Date: **October 20, 2015**

Rebecca Klein
Crown Castle
525 Alderman Lane
Fort Mill, SC 29715

Aero Solutions LLC
5555 Centeral Avenue, Suite 100
Boulder, CO 80301
(720) 304-6882

Subject: Structural Analysis Report

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CTL01054
	Carrier Site Name:	Plainville Center
Crown Castle Designation:	**Crown Castle BU Number:**	876333
	Crown Castle Site Name:	CREATIVE DIMENSIONS
	Crown Castle JDE Job Number:	351216
	Crown Castle Work Order Number:	1136066
	Crown Castle Application Number:	315605 Rev. 0
Engineering Firm Designation:	**Aero Solutions LLC Project Number:**	003-15-0660
Site Data:	**10 Sparks St., PLAINVILLE, Hartford County, CT**	
	Latitude *41° 40' 24.52"*, Longitude *-72° 51' 16.17"*	
	137 Foot - Monopole Tower	

Dear Rebecca Klein,

Aero Solutions LLC is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 835687, in accordance with application 315605, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 80 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at *Aero Solutions LLC* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Sina Erturk

Respectfully submitted by:

Ryan Spalding, P.E.
Structural Engineer
CT PE#: 30849
Expires: 01/31/2016

STATE OF CONNECTICUT
RYAN C SPALDING
0030849
LICENSED
PROFESSIONAL ENGINEER

10.20.2015

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
- Table 1 - Proposed Antenna and Cable Information
- Table 2 - Existing and Reserved Antenna and Cable Information
- Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE
- Table 4 - Documents Provided
- 3.1) Analysis Method
- 3.2) Assumptions

4) ANALYSIS RESULTS
- Table 5 - Section Capacity (Summary)
- Table 6 – Tower Components vs. Capacity
- 4.1) Recommendations

5) APPENDIX A
- tnxTower Output

6) APPENDIX B
- Base Level Drawing

7) APPENDIX C
- Additional Calculations

1) INTRODUCTION

This is a 50 ft monopole tower designed by Pittsburg Monopole in April of 1997. The manufacturer, original design standard and wind speed are unknown.

The tower has been modified multiple times in the past to accommodate additional loading.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
113.0	115.0	3	cci antennas	OPA-65R-LCUU-H8 w/ Mount Pipe			
		3	ericsson	RRUS 32 B30			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
124.0	131.0	1	andrew	VHLP1-23	10 3	5/16" 1-1/4"	1
		1	andrew	VHLP2.5-18			
	124.0	3	alcatel lucent	TD-RRH8x20-25	1	1-1/4"	2
		3	argus technologies	LLPX310R-V4 w/ Mount Pipe			1
		1	rfs celwave	APXV9ERR18-C-A20 w/ Mount Pipe			
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			2
		3	rfs celwave	IBC1900BB-1			1
		3	rfs celwave	IBC1900HG-2A			
		5	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Platform Mount [LP 601-1]			
122.0	125.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			1
	122.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER			
		1	tower mounts	Pipe Mount [PM 601-3]			
113.0	115.0	3	ericsson	RRUS-11	1 2 12	3/8" 3/4" 7/8"	1
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		3	powerwave technologies	7770.00 w/ Mount Pipe			3
		6	powerwave technologies	LGP13519			
	113.0	3	ericsson	RRUS-11			1
		3	lucent	LGP21401			
		3	powerwave technologies	LGP21903			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 601-1]			
100.0	100.0	1	tower mounts	T-Arm Mount [TA 602-3]			1
92.0	93.0	3	andrew	HBX-6516DS-VTM w/ Mount Pipe	1 6	3/8" 7/8"	1
	92.0	1	tower mounts	T-Arm Mount [TA 601-3]			
50.0	50.0	1	gps	GPS_A	1	1/2"	1
		1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welt	1529723	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Hodge Design Associates	1616541	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Pittsburg Monopole Division	1615369	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF	2680348	CCISITES
4-POST-MODIFICATION INSPECTION	TEP	5781873	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF	5626530	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) The modifications were installed per the referenced documents.

This analysis may be affected if any assumptions are not valid or have been made in error. Aero Solutions LLC should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	137 - 125	Pole	P12.75x0.375	1	-0.61	408.11	3.9	Pass
L2	125 - 120	Pole	P24x0.375	2	-3.63	779.12	7.6	Pass
L3	120 - 89.5	Pole	P24x0.375	3	-10.98	779.12	96.9	Pass
L4	89.5 - 85.6563	Pole	P24x0.375 [0.479035]	4	-11.58	962.60	90.8	Pass
L5	85.6563 - 80	Pole	P24x0.375 [0.617321]	5	-12.61	1233.79	85.5	Pass
L6	80 - 65.5	Pole	P36x0.375	6	-15.37	1169.03	93.1	Pass
L7	65.5 - 58.3958	Pole	P36x0.375 [0.464084]	7	-16.78	1308.65	88.0	Pass
L8	58.3958 - 57.5	Pole	P36x0.375 [0.614627]	8	-17.00	1712.84	68.9	Pass
L9	57.5 - 49.5	Pole	P36x0.375 [0.522938]	9	-17.23	1712.84	92.1	Pass
L10	49.5 - 40	Pole	P36x0.375 [0.589684]	10	-21.19	1627.75	97.5	Pass
L11	40 - 19.5	Pole	P42x0.5	11	-26.62	1824.81	98.2	Pass
L12	19.5 - 12.5	Pole	P42x0.5 [0.554237]	12	-28.59	1991.13	98.0	Pass
L13	12.5 - 0	Pole	P42x0.5 [0.692989]	13	-32.69	2455.88	91.7	Pass
							Summary	
						Pole (L11)	98.2	Pass
						Rating =	98.2	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	96.3	Pass
1	Base Plate	0	55.5	Pass
1	Base Foundation	0	74.4	Pass
1	Base Foundation Soil Interaction	0	28.7	Pass
1	Flange Connection	40	72.5	Pass
1	Flange Connection	80	73.5	Pass
1	Flange Connection	120	25.3	Pass

Structure Rating (max from all components) =	98.2%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

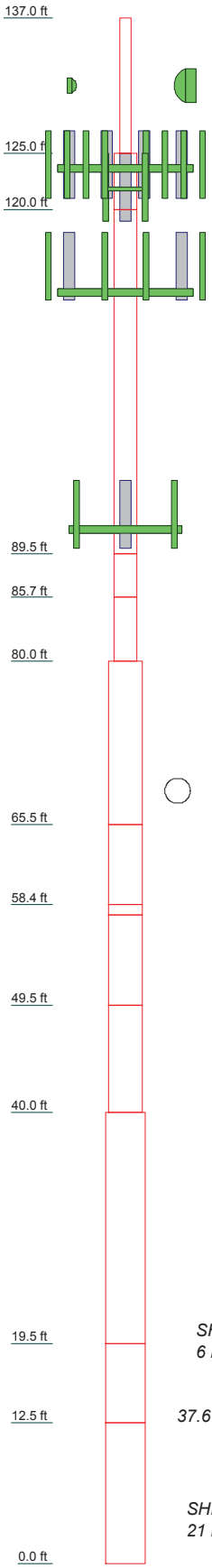
4.1) Recommendations

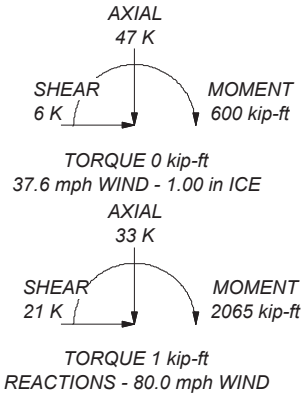
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Size	Length (ft)	Grade	Weight (K)
1	P12.75x0.375	12.00	A53-B-35	0.6
2	P24x0.375	5.00		0.5
3	P24x0.375	30.50		2.9
4	P24x0.375 [0.479035]	3.84	34.001098ksi	0.5
5	P24x0.375	5.66	34.017636ksi	0.9
6	P24x0.375 P36x0.375	14.50	A53-B-35	2.1
7	[0.464084]	7.10	31.581203ksi	1.2
8		0.90		0.2
9		8.00	-899829348193	1.5
10	P36x0.375 [0.589844]	9.50	31.024684ksi	2.1
11	P42x0.5	20.50	A53-B-35	4.5
12	P42x0.5 [0.554237]	7.00	34.497834ksi	1.8
13	P42x0.5 [0.692989]	12.50	34.144911ksi	3.7
				22.5





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LLPX310R-V4 w/ Mount Pipe	124	7770.00 w/ Mount Pipe	113
WIMAX DAP HEAD	124	AM-X-CD-16-65-00T-RET w/ Mount Pipe	113
LLPX310R-V4 w/ Mount Pipe	124	LGP21401	113
(2) WIMAX DAP HEAD	124	RRUS-11	113
LLPX310R-V4 w/ Mount Pipe	124	RRUS-11	113
(2) WIMAX DAP HEAD	124	LGP21903	113
APXVSPP18-C-A20 w/ Mount Pipe	124	OPA-65R-LCUU-H8 w/ Mount Pipe	113
IBC1900BB-1	124	RRUS 32 B30	113
IBC1900HG-2A	124	7770.00 w/ Mount Pipe	113
APXV9ERR18-C-A20 w/ Mount Pipe	124	AM-X-CD-16-65-00T-RET w/ Mount Pipe	113
IBC1900BB-1	124	LGP21401	113
IBC1900HG-2A	124	RRUS-11	113
APXVSPP18-C-A20 w/ Mount Pipe	124	RRUS-11	113
IBC1900BB-1	124	LGP21903	113
IBC1900HG-2A	124	OPA-65R-LCUU-H8 w/ Mount Pipe	113
APXVTM14-C-120 w/ Mount Pipe	124	RRUS 32 B30	113
TD-RRH8x20-25	124	Platform Mount [LP 601-1]	113
APXVTM14-C-120 w/ Mount Pipe	124	7770.00 w/ Mount Pipe	113
TD-RRH8x20-25	124	AM-X-CD-16-65-00T-RET w/ Mount Pipe	113
APXVTM14-C-120 w/ Mount Pipe	124	(4) 6' x 2" Mount Pipe	100
TD-RRH8x20-25	124	(4) 6' x 2" Mount Pipe	100
Platform Mount [LP 601-1]	124	T-Arm Mount [TA 602-3]	100
6' x 2" Mount Pipe	124	(4) 6' x 2" Mount Pipe	100
6' x 2" Mount Pipe	124	HBX-6516DS-VTM w/ Mount Pipe	92
6' x 2" Mount Pipe	124	T-Arm Mount [TA 601-3]	92
VHLP2.5-18	124	6' x 2" Mount Pipe	92
VHLP1-23	124	6' x 2" Mount Pipe	92
800MHz 2X50W RRH W/FILTER	122	6' x 2" Mount Pipe	92
PCS 1900MHz 4x45W-65MHz	122	HBX-6516DS-VTM w/ Mount Pipe	92
800MHz 2X50W RRH W/FILTER	122	HBX-6516DS-VTM w/ Mount Pipe	92
PCS 1900MHz 4x45W-65MHz	122	Bridge Stiffener (43" x 9.5" x 1")	80
Pipe Mount [PM 601-3]	122	Bridge Stiffener (43" x 9.5" x 1")	80
800MHz 2X50W RRH W/FILTER	122	Bridge Stiffener (43" x 9.5" x 1")	80
PCS 1900MHz 4x45W-65MHz	122	GPS_A	50
LGP21401	113	Side Arm Mount [SO 701-1]	50
RRUS-11	113	Bridge Stiffener (53" x 9" x 1")	40
RRUS-11	113	Bridge Stiffener (53" x 9" x 1")	40
DC6-48-60-18-8F	113	Bridge Stiffener (53" x 9" x 1")	40
LGP21903	113		
OPA-65R-LCUU-H8 w/ Mount Pipe	113		
RRUS 32 B30	113		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	-899829348193	8.99829e+012 ksi	8.99829e+012 ksi
34.001098ksi	34 ksi	49 ksi	31.024684ksi	31 ksi	46 ksi
34.017636ksi	34 ksi	49 ksi	34.497834ksi	34 ksi	49 ksi
31.581203ksi	32 ksi	47 ksi	34.144911ksi	34 ksi	49 ksi
31.34375ksi	31 ksi	46 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80.0 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.6 mph basic wind with 1.00 in ice.
4. Deflections are based upon a 50.0 mph wind.
5. TOWER RATING: 98.2%

Aero Solutions LLC
5555 Centeral Avenue, Suite 100
Boulder, CO 80301
Phone: (720) 304-6882
FAX:

Job: **BU#876333 CREATIVE DIMENSIONS**		
Project: ***Existing 137 ft Monopole***		
Client: CCI	Drawn by: SErturk	App'd:
Code: TIA/EIA-222-F	Date: 10/20/15	Scale: NTS
Path:		Dwg No. E-1

Tower Input Data

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

4) Tower is located in Hartford County, Connecticut.
5) Basic wind speed of 80.0 mph.
6) Nominal ice thickness of 1.00 in.
7) Ice density of 56 pcf.
8) A wind speed of 37.6 mph is used in combination with ice.
9) Temperature drop of 50 °F.
10) Deflections calculated using a wind speed of 50.0 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

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

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

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	137.00-125.00	12.00	P12.75x0.375	A53-B-35 (35 ksi)	
L2	125.00-120.00	5.00	P24x0.375	A53-B-35 (35 ksi)	
L3	120.00-89.50	30.50	P24x0.375	A53-B-35 (35 ksi)	
L4	89.50-85.66	3.84	P24x0.375 [0.479035]	34.001098ksi (34 ksi)	
L5	85.66-80.00	5.66	P24x0.375 [0.617321]	34.017636ksi (34 ksi)	
L6	80.00-65.50	14.50	P36x0.375	A53-B-35 (35 ksi)	
L7	65.50-58.40	7.10	P36x0.375 [0.464084]	31.581203ksi (32 ksi)	
L8	58.40-57.50	0.90	P36x0.375 [0.614627]	31.34375ksi (31 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L9	57.50-49.50	8.00	P36x0.375 [0.522938]	- 8998293481 931.39ksi (8.99829e+0 12 ksi)	
L10	49.50-40.00	9.50	P36x0.375 [0.589684]	31.024684ks i (31 ksi)	
L11	40.00-19.50	20.50	P42x0.5	A53-B-35 (35 ksi)	
L12	19.50-12.50	7.00	P42x0.5 [0.554237]	34.497834ks i (34 ksi)	
L13	12.50-0.00	12.50	P42x0.5 [0.692989]	34.144911ks i (34 ksi)	

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
L1 137.00-125.00				1	1	1		
L2 125.00-120.00				1	1	1		
L3 120.00-89.50				1	1	1		
L4 89.50-85.66				1	1	1.04107		
L5 85.66-80.00				1	1	0.998795		
L6 80.00-65.50				1	1	1		
L7 65.50-58.40				1	1	0.984279		
L8 58.40-57.50				1	1	0.960515		
L9 57.50-49.50				1	1	0.971512		
L10 49.50-40.00				1	1	1.00044		
L11 40.00-19.50				1	1	1		
L12 19.50-12.50				1	1	1.02856		
L13 12.50-0.00				1	1	0.979748		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***										

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
***								
1" Flat Reinforcement	A	No	CaAa (Out Of Face)	14.50 - 0.00	1	No Ice	0.17	0.00
						1/2" Ice	0.28	0.00
						1" Ice	0.39	0.00
1" Flat Reinforcement	A	No	CaAa (Out Of Face)	59.90 - 40.40	1	No Ice	0.17	0.00
						1/2" Ice	0.28	0.00
						1" Ice	0.39	0.00
3/4" Flat Reinforcement	A	No	CaAa (Out Of Face)	86.70 - 80.40	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	0.00
***								
3/4" Flat Reinforcement	A	No	CaAa (Out Of Face)	20.50 - 0.50	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	0.00
3/4" Flat Reinforcement	A	No	CaAa (Out Of Face)	50.50 - 40.50	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	0.00
3/4" Flat Reinforcement	A	No	CaAa (Out Of Face)	66.50 - 56.50	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	0.00
3/4" Flat Reinforcement	A	No	CaAa (Out Of Face)	90.50 - 80.50	1	No Ice	0.13	0.00
						1/2" Ice	0.24	0.00
						1" Ice	0.35	0.00
***								
9207(5/16")	C	No	Inside Pole	124.00 - 0.00	10	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
2" Flex Conduit	C	No	Inside Pole	124.00 - 0.00	2	No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32
***								
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	124.00 - 0.00	3	No Ice	0.00	1.08
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.18
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	124.00 - 0.00	1	No Ice	0.15	1.08
						1/2" Ice	0.25	2.33
						1" Ice	0.35	4.18
***								
LDF5-50A(7/8)	C	No	Inside Pole	113.00 - 0.00	12	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
FB-L98B-002-75000(3/8")	C	No	Inside Pole	113.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	113.00 - 0.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" Flex Conduit	C	No	Inside Pole	113.00 - 0.00	1	No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32
***								
LDF2-50(3/8")	A	No	Inside Pole	92.00 - 0.00	1	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
FXL 780 PE(7/8)	A	No	Inside Pole	92.00 - 0.00	6	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
						1" Ice	0.00	0.25
***								
LDF4-50A(1/2")	B	No	Inside Pole	50.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
***								

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 K
L1	137.00-125.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	125.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.616	0.04
L3	120.00-89.50	A	0.000	0.000	0.000	0.125	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.697	0.46
L4	89.50-85.66	A	0.000	0.000	0.000	0.611	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.592	0.06
L5	85.66-80.00	A	0.000	0.000	0.000	1.302	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.871	0.09
L6	80.00-65.50	A	0.000	0.000	0.000	0.125	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.233	0.24
L7	65.50-58.40	A	0.000	0.000	0.000	1.139	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.094	0.12
L8	58.40-57.50	A	0.000	0.000	0.000	0.261	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.138	0.01
L9	57.50-49.50	A	0.000	0.000	0.000	1.583	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.232	0.13
L10	49.50-40.00	A	0.000	0.000	0.000	2.642	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.463	0.16
L11	40.00-19.50	A	0.000	0.000	0.000	0.125	0.03
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.157	0.34
L12	19.50-12.50	A	0.000	0.000	0.000	1.208	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.078	0.12
L13	12.50-0.00	A	0.000	0.000	0.000	3.583	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.925	0.21

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 K
L1	137.00-125.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	125.00-120.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.416	0.09
L3	120.00-89.50	A	1.000	0.000	0.000	0.000	0.347	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	10.797	0.84
L4	89.50-85.66	A	1.000	0.000	0.000	0.000	1.697	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.361	0.11
L5	85.66-80.00	A	1.000	0.000	0.000	0.000	3.615	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.002	0.16
L6	80.00-65.50	A	1.000	0.000	0.000	0.000	0.347	0.02
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.133	0.42
L7	65.50-58.40	A	1.000	0.000	0.000	0.000	3.052	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.515	0.21

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 K
L8	58.40-57.50	A	1.000	0.000	0.000	0.000	0.659	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.317	0.03
L9	57.50-49.50	A	1.000	0.000	0.000	0.000	3.806	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.832	0.23
L10	49.50-40.00	A	1.000	0.000	0.000	0.000	6.664	0.02
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.363	0.27
L11	40.00-19.50	A	1.000	0.000	0.000	0.000	0.347	0.03
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	7.257	0.59
L12	19.50-12.50	A	1.000	0.000	0.000	0.000	3.208	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.478	0.20
L13	12.50-0.00	A	1.000	0.000	0.000	0.000	9.028	0.02
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.425	0.36

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	137.00-125.00	0.00	0.00	0.00	0.00
L2	125.00-120.00	-0.15	0.09	-0.30	0.17
L3	120.00-89.50	-0.19	0.10	-0.36	0.20
L4	89.50-85.66	-0.17	-0.11	-0.31	-0.27
L5	85.66-80.00	-0.17	-0.19	-0.29	-0.44
L6	80.00-65.50	-0.19	0.10	-0.39	0.19
L7	65.50-58.40	-0.18	-0.11	-0.35	-0.29
L8	58.40-57.50	-0.17	-0.28	-0.32	-0.59
L9	57.50-49.50	-0.18	-0.16	-0.35	-0.34
L10	49.50-40.00	-0.17	-0.26	-0.33	-0.56
L11	40.00-19.50	-0.19	0.10	-0.40	0.21
L12	19.50-12.50	-0.18	-0.13	-0.36	-0.33
L13	12.50-0.00	-0.18	-0.28	-0.34	-0.60

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
LLPX310R-V4 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	124.00	No Ice 1/2" Ice 1" Ice	5.43 5.99 6.50	3.38 4.15 4.79	0.05 0.09 0.14
WIMAX DAP HEAD	A	From Leg	4.00 0.00 0.00	0.000	124.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
LLPX310R-V4 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	124.00	No Ice 1/2" Ice 1" Ice	5.43 5.99 6.50	3.38 4.15 4.79	0.05 0.09 0.14
(2) WIMAX DAP HEAD	B	From Leg	4.00	0.000	124.00	No Ice	1.80	0.78	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	1.99	0.92	0.04
			0.00			Ice	2.18	1.07	0.06
						1" Ice			
LLPX310R-V4 w/ Mount Pipe	C	From Leg	4.00	0.000	124.00	No Ice	5.43	3.38	0.05
			0.00			1/2"	5.99	4.15	0.09
			0.00			Ice	6.50	4.79	0.14
						1" Ice			
(2) WIMAX DAP HEAD	C	From Leg	4.00	0.000	124.00	No Ice	1.80	0.78	0.03
			0.00			1/2"	1.99	0.92	0.04
			0.00			Ice	2.18	1.07	0.06
						1" Ice			
***									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	-30.000	124.00	No Ice	8.50	6.95	0.08
			0.00			1/2"	9.15	8.13	0.15
			0.00			Ice	9.77	9.02	0.23
						1" Ice			
IBC1900BB-1	A	From Leg	4.00	-30.000	124.00	No Ice	1.13	0.53	0.02
			0.00			1/2"	1.27	0.65	0.03
			0.00			Ice	1.43	0.77	0.04
						1" Ice			
IBC1900HG-2A	A	From Leg	4.00	-30.000	124.00	No Ice	1.13	0.53	0.02
			0.00			1/2"	1.27	0.65	0.03
			0.00			Ice	1.43	0.77	0.04
						1" Ice			
APXV9ERR18-C-A20 w/ Mount Pipe	B	From Leg	4.00	-30.000	124.00	No Ice	8.50	7.47	0.09
			0.00			1/2"	9.15	8.66	0.16
			0.00			Ice	9.77	9.56	0.24
						1" Ice			
IBC1900BB-1	B	From Leg	4.00	-30.000	124.00	No Ice	1.13	0.53	0.02
			0.00			1/2"	1.27	0.65	0.03
			0.00			Ice	1.43	0.77	0.04
						1" Ice			
IBC1900HG-2A	B	From Leg	4.00	-30.000	124.00	No Ice	1.13	0.53	0.02
			0.00			1/2"	1.27	0.65	0.03
			0.00			Ice	1.43	0.77	0.04
						1" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	-30.000	124.00	No Ice	8.50	6.95	0.08
			0.00			1/2"	9.15	8.13	0.15
			0.00			Ice	9.77	9.02	0.23
						1" Ice			
IBC1900BB-1	C	From Leg	4.00	-30.000	124.00	No Ice	1.13	0.53	0.02
			0.00			1/2"	1.27	0.65	0.03
			0.00			Ice	1.43	0.77	0.04
						1" Ice			
IBC1900HG-2A	C	From Leg	4.00	-30.000	124.00	No Ice	1.13	0.53	0.02
			0.00			1/2"	1.27	0.65	0.03
			0.00			Ice	1.43	0.77	0.04
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00	-30.000	124.00	No Ice	7.13	4.96	0.08
			0.00			1/2"	7.66	5.75	0.13
			0.00			Ice	8.18	6.47	0.19
						1" Ice			
TD-RRH8x20-25	A	From Leg	4.00	-30.000	124.00	No Ice	4.72	1.70	0.07
			0.00			1/2"	5.01	1.92	0.10
			0.00			Ice	5.32	2.15	0.13
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00	-30.000	124.00	No Ice	7.13	4.96	0.08
			0.00			1/2"	7.66	5.75	0.13
			0.00			Ice	8.18	6.47	0.19
						1" Ice			
TD-RRH8x20-25	B	From Leg	4.00	-30.000	124.00	No Ice	4.72	1.70	0.07
			0.00			1/2"	5.01	1.92	0.10
			0.00			Ice	5.32	2.15	0.13
						1" Ice			
APXVTM14-C-120 w/	C	From Leg	4.00	-30.000	124.00	No Ice	7.13	4.96	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.00			1/2"	7.66	5.75	0.13
			0.00			Ice	8.18	6.47	0.19
						1" Ice			
TD-RRH8x20-25	C	From Leg	4.00	-30.000	124.00	No Ice	4.72	1.70	0.07
			0.00			1/2"	5.01	1.92	0.10
			0.00			Ice	5.32	2.15	0.13
						1" Ice			
Platform Mount [LP 601-1]	C	None		0.000	124.00	No Ice	28.47	28.47	1.12
						1/2"	33.59	33.59	1.51
						Ice	38.71	38.71	1.91
						1" Ice			
6' x 2" Mount Pipe	A	From Leg	4.00	0.000	124.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
6' x 2" Mount Pipe	B	From Leg	4.00	0.000	124.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
6' x 2" Mount Pipe	C	From Leg	4.00	0.000	124.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
***									
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00	-50.000	122.00	No Ice	2.40	2.25	0.06
			0.00			1/2"	2.61	2.46	0.09
			0.00			Ice	2.83	2.68	0.11
						1" Ice			
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00	-50.000	122.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.85	0.08
			3.00			Ice	3.20	3.09	0.11
						1" Ice			
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00	-30.000	122.00	No Ice	2.40	2.25	0.06
			0.00			1/2"	2.61	2.46	0.09
			0.00			Ice	2.83	2.68	0.11
						1" Ice			
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00	-30.000	122.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.85	0.08
			3.00			Ice	3.20	3.09	0.11
						1" Ice			
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00	-30.000	122.00	No Ice	2.40	2.25	0.06
			0.00			1/2"	2.61	2.46	0.09
			0.00			Ice	2.83	2.68	0.11
						1" Ice			
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00	-30.000	122.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.85	0.08
			3.00			Ice	3.20	3.09	0.11
						1" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	122.00	No Ice	4.39	4.39	0.20
						1/2"	5.48	5.48	0.24
						Ice	6.57	6.57	0.28
						1" Ice			
***									
7770.00 w/ Mount Pipe	A	From Leg	4.00	13.000	113.00	No Ice	6.12	4.25	0.06
			0.00			1/2"	6.63	5.01	0.10
			2.00			Ice	7.13	5.71	0.16
						1" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	13.000	113.00	No Ice	8.50	6.30	0.07
			0.00			1/2"	9.15	7.48	0.14
			2.00			Ice	9.77	8.37	0.21
						1" Ice			
LGP21401	A	From Leg	4.00	13.000	113.00	No Ice	0.95	0.37	0.02
			0.00			1/2"	1.09	0.48	0.02
			0.00			Ice	1.24	0.60	0.03
						1" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS-11	A	From Leg	4.00 0.00 0.00	13.000	113.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
RRUS-11	A	From Leg	4.00 0.00 2.00	13.000	113.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
DC6-48-60-18-8F	A	From Leg	4.00 0.00 0.00	13.000	113.00	No Ice 1/2" Ice 1" Ice	2.57 2.80 3.04	2.57 2.80 3.04	0.02 0.04 0.07
LGP21903	A	From Leg	4.00 0.00 0.00	13.000	113.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.01 0.01 0.02
OPA-65R-LCUU-H8 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	13.000	113.00	No Ice 1/2" Ice 1" Ice	13.22 14.02 14.82	9.32 10.79 12.24	0.12 0.21 0.32
RRUS 32 B30	A	From Leg	4.00 0.00 2.00	13.000	113.00	No Ice 1/2" Ice 1" Ice	3.14 3.40 3.66	1.74 1.96 2.19	0.06 0.08 0.10
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
LGP21401	B	From Leg	4.00 0.00 0.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	0.95 1.09 1.24	0.37 0.48 0.60	0.02 0.02 0.03
RRUS-11	B	From Leg	4.00 0.00 2.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
RRUS-11	B	From Leg	4.00 0.00 0.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
LGP21903	B	From Leg	4.00 0.00 0.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.01 0.01 0.02
OPA-65R-LCUU-H8 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	13.22 14.02 14.82	9.32 10.79 12.24	0.12 0.21 0.32
RRUS 32 B30	B	From Leg	4.00 0.00 2.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	3.14 3.40 3.66	1.74 1.96 2.19	0.06 0.08 0.10
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.000	113.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
LGP21401	C	From Leg	4.00	23.000	113.00	No Ice	0.95	0.37	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	1.09	0.48	0.02
			0.00			Ice	1.24	0.60	0.03
						1" Ice			
RRUS-11	C	From Leg	4.00	23.000	113.00	No Ice	3.25	1.37	0.05
			0.00			1/2"	3.49	1.55	0.07
			0.00			Ice	3.74	1.74	0.09
						1" Ice			
RRUS-11	C	From Leg	4.00	23.000	113.00	No Ice	3.25	1.37	0.05
			0.00			1/2"	3.49	1.55	0.07
			2.00			Ice	3.74	1.74	0.09
						1" Ice			
LGP21903	C	From Leg	4.00	23.000	113.00	No Ice	0.27	0.18	0.01
			0.00			1/2"	0.34	0.25	0.01
			0.00			Ice	0.43	0.32	0.02
						1" Ice			
OPA-65R-LCUU-H8 w/ Mount Pipe	C	From Leg	4.00	23.000	113.00	No Ice	13.22	9.32	0.12
			0.00			1/2"	14.02	10.79	0.21
			2.00			Ice	14.82	12.24	0.32
						1" Ice			
RRUS 32 B30	C	From Leg	4.00	23.000	113.00	No Ice	3.14	1.74	0.06
			0.00			1/2"	3.40	1.96	0.08
			2.00			Ice	3.66	2.19	0.10
						1" Ice			
Platform Mount [LP 601-1]	C	None		0.000	113.00	No Ice	28.47	28.47	1.12
						1/2"	33.59	33.59	1.51
						Ice	38.71	38.71	1.91
						1" Ice			
***									
T-Arm Mount [TA 602-3]	C	None		0.000	100.00	No Ice	11.59	11.59	0.77
						1/2"	15.44	15.44	0.99
						Ice	19.29	19.29	1.21
						1" Ice			
(4) 6' x 2" Mount Pipe	A	From Leg	4.00	0.000	100.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			2.00			Ice	2.29	2.29	0.05
						1" Ice			
(4) 6' x 2" Mount Pipe	B	From Leg	4.00	0.000	100.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			2.00			Ice	2.29	2.29	0.05
						1" Ice			
(4) 6' x 2" Mount Pipe	C	From Leg	4.00	0.000	100.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			2.00			Ice	2.29	2.29	0.05
						1" Ice			
***									
HBX-6516DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.000	92.00	No Ice	3.60	3.24	0.03
			0.00			1/2"	4.00	3.91	0.06
			1.00			Ice	4.43	4.56	0.10
						1" Ice			
HBX-6516DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.000	92.00	No Ice	3.60	3.24	0.03
			0.00			1/2"	4.00	3.91	0.06
			1.00			Ice	4.43	4.56	0.10
						1" Ice			
HBX-6516DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.000	92.00	No Ice	3.60	3.24	0.03
			0.00			1/2"	4.00	3.91	0.06
			1.00			Ice	4.43	4.56	0.10
						1" Ice			
T-Arm Mount [TA 601-3]	C	None		0.000	92.00	No Ice	10.90	10.90	0.73
						1/2"	14.65	14.65	0.93
						Ice	18.40	18.40	1.13
						1" Ice			
6' x 2" Mount Pipe	A	From Leg	4.00	0.000	92.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	92.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	92.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
***									
GPS_A	C	From Leg	3.00 0.00 0.00	-30.000	50.00	No Ice 1/2" Ice 1" Ice	0.30 0.37 0.46	0.30 0.37 0.46	0.00 0.00 0.01
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	-30.000	50.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
***									
Bridge Stiffener (53" x 9" x 1")	A	None		0.000	40.00	No Ice 1/2" Ice 1" Ice	4.64 5.04 5.46	0.74 1.24 1.71	0.11 0.13 0.15
Bridge Stiffener (53" x 9" x 1")	B	None		0.000	40.00	No Ice 1/2" Ice 1" Ice	4.64 5.04 5.46	0.74 1.24 1.71	0.11 0.13 0.15
Bridge Stiffener (53" x 9" x 1")	C	None		0.000	40.00	No Ice 1/2" Ice 1" Ice	4.64 5.04 5.46	0.74 1.24 1.71	0.11 0.13 0.15
Bridge Stiffener (43" x 9.5" x 1")	A	None		0.000	80.00	No Ice 1/2" Ice 1" Ice	3.97 4.32 4.67	0.60 1.01 1.29	0.12 0.13 0.15
Bridge Stiffener (43" x 9.5" x 1")	B	None		0.000	80.00	No Ice 1/2" Ice 1" Ice	3.97 4.32 4.67	0.60 1.01 1.29	0.12 0.13 0.15
Bridge Stiffener (43" x 9.5" x 1")	C	None		0.000	80.00	No Ice 1/2" Ice 1" Ice	3.97 4.32 4.67	0.60 1.01 1.29	0.12 0.13 0.15

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
***											
VHLP2.5-18	B	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 7.00	0.000		124.00	2.92	No Ice 1/2" Ice 1" Ice	6.68 7.07 7.46	0.05 0.08 0.12
VHLP1-23	C	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 7.00	0.000		124.00	1.27	No Ice 1/2" Ice 1" Ice	1.28 1.45 1.62	0.01 0.02 0.03
***											

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	137 - 125	Pole	Max Tension	11	0.00	0	0
			Max. Compression	14	-0.95	0	0
			Max. Mx	11	-0.61	4	0
			Max. My	8	-0.62	-1	-4
			Max. Vy	11	-0.72	4	0
			Max. Vx	2	-0.61	1	4
			Max. Torque	9			1
L2	125 - 120	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-7.25	0	-1
			Max. Mx	11	-3.63	29	1
			Max. My	8	-3.64	-1	-28
			Max. Vy	11	-6.37	29	1
			Max. Vx	2	-6.23	1	28
			Max. Torque	9			1
L3	120 - 89.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-20.31	0	-1
			Max. Mx	11	-10.99	392	6
			Max. My	2	-11.00	8	389
			Max. Vy	11	-15.23	392	6

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	2	-15.21	8	389
			Max. Torque	3			-1
L4	89.5 - 85.6563	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-21.03	0	-1
			Max. Mx	11	-11.59	451	6
			Max. My	2	-11.59	9	448
			Max. Vy	11	-15.43	451	6
			Max. Vx	2	-15.40	9	448
			Max. Torque	3			-1
L5	85.6563 - 80	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-22.25	0	-1
			Max. Mx	11	-12.62	539	7
			Max. My	2	-12.62	10	536
			Max. Vy	11	-15.74	539	7
			Max. Vx	2	-15.71	10	536
			Max. Torque	3			-1
L6	80 - 65.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-25.87	1	-1
			Max. Mx	11	-15.38	781	10
			Max. My	2	-15.38	14	777
			Max. Vy	11	-17.13	781	10
			Max. Vx	2	-17.11	14	777
			Max. Torque	3			-1
L7	65.5 - 58.3958	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-27.64	1	-1
			Max. Mx	11	-16.78	904	11
			Max. My	2	-16.79	15	900
			Max. Vy	11	-17.61	904	11
			Max. Vx	2	-17.58	15	900
			Max. Torque	3			-1
L8	58.3958 - 57.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-27.91	1	-1
			Max. Mx	11	-17.01	920	11
			Max. My	2	-17.01	15	916
			Max. Vy	11	-17.67	920	11
			Max. Vx	2	-17.65	15	916
			Max. Torque	3			-1
L9	57.5 - 49.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-30.16	1	-1
			Max. Mx	11	-18.82	1064	13
			Max. My	2	-18.82	17	1059
			Max. Vy	11	-18.24	1064	13
			Max. Vx	2	-18.20	17	1059
			Max. Torque	3			-1
L10	49.5 - 40	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-33.00	1	-1
			Max. Mx	11	-21.19	1240	14
			Max. My	2	-21.19	20	1234
			Max. Vy	11	-18.82	1240	14
			Max. Vx	2	-18.78	20	1234
			Max. Torque	3			-1
L11	40 - 19.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-39.70	2	-2
			Max. Mx	11	-26.62	1645	18
			Max. My	2	-26.62	25	1639
			Max. Vy	11	-20.32	1645	18
			Max. Vx	2	-20.28	25	1639
			Max. Torque	3			-1
L12	19.5 - 12.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-42.05	2	-2
			Max. Mx	11	-28.59	1789	19
			Max. My	2	-28.59	26	1782
			Max. Vy	11	-20.70	1789	19
			Max. Vx	2	-20.66	26	1782
			Max. Torque	3			-1
L13	12.5 - 0	Pole	Max Tension	1	0.00	0	0

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-46.84	2	-2
			Max. Mx	11	-32.69	2052	22
			Max. My	2	-32.69	29	2045
			Max. Vy	11	-21.39	2052	22
			Max. Vx	2	-21.35	29	2045
			Max. Torque	3			-1

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	46.84	-0.00	0.00
	Max. H_x	11	32.70	21.38	0.18
	Max. H_z	2	32.70	0.23	21.34
	Max. M_x	2	2045	0.23	21.34
	Max. M_z	5	2043	-21.32	-0.16
	Max. Torsion	9	1	10.53	-18.41
	Min. Vert	11	32.70	21.38	0.18
	Min. H_x	5	32.70	-21.32	-0.16
	Min. H_z	8	32.70	-0.18	-21.32
	Min. M_x	8	-2044	-0.18	-21.32
	Min. M_z	11	-2052	21.38	0.18
	Min. Torsion	3	-1	-10.59	18.39

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	32.70	-0.00	0.00	1	1	0
Dead+Wind 0 deg - No Ice	32.70	-0.23	-21.34	-2045	29	1
Dead+Wind 30 deg - No Ice	32.70	10.59	-18.39	-1760	-1014	1
Dead+Wind 60 deg - No Ice	32.70	18.44	-10.50	-1002	-1767	1
Dead+Wind 90 deg - No Ice	32.70	21.32	0.16	20	-2043	0
Dead+Wind 120 deg - No Ice	32.70	18.53	10.75	1032	-1778	0
Dead+Wind 150 deg - No Ice	32.70	10.80	18.51	1775	-1038	0
Dead+Wind 180 deg - No Ice	32.70	0.18	21.32	2044	-21	-1
Dead+Wind 210 deg - No Ice	32.70	-10.53	18.41	1764	1007	-1
Dead+Wind 240 deg - No Ice	32.70	-18.47	10.45	996	1773	-1
Dead+Wind 270 deg - No Ice	32.70	-21.38	-0.18	-22	2052	0
Dead+Wind 300 deg - No Ice	32.70	-18.58	-10.79	-1037	1786	0
Dead+Wind 330 deg - No Ice	32.70	-10.86	-18.55	-1779	1047	0
Dead+Ice+Temp	46.84	0.00	-0.00	2	2	0
Dead+Wind 0 deg+Ice+Temp	46.84	-0.05	-6.06	-592	9	0
Dead+Wind 30 deg+Ice+Temp	46.84	3.02	-5.23	-510	-293	0
Dead+Wind 60 deg+Ice+Temp	46.84	5.25	-2.99	-290	-512	0
Dead+Wind 90 deg+Ice+Temp	46.84	6.07	0.04	6	-592	0
Dead+Wind 120 deg+Ice+Temp	46.84	5.27	3.05	301	-514	0
Dead+Wind 150 deg+Ice+Temp	46.84	3.06	5.25	517	-299	0
Dead+Wind 180 deg+Ice+Temp	46.84	0.04	6.06	596	-2	0
Dead+Wind 210 deg+Ice+Temp	46.84	-3.00	5.23	515	296	0
Dead+Wind 240	46.84	-5.26	2.98	293	518	0

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
deg+Ice+Temp						
Dead+Wind 270 deg+Ice+Temp	46.84	-6.08	-0.04	-3	599	0
Dead+Wind 300 deg+Ice+Temp	46.84	-5.28	-3.06	-298	521	0
Dead+Wind 330 deg+Ice+Temp	46.84	-3.08	-5.26	-514	306	0
Dead+Wind 0 deg - Service	32.70	-0.09	-8.34	-799	12	0
Dead+Wind 30 deg - Service	32.70	4.14	-7.18	-687	-396	0
Dead+Wind 60 deg - Service	32.70	7.20	-4.10	-391	-690	0
Dead+Wind 90 deg - Service	32.70	8.33	0.06	8	-798	0
Dead+Wind 120 deg - Service	32.70	7.24	4.20	404	-694	0
Dead+Wind 150 deg - Service	32.70	4.22	7.23	694	-405	0
Dead+Wind 180 deg - Service	32.70	0.07	8.33	799	-8	0
Dead+Wind 210 deg - Service	32.70	-4.11	7.19	690	394	0
Dead+Wind 240 deg - Service	32.70	-7.22	4.08	390	693	0
Dead+Wind 270 deg - Service	32.70	-8.35	-0.07	-8	802	0
Dead+Wind 300 deg - Service	32.70	-7.26	-4.22	-405	698	0
Dead+Wind 330 deg - Service	32.70	-4.24	-7.25	-695	410	0

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-32.70	0.00	0.00	32.70	-0.00	0.000%
2	-0.23	-32.70	-21.34	0.23	32.70	21.34	0.007%
3	10.59	-32.70	-18.39	-10.59	32.70	18.39	0.000%
4	18.44	-32.70	-10.50	-18.44	32.70	10.50	0.000%
5	21.32	-32.70	0.16	-21.32	32.70	-0.16	0.007%
6	18.53	-32.70	10.75	-18.53	32.70	-10.75	0.000%
7	10.80	-32.70	18.51	-10.80	32.70	-18.51	0.000%
8	0.18	-32.70	21.32	-0.18	32.70	-21.32	0.003%
9	-10.53	-32.70	18.41	10.53	32.70	-18.41	0.000%
10	-18.47	-32.70	10.45	18.47	32.70	-10.45	0.000%
11	-21.38	-32.70	-0.18	21.38	32.70	0.18	0.007%
12	-18.58	-32.70	-10.79	18.58	32.70	10.79	0.000%
13	-10.86	-32.70	-18.55	10.86	32.70	18.55	0.000%
14	0.00	-46.84	0.00	-0.00	46.84	0.00	0.000%
15	-0.05	-46.84	-6.06	0.05	46.84	6.06	0.000%
16	3.02	-46.84	-5.23	-3.02	46.84	5.23	0.000%
17	5.25	-46.84	-2.99	-5.25	46.84	2.99	0.000%
18	6.07	-46.84	0.04	-6.07	46.84	-0.04	0.000%
19	5.27	-46.84	3.05	-5.27	46.84	-3.05	0.000%
20	3.06	-46.84	5.25	-3.06	46.84	-5.25	0.000%
21	0.04	-46.84	6.06	-0.04	46.84	-6.06	0.000%
22	-3.00	-46.84	5.23	3.00	46.84	-5.23	0.000%
23	-5.26	-46.84	2.98	5.26	46.84	-2.98	0.000%
24	-6.08	-46.84	-0.04	6.08	46.84	0.04	0.000%
25	-5.28	-46.84	-3.06	5.28	46.84	3.06	0.000%
26	-3.08	-46.84	-5.26	3.08	46.84	5.26	0.000%
27	-0.09	-32.70	-8.34	0.09	32.70	8.34	0.003%
28	4.14	-32.70	-7.18	-4.14	32.70	7.18	0.003%
29	7.20	-32.70	-4.10	-7.20	32.70	4.10	0.003%
30	8.33	-32.70	0.06	-8.33	32.70	-0.06	0.003%
31	7.24	-32.70	4.20	-7.24	32.70	-4.20	0.003%
32	4.22	-32.70	7.23	-4.22	32.70	-7.23	0.003%
33	0.07	-32.70	8.33	-0.07	32.70	-8.33	0.003%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
34	-4.11	-32.70	7.19	4.11	32.70	-7.19	0.003%
35	-7.22	-32.70	4.08	7.22	32.70	-4.08	0.003%
36	-8.35	-32.70	-0.07	8.35	32.70	0.07	0.003%
37	-7.26	-32.70	-4.22	7.26	32.70	4.22	0.003%
38	-4.24	-32.70	-7.25	4.24	32.70	7.25	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	0.00008144	0.00008860
3	Yes	18	0.00000001	0.00007810
4	Yes	18	0.00000001	0.00007105
5	Yes	14	0.00008145	0.00011602
6	Yes	18	0.00000001	0.00007694
7	Yes	18	0.00000001	0.00007880
8	Yes	15	0.00003654	0.00008719
9	Yes	18	0.00000001	0.00007038
10	Yes	18	0.00000001	0.00007577
11	Yes	14	0.00008142	0.00007975
12	Yes	18	0.00000001	0.00007839
13	Yes	18	0.00000001	0.00007749
14	Yes	6	0.00000001	0.00000373
15	Yes	16	0.00000001	0.00011177
16	Yes	16	0.00000001	0.00012217
17	Yes	16	0.00000001	0.00012175
18	Yes	16	0.00000001	0.00011205
19	Yes	16	0.00000001	0.00012421
20	Yes	16	0.00000001	0.00012437
21	Yes	16	0.00000001	0.00011259
22	Yes	16	0.00000001	0.00012305
23	Yes	16	0.00000001	0.00012347
24	Yes	16	0.00000001	0.00011316
25	Yes	16	0.00000001	0.00012480
26	Yes	16	0.00000001	0.00012467
27	Yes	14	0.00000001	0.00004176
28	Yes	14	0.00000001	0.00012535
29	Yes	14	0.00000001	0.00009481
30	Yes	14	0.00000001	0.00004100
31	Yes	14	0.00000001	0.00011069
32	Yes	14	0.00000001	0.00011852
33	Yes	14	0.00000001	0.00004724
34	Yes	14	0.00000001	0.00009262
35	Yes	14	0.00000001	0.00011688
36	Yes	14	0.00000001	0.00003974
37	Yes	14	0.00000001	0.00011409
38	Yes	14	0.00000001	0.00010856

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	137 - 125	23.49	37	1.445	0.007
L2	125 - 120	19.86	37	1.440	0.005
L3	120 - 89.5	18.35	37	1.436	0.004
L4	89.5 - 85.6563	9.89	37	1.104	0.002
L5	85.6563 - 80	9.03	37	1.030	0.002
L6	80 - 65.5	7.86	37	0.929	0.001

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L7	65.5 - 58.3958	5.27	37	0.769	0.001
L8	58.3958 - 57.5	4.19	37	0.687	0.001
L9	57.5 - 49.5	4.06	37	0.678	0.001
L10	49.5 - 40	3.00	37	0.581	0.001
L11	40 - 19.5	1.96	37	0.462	0.000
L12	19.5 - 12.5	0.46	37	0.227	0.000
L13	12.5 - 0	0.19	37	0.140	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
131.00	VHLP2.5-18	37	21.67	1.442	0.006	101607
124.00	LLPX310R-V4 w/ Mount Pipe	37	19.56	1.440	0.005	63129
122.00	800MHz 2X50W RRH W/FILTER	37	18.95	1.439	0.004	65808
113.00	7770.00 w/ Mount Pipe	37	16.25	1.407	0.004	11021
100.00	T-Arm Mount [TA 602-3]	37	12.54	1.276	0.003	4088
92.00	HBX-6516DS-VTM w/ Mount Pipe	37	10.48	1.150	0.002	2964
80.00	Bridge Stiffener (43" x 9.5" x 1")	37	7.86	0.929	0.001	4350
50.00	GPS_A	37	3.06	0.588	0.001	4576
40.00	Bridge Stiffener (53" x 9" x 1")	37	1.96	0.462	0.000	5043

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	137 - 125	60.05	12	3.700	0.018
L2	125 - 120	50.77	12	3.686	0.012
L3	120 - 89.5	46.92	12	3.675	0.011
L4	89.5 - 85.6563	25.28	12	2.825	0.004
L5	85.6563 - 80	23.08	12	2.636	0.004
L6	80 - 65.5	20.11	12	2.377	0.003
L7	65.5 - 58.3958	13.48	12	1.966	0.002
L8	58.3958 - 57.5	10.71	12	1.757	0.002
L9	57.5 - 49.5	10.38	12	1.735	0.002
L10	49.5 - 40	7.68	12	1.487	0.001
L11	40 - 19.5	5.01	12	1.183	0.001
L12	19.5 - 12.5	1.17	12	0.580	0.000
L13	12.5 - 0	0.48	12	0.358	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
131.00	VHLP2.5-18	12	55.41	3.692	0.015	44290
124.00	LLPX310R-V4 w/ Mount Pipe	12	50.00	3.685	0.012	27323
122.00	800MHz 2X50W RRH W/FILTER	12	48.46	3.682	0.011	27884
113.00	7770.00 w/ Mount Pipe	12	41.56	3.601	0.010	4332
100.00	T-Arm Mount [TA 602-3]	12	32.06	3.264	0.007	1607
92.00	HBX-6516DS-VTM w/ Mount Pipe	12	26.80	2.942	0.005	1165
80.00	Bridge Stiffener (43" x 9.5" x 1")	12	20.11	2.377	0.003	1706
50.00	GPS_A	12	7.83	1.504	0.001	1792

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
40.00	Bridge Stiffener (53" x 9" x 1")	12	5.01	1.183	0.001	1973

Compression Checks

Pole Design Data

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 $\frac{P}{P_a}$
L1	137 - 125 (1)	P12.75x0.375	12.00	0.00	0.0	21.00	14.58	-0.61	306.16	0.002
L2	125 - 120 (2)	P24x0.375	5.00	0.00	0.0	21.00	27.83	-3.63	584.48	0.006
L3	120 - 89.5 (3)	P24x0.375	30.50	0.00	0.0	21.00	27.83	-10.98	584.48	0.019
L4	89.5 - 85.6563 (4)	P24x0.375 [0.479035]	3.84	0.00	0.0	20.40	35.40	-11.58	722.13	0.016
L5	85.6563 - 80 (5)	P24x0.375 [0.617321]	5.66	0.00	0.0	20.41	45.35	-12.61	925.57	0.014
L6	80 - 65.5 (6)	P36x0.375	14.50	0.00	0.0	20.90	41.97	-15.37	876.99	0.018
L7	65.5 - 58.3958 (7)	P36x0.375 [0.464084]	7.10	0.00	0.0	18.95	51.81	-16.78	981.73	0.017
L8	58.3958 - 57.5 (8)	P36x0.375 [0.614627]	0.90	0.00	0.0	18.81	68.33	-17.00	1284.95	0.013
L9	57.5 - 49.5 (9)	P36x0.375 [0.522938] d/t > 13000/Fy - 9/7	8.00	0.00	0.0	3.6e+012	58.28	-17.23	2.1e+014	0.000
L10	49.5 - 40 (10)	P36x0.375 [0.589684]	9.50	0.00	0.0	18.61	65.60	-21.19	1221.12	0.017
L11	40 - 19.5 (11)	P42x0.5	20.50	0.00	0.0	21.00	65.19	-26.62	1368.95	0.019
L12	19.5 - 12.5 (12)	P42x0.5 [0.554237]	7.00	0.00	0.0	20.70	72.16	-28.59	1493.72	0.019
L13	12.5 - 0 (13)	P42x0.5 [0.692989]	12.50	0.00	0.0	20.49	89.93	-32.69	1842.37	0.018

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	137 - 125 (1)	P12.75x0.375	4	1.16	23.10	0.050	0	0.00	23.10	0.000
L2	125 - 120 (2)	P24x0.375	29	2.17	23.10	0.094	0	0.00	23.10	0.000
L3	120 - 89.5 (3)	P24x0.375	395	29.27	23.10	1.267	0	0.00	23.10	0.000
L4	89.5 - 85.6563 (4)	P24x0.375 [0.479035]	454	26.71	22.44	1.190	0	0.00	22.44	0.000
L5	85.6563 - 80 (5)	P24x0.375 [0.617321]	543	25.21	22.45	1.123	0	0.00	22.45	0.000
L6	80 - 65.5 (6)	P36x0.375	786	25.50	20.90	1.220	0	0.00	20.90	0.000
L7	65.5 - 58.3958 (7)	P36x0.375 [0.464084]	910	24.04	20.84	1.153	0	0.00	20.84	0.000
L8	58.3958 - 57.5 (8)	P36x0.375 [0.614627]	926	18.70	20.69	0.904	0	0.00	20.69	0.000
L9	57.5 - 49.5 (9)	P36x0.375 [0.522938]	926	21.82	3.6e+012	0.000	0	0.00	3.6e+012	0.000
L10	49.5 - 40 (10)	P36x0.375 [0.589684]	1248	26.21	20.48	1.280	0	0.00	20.48	0.000
L11	40 - 19.5 (11)	P42x0.5	1656	29.73	23.10	1.287	0	0.00	23.10	0.000
L12	19.5 - 12.5 (12)	P42x0.5 [0.554237]	1800	29.27	22.77	1.286	0	0.00	22.77	0.000
L13	12.5 - 0 (13)	P42x0.5 [0.692989]	2065	27.12	22.54	1.203	0	0.00	22.54	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	137 - 125 (1)	P12.75x0.375	0.67	0.09	14.00	0.007	0	0.01	14.00	0.001
L2	125 - 120 (2)	P24x0.375	6.38	0.46	14.00	0.033	0	0.01	14.00	0.001
L3	120 - 89.5 (3)	P24x0.375	15.34	1.10	14.00	0.079	0	0.01	14.00	0.000
L4	89.5 - 85.6563 (4)	P24x0.375 [0.479035]	15.54	0.88	13.60	0.065	0	0.00	13.60	0.000
L5	85.6563 - 80 (5)	P24x0.375 [0.617321]	15.85	0.70	13.61	0.051	0	0.00	13.61	0.000
L6	80 - 65.5 (6)	P36x0.375	17.25	0.82	14.00	0.059	0	0.00	11.90	0.000
L7	65.5 - 58.3958 (7)	P36x0.375 [0.464084]	17.72	0.68	12.63	0.054	0	0.00	12.63	0.000
L8	58.3958 - 57.5 (8)	P36x0.375 [0.614627]	17.79	0.52	12.54	0.042	0	0.00	12.54	0.000
L10	49.5 - 40 (10)	P36x0.375 [0.589684]	18.94	0.58	12.41	0.047	0	0.00	12.41	0.000
L11	40 - 19.5 (11)	P42x0.5	20.44	0.63	14.00	0.045	0	0.00	14.00	0.000
L12	19.5 - 12.5 (12)	P42x0.5 [0.554237]	20.81	0.58	13.80	0.042	0	0.00	13.80	0.000
L13	12.5 - 0 (13)	P42x0.5 [0.692989]	21.50	0.48	13.66	0.035	0	0.00	13.66	0.000

Pole Interaction Design Data

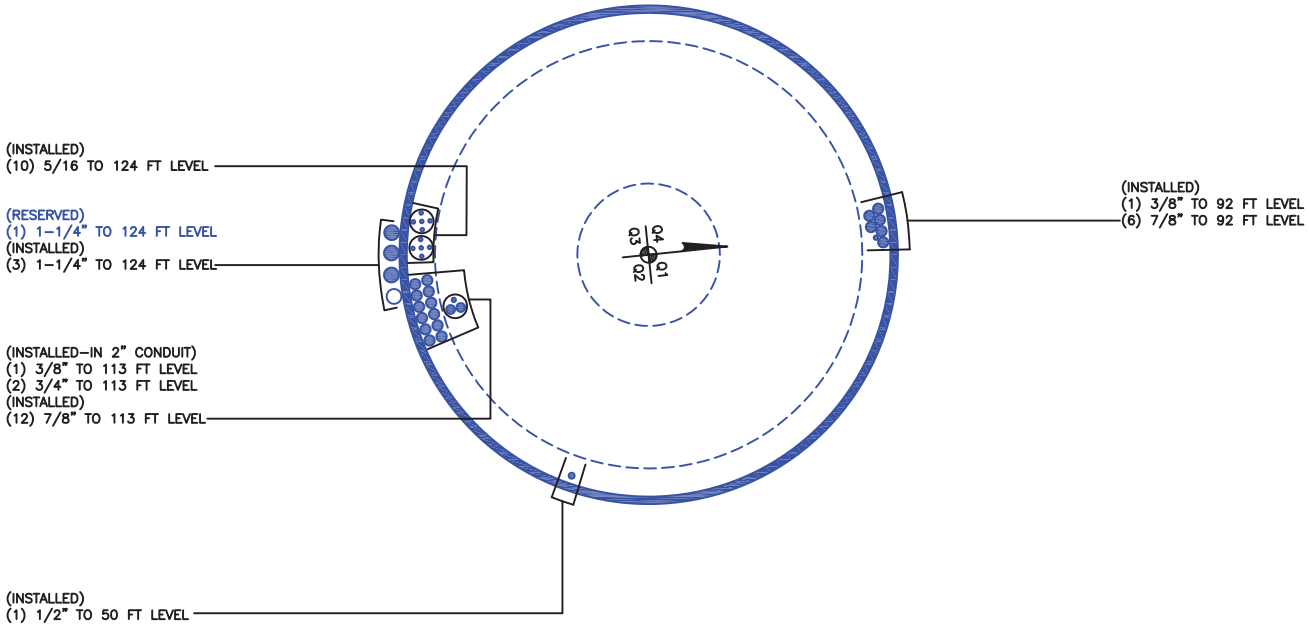
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	137 - 125 (1)	0.002	0.050	0.000	0.007	0.001	0.052 ✔	1.333	H1-3+VT ✔
L2	125 - 120 (2)	0.006	0.094	0.000	0.033	0.001	0.101 ✔	1.333	H1-3+VT ✔
L3	120 - 89.5 (3)	0.019	1.267	0.000	0.079	0.000	1.292 ✔	1.333	H1-3+VT ✔
L4	89.5 - 85.6563 (4)	0.016	1.190	0.000	0.065	0.000	1.210 ✔	1.333	H1-3+VT ✔
L5	85.6563 - 80 (5)	0.014	1.123	0.000	0.051	0.000	1.139 ✔	1.333	H1-3+VT ✔
L6	80 - 65.5 (6)	0.018	1.220	0.000	0.059	0.000	1.241 ✔	1.333	H1-3+VT ✔
L7	65.5 - 58.3958 (7)	0.017	1.153	0.000	0.054	0.000	1.173 ✔	1.333	H1-3+VT ✔
L8	58.3958 - 57.5 (8)	0.013	0.904	0.000	0.042	0.000	0.919 ✔	1.333	H1-3+VT ✔
L9	57.5 - 49.5 (9)	0.013	0.904	0.000	0.042	0.001	0.921 ✔	1.333	H1-3+VT ✔
L10	49.5 - 40 (10)	0.017	1.280	0.000	0.047	0.000	1.299 ✔	1.333	H1-3+VT ✔
L11	40 - 19.5 (11)	0.019	1.287	0.000	0.045	0.000	1.308 ✔	1.333	H1-3+VT ✔
L12	19.5 - 12.5 (12)	0.019	1.286	0.000	0.042	0.000	1.307 ✔	1.333	H1-3+VT ✔
L13	12.5 - 0 (13)	0.018	1.203	0.000	0.035	0.000	1.222 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
L1	137 - 125	Pole	P12.75x0.375	1	-0.61	408.11	3.9	Pass
L2	125 - 120	Pole	P24x0.375	2	-3.63	779.12	7.6	Pass
L3	120 - 89.5	Pole	P24x0.375	3	-10.98	779.12	96.9	Pass
L4	89.5 - 85.6563	Pole	P24x0.375 [0.479035]	4	-11.58	962.60	90.8	Pass
L5	85.6563 - 80	Pole	P24x0.375 [0.617321]	5	-12.61	1233.79	85.5	Pass
L6	80 - 65.5	Pole	P36x0.375	6	-15.37	1169.03	93.1	Pass
L7	65.5 - 58.3958	Pole	P36x0.375 [0.464084]	7	-16.78	1308.65	88.0	Pass
L8	58.3958 - 57.5	Pole	P36x0.375 [0.614627]	8	-17.00	1712.84	68.9	Pass
L9	57.5 - 49.5	Pole	P36x0.375 [0.522938]	9	-17.23	1712.84	92.1	Pass
L10	49.5 - 40	Pole	P36x0.375 [0.589684]	10	-21.19	1627.75	97.5	Pass
L11	40 - 19.5	Pole	P42x0.5	11	-26.62	1824.81	98.2	Pass
L12	19.5 - 12.5	Pole	P42x0.5 [0.554237]	12	-28.59	1991.13	98.0	Pass
L13	12.5 - 0	Pole	P42x0.5 [0.692989]	13	-32.69	2455.88	91.7	Pass
							Summary	
						Pole (L11)	98.2	Pass
						RATING =	**98.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(INSTALLED)
(10) 5/16 TO 124 FT LEVEL
(RESERVED)
(1) 1-1/4" TO 124 FT LEVEL
(INSTALLED)
(3) 1-1/4" TO 124 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 113 FT LEVEL
(2) 3/4" TO 113 FT LEVEL
(INSTALLED)
(12) 7/8" TO 113 FT LEVEL
(INSTALLED)
(1) 1/2" TO 50 FT LEVEL
(INSTALLED)
(1) 3/8" TO 92 FT LEVEL
(6) 7/8" TO 92 FT LEVEL
Q4
Q3
Q1
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforced Pole Stress
and Effective Thickness Check

AeroSolutions LLC
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Section / Loads / Pole

Section	Elevation (ft)	Moment (ft-kip)	Compression (kip)	Shear (kip)	Torsion (kip-ft)	Number of Sides	OD (in)	Thickness (in)	Yield Strength (ksi)	Flat Width (in)	Area (in^2)	Moment of Inertia (in^4)	Percent of Composite Moment of Inertia	Angle Offset to Pole Flat	Distance to Extreme Fiber (in)	Section Modulus (in^3)	Torsion Constant (in^4)	Polygonal Compact Criterion	Allowable Bending Stress (ksi)	Allowable Bending Moment Strength (ft-kip)	Allowable Axial Stress (ksi)	Allowable Shear Stress (ksi)
Section	*Elevation*	*Moment*	*Compression*	*Shear*	*Torsion*	*PoleSides*	*PoleOD*	*PoleT*	*PoleFy*	*PoleW*	*PoleA*	*PoleI*	*PoleIPer*	*PoleCPoint*	*PoleC*	*PoleS*	*PoleJ*	*PoleWTf*	*PoleFb*	*PoleMall*	*PoleFa*	*PoleFv*
1	137	0.0	0.0	0.0	0.0	Round	12.7500	0.3750	35	0.00	14.6	279	100%	TRUE	6.38	44	559	0	30.8	112.4	28.0	18.7
2	125	4.2	0.6	0.7	0.1	Round	12.7500	0.3750	35	0.00	14.6	279	100%	TRUE	6.38	44	559	0	30.8	112.4	28.0	18.7
3	120	29.2	3.6	6.4	0.2	Round	24.0000	0.3750	35	0.00	27.8	1942	100%	TRUE	12.00	162	3885	0	30.8	415.3	28.0	18.7
4	89.5	394.9	11.0	15.3	0.1	Round	24.0000	0.3750	35	0.00	27.8	1942	100%	TRUE	12.00	162	3885	0	30.8	415.3	28.0	18.7
5	85.65625	454.3	11.6	15.5	0.1	Round	24.0000	0.3750	35	0.00	27.8	1945	79%	TRUE	12.31	158	3885	0	30.8	405.4	28.0	18.7
6	80	542.9	12.6	15.8	0.2	Round	24.0000	0.3750	35	0.00	27.8	1944	63%	TRUE	12.25	159	3885	0	30.8	407.1	28.0	18.7
7	65.5	786.1	15.4	17.2	0.1	Round	36.0000	0.3750	35	0.00	42.0	6659	100%	TRUE	18.00	370	13318	0	27.9	858.7	28.0	18.7
8	58.39583	910.4	16.8	17.7	0.1	Round	36.0000	0.3750	35	0.00	42.0	6659	81%	TRUE	18.00	370	13318	0	27.9	858.7	28.0	18.7
9	57.5	926.2	17.0	17.8	0.1	Round	36.0000	0.3750	35	0.00	42.0	6659	62%	TRUE	18.00	370	13318	0	27.9	858.7	28.0	18.7
10	49.5	1070.6	18.8	18.4	0.0	Round	36.0000	0.3750	35	0.00	42.0	6659	73%	TRUE	18.00	370	13318	0	27.9	858.7	28.0	18.7
11	40	1247.8	21.2	18.9	0.0	Round	36.0000	0.3750	35	0.00	42.0	6662	65%	TRUE	18.26	365	13318	0	27.9	846.8	28.0	18.7
12	19.5	1655.9	26.6	20.4	0.0	Round	42.0000	0.5000	35	0.00	65.2	14036	100%	TRUE	21.00	668	28072	0	30.8	1715.1	28.0	18.7
13	12.5	1800.2	28.6	20.8	0.0	Round	42.0000	0.5000	35	0.00	65.2	14040	91%	TRUE	21.26	660	28072	0	30.8	1694.7	28.0	18.7
14	0	2064.7	32.7	21.5	0.0	Round	42.0000	0.5000	35	0.00	65.2	14046	73%	TRUE	21.39	657	28072	0	30.8	1685.0	28.0	18.7

Unreinforced Pole - Rev. F / Reinforced Pole / Rev. F

Section	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Stress Ratio	Moment in Pole when Reinforced	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Reinforced Pole Stress Ratio
Section	*PoleFbAct*	*PoleFaAct*	*PoleFvAct*	*PoleFvtAct*	*PoleSR*	*PoleMoment*	*RPoleFbAct*	*RPoleFaAct*	*RPoleFvAct*	*RPoleFvtAct*	*RPoleSR*
1	0.0	0.00	0.00	0.00	0.000	0.0	0.0	0.00	0.00	0.00	0.000
2	1.2	0.04	0.00	0.01	0.039	4.2	1.2	0.04	0.00	0.00	0.039
3	2.2	0.13	0.00	0.01	0.075	29.2	2.2	0.13	0.00	0.00	0.075
4	29.3	0.39	0.00	0.01	0.965	394.9	29.3	0.39	0.00	0.00	0.965
5	34.5	0.42	0.00	0.01	1.135	360.6	27.4	0.42	0.00	0.00	0.905
6	41.1	0.45	0.00	0.01	1.350	340.3	25.7	0.45	0.00	0.00	0.852
7	25.5	0.37	0.00	0.00	0.929	786.1	25.5	0.37	0.00	0.00	0.929
8	29.5	0.40	0.00	0.00	1.074	740.7	24.0	0.40	0.00	0.00	0.877
9	30.0	0.41	0.00	0.00	1.093	576.3	18.7	0.41	0.00	0.00	0.686
10	34.7	0.45	0.00	0.00	1.263	776.9	25.2	0.45	0.00	0.00	0.921
11	41.0	0.50	0.00	0.00	1.492	807.8	26.6	0.50	0.00	0.00	0.972
12	29.7	0.41	0.00	0.00	0.980	1655.9	29.7	0.41	0.00	0.00	0.980
13	32.7	0.44	0.00	0.00	1.078	1629.9	29.6	0.44	0.00	0.00	0.977
14	37.7	0.50	0.00	0.00	1.243	1510.8	27.6	0.50	0.00	0.00	0.915
					1.492						0.980

Reinforcement 1 / Reinforcement 2

Section	Qty	Model	Position (F-Flat, C-Corner)	Gap Between Pole and Back of Rein. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in^4)	Axial Force (kip)	Stress Ratio	Qty	Model	Position (F-Flat, C-Corner)	Gap Between Pole and Back of Rein. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in^4)	Axial Force (kip)	Stress Ratio
Section	*Rein1Qty*	*Rein1Model*	*Rein1Pos*	*Rein1Gap*	*Rein1TC*	*Rein1ITotal*	*Rein1P*	*Rein1SR*	*Rein2Qty*	*Rein2Model*	*Rein2Pos*	*Rein2Gap*	*Rein2TC*	*Rein2ITotal*	*Rein2P*	*Rein2SR*
1																
2																
3																
4																
5									3	CCI-XFP-040075	F	0	T&C	505	73.5	0.669
6	3	PL0.75x3.75-18	F	0	T&C	652	70.3	0.727	3	CCI-XFP-040075	F	0	T&C	506	69.8	0.635
7																
8									3	CCI-XFP-040075	F	0	T&C	1526	73.6	0.669
9	3	PL1x4.875-18	F	0	T&C	2518	93.3	0.487	3	CCI-XFP-040075	F	0	T&C	1526	57.2	0.521
10	3	PL1x4.875-18	F	0	T&C	2518	126.3	0.659								
11	3	PL1x4.875-18	F	0	T&C	2519	125.3	0.654	3	CCI-XFP-040075	F	0	T&C	1109	72.2	0.657
12																
13									3	CCI-XFP-040075	F	0	T&C	1467	79.9	0.727
14	3	PL1x4.625-18	F	0	T&C	3195	118.4	0.664	3	CCI-XFP-040075	F	0	T&C	1954	81.1	0.737
								0.727								0.737

Composite

Section	Centroid Offset (in)	Area (in^2)	Moment of Inertia (in^4)	Controlling Stress Ratio	Thickness (in)	Weight Multiplier	Derated Yield Stress (ksi)	% Error in Derated Yield Stress
Section	*CompYBar*	*CompA*	*CompI*	*CompSR*	*EPoleT*	*EPoleWM*	*EDPoleFy*	*EDPoleSRCheck*
1	0.000	14.6	279	0.000	0.3750	1.00	35.0	88.4%
2	0.000	14.6	279	0.039	0.3750	1.00	35.0	0.5%
3	0.000	27.8	1942	0.075	0.3750	1.00	35.0	5.2%
4	0.000	27.8	1942	0.965	0.3750	1.00	35.0	0.0%
5	0.311	36.8	2450	0.905	0.4790	1.04	35.0	2.8%
6	0.253	45.3	3102	0.852	0.6173	1.00	35.0	2.8%
7	0.000	42.0	6659	0.929	0.3750	1.00	35.0	0.1%
8	0.000	51.0	8185	0.877	0.4641	0.98	31.7	0.2%
9	0.000	65.6	10702	0.686	0.6146	0.96	31.7	0.7%
10	0.000	56.6	9177	0.921	0.5229	0.97	31.7	0.4%
11	0.260	65.6	10290	0.972	0.5897	1.00	31.7	2.0%
12	0.000	65.2	14036	0.980	0.5000	1.00	35.0	0.1%
13	-0.259	74.2	15507	0.977	0.5542	1.03	35.0	1.4%
14	-0.390	88.1	19195	0.915	0.6930	0.98	35.0	2.4%
				0.980				

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
0	12.5	3	1x4.625-18	F	T&C
40	58.39583	3	1x4.875-18	F	T&C
80	85.65625	3	75x3.75-18	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	1															
1	1	1															
1	1	1															

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
0	19.5	3	FP-040075	F	T&C
40	49.5	3	FP-040075	F	T&C
57.5	65.5	3	FP-040075	F	T&C
80	89.5	3	FP-040075	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

1	2	3
1	1	1
1	1	1
1	1	1
1	1	1

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
CCI-XFP-040075	10.2	3.00	0.14	4.00	0.375	0	0.75	4	0	0	1.1875	65	80	0.80	16	1.00	16	82.5	110.0	Rupture	123.8	Rupture
PL1x4.875-18	16.6	4.88	0.41	9.65	0.5	0	1	4.875	0	0	1.21875	65	80	0.80	18	1.00	18	143.8	191.7	Rupture	215.6	Rupture
PL1x4.625-18	15.7	4.63	0.39	8.24	0.5	0	1	4.625	0	0	1.21875	65	80	0.80	18	1.00	18	133.8	178.3	Rupture	200.6	Rupture
PL0.75x4-16	10.2	3.00	0.14	4.00	0.375	0	0.75	4	0	0	1.21875	65	80	0.80	16	1.00	16	81.6	108.8	Rupture	122.3	Rupture

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#:	*876333*
Site Name:	*CREATIVE DIMENSIONS*
App #:	*315605 R0*

Pole Manufacturer:	Other

Bolt Data			
Qty:	8		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	25		

Plate Data		
Diam:	32	in
Thick, t:	0.75	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	2.75	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
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:	24	in
Thick:	0.375	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	29.236113	ft-kips
Axial:	3.628	kips
Shear:	6.382145	kips
Elevation:	120	feet

If No stiffeners, Criteria: AISC ASD <-Only Applcable to Unstiffe

Flange Bolt Results

Bolt Tension Capacity, **B**:	25.91	kips
Max Bolt directly applied T:	6.56	Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	0.443	in
Min PL "treq" for actual **T w/ Pry**:	0.171	in
Min PL "t1" for actual **T w/o Pry**:	0.223	in
T allowable w/o Prying:	25.91	kips
Prying Force, Q:	0.00	kips
Total Bolt Tension=T+Q:	6.56	kips
Non-Prying Bolt Stress Ratio, T/B:	25.3%	**Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	5.7	ksi
Allowable Plate Stress:	36.0	ksi
Compression Plate Stress Ratio:	15.8%	**Pass**
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	5.2%	**Pass**

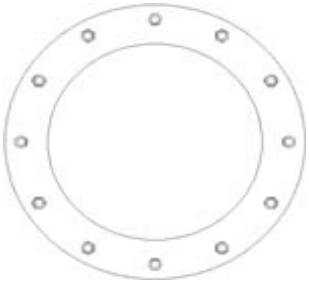
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check:	n/a



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

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

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information		
ID #:	876333	
Name:	CREATIVE DIMENSIONS	
App. #:	315605 R0	

Flange Height:	80	ft

System Reactions		
Moment:	542.9	kip-ft
Axial:	12.6	kip
Shear:	15.8	kip

Pole Geometry		
Upper Pole OD:	24.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	36.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	35.00	in

Design Information		
TIA Code:	F	
ASIF:	1.33	
Failure At:	105%	

Outer Bolt Group Data		
Quantity:	24	
Diameter:	0.75	in
Material:	A325	
Bolt Circle:	29.63	in
Bolt Group Area:	10.60	in^2
Bolt Group MOIx:	1170	in^4
Reactions Seen by Outer Bolt Group		
Moment:	125.1	kip-ft
Axial:	12.6	kip
Shear:	8.0	kip
Outer Bolt Capacity Check		
Max Tension:	8.3	kip
Allowable Tension:	25.9	kip
Max Shear:	0.3	kip
Allowable Shear:	13.0	kip
Bolt Capacity	31.9%	Pass

Inner Bolt Group Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4
Reactions Seen by Inner Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
Inner Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

Bridge Stiffener #1 Data		
Quantity:	3	
Type:	Write In	
Circle:	40.50	in
Individual Area:	3.50	in^2
BS #1 Group Area:	10.50	in^2
BS #1 Group MOIx:	2159	in^4
Reactions Seen by BS #1 Group		
Moment:	230.9	kip-ft
Axial:	0.0	kip
Shear:	7.9	kip
BS #1 Capacity Check		
Max Tension:	57.0	kip
Max Compression:	87.0	kip
Allowable Axial:	118.3	kip
Max Shear:	0.8	kip
Allowable Shear:	91.0	kip
Bolt Capacity	73.5%	Pass
BS #1 Upper Weld Capacity		
Eccentricity (ex):	8.250	in
Weld Length (l):	23.8	in
Weld Factor (a):	0.347	
Weld Size (D):	6	16TH
Weld Coef. (C):	1.04	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	44.1%	Pass
BS #1 Lower Weld Capacity		
Eccentricity (ex):	2.250	in
Weld Length (l):	17.3	in
Weld Factor (a):	0.130	
Weld Size (D):	6	16TH
Weld Coef. (C):	1.55	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	40.6%	Pass

Bridge Stiffener #2 Data		
Quantity:	3	
Type:	Write In	
Circle:	37.00	in
Individual Area:	4.50	in^2
BS #2 Group Area:	13.50	in^2
BS #2 Group MOIx:	1747	in^4
Reactions Seen by BS #2 Group		
Moment:	186.9	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
BS #2 Capacity Check		
Max Tension:	104.2	kip
Max Compression:	44.0	kip
Allowable Axial:	171.7	kip
Max Shear:	0.0	kip
Allowable Shear:	117.0	kip
Bolt Capacity	60.7%	Pass
BS #2 Upper Weld Capacity		
Eccentricity (ex):	6.500	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	
BS #2 Lower Weld Capacity		
Eccentricity (ex):	0.500	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Bridge Stiffener #3 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #3 Group Area:	0.00	in^2
BS #3 Group MOIx:	0	in^4
Reactions Seen by BS #3 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
BS #3 Capacity Check		
Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	
BS #3 Upper Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	
BS #3 Lower Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#:	*876333*
Site Name:	*CREATIVE DIMENSIONS*
App #:	*315605 R0*

Pole Manufacturer:	Other

Bolt Data			
Qty:	24		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	29.625		

Plate Data		
Diam:	35	in
Thick, t:	1.875	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.14	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
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:	24	in
Thick:	0.375	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	125.09899	ft-kips
Axial:	12.6095	kips
Shear:	7.9627426	kips
Elevation:	80	feet

If No stiffeners, Criteria: AISC ASD <-Only Applcable to Unstiff

Flange Bolt Results

Bolt Tension Capacity, **B**:	25.91	kips
Max Bolt directly applied T:	7.92	Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.831	in
Min PL "treq" for actual **T w/ Pry**:	0.767	in
Min PL "t1" for actual **T w/o Pry**:	1.012	in
T allowable w/o Prying:	25.91	kips
Prying Force, Q:	0.00	kips
Total Bolt Tension=T+Q:	7.92	kips
Non-Prying Bolt Stress Ratio, T/B:	30.6%	**Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	7.7	ksi
Allowable Plate Stress:	36.0	ksi
Compression Plate Stress Ratio:	21.4%	**Pass**
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	16.7%	**Pass**

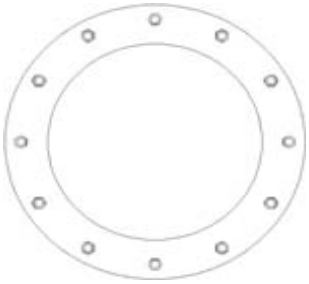
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check:	n/a



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

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

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#:	*876333*
Site Name:	*CREATIVE DIMENSIONS*
App #:	*315605 R0*

Manufacturer:	Other

Reactions

Moment:	125.09899	ft-kips
Axial:	12.6095	kips
Shear:	7.9627426	kips
Exterior Flange Run, T+Q:	7.9201059	kips

Elevation: 80 feet

Bolt Data

Qty:	24			
Diam:	0.75	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:		<-- Disregard	Bolt Fty:	
N/A:		<-- Disregard	44.00	
Circle:	29.625	in		

Interior Flange Bolt Results

Maximum Bolt Tension:	7.9	Kips, Ext. T=Interior T
Allowable Tension:	25.9	Kips
Bolt Stress Ratio:	30.6%	**Pass**

Plate Data

Plate Outer Diam:	35.25	in
Plate Inner Diam:	26.625	in (Hole @ Ctr)
Thick:	1.875	in
Grade:	36	ksi
Effective Width:	4.61	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	9.0	Kips, Ext. C= Interior C
Plate Stress:	9.3	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	25.9%	**Pass**

Stiffener Data (Welding at Both Sides)

Config:	0	*
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

n/a

Stiffener Results

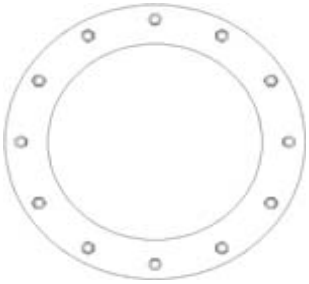
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data

Pole OuterDiam:	36	in
Thick:	0.375	in
Pole Inner Diam:	35.25	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi



Stress Increase Factor

ASIF:	1.333	

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

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

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information		
ID #:	876333	
Name:	CREATIVE DIMENSIONS	
App. #:	315605 R0	

Flange Height:	40	ft

System Reactions		
Moment:	1247.8	kip-ft
Axial:	21.2	kip
Shear:	18.9	kip

Pole Geometry		
Upper Pole OD:	36.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	42.00	in
Lower Pole Thick:	0.5000	in
Flange Plate OD:	40.75	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	105%

Outer Bolt Group Data		
Quantity:	32	
Diameter:	0.75	in
Material:	A325	
Bolt Circle:	38.50	in
Bolt Group Area:	14.14	in^2
Bolt Group MOIx:	2634	in^4
Reactions Seen by Outer Bolt Group		
Moment:	277.8	kip-ft
Axial:	21.2	kip
Shear:	8.7	kip
Outer Bolt Capacity Check		
Max Tension:	10.7	kip
Allowable Tension:	25.9	kip
Max Shear:	0.3	kip
Allowable Shear:	13.0	kip
Bolt Capacity	41.2%	Pass

Inner Bolt Group Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4
Reactions Seen by Inner Bolt Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
Inner Bolt Capacity Check		
Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	

Bridge Stiffener #1 Data		
Quantity:	3	
Type:	Write In	
Circle:	48.50	in
Individual Area:	5.50	in^2
BS #1 Group Area:	16.50	in^2
BS #1 Group MOIx:	4869	in^4
Reactions Seen by BS #1 Group		
Moment:	513.4	kip-ft
Axial:	0.0	kip
Shear:	10.2	kip
BS #1 Capacity Check		
Max Tension:	106.4	kip
Max Compression:	160.6	kip
Allowable Axial:	221.6	kip
Max Shear:	1.0	kip
Allowable Shear:	143.0	kip
Bolt Capacity	72.5%	Pass
BS #1 Upper Weld Capacity		
Eccentricity (ex):	6.250	in
Weld Length (l):	27.3	in
Weld Factor (a):	0.229	
Weld Size (D):	6	16TH
Weld Coef. (C):	1.31	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	56.1%	Pass
BS #1 Lower Weld Capacity		
Eccentricity (ex):	3.250	in
Weld Length (l):	23.5	in
Weld Factor (a):	0.138	
Weld Size (D):	6	16TH
Weld Coef. (C):	1.54	
Electrode Coef. (C_1):	1.00	
Weld Capacity:	55.6%	Pass

Bridge Stiffener #2 Data		
Quantity:	3	
Type:	Write In	
Circle:	43.25	in
Individual Area:	8.13	in^2
BS #2 Group Area:	24.38	in^2
BS #2 Group MOIx:	4331	in^4
Reactions Seen by BS #2 Group		
Moment:	456.6	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
BS #2 Capacity Check		
Max Tension:	218.2	kip
Max Compression:	90.3	kip
Allowable Axial:	347.9	kip
Max Shear:	0.0	kip
Allowable Shear:	211.2	kip
Bolt Capacity	62.7%	Pass
BS #2 Upper Weld Capacity		
Eccentricity (ex):	3.625	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	
BS #2 Lower Weld Capacity		
Eccentricity (ex):	0.625	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Bridge Stiffener #3 Data		
Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #3 Group Area:	0.00	in^2
BS #3 Group MOIx:	0	in^4
Reactions Seen by BS #3 Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
BS #3 Capacity Check		
Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	0.0%	
BS #3 Upper Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	
BS #3 Lower Weld Capacity		
Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	N/A	

Rev.4.1

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#:	*876333*
Site Name:	*CREATIVE DIMENSIONS*
App #:	*315605 R0*

Pole Manufacturer:	Other

Bolt Data			
Qty:	32		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	38.5		

Plate Data		
Diam:	40.75	in
Thick, t:	1.75	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.53	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
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:	36	in
Thick:	0.375	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	277.76778	ft-kips
Axial:	21.187	kips
Shear:	8.7388548	kips
Elevation:	40	feet

If No stiffeners, Criteria: AISC ASD <-Only Applcable to Unstiffe

Flange Bolt Results

Bolt Tension Capacity, **B**:	25.91	kips
Max Bolt directly applied T:	10.16	Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.034	in
Min PL "treq" for actual **T w/ Pry**:	0.487	in
Min PL "t1" for actual **T w/o Pry**:	0.648	in
T allowable w/o Prying:	25.91	kips
Prying Force, Q:	0.00	kips
Total Bolt Tension=T+Q:	10.16	kips
Non-Prying Bolt Stress Ratio, T/B:	39.2%	**Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	5.1	ksi
Allowable Plate Stress:	36.0	ksi
Compression Plate Stress Ratio:	14.3%	**Pass**
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	7.7%	**Pass**

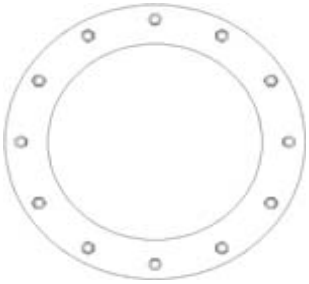
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check:	n/a



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

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

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#:	*876333*
Site Name:	*CREATIVE DIMENSIONS*
App #:	*315605 R0*

Manufacturer:	Other

Reactions

Moment:	277.76778	ft-kips
Axial:	21.187	kips
Shear:	8.7388548	kips
Exterior Flange Run, T+Q:	10.160028	kips

Elevation: 40 feet

Bolt Data

Qty:	32		
Diam:	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	38.5	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	10.2	Kips, Ext. T=Interior T
Allowable Tension:	25.9	Kips
Bolt Stress Ratio:	39.2%	**Pass**

Plate Data

Plate Outer Diam:	41	in
Plate Inner Diam:	35	in (Hole @ Ctr)
Thick:	1.75	in
Grade:	36	ksi
Effective Width:	4.03	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	11.5	Kips, Ext. C= Interior C
Plate Stress:	7.0	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	19.4%	**Pass**

Stiffener Data (Welding at Both Sides)

Config:	0	*
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

n/a

Stiffener Results

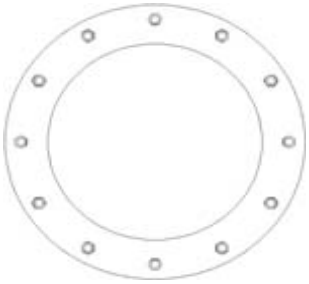
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data

Pole OuterDiam:	42	in
Thick:	0.5	in
Pole Inner Diam:	41	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi



Stress Increase Factor

ASIF:	1.333	

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

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

Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	876333
Name:	CREATIVE DIMENSIONS
App. #:	315605 R0

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Base Reactions		
Moment:	2065	ft-kip
Axial:	33	kip
Shear:	21	kip
Base Plate Type:	Circular	

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	105%
eta Factor:	0.50

Original Anchor Rod Data		
Quantity:	20	
Diameter:	2.00	in
Material:	A36	
Bolt Circle:	48.0	in
Bolt Spacing:		in
Bolt Group Area:	62.83	in^2
Bolt Group MOIx:	18122	in^4
Reactions Seen by Original AR Group		
Moment:	1460.7	kip-ft
Axial:	32.7	kip
Shear:	21.5	kip
Original AR Capacity Check		
Tension Load:	69.3	kip
Allowable load:	71.9	kip
AR Capacity:	96.3%	Pass

First Added Anchor Rod Data		
Quantity:	4	
Diameter:	2.00	in
Material:	A193 B7	
Bolt Circle:	54.0	in
Bolt Group Area:	12.57	in^2
Bolt Group MOIx:	4586	in^4
Reactions Seen by First Added AR Group		
Moment:	369.6	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
First Added AR Capacity Check		
Tension Load:	72.4	kip
Allowable load:	172.7	kip
AR Capacity:	41.9%	Pass

Second Added Anchor Rod Data		
Quantity:	3	
Diameter:	2.25	in
Material:	A193 B7	
Bolt Circle:	54.5	in
Bolt Group Area:	11.93	in^2
Bolt Group MOIx:	2907	in^4
Reactions Seen by Second Added AR Group		
Moment:	234.3	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
Second Added AR Capacity Check		
Tension Load:	100.4	kip
Allowable load:	218.6	kip
AR Capacity:	45.9%	Pass

Third Added Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4
Reactions Seen by Second Added AR Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip
Second Added AR Capacity Check		
Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Rev.4.1

AeroSolutions LLC
Optimizing Your Tower Infrastructure

5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
720-304-6882
www.AeroSolutionsLLC.com

Anchor Rod Embedment (v1.2)

Analysis Standard

TIA Code:	*TIACode*	F	
Allowable Stress Increase:	*ASIF*	1.333	

Dimensions and Properties

Pier Diameter:	*PierDia*	78	in
Concrete Strength:	*Fc*	4000	psi
Clear Cover, Side:	*cc.side*	3	in
Clear Cover, Top:	*cc.top*	3	in
Rebar Yield Strength:	*BarFy*	60	ksi
Rebar Tie Size:	*TieSize*	5	
Rebar Tie Diameter:	*TieDia*	0.63	in
Vertical Bar Quantity:	*BarQty*	16	
Vertical Bar Size:	*BarSize*	11	
Vertical Bar Diameter:	*BarDia*	1.410	in
Vertical Bar Area:	*BarArea*	1.56	in
Vertical Bar Circle Diameter:	*BarBC*	69.3	in
Vertical Bar Spacing:	*BarSp*	13.5	in
Vertical Bar Radial Angle Between:	*BarAngle*	22.5	deg
Anchor Rod Type:	*RodType*	Other	
Anchor Rod Diameter:	*RodDia*	2	in
Anchor Rod Threads per Inch:	*RodThreads*	4.5	
Anchor Rod Net Area Through Threads:	*RodArea*	2.50	sq in
Anchor Rod Circle Diameter:	*RodBC*	54	in
Anchor Rod Material:	*RodMatl*	A193 B7	
Anchor Rod Yield Strength:	*RodFy*	105	ksi
Anchor Rod Ultimate Strength:	*RodFu*	125	ksi

Anchor Rod Loading

Anchor Rod Tensile Requirement:	*RodP*	172.7	kip
Anchor Rod Design Criteria:	*DesCrit*	Analysis	

Development Length of Vertical Rebar

Reinforcement Location Factor[1]:	*Alpha*	1.0		ACI 12.2.4	
Coating Factor[1]:	*Beta*	1.0		ACI 12.2.4	
Lightweight Aggregate Concrete Factor[1]:	*Lambda*	1.0		ACI 12.2.4	
Reinforcement Size Factor[1]:	*Gamma*	1.0		ACI 12.2.4	
Transverse Reinforcement Ratio[2]:	*Ktr*	0.0	in	ACI 12.2.4	
Maximum Spacing or Cover Dimension:	*Cover*	4.33	in	ACI 12.2.4	
Development Length:	*Ld*	40.1	in	ACI 12.2.3	
Reinforcment Stress Ratio[3]:	*SR*	0.74			
Reduced Development Length:	*Ld.red*	29.9	in	ACI 12.2.5	Used only if DesCrit = "Analysis"

Force Transfer Length

Angle to Vertical Bar:	*Angle*	11.3	deg
Distance to Farthest Bar:	*BarDist*	9.7	in

Epoxy Bond

Epoxy Ultimate Bond Stress:	*EpoxyBond*	1800	psi
Factor of Safety:	*EpoxyFS*	3	
Strength Resistance Factor:	*EpoxyPhi*	0.5	
Bond Length Required:	*EpoxyL*	45.8	in

Embedment Length

Total Required Embedment Length:	*EmbedIn*	**55**	**in**	**Epoxy Length Controls**
	EmbedFt	**4.6**	**ft**	
Actual Embedment length:	*ActEmbed*	6.5	ft	
Embedment Capacity	*EmbedCap*	**70.9%**		

Notes:
(1) These factors are typically 1.0 for most tower foundations.
(2) This factor is typically 0 inches for most tower foundations.
(3) Stress ratio of reinforcement can be entered to reduce required development length. Only to be used in already installed desperate situations.
(4) This is consistent with on CCI Foundations Criteria Item AC-1, dated 06/01/2010.

AeroSolutions LLC
Optimizing Your Tower Infrastructure

5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
720-304-6882
www.AeroSolutionsLLC.com

Anchor Rod Embedment (v1.2)

Analysis Standard					
TIA Code:	*TIACode*	F			
Allowable Stress Increase:	*ASIF*	1.333			
Dimensions and Properties					
Pier Diameter:	*PierDia*	78	in		
Concrete Strength:	*Fc*	4000	psi		
Clear Cover, Side:	*cc.side*	3	in		
Clear Cover, Top:	*cc.top*	3	in		
Rebar Yield Strength:	*BarFy*	60	ksi		
Rebar Tie Size:	*TieSize*	5			
Rebar Tie Diameter:	*TieDia*	0.63	in		
Vertical Bar Quantity:	*BarQty*	16			
Vertical Bar Size:	*BarSize*	11			
Vertical Bar Diameter:	*BarDia*	1.410	in		
Vertical Bar Area:	*BarArea*	1.56	in		
Vertical Bar Circle Diameter:	*BarBC*	69.3	in		
Vertical Bar Spacing:	*BarSp*	13.5	in		
Vertical Bar Radial Angle Between:	*BarAngle*	22.5	deg		
Anchor Rod Type:	*RodType*	Other			
Anchor Rod Diameter:	*RodDia*	2.25	in		
Anchor Rod Threads per Inch:	*RodThreads*	4.5			
Anchor Rod Net Area Through Threads:	*RodArea*	3.25	sq in		
Anchor Rod Circle Diameter:	*RodBC*	54.5	in		
Anchor Rod Material:	*RodMatl*	A193 B7			
Anchor Rod Yield Strength:	*RodFy*	105	ksi		
Anchor Rod Ultimate Strength:	*RodFu*	125	ksi		
Anchor Rod Loading					
Anchor Rod Tensile Requirement:	*RodP*	218.6	kip		
Anchor Rod Design Criteria:	*DesCrit*	Analysis			
Development Length of Vertical Rebar					
Reinforcement Location Factor[1]:	*Alpha*	1.0		ACI 12.2.4	
Coating Factor[1]:	*Beta*	1.0		ACI 12.2.4	
Lightweight Aggregate Concrete Factor[1]:	*Lambda*	1.0		ACI 12.2.4	
Reinforcement Size Factor[1]:	*Gamma*	1.0		ACI 12.2.4	
Transverse Reinforcement Ratio[2]:	*Ktr*	0.0	in	ACI 12.2.4	
Maximum Spacing or Cover Dimension:	*Cover*	4.33	in	ACI 12.2.4	
Development Length:	*Ld*	40.1	in	ACI 12.2.3	
Reinforcment Stress Ratio[3]:	*SR*	0.74			
Reduced Development Length:	*Ld.red*	29.9	in	ACI 12.2.5	Used only if DesCrit = "Analysis"
Force Transfer Length					
Angle to Vertical Bar:	*Angle*	11.3	deg		
Distance to Farthest Bar:	*BarDist*	9.6	in		
Epoxy Bond					
Epoxy Ultimate Bond Stress:	*EpoxyBond*	1800	psi		
Factor of Safety:	*EpoxyFS*	3			
Strength Resistance Factor:	*EpoxyPhi*	0.5			
Bond Length Required:	*EpoxyL*	51.5	in		
Embedment Length					
Total Required Embedment Length:	*EmbedIn*	**61**	**in**	**Epoxy Length Controls**	
	EmbedFt	**5.1**	**ft**		
Actual Embedment length:	*ActEmbed*	8.0	ft		
Embedment Capacity	*EmbedCap*	**63.5%**			

Notes:
(1) These factors are typically 1.0 for most tower foundations.
(2) This factor is typically 0 inches for most tower foundations.
(3) Stress ratio of reinforcement can be entered to reduce required development length. Only to be used in already installed desperate situations.
(4) This is consistent with on CCI Foundations Criteria Item AC-1, dated 06/01/2010.

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#:	*876333*
Site Name:	*CREATIVE DIMENSIONS*
App #:	*315605 R0*
Pole Manufacturer:	*Other*

Reactions		
Moment:	1460.7132	ft-kips
Axial:	32.6942	kips
Shear:	21.499426	kips

Anchor Rod Data		
Qty:	20	
Diam:	2	in
Rod Material:	Other	
Strength (Fu):	58	ksi
Yield (Fy):	36	ksi
Bolt Circle:	48	in

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

Rigid
Service, ASD
Fty*ASIF

Plate Data		
Diam:	54	in
Thick:	2.5	in
Grade:	36	ksi
Single-Rod B-eff:	6.60	in

Base Plate Results Flexural Check

Base Plate Stress:	20.0	ksi	Rigid
Allowable Plate Stress:	36.0	ksi	Service ASD
Base Plate Stress Ratio:	55.5%	Pass	0.75*Fy*ASIF
			Y.L. Length: 23.24

Stiffener Data (Welding at both sides)		
Config:	0	*
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

n/a

Stiffener Results

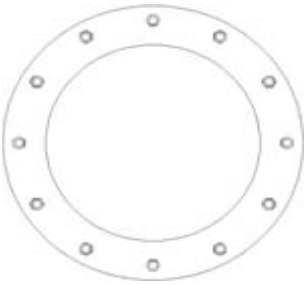
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	42	in
Thick:	0.5	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	



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

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

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Number	876333
Site Name	CREATIVE DIMENSIONS

Caisson Analysis

Pier Properties		
Moment	2065	kip-ft
Shear	21	kip
Pier Diameter	6.5	ft
Height Above Grade	0.50	ft
Depth Below Grade	30.00	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	F	
Soil Safety Factor	2.00	
Water Table Depth	14.0	ft
Ignored Soil Depth	3.3	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	110%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	30	30.00	115	0	34
2						
3						
4						
5						
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	20.72	ft
Zero Shear	6.95	ft

Results		
Soil Capacity	28.7%	OK
Max Pier Moment	2190	kip-ft

Moment At User Defined Depths Below Grade	
kip-ft	kip-ft
kip-ft	kip-ft

V1.0

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#:	*876333*
Site Name:	*CREATIVE DIMENSIONS*
App #:	*315605 R0*

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	6.5	ft
Concrete Area =	4778.4	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	5.78	ft
Vert. Cage Diameter =	69.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	16	
As Total=	24.96	in^2
A s/ Aconc, Rho:	0.0052	0.52%

ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0032
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.52%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	9182.77	kips
at Mu=(ϕ=0.65)Mn=	5201.41	ft-kips
Max Tu, (φ=0.9) Tn =	1347.84	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	2189.914	ft-kips **(* Note)**
Max. Service Shaft P:	32.6942	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	2846.888	ft-kips
1.30	Pu:	42.50246	kips

Material Properties

Concrete Comp. strength, f'c =	4000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2002

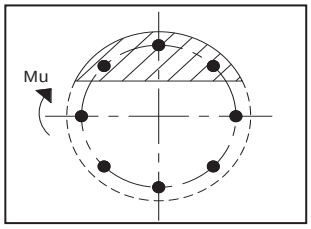
Seismic Properties

Seismic Design Category =	D
Seismic Risk =	**High**

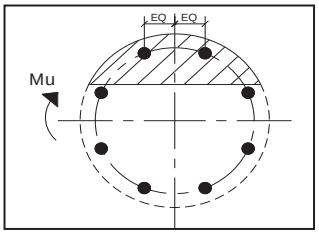
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**10.47**	in
Extreme Steel Strain, ϵt:	**0.0181**	
	ϵt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	42.50	kips
Drilled Shaft Moment Capacity, φMn:	**3825.63**	ft-kips
Drilled Shaft Superimposed Mu:	**2846.89**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**74.4%**