90.0	(6) 7700.00 w/Mount Pipe (3) AM-X-CD-16-65-00T-RET w/Mount Pipe (12) LGP21401 (3) RRUS 11	(1) Platform Mount	(12) 1-5/8" (3) 1/2"

Proposed and Final Configuration of AT&T Appurtenances:

Rad. Center (ft)	Antenna & TMA	Mount	Cables
90.0	(6) 7700.00 w/Mount Pipe (3) AM-X-CD-16-65-00T-RET w/Mount Pipe (12) LGP21401 (6) RRUS 11	(1) Platform Mount	(12) 1-5/8" (3) 1/2"

***All ancillary loading per RFDS included**

Existing Appurtenances by Others

Rad. Center (ft)	Antenna & TMA	Mount	Cables
101.0	6) Kathrein 800 10504 w/Mount Pipe	5' T-Arm	7/8"
82.0	(3) MG D3-900TV w/Mount Pipe (3) LNX-6512DS-T4M w/Mount Pipe (3) DB846F65ZAXY w/Mount Pipe (3) P65-16-XLH-RR w/Mount Pipe	10' Platform	7/8"
72.0	Andrew PX2F-52-NXA w/Mount Pipe (2) Dragonwave 2' HP Dish	12' T-Arm	1/2"
71.0	(3) U-RAS (6) 950F65T2ZE-M w/Mount Pipe (3) LLPX310R w/Mount Pipe CW Junction Box (3) DR90-11-00DBL w/Mount Pipe	12' T-Arm	1/2"
28.0	20' Omni (2) 12' Omni (3) 10' Omni GPS (2) climbing ladder	12' T-Arm 4' Standoff	(2) 1-5/8"

3.0 CODES AND LOADING

The Monopole was analyzed per *TIA/EIA-222-F* as referenced by *2005 Connecticut State Building Code with 2005 Addendum and 2013 Supplement*, International Code Council. The following wind loading was used in compliance with the standard for Fairfield County:

- Basic wind speed 85 mph without ice (W)
- Basic wind speed 73.6 mph with 1/2" radial ice (W_i)

The following load combinations were used with wind blowing at 0°, 60° and 90°, measured from a line normal to the face of the tower.

- D + W
- D + W_i + I

D: Dead Load W: Wind Load, without ice
W_i: Wind Load with ice I: Ice Gravity Load

4.0 STANDARD CONDITIONS FOR ENGINEERING SERVICES ON EXISTING STRUCTURES

The analysis is based on the information provided to Destek and is assumed to be current and correct. Unless otherwise noted, the structure is assumed to be in good condition, free of defects, and can achieve theoretical strength.

It is assumed that the structure has been maintained and shall be maintained during its service lifespan. The superstructure and the foundation system are assumed to be designed with proper engineering practice and fabricated, constructed and erected in accordance with the design documents. Destek will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, etc. or lack of maintenance.

The analysis does not include a qualification of the antenna mounts attached on the structure or their connections. The analysis is performed to verify the capacity of the main structural members, which is the current practice in the tower industry.

The analysis results presented in this report are only applicable for the previously mentioned existing and proposed appurtenances. Any deviation of the appurtenances and placement, etc., will require Destek to generate an additional structural analysis. Additionally, the proposed linear appurtenances should be placed per recommendations of this report.

5.0 ANALYSIS AND RESULTS

The Monopole was analyzed by utilizing tnxTower, a non-linear, three-dimensional, finite element-analysis software package, a product of Tower Numerics, Inc. Software output for this analysis is provided in Appendix A of this report.

6.0 **RESULTS AND CONCLUSION**

Based on analysis per TIA/EIA-222-F, the existing monopole is found to have **adequate** structural capacity for the proposed changes by AT&T. As a maximum, the monopole shaft between 44.98 feet and 89.78 feet is stressed to **99.7%** of its capacity. The anchor rods, base plate and foundation are also found to have **adequate** capacity.

Reaction Comparison:

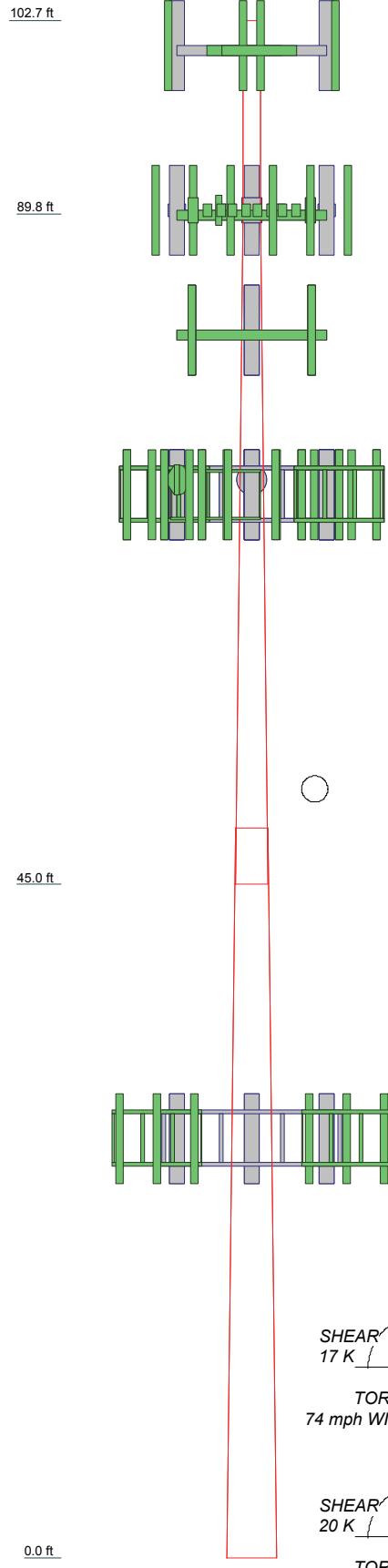
Maximums	GDP Group Analysis	Destek Analysis
Base Shear (kips)	19	20
Base Moment (kip-ft)	1390	1414

Therefore, the proposed additions and alterations by AT&T can be implemented as intended with the conditions outlined in this report.

Should you have any questions about this report, please contact Ahmet Colakoglu at (770) 693-0835 or acolakoglu@destekengineering.com.

**APPENDIX A
CALCULATIONS**

Section	1	2	3
Length (ft)	12.92	44.80	48.78
Number of Sides	1	18	18
Thickness (in)	0.2500	0.2500	0.3125
Socket Length (ft)		3.80	25.1226
Top Dia (in)	13.0000	13.0000	40.0000
Bot Dia (in)	13.0000	26.7925	
Grade	A53-B-35	A572-65	
Weight (K)	0.4	2.4	5.3



DESIGNED APPURTENANCE LOADING

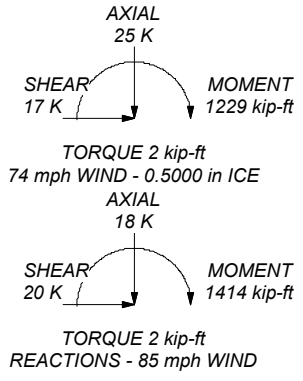
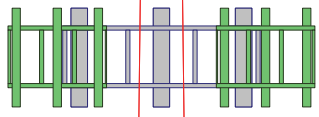
TYPE	ELEVATION	TYPE	ELEVATION
5' T-Arm	101	DB846F65ZAXY w/ Mount Pipe	82
5' T-Arm	101	P65-16-XL-2B w/ Mount Pipe	82
5' T-Arm	101	P65-16-XL-2B w/ Mount Pipe	82
(2) 800 10504 w/ Mount Pipe	101	P65-16-XL-2B w/ Mount Pipe	82
(2) 800 10504 w/ Mount Pipe	101	Sabre 10' Platform w/handrails	82
(2) 800 10504 w/ Mount Pipe	101	climbing ladder	82
climbing ladder	92	Andrew PX2F-52-NXA	72
(2) 7770.00 w/ Mount Pipe	90	Dragonwave 2' HP Dish	72
(2) 7770.00 w/ Mount Pipe	90	Dragonwave 2' HP Dish	72
(2) 7770.00 w/ Mount Pipe	90	U-RAS	71
AM-X-CD-16-65-00T-RET w/ Mount Pipe	90	(2) 950F85T2E-M w/Mount Pipe	71
AM-X-CD-16-65-00T-RET w/ Mount Pipe	90	(2) 950F85T2E-M w/Mount Pipe	71
AM-X-CD-16-65-00T-RET w/ Mount Pipe	90	(2) 950F85T2E-M w/Mount Pipe	71
(4) LGP21401	90	LLPX310R w/ Mount Pipe	71
(4) LGP21401	90	LLPX310R w/ Mount Pipe	71
(4) LGP21401	90	LLPX310R w/ Mount Pipe	71
RRUS 11	90	2x2' Junction box	71
RRUS 11	90	DR65-12-05DBL w/Mount Pipe	71
RRUS 11	90	DR65-12-05DBL w/Mount Pipe	71
RRUS 11	90	DR65-12-05DBL w/Mount Pipe	71
RRUS 11	90	12' T-ARM	71
RRUS 11	90	12' T-ARM	71
RRUS 11	90	12' T-ARM	71
RRUS 11	90	U-RAS	71
RRUS 11	90	U-RAS	71
DC6-48-60-18-8F	90	12' Omni	28
Sabre 10' Platform w/handrails	90	10' Omni	28
MG D3-800TV w/ Mount Pipe	82	10' Omni	28
MG D3-800TV w/ Mount Pipe	82	10' Omni	28
MG D3-800TV w/ Mount Pipe	82	10' Omni	28
LNX-6512DS-T4M w/ Mount Pipe	82	GPS	28
LNX-6512DS-T4M w/ Mount Pipe	82	12' T-Arm	28
LNX-6512DS-T4M w/ Mount Pipe	82	4' Standoff	28
DB846F65ZAXY w/ Mount Pipe	82	4' Standoff	28
DB846F65ZAXY w/ Mount Pipe	82	20' Omni	28
DB846F65ZAXY w/ Mount Pipe	82	12' Omni	28

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A572-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 99.7%



<p>Destek Engineering, LLC 5150 Stilesboro Road Kennesaw, GA 30152 Phone: (770) 693-0835 FAX:</p>	Job: 1529085
	Project: West Bridgeport
	Client: Com-Ex Consultants, LLC
	Code: TIA/EIA-222-F
	Path: <small>Y:\2015\29 - Com-Ex Consultants\1529085 - GT2112 - Monopole - West Bridgeport\TNC\West Bridgeport.dwg</small>
Drawn by: Ahmet Colakoglu	App'd:
Date: 05/20/15	Scale: NTS
	Dwg No. E-1

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	Client Com-Ex Consultants, LLC	Designed by Ahmet Colakoglu

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 Fairfield County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 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.

Options

<ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination 	<ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption 	<ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feedline Torque Include Angle Block Shear Check
Poles		
<ul style="list-style-type: none"> Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets 		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	102.70-89.78	12.92	0.00	Round	13.0000	13.0000	0.2500		A53-B-35 (35 ksi)
L2	89.78-44.98	44.80	3.80	18	13.0000	26.7925	0.2500	1.0000	A572-65 (65 ksi)
L3	44.98-0.00	48.78		18	25.1226	40.0000	0.3125	1.2500	A572-65 (65 ksi)

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Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	13.0000	10.0138	203.5623	4.5087	6.5000	31.3173	407.1246	5.0039	0.0000	0
	13.0000	10.0138	203.5623	4.5087	6.5000	31.3173	407.1246	5.0039	0.0000	0
L2	13.2005	10.1171	207.7854	4.5263	6.6040	31.4636	415.8441	5.0595	1.8480	7.392
	27.2058	21.0615	1874.6054	9.4226	13.6106	137.7314	3751.6774	10.5327	4.2755	17.102
L3	26.6870	24.6085	1913.7268	8.8076	12.7623	149.9518	3829.9717	12.3066	3.8716	12.389
	40.6171	39.3650	7833.4959	14.0891	20.3200	385.5067	15677.2994	19.6863	6.4900	20.768

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 102.70-89.78				1	1	1		
L2 89.78-44.98				1	1	1		
L3 44.98-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A	Weight
						ft ² /ft	plf
LDF1-50A(1/4")	B	No	CaAa (Out Of Face)	28.00 - 19.50	1	No Ice 1/2" Ice	0.03 0.58
LDF4-50A(1/2")	A	No	CaAa (Out Of Face)	28.00 - 19.50	8	No Ice 1/2" Ice	0.00 0.84
LDF1-50A(1/4")	B	No	Inside Pole	58.00 - 24.00	12	No Ice 1/2" Ice	0.00 0.06
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	71.00 - 19.50	2	No Ice 1/2" Ice	0.00 0.84
2" Rigid Conduit	C	No	CaAa (Out Of Face)	71.00 - 19.50	2	No Ice 1/2" Ice	0.00 4.33
2" Rigid Conduit	C	No	CaAa (Out Of Face)	71.00 - 19.50	1	No Ice 1/2" Ice	0.20 4.33
LDF6-50A(1-1/4")	A	No	CaAa (Out Of Face)	71.00 - 19.50	5	No Ice 1/2" Ice	0.00 1.91
LDF6-50A(1-1/4")	A	No	CaAa (Out Of Face)	71.00 - 19.50	1	No Ice 1/2" Ice	0.16 1.91
LDF4-50A(1/2")	A	No	Inside Pole	82.00 - 24.00	1	No Ice 1/2" Ice	0.00 0.15
LDF5-50A(7/8")	A	No	Inside Pole	82.00 - 24.00	12	No Ice 1/2" Ice	0.00 0.33
3/8" Fiber Cable	B	No	CaAa (Out Of Face)	92.00 - 22.00	1	No Ice 1/2" Ice	0.00 1.03
LDF5-50A(7/8")	B	No	Inside Pole	92.00 - 22.00	12	No Ice 1/2" Ice	0.00 0.33
3/8" Fiber Cable	C	No	Inside Pole	101.00 - 24.00	1	No Ice 1/2" Ice	0.00 0.50
LDF5-50A(7/8")	C	No	Inside Pole	101.00 - 24.00	12	No Ice 1/2" Ice	0.00 0.33
LDF5-50A(7/8")	C	No	Inside Pole	92.00 - 24.00	2	No Ice 1/2" Ice	0.00 0.33
LDF4-50A(1/2")	C	No	Inside Pole	92.00 - 24.00	1	No Ice 1/2" Ice	0.00 0.15

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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_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	102.70-89.78	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.01
		C	0.000	0.000	0.000	0.000	0.05
L2	89.78-44.98	A	0.000	0.000	0.000	4.033	0.26
		B	0.000	0.000	0.000	0.000	0.21
		C	0.000	0.000	0.000	5.204	0.46
L3	44.98-0.00	A	0.000	0.000	0.000	3.950	0.20
		B	0.000	0.000	0.000	0.293	0.12
		C	0.000	0.000	0.000	5.096	0.33

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_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	102.70-89.78	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.05
L2	89.78-44.98	A	0.500	0.000	0.000	0.000	6.635	0.45
		B		0.000	0.000	0.000	0.000	0.23
		C		0.000	0.000	0.000	7.806	0.62
L3	44.98-0.00	A	0.500	0.000	0.000	0.000	6.497	0.44
		B		0.000	0.000	0.000	1.143	0.13
		C		0.000	0.000	0.000	7.644	0.48

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	102.70-89.78	0.0000	0.0000	0.0000	0.0000
L2	89.78-44.98	-0.1537	-0.0488	-0.2083	-0.0842
L3	44.98-0.00	-0.1168	-0.0351	-0.1460	-0.0541

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C_{AA} Front ft ²	C_{AA} Side ft ²	Weight K	
5' T-Arm	A	From Leg	0.00	0.0000	101.00	No Ice	2.78	2.23	0.11

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			0.00			1/2" Ice	3.39	2.43	0.14
			0.00						
5' T-Arm	B	From Leg	0.00	0.0000	101.00	No Ice	2.78	2.23	0.11
			0.00			1/2" Ice	3.39	2.43	0.14
			0.00						
5' T-Arm	C	From Leg	0.00	0.0000	101.00	No Ice	2.78	2.23	0.11
			0.00			1/2" Ice	3.39	2.43	0.14
			0.00						
(2) 800 10504 w/ Mount Pipe	A	From Leg	3.00	0.0000	101.00	No Ice	3.59	3.18	0.04
			0.00			1/2" Ice	4.01	3.91	0.07
			0.00						
(2) 800 10504 w/ Mount Pipe	B	From Leg	3.00	0.0000	101.00	No Ice	3.59	3.18	0.04
			0.00			1/2" Ice	4.01	3.91	0.07
			0.00						
(2) 800 10504 w/ Mount Pipe	C	From Leg	3.00	0.0000	101.00	No Ice	3.59	3.18	0.04
			0.00			1/2" Ice	4.01	3.91	0.07
			0.00						
Sabre 10' Platform w/handrails	C	None		0.0000	90.00	No Ice	25.40	25.40	1.30
						1/2" Ice	30.40	30.40	1.69
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	90.00	No Ice	6.12	4.25	0.06
			0.00			1/2" Ice	6.63	5.01	0.10
			0.00						
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	90.00	No Ice	6.12	4.25	0.06
			0.00			1/2" Ice	6.63	5.01	0.10
			0.00						
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	90.00	No Ice	6.12	4.25	0.06
			0.00			1/2" Ice	6.63	5.01	0.10
			0.00						
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	90.00	No Ice	8.50	6.30	0.07
			0.00			1/2" Ice	9.15	7.48	0.14
			0.00						
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	90.00	No Ice	8.50	6.30	0.07
			0.00			1/2" Ice	9.15	7.48	0.14
			0.00						
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	90.00	No Ice	8.50	6.30	0.07
			0.00			1/2" Ice	9.15	7.48	0.14
			0.00						
(4) LGP21401	A	From Leg	0.00	0.0000	90.00	No Ice	1.29	0.23	0.01
			0.00			1/2" Ice	1.45	0.31	0.02
			0.00						
(4) LGP21401	B	From Leg	0.00	0.0000	90.00	No Ice	1.29	0.23	0.01
			0.00			1/2" Ice	1.45	0.31	0.02
			0.00						
(4) LGP21401	C	From Leg	0.00	0.0000	90.00	No Ice	1.29	0.23	0.01
			0.00			1/2" Ice	1.45	0.31	0.02
			0.00						
RRUS 11	A	From Leg	4.00	0.0000	90.00	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00						
RRUS 11	B	From Leg	4.00	0.0000	90.00	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00						
RRUS 11	C	From Leg	4.00	0.0000	90.00	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00						
RRUS 11	A	From Leg	4.00	0.0000	90.00	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07

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	Client	Com-Ex Consultants, LLC	Designed by	Ahmet Colakoglu

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz Lateral	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
RRUS 11	B	From Leg	0.00	4.00	0.0000	90.00	No Ice	3.25	1.37	0.05
			0.00	0.00			1/2" Ice	3.49	1.55	0.07
			0.00	0.00						
RRUS 11	C	From Leg	4.00	0.00	0.0000	90.00	No Ice	3.25	1.37	0.05
			0.00	0.00			1/2" Ice	3.49	1.55	0.07
			0.00	0.00						
DC6-48-60-18-8F	C	From Leg	2.00	0.00	0.0000	90.00	No Ice	2.57	2.57	0.02
			0.00	0.00			1/2" Ice	2.80	2.80	0.04
			0.00	0.00						
Sabre 10' Platform w/handrails	C	None			0.0000	82.00	No Ice	25.40	25.40	1.30
							1/2" Ice	30.40	30.40	1.69
MG D3-800TV w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	82.00	No Ice	3.57	3.42	0.04
			0.00	0.00			1/2" Ice	3.98	4.12	0.07
			0.00	0.00						
MG D3-800TV w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	82.00	No Ice	3.57	3.42	0.04
			0.00	0.00			1/2" Ice	3.98	4.12	0.07
			0.00	0.00						
MG D3-800TV w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	82.00	No Ice	3.57	3.42	0.04
			0.00	0.00			1/2" Ice	3.98	4.12	0.07
			0.00	0.00						
LNX-6512DS-T4M w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	82.00	No Ice	5.85	4.55	0.05
			0.00	0.00			1/2" Ice	6.31	5.23	0.09
			0.00	0.00						
LNX-6512DS-T4M w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	82.00	No Ice	5.85	4.55	0.05
			0.00	0.00			1/2" Ice	6.31	5.23	0.09
			0.00	0.00						
LNX-6512DS-T4M w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	82.00	No Ice	5.85	4.55	0.05
			0.00	0.00			1/2" Ice	6.31	5.23	0.09
			0.00	0.00						
DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	82.00	No Ice	7.27	7.82	0.05
			0.00	0.00			1/2" Ice	7.88	9.01	0.11
			0.00	0.00						
DB846F65ZAXY w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	82.00	No Ice	7.27	7.82	0.05
			0.00	0.00			1/2" Ice	7.88	9.01	0.11
			0.00	0.00						
DB846F65ZAXY w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	82.00	No Ice	7.27	7.82	0.05
			0.00	0.00			1/2" Ice	7.88	9.01	0.11
			0.00	0.00						
P65-16-XL-2B w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	82.00	No Ice	7.27	7.82	0.05
			0.00	0.00			1/2" Ice	7.88	9.01	0.11
			0.00	0.00						
P65-16-XL-2B w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	82.00	No Ice	7.27	7.82	0.05
			0.00	0.00			1/2" Ice	7.88	9.01	0.11
			0.00	0.00						
P65-16-XL-2B w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	82.00	No Ice	7.27	7.82	0.05
			0.00	0.00			1/2" Ice	7.88	9.01	0.11
			0.00	0.00						
12' T-ARM	A	From Leg	2.00	0.00	0.0000	71.00	No Ice	4.70	2.33	0.77
			0.00	0.00			1/2" Ice	5.33	2.96	0.99
			0.00	0.00						
12' T-ARM	B	From Leg	2.00	0.00	0.0000	71.00	No Ice	4.70	2.33	0.77
			0.00	0.00			1/2" Ice	5.33	2.96	0.99
			0.00	0.00						
12' T-ARM	C	From Leg	2.00	0.00	0.0000	71.00	No Ice	4.70	2.33	0.77
			0.00	0.00			1/2" Ice	5.33	2.96	0.99
			0.00	0.00						

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A		Weight	
			Horz	Vert			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
U-RAS	A	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	1.79 1.97	0.78 0.92	0.03 0.04
U-RAS	B	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	1.79 1.97	0.78 0.92	0.03 0.04
U-RAS	C	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	1.79 1.97	0.78 0.92	0.03 0.04
(2) 950F85T2E-M w/Mount Pipe	A	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	3.25 3.83	5.90 7.01	0.04 0.08
(2) 950F85T2E-M w/Mount Pipe	B	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	3.25 3.83	5.90 7.01	0.04 0.08
(2) 950F85T2E-M w/Mount Pipe	C	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	3.25 3.83	5.90 7.01	0.04 0.08
LLPX310R w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	5.07 5.48	2.98 3.53	0.05 0.08
LLPX310R w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	5.07 5.48	2.98 3.53	0.05 0.08
LLPX310R w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	71.00	No Ice 1/2" Ice	5.07 5.48	2.98 3.53	0.05 0.08
2'x2' Junction box	C	From Leg	2.00	0.00	0.0000	71.00	No Ice 1/2" Ice	5.60 5.92	2.80 3.04	0.10 0.14
DR65-12-05DBL w/Mount Pipe	A	From Leg	1.00	0.00	0.0000	71.00	No Ice 1/2" Ice	11.70 12.42	9.72 11.23	0.07 0.16
DR65-12-05DBL w/Mount Pipe	B	From Leg	1.00	0.00	0.0000	71.00	No Ice 1/2" Ice	11.70 12.42	9.72 11.23	0.07 0.16
DR65-12-05DBL w/Mount Pipe	C	From Leg	1.00	0.00	0.0000	71.00	No Ice 1/2" Ice	11.70 12.42	9.72 11.23	0.07 0.16
12' T-Arm	A	From Leg	1.00	0.00	0.0000	28.00	No Ice 1/2" Ice	4.70 5.33	2.33 2.96	0.33 0.40
4' Standoff	A	From Leg	1.00	0.00	0.0000	28.00	No Ice 1/2" Ice	3.41 4.47	3.41 4.47	0.08 0.10
4' Standoff	A	From Leg	1.00	0.00	0.0000	28.00	No Ice 1/2" Ice	3.41 4.47	3.41 4.47	0.08 0.10
20' Omni	A	From Leg	1.00	0.00	0.0000	28.00	No Ice 1/2" Ice	5.00 7.03	5.00 7.03	0.04 0.08
12' Omni	A	From Leg	1.00	0.00	0.0000	28.00	No Ice 1/2" Ice	3.00 4.23	3.00 4.23	0.02 0.04
12' Omni	A	From Leg	1.00	0.00	0.0000	28.00	No Ice 1/2" Ice	3.00 4.23	3.00 4.23	0.02 0.04

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _{Front}	C _A A _{Side}	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft ²	ft ²	K
10' Omni	A	From Leg	1.00	0.0000	28.00	No Ice	2.00	2.00	0.03
			0.00			1/2" Ice	3.02	3.02	0.04
			5.00						
10' Omni	A	From Leg	1.00	0.0000	28.00	No Ice	2.00	2.00	0.03
			0.00			1/2" Ice	3.02	3.02	0.04
			5.00						
10' Omni	A	From Leg	0.00	0.0000	28.00	No Ice	2.00	2.00	0.03
			0.00			1/2" Ice	3.02	3.02	0.04
			5.00						
GPS	A	From Leg	1.00	0.0000	28.00	No Ice	0.17	0.17	0.00
			0.00			1/2" Ice	0.24	0.24	0.00
			2.00						
climbing ladder	C	From Leg	0.00	0.0000	92.00	No Ice	0.29	0.29	0.01
			0.00			1/2" Ice	0.55	0.55	0.01
			0.00						
climbing ladder	C	From Leg	0.00	0.0000	82.00	No Ice	0.29	0.29	0.01
			0.00			1/2" Ice	0.55	0.55	0.01
			0.00						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz	Lateral							
				ft	ft	°	°	ft	ft	ft ²	K	
Andrew PX2F-52-NXA	C	Paraboloid w/Radome	From Leg	4.00	0.0000	0.0000		72.00	2.00	No Ice	3.14	0.04
				0.00						1/2" Ice	3.41	0.06
				0.00								
Dragonwave 2' HP Dish	A	Paraboloid w/Radome	From Leg	4.00	0.0000			72.00	2.08	No Ice	3.72	0.01
				0.00						1/2" Ice	4.01	0.03
				0.00								
Dragonwave 2' HP Dish	A	Paraboloid w/Radome	From Leg	4.00	0.0000			72.00	2.08	No Ice	3.72	0.01
				0.00						1/2" Ice	4.01	0.03
				0.00								

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _A A _{In} Face	C _A A _{Out} Face
ft	ft		psf	ft ²	c	ft ²	ft ²	ft ²		ft ²	ft ²
L1	96.24	1.358	25	13.997	A	0.000	13.997	13.997	100.00	0.000	0.000
102.70-89.78					B	0.000	13.997		100.00	0.000	0.000
					C	0.000	13.997		100.00	0.000	0.000

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Section Elevation ft	Add Weight K	Self Weight K	Face	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.44	A	1	0.59	1	1	1	13.997	0.35	27.13	C
			B	1	0.59	1	1	13.997				
			C	1	0.59	1	1	13.997				
L2 89.78-44.98	0.93	2.38	A	1	0.65	1	1	1	74.279	2.17	48.53	C
			B	1	0.65	1	1	74.279				
			C	1	0.65	1	1	74.279				
L3 44.98-0.00	0.65	5.31	A	1	0.65	1	1	1	124.223	2.82	62.68	C
			B	1	0.65	1	1	124.223				
			C	1	0.65	1	1	124.223				
Sum Weight:	1.64	8.13						OTM	234.78 kip-ft	5.34		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.44	A	1	0.59	1	1	1	13.997	0.35	27.13	C
			B	1	0.59	1	1	13.997				
			C	1	0.59	1	1	13.997				
L2 89.78-44.98	0.93	2.38	A	1	0.65	1	1	1	74.279	2.17	48.53	C
			B	1	0.65	1	1	74.279				
			C	1	0.65	1	1	74.279				
L3 44.98-0.00	0.65	5.31	A	1	0.65	1	1	1	124.223	2.82	62.68	C
			B	1	0.65	1	1	124.223				
			C	1	0.65	1	1	124.223				
Sum Weight:	1.64	8.13						OTM	234.78 kip-ft	5.34		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.44	A	1	0.59	1	1	1	13.997	0.35	27.13	C
			B	1	0.59	1	1	13.997				
			C	1	0.59	1	1	13.997				
L2 89.78-44.98	0.93	2.38	A	1	0.65	1	1	1	74.279	2.17	48.53	C
			B	1	0.65	1	1	74.279				
			C	1	0.65	1	1	74.279				
L3 44.98-0.00	0.65	5.31	A	1	0.65	1	1	1	124.223	2.82	62.68	C
			B	1	0.65	1	1	124.223				
			C	1	0.65	1	1	124.223				
Sum Weight:	1.64	8.13						OTM	234.78 kip-ft	5.34		

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Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.55	A	1	0.59	1	1	1	15.073	0.28	21.91	C
			B	1	0.59	1	1	1	15.073			
			C	1	0.59	1	1	1	15.073			
L2 89.78-44.98	1.30	2.94	A	1	0.65	1	1	1	78.013	1.85	41.22	C
			B	1	0.65	1	1	1	78.013			
			C	1	0.65	1	1	1	78.013			
L3 44.98-0.00	1.05	6.24	A	1	0.65	1	1	1	127.971	2.31	51.38	C
			B	1	0.65	1	1	1	127.971			
			C	1	0.65	1	1	1	127.971			
Sum Weight:	2.42	9.73						OTM	196.28 kip-ft	4.44		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.55	A	1	0.59	1	1	1	15.073	0.28	21.91	C
			B	1	0.59	1	1	1	15.073			
			C	1	0.59	1	1	1	15.073			
L2 89.78-44.98	1.30	2.94	A	1	0.65	1	1	1	78.013	1.85	41.22	C
			B	1	0.65	1	1	1	78.013			
			C	1	0.65	1	1	1	78.013			
L3 44.98-0.00	1.05	6.24	A	1	0.65	1	1	1	127.971	2.31	51.38	C
			B	1	0.65	1	1	1	127.971			
			C	1	0.65	1	1	1	127.971			
Sum Weight:	2.42	9.73						OTM	196.28 kip-ft	4.44		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.55	A	1	0.59	1	1	1	15.073	0.28	21.91	C
			B	1	0.59	1	1	1	15.073			
			C	1	0.59	1	1	1	15.073			
L2 89.78-44.98	1.30	2.94	A	1	0.65	1	1	1	78.013	1.85	41.22	C
			B	1	0.65	1	1	1	78.013			
			C	1	0.65	1	1	1	78.013			
L3 44.98-0.00	1.05	6.24	A	1	0.65	1	1	1	127.971	2.31	51.38	C
			B	1	0.65	1	1	1	127.971			
			C	1	0.65	1	1	1	127.971			
Sum Weight:	2.42	9.73						OTM	196.28 kip-ft	4.44		

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Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.44	A	1	0.594	1	1	1	13.997	0.12	9.45	C
			B	1	0.594	1	1	13.997				
			C	1	0.594	1	1	13.997				
L2 89.78-44.98	0.93	2.38	A	1	0.65	1	1	1	74.279	0.75	16.79	C
			B	1	0.65	1	1	74.279				
			C	1	0.65	1	1	74.279				
L3 44.98-0.00	0.65	5.31	A	1	0.65	1	1	1	124.223	0.98	21.69	C
			B	1	0.65	1	1	124.223				
			C	1	0.65	1	1	124.223				
Sum Weight:	1.64	8.13						OTM	81.32 kip-ft	1.85		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.44	A	1	0.594	1	1	1	13.997	0.12	9.45	C
			B	1	0.594	1	1	13.997				
			C	1	0.594	1	1	13.997				
L2 89.78-44.98	0.93	2.38	A	1	0.65	1	1	1	74.279	0.75	16.79	C
			B	1	0.65	1	1	74.279				
			C	1	0.65	1	1	74.279				
L3 44.98-0.00	0.65	5.31	A	1	0.65	1	1	1	124.223	0.98	21.69	C
			B	1	0.65	1	1	124.223				
			C	1	0.65	1	1	124.223				
Sum Weight:	1.64	8.13						OTM	81.32 kip-ft	1.85		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 102.70-89.78	0.06	0.44	A	1	0.594	1	1	1	13.997	0.12	9.45	C
			B	1	0.594	1	1	13.997				
			C	1	0.594	1	1	13.997				
L2 89.78-44.98	0.93	2.38	A	1	0.65	1	1	1	74.279	0.75	16.79	C
			B	1	0.65	1	1	74.279				
			C	1	0.65	1	1	74.279				
L3 44.98-0.00	0.65	5.31	A	1	0.65	1	1	1	124.223	0.98	21.69	C
			B	1	0.65	1	1	124.223				
			C	1	0.65	1	1	124.223				
Sum Weight:	1.64	8.13						OTM	81.32	1.85		

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
									kip-ft			

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	8.13					
Bracing Weight	0.00					
Total Member Self-Weight	8.13			-1.28	0.86	
Total Weight	18.36			-1.28	0.86	
Wind 0 deg - No Ice		0.06	-19.50	-1367.98	-3.48	-0.86
Wind 30 deg - No Ice		9.78	-16.91	-1186.48	-685.96	-1.90
Wind 60 deg - No Ice		16.84	-9.75	-684.71	-1182.41	-2.23
Wind 90 deg - No Ice		19.42	-0.01	-2.08	-1363.64	-2.02
Wind 120 deg - No Ice		16.82	9.72	679.83	-1181.05	-1.49
Wind 150 deg - No Ice		9.72	16.88	1181.66	-681.81	-0.53
Wind 180 deg - No Ice		-0.04	19.52	1366.73	3.93	0.81
Wind 210 deg - No Ice		-9.80	16.95	1186.88	689.28	1.96
Wind 240 deg - No Ice		-16.87	9.81	686.70	1185.99	2.34
Wind 270 deg - No Ice		-19.39	0.09	5.05	1362.89	2.06
Wind 300 deg - No Ice		-16.74	-9.64	-677.03	1176.96	1.42
Wind 330 deg - No Ice		-9.65	-16.82	-1180.33	678.63	0.44
Member Ice	1.60					
Total Weight Ice	24.79			-2.19	1.34	
Wind 0 deg - Ice		0.05	-16.72	-1174.09	-2.05	-0.72
Wind 30 deg - Ice		8.38	-14.50	-1018.33	-587.30	-1.78
Wind 60 deg - Ice		14.45	-8.36	-588.10	-1013.22	-2.19
Wind 90 deg - Ice		16.66	-0.01	-2.71	-1168.77	-2.07
Wind 120 deg - Ice		14.43	8.34	582.05	-1012.23	-1.57
Wind 150 deg - Ice		8.34	14.47	1012.23	-584.16	-0.62
Wind 180 deg - Ice		-0.03	16.73	1170.76	3.70	0.68
Wind 210 deg - Ice		-8.40	14.53	1016.33	591.28	1.82
Wind 240 deg - Ice		-14.47	8.41	587.40	1017.40	2.29
Wind 270 deg - Ice		-16.63	0.07	2.81	1169.45	2.10
Wind 300 deg - Ice		-14.37	-8.28	-582.09	1010.21	1.51
Wind 330 deg - Ice		-8.28	-14.43	-1013.46	582.87	0.55
Total Weight	18.36			-1.28	0.86	
Wind 0 deg - Service		0.02	-6.75	-474.29	-1.04	-0.30
Wind 30 deg - Service		3.38	-5.85	-411.48	-237.23	-0.66
Wind 60 deg - Service		5.83	-3.37	-237.82	-409.04	-0.77
Wind 90 deg - Service		6.72	-0.00	-1.58	-471.76	-0.70
Wind 120 deg - Service		5.82	3.36	234.41	-408.57	-0.51
Wind 150 deg - Service		3.36	5.84	408.09	-235.80	-0.18
Wind 180 deg - Service		-0.01	6.75	472.13	1.52	0.28
Wind 210 deg - Service		-3.39	5.87	409.89	238.71	0.68
Wind 240 deg - Service		-5.84	3.40	236.79	410.61	0.81
Wind 270 deg - Service		-6.71	0.03	0.89	471.83	0.71
Wind 300 deg - Service		-5.79	-3.34	-235.17	407.48	0.49
Wind 330 deg - Service		-3.34	-5.82	-409.35	235.02	0.15

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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
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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	102.7 - 89.78	Pole	Max Tension	15	0.00	-0.00	-0.00
			Max. Compression	14	-4.92	0.10	-0.06
			Max. Mx	11	-2.74	17.75	-0.01
			Max. My	8	-2.74	0.03	-17.73
			Max. Vy	11	-6.24	17.75	-0.01
			Max. Vx	8	6.24	0.03	-17.73
			Max. Torque	13			0.28
L2	89.78 - 44.98	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.16	0.97	-0.02
			Max. Mx	11	-10.55	534.50	-2.26
			Max. My	8	-10.54	1.63	-535.40
			Max. Vy	5	16.14	-534.06	0.08

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	44.98 - 0	Pole	Max. Vx	8	16.16	1.63	-535.40
			Max. Torque	9			-0.98
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.79	1.34	2.19
			Max. Mx	5	-18.34	-1405.18	2.11
			Max. My	2	-18.34	-3.57	1409.60
			Max. Vy	5	19.44	-1405.18	2.11
			Max. Vx	8	19.53	4.04	-1408.35
			Max. Torque	10			-2.34

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	24.79	-0.00	-0.00
	Max. H _x	11	18.36	19.39	-0.09
	Max. H _z	2	18.36	-0.06	19.50
	Max. M _x	2	1409.60	-0.06	19.50
	Max. M _z	5	1405.18	-19.42	0.01
	Max. Torsion	4	2.22	-16.84	9.75
	Min. Vert	8	18.36	0.04	-19.51
	Min. H _x	5	18.36	-19.42	0.01
	Min. H _z	8	18.36	0.04	-19.51
	Min. M _x	8	-1408.35	0.04	-19.51
	Min. M _z	11	-1404.45	19.39	-0.09
	Min. Torsion	10	-2.34	16.87	-9.81

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	18.36	0.00	0.00	-1.28	0.85	0.00
Dead+Wind 0 deg - No Ice	18.36	0.06	-19.50	-1409.60	-3.57	-0.84
Dead+Wind 30 deg - No Ice	18.36	9.78	-16.91	-1222.67	-706.90	-1.89
Dead+Wind 60 deg - No Ice	18.36	16.84	-9.75	-705.58	-1218.53	-2.22
Dead+Wind 90 deg - No Ice	18.36	19.42	-0.01	-2.11	-1405.18	-2.03
Dead+Wind 120 deg - No Ice	18.36	16.82	9.72	700.61	-1217.13	-1.50
Dead+Wind 150 deg - No Ice	18.36	9.72	16.88	1217.76	-702.64	-0.54
Dead+Wind 180 deg - No Ice	18.36	-0.04	19.51	1408.35	4.04	0.79
Dead+Wind 210 deg - No Ice	18.36	-9.80	16.95	1223.10	710.32	1.94
Dead+Wind 240 deg - No Ice	18.36	-16.87	9.81	707.67	1222.22	2.34
Dead+Wind 270 deg - No Ice	18.36	-19.39	0.09	5.21	1404.45	2.07
Dead+Wind 300 deg - No Ice	18.36	-16.74	-9.64	-697.71	1212.97	1.43
Dead+Wind 330 deg - No Ice	18.36	-9.65	-16.82	-1216.37	699.40	0.45
Dead+Ice+Temp	24.79	0.00	0.00	-2.19	1.34	0.00
Dead+Wind 0 deg+Ice+Temp	24.79	0.05	-16.72	-1226.84	-2.10	-0.71
Dead+Wind 30 deg+Ice+Temp	24.79	8.38	-14.50	-1064.22	-613.78	-1.77
Dead+Wind 60 deg+Ice+Temp	24.79	14.45	-8.36	-614.59	-1058.94	-2.19
Dead+Wind 90 deg+Ice+Temp	24.79	16.66	-0.01	-2.78	-1221.35	-2.08
Dead+Wind 120 deg+Ice+Temp	24.79	14.43	8.34	608.37	-1057.92	-1.58
Dead+Wind 150 deg+Ice+Temp	24.79	8.34	14.47	1057.94	-610.51	-0.64

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 180 deg+Ice+Temp	24.79	-0.03	16.73	1223.44	3.87	0.67
Dead+Wind 210 deg+Ice+Temp	24.79	-8.40	14.53	1062.20	617.97	1.81
Dead+Wind 240 deg+Ice+Temp	24.79	-14.47	8.41	613.93	1063.35	2.28
Dead+Wind 270 deg+Ice+Temp	24.79	-16.63	0.07	2.96	1222.12	2.11
Dead+Wind 300 deg+Ice+Temp	24.79	-14.37	-8.28	-608.35	1055.89	1.52
Dead+Wind 330 deg+Ice+Temp	24.79	-8.28	-14.43	-1059.17	609.24	0.56
Dead+Wind 0 deg - Service	18.36	0.02	-6.75	-489.36	-0.65	-0.29
Dead+Wind 30 deg - Service	18.36	3.38	-5.85	-424.55	-244.37	-0.66
Dead+Wind 60 deg - Service	18.36	5.83	-3.37	-245.36	-421.67	-0.77
Dead+Wind 90 deg - Service	18.36	6.72	-0.00	-1.58	-486.39	-0.70
Dead+Wind 120 deg - Service	18.36	5.82	3.36	241.94	-421.19	-0.52
Dead+Wind 150 deg - Service	18.36	3.36	5.84	421.14	-242.90	-0.19
Dead+Wind 180 deg - Service	18.36	-0.01	6.75	487.23	1.99	0.28
Dead+Wind 210 deg - Service	18.36	-3.39	5.86	423.00	246.74	0.68
Dead+Wind 240 deg - Service	18.36	-5.84	3.40	244.38	424.13	0.81
Dead+Wind 270 deg - Service	18.36	-6.71	0.03	0.95	487.32	0.72
Dead+Wind 300 deg - Service	18.36	-5.79	-3.34	-242.63	420.92	0.50
Dead+Wind 330 deg - Service	18.36	-3.34	-5.82	-422.36	242.95	0.15

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-18.36	0.00	-0.00	18.36	-0.00	0.001%
2	0.06	-18.36	-19.50	-0.06	18.36	19.50	0.005%
3	9.78	-18.36	-16.91	-9.78	18.36	16.91	0.000%
4	16.84	-18.36	-9.75	-16.84	18.36	9.75	0.000%
5	19.42	-18.36	-0.01	-19.42	18.36	0.01	0.005%
6	16.82	-18.36	9.72	-16.82	18.36	-9.72	0.000%
7	9.72	-18.36	16.88	-9.72	18.36	-16.88	0.000%
8	-0.04	-18.36	19.52	0.04	18.36	-19.51	0.005%
9	-9.80	-18.36	16.95	9.80	18.36	-16.95	0.000%
10	-16.87	-18.36	9.81	16.87	18.36	-9.81	0.000%
11	-19.39	-18.36	0.09	19.39	18.36	-0.09	0.005%
12	-16.74	-18.36	-9.64	16.74	18.36	9.64	0.000%
13	-9.65	-18.36	-16.82	9.65	18.36	16.82	0.000%
14	0.00	-24.79	0.00	-0.00	24.79	-0.00	0.003%
15	0.05	-24.79	-16.72	-0.05	24.79	16.72	0.006%
16	8.38	-24.79	-14.50	-8.38	24.79	14.50	0.000%
17	14.45	-24.79	-8.36	-14.45	24.79	8.36	0.000%
18	16.66	-24.79	-0.01	-16.66	24.79	0.01	0.006%
19	14.43	-24.79	8.34	-14.43	24.79	-8.34	0.000%
20	8.34	-24.79	14.47	-8.34	24.79	-14.47	0.000%
21	-0.03	-24.79	16.73	0.03	24.79	-16.73	0.006%
22	-8.40	-24.79	14.53	8.40	24.79	-14.53	0.000%
23	-14.47	-24.79	8.41	14.47	24.79	-8.41	0.000%
24	-16.63	-24.79	0.07	16.63	24.79	-0.07	0.006%
25	-14.37	-24.79	-8.28	14.37	24.79	8.28	0.000%
26	-8.28	-24.79	-14.43	8.28	24.79	14.43	0.000%
27	0.02	-18.36	-6.75	-0.02	18.36	6.75	0.003%
28	3.38	-18.36	-5.85	-3.38	18.36	5.85	0.003%
29	5.83	-18.36	-3.37	-5.83	18.36	3.37	0.003%
30	6.72	-18.36	-0.00	-6.72	18.36	0.00	0.003%
31	5.82	-18.36	3.36	-5.82	18.36	-3.36	0.003%
32	3.36	-18.36	5.84	-3.36	18.36	-5.84	0.003%
33	-0.01	-18.36	6.75	0.01	18.36	-6.75	0.003%
34	-3.39	-18.36	5.87	3.39	18.36	-5.86	0.003%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
35	-5.84	-18.36	3.40	5.84	18.36	-3.40	0.003%
36	-6.71	-18.36	0.03	6.71	18.36	-0.03	0.003%
37	-5.79	-18.36	-3.34	5.79	18.36	3.34	0.003%
38	-3.34	-18.36	-5.82	3.34	18.36	5.82	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	14	0.00006250	0.00012034
3	Yes	17	0.00000001	0.00012236
4	Yes	17	0.00000001	0.00012852
5	Yes	14	0.00006252	0.00009928
6	Yes	17	0.00000001	0.00012560
7	Yes	17	0.00000001	0.00012366
8	Yes	14	0.00006250	0.00012926
9	Yes	17	0.00000001	0.00013161
10	Yes	17	0.00000001	0.00012390
11	Yes	14	0.00006251	0.00009697
12	Yes	17	0.00000001	0.00012396
13	Yes	17	0.00000001	0.00012722
14	Yes	6	0.00000001	0.00001541
15	Yes	14	0.00010534	0.00013120
16	Yes	17	0.00000001	0.00013933
17	Yes	17	0.00000001	0.00014595
18	Yes	14	0.00010538	0.00010929
19	Yes	17	0.00000001	0.00014221
20	Yes	17	0.00000001	0.00014050
21	Yes	14	0.00010535	0.00013841
22	Yes	17	0.00000001	0.00014952
23	Yes	17	0.00000001	0.00014114
24	Yes	14	0.00010535	0.00010692
25	Yes	17	0.00000001	0.00014156
26	Yes	17	0.00000001	0.00014475
27	Yes	14	0.00000001	0.00005272
28	Yes	14	0.00000001	0.00008852
29	Yes	14	0.00000001	0.00010276
30	Yes	14	0.00000001	0.00005059
31	Yes	14	0.00000001	0.00009655
32	Yes	14	0.00000001	0.00009196
33	Yes	14	0.00000001	0.00005280
34	Yes	14	0.00000001	0.00010880
35	Yes	14	0.00000001	0.00009154
36	Yes	14	0.00000001	0.00005079
37	Yes	14	0.00000001	0.00009443
38	Yes	14	0.00000001	0.00010122

Maximum Tower Deflections - Service Wind

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	102.7 - 89.78	25.655	35	2.2207	0.0061
L2	89.78 - 44.98	19.683	35	2.1767	0.0060
L3	48.78 - 0	5.174	35	1.0509	0.0022

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
101.00	5' T-Arm	35	24.858	2.2204	0.0061	9824
92.00	climbing ladder	35	20.686	2.1954	0.0061	4625
90.00	Sabre 10' Platform w/handrails	35	19.781	2.1789	0.0060	3997
82.00	Sabre 10' Platform w/handrails	35	16.296	2.0555	0.0056	3011
72.00	Andrew PX2F-52-NXA	35	12.305	1.8009	0.0047	2372
71.00	12' T-ARM	35	11.932	1.7711	0.0046	2323
28.00	12' T-Arm	28	1.822	0.5192	0.0011	2766

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	102.7 - 89.78	73.735	9	6.3872	0.0175
L2	89.78 - 44.98	56.610	9	6.2609	0.0174
L3	48.78 - 0	14.926	9	3.0302	0.0062

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
101.00	5' T-Arm	9	71.449	6.3865	0.0176	3510
92.00	climbing ladder	9	59.488	6.3147	0.0176	1651
90.00	Sabre 10' Platform w/handrails	9	56.893	6.2672	0.0175	1426
82.00	Sabre 10' Platform w/handrails	9	46.891	5.9134	0.0163	1069
72.00	Andrew PX2F-52-NXA	9	35.430	5.1832	0.0136	839
71.00	12' T-ARM	9	34.358	5.0977	0.0133	821
28.00	12' T-Arm	9	5.254	1.4996	0.0033	964

Compression Checks

Pole Design Data

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	102.7 - 89.78 (1)	TP13x13x0.25	12.92	0.00	0.0	21.000	10.0138	-2.73	210.29	0.013
L2	89.78 - 44.98 (2)	TP26.7925x13x0.25	44.80	0.00	0.0	39.000	20.1332	-10.54	785.19	0.013
L3	44.98 - 0 (3)	TP40x25.1226x0.3125	48.78	0.00	0.0	39.000	32.2035	-14.73	1255.94	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	102.7 - 89.78 (1)	TP13x13x0.25	17.76	-6.807	23.100	0.295	0.00	0.000	23.100	0.000
L2	89.78 - 44.98 (2)	TP26.7925x13x0.25	537.63	-51.283	39.000	1.315	0.00	0.000	39.000	0.000
L3	44.98 - 0 (3)	TP40x25.1226x0.3125	966.45	-45.030	39.000	1.155	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	102.7 - 89.78 (1)	TP13x13x0.25	0.013	0.295	0.000	0.308	1.333	H1-3 ✓
L2	89.78 - 44.98 (2)	TP26.7925x13x0.25	0.013	1.315	0.000	1.328	1.333	H1-3 ✓
L3	44.98 - 0 (3)	TP40x25.1226x0.3125	0.012	1.155	0.000	1.166	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
L1	102.7 - 89.78	Pole	TP13x13x0.25	1	-2.73	280.32	23.1	Pass
L2	89.78 - 44.98	Pole	TP26.7925x13x0.25	2	-10.54	1046.66	99.7	Pass
L3	44.98 - 0	Pole	TP40x25.1226x0.3125	3	-14.73	1674.17	87.5	Pass
Summary								
Pole (L2)							99.7	Pass
RATING =							99.7	Pass