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

Also admitted in Massachusetts

October 24, 2012

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

Re: **EM-VER-105-120106 – Hatchetts Hill Road, Old Lyme, Connecticut**
EM-VER-057-120628 – 1111 East Putnam Avenue, Greenwich, Connecticut
EM-VER-057-120601 – 395 Round Hill Road, Greenwich, Connecticut
EM-VER-094-120514 – 605 Willard Avenue, Newington, Connecticut
EM-VER-155-120612 – 14-20 Isham Road, West Hartford, Connecticut
EM-VER-152-120622 – 53 Dayton Road, Waterford, Connecticut
EM-VER-005-120217A – 5 Old Farm Road, Barkhamsted, Connecticut
EM-VER-007-120125 – 1684 Chamberlain Highway, Berlin, Connecticut

Completion of Construction Activity

Dear Ms. Roberts:

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

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

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

11935925-v1

ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
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May 17, 2012

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

Re: **EM-VER-007-120125 – 1684 Chamberlain Highway, Berlin, Connecticut**
EM-VER-014-120110 – 405 Brushy Hill Road, Branford, Connecticut
EM-VER-026-111130 – Wig Hill Road, Chester, Connecticut
EM-VER-070-120202 – 78 Route 81, Killingworth, Connecticut
EM-VER-030-120106 – 330 Middletown Road, Columbia, Connecticut
EM-VER-046-120123 – 206 Everett Road, Easton, Connecticut
EM-VER-049-120214 – Town Farm Road, Enfield, Connecticut
EM-VER-013-111220 – 12 Polly Lane, Bozrah, Connecticut

Completion of Construction Activity

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 modification filings has 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

February 10, 2012

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

RE: **EM-VER-007-120125**- Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1684 Chamberlain Highway, Berlin, 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 January 23, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable Adam P. Salina, Mayor, Town of Berlin
Denise McNair, Town Manager, Town of Berlin
Hellyn Riggins, Town Planner, Town of Berlin
Crown Castle USA, Inc.

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
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www.ct.gov/csc

January 26, 2012

The Honorable Adam P. Salina
Mayor
Town of Berlin
240 Kensington Road
Kensington, CT 06037

RE: **EM-VER-007-120125**- Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1684 Chamberlain Highway, Berlin, Connecticut.

Dear Mayor Salina:

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 9, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: Denise McNair, Town Manager, Town of Berlin
Hellyn Riggins, Town Planner, Town of Berlin

EM-VER-007-120125

ROBINSON & COLE LLP

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280 Trumbull Street
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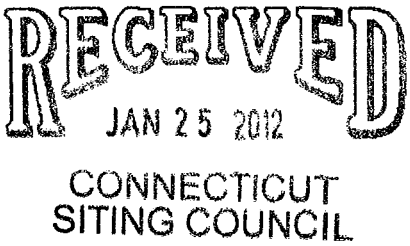
Direct (860) 275-8345

January 23, 2012



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

Re: **Notice of Exempt Modification – Antenna Swap**
1684 Chamberlain Highway, Berlin, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 94-foot level on the existing 120-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco's shared use of the existing tower in 2001. Cellco now intends to modify its installation by replacing all of its existing antennas with four (4) model APL866513-42T0 cellular antennas; two (2) model APL868013-42T0 cellular antennas; two (2) model BXA-171063-8BF PCS antennas; one (1) model BXA-171085/8BF PCS antenna; and three (3) model BXA-70063/4CF LTE antennas, all at the same 94-foot level. Cellco also intends to install six (6) coax cable diplexers on its existing antenna platform. Attached behind Tab 1 are the specifications for the proposed replacement antennas and cable diplexers.

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 Denise McNair, Town Manager of the Town of Berlin. A copy of this letter is also being sent to Ronald L. and Arlene G. Laviana, the owner of the property on which the tower is located.

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

1. The proposed modifications will not result in an increase in the overall height of the existing tower. Cellco's replacement antennas and diplexers will be located at the 94-foot level on the existing 120-foot tower.

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

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

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

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

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

Sincerely,

Kenneth C. Baldwin

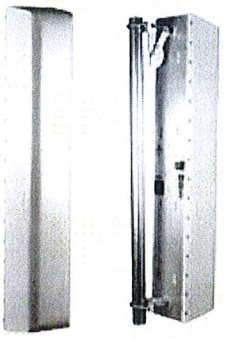
Enclosures
Copy to:
Denise McNair, Berlin Town Manager
Ronald L. and Arlene G. Laviana
Sandy M. Carter

Product Data Sheet APL866513-42T0

Maximizer® Log Periodic Antenna, 806-894, 65deg, 15.1dBi, 1.2m, FET, 0deg

Product Description

The Celwave® Maximizer series is a log periodic dipole array which uses a patented design to achieve a front-to-back ratio of 45 dB, the highest front-to-back ratio in the industry. Maximizers are available to cover ESMR, AMPS, PCS and DCS frequency ranges. They use RFS's patented monolithic CELlite® technology, which eliminates cable and soldered joints to reduce the possibility of inter-modulation products. The CELlite technology assures high reliability and excellent repeatability of electrical characteristics. The cellular Maximizers are available in 65°, 80° and 90° horizontal beamwidths and the PCS/DCS Maximizers are available in 65° and 90° horizontal beamwidths. Patent number 6,133,889.



FRONT BACK

Features/Benefits

• 45 dB front-to-back ratio reduces co-channel interference.• Monolithic construction reduces IM.• No solder joints, high reliability.• Surface treated components prevent galvanic corrosion.• UV stabilized radome assures long life without radome deterioration due to UV exposure.

Technical Specifications

Electrical Specifications

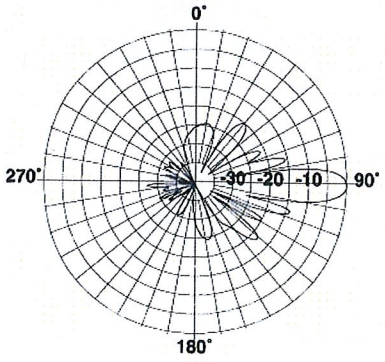
Frequency Range, MHz	806-894
Horizontal Beamwidth, deg	65
Vertical Beamwidth, deg	15
Electrical Downtilt, deg	0
Gain, dBi (dBd)	15.1 (13)
1st Upper Sidelobe Suppression, dB	>20
Upper Sidelobe Suppression, dB	>20
Front-To-Back Ratio, dB	45
Polarization	Vertical
VSWR	< 1.5:1
Impedance, Ohms	50
Maximum Power Input, W	500
Lightning Protection	Direct Ground
Connector Type	7-16 DIN Female

Mechanical Specifications

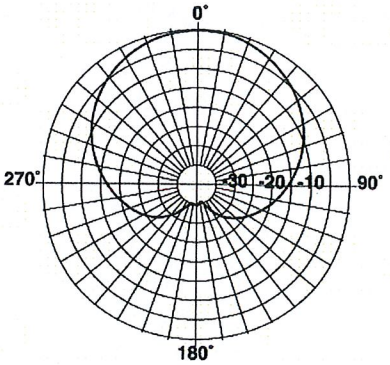
Dimensions - HxWxD, mm (in)	1219 x 234 x 203 (48 x 9.2 x 8)
Weight w/o Mtg Hardware, kg (lb)	7 (15.7)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	180 (112)
Max Wind Loading Area, m² (ft²)	0.376 (4.05)
Maximum Thrust @ Rated Wind, N (lbf)	903 (203)
Wind Load - Side @ Rated Wind, N (lbf)	594 (133.5)
Radome Material	UV Stabilized High Impact ABS
Shipping Weight, kg (lb)	9.1 (20)
Packing Dimensions, HxWxD, mm (in)	1594 x 343 x 349 (62.75 x 13.5 x 13.75)

Ordering Information

Mounting Hardware	APM21-3



Vertical Pattern



Horizontal Pattern

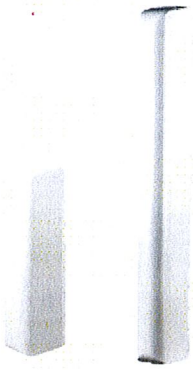
Other Documentation

Product Data Sheet **APL868013-42T0**

Maximizer® Log Periodic Antenna, 806-894, 80deg, 14.1dBi, 1.2m, FET, 0deg

Product Description

The Celwave® Maximizer series is a log periodic dipole array which uses a patented design to achieve a front-to-back ratio of 45 dB, the highest front-to-back ratio in the industry. Maximizers are available to cover ESMR, AMPS, PCS and DCS frequency ranges. They use RFS's patented monolithic CELlite® technology, which eliminates cable and soldered joints to reduce the possibility of inter-modulation products. The CELlite technology assures high reliability and excellent repeatability of electrical characteristics. The cellular Maximizers are available in 65°, 80° and 90° horizontal beamwidths and the PCS/DCS Maximizers are available in 65° and 90° horizontal beamwidths. Patent number 6,133,889.



Features/Benefits

- **45 dB front-to-back ratio reduces co-channel interference.• Monolithic construction reduces IM.• No solder joints, high reliability.• Surface treated components prevent galvanic corrosion.• UV stabilized radome assures long life without radome deterioration due to UV exposure.**

Technical Specifications

Electrical Specifications

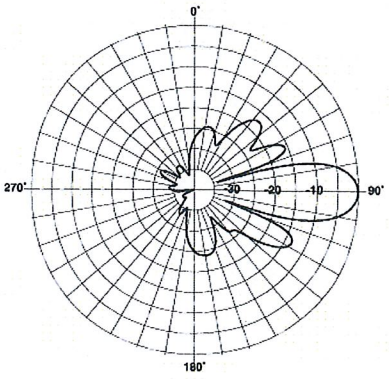
Frequency Range, MHz	806-894
Horizontal Beamwidth, deg	80
Vertical Beamwidth, deg	15
Electrical Downtilt, deg	0
Gain, dBi (dBd)	14.1 (12)
Front-To-Back Ratio, dB	45
Polarization	Vertical
VSWR	< 1.5:1
Impedance, Ohms	50
Maximum Power Input, W	500
Lightning Protection	Direct Ground
Connector Type	7-16 DIN Female

Mechanical Specifications

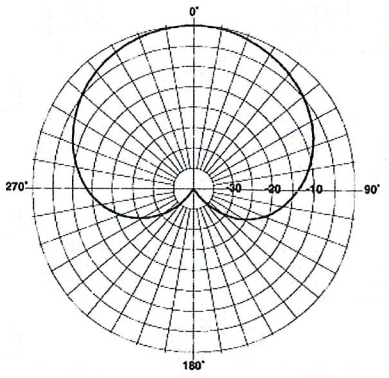
Dimensions - HxWxD, mm (in)	1219 x 152 x 203 (48 x 6 x 8)
Weight w/o Mtg Hardware, kg (lb)	2.8 (6.32)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	200 (125)
Max Wind Loading Area, m² (ft²)	0.307 (3.3)
Maximum Thrust @ Rated Wind, N (lbf)	916 (206)
Wind Load - Side @ Rated Wind, N (lbf)	743 (167)
Radome Material	UV Stabilized High Impact ABS
Shipping Weight, kg (lb)	7.9 (17.5)
Packing Dimensions, HxWxD, mm (in)	1270 x 305 x 203 (50 x 12 x 8)

Ordering Information

Mounting Hardware	APM21-3



Vertical Pattern



Horizontal Pattern

Other Documentation

BXA-171063-8BF-EDIN-X

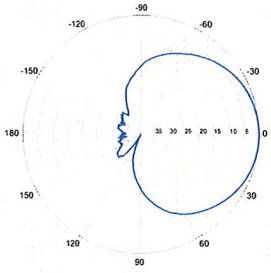
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in	
Depth with t-brackets	133 mm	5.2 in	
Weight without mounting brackets	4.8 kg	10.5 lbs	
Survival wind speed	296 km/hr	184 mph	
Wind area	Front: 0.19 m² Side: 0.14 m²	Front: 2.0 ft² Side: 1.5 ft²	
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf	

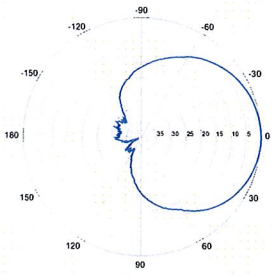
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

BXA-171063-8BF-EDIN-X



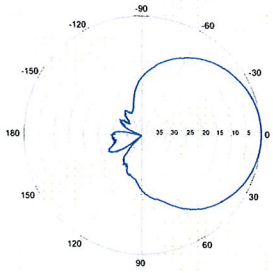
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



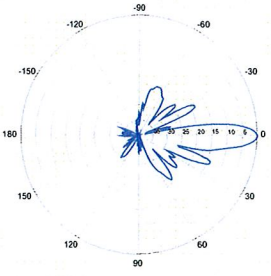
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



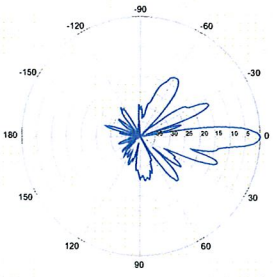
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



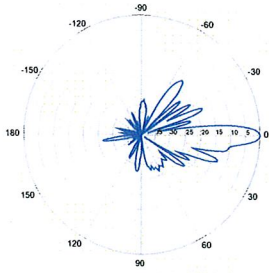
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-0

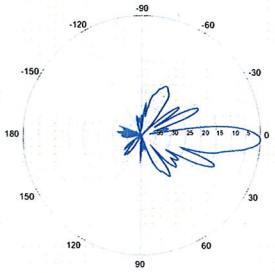


0° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-X

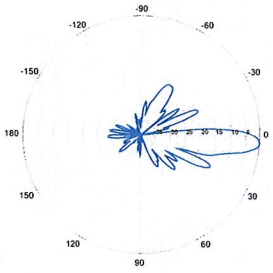
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8BF-EDIN-2



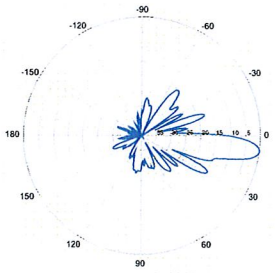
2° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-4



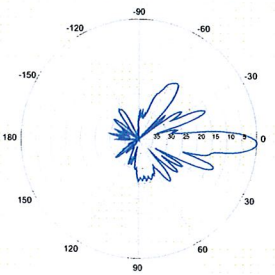
4° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-8



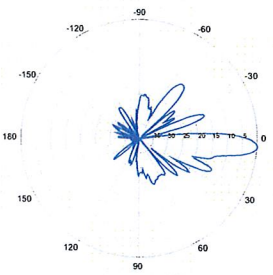
8° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-2



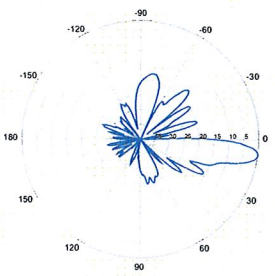
2° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-4



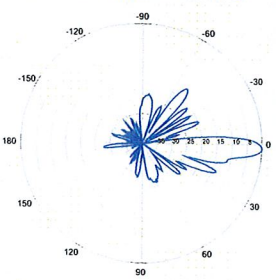
4° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-8



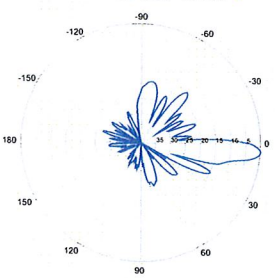
8° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-2



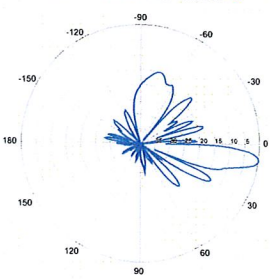
2° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-4



4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-8

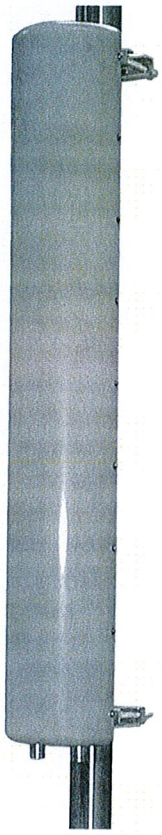


8° | Vertical | 1920-2170 MHz

BXA-171085-8BF-EDIN-X

Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 85° | 16.4 dBi

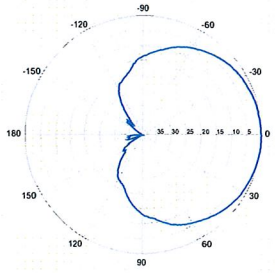


Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	88°	85°	80°
Vertical beamwidth	7°	7°	7°
Gain	13.5 dBd / 15.6 dBi	13.9 dBd / 16.0 dBi	14.3 dBd / 16.4 dBi
Electrical downtilt (X)	0, 2, 4		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back isolation	> 30 dB		
In-band isolation	> 28 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		

Mechanical Characteristics		
Dimensions Length x Width x Depth	1232 x 154 x 105 mm	48.5 x 6.1 x 4.1 in
Depth with t-brackets	133 mm	5.2 in
Weight without mounting brackets	4.8 kg	10.5 lbs
Survival wind speed	296 km/hr	184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²	Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf

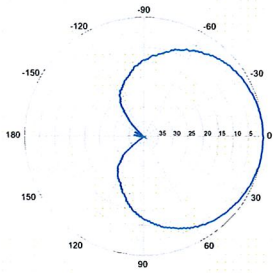
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171085-8BF-EDIN-X-FP		

BXA-171085-8BF-EDIN-X



Horizontal | 1710-1880 MHz

BXA-171085-8BF-EDIN-X



Horizontal | 1850-1990 MHz

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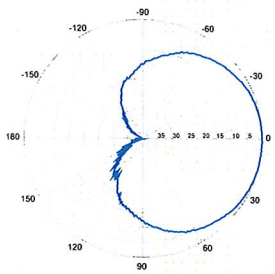

Horizontal | 1920-2170 MHz

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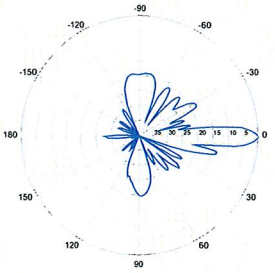
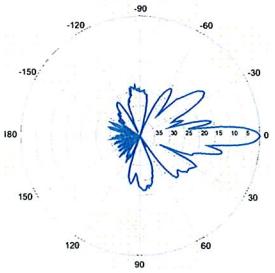


0° | Vertical | 1710-1880 MHz

BXA-171085-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

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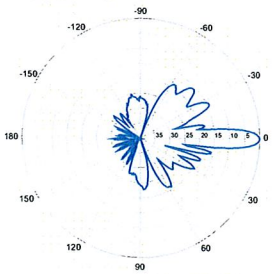
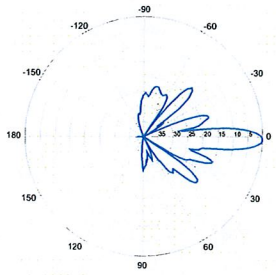


0° | Vertical | 1920-2170 MHz

BXA-171085-8BF-EDIN-X

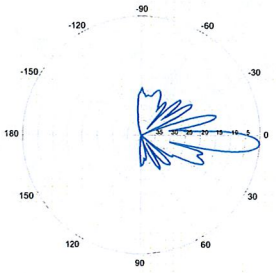
X-Pol | FET Panel | 85° | 16.4 dBi

BXA-171085-8BF-EDIN-2



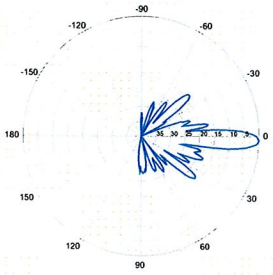
2° | Vertical | 1710-1880 MHz

BXA-171085-8BF-EDIN-4



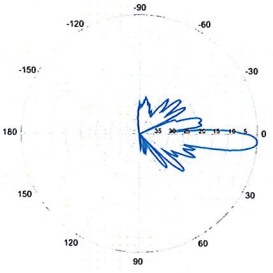
4° | Vertical | 1710-1880 MHz

BXA-171085-8BF-EDIN-2



2° | Vertical | 1850-1990 MHz

BXA-171085-8BF-EDIN-4



4° | Vertical | 1850-1990 MHz

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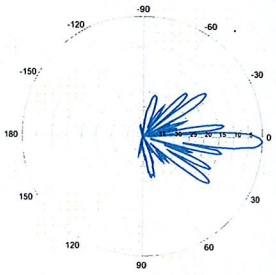
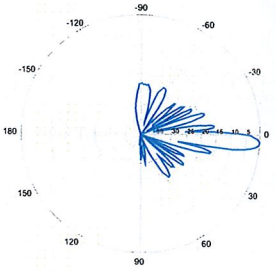


2° | Vertical | 1920-2170 MHz

BXA-171085-8BF-EDIN-4



4° | Vertical | 1920-2170 MHz

Slant ±45° Dual Polarized FET Panel 63° / 13 dBd
696-900 MHz

Mechanical specifications

Length	1205	mm	47.4	in
Width	285	mm	11.2	in
Depth	126	mm	5.0	in
Depth with z-bracket	166	mm	6.5	in
Weight [4]	4.5	kg	9.9	lbs
Wind Area Fore/Aft	0.36	m^2	3.9	ft^2
Wind Area Side	0.15	m^2	1.7	ft^2
Max Wind Survivability	>201	km/hr	>125	mph
Wind Load @ 100 mph (161 km/hr)				
Fore/Aft	522	N	117	lbf
Side	244	N	55	lbf

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

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

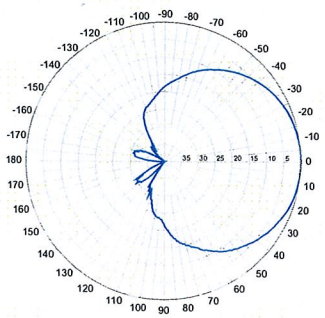
Frequency Range	696-900 MHz
Impedance	50Ω
Connector [3]	NE or E-DIN Female 2 ports / Center
VSWR [1]	≤ 1.4:1
Polarization	Slant ±45°
Isolation Between Ports [1]	< -30 dB
Gain [1]	13.0 dBd 15.0 dBi
Power Rating [2]	500 W
Half Power Angle [1]	
Horizontal Beamwidth	63°
Vertical Beamwidth	15°
Electrical downtilt [5]	0°
Null fill [1]	5%
Lightning protection	Direct ground

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

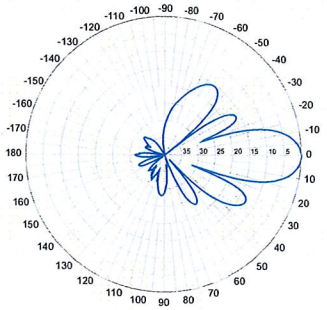
1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector. E-DIN indicates an elongated DIN connector.
4) Antenna weight does not include brackets.
5) Add'l downtilts may be available. Check website for details.

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

Radiation-pattern[1]
750 MHz

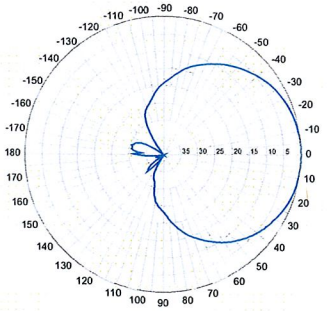


Horizontal

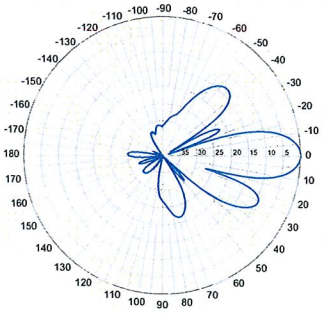


Vertical

850 MHz



Horizontal

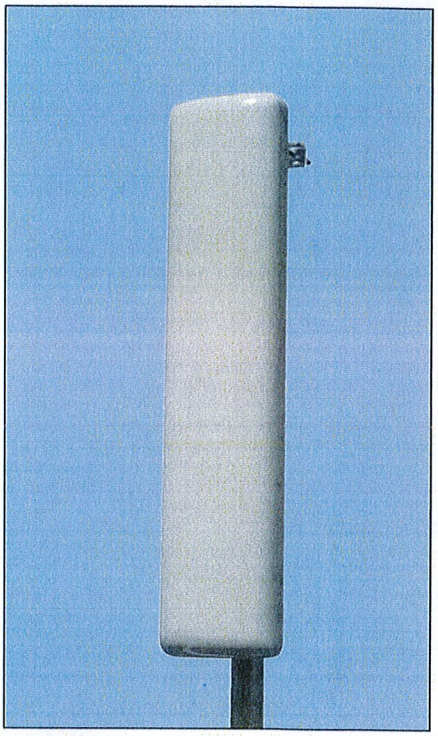


Vertical

696-900 MHz

BXA-70063/4CF ___

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: 10/27/08

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

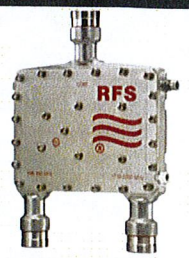
Amphenol Antel, Inc. The Antenna Technology Company

Product Data Sheet FD9R6004/2C-3L

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



Features/Benefits

- **LTE ready design**
- **Extremely Low Insertion Loss**
- **High level of Rejection between bands – Protection against interferences**
- **Extremely High Power Handling Capability**
- **Integrated DC block/bypass versions available**
- **Very compact & small size design – Easy installation and reduced tower load**
- **In-line long-neck connectors for easy connection & waterproofing**
- **Exceptional reliability & environmental protection (IP 67)**
- **Equipped with 1 * Breathable Vent – Prevent any humidity inside the product**
- **Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)**
- **Grounding already provided through the mounting bracket**
- **Kit available for easy dual mount**

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Frequency Range 1, MHz	698-960
Frequency Range 2, MHz	1710-2200
Application	LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710-2170MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss, Path 1, dB	0.07 typ.
Insertion Loss, Path 2, dB	0.13 typ.
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 60/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

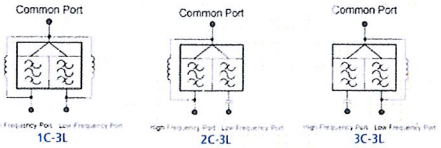
Notes

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Other Documentation

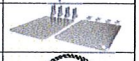
FD9R6004/2C-3L Installation Instructions: Wideband_Diplexer_Installation_Rev5.pdf

Selection Guide Diplexer 698-960 / 1710-2200MHz					
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



1C-3L 2C-3L 3C-3L

The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	**Description**	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (Included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FD9R6004/xC-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, includes lugs (Optional)	
CA030-2	Ground Cable, 2m, includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	

C Squared Systems, LLC
65 Dartmouth Drive, Unit A3
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions

verizonwireless

Berlin 3 CT

1684 Chamberlain Hwy, Berlin, CT 06037

January 19, 2012

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing Verizon Wireless antenna arrays on the monopole tower located at 1684 Chamberlain Highway in Berlin, CT. Verizon Wireless, AT&T, Sprint-Nextel, T-Mobile, Clearwire, MetroPCS (formerly Pocket Wireless) and the Town of Berlin all have antennas mounted on the tower. The coordinates of the tower are 41-35-23.06 N, 72-48-19.23 W.

Verizon Wireless is proposing the following modifications:

1) Install three 750 MHz LTE antennas (one per sector);
2) Remove six existing and install six replacement 850 MHz Cellular antennas (two per sector);
3) Remove six existing and install three replacement 1900 MHz PCS antennas (one per sector).

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right) \times OffBeamLoss$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna patterns

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. As a result, the predicted power density levels reported below are much higher than the actual levels will be from the finished modifications.

4. Calculation Results

Table 1 below outlines the power density information for the site. All information for carriers other than Verizon Wireless comes directly from the current CSC database, and %MPE values are referenced to ground level directly below the antennas. Because the Verizon antennas are directional in nature, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical patterns of the Verizon antennas. The calculated results for Verizon in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Town of Berlin	85	2400	2	5	0.0005	1.0000	0.05%
MetroPCS	75	2130	3	631	0.1210	1.0000	12.10%
Clearwire	119	2496	2	153	0.0078	1.0000	0.78%
Clearwire	123	5200	1	211	0.0050	1.0000	0.50%
Sprint	119	1962.5	11	629.58	0.1758	1.0000	17.58%
Nextel	113	851	9	100	0.0253	0.5673	4.47%
T-Mobile	100	1945	8	138	0.0397	1.0000	3.97%
T-Mobile	100	2100	2	780	0.0561	1.0000	5.61%
AT&T	65	880	1	500	0.0426	0.5867	7.25%
AT&T	65	1900	1	500	0.0426	1.0000	4.26%
AT&T	65	880	4	296	0.1008	0.5867	17.18%
AT&T	65	1900	2	427	0.0727	1.0000	7.27%
Verizon	94	698	2	711	0.0579	0.4653	1.24%
Verizon	94	869	9	399	0.1461	0.5793	2.52%
Verizon	94	1970	7	494	0.1407	1.0000	1.41%
Verizon	94	2145	1	1355	0.0551	1.0000	0.55%
						Total	**86.74%**

Table 1: Power Density Calculation Information[1]

[1] The nominal 10 dB off-beam loss factor for Verizon Wireless was derived from the specific antennas for this site and their associated antenna patterns, which are presented in Attachment C. Power densities for T-Mobile, Clearwire, Sprint-Nextel, MetroPCS, AT&T and the Town of Berlin were taken directly from the current CSC database and do not include any off-beam loss factor or centerline changes.

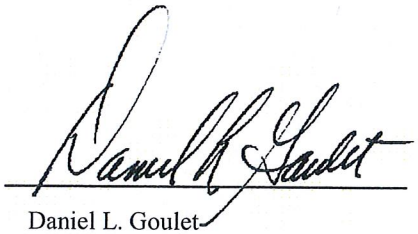
5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the power density from Verizon's proposed antenna configuration, along with all other existing antennas, is below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at the base of the tower is 86.74% of the FCC limit.

As noted in the introduction, obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished modifications.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Daniel L. Goulet
C Squared Systems, LLC

January 19, 2011
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure [2]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure [3]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[2] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

[3] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

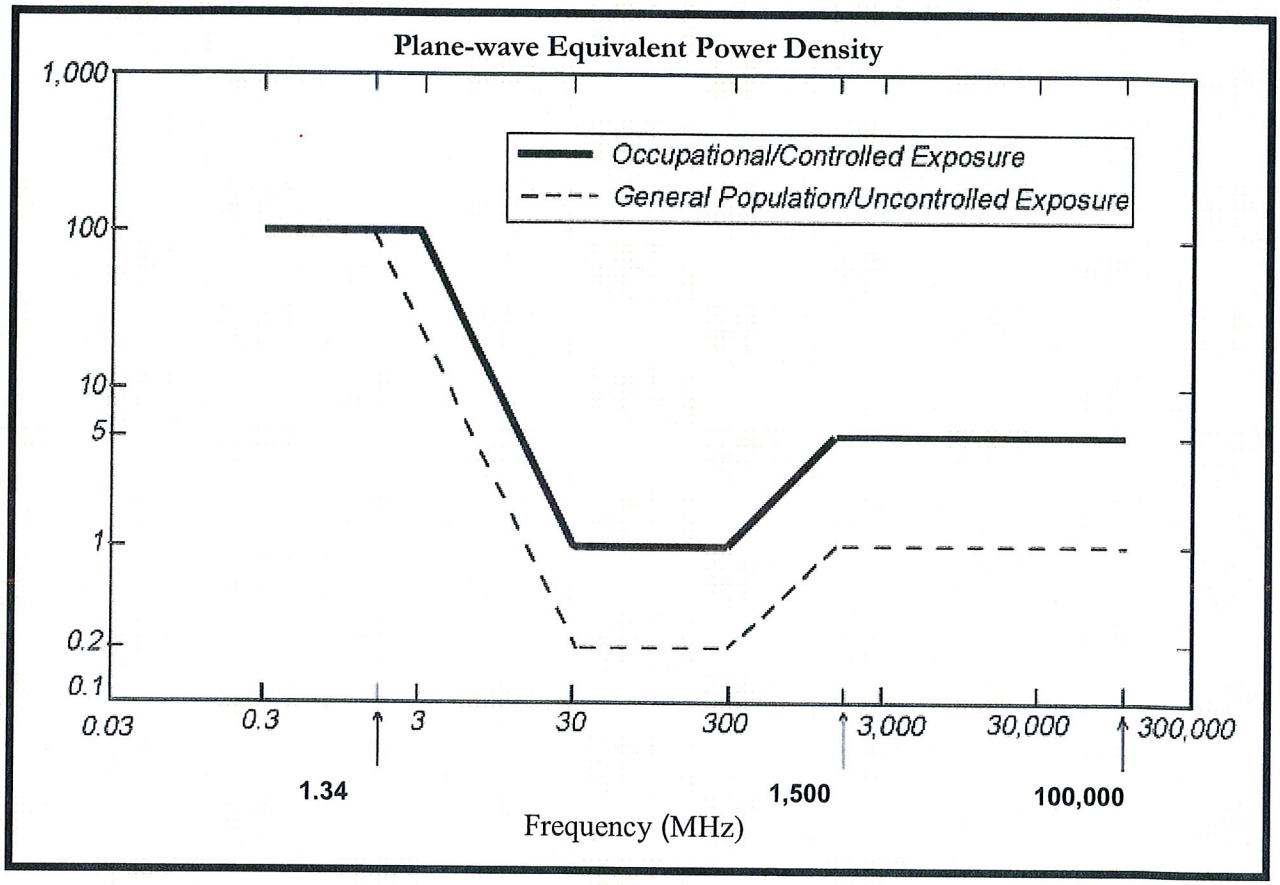
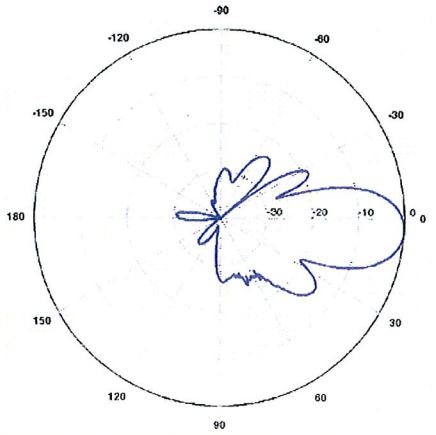


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Wireless' Antenna Model Data Sheets and Electrical Patterns

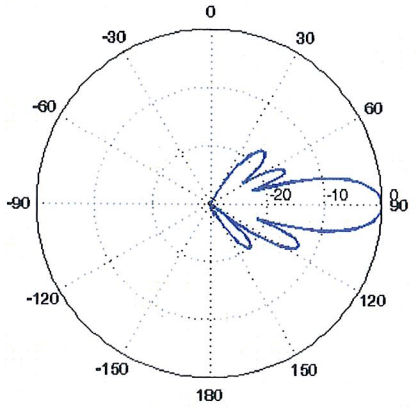
750 MHz

Manufacturer:	Amphenol
Model #:	BXA-70063/4CF_4
Frequency Band:	696-806 MHz
Gain:	12.5 dBd
Vertical Beamwidth:	17°
Horizontal Beamwidth:	65°
Polarization:	±45°
Size L x W x D:	47.4" x 11.2" x 5.2"



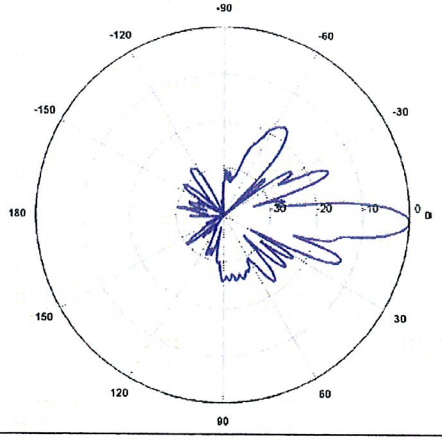
850 MHz

Manufacturer:	RFS
Model #:	APL866513-42T0
Frequency Band:	806-894 MHz
Gain:	13.0 dBd
Vertical Beamwidth:	15°
Horizontal Beamwidth:	65°
Polarization:	Vertical
Size L x W x D:	48.0" x 9.2" x 8.0"



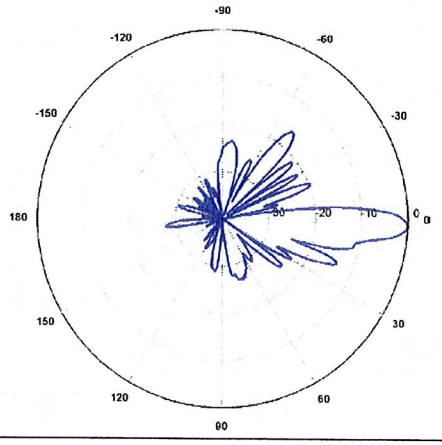
1900 MHz

Manufacturer:	Amphenol
Model #:	BXA-171063/8BF
Frequency Band:	1850-1990 MHz
Gain:	14.9 dBd
Vertical Beamwidth:	7°
Horizontal Beamwidth:	65°
Polarization:	±45°
Size L x W x D:	48.5" x 6.1" x 4.1"



2100 MHz

Manufacturer:	Amphenol
Model #:	BXA-171063/8BF
Frequency Band:	1920-2170 MHz
Gain:	15.3 dBd
Vertical Beamwidth:	7°
Horizontal Beamwidth:	60°
Polarization:	±45°
Size L x W x D:	48.5" x 6.1" x 4.1"



PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708

Date: **November 28, 2011**

Mitzi Parker
Crown Castle USA Inc.
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
704.405.6613

Paul J Ford and Company
250 E. Broad Street, Suite 1500
Columbus, OH 43215
614.221.6679
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Subject: **Structural Analysis Report**

Carrier Designation:	*Verizon Wireless* **Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Berlin 3, CT
Crown Castle Designation:	**Crown Castle BU Number:**	876382
	Crown Castle Site Name:	BERLIN / LAVIANA ORCHARD
	Crown Castle JDE Job Number:	172060
	Crown Castle Work Order Number:	453126
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37511-0160 R2
Site Data:	**1684 Chamberlain Highway, BERLIN, Hartford County, CT**	
	Latitude *41° 35' 23.07"*, Longitude *-72° 48' 19.2"*	
	123 Foot - Monopole Tower	

Dear Mitzi Parker,

Paul J Ford and Company 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 438710, in accordance with application 134794, revision 0.

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

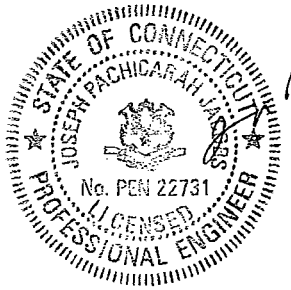
LC1: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

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

We at *Paul J Ford and Company* 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.

Respectfully submitted by:

Kyle Thorpe, E.I.
Structural Engineer



NOV 29 2011

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1) INTRODUCTION

This tower is a 123 ft Monopole tower designed by SUMMIT in July of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
93	94	2	antel	BXA-171063-8BF-2 w/ Mount Pipe	-	-	-
		1		BXA-171085-8BF-EDIN-0 w/ Mount Pipe			
		3		BXA-70063-4CF-EDIN-X w/ Mount Pipe			
		4		APL866513-42T0 w/ Mount Pipe			
		2	rfs celwave	APL868013-42T0 w/ Mount Pipe			
		6		FD9R6004/2C-3L			

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
120	121	6	decibel	DB980H65T2E-M w/Mount Pipe	6 (I)	1-1/4	3
		9	ems wireless	FV65-14-00NA2 w/Mount Pipe	9 (I)	1-5/8	2
	120	1	tower mounts	Platform Mount [LP 305-1]	-	-	1
112	113	12	decibel	DB844H90E-XY w/Mount Pipe	12 (I)	7/8	1
	112	1	tower mounts	Platform Mount [LP 402-1]			
100	101	3	ems wireless	RR65-18-02DP w/Mount Pipe	6 (I)	1-5/8	1
		3	remec	Remec S20057A-1	-	-	4
		3	rfs	APX16DWV-16DWV-S-E-A20 w/ mount pipe	6 (I)	1-5/8	5
		3		RFS ATMAA-1412D-1A20			
		3	rfs celwave	ATMPP1412D-1CWA			
	100	1	tower mounts	T-Arm Mount [TA 602-3]	-	-	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
93	94	6	decibel	DB844F90A-SX w/Mount Pipe	-	-	4
		6		DB948F85T2E-M w/ Mount Pipe			
	93	1	tower mounts	Platform Mount [LP 305-1]	12 (I)	1-5/8	1
75	75	3	rfs	RFS APXV18-206517S-C w/ mount pipe	2 (E)	1-5/8	1
		1	tower mounts	Side Arm Mount [SO 101-3]	4 (I)	1-5/8	
		3	adc	ADC CG-1900DD-Full-DIN TMA	6 (I)	1-5/8	6
		3	ems wireless	MB96RR900200DPBL w/Mount Pipe			
65	65	6	powerwave technologies	P65-15-XLH-RR w/ Mount Pipe	6 (E)	1-5/8	5
		6		TT19-08BP111-001			
		1	tower mounts	Pipe Mount [PM 601-3]			3
		1	tower mounts	Side Arm Mount [SO 102-3]	-	-	5
50	51	1	lucent	KS24019-L112A	1 (I)	1/2	1
	50	1	tower mounts (old cci)	Side Arm Mount [SO 702-1]			

Notes:
1) Existing
2) MLA; Controls Over Existing
3) Existing; Does Not Control
4) Existing; To Be Removed
5) Reserved
6) Existing; Controls Over Reserved

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, 05/05/2000	1629353	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 29200-0802, 06/06/2000	1629413	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 29200-0802, 06/06/2000	1629384	CCISITES
4-POST MOD BPSA	Vertical Solutions, 080828.04, 12/11/2008	2611098	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	PJF, 37511-0160R1, 06/02/2011	2894272	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) Existing mounts were assumed based off pictures present on CCISites, using the best fit mount within the Crown Castle mount catalogue.
5) The existing, post installed #18J reinforcing anchors have a minimum allowable load capacity of 170 kips (based on proof load testing to a minimum of 212 kips).

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company 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	123 - 82.25	Pole	TP28.114x22x0.1875	1	-8.24	782.55	72.5	Pass
L2	82.25 - 58	Pole	TP31.3777x27.2139x0.25	2	-12.65	1284.07	92.0	Pass
L3	58 - 40.75	Pole	TP33.966x31.3777x0.3267	3	-14.92	1779.04	82.5	Pass
L4	40.75 - 29.75	Pole	TP35.1164x32.6749x0.3424	4	-18.24	1964.67	91.9	Pass
L5	29.75 - 0	Pole	TP39.58x35.1164x0.3844	5	-24.72	2486.12	95.0	Pass
							Summary	
						Pole (L5)	95.0	Pass
						Rating =	95.0	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,3	Anchor Rods	0	95.8	Pass
1	Base Plate	0	61.9	Pass
1,2	Base Foundation Soil Interaction	0	62.1	Pass
1	Base Foundation Structural Steel	0	76.3	Pass

Structure Rating (max from all components) =	95.8%

Notes:

1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Foundation Analysis Notes: According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the caisson is the greater of the geotechnical report's recommendation, the frost depth of the site or half of the caisson diameter.
3) Worst case; original and post installed.

APPENDIX A

RISA TOWER OUTPUT

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 38 mph is used in combination with ice.
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	123.00-82.25	40.75	3.50	18	22.0000	28.1140	0.1875	0.7500	A607-60 (60 ksi)
L2	82.25-58.00	27.75	0.00	18	27.2139	31.3777	0.2500	1.0000	A607-65 (65 ksi)
L3	58.00-40.75	17.25	4.25	18	31.3777	33.9660	0.3267	1.3068	65 ksi (w/ Reinf.) (65 ksi)
L4	40.75-29.75	15.25	0.00	18	32.6749	35.1164	0.3424	1.3696	65 ksi (w/ Reinf.) (65 ksi)
L5	29.75-0.00	29.75		18	35.1164	39.5800	0.3844	1.5376	65 ksi (w/ Reinf.) (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	12.9812	780.3007	7.7434	11.1760	69.8193	1561.6281	6.4918	3.5420	18.891
	28.5477	16.6198	1637.5523	9.9139	14.2819	114.6592	3277.2593	8.3115	4.6181	24.63
L2	28.1670	21.3958	1965.3102	9.5722	13.8246	142.1599	3933.2064	10.6999	4.3496	17.399
	31.8618	24.6998	3023.6079	11.0503	15.9399	189.6884	6051.1944	12.3523	5.0825	20.33
L3	31.8618	32.1982	3922.1146	11.0231	15.9399	246.0569	7849.3900	16.1022	4.9475	15.144
	34.4900	34.8821	4986.9425	11.9420	17.2547	289.0189	9980.4469	17.4444	5.4030	16.538
L4	33.8699	35.1382	4640.8347	11.4780	16.5989	279.5877	9287.7760	17.5725	5.1482	15.036
	35.6581	37.7916	5773.5287	12.3448	17.8391	323.6442	11554.6543	18.8994	5.5779	16.29
L5	35.6581	42.3760	6458.2727	12.3299	17.8391	362.0286	12925.0433	21.1920	5.5039	14.318
	40.1906	47.8220	9281.9602	13.9144	20.1066	461.6366	18576.1339	23.9155	6.2895	16.362

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 123.00-82.25				1	1	1		
L2 82.25-58.00				1	1	1		
L3 58.00-40.75				1	1	1		
L4 40.75-29.75				1	1	1		
L5 29.75-0.00				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
***										

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 FOAM)	C	No	Inside Pole	120.00 - 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
***								
**								
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	112.00 - 0.00	12	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33
***								
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	100.00 - 0.00	6	No Ice	0.00	0.82
						1/2" 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
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	100.00 - 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 FOAM)	C	No	Inside Pole	93.00 - 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 LOW DENSI. FOAM)	C	No	CaAa (Out Of Face)	75.00 - 0.00	1	No Ice	0.20	0.72
						1/2" Ice	0.30	2.23
						1" Ice	0.40	4.36
						2" Ice	0.60	10.44
						4" Ice	1.00	29.94
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	CaAa (Out Of Face)	75.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	2.23
						1" Ice	0.00	4.36
						2" Ice	0.00	10.44
						4" Ice	0.00	29.94
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	75.00 - 0.00	4	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72
						4" Ice	0.00	0.72
***								
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	65.00 - 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 FOAM)	C	No	CaAa (Out Of Face)	65.00 - 0.00	1	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
						2" Ice	0.00	10.54
						4" Ice	0.00	30.04
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	65.00 - 0.00	5	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
						2" Ice	0.00	10.54
						4" Ice	0.00	30.04
****								
LDF4P-50A (1/2 FOAM)	C	No	Inside Pole	50.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
**								
1.25" Plate	C	No	CaAa (Out Of Face)	59.50 - 0.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00
						1" Ice	0.66	0.00
						2" Ice	0.88	0.00
						4" Ice	1.32	0.00

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	123.00-82.25	A	0.000	0.000	0.000	0.000	0.00

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
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.68
L2	82.25-58.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.888	0.89
L3	58.00-40.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	9.415	0.78
L4	40.75-29.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.004	0.50
L5	29.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	16.237	1.35

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	123.00-82.25	A	1.145	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.68
L2	82.25-58.00	A	1.094	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	8.293	1.24
L3	58.00-40.75	A	1.049	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	18.550	1.32
L4	40.75-29.75	A	1.008	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.829	0.85
L5	29.75-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	31.373	2.22

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	123.00-82.25	0.0000	0.0000	0.0000	0.0000
L2	82.25-58.00	-0.2002	0.1156	-0.3737	0.2158
L3	58.00-40.75	-0.5906	0.3410	-0.9573	0.5527
L4	40.75-29.75	-0.5952	0.3436	-0.9713	0.5608
L5	29.75-0.00	-0.6032	0.3483	-0.9839	0.5680

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
3/4" x 8 ft lightning rod	C	None		0.0000	123.00	No Ice	0.60	0.60	0.01
						1/2"	1.41	1.41	0.02

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
							Ice	2.25	2.25	0.03
							1" Ice	3.67	3.67	0.07
							2" Ice	5.74	5.74	0.21
							4" Ice			
***										
(3) FV65-14-00NA2 w/Mount Pipe	A	From Face	4.00	0.00	0.0000	120.00	No Ice	8.64	6.95	0.06
			0.00				1/2"	9.29	8.13	0.12
			1.00				Ice	9.91	9.02	0.20
							1" Ice	11.18	10.84	0.38
							2" Ice	13.83	14.85	0.89
							4" Ice			
(3) FV65-14-00NA2 w/Mount Pipe	B	From Face	4.00	0.00	0.0000	120.00	No Ice	8.64	6.95	0.06
			0.00				1/2"	9.29	8.13	0.12
			1.00				Ice	9.91	9.02	0.20
							1" Ice	11.18	10.84	0.38
							2" Ice	13.83	14.85	0.89
							4" Ice			
(3) FV65-14-00NA2 w/Mount Pipe	C	From Face	4.00	0.00	0.0000	120.00	No Ice	8.64	6.95	0.06
			0.00				1/2"	9.29	8.13	0.12
			1.00				Ice	9.91	9.02	0.20
							1" Ice	11.18	10.84	0.38
							2" Ice	13.83	14.85	0.89
							4" Ice			
Platform Mount [LP 305-1]	C	None			0.0000	120.00	No Ice	18.01	18.01	1.12
							1/2"	23.33	23.33	1.35
							Ice	28.65	28.65	1.58
							1" Ice	39.29	39.29	2.05
							2" Ice	60.57	60.57	2.97
							4" Ice			
**										
(4) DB844H90E-XY w/Mount Pipe	A	From Face	4.00	0.00	0.0000	112.00	No Ice	3.58	5.40	0.04
			0.00				1/2"	4.20	6.49	0.08
			1.00				Ice	4.73	7.30	0.13
							1" Ice	5.86	8.96	0.25
							2" Ice	8.27	12.49	0.62
							4" Ice			
(4) DB844H90E-XY w/Mount Pipe	B	From Face	4.00	0.00	0.0000	112.00	No Ice	3.58	5.40	0.04
			0.00				1/2"	4.20	6.49	0.08
			1.00				Ice	4.73	7.30	0.13
							1" Ice	5.86	8.96	0.25
							2" Ice	8.27	12.49	0.62
							4" Ice			
(4) DB844H90E-XY w/Mount Pipe	C	From Face	4.00	0.00	0.0000	112.00	No Ice	3.58	5.40	0.04
			0.00				1/2"	4.20	6.49	0.08
			1.00				Ice	4.73	7.30	0.13
							1" Ice	5.86	8.96	0.25
							2" Ice	8.27	12.49	0.62
							4" Ice			
Platform Mount [LP 402-1]	C	None			0.0000	112.00	No Ice	33.04	33.04	2.17
							1/2"	43.38	43.38	2.68
							Ice	53.72	53.72	3.19
							1" Ice	74.40	74.40	4.21
							2" Ice	115.76	115.76	6.26
							4" Ice			
***										
APX16DWV-16DWV-S-E-A20 w/ mount pipe	A	From Face	4.00	0.00	0.0000	100.00	No Ice	7.27	3.46	0.06
			0.00				1/2"	7.78	4.19	0.11
			1.00				Ice	8.29	4.88	0.16
							1" Ice	9.34	6.31	0.29
							2" Ice	11.57	9.36	0.67
							4" Ice			
APX16DWV-16DWV-S-E-A20 w/ mount pipe	B	From Face	4.00	0.00	0.0000	100.00	No Ice	7.27	3.46	0.06
			0.00				1/2"	7.78	4.19	0.11
			1.00				Ice	8.29	4.88	0.16
							1" Ice	9.34	6.31	0.29

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							2" Ice	11.57	9.36	0.67
							4" Ice			
APX16DWV-16DWV-S-E-A20 w/ mount pipe	C	From Face	4.00	0.00	0.0000	100.00	No Ice	7.27	3.46	0.06
			0.00				1/2" Ice	7.78	4.19	0.11
			1.00				1" Ice	8.29	4.88	0.16
							2" Ice	9.34	6.31	0.29
							4" Ice	11.57	9.36	0.67
RFS ATMAA-1412D-1A20	A	From Face	4.00	0.00	0.0000	100.00	No Ice	1.17	0.47	0.01
			0.00				1/2" Ice	1.31	0.57	0.01
			1.00				1" Ice	1.47	0.69	0.02
							2" Ice	1.81	0.95	0.05
							4" Ice	2.58	1.57	0.13
RFS ATMAA-1412D-1A20	B	From Face	4.00	0.00	0.0000	100.00	No Ice	1.17	0.47	0.01
			0.00				1/2" Ice	1.31	0.57	0.01
			1.00				1" Ice	1.47	0.69	0.02
							2" Ice	1.81	0.95	0.05
							4" Ice	2.58	1.57	0.13
RFS ATMAA-1412D-1A20	C	From Face	4.00	0.00	0.0000	100.00	No Ice	1.17	0.47	0.01
			0.00				1/2" Ice	1.31	0.57	0.01
			1.00				1" Ice	1.47	0.69	0.02
							2" Ice	1.81	0.95	0.05
							4" Ice	2.58	1.57	0.13
ATMPP1412D-1CWA	A	From Face	4.00	0.00	0.0000	100.00	No Ice	1.17	0.42	0.01
			0.00				1/2" Ice	1.32	0.53	0.02
			1.00				1" Ice	1.48	0.65	0.03
							2" Ice	1.82	0.92	0.05
							4" Ice	2.61	1.57	0.13
ATMPP1412D-1CWA	B	From Face	4.00	0.00	0.0000	100.00	No Ice	1.17	0.42	0.01
			0.00				1/2" Ice	1.32	0.53	0.02
			1.00				1" Ice	1.48	0.65	0.03
							2" Ice	1.82	0.92	0.05
							4" Ice	2.61	1.57	0.13
ATMPP1412D-1CWA	C	From Face	4.00	0.00	0.0000	100.00	No Ice	1.17	0.42	0.01
			0.00				1/2" Ice	1.32	0.53	0.02
			1.00				1" Ice	1.48	0.65	0.03
							2" Ice	1.82	0.92	0.05
							4" Ice	2.61	1.57	0.13
RR65-18-02DP w/Mount Pipe	A	From Face	4.00	0.00	0.0000	100.00	No Ice	4.91	3.64	0.04
			0.00				1/2" Ice	5.57	4.70	0.08
			1.00				1" Ice	6.14	5.48	0.13
							2" Ice	7.32	7.08	0.25
							4" Ice	9.81	10.47	0.61
RR65-18-02DP w/Mount Pipe	B	From Face	4.00	0.00	0.0000	100.00	No Ice	4.91	3.64	0.04
			0.00				1/2" Ice	5.57	4.70	0.08
			1.00				1" Ice	6.14	5.48	0.13
							2" Ice	7.32	7.08	0.25
							4" Ice	9.81	10.47	0.61
RR65-18-02DP w/Mount Pipe	C	From Face	4.00	0.00	0.0000	100.00	No Ice	4.91	3.64	0.04
			0.00				1/2" Ice	5.57	4.70	0.08
			1.00				1" Ice	6.14	5.48	0.13
							2" Ice	7.32	7.08	0.25
							4" Ice	9.81	10.47	0.61
T-Arm Mount [TA 602-3]	C	None			0.0000	100.00	No Ice	11.59	11.59	0.77
							1/2" Ice	15.44	15.44	0.99
							1" Ice	19.29	19.29	1.21

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
						1" Ice	26.99	26.99	1.64
						2" Ice	42.39	42.39	2.50
						4" Ice			
***									
(2) APL866513-42T0 w/ Mount Pipe	A	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.53 4.97 5.41 6.34 8.32	4.92 5.60 6.28 7.71 10.83	0.03 0.08 0.13 0.25 0.60
(2) APL866513-42T0 w/ Mount Pipe	B	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.53 4.97 5.41 6.34 8.32	4.92 5.60 6.28 7.71 10.83	0.03 0.08 0.13 0.25 0.60
(2) APL868013-42T0 w/ Mount Pipe	C	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.87 3.18 3.52 4.27 5.88	3.73 4.10 4.48 5.25 6.91	0.02 0.05 0.07 0.15 0.35
BXA-70063-4CF-EDIN-X w/ Mount Pipe	A	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.84 6.30 7.24 9.26	3.69 4.29 4.91 6.26 9.29	0.03 0.07 0.12 0.23 0.58
BXA-70063-4CF-EDIN-X w/ Mount Pipe	B	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.84 6.30 7.24 9.26	3.69 4.29 4.91 6.26 9.29	0.03 0.07 0.12 0.23 0.58
BXA-70063-4CF-EDIN-X w/ Mount Pipe	C	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.84 6.30 7.24 9.26	3.69 4.29 4.91 6.26 9.29	0.03 0.07 0.12 0.23 0.58
BXA-171063-8BF-2 w/ Mount Pipe	A	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.18 3.56 3.96 4.85 6.77	3.35 3.97 4.60 5.89 8.89	0.03 0.06 0.10 0.19 0.49
BXA-171063-8BF-2 w/ Mount Pipe	B	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.18 3.56 3.96 4.85 6.77	3.35 3.97 4.60 5.89 8.89	0.03 0.06 0.10 0.19 0.49
BXA-171085-8BF-EDIN-0 w/ Mount Pipe	C	From Face	4.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.18 3.56 3.96 4.85 6.77	3.35 3.97 4.60 5.89 8.89	0.03 0.06 0.10 0.19 0.49
(2) FD9R6004/2C-3L	A	From Face	4.00 0.00 1.00	0.0000	93.00	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
(2) FD9R6004/2C-3L	B	From Face	4.00	0.0000	93.00	No Ice	0.37	0.08	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	0.45	0.14	0.01
			1.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
(2) FD9R6004/2C-3L	C	From Face	4.00	0.0000	93.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			1.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
Platform Mount [LP 305-1]	C	None		0.0000	93.00	No Ice	18.01	18.01	1.12
						1/2"	23.33	23.33	1.35
						Ice	28.65	28.65	1.58
						1" Ice	39.29	39.29	2.05
						2" Ice	60.57	60.57	2.97
						4" Ice			
***									
***									
RFS APXV18-206517S-C w/ mount pipe	A	From Face	1.00	0.0000	75.00	No Ice	5.45	5.05	0.07
			0.00			1/2"	5.99	6.06	0.11
			0.00			Ice	6.51	6.93	0.17
						1" Ice	7.57	8.71	0.31
						2" Ice	9.95	12.48	0.72
						4" Ice			
RFS APXV18-206517S-C w/ mount pipe	B	From Face	1.00	0.0000	75.00	No Ice	5.45	5.05	0.07
			0.00			1/2"	5.99	6.06	0.11
			0.00			Ice	6.51	6.93	0.17
						1" Ice	7.57	8.71	0.31
						2" Ice	9.95	12.48	0.72
						4" Ice			
RFS APXV18-206517S-C w/ mount pipe	C	From Face	1.00	0.0000	75.00	No Ice	5.45	5.05	0.07
			0.00			1/2"	5.99	6.06	0.11
			0.00			Ice	6.51	6.93	0.17
						1" Ice	7.57	8.71	0.31
						2" Ice	9.95	12.48	0.72
						4" Ice			
Side Arm Mount [SO 101-3]	C	None		0.0000	75.00	No Ice	7.50	7.50	0.25
						1/2"	8.90	8.90	0.33
						Ice	10.30	10.30	0.41
						1" Ice	13.10	13.10	0.58
						2" Ice	18.70	18.70	0.90
						4" Ice			
***									
MB96RR900200DPBL w/Mount Pipe	A	From Face	1.00	0.0000	65.00	No Ice	11.47	9.48	0.07
			0.00			1/2"	12.08	10.90	0.15
			0.00			Ice	12.71	12.17	0.25
						1" Ice	14.07	14.38	0.47
						2" Ice	17.08	19.00	1.10
						4" Ice			
MB96RR900200DPBL w/Mount Pipe	B	From Face	1.00	0.0000	65.00	No Ice	11.47	9.48	0.07
			0.00			1/2"	12.08	10.90	0.15
			0.00			Ice	12.71	12.17	0.25
						1" Ice	14.07	14.38	0.47
						2" Ice	17.08	19.00	1.10
						4" Ice			
MB96RR900200DPBL w/Mount Pipe	C	From Face	1.00	0.0000	65.00	No Ice	11.47	9.48	0.07
			0.00			1/2"	12.08	10.90	0.15
			0.00			Ice	12.71	12.17	0.25
						1" Ice	14.07	14.38	0.47
						2" Ice	17.08	19.00	1.10
						4" Ice			
ADC CG-1900DD-Full-DIN TMA	A	From Face	1.00	0.0000	65.00	No Ice	1.29	0.32	0.02
			0.00			1/2"	1.44	0.42	0.02
			0.00			Ice	1.60	0.52	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
						1" Ice	1.95	0.76	0.06
						2" Ice	2.75	1.35	0.14
						4" Ice			
ADC CG-1900DD-Full-DIN TMA	B	From Face	1.00 / 0.00 / 0.00	0.0000	65.00	No Ice	1.29	0.32	0.02
						1/2" Ice	1.44	0.42	0.02
						1" Ice	1.60	0.52	0.03
						2" Ice	1.95	0.76	0.06
						4" Ice	2.75	1.35	0.14
ADC CG-1900DD-Full-DIN TMA	C	From Face	1.00 / 0.00 / 0.00	0.0000	65.00	No Ice	1.29	0.32	0.02
						1/2" Ice	1.44	0.42	0.02
						1" Ice	1.60	0.52	0.03
						2" Ice	1.95	0.76	0.06
						4" Ice	2.75	1.35	0.14
Pipe Mount [PM 601-3]	C	None		0.0000	65.00	No Ice	4.39	4.39	0.20
						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
***									
KS24019-L112A	C	From Face	2.00 / 0.00 / 1.00	0.0000	50.00	No Ice	0.10	0.10	0.01
						1/2" Ice	0.18	0.18	0.01
						1" Ice	0.26	0.26	0.01
						2" Ice	0.42	0.42	0.01
						4" Ice	0.74	0.74	0.02
Side Arm Mount [SO 702-1]	C	None		0.0000	50.00	No Ice	1.00	1.43	0.03
						1/2" Ice	1.00	2.05	0.04
						1" Ice	1.00	2.67	0.05
						2" Ice	1.00	3.91	0.07
						4" Ice	1.00	6.39	0.12
**********									

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 123.00-82.25	102.09	1.381	23	85.089	A	0.000	85.089	85.089	100.00	0.000	0.000
					B	0.000	85.089		100.00	0.000	0.000
					C	0.000	85.089		100.00	0.000	0.000
L2 82.25-58.00	69.88	1.239	20	59.733	A	0.000	59.733	59.733	100.00	0.000	0.000
					B	0.000	59.733		100.00	0.000	0.000
					C	0.000	59.733		100.00	0.000	3.888
L3 58.00-40.75	49.26	1.121	18	46.966	A	0.000	46.966	46.966	100.00	0.000	0.000
					B	0.000	46.966		100.00	0.000	0.000
					C	0.000	46.966		100.00	0.000	9.415
L4 40.75-29.75	35.20	1.019	17	31.383	A	0.000	31.383	31.383	100.00	0.000	0.000
					B	0.000	31.383		100.00	0.000	0.000
					C	0.000	31.383		100.00	0.000	6.004
L5 29.75-0.00	14.58	1	16	92.592	A	0.000	92.592	92.592	100.00	0.000	0.000
					B	0.000	92.592		100.00	0.000	0.000
					C	0.000	92.592		100.00	0.000	16.237

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.00-82.25	102.09	1.381	5	1.1451	92.867	A	0.000	92.867	92.867	100.00	0.000	0.000
						B	0.000	92.867		100.00	0.000	0.000
						C	0.000	92.867		100.00	0.000	0.000
L2 82.25-58.00	69.88	1.239	4	1.0942	64.361	A	0.000	64.361	64.361	100.00	0.000	0.000
						B	0.000	64.361		100.00	0.000	0.000
						C	0.000	64.361		100.00	0.000	8.293
L3 58.00-40.75	49.26	1.121	4	1.0492	49.982	A	0.000	49.982	49.982	100.00	0.000	0.000
						B	0.000	49.982		100.00	0.000	0.000
						C	0.000	49.982		100.00	0.000	18.550
L4 40.75-29.75	35.20	1.019	4	1.0078	33.306	A	0.000	33.306	33.306	100.00	0.000	0.000
						B	0.000	33.306		100.00	0.000	0.000
						C	0.000	33.306		100.00	0.000	11.829
L5 29.75-0.00	14.58	1	4	1.0000	97.551	A	0.000	97.551	97.551	100.00	0.000	0.000
						B	0.000	97.551		100.00	0.000	0.000
						C	0.000	97.551		100.00	0.000	31.373

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 123.00-82.25	102.09	1.381	9	85.089	A	0.000	85.089	85.089	100.00	0.000	0.000
					B	0.000	85.089		100.00	0.000	0.000
					C	0.000	85.089		100.00	0.000	0.000
L2 82.25-58.00	69.88	1.239	8	59.733	A	0.000	59.733	59.733	100.00	0.000	0.000
					B	0.000	59.733		100.00	0.000	0.000
					C	0.000	59.733		100.00	0.000	3.888
L3 58.00-40.75	49.26	1.121	7	46.966	A	0.000	46.966	46.966	100.00	0.000	0.000
					B	0.000	46.966		100.00	0.000	0.000
					C	0.000	46.966		100.00	0.000	9.415
L4 40.75-29.75	35.20	1.019	7	31.383	A	0.000	31.383	31.383	100.00	0.000	0.000
					B	0.000	31.383		100.00	0.000	0.000
					C	0.000	31.383		100.00	0.000	6.004
L5 29.75-0.00	14.58	1	6	92.592	A	0.000	92.592	92.592	100.00	0.000	0.000
					B	0.000	92.592		100.00	0.000	0.000
					C	0.000	92.592		100.00	0.000	16.237

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

Comb. No.	Description
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
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
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	123 - 82.25	Pole	Max Tension	24	0.00	-0.00	-0.00
			Max. Compression	14	-18.34	0.00	0.61
			Max. Mx	11	-8.24	315.02	0.08
			Max. My	2	-8.24	0.00	314.80
			Max. Vy	11	-13.94	315.02	0.08
			Max. Vx	2	-13.90	0.00	314.80
			Max. Torque	5			0.45
L2	82.25 - 58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.45	0.44	0.35
			Max. Mx	11	-12.65	747.85	0.05
			Max. My	2	-12.65	0.08	746.51
			Max. Vy	11	-17.70	747.85	0.05
			Max. Vx	8	17.66	0.08	-746.38
			Max. Torque	5			0.45
L3	58 - 40.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-28.55	1.02	-0.01
			Max. Mx	11	-14.92	983.72	-0.02
			Max. My	8	-14.93	0.17	-981.74
			Max. Vy	11	-18.60	983.72	-0.02
			Max. Vx	8	18.56	0.17	-981.74
			Max. Torque	5			0.43
L4	40.75 - 29.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.96	1.73	-0.42
			Max. Mx	11	-18.24	1275.02	-0.08
			Max. My	8	-18.24	0.29	-1272.42
			Max. Vy	11	-19.54	1275.02	-0.08
			Max. Vx	8	19.50	0.29	-1272.42
			Max. Torque	5			0.39
L5	29.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-41.15	3.15	-1.24
			Max. Mx	11	-24.72	1879.77	-0.23

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	-24.72	0.55	-1875.99
			Max. Vy	11	-21.11	1879.77	-0.23
			Max. Vx	8	21.07	0.55	-1875.99
			Max. Torque	4			0.38

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	41.15	6.20	0.00
	Max. H_x	11	24.73	21.09	0.00
	Max. H_z	2	24.73	0.00	21.06
	Max. M_x	2	1875.54	0.00	21.06
	Max. M_z	5	1878.67	-21.09	0.00
	Max. Torsion	4	0.38	-18.27	10.53
	Min. Vert	1	24.73	0.00	0.00
	Min. H_x	5	24.73	-21.09	0.00
	Min. H_z	8	24.73	0.00	-21.06
	Min. M_x	8	-1875.99	0.00	-21.06
	Min. M_z	11	-1879.77	21.09	0.00
	Min. Torsion	10	-0.38	18.27	-10.53

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	24.73	0.00	0.00	0.22	0.54	0.00
Dead+Wind 0 deg - No Ice	24.73	-0.00	-21.06	-1875.54	0.55	-0.23
Dead+Wind 30 deg - No Ice	24.73	10.55	-18.24	-1624.24	-939.07	-0.35
Dead+Wind 60 deg - No Ice	24.73	18.27	-10.53	-937.65	-1626.91	-0.38
Dead+Wind 90 deg - No Ice	24.73	21.09	-0.00	0.23	-1878.67	-0.30
Dead+Wind 120 deg - No Ice	24.73	18.27	10.53	938.11	-1626.91	-0.15
Dead+Wind 150 deg - No Ice	24.73	10.55	18.24	1624.69	-939.07	0.05
Dead+Wind 180 deg - No Ice	24.73	-0.00	21.06	1875.99	0.55	0.23
Dead+Wind 210 deg - No Ice	24.73	-10.55	18.24	1624.69	940.17	0.35
Dead+Wind 240 deg - No Ice	24.73	-18.27	10.53	938.11	1628.01	0.38
Dead+Wind 270 deg - No Ice	24.73	-21.09	-0.00	0.23	1879.77	0.30
Dead+Wind 300 deg - No Ice	24.73	-18.27	-10.53	-937.65	1628.01	0.15
Dead+Wind 330 deg - No Ice	24.73	-10.55	-18.24	-1624.24	940.17	-0.05
Dead+Ice	41.15	0.00	0.00	1.24	3.15	0.00
Dead+Wind 0 deg+Ice	41.15	-0.00	-6.20	-580.84	3.32	-0.10
Dead+Wind 30 deg+Ice	41.15	3.10	-5.37	-502.88	-287.76	-0.13
Dead+Wind 60 deg+Ice	41.15	5.37	-3.10	-289.81	-500.85	-0.13
Dead+Wind 90 deg+Ice	41.15	6.20	-0.00	1.26	-578.82	-0.09
Dead+Wind 120 deg+Ice	41.15	5.37	3.10	292.32	-500.85	-0.02
Dead+Wind 150 deg+Ice	41.15	3.10	5.37	505.39	-287.76	0.05
Dead+Wind 180 deg+Ice	41.15	-0.00	6.20	583.35	3.32	0.10
Dead+Wind 210 deg+Ice	41.15	-3.10	5.37	505.39	294.41	0.13
Dead+Wind 240 deg+Ice	41.15	-5.37	3.10	292.32	507.50	0.13
Dead+Wind 270 deg+Ice	41.15	-6.20	-0.00	1.26	585.46	0.09
Dead+Wind 300 deg+Ice	41.15	-5.37	-3.10	-289.80	507.50	0.02
Dead+Wind 330 deg+Ice	41.15	-3.10	-5.37	-502.88	294.41	-0.05
Dead+Wind 0 deg - Service	24.73	-0.00	-8.23	-733.55	0.55	-0.09
Dead+Wind 30 deg - Service	24.73	4.12	-7.12	-635.24	-367.02	-0.14
Dead+Wind 60 deg - Service	24.73	7.14	-4.11	-366.66	-636.09	-0.15
Dead+Wind 90 deg - Service	24.73	8.24	-0.00	0.23	-734.58	-0.12
Dead+Wind 120 deg - Service	24.73	7.14	4.11	367.11	-636.09	-0.06
Dead+Wind 150 deg -	24.73	4.12	7.12	635.70	-367.02	0.02

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
Service						
Dead+Wind 180 deg - Service	24.73	-0.00	8.23	734.00	0.55	0.09
Dead+Wind 210 deg - Service	24.73	-4.12	7.12	635.70	368.12	0.14
Dead+Wind 240 deg - Service	24.73	-7.14	4.11	367.11	637.19	0.15
Dead+Wind 270 deg - Service	24.73	-8.24	-0.00	0.23	735.68	0.12
Dead+Wind 300 deg - Service	24.73	-7.14	-4.11	-366.66	637.19	0.06
Dead+Wind 330 deg - Service	24.73	-4.12	-7.12	-635.24	368.12	-0.02

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	-24.73	0.00	0.00	24.73	0.00	0.000%
2	0.00	-24.73	-21.06	0.00	24.73	21.06	0.000%
3	10.55	-24.73	-18.24	-10.55	24.73	18.24	0.000%
4	18.27	-24.73	-10.53	-18.27	24.73	10.53	0.000%
5	21.09	-24.73	0.00	-21.09	24.73	0.00	0.000%
6	18.27	-24.73	10.53	-18.27	24.73	-10.53	0.000%
7	10.55	-24.73	18.24	-10.55	24.73	-18.24	0.000%
8	0.00	-24.73	21.06	0.00	24.73	-21.06	0.000%
9	-10.55	-24.73	18.24	10.55	24.73	-18.24	0.000%
10	-18.27	-24.73	10.53	18.27	24.73	-10.53	0.000%
11	-21.09	-24.73	0.00	21.09	24.73	0.00	0.000%
12	-18.27	-24.73	-10.53	18.27	24.73	10.53	0.000%
13	-10.55	-24.73	-18.24	10.55	24.73	18.24	0.000%
14	0.00	-41.15	0.00	0.00	41.15	0.00	0.000%
15	0.00	-41.15	-6.20	0.00	41.15	6.20	0.000%
16	3.10	-41.15	-5.37	-3.10	41.15	5.37	0.000%
17	5.37	-41.15	-3.10	-5.37	41.15	3.10	0.000%
18	6.20	-41.15	0.00	-6.20	41.15	0.00	0.000%
19	5.37	-41.15	3.10	-5.37	41.15	-3.10	0.000%
20	3.10	-41.15	5.37	-3.10	41.15	-5.37	0.000%
21	0.00	-41.15	6.20	0.00	41.15	-6.20	0.000%
22	-3.10	-41.15	5.37	3.10	41.15	-5.37	0.000%
23	-5.37	-41.15	3.10	5.37	41.15	-3.10	0.000%
24	-6.20	-41.15	0.00	6.20	41.15	0.00	0.000%
25	-5.37	-41.15	-3.10	5.37	41.15	3.10	0.000%
26	-3.10	-41.15	-5.37	3.10	41.15	5.37	0.000%
27	0.00	-24.73	-8.23	0.00	24.73	8.23	0.000%
28	4.12	-24.73	-7.12	-4.12	24.73	7.12	0.000%
29	7.14	-24.73	-4.11	-7.14	24.73	4.11	0.000%
30	8.24	-24.73	0.00	-8.24	24.73	0.00	0.000%
31	7.14	-24.73	4.11	-7.14	24.73	-4.11	0.000%
32	4.12	-24.73	7.12	-4.12	24.73	-7.12	0.000%
33	0.00	-24.73	8.23	0.00	24.73	-8.23	0.000%
34	-4.12	-24.73	7.12	4.12	24.73	-7.12	0.000%
35	-7.14	-24.73	4.11	7.14	24.73	-4.11	0.000%
36	-8.24	-24.73	0.00	8.24	24.73	0.00	0.000%
37	-7.14	-24.73	-4.11	7.14	24.73	4.11	0.000%
38	-4.12	-24.73	-7.12	4.12	24.73	7.12	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	0.00041022
3	Yes	6	0.00000001	0.00005517
4	Yes	6	0.00000001	0.00005619
5	Yes	4	0.00000001	0.00065405
6	Yes	6	0.00000001	0.00005517
7	Yes	6	0.00000001	0.00005577
8	Yes	4	0.00000001	0.00041025
9	Yes	6	0.00000001	0.00005607
10	Yes	6	0.00000001	0.00005506
11	Yes	4	0.00000001	0.00065426
12	Yes	6	0.00000001	0.00005607
13	Yes	6	0.00000001	0.00005546
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00066594
16	Yes	5	0.00000001	0.00032780
17	Yes	5	0.00000001	0.00034113
18	Yes	4	0.00000001	0.00067485
19	Yes	5	0.00000001	0.00033003
20	Yes	5	0.00000001	0.00033461
21	Yes	4	0.00000001	0.00066597
22	Yes	5	0.00000001	0.00034548
23	Yes	5	0.00000001	0.00033236
24	Yes	4	0.00000001	0.00068099
25	Yes	5	0.00000001	0.00034331
26	Yes	5	0.00000001	0.00033842
27	Yes	4	0.00000001	0.00020709
28	Yes	5	0.00000001	0.00014649
29	Yes	5	0.00000001	0.00015153
30	Yes	4	0.00000001	0.00023816
31	Yes	5	0.00000001	0.00014657
32	Yes	5	0.00000001	0.00014933
33	Yes	4	0.00000001	0.00020710
34	Yes	5	0.00000001	0.00015096
35	Yes	5	0.00000001	0.00014618
36	Yes	4	0.00000001	0.00023839
37	Yes	5	0.00000001	0.00015107
38	Yes	5	0.00000001	0.00014804

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	123 - 82.25	34.073	36	2.2677	0.0015
L2	85.75 - 58	17.268	36	1.8906	0.0012
L3	58 - 40.75	7.868	36	1.2752	0.0005
L4	45 - 29.75	4.786	36	0.9847	0.0003
L5	29.75 - 0	2.086	36	0.6668	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.00	3/4" x 8 ft lightning rod	36	34.073	2.2677	0.0015	22432
120.00	(3) FV65-14-00NA2 w/Mount Pipe	36	32.646	2.2483	0.0015	22432
112.00	(4) DB844H90E-XY w/Mount Pipe	36	28.862	2.1932	0.0014	10196
100.00	APX16DWV-16DWV-S-E-A20 w/ mount pipe	36	23.344	2.0871	0.0014	4875
93.00	(2) APL866513-42T0 w/ Mount Pipe	36	20.277	2.0026	0.0013	3737

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
75.00	RFS APXV18-206517S-C w/ mount pipe	36	13.194	1.6743	0.0009	2604
65.00	MB96RR900200DPBL w/Mount Pipe	36	9.882	1.4414	0.0006	2315
50.00	KS24019-L112A	36	5.884	1.0932	0.0004	2864

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	123 - 82.25	86.916	11	5.7882	0.0038
L2	85.75 - 58	44.076	11	4.8266	0.0029
L3	58 - 40.75	20.093	11	3.2567	0.0013
L4	45 - 29.75	12.224	11	2.5151	0.0008
L5	29.75 - 0	5.328	11	1.7033	0.0005

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.00	3/4" x 8 ft lightning rod	11	86.916	5.7882	0.0038	8942
120.00	(3) FV65-14-00NA2 w/Mount Pipe	11	83.278	5.7387	0.0037	8942
112.00	(4) DB844H90E-XY w/Mount Pipe	11	73.633	5.5983	0.0037	4063
100.00	APX16DWV-16DWV-S-E-A20 w/ mount pipe	11	59.568	5.3277	0.0035	1941
93.00	(2) APL866513-42T0 w/ Mount Pipe	11	51.750	5.1125	0.0033	1486
75.00	RFS APXV18-206517S-C w/ mount pipe	11	33.684	4.2750	0.0023	1031
65.00	MB96RR900200DPBL w/Mount Pipe	11	25.232	3.6808	0.0016	914
50.00	KS24019-L112A	11	15.028	2.7922	0.0010	1127

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	123 - 82.25 (1)	TP28.114x22x0.1875	40.75	0.00	0.0	36.000	16.3072	-8.24	587.06	0.014
L2	82.25 - 58 (2)	TP31.3777x27.2139x0.25	27.75	0.00	0.0	39.000	24.6998	-12.65	963.29	0.013
L3	58 - 40.75 (3)	TP33.966x31.3777x0.3267	17.25	0.00	0.0	39.000	34.2209	-14.92	1334.61	0.011
L4	40.75 - 29.75 (4)	TP35.1164x32.6749x0.3424	15.25	0.00	0.0	39.000	37.7916	-18.24	1473.87	0.012
L5	29.75 - 0 (5)	TP39.58x35.1164x0.3844	29.75	0.00	0.0	39.000	47.8220	-24.72	1865.06	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	123 - 82.25 (1)	TP28.114x22x0.1875	315.02	34.249	36.000	0.951	0.00	0.000	36.000	0.000
L2	82.25 - 58 (2)	TP31.3777x27.2139x0.25	747.85	47.310	39.000	1.213	0.00	0.000	39.000	0.000
L3	58 - 40.75 (3)	TP33.966x31.3777x0.3267	983.72	42.445	39.000	1.088	0.00	0.000	39.000	0.000
L4	40.75 - 29.75 (4)	TP35.1164x32.6749x0.3424	1275.02	47.275	39.000	1.212	0.00	0.000	39.000	0.000
L5	29.75 - 0 (5)	TP39.58x35.1164x0.3844	1879.78	48.864	39.000	1.253	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	123 - 82.25 (1)	TP28.114x22x0.1875	13.94	0.855	24.000	0.071	0.45	0.024	24.000	0.001
L2	82.25 - 58 (2)	TP31.3777x27.2139x0.25	17.70	0.717	26.000	0.055	0.43	0.013	26.000	0.001
L3	58 - 40.75 (3)	TP33.966x31.3777x0.3267	18.60	0.543	26.000	0.042	0.40	0.008	26.000	0.000
L4	40.75 - 29.75 (4)	TP35.1164x32.6749x0.3424	19.54	0.517	26.000	0.040	0.37	0.007	26.000	0.000
L5	29.75 - 0 (5)	TP39.58x35.1164x0.3844	21.11	0.441	26.000	0.034	0.31	0.004	26.000	0.000

Pole Interaction Design Data

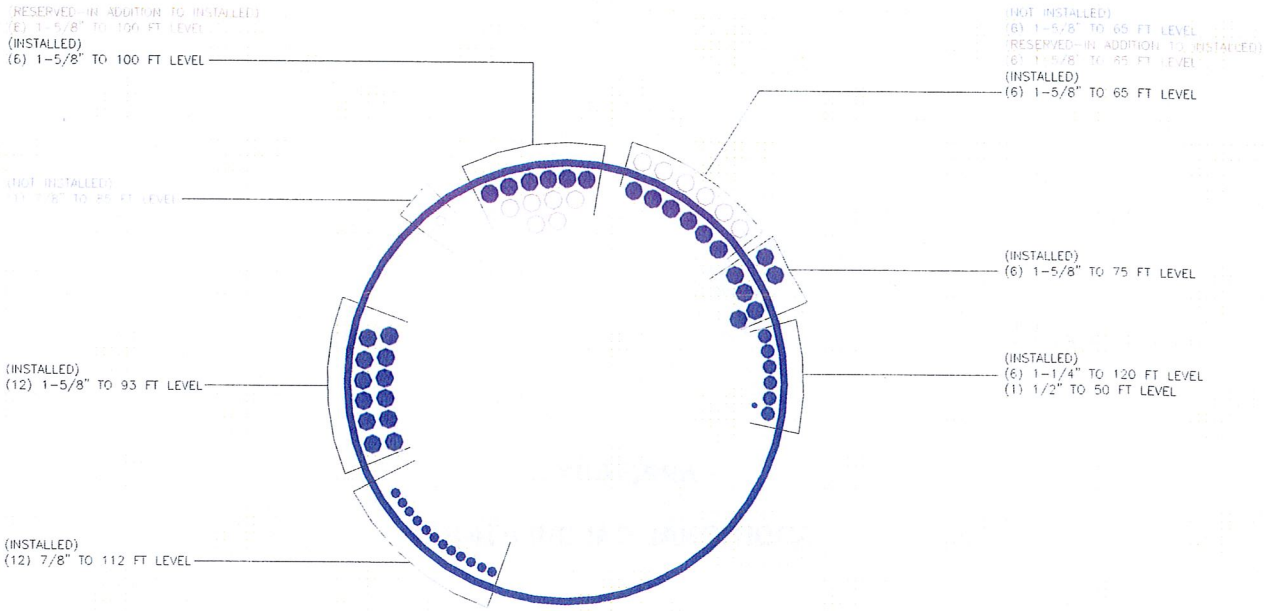
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	123 - 82.25 (1)	0.014	0.951	0.000	0.071	0.001	0.967 ✔	1.333	H1-3+VT ✔
L2	82.25 - 58 (2)	0.013	1.213	0.000	0.055	0.001	1.227 ✔	1.333	H1-3+VT ✔
L3	58 - 40.75 (3)	0.011	1.088	0.000	0.042	0.000	1.100 ✔	1.333	H1-3+VT ✔
L4	40.75 - 29.75 (4)	0.012	1.212	0.000	0.040	0.000	1.225 ✔	1.333	H1-3+VT ✔
L5	29.75 - 0 (5)	0.013	1.253	0.000	0.034	0.000	1.266 ✔	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	123 - 82.25	Pole	TP28.114x22x0.1875	1	-8.24	782.55	72.5	Pass
L2	82.25 - 58	Pole	TP31.3777x27.2139x0.25	2	-12.65	1284.07	92.0	Pass
L3	58 - 40.75	Pole	TP33.966x31.3777x0.3267	3	-14.92	1779.04	82.5	Pass
L4	40.75 - 29.75	Pole	TP35.1164x32.6749x0.3424	4	-18.24	1964.67	91.9	Pass
L5	29.75 - 0	Pole	TP39.58x35.1164x0.3844	5	-24.72	2486.12	95.0	Pass
							Summary	
						Pole (L5)	95.0	Pass
						RATING =	**95.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

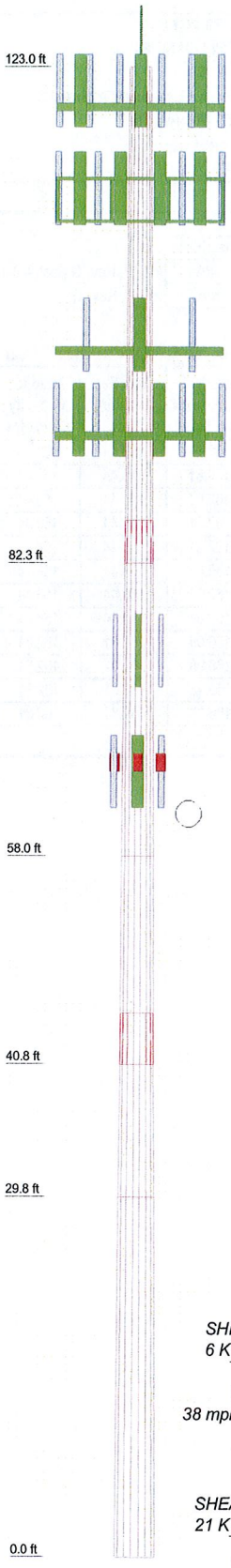


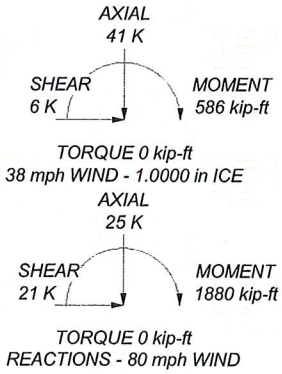
APPENDIX C

ADDITIONAL CALCULATIONS

Program Version 5.4.2.0 - 6/17/2010 File:G:/TOWER/375_Crown_Castle/2011/37511-0160 BU 876382/WO 453126 BU 876382/37511-0160 R2.eri

Section	1	2	3	4	5
Length (ft)	40.75	27.75	17.25	15.25	29.75
Number of Sides	18	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3267	0.3424	0.3844
Socket Length (ft)	3.50		4.25		
Top Dia (in)	22.0000	27.2139	31.3777	32.6749	35.1164
Bot Dia (in)	28.1140	31.3777	33.9660	35.1164	39.5800
Grade	A607-60		A607-65	65 ksi (w/ Reinf.)	
Weight (K)	2.1	2.2	2.0	1.9	4.6





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3/4" x 8 ft lightning rod	123	BXA-70063-4CF-EDIN-X w/ Mount Pipe	93
(3) FV65-14-00NA2 w/Mount Pipe	120	BXA-70063-4CF-EDIN-X w/ Mount Pipe	93
(3) FV65-14-00NA2 w/Mount Pipe	120	BXA-171063-8BF-2 w/ Mount Pipe	93
(3) FV65-14-00NA2 w/Mount Pipe	120	BXA-171063-8BF-2 w/ Mount Pipe	93
Platform Mount [LP 305-1]	120	BXA-171085-8BF-EDIN-0 w/ Mount Pipe	93
(4) DB844H90E-XY w/Mount Pipe	112	(2) FD9R6004/2C-3L	93
(4) DB844H90E-XY w/Mount Pipe	112	(2) FD9R6004/2C-3L	93
(4) DB844H90E-XY w/Mount Pipe	112	(2) FD9R6004/2C-3L	93
Platform Mount [LP 402-1]	112	Platform Mount [LP 305-1]	93
APX16DWV-16DWV-S-E-A20 w/ mount pipe	100	RFS APXV18-206517S-C w/ mount pipe	75
APX16DWV-16DWV-S-E-A20 w/ mount pipe	100	RFS APXV18-206517S-C w/ mount pipe	75
APX16DWV-16DWV-S-E-A20 w/ mount pipe	100	RFS APXV18-206517S-C w/ mount pipe	75
RFS ATMAA-1412D-1A20	100	Side Arm Mount [SO 101-3]	75
RFS ATMAA-1412D-1A20	100	MB96RR900200DPBL w/Mount Pipe	65
RFS ATMAA-1412D-1A20	100	MB96RR900200DPBL w/Mount Pipe	65
ATMPP1412D-1CWA	100	MB96RR900200DPBL w/Mount Pipe	65
ATMPP1412D-1CWA	100	ADC CG-1900DD-Full-DIN TMA	65
ATMPP1412D-1CWA	100	ADC CG-1900DD-Full-DIN TMA	65
RR65-18-02DP w/Mount Pipe	100	ADC CG-1900DD-Full-DIN TMA	65
RR65-18-02DP w/Mount Pipe	100	Pipe Mount [PM 601-3]	65
RR65-18-02DP w/Mount Pipe	100	KS24019-L112A	50
T-Arm Mount [TA 602-3]	100	Side Arm Mount [SO 702-1]	50
(2) APL866513-42T0 w/ Mount Pipe	93		
(2) APL866513-42T0 w/ Mount Pipe	93		
(2) APL868013-42T0 w/ Mount Pipe	93		
BXA-70063-4CF-EDIN-X w/ Mount Pipe	93		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	65 ksi (w/ Reinf.)	65 ksi	80 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 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: 95%

Paul J Ford and Company
250 E. Broad Street Suite 1500
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: *Ex. 123-ft Monopole / Berlin/Laviana Orchard*		
Project: *PJF#37511-0160 R2 / BU#876382*		
Client: Crown Castle	Drawn by: Kyle Thorpe	App'd:
Code: TIA/EIA-222-F	Date: 11/29/11	Scale: NTS
Path: G:\TOWER\375 Crown Castle\2011\37511-0160 BU 876382\WO 453126 BU 876382\37511-0160 R2.eri		Dwg No. E-1

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
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v3.6 - Effective 11-16-11

Date: 11/29/2011
PJF Project: 37511-0160 R2
Client Ref. # 876382
Site Name: Berlin / Laviana Orchard
Description: 123' Monopole
Owner: Crown
Engineer: KAT

Asymmetric Anchor Rod Analysis

Moment =	1880	k-ft	TIA Ref.	F	Location =	Base Plate		
Axial =	25.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	21.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	12							

**** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. ****

Item	Nominal Anchor Dia, in	Anchor Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	37.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
2	2.250	#18J A615 Gr 75	75	100	52.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
3	2.250	#18J A615 Gr 75	75	100	127.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
4	2.250	#18J A615 Gr 75	75	100	142.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
5	2.250	#18J A615 Gr 75	75	100	217.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
6	2.250	#18J A615 Gr 75	75	100	232.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
7	2.250	#18J A615 Gr 75	75	100	307.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
8	2.250	#18J A615 Gr 75	75	100	322.5	46.00	0.00	3.98	162.61	158.44	158.44	0.00	195.00	81.3%
9	2.250	#18J A615 Gr 75	75	100	0.0	47.25	0.00	3.98	166.98	162.81	162.81	170.00	170.00	95.8%
10	2.250	#18J A615 Gr 75	75	100	90.0	47.25	0.00	3.98	166.98	162.81	162.81	170.00	170.00	95.8%
11	2.250	#18J A615 Gr 75	75	100	180.0	47.25	0.00	3.98	166.98	162.81	162.81	170.00	170.00	95.8%
12	2.250	#18J A615 Gr 75	75	100	270.0	47.25	0.00	3.98	166.98	162.81	162.81	170.00	170.00	95.8%
								47.76						

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

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

Site Data

BU#: *876382*
Site Name: *Berlin / Laviana Orchard*
App #:

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	46	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	44	in
Thick:	2.75	in
Grade:	55	ksi
Clip Distance:	5	in

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

Pole Data		
Diam:	39.58	in
Thick:	0.2812	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions

TIA Revision:	F		Reactions modified to account for additional anchor rods
Unfactored Moment, M:	1230.7	ft-kips	
Unfactored Axial, P:	16.7	kips	
Unfactored Shear, V:	14	kips	

Anchor Rod Results

TIA F --> Maximum Rod Tension	158.4 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	81.3% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	34.0 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	61.9% **Pass**

PL Ref. Data	
Yield Line (in):	22.65
Max PL Length:	22.65

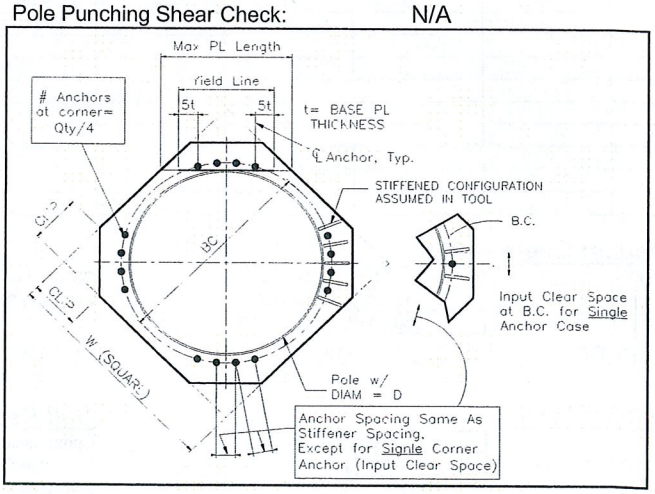
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

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Job Number:	37511-0160R1	**Page:**	1
Site Number:	876382	**By:**	RH
Site Name:	Laviana Orchard	**Date:**	11/29/2011

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	1867.0		k-ft
Shear, V =	21.0		kips
Axial Load, P =	25.0		kips
OTM =	1877.5	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	6 ft
Height Above Grade =	0.5 ft
Depth Below Grade =	20 ft
fc' =	3 ksi
εc =	0.003 in/in
Mat Ftdn. Cap Width =	ft
Mat Ftdn. Cap Length =	ft
Depth Below Grade =	ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00
+ Effective Soil Wt. - Buoyant Conc. Wt. ≥ Compression
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	16
Rebar Size =	#11
Rebar Fy =	60 ksi
Rebar MOE =	29000 ksi
Tie Size =	#5
Side Clear Cover to Ties =	4 in

Soil Parameters

Water Table Depth =	15.00 ft
Depth to Ignore Soil =	3.33 ft
Depth to Full Cohesion =	0 ft
Full Cohesion Starts at?	Ground

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Maximum Capacity Ratios

Maximum Soil Ratio =	110.0%
Maximum Steel Ratio =	105.0%

Define Soil Layers

Note: Cohesion = Undrained Shear Strengh = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	5	135		38	Sand				5
2	10	135		38	Sand				15
3	15	135		38	Sand	40000	1200		30
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	14.37 ft, from Grade	Shear, V =	21.00 kips
Bending Moment, M =	2179.22 k-ft, from COR	Resisting Shear, Va =	34.04 kips
Resisting Moment, Ma =	3531.91 k-ft, from COR		

MOMENT RATIO = 61.7% OK **SHEAR RATIO = 61.7% OK**

Soil Results: Uplift

Uplift, T =	0.00 kips
Allowable Uplift Cap., Ta =	62.50 kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	25.00 kips
Allowable Comp. Cap., Ca =	611.43 kips

COMPRESSION RATIO = 4.1% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	20.36 sq in
Actual Steel Area =	24.96 sq in
Allowable Min Axial, Pa =	-1036.80 kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	4726.51 kips, Where Ma = 0 k-ft
Axial Load, P =	46.21 kips @ 4.50 ft Below Grade
Moment, M =	1963.98 k-ft @ 4.50 ft Below Grade
Allowable Moment, Ma =	2592.26 k-ft

MOMENT RATIO = 75.8% OK

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

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

Site Data

BU#: *876382*
Site Name: *Laviana Orchard*
App #:

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	1963.98	ft-kips (* Note)
Max. Service Shaft P:	46.21	kips
Max Axial Force Type:	Comp.	

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

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

Load Factor	Shaft Factored Loads		
1.30	Mu:	2553.174	ft-kips
1.30	Pu:	60.073	kips

Pier Properties

Concrete:

Pier Diameter =	6.0	ft
Concrete Area =	4071.5	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	5.11	ft
Vert. Cage Diameter =	61.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	16	
As Total=	24.96	in^2
A s/ Aconc, Rho:	0.0061	0.61%

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2002

Seismic Properties

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

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

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tesnion Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027	
200 / Fy:	0.0033	
IBC 1810.1.2:	0.0050	SDC D, E, or F
Governing:	0.0050	**0.50%**

ACI 10.8 and 10.9
Min As for Columns, Comp. Controlled, Shafts:

Min As: 0.0100 **1.00%**

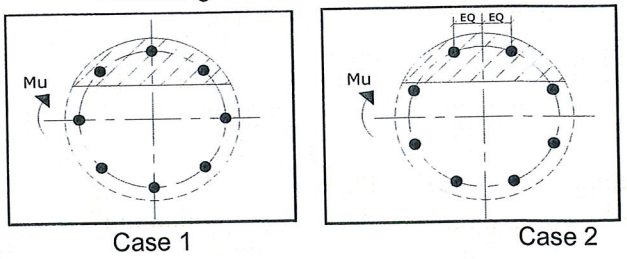
Minimum Rho Check:

Actual Req'd Min. Rho:	0.50%	Flexural Member
Provided Rho:	0.61%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	6144.47	kips
at Mu=(ϕ=0.65)Mn=	3164.92	ft-kips
Max Tu, (φ=0.9) Tn =	1347.84	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Extreme Steel Strain, εt: **0.0127**
εt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Dist. From Edge to Neutral Axis: **12.61** in

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu =	60.07	kips
Drilled Shaft Moment Capacity, φMn:	**3369.95**	ft-kips
Drilled Shaft Superimposed Mu:	**2553.17**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	75.76%