Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

December 12, 2014

ORIGINAL

Melanie Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-086-130604 – Cellco Partnership d/b/a Verizon Wireless**
577 Route 82, Montville, Connecticut

Dear Ms. Bachman:

On July 1, 2013, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its telecommunications facility at 577 Route 82 in Montville. The modification involved the replacement of certain antennas and installation of additional coaxial cables.

As a condition of the acknowledgement, Cellco was required to provide the Council with a letter stating that the recommendations specified in the structural report were implemented. Attached is a Tower Modification Certification Letter verifying that these conditions have been satisfied. All construction associated with these modifications has now been completed.

If you have any questions please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

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

CENTEK engineering

Centered on Solutions℠

December 09, 2014

Mr. Mark Gauger
Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Tower Modification Certification

Project:	**Verizon Montville NW** 557 Route 82, Montville, CT
Tower Owner:	**Crown Castle USA** 220 Lathrop Road, Candor, NY
Engineer:	**Paul J. Ford and Company** 250 East Broad Street, Suite 1500, Columbus, OH

Centek Project No.: 14055.042

CSC Exempt Mod Reference No.: EM-VER-086-130604

Dear Mr. Gauger,

We are providing this "Tower Modification Certification" with regard to the structural components at the above referenced project.

The following are the basis for substantiating compliance with the tower modification documents prepared by Paul J. Ford (PJF Project Number: 37512-2435 BP):

- Review of the Paul J. Ford Structural Analysis dated 10/04/2012.
- Review of the Paul J. Ford Modification Drawings S-1 thru S-9 dated 10/04/2012.
- Review of the Tower Engineering Professionals Modification Inspection Report dated 05/28/2013.
- Field observations by Centek Engineering personnel on 12/09/2014 of the completed modifications which determined all modifications were installed in general compliance with the recommendations of the structural analysis report prepared by Paul J. Ford on 10/04/2012.

The modification design prepared by Paul J. Ford demonstrates the tower will not exceed 100 percent of the post construction structural rating. The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above. This certification is not a review of the adequacy or effectiveness of the modification/reinforcement solution.

Sincerely,

Carlo F. Centore, PE
Senior Project Manager

Cc: Jim Smith, Tim Parks, Rachel Mayo

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

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

July 1, 2013

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

RE: **EM-VER-086-130604** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 557 Route 82, Montville, 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:

- Prior to antenna installation, Verizon shall verify that the modifications identified in the Structural Modification Report prepared by Paul J. Ford and Company dated October 4, 2012 for the CSC filing EM-CING-086-121116 have been completed;
- Within 45 days following completion of the antenna installation, Verizon shall provide documentation certified by a professional engineer that its installation complied with the recommendations of the Structural Analysis prepared by Paul J. Ford and Company dated October 4, 2012 and stamped by Joseph P. Jacobs;
- Any deviation from the proposed modification as specified in this notice and supporting materials with the 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;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated June 4, 2013. 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,

Melanie A. Bachman
Acting Executive Director

MAB/CDM/jb

c: The Honorable Ronald K. McDaniel, Mayor, Town of Montville
Marcia Vlaun, Town Planner, Town of Montville
Crown Castle

STATE OF CONNECTICUT
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www.ct.gov/csc

June 10, 2013

The Honorable Ronald K. McDaniel
Mayor
Town of Montville
Town Hall
310 Norwich New London Turnpike
Uncasville, CT 06382

RE: **EM-VER -086-130604** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 557 Route 82, Montville, Connecticut.

Dear Mayor McDaniel:

The Connecticut Siting Council (Council) received a request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72, a copy of which has already been provided to you.

If you have any questions or comments regarding the proposal, please call me or inform the Council by June 24, 2013.

Thank you for your cooperation and consideration.

Very truly yours,

Melanie Bachman
Acting Executive Director

MB/jb

c: Marcia Vlaun, Town Planner, Town of Montville

ROBINSON & COLE LLP

EM-VER-086-130604
(Re-filed for: EM-VER-086-120330)

KENNETH C. BALDWIN

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Also admitted in Massachusetts

ORIGINAL

June 4, 2013

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
557 Route 82, Montville, Connecticut
(EM-VER-086-120330)

Dear Ms. Bachman:

On April 17, 2012, the Council approved the request by Cellco Partnership d/b/a Verizon Wireless ("Cellco") to modify its existing telecommunications facility at the above-referenced site (EM-VER-086-120330). The time period within which these modifications were to be completed has expired. Cellco seeks Council approval for these same modifications.

As described in its previous filing, Cellco intends to remove all of its existing antennas and replace them with four (4) model LPA-80063-6CF cellular antennas; two (2) model LPA-80080-6CF cellular antennas; three (3) model BXA-171063-8BF PCS antennas; and three (3) model BXA-70063-6CF LTE antennas, at the same 167-foot level on the tower. Cellco also intends to install six (6) coax cable diplexers on its antenna platform. Attached behind Tab 1 are the specifications for the 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 Ronald K. McDaniel, Mayor for the Town of Montville. A copy of this letter is also being sent to Carolyn, Thomas, Edward, John and Brian Basade, the owners of the property on which the tower is located.

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

1. The proposed modifications will not result in an increase in the overall height of the existing tower. Cellco's replacement antennas and diplexers will be located at the 167-foot level on the existing 180-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 cumulative power density table for Cellco's modified facility is included behind Tab 2.

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Ronald K. McDaniel, Montville Mayor
Carolyn, Thomas, Edward, John and Brian Basade
Sandy M. Carter

Vertically Polarized, Log Periodic 63° / 16 dBd

LPA-80063/8CF ___

When ordering replace "___" with connector type.

Mechanical specifications

Length	2400 mm	94.5 in
Width	386 mm	15.2 in
Depth	335 mm	13.2 in
Depth with z-bracket	375 mm	14.8 in
[4] Weight	17.2 kg	38.0 lbs
Wind Area		
Fore/Aft	0.93 m^2	10.0 ft^2
Side	0.80 m^2	8.7 ft^2
Rated Wind Velocity (Safety factor 2.0)	>276 km/hr	>172 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	1357 N	305 lbs
Side	1197 N	269 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

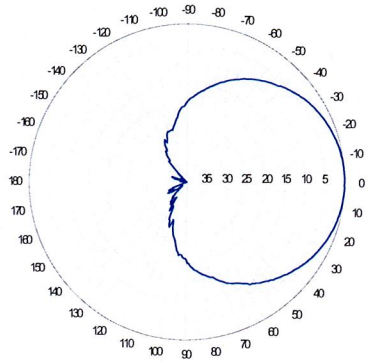
Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in). If the lock-down brace is used, the maximum diameter is Ø88.9 mm (3.5 in)

Mounting Bracket & Downtilt Bracket Kit #21699999

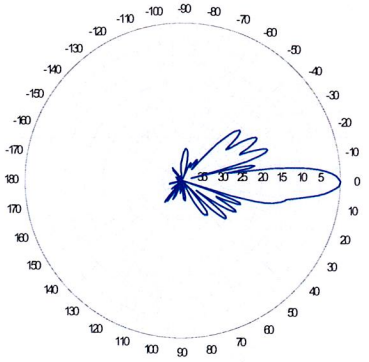
Electrical specifications

Frequency Range	806-960 MHz
Impedance	50Ω
[3] Connector(s)	NE or E-DIN 1 port / center
[1] VSWR	≤ 1.4:1
Polarization	Vertical
[1] Gain	16 dBd
[2] Power Rating	500 W
[1] Half Power Angle	
H-Plane	63°
E-Plane	7°
[1] Electrical Downtilt	0°
[1] Null Fill	10%
Lightning Protection	Direct Ground

Radiation pattern[1]



Horizontal

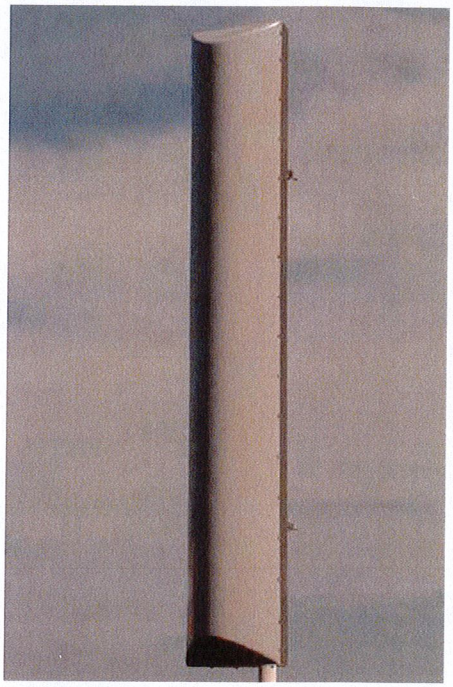


Vertical

Featuring upper side lobe suppression.

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.



Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- 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.

This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connector only.

CF Denotes a Center-Fed Connector.

806-960 MHz

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) The antenna weight listed above does not include the bracket weight.

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

Amphenol Antel, Inc. 1300 Capital Drive Rockford, Illinois 61109 USA Tel. (815) 399-0001
Toll-Free (888) 417-9562 Fax. (815) 399-0156 antel@antelinc.com www.antelinc.com

Amphenol Antel, Inc. The Antenna Technology Company

Revision Date: 7/5/07

Amphenol ANTENNA SOLUTIONS

LPA-80080-6CF-EDIN-X

V-Pol | Log Periodic | 80° | 14.0 dBd

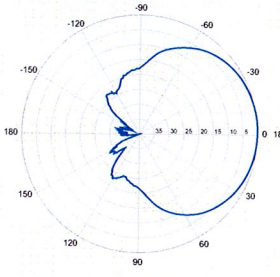
Replace "X" with desired electrical downtilt.

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

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

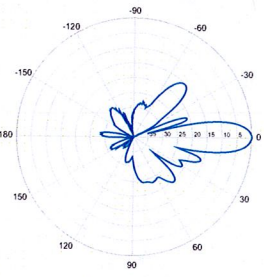
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit (0-20°)	21700000	50-102 mm 2.0-4.0 in	11 kg 25 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80080-6CF-EDIN-X



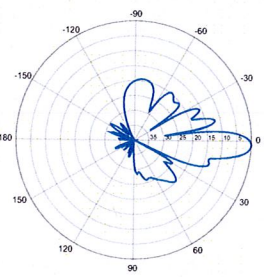
Horizontal | 750 MHz

LPA-80080-6CF-EDIN-0



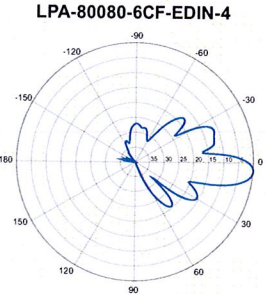
0° | Vertical

LPA-80080-6CF-EDIN-2



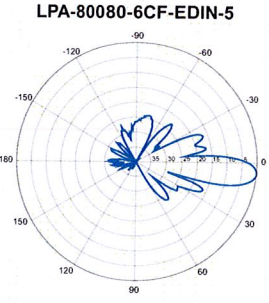
2° | Vertical

LPA-80080-6CF-EDIN-4



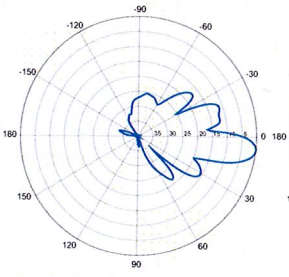
4° | Vertical

LPA-80080-6CF-EDIN-5



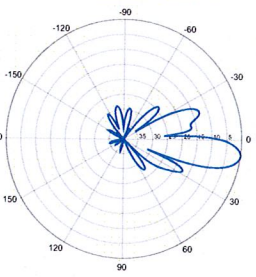
5° | Vertical

LPA-80080-6CF-EDIN-6



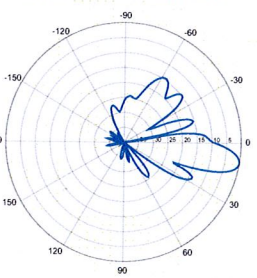
6° | Vertical

LPA-80080-6CF-EDIN-8



8° | Vertical

LPA-80080-6CF-EDIN-10



10° | Vertical

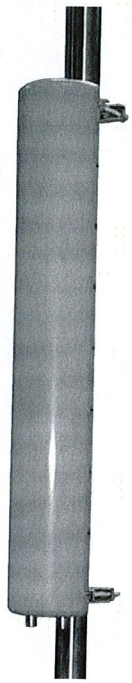
BXA-171063-8BF-EDIN-X

Replace "X" with desired electrical downtilt.

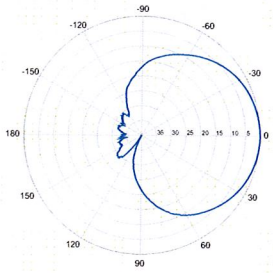
X-Pol | FET Panel | 63° | 17.4 dBi

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 m^2 Side: 0.14 m^2	Front: 2.0 ft^2 Side: 1.5 ft^2	
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 lbf	

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

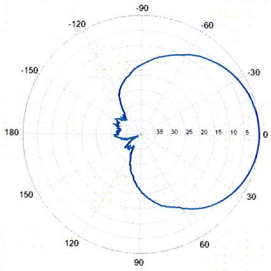


BXA-171063-8BF-EDIN-X



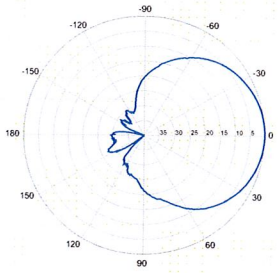
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



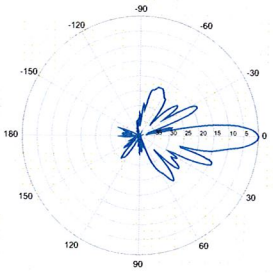
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



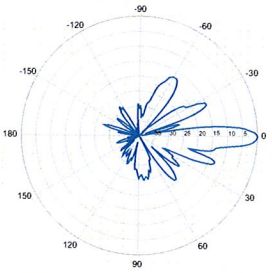
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



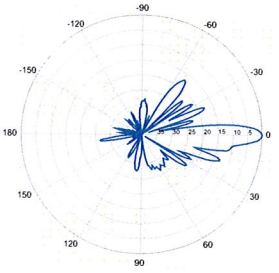
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-0



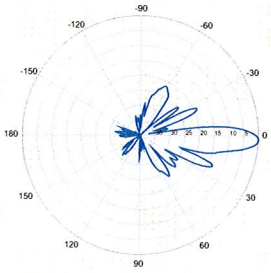
0° | Vertical | 1920-2170 MHz

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

BXA-171063-8BF-EDIN-X

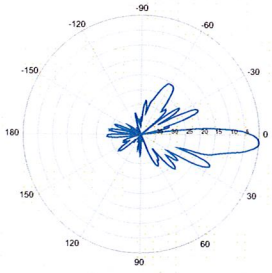
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8BF-EDIN-2



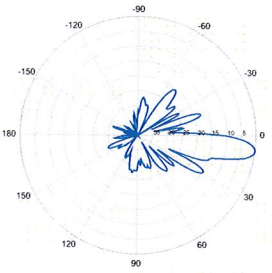
2° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-4



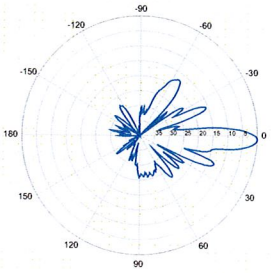
4° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-8



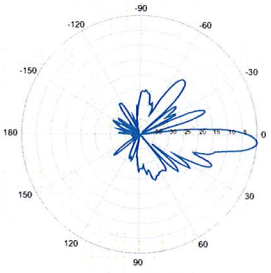
8° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-2



2° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-4



4° | Vertical | 1850-1990 MHz

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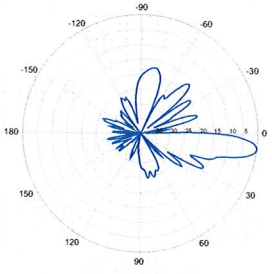

8° | Vertical | 1850-1990 MHz

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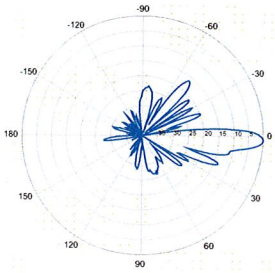
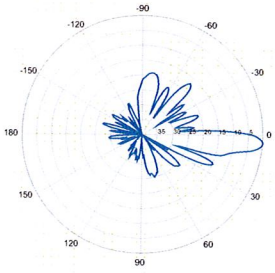


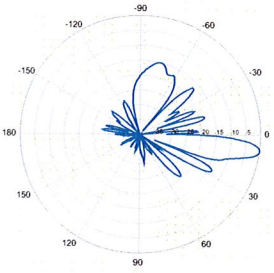
2° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-4



4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-8



8° | Vertical | 1920-2170 MHz

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

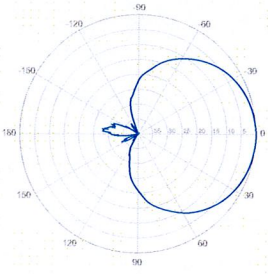
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

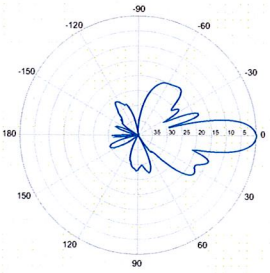
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



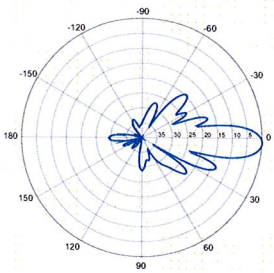
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

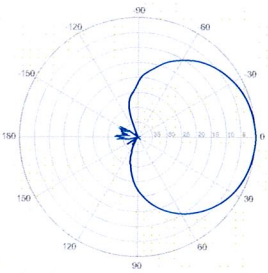


0° | Vertical | 750 MHz

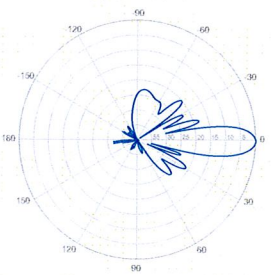
BXA-70063-6CF-EDIN-2



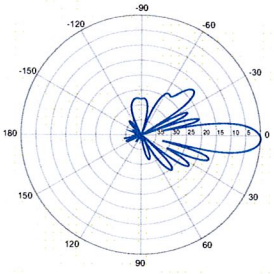
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

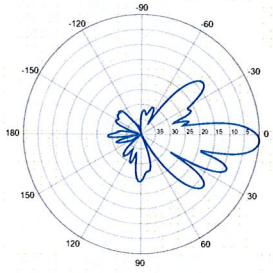


2° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-X

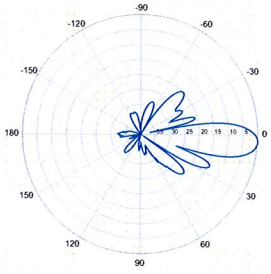
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4



4° | Vertical | 750 MHz

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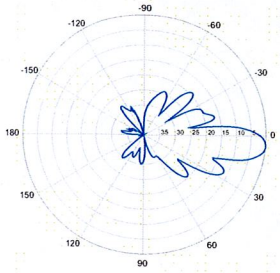
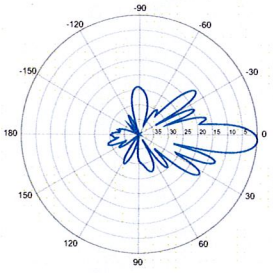
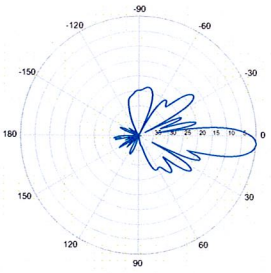


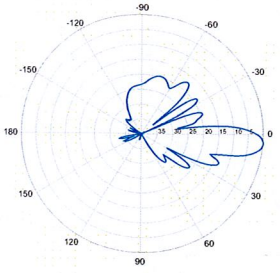
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

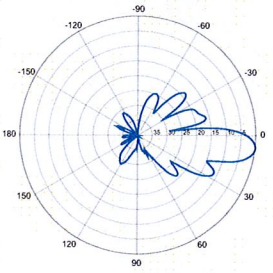


4° | Vertical | 850 MHz



5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



6° | Vertical | 750 MHz

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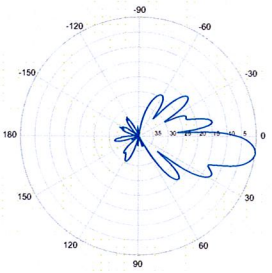

8° | Vertical | 750 MHz

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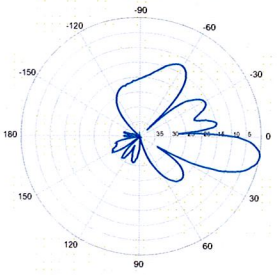
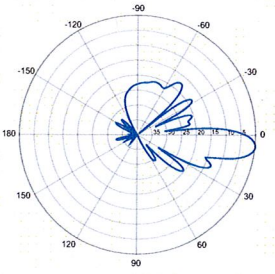
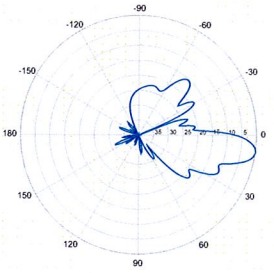


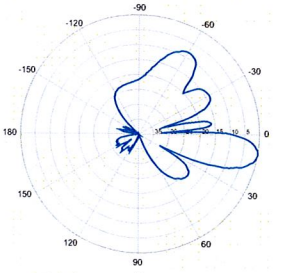
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



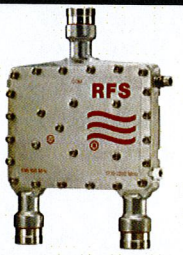
10° | Vertical | 850 MHz

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

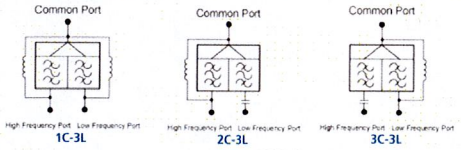
Notes

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



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)	

	General	Power	Density					
Site Name: Montville NW								
Tower Height: Verizon @ 167ft								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*Sprint	11	122	180	0.0149	1962.5	1.0000	1.49%	
*AT&T UMTS	1	500	147	0.0083	880	0.5867	1.42%	
*AT&T GSM	4	296	147	0.0197	880	0.5867	3.36%	
*AT&T GSM	2	427	147	0.0142	1900	1.0000	1.42%	
Verizon PCS	**7**	**256**	**167**	**0.0231**	**1970**	**1.0000**	**2.31%**	
Verizon Cellular	**9**	**362**	**167**	**0.0420**	**869**	**0.5793**	**7.25%**	
Verizon AWS	**1**	**639**	**167**	**0.0082**	**2145**	**1.0000**	**0.82%**	
Verizon 700	**1**	**760**	**167**	**0.0098**	**698**	**0.4653**	**2.11%**	
								20.18%
* Source: Siting Council								

Date: **March 22, 2012**

Veronica Harris
Crown Castle
1200 McArthur Blvd
Mahwah, NJ 07430

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

Subject: Structural Analysis Report

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	117761
	Carrier Site Name:	Montville NW
Crown Castle Designation:	**Crown Castle BU Number:**	876371
	Crown Castle Site Name:	WALDEN / CAROLYN BESADE
	Crown Castle JDE Job Number:	174831
	Crown Castle Work Order Number:	479912
	Crown Castle Application Number:	138075 Rev. 1
Engineering Firm Designation:	**Crown Castle Project Number:**	479912
Site Data:	**557 Rte. 82, Oakdale, New London County, CT** **Latitude *41° 30' 20.3"*, Longitude *-72° 11' 51.1"*** **180 Foot - Monopole Tower**	

Dear Veronica Harris,

Crown Castle is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 479912, in accordance with application 138075, revision 1.

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

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

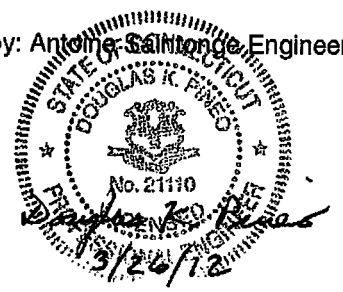
This analysis has been performed in accordance with the TIA/EIA-222-F standard and the 2005 Connecticut State Building Code based upon a wind speed of 85 mph fastest mile.

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

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

Structural analysis prepared by: Antoine Saintonge, Engineer II / CT

Respectfully submitted by:



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

tnxTower Report - version 6.0.4.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in November of 1999. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F. The tower was modified in 2007 by Vertical Structures.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 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
167	167	3	antel	BXA-171063-8BF-2 w/ Mount Pipe	-	-	-
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		4	antel	LPA-80063/6CF w/ Mount Pipe			
		2	antel	LPA-80080-6CF-EDIN w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			

Table 2 - Existing 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
180	180	6	decibel	DB980H90E-M w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Platform Mount [LP 712-1]	-	-	1
167	167	6	decibel	948F85T4E-M w/ Mount Pipe	-	-	2
		6	decibel	DB844H90-XY w/ Mount Pipe			
		1	gps	GPS_A	1	1/2	1
		1	tower mounts	Platform Mount [LP 712-1]	12	1-5/8	
147	147	6	powerwave technologies	7770.00 w/ Mount Pipe	12	1-5/8	1
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21901			
		1	tower mounts	Platform Mount [LP 712-1]			
75	76	1	gps	GPS_A	1	1/2	1
	75	1	tower mounts	Pipe Mount [PM 501-1]			

Notes:
1) Existing Equipment
2) Existing Equipment to be removed not considered in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180	180	12	Generic	DB980 Panel Antennas	-	-
170	170	12	Generic	DB980 Panel Antennas	-	-
160	160	12	Generic	DB980 Panel Antennas	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Assoc, Inc.	2053524	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI	1615419	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI	1615393	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Vertical Structures, Inc.	2254969	CCISITES

3.1) Analysis Method

tnxTower (version 6.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	180 - 133	Pole	TP27.99x18x0.25	1	-6.91	1109.25	63.3	Pass
L2	133 - 87.42	Pole	TP37.05x26.6398x0.3125	2	-13.25	1838.38	83.0	Pass
L3	87.42 - 42.88	Pole	TP45.76x35.3395x0.375	3	-22.42	2727.24	80.6	Pass
L4	42.88 - 0	Pole	TP54x43.6998x0.4375	4	-36.43	3866.70	74.2	Pass
							Summary	
						Pole (L2)	83.0	Pass
						Rating =	83.0	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	75.0	Pass
1	Base Plate	0	62.5	Pass
1	Base Foundation Soil Interaction	0	77.1	Pass

Structure Rating (max from all components) =	83%

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

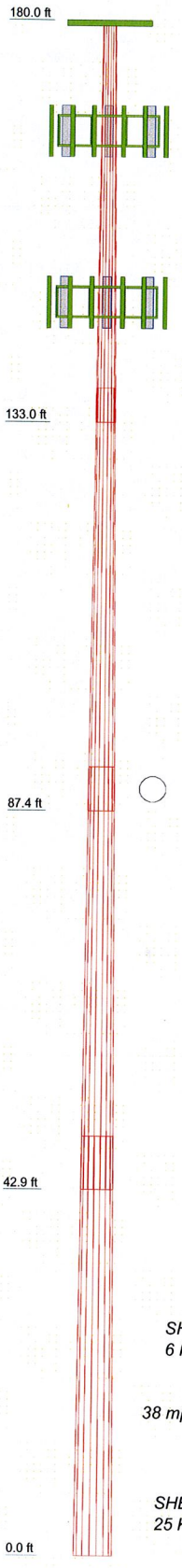
4.1) Recommendations

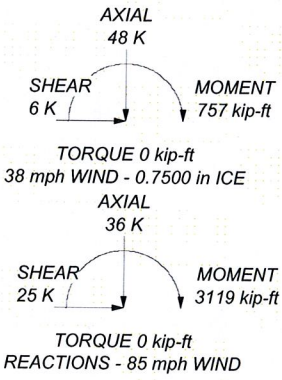
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	47.00	18	0.2500	4.00	18.0000	27.9900		2.9
2	49.58	18	0.3125	5.17	26.6398	37.0500		5.3
3	49.71	18	0.3750	6.25	35.3395	45.7600		8.1
4	49.13	18	0.4375		43.6998	54.0000		11.2
							A572-65	27.5





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H90E-M w/ Mount Pipe	180	(2) FD9R6004/2C-3L	167
(2) DB980H90E-M w/ Mount Pipe	180	Platform Mount [LP 712-1]	167
(2) DB980H90E-M w/ Mount Pipe	180	(2) 7770.00 w/Mount Pipe	147
Platform Mount [LP 712-1]	180	(2) LGP21401	147
GPS_A	167	(2) LGP21901	147
BXA-171063-8BF-2 w/ Mount Pipe	167	(2) 7770.00 w/Mount Pipe	147
BXA-70063-6CF-2 w/ Mount Pipe	167	(2) LGP21401	147
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	167	(2) LGP21901	147
		(2) 7770.00 w/Mount Pipe	147
(2) FD9R6004/2C-3L	167	(2) LGP21401	147
BXA-171063-8BF-2 w/ Mount Pipe	167	(2) LGP21901	147
BXA-70063-6CF-2 w/ Mount Pipe	167	(2) 4' x 2" Pipe Mount	147
(2) LPA-80063/6CF w/Mount Pipe	167	(2) 4' x 2" Pipe Mount	147
(2) FD9R6004/2C-3L	167	(2) 4' x 2" Pipe Mount	147
BXA-171063-8BF-2 w/ Mount Pipe	167	Platform Mount [LP 712-1]	147
BXA-70063-6CF-2 w/ Mount Pipe	167	GPS_A	75
(2) LPA-80063/6CF w/Mount Pipe	167	Pipe Mount [PM 501-1]	75

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 83%

CROWN CASTLE
We Are Solutions
Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: 724-416-2000
FAX:

Job: BU# 876371			
Project:			
Client: Crown Castle	Drawn by: ASaintonge		App'd:
Code: TIA/EIA-222-F	Date: 03/21/12		Scale: NTS
Path: RJSA Models - LetterWork Area\ASaintonge\876371_470912_Monopole_Correction\876371 monopole.eri			Dwg No. E-1

Tower Input Data

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

3) Tower is located in New London County, Connecticut.
4) Basic wind speed of 85 mph.
5) Nominal ice thickness of 0.7500 in.
6) Ice thickness is considered to increase with height.
7) Ice density of 56 pcf.
8) A wind speed of 38 mph is used in combination with ice.
9) Temperature drop of 50 °F.
10) Deflections calculated using a wind speed of 50 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) Local bending stresses due to climbing loads, 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	180.00-133.00	47.00	4.00	18	18.0000	27.9900	0.2500	1.0000	A572-65 (65 ksi)
L2	133.00-87.42	49.58	5.17	18	26.6398	37.0500	0.3125	1.2500	A572-65 (65 ksi)
L3	87.42-42.88	49.71	6.25	18	35.3395	45.7600	0.3750	1.5000	A572-65 (65 ksi)
L4	42.88-0.00	49.13		18	43.6998	54.0000	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.2777	14.0846	560.6340	6.3012	9.1440	61.3117	1122.0058	7.0437	2.7280	10.912

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
	28.4218	22.0117	2139.9506	9.8477	14.2189	150.5002	4282.7170	11.0079	4.4862	17.945
L2	27.9036	26.1134	2286.7186	9.3462	13.5330	168.9734	4576.4462	13.0592	4.1386	13.244
	37.6216	36.4390	6213.3124	13.0418	18.8214	330.1196	12434.800 5	18.2230	5.9708	19.107
L3	36.9851	41.6165	6427.7107	12.4124	17.9524	358.0409	12863.879 1	20.8122	5.5597	14.826
	46.4659	54.0195	14057.647 8	16.1117	23.2461	604.7320	28133.793 1	27.0149	7.3938	19.717
L4	45.7045	60.0752	14205.361 0	15.3581	22.1995	639.8951	28429.413 8	30.0433	6.9212	15.82
	54.8330	74.3782	26959.072 6	19.0147	27.4320	982.7600	53953.618 6	37.1962	8.7340	19.963

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 180.00-133.00				1	1	1		
L2 133.00-87.42				1	1	1		
L3 87.42-42.88				1	1	1		
L4 42.88-0.00				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
*								
VXL7-50(1-5/8")	B	No	Inside Pole	180.00 - 7.00	6	No Ice	0.00	0.75
						1/2" Ice	0.00	0.75
						1" Ice	0.00	0.75
						2" Ice	0.00	0.75
						4" Ice	0.00	0.75
LDF4-50A(1/2")	B	No	Inside Pole	167.00 - 7.00	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
LDF7-50A(1-5/8")	B	No	Inside Pole	167.00 - 7.00	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
LCF158-50A(1-5/8")	A	No	Inside Pole	147.00 - 7.00	12	No Ice	0.00	0.80
						1/2" Ice	0.00	0.80
						1" Ice	0.00	0.80
						2" Ice	0.00	0.80
						4" Ice	0.00	0.80
LCF12-50J(1/2")	B	No	Inside Pole	75.00 - 7.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
*								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	180.00-133.00	A	0.000	0.000	0.000	0.000	0.13
		B	0.000	0.000	0.000	0.000	0.55
		C	0.000	0.000	0.000	0.000	0.00
L2	133.00-87.42	A	0.000	0.000	0.000	0.000	0.44
		B	0.000	0.000	0.000	0.000	0.66
		C	0.000	0.000	0.000	0.000	0.00
L3	87.42-42.88	A	0.000	0.000	0.000	0.000	0.43
		B	0.000	0.000	0.000	0.000	0.65
		C	0.000	0.000	0.000	0.000	0.00
L4	42.88-0.00	A	0.000	0.000	0.000	0.000	0.34
		B	0.000	0.000	0.000	0.000	0.53
		C	0.000	0.000	0.000	0.000	0.00

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	180.00-133.00	A	0.903	0.000	0.000	0.000	0.000	0.13
		B		0.000	0.000	0.000	0.000	0.55
		C		0.000	0.000	0.000	0.000	0.00
L2	133.00-87.42	A	0.866	0.000	0.000	0.000	0.000	0.44
		B		0.000	0.000	0.000	0.000	0.66
		C		0.000	0.000	0.000	0.000	0.00
L3	87.42-42.88	A	0.813	0.000	0.000	0.000	0.000	0.43
		B		0.000	0.000	0.000	0.000	0.65
		C		0.000	0.000	0.000	0.000	0.00
L4	42.88-0.00	A	0.750	0.000	0.000	0.000	0.000	0.34
		B		0.000	0.000	0.000	0.000	0.53
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	180.00-133.00	0.0000	0.0000	0.0000	0.0000
L2	133.00-87.42	0.0000	0.0000	0.0000	0.0000
L3	87.42-42.88	0.0000	0.0000	0.0000	0.0000
L4	42.88-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
*									
(2) DB980H90E-M w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.06 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.06 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.04 4.50 4.95 5.87 8.05	3.62 4.48 5.22 6.74 10.00	0.03 0.06 0.11 0.22 0.55
Platform Mount [LP 712-1]	C	None		0.0000	180.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
*									
GPS_A	A	From Leg	4.00 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.30 0.37 0.46 0.65 1.15	0.30 0.37 0.46 0.65 1.15	0.00 0.00 0.01 0.02 0.08
BXA-171063-8BF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	167.00	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-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.10 5.61 6.65 8.83	10.74 12.00 12.98 14.99 19.23	0.05 0.11 0.19 0.36 0.86
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 0.00	0.0000	167.00	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
BXA-171063-8BF-2 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	167.00	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-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice	7.97 8.61 9.22	5.80 6.95 7.82	0.04 0.10 0.17

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	10.46	9.60	0.34
						2" Ice	13.07	13.37	0.80
						4" Ice			
(2) LPA-80063/6CF w/Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.35 10.92 11.50 12.69 15.17	10.45 11.51 12.44 14.36 18.40	0.02 0.11 0.21 0.44 1.03
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 0.00	0.0000	167.00	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
BXA-171063-8BF-2 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	167.00	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-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
(2) LPA-80063/6CF w/Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.35 10.92 11.50 12.69 15.17	10.45 11.51 12.44 14.36 18.40	0.02 0.11 0.21 0.44 1.03
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 0.00	0.0000	167.00	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
Platform Mount [LP 712-1]	C	None		0.0000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
*									
(2) 7770.00 w/Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.92 6.36 6.81 7.74 9.71	4.04 4.67 5.32 6.67 9.81	0.05 0.10 0.15 0.27 0.63
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) 7770.00 w/Mount Pipe	B	From Leg	4.00	0.0000	147.00	No Ice	5.92	4.04	0.05

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 0.00			1/2" Ice	6.36	4.67	0.10
						1" Ice	6.81	5.32	0.15
						2" Ice	7.74	6.67	0.27
						4" Ice	9.71	9.81	0.63
(2) LGP21401	B	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	B	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) 7770.00 w/Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.92 6.36 6.81 7.74 9.71	4.04 4.67 5.32 6.67 9.81	0.05 0.10 0.15 0.27 0.63
(2) LGP21401	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) 4' x 2" Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.03 0.04 0.04 0.07 0.17
(2) 4' x 2" Pipe Mount	B	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.03 0.04 0.04 0.07 0.17
(2) 4' x 2" Pipe Mount	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.79 1.03 1.28 1.81 3.11	0.79 1.03 1.28 1.81 3.11	0.03 0.04 0.04 0.07 0.17
Platform Mount [LP 712-1]	C	None		0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
* GPS_A	C	From Leg	4.00 0.00 1.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.30 0.37 0.46 0.65 1.15	0.30 0.37 0.46 0.65 1.15	0.00 0.00 0.01 0.02 0.08

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
Pipe Mount [PM 501-1]	C	None		0.0000	75.00	4" Ice			
						No Ice	3.47	1.67	0.05
						1/2" Ice	4.45	2.10	0.06
						1" Ice	5.43	2.53	0.07
						2" Ice	7.39	3.39	0.08
						4" Ice	11.31	5.11	0.11
*									

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 133	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.89	0.00	-0.15
			Max. Mx	11	-6.91	383.37	0.29
			Max. My	2	-7.03	0.00	364.90
			Max. Vy	11	-14.60	383.37	0.29
			Max. Vx	2	-13.97	0.00	364.90
			Max. Torque	5			0.21
L2	133 - 87.42	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.54	0.00	-0.15
			Max. Mx	11	-13.25	1107.29	0.31
			Max. My	2	-13.33	0.00	1060.66
			Max. Vy	11	-18.03	1107.29	0.31
			Max. Vx	2	-17.39	0.00	1060.66
			Max. Torque	5			0.21
L3	87.42 - 42.88	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.27	0.04	-0.17
			Max. Mx	11	-22.42	1970.70	0.31
			Max. My	2	-22.46	0.00	1896.56
			Max. Vy	11	-21.61	1970.70	0.31
			Max. Vx	2	-20.98	0.00	1896.56
			Max. Torque	5			0.20
L4	42.88 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-48.21	0.04	-0.17
			Max. Mx	11	-36.43	3119.05	0.31
			Max. My	2	-36.43	0.00	3014.54
			Max. Vy	11	-25.09	3119.05	0.31
			Max. Vx	2	-24.49	0.00	3014.54
			Max. Torque	10			-0.18

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	48.21	5.72	-0.00
	Max. H_x	11	36.44	25.07	0.00
	Max. H_z	2	36.44	0.00	24.47
	Max. M_x	2	3014.54	0.00	24.47
	Max. M_z	5	3119.04	-25.07	0.00
	Max. Torsion	4	0.17	-21.71	12.23
	Min. Vert	1	36.44	0.00	0.00
	Min. H_x	5	36.44	-25.07	0.00
	Min. H_z	8	36.44	0.00	-24.47
	Min. M_x	8	-3013.92	0.00	-24.47
	Min. M_z	11	-3119.05	25.07	0.00
	Min. Torsion	10	-0.18	21.71	-12.23

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	36.44	0.00	0.00	-0.29	0.00	0.00
Dead+Wind 0 deg - No Ice	36.44	0.00	-24.47	-3014.54	0.00	-0.06
Dead+Wind 30 deg - No Ice	36.44	12.53	-21.19	-2610.62	-1559.71	-0.13
Dead+Wind 60 deg - No Ice	36.44	21.71	-12.23	-1507.26	-2701.29	-0.17
Dead+Wind 90 deg - No Ice	36.44	25.07	-0.00	-0.31	-3119.04	-0.17
Dead+Wind 120 deg - No Ice	36.44	21.71	12.23	1506.63	-2701.29	-0.12
Dead+Wind 150 deg - No Ice	36.44	12.53	21.19	2609.99	-1559.71	-0.04
Dead+Wind 180 deg - No Ice	36.44	0.00	24.47	3013.92	0.00	0.06

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+Wind 210 deg - No Ice	36.44	-12.53	21.19	2609.99	1559.72	0.14
Dead+Wind 240 deg - No Ice	36.44	-21.71	12.23	1506.63	2701.29	0.18
Dead+Wind 270 deg - No Ice	36.44	-25.07	-0.00	-0.31	3119.05	0.17
Dead+Wind 300 deg - No Ice	36.44	-21.71	-12.23	-1507.26	2701.29	0.11
Dead+Wind 330 deg - No Ice	36.44	-12.53	-21.19	-2610.62	1559.72	0.03
Dead+Ice+Temp	48.21	0.00	0.00	0.17	0.04	0.00
Dead+Wind 0 deg+Ice+Temp	48.21	0.00	-5.60	-734.45	0.04	-0.02
Dead+Wind 30 deg+Ice+Temp	48.21	2.86	-4.85	-636.02	-378.45	-0.05
Dead+Wind 60 deg+Ice+Temp	48.21	4.95	-2.80	-367.13	-655.52	-0.06
Dead+Wind 90 deg+Ice+Temp	48.21	5.72	0.00	0.19	-756.93	-0.06
Dead+Wind 120 deg+Ice+Temp	48.21	4.95	2.80	367.51	-655.52	-0.05
Dead+Wind 150 deg+Ice+Temp	48.21	2.86	4.85	636.40	-378.45	-0.02
Dead+Wind 180 deg+Ice+Temp	48.21	0.00	5.60	734.83	0.04	0.02
Dead+Wind 210 deg+Ice+Temp	48.21	-2.86	4.85	636.40	378.53	0.05
Dead+Wind 240 deg+Ice+Temp	48.21	-4.95	2.80	367.51	655.60	0.06
Dead+Wind 270 deg+Ice+Temp	48.21	-5.72	0.00	0.19	757.02	0.06
Dead+Wind 300 deg+Ice+Temp	48.21	-4.95	-2.80	-367.13	655.60	0.05
Dead+Wind 330 deg+Ice+Temp	48.21	-2.86	-4.85	-636.02	378.53	0.02
Dead+Wind 0 deg - Service	36.44	0.00	-8.47	-1045.01	0.00	-0.02
Dead+Wind 30 deg - Service	36.44	4.34	-7.33	-905.05	-540.60	-0.05
Dead+Wind 60 deg - Service	36.44	7.51	-4.23	-522.66	-936.34	-0.06
Dead+Wind 90 deg - Service	36.44	8.67	0.00	-0.32	-1081.18	-0.06
Dead+Wind 120 deg - Service	36.44	7.51	4.23	522.02	-936.34	-0.04
Dead+Wind 150 deg - Service	36.44	4.34	7.33	904.41	-540.60	-0.01
Dead+Wind 180 deg - Service	36.44	0.00	8.47	1044.37	0.00	0.02
Dead+Wind 210 deg - Service	36.44	-4.34	7.33	904.41	540.61	0.05
Dead+Wind 240 deg - Service	36.44	-7.51	4.23	522.02	936.35	0.06
Dead+Wind 270 deg - Service	36.44	-8.67	0.00	-0.32	1081.19	0.06
Dead+Wind 300 deg - Service	36.44	-7.51	-4.23	-522.66	936.35	0.04
Dead+Wind 330 deg - Service	36.44	-4.34	-7.33	-905.05	540.61	0.01

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-36.44	0.00	0.00	36.44	0.00	0.000%
2	0.00	-36.44	-24.47	0.00	36.44	24.47	0.000%
3	12.53	-36.44	-21.19	-12.53	36.44	21.19	0.000%
4	21.71	-36.44	-12.23	-21.71	36.44	12.23	0.000%
5	25.07	-36.44	0.00	-25.07	36.44	0.00	0.000%
6	21.71	-36.44	12.23	-21.71	36.44	-12.23	0.000%
7	12.53	-36.44	21.19	-12.53	36.44	-21.19	0.000%
8	0.00	-36.44	24.47	0.00	36.44	-24.47	0.000%
9	-12.53	-36.44	21.19	12.53	36.44	-21.19	0.000%
10	-21.71	-36.44	12.23	21.71	36.44	-12.23	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
11	-25.07	-36.44	0.00	25.07	36.44	0.00	0.000%
12	-21.71	-36.44	-12.23	21.71	36.44	12.23	0.000%
13	-12.53	-36.44	-21.19	12.53	36.44	21.19	0.000%
14	0.00	-48.21	0.00	0.00	48.21	0.00	0.000%
15	0.00	-48.21	-5.60	0.00	48.21	5.60	0.000%
16	2.86	-48.21	-4.85	-2.86	48.21	4.85	0.000%
17	4.95	-48.21	-2.80	-4.95	48.21	2.80	0.000%
18	5.72	-48.21	0.00	-5.72	48.21	-0.00	0.000%
19	4.95	-48.21	2.80	-4.95	48.21	-2.80	0.000%
20	2.86	-48.21	4.85	-2.86	48.21	-4.85	0.000%
21	0.00	-48.21	5.60	0.00	48.21	-5.60	0.000%
22	-2.86	-48.21	4.85	2.86	48.21	-4.85	0.000%
23	-4.95	-48.21	2.80	4.95	48.21	-2.80	0.000%
24	-5.72	-48.21	0.00	5.72	48.21	-0.00	0.000%
25	-4.95	-48.21	-2.80	4.95	48.21	2.80	0.000%
26	-2.86	-48.21	-4.85	2.86	48.21	4.85	0.000%
27	0.00	-36.44	-8.47	0.00	36.44	8.47	0.000%
28	4.34	-36.44	-7.33	-4.34	36.44	7.33	0.000%
29	7.51	-36.44	-4.23	-7.51	36.44	4.23	0.000%
30	8.67	-36.44	0.00	-8.67	36.44	0.00	0.000%
31	7.51	-36.44	4.23	-7.51	36.44	-4.23	0.000%
32	4.34	-36.44	7.33	-4.34	36.44	-7.33	0.000%
33	0.00	-36.44	8.47	0.00	36.44	-8.47	0.000%
34	-4.34	-36.44	7.33	4.34	36.44	-7.33	0.000%
35	-7.51	-36.44	4.23	7.51	36.44	-4.23	0.000%
36	-8.67	-36.44	0.00	8.67	36.44	0.00	0.000%
37	-7.51	-36.44	-4.23	7.51	36.44	4.23	0.000%
38	-4.34	-36.44	-7.33	4.34	36.44	7.33	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	0.00041440
3	Yes	5	0.00000001	0.00093083
4	Yes	5	0.00000001	0.00094427
5	Yes	4	0.00000001	0.00045247
6	Yes	5	0.00000001	0.00093715
7	Yes	5	0.00000001	0.00093360
8	Yes	4	0.00000001	0.00041433
9	Yes	5	0.00000001	0.00093421
10	Yes	5	0.00000001	0.00093676
11	Yes	4	0.00000001	0.00045247
12	Yes	5	0.00000001	0.00094388
13	Yes	5	0.00000001	0.00093143
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00019114
16	Yes	5	0.00000001	0.00025144
17	Yes	5	0.00000001	0.00025497
18	Yes	5	0.00000001	0.00019776
19	Yes	5	0.00000001	0.00025453
20	Yes	5	0.00000001	0.00025215
21	Yes	5	0.00000001	0.00019137
22	Yes	5	0.00000001	0.00025223
23	Yes	5	0.00000001	0.00025452
24	Yes	5	0.00000001	0.00019778
25	Yes	5	0.00000001	0.00025496
26	Yes	5	0.00000001	0.00025152
27	Yes	4	0.00000001	0.00009685
28	Yes	5	0.00000001	0.00007384
29	Yes	5	0.00000001	0.00007627
30	Yes	4	0.00000001	0.00010667
31	Yes	5	0.00000001	0.00007485
32	Yes	5	0.00000001	0.00007417

33	Yes	4	0.00000001	0.00009661
34	Yes	5	0.00000001	0.00007427
35	Yes	5	0.00000001	0.00007479
36	Yes	4	0.00000001	0.00010667
37	Yes	5	0.00000001	0.00007620
38	Yes	5	0.00000001	0.00007394

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 133	47.826	36	2.4721	0.0010
L2	137 - 87.42	26.830	36	2.0407	0.0004
L3	92.59 - 42.88	11.384	36	1.2353	0.0002
L4	49.13 - 0	3.044	36	0.5751	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	(2) DB980H90E-M w/ Mount Pipe	36	47.826	2.4721	0.0010	26298
167.00	GPS_A	36	41.145	2.3687	0.0008	10114
147.00	(2) 7770.00 w/Mount Pipe	36	31.330	2.1720	0.0006	3983
75.00	GPS_A	36	7.225	0.9404	0.0001	3480

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 133	137.573	11	7.1152	0.0031
L2	137 - 87.42	77.255	11	5.8762	0.0017
L3	92.59 - 42.88	32.811	11	3.5599	0.0005
L4	49.13 - 0	8.778	11	1.6582	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	(2) DB980H90E-M w/ Mount Pipe	11	137.573	7.1152	0.0032	9384
167.00	GPS_A	11	118.385	6.8185	0.0028	3607
147.00	(2) 7770.00 w/Mount Pipe	11	90.189	6.2538	0.0021	1416
75.00	GPS_A	11	20.829	2.7109	0.0003	1213

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	180 - 133 (1)	TP27.99x18x0.25	47.00	0.00	0.0	39.000	21.3370	-6.91	832.14	0.008
L2	133 - 87.42 (2)	TP37.05x26.6398x0.3125	49.58	0.00	0.0	39.000	35.3623	-13.25	1379.13	0.010
L3	87.42 - 42.88 (3)	TP45.76x35.3395x0.375	49.71	0.00	0.0	39.000	52.4601	-22.42	2045.94	0.011
L4	42.88 - 0 (4)	TP54x43.6998x0.4375	49.13	0.00	0.0	39.000	74.3782	-36.43	2900.75	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	180 - 133 (1)	TP27.99x18x0.25	383.37	32.540	39.000	0.834	0.00	0.000	39.000	0.000
L2	133 - 87.42 (2)	TP37.05x26.6398x0.3125	1107.29	42.750	39.000	1.096	0.00	0.000	39.000	0.000
L3	87.42 - 42.88 (3)	TP45.76x35.3395x0.375	1970.70	41.475	39.000	1.063	0.00	0.000	39.000	0.000
L4	42.88 - 0 (4)	TP54x43.6998x0.4375	3119.05	38.085	39.000	0.977	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	180 - 133 (1)	TP27.99x18x0.25	14.60	0.684	26.000	0.053	0.21	0.009	26.000	0.000
L2	133 - 87.42 (2)	TP37.05x26.6398x0.3125	18.03	0.510	26.000	0.039	0.20	0.004	26.000	0.000
L3	87.42 - 42.88 (3)	TP45.76x35.3395x0.375	21.61	0.412	26.000	0.032	0.17	0.002	26.000	0.000
L4	42.88 - 0 (4)	TP54x43.6998x0.4375	25.09	0.337	26.000	0.026	0.17	0.001	26.000	0.000

Pole Interaction Design Data

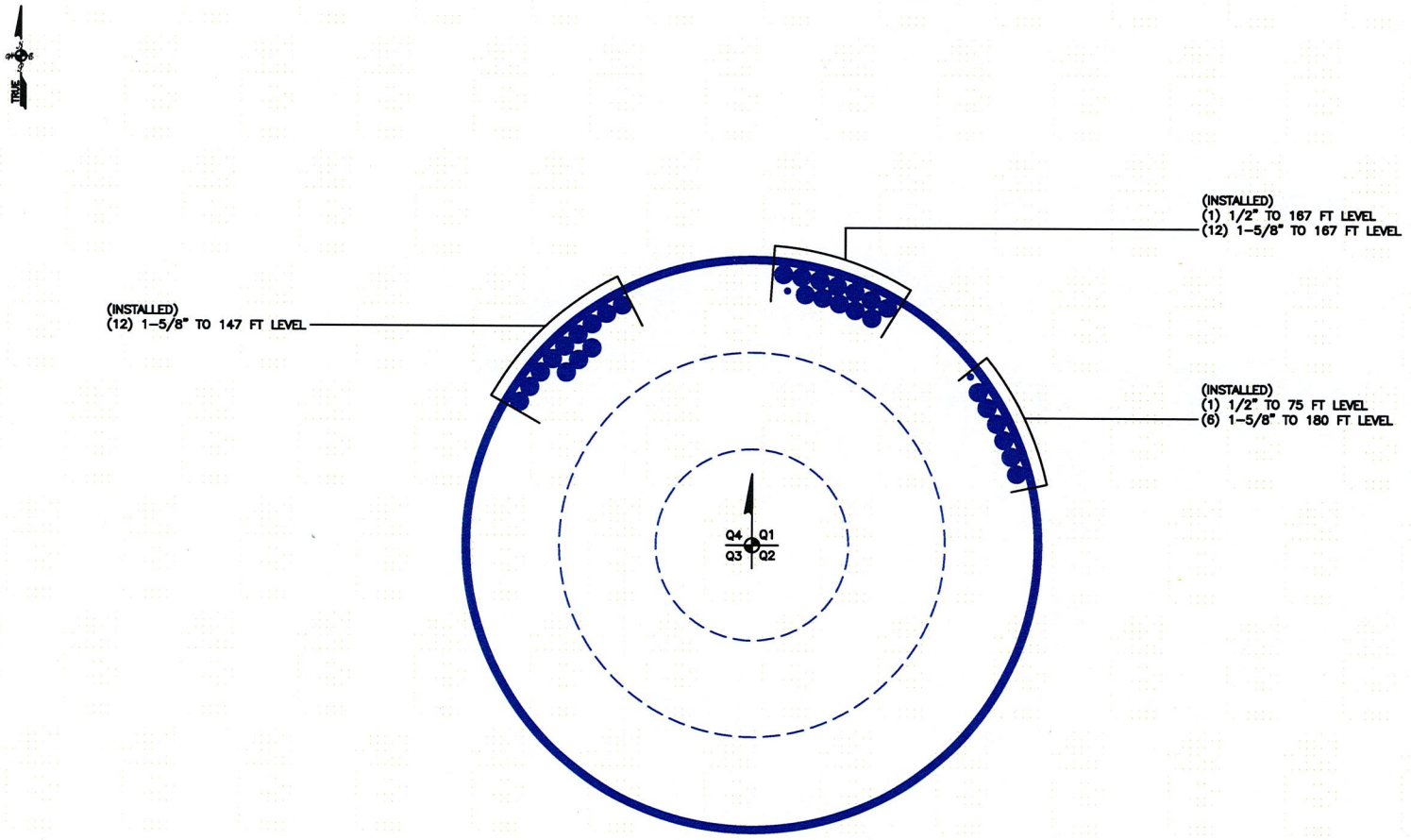
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 133 (1)	0.008	0.834	0.000	0.053	0.000	0.843 ✔	1.333	H1-3+VT ✔
L2	133 - 87.42 (2)	0.010	1.096	0.000	0.039	0.000	1.106 ✔	1.333	H1-3+VT ✔
L3	87.42 - 42.88 (3)	0.011	1.063	0.000	0.032	0.000	1.075 ✔	1.333	H1-3+VT ✔
L4	42.88 - 0 (4)	0.013	0.977	0.000	0.026	0.000	0.989 ✔	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	180 - 133	Pole	TP27.99x18x0.25	1	-6.91	1109.25	63.3	Pass
L2	133 - 87.42	Pole	TP37.05x26.6398x0.3125	2	-13.25	1838.38	83.0	Pass
L3	87.42 - 42.88	Pole	TP45.76x35.3395x0.375	3	-22.42	2727.24	80.6	Pass
L4	42.88 - 0	Pole	TP54x43.6998x0.4375	4	-36.43	3866.70	74.2	Pass
							Summary	
						Pole (L2)	83.0	Pass
						RATING =	**83.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876371 TOWER ID: C_BASELEVEL

: SCALE :

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: *876371*
Site Name: *WALDEN / CAROLYN BES*
App #: *138075 Rev. #1*

Pole Manufacturer:	*Other*

Reactions		
Moment:	3119	ft-kips
Axial:	36	kips
Shear:	25	kips

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	63	in

Plate Data		
Diam:	69	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	10.71	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.75	in
Fillet V. Weld:	0.4375	in
Width:	7	in
Height:	20	in
Thick:	1	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	54	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	146.3 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	75.0% **Pass**	

Base Plate Results

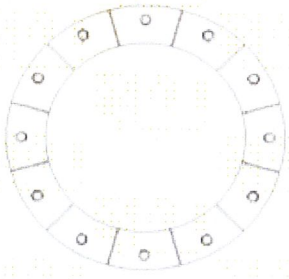
	Flexural Check	Stiffened
Base Plate Stress:	37.5 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	62.5% **Pass**	Y.L. Length: N/A, Roark

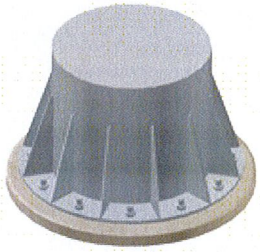
Stiffener Results

Horizontal Weld :	54.9% **Pass**
Vertical Weld:	33.6% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	10.8% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	42.1% **Pass**
Plate Comp. (AISC Bracket):	45.7% **Pass**

Pole Results

Pole Punching Shear Check:	9.4% **Pass**





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

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

Monopole Block Foundation

Checks capacity of monolithic block foundation for a monopole tower per TIA/EIA-222-F

BU #: 876371
Site Name: WALDEN / CAROLYN BESA
App No.: 138075, Rev 1

Design Reactions		
Shear, **S**:	25.00	kips
Moment, **M**:	3119.00	ft*kips
Height, **H**:	180.00	ft
Weight, **Wt**:	36.00	kips
Base Diameter, **BD**:	54.0	in

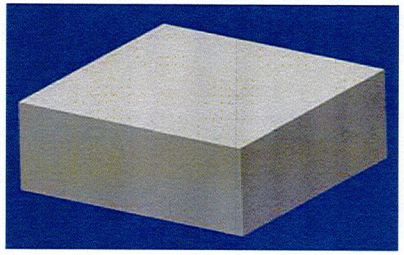
Foundation Dimensions		
Depth, **D**:	4.25	ft
Block Width, **W**:	25.0	ft
Neglected Depth, **N**:	3.5	ft
Ext. Above Grade, **E**:	0.75	ft
Anchor Steel Length, **Lst**:	72.0	in
Clear Cover, **cc**:	3.0	in

Soil Properties		
Soil Unit Weight, **γ**:	0.120	kcf
Allowable Bearing, **Bc**:	12.000	ksf
Int. Angle of Friction, **Φ**:	32.00	deg
Cohesion, **Co**:	0.000	ksf
Passive Pressure, **Pp**:	0.000	kcf
Base Friction, **μ**:	0.6	
Seismic Zone, **z**:	2	

Material Properties		
Rebar Yield Strength, **Fy**:	60000	psi
Concrete Strength, **F'c**:	4000	psi
Concrete Density, **δc**:	0.150	kcf

Rebar Properties		
Pad Rebar Size, **sp**:	8	
Rebar Quanity, **mp**:	40	21

Design Checks	*Capacity/ Availability*	*Demands/ Limits*	*Check*	*%*
Shear (ksf)	151.43	25.00	**OK**	**16.5%**
*Overturning (ft*kips):*	4206.25	3244.00	**OK**	**77.1%**
Bearing (ksf):	12.00	2.22	**OK**	**18.5%**
Shear - 1-Way (kips):	2144.02	707.51	**OK**	**33.0%**
Pad Rebar Area (in²):	31.42	16.20	**OK**	**N/A**
Bar Spacing (in):	6.51	18 > Bs > 2	**OK**	**N/A**
Development Length (in):	147.00	37.00	**OK**	**N/A**



Modification Checks	*Capacity/ Availibility*	*Demands/ Limits*	*Check*
Minimum Extra Thickness (in):	0.00	0.00	**Not Used**
Pad Rebar Area-short (in²):	8.84	0.00	**Not Used**
Pad Rebar Area-long (in2):	2.21	0.00	**Not Used**
Pad Rebar Spacing-short (in2):	14.68	18 > Bs > 2	**Not Used**
Pad Rebar Spacing-long (in2):	72.56	18 > Bs > 2	**Not Used**
End Cap Width (in):	0.00	0.00	**Not Used**
End Cap Rebar Area (in2):	4.81	0.00	**Not Used**
EC Rebar Spacing (in):	-1.73	18 > Bs > 2	**Not Used**
Tie Spacing (in):	14.97	294 > s > 4.5	**Not Used**
Dowel Area (in2):	8.84	0.00	**Not Used**
Dowel Embedment (in):	15.00	6.00	**Not Used**
Shear Strength of Cone (kips):	68.73	23.86	**Not Used**
Dowel Edge Distance (in):	12.00	14.51	**Not Used**
Dowel Spacing (in):	30.67	30.00	**Not Used**
Dowel Edge Distance (vert) (in):	30.00	14.51	**Not Used**
Dowel Devel. Length (in):	-3.00	13.32	**Not Used**

Modifications					
Pad Thickness, Te:	0	in	**End Cap Width, Wec:**	0	in
Revised Pad Thickness, **Tx:**	5	ft	Revised Width, **Wx:**	25	ft
Pad Rebar Size, **Se:**	6		EC Rebar Size, **Sec:**	7	per side, top & bottom
Rebar Quanity (long), **me:**	20	0	EC Rebar Quanity, **mec:**	8	0
Rebar Quanity (short), **mex:**	5	0	EC Tie Size, **Sect:**	4	per side
Dowel Size, **Sed:**	7		Tie Quanity, **mect:**	20	0
Dowel Quanity, **med:**	20	0	EC Dowel Size, **Secd:**	6	per side
			Dowel Quanity, **mecd:**	20	0
			Rows of Dowels, **Nd:**	2	
			Dowel Depth, **decd:**	15	in
			Edge Distance, **eecd:**	12	in