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

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

June 4, 2010

Kenneth C. Baldwin
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-077-100128** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 53 Slater Road, Manchester, Connecticut. (Amendment)

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your amendment to the exempt modification, originally approved on March 8, 2010.

The proposed modifications are to be implemented as specified here and in your notice dated May 21, 2010, including the placement of all necessary equipment and shelters within the tower compound. 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/CDM/laf

c: The Honorable Louis A. Spadaccini, Mayor, Town of Manchester
Scott A. Shanley, General Manager, Town of Manchester
James Davis, Zoning Enforcement Officer, Town of Manchester
Crown Castle USA, Inc.

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

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

March 8, 2010

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-077-100128** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 53 Slater Road, Manchester, 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.

The proposed modifications are to be implemented as specified here and in your notice dated January 28, 2010, including the placement of all necessary equipment and shelters within the tower compound. 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.

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Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps

S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable Louis A. Spadaccini, Mayor, Town of Manchester
Scott A. Shanley, General Manager, Town of Manchester
James Davis, Zoning Enforcement Officer, Town of Manchester
Crown Castle USA, Inc.

G:\EM\BAM-VERIZON\MANCHEST\dc021710SlaterRd.DOC

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

January 29, 2010

The Honorable Louis A. Spadaccini
Mayor
Town of Manchester
Town Hall
41 Center Street
P. O. Box 191
Manchester, CT 06040-0191

RE: **EM-VER-077-100128** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 53 Slater Road, Manchester, Connecticut.

Dear Mayor Spadaccini:

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 February 12, 2010.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/jbw

Enclosure: Notice of Intent

c: Scott A. Shanley, General Manager, Town of Manchester
James Davis, Zoning Enforcement Officer, Town of Manchester

ROBINSON & COLE LLP

KENNETH C. BALDWIN

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

ORIGINAL

EM-VER-077-100128

January 28, 2010

RECEIVED
JAN 28 2010
CONNECTICUT
SITING COUNCIL

Via Hand Delivery

S. Derek Phelps
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
53 Slater Road, Manchester, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains wireless telecommunications antennas at the 113-foot level on the existing 155-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco's use of the existing tower in 2002 through its approval of EM-VER-077-021220. Cellco now intends to modify its installation by replacing six (6) of its PCS antennas with three (3) model MG D3-800T2 PCS antennas; two (2) model BXA 70063/6CF_2 LTE (700MHz) antennas; and one (1) model BXA 70063/6CF_4 LTE (700 MHz) antenna, all at the same 113-foot level on the tower. Attached behind Tab 1 are the specifications for the proposed 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 Louis A. Spadaccini, First Selectman for the Town of Manchester. A copy of this letter is also being sent to 121 Connecticut Avenue Associates, the owners 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 any increase in the overall height of the existing tower. Cellco's antennas will be located at the same 113-foot level on the existing 155-foot tower.

2. The proposed modifications will not involve any modifications 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) power density levels 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 antennas modification. (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:
Louis A. Spadaccini, Manchester First Selectman
121 Connecticut Avenue Associates
Sandy M. Carter

RYMSA WIRELESS

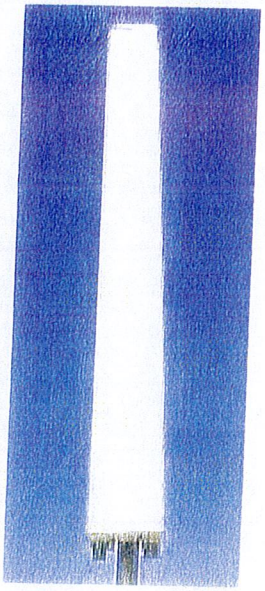
1710-2170 MHz

Model # MG D3-800TX

XPol GSM1800+PCS & UMTS Panel Antenna

Beamwidth: H 65º/V 6.5º
Gain: 16.15 dBd/18.25 dBi
Length: 52.7 in

Electrical Specifications			
Antenna model	MG D3-800TX		
Frequency range (MHz)	1710-1880	1850-1990	1920-2170
Impedance	50 ohms		
VSWR	1.4		
Polarization	±45º		
Isolation between ports (dB)	30		
Average gain (dBd/dBi)	15.7/17.8	15.9/18	16.15/18.25
Horizontal beamwidth (deg)	65º±5º		
Vertical beamwidth (deg)	6.5º±0.5º	6.3º±0.5º	6.3º±0.5º
Electrical tilt (deg)	Fixed 0º-14º		
Upper sidelobe suppression (dB)	18		
Front-to-back ratio (db) @180º±30º	30		
Polarization isolation (dB) @3 dB beamwidth	20		
Maximum power per input (w)	250		
Intermodulation products (dBc)	-150		
Connectors	2 X 7/16 female		
Connector position	Antenna bottom		



Mechanical & Environmental Specifications	
Dimensions in (mm)	52.7 x 6.3 x 3.5 (1380 x 160 x 90)
Survival wind speed mph (kph)	124 (200)
Front windload lbs (N) @100 mph/160 kph	74 (335)
Lateral windload lbs (N) @100 mph/160 kph	42 (188)
Antenna weight lbs (kg)	15 (7)
Clamps weight lbs (kg)	7.7 (3.5)
Mast mounting in (cm)	2.0 to 5.3 (50 to 135)
Radome color	Gray
Grounding	All metallic parts DC grounded
Temperature range F (ºC)	-67º to 140º (-55 to +60º)
Humidity	100%

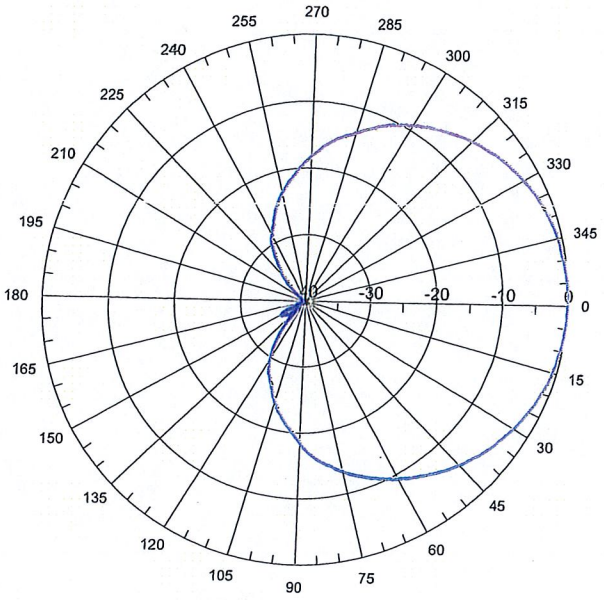
Shipping Specifications	
Dimensions in (mm)	64 x 8.8 x 6.9 (1630 x 225 x 175)
Weight lbs (kg)	27 (12.5)
Material	Cardboard and foam

1710-2170 MHz

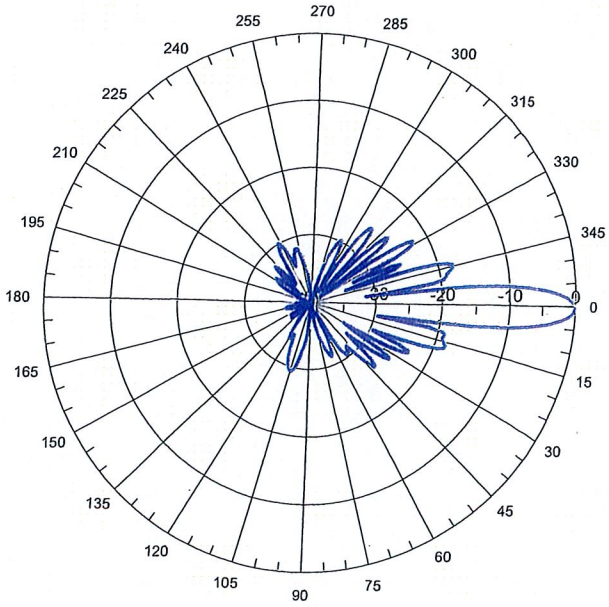
Model # MG D3-800TX

XPol GSM1800+PCS & UMTS Panel Antenna

H plane



E plane



Slant ±45° Dual Polarized FET Panel 63° / 14.5 dBd
696-900 MHz

Mechanical specifications

Length	1804	mm	71.0	in
Width	285	mm	11.2	in
Depth	114	mm	4.5	in
Depth with z-bracket	154	mm	6.1	in
Weight [4]	7.9	kg	17.0	lbs
Wind Area Fore/Aft	0.51	m^2	5.5	ft^2
Wind Area Side	0.21	m^2	2.2	ft^2
Max Wind Survivability	>201	km/hr	>125	mph
Wind Load @ 100 mph (161 km/hr)				
Fore/Aft	753	N	169	lbf
Side	351	N	79	lbf

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiber-glass radome.

Mounting & Downtilting

Mounting hardware attaches to pipe diameter Ø50-160 mm; Ø2.0-6.3 in

Mounting Bracket Kit	36210002
Downtilt Bracket Kit	36114003

Electrical specifications

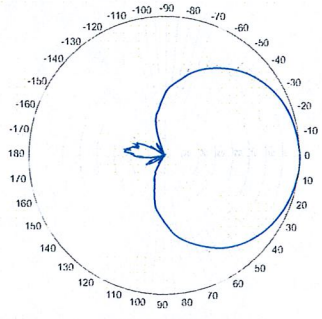
Frequency Range	696-900 MHz
Impedance	50Ω
Connector [3]	NE or E-DIN Female 2 ports / Center
VSWR [1]	≤ 1.35:1
Polarization	Slant ±45°
Isolation Between Ports [1]	< -25 dB
Gain [1]	14.5 dBd 16.5 dBi
Power Rating [2]	500 W
Half Power Angle [1]	
Horizontal Beamwidth	63°
Vertical Beamwidth	11°
Electrical downtilt [5]	2°
Null fill [1]	5%
Lightning protection	Direct ground

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

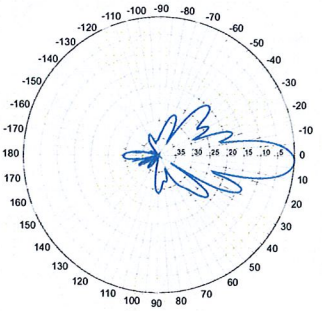
1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.
4) Antenna weight does not include brackets.
5) Add'l downtilts may be available. Check website for details.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern[1]
750 MHz

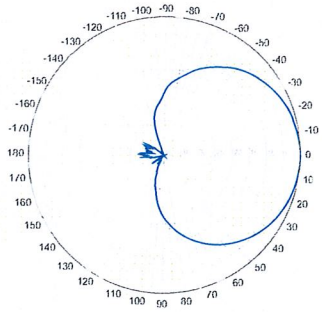


Horizontal

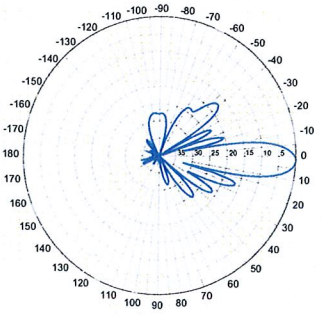


Vertical

850 MHz



Horizontal

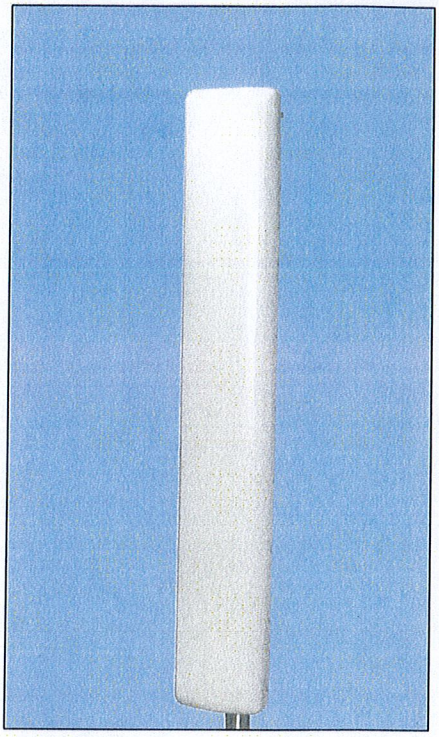


Vertical

696-900 MHz

BXA-70063/6CF __ 2°

When ordering replace "__" with connector type.



Featuring our Exclusive 3T Technology™ Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad band-width and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:
This antenna is under a five-year limited warranty for repair or replacement.

Revision Date: 04/07/09

815.399.0001 • antel@antelinc.com • www.antelinc.com

Amphenol Antel, Inc. The Antenna Technology Company

Slant ±45° Dual Polarized, Panel 63° / 14.5 dBd
696-900 MHz

Mechanical specifications

Length	1804	mm	71.0	in
Width	285	mm	11.2	in
Depth	114	mm	4.5	in
Depth with z-bracket	154	mm	6.1	in
Weight [4]	7.9	kg	17.0	lbs
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Max Wind Survivability	>201	km/hr	>125	mph
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Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiber-glass radome.

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Mounting hardware attaches to pipe diameter Ø50-160 mm; Ø2.0-6.3 in

Mounting Bracket Kit	36210003
Downtilt Bracket Kit	36210004

Electrical specifications

Frequency Range	696-900 MHz
Impedance	50Ω
Connector [3]	NE or E-DIN Female 2 ports / Center
VSWR [1]	≤ 1.35:1
Polarization	Slant ±45°
Isolation Between Ports [1]	< -25 dB
Gain [1]	14.5 dBd 16.5 dBi
Power Rating [2]	500 W
Half Power Angle [1]	
Horizontal Beamwidth	63°
Vertical Beamwidth	11°
Electrical downtilt [5]	4°
Null fill [1]	5%
Lightning protection	Direct ground

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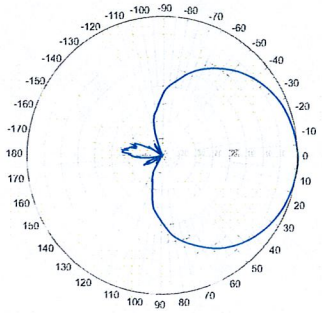
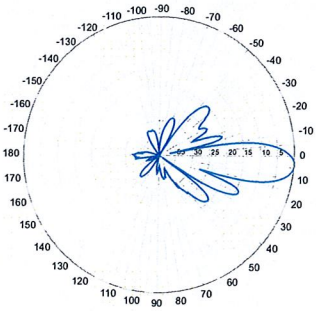
750 MHz

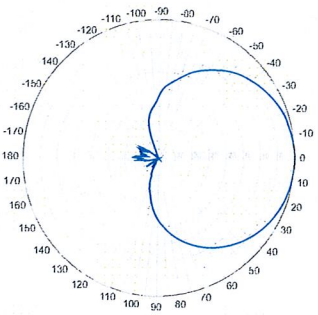


Horizontal



Vertical

850 MHz



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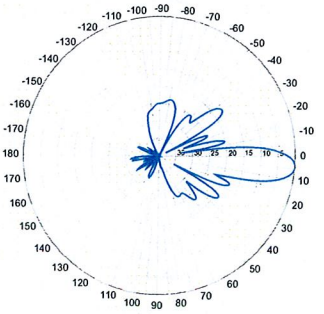
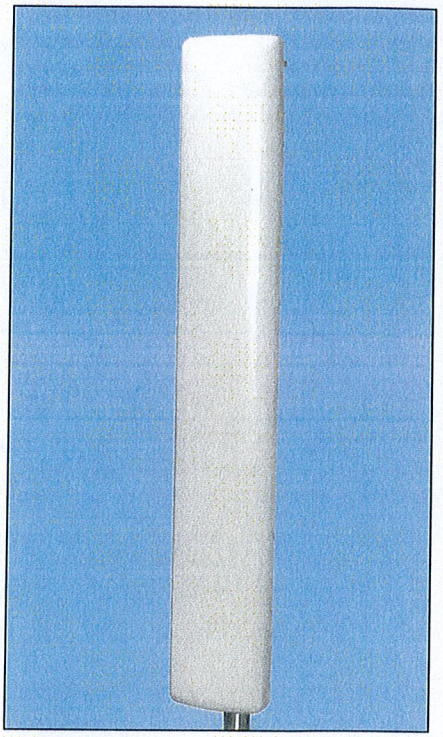


Vertical

696-900 MHz

BXA-70063/6CF __ 4°

When ordering replace "__" with connector type.



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Revision Date 04/09/09

815.399.0001 • antel@antelinc.com • www.antelinc.com

Amphenol Antel, Inc. The Antenna Technology Company

	General	Power	Density					
Site Name: Buckland (Manchester)								
Tower Height: Verizon @ 113'								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*Nextel	9	100	78	0.0532	851	0.5673	9.38%	
*Sprint	11	100	155	0.0165	1962	1.0000	1.65%	
*Cingular GSM	4	427	145	0.0292	1900	1.0000	2.92%	
*Cingular UMTS	1	500	145	0.0086	880	0.5867	1.46%	
*Cingular UMTS	1	500	145	0.0086	1900	1.0000	0.86%	
*Pocket	3	631	103	0.0642	2130	1.0000	6.42%	
*T-Mobile	8	175	133	0.0285	1945	1.0000	2.85%	
*T-Mobile	2	699	133	0.0284	2100	1.0000	2.84%	
Verizon	**3**	**418**	**113**	**0.0353**	**1970**	**1.0000**	**3.53%**	
Verizon	**9**	**338**	**113**	**0.0857**	**869**	**0.5793**	**14.79%**	
Verizon	**1**	**867**	**113**	**0.0244**	**757**	**0.4973**	**4.91%**	
								51.6%
* Source: Siting Council								

Date: **December 18, 2009**

Eva Morales
Crown Castle USA Inc
46 Broadway
Albany, NY 12204

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Buckland CT
Crown Castle Designation:	**Crown Castle BU Number:**	876347
	Crown Castle Site Name:	BUCKLAND MALL
	Crown Castle JDE Job Number:	128325
	Crown Castle Work Order Number:	308955
Engineering Firm Designation:	**Crown Castle USA Inc. Project Number:**	308955
Site Data:	**53 Slater Street, MANCHESTER, Hartford County, CT**	
	Latitude *41° 48' 43.9"*, Longitude *-72° 32' 3.2"*	
	155 Foot - Monopole Tower	

Dear Eva Morales,

Crown Castle USA Inc. 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 308955, in accordance with application 91528, revision 1.

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:

LC1: 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 local code requirements 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 USA Inc.* appreciate the opportunity of providing our continuing professional services to you and Crown Castle USA Inc. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Christopher Volk, E.I.T./MO

Respectfully submitted by:

Kenton C. Weber, P.E.
Engineering Supervisor

STATE OF CONNECTICUT · KENTON C. WEBER · No. 27263 · LICENSED PROFESSIONAL ENGINEER

12/18/09

RISA Tower Report - version 5.3.1.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 155 ft Monopole tower designed by SUMMIT in February of 2002. The tower was originally designed for a wind speed of 90 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, 69.3 mph with 0.5 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	113	2	antel	BXA-70063/6CFx2 w/ Mount Pipe	-	-	1
		1	antel	BXA-70063/6CFx4 w/ Mount Pipe			
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			

Notes:
1) Installed feedlines to be reused with proposed loading

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
155	155	6	decibel	DB980H90E-M w/Mount Pipe	6	1-5/8	1
		9	mla	MLA_ANTENNA w/Mount Pipe	9	1-5/8	2
		1	tower mounts	Platform Mount [LP 712-1]	-	-	1
		3	kathrein	800 10121 w/Mount Pipe			
145	145	6	powerwave technologies	LGP21401	6	1-1/4	1
		1	tower mounts	Pipe Mount [PM 601-3]			
		3	andrew	ETW190VS12UB			
133	133	6	rfs celwave	APX16DWV-16DWV-S-E-A20 w/Mount Pipe	18	1-5/8	1
		3	rfs celwave	ATMAA1412D-1A20			
		1	tower mounts	Platform Mount [LP 403-1]			
113	113	6	decibel	948F65T2ZE-M w/Mount Pipe	6	1-5/8	3
		6	decibel	DB844G65ZAXY w/Mount Pipe	6	1-5/8	1
		1	tower mounts	Platform Mount [LP 712-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
103	103	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	3	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
78	78	12	decibel	844G65VTZASX w/Mount Pipe	12	1-5/8	1
		1	tower mounts	Platform Mount [LP 304-1]			
60	60	1	tower mounts	Side Arm Mount [SO 701-1]	1	1/2	1
		1	trimble	ACUTIME 2000			

Notes:
1) Existing Equipment
2) MLA Equipment Controlling, was considered in analysis
3) Equipment to be Removed; Installed feedlines to be reused with proposed loading

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)
155	155	9	Decibel	DB980H90	-	-
145	145	6	Allgon	7250.03	-	-
133	133	6	EMS Wireless	RR90-17-00DP	-	-
50	50	1	Generic	GPS Antenna	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clough, Harbour, & Associates LLP.	1533476	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit Manufacturing Inc.	1615406	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit Manufacturing Inc.	2068033	CCISITES

3.1) Analysis Method

RISATower (version 5.3.1.0), 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.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle USA Inc. 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	155 - 115.5	Pole	TP29.308x22x0.25	1	-6.36	1080.07	41.2	Pass
L2	115.5 - 79.25	Pole	TP35.514x28.1142x0.3125	2	-13.08	1772.22	63.9	Pass
L3	79.25 - 43.75	Pole	TP41.456x34.0565x0.375	3	-22.05	2481.90	76.8	Pass
L4	43.75 - 0	Pole	TP48.8x39.7348x0.4375	4	-35.54	3491.31	81.9	Pass
							Summary	
						Pole (L4)	81.9	Pass
						Rating =	81.9	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	76.0	Pass
1	Base Plate	0	65.5	Pass
1	Base Foundation	0	80.8	Pass

Structure Rating (max from all components) =	81.9%

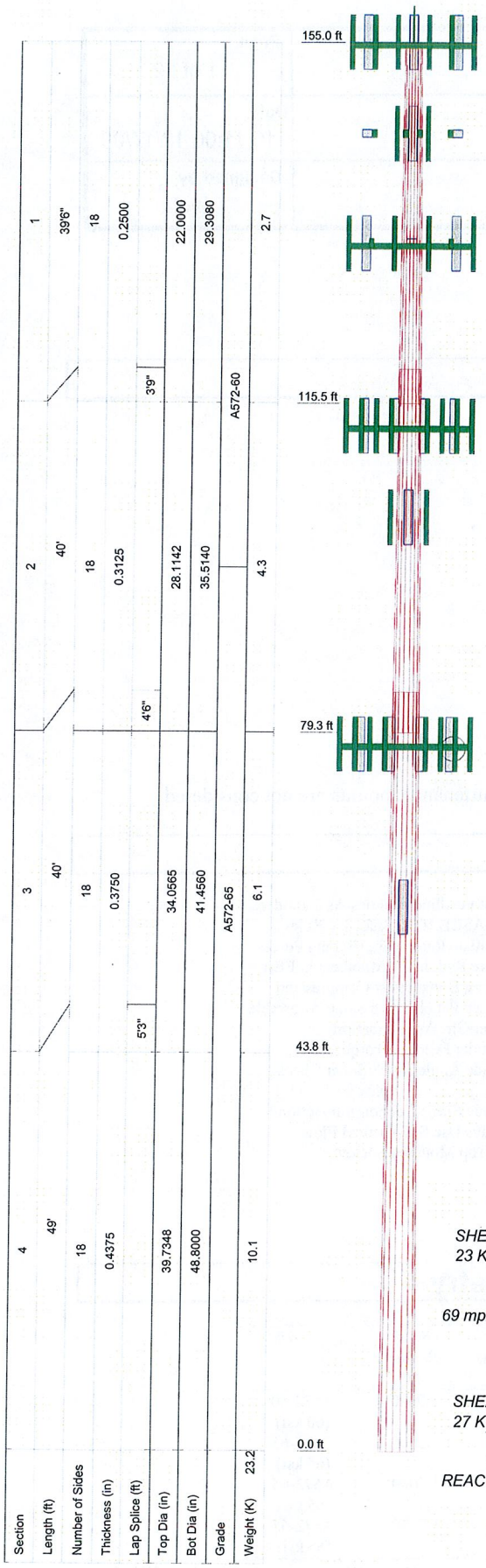
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

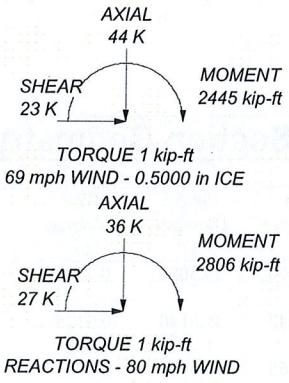
4.1) Recommendations

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

APPENDIX A

RISA TOWER OUTPUT





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8x4'	157	ATMAA1412D-1A20	133
(3) MLA_ANTENNA w/Mount Pipe	155	Platform Mount [LP 403-1]	133
(3) MLA_ANTENNA w/Mount Pipe	155	(2) DB844G65ZAXY w/Mount Pipe	113
(3) MLA_ANTENNA w/Mount Pipe	155	BXA-70063/6CFx2 w/ Mount Pipe	113
Platform Mount [LP 712-1]	155	MG D3-800Tx w/ Mount Pipe	113
800 10121 w/Mount Pipe	145	(2) DB844G65ZAXY w/Mount Pipe	113
(2) LGP21401	145	BXA-70063/6CFx2 w/ Mount Pipe	113
800 10121 w/Mount Pipe	145	MG D3-800Tx w/ Mount Pipe	113
(2) LGP21401	145	(2) DB844G65ZAXY w/Mount Pipe	113
800 10121 w/Mount Pipe	145	BXA-70063/6CFx4 w/ Mount Pipe	113
(2) LGP21401	145	MG D3-800Tx w/ Mount Pipe	113
Pipe Mount [PM 601-3]	145	Platform Mount [LP 712-1]	113
(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	133	APXV18-206517S-C w/ Mount Pipe	103
ETW190VS12UB	133	APXV18-206517S-C w/ Mount Pipe	103
ATMAA1412D-1A20	133	APXV18-206517S-C w/ Mount Pipe	103
(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	133	Pipe Mount [PM 601-3]	103
ETW190VS12UB	133	(4) 844G65VTZASX w/Mount Pipe	78
ATMAA1412D-1A20	133	(4) 844G65VTZASX w/Mount Pipe	78
(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	133	(4) 844G65VTZASX w/Mount Pipe	78
ETW190VS12UB	133	Platform Mount [LP 304-1]	78
		ACUTIME 2000	60
		Side Arm Mount [SO 701-1]	60

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-60	60 ksi	75 ksi	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 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 81.9%

CROWN CASTLE
Shaping the Wireless World

Crown Castle USA Inc.
2000 Corporate Dr.
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX: (724) 416-2254

Job: **BU# 876347**			
Project:			
Client: Crown Castle USA, Inc.	Drawn by: cvolk	App'd:	
Code: TIA/EIA-222-F	Date: 12/17/09	Scale: NTS	
Path: R:\SA Models - Letters\Work Area\CVolk\876347\876347.eri		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:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

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	155'-115'6"	39'6"	3'9"	18	22.0000	29.3080	0.2500	1.0000	A572-60 (60 ksi)
L2	115'6"-79'3"	40'	4'6"	18	28.1142	35.5140	0.3125	1.2500	A572-65 (65 ksi)
L3	79'3"-43'9"	40'	5'3"	18	34.0565	41.4560	0.3750	1.5000	A572-65 (65 ksi)
L4	43'9"-0'	49'		18	39.7348	48.8000	0.4375	1.7500	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	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.7601	23.0575	2459.6966	10.3156	14.8885	165.2082	4922.6297	11.5310	4.7182	18.873
L2	29.2523	27.5758	2692.8279	9.8696	14.2820	188.5468	5389.1990	13.7905	4.3981	14.074
	36.0619	34.9155	5466.1042	12.4965	18.0411	302.9804	10939.4008	17.4611	5.7005	18.241
L3	35.4272	40.0894	5745.8039	11.9569	17.3007	332.1137	11499.1684	20.0485	5.3339	14.224
	42.0955	48.8967	10425.5424	14.5838	21.0596	495.0483	20864.8031	24.4530	6.6363	17.697
L4	41.3340	54.5692	10646.6064	13.9505	20.1853	527.4439	21307.2218	27.2898	6.2233	14.225
	49.5528	67.1574	19844.8883	17.1687	24.7904	800.5070	39715.8890	33.5851	7.8188	17.872

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 155'-115'6"				1	1	1		
L2 115'6"-79'3"				1	1	1		
L3 79'3"-43'9"				1	1	1		
L4 43'9"-0'				1	1	1		

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
LDF7-50A(1-5/8")	C	No	Inside Pole	155' - 0'	9	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF6-50A(1-1/4")	A	No	Inside Pole	145' - 0'	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
LCF158-50JA-A0(1 5/8")	A	No	CaAa (Out Of Face)	133' - 0'	2	No Ice	0.20	0.08
						1/2" Ice	0.30	1.59
LCF158-50JA-A0(1 5/8")	A	No	CaAa (Out Of Face)	133' - 0'	4	No Ice	0.00	0.08
						1/2" Ice	0.00	1.59
LCF158-50JA-A0(1 5/8")	A	No	Inside Pole	133' - 0'	12	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
LDF7-50A(1-5/8")	B	No	Inside Pole	113' - 0'	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
AVA7-50(1-5/8")	B	No	CaAa (Out Of Face)	103' - 0'	1	No Ice	0.20	0.72
						1/2" Ice	0.30	2.23
AVA7-50(1-5/8")	B	No	CaAa (Out Of Face)	103' - 0'	2	No Ice	0.00	0.72
						1/2" Ice	0.00	2.23
LDF7-50A(1-5/8")	C	No	Inside Pole	78' - 0'	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF4-50A(1/2")	C	No	Inside Pole	60' - 0'	1	No Ice	0.00	0.15
						1/2" 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

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	155'-115'6"	A	0.000	0.000	0.000	6.930	0.14
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.29
L2	115'6"-79'3"	A	0.000	0.000	0.000	14.355	0.20
		B	0.000	0.000	0.000	4.702	0.38
		C	0.000	0.000	0.000	0.000	0.27
L3	79'3"-43'9"	A	0.000	0.000	0.000	14.058	0.19
		B	0.000	0.000	0.000	7.029	0.43
		C	0.000	0.000	0.000	0.000	0.60
L4	43'9"-0'	A	0.000	0.000	0.000	17.325	0.24
		B	0.000	0.000	0.000	8.663	0.53
		C	0.000	0.000	0.000	0.000	0.76

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	155'-115'6"	A	0.500	0.000	0.000	0.000	10.430	0.30
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.29
L2	115'6"-79'3"	A	0.500	0.000	0.000	0.000	21.605	0.53
		B		0.000	0.000	0.000	7.077	0.49
		C		0.000	0.000	0.000	0.000	0.27
L3	79'3"-43'9"	A	0.500	0.000	0.000	0.000	21.158	0.51
		B		0.000	0.000	0.000	10.579	0.59
		C		0.000	0.000	0.000	0.000	0.60
L4	43'9"-0'	A	0.500	0.000	0.000	0.000	26.075	0.63
		B		0.000	0.000	0.000	13.037	0.72
		C		0.000	0.000	0.000	0.000	0.76

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	155'-115'6"	0.0000	-0.2625	0.0000	-0.3677
L2	115'6"-79'3"	0.1459	-0.4123	0.1981	-0.5597
L3	79'3"-43'9"	0.2167	-0.3754	0.2961	-0.5129
L4	43'9"-0'	0.2219	-0.3843	0.3067	-0.5313

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod 5/8x4'	B	None		0.000	157'	No Ice	0.25	0.25	0.03
						1/2" Ice	0.66	0.66	0.03
***									
(3) MLA_ANTENNA w/Mount Pipe	A	From Leg	4.00 0' 0'	0.000	155'	No Ice	8.64	6.95	0.07
						1/2" Ice	9.29	8.13	0.13
(3) MLA_ANTENNA w/Mount Pipe	B	From Leg	4.00 0' 0'	0.000	155'	No Ice	8.64	6.95	0.07
						1/2" Ice	9.29	8.13	0.13
(3) MLA_ANTENNA w/Mount Pipe	C	From Leg	4.00 0' 0'	0.000	155'	No Ice	8.64	6.95	0.07
						1/2" Ice	9.29	8.13	0.13
Platform Mount [LP 712-1]	C	None		0.000	155'	No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
***									
800 10121 w/Mount Pipe	A	From Leg	1.00 0' 0'	0.000	145'	No Ice	5.49	4.38	0.06
						1/2" Ice	5.92	5.01	0.11
(2) LGP21401	A	From Leg	1.00 0' 0'	0.000	145'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
800 10121 w/Mount Pipe	B	From Leg	1.00 0' 0'	0.000	145'	No Ice	5.49	4.38	0.06
						1/2" Ice	5.92	5.01	0.11
(2) LGP21401	B	From Leg	1.00 0' 0'	0.000	145'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
800 10121 w/Mount Pipe	C	From Leg	1.00 0' 0'	0.000	145'	No Ice	5.49	4.38	0.06
						1/2" Ice	5.92	5.01	0.11
(2) LGP21401	C	From Leg	1.00 0' 0'	0.000	145'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
Pipe Mount [PM 601-3]	C	None		0.000	145'	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
***									
(2) APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	A	From Leg	4.00 0' 0'	0.000	133'	No Ice	7.27	3.29	0.06
						1/2" Ice	7.73	3.92	0.10
ETW190VS12UB	A	From Leg	4.00 0' 0'	0.000	133'	No Ice	0.76	0.35	0.01
						1/2" Ice	0.88	0.44	0.02
ATMAA1412D-1A20	A	From Leg	4.00 0' 0'	0.000	133'	No Ice	1.52	0.47	0.01
						1/2" Ice	1.68	0.57	0.02
(2) APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	B	From Leg	4.00 0' 0'	0.000	133'	No Ice	7.27	3.29	0.06
						1/2" Ice	7.73	3.92	0.10
ETW190VS12UB	B	From Leg	4.00 0' 0'	0.000	133'	No Ice	0.76	0.35	0.01
						1/2" Ice	0.88	0.44	0.02
ATMAA1412D-1A20	B	From Leg	4.00 0' 0'	0.000	133'	No Ice	1.52	0.47	0.01
						1/2" Ice	1.68	0.57	0.02
(2) APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	C	From Leg	4.00 0' 0'	0.000	133'	No Ice	7.27	3.29	0.06
						1/2" Ice	7.73	3.92	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ETW190VS12UB	C	From Leg	4.00 0' 0'	0.000	133'	No Ice 1/2" Ice	0.76 0.88	0.35 0.44	0.01 0.02
ATMAA1412D-1A20	C	From Leg	4.00 0' 0'	0.000	133'	No Ice 1/2" Ice	1.52 1.68	0.47 0.57	0.01 0.02
Platform Mount [LP 403-1]	C	None		0.000	133'	No Ice 1/2" Ice	18.85 24.30	18.85 24.30	1.50 1.80
***									
(2) DB844G65ZAXY w/Mount Pipe	A	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	5.38 6.07	5.40 6.49	0.04 0.09
BXA-70063/6CFx2 w/ Mount Pipe	A	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	7.97 8.61	5.40 6.55	0.04 0.10
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	3.57 3.98	3.42 4.12	0.03 0.07
(2) DB844G65ZAXY w/Mount Pipe	B	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	5.38 6.07	5.40 6.49	0.04 0.09
BXA-70063/6CFx2 w/ Mount Pipe	B	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	7.97 8.61	5.40 6.55	0.04 0.10
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	3.57 3.98	3.42 4.12	0.03 0.07
(2) DB844G65ZAXY w/Mount Pipe	C	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	5.38 6.07	5.40 6.49	0.04 0.09
BXA-70063/6CFx4 w/ Mount Pipe	C	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	7.97 8.61	5.40 6.55	0.04 0.10
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.00 0' 0'	0.000	113'	No Ice 1/2" Ice	3.57 3.98	3.42 4.12	0.03 0.07
Platform Mount [LP 712-1]	C	None		0.000	113'	No Ice 1/2" Ice	24.53 29.94	24.53 29.94	1.34 1.65
***									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.00 0' 0'	0.000	103'	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.00 0' 0'	0.000	103'	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.00 0' 0'	0.000	103'	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09
Pipe Mount [PM 601-3]	C	None		0.000	103'	No Ice 1/2" Ice	4.39 5.48	4.39 5.48	0.20 0.24
***									
(4) 844G65VTZASX w/Mount Pipe	A	From Leg	4.00 0' 0'	0.000	78'	No Ice 1/2" Ice	6.55 7.25	5.63 6.73	0.04 0.10
(4) 844G65VTZASX w/Mount Pipe	B	From Leg	4.00 0' 0'	0.000	78'	No Ice 1/2" Ice	6.55 7.25	5.63 6.73	0.04 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) 844G65VTZASX w/Mount Pipe	C	From Leg	4.00 0' 0'	0.000	78'	No Ice 1/2" Ice	6.55 7.25	5.63 6.73	0.04 0.10
Platform Mount [LP 304-1]	C	None		0.000	78'	No Ice 1/2" Ice	17.46 22.44	17.46 22.44	1.35 1.62
***									
ACUTIME 2000	A	From Leg	2.00 0' 0'	0.000	60'	No Ice 1/2" Ice	0.30 0.37	0.30 0.37	0.00 0.00
Side Arm Mount [SO 701-1]	A	From Leg	1.00 0' 0'	0.000	60'	No Ice 1/2" Ice	0.85 1.14	1.67 2.34	0.07 0.08

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

Comb. No.	Description
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	155 - 115.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-9.60	0.00	0.17
			Max. Mx	5	-6.36	-255.33	0.01
			Max. My	2	-6.36	-0.00	255.34
			Max. Vy	5	10.20	-255.33	0.01
			Max. Vx	2	-10.20	-0.00	255.34
			Max. Torque	24			-0.06
L2	115.5 - 79.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18.70	-0.17	0.50
			Max. Mx	5	-13.08	-790.35	0.00
			Max. My	2	-13.08	-0.06	790.28
			Max. Vy	5	17.59	-790.35	0.00
			Max. Vx	2	-17.59	-0.06	790.28
			Max. Torque	24			-0.17
L3	79.25 - 43.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.69	-0.47	1.07
			Max. Mx	5	-22.05	-1550.43	0.14
			Max. My	2	-22.05	-0.16	1550.10
			Max. Vy	5	23.88	-1550.43	0.14
			Max. Vx	2	-23.85	-0.16	1550.10
			Max. Torque	24			-0.46
L4	43.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-44.43	-0.99	1.63
			Max. Mx	5	-35.54	-2805.70	0.09
			Max. My	2	-35.54	-0.33	2803.82
			Max. Vy	5	27.27	-2805.70	0.09
			Max. Vx	2	-27.24	-0.33	2803.82
			Max. Torque	25			-0.62

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	18	44.43	-23.41	0.00
	Max. H_x	11	35.56	27.24	0.00
	Max. H_z	2	35.56	-0.00	27.21
	Max. M_x	2	2803.82	-0.00	27.21
	Max. M_z	5	2805.70	-27.24	0.00
	Max. Torsion	19	0.62	-20.27	-11.69
	Min. Vert	1	35.56	0.00	0.00
	Min. H_x	5	35.56	-27.24	0.00
	Min. H_z	8	35.56	-0.00	-27.21
	Min. M_x	8	-2803.64	-0.00	-27.21
	Min. M_z	11	-2805.05	27.24	0.00

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. Torsion	25	-0.62	20.27	11.69

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	35.56	0.00	0.00	-0.09	-0.32	0.00
Dead+Wind 0 deg - No Ice	35.56	0.00	-27.21	-2803.82	-0.33	0.16
Dead+Wind 30 deg - No Ice	35.56	13.62	-23.57	-2428.20	-1403.02	-0.13
Dead+Wind 60 deg - No Ice	35.56	23.59	-13.61	-1401.96	-2429.86	-0.39
Dead+Wind 90 deg - No Ice	35.56	27.24	-0.00	-0.09	-2805.70	-0.55
Dead+Wind 120 deg - No Ice	35.56	23.59	13.61	1401.78	-2429.86	-0.56
Dead+Wind 150 deg - No Ice	35.56	13.62	23.57	2428.02	-1403.02	-0.41
Dead+Wind 180 deg - No Ice	35.56	0.00	27.21	2803.64	-0.33	-0.16
Dead+Wind 210 deg - No Ice	35.56	-13.62	23.57	2428.02	1402.36	0.13
Dead+Wind 240 deg - No Ice	35.56	-23.59	13.61	1401.78	2429.20	0.39
Dead+Wind 270 deg - No Ice	35.56	-27.24	-0.00	-0.09	2805.05	0.55
Dead+Wind 300 deg - No Ice	35.56	-23.59	-13.61	-1401.96	2429.20	0.56
Dead+Wind 330 deg - No Ice	35.56	-13.62	-23.57	-2428.20	1402.36	0.41
Dead+Ice+Temp	44.43	0.00	0.00	-1.63	-0.99	0.00
Dead+Wind 0 deg+Ice+Temp	44.43	0.00	-23.38	-2443.92	-1.03	0.19
Dead+Wind 30 deg+Ice+Temp	44.43	11.70	-20.25	-2116.73	-1223.05	-0.14
Dead+Wind 60 deg+Ice+Temp	44.43	20.27	-11.69	-1222.82	-2117.63	-0.44
Dead+Wind 90 deg+Ice+Temp	44.43	23.41	0.00	-1.71	-2445.07	-0.61
Dead+Wind 120 deg+Ice+Temp	44.43	20.27	11.69	1219.40	-2117.63	-0.62
Dead+Wind 150 deg+Ice+Temp	44.43	11.70	20.25	2113.32	-1223.05	-0.47
Dead+Wind 180 deg+Ice+Temp	44.43	0.00	23.38	2440.51	-1.03	-0.19
Dead+Wind 210 deg+Ice+Temp	44.43	-11.70	20.25	2113.32	1220.99	0.14
Dead+Wind 240 deg+Ice+Temp	44.43	-20.27	11.69	1219.40	2115.57	0.44
Dead+Wind 270 deg+Ice+Temp	44.43	-23.41	0.00	-1.71	2443.00	0.61
Dead+Wind 300 deg+Ice+Temp	44.43	-20.27	-11.69	-1222.82	2115.57	0.62
Dead+Wind 330 deg+Ice+Temp	44.43	-11.70	-20.25	-2116.73	1220.99	0.47
Dead+Wind 0 deg - Service	35.56	0.00	-10.63	-1096.42	-0.33	0.06
Dead+Wind 30 deg - Service	35.56	5.32	-9.21	-949.54	-548.82	-0.05
Dead+Wind 60 deg - Service	35.56	9.21	-5.31	-548.26	-950.34	-0.15
Dead+Wind 90 deg - Service	35.56	10.64	-0.00	-0.09	-1097.30	-0.22
Dead+Wind 120 deg - Service	35.56	9.21	5.31	548.07	-950.34	-0.22
Dead+Wind 150 deg - Service	35.56	5.32	9.21	949.36	-548.82	-0.16
Dead+Wind 180 deg - Service	35.56	0.00	10.63	1096.24	-0.33	-0.06
Dead+Wind 210 deg - Service	35.56	-5.32	9.21	949.36	548.16	0.05
Dead+Wind 240 deg - Service	35.56	-9.21	5.31	548.07	949.68	0.15
Dead+Wind 270 deg - Service	35.56	-10.64	-0.00	-0.09	1096.64	0.22
Dead+Wind 300 deg - Service	35.56	-9.21	-5.31	-548.26	949.68	0.22
Dead+Wind 330 deg - Service	35.56	-5.32	-9.21	-949.54	548.16	0.16

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	-35.56	0.00	0.00	35.56	0.00	0.000%
2	0.00	-35.56	-27.21	-0.00	35.56	27.21	0.000%
3	13.62	-35.56	-23.57	-13.62	35.56	23.57	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
4	23.59	-35.56	-13.61	-23.59	35.56	13.61	0.000%
5	27.24	-35.56	0.00	-27.24	35.56	0.00	0.000%
6	23.59	-35.56	13.61	-23.59	35.56	-13.61	0.000%
7	13.62	-35.56	23.57	-13.62	35.56	-23.57	0.000%
8	0.00	-35.56	27.21	-0.00	35.56	-27.21	0.000%
9	-13.62	-35.56	23.57	13.62	35.56	-23.57	0.000%
10	-23.59	-35.56	13.61	23.59	35.56	-13.61	0.000%
11	-27.24	-35.56	0.00	27.24	35.56	0.00	0.000%
12	-23.59	-35.56	-13.61	23.59	35.56	13.61	0.000%
13	-13.62	-35.56	-23.57	13.62	35.56	23.57	0.000%
14	0.00	-44.43	0.00	0.00	44.43	0.00	0.000%
15	0.00	-44.43	-23.38	0.00	44.43	23.38	0.000%
16	11.70	-44.43	-20.25	-11.70	44.43	20.25	0.000%
17	20.27	-44.43	-11.69	-20.27	44.43	11.69	0.000%
18	23.41	-44.43	0.00	-23.41	44.43	0.00	0.000%
19	20.27	-44.43	11.69	-20.27	44.43	-11.69	0.000%
20	11.70	-44.43	20.25	-11.70	44.43	-20.25	0.000%
21	0.00	-44.43	23.38	0.00	44.43	-23.38	0.000%
22	-11.70	-44.43	20.25	11.70	44.43	-20.25	0.000%
23	-20.27	-44.43	11.69	20.27	44.43	-11.69	0.000%
24	-23.41	-44.43	0.00	23.41	44.43	0.00	0.000%
25	-20.27	-44.43	-11.69	20.27	44.43	11.69	0.000%
26	-11.70	-44.43	-20.25	11.70	44.43	20.25	0.000%
27	0.00	-35.56	-10.63	0.00	35.56	10.63	0.000%
28	5.32	-35.56	-9.21	-5.32	35.56	9.21	0.000%
29	9.21	-35.56	-5.31	-9.21	35.56	5.31	0.000%
30	10.64	-35.56	0.00	-10.64	35.56	0.00	0.000%
31	9.21	-35.56	5.31	-9.21	35.56	-5.31	0.000%
32	5.32	-35.56	9.21	-5.32	35.56	-9.21	0.000%
33	0.00	-35.56	10.63	0.00	35.56	-10.63	0.000%
34	-5.32	-35.56	9.21	5.32	35.56	-9.21	0.000%
35	-9.21	-35.56	5.31	9.21	35.56	-5.31	0.000%
36	-10.64	-35.56	0.00	10.64	35.56	0.00	0.000%
37	-9.21	-35.56	-5.31	9.21	35.56	5.31	0.000%
38	-5.32	-35.56	-9.21	5.32	35.56	9.21	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	0.00020092
3	Yes	5	0.00000001	0.00068691
4	Yes	5	0.00000001	0.00069097
5	Yes	4	0.00000001	0.00026976
6	Yes	5	0.00000001	0.00068398
7	Yes	5	0.00000001	0.00069080
8	Yes	4	0.00000001	0.00020090
9	Yes	5	0.00000001	0.00068892
10	Yes	5	0.00000001	0.00068467
11	Yes	4	0.00000001	0.00026970
12	Yes	5	0.00000001	0.00069169
13	Yes	5	0.00000001	0.00068505
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00030777
16	Yes	6	0.00000001	0.00007189

17	Yes	6	0.00000001	0.00007230
18	Yes	5	0.00000001	0.00030820
19	Yes	6	0.00000001	0.00007143
20	Yes	6	0.00000001	0.00007213
21	Yes	5	0.00000001	0.00030740
22	Yes	6	0.00000001	0.00007187
23	Yes	6	0.00000001	0.00007145
24	Yes	5	0.00000001	0.00030803
25	Yes	6	0.00000001	0.00007232
26	Yes	6	0.00000001	0.00007164
27	Yes	4	0.00000001	0.00007839
28	Yes	5	0.00000001	0.00006996
29	Yes	5	0.00000001	0.00007084
30	Yes	4	0.00000001	0.00008764
31	Yes	5	0.00000001	0.00006936
32	Yes	5	0.00000001	0.00007077
33	Yes	4	0.00000001	0.00007837
34	Yes	5	0.00000001	0.00007035
35	Yes	5	0.00000001	0.00006948
36	Yes	4	0.00000001	0.00008759
37	Yes	5	0.00000001	0.00007097
38	Yes	5	0.00000001	0.00006954

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	37.92	30	2.026	0.001
L2	119.25 - 79.25	23.36	30	1.791	0.000
L3	83.75 - 43.75	11.65	30	1.302	0.000
L4	49 - 0	4.02	30	0.751	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157'	Lightning Rod 5/8x4'	30	37.92	2.026	0.001	34292
155'	(3) MLA_ANTENNA w/Mount Pipe	30	37.92	2.026	0.001	34292
145'	800 10121 w/Mount Pipe	30	33.71	1.974	0.001	17145
133'	(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	30	28.76	1.902	0.001	7792
113'	(2) DB844G65ZAXY w/Mount Pipe	30	21.05	1.725	0.000	4628
103'	APXV18-206517S-C w/ Mount Pipe	30	17.57	1.601	0.000	4384
78'	(4) 844G65VTZASX w/Mount Pipe	30	10.09	1.200	0.000	3718
60'	ACUTIME 2000	30	5.95	0.891	0.000	3083

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	96.83	5	5.175	0.002
L2	119.25 - 79.25	59.67	5	4.575	0.001
L3	83.75 - 43.75	29.77	5	3.326	0.001
L4	49 - 0	10.28	5	1.921	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157'	Lightning Rod 5/8x4'	5	96.83	5.175	0.002	13614
155'	(3) MLA_ANTENNA w/Mount Pipe	5	96.83	5.175	0.002	13614
145'	800 10121 w/Mount Pipe	5	86.09	5.047	0.002	6806
133'	(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	5	73.45	4.865	0.001	3091
113'	(2) DB844G65ZAXY w/Mount Pipe	5	53.78	4.402	0.001	1832
103'	APXV18-206517S-C w/ Mount Pipe	5	44.89	4.077	0.001	1732
78'	(4) 844G65VTZASX w/Mount Pipe	5	25.80	3.083	0.001	1464
60'	ACUTIME 2000	5	15.20	2.330	0.001	1210

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	155 - 115.5 (1)	TP29.308x22x0.25	39'6"	0'	0.0	36.00	22.5070	-6.36	810.25	0.008
L2	115.5 - 79.25 (2)	TP35.514x28.1142x0.3125	40'	0'	0.0	39.00	34.0898	-13.08	1329.50	0.010
L3	79.25 - 43.75 (3)	TP41.456x34.0565x0.375	40'	0'	0.0	39.00	47.7407	-22.05	1861.89	0.012
L4	43.75 - 0 (4)	TP48.8x39.7348x0.4375	49'	0'	0.0	39.00	67.1574	-35.54	2619.14	0.014

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	155 - 115.5 (1)	TP29.308x22x0.25	255.34	19.47	36.00	0.541	0.00	0.00	36.00	0.000
L2	115.5 - 79.25 (2)	TP35.514x28.1142x0.3125	790.35	32.84	39.00	0.842	0.00	0.00	39.00	0.000
L3	79.25 - 43.75 (3)	TP41.456x34.0565x0.375	1550.43	39.43	39.00	1.011	0.00	0.00	39.00	0.000
L4	43.75 - 0 (4)	TP48.8x39.7348x0.4375	2805.71	42.06	39.00	1.078	0.00	0.00	39.00	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	155 - 115.5 (1)	TP29.308x22x0.25	10.20	0.45	24.00	0.038	0.02	0.00	24.00	0.000
L2	115.5 - 79.25 (2)	TP35.514x28.1142x0.3125	17.59	0.52	26.00	0.040	0.15	0.00	26.00	0.000
L3	79.25 - 43.75 (3)	TP41.456x34.0565x0.375	23.88	0.50	26.00	0.038	0.42	0.01	26.00	0.000
L4	43.75 - 0 (4)	TP48.8x39.7348x0.4375	27.27	0.41	26.00	0.031	0.55	0.00	26.00	0.000

Pole Interaction Design Data

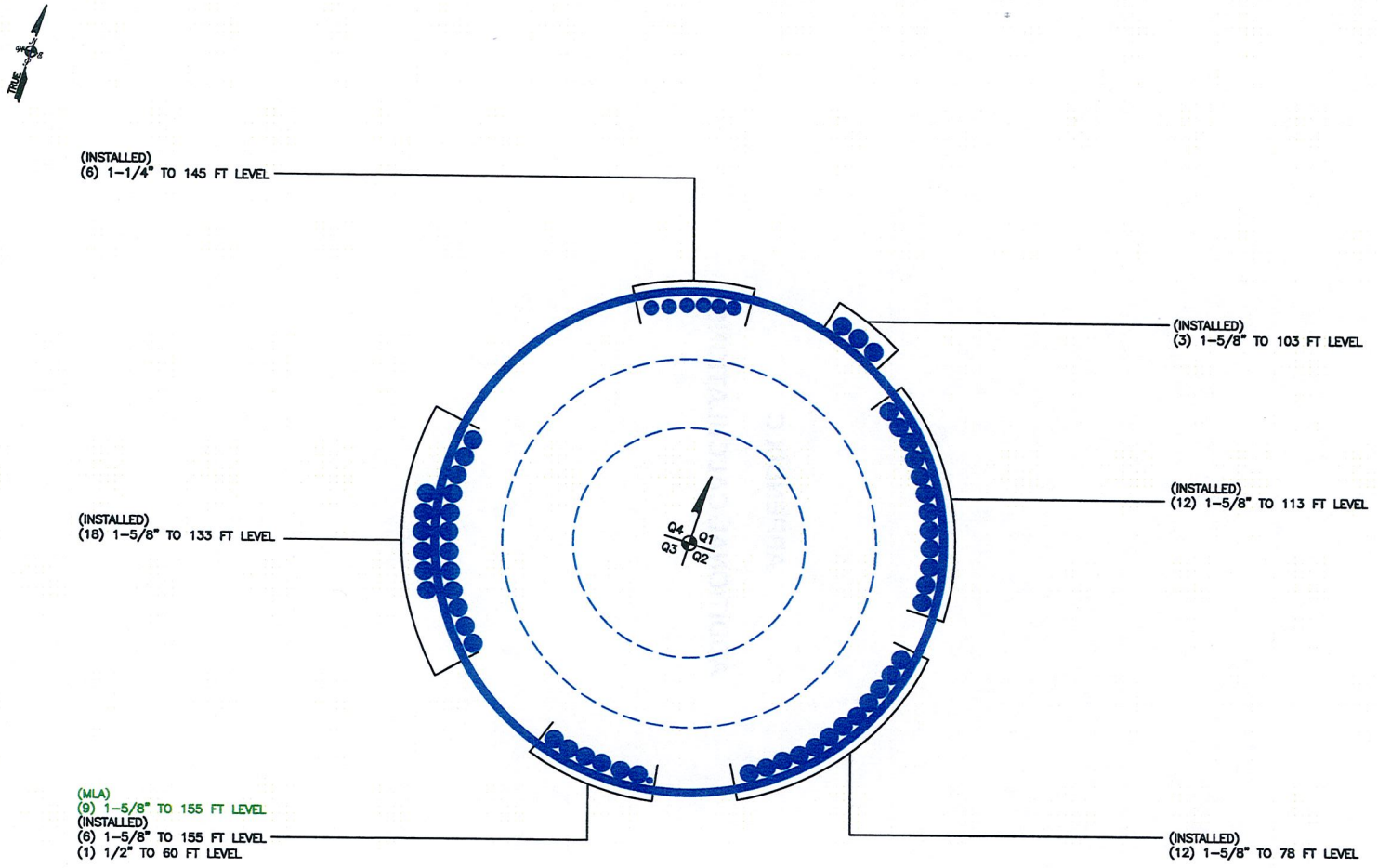
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	155 - 115.5 (1)	0.008	0.541	0.000	0.038	0.000	0.549 ✔	1.333	H1-3+VT ✔
L2	115.5 - 79.25 (2)	0.010	0.842	0.000	0.040	0.000	0.852 ✔	1.333	H1-3+VT ✔
L3	79.25 - 43.75 (3)	0.012	1.011	0.000	0.038	0.000	1.023 ✔	1.333	H1-3+VT ✔
L4	43.75 - 0 (4)	0.014	1.078	0.000	0.031	0.000	1.092 ✔	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	155 - 115.5	Pole	TP29.308x22x0.25	1	-6.36	1080.07	41.2	Pass
L2	115.5 - 79.25	Pole	TP35.514x28.1142x0.3125	2	-13.08	1772.22	63.9	Pass
L3	79.25 - 43.75	Pole	TP41.456x34.0565x0.375	3	-22.05	2481.90	76.8	Pass
L4	43.75 - 0	Pole	TP48.8x39.7348x0.4375	4	-35.54	3491.31	81.9	Pass
							Summary	
						Pole (L4)	81.9	Pass
						RATING =	**81.9**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



0 1 2 3FT

: SCALE :

BUSINESS UNIT: 876347 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

Assumptions: Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48.
Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)

Site Data

BU#: *876347*
Site Name: *Buckland Mall*
App #: *91528 Rev. 1*

Reactions		
Moment:	2806	ft-kips
Axial:	36	kips
Shear:	27	kips

Connection Type:	*Butt*

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Grade(Fy):	75	ksi
Bolt Circle:	56	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	55	in
Thick:	3.25	in
Grade:	50	ksi
B effective	28.98	in

Pole Data		
Diam:	48.8	in
Thick:	0.4375	in
Grade:	65	ksi

Stress Increase Factor		
ASIF:	1.333	

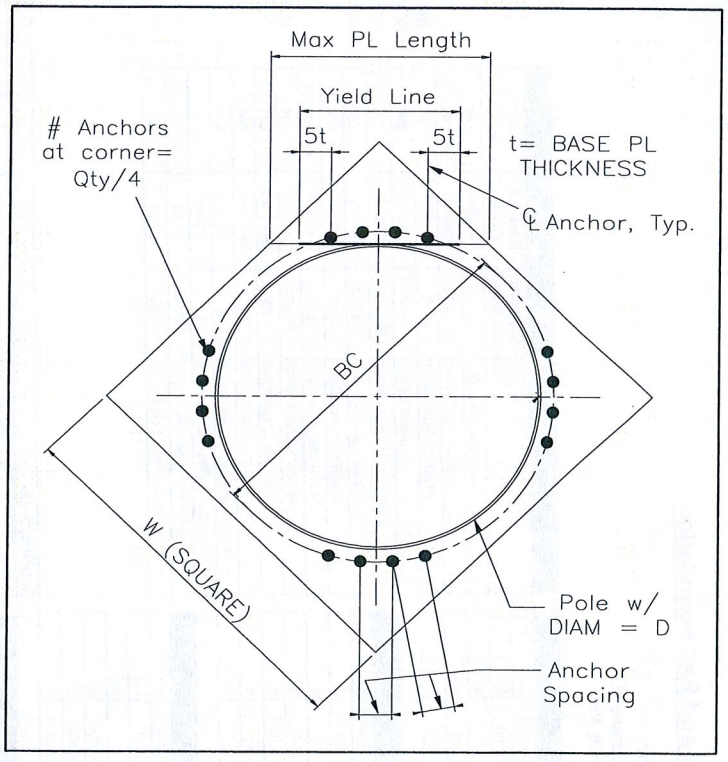
Anchor Rod Results

Maximum Rod Tension:	148.1 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	76.0% **Pass**

Base Plate Results

Base Plate Stress:	32.7 ksi
Allowable Plate Stress:	50.0 ksi
Base Plate Stress Ratio:	65.5% **Pass**

PL Ref. Data
Yield Line (in):
28.98
Max PL Length:
28.98



Monopole Pier and Pad Foundation

BU # : 876347
Site Name: Buckland Mall
App. Number: 91528 Rev. 1

CROWN CASTLE

Design Reactions		
Shear, **S**:	27	kips
Moment, **M**:	2806	ft-kips
Tower Height, **H**:	155	ft
Tower Weight, **Wt**:	36	kips
Base Diameter, **BD**:	4.0667	ft

Foundation Dimensions		
Depth, **D**:	10	ft
Pad Width, **W**:	23	ft
Neglected Depth, **N**:	2	ft
Thickness, **T**:	3.00	ft
Pier Diameter, **Pd**:	7.00	ft
Ext. Above Grade, **E**:	0.50	ft
Clear Cover, **Cc**:	3.0	in

Soil Properties		
Soil Unit Weight, **γ**:	0.120	kcf
Bearing Capacity, **Bc**:	4.0	ksf
Angle of Friction, **Φ**:	30	deg
Cohesion, **Co**:	0.000	ksf
Passive Pressure, **Pp**:	0.000	kcf
Base Friction, **μ**:	0.20	

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

Rebar Properties		
Pier Rebar Size, **Sp**:	11	
Pier Rebar Quanity, **mp**:	32	
Pad Rebar Size, **Spad**:	9	
Pad Rebar Quanity, **mpad**:	19	
Pier Tie Size, **St**:	5	
Tie Quanity, **mt**:	12	

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	7	5.5667	OK
Overturning (ft-kips)	7070.15	3089.50	OK
Shear Capacity (kips)	90.38	27.00	OK
Bearing (ksf)	4.00	3.23	OK
Pad Shear - 1-way (kips)	976.42	653.39	OK
Pad Shear - 2-way (kips)	1867.18	987.72	OK
Pier Rebar Area (in^2)	49.92	27.71	OK
Pad Rebar Area (in^2)	19.00	19.50	Acceptable
Pier Moment Capacity (k-ft)	5888.23	3008.50	OK
Pier Bar Spacing (in)	6.25	18 > s > 2	OK
Pad Bar Spacing (in)	13.81	18 > s > 2	OK
Pier Development Length (in)	87	33.44	OK
Pad Development Length (in)	33	33.44	Hooks!
Hook Development Length (in)	135.00	21.62	OK
Rebar Hook Length (in)	96.00	23.97	OK

	Modification Checks	Capacity/ Availability	Demand/ Limits	Check
	Sleeve Rebar Area (in2):	15.8	0.00	Not Used
43.7%	*Sleeve Moment Capacity (k-ft):*	5888.23	3008.50	Not Run
29.9%	*Sleeve Rebar Spacing (in):*	N/a	18 > s > 2	Not Used
80.8%	*Sleeve Tie Spacing (in):*	N/A	9 > s > 4.5	Not Used
66.9%	*Minimum Extra Thickness (in):*	0	0	Not Used
52.9%	*Pad Rebar Area-short (in2):*	0.44	2.40	Not Used
	Pad Rebar Area-long (in2):	0.44	2.40	Not Used
	Pad Rebar Spacing-short (in):	89.5	18 > s > 2	Not Used
51.1%	*Pad Rebar Spacing-long (in):*	89.5	18 > s > 2	Not Used
	End Cap Width (ft):	0	0	Not Used
	End Cap Rebar Area (in2):	3.16	0	Not Used
	Rebar Spacing (in):	-3.00	18 > s > 2	Not Used
	Tie Spacing (in):	18.79	270 > s > 4.5	Not Used
	Dowel Area (in2):	2.2	0.00	Not Used
	Dowel Embedment (in):	9	6	Not Used
	Cone Shear Strength (kips):	24.68	23.76	Not Used
	Dowel Edge Dist (in):	12.00	4.78	Not Used
	Dowel Spacing (in):	63.00	18.00	Not Used
	Dowel Edge Dist (vert) (in):	18.00	4.78	Not Used
	Dowel Devel. Length (in):	-3.00	15.38	Not Used

Modifications					
Pier Sleeve, ds:	0	in	**End Cap Width, Wec:**	0	ft
Revised Pier Diameter, **dx:**	7	ft	Revised Width, **Wx:**	23	ft
PS Rebar Size, **Ss:**	8		EC Rebar Size, **Sec:**	8	per side, top & bottom
Rebar Quanity, **ms:**	20		Rebar Quanity, **mec:**	4	
Tie Size, **Sst:**	3		EC Tie Size, **Sect:**	4	per side
Tie Quanity, **mst:**	9		Tie Quanity, **mect:**	15	
Pad Thickness, Te:	0	in	EC Dowel Size, **Secd:**	6	per side
Revised Pier Thickness, **Tx:**	3.00	ft	Dowel Quanity, **mecd:**	5	
Rebar Size, **Se:**	3		Rows of Dowels, **Nd:**	1	
Rebar Quanity (long), **me:**	4		Dowel Depth, **decd:**	9	in
Rebar Quanity (short), **mex:**	4		Edge Distance, **eecd:**	12	in
Dowel Size, **Sed:**	3				
Dowel Quanity, **med:**	0				

ROBINSON & COLE LLP

KENNETH C. BALDWIN

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

ORIGINAL

May 21, 2010

Michael Perrone
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Cellco Partnership d/b/a Verizon Wireless**
EM-VER-077-100128 – 53 Slater Road, Manchester, Connecticut

Dear Mr. Perrone:

On January 28, 2010, the Siting Council acknowledged receipt of Cellco's notice of intent to modify the above-referenced telecommunications facility. This modification involved the removal of six (6) existing PCS antennas and the installation of three (3) newer model PCS antennas and three (3) new LTE antennas.

In addition to the antenna modifications, Cellco intends to install six (6) coax cable diplexers on its antenna mounting platform. Attached to this letter is an updated Structural Analysis for the antenna modifications and the installation of the coax diplexers. This analysis confirms that the tower can support all of Cellco's proposed modifications, including the diplexers.

If you have any questions regarding any of these materials, please do not hesitate to contact me or Rachel Mayo.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Sandy M. Carter
Brian Ragozzine
Mark Gauger

10383470-v1

Date: **May 20, 2010**

Branden Woodard
Crown Castle USA Inc.
2000 Corporate Drive
Canonsburg, PA 15317

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Buckland CT
Crown Castle Designation:	**Crown Castle BU Number:**	876347
	Crown Castle Site Name:	BUCKLAND MALL
	Crown Castle JDE Job Number:	134969
	Crown Castle Work Order Number:	336931
Engineering Firm Designation:	**Crown Castle Project Number:**	336931
Site Data:	**53 Slater Street, MANCHESTER, Hartford County, CT** **Latitude *41° 48' 43.9"*, Longitude *-72° 32' 3.2"*** **155 Foot - Monopole Tower**	

Dear Branden Woodard,

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 336931, in accordance with application 100032 , revision 1.

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:

LC1: 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 local code requirements based upon a wind speed of 80 mph fastest mile.

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

Structural analysis prepared by: Mital Chavda, EIT/TS

Respectfully submitted by:

Kenton C. Weber, P.E
Engineering Supervisor

STATE OF CONNECTICUT
KENTON C. WEBER
No. 27263
LICENSED
PROFESSIONAL ENGINEER

5/20/10

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 155 ft Monopole tower designed by Paul J. Ford and Company in February of 2002. The tower was originally designed for a wind speed of 90 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, 28.1 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	113	2	Antel	BXA-70063/6CFx2 w/ Mount Pipe	-	-	-
		1	Antel	BXA-70063/6CFx4 w/ Mount Pipe			
		6	RFS Celwave	FD9R6004/2C-3L			
		3	RYMSA Wireless	MG D3-800Tx 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
155	155	9	-	MLA_ANTENNA w/ Mount Pipe	9	1-5/8	2
		6	Decibel	DB980H90E-M w/ Mount Pipe	6	1-5/8	1
		4	Dragonwave	HORIZON COMPACT	5 3	½ 5/16	3
		3	Kathrein	840 10054 w/ Mount Pipe			
		1	Motorola	TIMING 2000			
		3	Samsung telecommunications	WIMAX DAP HEAD			
	151	1	-	Platform Mount [LP 601-1]	-	-	1
		4	Dragonwave	A-ANT-18G-2-C	-	-	3
145	145	3	Kathrein	800 10121 w/ Mount Pipe	6	1-1/4	1
		6	Powerwave technologies	LGP21401			
		1	-	Pipe Mount [PM 601-3]			
133	133	3	Andrew	ETW190VS12UB	18	1-5/8	1
		6	RFS Celwave	APX16DWV-16DWV-S-E-A20 w/Mount Pipe			
		3	RFS Celwave	ATMAA1412D-1A20			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		1	-	Platform Mount [LP 403-1]			
113	113	6	Decibel	948F65T2ZBE-M w/ Mount Pipe	-	-	4
		6	Decibel	DB844G65ZAXY w/ Mount Pipe	12	1-5/8	1
		1	-	Platform Mount [LP 601-1]			
103	103	3	RFS Celwave	APXV18-206517S-C w/ Mount Pipe	3	1-5/8	1
		1	-	Pipe Mount [PM 601-3]			
78	78	12	Decibel	844G65VTZASX w/ Mount Pipe	12	1-5/8	1
		1	-	Platform Mount [LP 303-1]			
60	60	1	-	Side Arm Mount [SO 701-1]	1	1/2	1
		1	Trimble	ACUTIME 2000			

Notes:
1) Existing Equipment
2) Carrier 1: MLA Equipment controlling, was considered in this analysis.
3) Carrier 2: Reserved Equipment
4) Existing equipment to be replaced with proposed equipment

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)
155	155	9	Decibel	DB980H90	-	-
		1	-	14' Low Profile Platform		
145	145	6	Allgon	7250.03	-	-
		1	-	T-Arm Mounts		
133	133	6	EMS	RR90-17-00DP	-	-
		1	-	14' Low Profile Platform		
50	50	1	-	GPS Antenna w/ mount	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clough, Harbour, & Associates LLP.	1533476	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit Manufacturing Inc.	1615406	CCISITES
4-TOWER MANUFACTURER DRAWINGS	SEA Consultants Inc.	2068033	CCISITES

3.1) Analysis Method

RISATower (version 5.4.1.8), 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.

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	155 - 115.5	Pole	TP29.308x22x0.25	1	-6.72	1080.07	51.7	Pass
L2	115.5 - 79.25	Pole	TP35.514x28.1142x0.3125	2	-13.27	1772.22	75.6	Pass
L3	79.25 - 43.75	Pole	TP41.456x34.0565x0.375	3	-22.17	2481.90	87.0	Pass
L4	43.75 - 0	Pole	TP48.8x39.7348x0.4375	4	-35.86	3491.31	90.2	Pass
							Summary	
						Pole (L4)	90.2	Pass
						RATING =	**90.2**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	83.8	Pass
1	Base Plate	0	72.0	Pass
1	Base Foundation	0	84.8	Pass

Structure Rating (max from all components) =	90.2%

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

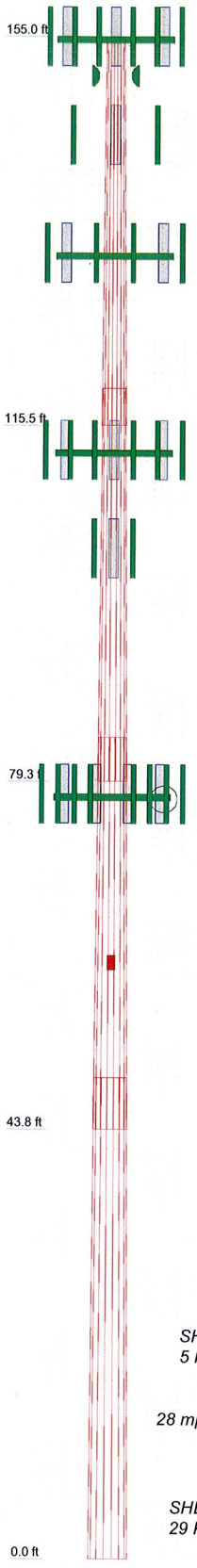
4.1) Recommendations

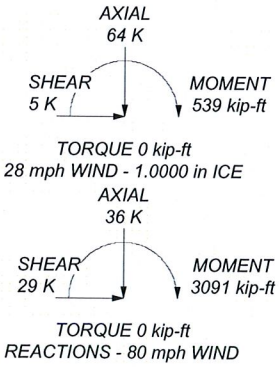
The tower and foundation have sufficient capacity to carry the existing, reserved, and proposed loading. No modifications are required at this time.

APPENDIX A

RISA TOWER OUTPUT

Section	1	2	3	4
Length (ft)	39.50	40.00	40.00	49.00
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.4375
Socket Length (ft)	3.75	4.50	5.25	
Top Dia (in)	22.0000	28.1142	34.0565	39.7348
Bot Dia (in)	29.3080	35.5140	41.4560	48.8000
Grade	A607-60		A607-65	
Weight (K)	2.7	4.3	6.1	10.1





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(3) MLA_ANTENNA w/ Mount Pipe	155	(2) 5' x 2' Pipe Mount	133
(3) MLA_ANTENNA w/ Mount Pipe	155	(2) 5' x 2' Pipe Mount	133
(3) MLA_ANTENNA w/ Mount Pipe	155	(2) 5' x 2' Pipe Mount	133
840 10054 w/ Mount Pipe	155	Platform Mount [LP 403-1]	133
TIMING 2000	155	Side Arm Mount [SO 201-3]	133
WIMAX DAP HEAD	155	(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	133
(2) HORIZON COMPACT	155		
840 10054 w/ Mount Pipe	155	ETW190VS12UB	133
WIMAX DAP HEAD	155	(2) FD9R6004/2C-3L	113
(2) HORIZON COMPACT	155	MG D3-800Tx w/ Mount Pipe	113
840 10054 w/ Mount Pipe	155	(2) DB844G65ZAXY w/ Mount Pipe	113
WIMAX DAP HEAD	155	BXA-70063/6CFx2 w/ Mount Pipe	113
Platform Mount [LP 601-1]	155	(2) FD9R6004/2C-3L	113
(2) A-ANT-18G-2-C	155	MG D3-800Tx w/ Mount Pipe	113
(2) A-ANT-18G-2-C	155	(2) DB844G65ZAXY w/ Mount Pipe	113
800 10121 w/ Mount Pipe	145	BXA-70063/6CFx4 w/ Mount Pipe	113
(2) LGP21401	145	(2) FD9R6004/2C-3L	113
800 10121 w/ Mount Pipe	145	MG D3-800Tx w/ Mount Pipe	113
(2) LGP21401	145	Platform Mount [LP 601-1]	113
Pipe Mount [PM 601-3]	145	(2) DB844G65ZAXY w/ Mount Pipe	113
800 10121 w/ Mount Pipe	145	BXA-70063/6CFx2 w/ Mount Pipe	113
(2) LGP21401	145	APXV18-206517S-C w/ Mount Pipe	103
ATMAA1412D-1A20	133	Pipe Mount [PM 601-3]	103
(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	133	APXV18-206517S-C w/ Mount Pipe	103
		APXV18-206517S-C w/ Mount Pipe	103
ETW190VS12UB	133	(4) 844G65VTZASX w/ Mount Pipe	78
ATMAA1412D-1A20	133	Platform Mount [LP 303-1]	78
(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	133	(4) 844G65VTZASX w/ Mount Pipe	78
		(4) 844G65VTZASX w/ Mount Pipe	78
ETW190VS12UB	133	ACUTIME 2000	60
ATMAA1412D-1A20	133	Side Arm Mount [SO 701-1]	60

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	A607-65	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 28 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: 90.2%

CROWN CASTLE
Shaping the Wireless World

Crown Castle USA Inc.
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2879
FAX: (724) 416-4879

Job: 876347			
Project:			
Client: Crown Castle	Drawn by: tstyran		App'd:
Code: TIA/EIA-222-F	Date: 05/20/10		Scale: NTS
Path: \\Ccicusphotos1\cad\SA Models - Letters\Work Area\MChavda\876347\876347_336931.er			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:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 28 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	155.00-115.50	39.50	3.75	18	22.0000	29.3080	0.2500	1.0000	A607-60 (60 ksi)
L2	115.50-79.25	40.00	4.50	18	28.1142	35.5140	0.3125	1.2500	A607-65 (65 ksi)
L3	79.25-43.75	40.00	5.25	18	34.0565	41.4560	0.3750	1.5000	A607-65 (65 ksi)
L4	43.75-0.00	49.00		18	39.7348	48.8000	0.4375	1.7500	A607-65 (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	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.7601	23.0575	2459.6966	10.3156	14.8885	165.2082	4922.6297	11.5310	4.7182	18.873
L2	29.2523	27.5758	2692.8277	9.8696	14.2820	188.5468	5389.1988	13.7905	4.3981	14.074
	36.0619	34.9155	5466.1042	12.4965	18.0411	302.9804	10939.4008	17.4611	5.7005	18.241
L3	35.4272	40.0894	5745.8038	11.9569	17.3007	332.1137	11499.1682	20.0485	5.3339	14.224
	42.0955	48.8967	10425.5424	14.5838	21.0596	495.0483	20864.8031	24.4530	6.6363	17.697
L4	41.3340	54.5692	10646.6060	13.9505	20.1853	527.4439	21307.2212	27.2898	6.2233	14.225
	49.5528	67.1574	19844.8883	17.1687	24.7904	800.5070	39715.8890	33.5851	7.8188	17.872

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 155.00-115.50				1	1	1		
L2 115.50-79.25				1	1	1		
L3 79.25-43.75				1	1	1		
L4 43.75-0.00				1	1	1		

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
**										
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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
**								
**								
LDF7-50A(1-5/8")	B	No	Inside Pole	155.00 - 0.00	9	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
*								

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
*								
FSJ4-50B(1/2")	A	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.05	0.14
						1/2" Ice	0.15	0.76
						1" Ice	0.25	2.00
						2" Ice	0.45	6.30
						4" Ice	0.85	22.23
FSJ4-50B(1/2")	A	No	CaAa (Out Of Face)	155.00 - 0.00	4	No Ice	0.00	0.14
						1/2" Ice	0.00	0.76
						1" Ice	0.00	2.00
						2" Ice	0.00	6.30
						4" Ice	0.00	22.23
ATCB-B01-005(5/16)	A	No	CaAa (Out Of Face)	155.00 - 0.00	3	No Ice	0.00	0.07
						1/2" Ice	0.00	0.57
						1" Ice	0.00	1.68
						2" Ice	0.00	5.73
						4" Ice	0.00	21.16
**								
**								
LDF6-50A(1-1/4")	C	No	Inside Pole	145.00 - 0.00	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
**								
**								
LCF158-50JA-A0(1 5/8")	C	No	CaAa (Out Of Face)	133.00 - 0.00	1	No Ice	0.20	0.08
						1/2" Ice	0.30	1.59
						1" Ice	0.40	3.72
						2" Ice	0.60	9.80
						4" Ice	1.00	29.30
LCF158-50JA-A0(1 5/8")	C	No	CaAa (Out Of Face)	133.00 - 0.00	5	No Ice	0.00	0.08
						1/2" Ice	0.00	1.59
						1" Ice	0.00	3.72
						2" Ice	0.00	9.80
						4" Ice	0.00	29.30
LCF158-50JA-A0(1 5/8")	B	No	Inside Pole	133.00 - 0.00	12	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
						2" Ice	0.00	0.08
						4" Ice	0.00	0.08
**								
**								
LDF7-50A(1-5/8")	A	No	Inside Pole	113.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
**								
**								
AVA7-50(1-5/8")	A	No	CaAa (Out Of Face)	103.00 - 0.00	1	No Ice	0.20	0.70
						1/2" Ice	0.30	2.23
						1" Ice	0.40	4.38
						2" Ice	0.60	10.50
						4" Ice	1.00	30.07
AVA7-50(1-5/8")	A	No	CaAa (Out Of Face)	103.00 - 0.00	2	No Ice	0.00	0.70
						1/2" Ice	0.00	2.23
						1" Ice	0.00	4.38
						2" Ice	0.00	10.50
						4" Ice	0.00	30.07
**								
**								

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	A	No	Inside Pole	78.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
**								
**								
LDF4-50A(1/2")	B	No	Inside Pole	60.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	155.00-115.50	A	0.000	0.000	0.000	2.054	0.04
		B	0.000	0.000	0.000	0.000	0.31
		C	0.000	0.000	0.000	3.465	0.13
L2	115.50-79.25	A	0.000	0.000	0.000	6.659	0.42
		B	0.000	0.000	0.000	0.000	0.30
		C	0.000	0.000	0.000	7.178	0.16
L3	79.25-43.75	A	0.000	0.000	0.000	8.982	0.79
		B	0.000	0.000	0.000	0.000	0.30
		C	0.000	0.000	0.000	7.029	0.16
L4	43.75-0.00	A	0.000	0.000	0.000	11.069	0.99
		B	0.000	0.000	0.000	0.000	0.37
		C	0.000	0.000	0.000	8.663	0.19

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	155.00-115.50	A	1.184	0.000	0.000	0.000	11.405	0.84
		B		0.000	0.000	0.000	0.000	0.31
		C		0.000	0.000	0.000	7.608	0.62
L2	115.50-79.25	A	1.138	0.000	0.000	0.000	20.863	1.49
		B		0.000	0.000	0.000	0.000	0.30
		C		0.000	0.000	0.000	15.759	1.20
L3	79.25-43.75	A	1.077	0.000	0.000	0.000	25.143	1.94
		B		0.000	0.000	0.000	0.000	0.30
		C		0.000	0.000	0.000	15.110	1.11
L4	43.75-0.00	A	1.000	0.000	0.000	0.000	29.921	2.27
		B		0.000	0.000	0.000	0.000	0.37
		C		0.000	0.000	0.000	18.089	1.27

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	155.00-115.50	-0.1154	-0.0066	-0.2050	-0.2104
L2	115.50-79.25	-0.2251	-0.1174	-0.3893	-0.3810
L3	79.25-43.75	-0.2253	-0.2023	-0.3904	-0.5248
L4	43.75-0.00	-0.2295	-0.2061	-0.4001	-0.5332

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
**									
**									
(3) MLA_ANTENNA w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	6.95 8.13 9.02 10.84 14.85	0.07 0.13 0.21 0.39 0.90
(3) MLA_ANTENNA w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	6.95 8.13 9.02 10.84 14.85	0.07 0.13 0.21 0.39 0.90
(3) MLA_ANTENNA w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.64 9.29 9.91 11.18 13.83	6.95 8.13 9.02 10.84 14.85	0.07 0.13 0.21 0.39 0.90
*									
*									
840 10054 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.41 5.83 6.26 7.16 9.09	2.39 2.92 3.47 4.61 7.32	0.05 0.09 0.13 0.23 0.53
TIMING 2000	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.13 0.18 0.24 0.38 0.78	0.13 0.18 0.24 0.38 0.78	0.00 0.00 0.01 0.01 0.05
WIMAX DAP HEAD	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.80 1.99 2.18 2.59 3.51	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
(2) HORIZON COMPACT	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.84 0.97 1.10 1.39 2.08	0.43 0.52 0.63 0.86 1.43	0.01 0.02 0.03 0.05 0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
840 10054 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.41 5.83 6.26 7.16 9.09	2.39 2.92 3.47 4.61 7.32	0.05 0.09 0.13 0.23 0.53
WIMAX DAP HEAD	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.80 1.99 2.18 2.59 3.51	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
(2) HORIZON COMPACT	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.84 0.97 1.10 1.39 2.08	0.43 0.52 0.63 0.86 1.43	0.01 0.02 0.03 0.05 0.12
840 10054 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.41 5.83 6.26 7.16 9.09	2.39 2.92 3.47 4.61 7.32	0.05 0.09 0.13 0.23 0.53
WIMAX DAP HEAD	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.80 1.99 2.18 2.59 3.51	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
*									
Platform Mount [LP 601-1]	C	None		0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.47 33.59 38.71 48.95 69.43	28.47 33.59 38.71 48.95 69.43	1.12 1.51 1.91 2.69 4.26
**									
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800 10121 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.69 6.18 6.68 7.70 9.86	4.60 5.35 6.05 7.53 10.83	0.07 0.11 0.17 0.30 0.68
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
800 10121 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.69 6.18 6.68 7.70 9.86	4.60 5.35 6.05 7.53 10.83	0.07 0.11 0.17 0.30 0.68
(2) LGP21401	B	From Leg	4.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
800 10121 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.69 6.18 6.68 7.70	4.60 5.35 6.05 7.53	0.07 0.11 0.17 0.30

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	9.86	10.83	0.68
(2) LGP21401	C	From Leg	4.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
*									
Pipe Mount [PM 601-3]	C	None		0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.39 5.48 6.57 8.75 13.11	4.39 5.48 6.57 8.75 13.11	0.20 0.24 0.28 0.36 0.53
**									
**									
(2) APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.27 7.73 8.21 9.18 11.23	3.29 3.92 4.57 5.92 8.88	0.06 0.10 0.16 0.28 0.65
ETW190VS12UB	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.76 0.88 1.01 1.30 1.97	0.35 0.44 0.54 0.77 1.33	0.01 0.02 0.02 0.04 0.11
ATMAA1412D-1A20	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.52 1.68 1.86 2.23 3.09	0.47 0.57 0.69 0.95 1.57	0.01 0.02 0.03 0.06 0.16
(2) APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.27 7.73 8.21 9.18 11.23	3.29 3.92 4.57 5.92 8.88	0.06 0.10 0.16 0.28 0.65
ETW190VS12UB	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.76 0.88 1.01 1.30 1.97	0.35 0.44 0.54 0.77 1.33	0.01 0.02 0.02 0.04 0.11
ATMAA1412D-1A20	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.52 1.68 1.86 2.23 3.09	0.47 0.57 0.69 0.95 1.57	0.01 0.02 0.03 0.06 0.16
(2) APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.27 7.73 8.21 9.18 11.23	3.29 3.92 4.57 5.92 8.88	0.06 0.10 0.16 0.28 0.65
ETW190VS12UB	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.76 0.88 1.01 1.30 1.97	0.35 0.44 0.54 0.77 1.33	0.01 0.02 0.02 0.04 0.11
ATMAA1412D-1A20	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	1.52 1.68 1.86	0.47 0.57 0.69	0.01 0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							2" Ice	2.23	0.95	0.06
							4" Ice	3.09	1.57	0.16
*										
(2) 5' x 2' Pipe Mount	A	From Leg	4.00	0.00	0.000	133.00	No Ice	1.00	1.00	0.03
			0.00				1/2" Ice	1.39	1.39	0.04
			0.00				1" Ice	1.70	1.70	0.05
							2" Ice	2.35	2.35	0.08
							4" Ice	3.78	3.78	0.20
(2) 5' x 2' Pipe Mount	B	From Leg	4.00	0.00	0.000	133.00	No Ice	1.00	1.00	0.03
			0.00				1/2" Ice	1.39	1.39	0.04
			0.00				1" Ice	1.70	1.70	0.05
							2" Ice	2.35	2.35	0.08
							4" Ice	3.78	3.78	0.20
(2) 5' x 2' Pipe Mount	C	From Leg	4.00	0.00	0.000	133.00	No Ice	1.00	1.00	0.03
			0.00				1/2" Ice	1.39	1.39	0.04
			0.00				1" Ice	1.70	1.70	0.05
							2" Ice	2.35	2.35	0.08
							4" Ice	3.78	3.78	0.20
Platform Mount [LP 403-1]	C	None			0.000	133.00	No Ice	18.85	18.85	1.50
							1/2" Ice	24.30	24.30	1.80
							1" Ice	29.75	29.75	2.09
							2" Ice	40.65	40.65	2.69
							4" Ice	62.45	62.45	3.87
Side Arm Mount [SO 201-3]	C	None			0.000	133.00	No Ice	5.71	5.71	0.29
							1/2" Ice	7.91	7.91	0.35
							1" Ice	10.11	10.11	0.41
							2" Ice	14.51	14.51	0.54
							4" Ice	23.31	23.31	0.79
**										
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.00	0.00	0.000	113.00	No Ice	4.90	4.92	0.03
			0.00				1/2" Ice	5.35	5.60	0.08
			0.00				1" Ice	5.80	6.28	0.13
							2" Ice	6.73	7.71	0.26
							4" Ice	8.73	10.83	0.62
BXA-70063/6CFx2 w/ Mount Pipe	A	From Leg	4.00	0.00	0.000	113.00	No Ice	7.97	5.40	0.04
			0.00				1/2" Ice	8.61	6.55	0.10
			0.00				1" Ice	9.22	7.41	0.17
							2" Ice	10.46	9.18	0.33
							4" Ice	13.07	12.93	0.79
(2) FD9R6004/2C-3L	A	From Leg	4.00	0.00	0.000	113.00	No Ice	0.37	0.08	0.00
			0.00				1/2" Ice	0.45	0.14	0.01
			0.00				1" Ice	0.54	0.20	0.01
							2" Ice	0.75	0.34	0.02
							4" Ice	1.28	0.74	0.06
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.00	0.00	0.000	113.00	No Ice	3.57	3.42	0.03
			0.00				1/2" Ice	3.98	4.12	0.07
			0.00				1" Ice	4.39	4.78	0.11
							2" Ice	5.33	6.16	0.21
							4" Ice	7.34	9.18	0.52
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	113.00	No Ice	4.90	4.92	0.03
			0.00				1/2" Ice	5.35	5.60	0.08
			0.00				1" Ice	5.80	6.28	0.13
							2" Ice	6.73	7.71	0.26
							4" Ice	8.73	10.83	0.62
BXA-70063/6CFx2 w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	113.00	No Ice	7.97	5.40	0.04
			0.00				1/2" Ice	8.61	6.55	0.10
			0.00				1" Ice	9.22	7.41	0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.57 3.98 4.39 5.33 7.34	3.42 4.12 4.78 6.16 9.18	0.03 0.07 0.11 0.21 0.52
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.90 5.35 5.80 6.73 8.73	4.92 5.60 6.28 7.71 10.83	0.03 0.08 0.13 0.26 0.62
BXA-70063/6CFx4 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.40 6.55 7.41 9.18 12.93	0.04 0.10 0.17 0.33 0.79
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.57 3.98 4.39 5.33 7.34	3.42 4.12 4.78 6.16 9.18	0.03 0.07 0.11 0.21 0.52
*									
Platform Mount [LP 601-1]	C	None		0.000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.47 33.59 38.71 48.95 69.43	28.47 33.59 38.71 48.95 69.43	1.12 1.51 1.91 2.69 4.26
**									
**									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.00 0.00 0.00	0.000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.96 6.48 7.55 9.92	4.70 5.86 6.73 8.51 12.28	0.05 0.09 0.15 0.28 0.68
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.00 0.00 0.00	0.000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.96 6.48 7.55 9.92	4.70 5.86 6.73 8.51 12.28	0.05 0.09 0.15 0.28 0.68
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.00 0.00 0.00	0.000	103.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.96 6.48 7.55 9.92	4.70 5.86 6.73 8.51 12.28	0.05 0.09 0.15 0.28 0.68
*									
Pipe Mount [PM 601-3]	C	None		0.000	103.00	No Ice	4.39	4.39	0.20

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28
						2" Ice	8.75	8.75	0.36
						4" Ice	13.11	13.11	0.53
**									
**									
(4) 844G65VTZASX w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	78.00	No Ice	6.13	5.21	0.03
						1/2" Ice	6.59	5.89	0.08
						1" Ice	7.06	6.59	0.14
						2" Ice	8.04	8.04	0.28
						4" Ice	10.12	11.19	0.67
(4) 844G65VTZASX w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	78.00	No Ice	6.13	5.21	0.03
						1/2" Ice	6.59	5.89	0.08
						1" Ice	7.06	6.59	0.14
						2" Ice	8.04	8.04	0.28
						4" Ice	10.12	11.19	0.67
(4) 844G65VTZASX w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	78.00	No Ice	6.13	5.21	0.03
						1/2" Ice	6.59	5.89	0.08
						1" Ice	7.06	6.59	0.14
						2" Ice	8.04	8.04	0.28
						4" Ice	10.12	11.19	0.67
*									
Platform Mount [LP 303-1]	C	None		0.000	78.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10
**									
**									
ACUTIME 2000	A	From Leg	1.00 0.00 0.00	0.000	60.00	No Ice	0.30	0.30	0.00
						1/2" Ice	0.37	0.37	0.00
						1" Ice	0.46	0.46	0.01
						2" Ice	0.65	0.65	0.02
						4" Ice	1.15	1.15	0.08
*									
Side Arm Mount [SO 701-1]	A	From Leg	1.00 0.00 0.00	0.000	60.00	No Ice	0.85	1.67	0.07
						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
**									
**									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft^2	Weight K
**										

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 ft²	Weight K
**											
(2) A-ANT-18G-2-C	B	Paraboloid w/o Radome	From Leg	1.00 0.00 -4.00	0.000		155.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.03 0.36 0.07 0.19
(2) A-ANT-18G-2-C	C	Paraboloid w/o Radome	From Leg	1.00 0.00 -4.00	0.000		155.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.03 0.36 0.07 0.19
**											
**											

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

Comb. No.	Description
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	155 - 115.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-17.01	0.53	-0.90
			Max. Mx	11	-6.72	321.14	7.74
			Max. My	2	-6.74	0.01	318.33
			Max. Vy	11	-12.45	321.14	7.74
			Max. Vx	2	-12.37	0.01	318.33
			Max. Torque	12			0.53
L2	115.5 - 79.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-30.35	1.77	-0.05
			Max. Mx	11	-13.27	936.03	16.83
			Max. My	2	-13.28	0.03	930.45
			Max. Vy	11	-19.76	936.03	16.83
			Max. Vx	2	-19.68	0.03	930.45
			Max. Torque	12			0.54
L3	79.25 - 43.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-45.10	3.14	1.41
			Max. Mx	11	-22.17	1759.90	25.97
			Max. My	2	-22.18	0.05	1751.52
			Max. Vy	11	-25.57	1759.90	25.97
			Max. Vx	2	-25.46	0.05	1751.52
			Max. Torque	12			0.54
L4	43.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-63.56	5.11	3.19
			Max. Mx	11	-35.86	3091.04	38.34
			Max. My	2	-35.86	0.09	3077.71
			Max. Vy	11	-28.67	3091.04	38.34
			Max. Vx	2	-28.56	0.09	3077.71
			Max. Torque	13			0.45

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	63.56	4.70	0.04
	Max. H_x	11	35.88	28.63	0.24
	Max. H_z	2	35.88	0.00	28.53
	Max. M_x	2	3077.71	0.00	28.53
	Max. M_z	5	3090.86	-28.63	0.24
	Max. Torsion	13	0.45	14.46	24.47
	Min. Vert	1	35.88	0.00	0.00
	Min. H_x	5	35.88	-28.63	0.24
	Min. H_z	8	35.88	0.00	-28.27
	Min. M_x	8	-3035.88	0.00	-28.27
	Min. M_z	11	-3091.04	28.63	0.24
	Min. Torsion	9	-0.25	14.17	-24.47

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	35.88	0.00	0.00	-0.48	0.09	0.00
Dead+Wind 0 deg - No Ice	35.88	-0.00	-28.53	-3077.71	0.09	-0.20
Dead+Wind 30 deg - No Ice	35.88	14.46	-24.47	-2628.02	-1567.79	0.10
Dead+Wind 60 deg - No Ice	35.88	24.82	-14.24	-1534.52	-2680.06	0.16
Dead+Wind 90 deg - No Ice	35.88	28.63	-0.24	-38.34	-3090.86	0.13
Dead+Wind 120 deg - No Ice	35.88	24.98	13.91	1481.98	-2704.84	0.08
Dead+Wind 150 deg - No Ice	35.88	14.17	24.47	2626.45	-1522.39	0.09
Dead+Wind 180 deg - No Ice	35.88	-0.00	28.27	3035.88	0.09	0.20
Dead+Wind 210 deg - No Ice	35.88	-14.17	24.47	2626.45	1522.56	0.25
Dead+Wind 240 deg - No Ice	35.88	-24.98	13.91	1481.98	2705.02	0.12
Dead+Wind 270 deg - No Ice	35.88	-28.63	-0.24	-38.34	3091.04	-0.13
Dead+Wind 300 deg - No Ice	35.88	-24.82	-14.24	-1534.52	2680.23	-0.36
Dead+Wind 330 deg - No Ice	35.88	-14.46	-24.47	-2628.02	1567.97	-0.45
Dead+Ice+Temp	63.56	-0.00	-0.00	-3.19	5.11	-0.00
Dead+Wind 0 deg+Ice+Temp	63.56	-0.00	-4.69	-534.35	5.25	-0.06
Dead+Wind 30 deg+Ice+Temp	63.56	2.37	-4.02	-457.42	-264.87	-0.03
Dead+Wind 60 deg+Ice+Temp	63.56	4.08	-2.34	-268.11	-457.16	-0.03
Dead+Wind 90 deg+Ice+Temp	63.56	4.70	-0.04	-9.11	-528.11	-0.02
Dead+Wind 120 deg+Ice+Temp	63.56	4.10	2.29	253.61	-460.98	-0.01
Dead+Wind 150 deg+Ice+Temp	63.56	2.33	4.02	450.78	-257.86	0.01
Dead+Wind 180 deg+Ice+Temp	63.56	-0.00	4.65	521.49	5.25	0.06
Dead+Wind 210 deg+Ice+Temp	63.56	-2.33	4.02	450.78	268.37	0.08
Dead+Wind 240 deg+Ice+Temp	63.56	-4.10	2.29	253.61	471.49	0.07
Dead+Wind 270 deg+Ice+Temp	63.56	-4.70	-0.04	-9.11	538.62	0.02
Dead+Wind 300 deg+Ice+Temp	63.56	-4.08	-2.34	-268.11	467.67	-0.03
Dead+Wind 330 deg+Ice+Temp	63.56	-2.37	-4.02	-457.42	275.38	-0.07
Dead+Wind 0 deg - Service	35.88	0.00	-11.14	-1204.21	0.09	-0.08
Dead+Wind 30 deg - Service	35.88	5.65	-9.56	-1028.28	-613.21	0.04
Dead+Wind 60 deg - Service	35.88	9.69	-5.56	-600.56	-1048.32	0.06
Dead+Wind 90 deg - Service	35.88	11.18	-0.09	-15.30	-1209.02	0.05
Dead+Wind 120 deg - Service	35.88	9.76	5.43	579.40	-1058.02	0.03
Dead+Wind 150 deg - Service	35.88	5.54	9.56	1027.04	-595.43	0.04
Dead+Wind 180 deg - Service	35.88	0.00	11.04	1187.19	0.09	0.08
Dead+Wind 210 deg - Service	35.88	-5.54	9.56	1027.04	595.61	0.10
Dead+Wind 240 deg - Service	35.88	-9.76	5.43	579.40	1058.20	0.05
Dead+Wind 270 deg - Service	35.88	-11.18	-0.09	-15.30	1209.20	-0.05
Dead+Wind 300 deg - Service	35.88	-9.69	-5.56	-600.56	1048.50	-0.14
Dead+Wind 330 deg - Service	35.88	-5.65	-9.56	-1028.28	613.39	-0.18

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-35.88	0.00	0.00	35.88	0.00	0.000%
2	0.00	-35.88	-28.53	0.00	35.88	28.53	0.000%
3	14.46	-35.88	-24.47	-14.46	35.88	24.47	0.000%
4	24.82	-35.88	-14.24	-24.82	35.88	14.24	0.000%
5	28.63	-35.88	-0.24	-28.63	35.88	0.24	0.000%
6	24.98	-35.88	13.91	-24.98	35.88	-13.91	0.000%
7	14.17	-35.88	24.47	-14.17	35.88	-24.47	0.000%
8	0.00	-35.88	28.27	0.00	35.88	-28.27	0.000%
9	-14.17	-35.88	24.47	14.17	35.88	-24.47	0.000%
10	-24.98	-35.88	13.91	24.98	35.88	-13.91	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
11	-28.63	-35.88	-0.24	28.63	35.88	0.24	0.000%
12	-24.82	-35.88	-14.24	24.82	35.88	14.24	0.000%
13	-14.46	-35.88	-24.47	14.46	35.88	24.47	0.000%
14	0.00	-63.56	0.00	0.00	63.56	0.00	0.000%
15	0.00	-63.56	-4.69	0.00	63.56	4.69	0.000%
16	2.37	-63.56	-4.02	-2.37	63.56	4.02	0.000%
17	4.08	-63.56	-2.34	-4.08	63.56	2.34	0.000%
18	4.70	-63.56	-0.04	-4.70	63.56	0.04	0.000%
19	4.10	-63.56	2.29	-4.10	63.56	-2.29	0.000%
20	2.33	-63.56	4.02	-2.33	63.56	-4.02	0.000%
21	0.00	-63.56	4.65	0.00	63.56	-4.65	0.000%
22	-2.33	-63.56	4.02	2.33	63.56	-4.02	0.000%
23	-4.10	-63.56	2.29	4.10	63.56	-2.29	0.000%
24	-4.70	-63.56	-0.04	4.70	63.56	0.04	0.000%
25	-4.08	-63.56	-2.34	4.08	63.56	2.34	0.000%
26	-2.37	-63.56	-4.02	2.37	63.56	4.02	0.000%
27	0.00	-35.88	-11.14	0.00	35.88	11.14	0.000%
28	5.65	-35.88	-9.56	-5.65	35.88	9.56	0.000%
29	9.69	-35.88	-5.56	-9.69	35.88	5.56	0.000%
30	11.18	-35.88	-0.09	-11.18	35.88	0.09	0.000%
31	9.76	-35.88	5.43	-9.76	35.88	-5.43	0.000%
32	5.54	-35.88	9.56	-5.54	35.88	-9.56	0.000%
33	0.00	-35.88	11.04	0.00	35.88	-11.04	0.000%
34	-5.54	-35.88	9.56	5.54	35.88	-9.56	0.000%
35	-9.76	-35.88	5.43	9.76	35.88	-5.43	0.000%
36	-11.18	-35.88	-0.09	11.18	35.88	0.09	0.000%
37	-9.69	-35.88	-5.56	9.69	35.88	5.56	0.000%
38	-5.65	-35.88	-9.56	5.65	35.88	9.56	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	0.00026603
3	Yes	6	0.00000001	0.00003994
4	Yes	6	0.00000001	0.00003952
5	Yes	4	0.00000001	0.00069544
6	Yes	5	0.00000001	0.00099678
7	Yes	5	0.00000001	0.00097921
8	Yes	4	0.00000001	0.00026337
9	Yes	5	0.00000001	0.00098230
10	Yes	5	0.00000001	0.00099495
11	Yes	4	0.00000001	0.00069552
12	Yes	6	0.00000001	0.00003944
13	Yes	6	0.00000001	0.00004007
14	Yes	4	0.00000001	0.00002509
15	Yes	5	0.00000001	0.00027035
16	Yes	5	0.00000001	0.00030684
17	Yes	5	0.00000001	0.00030856
18	Yes	5	0.00000001	0.00026824
19	Yes	5	0.00000001	0.00030513
20	Yes	5	0.00000001	0.00030078
21	Yes	5	0.00000001	0.00026509
22	Yes	5	0.00000001	0.00030647
23	Yes	5	0.00000001	0.00031109

24	Yes	5	0.00000001	0.00027376
25	Yes	5	0.00000001	0.00031456
26	Yes	5	0.00000001	0.00031267
27	Yes	4	0.00000001	0.00010209
28	Yes	5	0.00000001	0.00011433
29	Yes	5	0.00000001	0.00011249
30	Yes	4	0.00000001	0.00010636
31	Yes	5	0.00000001	0.00011172
32	Yes	5	0.00000001	0.00010796
33	Yes	4	0.00000001	0.00010015
34	Yes	5	0.00000001	0.00010866
35	Yes	5	0.00000001	0.00011132
36	Yes	4	0.00000001	0.00010639
37	Yes	5	0.00000001	0.00011215
38	Yes	5	0.00000001	0.00011502

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	43.44	36	2.370	0.002
L2	119.25 - 79.25	26.47	36	2.069	0.001
L3	83.75 - 43.75	13.06	36	1.475	0.000
L4	49 - 0	4.47	36	0.839	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	(3) MLA_ANTENNA w/ Mount Pipe	36	43.44	2.370	0.003	27117
151.00	(2) A-ANT-18G-2-C	36	41.47	2.345	0.002	27117
145.00	800 10121 w/ Mount Pipe	36	38.52	2.306	0.002	13558
133.00	(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	36	32.74	2.214	0.002	6162
113.00	(2) DB844G65ZAXY w/ Mount Pipe	36	23.81	1.984	0.001	3704
103.00	APXV18-206517S-C w/ Mount Pipe	36	19.80	1.825	0.001	3573
78.00	(4) 844G65VTZASX w/ Mount Pipe	36	11.29	1.368	0.000	3163
60.00	ACUTIME 2000	36	6.63	1.036	0.000	2701

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	110.83	11	6.050	0.007
L2	119.25 - 79.25	67.58	11	5.283	0.003
L3	83.75 - 43.75	33.35	11	3.768	0.001

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L4	49 - 0	11.42	11	2.143	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	(3) MLA_ANTENNA w/ Mount Pipe	11	110.83	6.050	0.007	10828
151.00	(2) A-ANT-18G-2-C	11	105.80	5.986	0.006	10828
145.00	800 10121 w/ Mount Pipe	11	98.29	5.885	0.006	5413
133.00	(2) APX16DWV-16DWV-S-E-A20 w/Mount Pipe	11	83.56	5.652	0.004	2458
113.00	(2) DB844G65ZAXY w/ Mount Pipe	11	60.78	5.066	0.002	1472
103.00	APXV18-206517S-C w/ Mount Pipe	11	50.57	4.660	0.002	1417
78.00	(4) 844G65VTZASX w/ Mount Pipe	11	28.85	3.494	0.001	1248
60.00	ACUTIME 2000	11	16.93	2.648	0.001	1062

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	155 - 115.5 (1)	TP29.308x22x0.25	39.50	0.00	0.0	36.00	22.5070	-6.72	810.25	0.008
L2	115.5 - 79.25 (2)	TP35.514x28.1142x0.3125	40.00	0.00	0.0	39.00	34.0898	-13.27	1329.50	0.010
L3	79.25 - 43.75 (3)	TP41.456x34.0565x0.375	40.00	0.00	0.0	39.00	47.7407	-22.17	1861.89	0.012
L4	43.75 - 0 (4)	TP48.8x39.7348x0.4375	49.00	0.00	0.0	39.00	67.1574	-35.86	2619.14	0.014

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	155 - 115.5 (1)	TP29.308x22x0.25	321.24	24.49	36.00	0.680	0.00	0.00	36.00	0.000
L2	115.5 - 79.25 (2)	TP35.514x28.1142x0.3125	936.18	38.91	39.00	0.998	0.00	0.00	39.00	0.000
L3	79.25 - 43.75 (3)	TP41.456x34.0565x0.375	1760.09	44.77	39.00	1.148	0.00	0.00	39.00	0.000
L4	43.75 - 0 (4)	TP48.8x39.7348x0.4375	3091.28	46.34	39.00	1.188	0.00	0.00	39.00	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	155 - 115.5 (1)	TP29.308x22x0.25	12.45	0.55	24.00	0.046	0.44	0.02	24.00	0.001
L2	115.5 - 79.25 (2)	TP35.514x28.1142x0.3125	19.76	0.58	26.00	0.045	0.41	0.01	26.00	0.000
L3	79.25 - 43.75 (3)	TP41.456x34.0565x0.375	25.57	0.54	26.00	0.041	0.20	0.00	26.00	0.000
L4	43.75 - 0 (4)	TP48.8x39.7348x0.4375	28.67	0.43	26.00	0.033	0.14	0.00	26.00	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	155 - 115.5 (1)	0.008	0.680	0.000	0.046	0.001	0.689 ✓	1.333	H1-3+VT ✓
L2	115.5 - 79.25 (2)	0.010	0.998	0.000	0.045	0.000	1.008 ✓	1.333	H1-3+VT ✓
L3	79.25 - 43.75 (3)	0.012	1.148	0.000	0.041	0.000	1.160 ✓	1.333	H1-3+VT ✓
L4	43.75 - 0 (4)	0.014	1.188	0.000	0.033	0.000	1.202 ✓	1.333	H1-3+VT ✓

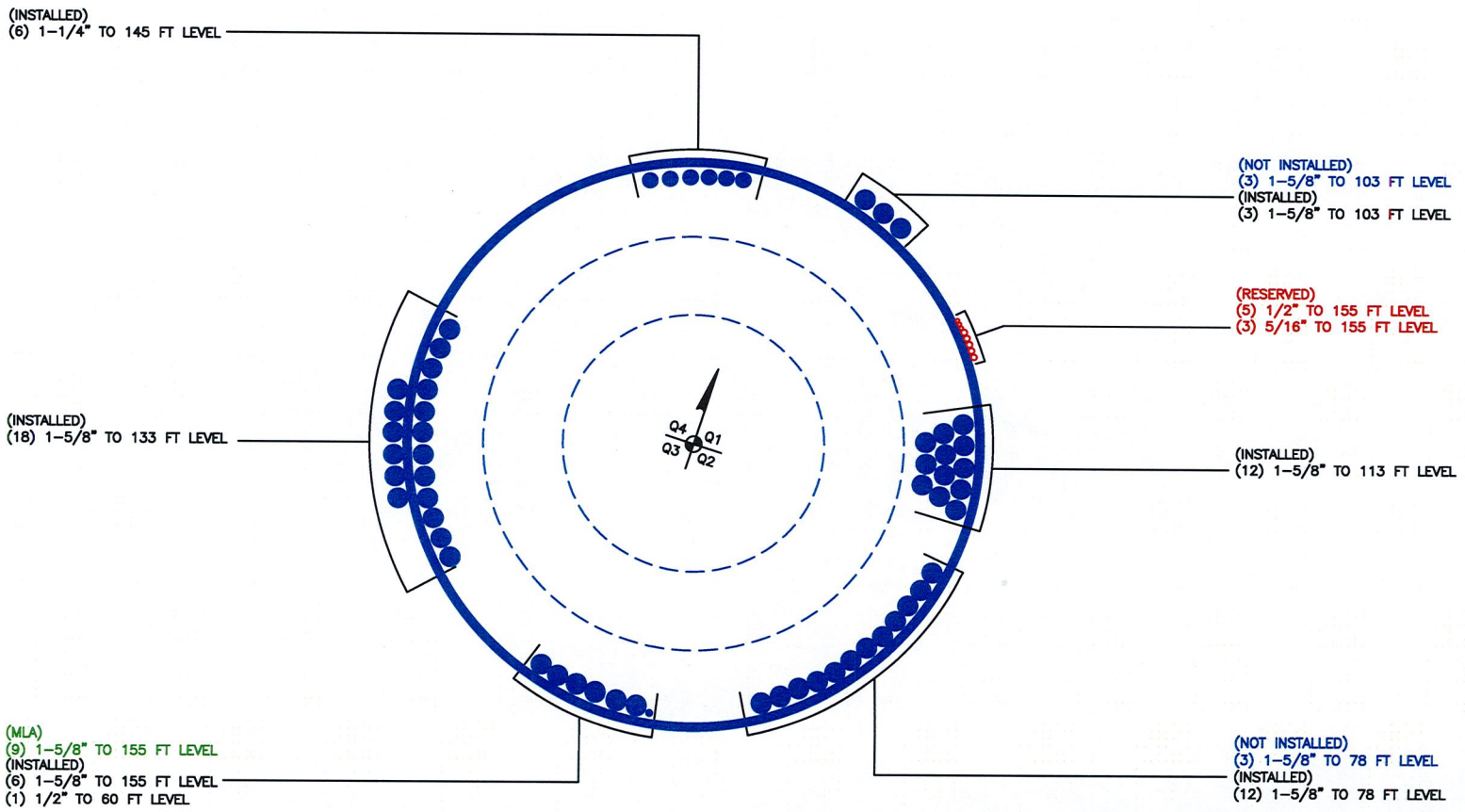
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	155 - 115.5	Pole	TP29.308x22x0.25	1	-6.72	1080.07	51.7	Pass
L2	115.5 - 79.25	Pole	TP35.514x28.1142x0.3125	2	-13.27	1772.22	75.6	Pass
L3	79.25 - 43.75	Pole	TP41.456x34.0565x0.375	3	-22.17	2481.90	87.0	Pass
L4	43.75 - 0	Pole	TP48.8x39.7348x0.4375	4	-35.86	3491.31	90.2	Pass
							Summary	
						Pole (L4)	90.2	Pass
						RATING =	**90.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


TRUE


(INSTALLED)
(6) 1-1/4" TO 145 FT LEVEL
(NOT INSTALLED)
(3) 1-5/8" TO 103 FT LEVEL
(INSTALLED)
(3) 1-5/8" TO 103 FT LEVEL
(RESERVED)
(5) 1/2" TO 155 FT LEVEL
(3) 5/16" TO 155 FT LEVEL
(INSTALLED)
(18) 1-5/8" TO 133 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 113 FT LEVEL
Q4
Q1
Q3
Q2
(MLA)
(9) 1-5/8" TO 155 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 155 FT LEVEL
(1) 1/2" TO 60 FT LEVEL
(NOT INSTALLED)
(3) 1-5/8" TO 78 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 78 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Monopole Pier and Pad Foundation

BU # : 876347
Site Name: Buckland Mall
App. Number: 100032 Rev. 1

CROWN

Design Reactions		
Shear, S:	29	kips
Moment, M:	3091	ft-kips
Tower Height, H:	155	ft
Tower Weight, Wt:	36	kips
Base Diameter, BD:	4.067	ft

Foundation Dimensions		
Depth, D:	10	ft
Pad Width, W:	23	ft
Neglected Depth, N:	0	ft
Thickness, T:	3.00	ft
Pier Diameter, Pd:	7.00	ft
Ext. Above Grade, E:	0.50	ft
Clear Cover, Cc:	3.0	in

Soil Properties		
Soil Unit Weight, γ:	0.120	kcf
Bearing Capacity, Bc:	4.0	ksf
Angle of Friction, Φ:	30	deg
Cohesion, Co:	0.000	ksf
Passive Pressure, Pp:	0.000	kcf
Base Friction, μ:	0.20	

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

Rebar Properties		
Pier Rebar Size, Sp:	11	
Pier Rebar Quanity, mp:	32	18
Pad Rebar Size, Spad:	9	
Pad Rebar Quanity, mpad:	33	21
Pier Tie Size, St:	5	4
Tie Quanity, mt:	12	7

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	7	5.567	OK
Overturning (ft-kips)	7070.15	3395.50	OK
Shear Capacity (kips)	90.38	29.00	OK
Bearing (ksf)	3.99	3.38	OK
Pad Shear - 1-way (kips)	976.42	678.49	OK
Pad Shear - 2-way (kips)	1867.18	1033.84	OK
Pier Rebar Area (in^2)	49.92	27.71	OK
Pad Rebar Area (in^2)	33.00	20.30	OK
Pier Moment Capacity (k-ft)	5888.23	3308.50	OK
Pier Bar Spacing (in)	6.25	18 > s > 2	OK
Pad Bar Spacing (in)	7.27	18 > s > 2	OK
Pier Development Length (in)	87	33.44	OK
Pad Development Length (in)	33	33.44	Hooks!
Hook Development Length (in)	135.00	21.62	OK
Rebar Hook Length (in)	96.00	23.97	OK

	Modification Checks	Capacity/ Availability	Demand/ Limits	Check
79.5%	*Sleeve Rebar Area (in2):*	15.8	0.00	Not Used
48.0%	*Sleeve Moment Capacity (k-ft):*	5888.23	3308.50	Not Run
32.1%	*Sleeve Rebar Spacing (in):*	N/a	18 > s > 2	Not Used
84.8%	*Sleeve Tie Spacing (in):*	N/A	9 > s > 4.5	Not Used
69.5%	*Minimum Extra Thickness (in):*	0	0	Not Used
55.4%	*Pad Rebar Area-short (in2):*	0.44	0.00	Not Used
55.5%	*Pad Rebar Area-long (in2):*	0.44	0.00	Not Used
61.5%	*Pad Rebar Spacing-short (in):*	89.5	18 > s > 2	Not Used
56.2%	*Pad Rebar Spacing-long (in):*	89.5	18 > s > 2	Not Used
	End Cap Width (ft):	0	0	Not Used
	End Cap Rebar Area (in2):	3.16	0	Not Used
38.4%	*Rebar Spacing (in):*	-3.00	18 > s > 2	Not Used
	Tie Spacing (in):	18.79	270 > s > 4.5	Not Used
16.0%	*Dowel Area (in2):*	2.2	0.00	Not Used
25.0%	*Dowel Embedment (in):*	9	6	Not Used
	Cone Shear Strength (kips):	24.68	23.76	Not Used
	Dowel Edge Dist (in):	12.00	4.78	Not Used
	Dowel Spacing (in):	63.00	18.00	Not Used
	Dowel Edge Dist (vert) (in):	18.00	4.78	Not Used
	Dowel Devel. Length (in):	-3.00	15.38	Not Used

Modifications					
Pier Sleeve, ds:	0	in	**End Cap Width, Wec:**	0	ft
Revised Pier Diameter, dx:	7	ft	**Revised Width, Wx:**	23	ft
PS Rebar Size, Ss:	8		**EC Rebar Size, Sec:**	8	per side, top & bottom
Rebar Quanity, ms:	20	0	**Rebar Quanity, mec:**	4	0
Tie Size, Sst:	3		**EC Tie Size, Sect:**	4	per side
Tie Quanity, mst:	9	12	**Tie Quanity, mect:**	15	0
Pad Thickness, Te:	0	in	**EC Dowel Size, Secd:**	6	per side
Revised Pier Thickness, Tx:	3.00	ft	**Dowel Quanity, mecd:**	5	0
Rebar Size, Se:	3		**Rows of Dowels, Nd:**	1	
Rebar Quanity (long), me:	4	0	**Dowel Depth, decd:**	9	in
Rebar Quanity (short), mex:	4	0	**Edge Distance, eecd:**	12	in
Dowel Size, Sed:	3				
Dowel Quanity, med:	0	0			

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

Assumptions: Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48.
Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)

Site Data

BU#: *876347*
Site Name: *Buckland Mall*
App #: *100032 Rev.1*

Reactions		
Moment:	3091	ft-kips
Axial:	36	kips
Shear:	29	kips

Connection Type:	*Butt*

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Grade(Fy):	75	ksi
Bolt Circle:	56	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	55	in
Thick:	3.25	in
Grade:	50	ksi
B effective	28.98	in

Pole Data		
Diam:	48.8	in
Thick:	0.4375	in
Grade:	65	ksi

Stress Increase Factor		
ASIF:	1.333	

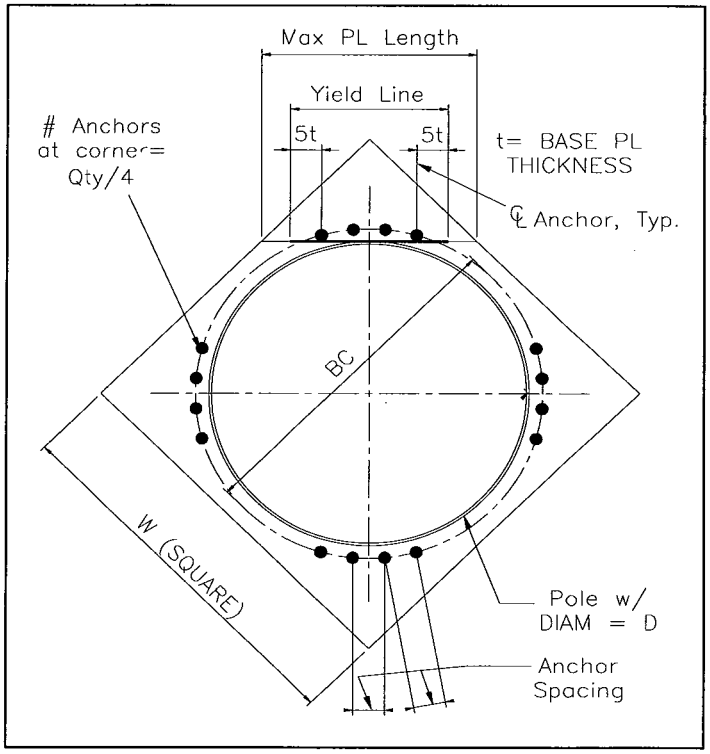
Anchor Rod Results

Maximum Rod Tension:	163.3 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	83.8% **Pass**

Base Plate Results

Base Plate Stress:	36.0 ksi
Allowable Plate Stress:	50.0 ksi
Base Plate Stress Ratio:	72.0% **Pass**

PL Ref. Data
Yield Line (in):
28.98
Max PL Length:
28.98



Maximum Allowable Moment of a Circular Pier

Axial Load (Negative for Compression) = -36.00 kips

Pier Properties

Concrete:

Pier Diameter = 7.0 ft

Concrete Area = 5541.8 in^2

Reinforcement:

Clear Cover = 3.00 in

Cage Diameter = 6.38 ft

Bar Size = 11

Bar Diameter = 1.41 in

Bar Area = 1.56 in^2

Number of Bars = 32

Material Properties

Concrete compressive strength = 3000 psi

Reinforcement yield strength = 60000 psi

Modulus of elasticity = 29000 ksi

Reinforcement yield strain = 0.00207

Limiting compressive strain = 0.003

Seismic Properties

Seismic Zone = 1

Minimum Area of Steel

Required area of steel = 27.71 in^2

Provided area of steel = 49.92 in^2 **OK**

Axial Loading

Load factor = 1.3

Reduction factor = 0.9

Factored axial load = -52 kips

Neutral Axis

Distance from extreme edge to neutral axis =	16.41	in
Equivalent compression zone factor =	0.85	
Distance from extreme edge to equivalent compression zone factor =	13.95	in
Distance from centroid to neutral axis =	25.59	in

Compression Zone

Area of steel in compression zone =	10.92	in^2
Angle from centroid of pier to intersection of equivalent compression zone and edge of pier =	48.09	deg
Area of concrete in compression =	603.84	in^2
Force in concrete = 0.85 * f`c * Acc =	1539.80	kips
Total reinforcement forces =	-1487.79	kips
Factored axial load =	-52.00	kips
Force in concrete =	-1539.79	kips
Sum of the forces in concrete =	0.00	kips **OK**

Maximum Moment

First moment of the concrete area in compression about the centoid =	20361.06	in^3
Distance between centroid of concrete in compression and centroid of pier =	33.72	in
Moment of concrete in compression =	51920.70	in-kips
Total reinforcement moment =	50142.02	in-kips
Nominal moment strength of column =	102062.72	in-kips
Factored moment strength of column =	70658.81	in-kips

Maximum Allowable Moment = 5888.23 ft-kips

Individual Bars

Bar #	Angle from first bar (deg)	Distance to centroid (in)	Distance to neutral axis (in)	Distance to equivalent comp. zone (in)	Strain	Area of steel in compression (in^2)	Stress (ksi)	Axial force (kips)
1	0.00	0.00	-25.59	-28.05	-0.0046786	0.00	-60.00	-93.60
2	11.25	7.47	-18.12	-20.58	-0.0033127	0.00	-60.00	-93.60
3	22.50	14.65	-10.94	-13.40	-0.0019994	0.00	-57.98	-90.45
4	33.75	21.28	-4.32	-6.78	-0.0007889	0.00	-22.88	-35.69
5	45.00	27.08	1.49	-0.97	0.000272	0.00	7.89	12.31
6	56.25	31.84	6.25	3.79	0.0011427	1.56	33.14	47.72
7	67.50	35.38	9.79	7.33	0.0017897	1.56	51.90	76.99
8	78.75	37.56	11.97	9.51	0.0021881	1.56	60.00	89.62
9	90.00	38.30	12.70	10.24	0.0023226	1.56	60.00	89.62
10	101.25	37.56	11.97	9.51	0.0021881	1.56	60.00	89.62
11	112.50	35.38	9.79	7.33	0.0017897	1.56	51.90	76.99
12	123.75	31.84	6.25	3.79	0.0011427	1.56	33.14	47.72
13	135.00	27.08	1.49	-0.97	0.000272	0.00	7.89	12.31
14	146.25	21.28	-4.32	-6.78	-0.0007889	0.00	-22.88	-35.69
15	157.50	14.65	-10.94	-13.40	-0.0019994	0.00	-57.98	-90.45
16	168.75	7.47	-18.12	-20.58	-0.0033127	0.00	-60.00	-93.60
17	180.00	0.00	-25.59	-28.05	-0.0046786	0.00	-60.00	-93.60
18	191.25	-7.47	-33.06	-35.52	-0.0060445	0.00	-60.00	-93.60
19	202.50	-14.65	-40.25	-42.71	-0.0073579	0.00	-60.00	-93.60
20	213.75	-21.28	-46.87	-49.33	-0.0085683	0.00	-60.00	-93.60
21	225.00	-27.08	-52.67	-55.13	-0.0096293	0.00	-60.00	-93.60
22	236.25	-31.84	-57.43	-59.89	-0.0105	0.00	-60.00	-93.60
23	247.50	-35.38	-60.97	-63.43	-0.0111469	0.00	-60.00	-93.60
24	258.75	-37.56	-63.15	-65.61	-0.0115454	0.00	-60.00	-93.60
25	270.00	-38.30	-63.89	-66.35	-0.0116799	0.00	-60.00	-93.60
26	281.25	-37.56	-63.15	-65.61	-0.0115454	0.00	-60.00	-93.60
27	292.50	-35.38	-60.97	-63.43	-0.0111469	0.00	-60.00	-93.60
28	303.75	-31.84	-57.43	-59.89	-0.0105	0.00	-60.00	-93.60
29	315.00	-27.08	-52.67	-55.13	-0.0096293	0.00	-60.00	-93.60
30	326.25	-21.28	-46.87	-49.33	-0.0085683	0.00	-60.00	-93.60
31	337.50	-14.65	-40.25	-42.71	-0.0073579	0.00	-60.00	-93.60
32	348.75	-7.47	-33.06	-35.52	-0.0060445	0.00	-60.00	-93.60