EMPIRE telecom

March 6, 2017

Melanie A. Bachman
Acting Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: EM-AT&T-159-161223 – 23 Kelleher Court, Wethersfield
AT&T Site CT5122 – FA#10092829

Dear Ms. Bachman:

In accordance with your acknowledgement concerning the above-referenced matter dated January 17, 2017, enclosed please find a passing structural analysis which takes into account Verizon modifications recently approved by the Council in EM-VER-159-161117b.

Please do not hesitate to contact me with any questions or concerns. Thank you for your attention to this matter.

Sincerely,

Sarah Snell
Site Acquisition Specialist
Empire Telecom
16 Esquire Rd
Billerica, MA 01862
ssnell@empiretelecomm.com

STRUCTURAL ANALYSIS REPORT – REV. 2
MONOPOLE

Prepared For:

Com-Ex Consultants, LLC
115 Route 46 – Suite E39
Mountain Lakes, NJ 07046

Structure Rating:	
Monopole:	**Pass (74.7%)**
Foundation:	**Pass**

Sincerely,
Destek Engineering, LLC

03-02-2017

STATE OF CONNECTICUT
AHMET COLAKOGLU
PEN. 27057
LICENSED
PROFESSIONAL ENGINEER

Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057

AT&T Site ID: CT5122
FA Number: 10092829
Site Name: Wethersfield North
23 Kelleher Court
Wethersfield, CT 06109

Destek Job No: 1629137 March 02, 2017

CONTENTS

DESTEK ENGINEERING, LLC
1281 Kennestone Circle, Ste 100, Marietta, GA 30066 -Tel: (770) 693-0835

1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the existing monopole located at 23 Kelleher Court, Wethersfield, CT, 06109, for the additions and alterations proposed by AT&T.

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

- Structural Analysis Report prepared by Hudson Design Group, dated 08/08/2016
- Upgrade Drawings prepared by Hudson Design Group, dates 08/23/2016
- Construction Drawings prepared by Com-Ex, dated 11/02/2016.
- RFDS prepared by AT&T, dated 09/01/2016.

1.1 STRUCTURE

The structure is a 179'-0" (18) sided monopole, which is attached to the foundation with anchor bolts and a 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 (FT)	SHAFT THICKNESS (IN)	TOP DIAMETER (IN)	BOTTOM DIAMETER (IN)	YIELD STRENGTH (KSI)
179.00-141.25	37.75	4.33	0.250	23.100	33.249	65
141.25-92.58	53.00	5.92	0.375	31.585	45.834	65
92.58-45.50	53.00	7.50	0.375	43.492	57.742	65
45.50-0.0	53.00	-	0.375	54.976	69.225	65

*Does not include description of existing monopole modifications.

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2.0 EXISTING AND PROPOSED APPURTENANCES

AT&T is proposing the following antenna configuration on the tower:

Existing Configuration of AT&T Appurtenances:

Rad. Center (ft)	Antenna & TMA	Mount	Cables*
142	(6) RRUS-11 (3) RRUS-A2	Ring Mount	(12) 1-5/8"
140	(3) 7770.00 w/Mount Pipe (2) SBNHH-1D65A w/Mount Pipe (2) HPA-65R-BUU-H8 w/Mount Pipe (2) TPA-65R-LCUUUU-H8 w/Mount Pipe (6) LGP21401 TMAs (3) RRUS-32 (2) DC 6 (6) TPX-070821	(3) Sector Mounts	

Proposed and Final Configuration of AT&T Appurtenances:

Rad. Center (ft)	Antenna & TMA	Mount	Cables*
142	(3) RRUS-11 (3) RRUS-32 B2	Ring Mount	(12) 1-5/8" (2) DC Cable (1) Fiber Cable
140	(3) 7770.00 w/Mount Pipe (2) SBNHH-1D65A w/Mount Pipe (2) HPA-65R-BUU-H8 w/Mount Pipe (2) TPA-65R-LCUUUU-H8 w/Mount Pipe (6) LGP21401 TMAs (3) RRUS-32 (2) DC 6 (6) TPX-070821	(3) Sector Mounts	

*All feed lines inside the shaft

Existing Appurtenances by Others

Rad. Center (ft)	Antenna & TMA	Mount	Feedlines
188	(1) 10’ Omni	(1) Pipe Mount	(1) 1-1/4”
186	(2) 6’ Omni	(2) Pipe Mounts	(2) 7/8”
185	(2) 4’ Omni 4’ Dipole	(3) Pipe Mounts	(4) 1-5/8”
181	Distribution Box	-	(2) 1/2”
174	(2) APXVSPP18-C w/Mount Pipe ET-X-TU-42-15 w/Mount Pipe	(3) Sector Mounts	(4) 1-1/4”

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	(3) APXV9TM14 w/Mount Pipe (3) RRH 8X20-25		
170	(3) RRH 800 (3) RRH 1900	Ring Mount	-
159	2’ Dish	Pipe Mount	1/4”
152	(6) AIR21 B4A/B2P w/Mount Pipe (3) LNX-6515DS w/Mount Pipe	(3) Sector Mounts	(18) 1-5/8” 1/4”
151	(3) RRUS – 11 (3) TMA		
130	(3) Antel BXA-70063-6CF w/ Mount Pipe (3) Antel BXA-70063-4CF w/ Mount Pipe (2) RFS DB-T1-6Z-8AB-0Z (6) SBNHH-1D65B w/ Mount Pipe (3) ALU RRH2x60-700 (3) ALU RRH2x60-PCS (3) ALU RRH4x45/2x90-AWS	Platform	(12) 1-5/8” (2) 1-5/8” Hybrid
126	2’ Dish	Pipe Mount	1/4”

3.0 CODES AND LOADING

This analysis has been performed in accordance with the 2016 Connecticut Building Code based upon an ultimate 3-second gust wind speed of 125 mph (Risk Category II) converted to a nominal 3-second gust wind speed of 97 mph per section 1609.3.1 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. The following loading criteria were used in the analysis:

- Basic wind speed of 97 mph without ice (V)
- Basic wind speed of 50 mph concurrent with the design ice thickness of 1” (V_i and t_i)
- Exposure Category C, Topographic Category 1

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

- $1.2D + 1.6W_o$
- $0.9D + 1.6W_o$
- $1.2D + 1.0D_i + 1.0W_i$

D: Dead load of structure and appurtenances
W_o: Wind load without ice (based upon V)
W_i: Concurrent wind load with factored ice thickness (based upon V_i)
D_i: Weight of ice due to factored ice thickness (based upon t_i)

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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 ASSUMPTIONS

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.

This analysis assumes that the modifications detailed in the Structural Modification Drawings prepared by Hudson Design Group, dated 8/23/2016, have been installed.

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6.0 RESULTS AND CONCLUSION

The structural modifications detailed in the Structural Modification Drawings prepared by Hudson Design Group, dated 8/23/2016, have been incorporated into our analysis. After analyzing the upgraded structure, Destek has deemed the modifications to be **ineffective** due to the inadequate thickness of the reinforcement plates. The added wind area of the reinforcement has been considered in this analysis.

Based on a structural analysis per TIA-222-G, the existing reinforced monopole has **adequate** structural capacity for the proposed changes by AT&T. As a maximum, the monopole shaft between 0 feet and 45.5 feet is stressed to **77.7%** of its capacity. The anchor rods also have **adequate** structural capacity for the proposed changes by AT&T. As a maximum, the anchor rods are stressed to **79.5%** of its capacity. The existing foundation is found to have **adequate** capacity to support the proposed installation by AT&T.

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.

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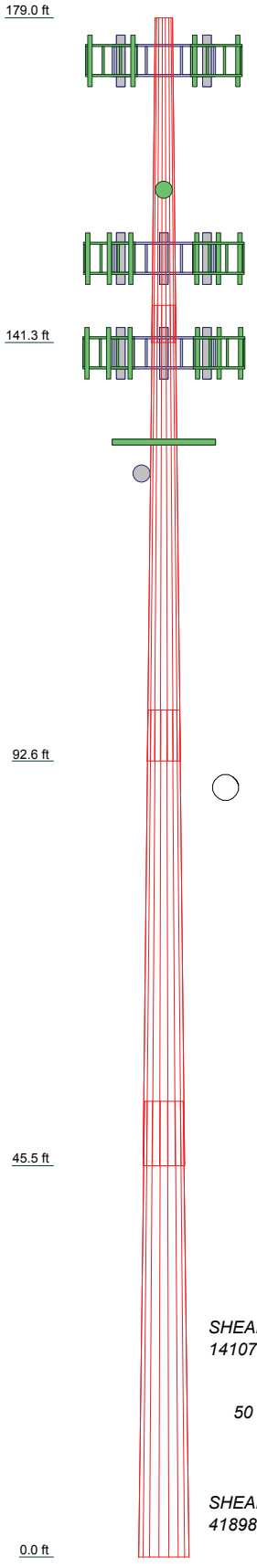
APPENDIX A
CALCULATIONS

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	37.75	18	0.2500	4.33	23.1000	33.2490	A572-65	2846.3
2	53.00	18	0.3750	5.92	31.5849	45.8340		8228.8
3	53.00	18	0.3750	7.50	43.4924	57.7420		10784.9
4	53.00	18	0.3750		54.9755	69.2250		13249.9
								35110.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(3) 6' x 2" Mount Pipe	181	RRUS 32 B2	142
(3) 6' x 2" Mount Pipe	181	RRUS 32 B2	142
(3) 6' x 2" Mount Pipe	181	(2) SBNHH-1D65A w/ Mount Pipe	140
Omni 4"x6'	181	7770.00 w/ Mount Pipe	140
Omni 2"x6'	181	7770.00 w/ Mount Pipe	140
Distribution Box	181	TPA-65R-LCUUUU-H8 w/ Mount Pipe	140
Omni 3"x4'	181	RRUS 32	140
Omni 3"x10'	181	RRUS 32	140
Distribution Box	181	RRUS 32	140
Omni 3" x 4'	181	TPA-65R-LCUUUU-H8 w/ Mount Pipe	140
4' Dipole	181	CCI HPA-65R-BUU-H8 with pipe	140
TA 702-3	181	CCI HPA-65R-BUU-H8 with pipe	140
ET-X-TU-42-15-37-18-iR-ST w/ Mount Pipe	174	(2) LGP21401	140
		(2) LGP21401	140
APXVSPP18-C w/ Mount Pipe	174	(2) LGP21401	140
APXVSPP18-C w/ Mount Pipe	174	LGP12104	140
APXV9TM14 w/ Mount Pipe	174	(2) TPX-070821	140
APXV9TM14 w/ Mount Pipe	174	(2) TPX-070821	140
APXV9TM14 w/ Mount Pipe	174	(2) TPX-070821	140
TA 602-3	174	DC6-48-60-18-8F (Round)	140
RRH8x20-25	174	DC6-48-60-18-8F (Round)	140
RRH8x20-25	174	TA 602-3	140
RRH8x20-25	174	7770.00 w/ Mount Pipe	140
RRH800MHz	170	BXA-80063/6CF w/Mount Pipe	130
RRH800MHz	170	BXA-80063/6CF w/Mount Pipe	130
RRH800MHz	170	BXA-80063/4CF w/Mount Pipe	130
RRH1900MHz	170	BXA-80063/4CF w/Mount Pipe	130
RRH1900MHz	170	BXA-80063/4CF w/Mount Pipe	130
RRH1900MHz	170	(2) SBNHH-1D65B w/ Mount Pipe	130
Ring Mount	170	(2) SBNHH-1D65B w/ Mount Pipe	130
HP2-102	159	(2) SBNHH-1D65B w/ Mount Pipe	130
(2) AIR 21 B4A/B2P w/ Mount Pipe	151	RRH2x60-700	130
(2) AIR 21 B4A/B2P w/ Mount Pipe	151	RRH2x60-700	130
LNX-6515DS-VTM w/ Mount Pipe	151	RRH2x60-700	130
LNX-6515DS-VTM w/ Mount Pipe	151	RRH2X60-PCS	130
LNX-6515DS-VTM w/ Mount Pipe	151	RRH2X60-PCS	130
RRUS 11	151	RRH2X60-PCS	130
RRUS 11	151	RRH2X60-PCS	130
RRUS 11	151	RRH2X60-PCS	130
Gen TMA	151	RRH2X60-PCS	130
Gen TMA	151	RRH4x45/2x90-AWS	130
Gen TMA	151	RRH4x45/2x90-AWS	130
TA 602-3	151	RRH4x45/2x90-AWS	130
(2) AIR 21 B4A/B2P w/ Mount Pipe	151	(2) DB-T1-6Z-8AB-0Z	130
RRUS-11	142	Pirod 13' Low Profit Platfrom	130
RRUS-11	142	BXA-80063/6CF w/Mount Pipe	130
RRUS-11	142	HP2-102	126
RRUS 32 B2	142		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

ALL REACTION
ARE FACTORE

AXIAL
125040 lb

SHEAR
14107 lb

TORQUE 1 kip-
50 mph WIND - 1.000

AXIAL
60415 lb

SHEAR
41898 lb

MOMENT
5011 kip-ft

TORQUE 2 kip-ft
REACTIONS - 97 mph WIND

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 74.7%

DESTEK ENGINEERING
Destek Engineering, LLC
1281 Kennestone Circle, Suite 100
Marietta, GA 30066
Phone: (770) 693-0835
FAX:

Job:			
Project: *CT5122*			
Client: Com-Ex	Drawn by: Ahmet Colakoglu		App'd:
Code: TIA-222-G	Date: 03/02/17		Scale: NTS
Path: Z:\Projects\2016\29 - Com-Ex\137 - CT5122\Revision 030117\TNX\CT5122 rev 2.er			Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 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 pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	179.00-141.25	37.75	4.33	18	23.1000	33.2490	0.2500	1.0000	A572-65 (65 ksi)
L2	141.25-92.58	53.00	5.92	18	31.5849	45.8340	0.3750	1.5000	A572-65 (65 ksi)
L3	92.58-45.50	53.00	7.50	18	43.4924	57.7420	0.3750	1.5000	A572-65

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
L4	45.50-0.00	53.00		18	54.9755	69.2250	0.3750	1.5000	(65 ksi) A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	23.4564	18.1315	1196.0325	8.1118	11.7348	101.9219	2393.6388	9.0675	3.6256	14.502
	33.7619	26.1847	3602.3567	11.7146	16.8905	213.2772	7209.4536	13.0948	5.4118	21.647
L2	33.2542	37.1476	4571.4330	11.0795	16.0451	284.9110	9148.8811	18.5773	4.8989	13.064
	46.5411	54.1076	14126.5228	16.1379	23.2837	606.7137	28271.6336	27.0589	7.4068	19.751
L3	45.7795	51.3205	12054.0604	15.3067	22.0941	545.5773	24123.9819	25.6651	6.9947	18.652
	58.6328	68.2811	28389.7820	20.3653	29.3329	967.8466	56816.9200	34.1470	9.5026	25.34
L4	57.8712	64.9883	24477.4753	19.3832	27.9276	876.4625	48987.1587	32.5003	9.0157	24.042
	70.2929	81.9487	49078.0698	24.4417	35.1663	1395.5995	98220.7178	40.9821	11.5236	30.73

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
L1 179.00-141.25				1	1	1			
L2 141.25-92.58				1	1	1			
L3 92.58-45.50				1	1	1			
L4 45.50-0.00				1	1	1			

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
AVA6-50(1-1/4)	B	Surface Ar (CaAa)	6.00 - 174.00	1	1	0.000 0.000	1.5600		0.46
AL7-50(1-5/8")	C	Surface Ar (CaAa)	6.00 - 151.00	6	6	-0.100 0.100	1.9600		0.52
ATCB-B01(1/4")	C	Surface Ar (CaAa)	6.00 - 151.00	1	1	-0.125 -0.125	0.3150		0.07
AL7-50(1-5/8")	C	Surface Ar (CaAa)	6.00 - 130.00	2	2	0.100 0.300	1.9600		0.52
***** Step Pegs (Surface Ar)	C	Surface Ar (CaAa)	6.00 - 179.00	1	1	0.000 0.000	0.8000		2.72
**** 8x0.5	A	Surface Af (CaAa)	30.00 - 0.00	1	1	0.000 0.000	8.0000	17.0000	13.61
8x0.5	B	Surface Af (CaAa)	30.00 - 0.00	1	1	0.000 0.000	8.0000	17.0000	13.61
8x0.5	C	Surface Af (CaAa)	30.00 - 0.00	1	1	0.000 0.000	8.0000	17.0000	13.61

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
AL7-50(1-5/8")	B	No	Inside Pole	6.00 - 179.00	4	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
						1" Ice	0.00	0.52
AVA6-50(1-1/4)	B	No	Inside Pole	6.00 - 179.00	1	No Ice	0.00	0.46
						1/2" Ice	0.00	0.46
						1" Ice	0.00	0.46
AL5-50(7/8")	B	No	Inside Pole	6.00 - 179.00	2	No Ice	0.00	0.26
						1/2" Ice	0.00	0.26
						1" Ice	0.00	0.26
HJ4-50(1/2")	B	No	Inside Pole	6.00 - 179.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
						1" Ice	0.00	0.25
****								
AVA6-50(1-1/4)	B	No	Inside Pole	6.00 - 174.00	3	No Ice	0.00	0.46
						1/2" Ice	0.00	0.46
						1" Ice	0.00	0.46
****								
ATCB-B01(1/4")	B	No	Inside Pole	6.00 - 159.00	1	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07
****								
AL7-50(1-5/8")	C	No	Inside Pole	6.00 - 151.00	12	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
						1" Ice	0.00	0.52
*****								
AL7-50(1-5/8")	A	No	Inside Pole	6.00 - 140.00	12	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
						1" Ice	0.00	0.52
FB-L98-002-XXX(3/8")	A	No	Inside Pole	6.00 - 140.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG122ST-BRDA(7/16")	A	No	Inside Pole	6.00 - 140.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
						1" Ice	0.00	0.25
****								
AL7-50(1-5/8")	C	No	Inside Pole	6.00 - 130.00	12	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
						1" Ice	0.00	0.52
***								
ATCB-B01(1/4")	B	No	Inside Pole	6.00 - 126.00	1	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	179.00-141.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	5.109	0.000	195.98
		C	0.000	0.000	14.793	0.000	194.67
L2	141.25-92.58	A	0.000	0.000	0.000	0.000	322.67

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		B	0.000	0.000	7.593	0.000	268.97
		C	0.000	0.000	77.331	0.000	864.00
L3	92.58-45.50	A	0.000	0.000	0.000	0.000	320.36
		B	0.000	0.000	7.344	0.000	261.29
		C	0.000	0.000	79.071	0.000	915.00
L4	45.50-0.00	A	0.000	0.000	40.000	0.000	677.08
		B	0.000	0.000	46.162	0.000	627.52
		C	0.000	0.000	106.340	0.000	1175.98

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_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	179.00-141.25	A	2.341	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	20.441	0.000	561.31
		C		0.000	0.000	45.602	0.000	917.27
L2	141.25-92.58	A	2.268	0.000	0.000	0.000	0.000	322.67
		B		0.000	0.000	30.377	0.000	811.89
		C		0.000	0.000	191.254	0.000	3821.45
L3	92.58-45.50	A	2.152	0.000	0.000	0.000	0.000	320.36
		B		0.000	0.000	28.696	0.000	760.52
		C		0.000	0.000	193.608	0.000	3821.77
L4	45.50-0.00	A	1.929	0.000	0.000	52.909	0.000	1308.23
		B		0.000	0.000	76.068	0.000	1644.05
		C		0.000	0.000	211.220	0.000	4076.81

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	179.00-141.25	0.1559	0.4641	0.4046	0.7826
L2	141.25-92.58	0.0148	1.5167	0.1646	1.8668
L3	92.58-45.50	-0.0188	1.6873	0.1299	2.2146
L4	45.50-0.00	-0.0126	1.1401	0.0974	1.7230

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	7	AVA6-50(1-1/4)	141.25 - 174.00	1.0000	1.0000
L1	12	AL7-50(1-5/8")	141.25 - 151.00	1.0000	1.0000
L1	13	ATCB-B01(1/4")	141.25 - 151.00	1.0000	1.0000
L1	27	Step Pegs (Surface Ar)	141.25 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			179.00		
L1	23	AL7-50(1-5/8")	141.25 - 130.00	1.0000	1.0000
L2	7	AVA6-50(1-1/4)	92.58 - 141.25	1.0000	1.0000
L2	12	AL7-50(1-5/8")	92.58 - 141.25	1.0000	1.0000
L2	13	ATCB-B01(1/4")	92.58 - 141.25	1.0000	1.0000
L2	23	AL7-50(1-5/8")	92.58 - 130.00	1.0000	1.0000
L2	27	Step Pegs (Surface Ar)	92.58 - 141.25	1.0000	1.0000
L3	7	AVA6-50(1-1/4)	45.50 - 92.58	1.0000	1.0000
L3	12	AL7-50(1-5/8")	45.50 - 92.58	1.0000	1.0000
L3	13	ATCB-B01(1/4")	45.50 - 92.58	1.0000	1.0000
L3	23	AL7-50(1-5/8")	45.50 - 92.58	1.0000	1.0000
L3	27	Step Pegs (Surface Ar)	45.50 - 92.58	1.0000	1.0000
L3	29	8x0.5	45.50 - 30.00	1.0000	1.0000
L3	30	8x0.5	45.50 - 30.00	1.0000	1.0000
L3	31	8x0.5	45.50 - 30.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(3) 6' x 2" Mount Pipe	A	From Face	2.00 0.00 0.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	22.00 32.83 47.71
(3) 6' x 2" Mount Pipe	B	From Face	2.00 0.00 0.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	22.00 32.83 47.71
(3) 6' x 2" Mount Pipe	C	From Face	2.00 0.00 0.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	22.00 32.83 47.71
Omni 4"x6'	A	From Face	2.00 0.00 5.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	2.09 2.46 2.83	2.09 2.46 2.83	20.00 37.13 54.26
Omni 2"x6'	A	From Face	2.00 0.00 5.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	1.20 1.80 2.40	1.20 1.80 2.40	25.00 34.39 43.78
Distribution Box	A	From Face	2.00 0.00 0.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	2.33 2.55 2.77	1.36 1.54 1.50	10.00 26.33 42.66
Omni 3"x4'	B	From Face	2.00 0.00 4.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	1.00 1.25 1.50	1.00 1.25 5.06	15.00 23.96 32.92
Omni 3"x10'	B	From Face	2.00 0.00 7.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	3.00 4.03 5.06	3.00 4.03 1.72	20.00 41.79 63.58
Distribution Box	B	From Face	2.00 0.00 0.00	0.0000	181.00	No Ice 1/2" Ice 1" Ice	2.33 2.55 2.77	1.36 1.54 1.50	10.00 26.33 42.66
Omni 3" x 4'	C	From Face	2.00 0.00	0.0000	181.00	No Ice 1/2" Ice	1.00 1.25	1.00 1.25	15.00 23.96

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			4.00			1" Ice	1.50	2.18	32.92
4' Dipole	C	From Face	2.00	0.0000	181.00	No Ice	1.64	1.64	15.00
			0.00			1/2" Ice	1.91	1.91	32.13
			2.00			1" Ice	2.18	2.18	49.26
TA 702-3	A	None		0.0000	181.00	No Ice	5.64	5.64	339.00
						1/2" Ice	6.55	6.55	429.00
						1" Ice	7.46	7.46	519.00
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ET-X-TU-42-15-37-18-iR-ST w/ Mount Pipe	A	From Face	3.00	0.0000	174.00	No Ice	8.68	4.50	68.25
			0.00			1/2" Ice	9.18	5.17	127.30
			0.00			1" Ice	9.68	5.84	192.77
APXVSPP18-C w/ Mount Pipe	B	From Face	3.00	0.0000	174.00	No Ice	8.26	6.95	82.55
			0.00			1/2" Ice	8.82	8.13	150.56
			0.00			1" Ice	9.35	9.02	226.53
APXVSPP18-C w/ Mount Pipe	C	From Face	3.00	0.0000	174.00	No Ice	8.26	6.95	82.55
			0.00			1/2" Ice	8.82	8.13	150.56
			0.00			1" Ice	9.35	9.02	226.53
APXV9TM14 w/ Mount Pipe	A	From Face	3.00	0.0000	174.00	No Ice	7.21	5.03	91.90
			0.00			1/2" Ice	7.77	5.89	147.31
			0.00			1" Ice	8.33	6.75	202.72
APXV9TM14 w/ Mount Pipe	B	From Face	3.00	0.0000	174.00	No Ice	7.21	5.03	91.90
			0.00			1/2" Ice	7.77	5.89	147.31
			0.00			1" Ice	8.33	6.75	202.72
APXV9TM14 w/ Mount Pipe	C	From Face	3.00	0.0000	174.00	No Ice	7.21	5.03	91.90
			0.00			1/2" Ice	7.77	5.89	147.31
			0.00			1" Ice	8.33	6.75	202.72
TA 602-3	C	None		0.0000	174.00	No Ice	11.59	11.59	774.00
						1/2" Ice	15.44	15.44	990.00
						1" Ice	19.29	19.29	1206.00
***									
RRH1900MHz	A	From Face	1.50	0.0000	170.00	No Ice	2.60	3.72	59.13
			0.00			1/2" Ice	2.84	4.10	97.16
			0.00			1" Ice	3.09	4.50	139.81
RRH1900MHz	B	From Face	1.50	0.0000	170.00	No Ice	2.60	3.72	59.13
			0.00			1/2" Ice	2.84	4.10	97.16
			0.00			1" Ice	3.09	4.50	139.81
RRH1900MHz	C	From Face	1.50	0.0000	170.00	No Ice	2.60	3.72	59.13
			0.00			1/2" Ice	2.84	4.10	97.16
			0.00			1" Ice	3.09	4.50	139.81
RRH800MHz	A	From Face	1.50	0.0000	170.00	No Ice	2.24	2.41	49.43
			0.00			1/2" Ice	2.49	2.75	78.53
			0.00			1" Ice	2.74	3.11	111.69
RRH800MHz	B	From Face	1.50	0.0000	170.00	No Ice	2.24	2.41	49.43
			0.00			1/2" Ice	2.49	2.75	78.53
			0.00			1" Ice	2.74	3.11	111.69
RRH800MHz	C	From Face	1.50	0.0000	170.00	No Ice	2.24	2.41	49.43
			0.00			1/2" Ice	2.49	2.75	78.53
			0.00			1" Ice	2.74	3.11	111.69
RRH8x20-25	A	From Face	1.50	0.0000	174.00	No Ice	4.72	1.70	70.00
			0.00			1/2" Ice	5.01	1.92	97.14
			0.00			1" Ice	5.30	2.14	124.28
RRH8x20-25	B	From Face	1.50	0.0000	174.00	No Ice	4.72	1.70	70.00
			0.00			1/2" Ice	5.01	1.92	97.14
			0.00			1" Ice	5.30	2.14	124.28
RRH8x20-25	C	From Face	1.50	0.0000	174.00	No Ice	4.72	1.70	70.00
			0.00			1/2" Ice	5.01	1.92	97.14
			0.00			1" Ice	5.30	2.14	124.28

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Ring Mount	C	None		0.0000	170.00	No Ice	1.40	1.40	90.00
						1/2" Ice	2.40	2.40	130.00
						1" Ice	3.40	3.40	170.00
****									
(2) AIR 21 B4A/B2P w/ Mount Pipe	A	From Face	3.00 0.00 1.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	6.16 6.60 7.03	5.55 6.30 7.00	103.38 159.18 221.63
(2) AIR 21 B4A/B2P w/ Mount Pipe	B	From Face	3.00 0.00 1.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	6.16 6.60 7.03	5.55 6.30 7.00	103.38 159.18 221.63
(2) AIR 21 B4A/B2P w/ Mount Pipe	C	From Face	3.00 0.00 1.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	6.16 6.60 7.03	5.55 6.30 7.00	103.38 159.18 221.63
LNX-6515DS-VTM w/ Mount Pipe	A	From Face	3.00 0.00 1.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	11.65 12.37 13.10	9.84 11.37 12.92	83.25 172.75 272.22
LNX-6515DS-VTM w/ Mount Pipe	B	From Face	3.00 0.00 1.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	11.65 12.37 13.10	9.84 11.37 12.92	83.25 172.75 272.22
LNX-6515DS-VTM w/ Mount Pipe	C	From Face	3.00 0.00 1.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	11.65 12.37 13.10	9.84 11.37 12.92	83.25 172.75 272.22
RRUS 11	A	From Face	2.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	50.70 71.50 95.33
RRUS 11	B	From Face	2.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	50.70 71.50 95.33
RRUS 11	C	From Face	2.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	50.70 71.50 95.33
Gen TMA	A	From Face	2.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	0.68 0.80 0.92	0.45 0.56 0.67	13.20 18.38 23.56
Gen TMA	B	From Face	2.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	0.68 0.80 0.92	0.45 0.56 0.67	13.20 18.38 23.56
Gen TMA	C	From Face	2.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice 1" Ice	0.68 0.80 0.92	0.45 0.56 0.67	13.20 18.38 23.56
TA 602-3	C	None		0.0000	151.00	No Ice 1/2" Ice 1" Ice	11.59 15.44 19.29	11.59 15.44 19.29	774.00 990.00 1206.00
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7770.00 w/ Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	55.38 102.81 156.64
7770.00 w/ Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	55.38 102.81 156.64
7770.00 w/ Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	55.38 102.81 156.64
TPA-65R-LCUUUU-H8 w/ Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	13.54 14.24 14.95	10.96 12.49 14.04	114.45 217.61 330.97
TPA-65R-LCUUUU-H8 w/	B	From Face	3.00	0.0000	140.00	No Ice	13.54	10.96	114.45

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Mount Pipe			0.00				1/2" Ice	14.24	12.49	217.61
			0.00				1" Ice	14.95	14.04	330.97
CCI HPA-65R-BUU-H8 with pipe	A	From Face	3.00	0.0000	140.00		No Ice	13.28	9.65	122.85
			0.00				1/2" Ice	14.00	11.15	220.33
			0.00				1" Ice	14.73	12.68	327.71
CCI HPA-65R-BUU-H8 with pipe	B	From Face	3.00	0.0000	140.00		No Ice	13.28	9.65	122.85
			0.00				1/2" Ice	14.00	11.15	220.33
			0.00				1" Ice	14.73	12.68	327.71
(2) SBNHH-1D65A w/ Mount Pipe	C	From Face	3.00	0.0000	140.00		No Ice	5.95	5.19	61.30
			0.00				1/2" Ice	6.39	5.96	114.32
			0.00				1" Ice	6.82	6.66	173.89
RRUS-11	A	From Face	1.00	0.0000	142.00		No Ice	2.78	1.19	47.62
			0.00				1/2" Ice	2.99	1.33	68.42
			0.00				1" Ice	3.21	1.49	92.25
RRUS-11	B	From Face	1.00	0.0000	142.00		No Ice	2.78	1.19	47.62
			0.00				1/2" Ice	2.99	1.33	68.42
			0.00				1" Ice	3.21	1.49	92.25
RRUS-11	C	From Face	1.00	0.0000	142.00		No Ice	2.78	1.19	47.62
			0.00				1/2" Ice	2.99	1.33	68.42
			0.00				1" Ice	3.21	1.49	92.25
RRUS 32	A	From Face	1.00	0.0000	140.00		No Ice	2.86	1.78	55.12
			0.00				1/2" Ice	3.08	1.97	77.39
			0.00				1" Ice	3.32	2.17	102.93
RRUS 32	B	From Face	1.00	0.0000	140.00		No Ice	2.86	1.78	55.12
			0.00				1/2" Ice	3.08	1.97	77.39
			0.00				1" Ice	3.32	2.17	102.93
RRUS 32	C	From Face	1.00	0.0000	140.00		No Ice	2.86	1.78	55.12
			0.00				1/2" Ice	3.08	1.97	77.39
			0.00				1" Ice	3.32	2.17	102.93
RRUS 32 B2	A	From Face	1.00	0.0000	142.00		No Ice	2.73	1.67	52.90
			0.00				1/2" Ice	2.95	1.86	73.96
			0.00				1" Ice	3.18	2.05	98.21
RRUS 32 B2	B	From Face	1.00	0.0000	142.00		No Ice	2.73	1.67	52.90
			0.00				1/2" Ice	2.95	1.86	73.96
			0.00				1" Ice	3.18	2.05	98.21
RRUS 32 B2	C	From Face	1.00	0.0000	142.00		No Ice	2.73	1.67	52.90
			0.00				1/2" Ice	2.95	1.86	73.96
			0.00				1" Ice	3.18	2.05	98.21
(2) LGP21401	A	From Face	2.00	0.0000	140.00		No Ice	1.10	0.21	14.10
			0.00				1/2" Ice	1.24	0.27	21.26
			0.00				1" Ice	1.38	0.35	30.32
(2) LGP21401	B	From Face	2.00	0.0000	140.00		No Ice	1.10	0.21	14.10
			0.00				1/2" Ice	1.24	0.27	21.26
			0.00				1" Ice	1.38	0.35	30.32
(2) LGP21401	C	From Face	2.00	0.0000	140.00		No Ice	1.10	0.21	14.10
			0.00				1/2" Ice	1.24	0.27	21.26
			0.00				1" Ice	1.38	0.35	30.32
LGP12104	A	From Face	2.00	0.0000	140.00		No Ice	0.44	0.02	1.80
			0.00				1/2" Ice	0.57	0.05	5.00
			0.00				1" Ice	0.70	0.08	9.88
(2) TPX-070821	A	From Face	2.00	0.0000	140.00		No Ice	0.47	0.10	10.00
			0.00				1/2" Ice	0.56	0.15	13.45
			0.00				1" Ice	0.65	0.20	18.22
(2) TPX-070821	B	From Face	2.00	0.0000	140.00		No Ice	0.47	0.10	10.00
			0.00				1/2" Ice	0.56	0.15	13.45
			0.00				1" Ice	0.65	0.20	18.22
(2) TPX-070821	C	From Face	2.00	0.0000	140.00		No Ice	0.47	0.10	10.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1/2" Ice	0.56	0.15	13.45
			0.00			1" Ice	0.65	0.20	18.22
DC6-48-60-18-8F (Round)	A	From Face	1.00	0.0000	140.00	No Ice	0.79	0.79	18.90
			0.00			1/2" Ice	1.27	1.27	34.02
			0.00			1" Ice	1.45	1.45	51.47
DC6-48-60-18-8F (Round)	A	From Face	1.00	0.0000	140.00	No Ice	0.79	0.79	18.90
			0.00			1/2" Ice	1.27	1.27	34.02
			0.00			1" Ice	1.45	1.45	51.47
TA 602-3	C	None		0.0000	140.00	No Ice	11.59	11.59	774.00
						1/2" Ice	15.44	15.44	990.00
						1" Ice	19.29	19.29	1206.00
****									
***									
BXA-80063/6CF w/Mount Pipe	A	From Face	3.00	0.0000	130.00	No Ice	7.84	5.42	40.45
			0.00			1/2" Ice	8.40	6.59	99.60
			0.00			1" Ice	8.92	7.46	166.44
BXA-80063/6CF w/Mount Pipe	B	From Face	3.00	0.0000	130.00	No Ice	7.84	5.42	40.45
			0.00			1/2" Ice	8.40	6.59	99.60
			0.00			1" Ice	8.92	7.46	166.44
BXA-80063/6CF w/Mount Pipe	C	From Face	3.00	0.0000	130.00	No Ice	7.84	5.42	40.45
			0.00			1/2" Ice	8.40	6.59	99.60
			0.00			1" Ice	8.92	7.46	166.44
BXA-80063/4CF w/Mount Pipe	A	From Face	3.00	0.0000	130.00	No Ice	5.43	3.91	35.45
			0.00			1/2" Ice	6.07	4.94	81.77
			0.00			1" Ice	6.58	5.68	134.25
BXA-80063/4CF w/Mount Pipe	B	From Face	3.00	0.0000	130.00	No Ice	5.43	3.91	35.45
			0.00			1/2" Ice	6.07	4.94	81.77
			0.00			1" Ice	6.58	5.68	134.25
BXA-80063/4CF w/Mount Pipe	C	From Face	3.00	0.0000	130.00	No Ice	5.43	3.91	35.45
			0.00			1/2" Ice	6.07	4.94	81.77
			0.00			1" Ice	6.58	5.68	134.25
(2) SBNHH-1D65B w/ Mount Pipe	A	From Face	3.00	0.0000	130.00	No Ice	8.32	7.00	66.15
			0.00			1/2" Ice	8.88	8.19	134.70
			0.00			1" Ice	9.40	9.08	211.21
(2) SBNHH-1D65B w/ Mount Pipe	B	From Face	3.00	0.0000	130.00	No Ice	8.32	7.00	66.15
			0.00			1/2" Ice	8.88	8.19	134.70
			0.00			1" Ice	9.40	9.08	211.21
(2) SBNHH-1D65B w/ Mount Pipe	C	From Face	3.00	0.0000	130.00	No Ice	8.32	7.00	66.15
			0.00			1/2" Ice	8.88	8.19	134.70
			0.00			1" Ice	9.40	9.08	211.21
RRH2x60-700	A	From Face	3.00	0.0000	130.00	No Ice	3.50	1.82	60.00
			0.00			1/2" Ice	3.76	2.05	82.72
			0.00			1" Ice	4.03	2.29	109.06
RRH2x60-700	B	From Face	3.00	0.0000	130.00	No Ice	3.50	1.82	60.00
			0.00			1/2" Ice	3.76	2.05	82.72
			0.00			1" Ice	4.03	2.29	109.06
RRH2x60-700	C	From Face	3.00	0.0000	130.00	No Ice	3.50	1.82	60.00
			0.00			1/2" Ice	3.76	2.05	82.72
			0.00			1" Ice	4.03	2.29	109.06
RRH2X60-PCS	A	From Face	3.00	0.0000	130.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
RRH2X60-PCS	B	From Face	3.00	0.0000	130.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
RRH2X60-PCS	C	From Face	3.00	0.0000	130.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	2.59	2.09	98.71
RRH2X60-PCS	A	From Face	3.00	0.0000	130.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
RRH2X60-PCS	B	From Face	3.00	0.0000	130.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
RRH2X60-PCS	C	From Face	3.00	0.0000	130.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
RRH4x45/2x90-AWS	A	From Face	3.00	0.0000	130.00	No Ice	2.58	1.69	80.00
			0.00			1/2" Ice	2.79	1.87	100.00
			0.00			1" Ice	3.01	2.06	120.00
RRH4x45/2x90-AWS	B	From Face	3.00	0.0000	130.00	No Ice	2.58	1.69	80.00
			0.00			1/2" Ice	2.79	1.87	100.00
			0.00			1" Ice	3.01	2.06	120.00
RRH4x45/2x90-AWS	C	From Face	3.00	0.0000	130.00	No Ice	2.58	1.69	80.00
			0.00			1/2" Ice	2.79	1.87	100.00
			0.00			1" Ice	3.01	2.06	120.00
(2) DB-T1-6Z-8AB-0Z	A	From Face	3.00	0.0000	130.00	No Ice	4.80	2.00	44.00
			0.00			1/2" Ice	5.07	2.19	80.13
			0.00			1" Ice	5.35	2.39	120.22
Pirod 13' Low Profit Platfrom	C	None		0.0000	130.00	No Ice	15.70	15.70	1300.00
						1/2" Ice	20.10	20.10	1765.00
						1" Ice	24.50	24.50	2230.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
HP2-102	C	Paraboloid w/Shroud (HP)	From Face	1.50	0.0000		159.00	2.00	No Ice	3.14	25.00
				0.00					1/2" Ice	3.41	42.49
				0.00					1" Ice	3.68	59.98
HP2-102	A	Paraboloid w/Shroud (HP)	From Face	1.50	0.0000		126.00	2.00	No Ice	3.14	25.00
				0.00					1/2" Ice	3.41	42.49
				0.00					1" Ice	3.68	59.98

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice

Comb. No.	Description
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	179 - 141.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-24386.32	-0.67	-0.97
			Max. Mx	8	-7758.25	-257.15	-2.13
			Max. My	2	-7770.45	1.69	254.43
			Max. Vy	8	13240.96	-257.15	-2.13
			Max. Vx	2	-13224.92	1.69	254.43
			Max. Torque	12			0.52

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	141.25 - 92.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-65112.35	1.80	-1.39
			Max. Mx	8	-23746.44	-1422.47	-11.34
			Max. My	2	-23788.31	10.73	1404.99
			Max. Vy	8	30241.79	-1422.47	-11.34
			Max. Vx	2	-29809.99	10.73	1404.99
			Max. Torque	19			-2.42
L3	92.58 - 45.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-89457.58	1.37	-7.77
			Max. Mx	8	-38221.18	-2929.42	-24.20
			Max. My	2	-38245.06	21.89	2891.52
			Max. Vy	8	35960.84	-2929.42	-24.20
			Max. Vx	2	-35531.23	21.89	2891.52
			Max. Torque	19			-2.41
L4	45.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-125039.76	0.85	-15.02
			Max. Mx	8	-60389.74	-5000.49	-39.02
			Max. My	2	-60390.31	34.65	4939.13
			Max. Vy	8	41866.65	-5000.49	-39.02
			Max. Vx	2	-41449.77	34.65	4939.13
			Max. Torque	19			-2.41

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	36	125039.76	14097.68	44.02
	Max. H_x	20	60415.28	41787.92	204.79
	Max. H_z	2	60415.28	235.97	41413.37
	Max. M_x	2	4939.13	235.97	41413.37
	Max. M_z	8	5000.49	-41829.79	-256.20
	Max. Torsion	7	2.41	-36109.05	20527.89
	Min. Vert	17	45311.46	20714.64	-35731.34
	Min. H_x	8	60415.28	-41829.79	-256.20
	Min. H_z	14	60415.28	-275.98	-41379.40
	Min. M_x	14	-4936.46	-275.98	-41379.40
	Min. M_z	20	-4996.19	41787.92	204.79
	Min. Torsion	19	-2.41	36093.26	-20516.45

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	50346.07	0.00	0.00	1.33	0.45	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	60415.28	-235.97	-41413.37	-4939.13	34.65	-0.56
0.9 Dead+1.6 Wind 0 deg - No Ice	45311.46	-235.97	-41413.36	-4899.17	34.21	-0.56
1.2 Dead+1.6 Wind 30 deg - No Ice	60415.28	20693.15	-35794.53	-4267.07	-2467.79	-1.81
0.9 Dead+1.6 Wind 30 deg - No	45311.46	20693.15	-35794.53	-4232.60	-2447.76	-1.81

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	kip-ft	kip-ft	kip-ft
Ice						
1.2 Dead+1.6 Wind 60 deg - No Ice	60415.28	36109.05	-20527.89	-2444.47	-4312.63	-2.40
0.9 Dead+1.6 Wind 60 deg - No Ice	45311.46	36109.05	-20527.89	-2424.90	-4277.52	-2.41
1.2 Dead+1.6 Wind 90 deg - No Ice	60415.28	41829.79	256.20	39.02	-5000.49	-2.35
0.9 Dead+1.6 Wind 90 deg - No Ice	45311.46	41829.78	256.20	38.28	-4959.76	-2.36
1.2 Dead+1.6 Wind 120 deg - No Ice	60415.28	36305.92	20911.71	2502.04	-4341.97	-1.84
0.9 Dead+1.6 Wind 120 deg - No Ice	45311.46	36305.92	20911.71	2481.19	-4306.61	-1.84
1.2 Dead+1.6 Wind 150 deg - No Ice	60415.28	21095.93	35954.70	4292.92	-2525.63	-0.81
0.9 Dead+1.6 Wind 150 deg - No Ice	45311.46	21095.93	35954.69	4257.44	-2505.12	-0.82
1.2 Dead+1.6 Wind 180 deg - No Ice	60415.28	275.98	41379.40	4936.46	-38.72	0.50
0.9 Dead+1.6 Wind 180 deg - No Ice	45311.46	275.98	41379.39	4895.74	-38.53	0.50
1.2 Dead+1.6 Wind 210 deg - No Ice	60415.28	-20714.64	35731.34	4260.56	2471.33	1.80
0.9 Dead+1.6 Wind 210 deg - No Ice	45311.46	-20714.64	35731.34	4225.36	2451.00	1.81
1.2 Dead+1.6 Wind 240 deg - No Ice	60415.28	-36093.26	20516.45	2444.81	4312.13	2.40
0.9 Dead+1.6 Wind 240 deg - No Ice	45311.46	-36093.26	20516.45	2424.44	4276.74	2.41
1.2 Dead+1.6 Wind 270 deg - No Ice	60415.28	-41787.92	-204.79	-27.73	4996.19	2.36
0.9 Dead+1.6 Wind 270 deg - No Ice	45311.46	-41787.91	-204.79	-27.89	4955.21	2.36
1.2 Dead+1.6 Wind 300 deg - No Ice	60415.28	-36257.70	-20932.39	-2502.91	4336.42	1.90
0.9 Dead+1.6 Wind 300 deg - No Ice	45311.46	-36257.70	-20932.39	-2482.84	4300.82	1.91
1.2 Dead+1.6 Wind 330 deg - No Ice	60415.28	-21074.24	-35969.64	-4293.17	2524.31	0.82
0.9 Dead+1.6 Wind 330 deg - No Ice	45311.46	-21074.24	-35969.64	-4258.48	2503.52	0.82
1.2 Dead+1.0 Ice+1.0 Temp	125039.76	-0.00	0.01	15.02	0.85	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	125039.76	-51.26	-12836.66	-1574.52	8.69	-0.11
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	125039.76	6400.65	-11102.26	-1359.31	-791.59	-0.45
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	125039.76	11144.78	-6379.94	-774.13	-1380.46	-0.63
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	125039.76	14107.37	55.97	24.00	-1719.34	-0.64
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	125039.76	11187.02	6462.90	817.24	-1387.14	-0.52
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	125039.76	6488.05	11135.92	1395.06	-804.82	-0.25
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	125039.76	60.52	12828.74	1603.81	-8.18	0.10
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	125039.76	-6405.60	11087.58	1387.66	793.94	0.45
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	125039.76	-11141.15	6377.23	804.15	1381.84	0.63
1.2 Dead+1.0 Wind 270	125039.76	-14097.68	-44.02	8.74	1719.79	0.64

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	kip-ft	kip-ft	kip-ft
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	125039.76	-11175.84	-6467.75	-787.51	1387.28	0.53
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	125039.76	-6483.04	-11139.45	-1365.19	806.01	0.25
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	50346.07	-50.49	-8860.84	-1050.88	7.72	-0.12
Dead+Wind 30 deg - Service	50346.07	4427.53	-7658.63	-907.75	-525.21	-0.39
Dead+Wind 60 deg - Service	50346.07	7725.92	-4392.17	-519.60	-918.12	-0.52
Dead+Wind 90 deg - Service	50346.07	8949.94	54.82	9.31	-1064.63	-0.51
Dead+Wind 120 deg - Service	50346.07	7768.05	4474.29	533.87	-924.38	-0.40
Dead+Wind 150 deg - Service	50346.07	4513.70	7692.90	915.28	-537.54	-0.18
Dead+Wind 180 deg - Service	50346.07	59.05	8853.57	1052.32	-7.90	0.11
Dead+Wind 210 deg - Service	50346.07	-4432.12	7645.11	908.37	526.66	0.39
Dead+Wind 240 deg - Service	50346.07	-7722.55	4389.72	521.67	918.70	0.52
Dead+Wind 270 deg - Service	50346.07	-8940.98	-43.82	-4.90	1064.40	0.51
Dead+Wind 300 deg - Service	50346.07	-7757.73	-4478.71	-532.05	923.89	0.41
Dead+Wind 330 deg - Service	50346.07	-4509.06	-7696.10	-913.33	537.95	0.18

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-50346.07	0.00	0.00	50346.07	0.00	0.000%
2	-235.97	-60415.28	-41413.35	235.97	60415.28	41413.37	0.000%
3	-235.97	-45311.46	-41413.35	235.97	45311.46	41413.36	0.000%
4	20693.15	-60415.28	-35794.53	-20693.15	60415.28	35794.53	0.000%
5	20693.15	-45311.46	-35794.53	-20693.15	45311.46	35794.53	0.000%
6	36109.05	-60415.28	-20527.89	-36109.05	60415.28	20527.89	0.000%
7	36109.05	-45311.46	-20527.89	-36109.05	45311.46	20527.89	0.000%
8	41829.78	-60415.28	256.20	-41829.79	60415.28	-256.20	0.000%
9	41829.78	-45311.46	256.20	-41829.78	45311.46	-256.20	0.000%
10	36305.92	-60415.28	20911.71	-36305.92	60415.28	-20911.71	0.000%
11	36305.92	-45311.46	20911.71	-36305.92	45311.46	-20911.71	0.000%
12	21095.93	-60415.28	35954.69	-21095.93	60415.28	-35954.70	0.000%
13	21095.93	-45311.46	35954.69	-21095.93	45311.46	-35954.69	0.000%
14	275.98	-60415.28	41379.39	-275.98	60415.28	-41379.40	0.000%
15	275.98	-45311.46	41379.39	-275.98	45311.46	-41379.39	0.000%
16	-20714.64	-60415.28	35731.34	20714.64	60415.28	-35731.34	0.000%
17	-20714.64	-45311.46	35731.34	20714.64	45311.46	-35731.34	0.000%
18	-36093.26	-60415.28	20516.45	36093.26	60415.28	-20516.45	0.000%
19	-36093.26	-45311.46	20516.45	36093.26	45311.46	-20516.45	0.000%
20	-41787.91	-60415.28	-204.79	41787.92	60415.28	204.79	0.000%
21	-41787.91	-45311.46	-204.79	41787.91	45311.46	204.79	0.000%
22	-36257.70	-60415.28	-20932.39	36257.70	60415.28	20932.39	0.000%
23	-36257.70	-45311.46	-20932.39	36257.70	45311.46	20932.39	0.000%
24	-21074.24	-60415.28	-35969.64	21074.24	60415.28	35969.64	0.000%
25	-21074.24	-45311.46	-35969.64	21074.24	45311.46	35969.64	0.000%
26	0.00	-125039.76	0.00	0.00	125039.76	-0.01	0.000%
27	-51.26	-125039.76	-12836.54	51.26	125039.76	12836.66	0.000%
28	6400.58	-125039.76	-11102.16	-6400.65	125039.76	11102.26	0.000%
29	11144.67	-125039.76	-6379.88	-11144.78	125039.76	6379.94	0.000%
30	14107.23	-125039.76	55.97	-14107.37	125039.76	-55.97	0.000%
31	11186.91	-125039.76	6462.84	-11187.02	125039.76	-6462.90	0.000%
32	6487.98	-125039.76	11135.81	-6488.05	125039.76	-11135.92	0.000%
33	60.52	-125039.76	12828.61	-60.52	125039.76	-12828.74	0.000%
34	-6405.54	-125039.76	11087.47	6405.60	125039.76	-11087.58	0.000%
35	-11141.04	-125039.76	6377.17	11141.15	125039.76	-6377.23	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
36	-14097.55	-125039.76	-44.02	14097.68	125039.76	44.02	0.000%
37	-11175.73	-125039.76	-6467.69	11175.84	125039.76	6467.75	0.000%
38	-6482.98	-125039.76	-11139.34	6483.04	125039.76	11139.45	0.000%
39	-50.49	-50346.07	-8860.84	50.49	50346.07	8860.84	0.000%
40	4427.53	-50346.07	-7658.63	-4427.53	50346.07	7658.63	0.000%
41	7725.92	-50346.07	-4392.17	-7725.92	50346.07	4392.17	0.000%
42	8949.94	-50346.07	54.82	-8949.94	50346.07	-54.82	0.000%
43	7768.05	-50346.07	4474.29	-7768.05	50346.07	-4474.29	0.000%
44	4513.70	-50346.07	7692.90	-4513.70	50346.07	-7692.90	0.000%
45	59.05	-50346.07	8853.57	-59.05	50346.07	-8853.57	0.000%
46	-4432.12	-50346.07	7645.11	4432.12	50346.07	-7645.11	0.000%
47	-7722.55	-50346.07	4389.72	7722.55	50346.07	-4389.72	0.000%
48	-8940.98	-50346.07	-43.82	8940.98	50346.07	43.82	0.000%
49	-7757.73	-50346.07	-4478.71	7757.73	50346.07	4478.71	0.000%
50	-4509.06	-50346.07	-7696.10	4509.06	50346.07	7696.10	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	0.00026103
3	Yes	4	0.00000001	0.00015447
4	Yes	5	0.00000001	0.00030859
5	Yes	5	0.00000001	0.00013717
6	Yes	5	0.00000001	0.00032657
7	Yes	5	0.00000001	0.00014567
8	Yes	4	0.00000001	0.00033297
9	Yes	4	0.00000001	0.00020755
10	Yes	5	0.00000001	0.00031819
11	Yes	5	0.00000001	0.00014067
12	Yes	5	0.00000001	0.00032855
13	Yes	5	0.00000001	0.00014592
14	Yes	4	0.00000001	0.00016833
15	Yes	4	0.00000001	0.00008947
16	Yes	5	0.00000001	0.00032177
17	Yes	5	0.00000001	0.00014358
18	Yes	5	0.00000001	0.00030685
19	Yes	5	0.00000001	0.00013611
20	Yes	4	0.00000001	0.00061477
21	Yes	4	0.00000001	0.00038723
22	Yes	5	0.00000001	0.00033485
23	Yes	5	0.00000001	0.00014870
24	Yes	5	0.00000001	0.00032088
25	Yes	5	0.00000001	0.00014216
26	Yes	4	0.00000001	0.00002472
27	Yes	5	0.00000001	0.00033415
28	Yes	5	0.00000001	0.00042592
29	Yes	5	0.00000001	0.00043080
30	Yes	5	0.00000001	0.00035630
31	Yes	5	0.00000001	0.00043891
32	Yes	5	0.00000001	0.00044034
33	Yes	5	0.00000001	0.00033840
34	Yes	5	0.00000001	0.00043620
35	Yes	5	0.00000001	0.00043410
36	Yes	5	0.00000001	0.00035727

37	Yes	5	0.00000001	0.00043806
38	Yes	5	0.00000001	0.00043369
39	Yes	4	0.00000001	0.00002310
40	Yes	4	0.00000001	0.00010623
41	Yes	4	0.00000001	0.00012706
42	Yes	4	0.00000001	0.00003271
43	Yes	4	0.00000001	0.00011032
44	Yes	4	0.00000001	0.00012232
45	Yes	4	0.00000001	0.00002240
46	Yes	4	0.00000001	0.00012198
47	Yes	4	0.00000001	0.00010496
48	Yes	4	0.00000001	0.00003529
49	Yes	4	0.00000001	0.00012974
50	Yes	4	0.00000001	0.00011331

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	179 - 141.25 (1)	TP33.249x23.1x0.25	37.75	0.00	0.0	25.2610	-7753.43	1748390.00	0.004
L2	141.25 - 92.58 (2)	TP45.834x31.5849x0.375	53.00	0.00	0.0	52.2132	-23741.80	3714610.00	0.006
L3	92.58 - 45.5 (3)	TP57.742x43.4924x0.375	53.00	0.00	0.0	65.8810	-38217.10	4311140.00	0.009
L4	45.5 - 0 (4)	TP69.225x54.9755x0.375	53.00	0.00	0.0	81.9487	-60389.60	4812990.00	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	179 - 141.25 (1)	TP33.249x23.1x0.25	257.96	1144.56	0.225	0.00	1144.56	0.000
L2	141.25 - 92.58 (2)	TP45.834x31.5849x0.375	1426.02	3348.51	0.426	0.00	3348.51	0.000
L3	92.58 - 45.5 (3)	TP57.742x43.4924x0.375	2936.04	4912.18	0.598	0.00	4912.18	0.000
L4	45.5 - 0 (4)	TP69.225x54.9755x0.375	5011.27	6830.50	0.734	0.00	6830.50	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	179 - 141.25 (1)	TP33.249x23.1x0.25	13280.80	874196.00	0.015	0.17	2291.92	0.000
L2	141.25 - 92.58	TP45.834x31.5849x0.375	30280.70	1857310.00	0.016	1.91	6705.20	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L3	92.58 - 45.5 (3)	TP57.742x43.4924x0.375	36031.00	2155570.00	0.017	1.84	9836.33	0.000
L4	45.5 - 0 (4)	TP69.225x54.9755x0.375	41934.70	2406490.00	0.017	1.84	13677.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	179 - 141.25 (1)	0.004	0.225	0.000	0.015	0.000	0.230 ✔	1.000	4.8.2 ✔
L2	141.25 - 92.58 (2)	0.006	0.426	0.000	0.016	0.000	0.433 ✔	1.000	4.8.2 ✔
L3	92.58 - 45.5 (3)	0.009	0.598	0.000	0.017	0.000	0.607 ✔	1.000	4.8.2 ✔
L4	45.5 - 0 (4)	0.013	0.734	0.000	0.017	0.000	0.747 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	179 - 141.25	Pole	TP33.249x23.1x0.25	1	-7753.43	1748390.00	23.0	Pass
L2	141.25 - 92.58	Pole	TP45.834x31.5849x0.375	2	-23741.80	3714610.00	43.3	Pass
L3	92.58 - 45.5	Pole	TP57.742x43.4924x0.375	3	-38217.10	4311140.00	60.7	Pass
L4	45.5 - 0	Pole	TP69.225x54.9755x0.375	4	-60389.60	4812990.00	74.7	Pass
							Summary	
						Pole (L4)	74.7	Pass
						RATING =	**74.7**	**Pass**

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:
Site Name: *CT 5122*
App #:

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	76	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	82	in
Thick:	2.25	in
Grade:	60	ksi
Clip Distance:	16	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	69.225	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Base Reactions		
TIA Revision:	G	
Factored Moment, Mu:	5011	ft-kips
Factored Axial, Pu:	60.4	kips
Factored Shear, Vu:	41.9	kips

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/η):	206.8	Kips
Axial Design Strength, Φ*Fu*Anet:	260.0	Kips
Anchor Rod Stress Ratio:	79.5%	**Pass**

Base Plate Results Flexural Check

Base Plate Stress:	43.6	ksi
PL Design Bending Strength, Φ*Fy:	54.0	ksi
Base Plate Stress Ratio:	80.7%	**Pass**

PL Ref. Data	
Yield Line (in):	40.35
Max PL Length:	46.74

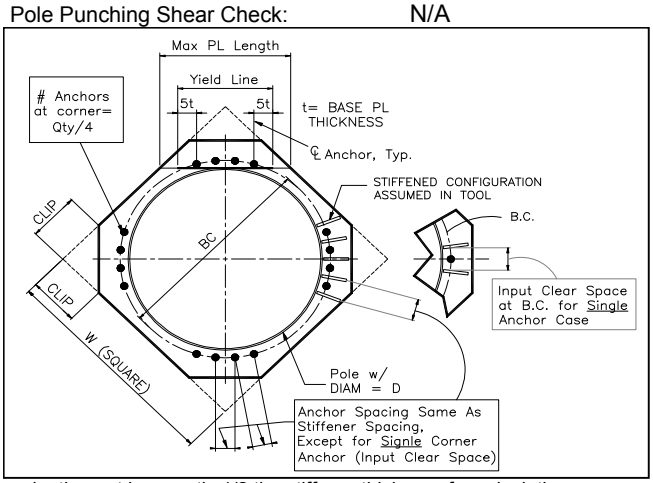
N/A - Unstiffened

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



** 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 # : -
Site Name: CT 5122
App. Number: -
TIA-222 Revision: G

Design Reactions		
Shear, **S**:	41.9	kips
Moment, **M**:	5011	ft-kips
Tower Height, **H**:	179	ft
Tower Weight, **Wt**:	60.4	kips
Base Diameter, **BD**:	5.77	ft

Foundation Dimensions		
Depth, **D**:	6.5	ft
Pad Width, **W**:	30	ft
Neglected Depth, **N**:	3.33	ft
Thickness, **T**:	2.50	ft
Pier Diameter, **Pd**:	8.50	ft
Ext. Above Grade, **E**:	0.50	ft
BP Dist. Above Pier:	3	in.
Clear Cover, **Cc**:	3.0	in

Soil Properties		
Soil Unit Weight, **γ**:	0.100	kcf
Ult. Bearing Capacity, Bc:	6.0	ksf
Angle of Friction, **Φ**:	30	deg
Cohesion, **Co**:	0.000	ksf
Passive Pressure, **Pp**:	0.000	ksf
Base Friction, **μ**:	0.40	

Material Properties		
Rebar Yield Strength, **Fy**:	60000	psi
Concrete Strength, **F'c**:	3000	psi
Concrete Unit Weight, **δc**:	0.150	kcf
Seismic Zone, **z**:	1	

Rebar Properties		
Pier Rebar Size, **Sp**:	9	
Pier Rebar Quanity, **mp**:	41	41
Pad Rebar Size, **Spad**:	9	
Pad Rebar Quanity, **mpad**:	33	14
Pier Tie Size, **St**:	4	3
Tie Quanity, **mt**:	14	5

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	8.5	7.77	**OK**
Overturning (ft-kips)	8859.10	5011.00	**56.6%**
Shear Capacity (kips)	249.53	41.90	**16.8%**
Bearing (ksf)	4.50	1.92	**42.6%**
Pad Shear - 1-way (kips)	781.90	458.84	**58.7%**
Pad Shear - 2-way (kips)	1752.73	119.98	**6.8%**
Pad Moment Capacity (k-ft)	3765.60	1715.35	**45.6%**
Pier Moment Capacity (k-ft)	9815.92	5199.55	**53.0%**