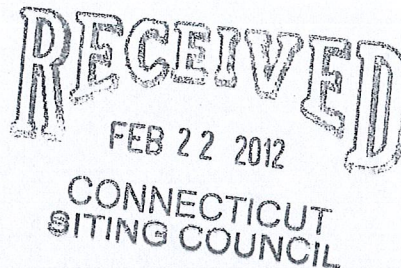


280 Trumbull Street  
Hartford, CT 06103-3597  
Main (860) 275-8200  
Fax (860) 275-8299  
kbaldwin@rc.com  
Direct (860) 275-8345

February 21, 2012

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



Re: **EM-VER-027-111130 – 48 Cow Hill Road, Clinton, Connecticut**  
**EM-VER-038-111108 – 101 Old Blue Hill, Durham, Connecticut**  
**EM-VER-042-111101 – 94 High Street, East Hampton, Connecticut**  
**EM-VER-060-111101 – 1919 Boston Post Road, Guilford, Connecticut**  
**EM-VER-061-111107 – 539 Plains Road, Haddam, Connecticut**  
**EM-VER-070-111108 – Route 80, Killingworth, 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 now been completed.

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

Sincerely,

Kenneth C. Baldwin

Copy to:  
Sandy M. Carter



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# 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](mailto:siting.council@ct.gov)

[www.ct.gov/csc](http://www.ct.gov/csc)

November 18, 2011

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

RE: **EM-VER-060-111101** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1919 Boston Post Road, Guilford, Connecticut.

Dear Attorney Baldwin:

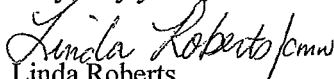
The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- 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 October 28, 2011. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

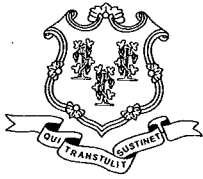
Very truly yours,

  
Linda Roberts  
Executive Director

LR/CDM/laf

c: The Honorable Joseph S. Mazza, First Selectman, Town of Guilford  
Regina Reid, Zoning Enforcement Officer, Town of Guilford  
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

E-Mail: [siting.council@ct.gov](mailto:siting.council@ct.gov)

[www.ct.gov/csc](http://www.ct.gov/csc)

November 1, 2011

The Honorable Joseph S. Mazza  
First Selectman  
Town of Guilford  
Town Hall  
31 Park Street  
Guilford, CT 06437

RE: **EM-VER-060-111101** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1919 Boston Post Road, Guilford, Connecticut.

Dear First Selectman Mazza:

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 November 15, 2011.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts  
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: Regina Reid, Zoning Enforcement Officer, Town of Guilford

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

EM-VER-060-111101

October 28, 2011

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

RECEIVED  
NOV - 1 2011  
CONNECTICUT  
SITING COUNCIL

Re: **Notice of Exempt Modification – Antenna Swap  
1919 Boston Post Road, Guilford, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains wireless telecommunications antennas at the 120-foot level on the existing 150-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council originally approved Cellco’s shared use of the existing tower in 1998. Cellco now intends to modify its installation by replacing six (6) of its existing antennas with one (1) model BXA-171063-8BF PCS antenna; one (1) model BXA-171085-12BF PCS antenna; one (1) model BXA-171063-12BF PCS antenna; and three (3) BXA-70063/6CF LTE antennas, all at the same 120-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 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 Joseph S. Mazza, First Selectman of the Town of Guilford. A copy of this letter is also being sent to Roger W. Stone, 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).



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Linda Roberts  
October 28, 2011  
Page 2

1. The proposed modifications will not result in an increase in the overall height of the existing tower. Cellco's antennas and diplexers will be located at the same 120-foot level on the existing 150-foot tower.
2. The proposed modifications will not involve any modifications to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.
4. The operation of the replacement antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative power density table for Cellco's modified facility is included behind Tab 2.

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

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Joseph S. Mazza, Guilford First Selectman  
Roger W. Stone  
Sandy M. Carter

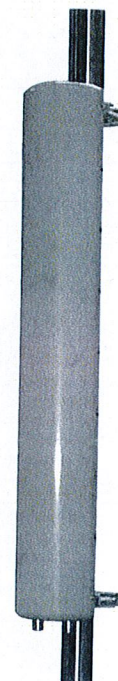


## BXA-171063-8BF-EDIN-X

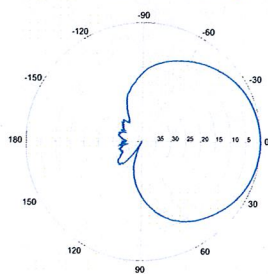
Replace "X" with desired electrical downtilt.

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°		
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 l-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 <sup>2</sup> Side: 0.14 m <sup>2</sup>	Front: 2.0 ft <sup>2</sup> Side: 1.5 ft <sup>2</sup>	
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		

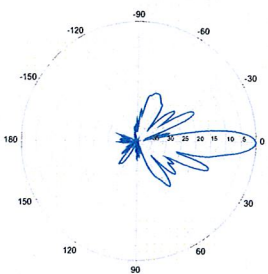


**BXA-171063-8BF-EDIN-X**



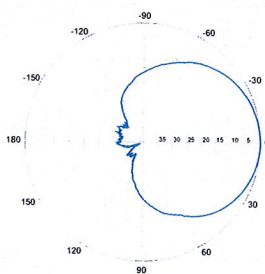
Horizontal | 1710-1880 MHz

**BXA-171063-8BF-EDIN-0**



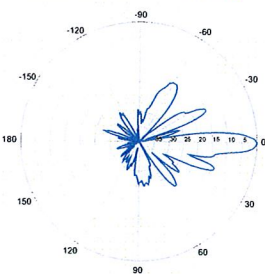
0° | Vertical | 1710-1880 MHz

**BXA-171063-8BF-EDIN-X**



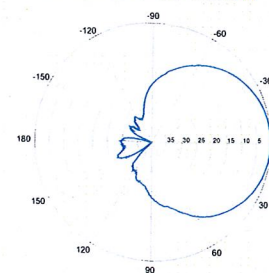
Horizontal | 1850-1990 MHz

**BXA-171063-8BF-EDIN-0**



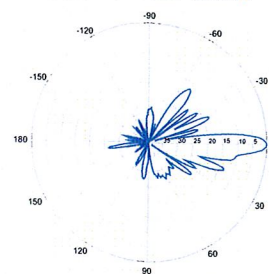
0° | Vertical | 1850-1990 MHz

**BXA-171063-8BF-EDIN-X**



Horizontal | 1920-2170 MHz

**BXA-171063-8BF-EDIN-0**



0° | Vertical | 1920-2170 MHz

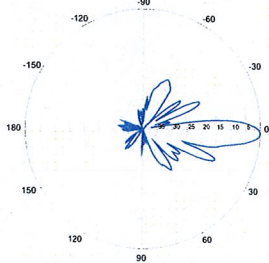
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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



**BXA-171063-8BF-EDIN-X**

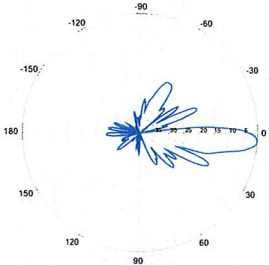
X-Pol | FET Panel | 63° | 17.4 dBi

**BXA-171063-8BF-EDIN-2**



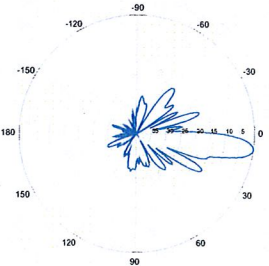
2° | Vertical | 1710-1880 MHz

**BXA-171063-8BF-EDIN-4**



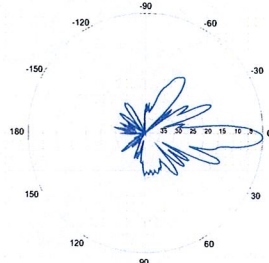
4° | Vertical | 1710-1880 MHz

**BXA-171063-8BF-EDIN-8**



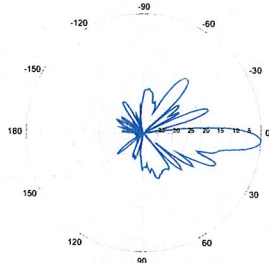
8° | Vertical | 1710-1880 MHz

**BXA-171063-8BF-EDIN-2**



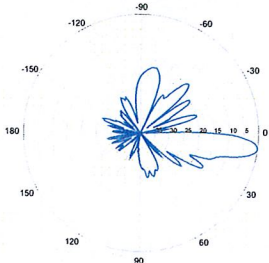
2° | Vertical | 1850-1990 MHz

**BXA-171063-8BF-EDIN-4**



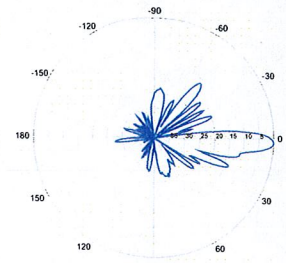
4° | Vertical | 1850-1990 MHz

**BXA-171063-8BF-EDIN-8**



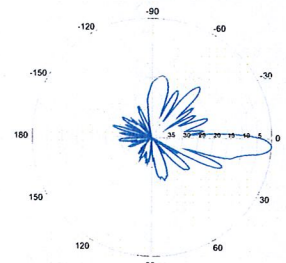
8° | Vertical | 1850-1990 MHz

**BXA-171063-8BF-EDIN-2**



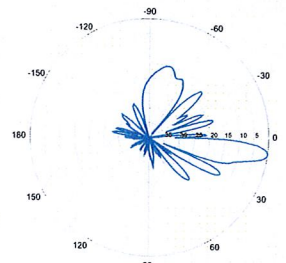
2° | Vertical | 1920-2170 MHz

**BXA-171063-8BF-EDIN-4**



4° | Vertical | 1920-2170 MHz

**BXA-171063-8BF-EDIN-8**



8° | Vertical | 1920-2170 MHz

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-171085-12BF-EDIN-X

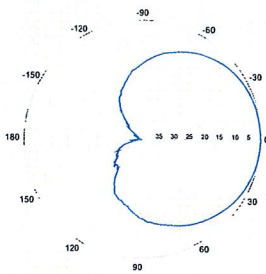
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 85° | 18.0 dBi

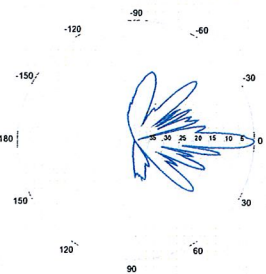


Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	88°	85°	80°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	15.1 dBd / 17.2 dBi	15.5 dBd / 17.6 dBi	15.9 dBd / 18.0 dBi
Electrical downtilt (X)		0, 2, 4	
Impedance		50Ω	
VSWR		≤1.5:1	
First upper sidelobe		< -17 dB	
Front-to-back ratio		> 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	1820 x 154 x 105 mm	71.7 x 6.1 x 4.1 in	
Depth with z-brackets	133 mm	5.2 in	
Weight without mounting brackets	6.8 kg	15 lbs	
Survival wind speed	> 201 km/hr		> 125 mph
Wind area	Front: 0.28 m <sup>2</sup> Side: 0.19 m <sup>2</sup>	Front: 3.1 ft <sup>2</sup> Side: 2.1 ft <sup>2</sup>	
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N	Front: 103 lbf Side: 68 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-171085-12BF-EDIN-X-FP		

**BXA-171085-12BF-EDIN-X**

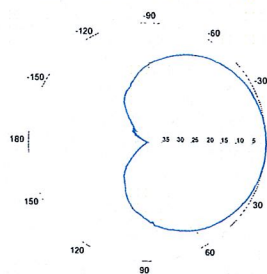


Horizontal | 1710-1880 MHz  
**BXA-171085-12BF-EDIN-0**

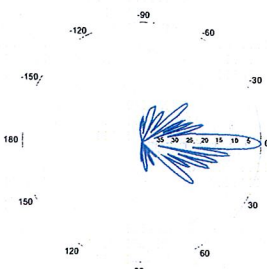


0° | Vertical | 1710-1880 MHz

**BXA-171085-12BF-EDIN-X**

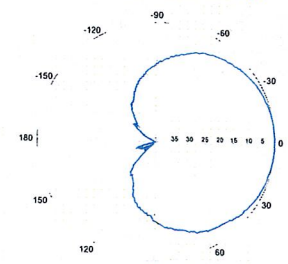


Horizontal | 1850-1990 MHz  
**BXA-171085-12BF-EDIN-0**

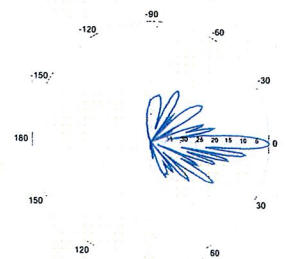


0° | Vertical | 1850-1990 MHz

**BXA-171085-12BF-EDIN-X**



Horizontal | 1920-2170 MHz  
**BXA-171085-12BF-EDIN-0**



0° | Vertical | 1920-2170 MHz

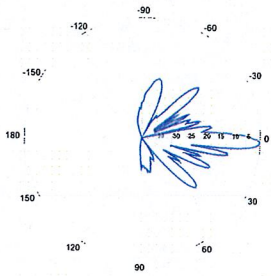
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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



**BXA-171085-12BF-EDIN-X**

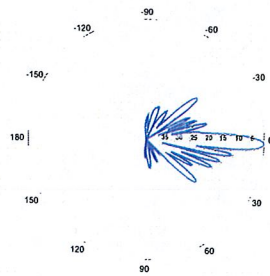
X-Pol | FET Panel | 85° | 18.0 dBi

**BXA-171085-12BF-EDIN-2**



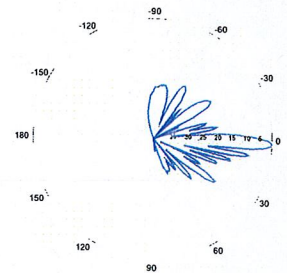
2° | Vertical | 1710-1880 MHz

**BXA-171085-12BF-EDIN-2**



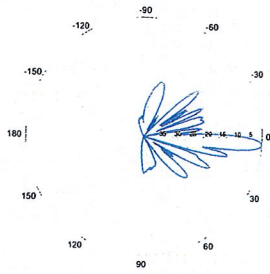
2° | Vertical | 1850-1990 MHz

**BXA-171085-12BF-EDIN-2**



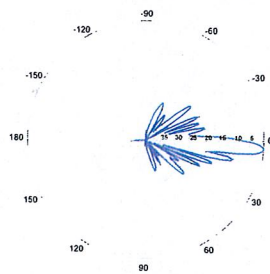
2° | Vertical | 1920-2170 MHz

**BXA-171085-12BF-EDIN-4**



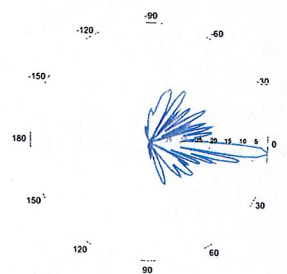
4° | Vertical | 1710-1880 MHz

**BXA-171085-12BF-EDIN-4**



4° | Vertical | 1850-1990 MHz

**BXA-171085-12BF-EDIN-4**



4° | 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-171063-12BF-EDIN-X

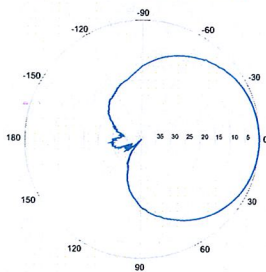
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 19.0 dBi

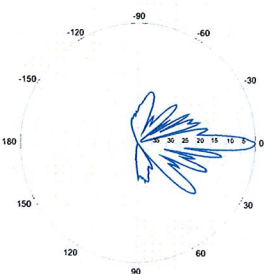
Electrical Characteristics	1710-2170 MHz		
	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 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	1820 x 154 x 105 mm		71.7 x 6.1 x 4.1 in
Depth with z-brackets	133 mm		5.2 in
Weight without mounting brackets	6.8 kg		15 lbs
Survival wind speed	> 201 km/hr		> 125 mph
Wind area	Front: 0.28 m <sup>2</sup> Side: 0.19 m <sup>2</sup>	Front: 3.1 ft <sup>2</sup> Side: 2.1 ft <sup>2</sup>	
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N	Front: 103 lbf Side: 68 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-171063-12BF-EDIN-X-FP		



**BXA-171063-12BF-EDIN-X**

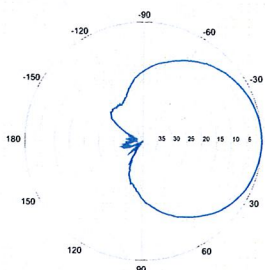


Horizontal | 1710-1880 MHz  
**BXA-171063-12BF-EDIN-0**

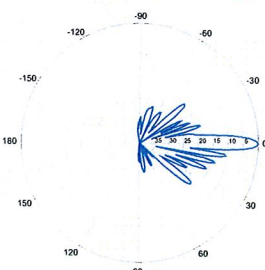


0° | Vertical | 1710-1880 MHz

**BXA-171063-12BF-EDIN-X**

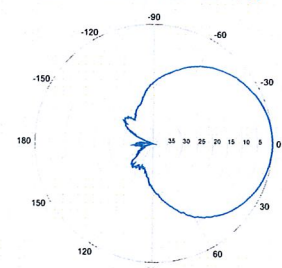


Horizontal | 1850-1990 MHz  
**BXA-171063-12BF-EDIN-0**

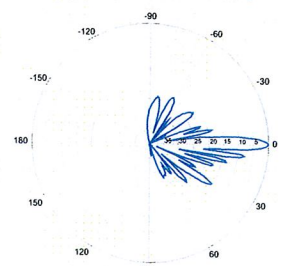


0° | Vertical | 1850-1990 MHz

**BXA-171063-12BF-EDIN-X**



Horizontal | 1920-2170 MHz  
**BXA-171063-12BF-EDIN-0**



0° | Vertical | 1920-2170 MHz

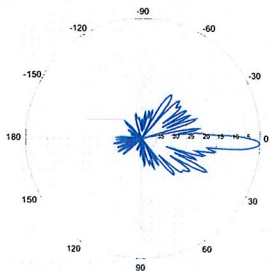
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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



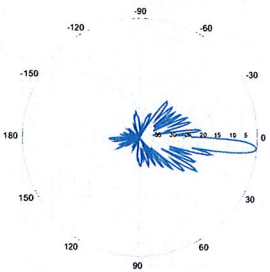
**BXA-171063-12BF-EDIN-X**

X-Pol | FET Panel | 63° | 19.0 dBi

**BXA-171063-12BF-EDIN-2**

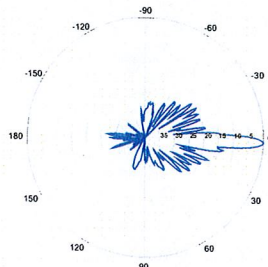


2° | Vertical | 1710-1880 MHz  
**BXA-171063-12BF-EDIN-5**

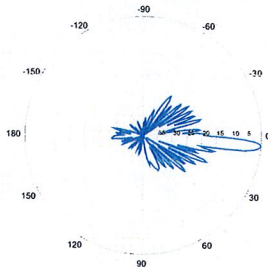


5° | Vertical | 1710-1880 MHz

**BXA-171063-12BF-EDIN-2**

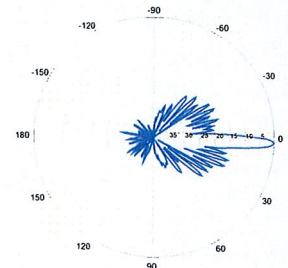


2° | Vertical | 1850-1990 MHz  
**BXA-171063-12BF-EDIN-5**

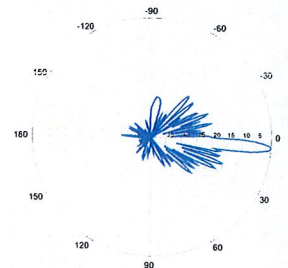


5° | Vertical | 1850-1990 MHz

**BXA-171063-12BF-EDIN-2**



2° | Vertical | 1920-2170 MHz  
**BXA-171063-12BF-EDIN-5**



5° | 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-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

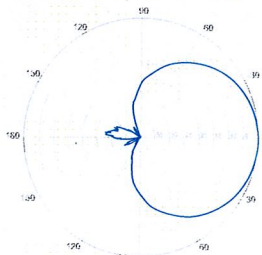
Replace "X" with desired electrical downtilt.

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



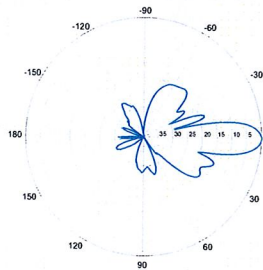
Electrical Characteristics	696-900 MHz		
Frequency bands	696-806 MHz	806-900 MHz	
Polarization	±45°		
Horizontal beamwidth	65°	63°	
Vertical beamwidth	13°	11°	
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10		
Impedance	50Ω		
VSWR	≤1.35:1		
Upper sidelobe 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		
Wind area	Front: 0.51 m <sup>2</sup> Side: 0.24 m <sup>2</sup>	Front: 5.5 ft <sup>2</sup> Side: 2.6 ft <sup>2</sup>	
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting Bracket Kit	36210003	50-160 mm 2.0-6.3 in	6.3 kg 14 lbs
3-Point Downtilt Bracket Kit (0-14°)	36210004	50-160 mm 2.0-6.3 in	7.3 kg 16 lbs
Downtilt Mounting Applications	A mounting bracket and downtilt bracket kit must be ordered for downtilt applications		
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



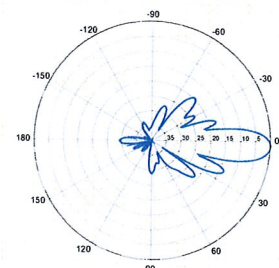
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

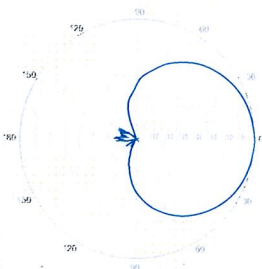


0° | Vertical | 750 MHz

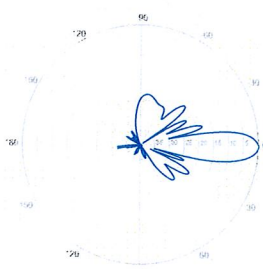
BXA-70063-6CF-EDIN-2



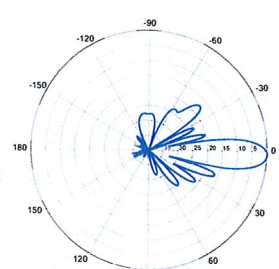
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

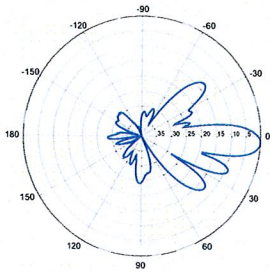
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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



**BXA-70063-6CF-EDIN-X**

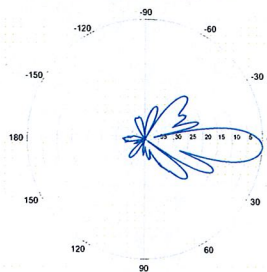
X-Pol | FET Panel | 63° | 14.5 dBd

**BXA-70063-6CF-EDIN-3**



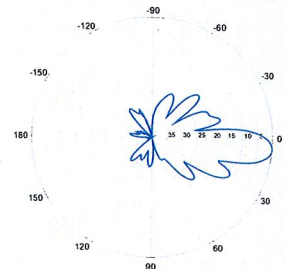
3° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-4**

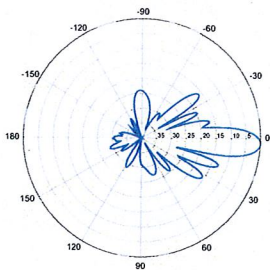


4° | Vertical | 750 MHz

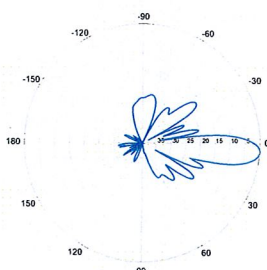
**BXA-70063-6CF-EDIN-5**



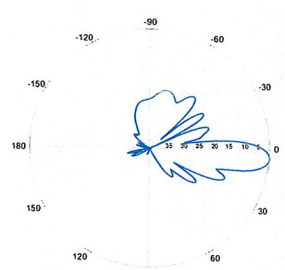
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

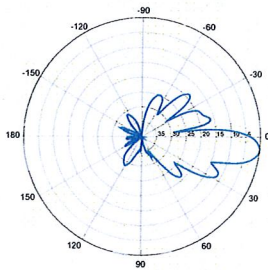


4° | Vertical | 850 MHz



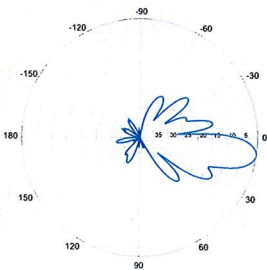
5° | Vertical | 850 MHz

**BXA-70063-6CF-EDIN-6**



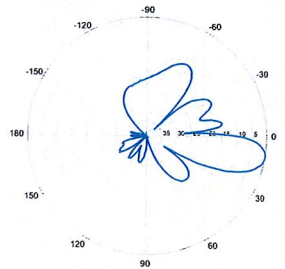
6° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-8**

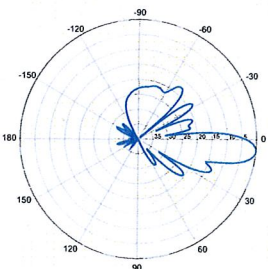


8° | Vertical | 750 MHz

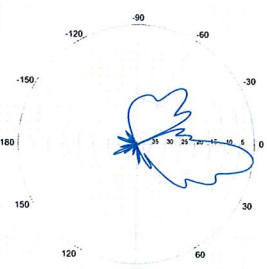
**BXA-70063-6CF-EDIN-10**



10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 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.

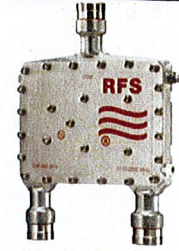




## ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

## 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

All information contained in the present datasheet is subject to confirmation at time of ordering



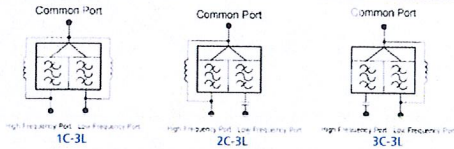


ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

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)	

All information contained in the present datasheet is subject to confirmation at time of ordering

Site Name: Guilford 2 Relo		General		Power		Density							
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*Cingular UMTS	1	500	110	0.0149	1935	1.0000	1.49%						
*Pocket	3	631	103	0.0642	2130	1.0000	6.42%						
*T-Mobile GSM	8	120	148	0.0158	1945	1.0000	1.58%						
*T-Mobile UMTS	2	674	148	0.0221	2100	1.0000	2.21%						
*SNET/Cingular			112	0.0254	1900	1.0000	2.54%						
*SNET/Cingular			112	0.0651	880	0.5867	11.10%						
*Sprint	11	122	130	0.0286	1957.5	1.0000	2.86%						
*Nextel	9	100	140	0.0165	851	0.5673	2.91%						
<b>Verizon PCS</b>	<b>7</b>	<b>286</b>	<b>120</b>	<b>0.0500</b>	<b>1970</b>	<b>1.0000</b>	<b>5.00%</b>						
<b>Verizon Cellular</b>	<b>9</b>	<b>389</b>	<b>120</b>	<b>0.0874</b>	<b>869</b>	<b>0.5793</b>	<b>15.09%</b>						
<b>Verizon AWS</b>	<b>1</b>	<b>716</b>	<b>120</b>	<b>0.0179</b>	<b>2145</b>	<b>1.0000</b>	<b>1.79%</b>						
<b>Verizon 700</b>	<b>2</b>	<b>721</b>	<b>120</b>	<b>0.0360</b>	<b>698</b>	<b>0.4653</b>	<b>7.74%</b>						
													<b>60.71%</b>
* Source: Siting Council													



Date: October 06, 2011



Cheryl Schultz  
Crown Castle  
3530 Toringdon Way, Suite 300  
Charlotte, NC 28277

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

**Subject: Structural Analysis Report**

**Carrier Designation:** Verizon Wireless Co-Locate  
**Carrier Site Name:** Guilford NHV2040

**Crown Castle Designation:** Crown Castle BU Number: 876343  
Crown Castle Site Name: GUILFORD WEST STONE PROPERTY  
Crown Castle JDE Job Number: 167796  
Crown Castle Work Order Number: 441477

**Engineering Firm Designation:** Crown Castle Project Number: 441477

**Site Data:** 1919 Boston Post Rd., GUILFORD, New Haven County, CT  
Latitude 41° 18' 1.27", Longitude -72° 42' 29.13"  
149 Foot - Monopole Tower

Dear Cheryl Schultz,

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 441477, in accordance with application 131948, revision 1.

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

LC1: Existing + Reserved + Proposed Equipment

**Sufficient Capacity**

Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon a wind speed of 85 mph fastest mile.

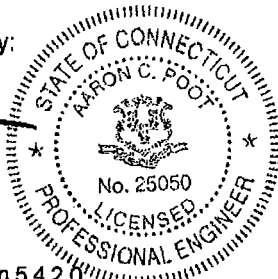
All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

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: Matt Anspach, E.I.T. / JAH

Respectfully submitted by:

  
Aaron C. Poot, P.E.  
Engineering Supervisor



RISA Tower Report - version 5.4.2.0

10/6/11

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RISATower Output

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### 7) APPENDIX C

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## 1) INTRODUCTION

This tower is a 149 ft Monopole tower designed by Engineered Endeavors, Inc. in June of 2008. The tower was originally designed for a wind speed of 115 mph per TIA-222-G.

## 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
116	118	4	andrew	DB846F65ZAXY w/ Mount Pipe			
		1	antel	BXA-171063-12BF w/ Mount Pipe			
		1	antel	BXA-171063-8BF-2 w/ Mount Pipe			
		1	antel	BXA-171085-12BF-2 w/ Mount Pipe	-	-	-
		3	antel	BXA-70063/6CF-2 w/ Mount Pipe			
		2	decibel	DB846H80E-SX w/ Mount Pipe			
		6	rfs celwave	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
148	148	3	ems wireless	RR90-17-02DP w/ Mount Pipe	6	1-5/8	1
		3	ericsson	KRY 112 71/1			
		3	rfs celwave	APX16DWV-16DWV-S-E- A20 w/Mount Pipe	6	1-5/8	2
		3	rfs celwave	ATMAA1412D-1A20			
		1	tower mounts	T-Arm Mount [TA 602-3]	-	-	1
139	140	12	decibel	DB848H90E-XY w/ Mount Pipe	12	1-1/4	1
	139	1	tower mounts	T-Arm Mount [TA 602-3]			
128	128	3	decibel	DB980H90E-M w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	T-Arm Mount [TA 602-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		6	allgon	7130.16 w/ Mount Pipe			
116	118	6	antel	LPD-7905/4 w/ Mount Pipe	-	-	3
	116	1	maxrad	GPS-TMG-26NMS	12	1-5/8	1
		1	tower mounts	T-Arm Mount [TA 602-3]	1	1/2	
106	108	6	powerwave technologies	7200.40 w/ Mount Pipe			
		12	powerwave technologies	LGP 21403	12	7/8	1
	106	1	tower mounts	T-Arm Mount [TA 602-3]			
98	98	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8	1
55	57	1	lucent	KS24019-L112A			
	55	1	tower mounts	Side Arm Mount [SO 701-1]	1	1/2	1

- Notes:  
 1) Existing Equipment  
 2) Reserved Equipment  
 3) Equipment to be Removed, was 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)
150	150	12	generic	72" x 12" Panel	-	-
140	140	12	generic	72" x 12" Panel	-	-
130	130	12	generic	72" x 12" Panel	-	-
120	120	12	generic	72" x 12" Panel	-	-
110	110	12	generic	72" x 12" Panel	-	-

**3) ANALYSIS PROCEDURE**

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Terracon	2302346	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors Inc.	2302348	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors Inc.	2302343	CCISITES

**3.1) Analysis Method**

RISATower (version 5.4.2.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.



### 3.2) Assumptions

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

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

### 4) ANALYSIS RESULTS

**Table 5 - Section Capacity (Summary)**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail	
L1	149 - 135.039	Pole	TP26.77x22x0.1875	1	-2.87	781.03	9.2	Pass	
L2	135.039 - 92.1667	Pole	TP40.91x25.0568x0.25	2	-11.29	1575.67	53.8	Pass	
L3	92.1667 - 45.2031	Pole	TP56.31x38.49x0.3125	3	-21.06	2589.77	65.2	Pass	
L4	45.2031 - 0	Pole	TP71x53.1174x0.375	4	-38.31	3890.11	63.7	Pass	
							Summary		
							Pole (L3)	65.2	Pass
							Rating =	65.2	Pass

**Table 6 - Tower Component Stresses vs. Capacity - LC1**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	38.9	Pass
1	Base Plate	0	38.9	Pass
1	Base Foundation	0	87.0	Pass

<b>Structure Rating (max from all components) =</b>	<b>87.0%</b>
---	--------------

Notes:

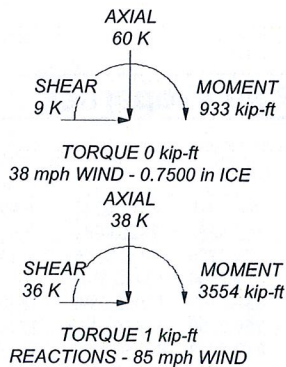
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

### 4.1) Recommendations

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

**APPENDIX A**  
**RISA TOWER OUTPUT**

Section	1	2	3	4
Length (ft)	13'11"-17'32"	46'9"-15'32"	52'7"-9'16"	52'9"-15'32"
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3125	0.3750
Socket Length (ft)	3'11"-1'32"	5'8"-1'32"	7'6"-3'132"	53.1174
Top Dia (in)	22.0000	25.0568	38.4900	71.0000
Bot Dia (in)	26.7700	40.9100	56.3100	13.2
Grade			A572-65	
Weight (K)	0.7	4.1	8.4	13.2



### DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
RR90-17-02DP w/ Mount Pipe	148	GPS-TMG-26NMS	116
KRY 112 71/1	148	(2) DB846F65ZAXY w/ Mount Pipe	116
APX16DWV-16DWV-S-E-A20 w/Mount Pipe	148	BXA-171063-8BF-2 w/ Mount Pipe	116
ATMAA1412D-1A20	148	BXA-70063/6CF-2 w/ Mount Pipe	116
RR90-17-02DP w/ Mount Pipe	148	(2) FD9R6004/2C-3L	116
KRY 112 71/1	148	BXA-171085-12BF-2 w/ Mount Pipe	116
APX16DWV-16DWV-S-E-A20 w/Mount Pipe	148	BXA-70063/6CF-2 w/ Mount Pipe	116
ATMAA1412D-1A20	148	(2) DB846H80E-SX w/ Mount Pipe	116
RR90-17-02DP w/ Mount Pipe	148	(2) FD9R6004/2C-3L	116
KRY 112 71/1	148	(2) DB846F65ZAXY w/ Mount Pipe	116
APX16DWV-16DWV-S-E-A20 w/Mount Pipe	148	BXA-171063-12BF w/ Mount Pipe	116
ATMAA1412D-1A20	148	BXA-70063/6CF-2 w/ Mount Pipe	116
T-Arm Mount [TA 602-3]	148	(2) FD9R6004/2C-3L	116
(2) 8"x2" Antenna Mount Pipe	148	(2) DB846H80E-SX w/ Mount Pipe	116
(2) 8"x2" Antenna Mount Pipe	148	(2) FD9R6004/2C-3L	116
(2) 8"x2" Antenna Mount Pipe	148	(2) DB846F65ZAXY w/ Mount Pipe	116
(4) DB848H90E-XY w/Mount Pipe	139	BXA-171063-12BF w/ Mount Pipe	116
(4) DB848H90E-XY w/Mount Pipe	139	BXA-70063/6CF-2 w/ Mount Pipe	116
(4) DB848H90E-XY w/Mount Pipe	139	(2) FD9R6004/2C-3L	116
T-Arm Mount [TA 602-3]	139	T-Arm Mount [TA 602-3]	116
DB980H90E-M w/ Mount Pipe	128	(2) 7200.40 w/Mount Pipe	106
DB980H90E-M w/ Mount Pipe	128	(4) LGP 21403	106
DB980H90E-M w/ Mount Pipe	128	(2) 7200.40 w/Mount Pipe	106
T-Arm Mount [TA 602-3]	128	(4) LGP 21403	106
(3) 8"x2" Antenna Mount Pipe	128	(2) 7200.40 w/Mount Pipe	106
(3) 8"x2" Antenna Mount Pipe	128	(4) LGP 21403	106
(3) 8"x2" Antenna Mount Pipe	128	T-Arm Mount [TA 602-3]	106
		(2) 8"x2" Antenna Mount Pipe	106
		(2) 8"x2" Antenna Mount Pipe	106
		APXV18-206517S-C w/ Mount Pipe	98
		APXV18-206517S-C w/ Mount Pipe	98
		APXV18-206517S-C w/ Mount Pipe	98
		KS24019-L112A	55
		Side Arm Mount [SO 701-1]	55

### MATERIAL STRENGTH

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

### TOWER DESIGN NOTES

1. Tower is located in New Haven 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: 65.2%

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	<p>Project: _____</p>
	<p>Client: <b>Crown Castle</b>      Drawn by: <b>Manspach</b>      App'd: _____</p>
	<p>Code: <b>TIA/EIA-222-F</b>      Date: <b>10/03/11</b>      Scale: <b>NTS</b></p>
	<p>Path: R:\ISA Models - Letters\Work Area\Manspach\876343\876343.dwg      Dwg No: <b>E-1</b></p>



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## 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 New Haven County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 38 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

## 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	149'-135'15/32"	13'11"-17/32"	3'11"-1/32"	18	22.0000	26.7700	0.1875	0.7500	A572-65 (65 ksi)
L2	135'15/32"-92'2- 1/32"	46'9"-15/32"	5'8"-1/32"	18	25.0568	40.9100	0.2500	1.0000	A572-65 (65 ksi)
L3	92'2"-1/32"-45'2- 13/32"	52'7"-9/16"	7'6"-31/32"	18	38.4900	56.3100	0.3125	1.2500	A572-65 (65 ksi)
L4	45'2"-13/32"-0'	52'9"-15/32"		18	53.1174	71.0000	0.3750	1.5000	A572-65 (65 ksi)

## Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	I/Q in <sup>2</sup>	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
	27.1830	15.8199	1412.3200	9.4368	13.5992	103.8535	2826.4984	7.9115	4.3815	23.368
L2	26.7909	19.6842	1530.3710	8.8064	12.7289	120.2285	3062.7556	9.8440	3.9700	15.88
	41.5411	32.2637	6738.8611	14.4343	20.7823	324.2600	13486.5893	16.1349	6.7602	27.041
L3	41.0320	37.8673	6972.9573	13.5530	19.5529	356.6197	13955.0898	18.9373	6.2242	19.918
	57.1787	55.5425	22003.9328	19.8791	28.6055	769.2209	44036.8189	27.7765	9.3606	29.954
L4	56.5455	62.7766	22062.4904	18.7235	26.9836	817.6252	44154.0112	31.3943	8.6887	23.17
	72.0953	84.0614	52972.5675	25.0719	36.0680	1468.6860	106014.837	42.0387	11.8360	31.563

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Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_f$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft <sup>2</sup>	in					in	in
L1 149'-135'15/32'				1	1	1		
L2 135'15/32"-92' 2-1/32"				1	1	1		
L3 92'2-1/32"-45' -13/32"				1	1	1		
L4 45'2-13/32"-0'				1	1	1		

### Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	$C_{AA}$	Weight
				ft		ft <sup>2</sup> /ft	plf
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	148' - 0'	3	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.82 2.33 4.46 10.54 30.04
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	148' - 0'	9	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.82 2.33 4.46 10.54 30.04
***							
LDF6-50A(1-1/4")	A	No	Inside Pole	139' - 0'	12	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.66 0.66 0.66 0.66 0.66
***							
LDF7-50A(1-5/8")	C	No	Inside Pole	128' - 0'	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.82 0.82 0.82 0.82 0.82
***							
LDF4-50A(1/2")	C	No	Inside Pole	116' - 0'	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.15 0.15 0.15 0.15

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>AA</sub>		Weight plf
						ft <sup>2</sup> /ft		
LDF7-50A(1-5/8")	C	No	Inside Pole	116' - 0'	12	4" Ice	0.00	0.15
						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")	A	No	Inside Pole	106' - 0'	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
***								
CR 50 1873(1-5/8")	B	No	CaAa (Out Of Face)	98' - 0'	2	No Ice	0.20	0.83
						1/2" Ice	0.30	2.34
						1" Ice	0.40	4.47
						2" Ice	0.60	10.55
						4" Ice	1.00	30.05
LCF158-50JL(1-5/8")	B	No	CaAa (Out Of Face)	98' - 0'	4	No Ice	0.00	0.52
						1/2" Ice	0.00	2.03
						1" Ice	0.00	4.16
						2" Ice	0.00	10.24
						4" Ice	0.00	29.74
***								
***								
LDF4-50A(1/2")	C	No	Inside Pole	55' - 0'	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
***								

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	149'-135'15/32"	A	0.000	0.000	0.000	7.699	0.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	135'15/32"-92'2-1/32"	A	0.000	0.000	0.000	25.466	0.82
		B	0.000	0.000	0.000	2.310	0.02
		C	0.000	0.000	0.000	0.000	0.41
L3	92'2-1/32"-45'2-13/32"	A	0.000	0.000	0.000	27.896	1.02
		B	0.000	0.000	0.000	18.598	0.18
		C	0.000	0.000	0.000	0.000	0.70
L4	45'2-13/32"-0'	A	0.000	0.000	0.000	26.851	0.98
		B	0.000	0.000	0.000	17.900	0.17
		C	0.000	0.000	0.000	0.000	0.68

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
L1	149'-135'15/32"	A	0.893	0.000	0.000	0.000	14.646	0.65
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	135'15/32"-92'2-1/32"	A	0.869	0.000	0.000	0.000	48.447	2.46
		B		0.000	0.000	0.000	4.395	0.13
		C		0.000	0.000	0.000	0.000	0.41
L3	92'2-1/32"-45'2-13/32"	A	0.818	0.000	0.000	0.000	52.377	2.76
		B		0.000	0.000	0.000	34.918	1.04
		C		0.000	0.000	0.000	0.000	0.70
L4	45'2-13/32"-0'	A	0.750	0.000	0.000	0.000	49.035	2.54
		B		0.000	0.000	0.000	32.690	0.95
		C		0.000	0.000	0.000	0.000	0.68

### Feed Line Center of Pressure

Section	Elevation ft	$CP_x$ in	$CP_z$ in	$CP_x$ Ice in	$CP_z$ Ice in
L1	149'-135'15/32"	0.0000	-0.6552	0.0000	-0.9969
L2	135'15/32"-92'2-1/32"	0.0675	-0.6848	0.1058	-1.0745
L3	92'2-1/32"-45'2-13/32"	0.4130	-0.4769	0.6451	-0.7449
L4	45'2-13/32"-0'	0.4332	-0.5002	0.6866	-0.7928

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	$C_{AA}$ Front ft <sup>2</sup>	$C_{AA}$ Side ft <sup>2</sup>	Weight K
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	148'	No Ice	3.32	0.03
						1/2" Ice	5.09	0.07
						1" Ice	5.58	0.11
						2" Ice	6.59	0.22
						4" Ice	8.73	0.56
KRY 112 71/1	A	From Leg	4.00 0' 0'	0.0000	148'	No Ice	0.45	0.01
						1/2" Ice	0.80	0.02
						1" Ice	0.93	0.03
						2" Ice	1.22	0.04
						4" Ice	1.90	0.11
APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	148'	No Ice	3.29	0.06
						1/2" Ice	7.73	0.10
						1" Ice	8.21	0.16
						2" Ice	9.18	0.28
						4" Ice	11.23	0.65
ATMAA1412D-1A20	A	From Leg	4.00 0' 0'	0.0000	148'	No Ice	0.47	0.01
						1/2" Ice	1.31	0.02
						1" Ice	1.47	0.03

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	$C_{AA}$ Front	$C_{AA}$ Side	Weight	
			Horz	Lateral Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00	0.0000	148'	2" Ice	1.81	0.95	0.06	
						4" Ice	2.58	1.57	0.14	
						No Ice	4.59	3.32	0.03	
						1/2" Ice	5.09	4.09	0.07	
						1" Ice	5.58	4.78	0.11	
						2" Ice	6.59	6.23	0.22	
KRY 112 71/1	B	From Leg	4.00	0.0000	148'	4" Ice	8.73	9.31	0.56	
						No Ice	0.68	0.45	0.01	
						1/2" Ice	0.80	0.56	0.02	
						1" Ice	0.93	0.68	0.03	
						2" Ice	1.22	0.94	0.04	
						4" Ice	1.90	1.57	0.11	
APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	B	From Leg	4.00	0.0000	148'	No Ice	7.27	3.29	0.06	
						1/2" Ice	7.73	3.92	0.10	
						1" Ice	8.21	4.57	0.16	
						2" Ice	9.18	5.92	0.28	
						4" Ice	11.23	8.88	0.65	
						No Ice	1.17	0.47	0.01	
ATMAA1412D-1A20	B	From Leg	4.00	0.0000	148'	1/2" Ice	1.31	0.57	0.02	
						1" Ice	1.47	0.69	0.03	
						2" Ice	1.81	0.95	0.06	
						4" Ice	2.58	1.57	0.14	
						No Ice	4.59	3.32	0.03	
						1/2" Ice	5.09	4.09	0.07	
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00	0.0000	148'	1" Ice	5.58	4.78	0.11	
						2" Ice	6.59	6.23	0.22	
						4" Ice	8.73	9.31	0.56	
						No Ice	0.68	0.45	0.01	
						1/2" Ice	0.80	0.56	0.02	
						1" Ice	0.93	0.68	0.03	
KRY 112 71/1	C	From Leg	4.00	0.0000	148'	2" Ice	1.22	0.94	0.04	
						4" Ice	1.90	1.57	0.11	
						No Ice	7.27	3.29	0.06	
						1/2" Ice	7.73	3.92	0.10	
						1" Ice	8.21	4.57	0.16	
						2" Ice	9.18	5.92	0.28	
APX16DWV-16DWV-S-E-A 20 w/Mount Pipe	C	From Leg	4.00	0.0000	148'	4" Ice	11.23	8.88	0.65	
						No Ice	1.17	0.47	0.01	
						1/2" Ice	1.31	0.57	0.02	
						1" Ice	1.47	0.69	0.03	
						2" Ice	1.81	0.95	0.06	
						4" Ice	2.58	1.57	0.14	
ATMAA1412D-1A20	C	From Leg	4.00	0.0000	148'	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	
						2" Ice	26.99	26.99	1.64	
						4" Ice	42.39	42.39	2.50	
						No Ice	1.90	1.90	0.03	
(2) 8"x2" Antenna Mount Pipe	A	From Leg	4.00	0.0000	148'	1/2" Ice	2.73	2.73	0.04	
						3'	1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12	
						4" Ice	6.50	6.50	0.30	
						No Ice	1.90	1.90	0.03	
						1/2" Ice	2.73	2.73	0.04	
(2) 8"x2" Antenna Mount Pipe	B	From Leg	4.00	0.0000	148'	1" Ice	3.40	3.40	0.06	
						2" Ice	4.40	4.40	0.12	
						4" Ice	6.50	6.50	0.30	
						No Ice	1.90	1.90	0.03	
						1/2" Ice	2.73	2.73	0.04	
						3'	1" Ice	3.40	3.40	0.06

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz Lateral	Vert					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
(2) 8'x2" Antenna Mount Pipe	C	From Leg	4.00	0.0000	148'	No Ice	1.90	1.90	0.03
			0'			1/2" Ice	2.73	2.73	0.04
			3'			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
						4" Ice	6.50	6.50	0.30
***									
(4) DB848H90E-XY w/Mount Pipe	A	From Leg	4.00	0.0000	139'	No Ice	7.19	10.26	0.06
			0'			1/2" Ice	7.78	11.68	0.13
			1'			1" Ice	8.37	12.95	0.21
						2" Ice	9.58	15.18	0.40
						4" Ice	12.09	19.82	0.96
(4) DB848H90E-XY w/Mount Pipe	B	From Leg	4.00	0.0000	139'	No Ice	7.19	10.26	0.06
			0'			1/2" Ice	7.78	11.68	0.13
			1'			1" Ice	8.37	12.95	0.21
						2" Ice	9.58	15.18	0.40
						4" Ice	12.09	19.82	0.96
(4) DB848H90E-XY w/Mount Pipe	C	From Leg	4.00	0.0000	139'	No Ice	7.19	10.26	0.06
			0'			1/2" Ice	7.78	11.68	0.13
			1'			1" Ice	8.37	12.95	0.21
						2" Ice	9.58	15.18	0.40
						4" Ice	12.09	19.82	0.96
T-Arm Mount [TA 602-3]	C	None		0.0000	139'	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
						2" Ice	26.99	26.99	1.64
						4" Ice	42.39	42.39	2.50
***									
DB980H90E-M w/ Mount Pipe	A	From Leg	4.00	0.0000	128'	No Ice	4.04	3.62	0.03
			0'			1/2" Ice	4.50	4.48	0.06
			0'			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
DB980H90E-M w/ Mount Pipe	B	From Leg	4.00	0.0000	128'	No Ice	4.04	3.62	0.03
			0'			1/2" Ice	4.50	4.48	0.06
			0'			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
DB980H90E-M w/ Mount Pipe	C	From Leg	4.00	0.0000	128'	No Ice	4.04	3.62	0.03
			0'			1/2" Ice	4.50	4.48	0.06
			0'			1" Ice	4.95	5.22	0.11
						2" Ice	5.87	6.74	0.22
						4" Ice	8.05	10.00	0.55
T-Arm Mount [TA 602-3]	C	None		0.0000	128'	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
						2" Ice	26.99	26.99	1.64
						4" Ice	42.39	42.39	2.50
(3) 8'x2" Antenna Mount Pipe	A	From Leg	4.00	0.0000	128'	No Ice	1.90	1.90	0.03
			0'			1/2" Ice	2.73	2.73	0.04
			0'			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
						4" Ice	6.50	6.50	0.30
(3) 8'x2" Antenna Mount Pipe	B	From Leg	4.00	0.0000	128'	No Ice	1.90	1.90	0.03
			0'			1/2" Ice	2.73	2.73	0.04
			0'			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
						4" Ice	6.50	6.50	0.30



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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
(3) 8'x2" Antenna Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	128'	No Ice 1.90 1/2" Ice 2.73 1" Ice 3.40 2" Ice 4.40 4" Ice 6.50	1.90 2.73 3.40 4.40 6.50	0.03 0.04 0.06 0.12 0.30
*** GPS-TMG-26NMS	B	From Leg	4.00 0' 2'	0.0000	116'	No Ice 0.16 1/2" Ice 0.21 1" Ice 0.28 2" Ice 0.44 4" Ice 0.86	0.16 0.21 0.28 0.44 0.86	0.00 0.00 0.01 0.01 0.05
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	116'	No Ice 7.27 1/2" Ice 7.88 1" Ice 8.48 2" Ice 9.72 4" Ice 12.33	7.27 7.88 8.48 9.72 12.33	0.05 0.11 0.19 0.37 0.87
BXA-171063-8BF-2 w/ Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	116'	No Ice 3.18 1/2" Ice 3.56 1" Ice 3.96 2" Ice 4.85 4" Ice 6.77	3.18 3.56 3.96 4.85 6.77	0.03 0.06 0.10 0.19 0.49
BXA-70063/6CF-2 w/ Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	116'	No Ice 7.97 1/2" Ice 8.61 1" Ice 9.22 2" Ice 10.46 4" Ice 13.07	7.97 8.61 9.22 10.46 13.07	0.04 0.10 0.17 0.33 0.79
(2) FD9R6004/2C-3L	A	From Leg	4.00 0' 2'	0.0000	116'	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.37 0.45 0.54 0.75 1.28	0.00 0.01 0.01 0.02 0.06
BXA-171085-12BF-2 w/ Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	116'	No Ice 4.97 1/2" Ice 5.52 1" Ice 6.04 2" Ice 7.09 4" Ice 9.36	4.97 5.52 6.04 7.09 9.36	0.04 0.08 0.14 0.27 0.67
BXA-70063/6CF-2 w/ Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	116'	No Ice 7.97 1/2" Ice 8.61 1" Ice 9.22 2" Ice 10.46 4" Ice 13.07	7.97 8.61 9.22 10.46 13.07	0.04 0.10 0.17 0.33 0.79
(2) DB846H80E-SX w/ Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	116'	No Ice 5.33 1/2" Ice 5.89 1" Ice 6.41 2" Ice 7.48 4" Ice 9.83	5.33 5.89 6.41 7.48 9.83	0.04 0.10 0.16 0.32 0.78
(2) FD9R6004/2C-3L	B	From Leg	4.00 0' 2'	0.0000	116'	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.37 0.45 0.54 0.75 1.28	0.00 0.01 0.01 0.02 0.06
(2) DB846F65ZAXY w/ Mount Pipe	C	From Leg	4.00 0' 2'	0.0000	116'	No Ice 7.27 1/2" Ice 7.88 1" Ice 8.48 2" Ice 9.72 4" Ice 12.33	7.27 7.88 8.48 9.72 12.33	0.05 0.11 0.19 0.37 0.87
BXA-171063-12BF w/	C	From Leg	4.00	0.0000	116'	No Ice 4.97	5.23	0.04

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>A</sub> Front	C <sub>A</sub> A <sub>A</sub> Side	Weight
			Horz	Lateral					
			ft	ft					
Mount Pipe			0'			1/2" Ice	5.52	6.39	0.08
			2'			1" Ice	6.04	7.26	0.14
						2" Ice	7.09	9.05	0.27
						4" Ice	9.36	12.82	0.67
BXA-70063/6CF-2 w/ Mount Pipe	C	From Leg	4.00	0.0000	116'	No Ice	7.97	5.40	0.04
			0'			1/2" Ice	8.61	6.55	0.10
			2'			1" Ice	9.22	7.41	0.17
						2" Ice	10.46	9.18	0.33
						4" Ice	13.07	12.93	0.79
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	116'	No Ice	0.37	0.08	0.00
			0'			1/2" Ice	0.45	0.14	0.01
			2'			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
T-Arm Mount [TA 602-3]	C	None		0.0000	116'	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
						2" Ice	26.99	26.99	1.64
						4" Ice	42.39	42.39	2.50
***									
(2) 7200.40 w/Mount Pipe	A	From Leg	4.00	0.0000	106'	No Ice	4.16	4.41	0.05
			0'			1/2" Ice	4.61	5.38	0.08
			2'			1" Ice	5.07	6.20	0.13
						2" Ice	6.01	7.88	0.24
						4" Ice	7.99	11.45	0.60
(4) LGP 21403	A	From Leg	4.00	0.0000	106'	No Ice	1.29	0.36	0.01
			0'			1/2" Ice	1.45	0.48	0.02
			2'			1" Ice	1.61	0.60	0.03
						2" Ice	1.97	0.87	0.05
						4" Ice	2.79	1.52	0.14
(2) 7200.40 w/Mount Pipe	B	From Leg	4.00	0.0000	106'	No Ice	4.16	4.41	0.05
			0'			1/2" Ice	4.61	5.38	0.08
			2'			1" Ice	5.07	6.20	0.13
						2" Ice	6.01	7.88	0.24
						4" Ice	7.99	11.45	0.60
(4) LGP 21403	B	From Leg	4.00	0.0000	106'	No Ice	1.29	0.36	0.01
			0'			1/2" Ice	1.45	0.48	0.02
			2'			1" Ice	1.61	0.60	0.03
						2" Ice	1.97	0.87	0.05
						4" Ice	2.79	1.52	0.14
(2) 7200.40 w/Mount Pipe	C	From Leg	4.00	0.0000	106'	No Ice	4.16	4.41	0.05
			0'			1/2" Ice	4.61	5.38	0.08
			2'			1" Ice	5.07	6.20	0.13
						2" Ice	6.01	7.88	0.24
						4" Ice	7.99	11.45	0.60
(4) LGP 21403	C	From Leg	4.00	0.0000	106'	No Ice	1.29	0.36	0.01
			0'			1/2" Ice	1.45	0.48	0.02
			2'			1" Ice	1.61	0.60	0.03
						2" Ice	1.97	0.87	0.05
						4" Ice	2.79	1.52	0.14
T-Arm Mount [TA 602-3]	C	None		0.0000	106'	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
						2" Ice	26.99	26.99	1.64
						4" Ice	42.39	42.39	2.50
(2) 8'x2" Antenna Mount Pipe	A	From Leg	4.00	0.0000	106'	No Ice	1.90	1.90	0.03
			0'			1/2" Ice	2.73	2.73	0.04

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz Lateral	Vert						
				ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
				0'		1" Ice	3.40	3.40	0.06	
						2" Ice	4.40	4.40	0.12	
						4" Ice	6.50	6.50	0.30	
(2) 8'x2" Antenna Mount Pipe	B	From Leg	4.00		0.0000	106'	No Ice	1.90	1.90	0.03
			0'				1/2" Ice	2.73	2.73	0.04
			0'				1" Ice	3.40	3.40	0.06
							2" Ice	4.40	4.40	0.12
							4" Ice	6.50	6.50	0.30
(2) 8'x2" Antenna Mount Pipe	C	From Leg	4.00		0.0000	106'	No Ice	1.90	1.90	0.03
			0'				1/2" Ice	2.73	2.73	0.04
			0'				1" Ice	3.40	3.40	0.06
							2" Ice	4.40	4.40	0.12
							4" Ice	6.50	6.50	0.30
***										
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.00		0.0000	98'	No Ice	5.40	4.70	0.05
			0'				1/2" Ice	5.96	5.86	0.09
			0'				1" Ice	6.48	6.73	0.15
							2" Ice	7.55	8.51	0.28
							4" Ice	9.92	12.28	0.68
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.00		0.0000	98'	No Ice	5.40	4.70	0.05
			0'				1/2" Ice	5.96	5.86	0.09
			0'				1" Ice	6.48	6.73	0.15
							2" Ice	7.55	8.51	0.28
							4" Ice	9.92	12.28	0.68
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.00		0.0000	98'	No Ice	5.40	4.70	0.05
			0'				1/2" Ice	5.96	5.86	0.09
			0'				1" Ice	6.48	6.73	0.15
							2" Ice	7.55	8.51	0.28
							4" Ice	9.92	12.28	0.68
***										
KS24019-L112A	A	From Leg	3.00		0.0000	55'	No Ice	0.10	0.10	0.01
			0'				1/2" Ice	0.18	0.18	0.01
			2'				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 701-1]	A	From Leg	1.00		0.0000	55'	No Ice	0.85	1.67	0.07
			0'				1/2" Ice	1.14	2.34	0.08
			0'				1" Ice	1.43	3.01	0.09
							2" Ice	2.01	4.35	0.12
							4" Ice	3.17	7.03	0.18

### Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice



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Comb. No.	Description
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	149 - 135.039	Pole	Max Tension	21	0.00	0.00	0.00
			Max. Compression	14	-7.10	-0.00	0.47
			Max. Mx	5	-2.87	-35.68	0.09
			Max. My	2	-2.87	-0.00	35.78
			Max. Vy	5	9.16	-35.68	0.09
			Max. Vx	2	-9.16	-0.00	35.78
			Max. Torque	11			-0.05
L2	135.039 - 92.1667	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.10	0.00	3.08
			Max. Mx	11	-11.30	663.34	-0.84
			Max. My	2	-11.29	-1.43	665.71
			Max. Vy	5	22.86	-663.22	2.14
			Max. Vx	2	-22.95	-1.43	665.71
			Max. Torque	5			-0.27
L3	92.1667 - 45.2031	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-37.39	-1.57	6.69
			Max. Mx	5	-21.06	-1826.41	6.40
			Max. My	2	-21.06	-5.00	1833.52
			Max. Vy	5	28.93	-1826.41	6.40

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L4	45.2031 - 0	Pole	Max. Vx	2	-28.99	-5.00	1833.52
			Max. Torque	6			0.38
			Max. Tension	1	0.00	0.00	0.00
			Max. Compression	14	-60.38	-4.03	11.26
			Max. Mx	5	-38.31	-3537.53	11.33
			Max. My	2	-38.31	-9.28	3548.35
			Max. Vy	5	35.93	-3537.53	11.33
			Max. Vx	2	-35.99	-9.28	3548.35
			Max. Torque	6			0.77

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	16	60.38	-4.55	7.88
	Max. H <sub>x</sub>	11	38.32	35.92	-0.07
	Max. H <sub>z</sub>	2	38.32	-0.07	35.98
	Max. M <sub>x</sub>	2	3548.35	-0.07	35.98
	Max. M <sub>z</sub>	5	3537.53	-35.92	0.07
	Max. Torsion	6	0.77	-31.07	-17.93
	Min. Vert	1	38.32	0.00	0.00
	Min. H <sub>x</sub>	5	38.32	-35.92	0.07
	Min. H <sub>z</sub>	8	38.32	0.07	-35.98
	Min. M <sub>x</sub>	8	-3542.99	0.07	-35.98
	Min. M <sub>z</sub>	11	-3536.25	35.92	-0.07
	Min. Torsion	12	-0.77	31.07	17.93

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	38.32	0.00	0.00	-2.64	-0.63	0.00
Dead+Wind 0 deg - No Ice	38.32	0.07	-35.98	-3548.35	-9.28	0.47
Dead+Wind 30 deg - No Ice	38.32	18.02	-31.19	-3077.64	-1776.57	0.10
Dead+Wind 60 deg - No Ice	38.32	31.14	-18.05	-1783.00	-3067.99	-0.30
Dead+Wind 90 deg - No Ice	38.32	35.92	-0.07	-11.33	-3537.53	-0.62
Dead+Wind 120 deg - No Ice	38.32	31.07	17.93	1762.67	-3059.36	-0.77
Dead+Wind 150 deg - No Ice	38.32	17.90	31.12	3063.65	-1761.60	-0.72
Dead+Wind 180 deg - No Ice	38.32	-0.07	35.98	3542.99	8.01	-0.47
Dead+Wind 210 deg - No Ice	38.32	-18.02	31.19	3072.28	1775.29	-0.10
Dead+Wind 240 deg - No Ice	38.32	-31.14	18.05	1777.64	3066.71	0.30
Dead+Wind 270 deg - No Ice	38.32	-35.92	0.07	5.96	3536.25	0.62
Dead+Wind 300 deg - No Ice	38.32	-31.07	-17.93	-1768.04	3058.08	0.77
Dead+Wind 330 deg - No Ice	38.32	-17.90	-31.12	-3069.01	1760.32	0.72
Dead+Ice+Temp	60.38	0.00	-0.00	-11.26	-4.03	0.00
Dead+Wind 0 deg+Ice+Temp	60.38	0.02	-9.09	-931.67	-5.90	0.19
Dead+Wind 30 deg+Ice+Temp	60.38	4.55	-7.88	-809.29	-464.72	0.02
Dead+Wind 60 deg+Ice+Temp	60.38	7.87	-4.56	-473.11	-800.11	-0.14
Dead+Wind 90 deg+Ice+Temp	60.38	9.08	-0.02	-13.22	-922.21	-0.27
Dead+Wind 120 deg+Ice+Temp	60.38	7.86	4.53	447.17	-798.29	-0.33
Dead+Wind 150 deg+Ice+Temp	60.38	4.53	7.87	784.68	-461.56	-0.30

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Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead+Wind 180 deg+Ice+Temp	60.38	-0.02	9.09	908.89	-2.24	-0.19
Dead+Wind 210 deg+Ice+Temp	60.38	-4.55	7.88	786.51	456.58	-0.02
Dead+Wind 240 deg+Ice+Temp	60.38	-7.87	4.56	450.33	791.97	0.14
Dead+Wind 270 deg+Ice+Temp	60.38	-9.08	0.02	-9.56	914.07	0.27
Dead+Wind 300 deg+Ice+Temp	60.38	-7.86	-4.53	-469.95	790.15	0.33
Dead+Wind 330 deg+Ice+Temp	60.38	-4.53	-7.87	-807.46	453.41	0.30
Dead+Wind 0 deg - Service	38.32	0.02	-12.45	-1229.98	-3.63	0.16
Dead+Wind 30 deg - Service	38.32	6.24	-10.79	-1067.05	-615.36	0.03
Dead+Wind 60 deg - Service	38.32	10.78	-6.25	-618.92	-1062.37	-0.10
Dead+Wind 90 deg - Service	38.32	12.43	-0.02	-5.68	-1224.89	-0.21
Dead+Wind 120 deg - Service	38.32	10.75	6.20	608.37	-1059.38	-0.27
Dead+Wind 150 deg - Service	38.32	6.19	10.77	1058.69	-610.17	-0.25
Dead+Wind 180 deg - Service	38.32	-0.02	12.45	1224.61	2.35	-0.16
Dead+Wind 210 deg - Service	38.32	-6.24	10.79	1061.68	614.08	-0.03
Dead+Wind 240 deg - Service	38.32	-10.78	6.25	613.56	1061.09	0.10
Dead+Wind 270 deg - Service	38.32	-12.43	0.02	0.31	1223.61	0.21
Dead+Wind 300 deg - Service	38.32	-10.75	-6.20	-613.74	1058.10	0.27
Dead+Wind 330 deg - Service	38.32	-6.19	-10.77	-1064.05	608.89	0.25

### Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-38.32	0.00	0.00	38.32	0.00	0.000%
2	0.07	-38.32	-35.98	-0.07	38.32	35.98	0.000%
3	18.02	-38.32	-31.19	-18.02	38.32	31.19	0.000%
4	31.14	-38.32	-18.05	-31.14	38.32	18.05	0.000%
5	35.92	-38.32	-0.07	-35.92	38.32	0.07	0.000%
6	31.07	-38.32	17.93	-31.07	38.32	-17.93	0.000%
7	17.90	-38.32	31.12	-17.90	38.32	-31.12	0.000%
8	-0.07	-38.32	35.98	0.07	38.32	-35.98	0.000%
9	-18.02	-38.32	31.19	18.02	38.32	-31.19	0.000%
10	-31.14	-38.32	18.05	31.14	38.32	-18.05	0.000%
11	-35.92	-38.32	0.07	35.92	38.32	-0.07	0.000%
12	-31.07	-38.32	-17.93	31.07	38.32	17.93	0.000%
13	-17.90	-38.32	-31.12	17.90	38.32	31.12	0.000%
14	0.00	-60.38	0.00	-0.00	60.38	0.00	0.000%
15	0.02	-60.38	-9.09	-0.02	60.38	9.09	0.000%
16	4.55	-60.38	-7.88	-4.55	60.38	7.88	0.000%
17	7.87	-60.38	-4.56	-7.87	60.38	4.56	0.000%
18	9.08	-60.38	-0.02	-9.08	60.38	0.02	0.000%
19	7.86	-60.38	4.53	-7.86	60.38	-4.53	0.000%
20	4.53	-60.38	7.87	-4.53	60.38	-7.87	0.000%
21	-0.02	-60.38	9.09	0.02	60.38	-9.09	0.000%
22	-4.55	-60.38	7.88	4.55	60.38	-7.88	0.000%
23	-7.87	-60.38	4.56	7.87	60.38	-4.56	0.000%
24	-9.08	-60.38	0.02	9.08	60.38	-0.02	0.000%
25	-7.86	-60.38	-4.53	7.86	60.38	4.53	0.000%
26	-4.53	-60.38	-7.87	4.53	60.38	7.87	0.000%
27	0.02	-38.32	-12.45	-0.02	38.32	12.45	0.000%
28	6.24	-38.32	-10.79	-6.24	38.32	10.79	0.000%
29	10.78	-38.32	-6.25	-10.78	38.32	6.25	0.000%
30	12.43	-38.32	-0.02	-12.43	38.32	0.02	0.000%
31	10.75	-38.32	6.20	-10.75	38.32	-6.20	0.000%
32	6.19	-38.32	10.77	-6.19	38.32	-10.77	0.000%
33	-0.02	-38.32	12.45	0.02	38.32	-12.45	0.000%
34	-6.24	-38.32	10.79	6.24	38.32	-10.79	0.000%



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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
35	-10.78	-38.32	6.25	10.78	38.32	-6.25	0.000%
36	-12.43	-38.32	0.02	12.43	38.32	-0.02	0.000%
37	-10.75	-38.32	-6.20	10.75	38.32	6.20	0.000%
38	-6.19	-38.32	-10.77	6.19	38.32	10.77	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	0.00001732
3	Yes	4	0.00000001	0.00095356
4	Yes	4	0.00000001	0.00095195
5	Yes	4	0.00000001	0.00001735
6	Yes	4	0.00000001	0.00093504
7	Yes	4	0.00000001	0.00094223
8	Yes	4	0.00000001	0.00001304
9	Yes	4	0.00000001	0.00094696
10	Yes	4	0.00000001	0.00094783
11	Yes	4	0.00000001	0.00001332
12	Yes	4	0.00000001	0.00094451
13	Yes	4	0.00000001	0.00093802
14	Yes	4	0.00000001	0.00000725
15	Yes	4	0.00000001	0.00040459
16	Yes	4	0.00000001	0.00044993
17	Yes	4	0.00000001	0.00044888
18	Yes	4	0.00000001	0.00039911
19	Yes	4	0.00000001	0.00043634
20	Yes	4	0.00000001	0.00043625
21	Yes	4	0.00000001	0.00039321
22	Yes	4	0.00000001	0.00043595
23	Yes	4	0.00000001	0.00043612
24	Yes	4	0.00000001	0.00039673
25	Yes	4	0.00000001	0.00044471
26	Yes	4	0.00000001	0.00044576
27	Yes	4	0.00000001	0.00000689
28	Yes	4	0.00000001	0.00006882
29	Yes	4	0.00000001	0.00006857
30	Yes	4	0.00000001	0.00000687
31	Yes	4	0.00000001	0.00006630
32	Yes	4	0.00000001	0.00006754
33	Yes	4	0.00000001	0.00000674
34	Yes	4	0.00000001	0.00006753
35	Yes	4	0.00000001	0.00006765
36	Yes	4	0.00000001	0.00000676
37	Yes	4	0.00000001	0.00006810
38	Yes	4	0.00000001	0.00006698

### Maximum Tower Deflections - Service Wind

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149 - 135.039	18.218	28	1.1089	0.0002
L2	138.956 - 92.1667	15.895	28	1.0957	0.0001
L3	97.8333 - 45.2031	7.547	28	0.7796	0.0001
L4	52.7865 - 0	2.062	28	0.3625	0.0001

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
148'	RR90-17-02DP w/ Mount Pipe	28	17.985	1.1082	0.0001	29426
139'	(4) DB848H90E-XY w/Mount Pipe	28	15.905	1.0958	0.0001	15495
128'	DB980H90E-M w/ Mount Pipe	28	13.447	1.0466	0.0001	10359
116'	GPS-TMG-26NMS	28	10.926	0.9554	0.0001	7841
106'	(2) 7200.40 w/Mount Pipe	28	8.992	0.8614	0.0001	6519
98'	APXV18-206517S-C w/ Mount Pipe	28	7.575	0.7813	0.0001	5810
55'	KS24019-L112A	28	2.233	0.3806	0.0001	5852

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149 - 135.039	52.513	3	3.1969	0.0005
L2	138.956 - 92.1667	45.820	3	3.1590	0.0004
L3	97.8333 - 45.2031	21.765	3	2.2484	0.0003
L4	52.7865 - 0	5.947	3	1.0457	0.0003

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
148'	RR90-17-02DP w/ Mount Pipe	3	51.843	3.1949	0.0005	10299
139'	(4) DB848H90E-XY w/Mount Pipe	3	45.849	3.1593	0.0004	5421
128'	DB980H90E-M w/ Mount Pipe	3	38.767	3.0176	0.0004	3617
116'	GPS-TMG-26NMS	3	31.504	2.7551	0.0004	2734
106'	(2) 7200.40 w/Mount Pipe	3	25.929	2.4841	0.0004	2271
98'	APXV18-206517S-C w/ Mount Pipe	3	21.846	2.2532	0.0004	2023
55'	KS24019-L112A	3	6.441	1.0978	0.0003	2030

### Compression Checks

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### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>					
L1	149 - 147.996	TP26.77x22x0.1875	13'11-17/ 32"	0'	0.0	39.000	13.1854	-1.19	514.23	0.002					
	147.996 - 146.991					39.000	13.3896	-1.24	522.20	0.002					
	146.991 - 145.987					39.000	13.5939	-1.29	530.16	0.002					
	145.987 - 144.982					39.000	13.7981	-1.35	538.13	0.003					
	144.982 - 143.978					39.000	14.0023	-1.40	546.09	0.003					
	143.978 - 142.973					39.000	14.2066	-1.45	554.06	0.003					
	142.973 - 141.969					39.000	14.4108	-1.51	562.02	0.003					
	141.969 - 140.965					39.000	14.6150	-1.57	569.99	0.003					
	140.965 - 139.96					39.000	14.8193	-1.62	577.95	0.003					
	139.96 - 138.956					39.000	15.0235	-2.87	585.92	0.005					
	138.956 - 135.039					39.000	15.8199	-1.47	616.98	0.002					
	L2					138.956 - 135.039	TP40.91x25.0568x0.25	46'9-15/ 2"	0'	0.0	39.000	20.7372	-1.91	808.75	0.002
						135.039 - 132.972					39.000	21.2929	-3.57	830.42	0.004
						132.972 - 130.905					39.000	21.8487	-3.78	852.10	0.004
						130.905 - 128.838					39.000	22.4044	-3.99	873.77	0.005
128.838 - 126.771		39.000	22.9601	-5.24	895.44	0.006									
126.771 - 124.704		39.000	23.5158	-5.46	917.12	0.006									
124.704 - 122.637		39.000	24.0715	-5.69	938.79	0.006									
122.637 - 120.57		39.000	24.6273	-5.92	960.46	0.006									
120.57 - 118.503		39.000	25.1830	-6.15	982.14	0.006									
118.503 - 116.436		39.000	25.7387	-6.39	1003.81	0.006									
116.436 - 114.369		39.000	26.2944	-7.74	1025.48	0.008									
114.369 - 112.302		39.000	26.8501	-7.99	1047.16	0.008									
112.302 - 110.235		39.000	27.4059	-8.25	1068.83	0.008									
110.235 - 108.168		39.000	27.9616	-8.51	1090.50	0.008									
108.168 - 106.101		39.000	28.5173	-8.78	1112.18	0.008									
106.101 - 104.034	39.000	29.0730	-10.31	1133.85	0.009										
104.034 - 101.967	39.000	29.6288	-10.59	1155.52	0.009										
101.967 - 99.9003	38.767	30.1845	-10.88	1170.15	0.009										







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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 $\frac{f_{by}}{F_{by}}$
	130.905 - 128.838		133.72	10.290	39.000	0.264	0.00	0.000	39.000	0.000
	128.838 - 126.771		157.33	11.525	39.000	0.296	0.00	0.000	39.000	0.000
	126.771 - 124.704		182.96	12.774	39.000	0.328	0.00	0.000	39.000	0.000
	124.704 - 122.637		209.03	13.926	39.000	0.357	0.00	0.000	39.000	0.000
	122.637 - 120.57		235.56	14.990	39.000	0.384	0.00	0.000	39.000	0.000
	120.57 - 118.503		262.53	15.975	39.000	0.410	0.00	0.000	39.000	0.000
	118.503 - 116.436		289.97	16.888	39.000	0.433	0.00	0.000	39.000	0.000
	116.436 - 114.369		331.81	18.513	39.000	0.475	0.00	0.000	39.000	0.000
	114.369 - 112.302		368.84	19.733	39.000	0.506	0.00	0.000	39.000	0.000
	112.302 - 110.235		406.34	20.863	39.000	0.535	0.00	0.000	39.000	0.000
	110.235 - 108.168		444.33	21.913	39.000	0.562	0.00	0.000	39.000	0.000
	108.168 - 106.101		482.81	22.889	39.000	0.587	0.00	0.000	39.000	0.000
	106.101 - 104.034		530.07	24.175	39.000	0.620	0.00	0.000	39.000	0.000
	104.034 - 101.967		574.98	25.245	39.000	0.647	0.00	0.000	39.000	0.000
	101.967 - 99.9003		620.39	26.242	38.767	0.677	0.00	0.000	38.767	0.000
	99.9003 - 97.8333		666.43	27.176	38.453	0.707	0.00	0.000	38.453	0.000
	97.8333 - 92.1667		363.71	13.460	37.593	0.358	0.00	0.000	37.593	0.000
L3	97.8333 - 92.1667	TP56.31x38.49x0.3125	435.18	13.271	39.000	0.340	0.00	0.000	39.000	0.000
	92.1667 - 89.9789		851.17	25.019	39.000	0.642	0.00	0.000	39.000	0.000
	89.9789 - 87.7911		904.07	25.632	39.000	0.657	0.00	0.000	39.000	0.000
	87.7911 - 85.6033		957.57	26.203	39.000	0.672	0.00	0.000	39.000	0.000
	85.6033 - 83.4155		1011.68	26.736	39.000	0.686	0.00	0.000	39.000	0.000
	83.4155 - 81.2277		1066.40	27.234	39.000	0.698	0.00	0.000	39.000	0.000
	81.2277 - 79.0399		1121.75	27.699	39.000	0.710	0.00	0.000	39.000	0.000
	79.0399 - 76.8521		1177.72	28.135	39.000	0.721	0.00	0.000	39.000	0.000
	76.8521 - 74.6644		1234.33	28.542	39.000	0.732	0.00	0.000	39.000	0.000
	74.6644 - 72.4766		1291.57	28.924	39.000	0.742	0.00	0.000	39.000	0.000
	72.4766 - 70.2888		1349.44	29.282	38.783	0.755	0.00	0.000	38.783	0.000
	70.2888 - 68.101		1407.95	29.617	38.518	0.769	0.00	0.000	38.518	0.000
	68.101 - 65.9132		1467.11	29.933	38.252	0.783	0.00	0.000	38.252	0.000

<b>RISA Tower</b>  <b>Crown Castle</b> 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-4594	<b>Job</b> BU# 876343	<b>Page</b> 19 of 25
	<b>Project</b>	<b>Date</b> 15:56:18 10/03/11
	<b>Client</b> Crown Castle	<b>Designed by</b> Manspach

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 $\frac{f_{by}}{F_{by}}$
	65.9132 - 63.7254		1526.92	30.229	37.987	0.796	0.00	0.000	37.987	0.000
	63.7254 - 61.5376		1587.38	30.507	37.721	0.809	0.00	0.000	37.721	0.000
	61.5376 - 59.3498		1648.49	30.769	37.456	0.821	0.00	0.000	37.456	0.000
	59.3498 - 57.162		1710.28	31.015	37.191	0.834	0.00	0.000	37.191	0.000
	57.162 - 54.9742		1772.93	31.251	36.925	0.846	0.00	0.000	36.925	0.000
	54.9742 - 52.7865		1836.13	31.471	36.660	0.858	0.00	0.000	36.660	0.000
	52.7865 - 45.2031		956.43	14.921	35.740	0.417	0.00	0.000	35.740	0.000
L4	52.7865 - 45.2031	TP71x53.1174x0.375	1104.27	14.732	39.000	0.378	0.00	0.000	39.000	0.000
	45.2031 - 42.824		2132.87	27.640	39.000	0.709	0.00	0.000	39.000	0.000
	42.824 - 40.4449		2205.71	27.777	38.807	0.716	0.00	0.000	38.807	0.000
	40.4449 - 38.0658		2279.22	27.904	38.567	0.724	0.00	0.000	38.567	0.000
	38.0658 - 35.6867		2353.42	28.022	38.326	0.731	0.00	0.000	38.326	0.000
	35.6867 - 33.3076		2428.31	28.132	38.085	0.739	0.00	0.000	38.085	0.000
	33.3076 - 30.9285		2503.89	28.233	37.845	0.746	0.00	0.000	37.845	0.000
	30.9285 - 28.5493		2580.19	28.326	37.604	0.753	0.00	0.000	37.604	0.000
	28.5493 - 26.1702		2657.20	28.413	37.363	0.760	0.00	0.000	37.363	0.000
	26.1702 - 23.7911		2734.93	28.494	37.123	0.768	0.00	0.000	37.123	0.000
	23.7911 - 21.412		2813.39	28.568	36.882	0.775	0.00	0.000	36.882	0.000
	21.412 - 19.0329		2892.59	28.637	36.642	0.782	0.00	0.000	36.642	0.000
	19.0329 - 16.6538		2972.53	28.701	36.401	0.788	0.00	0.000	36.401	0.000
	16.6538 - 14.2747		3053.23	28.760	36.160	0.795	0.00	0.000	36.160	0.000
	14.2747 - 11.8956		3134.68	28.815	35.920	0.802	0.00	0.000	35.920	0.000
	11.8956 - 9.51645		3216.91	28.866	35.679	0.809	0.00	0.000	35.679	0.000
	9.51645 - 7.13734		3299.90	28.913	35.438	0.816	0.00	0.000	35.438	0.000
	7.13734 - 4.75822		3383.68	28.957	35.198	0.823	0.00	0.000	35.198	0.000
	4.75822 - 2.37911		3468.24	28.997	34.957	0.830	0.00	0.000	34.957	0.000
	2.37911 - 0		3553.60	29.035	34.716	0.836	0.00	0.000	34.716	0.000

**Pole Shear Design Data**



<b>RISATower</b>  <b>Crown Castle</b> 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-4594	<b>Job</b> BU# 876343	<b>Page</b> 20 of 25
	<b>Project</b>	<b>Date</b> 15:56:18 10/03/11
	<b>Client</b> Crown Castle	<b>Designed by</b> Manspach

Section No.	Elevation ft	Size	Actual V K	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio f <sub>v</sub> F <sub>v</sub>	Actual T kip-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio f <sub>vt</sub> F <sub>vt</sub>		
L1	149 - 147.996	TP26.77x22x0.1875	2.79	0.211	26.000	0.016	0.00	0.000	26.000	0.000		
	147.996 - 146.991		2.87	0.214	26.000	0.016	0.00	0.000	26.000	0.000		
	146.991 - 145.987		2.96	0.218	26.000	0.017	0.00	0.000	26.000	0.000		
	145.987 - 144.982		3.05	0.221	26.000	0.017	0.00	0.000	26.000	0.000		
	144.982 - 143.978		3.14	0.224	26.000	0.017	0.00	0.000	26.000	0.000		
	143.978 - 142.973		3.23	0.227	26.000	0.017	0.00	0.000	26.000	0.000		
	142.973 - 141.969		3.32	0.230	26.000	0.018	0.00	0.000	26.000	0.000		
	141.969 - 140.965		3.41	0.233	26.000	0.018	0.00	0.000	26.000	0.000		
	140.965 - 139.96		3.50	0.236	26.000	0.018	0.00	0.000	26.000	0.000		
	139.96 - 138.956		9.16	0.610	26.000	0.047	0.00	0.000	26.000	0.000		
	138.956 - 135.039		4.32	0.273	26.000	0.021	0.00	0.000	26.000	0.000		
	L2		138.956 - 135.039	TP40.91x25.0568x0.25	5.24	0.253	26.000	0.019	0.00	0.000	26.000	0.000
			135.039 - 132.972		9.76	0.458	26.000	0.035	0.00	0.000	26.000	0.000
			132.972 - 130.905		9.96	0.456	26.000	0.035	0.00	0.000	26.000	0.000
130.905 - 128.838		10.17	0.454		26.000	0.035	0.00	0.000	26.000	0.000		
128.838 - 126.771		12.28	0.535		26.000	0.041	0.00	0.000	26.000	0.000		
126.771 - 124.704		12.50	0.531		26.000	0.041	0.00	0.000	26.000	0.000		
124.704 - 122.637		12.71	0.528		26.000	0.041	0.01	0.000	26.000	0.000		
122.637 - 120.57		12.93	0.525		26.000	0.040	0.01	0.000	26.000	0.000		
120.57 - 118.503		13.15	0.522		26.000	0.040	0.01	0.000	26.000	0.000		
118.503 - 116.436		13.38	0.520		26.000	0.040	0.01	0.000	26.000	0.000		
116.436 - 114.369		17.79	0.677		26.000	0.052	0.14	0.004	26.000	0.000		
114.369 - 112.302		18.02	0.671		26.000	0.052	0.14	0.004	26.000	0.000		
112.302 - 110.235		18.25	0.666		26.000	0.051	0.13	0.003	26.000	0.000		
110.235 - 108.168		18.49	0.661		26.000	0.051	0.13	0.003	26.000	0.000		
108.168 - 106.101		18.73	0.657		26.000	0.051	0.12	0.003	26.000	0.000		
106.101 - 104.034		21.60	0.743		26.000	0.057	0.12	0.003	26.000	0.000		
104.034 - 101.967		21.84	0.737		26.000	0.057	0.11	0.002	26.000	0.000		
101.967 - 99.9003		22.09	0.732		26.000	0.056	0.11	0.002	26.000	0.000		
99.9003 - 97.8333		23.00	0.748		26.000	0.058	0.10	0.002	26.000	0.000		
97.8333 - 95.7663		11.00	0.341		26.000	0.026	0.05	0.001	26.000	0.000		

<b>RISATower</b>  <b>Crown Castle</b> 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-4594	Job	BU# 876343	Page	21 of 25
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	Client	Crown Castle	Designed by	Manspach

Section No.	Elevation ft	Size	Actual V K	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio $\frac{f_{vt}}{F_{vt}}$								
L3	92.1667	TP56.31x38.49x0.3125	12.75	0.321	26.000	0.025	0.05	0.001	26.000	0.000								
	97.8333 - 92.1667																	
	92.1667 - 89.9789										24.03	0.593	26.000	0.046	0.08	0.001	26.000	0.000
	89.9789 - 87.7911										24.30	0.589	26.000	0.045	0.08	0.001	26.000	0.000
	87.7911 - 85.6033										24.58	0.586	26.000	0.045	0.09	0.001	26.000	0.000
	85.6033 - 83.4155										24.86	0.582	26.000	0.045	0.09	0.001	26.000	0.000
	83.4155 - 81.2277										25.15	0.579	26.000	0.045	0.09	0.001	26.000	0.000
	81.2277 - 79.0399										25.43	0.576	26.000	0.044	0.09	0.001	26.000	0.000
	79.0399 - 76.8521										25.72	0.573	26.000	0.044	0.10	0.001	26.000	0.000
	76.8521 - 74.6644										26.01	0.570	26.000	0.044	0.10	0.001	26.000	0.000
	74.6644 - 72.4766										26.30	0.567	26.000	0.044	0.10	0.001	26.000	0.000
	72.4766 - 70.2888										26.59	0.564	26.000	0.043	0.11	0.001	26.000	0.000
	70.2888 - 68.101										26.89	0.562	26.000	0.043	0.11	0.001	26.000	0.000
	68.101 - 65.9132										27.18	0.559	26.000	0.043	0.11	0.001	26.000	0.000
	65.9132 - 63.7254										27.48	0.557	26.000	0.043	0.12	0.001	26.000	0.000
	63.7254 - 61.5376										27.78	0.555	26.000	0.043	0.12	0.001	26.000	0.000
	61.5376 - 59.3498										28.08	0.553	26.000	0.043	0.12	0.001	26.000	0.000
	59.3498 - 57.162										28.38	0.551	26.000	0.042	0.12	0.001	26.000	0.000
	57.162 - 54.9742										28.73	0.550	26.000	0.042	0.12	0.001	26.000	0.000
	54.9742 - 52.7865										29.04	0.548	26.000	0.042	0.02	0.000	26.000	0.000
52.7865 - 45.2031	14.30	0.258	26.000	0.020	0.02	0.000	26.000	0.000										
L4	52.7865 - 45.2031	TP71x53.1174x0.375	15.89	0.241	26.000	0.019	0.01	0.000	26.000	0.000								
	45.2031 - 42.824										30.46	0.456	26.000	0.035	0.04	0.000	26.000	0.000
	42.824 - 40.4449										30.75	0.454	26.000	0.035	0.04	0.000	26.000	0.000
	40.4449 - 38.0658										31.03	0.452	26.000	0.035	0.04	0.000	26.000	0.000
	38.0658 - 35.6867										31.32	0.450	26.000	0.035	0.05	0.000	26.000	0.000
	35.6867 - 33.3076										31.61	0.448	26.000	0.034	0.05	0.000	26.000	0.000
	33.3076 - 30.9285										31.91	0.446	26.000	0.034	0.05	0.000	26.000	0.000
	30.9285 - 28.5493										32.21	0.444	26.000	0.034	0.06	0.000	26.000	0.000
	28.5493 - 26.1702										32.51	0.442	26.000	0.034	0.06	0.000	26.000	0.000
	26.1702 - 26.1702										32.82	0.441	26.000	0.034	0.06	0.000	26.000	0.000

<b>RISATower</b>  <b>Crown Castle</b> 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-4594	<b>Job</b> BU# 876343	<b>Page</b> 22 of 25
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	<b>Client</b> Crown Castle	<b>Designed by</b> Manspach

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 $\frac{f_{vt}}{F_{vt}}$
	23.7911									
	23.7911 - 21.412		33.12	0.439	26.000	0.034	0.07	0.000	26.000	0.000
	21.412 - 19.0329		33.44	0.438	26.000	0.034	0.07	0.000	26.000	0.000
	19.0329 - 16.6538		33.75	0.436	26.000	0.034	0.07	0.000	26.000	0.000
	16.6538 - 14.2747		34.07	0.435	26.000	0.033	0.08	0.000	26.000	0.000
	14.2747 - 11.8956		34.39	0.434	26.000	0.033	0.08	0.000	26.000	0.000
	11.8956 - 9.51645		34.71	0.433	26.000	0.033	0.08	0.000	26.000	0.000
	9.51645 - 7.13734		35.04	0.432	26.000	0.033	0.09	0.000	26.000	0.000
	7.13734 - 4.75822		35.37	0.431	26.000	0.033	0.09	0.000	26.000	0.000
	4.75822 - 2.37911		35.70	0.430	26.000	0.033	0.09	0.000	26.000	0.000
	2.37911 - 0		36.04	0.429	26.000	0.033	0.10	0.000	26.000	0.000

### Pole Interaction Design Data

Section No.	Elevation ft	Ratio $P$ $P_a$	Ratio $f_{bx}$ $F_{bx}$	Ratio $f_{by}$ $F_{by}$	Ratio $f_v$ $F_v$	Ratio $f_{vt}$ $F_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	149 - 147.996	0.002	0.007	0.000	0.016	0.000	0.010	1.333	H1-3+VT ✓
	147.996 - 146.991	0.002	0.019	0.000	0.016	0.000	0.021	1.333	H1-3+VT ✓
	146.991 - 145.987	0.002	0.030	0.000	0.017	0.000	0.033	1.333	H1-3+VT ✓
	145.987 - 144.982	0.003	0.041	0.000	0.017	0.000	0.044	1.333	H1-3+VT ✓
	144.982 - 143.978	0.003	0.052	0.000	0.017	0.000	0.054	1.333	H1-3+VT ✓
	143.978 - 142.973	0.003	0.062	0.000	0.017	0.000	0.065	1.333	H1-3+VT ✓
	142.973 - 141.969	0.003	0.072	0.000	0.018	0.000	0.075	1.333	H1-3+VT ✓
	141.969 - 140.965	0.003	0.082	0.000	0.018	0.000	0.085	1.333	H1-3+VT ✓
	140.965 - 139.96	0.003	0.091	0.000	0.018	0.000	0.094	1.333	H1-3+VT ✓
	139.96 - 138.956	0.005	0.118	0.000	0.047	0.000	0.123	1.333	H1-3+VT ✓
	138.956 - 135.039	0.002	0.095	0.000	0.021	0.000	0.097	1.333	H1-3+VT ✓
L2	138.956 - 135.039	0.002	0.093	0.000	0.019	0.000	0.096	1.333	H1-3+VT ✓
	135.039 -	0.004	0.202	0.000	0.035	0.000	0.207	1.333	H1-3+VT ✓

# RISATower

**Crown Castle**  
 2000 Corporate Drive  
 Canonsburg, PA 15317  
 Phone: (724) 416-2000  
 FAX: (724) 416-4594

<b>Job</b>	BU# 876343	<b>Page</b>	23 of 25
<b>Project</b>		<b>Date</b>	15:56:18 10/03/11
<b>Client</b>	Crown Castle	<b>Designed by</b>	Manspach

Section No.	Elevation ft	Ratio P	Ratio $f_{bx}$	Ratio $f_{by}$	Ratio $f_v$	Ratio $f_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_a$	$F_{bx}$	$F_{by}$	$F_v$	$F_{vt}$			
	132.972						✓		
	132.972 - 130.905	0.004	0.234	0.000	0.035	0.000	0.239	1.333	H1-3+VT ✓
	130.905 - 128.838	0.005	0.264	0.000	0.035	0.000	0.269	1.333	H1-3+VT ✓
	128.838 - 126.771	0.006	0.296	0.000	0.041	0.000	0.302	1.333	H1-3+VT ✓
	126.771 - 124.704	0.006	0.328	0.000	0.041	0.000	0.334	1.333	H1-3+VT ✓
	124.704 - 122.637	0.006	0.357	0.000	0.041	0.000	0.364	1.333	H1-3+VT ✓
	122.637 - 120.57	0.006	0.384	0.000	0.040	0.000	0.391	1.333	H1-3+VT ✓
	120.57 - 118.503	0.006	0.410	0.000	0.040	0.000	0.416	1.333	H1-3+VT ✓
	118.503 - 116.436	0.006	0.433	0.000	0.040	0.000	0.440	1.333	H1-3+VT ✓
	116.436 - 114.369	0.008	0.475	0.000	0.052	0.000	0.483	1.333	H1-3+VT ✓
	114.369 - 112.302	0.008	0.506	0.000	0.052	0.000	0.514	1.333	H1-3+VT ✓
	112.302 - 110.235	0.008	0.535	0.000	0.051	0.000	0.543	1.333	H1-3+VT ✓
	110.235 - 108.168	0.008	0.562	0.000	0.051	0.000	0.570	1.333	H1-3+VT ✓
	108.168 - 106.101	0.008	0.587	0.000	0.051	0.000	0.595	1.333	H1-3+VT ✓
	106.101 - 104.034	0.009	0.620	0.000	0.057	0.000	0.630	1.333	H1-3+VT ✓
	104.034 - 101.967	0.009	0.647	0.000	0.057	0.000	0.657	1.333	H1-3+VT ✓
	101.967 - 99.9003	0.009	0.677	0.000	0.056	0.000	0.687	1.333	H1-3+VT ✓
	99.9003 - 97.8333	0.010	0.707	0.000	0.058	0.000	0.717	1.333	H1-3+VT ✓
	97.8333 - 92.1667	0.005	0.358	0.000	0.026	0.000	0.363	1.333	H1-3+VT ✓
L3	97.8333 - 92.1667	0.005	0.340	0.000	0.025	0.000	0.345	1.333	H1-3+VT ✓
	92.1667 - 89.9789	0.008	0.642	0.000	0.046	0.000	0.650	1.333	H1-3+VT ✓
	89.9789 - 87.7911	0.008	0.657	0.000	0.045	0.000	0.666	1.333	H1-3+VT ✓
	87.7911 - 85.6033	0.009	0.672	0.000	0.045	0.000	0.681	1.333	H1-3+VT ✓
	85.6033 - 83.4155	0.009	0.686	0.000	0.045	0.000	0.695	1.333	H1-3+VT ✓
	83.4155 - 81.2277	0.009	0.698	0.000	0.045	0.000	0.708	1.333	H1-3+VT ✓
	81.2277 - 79.0399	0.009	0.710	0.000	0.044	0.000	0.720	1.333	H1-3+VT ✓
	79.0399 - 76.8521	0.009	0.721	0.000	0.044	0.000	0.731	1.333	H1-3+VT ✓



<b>RISATower</b>  <b>Crown Castle</b> 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-4594	<b>Job</b> BU# 876343	<b>Page</b> 24 of 25
	<b>Project</b>	<b>Date</b> 15:56:18 10/03/11
	<b>Client</b> Crown Castle	<b>Designed by</b> Manspach

Section No.	Elevation ft	Ratio P	Ratio $f_{bx}$	Ratio $f_{by}$	Ratio $f_v$	Ratio $f_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_a$	$F_{bx}$	$F_{by}$	$F_v$	$F_{vt}$			
	76.8521 - 74.6644	0.009	0.732	0.000	0.044	0.000	0.741	1.333	H1-3+VT ✓
	74.6644 - 72.4766	0.009	0.742	0.000	0.044	0.000	0.751	1.333	H1-3+VT ✓
	72.4766 - 70.2888	0.009	0.755	0.000	0.043	0.000	0.765	1.333	H1-3+VT ✓
	70.2888 - 68.101	0.010	0.769	0.000	0.043	0.000	0.779	1.333	H1-3+VT ✓
	68.101 - 65.9132	0.010	0.783	0.000	0.043	0.000	0.793	1.333	H1-3+VT ✓
	65.9132 - 63.7254	0.010	0.796	0.000	0.043	0.000	0.806	1.333	H1-3+VT ✓
	63.7254 - 61.5376	0.010	0.809	0.000	0.043	0.000	0.819	1.333	H1-3+VT ✓
	61.5376 - 59.3498	0.010	0.821	0.000	0.043	0.000	0.832	1.333	H1-3+VT ✓
	59.3498 - 57.162	0.010	0.834	0.000	0.042	0.000	0.845	1.333	H1-3+VT ✓
	57.162 - 54.9742	0.011	0.846	0.000	0.042	0.000	0.857	1.333	H1-3+VT ✓
	54.9742 - 52.7865	0.011	0.858	0.000	0.042	0.000	0.870	1.333	H1-3+VT ✓
	52.7865 - 45.2031	0.006	0.417	0.000	0.020	0.000	0.423	1.333	H1-3+VT ✓
L4	52.7865 - 45.2031	0.005	0.378	0.000	0.019	0.000	0.383	1.333	H1-3+VT ✓
	45.2031 - 42.824	0.010	0.709	0.000	0.035	0.000	0.719	1.333	H1-3+VT ✓
	42.824 - 40.4449	0.010	0.716	0.000	0.035	0.000	0.726	1.333	H1-3+VT ✓
	40.4449 - 38.0658	0.010	0.724	0.000	0.035	0.000	0.734	1.333	H1-3+VT ✓
	38.0658 - 35.6867	0.010	0.731	0.000	0.035	0.000	0.742	1.333	H1-3+VT ✓
	35.6867 - 33.3076	0.010	0.739	0.000	0.034	0.000	0.749	1.333	H1-3+VT ✓
	33.3076 - 30.9285	0.011	0.746	0.000	0.034	0.000	0.757	1.333	H1-3+VT ✓
	30.9285 - 28.5493	0.011	0.753	0.000	0.034	0.000	0.764	1.333	H1-3+VT ✓
	28.5493 - 26.1702	0.011	0.760	0.000	0.034	0.000	0.772	1.333	H1-3+VT ✓
	26.1702 - 23.7911	0.011	0.768	0.000	0.034	0.000	0.779	1.333	H1-3+VT ✓
	23.7911 - 21.412	0.011	0.775	0.000	0.034	0.000	0.786	1.333	H1-3+VT ✓
	21.412 - 19.0329	0.011	0.782	0.000	0.034	0.000	0.793	1.333	H1-3+VT ✓
	19.0329 - 16.6538	0.012	0.788	0.000	0.034	0.000	0.800	1.333	H1-3+VT ✓
	16.6538 - 14.2747	0.012	0.795	0.000	0.033	0.000	0.808	1.333	H1-3+VT ✓

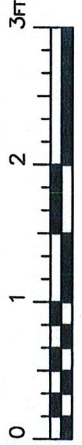
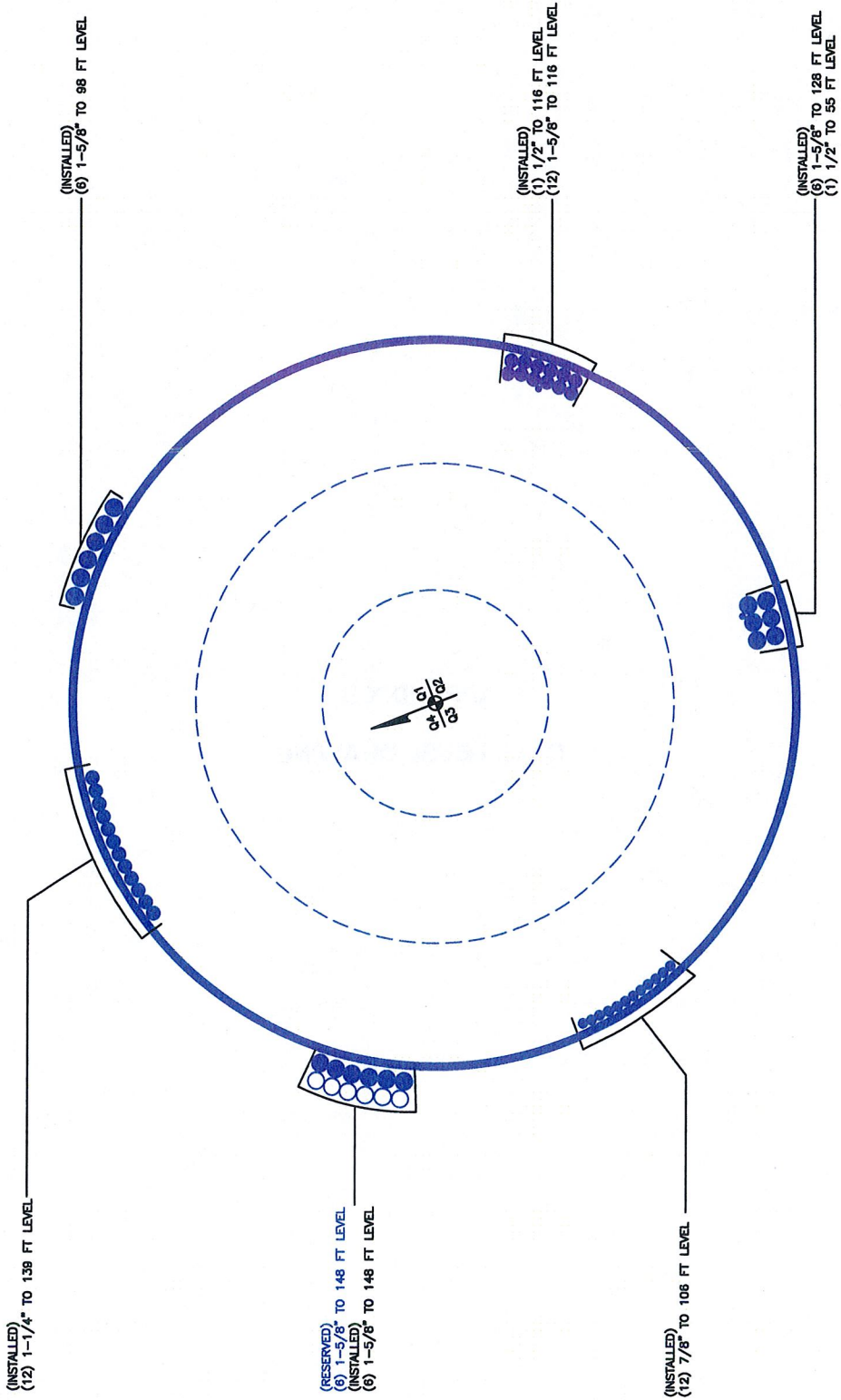
<b>RISA Tower</b>  <b>Crown Castle</b> 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX: (724) 416-4594	<b>Job</b> BU# 876343	<b>Page</b> 25 of 25
	<b>Project</b>	<b>Date</b> 15:56:18 10/03/11
	<b>Client</b> Crown Castle	<b>Designed by</b> Manspach

Section No.	Elevation ft	Ratio P $P_a$	Ratio $f_{bx}$ $F_{bx}$	Ratio $f_{by}$ $F_{by}$	Ratio $f_v$ $F_v$	Ratio $f_{vt}$ $F_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	14.2747 - 11.8956	0.012	0.802	0.000	0.033	0.000	0.815	1.333	H1-3+VT ✓
	11.8956 - 9.51645	0.012	0.809	0.000	0.033	0.000	0.822	1.333	H1-3+VT ✓
	9.51645 - 7.13734	0.012	0.816	0.000	0.033	0.000	0.829	1.333	H1-3+VT ✓
	7.13734 - 4.75822	0.013	0.823	0.000	0.033	0.000	0.836	1.333	H1-3+VT ✓
	4.75822 - 2.37911	0.013	0.830	0.000	0.033	0.000	0.843	1.333	H1-3+VT ✓
	2.37911 - 0	0.013	0.836	0.000	0.033	0.000	0.850	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	149 - 135.039	Pole	TP26.77x22x0.1875	1	-2.87	781.03	9.2	Pass	
L2	135.039 - 92.1667	Pole	TP40.91x25.0568x0.25	2	-11.29	1575.67	53.8	Pass	
L3	92.1667 - 45.2031	Pole	TP56.31x38.49x0.3125	3	-21.06	2589.77	65.2	Pass	
L4	45.2031 - 0	Pole	TP71x53.1174x0.375	4	-38.31	3890.11	63.7	Pass	
							Summary		
							Pole (L3)	65.2	Pass
							<b>RATING =</b>	<b>65.2</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**



: SCALE :

BUSINESS UNIT: 876343 TOWER ID: C.BASELEVEL



**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

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

**Site Data**

BU#: 876343
Site Name: GUILFORD WEST STONE PROPERTY
App #: 131948

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	38	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	36	kips
Unfactored WL Moment, M:	3554	ft-kips

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

Load Factor	Shaft Factored Loads	
1.35	1.2D+1.6W, Pu:	51.3 kips
0.90	0.9D+1.6W, Pu:	34.2 kips
1.35	Vu:	48.6 kips
	Mu:	4797.9 ft-kips

Pad & Pier Data		
Base PL Dist. Above Pier:	3	in
Pier Dist. Above Grade:	1	in
Pad Bearing Depth, D:	12	ft
Pad Thickness, T:	3	ft
Pad Width=Length, L:	30	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	8.5	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	72.25	ft^2
Pier Height:	9.08	ft
Soil (above pad) Height:	9.00	ft

**1.2D+1.6W Load Combination, Bearing Results:**

(No Soil Wedges)	[Reaction+Conc+Soil]	P1="1.2D+1.6W" (Kips)
	1728.19	
Factored "1.6W" Overturning Moment (MW-Msoil), M1	5327.87	ft-kips

**Orthogonal Direction:**

$ecc1 = M1/P1 = 3.08 \text{ ft}$   
 $Orthogonal qu = 2.71 \text{ ksf}$   
 $qu/\phi*qn \text{ Ratio} = 25.44\% \text{ Pass}$

**Diagonal Direction:**

$ecc2 = (0.707M1)/P1 = 2.18 \text{ ft}$   
 $Diagonal qu = 2.63 \text{ ksf}$   
 $qu/\phi*qn \text{ Ratio} = 24.68\% \text{ Pass}$

<-- Press Upon Completing All Input

Soil Parameters		
Unit Weight, $\gamma$ :	120.0	pcf
Ultimate Bearing Capacity, $q_n$ :	21.30	ksf
Strength Reduct. factor, $\phi$ :	0.5	
Angle of Friction, $\Phi$ :	30.0	degrees
Undrained Shear Strength, $C_u$ :	0.00	ksf
Allowable Bearing: $\phi*qn$ :	10.65	ksf
Passive Pres. Coeff., $K_p$ :	3.00	

**Overturning Stability Check**

**0.9D+1.6W Load Combination, Bearing Results:**

(w/ Soil Wedges)	[Reaction+Conc+Soil]	P2="0.9D+1.6W" (Kips)
	1409.87	
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	3453.20	ft-kips

$Orthogonal ecc3 = M2/P2 = 2.45 \text{ ft}$   
 $Ortho Non Bearing Length, NBL = 4.90 \text{ ft}$   
 $Orthogonal qu = 2.08 \text{ ksf}$   
 $Diagonal qu = 2.00 \text{ ksf}$

Forces/Moments due to Wind and Lateral Soil		
Minimum of ( $\phi$ *Ultimate Pad Passive Force, Vu):	48.6	kips
Pad Force Location Above D:	1.43	ft
$\phi$ (Passive Pressure Moment):	69.43	ft-kips
Factored O.T. M(WL), "1.6W":	5397.3	ft-kips
Factored OT (MW-Msoil), M1	5327.87	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	5.20	ft
Sum of Soil Wedges Wt:	131.11	kips
Soil Wedges ecc, K1:	15.89	ft
Ftg+Soil above Pad wt:	1397.4	kips
Unfactored (Total ftg-soil Wt):	1528.52	kips
1.2D. <b>No Soil Wedges.</b>	1728.19	kips
0.9D. <b>With Soil Wedges</b>	1409.87	kips

Max Reaction Moment (ft-kips) so that $qu=\phi*qn = 100\%$ Capacity Rating			
Actual M:	3554.00		
M Orthogonal:	15145.25	23.47%	Pass
M Diagonal:	15145.25	23.47%	Pass

Resistance due to Cohesion (Vertical)		
$\phi*(1/2*C_u)$ (Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft



# Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

## TIA Rev F

### Site Data

BU#: 876343
Site Name: GUILFORD WEST STONE
App #: 131948 Rev. 1
Pole Manufacturer: <i>Other</i>

Reactions		
Moment:	3554	ft-kips
Axial:	38	kips
Shear:	36	kips

### Anchor Rod Data

Qty:	28	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	79	in

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

### Anchor Rod Results

Maximum Rod Tension: 75.8 Kips  
 Allowable Tension: 195.0 Kips  
 Anchor Rod Stress Ratio: 38.9% **Pass**

Rigid
Service, ASD
Fty*ASIF

### Plate Data

Diam:	85	in
Thick:	2.75	in
Grade:	50	ksi
Single-Rod B-eff:	8.05	in

### Base Plate Results

Base Plate Stress: 19.5 ksi  
 Allowable Plate Stress: 50.0 ksi  
 Base Plate Stress Ratio: 38.9% **Pass**

### Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
34.64

### Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

### Stiffener Results

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

### Pole Results

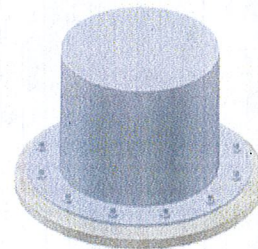
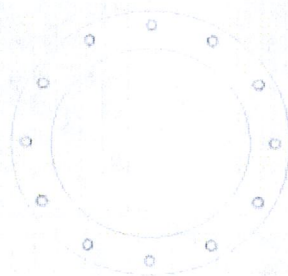
Pole Punching Shear Check: n/a

### Pole Data

Diam:	71	in
Thick:	0.375	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
-------	-------



\* 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 Pier and Pad Foundation

BU #: 876343  
 Site Name: GULLFORD WEST STC  
 App. Number: 131948



Design Reactions	
Shear, S:	36 kips
Moment, M:	3554 ft-kips
Tower Height, H:	149 ft
Tower Weight, Wt:	38 kips
Base Diameter, BD:	5.92 ft

Foundation Dimensions	
Depth, D:	12 ft
Pad Width, W:	30 ft
Neglected Depth, N:	3.3 ft
Thickness, T:	3.00 ft
Pier Diameter, Pd:	8.50 ft
Ext. Above Grade, E:	1.00 ft
Clear Cover, Cc:	3.0 in

Soil Properties	
Soil Unit Weight, $\gamma$ :	0.120 kcf
Bearing Capacity, Bc:	10.7 ksf
Angle of Friction, $\phi$ :	30 deg
Cohesion, Co:	0.000 ksf
Passive Pressure, Pp:	0.000 kcf
Base Friction, $\mu$ :	0.33

Material Properties	
Rebar Yield Strength, Fy:	60000 psi
Concrete Strength, Fc:	4000 psi
Concrete Unit Weight, $\delta_c$ :	0.150 kcf
Seismic Zone, z:	1

Rebar Properties	
Pier Rebar Size, Sp:	9
Pier Rebar Quantity, mp:	48
Pad Rebar Size, Spad:	8
Pad Rebar Quantity, mpad:	58
Pier Tie Size, St:	4
Tie Quantity, mt:	20

Design Checks			
	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam. (ft)	8.5	7.92	OK
Shear Capacity (kips)	299.38	36.00	OK
Pad Shear - 1-way (kips)	1477.03	1285.24	OK
Pad Shear - 2-way (kips)	3465.63	1934.62	OK
Pier Rebar Area ( $in^2$ )	48.00	40.88	OK
Pad Rebar Area ( $in^2$ )	45.82	43.13	OK
Pier Moment Capacity (k-ft)	7400.31	3914.00	OK
Pier Bar Spacing (in)	5.16	18 > s > 2	OK
Pad Bar Spacing (in)	5.19	18 > s > 2	OK
Pier Development Length (in)	117	35.52	OK
Pad Development Length (in)	33	35.52	OK
Hook Development Length (in)	177.00	14.98	OK
Rebar Hook Length (in)	129.00	19.18	OK

Modification Checks			
	Capacity/ Availability	Demand/ Limits	Check
Sleeve Rebar Area ( $in^2$ ):	15.8	0.00	Not Used
Sleeve Moment Capacity (k-ft):	7400.31	3914.00	Not Used
Sleeve Rebar Spacing (in):	N/A	18 > s > 2	Not Used
Sleeve Tie Spacing (in):	N/A	9 > s > 4.5	Not Used
Minimum Extra Thickness (in):	0	0	Not Used
Pad Rebar Area-short ( $in^2$ ):	0.44	1.91	Not Used
Pad Rebar Area-long ( $in^2$ ):	0.44	1.91	Not Used
Pad Rebar Spacing-short (in):	117.5	18 > s > 2	Not Used
Pad Rebar Spacing-long (in):	117.5	18 > s > 2	Not Used
End Cap Width (ft):	0	0	Not Used
End Cap Rebar Area ( $in^2$ ):	3.16	0	Not Used
Rebar Spacing (in):	-3.00	18 > s > 2	Not Used
Tie Spacing (in):	24.79	35.4 > s > 4.5	Not Used
Dowel Area ( $in^2$ ):	2.2	0.00	Not Used
Dowel Embedment (in):	9	6	Not Used
Conc Shear Strength (kips):	25.15	23.76	Not Used
Dowel Edge Dist (in):	12.00	4.78	Not Used
Dowel Spacing (in):	84.00	18.00	Not Used
Dowel Edge Dist (vert) (in):	18.00	4.78	Not Used
Dowel Devel. Length (in):	-3.00	13.32	Not Used

Modifications			
	Pier Sleeve, ds:	End Cap Width, Wecc:	
Revised Pier Diameter, dc:	0	Revised Width, Wc:	0
PS Rebar Size, Ss:	8.5	EC Rebar Size, Sec:	30
Rebar Quantity, ms:	8	Rebar Quantity, mecd:	8
Tie Size, Sst:	20	EC Tie Size, Sect:	4
Tie Quantity, mst:	3	Tie Quantity, mect:	4
Pad Thickness, Te:	9	EC Dowel Size, Secd:	15
Revised Pier Thickness, Tx:	0	Dowel Quantity, mecd:	6
Rebar Size, Se:	3.00	Rows of Dowels, Nd:	5
Rebar Quantity (long), me:	3	Dowel Depth, decd:	1
Rebar Quantity (short), mex:	4	Edge Distance, eecd:	9
Dowel Size, Sed:	4		12
Dowel Quantity, med:	3		in
	0		in