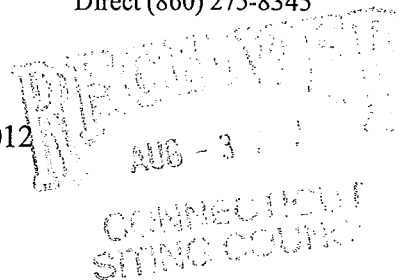


280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

August 2, 2012



Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-105-120125 – 125 Mile Creek Road, Old Lyme, Connecticut**
EM-VER-117-120306 – 80 Lonetown Road, Redding, Connecticut
EM-VER-108-120227 – 85 Quaker Farms Road, Seymour, Connecticut
EM-VER-056-120217 – 8 Upper Meadow Road, Granby, Connecticut
EM-VER-132-120605 – Burnham Street, South Windsor, Connecticut
EM-VER-067-120622 – 439-455 Homestead Avenue, Hartford, Connecticut
EM-VER-077-120412 – 60 Adams Street, Manchester, Connecticut

Completion of Construction Activity

Dear Ms. Roberts:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter



Law Offices

BOSTON

PROVIDENCE

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

ALBANY

SARASOTA

www.rc.com



STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

July 11, 2012

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-064-120622-** Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 439-455 Homestead Avenue, Hartford, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated June 21, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

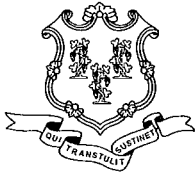
Very truly yours,

Linda Roberts
Executive Director

LR/CDM/jbw

c: The Honorable Pedro E. Segarra, Mayor, City of Hartford
David B. Panagore, Chief Operating Officer, City of Hartford
Roger J. O'Brien, Director of Planning, City of Hartford
Crown Castle





STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

June 26, 2012

The Honorable Pedro E. Segarra
Mayor
City of Hartford
Municipal Building
550 Main Street
Hartford, CT 06103

RE: **EM-VER-064-120622**- Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 439-455 Homestead Avenue, Hartford, Connecticut.

Dear Mayor Segarra:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by July 11, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

A handwritten signature in cursive script that reads "L Roberts".

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: David B. Panagore, Chief Operating Officer, City of Hartford
Roger J. O'Brien, Director of Planning, City of Hartford

280 Trumbull Street
 Hartford, CT 06103-3597
 Main (860) 275-8200
 Fax (860) 275-8299
 kbaldwin@rc.com
 Direct (860) 275-8345

June 21, 2012

Linda Roberts
 Executive Director
 Connecticut Siting Council
 10 Franklin Square
 New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap
 439-455 Homestead Avenue, Hartford, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 137-foot level of the 140-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco’s shared use of this tower in 1990 in Docket No. 126. Cellco now intends to replace nine (9) of its existing antennas with four (4) model LPA-80063-4CF cellular antennas; two (2) model SC-E 6014 rev 2 cellular antennas; and three (3) model BXA-171063-8CF PCS antennas, all at the 137-foot level. Attached behind Tab 1 are the specifications for the replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Pedro E. Segarra, Mayor for the City of Hartford. A copy of this letter is also being sent to Talar Properties LLC, the owner of the property on which the tower is located.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s replacement antennas will be located at the 137-foot level of the tower.



Law Offices

BOSTON

PROVIDENCE

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

ALBANY

SARASOTA

www.rc.com

11728982-v1

ROBINSON & COLE^{LLP}

Linda Roberts
June 21, 2012
Page 2

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A Cumulative power density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed modifications. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Pedro E. Segarra, Hartford Mayor
Talar Properties LLC
Sandy M. Carter

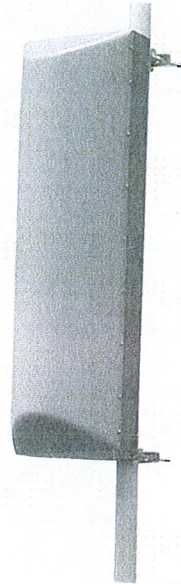


LPA-80063-4CF-EDIN-X

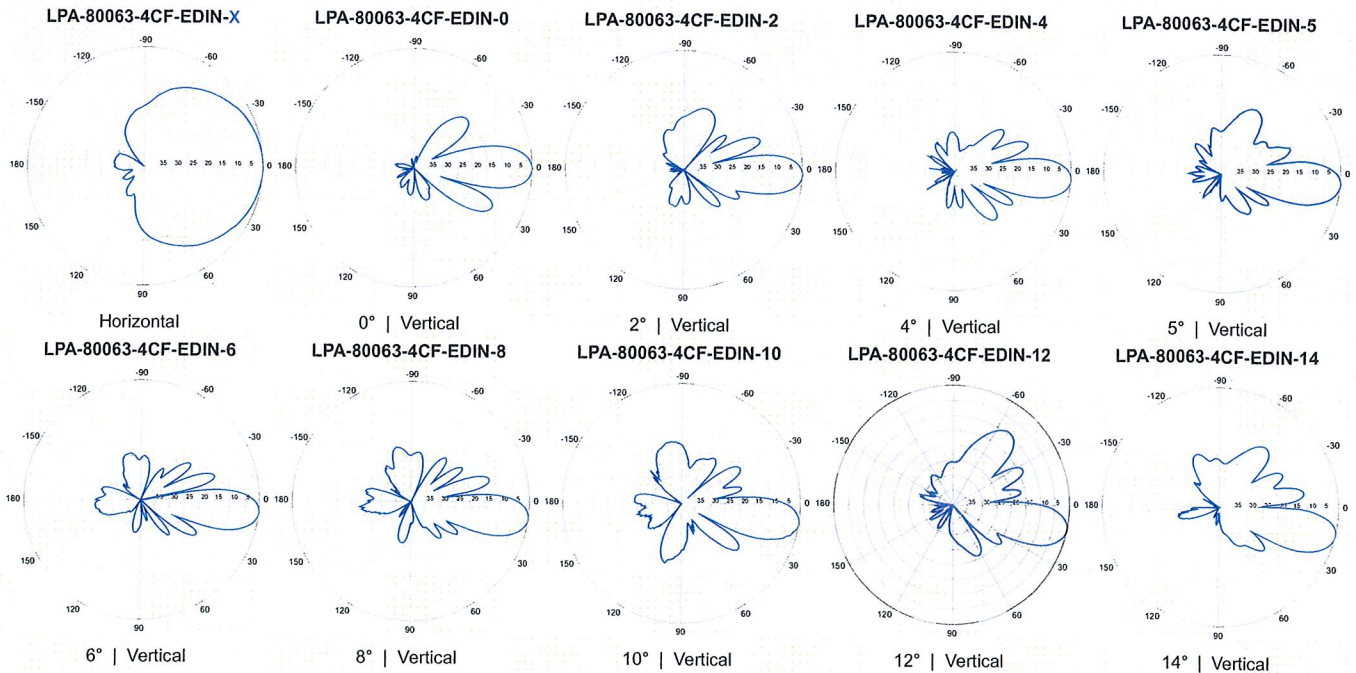
V-Pol | Log Periodic | 63° | 13.0 dBd

Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.



Electrical Characteristics		
Frequency bands	806-960 MHz	
Polarization	Vertical	
Horizontal beamwidth	63°	
Vertical beamwidth	15°	
Gain	13.0 dBd (15.1 dBi)	
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10, 12, 14	
Impedance	50Ω	
VSWR	≤1.4:1	
Upper sidelobe suppression (0°)	-15.7 dB	
Front-to-back ratio (+/-30°)	-31.7 dB	
Null fill	5% (-26.02 dB)	
Input power	500 W	
Lightning protection	Direct Ground	
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1205 x 385 x 332 mm 47.4 x 15.2 x 13.1 in	
Depth of antenna with z-bracket	372 mm 14.6 in	
Weight without mounting brackets	9.1 kg 20 lbs	
Survival wind speed	> 201 km/hr > 125 mph	
Wind area	Front: 0.46 m ² Side: 0.39 m ² Front: 5.0 ft ² Side: 4.2 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 660 N Side: 550 N Front: 149 lbf Side: 124 lbf	
Mounting Options		
Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit (0-20°)	21699999 50-102 mm 2.0-4.0 in	5.4 kg 12 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.	



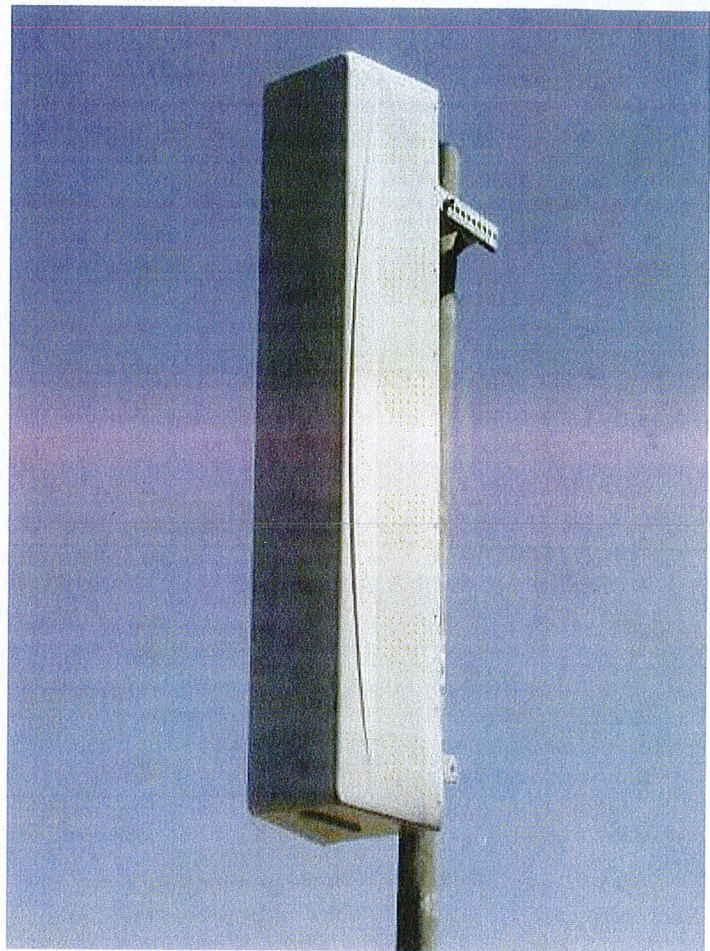
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

SC-E 6014 rev2

Enhanced 800 - 960 MHz log-periodic antenna

Features

- ❑ Small size
- ❑ Aesthetically pleasing
- ❑ Suitable for TDMA/CDMA/GSM/3G
- ❑ High return loss
- ❑ Low intermodulation
- ❑ High front-to-back ratio
- ❑ Outstanding performance over the entire band (800 - 960 MHz)
- ❑ Upper side-lobe suppression
- ❑ Rugged design
- ❑ Dramatically improved signal to interference performance



Electrical specifications

Frequency range:	800-960 MHz
Impedance:	50 ohm
Connector type:	7/16 Din
Return loss:	20 dB
Polarization:	Vertical
Gain:	14 dBd
Front-to-back ratio:	> 30 dB
Upper side-lobe suppression:	18 dB

Intermodulation (2x20W):	IM5 160 dB
	IM7/9 170 dB

Power rating:	500 W
H-plane (-3 dB point):	54 - 60°
V-plane (-3 dB point):	16 - 18°
Lightning protection:	DC grounded

Mechanical specifications

Overall height:	43 in	[1092 mm]
Width:	8.5 in	[216 mm]
Depth:	8 in	[203 mm]
Weight (excluding brackets):	15 lbs	[6.8 Kg]
Wind load measured up to:	150 mph	[240 Km/h]
Wind area (side of antenna):	2.54 sq. ft.	[0.24 sq.m]
Lateral thrust At 113 mph/ 180Km/h (worst case):	122 lbs	[577 N]

Materials

Radiating Elements:	Aluminum
Transformer (Power distribution)	Ceramic PCB
Chassis:	Aluminum
Radome:	Grey Fiberglass/PVC
Tilt-bracket:	Hot dip galvanized steel
Mounting bolts:	Stainless steel

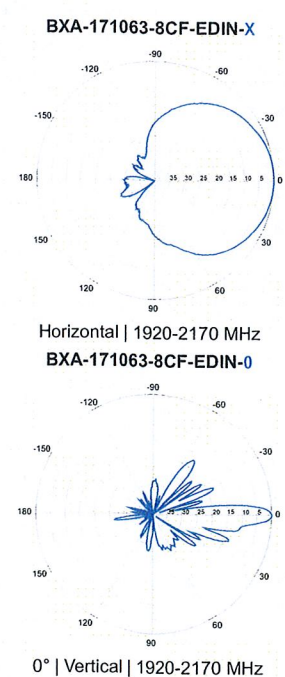
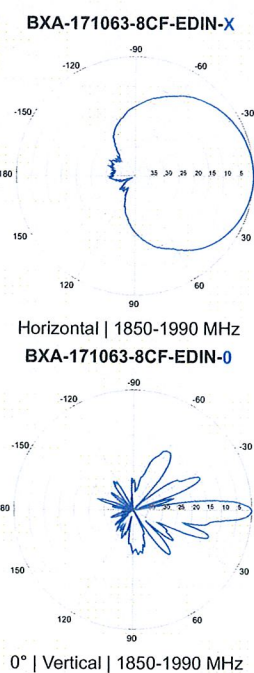
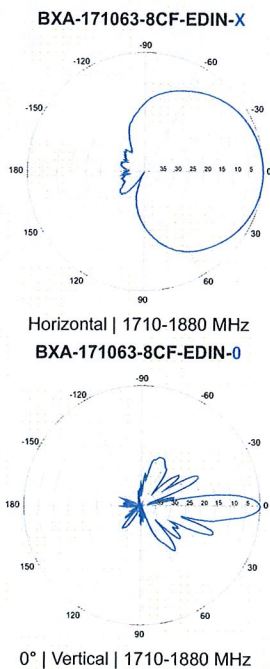
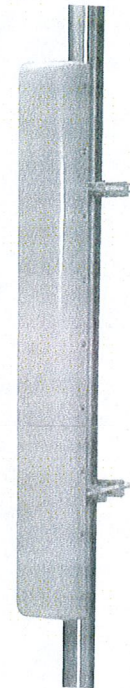
The SC-E 6014 rev2 is made in the U.S.A.

BXA-171063-8CF-EDIN-X

Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 dBi

Electrical Characteristics	1710-2170 MHz			
	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz	
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz	
Polarization	±45°	±45°	±45°	
Horizontal beamwidth	68°	65°	60°	
Vertical beamwidth	7°	7°	7°	
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi	
Electrical downtilt (X)	0, 2, 4, 8			
Impedance	50Ω			
VSWR	≤1.5:1			
First upper sidelobe	< -17 dB			
Front-to-back isolation	> 30 dB			
In-band isolation	> 28 dB			
IM3 (20W carrier)	< -150 dBc			
Input power	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN / Female / Center (Back)			
Operating temperature	-40° to +60° C / -40° to +140° F			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1232 x 154 x 105 mm		48.5 x 6.1 x 4.1 in	
Depth with t-brackets	133 mm		5.2 in	
Weight without mounting brackets	4.8 kg		10.5 lbs	
Survival wind speed	296 km/hr		184 mph	
Wind area	Front: 0.19 m ² Side: 0.14 m ²	Front: 2.0 ft ² Side: 1.5 ft ²		
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf		
Mounting Options				
	Part Number	Fits Pipe Diameter		Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm	2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm	2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8CF-EDIN-X-FP			

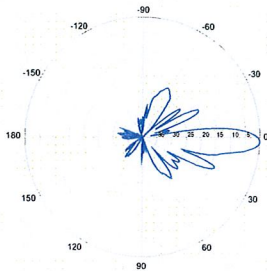


Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-171063-8CF-EDIN-X

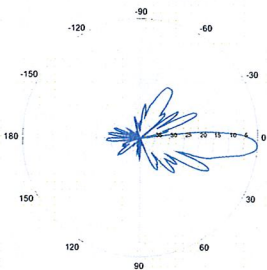
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8CF-EDIN-2



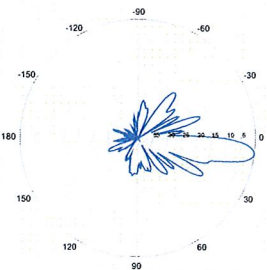
2° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-4



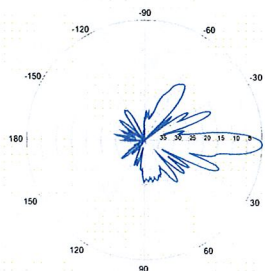
4° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-8



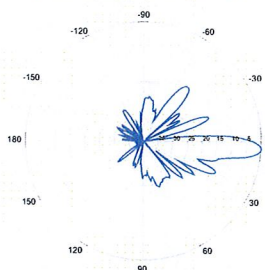
8° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-2



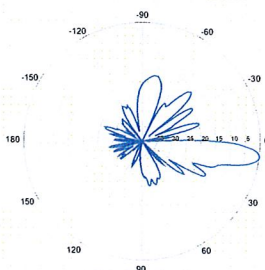
2° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-4



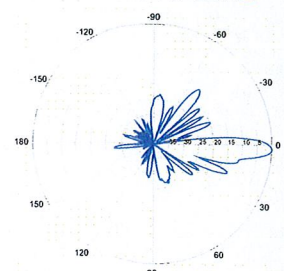
4° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-8



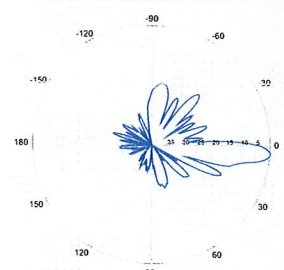
8° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-2



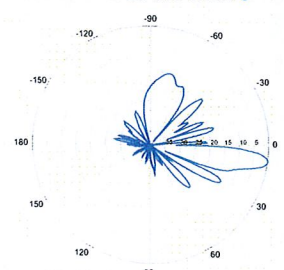
2° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-4



4° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-8



8° | Vertical | 1920-2170 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

		General		Power		Density							
Site Name: Hartford NW													
Tower Height: Verizon @ 137Ft.													
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*Sprint	11	609	104	0.2227	1962.5	1.0000	22.27%						
*Clearwire	2	153	104	0.0102	2496	1.0000	1.02%						
*Clearwire	1	211	108	0.0065	11 GHz	1.0000	0.65%						
*Sensus (CL&P)	1	200	74	0.0131	940.1125	0.6267	2.10%						
*Pocket	3	631	94	0.0770	2130	1.0000	7.70%						
*T-Mobile GSM	8	193	127	0.0344	1945	1.0000	3.44%						
*T-Mobile UMTS	2	770	127	0.0343	2100	1.0000	3.43%						
*AT&T UMTS	2	875	120	0.0437	1900	1.0000	0.44%						
*AT&T UMTS	2	565	120	0.0282	880	0.5867	0.48%						
*AT&T GSM	4	525	120	0.0524	1900	1.0000	0.52%						
*AT&T GSM	1	283	120	0.0071	880	0.5867	0.12%						
*AT&T LTE	1	1615	120	0.0403	734	0.4893	0.82%						
Verizon PCS	11	252	137	0.0531	1970	1.0000	5.31%						
Verizon Cellular	9	258	137	0.0445	869	0.5793	7.68%						
Verizon AWS	1	611	137	0.0117	2145	1.0000	1.17%						
Verizon 700	1	845	137	0.0162	698	0.4653	3.48%						
								60.64%					
* Source: Siting Council													

Date: June 16, 2012

Greg Guzzie
Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317



Crown Castle
2000 Corporate Dr.
Canonsburg, PA 15317
(724) 416-2000

Subject: Structural Analysis Report

Carrier Designation: Verizon Wireless Co-Locate
Carrier Site Name: hartford NW

Crown Castle Designation:
Crown Castle BU Number: 806369
Crown Castle Site Name: HRT 094 943225
Crown Castle JDE Job Number: 183348
Crown Castle Work Order Number: 502589
Crown Castle Application Number: 145994 Rev. 0

Engineering Firm Designation: Crown Castle Project Number: 502589

Site Data: 439-455 HOMESTEAD AVE, HARTFORD, Hartford County, CT
Latitude 41° 47' 1.61", Longitude -72° 42' 13.66"
140 Foot - Monopole Tower

Dear Greg Guzzie,

Crown Castle 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 502589, in accordance with application 145994, 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.

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

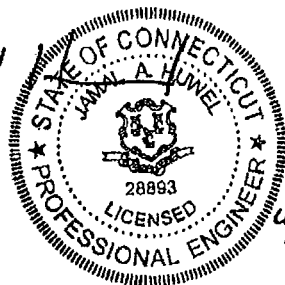
All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Crown Castle 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: Brad Gruszecki, Engineer I / JAH

Respectfully submitted by:

Jamal A. Huwel, P.E.
Manager Engineering



6/16/2012

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 tower is a 140 ft Monopole tower designed by Valmont Industries, Inc. in August of 1999. The tower was originally designed for a wind speed of 125 mph per TIA/EIA-222-F.

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
140.0	137.0	3	antel	BXA-171063/8CFx2 w/ Mount Pipe	-	-	-
		4	antel	LPA-80063/4CF w/ Mount Pipe			
		2	swedcom	SC-E 6014 rev2 w/ Mount Pipe			

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
140.0	137.0	1	tower mounts	Platform Mount (LP 101-1)	12	7/8	1
		3	antel	BXA-70063/6CF w/ Mount Pipe			
		6	rfs celwave	FD9R6004/1C-3L			
		2	antel	LPA-80063/4CF w/ Mount Pipe			
		4	antel	LPA-80080/4CF w/ Mount Pipe			
126.0	128.0	3	antel	BXA-185090/8CF w/ Mount Pipe	-	-	3
		8	rfs celwave	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe			
		6	siemens	DTMA GSM 1900			
115.0	117.0	1	tower mounts	Platform Mount [LP 1001-1]	2	3/4	2
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		2	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
115.0	117.0	1	raycap	DC6-48-60-18-8F	1	3/8	2
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		12	powerwave technologies	LGP21401			

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	1	tower mounts	Platform Mount [LP 712-1]			
	115.0	6	ericsson	RRUS-11	-	-	2
	113.0	1	tower mounts	Side Arm Mount [SO 702-3]			
	108.0	1	andrew	VHLP2-180			
102.0	108.0	1	andrew	VHLP2.5-11			
		2	dragonwave	HORIZON COMPACT	6	1-5/8	
		3	argus technologies	LLPX310R-V1 w/ Mount Pipe	3	5/16	1
	104.0	6	decibel	950F40T4E-M w/ Mount Pipe	3	1/2	
		3	samsung telecommunications	WIMAX DAP HEAD	3	1/4	
94.0	102.0	1	tower mounts	Platform Mount [LP 602-1]			
	94.0	3	kathrein	742 213 w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
74.0	80.0	1	antel	BCD-87010	1	7/8	1
	74.0	1	tower mounts	Side Arm Mount [SO 701-1]			
40.0	41.0	1	lucent	KS24019-L112A	1	1/2	1
	40.0	1	tower mounts	Side Arm Mount [SO 701-1]			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment to be Removed, Not Considered in Analysis

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)
137	137	12	swedcom	ALP 9212-N	-	-
124	124	6	rfs celwave	APN199015	-	-
114	114	9	allgon	7184.15	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Tower Engineering Professionals	2294838	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Tower Engineering Professionals (Mapping)	2294380	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Tower Engineering Professionals (Mapping)	2294379	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Valmont Industries, Inc.	823121	CCISITES

3.1) Analysis Method

tnxTower (version 6.0.4.0), 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 existing base plate grout was not considered in this analysis.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle 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	140 - 86.8333	Pole	TP39.223x26.216x0.3125	1	-15.88	1950.17	45.3	Pass	
L2	86.8333 - 39	Pole	TP50.56x36.967x0.4063	2	-28.50	3292.00	64.8	Pass	
L3	39 - 0	Pole	TP59.05x48.0016x0.5	3	-46.49	4900.57	66.3	Pass	
							Summary		
							Pole (L3)	66.3	Pass
							Rating =	66.3	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	71.0	Pass
1	Base Plate	0	33.1	Pass
1	Base Foundation	0	51.1	Pass
Structure Rating (max from all components) =				71.0%

Notes:

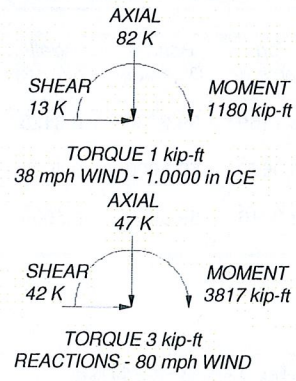
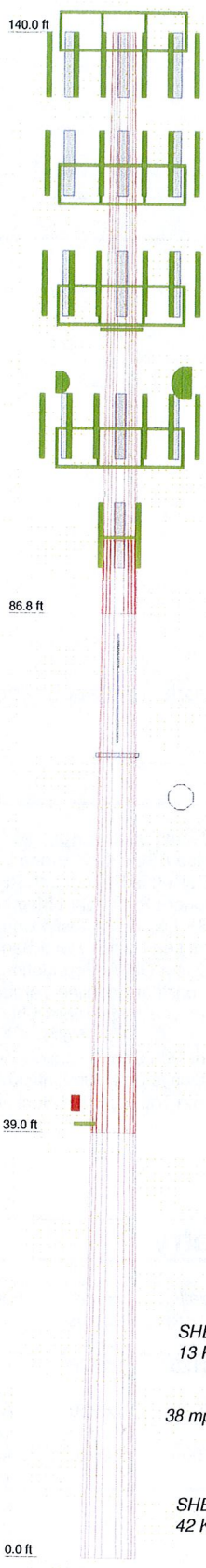
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

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	1	2	3
Length (ft)	53'2-1/32"	54'6"	46'
Number of Sides	12	12	12
Thickness (in)	0.3125	0.4063	0.5000
Socket Length (ft)	6'8-1/32"	7'	48.0016
Top Dia (in)	26.2160	36.9670	59.0500
Bot Dia (in)	39.2230	50.5600	13.4
Grade		A572-65	
Weight (K)	5.9	10.5	28.8



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-70063/6CF w/ Mount Pipe	140	P65-17-XLH-RR w/ Mount Pipe	115
BXA-70063/6CF w/ Mount Pipe	140	DC6-48-60-18-8F	115
BXA-70063/6CF w/ Mount Pipe	140	8'x2" Antenna Mount Pipe	115
(2) FD9R6004/1C-3L	140	8'x2" Antenna Mount Pipe	115
(2) FD9R6004/1C-3L	140	8'x2" Antenna Mount Pipe	115
(2) FD9R6004/1C-3L	140	Platform Mount [LP 712-1]	115
BXA-171063/8CFx2 w/ Mount Pipe	140	(2) RRUS-11	113
BXA-171063/8CFx2 w/ Mount Pipe	140	(2) RRUS-11	113
BXA-171063/8CFx2 w/ Mount Pipe	140	(2) RRUS-11	113
(2) LPA-80063/4CF w/ Mount Pipe	140	Side Arm Mount [SO 702-3]	113
(2) LPA-80063/4CF w/ Mount Pipe	140	LLPX310R-V1 w/ Mount Pipe	102
(2) SC-E 6014 rev2 w/ Mount Pipe	140	LLPX310R-V1 w/ Mount Pipe	102
Platform Mount (LP 101-1)	140	LLPX310R-V1 w/ Mount Pipe	102
(3) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	126	(2) 950F40T4E-M w/ Mount Pipe	102
(3) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	126	(2) 950F40T4E-M w/ Mount Pipe	102
(3) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	126	(2) 950F40T4E-M w/ Mount Pipe	102
(2) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	126	WIMAX DAP HEAD	102
(2) DTMA GSM 1900	126	WIMAX DAP HEAD	102
(2) DTMA GSM 1900	126	WIMAX DAP HEAD	102
(2) DTMA GSM 1900	126	HORIZON COMPACT	102
6' x 2" Mount Pipe	126	HORIZON COMPACT	102
6' x 2" Mount Pipe	126	HORIZON COMPACT	102
(2) 6' x 2" Mount Pipe	126	Platform Mount [LP 602-1]	102
Platform Mount [LP 1001-1]	126	VHLP2-180	102
(2) 7770.00 w/ Mount Pipe	115	VHLP2.5-11	102
(2) 7770.00 w/ Mount Pipe	115	742 213 w/ Mount Pipe	94
(2) 7770.00 w/ Mount Pipe	115	Side Arm Mount [SO 102-3]	94
(2) 7770.00 w/ Mount Pipe	115	742 213 w/ Mount Pipe	94
(2) 7770.00 w/ Mount Pipe	115	742 213 w/ Mount Pipe	94
(4) LGP21401	115	BCD-87010	74
(4) LGP21401	115	Side Arm Mount [SO 701-1]	74
(4) LGP21401	115	KS24019-L112A	40
P65-17-XLH-RR w/ Mount Pipe	115	Side Arm Mount [SO 701-1]	40
AM-X-CD-16-65-00T-RET w/ Mount Pipe	115		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 66.3%

<p>Crown Castle 2000 Corporate Dr. Canonsburg, PA 15317 We Are Solutions Phone: (724) 416-2000 FAX:</p>	Job: BU# 806369		
	Project:		
	Client: Crown Castle	Drawn by: bgruszecki	App'd:
	Code: TIA/EIA-222-F	Date: 06/14/12	Scale: NTS
	Path: R:\SA Models - Letters\Work Area\BGruszecki\806369\806369.dwg	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 mph.
- 6) Nominal ice thickness of 1.0000 in.
- 7) Ice thickness is considered to increase with height.
- 8) Ice density of 56.00 pcf.
- 9) A wind speed of 38 mph is used in combination with ice.
- 10) Temperature drop of 50 °F.
- 11) Deflections calculated using a wind speed of 50 mph.
- 12) A non-linear (P-delta) analysis was used.
- 13) Pressures are calculated at each section.
- 14) Stress ratio used in pole design is 1.333.
- 15) Local bending stresses due to climbing loads, feedline 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	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
--	--	---

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	140'-86'9- 31/32"	53'-2-1/32"	6'-8-1/32"	12	26.2160	39.2230	0.3125	1.2500	A572-65 (65 ksi)
L2	86'9-31/32"-39'	54'6"	7'	12	36.9670	50.5600	0.4063	1.6250	A572-65 (65 ksi)
L3	39'-0'	46'		12	48.0016	59.0500	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	27.1408 40.6066	26.0654 39.1537	2232.3752 7566.4519	9.2735 13.9300	13.5799 20.3175	164.3883 372.4103	4523.3974 15331.683	12.8286 19.2703	6.1884 9.6743	19.803 30.958

0

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L2	39.9925	47.8261	8159.8371	13.0888	19.1489	426.1252	16534.042	23.5385	8.8184	21.707
	52.3436	65.6074	21064.222	17.9550	26.1901	804.2825	42681.825	32.2900	12.4613	30.674
L3	51.4355	76.4776	22026.065	17.0056	24.8648	885.8319	44630.779	37.6399	11.5244	23.049
	61.1331	94.2655	41247.015	20.9609	30.5879	1348.4749	83577.635	46.3946	14.4854	28.971

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 140'-86'9"-31/32"				1	1	1		
L2 86'9"-31/32"-39'				1	1	1		
L3 39'-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Face Offset	Lateral Offset (Frac FW)	#	C _A A _A	Weight	
				ft	in			ft ² /ft	klf	
HJ5-50A(7/8")	A	No	Inside Pole	140' - 0'	0.0000	0	12	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	
*										
FLC 158-50J(1-5/8")	A	No	Inside Pole	126' - 0'	0.0000	0	4	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	
LCF158-50JA-A0(1 5/8")	A	No	Inside Pole	126' - 0'	0.0000	0	8	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	
LCF158-50JA-A0(1 5/8")	A	No	CaAa (Out Of Face)	126' - 0'	0.0000	0	3	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.20 0.30 0.40 0.60 1.00	
LCF158-50JA-A0(1 5/8")	A	No	CaAa (Out Of Face)	126' - 0'	0.0000	0	5	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	
LCF158-50JA-A0(1 5/8")	B	No	CaAa (Out Of Face)	126' - 0'	0.0000	0	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.20 0.30 0.40 0.60	

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	C _A A _A		Weight
								ft ² /ft	k/ft	
LCF158-50JA-A0(1 5/8")	B	No	CaAa (Out Of Face)	126' - 0'	0.0000	0	3	4" Ice	1.00	0.03
								No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.01
								4" Ice	0.00	0.03
* LDF7-50A(1-5/8")	C	No	Inside Pole	115' - 0'	0.0000	0	12	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.00
								4" Ice	0.00	0.00
FB-L98B-002-75000(3/8")	C	No	CaAa (Out Of Face)	115' - 0'	0.0000	0	1	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.01
								4" Ice	0.00	0.02
* WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	115' - 0'	0.0000	0	2	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.01
								4" Ice	0.00	0.02
* ATCB-B01-005(5/16)	A	No	CaAa (Out Of Face)	102' - 0'	0.0000	0	3	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.01
								4" Ice	0.00	0.02
FSJ4-50B(1/2")	A	No	CaAa (Out Of Face)	102' - 0'	0.0000	0	3	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.01
								4" Ice	0.00	0.02
LDF1-50A(1/4")	A	No	CaAa (Out Of Face)	102' - 0'	0.0000	0	3	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.01
								4" Ice	0.00	0.02
LDF7-50A(1-5/8")	A	No	Inside Pole	102' - 0'	0.0000	0	6	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.00
								4" Ice	0.00	0.00
2" Rigid Conduit	A	No	CaAa (Out Of Face)	102' - 0'	0.0000	0	2	No Ice	0.20	0.00
								1/2" Ice	0.30	0.00
								1" Ice	0.40	0.01
								2" Ice	0.60	0.01
								4" Ice	1.00	0.03
* AVA7-50(1-5/8")	B	No	CaAa (Out Of Face)	94' - 0'	0.0000	0	6	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.01
								4" Ice	0.00	0.03
* LDF5-50A(7/8")	B	No	CaAa (Out Of Face)	74' - 0'	0.0000	0	1	No Ice	0.11	0.00
								1/2" Ice	0.21	0.00
								1" Ice	0.31	0.00
								2" Ice	0.51	0.01
								4" Ice	0.91	0.03
* LDF4-50A(1/2")	C	No	Inside Pole	40' - 0'	0.0000	0	1	No Ice	0.00	0.00
								1/2" Ice	0.00	0.00
								1" Ice	0.00	0.00
								2" Ice	0.00	0.00
								4" Ice	0.00	0.00
* Thin Flat Bar Climbing	C	No	CaAa (Out Of Face)	115' - 105'	30.0000	0	1	No Ice	0.33	0.00
								1/2" Ice	0.44	0.01

Description	Face or Shield Leg	Allow	Component Type	Placement	Face Offset	Lateral Offset (Frac FW)	#	C _A A _A	Weight
				ft	in			ft ² /ft	kif
Ladder							1" Ice	0.56	0.01
							2" Ice	0.78	0.01
							4" Ice	1.22	0.02

*

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A _R	A _F	C _A A _A In Face	C _A A _A Out Face	Weight
			ft ²	ft ²	ft ²	ft ²	K
L1	140'-86'9-31/32"	A	0.000	0.000	0.000	29.332	1.35
		B	0.000	0.000	0.000	23.265	0.05
		C	0.000	0.000	0.000	3.333	0.35
L2	86'9-31/32"-39'	A	0.000	0.000	0.000	47.547	1.66
		B	0.000	0.000	0.000	32.228	0.24
		C	0.000	0.000	0.000	0.000	0.53
L3	39'-0'	A	0.000	0.000	0.000	38.766	1.36
		B	0.000	0.000	0.000	27.417	0.20
		C	0.000	0.000	0.000	0.000	0.44

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R	A _F	C _A A _A In Face	C _A A _A Out Face	Weight
			in	ft ²	ft ²	ft ²	ft ²	K
L1	140'-86'9-31/32"	A	1.158	0.000	0.000	0.000	63.572	3.25
		B		0.000	0.000	0.000	50.480	1.33
		C		0.000	0.000	0.000	5.907	0.62
L2	86'9-31/32"-39'	A	1.080	0.000	0.000	0.000	102.940	4.88
		B		0.000	0.000	0.000	73.571	3.01
		C		0.000	0.000	0.000	0.000	0.92
L3	39'-0'	A	1.000	0.000	0.000	0.000	80.873	3.68
		B		0.000	0.000	0.000	61.103	2.25
		C		0.000	0.000	0.000	0.000	0.71

Feed Line Center of Pressure

Section	Elevation	CP _X	CP _Z	CP _X Ice	CP _Z Ice
	ft	in	in	in	in
L1	140'-86'9-31/32"	0.3714	-0.3555	0.6058	-0.5720
L2	86'9-31/32"-39'	0.6067	-0.6789	0.9827	-1.0112
L3	39'-0'	0.6644	-0.7011	1.1042	-1.0500

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Azimuth Adjustmen t	Placement	C _A A _A Front	C _A A _A Side	Weight
			ft	°	ft	ft ²	ft ²	K
BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.00 0'	0.0000	140'	No Ice 1/2"	7.98 6.85	0.04 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
			-3'			Ice 9.23	7.71	0.17
						1" Ice 10.47	9.50	0.33
						2" Ice 13.08	13.26	0.80
						4" Ice		
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00 0' -3'	0.0000	140'	No Ice 7.98	5.70	0.04
						1/2" 8.62	6.85	0.10
						Ice 9.23	7.71	0.17
						1" Ice 10.47	9.50	0.33
						2" Ice 13.08	13.26	0.80
						4" Ice		
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00 0' -3'	0.0000	140'	No Ice 7.98	5.70	0.04
						1/2" 8.62	6.85	0.10
						Ice 9.23	7.71	0.17
						1" Ice 10.47	9.50	0.33
						2" Ice 13.08	13.26	0.80
						4" Ice		
(2) FD9R6004/1C-3L	A	From Leg	4.00 0' -3'	0.0000	140'	No Ice 0.37	0.08	0.00
						1/2" 0.45	0.14	0.01
						Ice 0.54	0.20	0.01
						1" Ice 0.75	0.34	0.02
						2" Ice 1.28	0.74	0.06
						4" Ice		
(2) FD9R6004/1C-3L	B	From Leg	4.00 0' -3'	0.0000	140'	No Ice 0.37	0.08	0.00
						1/2" 0.45	0.14	0.01
						Ice 0.54	0.20	0.01
						1" Ice 0.75	0.34	0.02
						2" Ice 1.28	0.74	0.06
						4" Ice		
(2) FD9R6004/1C-3L	C	From Leg	4.00 0' -3'	0.0000	140'	No Ice 0.37	0.08	0.00
						1/2" 0.45	0.14	0.01
						Ice 0.54	0.20	0.01
						1" Ice 0.75	0.34	0.02
						2" Ice 1.28	0.74	0.06
						4" Ice		
BXA-171063/8CFx2 w/ Mount Pipe	A	From Leg	4.00 0' -3'	0.0000	140'	No Ice 3.14	3.51	0.03
						1/2" 3.52	4.13	0.06
						Ice 3.92	4.76	0.10
						1" Ice 4.80	6.06	0.20
						2" Ice 6.71	9.09	0.49
						4" Ice		
BXA-171063/8CFx2 w/ Mount Pipe	B	From Leg	4.00 0' -3'	0.0000	140'	No Ice 3.14	3.51	0.03
						1/2" 3.52	4.13	0.06
						Ice 3.92	4.76	0.10
						1" Ice 4.80	6.06	0.20
						2" Ice 6.71	9.09	0.49
						4" Ice		
BXA-171063/8CFx2 w/ Mount Pipe	C	From Leg	4.00 0' -3'	0.0000	140'	No Ice 3.14	3.51	0.03
						1/2" 3.52	4.13	0.06
						Ice 3.92	4.76	0.10
						1" Ice 4.80	6.06	0.20
						2" Ice 6.71	9.09	0.49
						4" Ice		
(2) LPA-80063/4CF w/ Mount Pipe	A	From Leg	4.00 0' -3'	0.0000	140'	No Ice 7.25	7.26	0.04
						1/2" 7.72	7.96	0.10
						Ice 8.20	8.67	0.18
						1" Ice 9.19	10.16	0.34
						2" Ice 11.32	13.39	0.80
						4" Ice		
(2) LPA-80063/4CF w/ Mount Pipe	B	From Leg	4.00 0' -3'	0.0000	140'	No Ice 7.25	7.26	0.04
						1/2" 7.72	7.96	0.10
						Ice 8.20	8.67	0.18
						1" Ice 9.19	10.16	0.34
						2" Ice 11.32	13.39	0.80
						4" Ice		
(2) SC-E 6014 rev2 w/	C	From Leg	4.00	0.0000	140'	No Ice 3.78	4.40	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
Mount Pipe			0' -3'			1/2" Ice 4.18 Ice 4.59 1" Ice 5.44 2" Ice 7.29 4" Ice 9.90	5.01 5.64 6.96 9.90	0.07 0.11 0.22 0.54
Platform Mount (LP 101-1)	C	None		0.0000	140'	No Ice 36.21 1/2" Ice 42.82 Ice 49.43 1" Ice 62.65 2" Ice 89.09 4" Ice 99.00	36.21 42.82 49.43 62.65 89.09	1.50 2.30 3.10 4.70 7.89
*								
(3) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	126'	No Ice 7.47 1/2" Ice 7.99 Ice 8.52 1" Ice 9.59 2" Ice 11.87 4" Ice 14.88	3.49 4.26 4.96 6.40 9.49	0.06 0.11 0.16 0.30 0.68
(3) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	126'	No Ice 7.47 1/2" Ice 7.99 Ice 8.52 1" Ice 9.59 2" Ice 11.87 4" Ice 14.88	3.49 4.26 4.96 6.40 9.49	0.06 0.11 0.16 0.30 0.68
(2) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	C	From Leg	4.00 0' 2'	0.0000	126'	No Ice 7.47 1/2" Ice 7.99 Ice 8.52 1" Ice 9.59 2" Ice 11.87 4" Ice 14.88	3.49 4.26 4.96 6.40 9.49	0.06 0.11 0.16 0.30 0.68
(2) DTMA GSM 1900	A	From Leg	4.00 0' 2'	0.0000	126'	No Ice 0.79 1/2" Ice 0.92 Ice 1.05 1" Ice 1.35 2" Ice 2.04 4" Ice 3.16	0.54 0.65 0.77 1.04 1.68	0.02 0.03 0.03 0.06 0.13
(2) DTMA GSM 1900	B	From Leg	4.00 0' 2'	0.0000	126'	No Ice 0.79 1/2" Ice 0.92 Ice 1.05 1" Ice 1.35 2" Ice 2.04 4" Ice 3.16	0.54 0.65 0.77 1.04 1.68	0.02 0.03 0.03 0.06 0.13
(2) DTMA GSM 1900	C	From Leg	4.00 0' 2'	0.0000	126'	No Ice 0.79 1/2" Ice 0.92 Ice 1.05 1" Ice 1.35 2" Ice 2.04 4" Ice 3.16	0.54 0.65 0.77 1.04 1.68	0.02 0.03 0.03 0.06 0.13
6' x 2" Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	126'	No Ice 1.43 1/2" Ice 1.92 Ice 2.29 1" Ice 3.06 2" Ice 4.70 4" Ice 7.40	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
6' x 2" Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	126'	No Ice 1.43 1/2" Ice 1.92 Ice 2.29 1" Ice 3.06 2" Ice 4.70 4" Ice 7.40	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
(2) 6' x 2" Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	126'	No Ice 1.43 1/2" Ice 1.92 Ice 2.29 1" Ice 3.06 2" Ice 4.70 4" Ice 7.40	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Lateral	Vert					
Platform Mount [LP 1001-1]	C	None			0.0000	126'	4" Ice			
							No Ice	47.70	47.70	3.02
							1/2"	59.50	59.50	3.62
							Ice	71.30	71.30	4.22
							1" Ice	94.90	94.90	5.43
2" Ice	142.10	142.10	7.85							
4" Ice										
* (2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0' 2'	0.0000	115'	No Ice	6.12	4.25	0.06
							1/2"	6.63	5.01	0.10
							Ice	7.13	5.71	0.16
							1" Ice	8.16	7.16	0.29
							2" Ice	10.36	10.41	0.66
4" Ice										
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0' 2'	0.0000	115'	No Ice	6.12	4.25	0.06
							1/2"	6.63	5.01	0.10
							Ice	7.13	5.71	0.16
							1" Ice	8.16	7.16	0.29
							2" Ice	10.36	10.41	0.66
4" Ice										
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0' 2'	0.0000	115'	No Ice	6.12	4.25	0.06
							1/2"	6.63	5.01	0.10
							Ice	7.13	5.71	0.16
							1" Ice	8.16	7.16	0.29
							2" Ice	10.36	10.41	0.66
4" Ice										
(4) LGP21401	A	From Leg	4.00	0' 2'	0.0000	115'	No Ice	1.29	0.23	0.01
							1/2"	1.45	0.31	0.02
							Ice	1.61	0.40	0.03
							1" Ice	1.97	0.61	0.05
							2" Ice	2.79	1.12	0.14
4" Ice										
(4) LGP21401	B	From Leg	4.00	0' 2'	0.0000	115'	No Ice	1.29	0.23	0.01
							1/2"	1.45	0.31	0.02
							Ice	1.61	0.40	0.03
							1" Ice	1.97	0.61	0.05
							2" Ice	2.79	1.12	0.14
4" Ice										
(4) LGP21401	C	From Leg	4.00	0' 2'	0.0000	115'	No Ice	1.29	0.23	0.01
							1/2"	1.45	0.31	0.02
							Ice	1.61	0.40	0.03
							1" Ice	1.97	0.61	0.05
							2" Ice	2.79	1.12	0.14
4" Ice										
P65-17-XLH-RR w/ Mount Pipe	A	From Leg	4.00	0' 2'	0.0000	115'	No Ice	11.70	8.94	0.09
							1/2"	12.42	10.45	0.17
							Ice	13.15	11.99	0.27
							1" Ice	14.64	14.31	0.50
							2" Ice	17.91	19.14	1.13
4" Ice										
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0' 2'	0.0000	115'	No Ice	8.50	6.30	0.07
							1/2"	9.15	7.48	0.14
							Ice	9.77	8.37	0.21
							1" Ice	11.03	10.18	0.38
							2" Ice	13.68	14.02	0.87
4" Ice										
P65-17-XLH-RR w/ Mount Pipe	C	From Leg	4.00	0' 2'	0.0000	115'	No Ice	11.70	8.94	0.09
							1/2"	12.42	10.45	0.17
							Ice	13.15	11.99	0.27
							1" Ice	14.64	14.31	0.50
							2" Ice	17.91	19.14	1.13
4" Ice										
DC6-48-60-18-8F	A	From Leg	4.00	0' 2'	0.0000	115'	No Ice	1.27	1.27	0.02
							1/2"	1.46	1.46	0.04
							Ice	1.66	1.66	0.05

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			Horz Lateral ft	Vert ft					
(2) RRUS-11	A	From Leg	4.00 0' 2'	0.0000	113'	1" Ice	2.09	2.09	0.10
						2" Ice	3.10	3.10	0.21
						4" Ice			
						No Ice	4.42	1.19	0.06
						1/2" Ice	4.71	1.35	0.08
						Ice	5.00	1.53	0.11
(2) RRUS-11	B	From Leg	4.00 0' 2'	0.0000	113'	1" Ice	5.61	1.90	0.18
						2" Ice	6.94	2.75	0.37
						4" Ice			
						No Ice	4.42	1.19	0.06
						1/2" Ice	4.71	1.35	0.08
						Ice	5.00	1.53	0.11
(2) RRUS-11	C	From Leg	4.00 0' 2'	0.0000	113'	1" Ice	5.61	1.90	0.18
						2" Ice	6.94	2.75	0.37
						4" Ice			
						No Ice	4.42	1.19	0.06
						1/2" Ice	4.71	1.35	0.08
						Ice	5.00	1.53	0.11
8'x2" Antenna Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	115'	1" Ice	5.61	1.90	0.18
						2" Ice	6.94	2.75	0.37
						4" Ice			
						No Ice	1.90	1.90	0.03
						1/2" Ice	2.73	2.73	0.04
						Ice	3.40	3.40	0.06
8'x2" Antenna Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	115'	1" Ice	4.40	4.40	0.12
						2" Ice	6.50	6.50	0.30
						4" Ice			
						No Ice	1.90	1.90	0.03
						1/2" Ice	2.73	2.73	0.04
						Ice	3.40	3.40	0.06
8'x2" Antenna Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	115'	1" Ice	4.40	4.40	0.12
						2" Ice	6.50	6.50	0.30
						4" Ice			
						No Ice	1.90	1.90	0.03
						1/2" Ice	2.73	2.73	0.04
						Ice	3.40	3.40	0.06
Platform Mount [LP 712-1]	C	None		0.0000	115'	1" Ice	4.40	4.40	0.12
						2" Ice	6.50	6.50	0.30
						4" Ice			
						No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
						Ice	35.35	35.35	1.96
Side Arm Mount [SO 702-3]	C	None		0.0000	113'	1" Ice	46.17	46.17	2.58
						2" Ice	67.81	67.81	3.82
						4" Ice			
						No Ice	3.22	3.22	0.08
						1/2" Ice	4.15	4.15	0.11
						Ice	5.08	5.08	0.15
* LLPX310R-V1 w/ Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	102'	1" Ice	6.94	6.94	0.21
						2" Ice	10.66	10.66	0.34
						4" Ice			
						No Ice	5.07	2.98	0.05
						1/2" Ice	5.48	3.53	0.08
						Ice	5.91	4.09	0.13
LLPX310R-V1 w/ Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	102'	1" Ice	6.79	5.31	0.23
						2" Ice	8.70	8.13	0.54
						4" Ice			
						No Ice	5.07	2.98	0.05
						1/2" Ice	5.48	3.53	0.08
						Ice	5.91	4.09	0.13
LLPX310R-V1 w/ Mount	C	From Leg	4.00	0.0000	102'	1" Ice	6.79	5.31	0.23
						2" Ice	8.70	8.13	0.54
						4" Ice			
						No Ice	5.07	2.98	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Pipe			0' 2'			1/2" Ice 5.48 Ice 5.91	3.53 4.09	0.08 0.13
						1" Ice 6.79 2" Ice 8.70 4" Ice	5.31 8.13	0.23 0.54
(2) 950F40T4E-M w/ Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	102'	No Ice 7.24 1/2" Ice 7.79 Ice 8.33 1" Ice 9.45 2" Ice 11.79 4" Ice	6.15 7.04 7.86 9.56 13.17	0.04 0.10 0.17 0.33 0.78
(2) 950F40T4E-M w/ Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	102'	No Ice 7.24 1/2" Ice 7.79 Ice 8.33 1" Ice 9.45 2" Ice 11.79 4" Ice	6.15 7.04 7.86 9.56 13.17	0.04 0.10 0.17 0.33 0.78
(2) 950F40T4E-M w/ Mount Pipe	C	From Leg	4.00 0' 2'	0.0000	102'	No Ice 7.24 1/2" Ice 7.79 Ice 8.33 1" Ice 9.45 2" Ice 11.79 4" Ice	6.15 7.04 7.86 9.56 13.17	0.04 0.10 0.17 0.33 0.78
WIMAX DAP HEAD	A	From Leg	4.00 0' 2'	0.0000	102'	No Ice 1.80 1/2" Ice 1.99 Ice 2.18 1" Ice 2.59 2" Ice 3.51 4" Ice	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
WIMAX DAP HEAD	B	From Leg	4.00 0' 2'	0.0000	102'	No Ice 1.80 1/2" Ice 1.99 Ice 2.18 1" Ice 2.59 2" Ice 3.51 4" Ice	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
WIMAX DAP HEAD	C	From Leg	4.00 0' 2'	0.0000	102'	No Ice 1.80 1/2" Ice 1.99 Ice 2.18 1" Ice 2.59 2" Ice 3.51 4" Ice	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
HORIZON COMPACT	A	From Leg	4.00 0' 6'	0.0000	102'	No Ice 0.84 1/2" Ice 0.97 Ice 1.10 1" Ice 1.39 2" Ice 2.08 4" Ice	0.43 0.52 0.63 0.86 1.43	0.01 0.02 0.03 0.05 0.12
HORIZON COMPACT	B	From Leg	4.00 0' 6'	0.0000	102'	No Ice 0.84 1/2" Ice 0.97 Ice 1.10 1" Ice 1.39 2" Ice 2.08 4" Ice	0.43 0.52 0.63 0.86 1.43	0.01 0.02 0.03 0.05 0.12
Platform Mount [LP 602-1]	C	None		0.0000	102'	No Ice 32.03 1/2" Ice 38.71 Ice 45.39 1" Ice 58.75 2" Ice 85.47 4" Ice	32.03 38.71 45.39 58.75 85.47	1.34 1.80 2.26 3.17 5.00
* 742 213 w/ Mount Pipe	A	From Leg	0.50 0' 0'	0.0000	94'	No Ice 5.37 1/2" Ice 5.95 Ice 6.50 1" Ice 7.61 2" Ice 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.14 0.28 0.68

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz Lateral	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
742 213 w/ Mount Pipe	B	From Leg	0.50	0'	0.0000	94'	4" Ice			
							No Ice	5.37	4.62	0.05
							1/2" Ice	5.95	6.00	0.09
							Ice	6.50	6.98	0.14
							1" Ice	7.61	8.85	0.28
742 213 w/ Mount Pipe	C	From Leg	0.50	0'	0.0000	94'	2" Ice	9.93	12.79	0.68
							4" Ice			
							No Ice	5.37	4.62	0.05
							1/2" Ice	5.95	6.00	0.09
							Ice	6.50	6.98	0.14
Side Arm Mount [SO 102-3]	C	None			0.0000	94'	1" Ice	7.61	8.85	0.28
							2" Ice	9.93	12.79	0.68
							4" Ice			
							No Ice	3.00	3.00	0.08
							1/2" Ice	3.48	3.48	0.11
* BCD-87010	A	From Leg	2.00	0'	0.0000	74'	Ice	3.96	3.96	0.14
							1" Ice	4.92	4.92	0.20
							2" Ice	6.84	6.84	0.32
							4" Ice			
							No Ice	2.90	2.90	0.03
Side Arm Mount [SO 701-1]	A	From Leg	1.00	0'	0.0000	74'	1/2" Ice	4.05	4.05	0.05
							Ice	5.21	5.21	0.08
							1" Ice	7.01	7.01	0.16
							2" Ice	9.85	9.85	0.41
							4" Ice			
* KS24019-L112A	C	From Leg	2.00	0'	0.0000	40'	No Ice	0.10	0.10	0.01
							1/2" Ice	0.18	0.18	0.01
							Ice	0.26	0.26	0.01
							1" Ice	0.42	0.42	0.01
							2" Ice	0.74	0.74	0.02
Side Arm Mount [SO 701-1]	C	From Leg	1.00	0'	0.0000	40'	4" Ice			
							No Ice	0.85	1.67	0.07
							1/2" Ice	1.14	2.34	0.08
							Ice	1.43	3.01	0.09
							1" Ice	2.01	4.35	0.12
*							2" Ice	3.17	7.03	0.18
							4" Ice			
							No Ice	0.85	1.67	0.07
							1/2" Ice	1.14	2.34	0.08
							Ice	1.43	3.01	0.09

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz Lateral	Vert							
			ft	ft	°	°	ft	ft	ft ²	K		
VHLP2-180	C	Paraboloid w/Shroud (HP)	From Leg	4.00	0'	86.0000		102'	2.00	No Ice	3.14	0.03
										1/2" Ice	3.41	0.04
										1" Ice	3.67	0.06
										2" Ice	4.21	0.09
										4" Ice	5.28	0.16

Description	Face or Leg	Dish Type	Offset Type	Offsets: Lateral Vert ft	Azimuth Adjustment	3 dB Beam Width	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
VHLP2.5-11	B	Paraboloid w/Shroud (HP)	From Leg	4.00 0' 6'	3.0000	°	102'	2.92	No Ice 6.68 1/2" Ice 7.07 1" Ice 7.46 2" Ice 8.23 4" Ice 9.78	0.03 0.04 0.05 0.07 0.11

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	140 - 86.8333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.27	-2.22	2.66
			Max. Mx	11	-15.90	650.99	6.08
			Max. My	2	-15.89	6.29	654.89
			Max. Vy	11	-25.28	650.99	6.08

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	86.8333 - 39	Pole	Max. Vx	8	25.36	-5.95	-654.45
			Max. Torque	6			1.85
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-55.73	-6.06	6.52
			Max. Mx	11	-28.51	2055.30	19.11
			Max. My	2	-28.51	20.58	2062.35
			Max. Vy	11	-33.83	2055.30	19.11
L3	39 - 0	Pole	Max. Vx	8	33.87	-18.48	-2061.00
			Max. Torque	12			-2.53
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-82.29	-10.16	9.83
			Max. Mx	11	-46.49	3789.00	31.69
			Max. My	2	-46.49	34.78	3798.60
			Max. Vy	11	-41.49	3789.00	31.69
			Max. Vx	8	41.54	-30.79	-3796.96
			Max. Torque	12			-3.02

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	15	82.29	0.08	12.55
	Max. H _x	11	46.51	41.47	0.27
	Max. H _z	2	46.51	0.31	41.51
	Max. M _x	2	3798.60	0.31	41.51
	Max. M _z	5	3784.68	-41.42	-0.27
	Max. Torsion	6	2.80	-35.96	-20.93
	Min. Vert	1	46.51	0.00	0.00
	Min. H _x	5	46.51	-41.42	-0.27
	Min. H _z	8	46.51	-0.26	-41.52
	Min. M _x	8	-3796.96	-0.26	-41.52
	Min. M _z	11	-3789.00	41.47	0.27
	Min. Torsion	12	-3.02	35.99	20.94

Tower Mast Reaction Summary

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	46.51	0.00	0.00	-1.16	-0.58	0.00
Dead+Wind 0 deg - No Ice	46.51	-0.31	-41.51	-3798.60	34.78	1.85
Dead+Wind 30 deg - No Ice	46.51	20.54	-35.85	-3278.27	-1873.38	0.64
Dead+Wind 60 deg - No Ice	46.51	35.80	-20.55	-1876.43	-3269.64	-0.96
Dead+Wind 90 deg - No Ice	46.51	41.42	0.27	29.79	-3784.68	-2.11
Dead+Wind 120 deg - No Ice	46.51	35.96	20.93	1917.31	-3287.89	-2.80
Dead+Wind 150 deg - No Ice	46.51	20.89	36.02	3295.93	-1914.13	-2.71
Dead+Wind 180 deg - No Ice	46.51	0.26	41.52	3796.96	-30.79	-1.86
Dead+Wind 210 deg - No Ice	46.51	-20.49	35.89	3280.42	1865.95	-0.57
Dead+Wind 240 deg - No Ice	46.51	-35.85	20.50	1867.60	3273.61	1.05
Dead+Wind 270 deg - No Ice	46.51	-41.47	-0.27	-31.69	3789.00	2.32
Dead+Wind 300 deg - No Ice	46.51	-35.99	-20.94	-1921.00	3290.26	3.02
Dead+Wind 330 deg - No Ice	46.51	-20.93	-36.04	-3300.71	1916.53	2.88
Dead+Ice+Temp	82.29	0.00	-0.00	-9.83	-10.16	0.00
Dead+Wind 0 deg+Ice+Temp	82.29	-0.08	-12.55	-1180.47	-1.30	0.68
Dead+Wind 30 deg+Ice+Temp	82.29	6.23	-10.84	-1020.75	-589.73	0.18
Dead+Wind 60 deg+Ice+Temp	82.29	10.84	-6.22	-589.30	-1020.33	-0.43
Dead+Wind 90 deg+Ice+Temp	82.29	12.54	0.07	-2.05	-1178.94	-0.87

Load Combination	Vertical	Shear _x	Shear _z	Overturing Moment, M _x	Overturing Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
deg+Ice+Temp						
Dead+Wind 120	82.29	10.88	6.32	580.33	-1024.93	-1.11
deg+Ice+Temp						
Dead+Wind 150	82.29	6.32	10.88	1005.89	-600.04	-1.04
deg+Ice+Temp						
Dead+Wind 180	82.29	0.07	12.55	1160.79	-17.95	-0.68
deg+Ice+Temp						
Dead+Wind 210	82.29	-6.21	10.85	1002.03	567.55	-0.16
deg+Ice+Temp						
Dead+Wind 240	82.29	-10.85	6.21	567.72	1001.11	0.45
deg+Ice+Temp						
Dead+Wind 270	82.29	-12.55	-0.07	-17.69	1159.78	0.92
deg+Ice+Temp						
Dead+Wind 300	82.29	-10.89	-6.32	-600.54	1005.25	1.17
deg+Ice+Temp						
Dead+Wind 330	82.29	-6.32	-10.89	-1026.37	580.37	1.08
deg+Ice+Temp						
Dead+Wind 0 deg - Service	46.51	-0.12	-16.22	-1485.10	13.23	0.72
Dead+Wind 30 deg - Service	46.51	8.02	-14.00	-1281.76	-732.41	0.25
Dead+Wind 60 deg - Service	46.51	13.98	-8.03	-733.97	-1278.02	-0.38
Dead+Wind 90 deg - Service	46.51	16.18	0.11	10.92	-1479.29	-0.82
Dead+Wind 120 deg - Service	46.51	14.04	8.17	748.50	-1285.16	-1.09
Dead+Wind 150 deg - Service	46.51	8.16	14.07	1287.23	-748.34	-1.06
Dead+Wind 180 deg - Service	46.51	0.10	16.22	1483.01	-12.39	-0.73
Dead+Wind 210 deg - Service	46.51	-8.00	14.02	1281.16	728.79	-0.22
Dead+Wind 240 deg - Service	46.51	-14.00	8.01	729.07	1278.85	0.41
Dead+Wind 270 deg - Service	46.51	-16.20	-0.10	-13.11	1480.26	0.91
Dead+Wind 300 deg - Service	46.51	-14.06	-8.18	-751.39	1285.37	1.18
Dead+Wind 330 deg - Service	46.51	-8.17	-14.08	-1290.54	748.56	1.13

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-46.51	0.00	0.00	46.51	0.00	0.000%
2	-0.31	-46.51	-41.51	0.31	46.51	41.51	0.000%
3	20.54	-46.51	-35.85	-20.54	46.51	35.85	0.000%
4	35.80	-46.51	-20.55	-35.80	46.51	20.55	0.000%
5	41.42	-46.51	0.27	-41.42	46.51	-0.27	0.000%
6	35.96	-46.51	20.93	-35.96	46.51	-20.93	0.000%
7	20.89	-46.51	36.02	-20.89	46.51	-36.02	0.000%
8	0.26	-46.51	41.52	-0.26	46.51	-41.52	0.000%
9	-20.49	-46.51	35.89	20.49	46.51	-35.89	0.000%
10	-35.85	-46.51	20.50	35.85	46.51	-20.50	0.000%
11	-41.47	-46.51	-0.27	41.47	46.51	0.27	0.000%
12	-35.99	-46.51	-20.94	35.99	46.51	20.94	0.000%
13	-20.93	-46.51	-36.04	20.93	46.51	36.04	0.000%
14	0.00	-82.29	0.00	-0.00	82.29	0.00	0.000%
15	-0.08	-82.29	-12.55	0.08	82.29	12.55	0.000%
16	6.23	-82.29	-10.84	-6.23	82.29	10.84	0.000%
17	10.84	-82.29	-6.22	-10.84	82.29	6.22	0.000%
18	12.54	-82.29	0.07	-12.54	82.29	-0.07	0.000%
19	10.88	-82.29	6.32	-10.88	82.29	-6.32	0.000%
20	6.32	-82.29	10.88	-6.32	82.29	-10.88	0.000%
21	0.07	-82.29	12.55	-0.07	82.29	-12.55	0.000%
22	-6.21	-82.29	10.85	6.21	82.29	-10.85	0.000%
23	-10.85	-82.29	6.21	10.85	82.29	-6.21	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
24	-12.55	-82.29	-0.07	12.55	82.29	0.07	0.000%
25	-10.89	-82.29	-6.32	10.89	82.29	6.32	0.000%
26	-6.32	-82.29	-10.89	6.32	82.29	10.89	0.000%
27	-0.12	-46.51	-16.22	0.12	46.51	16.22	0.000%
28	8.02	-46.51	-14.00	-8.02	46.51	14.00	0.000%
29	13.98	-46.51	-8.03	-13.98	46.51	8.03	0.000%
30	16.18	-46.51	0.11	-16.18	46.51	-0.11	0.000%
31	14.04	-46.51	8.17	-14.04	46.51	-8.17	0.000%
32	8.16	-46.51	14.07	-8.16	46.51	-14.07	0.000%
33	0.10	-46.51	16.22	-0.10	46.51	-16.22	0.000%
34	-8.00	-46.51	14.02	8.00	46.51	-14.02	0.000%
35	-14.00	-46.51	8.01	14.00	46.51	-8.01	0.000%
36	-16.20	-46.51	-0.10	16.20	46.51	0.10	0.000%
37	-14.06	-46.51	-8.18	14.06	46.51	8.18	0.000%
38	-8.17	-46.51	-14.08	8.17	46.51	14.08	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00005314
3	Yes	5	0.00000001	0.00002373
4	Yes	4	0.00000001	0.00099778
5	Yes	4	0.00000001	0.00005398
6	Yes	4	0.00000001	0.00097230
7	Yes	5	0.00000001	0.00002533
8	Yes	4	0.00000001	0.00009371
9	Yes	4	0.00000001	0.00096841
10	Yes	4	0.00000001	0.00096421
11	Yes	4	0.00000001	0.00010058
12	Yes	5	0.00000001	0.00002546
13	Yes	4	0.00000001	0.00097398
14	Yes	4	0.00000001	0.00001073
15	Yes	4	0.00000001	0.00067414
16	Yes	4	0.00000001	0.00074168
17	Yes	4	0.00000001	0.00074129
18	Yes	4	0.00000001	0.00067232
19	Yes	4	0.00000001	0.00073569
20	Yes	4	0.00000001	0.00073798
21	Yes	4	0.00000001	0.00066074
22	Yes	4	0.00000001	0.00071590
23	Yes	4	0.00000001	0.00071503
24	Yes	4	0.00000001	0.00066066
25	Yes	4	0.00000001	0.00073931
26	Yes	4	0.00000001	0.00073797
27	Yes	4	0.00000001	0.00001831
28	Yes	4	0.00000001	0.00009534
29	Yes	4	0.00000001	0.00009462
30	Yes	4	0.00000001	0.00001813
31	Yes	4	0.00000001	0.00008754
32	Yes	4	0.00000001	0.00010654
33	Yes	4	0.00000001	0.00002115
34	Yes	4	0.00000001	0.00008868
35	Yes	4	0.00000001	0.00008812
36	Yes	4	0.00000001	0.00002236
37	Yes	4	0.00000001	0.00010779
38	Yes	4	0.00000001	0.00008768

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 86.8333	20.342	38	1.1884	0.0040
L2	93.5 - 39	9.484	38	0.9495	0.0015
L3	46 - 0	2.291	38	0.4482	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140'	BXA-70063/6CF w/ Mount Pipe	38	20.342	1.1884	0.0040	58199
126'	(3) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	38	16.883	1.1354	0.0032	20785
115'	(2) 7770.00 w/ Mount Pipe	38	14.240	1.0864	0.0025	11639
113'	(2) RRUS-11	38	13.771	1.0763	0.0024	10777
108'	VHLP2-180	38	12.619	1.0490	0.0021	9093
102'	LLPX310R-V1 w/ Mount Pipe	38	11.281	1.0119	0.0019	7657
94'	742 213 w/ Mount Pipe	38	9.586	0.9535	0.0015	6372
74'	BCD-87010	38	5.898	0.7618	0.0010	5289
40'	KS24019-L112A	38	1.785	0.3842	0.0005	4977

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 86.8333	51.999	13	3.0387	0.0103
L2	93.5 - 39	24.251	13	2.4282	0.0038
L3	46 - 0	5.860	13	1.1464	0.0014

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140'	BXA-70063/6CF w/ Mount Pipe	13	51.999	3.0387	0.0103	22887
126'	(3) APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	13	43.161	2.9033	0.0081	8173
115'	(2) 7770.00 w/ Mount Pipe	13	36.406	2.7780	0.0064	4576
113'	(2) RRUS-11	13	35.208	2.7522	0.0061	4236
108'	VHLP2-180	13	32.264	2.6826	0.0055	3574
102'	LLPX310R-V1 w/ Mount Pipe	13	28.844	2.5878	0.0047	3009
94'	742 213 w/ Mount Pipe	13	24.512	2.4385	0.0039	2503
74'	BCD-87010	13	15.083	1.9485	0.0025	2074
40'	KS24019-L112A	13	4.566	0.9826	0.0012	1947

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 P P _a
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	53'2- 1/32"	0'	0.0	39.000	37.5125	-15.88	1462.99	0.011
L2	86.8333 - 39 (2)	TP50.56x36.967x0.4063	54'6"	0'	0.0	39.000	63.3235	-28.50	2469.62	0.012
L3	39 - 0 (3)	TP59.05x48.0016x0.5	46'	0'	0.0	39.000	94.2655	-46.49	3676.35	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	658.13	23.111	39.000	0.593	0.00	0.000	39.000	0.000
L2	86.8333 - 39 (2)	TP50.56x36.967x0.4063	2072.9 8	33.210	39.000	0.852	0.00	0.000	39.000	0.000
L3	39 - 0 (3)	TP59.05x48.0016x0.5	3816.7 8	33.965	39.000	0.871	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio f _v F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} F _{vt}
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	25.51	0.680	26.000	0.053	1.57	0.026	26.000	0.001
L2	86.8333 - 39 (2)	TP50.56x36.967x0.4063	34.03	0.537	26.000	0.042	2.42	0.018	26.000	0.001
L3	39 - 0 (3)	TP59.05x48.0016x0.5	41.70	0.442	26.000	0.035	2.88	0.012	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Ratio f _v F _v	Ratio f _{vt} F _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 86.8333 (1)	0.011	0.593	0.000	0.053	0.001	0.604	1.333	H1-3+VT ✓
L2	86.8333 - 39 (2)	0.012	0.852	0.000	0.042	0.001	0.864	1.333	H1-3+VT ✓
L3	39 - 0 (3)	0.013	0.871	0.000	0.035	0.000	0.884	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	140 - 86.8333	Pole	TP39.223x26.216x0.3125	1	-15.88	1950.17	45.3	Pass
L2	86.8333 - 39	Pole	TP50.56x36.967x0.4063	2	-28.50	3292.00	64.8	Pass
L3	39 - 0	Pole	TP59.05x48.0016x0.5	3	-46.49	4900.57	66.3	Pass

Summary

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
						Pole (L3)	66.3	Pass
						RATING =	66.3	Pass

APPENDIX B
BASE LEVEL DRAWING

APPENDIX C
ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: 806369
Site Name: HRT 094 943225
App #: 145994, Rev. 0
Pole Manufacturer: <i>Other</i>

Reactions		
Moment:	3817	ft-kips
Axial:	47	kips
Shear:	42	kips

Anchor Rod Data

Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	65.05	in

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

Anchor Rod Results

Maximum Rod Tension: 138.5 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 71.0% **Pass**

Rigid
Service ASD
Fty*ASIF

Plate Data

Diam:	71.05	in
Thick:	3	in
Grade:	60	ksi
Single-Rod B-eff:	9.49	in

Base Plate Results

Base Plate Stress: 19.9 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 33.1% **Pass**

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
27.29

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

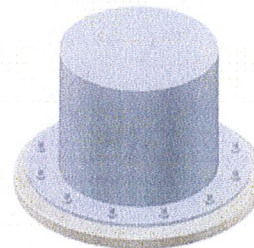
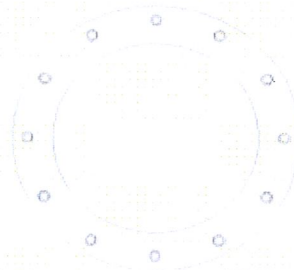
Pole Punching Shear Check: n/a

Pole Data

Diam:	59.05	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	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

Monopole Drilled Pier

Checks capacity of a single drilled shaft foundation for a monopole

BU#: 806369

Site Name: HRT 094 943225

App Number: 145994, Rev. 0



ACI 318 Version: 2002

Design Reactions		
Shear, S:	42.00	kips
Moment, Mt:	3817.00	ft-kips
Tower Weight, Wt:	47.00	kips
Tower Height, H:	140	ft
Base Diameter, BD:	59.05	in

Foundation Dimensions		
Caisson Diameter, CD:	7.5	ft
Ext. Above Grade, E:	0.0	ft
Depth Below Grade, L:	47.0	ft
Neglected Depth, N:	5.0	ft
Rebar Size, Sp:	10	
Rebar Quantity, mp:	52	
Tie Size, tp:	3	

Material Properties		
Rebar Tensile, Fy:	60	ksi
Concrete Strength, F'c:	3000	psi
Concrete Density, δx:	101	pcf
Clear Cover, cc:	3	in

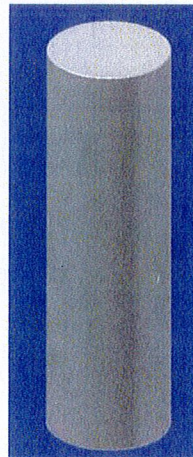
Soil Properties		
Soil Unit Weight, γ:	51	pcf
Allowable Bearing, Bc:	4.500	ksf
Seismic Design Cat, z:	B	

Caisson Analysis		
Depth to Zero Shear:	8.9	ft
Max Factored Moment:	5451.58	ft-kips
Overturning FOS:	5.66	

Depth	Shear	Moment
0 ft	42.1 kips	3820.6 ft-kips
4.7 ft	42.1 kips	4018.3 ft-kips
9.4 ft	-5.4 kips	4111.6 ft-kips

Design Checks			
	Capacity/Availability	Demand/Limits	Check
Minimum Req'd Dia. 1 (ft):	7.50	3.65	OK
Minimum Req'd Dia. 2 (ft):	7.50	6.42	OK
Bearing (ksf):	4.50	1.06	OK
Rebar Area (in ²):	66.04	21.21	OK
Pier moment capacity (k-ft):	10671.42	5451.58	OK
Rebar spacing (in):	3.80	2 < Bs < 18	OK
Development Length (in):	454.61	12.00	OK
Soil moment capacity (FOS):	5.66	2.00	OK

Assume 0.33% Minimum Steel?



Bearing: 23.6%

Steel: 51.1%

Soil: 35.3%

Equivalent Silty Soil Parameter Tool

Note:

This tool determines the equivalent soil parameters for silty soil (having both cohesion and angle of friction), according to the CCI Foundations ongoing discussions (2010), Criteria Item DS-7. The equivalent parameters results are to be input in the PLS-Caisson Software to account for the combined resistance of the granular and cohesive parameters simultaneously present in silty and similar soils



Site Data

BU#: 806369
 Site Name: HRT 094 943225
 App #: 145994, Rev. 0

Neglect Top Layer: Y N
 # of Layers:

Input the data in the "shaded" columns. If soil layer is submerged, then enter the saturated density (buoyant unit weight)

Layer:	Layer Thickness (ft)	From (ft)	To (ft)	Unit Weight of Soil (pcf)	Cohesion (psf)	Internal Friction Angle (deg)	K _p	Depth to Mid-Layer (ft)	Overburden (psf)	Sand Resistance (ksf)	Clay Resistance (ksf)	P _p total (ksf)	Equivalent Parameters for PLS Caisson Input	
													Equivalent Cohesion (psf)	Equivalent K _p
1	2	0	2	105	500	30	0.000	1	105	0.000	0.00	0.000	0	0.00
2	5	2	7	100	500	30	3.000	4.5	460	4.140	4.00	8.140	1018	5.90

Calculation Notes:

- 1- Sand Resistance = 3 * K_p * Overburden -----> (Per equations used in PLS-Caisson Software)
- 2- Cohesion Resistance = 8 * C -----> (Per equations used in PLS-Caisson Software, Full 8CD approach)
- 3- Total Resistance = Sand Resistance + Cohesion Resistance
- 4- Equivalent K_p= Total / Overburden / 3
- 5- Equivalent C= Total / 8

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#: 806369
 Site Name: HRT 094 943225
 App #: 145994, Rev. 0

Enter Load Factors Below:

For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter = 7.5 ft
 Concrete Area = 6361.7 in²

Reinforcement:

Clear Cover to Tie = 3.00 in
 Horiz. Tie Bar Size = 3
 Vert. Cage Diameter = 6.83 ft
 Vert. Cage Diameter = 81.98 in

Vertical Bar Size = 10

Bar Diameter = 1.27 in
 Bar Area = 1.27 in²
 Number of Bars = 52
 As Total = 66.04 in²
 A s/ Aconc, Rho: 0.0104 1.04%

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	4193.525	ft-kips (* Note)
Max. Service Shaft P:	47	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:	5451.582	ft-kips
1.30	Pu:	61.1	kips

Material Properties

Concrete Comp. strength, f _c =	3000	psi
Reinforcement yield strength, F _y =	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 = B

Seismic Risk = Low

Solve
(Run)

<-- Press Upon Completing All Input

ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f_c)/F_y): 0.0027
 200 / F_y: 0.0033
 IBC 1810.1.2: None SDC A or B
 Governing: 0.0033 0.33%

ACI 10.8 and 10.9

Min As for Columns, Comp. Controlled, Shafts:

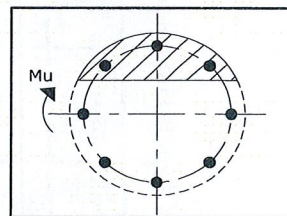
Min As: 0.0050 0.50%

Minimum Rho Check:

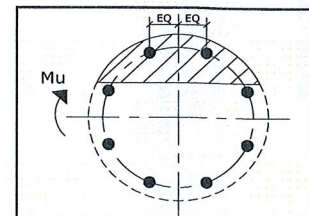
Actual Req'd Min. Rho: 0.33% Flexural
 Provided Rho: 1.04% **OK**

Results:

Governing Orientation Case: 1



Case 1



Case 2

Dist. From Edge to Neutral Axis: 18.74 in

Extreme Steel Strain, ε_t: 0.0108

ε_t > 0.0050, Tension Controlled

Reduction Factor, φ: 0.900

<-- Comment Box

Ref. Shaft Max Axial Capacities, φ Max(P_n or T_n):

Max P _u = (φ=0.65) P _n .		
P _n per ACI 318 (10-2)	10408.53	kips
at Mu=(φ=0.65)M _n =	6794.66	ft-kips
Max T _u , (φ=0.9) T _n =	3566.16	kips
at Mu=φ=(0.90)M _n =	0.00	ft-kips

Output Note: Negative P_u=Tension

For Axial Compression, φ P_n = P_u: 61.10 kips

Drilled Shaft Moment Capacity, φM_n: 10671.42 ft-kips

Drilled Shaft Superimposed Mu: 5451.58 ft-kips

(Mu/φM_n, Drilled Shaft Flexure CSR: 51.09%

 * CAISSON - Pier Foundations Analysis and Design - Copyright Power Line Systems, Inc. 1993-2010 *

Project Title: BU# 806369
 Project Notes:

Calculation Method: Full 8CD

***** I N P U T D A T A

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
7.50	0.00	3.00	60.00

Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	clay	2.00	0.00	105.0			
2	clay	3.00	2.00	100.0			
3	clay	5.00	5.00	100.0	1018.0		
4	Sand	25.00	10.00	36.0		2.663	27.00
5	clay	10.00	35.00	41.0	200.0		
6	Sand	2.00	45.00	41.0		3.255	32.00

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
3817.0	47.0	42.00	5.66

***** R E S U L T S

Calculated Pier Properties

Length (ft)	Weight (kips)	End Bearing Pressure (psf)
47.000	311.459	1063.9

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.00	2.00	105.0			0.00	1.00
Clay	2.00	3.00	100.0			0.00	3.50
Clay	5.00	5.00	100.0	1018.0		305.40	7.50
Sand	10.00	16.51	36.0		2.663	1292.76	18.88
Sand	26.51	8.49	36.0		2.663	-894.23	30.88
Clay	35.00	10.00	41.0	200.0		-120.00	40.00
Sand	45.00	2.00	41.0		3.255	-345.83	46.01

Shear and Moments Along Pier

Distance below Top of Pier (ft)	(with Safety Factor)	Shear Factor) (kips)	(with Safety Factor)	Moment Factor) (ft-k)	(without Safety Factor)	Shear Factor) (kips)	(without Safety Factor)	Moment Factor) (ft-k)
0.00		238.1		21624.7		42.1		3820.6
4.70		238.1		22743.8		42.1		4018.3
9.40		-30.6		23271.6		-5.4		4111.6
14.10		-333.5		22432.9		-58.9		3963.4
18.80		-683.4		20061.8		-120.7		3544.5
23.50		-1080.8		15934.6		-191.0		2815.3
28.20		-1194.2		10106.6		-211.0		1785.6
32.90		-701.4		5633.4		-123.9		995.3
37.60		-434.6		3235.5		-76.8		571.6
42.30		-378.2		1325.3		-66.8		234.2
47.00		-321.8		-319.8		-56.9		-56.5