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March 26, 2012

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

Re: **Completion of Construction Activity**
EM-VER-009-111207 – Spring Hill Road, Bethel, Connecticut
EM-VER-014-111021 – 21 Acorn Road, Branford, Connecticut
EM-VER-023-120110 – 650 Albany Turnpike, Canton, Connecticut
EM-VER-032-111108 – 330 Middletown Road, Coventry , Connecticut
EM-VER-030-111005 – 400 Riley Mountain Road, Coventry, Connecticut
EM-VER-111-111213 – 297 North Adams Street, Plymouth, Connecticut
EM-VER-099-111101 – 83 Reeds Gap Road, North Branford, Connecticut

Dear Ms. Roberts:

The purpose of this letter is to notify you and the Connecticut Siting Council that construction activity associated with each of the above-referenced facility modification filings has now been completed.

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

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

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

November 25, 2011

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

RE: **EM-VER-032-111108** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 400 Reilly Mountain Road, Coventry, Connecticut.

Dear Attorney Baldwin:

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

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

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated November 4, 2011. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

Linda Roberts UHB

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable James E. Clark, Chairman Town Council, Town of Coventry
John A. Elsesser, Town Manager, Town of Coventry
Eric M. Trott, Director of Planning & Development, Town of Coventry
Crown Castle USA, Inc.

EM-VER-032-111108

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ORIGINAL

November 4, 2011

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

Re: **Notice of Exempt Modification – Antenna Swap**
400 Reilly Mountain Road, Coventry, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains wireless telecommunications antennas at the 126-foot level on the existing 152-foot tower at the above-referenced address. The tower is owned by Crown Castle. Cellco now intends to modify its installation by replacing all of its existing antennas with six (6) model LPA-80080/6CF cellular antennas; six (6) model LPA-171080-12CF PCS antennas; and three (3) BXA-70063/6CF LTE antennas, for a total of fifteen antennas, all at the same 126-foot level on the tower. Cellco also intends to install six (6) additional coax cables inside the monopole 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 John Elsesser, Town Manager of the Town of Coventry. A copy of this letter is also being sent to James and Concetta Wallbeoff, Trustees, the record owner of the property on which the tower is located.

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

1. The proposed modifications will not result in an increase in the overall height of the existing tower. Cellco's replacement antennas will be located at the same 126-foot level on the existing 152-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:
John Elsesser, Coventry Town Manager
James and Concetta Wallbeoff, Trustees
Sandy M. Carter

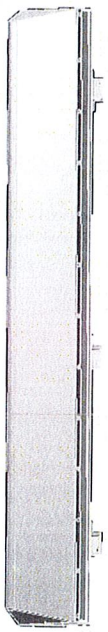
Amphenol ANTENNA SOLUTIONS

LPA-80080-6CF-EDIN-X

V-Pol | Log Periodic | 80° | 14.0 dBd

Replace "X" with desired electrical downtilt.

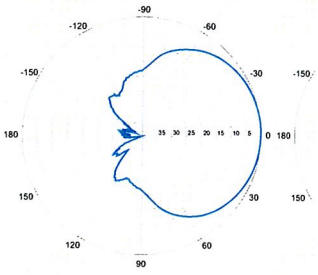
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.



Electrical Characteristics		
Frequency bands	806-960 MHz	
Polarization	Vertical	
Horizontal beamwidth	80°	
Vertical beamwidth	10°	
Gain	14.0 dBd (16.1 dBi)	
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.4:1	
Upper sidelobe suppression (0°)	-22.6 dB	
Null fill	10% (-20.0 dB)	
Input power	500 W	
Lightning protection	Direct Ground	
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1800 x 140 x 335 mm	70.9 x 5.5 x 13.2 in
Depth of antenna with z-bracket	375 mm	14.8 in
Weight without mounting brackets	9.5 kg	21.0 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.25 m² Side: 0.61 m²	Front: 2.7 ft² Side: 6.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 415 N Side: 878 N	Front: 93 lbf Side: 198 lbf

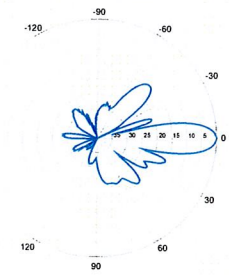
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit (0-20°)	21700000	50-102 mm 2.0-4.0 in	11 kg 25 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80080-6CF-EDIN-X



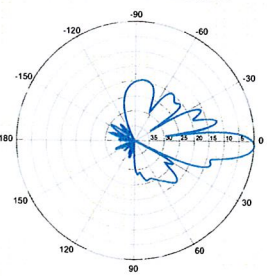
Horizontal | 750 MHz

LPA-80080-6CF-EDIN-0



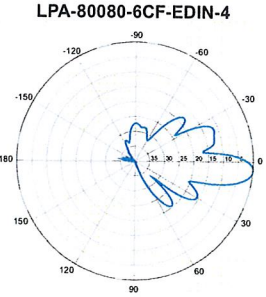
0° | Vertical

LPA-80080-6CF-EDIN-2



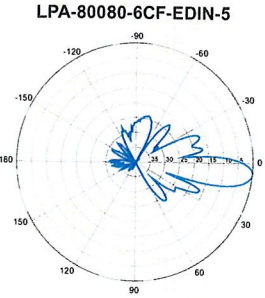
2° | Vertical

LPA-80080-6CF-EDIN-4



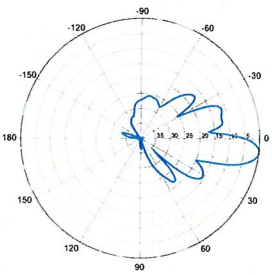
4° | Vertical

LPA-80080-6CF-EDIN-5



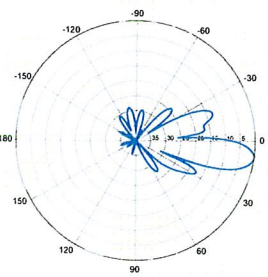
5° | Vertical

LPA-80080-6CF-EDIN-6



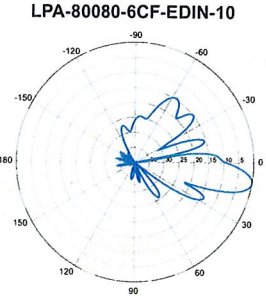
6° | Vertical

LPA-80080-6CF-EDIN-8



8° | Vertical

LPA-80080-6CF-EDIN-10



10° | Vertical

Amphenol ANTENNA SOLUTIONS

LPA-171080-12CF-EDIN-X

V-Pol | Log Periodic | 80° | 17.5 dBi

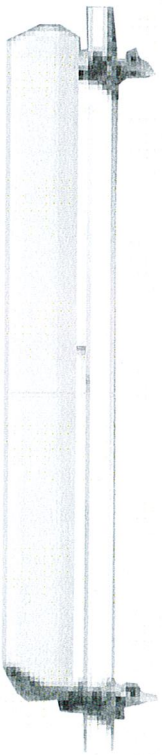
Replace "X" with desired electrical downtilt

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

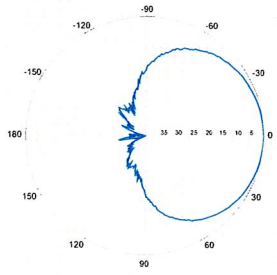
Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	Vertical		
Horizontal beamwidth	80°	82°	80°
Vertical beamwidth	3°	4°	3°
Gain	14.9 dBd (17.0 dBi)	15.4 dBd (17.5 dBi)	14.9 dBd (17.0 dBi)
Electrical downtilt (X)	0, 2		
Impedance	50Ω		
VSWR	≤ 1.5:1		
Null fill	5% (-26.02 dB)		
Input power	250 W		
Lightning protection	Direct Ground		
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)		

Mechanical Characteristics		
Dimensions Length x Width x Depth	1876 x 105 x 175 mm	73.9 x 4.1 x 6.9 in
Depth with +- Bracket	203 mm	8.0 in
Weight without mounting brackets	4.8 kg	11 lbs
Survival wind speed	>201 km/hr	>125 mph
Wind area	Front: 0.20 m² Side: 0.32 m²	Front: 2.1 ft² Side: 3.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 265 N Side: 504 N	Front: 60 lbf Side: 113 lbf

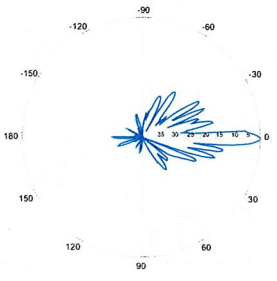
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5.0 lbs
2-Point Mounting and Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	2.3 kg 5.0 lbs



1710-1880 MHz

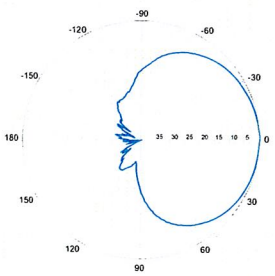


Horizontal

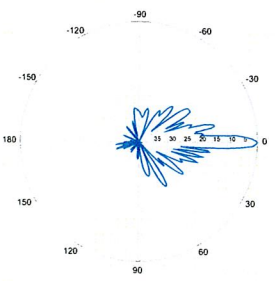


0° | Vertical

1850-1990 MHz

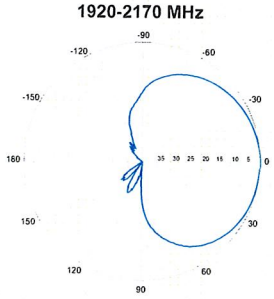


Horizontal



0° | Vertical

1920-2170 MHz



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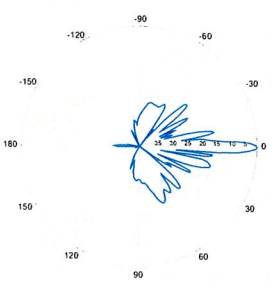
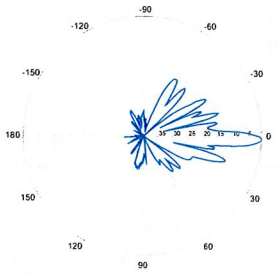


0° | Vertical

LPA-171080-12CF-EDIN-X

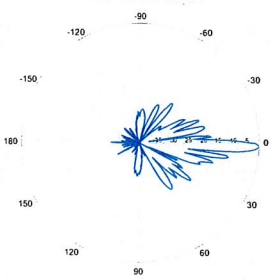
V-Pol | Log Periodic | 80° | 17.5 dBi

1710-1880 MHz



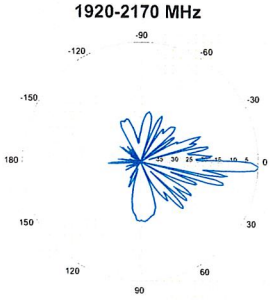
2° | Vertical

1850-1990 MHz



2° | Vertical

1920-2170 MHz



2° | Vertical

Amphenol ANTENNA SOLUTIONS

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

Replace "X" with desired electrical downtilt.

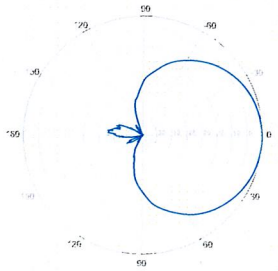
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	

Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

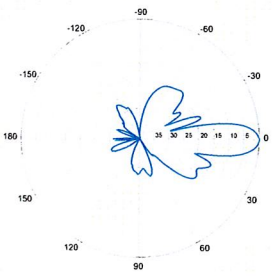
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting Bracket Kit	36210003	50-160 mm 2.0-6.3 in	6.3 kg 14 lbs
3-Point Downtilt Bracket Kit (0-14°)	36210004	50-160 mm 2.0-6.3 in	7.3 kg 16 lbs
Downtilt Mounting Applications	A mounting bracket and downtilt bracket kit must be ordered for downtilt applications		
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



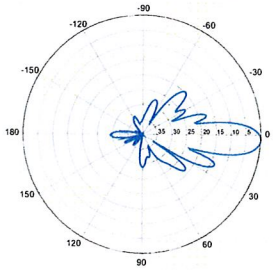
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

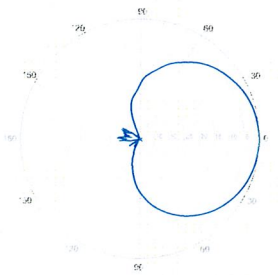


0° | Vertical | 750 MHz

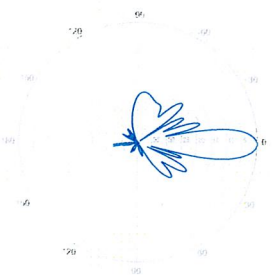
BXA-70063-6CF-EDIN-2



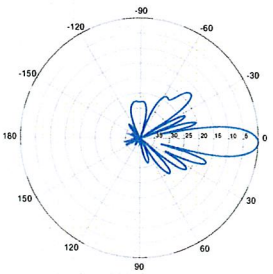
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

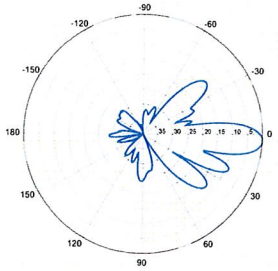


2° | Vertical | 850 MHz

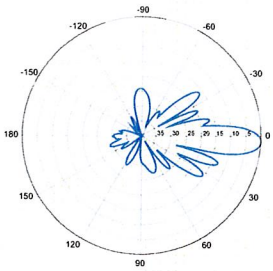
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

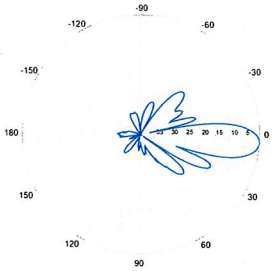


3° | Vertical | 750 MHz

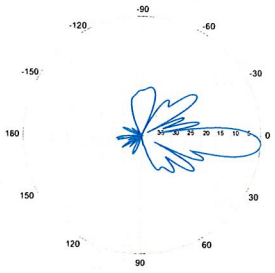


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

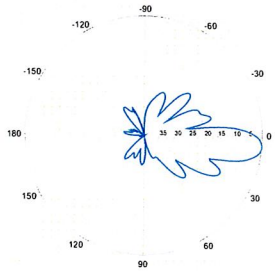


4° | Vertical | 750 MHz

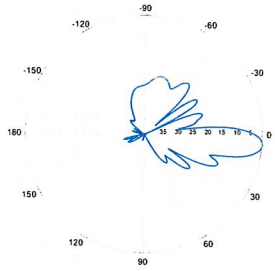


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5

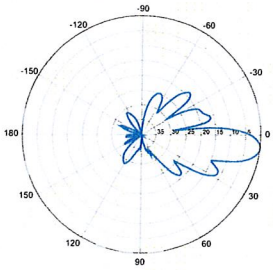


5° | Vertical | 750 MHz

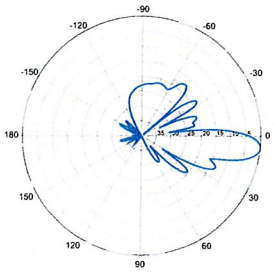


5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



6° | Vertical | 750 MHz



6° | Vertical | 850 MHz

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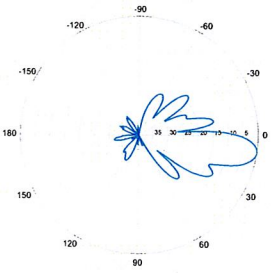
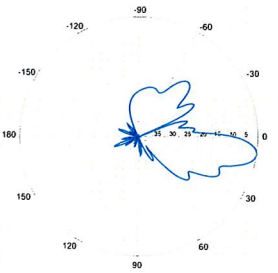


8° | Vertical | 750 MHz



8° | Vertical | 850 MHz

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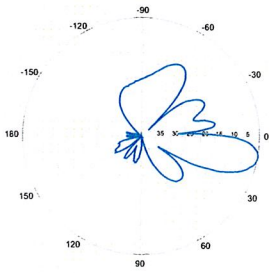
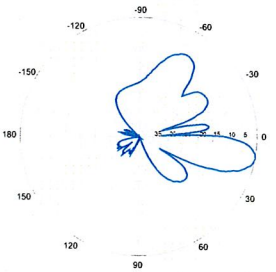


10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

	General	Power	Density					
Site Name: Coventry North								
Tower Height: Verizon @ 126ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	1	500	119	0.0127	880	0.5867	2.16%	
*AT&T GSM	4	296	119	0.0301	880	0.5867	5.12%	
*AT&T GSM	2	427	119	0.0217	1930	1.0000	2.17%	
*Pocket	3	631	107	0.0595	2130	1.0000	5.95%	
*Sprint	11	384	147	0.0703	1962.5	1.0000	7.03%	
*T-Mobile	8	246	137	0.0377	1935	1.0000	3.77%	
Verizon PCS	**7**	**228**	**126**	**0.0361**	**1970**	**1.0000**	**3.61%**	
Verizon Cellular	**9**	**305**	**126**	**0.0622**	**869**	**0.5793**	**10.73%**	
Verizon AWS	**1**	**571**	**126**	**0.0129**	**2145**	**1.0000**	**1.29%**	
Verizon 700	**2**	**713**	**126**	**0.0323**	**698**	**0.4653**	**6.94%**	
								48.78%
* Source: Siting Council								

Date: **September 27, 2011**

Eva Morales
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Name:	Coventry North, CT
Crown Castle Designation:	**Crown Castle BU Number:**	876385
	Crown Castle Site Name:	N. COVENTRY / WALLBEOFF
	Crown Castle JDE Job Number:	166874
	Crown Castle Work Order Number:	438487
Engineering Firm Designation:	**Crown Castle Project Number:**	438487
Site Data:	**Reilly Mtn. Rd., COVENTRY, Tolland County, CT** **Latitude *41° 47' 56.21"*, Longitude *-72° 19' 55.88"*** **152 Foot - Monopole Tower**	

Dear Eva Morales,

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 438487, in accordance with application 130979, 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 85 mph fastest mile.

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

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

Structural analysis prepared by: Jeffrey Fesko, E.I.T. / MDD

Respectfully submitted by:

Douglas K. Pineo, P.E.
Manager Structural Design

RISA Tower Report - version 5.4.2.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 152 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in November of 2007. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F. The tower was designed to be extendible to a height of 194 feet.

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 85 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
124	126	3	antel	BXA-70063/6CF-2 w/ Mount Pipe	6	1-5/8	-
		6	antel	LPA-171080-12CF-EDIN-2 w/ Mount Pipe			
		6	antel	LPA-80080/6CF 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
150	152	9	mla	MLA_ANTENNA w/ Mount Pipe	9	1-5/8	2
		6	decibel	DB980F90T2E-M w/ Mount Pipe	6	1-5/8	1
	150	1	tower mounts	Platform Mount [LP 601-1]			
133	136	3	ems wireless	RR90-17-02DP w/ Mount Pipe	6	1-5/8	1
		6	ericsson	KRY 112 71/2			
	133	1	tower mounts	Platform Mount [LP 303-1]			
124	126	6	decibel	DB846H80E-SX w/ Mount Pipe	-	-	3
		6	decibel	DB948F85E-M w/ Mount Pipe			
	124	1	tower mounts	Platform Mount [LP 303-1]	12	1-5/8	1
116	119	6	powerwave technologies	7770.00 w/ Mount Pipe	12	1-1/4	1
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21903			
	116	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
107	107	3	kathrein	742 213 w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 501-3]			
74	75	1	lucent	KS24019-L112A	1	1/2	1
	74	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing equipment
2) MLA equipment controlling; considered in analysis
3) Equipment to be removed; not considered in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
191.5	191.5	12	DAPA	48000	-	-
181.5	181.5	12	DAPA	48000	-	-
171.5	171.5	12	DAPA	48000	-	-
161.5	161.5	12	DAPA	48000	-	-
150	150	12	DAPA	48000	-	-
140	140	12	DAPA	48000	-	-
130	130	12	DAPA	48000	-	-
120	120	12	DAPA	48000	-	-
110	110	12	DAPA	48000	-	-
100	100	12	DAPA	48000	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Goodkind & O'Dea, Inc.	1531969	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors Incorporated	1441268	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors Incorporated	1614566	CCISITES

3.1) Analysis Method

RISATower (version 5.4.2.0), 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 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	152 - 137.422	Pole	TP37.31x33.03x0.3125	1	-2.76	1829.54	3.6	Pass
L2	137.422 - 91.0885	Pole	TP50.15x35.1681x0.375	2	-17.27	2956.95	23.6	Pass
L3	91.0885 - 44.7917	Pole	TP62.86x47.4121x0.4375	3	-31.82	4329.65	32.9	Pass
L4	44.7917 - 0	Pole	TP75x59.5378x0.5	4	-55.81	6146.50	35.5	Pass
							Summary	
						Pole (L4)	35.5	Pass
						Rating =	35.5	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	32.7	Pass
1	Base Plate	0	48.0	Pass
1	Base Foundation	0	60.9	Pass

Structure Rating (max from all components) =	60.9%

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

4.1) Recommendations

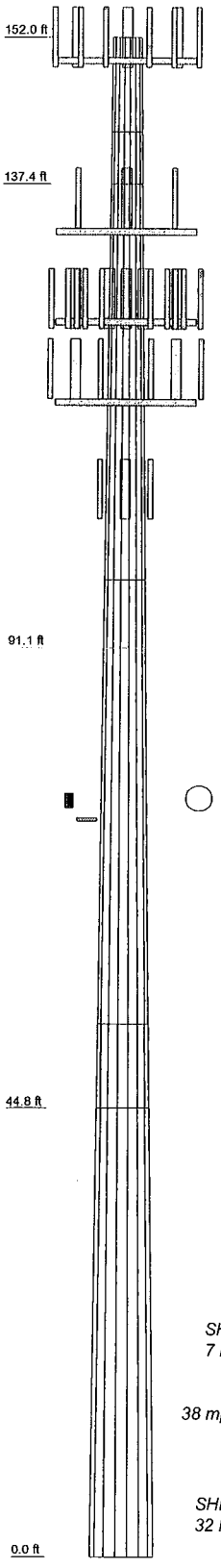
The tower and its base and anchor foundations have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

RISA TOWER OUTPUT

Section	1	2	3	4
Length (ft)	14.58	51.50	53.13	53.21
Number of Sides	18	18	18	18
Thickness (in)	0.3125	0.3750	0.4375	0.5000
Socket Length (ft)	5.17	6.83	8.42	
Top Dia (in)	33.0300	35.1681	47.4121	59.5378
Bot Dia (in)	37.3100	50.1500	62.8600	75.0000
Grade	A572-65			
Weight (K)	1.7	8.8	13.7	19.2

43.5



AXIAL
77 K

SHEAR
7 K

MOMENT
800 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 1.0000 in ICE

AXIAL
56 K

SHEAR
32 K

MOMENT
3261 kip-ft

TORQUE 0 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(3) MLA_ANTENNA w/ Mount Pipe	150	BXA-70063/6CF-2 w/ Mount Pipe	124
(3) MLA_ANTENNA w/ Mount Pipe	150	(2) LPA-171080-12CF-EDIN-2 w/ Mount Pipe	124
(3) MLA_ANTENNA w/ Mount Pipe	150	(2) LPA-80080/6CF w/ Mount Pipe	124
Platform Mount [LP 601-1]	150	Platform Mount [LP 303-1]	124
RR90-17-02DP w/ Mount Pipe	133	(2) 7770.00 w/ Mount Pipe	116
(2) KRY 112 71/2	133	(2) LGP21401	116
RR90-17-02DP w/ Mount Pipe	133	(2) LGP21903	116
(2) KRY 112 71/2	133	(2) 7770.00 w/ Mount Pipe	116
RR90-17-02DP w/ Mount Pipe	133	(2) LGP21401	116
(2) KRY 112 71/2	133	(2) LGP21903	116
4' x 2" Pipe Mount	133	(2) 7770.00 w/ Mount Pipe	116
4' x 2" Pipe Mount	133	(2) LGP21401	116
4' x 2" Pipe Mount	133	(2) LGP21903	116
Platform Mount [LP 303-1]	133	Platform Mount [LP 712-1]	116
BXA-70063/6CF-2 w/ Mount Pipe	124	742 213 w/ Mount Pipe	107
(2) LPA-171080-12CF-EDIN-2 w/ Mount Pipe	124	742 213 w/ Mount Pipe	107
(2) LPA-80080/6CF w/ Mount Pipe	124	742 213 w/ Mount Pipe	107
BXA-70063/6CF-2 w/ Mount Pipe	124	Pipe Mount [PM 501-3]	107
(2) LPA-171080-12CF-EDIN-2 w/ Mount Pipe	124	KS24019-L112A	74
(2) LPA-80080/6CF w/ Mount Pipe	124	Side Arm Mount [SO 701-1]	74

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 35.5%

CROWN CASTLE
We Are Solutions

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: 724-416-2000
FAX:

Job: **BU#876385**			
Project:			
Client: Crown Castle	Drawn by: JFesko		App'd:
Code: TIA/EIA-222-F	Date: 09/26/11		Scale: NTS
Path: R:\SA Models - Letters\Work Area\JFesko\876385\876385.eri			Dwg No. E-1

RISATower	Job	Page
	BU#876385	1 of 14
Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 Phone: 724-416-2000 FAX:	Project	Date 10:25:21 09/26/11
	Client Crown Castle	Designed by JFesko

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 Tolland County, Connecticut.
Basic wind speed of 85 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 38 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	152.00-137.42	14.58	5.17	18	33.0300	37.3100	0.3125	1.2500	A572-65 (65 ksi)
L2	137.42-91.09	51.50	6.83	18	35.1681	50.1500	0.3750	1.5000	A572-65 (65 ksi)
L3	91.09-44.79	53.13	8.42	18	47.4121	62.8600	0.4375	1.7500	A572-65 (65 ksi)
L4	44.79-0.00	53.21		18	59.5378	75.0000	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	33.5395	32.4517	4388.6882	11.6147	16.7792	261.5546	8783.1512	16.2289	5.2633	16.842
	37.8856	36.6969	6346.1675	13.1341	18.9535	334.8286	12700.6855	18.3519	6.0166	19.253
L2	37.2369	41.4125	6333.6723	12.3516	17.8654	354.5217	12675.6786	20.7102	5.5296	14.746
	50.9236	59.2447	18544.2574	17.6701	25.4762	727.9052	37112.9158	29.6280	8.1664	21.777
L3	50.1610	65.2301	18184.9474	16.6760	24.0854	755.0210	36393.8229	32.6213	7.5745	17.313
	63.8297	86.6814	42672.2855	22.1600	31.9329	1336.3118	85400.7203	43.3490	10.2934	23.528
L4	62.9399	93.6930	41257.7072	20.9584	30.2452	1364.1073	82569.7023	46.8554	9.5987	19.197
	76.1570	118.2315	82905.4718	26.4475	38.1000	2175.9966	165920.032 8	59.1270	12.3200	24.64

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 152.00-137.42				1	1	1		
L2 137.42-91.09				1	1	1		
L3 91.09-44.79				1	1	1		
L4 44.79-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	A	No	Inside Pole	150.00 - 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
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	133.00 - 0.00	6	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
***								
LDF7-50A(1-5/8")	A	No	Inside Pole	124.00 - 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
LDF7-50A(1-5/8")	A	No	Inside Pole	124.00 - 0.00	6	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
***								
LCF114-50J(1-1/4")	C	No	Inside Pole	116.00 - 0.00	12	No Ice	0.00	0.70
						1/2" Ice	0.00	0.70

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
						1" Ice	0.00	0.70
						2" Ice	0.00	0.70
						4" Ice	0.00	0.70
***								
AVA7-50(1-5/8")	C	No	Inside Pole	107.00 - 0.00	6	No Ice	0.00	0.70
						1/2" Ice	0.00	0.70
						1" Ice	0.00	0.70
						2" Ice	0.00	0.70
						4" Ice	0.00	0.70
***								
LDF4-50A(1/2")	A	No	Inside Pole	74.00 - 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

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	152.00-137.42	A	0.000	0.000	0.000	0.000	0.09
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	137.42-91.09	A	0.000	0.000	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.48
L3	91.09-44.79	A	0.000	0.000	0.000	0.000	1.03
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.81
L4	44.79-0.00	A	0.000	0.000	0.000	0.000	1.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.78

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	152.00-137.42	A	1.194	0.000	0.000	0.000	0.000	0.09
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	137.42-91.09	A	1.160	0.000	0.000	0.000	0.000	0.83
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.48
L3	91.09-44.79	A	1.090	0.000	0.000	0.000	0.000	1.03
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.81
L4	44.79-0.00	A	1.000	0.000	0.000	0.000	0.000	1.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.78

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	152.00-137.42	0.0000	0.0000	0.0000	0.0000
L2	137.42-91.09	0.0000	0.0000	0.0000	0.0000
L3	91.09-44.79	0.0000	0.0000	0.0000	0.0000
L4	44.79-0.00	0.0000	0.0000	0.0000	0.0000

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	0.0000	150.00	No Ice	8.64	6.95	0.07
				2.00			1/2" Ice	9.29	8.13	0.13
							1" Ice	9.91	9.02	0.21
							2" Ice	11.18	10.84	0.39
							4" Ice	13.83	14.85	0.90
(3) MLA_ANTENNA w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	150.00	No Ice	8.64	6.95	0.07
				2.00			1/2" Ice	9.29	8.13	0.13
							1" Ice	9.91	9.02	0.21
							2" Ice	11.18	10.84	0.39
							4" Ice	13.83	14.85	0.90
(3) MLA_ANTENNA w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	150.00	No Ice	8.64	6.95	0.07
				2.00			1/2" Ice	9.29	8.13	0.13
							1" Ice	9.91	9.02	0.21
							2" Ice	11.18	10.84	0.39
							4" Ice	13.83	14.85	0.90
Platform Mount [LP 601-1]	C	None			0.0000	150.00	No Ice	28.47	28.47	1.12
							1/2" Ice	33.59	33.59	1.51
							1" Ice	38.71	38.71	1.91
							2" Ice	48.95	48.95	2.69
							4" Ice	69.43	69.43	4.26
***										
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	133.00	No Ice	4.59	3.32	0.03
				3.00			1/2" Ice	5.09	4.09	0.07
							1" Ice	5.58	4.78	0.11
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56
(2) KRY 112 71/2	A	From Leg	4.00	0.00	0.0000	133.00	No Ice	0.68	0.45	0.01
				3.00			1/2" Ice	0.80	0.56	0.02
							1" Ice	0.93	0.68	0.03
							2" Ice	1.22	0.94	0.04
							4" Ice	1.90	1.57	0.11
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	133.00	No Ice	4.59	3.32	0.03
				3.00			1/2" Ice	5.09	4.09	0.07
							1" Ice	5.58	4.78	0.11
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56
(2) KRY 112 71/2	B	From Leg	4.00	0.00	0.0000	133.00	No Ice	0.68	0.45	0.01
				3.00			1/2" Ice	0.80	0.56	0.02
							1" Ice	0.93	0.68	0.03

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	1.22	0.94	0.04
						4" Ice	1.90	1.57	0.11
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.09 5.58 6.59 8.73	3.32 4.09 4.78 6.23 9.31	0.03 0.07 0.11 0.22 0.56
(2) KRY 112 71/2	C	From Leg	4.00 0.00 3.00	0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.68 0.80 0.93 1.22 1.90	0.45 0.56 0.68 0.94 1.57	0.01 0.02 0.03 0.04 0.11
4' x 2" Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.03 0.04 0.04 0.07 0.17
4' x 2" Pipe Mount	B	From Leg	4.00 0.00 0.00	0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.03 0.04 0.04 0.07 0.17
4' x 2" Pipe Mount	C	From Leg	4.00 0.00 0.00	0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.03 0.04 0.04 0.07 0.17
Platform Mount [LP 303-1]	C	None		0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.66 18.87 23.08 31.50 48.34	14.66 18.87 23.08 31.50 48.34	1.25 1.48 1.71 2.18 3.10
***									
BXA-70063/6CF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	124.00	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) LPA-171080-12CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.51 5.03 6.09 8.31	7.10 8.30 9.24 11.10 15.14	0.04 0.08 0.14 0.28 0.70
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
BXA-70063/6CF-2 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	124.00	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) LPA-171080-12CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.96 4.51 5.03 6.09	7.10 8.30 9.24 11.10	0.04 0.08 0.14 0.28

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	124.00	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.31 4.56 5.11 5.61 6.65 8.83	15.14 10.73 11.99 12.97 14.98 19.22	0.70 0.05 0.11 0.19 0.36 0.86
BXA-70063/6CF-2 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	124.00	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) LPA-171080-12CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.51 5.03 6.09 8.31	7.10 8.30 9.24 11.10 15.14	0.04 0.08 0.14 0.28 0.70
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
Platform Mount [LP 303-1]	C	None		0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.66 18.87 23.08 31.50 48.34	14.66 18.87 23.08 31.50 48.34	1.25 1.48 1.71 2.18 3.10
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	A	From Leg	4.00 0.00 3.00	0.0000	116.00	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
(2) LGP21903	A	From Leg	4.00 0.00 3.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	B	From Leg	4.00 0.00 3.00	0.0000	116.00	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
(2) LGP21903	B	From Leg	4.00 0.00 3.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07

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) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	C	From Leg	4.00 0.00 3.00	0.0000	116.00	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
(2) LGP21903	C	From Leg	4.00 0.00 3.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07
Platform Mount [LP 712-1]	C	None		0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
***									
742 213 w/ Mount Pipe	A	From Leg	1.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.14 0.28 0.68
742 213 w/ Mount Pipe	B	From Leg	1.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.14 0.28 0.68
742 213 w/ Mount Pipe	C	From Leg	1.00 0.00 0.00	0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.14 0.28 0.68
Pipe Mount [PM 501-3]	C	None		0.0000	107.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.78 7.37 8.96 12.14 18.50	5.78 7.37 8.96 12.14 18.50	0.16 0.18 0.20 0.24 0.32
***									
KS24019-L112A	C	From Leg	4.00 0.00 1.00	0.0000	74.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.10 0.18 0.26 0.42 0.74	0.10 0.18 0.26 0.42 0.74	0.01 0.01 0.01 0.01 0.02
Side Arm Mount [SO 701-1]	C	From Leg	2.00 0.00 0.00	0.0000	74.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.85 1.14 1.43 2.01 3.17	1.67 2.34 3.01 4.35 7.03	0.07 0.08 0.09 0.12 0.18

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	152 - 137.422	Pole	Max Tension	24	0.00	-0.00	0.00
			Max. Compression	14	-5.92	0.00	0.00
			Max. Mx	11	-2.76	46.39	-0.00
			Max. My	8	-2.76	0.00	-46.39
			Max. Vy	11	-5.67	46.39	-0.00
			Max. Vx	8	5.67	0.00	-46.39
			Max. Torque	2			-0.00
L2	137.422 - 91.0885	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.61	0.00	0.00
			Max. Mx	11	-17.27	667.82	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	8	-17.27	0.00	-667.83
			Max. Vy	11	-20.87	667.82	0.00
			Max. Vx	8	20.87	0.00	-667.83
			Max. Torque	2			-0.00
L3	91.0885 - 44.7917	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.94	0.40	-0.23
			Max. Mx	11	-31.82	1717.10	0.14
			Max. My	8	-31.82	-0.03	-1717.33
			Max. Vy	11	-26.05	1717.10	0.14
			Max. Vx	8	26.06	-0.03	-1717.33
			Max. Torque	13			0.31
L4	44.7917 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-76.88	0.40	-0.23
			Max. Mx	11	-55.81	3259.70	0.89
			Max. My	8	-55.81	-0.77	-3260.79
			Max. Vy	11	-31.95	3259.70	0.89
			Max. Vx	8	31.97	-0.77	-3260.79
			Max. Torque	13			0.31

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	76.88	0.00	0.00
	Max. H_x	11	55.82	31.94	0.01
	Max. H_z	2	55.82	0.01	31.95
	Max. M_x	2	3260.48	0.01	31.95
	Max. M_z	5	3259.16	-31.94	-0.01
	Max. Torsion	13	0.31	15.98	27.68
	Min. Vert	33	55.82	-0.00	-11.06
	Min. H_x	5	55.82	-31.94	-0.01
	Min. H_z	8	55.82	-0.01	-31.95
	Min. M_x	8	-3260.79	-0.01	-31.95
	Min. M_z	11	-3259.70	31.94	0.01
	Min. Torsion	7	-0.31	-15.98	-27.68

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	55.82	0.00	0.00	0.15	0.27	0.00
Dead+Wind 0 deg - No Ice	55.82	-0.01	-31.95	-3260.48	1.31	-0.27
Dead+Wind 30 deg - No Ice	55.82	15.96	-27.67	-2823.11	-1628.54	-0.15
Dead+Wind 60 deg - No Ice	55.82	27.65	-15.96	-1629.26	-2821.96	-0.00
Dead+Wind 90 deg - No Ice	55.82	31.94	0.01	1.20	-3259.16	0.15
Dead+Wind 120 deg - No Ice	55.82	27.67	15.99	1631.38	-2823.00	0.27
Dead+Wind 150 deg - No Ice	55.82	15.98	27.68	2824.47	-1630.35	0.31
Dead+Wind 180 deg - No Ice	55.82	0.01	31.95	3260.79	-0.77	0.27
Dead+Wind 210 deg - No Ice	55.82	-15.96	27.67	2823.43	1629.08	0.15
Dead+Wind 240 deg - No Ice	55.82	-27.65	15.96	1629.57	2822.50	-0.00

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+Wind 270 deg - No Ice	55.82	-31.94	-0.01	-0.89	3259.70	-0.15
Dead+Wind 300 deg - No Ice	55.82	-27.67	-15.99	-1631.06	2823.54	-0.27
Dead+Wind 330 deg - No Ice	55.82	-15.98	-27.68	-2824.16	1630.89	-0.31
Dead+Ice+Temp	76.88	0.00	0.00	0.23	0.40	0.00
Dead+Wind 0 deg+Ice+Temp	76.88	-0.01	-7.49	-799.58	0.82	-0.10
Dead+Wind 30 deg+Ice+Temp	76.88	3.74	-6.48	-692.22	-398.90	-0.06
Dead+Wind 60 deg+Ice+Temp	76.88	6.48	-3.74	-399.32	-691.64	-0.00
Dead+Wind 90 deg+Ice+Temp	76.88	7.48	0.01	0.65	-798.93	0.06
Dead+Wind 120 deg+Ice+Temp	76.88	6.48	3.75	400.51	-692.05	0.10
Dead+Wind 150 deg+Ice+Temp	76.88	3.75	6.49	693.11	-399.62	0.12
Dead+Wind 180 deg+Ice+Temp	76.88	0.00	7.49	800.06	-0.00	0.10
Dead+Wind 210 deg+Ice+Temp	76.88	-3.74	6.48	692.69	399.72	0.06
Dead+Wind 240 deg+Ice+Temp	76.88	-6.48	3.74	399.79	692.45	-0.00
Dead+Wind 270 deg+Ice+Temp	76.88	-7.48	-0.01	-0.18	799.75	-0.06
Dead+Wind 300 deg+Ice+Temp	76.88	-6.48	-3.75	-400.03	692.87	-0.10
Dead+Wind 330 deg+Ice+Temp	76.88	-3.75	-6.49	-692.64	400.44	-0.12
Dead+Wind 0 deg - Service	55.82	-0.00	-11.06	-1128.17	0.63	-0.09
Dead+Wind 30 deg - Service	55.82	5.52	-9.57	-976.82	-563.37	-0.05
Dead+Wind 60 deg - Service	55.82	9.57	-5.52	-563.70	-976.35	-0.00
Dead+Wind 90 deg - Service	55.82	11.05	0.00	0.52	-1127.64	0.05
Dead+Wind 120 deg - Service	55.82	9.57	5.53	564.63	-976.71	0.09
Dead+Wind 150 deg - Service	55.82	5.53	9.58	977.50	-564.00	0.11
Dead+Wind 180 deg - Service	55.82	0.00	11.06	1128.49	-0.09	0.09
Dead+Wind 210 deg - Service	55.82	-5.52	9.57	977.14	563.91	0.05
Dead+Wind 240 deg - Service	55.82	-9.57	5.52	564.01	976.89	-0.00
Dead+Wind 270 deg - Service	55.82	-11.05	-0.00	-0.20	1128.18	-0.05
Dead+Wind 300 deg - Service	55.82	-9.57	-5.53	-564.32	977.25	-0.09
Dead+Wind 330 deg - Service	55.82	-5.53	-9.58	-977.18	564.54	-0.11

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	-55.82	0.00	0.00	55.82	0.00	0.000%
2	-0.01	-55.82	-31.95	0.01	55.82	31.95	0.000%
3	15.96	-55.82	-27.67	-15.96	55.82	27.67	0.000%
4	27.65	-55.82	-15.96	-27.65	55.82	15.96	0.000%
5	31.94	-55.82	0.01	-31.94	55.82	-0.01	0.000%
6	27.67	-55.82	15.99	-27.67	55.82	-15.99	0.000%
7	15.98	-55.82	27.68	-15.98	55.82	-27.68	0.000%
8	0.01	-55.82	31.95	-0.01	55.82	-31.95	0.000%
9	-15.96	-55.82	27.67	15.96	55.82	-27.67	0.000%
10	-27.65	-55.82	15.96	27.65	55.82	-15.96	0.000%
11	-31.94	-55.82	-0.01	31.94	55.82	0.01	0.000%
12	-27.67	-55.82	-15.99	27.67	55.82	15.99	0.000%
13	-15.98	-55.82	-27.68	15.98	55.82	27.68	0.000%
14	0.00	-76.88	0.00	0.00	76.88	0.00	0.000%
15	-0.01	-76.88	-7.49	0.01	76.88	7.49	0.000%
16	3.74	-76.88	-6.48	-3.74	76.88	6.48	0.000%
17	6.48	-76.88	-3.74	-6.48	76.88	3.74	0.000%
18	7.48	-76.88	0.01	-7.48	76.88	-0.01	0.000%
19	6.48	-76.88	3.75	-6.48	76.88	-3.75	0.000%
20	3.75	-76.88	6.49	-3.75	76.88	-6.49	0.000%
21	0.01	-76.88	7.49	-0.00	76.88	-7.49	0.004%
22	-3.74	-76.88	6.48	3.74	76.88	-6.48	0.000%
23	-6.48	-76.88	3.74	6.48	76.88	-3.74	0.000%
24	-7.48	-76.88	-0.01	7.48	76.88	0.01	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
25	-6.48	-76.88	-3.75	6.48	76.88	3.75	0.000%
26	-3.75	-76.88	-6.49	3.75	76.88	6.49	0.000%
27	-0.00	-55.82	-11.06	0.00	55.82	11.06	0.000%
28	5.52	-55.82	-9.57	-5.52	55.82	9.57	0.000%
29	9.57	-55.82	-5.52	-9.57	55.82	5.52	0.000%
30	11.05	-55.82	0.00	-11.05	55.82	-0.00	0.000%
31	9.57	-55.82	5.53	-9.57	55.82	-5.53	0.000%
32	5.53	-55.82	9.58	-5.53	55.82	-9.58	0.000%
33	0.00	-55.82	11.06	-0.00	55.82	-11.06	0.000%
34	-5.52	-55.82	9.57	5.52	55.82	-9.57	0.000%
35	-9.57	-55.82	5.52	9.57	55.82	-5.52	0.000%
36	11.05	-55.82	-0.00	11.05	55.82	0.00	0.000%
37	-9.57	-55.82	-5.53	9.57	55.82	5.53	0.000%
38	-5.53	-55.82	-9.58	5.53	55.82	9.58	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	0.00000832
3	Yes	4	0.00000001	0.00017031
4	Yes	4	0.00000001	0.00017091
5	Yes	4	0.00000001	0.00000810
6	Yes	4	0.00000001	0.00017213
7	Yes	4	0.00000001	0.00016991
8	Yes	4	0.00000001	0.00000828
9	Yes	4	0.00000001	0.00017161
10	Yes	4	0.00000001	0.00017102
11	Yes	4	0.00000001	0.00000808
12	Yes	4	0.00000001	0.00017010
13	Yes	4	0.00000001	0.00017231
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00018267
16	Yes	4	0.00000001	0.00018709
17	Yes	4	0.00000001	0.00018704
18	Yes	4	0.00000001	0.00018256
19	Yes	4	0.00000001	0.00018723
20	Yes	4	0.00000001	0.00018730
21	Yes	4	0.00000001	0.00018280
22	Yes	4	0.00000001	0.00018735
23	Yes	4	0.00000001	0.00018733
24	Yes	4	0.00000001	0.00018279
25	Yes	4	0.00000001	0.00018734
26	Yes	4	0.00000001	0.00018733
27	Yes	4	0.00000001	0.00000341
28	Yes	4	0.00000001	0.00001049
29	Yes	4	0.00000001	0.00001056
30	Yes	4	0.00000001	0.00000339
31	Yes	4	0.00000001	0.00001071
32	Yes	4	0.00000001	0.00001044
33	Yes	4	0.00000001	0.00000341
34	Yes	4	0.00000001	0.00001065
35	Yes	4	0.00000001	0.00001058
36	Yes	4	0.00000001	0.00000340
37	Yes	4	0.00000001	0.00001046

38	Yes	4	0.00000001	0.00001073

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	152 - 137.422	8.958	33	0.4793	0.0001
L2	142.589 - 91.0885	8.016	33	0.4756	0.0001
L3	97.9219 - 44.7917	3.916	33	0.3731	0.0001
L4	53.2083 - 0	1.167	33	0.1976	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	(3) MLA_ANTENNA w/ Mount Pipe	33	8.758	0.4787	0.0001	134253
133.00	RR90-17-02DP w/ Mount Pipe	33	7.070	0.4651	0.0001	42067
124.00	BXA-70063/6CF-2 w/ Mount Pipe	33	6.207	0.4486	0.0001	30373
116.00	(2) 7770.00 w/ Mount Pipe	33	5.465	0.4293	0.0001	24354
107.00	742 213 w/ Mount Pipe	33	4.669	0.4032	0.0001	19914
74.00	KS24019-L112A	33	2.225	0.2817	0.0000	13444

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	152 - 137.422	25.882	7	1.3847	0.0002
L2	142.589 - 91.0885	23.160	7	1.3741	0.0002
L3	97.9219 - 44.7917	11.314	7	1.0779	0.0002
L4	53.2083 - 0	3.373	7	0.5710	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	(3) MLA_ANTENNA w/ Mount Pipe	7	25.302	1.3833	0.0002	46517
133.00	RR90-17-02DP w/ Mount Pipe	7	20.428	1.3438	0.0002	14574
124.00	BXA-70063/6CF-2 w/ Mount Pipe	7	17.932	1.2962	0.0002	10521
116.00	(2) 7770.00 w/ Mount Pipe	7	15.791	1.2405	0.0002	8436
107.00	742 213 w/ Mount Pipe	7	13.491	1.1651	0.0002	6898
74.00	KS24019-L112A	7	6.430	0.8138	0.0001	4655

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	152 - 137.422 (1)	TP37.31x33.03x0.3125	14.58	0.00	0.0	39.000	35.1923	-2.76	1372.50	0.002
L2	137.422 - 91.0885 (2)	TP50.15x35.1681x0.375	51.50	0.00	0.0	39.000	56.8786	-17.27	2218.27	0.008
L3	91.0885 - 44.7917 (3)	TP62.86x47.4121x0.4375	53.13	0.00	0.0	39.000	83.2832	-31.82	3248.05	0.010
L4	44.7917 - 0 (4)	TP75x59.5378x0.5	53.21	0.00	0.0	39.000	118.2310	-55.81	4611.03	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	152 - 137.422 (1)	TP37.31x33.03x0.3125	46.39	1.809	39.000	0.046	0.00	0.000	39.000	0.000
L2	137.422 - 91.0885 (2)	TP50.15x35.1681x0.375	667.83	11.948	39.000	0.306	0.00	0.000	39.000	0.000
L3	91.0885 - 44.7917 (3)	TP62.86x47.4121x0.4375	1717.34	16.711	39.000	0.428	0.00	0.000	39.000	0.000
L4	44.7917 - 0 (4)	TP75x59.5378x0.5	3261.23	17.985	39.000	0.461	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	152 - 137.422 (1)	TP37.31x33.03x0.3125	5.67	0.161	26.000	0.012	0.00	0.000	26.000	0.000
L2	137.422 - 91.0885 (2)	TP50.15x35.1681x0.375	20.87	0.367	26.000	0.028	0.00	0.000	26.000	0.000
L3	91.0885 - 44.7917 (3)	TP62.86x47.4121x0.4375	26.07	0.313	26.000	0.024	0.31	0.001	26.000	0.000
L4	44.7917 - 0 (4)	TP75x59.5378x0.5	31.97	0.270	26.000	0.021	0.31	0.001	26.000	0.000

Pole Interaction Design Data

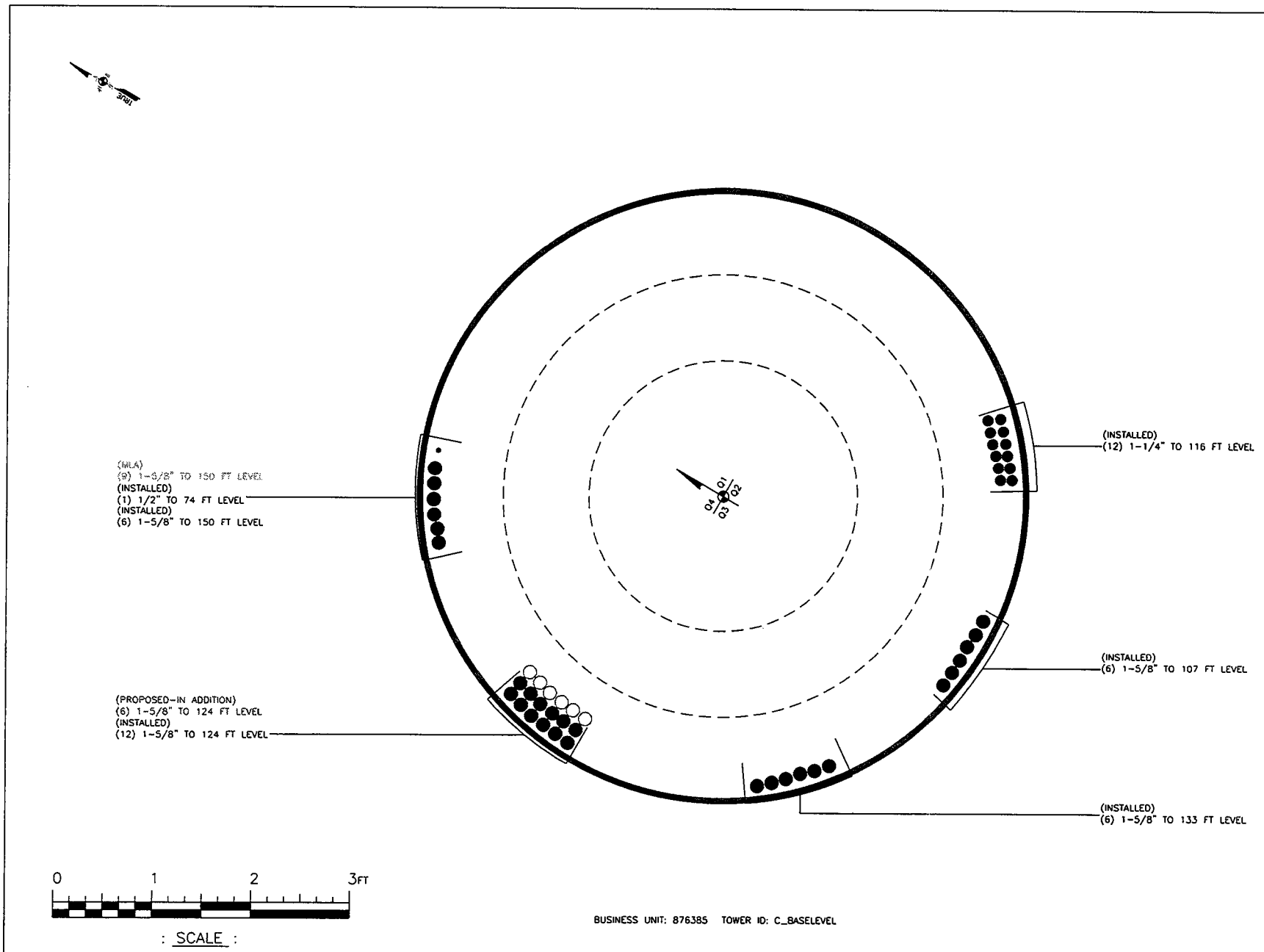
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	152 - 137.422 (1)	0.002	0.046	0.000	0.012	0.000	0.048 ✔	1.333	H1-3+VT ✔
L2	137.422 - 91.0885 (2)	0.008	0.306	0.000	0.028	0.000	0.314 ✔	1.333	H1-3+VT ✔
L3	91.0885 - 44.7917 (3)	0.010	0.428	0.000	0.024	0.000	0.438 ✔	1.333	H1-3+VT ✔
L4	44.7917 - 0 (4)	0.012	0.461	0.000	0.021	0.000	0.473 ✔	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	152 - 137.422	Pole	TP37.31x33.03x0.3125	1	-2.76	1829.54	3.6	Pass
L2	137.422 - 91.0885	Pole	TP50.15x35.1681x0.375	2	-17.27	2956.95	23.6	Pass
L3	91.0885 - 44.7917	Pole	TP62.86x47.4121x0.4375	3	-31.82	4329.65	32.9	Pass
L4	44.7917 - 0	Pole	TP75x59.5378x0.5	4	-55.81	6146.50	35.5	Pass
							Summary	
						Pole (L4)	35.5	Pass
						RATING =	**35.5**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876385 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Maximum Allowable Moment of a Circular Pier

Axial Load (Negative for Compression) = -56.00 kips

Pier Properties

Concrete:

Pier Diameter = 9.0 ft

Concrete Area = 9160.9 in^2

Reinforcement:

Clear Cover = 3.00 in

Cage Diameter = 8.42 ft

Bar Size = 8

Bar Diameter = 1.00 in

Bar Area = 0.79 in^2

Number of Bars = 62

Material Properties

Concrete compressive strength = 4000 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 = 45.80 in^2

Provided area of steel = 48.98 in^2 **OK**

Axial Loading

Load factor = 1.3

Reduction factor = 0.9

Factored axial load = -80.8889 kips

Neutral Axis

Distance from extreme edge to neutral axis =	12.89	in
Equivalent compression zone factor =	0.85	
Distance from extreme edge to equivalent compression zone factor =	10.96	in
Distance from centroid to neutral axis =	41.11	in

Compression Zone

Area of steel in compression zone =	7.90	in^2
Angle from centroid of pier to intersection of equivalent compression zone and edge of pier =	37.14	deg
Area of concrete in compression =	486.85	in^2
Force in concrete = 0.85 * f'c * Acc =	1655.29	kips
Total reinforcement forces =	-1574.40	kips
Factored axial load =	-80.89	kips
Force in concrete =	-1655.29	kips
Sum of the forces in concrete =	0.00	kips **OK**

Maximum Moment

First moment of the concrete area in compression about the centoid =	23109.51	in^3
Distance between centroid of concrete in compression and centroid of pier =	47.47	in
Moment of concrete in compression =	78572.34	in-kips
Total reinforcement moment =	45534.13	in-kips
Nominal moment strength of column =	124106.48	in-kips
Factored moment strength of column =	85919.87	in-kips

Maximum Allowable Moment = 7159.99 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	-41.11	-43.04	-0.0095695	0.00	-60.00	-47.40
2	5.81	5.11	-36.00	-37.94	-0.0083803	0.00	-60.00	-47.40
3	11.61	10.17	-30.95	-32.88	-0.0072033	0.00	-60.00	-47.40
4	17.42	15.12	-25.99	-27.93	-0.0060506	0.00	-60.00	-47.40
5	23.23	19.91	-21.20	-23.13	-0.0049339	0.00	-60.00	-47.40
6	29.03	24.51	-16.60	-18.54	-0.0038649	0.00	-60.00	-47.40
7	34.84	28.85	-12.26	-14.20	-0.0028544	0.00	-60.00	-47.40
8	40.65	32.89	-8.22	-10.15	-0.0019127	0.00	-55.47	-43.82
9	46.45	36.60	-4.51	-6.44	-0.0010497	0.00	-30.44	-24.05
10	52.26	39.93	-1.18	-3.11	-0.0002741	0.00	-7.95	-6.28
11	58.06	42.86	1.74	-0.19	0.0004061	0.00	11.78	9.30
12	63.87	45.34	4.23	2.29	0.000984	0.79	28.54	19.86
13	69.68	47.36	6.24	4.31	0.0014536	0.79	42.15	30.62
14	75.48	48.89	7.78	5.84	0.0018101	0.79	52.49	38.78
15	81.29	49.92	8.81	6.87	0.0020498	0.79	59.44	44.27
16	87.10	50.44	9.32	7.39	0.0021702	0.79	60.00	44.71
17	92.90	50.44	9.32	7.39	0.0021702	0.79	60.00	44.71
18	98.71	49.92	8.81	6.87	0.0020498	0.79	59.44	44.27
19	104.52	48.89	7.78	5.84	0.0018101	0.79	52.49	38.78
20	110.32	47.36	6.24	4.31	0.0014536	0.79	42.15	30.62
21	116.13	45.34	4.23	2.29	0.000984	0.79	28.54	19.86
22	121.94	42.86	1.74	-0.19	0.0004061	0.00	11.78	9.30
23	127.74	39.93	-1.18	-3.11	-0.0002741	0.00	-7.95	-6.28
24	133.55	36.60	-4.51	-6.44	-0.0010497	0.00	-30.44	-24.05
25	139.35	32.89	-8.22	-10.15	-0.0019127	0.00	-55.47	-43.82
26	145.16	28.85	-12.26	-14.20	-0.0028544	0.00	-60.00	-47.40
27	150.97	24.51	-16.60	-18.54	-0.0038649	0.00	-60.00	-47.40
28	156.77	19.91	-21.20	-23.13	-0.0049339	0.00	-60.00	-47.40
29	162.58	15.12	-25.99	-27.93	-0.0060506	0.00	-60.00	-47.40
30	168.39	10.17	-30.95	-32.88	-0.0072033	0.00	-60.00	-47.40
31	174.19	5.11	-36.00	-37.94	-0.0083803	0.00	-60.00	-47.40
32	180.00	0.00	-41.11	-43.04	-0.0095695	0.00	-60.00	-47.40
33	185.81	-5.11	-46.22	-48.15	-0.0107587	0.00	-60.00	-47.40
34	191.61	-10.17	-51.28	-53.21	-0.0119358	0.00	-60.00	-47.40
35	197.42	-15.12	-56.23	-58.16	-0.0130885	0.00	-60.00	-47.40
36	203.23	-19.91	-61.03	-62.96	-0.0142051	0.00	-60.00	-47.40
37	209.03	-24.51	-65.62	-67.55	-0.0152742	0.00	-60.00	-47.40
38	214.84	-28.85	-69.96	-71.89	-0.0162847	0.00	-60.00	-47.40
39	220.65	-32.89	-74.01	-75.94	-0.0172263	0.00	-60.00	-47.40
40	226.45	-36.60	-77.71	-79.65	-0.0180893	0.00	-60.00	-47.40
41	232.26	-39.93	-81.05	-82.98	-0.018865	0.00	-60.00	-47.40
42	238.06	-42.86	-83.97	-85.90	-0.0195452	0.00	-60.00	-47.40
43	243.87	-45.34	-86.45	-88.38	-0.0201231	0.00	-60.00	-47.40
44	249.68	-47.36	-88.47	-90.40	-0.0205926	0.00	-60.00	-47.40
45	255.48	-48.89	-90.00	-91.93	-0.0209491	0.00	-60.00	-47.40
46	261.29	-49.92	-91.03	-92.96	-0.0211888	0.00	-60.00	-47.40
47	267.10	-50.44	-91.55	-93.48	-0.0213093	0.00	-60.00	-47.40

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

TIA Rev F

Site Data

BU#: *876385*
Site Name: *N. COVENTRY / WALLBE*
App #: *130979, rev.1*

Pole Manufacturer:	*Other*

Reactions		
Moment:	3261	ft-kips
Axial:	56	kips
Shear:	32	kips

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

Anchor Rod Data		
Qty:	28	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	85	in

Plate Data		
Diam:	91	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	8.50	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	75	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

Maximum Rod Tension:	63.8 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	32.7% **Pass**	Fty*ASIF

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	28.8 ksi	Service ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	48.0% **Pass**	Y.L. Length: 40.00

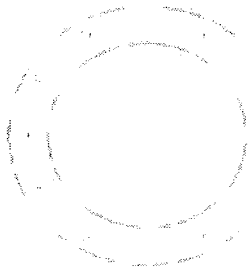
n/a

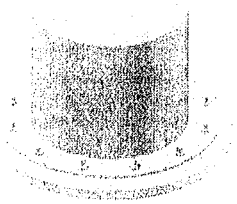
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: ######
Site Name: *Site-name*
App #: ????

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	3	in
Pier Dist. Above Grade:	12	in
Pad Bearing Depth, D:	8	ft
Pad Thickness, T:	3	ft
Pad Width=Length, L:	29	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	9	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	81.00	ft^2
Pier Height:	6.00	ft
Soil (above pad) Height:	5.00	ft

Soil Parameters		
Unit Weight, γ:	130.0	pcf
Ultimate Bearing Capacity, qn:	8.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	40.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	6.00	ksf
Passive Pres. Coeff., Kp	4.60	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	43.2	kips
Pad Force Location Above D:	1.38	ft
ϕ(Passive Pressure Moment):	59.82	ft-kips
Factored O.T. M(WL), "1.6W":	4802.0	ft-kips
Factored OT (MW-Msoil), M1	4742.13	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	4.20	ft
Sum of Soil Wedges Wt:	69.02	kips
Soil Wedges ecc, K1:	14.21	ft
Ftg+Soil above Pad wt:	945.4	kips
Unfactored (Total ftg-soil Wt):	1014.37	kips
1.2D. **No Soil Wedges.**	1201.62	kips
0.9D. **With Soil Wedges**	963.34	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	56	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	32	kips
Unfactored WL Moment, M:	3261	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	67.2	kips
0.90	0.9D+1.6W, Pu:	50.4	kips
1.35	Vu:	43.2	kips
	Mu:	4402.35	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(No Soil Wedges) [Reaction+Conc+Soil]	1201.62	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	4742.13	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	3.95	ft
Orthogonal qu=	2.21	ksf
qu/ϕ*qn Ratio=	**36.78%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	2.79	ft
Diagonal qu=	2.19	ksf
qu/ϕ*qn Ratio=	**36.51%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(w/ Soil Wedges) [Reaction+Conc+Soil]	963.34	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	3859.62	ft-kips

Orthogonal ecc3 = M2/P2 =	4.01	ft
Ortho Non Bearing Length,NBL=	8.01	ft
Orthogonal qu=	1.78	ksf
Diagonal qu=	1.77	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	3261.00		
M Orthogonal:	8987.60	**36.28%**	**Pass**
M Diagonal:	8803.58	**37.04%**	**Pass**

Monopole Pier and Pad Foundation

BU # : 876385
Site Name: N. COVENTRY / WALL
App. Number: 130979, rev.1

Design Reactions		
Shear, S:	32	kips
Moment, M:	3261	ft-kips
Tower Height, H:	152	ft
Tower Weight, Wt:	56	kips
Base Diameter, BD:	6.25	ft

Foundation Dimensions		
Depth, D:	8	ft
Pad Width, W:	29	ft
Neglected Depth, N:	3.33	ft
Thickness, T:	3.00	ft
Pier Diameter, Pd:	9.00	ft
Ext. Above Grade, E:	1.00	ft
Clear Cover, Cc:	3.0	in

Soil Properties		
Soil Unit Weight, γ:	0.130	kcf
Bearing Capacity, Bc:	8.0	ksf
Angle of Friction, Φ:	40	deg
Cohesion, Co:	0.000	ksf
Passive Pressure, Pp:	0.000	kcf
Base Friction, μ:	0.55	

Material Properties		
Rebar Yield Strength, Fy:	60000	psi
Concrete Strength, F'c:	4000	psi
Concrete Unit Weight, δc:	0.150	kcf
Seismic Zone, z:	1	

Rebar Properties		
Pier Rebar Size, Sp:	8	
Pier Rebar Quanity, mp:	62	38
Pad Rebar Size, Spad:	9	
Pad Rebar Quanity, mpad:	54	28
Pier Tie Size, St:	4	3
Tie Quanity, mt:	10	7

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	9	8.25	OK
Overturning (ft-kips)	8803.58	3261.00	OK
Shear Capacity (kips)	321.87	32.00	OK
Bearing (ksf)	8.00	2.37	OK
Pad Shear - 1-way (kips)	1430.61	871.16	OK
Pad Shear - 2-way (kips)	3629.11	1301.47	OK
Pier Rebar Area (in^2)	48.98	45.80	OK
Pad Rebar Area (in^2)	54.00	27.23	OK
Pier Moment Capacity (k-ft)	7159.99	3453.00	OK
Pier Bar Spacing (in)	4.17	18 > s > 2	OK
Pad Bar Spacing (in)	5.30	18 > s > 2	OK
Pier Development Length (in)	69	34.60	OK
Pad Development Length (in)	33	34.60	OK
Hook Development Length (in)	171.00	13.28	OK
Rebar Hook Length (in)	120.00	16.00	OK

	Modification Checks	Capacity/ Availability	Demand/ Limits	Check
	Sleeve Rebar Area (in2):	15.8	0.00	Not Used
37.0%	Sleeve Moment Capacity (k-ft):	7159.99	3453.00	Not Run
9.9%	Sleeve Rebar Spacing (in):	N/a	18 > s > 2	Not Used
29.6%	Sleeve Tie Spacing (in):	N/A	9 > s > 4.5	Not Used
60.9%	Minimum Extra Thickness (in):	0	0	Not Used
35.9%	Pad Rebar Area-short (in2):	0.44	0.00	Not Used
	Pad Rebar Area-long (in2):	0.44	0.00	Not Used
	Pad Rebar Spacing-short (in):	113.5	18 > s > 2	Not Used
48.2%	Pad Rebar Spacing-long (in):	113.5	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):	23.93	342 > 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):	25.15	23.76	Not Used
	Dowel Edge Dist (in):	12.00	4.78	Not Used
	Dowel Spacing (in):	81.00	18.00	Not Used
	Dowel Edge Dist (vert) (in):	18.00	4.78	Not Used
	Dowel Devel. Length (in):	-3.00	13.32	Not Used

Modifications					
Pier Sleeve, ds:	0	in	End Cap Width, Wec:	0	ft
Revised Pier Diameter, dx:	9	ft	Revised Width, Wx:	29	ft
PS Rebar Size, Ss:	8		EC Rebar Size, Sec:	8	per side, top & bottom
Rebar Quanity, ms:	20	2	Rebar Quanity, mec:	4	2
Tie Size, Sst:	3		EC Tie Size, Sect:	4	per side
Tie Quanity, mst:	9	12	Tie Quanity, mect:	15	3
Pad Thickness, Te:	0	in	EC Dowel Size, Secd:	6	per side
Revised Pier Thickness, Tx:	3.00	ft	Dowel Quanity, mecd:	5	2
Rebar Size, Se:	3		Rows of Dowels, Nd:	1	
Rebar Quanity (long), me:	4	2	Dowel Depth, decd:	9	in
Rebar Quanity (short), mex:	4	2	Edge Distance, eecd:	12	in
Dowel Size, Sed:	3				
Dowel Quanity, med:	0	2			