

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

ORIGINAL

February 21, 2012

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

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FEB 22 2012
CONNECTICUT
SITING COUNCIL

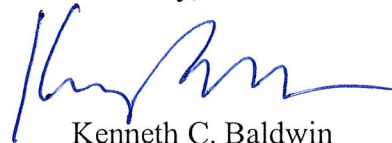
Re: **EM-VER-027-111130 – 48 Cow Hill Road, Clinton, Connecticut**
EM-VER-038-111108 – 101 Old Blue Hill, Durham, Connecticut
EM-VER-042-111101 – 94 High Street, East Hampton, Connecticut
EM-VER-060-111101 – 1919 Boston Post Road, Guilford, Connecticut
EM-VER-061-111107 – 539 Plains Road, Haddam, Connecticut
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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NEW YORK CITY

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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

www.ct.gov/csc

December 20, 2011

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

RE: **EM-VER-027-111130** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 48 Cow Hill Road, Clinton, Connecticut.

Dear Attorney Baldwin:

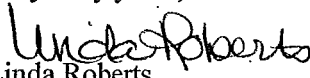
The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

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

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated November 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 William W. Fritz, Jr., First Selectman, Town of Clinton
Thomas Lane, Zoning Enforcement Officer, Town of Clinton
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

www.ct.gov/csc

December 6, 2011

The Honorable William W. Fritz, Jr.
First Selectman
Town of Clinton
54 East Main Street
Clinton, CT 06413

RE: **EM-VER-027-111130** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 48 Cow Hill Road, Clinton, Connecticut.

Dear First Selectman Fritz:

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 December 20, 2011.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: Thomas Lane, Zoning Enforcement Officer, Town of Clinton

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

November 28, 2011

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

RECEIVED
NOV 30 2011
CONNECTICUT
SITING COUNCIL

Re: **Notice of Exempt Modification – Antenna Swap
48 Cow Hill Road, Clinton, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains wireless telecommunications antennas at the 209-foot level on the existing 212-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco’s use of the existing tower in 1992 (Docket No. 148). Cellco now intends to modify its installation by replacing all of its existing antennas with six (6) model LPA-80080/6CF cellular antennas; six (6) model LPA-171080-8CF PCS antennas; one (1) model BXA-70080/6CF LTE antenna; and two (2) model BXA-70063/4CF LTE antennas, all at the same 209-foot level on the tower. Cellco also intends to install three additional coax cables. Attached behind Tab 1 are the specifications for the proposed replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to William W. Fritz, First Selectman of the Town of Clinton. A copy of this letter is also being sent to Raymond E. Hesel, owner of the property on which the tower is located.

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

1. The proposed modifications will not result in an increase in the overall height of the existing tower. Cellco’s antennas will be located at the same 209-foot level on the existing 212-foot tower.



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Linda Roberts
November 28, 2011
Page 2

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

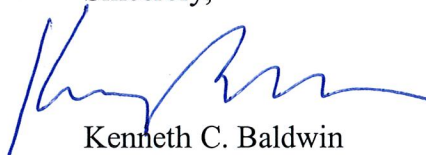
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

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:

William W. Fritz, Clinton First Selectman
Raymond E. Heser
Sandy M. Carter



Mechanical specifications

Length	1800 mm	70.9 in
Width	140 mm	5.5 in
Depth	335 mm	13.2 in
Depth with z-bracket	375 mm	14.8 in
Weight ⁴⁾	9.5 kg	21.0 lbs
Wind Area Fore/Aft ⁶⁾	0.25 m ²	2.7 ft ²
Wind Area Side ⁶⁾	0.61 m ²	6.6 ft ²
Max Wind Survivability ⁶⁾	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr) ⁶⁾		
Fore/Aft	415 N	93 lbf
Side	878 N	198 lbf

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

Mounting & Downtilting

Mounting hardware attaches to pipe diameter Ø50-102 mm; Ø2.0-4.0 in. If the lock-down brace is used, the maximum diameter is Ø88.9 mm (3.5 in).

Mechanical downtilt angle 0-22°

Mounting & Downtilt Bracket Kit 21700000

Electrical specifications

Frequency Range	806-960 MHz
Impedance	50Ω
Connector ³⁾	NE or E-DIN Female 1 port / Center
VSWR ¹⁾	≤ 1.4:1
Polarization	Vertical
Gain ¹⁾	14 dBd
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	80°
Vertical Beamwidth	10°
Electrical downtilt ⁵⁾	0°
Null fill ¹⁾	10%
Lightning protection	Direct ground

1) Typical values.

2) Power rating limited by connector only.

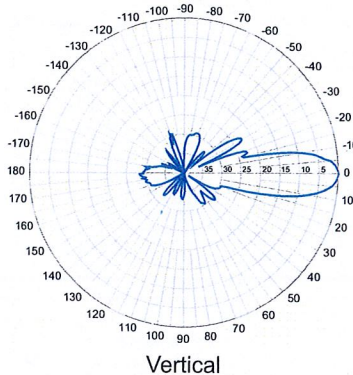
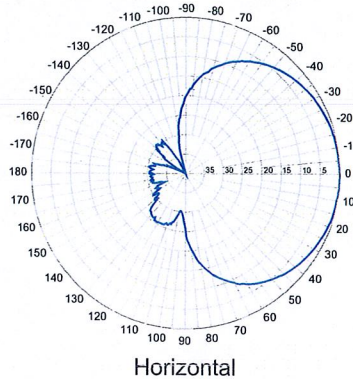
3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.

4) Antenna weight does not include brackets.

5) Add'l downtilts may be available. Check website for details.

6) Values reflect installation with all three brackets utilized.

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

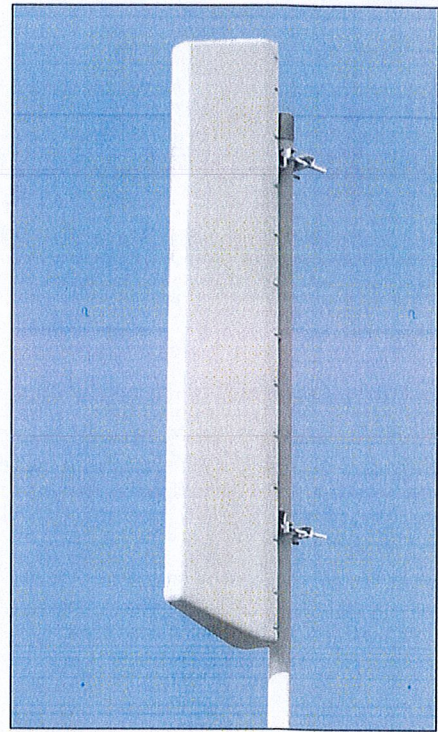
Radiation-pattern¹⁾

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

Mounting on a metal pole will typically improve the front-to-back ratio.

LPA-80080/6CF _____

When ordering replace "____" with connector type.



Featuring our Exclusive
3T Technology™
Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:

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

Revision Date 08/18/08

806-960 MHz

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

**Amphenol
Antel, Inc.** 1 of 1
The Antenna Technology Company

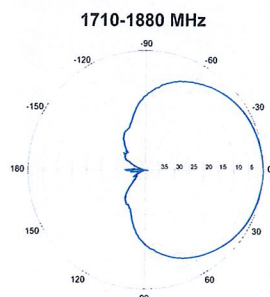
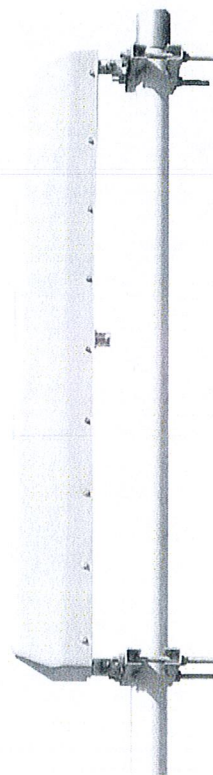
LPA-171080-8CF-EDIN-X

V-Pol | Log Periodic | 80° | 16.0-16.5 dBi

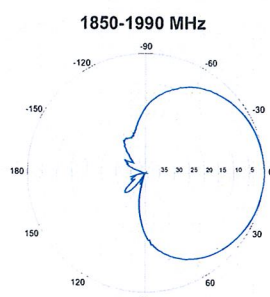
Replace "X" with desired electrical downtilt.

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

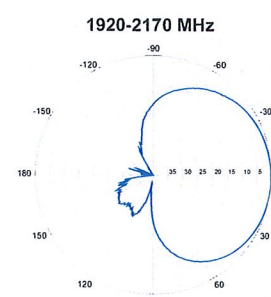
Electrical Characteristics		1710-2170 MHz			
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz		
Polarization	Vertical				
Horizontal beamwidth	78°	80°	77°		
Vertical beamwidth	6°	7°	6°		
Gain	13.9 dBd (16.0 dBi)	14.4 dBd (16.5 dBi)	13.9 dBd (16.0 dBi)		
Electrical downtilt (X)	0, 2				
Impedance	50Ω				
VSWR	≤ 1.5:1				
Null fill	5% (-26.02 dB)				
Input power	250 W				
Lightning protection	Direct Ground				
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)				
Mechanical Characteristics					
Dimensions Length x Width x Depth	1207 x 105 x 175 mm	47.5 x 4.1 x 6.9 in			
Weight without mounting brackets	3.9 kg	8.5 lbs			
Survival wind speed	>276 km/hr	>171 mph			
Wind area	Front: 0.14 m ² Side: 0.22 m ²	Front: 1.5 ft ² Side: 2.3 ft ²			
Wind load @ 161 km/hr (100 mph)	Front: 185 N Side: 317 N	Front: 42 lbf Side: 71 lbf			
Mounting Options		Part Number	Fits Pipe Diameter		Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm	2.0-4.0 in		2.3 kg 5.0 lbs
2-Point Mounting and Downtilt Bracket Kit	26799999	50-102 mm	2.0-4.0 in		2.3 kg 5.0 lbs



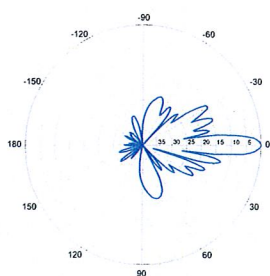
Horizontal



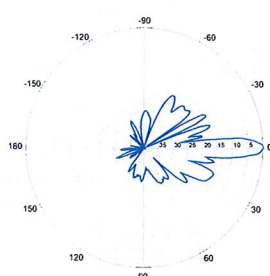
Horizontal



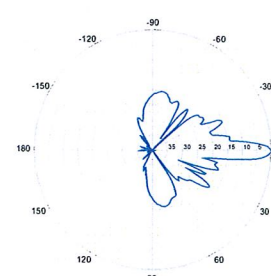
Horizontal



0° | Vertical



0° | Vertical



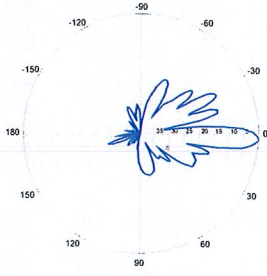
0° | Vertical

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.

LPA-171080-8CF-EDIN-X

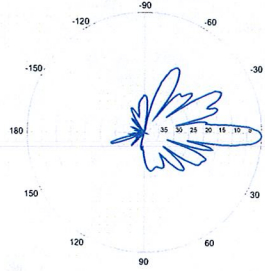
V-Pol | Log Periodic | 80° | 16.0-16.5 dBi

1710-1880 MHz



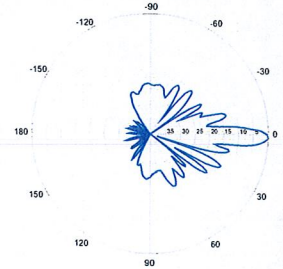
2° | Vertical

1850-1990 MHz



2° | Vertical

1920-2170 MHz



2° | Vertical

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.

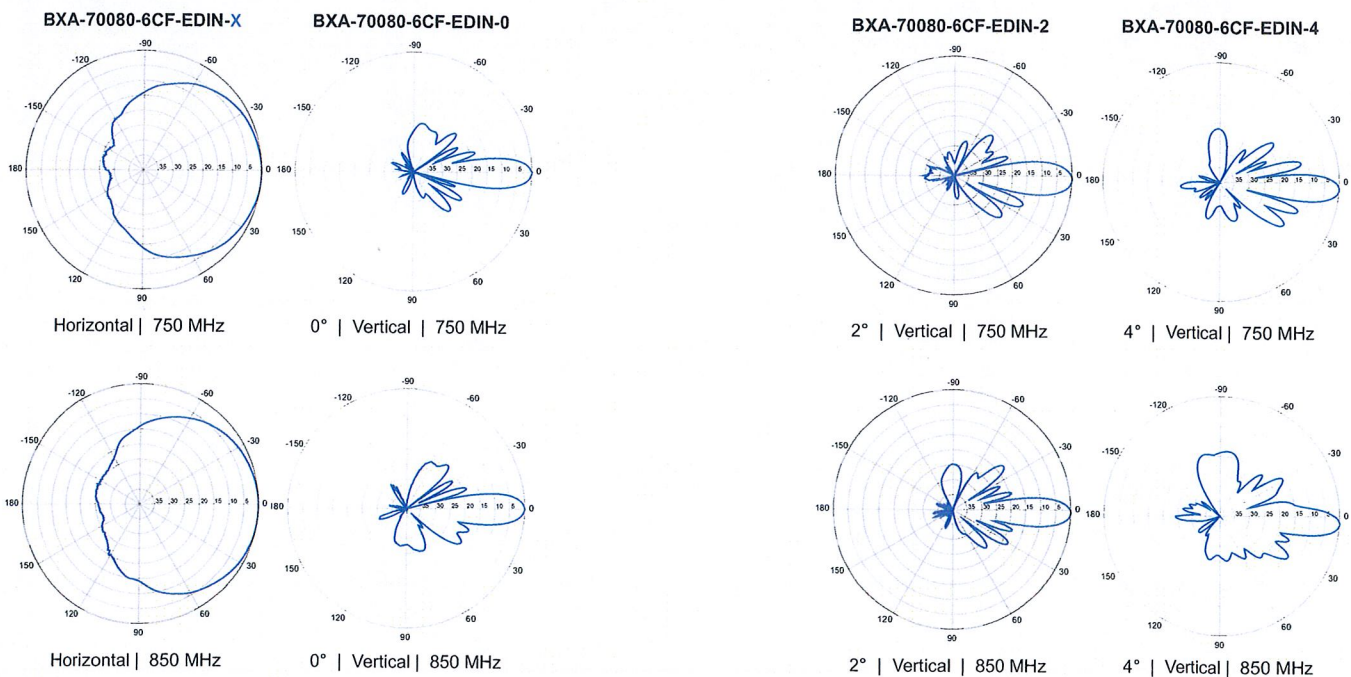
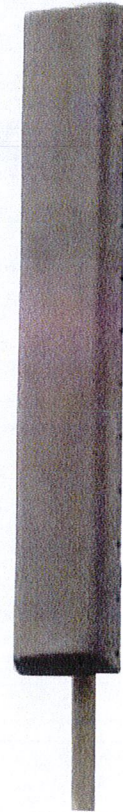
BXA-70080-6CF-EDIN-X

X-Pol | FET Panel | 80° | 13.5 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	82°	80°	
Vertical beamwidth	12°	10°	
Gain	13.0 dBd (15.1 dBi)	13.5 dBd (15.6 dBi)	
Electrical downtilt (X)	0, 2, 4, 6, 8, 10		
Impedance	50Ω		
VSWR	≤1.35:1		
Upper sidelobe suppression (0°)	-18.3 dB	-18.6 dB	
Front-to-back ratio (+/-30°)	-26.9 dB	-25.6 dB	
Null fill	5% (-26.02 dB)		
Isolation between ports	< -30 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 204 x 151 mm	71.0 x 8.0 x 5.9 in	
Depth with z-brackets	191 mm	7.5 in	
Weight without mounting brackets	8.2 kg	18 lbs	
Survival wind speed	> 201 km/hr > 125 mph		
Wind area	Front: 0.37 m ² Side: 0.27 m ²	Front: 3.9 ft ² Side: 2.9 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 531 N Side: 475 N	Front: 119 lbf Side: 104 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70080-6CF-EDIN-X-FP		

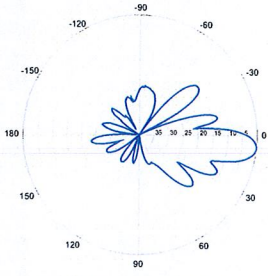


Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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

BXA-70080-6CF-EDIN-X

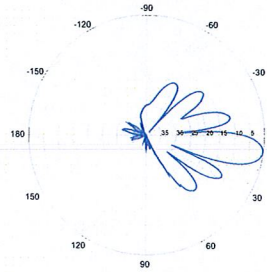
X-Pol | FET Panel | 80° | 13.5 dBd

BXA-70080-6CF-EDIN-6



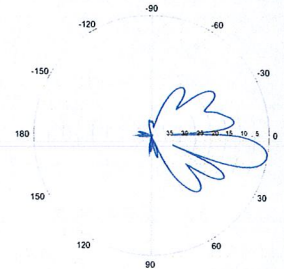
6° | Vertical | 750 MHz

BXA-70080-6CF-EDIN-8

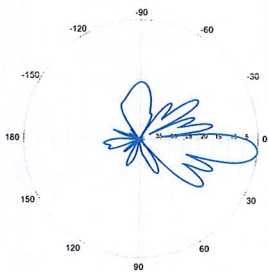


8° | Vertical | 750 MHz

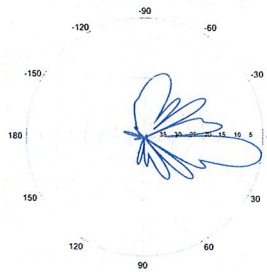
BXA-70080-6CF-EDIN-10



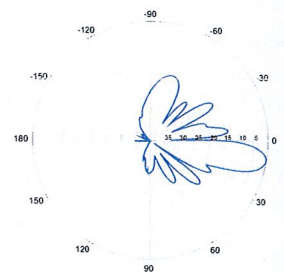
10° | Vertical | 750 MHz



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.

Mechanical specifications

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

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

Mounting & Downtilting

Mounting hardware attaches to pipe diameter $\text{Ø}50\text{-}160 \text{ mm}$; $\text{Ø}2.0\text{-}6.3 \text{ in}$.

Mounting Bracket Kit	36210002
Downtilt Bracket Kit	36114003

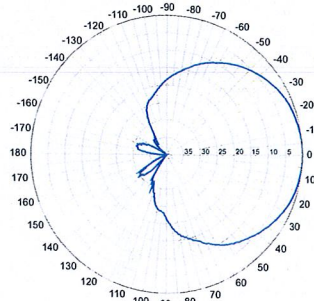
Electrical specifications

Frequency Range	696-900 MHz
Impedance	50 Ω
Connector ³⁾	NE or E-DIN Female 2 ports / Center
VSWR ¹⁾	$\leq 1.4:1$
Polarization	Slant $\pm 45^\circ$
Isolation Between Ports ¹⁾	< -30 dB
Gain ¹⁾	13.0 dBd 15.0 dBi
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	63°
Vertical Beamwidth	15°
Electrical downtilt ⁵⁾	0°
Null fill ¹⁾	5%
Lightning protection	Direct ground
Patented Dipole Design: U.S. Patent No. 6,608,600 B2	

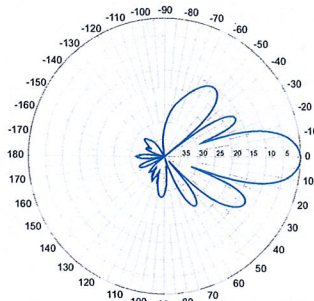
- 1) Typical values.
- 2) Power rating limited by connector only.
- 3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.
- 4) Antenna weight does not include brackets.
- 5) Add'l downtilts may be available. Check website for details.

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

Radiation-pattern
750 MHz

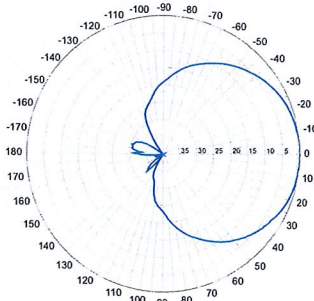


Horizontal

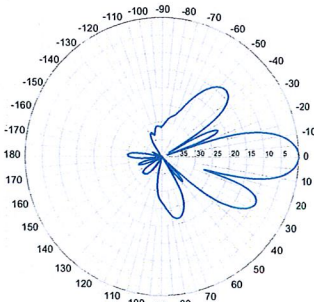


Vertical

850 MHz



Horizontal

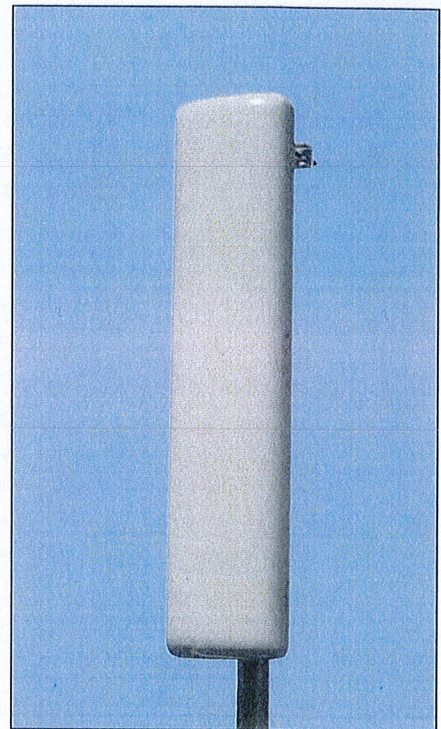


Vertical

696-900 MHz

BXA-70063/4CF

When ordering replace "___" with connector type.



Featuring our Exclusive
3T Technology™
Antenna Design:

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

Warranty:

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

Revision Date: 10/27/08

		General		Power		Density							
Site Name: Clinton													
Tower Height: Verizon @ 209ft													
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*AT&T UMTS	1	500	190	0.0050	880	0.5867	0.85%						
*AT&T GSM	6	296	190	0.0177	880	0.5867	3.02%						
*AT&T GSM	3	427	190	0.0128	1900	1.0000	1.28%						
*AT&T LTE	1	500	190	0.0050	740	0.4933	1.01%						
*T-Mobile GSM	8	126	137	0.0193	1945	1.0000	1.93%						
*T-Mobile UMTS	2	711	137	0.0272	2100	1.0000	2.72%						
*Pocket	3	631	182	0.0205	2130	1.0000	2.05%						
*Sprint	11	122	197	0.0124	1962.5	1.0000	1.24%						
*Nextel	9	100	175	0.0106	851	0.5673	1.86%						
*Town	6	100	125	0.0138	46	0.2000	6.90%						
*MediaFLO			228				6.63%						
Verizon PCS	7	233	209	0.0134	1970	1.0000	1.34%						
Verizon Cellular	9	242	209	0.0179	869	0.5793	3.09%						
Verizon AWS	1	582	209	0.0048	2145	1.0000	0.48%						
Verizon 700	2	511	209	0.0084	698	0.4653	1.81%						
								36.22%					
* Source: Siting Council													

Date: October 26, 2011



Veronica Harris
Crown Castle USA Inc.
1200 McArthur Boulevard
Mahwah, NJ 07430
(201) 236-9094

Vertical Structures, Inc.
309 Spangler Drive, Suite E
Richmond, KY 40475
(859) 624-8360
ncoomes@verticalstructures.com

Subject: Structural Analysis Report

Carrier Designation: Verizon Wireless Change-Out
Carrier Site Number: N/A
Carrier Site Name: Clinton, CT

Crown Castle Designation:
Crown Castle BU Number: 806363
Crown Castle Site Name: HRT 105
Crown Castle JDE Job Number: 166186
Crown Castle Work Order Number: 445691

Engineering Firm Designation: Vertical Structures, Inc. Project Number: 2011-004-083

Site Data: 48 Cow Hill Road, Clinton, CT, Middlesex County
Latitude 41° 17' 20.2", Longitude -72° 32' 18.5"
212.625 Foot - Self Support Tower

Dear Veronica Harris,

Vertical Structures, Inc. is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 435582, in accordance with application 130795, revision 7.

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

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

Sufficient Capacity

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

Respectfully submitted by:

A handwritten signature in blue ink that reads "Nathan Coomes".

Nathan Coomes, P.E.
Project Engineer

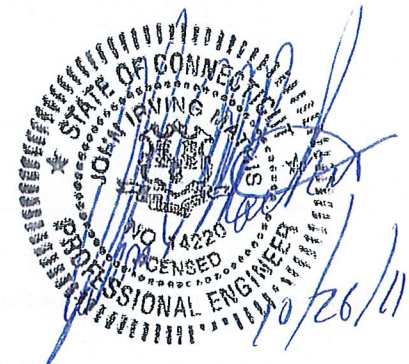


TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Table 6 - Tower Component Stresses vs. Capacity - LC1

4.1) Recommendations

5) APPENDIX A

RISATower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 212.625 ft Self Support tower designed by Rohn in 1992. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E. The tower was reworked in 2007 to accommodate additional loading.

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 and 50 mph under service loads. Also, per Crown Castle's direction and in accordance with ASCE-7-05 we have considered a fastest mile wind speed of 38 mph with an escalating 0.75 inch ice thickness.

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
208	209	2	antel	BXA-70063/4CF w/ Mount Pipe	3	1 5/8	
		1	antel	BXA-70080/6CF w/Mount Pipe			
		6	antel	LPA-171080/8CFx2 w/ Mount Pipe			
		6	antel	LPA-80080/6CF w/ mount pipe			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
208	209	5	decibel	DB948F85T2E-M w/Mount Pipe	15	1 5/8	3
		9	swedcom	ALP 9212-N w/Mount Pipe			
197	208	1		Sector Mount [SM 510-3]	6	1 5/8	1
	198	6	decibel	DB980H90E-M w/Mount Pipe			
	197	1		Sector Mount [SM 505-3]			
		1		14' Angle Sector Frame (3)			
190	190	6	adc	Cleargain Dual Band 800/1900 TMA	2	7/8	2
		6	ericsson	RRUS-11 BTS			
		3	kmw communications	AM-X-CD-14-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ mount pipe			
		6	powerwave technologies	LGP13519 Diplexer			
		1	raycap	DC6-48-60-18-8F			1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
182	182	3	kathrein	742 213 w/ Mount Pipe	6	1 5/8	1
181	181	2	radiowaves	HP2-4.7HS	4	11/32	1
175	176	12	decibel	DB844H90E-XY w/Mount Pipe	12	1 1/4	1
	175	1		Sector Mount [SM 510-3]			
	173	2	celwave	1151-3			
165	165	2		Side Arm Mount [SO 308-1]	2	7/8	1
	153	1	celwave	1151-3			
145	148	1	sinclair	SRL-310HL	2	7/8	1
	145	2		Side Arm Mount [SO 308-1]			
		1		Side Arm Mount [SO 201-3]			
		3	celwave	APX16DWV-16DWV-S-E-A20			
137	137	3	celwave	ATMAA1412D-1A20 TMA	6	1 5/8	1
		3	celwave	ATMPP1412D-1CWA TMA	6	1 1/4	
		3	ems wireless	RR90-17-02DP w/Mount Pipe			
133	133	1		5'3"x4" Pipe Mount	1	EW52	1
		1	andrew	PL6-59W			
125	125	1		Side Arm Mount [SO 308-1]	1	7/8	1
		1	celwave	1142-2C			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment to be Removed

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)
212	212	4	celwave	PD10017		
		6	rohn	6' Sidearm		
		12	sinclair	SRL410C		
200	200	2		6' Grid Dish		
190	190	3	rohn	Mounting Frame		
		9	swedcom	ALP9212N		
100	100	1	decibel	DB222		
		1	rohn	Mount		
90	90	1	decibel	DB225		
		1	rohn	Mount		
80	80	2	decibel	DB225-2		
		2	rohn	Mount		
60	60	1	decibel	DB212-2		
		1	decibel	DB225		
		1	decibel	DB225-2		
		3	rohn	Mount		
		1	decibel	DB212-2		
50	50	1	rohn	Mount		
		1	decibel	DB212		
40	40	1	rohn	Mount		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Change-Out Revision #7	130795	CCIsites
Tower Drawing	Rohn Drawing No. C921279	262274	CCIsites
Foundation Drawing	Rohn Drawing No. A921278-1	262273	CCIsites
Geotechnical Report	Dr. Clarence Welti Report Dated July 6, 1992	262276	CCIsites
Rework Drawings	Vertical Structures Job No. 2007-004-075	2169576	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. Vertical Structures, Inc. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T1	212.625 - 202.458	Leg	ROHN 2.5 STD	2	-5493.53	51333.83	12.4	Pass
		Diagonal	ROHN 2 STD	8	-2885.64	24117.17	12.0	Pass
		Horizontal	ROHN 1.5 STD	7	-2139.74	20300.52	10.5 12.7 (b)	Pass
		Top Girt	ROHN 1.5 STD	4	-208.10	20340.78	1.0	Pass
		Inner Bracing	L2x2x1/8	16	-4.37	5828.76	0.3	Pass
T2	202.458 - 182.292	Leg	ROHN 3 EH	28	-34615.90	84964.22	40.7	Pass
		Diagonal	ROHN 2 STD	39	-9176.65	17252.62	53.2	Pass
		Horizontal	ROHN 1.5 STD	37	-5103.79	20251.47	25.2 29.9 (b)	Pass
		Inner Bracing	L2x2x1/8	42	-7.31	5726.17	0.3	Pass
T3	182.292 - 162.104	Leg	ROHN 4 EH	67	-73261.90	140142.28	52.3	Pass
		Diagonal	ROHN 2 STD	77	-9738.71	14724.98	66.1	Pass
		Horizontal	ROHN 1.5 STD	76	-6246.67	17358.06	36.0 36.4 (b)	Pass
		Inner Bracing	L2x2x1/8	80	-6.88	4212.61	0.3	Pass
T4	162.104 - 141.896	Leg	ROHN 5 EH	106	109691.00	207361.47	52.9	Pass
		Diagonal	ROHN 2 STD	111	-9801.86	12580.63	77.9	Pass
		Horizontal	ROHN 2 STD	109	-6913.46	24641.04	28.1 40.3 (b)	Pass
		Inner Bracing	L2x2x1/8	119	-7.62	2887.25	0.4	Pass
T5	141.896 - 121.688	Leg	ROHN 6 EHS	145	144606.00	213793.20	67.6	Pass
		Diagonal	ROHN 2.5 STD	149	-12762.30	15376.69	83.0	Pass
		Horizontal	ROHN 2 STD	148	-7793.44	20379.30	38.2 45.4 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T6	121.688 - 101.479	Inner Bracing	L2x2x1/8	158	-8.08	2178.27	0.4	Pass
		Leg	ROHN 6 EH	172	-	266297.40	66.0	Pass
		Diagonal	ROHN 2.5 STD	176	-11663.50	13473.43	86.6	Pass
		Horizontal	ROHN 2 STD	175	-7784.79	14810.83	52.6	Pass
T7	101.479 - 81.2708	Inner Bracing	L2 1/2x2 1/2x3/16	186	-7.48	4589.77	0.3	Pass
		Leg	ROHN 6 EH	199	-	266297.40	77.1	Pass
		Diagonal	ROHN 3 STD	203	-11652.20	23342.43	49.9	Pass
		Horizontal	ROHN 2.5 STD	202	-8286.03	25350.59	32.7 48.2 (b)	Pass
T8	81.2708 - 61	Inner Bracing	L3x3x3/16	213	-7.46	4535.72	0.5	Pass
		Leg	ROHN 8 EHS	226	-	334029.79	69.7	Pass
		Diagonal	ROHN 3 STD	230	-11736.60	20458.62	57.4	Pass
		Horizontal	ROHN 2.5 STD	229	-8736.09	19807.45	44.1 50.9 (b)	Pass
T9	61 - 40.6667	Inner Bracing	L3 1/2x3 1/2x1/4	238	-9.06	7384.85	0.3	Pass
		Leg	ROHN 8 EHS	253	-	334051.12	78.1	Pass
		Diagonal	ROHN 3 STD	257	-12664.90	17935.11	70.6	Pass
		Horizontal	ROHN 2.5 STD	256	-9779.61	15667.41	62.4	Pass
T10	40.6667 - 20.3333	Inner Bracing	L3 1/2x3 1/2x1/4	267	-9.27	5884.99	0.4	Pass
		Leg	ROHN 8 EH	280	-	437213.32	65.5 66.3 (b)	Pass
		Diagonal	ROHN 3 STD	284	-17488.10	30741.38	56.9	Pass
		Horizontal	ROHN 3 STD	283	-9850.95	27715.33	35.5 39.8 (b)	Pass
		Redund Horz 1 Bracing	ROHN 1.5 STD	285	-4972.44	11745.65	42.3	Pass
		Redund Diag 1 Bracing	ROHN 2 STD	305	-4458.96	8179.69	54.5	Pass
		Redund Hip 1 Bracing	ROHN 1.5 STD	308	-49.43	10699.36	0.5	Pass
		Redund Hip Diagonal Bracing	ROHN 2.5 STD	307	-48.15	7078.91	0.7	Pass
T11	20.3333 - 0	Inner Bracing	ROHN 3 STD	312	-11.62	19625.00	1.8	Pass
		Leg	ROHN 8 EH	313	-	437299.96	71.9	Pass
		Diagonal	ROHN 3 STD	317	-19703.30	29095.39	67.7	Pass
		Horizontal	ROHN 3 STD	316	-11720.60	22586.22	51.9	Pass
		Redund Horz 1 Bracing	ROHN 1.5 STD	318	-5451.89	9790.38	55.7	Pass
		Redund Diag 1 Bracing	ROHN 2 STD	338	-4582.87	7507.55	61.0	Pass
		Redund Hip 1 Bracing	ROHN 1.5 STD	341	-50.09	8807.40	0.6	Pass
		Redund Hip Diagonal Bracing	ROHN 2.5 STD	340	-47.53	6355.22	0.7	Pass
		Inner Bracing	ROHN 3 STD	343	-10.15	16082.00	1.5	Pass
						Summary		
						Leg (T9)	78.1	Pass
						Diagonal	86.6	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
						(T6)		
						Horizontal (T9)	62.4	Pass
						Top Girt (T1)	1.0	Pass
						Redund Horz 1 Bracing (T11)	55.7	Pass
						Redund Diag 1 Bracing (T11)	61.0	Pass
						Redund Hip 1 Bracing (T11)	0.6	Pass
						Redund Hip Diagonal Bracing (T11)	0.7	Pass
						Inner Bracing (T10)	1.8	Pass
						Bolt Checks	66.3	Pass
						Rating =	86.6	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	61.2	Pass
1	Base Foundation Soil Interaction	0	55.4	Pass
Structure Rating (max from all components) =				86.6%

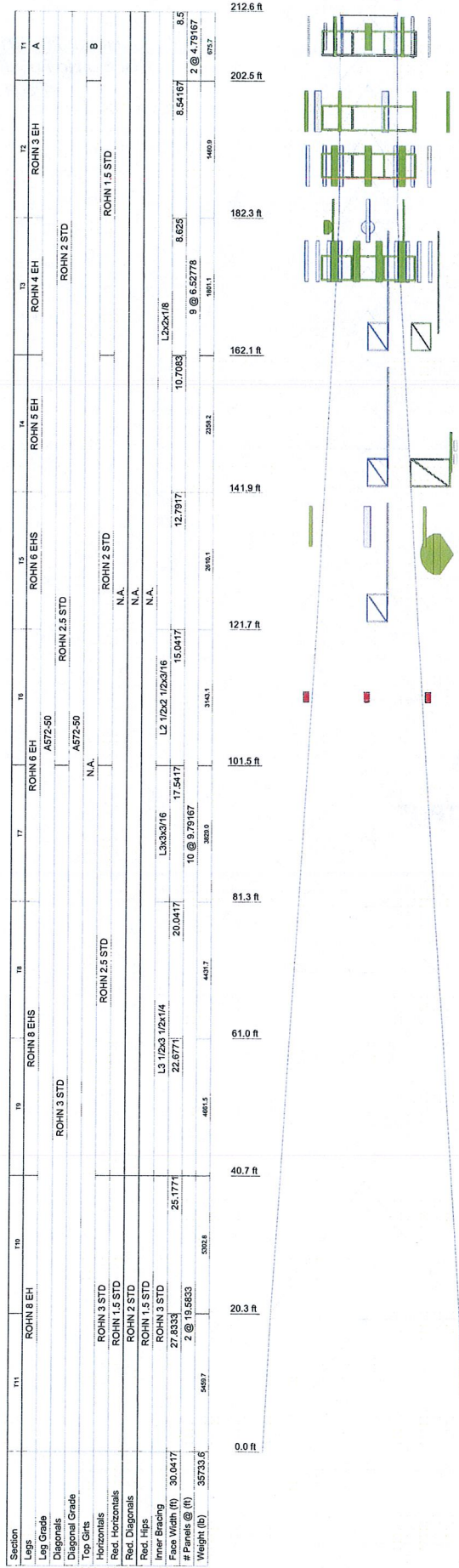
Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity.
- 2) Capacities up to 105% are considered acceptable based on analysis methods used.

4.1) Recommendations

N/A

APPENDIX A
RISA TOWER OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon Lighting	212	AM-X-CD-14-65-00T-RET w/ Mount Pipe	190
Sector Mount [SM 510-3] (Verizon Wireless)	208	(2) RRUS-11 BTS	190
(2) LPA-80080/6CF w/ mount pipe (Verizon Wireless)	208	(2) RRUS-11 BTS	190
(2) LPA-80080/6CF w/ mount pipe (Verizon Wireless)	208	(2) RRUS-11 BTS	190
(2) LPA-80080/6CF w/ mount pipe (Verizon Wireless)	208	DC6-48-60-18-8F	190
(2) LPA-80080/6CF w/ mount pipe (Verizon Wireless)	208	742 213 w/ Mount Pipe	182
BXA-70063/4CF w/ Mount Pipe (Verizon Wireless)	208	742 213 w/ Mount Pipe	182
BXA-70063/4CF w/ Mount Pipe (Verizon Wireless)	208	742 213 w/ Mount Pipe	182
BXA-70063/4CF w/ Mount Pipe (Verizon Wireless)	208	HP2-4.7HS	181
BXA-70063/4CF w/ Mount Pipe (Verizon Wireless)	208	HP2-4.7HS	181
BXA-70063/4CF w/ Mount Pipe (Verizon Wireless)	208	Sector Mount [SM 510-3]	175
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	208	(4) DB844H90E-XY w/ Mount Pipe	175
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	208	(4) DB844H90E-XY w/ Mount Pipe	175
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	208	(4) DB844H90E-XY w/ Mount Pipe	175
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	208	Side Arm Mount [SO 308-1]	165
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	208	Side Arm Mount [SO 308-1]	165
Sector Mount [SM 505-3]	197	1151-3	165
(2) DB980H90E-M w/ Mount Pipe	197	1151-3	165
(2) DB980H90E-M w/ Mount Pipe	197	Side Arm Mount [SO 308-1]	145
(2) DB980H90E-M w/ Mount Pipe	197	Side Arm Mount [SO 308-1]	145
(3) 6' Empty Mount Pipe	197	1151-3	145
(3) 6' Empty Mount Pipe	197	SD310-HL	145
(3) 6' Empty Mount Pipe	197	Side Arm Mount [SO 201-3]	137
(3) 6' Empty Mount Pipe	197	RR90-17-02DP w/ Mount Pipe	137
(3) 6' Empty Mount Pipe	197	RR90-17-02DP w/ Mount Pipe	137
(2) 7770.00 w/ mount pipe	190	RR90-17-02DP w/ Mount Pipe	137
(2) 7770.00 w/ mount pipe	190	APX16DWV-16DWV-S-E-A20	137
(2) 7770.00 w/ mount pipe	190	APX16DWV-16DWV-S-E-A20	137
(2) 7770.00 w/ mount pipe	190	APX16DWV-16DWV-S-E-A20	137
(2) LGP13519 Diplexer	190	ATMPP1412D-1CWA TMA	137
(2) LGP13519 Diplexer	190	ATMPP1412D-1CWA TMA	137
(2) LGP13519 Diplexer	190	ATMPP1412D-1CWA TMA	137
(2) Cleargain Dual Band 800/1900 TMA (VSI)	190	ATMAA1412D-1A20 TMA	137
(2) Cleargain Dual Band 800/1900 TMA (VSI)	190	ATMAA1412D-1A20 TMA	137
(2) Cleargain Dual Band 800/1900 TMA (VSI)	190	ATMAA1412D-1A20 TMA	137
AM-X-CD-14-65-00T-RET w/ Mount Pipe	190	5"3"x4" Pipe Mount	133
AM-X-CD-14-65-00T-RET w/ Mount Pipe	190	PL6-59W	133
AM-X-CD-14-65-00T-RET w/ Mount Pipe	190	Side Arm Mount [SO 308-1]	125
AM-X-CD-14-65-00T-RET w/ Mount Pipe	190	1142-2C	125
AM-X-CD-14-65-00T-RET w/ Mount Pipe	190	Intermediate Side Lights (VSI)	111
AM-X-CD-14-65-00T-RET w/ Mount Pipe	190	Intermediate Side Lights (VSI)	111
AM-X-CD-14-65-00T-RET w/ Mount Pipe	190	Intermediate Side Lights (VSI)	111

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	ROHN 2.5 STD	B	ROHN 1.5 STD

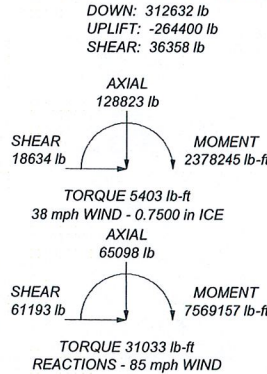
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

1. Tower is located in Middlesex 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: 86.6%

MAX. CORNER REACTIONS AT BASE:



Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job: HRT 105, CT BU#806363
	Project: Vertical Structures Job No. 2011-004-083
	Client: Crown Castle Drawn by: ncoomes App'd:
	Code: TIA/EIA-222-F Date: 10/25/11 Scale: NTS
	Path: Was11coomes\OPEN\2011-004-083 HRT 105, CT\RSA\806363.dwg Dwg No. E-1

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 1 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Tower Input Data

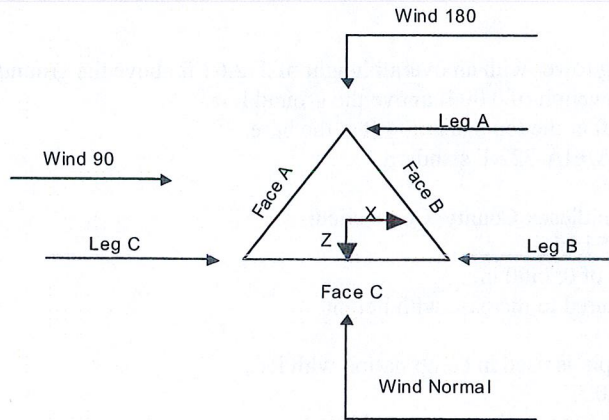
The main tower is a 3x free standing tower with an overall height of 212.63 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 8.50 ft at the top and 30.04 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

- Tower is located in Middlesex 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 tower member design is 1.333.
- Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys √ Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity Leg Bolts Are At Top Of Section √ Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r √ Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. √ Autocalc Torque Arm Areas √ SR Members Have Cut Ends Sort Capacity Reports By Component √ Triangulate Diamond Inner Bracing | <ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression √ All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feedline Torque Include Angle Block Shear Check <li style="padding-left: 20px;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets |
|--|--|---|

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 2 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	212.63-202.46			8.50	1	10.17
T2	202.46-182.29			8.54	1	20.17
T3	182.29-162.10			8.63	1	20.19
T4	162.10-141.90			10.71	1	20.21
T5	141.90-121.69			12.79	1	20.21
T6	121.69-101.48			15.04	1	20.21
T7	101.48-81.27			17.54	1	20.21
T8	81.27-61.00			20.04	1	20.27
T9	61.00-40.67			22.68	1	20.33
T10	40.67-20.33			25.18	1	20.33
T11	20.33-0.00			27.83	1	20.33

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	212.63-202.46	4.79	K Brace Down	No	Yes	6.0000	1.0000
T2	202.46-182.29	6.53	K Brace Down	No	Yes	6.0000	1.0000
T3	182.29-162.10	6.53	K Brace Down	No	Yes	6.0000	1.2500
T4	162.10-141.90	6.53	K Brace Down	No	Yes	6.2500	1.2500

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 3 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Tower Section	Tower Elevation <i>ft</i>	Diagonal Spacing <i>ft</i>	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset <i>in</i>	Bottom Girt Offset <i>in</i>
T5	141.90-121.69	9.79	K Brace Down	No	Yes	6.2500	1.2500
T6	121.69-101.48	9.79	K Brace Down	No	Yes	6.2500	1.2500
T7	101.48-81.27	9.79	K Brace Down	No	Yes	6.2500	1.2500
T8	81.27-61.00	9.79	K Brace Down	No	Yes	6.2500	2.0000
T9	61.00-40.67	9.79	K Brace Down	No	Yes	7.0000	2.0000
T10	40.67-20.33	19.58	K1 Down	No	Yes	7.0000	2.0000
T11	20.33-0.00	19.58	K1 Down	No	Yes	7.0000	2.0000

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 212.63-202.46	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T2 202.46-182.29	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T3 182.29-162.10	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 162.10-141.90	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T5 141.90-121.69	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T6 121.69-101.48	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T7 101.48-81.27	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T8 81.27-61.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T9 61.00-40.67	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T10 40.67-20.33	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T11 20.33-0.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 212.63-202.46	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T2 202.46-182.29	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T3 182.29-162.10	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T4 162.10-141.90	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T5 141.90-121.69	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 4 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T6 121.69-101.48	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T7 101.48-81.27	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T8 81.27-61.00	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T9 61.00-40.67	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T10 40.67-20.33	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T11 20.33-0.00	None	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 212.63-202.46	Single Angle		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T2 202.46-182.29	Single Angle		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T3 182.29-162.10	Single Angle		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T4 162.10-141.90	Single Angle		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T5 141.90-121.69	Single Angle		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T6 121.69-101.48	Single Angle		A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 101.48-81.27	Single Angle		A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T8 81.27-61.00	Single Angle		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T9 61.00-40.67	Single Angle		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T10 40.67-20.33	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T11 20.33-0.00	Single Angle		A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Redundant Bracing Grade	Redundant Type	Redundant Size	K Factor
T10 40.67-20.33	A36 (36 ksi)	Horizontal (1) Diagonal (1) Hip (1)	Pipe Pipe Pipe	1 1 1

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job	HRT 105, CT BU#806363	Page	6 of 28
	Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
	Client	Crown Castle	Designed by	ncoomes

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹								
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace		
				X Y	X Y	X Y	X Y	X Y	X Y	X Y		
ft												
121.69				1	1	1	1	1	1	1	1	1
T6 121.69-101.48	No	No	1	1	1	1	1	1	1	1	1	1
T7 101.48-81.27	No	No	1	1	1	1	1	1	1	1	1	1
T8 81.27-61.00	No	No	1	1	1	1	1	1	1	1	1	1
T9 61.00-40.67	No	No	1	1	1	1	1	1	1	1	1	1
T10 40.67-20.33	No	No	1	1	1	1	1	1	1	1	1	1
T11 20.33-0.00	No	No	1	1	1	1	1	1	1	1	1	1

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 212.63-202.46	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T2 202.46-182.29	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T3 182.29-162.10	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T4 162.10-141.90	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T5 141.90-121.69	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T6 121.69-101.48	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T7 101.48-81.27	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T8 81.27-61.00	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T9 61.00-40.67	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T10 40.67-20.33	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T11 20.33-0.00	0.0000	1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75

Tower Section Geometry (cont'd)

RISA Tower

Vertical Structures, Inc.
 309 Spangler Drive, Suite E
 Richmond, KY 40475
 Phone: (859) 624-8360
 FAX: (859) 624-8369

Job	HRT 105, CT BU#806363	Page	7 of 28
Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
Client	Crown Castle	Designed by	ncomes

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 212.63-202.46	0.0000	0.0000	0.0000	0.0000	0.9500	0.9500	4.7500	1.4375
T2 202.46-182.29	0.0000	0.0000	0.0000	0.0000	0.9500	0.9500	4.7500	1.7500
T3 182.29-162.10	0.0000	0.0000	0.0000	0.0000	0.9500	0.9500	4.7500	2.2500
T4 162.10-141.90	0.0000	0.0000	0.0000	0.0000	1.1875	1.1875	4.7500	2.7815
T5 141.90-121.69	0.0000	0.0000	0.0000	0.0000	1.1875	1.1875	4.7500	3.3125
T6 121.69-101.48	0.0000	0.0000	0.0000	0.0000	1.1875	1.1875	4.7500	3.3125
T7 101.48-81.27	0.0000	0.0000	0.0000	0.0000	1.4375	1.4375	4.7500	3.3125
T8 81.27-61.00	0.0000	0.0000	0.0000	0.0000	1.4375	1.4375	4.7500	4.3125
T9 61.00-40.67	0.0000	0.0000	0.0000	0.0000	1.4375	1.4375	4.7500	4.3125
T10 40.67-20.33	0.0000	0.0000	0.0000	0.0000	1.7500	1.7500	4.7500	4.3125
T11 20.33-0.00	0.0000	0.0000	0.0000	0.0000	1.7500	1.7500	4.7500	4.3125

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
				Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 212.63-202.46	Flange	0.7500	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T2 202.46-182.29	Flange	0.8750	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T3 182.29-162.10	Flange	1.0000	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T4 162.10-141.90	Flange	1.0000	6	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T5 141.90-121.69	Flange	1.0000	6	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T6 121.69-101.48	Flange	1.0000	6	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T7 101.48-81.27	Flange	1.0000	8	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T8 81.27-61.00	Flange	1.0000	8	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T9 61.00-40.67	Flange	1.0000	8	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
T10 40.67-20.33	Flange	1.0000	8	0.7500	3	0.6250	0	0.6250	0	0.6250	0	0.7500	2	0.6250	0
T11 20.33-0.00	Flange	1.0000	0	0.7500	3	0.6250	0	0.6250	0	0.6250	0	0.7500	2	0.6250	0
		A354-BC		A325N		A325N		A325X		A325X		A325N		A325X	

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job	HRT 105, CT BU#806363	Page	8 of 28
	Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
	Client	Crown Castle	Designed by	ncoomes

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF7-50A (1-5/8 FOAM) (Verizon Wireless)	C	Yes	Ar (CfAe)	133.00 - 8.00	1.0000	0.4	19	13	0.2700 1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (Verizon Wireless)	C	Yes	Ar (CfAe)	209.00 - 133.00	1.0000	0.42	9	6	0.2700	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (Verizon Wireless)	C	Yes	Ar (CfAe)	209.00 - 133.00	1.0000	0.38	9	6	0.2700 1.0000	1.9800		0.82
Feedline Ladder (Af) (Verizon Wireless) ***	C	Yes	Af (CfAe)	203.00 - 8.00	0.5000	0.4	1	1	1.5000	1.5000	12.0000	8.40
9114 (11/32)	A	Yes	Ar (CfAe)	181.00 - 8.00	1.0000	-0.3	4	2	0.0000	0.3800		0.03
LDF5-50A (7/8 FOAM)	A	Yes	Ar (CfAe)	125.00 - 8.00	1.0000	-0.35	5	5	1.1600	1.0900		0.33
LDF5-50A (7/8 FOAM)	A	Yes	Ar (CfAe)	145.00 - 125.00	1.0000	-0.35	4	4	1.1600	1.0900		0.33
LDF5-50A (7/8 FOAM)	A	Yes	Ar (CfAe)	165.00 - 145.00	1.0000	-0.35	2	2	1.1600	1.0900		0.33
CR 50 1873 (1-5/8 FOAM)	A	Yes	Ar (CfAe)	190.00 - 8.00	1.0000	-0.42	12	6	0.2700 1.0000	1.9800		0.83
LDF5-50A (7/8 FOAM)	A	Yes	Ar (CfAe)	190.00 - 8.00	1.0000	-0.45	2	2	1.0000	1.0900		0.33
LDF1-50A (1/4 FOAM)	A	Yes	Ar (CfAe)	190.00 - 8.00	1.0000	-0.47	1	1	0.3500	0.3500		0.06
Feedline Ladder (Af)	A	Yes	Af (CfAe)	190.00 - 8.00	0.5000	-0.4	1	1	3.0000	3.0000	12.0000	8.40
Feedline Ladder (Af)	A	Yes	Af (CfAe)	198.00 - 8.00	0.5000	0.4	1	1	3.0000	3.0000	12.0000	8.40
LDF7-50A (1-5/8 FOAM) ***	A	Yes	Ar (CfAe)	198.00 - 8.00	1.0000	0.4	6	6	0.5000 1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	B	Yes	Ar (CfAe)	137.00 - 8.00	1.0000	-0.4	12	6	1.0000	1.9800		0.82
Feedline Ladder (Af)	B	Yes	Af (CfAe)	137.00 - 8.00	0.5000	-0.4	1	1	3.0000	3.0000	12.0000	8.40
LDF6-50A (1-1/4 FOAM)	B	Yes	Ar (CfAe)	176.00 - 8.00	1.0000	0.4	12	12	0.7000	1.5500		0.66
Feedline Ladder (Af) **	B	Yes	Af (CfAe)	176.00 - 8.00	0.5000	0.4	1	1	3.0000	3.0000	12.0000	8.40
Feedline Ladder (Af)	C	Yes	Af (CfAe)	182.00 - 8.00	0.5000	-0.35	1	1	3.0000	3.0000	12.0000	8.40
AVA7-50 (1-5/8 LOW DENS. FOAM)	C	Yes	Ar (CfAe)	182.00 - 8.00	1.0000	-0.35	6	6	1.0000	1.9800		0.72

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 9 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight lb
T1	212.63-202.46	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	12.953	0.068	0.000	0.000	101.11
T2	202.46-182.29	A	24.808	5.854	0.000	0.000	356.31
		B	0.000	0.000	0.000	0.000	0.00
		C	39.930	2.521	0.000	0.000	467.06
T3	182.29-162.10	A	45.950	10.094	0.000	0.000	658.25
		B	21.539	3.474	0.000	0.000	226.78
		C	59.668	7.497	0.000	0.000	720.62
T4	162.10-141.90	A	49.788	10.104	0.000	0.000	672.56
		B	31.323	5.052	0.000	0.000	329.80
		C	60.019	7.578	0.000	0.000	725.07
T5	141.90-121.69	A	53.196	10.104	0.000	0.000	684.94
		B	46.482	8.880	0.000	0.000	609.10
		C	61.885	7.578	0.000	0.000	734.35
T6	121.69-101.48	A	54.731	10.104	0.000	0.000	690.52
		B	51.329	10.104	0.000	0.000	698.40
		C	63.353	7.578	0.000	0.000	741.65
T7	101.48-81.27	A	54.731	10.104	0.000	0.000	690.52
		B	51.329	10.104	0.000	0.000	698.40
		C	63.353	7.578	0.000	0.000	741.65
T8	81.27-61.00	A	54.900	10.135	0.000	0.000	692.65
		B	51.488	10.135	0.000	0.000	700.56
		C	63.549	7.602	0.000	0.000	743.94
T9	61.00-40.67	A	55.069	10.167	0.000	0.000	694.79
		B	51.647	10.167	0.000	0.000	702.72
		C	63.745	7.625	0.000	0.000	746.23
T10	40.67-20.33	A	55.069	10.167	0.000	0.000	694.79
		B	51.647	10.167	0.000	0.000	702.72
		C	63.745	7.625	0.000	0.000	746.23
T11	20.33-0.00	A	33.403	6.167	0.000	0.000	421.43
		B	31.327	6.167	0.000	0.000	426.24
		C	38.665	4.625	0.000	0.000	452.63

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight lb
T1	212.63-202.46	A	0.935	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		4.198	12.390	0.000	0.000	360.93
T2	202.46-182.29	A	0.927	10.787	33.066	0.000	0.000	967.44
		B		0.000	0.000	0.000	0.000	0.00
		C		12.884	42.410	0.000	0.000	1366.13
T3	182.29-162.10	A	0.914	25.574	58.640	0.000	0.000	1848.90
		B		3.913	33.546	0.000	0.000	681.20
		C		19.131	74.126	0.000	0.000	2105.04
T4	162.10-141.90	A	0.901	29.774	63.090	0.000	0.000	1940.43
		B		5.644	48.755	0.000	0.000	982.22
		C		19.106	74.606	0.000	0.000	2101.39
T5	141.90-121.69	A	0.886	29.465	70.056	0.000	0.000	2014.19
		B		10.380	73.068	0.000	0.000	1842.61
		C		15.415	78.780	0.000	0.000	2142.79
T6	121.69-101.48	A	0.868	29.111	73.145	0.000	0.000	2032.69

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 10 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
T7	101.48-81.27	B	0.847	11.792	80.774	0.000	0.000	2100.82
		C		12.516	82.037	0.000	0.000	2169.55
		A		28.696	73.053	0.000	0.000	2005.56
T8	81.27-61.00	B	0.822	11.653	80.682	0.000	0.000	2077.52
		C		12.378	81.945	0.000	0.000	2145.44
		A		28.276	73.166	0.000	0.000	1978.81
T9	61.00-40.67	B	0.790	11.520	80.818	0.000	0.000	2055.57
		C		12.246	82.085	0.000	0.000	2122.70
		A		27.702	73.245	0.000	0.000	1942.46
T10	40.67-20.33	B	0.750	11.335	80.921	0.000	0.000	2025.24
		C		12.064	82.191	0.000	0.000	2091.26
		A		26.891	73.064	0.000	0.000	1890.95
T11	20.33-0.00	B	0.750	11.065	80.740	0.000	0.000	1980.53
		C		11.793	82.011	0.000	0.000	2044.94
		A		16.311	44.318	0.000	0.000	1146.97
		B		6.711	48.974	0.000	0.000	1201.30
		C		7.153	49.744	0.000	0.000	1240.37

Feed Line Shielding

Section	Elevation ft	Face	A_R ft ²	A_R Ice ft ²	A_F ft ²	A_F Ice ft ²
T1	212.63-202.46	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	1.168	2.766	0.000	0.000
T2	202.46-182.29	A	2.364	6.391	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.272	7.990	0.000	0.000
T3	182.29-162.10	A	4.030	11.371	0.000	0.000
		B	1.799	5.031	0.000	0.000
		C	4.830	12.561	0.000	0.000
T4	162.10-141.90	A	4.350	12.121	0.000	0.000
		B	2.642	7.078	0.000	0.000
		C	4.910	12.229	0.000	0.000
T5	141.90-121.69	A	3.765	10.015	0.000	0.000
		B	3.293	8.406	0.000	0.000
		C	4.132	9.490	0.000	0.000
T6	121.69-101.48	A	3.622	9.597	0.000	0.000
		B	3.432	8.704	0.000	0.000
		C	3.963	8.887	0.000	0.000
T7	101.48-81.27	A	4.196	10.215	0.000	0.000
		B	3.976	9.287	0.000	0.000
		C	4.590	9.483	0.000	0.000
T8	81.27-61.00	A	4.043	9.687	0.000	0.000
		B	3.830	8.834	0.000	0.000
		C	4.423	9.021	0.000	0.000
T9	61.00-40.67	A	3.932	9.223	0.000	0.000
		B	3.725	8.443	0.000	0.000
		C	4.301	8.623	0.000	0.000
T10	40.67-20.33	A	4.323	10.309	0.000	0.000
		B	4.096	9.482	0.000	0.000
		C	4.729	9.685	0.000	0.000
T11	20.33-0.00	A	2.508	5.978	0.000	0.000
		B	2.377	5.499	0.000	0.000
		C	2.744	5.617	0.000	0.000

RISATower

Vertical Structures, Inc.
 309 Spangler Drive, Suite E
 Richmond, KY 40475
 Phone: (859) 624-8360
 FAX: (859) 624-8369

Job	HRT 105, CT BU#806363	Page	11 of 28
Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
Client	Crown Castle	Designed by	ncoomes

Feed Line Center of Pressure

Section	Elevation	CP _x	CP _z	CP _x Ice	CP _z Ice
	ft	in	in	in	in
T1	212.63-202.46	-8.6747	6.9586	-4.4795	3.5930
T2	202.46-182.29	-14.8532	3.8546	-9.2623	1.9621
T3	182.29-162.10	-5.9124	9.1145	-2.0252	6.5881
T4	162.10-141.90	-4.5970	10.9253	-0.5987	8.1203
T5	141.90-121.69	-5.4083	7.2362	-1.9542	5.6869
T6	121.69-101.48	-6.5532	6.8158	-3.1233	5.5875
T7	101.48-81.27	-7.1179	7.3800	-3.4134	6.1262
T8	81.27-61.00	-7.4972	7.7542	-3.6811	6.5766
T9	61.00-40.67	-8.2477	8.5139	-4.0752	7.2652
T10	40.67-20.33	-8.8243	9.0950	-4.2845	7.7254
T11	20.33-0.00	-7.0208	7.2287	-3.4370	6.1670

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			ft ft ft	°	ft	ft ²	ft ²	lb	
Flash Beacon Lighting	B	From Leg	0.00	0.0000	212.00	No Ice	2.70	2.70	50.00
			0.00			1/2" Ice	3.10	3.10	70.00
			3.00			1" Ice	3.50	3.50	90.00
						2" Ice	4.30	4.30	130.00
						4" Ice	5.90	5.90	210.00
Intermediate Side Lights (VSI)	A	From Leg	1.00	0.0000	111.00	No Ice	0.79	0.79	29.13
			0.00			1/2" Ice	1.04	1.04	39.42
			0.00			1" Ice	1.32	1.32	53.41
						2" Ice	1.98	1.98	89.69
						4" Ice	3.59	3.59	212.79
Intermediate Side Lights (VSI)	B	From Leg	1.00	0.0000	111.00	No Ice	0.79	0.79	29.13
			0.00			1/2" Ice	1.04	1.04	39.42
			0.00			1" Ice	1.32	1.32	53.41
						2" Ice	1.98	1.98	89.69
						4" Ice	3.59	3.59	212.79
Intermediate Side Lights (VSI)	C	From Leg	1.00	0.0000	111.00	No Ice	0.79	0.79	29.13
			0.00			1/2" Ice	1.04	1.04	39.42
			0.00			1" Ice	1.32	1.32	53.41
						2" Ice	1.98	1.98	89.69
						4" Ice	3.59	3.59	212.79
** Sector Mount [SM 510-3] (Verizon Wireless)	A	None		0.0000	208.00	No Ice	40.10	40.10	2396.40
						1/2" Ice	57.33	57.33	3089.00
						1" Ice	74.56	74.56	3781.60
						2" Ice	109.02	109.02	5166.80
						4" Ice	177.94	177.94	7937.20
(2) LPA-80080/6CF w/ mount pipe (Verizon Wireless)	A	From Face	5.00	-6.0000	208.00	No Ice	4.35	10.51	42.90
			0.00			1/2" Ice	4.79	11.56	104.60
			1.00			1" Ice	5.25	12.49	177.42

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job		HRT 105, CT BU#806363		Page	12 of 28
	Project		Vertical Structures Job No. 2011-004-083		Date	13:44:11 10/26/11
	Client		Crown Castle		Designed by	ncoomes

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
(2) LPA-80080/6CF w/ mount pipe (Verizon Wireless)	B	From Face	5.00	-6.0000	208.00	2" Ice	6.17	14.40	348.65
						4" Ice	8.11	18.43	824.28
						No Ice	4.35	10.51	42.90
						1/2" Ice	4.79	11.56	104.60
						1" Ice	5.25	12.49	177.42
						2" Ice	6.17	14.40	348.65
(2) LPA-80080/6CF w/ mount pipe (Verizon Wireless)	C	From Face	5.00	-6.0000	208.00	4" Ice	8.11	18.43	824.28
						No Ice	4.35	10.51	42.90
						1/2" Ice	4.79	11.56	104.60
						1" Ice	5.25	12.49	177.42
						2" Ice	6.17	14.40	348.65
						4" Ice	8.11	18.43	824.28
BXA-70063/4CF w/ Mount Pipe (Verizon Wireless)	A	From Face	5.00	-6.0000	208.00	No Ice	5.65	3.87	31.80
						1/2" Ice	6.20	4.67	74.05
						1" Ice	6.72	5.34	125.75
						2" Ice	7.80	6.79	249.67
						4" Ice	10.08	10.00	610.49
						No Ice	5.85	5.88	39.90
BXA-70080/6CF w/Mount Pipe (Verizon Wireless)	B	From Face	5.00	-6.0000	208.00	1/2" Ice	6.31	6.82	89.44
						1" Ice	6.78	7.64	149.80
						2" Ice	7.76	9.32	295.19
						4" Ice	10.04	12.90	715.52
						No Ice	5.65	3.87	31.80
						1/2" Ice	6.20	4.67	74.05
BXA-70063/4CF w/ Mount Pipe (Verizon Wireless)	C	From Face	5.00	-6.0000	208.00	1" Ice	6.72	5.34	125.75
						2" Ice	7.80	6.79	249.67
						4" Ice	10.08	10.00	610.49
						No Ice	2.50	4.42	26.75
						1/2" Ice	2.86	5.09	58.67
						1" Ice	3.24	5.76	98.96
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	A	From Face	5.00	-6.0000	208.00	2" Ice	4.01	7.17	198.35
						4" Ice	5.87	10.25	499.64
						No Ice	2.50	4.42	26.75
						1/2" Ice	2.86	5.09	58.67
						1" Ice	3.24	5.76	98.96
						2" Ice	4.01	7.17	198.35
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	B	From Face	5.00	-6.0000	208.00	4" Ice	5.87	10.25	499.64
						No Ice	2.50	4.42	26.75
						1/2" Ice	2.86	5.09	58.67
						1" Ice	3.24	5.76	98.96
						2" Ice	4.01	7.17	198.35
						4" Ice	5.87	10.25	499.64
(2) LPA-171080/8CFx2 w/ Mount Pipe (Verizon Wireless)	C	From Face	5.00	-6.0000	208.00	No Ice	2.50	4.42	26.75
						1/2" Ice	2.86	5.09	58.67
						1" Ice	3.24	5.76	98.96
						2" Ice	4.01	7.17	198.35
						4" Ice	5.87	10.25	499.64
						No Ice	34.86	34.86	1725.30
** Sector Mount [SM 505-3]	A	None		0.0000	197.00	1/2" Ice	49.79	49.79	2316.90
(2) DB980H90E-M w/Mount Pipe	A	From Leg	4.25	-30.0000	197.00	1" Ice	64.72	64.72	2908.50
						2" Ice	94.58	94.58	4091.70
						4" Ice	154.30	154.30	6458.10
						No Ice	4.27	3.86	34.05
						1/2" Ice	4.86	4.95	69.84
						1" Ice	5.37	5.75	116.19
(2) DB980H90E-M w/Mount Pipe	B	From Leg	4.25	-30.0000	197.00	2" Ice	6.42	7.39	231.29
						4" Ice	8.86	10.87	585.45
						No Ice	4.27	3.86	34.05
						1/2" Ice	4.86	4.95	69.84
						1" Ice	5.37	5.75	116.19
						2" Ice	6.42	7.39	231.29

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job		HRT 105, CT BU#806363		Page		13 of 28	
	Project		Vertical Structures Job No. 2011-004-083		Date		13:44:11 10/26/11	
	Client		Crown Castle		Designed by		ncomes	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft ²	ft ²	lb
(2) DB980H90E-M w/Mount Pipe	C	From Leg	4.25	-30.0000	197.00	4" Ice	8.86	10.87	585.45
			-2.50			No Ice	4.27	3.86	34.05
			1.00			1/2" Ice	4.86	4.95	69.84
						1" Ice	5.37	5.75	116.19
						2" Ice	6.42	7.39	231.29
(3) 6' Empty Mount Pipe	A	From Leg	4.25	0.0000	197.00	4" Ice	8.86	10.87	585.45
			-2.50			No Ice	1.43	1.43	22.90
			0.00			1/2" Ice	1.95	1.95	36.54
						1" Ice	2.34	2.34	55.61
						2" Ice	3.20	3.20	102.08
(3) 6' Empty Mount Pipe	B	From Leg	4.25	0.0000	197.00	4" Ice	5.15	5.15	258.02
			-2.50			No Ice	1.43	1.43	22.90
			0.00			1/2" Ice	1.95	1.95	36.54
						1" Ice	2.34	2.34	55.61
						2" Ice	3.20	3.20	102.08
(3) 6' Empty Mount Pipe	C	From Leg	4.25	0.0000	197.00	4" Ice	5.15	5.15	258.02
			-2.50			No Ice	1.43	1.43	22.90
			0.00			1/2" Ice	1.95	1.95	36.54
						1" Ice	2.34	2.34	55.61
						2" Ice	3.20	3.20	102.08
**					4" Ice	5.15	5.15	258.02	
14' Angle Sector Frame (3)	A	None		0.0000	190.00	No Ice	24.75	24.75	750.00
						1/2" Ice	33.19	33.19	1125.00
						1" Ice	41.63	41.63	1500.00
						2" Ice	58.50	58.50	2250.00
						4" Ice	92.25	92.25	3750.00
(2) 7770.00 w/ mount pipe	A	From Face	5.00	-7.0000	190.00	No Ice	6.22	4.35	56.90
			0.00			1/2" Ice	6.77	5.20	102.99
			0.00			1" Ice	7.30	5.92	159.01
						2" Ice	8.38	7.41	293.01
						4" Ice	10.69	10.76	679.74
(2) 7770.00 w/ mount pipe	B	From Face	5.00	-9.0000	190.00	No Ice	6.22	4.35	56.90
			0.00			1/2" Ice	6.77	5.20	102.99
			0.00			1" Ice	7.30	5.92	159.01
						2" Ice	8.38	7.41	293.01
						4" Ice	10.69	10.76	679.74
(2) 7770.00 w/ mount pipe	C	From Face	5.00	-8.0000	190.00	No Ice	6.22	4.35	56.90
			0.00			1/2" Ice	6.77	5.20	102.99
			0.00			1" Ice	7.30	5.92	159.01
						2" Ice	8.38	7.41	293.01
						4" Ice	10.69	10.76	679.74
(2) LGP13519 Diplexer	A	From Face	5.00	-7.0000	190.00	No Ice	0.27	0.18	5.50
			0.00			1/2" Ice	0.34	0.25	7.92
			0.00			1" Ice	0.43	0.32	11.41
						2" Ice	0.62	0.49	22.43
						4" Ice	1.10	0.94	66.02
(2) LGP13519 Diplexer	B	From Face	5.00	-9.0000	190.00	No Ice	0.27	0.18	5.50
			0.00			1/2" Ice	0.34	0.25	7.92
			0.00			1" Ice	0.43	0.32	11.41
						2" Ice	0.62	0.49	22.43
						4" Ice	1.10	0.94	66.02
(2) LGP13519 Diplexer	C	From Face	5.00	-8.0000	190.00	No Ice	0.27	0.18	5.50
			0.00			1/2" Ice	0.34	0.25	7.92
			0.00			1" Ice	0.43	0.32	11.41
						2" Ice	0.62	0.49	22.43
						4" Ice	1.10	0.94	66.02

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job		HRT 105, CT BU#806363		Page		14 of 28	
	Project		Vertical Structures Job No. 2011-004-083		Date		13:44:11 10/26/11	
	Client		Crown Castle		Designed by		ncoomes	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	lb
(2) Cleargain Dual Band 800/1900 TMA (VSI)	A	From Face	5.00	-7.0000	190.00	No Ice	1.54	0.80	22.50
			0.00			1/2" Ice	1.71	0.94	33.51
			0.00			1" Ice	1.89	1.08	46.74
						2" Ice	2.27	1.39	80.63
						4" Ice	3.14	2.11	183.58
(2) Cleargain Dual Band 800/1900 TMA (VSI)	B	From Face	5.00	-9.0000	190.00	No Ice	1.54	0.80	22.50
			0.00			1/2" Ice	1.71	0.94	33.51
			0.00			1" Ice	1.89	1.08	46.74
						2" Ice	2.27	1.39	80.63
						4" Ice	3.14	2.11	183.58
(2) Cleargain Dual Band 800/1900 TMA (VSI)	C	From Face	5.00	-8.0000	190.00	No Ice	1.54	0.80	22.50
			0.00			1/2" Ice	1.71	0.94	33.51
			0.00			1" Ice	1.89	1.08	46.74
						2" Ice	2.27	1.39	80.63
						4" Ice	3.14	2.11	183.58
AM-X-CD-14-65-00T-RET w/ Mount Pipe	A	From Face	5.00	-7.0000	190.00	No Ice	5.74	4.02	34.75
			0.00			1/2" Ice	6.20	4.63	77.95
			0.00			1" Ice	6.66	5.28	129.96
						2" Ice	7.62	6.68	254.09
						4" Ice	9.67	9.74	610.07
AM-X-CD-14-65-00T-RET w/ Mount Pipe	B	From Face	5.00	-9.0000	190.00	No Ice	5.74	4.02	34.75
			0.00			1/2" Ice	6.20	4.63	77.95
			0.00			1" Ice	6.66	5.28	129.96
						2" Ice	7.62	6.68	254.09
						4" Ice	9.67	9.74	610.07
AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Face	5.00	-8.0000	190.00	No Ice	5.74	4.02	34.75
			0.00			1/2" Ice	6.20	4.63	77.95
			0.00			1" Ice	6.66	5.28	129.96
						2" Ice	7.62	6.68	254.09
						4" Ice	9.67	9.74	610.07
(2) RRUS-11 BTS	A	From Face	5.00	-7.0000	190.00	No Ice	4.42	1.19	55.00
			0.00			1/2" Ice	4.71	1.35	80.77
			0.00			1" Ice	5.00	1.53	109.98
						2" Ice	5.61	1.90	179.45
						4" Ice	6.94	2.75	368.09
(2) RRUS-11 BTS	B	From Face	5.00	-9.0000	190.00	No Ice	4.42	1.19	55.00
			0.00			1/2" Ice	4.71	1.35	80.77
			0.00			1" Ice	5.00	1.53	109.98
						2" Ice	5.61	1.90	179.45
						4" Ice	6.94	2.75	368.09
(2) RRUS-11 BTS	C	From Face	5.00	-8.0000	190.00	No Ice	4.42	1.19	55.00
			0.00			1/2" Ice	4.71	1.35	80.77
			0.00			1" Ice	5.00	1.53	109.98
						2" Ice	5.61	1.90	179.45
						4" Ice	6.94	2.75	368.09
DC6-48-60-18-8F	A	From Face	5.00	-7.0000	190.00	No Ice	2.57	4.32	18.90
			0.00			1/2" Ice	2.80	4.60	50.21
			0.00			1" Ice	3.04	4.88	85.17
						2" Ice	3.54	5.49	166.87
						4" Ice	4.66	6.80	382.77
**									
742 213 w/ Mount Pipe	A	From Leg	1.00	54.0000	182.00	No Ice	5.28	4.53	47.55
			0.00			1/2" Ice	5.82	5.87	88.36
			0.00			1" Ice	6.34	6.77	140.80
						2" Ice	7.40	8.60	271.26
						4" Ice	9.63	12.45	668.89
742 213 w/ Mount Pipe	B	From Leg	1.00	54.0000	182.00	No Ice	5.28	4.53	47.55

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 15 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			0.00			1/2" Ice	5.82	5.87	88.36
			0.00			1" Ice	6.34	6.77	140.80
						2" Ice	7.40	8.60	271.26
						4" Ice	9.63	12.45	668.89
742 213 w/ Mount Pipe	C	From Leg	1.00	54.0000	182.00	No Ice	5.28	4.53	47.55
			0.00			1/2" Ice	5.82	5.87	88.36
			0.00			1" Ice	6.34	6.77	140.80
						2" Ice	7.40	8.60	271.26
						4" Ice	9.63	12.45	668.89
**									
Sector Mount [SM 510-3]	A	None		0.0000	175.00	No Ice	40.10	40.10	2396.40
						1/2" Ice	57.33	57.33	3089.00
						1" Ice	74.56	74.56	3781.60
						2" Ice	109.02	109.02	5166.80
						4" Ice	177.94	177.94	7937.20
(4) DB844H90E-XY w/Mount Pipe	A	From Face	5.00	-6.0000	175.00	No Ice	3.58	5.40	35.55
			0.00			1/2" Ice	4.20	6.49	76.59
			1.00			1" Ice	4.73	7.30	127.74
						2" Ice	5.86	8.96	251.11
						4" Ice	8.27	12.49	616.43
(4) DB844H90E-XY w/Mount Pipe	B	From Face	5.00	-6.0000	175.00	No Ice	3.58	5.40	35.55
			0.00			1/2" Ice	4.20	6.49	76.59
			1.00			1" Ice	4.73	7.30	127.74
						2" Ice	5.86	8.96	251.11
						4" Ice	8.27	12.49	616.43
(4) DB844H90E-XY w/Mount Pipe	C	From Face	5.00	-6.0000	175.00	No Ice	3.58	5.40	35.55
			0.00			1/2" Ice	4.20	6.49	76.59
			1.00			1" Ice	4.73	7.30	127.74
						2" Ice	5.86	8.96	251.11
						4" Ice	8.27	12.49	616.43
**									
Side Arm Mount [SO 308-1]	B	From Leg	3.00	0.0000	165.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
						2" Ice	3.86	11.79	156.01
						4" Ice	6.74	20.55	259.02
Side Arm Mount [SO 308-1]	A	Stand-Off Right	3.00	0.0000	165.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
						2" Ice	3.86	11.79	156.01
						4" Ice	6.74	20.55	259.02
1151-3	B	From Leg	6.00	0.0000	165.00	No Ice	4.18	4.18	16.00
			0.00			1/2" Ice	5.73	5.73	46.53
			8.00			1" Ice	7.30	7.30	86.79
						2" Ice	10.48	10.48	197.06
						4" Ice	14.75	14.75	540.93
1151-3	A	Stand-Off Right	6.00	0.0000	165.00	No Ice	4.18	4.18	16.00
			0.00			1/2" Ice	5.73	5.73	46.53
			8.00			1" Ice	7.30	7.30	86.79
						2" Ice	10.48	10.48	197.06
						4" Ice	14.75	14.75	540.93
**									
Side Arm Mount [SO 308-1]	A	Stand-Off Right	3.00	0.0000	145.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
						2" Ice	3.86	11.79	156.01
						4" Ice	6.74	20.55	259.02

RISATower

Vertical Structures, Inc.
 309 Spangler Drive, Suite E
 Richmond, KY 40475
 Phone: (859) 624-8360
 FAX: (859) 624-8369

Job	HRT 105, CT BU#806363	Page	16 of 28
Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
Client	Crown Castle	Designed by	ncoomes

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	lb
Side Arm Mount [SO 308-1]	C	Stand-Off Left	3.00	0.00	0.0000	145.00	No Ice 0.98	3.03	53.00
			0.00	0.00			1/2" Ice 1.70	5.22	78.75
			0.00	0.00			1" Ice 2.42	7.41	104.50
							2" Ice 3.86	11.79	156.01
							4" Ice 6.74	20.55	259.02
1151-3	A	Stand-Off Right	6.00	0.00	0.0000	145.00	No Ice 4.18	4.18	16.00
			0.00	0.00			1/2" Ice 5.73	5.73	46.53
			8.00	0.00			1" Ice 7.30	7.30	86.79
							2" Ice 10.48	10.48	197.06
							4" Ice 14.75	14.75	540.93
SD310-HL	C	Stand-Off Left	6.00	0.00	0.0000	145.00	No Ice 1.50	1.50	15.00
			0.00	0.00			1/2" Ice 2.70	2.70	19.50
			3.00	0.00			1" Ice 3.90	3.90	24.00
							2" Ice 6.30	6.30	33.00
							4" Ice 11.10	11.10	51.00
**									
Side Arm Mount [SO 201-3]	A	None			0.0000	137.00	No Ice 5.71	5.71	288.00
							1/2" Ice 7.91	7.91	351.14
							1" Ice 10.11	10.11	414.28
							2" Ice 14.51	14.51	540.56
							4" Ice 23.31	23.31	793.12
RR90-17-02DP w/Mount Pipe	A	From Leg	2.00	0.00	30.0000	137.00	No Ice 4.91	3.64	43.55
			0.00	0.00			1/2" Ice 5.57	4.70	81.64
			0.00	0.00			1" Ice 6.14	5.48	130.14
							2" Ice 7.32	7.08	249.13
							4" Ice 9.81	10.47	609.39
RR90-17-02DP w/Mount Pipe	B	From Leg	2.00	0.00	19.0000	137.00	No Ice 4.91	3.64	43.55
			0.00	0.00			1/2" Ice 5.57	4.70	81.64
			0.00	0.00			1" Ice 6.14	5.48	130.14
							2" Ice 7.32	7.08	249.13
							4" Ice 9.81	10.47	609.39
RR90-17-02DP w/Mount Pipe	C	From Leg	2.00	0.00	24.0000	137.00	No Ice 4.91	3.64	43.55
			0.00	0.00			1/2" Ice 5.57	4.70	81.64
			0.00	0.00			1" Ice 6.14	5.48	130.14
							2" Ice 7.32	7.08	249.13
							4" Ice 9.81	10.47	609.39
APX16DWV-16DWV-S-E-A20	A	From Leg	2.00	0.00	84.0000	137.00	No Ice 7.23	2.15	40.70
			0.00	0.00			1/2" Ice 7.68	2.49	74.24
			0.00	0.00			1" Ice 8.14	2.84	112.65
							2" Ice 9.09	3.55	204.92
							4" Ice 11.09	5.08	456.62
APX16DWV-16DWV-S-E-A20	B	From Leg	2.00	0.00	90.0000	137.00	No Ice 7.23	2.15	40.70
			0.00	0.00			1/2" Ice 7.68	2.49	74.24
			0.00	0.00			1" Ice 8.14	2.84	112.65
							2" Ice 9.09	3.55	204.92
							4" Ice 11.09	5.08	456.62
APX16DWV-16DWV-S-E-A20	C	From Leg	2.00	0.00	54.0000	137.00	No Ice 7.23	2.15	40.70
			0.00	0.00			1/2" Ice 7.68	2.49	74.24
			0.00	0.00			1" Ice 8.14	2.84	112.65
							2" Ice 9.09	3.55	204.92
							4" Ice 11.09	5.08	456.62
ATMPP1412D-1CWA TMA	A	From Leg	2.00	0.00	30.0000	137.00	No Ice 1.17	0.42	12.50
			0.00	0.00			1/2" Ice 1.32	0.53	19.51
			0.00	0.00			1" Ice 1.48	0.65	28.38
							2" Ice 1.82	0.92	52.45
							4" Ice 2.61	1.57	131.40
ATMPP1412D-1CWA TMA	B	From Leg	2.00	0.00	19.0000	137.00	No Ice 1.17	0.42	12.50

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 17 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			ft ft ft	°	ft	ft ²	ft ²	lb
			0.00		1/2" Ice	1.32	0.53	19.51
			0.00		1" Ice	1.48	0.65	28.38
					2" Ice	1.82	0.92	52.45
					4" Ice	2.61	1.57	131.40
ATMPPI1412D-1CWA TMA	C	From Leg	2.00	24.0000	137.00	No Ice	1.17	12.50
			0.00			1/2" Ice	1.32	19.51
			0.00			1" Ice	1.48	28.38
						2" Ice	1.82	52.45
						4" Ice	2.61	131.40
ATMAA1412D-1A20 TMA	A	From Leg	2.00	84.0000	137.00	No Ice	1.17	13.00
			0.00			1/2" Ice	1.31	20.62
			0.00			1" Ice	1.47	30.11
						2" Ice	1.81	55.52
						4" Ice	2.58	137.44
ATMAA1412D-1A20 TMA	B	From Leg	2.00	90.0000	137.00	No Ice	1.17	13.00
			0.00			1/2" Ice	1.31	20.62
			0.00			1" Ice	1.47	30.11
						2" Ice	1.81	55.52
						4" Ice	2.58	137.44
ATMAA1412D-1A20 TMA	C	From Leg	2.00	54.0000	137.00	No Ice	1.17	13.00
			0.00			1/2" Ice	1.31	20.62
			0.00			1" Ice	1.47	30.11
						2" Ice	1.81	55.52
						4" Ice	2.58	137.44
**								
5'3"x4" Pipe Mount	B	From Leg	0.50	0.0000	133.00	No Ice	1.88	57.00
			0.00			1/2" Ice	2.21	73.81
			0.00			1" Ice	2.54	94.43
						2" Ice	3.24	147.74
						4" Ice	4.93	306.89
**								
Side Arm Mount [SO 308-1]	A	Stand-Off Right	3.00	0.0000	125.00	No Ice	0.98	53.00
			0.00			1/2" Ice	1.70	78.75
			0.00			1" Ice	2.42	104.50
						2" Ice	3.86	156.01
						4" Ice	6.74	259.02
1142-2C	A	Stand-Off Right	6.00	0.0000	125.00	No Ice	2.09	24.00
			0.00			1/2" Ice	3.37	40.81
			8.00			1" Ice	4.67	65.63
						2" Ice	7.32	139.94
						4" Ice	10.79	391.52
**								

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				ft ft ft	°	°	ft	ft	ft ²	lb
PL6-59W	B	Paraboloid	From	1.00	-90.0000		133.00	6.00	No Ice 28.27	143.00

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 18 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncomes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horiz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				ft	°	°	ft	ft	ft ²	lb
		w/Radome	Leg	0.00					1/2" Ice 29.05	292.13
				0.00					1" Ice 29.83	441.25
									2" Ice 31.39	739.50
									4" Ice 34.51	1336.01
HP2-4.7HS	C	Paraboloid w/Shroud (HP)	From Leg	1.00	-90.0000		181.00	2.00	No Ice 3.14	27.00
				0.00					1/2" Ice 3.41	44.49
				0.00					1" Ice 3.67	61.98
									2" Ice 4.21	96.96
									4" Ice 5.28	166.92
HP2-4.7HS	A	Paraboloid w/Shroud (HP)	From Leg	1.00	-47.0000		181.00	2.00	No Ice 3.14	27.00
				0.00					1/2" Ice 3.41	44.49
				0.00					1" Ice 3.67	61.98
									2" Ice 4.21	96.96
									4" Ice 5.28	166.92

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T1	212.625	Leg	A325N	0.7500	4	766.45	19386.40	0.040 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	961.88	6442.72	0.149 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	1087.50	6442.72	0.169 ✓	1.333	Bolt Shear
T2	202.458	Leg	A325N	0.8750	4	7013.06	26198.00	0.268 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	3058.88	6442.72	0.475 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	2565.94	6442.72	0.398 ✓	1.333	Bolt Shear
T3	182.292	Leg	A325N	1.0000	4	15552.70	34289.60	0.454 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	3246.24	6442.72	0.504 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	3123.33	6442.72	0.485 ✓	1.333	Bolt Shear
T4	162.104	Leg	A325N	1.0000	6	15937.70	34415.20	0.463 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	3336.01	6442.72	0.518 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	3456.73	6442.72	0.537 ✓	1.333	Bolt Shear
T5	141.896	Leg	A325N	1.0000	6	21056.40	34372.00	0.613 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	4254.09	6442.72	0.660 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	3896.72	6442.72	0.605 ✓	1.333	Bolt Shear
T6	121.688	Leg	A325N	1.0000	6	25536.60	34373.10	0.743 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	3919.40	6442.72	0.608 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	3892.39	6442.72	0.604 ✓	1.333	Bolt Shear
T7	101.479	Leg	A325N	1.0000	8	22239.70	34436.90	0.646 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	3939.92	6442.72	0.612 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	4143.01	6442.72	0.643 ✓	1.333	Bolt Shear
T8	81.2708	Leg	A325N	1.0000	8	25066.10	34429.50	0.728 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	3912.20	6442.72	0.607 ✓	1.333	Bolt Shear

RISA Tower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 19 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncomes

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T9	61	Horizontal	A325N	0.6250	2	4373.55	6442.72	0.679 ✓	1.333	Bolt Shear
		Leg	A325N	1.0000	8	27907.00	34400.70	0.811 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	4221.62	6442.72	0.655 ✓	1.333	Bolt Shear
T10	40.6667	Horizontal	A325N	0.6250	2	4948.14	6442.72	0.768 ✓	1.333	Bolt Shear
		Leg	A325N	1.0000	8	30409.30	34399.60	0.884 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	3	5829.38	9277.52	0.628 ✓	1.333	Bolt Shear
T11	20.3333	Horizontal	A325N	0.7500	2	4925.47	9277.52	0.531 ✓	1.333	Bolt Shear
		Diagonal	A325N	0.7500	3	6567.75	9277.52	0.708 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.7500	2	5860.32	9277.52	0.632 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	212.625 - 202.458	ROHN 2.5 STD	10.17	4.79	60.7 K=1.00	22.599	1.7040	-5493.53	38510.00	0.143
T2	202.458 - 182.292	ROHN 3 EH	20.17	6.53	68.9 K=1.00	21.134	3.0159	-34615.90	63739.10	0.543
T3	182.292 - 162.104	ROHN 4 EH	20.22	6.54	53.1 K=1.00	23.854	4.4074	-73261.90	105133.00	0.697
T4	162.104 - 141.896	ROHN 5 EH	20.24	6.54	42.7 K=1.00	25.452	6.1120	-109691.00	155560.00	0.705
T5	141.896 - 121.688	ROHN 6 EHS	20.25	9.81	52.9 K=1.00	23.891	6.7133	-144606.00	160385.00	0.902
T6	121.688 - 101.479	ROHN 6 EH	20.26	9.82	53.7 K=1.00	23.769	8.4049	-175788.00	199773.00	0.880
T7	101.479 - 81.2708	ROHN 6 EH	20.26	9.82	53.7 K=1.00	23.769	8.4049	-205190.00	199773.00	1.027
T8	81.2708 - 61	ROHN 8 EHS	20.33	9.82	40.4 K=1.00	25.782	9.7193	-232881.00	250585.00	0.929
T9	61 - 40.6667	ROHN 8 EHS	20.38	9.82	40.3 K=1.00	25.784	9.7193	-260814.00	250601.00	1.041
T10	40.6667 - 20.3333	ROHN 8 EH	20.39	9.82	40.9 K=1.00	25.699	12.7627	-286475.00	327992.00	0.873
T11	20.3333 - 0	ROHN 8 EH	20.37	9.81	40.9 K=1.00	25.704	12.7627	-314302.00	328057.00	0.958

Job	HRT 105, CT BU#806363	Page	20 of 28
Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
Client	Crown Castle	Designed by	ncomes

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	212.625 - 202.458	ROHN 2 STD	5.93	5.93	90.5 K=1.00	16.837	1.0745	-2885.64	18092.40	0.159
T2	202.458 - 182.292	ROHN 2 STD	7.30	7.30	111.3 K=1.00	12.045	1.0745	-9176.65	12942.70	0.709
T3	182.292 - 162.104	ROHN 2 STD	7.91	7.91	120.5 K=1.00	10.280	1.0745	-9738.71	11046.50	0.882
T4	162.104 - 141.896	ROHN 2 STD	8.55	8.55	130.4 K=1.00	8.783	1.0745	-9801.86	9437.83	1.039
T5	141.896 - 121.688	ROHN 2.5 STD	11.73	11.73	148.5 K=1.00	6.769	1.7040	-12762.30	11535.40	1.106
T6	121.688 - 101.479	ROHN 2.5 STD	12.53	12.53	158.7 K=1.00	5.932	1.7040	-11663.50	10107.60	1.154
T7	101.479 - 81.2708	ROHN 3 STD	13.37	13.37	137.9 K=1.00	7.858	2.2285	-11652.20	17511.20	0.665
T8	81.2708 - 61	ROHN 3 STD	14.28	14.28	147.3 K=1.00	6.887	2.2285	-11736.60	15347.80	0.765
T9	61 - 40.6667	ROHN 3 STD	15.25	15.25	157.3 K=1.00	6.038	2.2285	-12664.90	13454.70	0.941
T10	40.6667 - 20.3333	ROHN 3 STD	23.30	11.65	120.1 K=1.00	10.349	2.2285	-17488.10	23061.80	0.758
T11	20.3333 - 0	ROHN 3 STD	23.95	11.97	123.5 K=1.00	9.795	2.2285	-19703.30	21827.00	0.903

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	212.625 - 202.458	ROHN 1.5 STD	8.52	4.14	79.8 K=1.00	19.049	0.7995	-2139.74	15229.20	0.141
T2	202.458 - 182.292	ROHN 1.5 STD	8.60	4.15	80.0 K=1.00	19.003	0.7995	-5103.79	15192.40	0.336
T3	182.292 - 162.104	ROHN 1.5 STD	10.02	4.82	93.0 K=1.00	16.288	0.7995	-6246.67	13021.80	0.480
T4	162.104 - 141.896	ROHN 2 STD	12.11	5.82	88.8 K=1.00	17.203	1.0745	-6913.46	18485.40	0.374
T5	141.896 - 121.688	ROHN 2 STD	13.94	6.69	102.1 K=1.00	14.228	1.0745	-7793.44	15288.30	0.510
T6	121.688 - 101.479	ROHN 2 STD	16.32	7.88	120.2 K=1.00	10.340	1.0745	-7784.79	11110.90	0.701
T7	101.479 - 81.2708	ROHN 2.5 STD	18.82	9.13	115.7 K=1.00	11.160	1.7040	-8286.03	19017.70	0.436
T8	81.2708 - 61	ROHN 2.5 STD	21.38	10.33	130.9 K=1.00	8.720	1.7040	-8736.09	14859.30	0.588
T9	61 - 40.6667	ROHN 2.5 STD	23.95	11.62	147.1 K=1.00	6.897	1.7040	-9779.61	11753.50	0.832
T10	40.6667 -	ROHN 3 STD	25.25	12.27	126.5	9.330	2.2285	-9850.95	20791.70	0.474

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job	HRT 105, CT BU#806363	Page	21 of 28
	Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
	Client	Crown Castle	Designed by	ncoomes

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T11	20.3333 - 0	ROHN 3 STD	27.90	13.59	K=1.00 140.1	7.603	2.2285	-11720.60	16943.90	0.692 ✓ ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T1	212.625 - 202.458	ROHN 1.5 STD	8.50	4.13	K=1.00 79.6	19.087	0.7995	-208.10	15259.40	0.014 ✓

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T10	40.6667 - 20.3333	ROHN 1.5 STD	6.31	5.95	K=1.00 114.8	11.022	0.7995	-4972.44	8811.44	0.564 ✓
T11	20.3333 - 0	ROHN 1.5 STD	6.97	6.61	K=1.00 127.5	9.187	0.7995	-5451.89	7344.62	0.742 ✓

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T10	40.6667 - 20.3333	ROHN 2 STD	11.32	10.61	K=1.00 161.7	5.711	1.0745	-4458.96	6136.30	0.727 ✓
T11	20.3333 - 0	ROHN 2 STD	11.72	11.07	K=1.00 168.8	5.241	1.0745	-4582.87	5632.07	0.814 ✓

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T10	40.6667 - 20.3333	ROHN 1.5 STD	6.31	6.31	K=1.00 121.7	10.040	0.7995	-49.43	8026.53	0.006 ✓
T11	20.3333 - 0	ROHN 1.5 STD	6.97	6.97	K=1.00 134.4	8.265	0.7995	-50.09	6607.20	0.008 ✓

RISATower

Vertical Structures, Inc.
309 Spangler Drive, Suite E
Richmond, KY 40475
Phone: (859) 624-8360
FAX: (859) 624-8369

Job	HRT 105, CT BU#806363	Page	22 of 28
Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
Client	Crown Castle	Designed by	ncoomes

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
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Redundant Hip Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T10	40.6667 - 20.3333	ROHN 2.5 STD	14.97	14.97	189.6 K=1.00	4.154	1.7040	-48.15	7078.91	0.007*
T11	20.3333 - 0	ROHN 2.5 STD	15.80	15.80	200.1 K=1.00	3.729	1.7040	-47.53	6355.22	0.007*

* DL controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T1	212.625 - 202.458	L2x2x1/8	4.26	4.26	128.6 K=1.00	9.027	0.4844	-4.37	4372.66	0.001
T2	202.458 - 182.292	L2x2x1/8	4.30	4.30	129.8 K=1.00	8.869	0.4844	-7.37	4295.70	0.002
T3	182.292 - 162.104	L2x2x1/8	5.01	5.01	151.3 K=1.00	6.524	0.4844	-6.88	3160.25	0.002
T4	162.104 - 141.896	L2x2x1/8	6.05	6.05	182.7 K=1.00	4.472	0.4844	-7.63	2165.98	0.004
T5	141.896 - 121.688	L2x2x1/8	6.97	6.97	210.4 K=1.00	3.374	0.4844	-8.08	1634.11	0.005
T6	121.688 - 101.479	L2 1/2x2 1/2x3/16	8.16	8.16	197.8 K=1.00	3.817	0.9020	-7.48	3443.19	0.002
T7	101.479 - 81.2708	L3x3x3/16	9.41	9.41	189.4 K=1.00	4.161	1.0900	-7.46	4535.72	0.002*
T8	81.2708 - 61	L3 1/2x3 1/2x1/4	10.69	10.69	184.9 K=1.00	4.370	1.6900	-9.12	7384.85	0.001*
T9	61 - 40.6667	L3 1/2x3 1/2x1/4	11.98	11.98	207.1 K=1.00	3.482	1.6900	-9.27	5884.99	0.002*
T10	40.6667 - 20.3333	ROHN 3 STD	12.63	12.63	130.2 K=1.00	8.807	2.2285	-11.62	19625.00	0.001*
T11	20.3333 - 0	ROHN 3 STD	13.95	13.95	143.9 K=1.00	7.217	2.2285	-14.87	16082.00	0.001

* DL controls

Tension Checks

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 23 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	212.625 - 202.458	ROHN 2.5 STD	10.17	4.79	60.7	30.000	1.7040	3065.79	51121.50	0.060 ✓
T2	202.458 - 182.292	ROHN 3 EH	20.17	6.53	68.9	30.000	3.0159	28052.20	90477.90	0.310 ✓
T3	182.292 - 162.104	ROHN 4 EH	20.22	6.54	53.1	30.000	4.4074	62211.00	132223.00	0.470 ✓
T4	162.104 - 141.896	ROHN 5 EH	20.24	6.54	42.7	30.000	6.1120	95626.10	183359.00	0.522 ✓
T5	141.896 - 121.688	ROHN 6 EHS	20.25	9.81	52.9	30.000	6.7133	126338.00	201398.00	0.627 ✓
T6	121.688 - 101.479	ROHN 6 EH	20.26	9.82	53.7	30.000	8.4049	153219.00	252148.00	0.608 ✓
T7	101.479 - 81.2708	ROHN 6 EH	20.26	9.82	53.7	30.000	8.4049	177918.00	252148.00	0.706 ✓
T8	81.2708 - 61	ROHN 8 EHS	20.33	9.82	40.4	30.000	9.7193	200529.00	291579.00	0.688 ✓
T9	61 - 40.6667	ROHN 8 EHS	20.38	9.82	40.3	30.000	9.7193	223256.00	291579.00	0.766 ✓
T10	40.6667 - 20.3333	ROHN 8 EH	20.39	9.82	40.9	30.000	12.7627	243275.00	382882.00	0.635 ✓
T11	20.3333 - 0	ROHN 8 EH	20.37	9.81	40.9	30.000	12.7627	265936.00	382882.00	0.695 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	212.625 - 202.458	ROHN 2 STD	5.93	5.93	90.5	30.000	1.0745	2828.40	32235.90	0.088 ✓
T2	202.458 - 182.292	ROHN 2 STD	7.30	7.30	111.3	30.000	1.0745	9125.28	32235.90	0.283 ✓
T3	182.292 - 162.104	ROHN 2 STD	7.91	7.91	120.5	30.000	1.0745	9673.10	32235.90	0.300 ✓
T4	162.104 - 141.896	ROHN 2 STD	8.09	8.09	123.3	30.000	1.0745	9931.22	32235.90	0.308 ✓
T5	141.896 - 121.688	ROHN 2.5 STD	11.73	11.73	148.5	30.000	1.7040	12619.90	51121.50	0.247 ✓
T6	121.688 - 101.479	ROHN 2.5 STD	12.13	12.13	153.6	30.000	1.7040	11589.70	51121.50	0.227 ✓
T7	101.479 - 81.2708	ROHN 3 STD	12.94	12.94	133.4	30.000	2.2285	11541.20	66854.10	0.173 ✓
T8	81.2708 - 61	ROHN 3 STD	14.28	14.28	147.3	30.000	2.2285	11347.60	66854.10	0.170 ✓
T9	61 - 40.6667	ROHN 3 STD	15.25	15.25	157.3	30.000	2.2285	12207.10	66854.10	0.183 ✓

Job	HRT 105, CT BU#806363	Page	24 of 28
Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
Client	Crown Castle	Designed by	ncoomes

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T10	40.6667 - 20.3333	ROHN 3 STD	23.30	11.65	120.1	30.000	2.2285	16902.90	66854.10	0.253 ✓
T11	20.3333 - 0	ROHN 3 STD	23.95	11.97	123.5	30.000	2.2285	19115.10	66854.10	0.286 ✓

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	212.625 - 202.458	ROHN 1.5 STD	8.52	4.14	79.8	30.000	0.7995	2175.01	23983.70	0.091 ✓
T2	202.458 - 182.292	ROHN 1.5 STD	8.60	4.15	80.0	30.000	0.7995	5131.88	23983.70	0.214 ✓
T3	182.292 - 162.104	ROHN 1.5 STD	10.02	4.82	93.0	30.000	0.7995	6216.62	23983.70	0.259 ✓
T4	162.104 - 141.896	ROHN 2 STD	12.11	5.82	88.8	30.000	1.0745	6891.49	32235.90	0.214 ✓
T5	141.896 - 121.688	ROHN 2 STD	13.94	6.69	102.1	30.000	1.0745	7623.46	32235.90	0.236 ✓
T6	121.688 - 101.479	ROHN 2 STD	16.32	7.88	120.2	30.000	1.0745	7673.95	32235.90	0.238 ✓
T7	101.479 - 81.2708	ROHN 2.5 STD	18.82	9.13	115.7	30.000	1.7040	8211.33	51121.50	0.161 ✓
T8	81.2708 - 61	ROHN 2.5 STD	21.38	10.33	130.9	30.000	1.7040	8747.10	51121.50	0.171 ✓
T9	61 - 40.6667	ROHN 2.5 STD	23.95	11.62	147.1	30.000	1.7040	9896.29	51121.50	0.194 ✓
T10	40.6667 - 20.3333	ROHN 3 STD	25.25	12.27	126.5	30.000	2.2285	9512.67	66854.10	0.142 ✓
T11	20.3333 - 0	ROHN 3 STD	27.90	13.59	140.1	30.000	2.2285	11583.30	66854.10	0.173 ✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	212.625 - 202.458	ROHN 1.5 STD	8.50	4.13	79.6	30.000	0.7995	208.70	23983.70	0.009 ✓

Redundant Horizontal (1) Design Data (Tension)

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 25 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncomes

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T10	40.6667 - 20.3333	ROHN 1.5 STD	6.31	5.95	114.8	21.600	0.7995	4972.44	17268.30	0.288
T11	20.3333 - 0	ROHN 1.5 STD	6.97	6.61	127.5	21.600	0.7995	5451.89	17268.30	0.316

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T10	40.6667 - 20.3333	ROHN 2 STD	11.32	10.61	161.7	21.600	1.0745	4458.96	23209.90	0.192
T11	20.3333 - 0	ROHN 2 STD	11.72	11.07	168.8	21.600	1.0745	4582.87	23209.90	0.197

Redundant Hip Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T10	40.6667 - 20.3333	ROHN 2.5 STD	14.97	14.97	189.6	21.600	1.7040	84.51	36807.50	0.002
T11	20.3333 - 0	ROHN 2.5 STD	15.80	15.80	200.1	21.600	1.7040	86.95	36807.50	0.002

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T1	212.625 - 202.458	L2x2x1/8	4.25	4.25	81.5	21.600	0.4844	3.60	10462.50	0.000
T2	202.458 - 182.292	L2x2x1/8	4.30	4.30	82.4	21.600	0.4844	5.79	10462.50	0.001
T3	182.292 - 162.104	L2x2x1/8	4.34	4.34	83.1	21.600	0.4844	5.44	10462.50	0.001
T4	162.104 - 141.896	L2x2x1/8	5.38	5.38	103.1	21.600	0.4844	6.54	10462.50	0.001
T5	141.896 - 121.688	L2x2x1/8	6.42	6.42	123.1	21.600	0.4844	4.11	10462.50	0.000
T6	121.688 - 101.479	L2 1/2x2 1/2x3/16	7.55	7.55	116.5	21.600	0.9020	2.10	19483.20	0.000
T7	101.479 - 81.2708	L3x3x3/16	8.80	8.80	112.5	21.600	1.0900	1.23	23544.00	0.000

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job	HRT 105, CT BU#806363	Page	26 of 28
	Project	Vertical Structures Job No. 2011-004-083	Date	13:44:11 10/26/11
	Client	Crown Castle	Designed by	ncomes

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T10	40.6667 - 20.3333	ROHN 3 STD	12.63	12.63	130.2	30.000	2.2285	0.64	66854.10	0.000
T11	20.3333 - 0	ROHN 3 STD	13.95	13.95	143.9	30.000	2.2285	2.51	66854.10	0.000



Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail	
T1	212.625 - 202.458	Leg	ROHN 2.5 STD	2	-5493.53	51333.83	12.4	Pass	
		Diagonal	ROHN 2 STD	8	-2885.64	24117.17	12.0	Pass	
		Horizontal	ROHN 1.5 STD	7	-2139.74	20300.52	10.5	Pass	
T2	202.458 - 182.292	Top Girt	ROHN 1.5 STD	4	-208.10	20340.78	1.0	Pass	
			L2x2x1/8	16	-4.37	5828.76	0.3	Pass	
		Inner Bracing	Leg	ROHN 3 EH	28	-34615.90	84964.22	40.7	Pass
			Diagonal	ROHN 2 STD	39	-9176.65	17252.62	53.2	Pass
			Horizontal	ROHN 1.5 STD	37	-5103.79	20251.47	25.2	Pass
T3	182.292 - 162.104	Inner Bracing	L2x2x1/8	42	-7.31	5726.17	0.3	Pass	
			Leg	ROHN 4 EH	67	-73261.90	140142.28	52.3	Pass
		Diagonal	ROHN 2 STD	77	-9738.71	14724.98	66.1	Pass	
			Horizontal	ROHN 1.5 STD	76	-6246.67	17358.06	36.0	Pass
T4	162.104 - 141.896	Inner Bracing	L2x2x1/8	80	-6.88	4212.61	0.3	Pass	
			Leg	ROHN 5 EH	106	-109691.00	207361.47	52.9	Pass
		Diagonal	ROHN 2 STD	111	-9801.86	12580.63	77.9	Pass	
T5	141.896 - 121.688	Horizontal	ROHN 2 STD	109	-6913.46	24641.04	28.1	Pass	
			ROHN 2 STD	119	-7.62	2887.25	0.4	Pass	
		Inner Bracing	Leg	ROHN 6 EHS	145	-144606.00	213793.20	67.6	Pass
			Diagonal	ROHN 2.5 STD	149	-12762.30	15376.69	83.0	Pass
			Horizontal	ROHN 2 STD	148	-7793.44	20379.30	38.2	Pass
T6	121.688 - 101.479	Inner Bracing	L2x2x1/8	158	-8.08	2178.27	0.4	Pass	
			Leg	ROHN 6 EH	172	-175788.00	266297.40	66.0	Pass
		Diagonal	ROHN 2.5 STD	176	-11663.50	13473.43	86.6	Pass	
			Horizontal	ROHN 2 STD	175	-7784.79	14810.83	52.6	Pass
T7	101.479 - 81.2708	Inner Bracing	L2 1/2x2 1/2x3/16	186	-7.48	4589.77	0.3	Pass	
			Leg	ROHN 6 EH	199	-205190.00	266297.40	77.1	Pass
		Diagonal	ROHN 3 STD	203	-11652.20	23342.43	49.9	Pass	
T8	81.2708 - 61	Horizontal	ROHN 2.5 STD	202	-8286.03	25350.59	32.7	Pass	
			ROHN 2.5 STD	213	-7.46	4535.72	0.5	Pass	
		Inner Bracing	Leg	L3x3x3/16	226	-232881.00	334029.79	69.7	Pass
			Diagonal	ROHN 8 EHS	230	-11736.60	20458.62	57.4	Pass
		Horizontal	ROHN 3 STD	230	-11736.60	20458.62	57.4	Pass	
			ROHN 2.5 STD	229	-8736.09	19807.45	44.1	Pass	
Inner Bracing	L3 1/2x3 1/2x1/4	238	-9.06	7384.85	0.3	Pass			

RISATower Vertical Structures, Inc. 309 Spangler Drive, Suite E Richmond, KY 40475 Phone: (859) 624-8360 FAX: (859) 624-8369	Job HRT 105, CT BU#806363	Page 27 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail			
T9	61 - 40.6667	Leg	ROHN 8 EHS	253	-260814.00	334051.12	78.1	Pass			
		Diagonal	ROHN 3 STD	257	-12664.90	17935.11	70.6	Pass			
		Horizontal	ROHN 2.5 STD	256	-9779.61	15667.41	62.4	Pass			
T10	40.6667 - 20.3333	Inner Bracing	L3 1/2x3 1/2x1/4	267	-9.27	5884.99	0.4	Pass			
		Leg	ROHN 8 EH	280	-286475.00	437213.32	65.5	Pass			
		Diagonal	ROHN 3 STD	284	-17488.10	30741.38	56.9	Pass			
		Horizontal	ROHN 3 STD	283	-9850.95	27715.33	35.5	Pass			
		Redund Horz 1 Bracing	ROHN 1.5 STD	285	-4972.44	11745.65	42.3	Pass			
		Redund Diag 1 Bracing	ROHN 2 STD	305	-4458.96	8179.69	54.5	Pass			
		Redund Hip 1 Bracing	ROHN 1.5 STD	308	-49.43	10699.36	0.5	Pass			
		Redund Hip Diagonal Bracing	ROHN 2.5 STD	307	-48.15	7078.91	0.7	Pass			
		Inner Bracing	ROHN 3 STD	312	-11.62	19625.00	1.8	Pass			
		Leg	ROHN 8 EH	313	-314302.00	437299.96	71.9	Pass			
T11	20.3333 - 0	Diagonal	ROHN 3 STD	317	-19703.30	29095.39	67.7	Pass			
		Horizontal	ROHN 3 STD	316	-11720.60	22586.22	51.9	Pass			
		Redund Horz 1 Bracing	ROHN 1.5 STD	318	-5451.89	9790.38	55.7	Pass			
		Redund Diag 1 Bracing	ROHN 2 STD	338	-4582.87	7507.55	61.0	Pass			
		Redund Hip 1 Bracing	ROHN 1.5 STD	341	-50.09	8807.40	0.6	Pass			
		Redund Hip Diagonal Bracing	ROHN 2.5 STD	340	-47.53	6355.22	0.7	Pass			
		Inner Bracing	ROHN 3 STD	343	-10.15	16082.00	1.5	Pass			
									Summary		
									Leg (T9)	78.1	Pass
									Diagonal (T6)	86.6	Pass
							Horizontal (T9)	62.4	Pass		
							Top Girt (T1)	1.0	Pass		
							Redund Horz 1 Bracing (T11)	55.7	Pass		
							Redund Diag 1 Bracing (T11)	61.0	Pass		
							Redund Hip 1 Bracing (T11)	0.6	Pass		
							Redund Hip Diagonal Bracing (T11)	0.7	Pass		
							Inner Bracing (T10)	1.8	Pass		
							Bolt Checks	66.3	Pass		
							RATING =	86.6	Pass		

<i>RISATower</i> <i>Vertical Structures, Inc.</i> <i>309 Spangler Drive, Suite E</i> <i>Richmond, KY 40475</i> <i>Phone: (859) 624-8360</i> <i>FAX: (859) 624-8369</i>	Job HRT 105, CT BU#806363	Page 28 of 28
	Project Vertical Structures Job No. 2011-004-083	Date 13:44:11 10/26/11
	Client Crown Castle	Designed by ncoomes

APPENDIX B
BASE LEVEL DRAWING

APPENDIX C
ADDITIONAL CALCULATIONS



ANCHOR BOLT CALCULATIONS

Customer: Crown Castle
Site Name: HRT 105, CT BU#806363
Job Number: 2011-004-083
Tower Model: 212' Rohn SSMW Self-Supporting Tower
Date: 10/26/2011

Input Information:

# Bolts	10	
Bolt Diameter	1	in
Allowable Tension, F_u	125	ksi
Steel Grade	A354-BC	
Applied Shear	36.358	kips
Uplift per Leg	264.400	kips

Bolt Cross-Sectional Area, A	0.785	in ²
Applied Shear, f_v	4.63	ksi
Maximum Allowable Tensile Stress, F_t	41.25	ksi
Allowable Tension Force	323.98	kips
Maximum Allowable	431.86	kips
% Capacity	61.2%	

The Bolt Group is sufficient for the applied Uplift Force

Maximum Allowable Tensile Stress, F_t

$$0.43F_u - 1.8f_v \leq 0.33F_u$$

This equation is for threaded parts, A449 bolts over 1 1/2" dia. (threads included in shear plane) Manual of Steel Construction ASD, 9th Edition, pg. 5-74, Table J3.3



Overturning Calculation for Square Mat Foundations

Customer: Crown Castle
Site Name: HRT 105, CT BU#806363
Job Number: 2011-004-083
Tower Model: 212' Rohn SSMW Self-Supporting Tower
Date: 10/26/2011

Soil Ultimate Bearing	8	ksf
Unit wt soil	0.1	kcf
Unit wt concrete	0.15	kcf

Mat Width	40.25	ft
Mat Thickness	4.5	ft
Depth of Soil Over Mat	0	ft
Has Pedestals? (Y or N)	N	
Pedestal Round or Square? (R or S)	R	
Number of Pedestals	0	
Pedestal Height	0	ft
Pedestal Diameter or Width	0	ft

Applied Shear	61.193	kip
Applied Axial Force	65.098	kip
Applied Moment	7569.157	k-ft

wt. Concrete =	1093.542	kip
wt. Soil =	0.000	kip
x =	3.598	ft
Shear Moment =	275.3685	k-ft

Allowable Bearing =	4	ksf
Mat Width / 6 =	6.71	ft
e =	6.77	ft
L =	40.06	ft
Bearing =	0.99	ksf
Resisting Moment =	21233.0886	k-ft
SF =	2.707	

BEARING ADEQUATE

OVERTURNING ADEQUATE