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Also admitted in Massachusetts

May 7, 2014

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

Re: **Notice of Exempt Modification – Facility Modification
East Street (a/k/a Rte. 322), Wolcott, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 177-foot level of the existing 180-foot tower off East Street in Wolcott, Connecticut (the “Property”). The tower is owned by Crown Castle. The Council approved Cellco’s use of this tower in 1986. Cellco now intends to modify its facility by adding three (3) model BXA-171063-8CF, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 177-foot level on the tower. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco’s additional antennas, RRHs and HYBRIFLEX™ cable.



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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 Thomas G. Dunn, Mayor for the Town of Wolcott. A copy of this letter is also being sent to Augostinho and Joanne Rodrigues, the owners of the Property.

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

ROBINSON & COLE LLP

Melanie A. Bachman
May 7, 2014
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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's three (3) additional antennas and RRHs will be located at the 177-foot level on the 180-foot tower.

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative worst-case General Power Density table for Cellco's modified facility is included in Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis Report included in Attachment 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:

Thomas G. Dunn, Wolcott Mayor
Augostinho and Joanne Rodrigues
Sandy M. Carter



ATTACHMENT 1

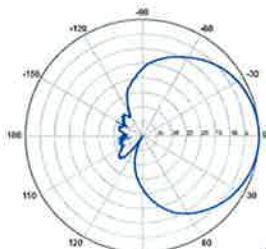
BXA-171063-8CF-EDIN-X

X-Pol | FET Panel | 63° | 17.4 dBi

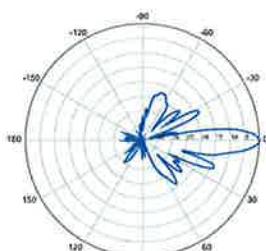
Replace 'X' with desired electrical downtilt.

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

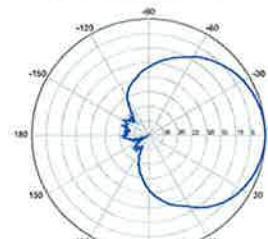
Electrical Characteristics			
1710-2170 MHz			
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 6, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	> 25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1225 x 154 x 105 mm		48.2 x 6.1 x 4.1 in
Depth with t-brackets	133 mm		5.2 in
Weight without mounting brackets	4.2 kg		9.2 lbs
Survival wind speed	296 km/hr		184 mph
Wind area	Front: 0.19 m²	Side: 0.14 m²	Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N	Side: 223 N	Front: 63 lbf Side: 50 lbf
Mounting Options		Part Number	Fits Pipe Diameter
2-Point Mounting Bracket Kit	26799997	50-102 mm	2.0-4.0 in
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm	2.0-4.0 in
Concealment Configurations	For concealment configurations, order BXA-171063-8CF-EDIN-X-FP		

**BXA-171063-8CF-EDIN-X**

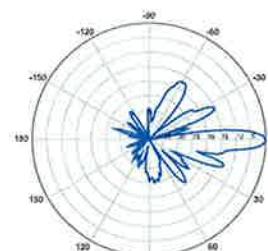
Horizontal | 1710-1880 MHz

BXA-171063-8CF-EDIN-0

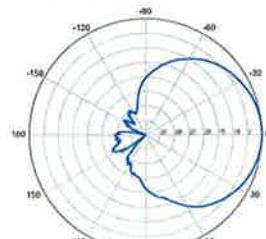
0° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-X

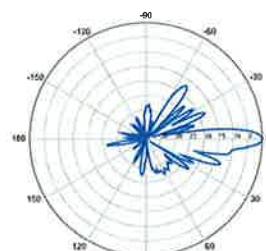
Horizontal | 1850-1990 MHz

BXA-171063-8CF-EDIN-0

0° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-X

Horizontal | 1920-2170 MHz

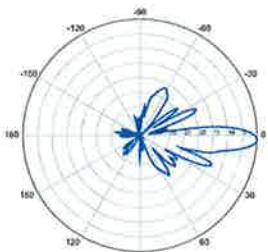
BXA-171063-8CF-EDIN-0

0° | Vertical | 1920-2170 MHz

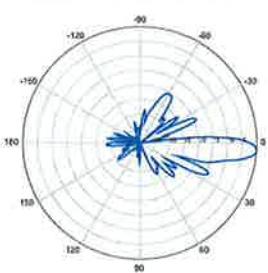
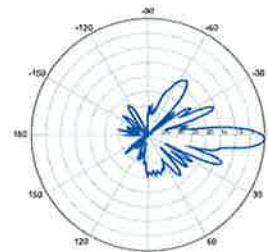
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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

BXA-171063-8CF-EDIN-X

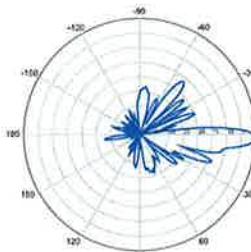
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8CF-EDIN-2

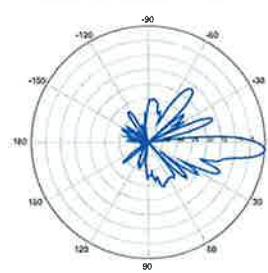
2° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-4**BXA-171063-8CF-EDIN-2**

2° | Vertical | 1920-2170 MHz

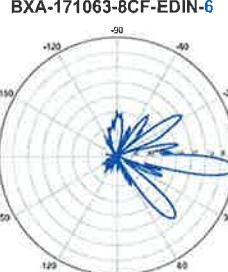
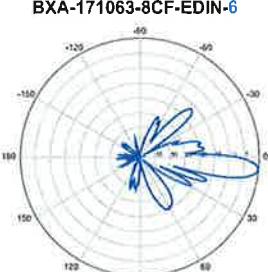
BXA-171063-8CF-EDIN-2

2° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-4

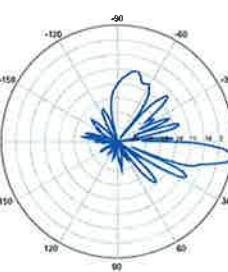
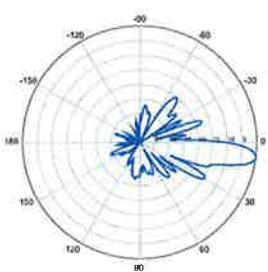
4° | Vertical | 1850-1990 MHz

4° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-6

4° | Vertical | 1920-2170 MHz

6° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-8

6° | Vertical | 1850-1990 MHz

8° | Vertical | 1920-2170 MHz

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

Alcatel-Lucent RRH2x40-AWS REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

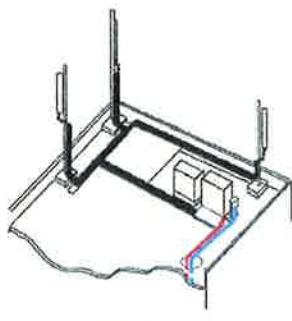
Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced.

The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.



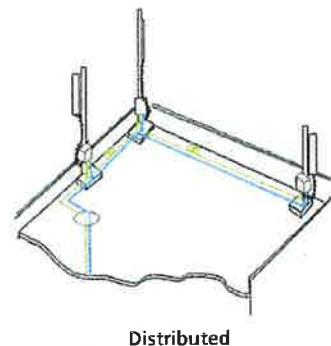
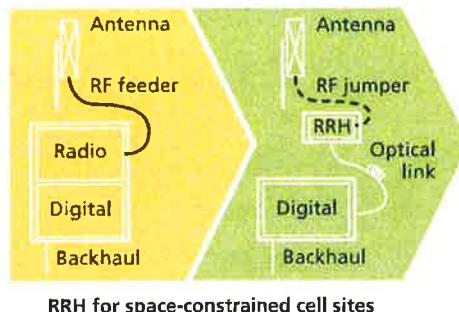
Macro

Features

- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
 - With solar load: -40°C to +50°C (-40°F to +122°F)
 - Without solar load: -40°C to +55°C (-40°F to +131°F)
- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
 - TMA and Remote electrical tilt (RET) support via AISG v2.0

- Passive convection cooling (no fans)
- Enclosure protection
 - IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
 - TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
 - One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
 - Single mode dual fiber (SM/DF)
- Multi-mode variant
 - Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Features/Benefits

- » Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- » Same accessories as 1 5/8" coaxial cable
- » Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- » Lightweight solution and compact design – Decreases tower loading
- » Robust cabling – Eliminates need for expensive cable trays and ducts
- » Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- » Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- » Outdoor polyethylene jacket – Ensures long-lasting cable protection



Figure 1: HYBRIFLEX Series

Technical Specifications

Strand Type	
Outer Conductor Armor	Corrugated Aluminum
Jacket	Polyethylene, PE
UV-Protection	Individual and External Jacket
Material/Allowable Stress	
Weight, Approximate	[kg/m (lb/ft)] 1.9 (1.30)
Minimum Bending Radius, Single Bending	[mm (in)] 200 (8)
Minimum Bending Radius, Repeated Bending	[mm (in)] 500 (20)
Recommended/Maximum Clamp Spacing	[m (ft)] 1.0 / 1.2 (3.25 / 4.0)
Electrical Properties	
DC-Resistance Outer Conductor Armor	[Ω/km (Ω/1000ft)] 0.68 (0.205)
DC-Resistance Power Cable: 8.4mm ² (8AWG)	[Ω/km (Ω/1000ft)] 2.1 (0.307)
Fiber Optic Properties	
Version	Single-mode OM3
Quantity, Fiber Count	16 (8 pairs)
Core/Clad	[μm] 50/125
Primary Coating (Acrylate)	[μm] 245
Buffer Diameter, Nominal	[μm] 900
Secondary Protection, Jacket, Nominal	[mm (in)] 2.0 (0.08)
Minimum Bending Radius	[mm (in)] 104 (4.1)
Insertion Loss @ wavelength 850nm	[dB/km] 3.0
Insertion Loss @ wavelength 1310nm	[dB/km] 1.0
Standards (Meets or exceeds)	UL34-V0, UL1666 RoHS Compliant
DC Powerable Properties	
Size (Power)	[mm (AWG)] 8.4 (8)
Quantity, Wire Count (Power)	16 (8 pairs)
Size (Alarm)	[mm (AWG)] 0.8 (18)
Quantity, Wire Count (Alarm)	4 (2 pairs)
Type	UV protected
Strands	19
Primary Jacket Diameter, Nominal	[mm (in)] 6.8 (0.27)
Standards (Meets or exceeds)	NFPA 130, IEC65-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environmental	
Installation Temperature	[°C (°F)] -40 to +65 (-40 to 149)
Operation Temperature	[°C (°F)] -40 to +65 (-40 to 149)

* This data is provisional and subject to change.

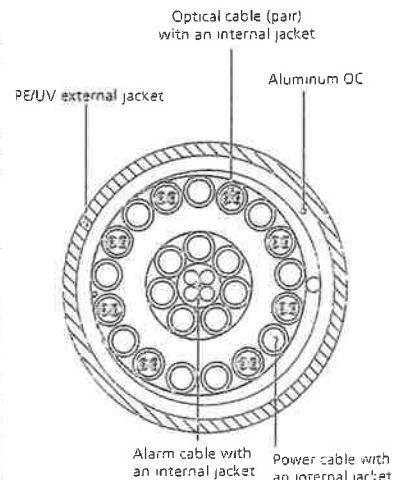


Figure 2: Construction Detail

ATTACHMENT 2

Site Name: Wolcott		General	Power	Density	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	MPE FRACTION	Total
		# OF CHAN.	WATTS ERP	HEIGHT					
*AT&T UMTS	2	565	160	0.0159	880	0.5867	2.71%		
*AT&T UMTS	2	875	160	0.0246	1900	1.0000		2.46%	
*AT&T GSM	1	538	160	0.0076	880	0.5867	1.29%		
*AT&T GSM	4	934	160	0.0525	1900	1.0000		5.25%	
*AT&T LTE	1	1375	160	0.0193	734	0.4893		3.95%	
*Clearwire	2	153	168	0.0039	2496	1.0000		0.39%	
*Clearwire	1	211	168	0.0027	11 GHz	1.0000		0.27%	
*MetroPCS CDMA	3	727	148	0.0358	2135	1.0000		3.58%	
*MetroPCS LTE	1	1200	148	0.0197	2130	1.0000		1.97%	
*T-Mobile UMTS/LTE	4	12	188	0.0005	2100	1.0000		0.05%	
*T-Mobile GSM/UMTS	4	11	188	0.0004	1950	1.0000		0.04%	
Verizon	7	539	177	0.0433	1970	1.0000	4.33%		
Verizon	9	370	177	0.0382	869	0.5793	6.60%		
Verizon	1	1265	177	0.0145	2145	1.0000	1.45%		
Verizon	1	774	177	0.0089	698	0.4653	1.91%	36.24%	
* Source: Siting Council									

ATTACHMENT 3



Date: May 6, 2014

Patrick Byrum
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012

Subject: Structural Analysis Report

Carrier Designation:	Verizon Wireless Co-Locate	
	Carrier Site Name:	Wolcott, CT
Crown Castle Designation:	Crown Castle BU Number:	806362
	Crown Castle Site Name:	NHV 108 943133
	Crown Castle JDE Job Number:	264263
	Crown Castle Work Order Number:	727139
	Crown Castle Application Number:	215315 Rev. 2
Engineering Firm Designation:	FDH Engineering, Inc. Project Number:	14256O1400
Site Data:	INTERSECTION OF RTE 322/MERIDIAN RDWOLCOTT SITE, WOLCOTT, New Haven County, CT	
	Latitude 41° 33' 34.41", Longitude -72° 56' 49.1"	
	180 Foot - Self Support Tower	

Dear Patrick Byrum,

FDH Engineering, 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 626851, in accordance with application 215315, revision 2.

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:

LC7: Existing + Reserved + Proposed Equipment	Sufficient Capacity
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.	

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

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

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

Respectfully submitted by:

Jarel Duncan

Jarel Duncan, EI
Project Engineer

Reviewed by:

By [Signature]

Bradley R. Newman, PE
Senior Project Engineer
CT PE License No. 29630



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 - 3.2) Assumptions

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1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by ROHN in September of 1986. The tower was originally designed for E.I.A. zone C with 1" radial ice. The tower has been modified per reinforcement drawings prepared by All-Points Technology Corp, P.C., in August of 2002. Reinforcement consists of addition of concrete cap to existing foundations.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
177.0	177.0	3	alcatel lucent	RRH2X40-AWS	1	1-5/8	-
		3	antel	BXA-171063/8CF w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

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
180.0	188.0	3	ericsson	AIR 21	1	1-5/8	2
	180.0	6	rfs celwave	ATMAA1412D-1A20	18	1-5/8	1
		1	crown mounts	Pipe Mount			
177.0	177.0	3	antel	BXA-70063/6CFx4 w/ Mount Pipe	-	-	3
		3	antel	BXA-70040/6CFx4 w/ Mount Pipe	-	-	2
		2	andrew	DB846F65ZAXY w/ Mount Pipe	12	1-5/8	1
		1	antel	BXA-185063/12CFx2 w/ Mount Pipe			
		2	antel	LPA-80063/6CFx5 w/ Mount Pipe			
		1	crown mounts	Sector Mount [SM 502-3]			
		2	rfs celwave	APX18-206516L-CT0 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		2	swedcom	SC-E 6014 rev2 w/ Mount Pipe			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
168.0	168.0	3	argus technologies	LLPX310R w/ Mount Pipe	3 1	5/16 1/2	1
		1	crown mounts	Sector Mount [SM 411-3]			
		1	dragonwave	A-ANT-18G-2-C			
		3	samsung telecommunications	FDD_R6_RRH			
158.0	160.0	4	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe	12 2 1	1-1/4 3/4 3/8	1
		6	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD			
		2	andrew	SBNH-1D6565C w/ Mount Pipe			
		3	communication components inc.	DTMABP7819VG12A			
		6	ericsson	RRUS-11			
		3	powerwave technologies	7020.00			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		1	raycap	DC6-48-60-18-8F			
	158.0	1	crown mounts	Sector Mount [SM 502-3]			
148.0	148.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8	1
112.0	112.0	1	andrew	HP8-59E	1	EW107	3
		1	crown mounts	Pipe Mount [PM 601-1]			
70.0	70.0	1	andrew	HP10-59E	1	EW107	3
		1	crown mounts	Pipe Mount [PM 602-1]			
40.0	40.0	1	crown mounts	Side Arm Mount [SO 201-1]	1	1/2	1
		1	gps	GPS_A			

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment
- 3) Equipment to be Removed, Not considered in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180	180	4	RFS	PD10017	-	-
170	170	3	RFS	PD1132D	-	-
160	160	2	-	6' STD Dish	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering, Inc.	2303630	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn	217670	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn	529684	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	All Points Technology Corp.	903539	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), 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. FDH Engineering, 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 (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 160	Leg	ROHN 2.5 STD	2	-13.11	41.14	31.9	Pass
		Diagonal	ROHN 2 STD	9	-6.24	15.54	40.1	Pass
		Horizontal	ROHN 1.5 STD	7	-3.35	20.29	16.5 19.5 (b)	Pass
		Top Girt	ROHN 1.5 STD	5	-1.41	20.34	7.0	Pass
		Inner Bracing	L2x2x1/8	37	-0.02	5.86	0.4	Pass
T2	160 - 140	Leg	ROHN 3 X-STR	41	-44.84	83.78	53.5	Pass
		Diagonal	ROHN 2 STD	48	-8.06	13.38	60.2	Pass
		Horizontal	ROHN 1.5 STD	46	-4.99	17.38	28.7 29.0 (b)	Pass
		Inner Bracing	L2x2x1/8	52	-0.01	4.29	0.3	Pass
T3	140 - 120	Leg	ROHN 4 X-STR	80	-75.21	139.07	54.1	Pass
		Diagonal	ROHN 2 STD	87	-7.79	11.51	67.7	Pass
		Horizontal	ROHN 2 STD	85	-5.34	24.65	21.6	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail	
							31.1 (b)		
T4	120 - 100	Inner Bracing	L2x2x1/8	92	-0.01	2.93	0.4	Pass	
		Leg	ROHN 5 X-STR	119	-97.97	177.42	55.2	Pass	
		Diagonal	ROHN 2.5 STD	126	-9.45	14.43	65.5	Pass	
T5	100 - 80	Horizontal	ROHN 2 STD	124	-5.62	20.43	27.5 32.7 (b)	Pass	
		Inner Bracing	L2x2x1/8	131	-0.01	2.21	0.4	Pass	
		Leg	ROHN 5 X-STR	146	-122.03	177.35	68.8	Pass	
T6	80 - 60	Diagonal	ROHN 2.5 STD	153	-8.61	12.60	68.4	Pass	
		Horizontal	ROHN 2 STD	151	-5.62	14.77	38.1	Pass	
		Inner Bracing	L2 1/2x2 1/2x3/16	157	-0.01	3.47	0.4	Pass	
T7	60 - 40	Leg	ROHN 6 EHS	173	-143.99	212.13	67.9	Pass	
		Diagonal	ROHN 2.5 STD	180	-9.03	11.15	81.0	Pass	
		Horizontal	ROHN 2.5 STD	178	-6.28	25.42	24.7 36.6 (b)	Pass	
T8	40 - 20	Inner Bracing	L3x3x3/16	184	-0.01	4.55	0.5	Pass	
		Leg	ROHN 6 X-STR	200	-165.79	264.22	62.7	Pass	
		Diagonal	ROHN 2.5 X-STR	207	-9.31	12.30	75.7	Pass	
T9	20 - 0	Horizontal	ROHN 2.5 STD	205	-6.75	19.66	34.3 39.7 (b)	Pass	
		Inner Bracing	L3 1/2x3 1/2x1/4	212	-0.01	7.45	0.5	Pass	
		Leg	ROHN 6 X-STR	227	-186.64	264.19	70.6	Pass	
T10	0 - 0	Diagonal	ROHN 3 STD	234	-9.17	16.86	54.4	Pass	
		Horizontal	ROHN 2.5 STD	232	-6.90	15.57	44.3	Pass	
		Inner Bracing	L3 1/2x3 1/2x1/4	238	-0.01	5.93	0.5	Pass	
T11	0 - 0	Leg	ROHN 8 EHS	254	-196.38	332.47	59.1	Pass	
		Diagonal	ROHN 3 STD	267	-14.21	28.18	50.4 55.2 (b)	Pass	
		Horizontal	ROHN 3 STD	263	-7.72	27.51	28.0 44.9 (b)	Pass	
T12	0 - 0	Redund Horz 1 Bracing	ROHN TS1.5x11 ga	261	-3.41	4.90	69.6	Pass	
		Redund Diag 1 Bracing	ROHN 1.5 STD	262	-3.11	3.58	87.0	Pass	
		Redund Hip 1 Bracing	ROHN TS1.5x11 ga	270	-0.04	4.35	0.9	Pass	
T13	0 - 0	Redund Hip Diagonal Bracing	ROHN 2.5 STD	282	-0.05	6.98	0.7	Pass	
		Inner Bracing	ROHN 3 STD	285	-0.01	19.74	0.4	Pass	
							Summary		
T14	0 - 0						Leg (T8)	70.6	Pass
							Diagonal (T6)	81.0	Pass
							Horizontal (T9)	44.9	Pass
T15	0 - 0						Top Girt	7.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P allow (K)	% Capacity	Pass / Fail
					(T1)			
					Redund Horz 1 Bracing (T9)	69.6	Pass	
					Redund Diag 1 Bracing (T9)	87.0	Pass	
					Redund Hip 1 Bracing (T9)	0.9	Pass	
					Redund Hip Diagonal Bracing (T9)	0.7	Pass	
					Inner Bracing (T8)	0.5	Pass	
					Bolt Checks	55.2	Pass	
					RATING =	87.0	Pass	

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
-	Anchor Rods	0	44.9	Pass
1	Base Foundation Soil Interaction	0	26.1	Pass

Structure Rating (max from all components) =	87.0%
--	-------

Notes:

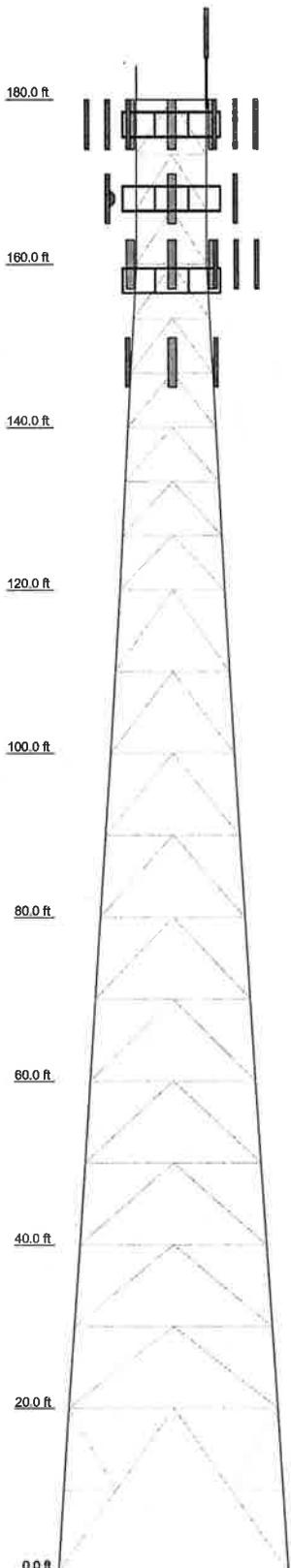
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

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

**APPENDIX A
TNXTOWER OUTPUT**

Section		T ₉ ROHN 6 EHS	T ₈ ROHN 6 X-STR	T ₇	ROHN 6 EHS	T ₆	ROHN 5 X-STR	T ₅	ROHN 5 X-STR	T ₄	ROHN 4 X-STR	T ₃	ROHN 3 X-STR	T ₂	ROHN 2 STD	T ₁	ROHN 1.5 STD
Legs																	
Leg Grade		ROHN 3 STD		ROHN 2.5 X-STR													
Diagonals																	
Diagonal Grade																	
Top Girts		ROHN 3 STD															
Horizontals		ROHN 3 STD															
Red. Horizontals		ROHN TS 1.5x11 ga															
Red. Diagonals		ROHN 1.5 STD															
Red. Hips		ROHN TS 1.5x11 ga															
Inner Bracing		ROHN 3 STD		L3 1/2x3 1/2x14		20.0417		L3x3x16		L2 1/2x2 1/2x3/16							
Face Width (ft)	27.6771	25.1771		22.5417				17.5417		14.9853		12.7083		10.825		8.54167	
# Panels @ (ft)		1 @ 20				10 @ 10						25		19		16	
Weight (K)	25.5	4.5		4.4		4.2		3.2								1.1	



DESIGNED APPURTEINANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	180	(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	158
8x2 1/2" Pipe Mount	180		
(3) AIR 21	180	7020.00	158
(6) ATMAA1412D-1A20	180	7770.00 w/ Mount Pipe	158
(2) DB846F85ZAXY w/ Mount Pipe	177	(2) LGP13519	158
BXA-185063/12CFx2 w/ Mount Pipe	177	DC6-4B-60-18-BF	158
RRH2X40-AWS	177	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	158
BXA-171063/8CF w/ Mount Pipe	177	(2) SBNH-1D6565C w/ Mount Pipe	158
BXA-70040/6CFx4 w/ Mount Pipe	177	DTMABP7819VG12A	158
(2) FD9R6004/2C-3L	177	(2) RRUS-11	158
RRH2X40-AWS	177	7020.00	158
BXA-171063/8CF w/ Mount Pipe	177	7770.00 w/ Mount Pipe	158
BXA-70040/6CFx4 w/ Mount Pipe	177	(2) LGP13519	158
(2) LPA-80063/6CFx5 w/ Mount Pipe	177	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	158
APX18-206516L-CT0 w/ Mount Pipe	177	(2) FD9R6004/2C-3L	158
(2) FD9R6004/2C-3L	177	DTMABP7819VG12A	158
DB-T1-6Z-8AB-0Z	177	(2) RRUS-11	158
RRH2X40-AWS	177	(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	158
BXA-171063/8CF w/ Mount Pipe	177	7020.00	158
BXA-70040/6CFx4 w/ Mount Pipe	177	7770.00 w/ Mount Pipe	158
(2) SC-E 6014 rev2 w/ Mount Pipe	177	(2) LGP13519	158
Sector Mount [SM 502-3]	177	Sector Mount [SM 502-3]	158
LLPX310R w/ Mount Pipe	168	Empty Mount Pipe	158
FDD_R6_RRH	168	Empty Mount Pipe	158
LLPX310R w/ Mount Pipe	168	Empty Mount Pipe	158
FDD_R6_RRH	168	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	158
LLPX310R w/ Mount Pipe	168	APXV18-206513C w/ Mount Pipe	148
FDD_R6_RRH	168	APXV18-206517S-C w/ Mount Pipe	148
Sector Mount [SM 411-3]	168	APXV18-206517S-C w/ Mount Pipe	148
A-ANT-18G-2-C	168	Side Arm Mount [SO 201-1]	40
DTMABP7819VG12A	158	GPS_A	40
(2) RRUS-11	158		

MATERIAL STRENGTH

GRADE	F _y	F _u	GRADE	F _y	F _u
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 87%

MAX. CORNER REACTIONS AT BASE:

DOWN: 216 K

SHEAR: 26 K

UPLIFT: -179 K

SHEAR: 23 K

AXIAL

91 K



TORQUE 12 kip-ft

38 mph WIND - 0.7500 in ICE

AXIAL

49 K



TORQUE 52 kip-ft

REACTIONS - 85 mph WIND



FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
Phone: (919) 755-1012
FAX: (919) 755-1031

Job: NHV 108 943133, CT (BU# 806362)	Project: 1425601400
Client: Crown Castle	Drawn by: Jarel Duncan
Code: TIA/EIA-222-F	App'd: NTS
Date: 03/25/14	Scale: NTS
Path:	Dwg No: E-1

tnxTower	Job NHV 108 943133, CT (BU# 806362)	Page 1 of 47
FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Project 1425601400	Date 15:59:40 03/25/14
	Client Crown Castle	Designed by Jarel Duncan

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 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 27.68 ft at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

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, feed line supports, and appurtenance mounts are not considered.

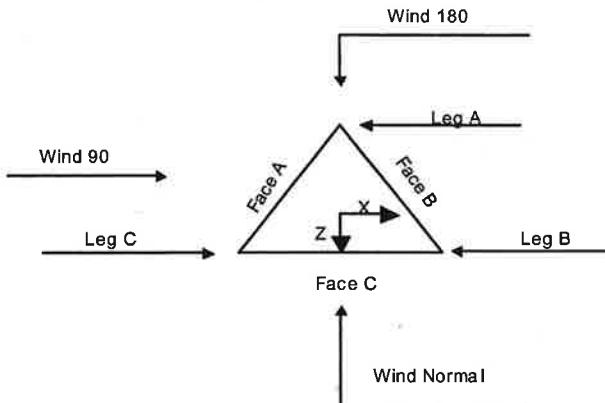
Options

- 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

- 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
- Use TIA-222-G Tension Splice Capacity Exemption

- 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
- Poles
- Include Shear-Torsion Interaction
- Always Use Sub-Critical Flow
- Use Top Mounted Sockets

tnxTower	Job NHV 108 943133, CT (BU# 806362)	Page 2 of 47
FDH Engineering, Inc. 6521 Meridian Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Project 14256O1400	Date 15:59:40 03/25/14
	Client Crown Castle	Designed by Jarel Duncan



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
				ft		ft
T1	180.00-160.00			8.50	1	20.00
T2	160.00-140.00			8.54	1	20.00
T3	140.00-120.00			10.63	1	20.00
T4	120.00-100.00			12.71	1	20.00
T5	100.00-80.00			14.96	1	20.00
T6	80.00-60.00			17.54	1	20.00
T7	60.00-40.00			20.04	1	20.00
T8	40.00-20.00			22.54	1	20.00
T9	20.00-0.00			25.18	1	20.00

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	180.00-160.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T2	160.00-140.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T3	140.00-120.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T4	120.00-100.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T5	100.00-80.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T6	80.00-60.00	10.00	K Brace Down	No	Yes	0.0000	0.0000

Job	NHV 108 943133, CT (BU# 806362)	Page	3 of 47
Project	14256O1400	Date	15:59:40 03/25/14
Client	Crown Castle	Designed by	Jarel Duncan

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
T7	60.00-40.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T8	40.00-20.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T9	20.00-0.00	20.00	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T2 160.00-140.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T3 140.00-120.00	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 120.00-100.00	Pipe	ROHN 5 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T5 100.00-80.00	Pipe	ROHN 5 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T6 80.00-60.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T7 60.00-40.00	Pipe	ROHN 6 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)
T8 40.00-20.00	Pipe	ROHN 6 X-STR	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T9 20.00-0.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.00-160.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T2 160.00-140.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T3 140.00-120.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 120.00-100.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T5 100.00-80.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T6 80.00-60.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T7 60.00-40.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T8 40.00-20.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T9 20.00-0.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

 FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Job	NHV 108 943133, CT (BU# 806362)	Page
	Project	1425601400	Date 15:59:40 03/25/14
	Client	Crown Castle	Designed by Jarel Duncan

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 180.00-160.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T2 160.00-140.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T3 140.00-120.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T4 120.00-100.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T5 100.00-80.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 80.00-60.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 60.00-40.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T8 40.00-20.00	Solid Round		A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T9 20.00-0.00	Solid Round		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
T9 20.00-0.00	A572-50 (50 ksi)	Horizontal (1)	Pipe	ROHN TS1.5x11 ga
		Diagonal (1)	Pipe	ROHN 1.5 STD
		Hip (1)	Pipe	ROHN TS1.5x11 ga
		Hip Diagonal		ROHN 2.5 STD

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
T5	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
100.00-80.00								
T6	80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	36.0000	36.0000
T7	60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	36.0000	36.0000
T8	40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	36.0000	36.0000
T9	20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹							
				X Brace Diags	X Brace Diags	Single Diags		Girts		Horiz.	
						X	Y	X	Y	X	Y
ft				X	Y	X	Y	X	Y	X	Y
T1	No	No	1	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1	1
T2	No	No	1	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1	1
T3	No	No	1	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1	1
T4	No	No	1	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1	1
T5	No	No	1	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1	1
T6	No	No	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1
T7	No	No	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1
T8	No	No	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1
T9 20.00-0.00	No	No	1	1	1	1	1	1	1	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 180.00-160.00	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

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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
T2 160.00-140.00	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
T3 140.00-120.00	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
T4 120.00-100.00	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
T5 100.00-80.00	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
T6 80.00-60.00	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
T7 60.00-40.00	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
T8 40.00-20.00	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 20.00-0.00	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)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.								
T1 180.00-160.00	Flange	0.7500	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 160.00-140.00	Flange	0.8750	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 140.00-120.00	Flange	1.0000	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 120.00-100.00	Flange	1.0000	4	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 100.00-80.00	Flange	1.0000	6	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 80.00-60.00	Flange	1.0000	6	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 60.00-40.00	Flange	1.0000	6	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T8 40.00-20.00	Flange	1.0000	8	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T9 20.00-0.00	Flange	1.0000	8	0.6250	3	0.6250	0	0.6250	0	0.6250	0	0.6250	2	0.6250	0
		A449		A325N		A325N									

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset in (Frac FW)	# Per Row	# Spacing in	Clear Diameter in	Width or Perimeter in	Weight plf
LCF158-50A(1-5/8")	C	Yes	Ar (CfAe)	158.00 - 0.00	-1.0000	-0.44	31	14	0.5000	1.9800	0.80
LCF158-50A(1-5/8")	C	Yes	Ar (CfAe)	180.00 - 158.00	-1.5000	-0.44	19	12	0.5000	1.9800	0.80

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	# Per Row	# Spacing in	Width or Diameter in	Perimeter in	Weight plf

561(1-5/8")	A	Yes	Ar (CfAe)	177.00 - 0.00	1.0000	-0.35	12	2	0.5000	1.6250	1.35
561(1-5/8")	A	Yes	Ar (CfAe)	177.00 - 0.00	10.0000	-0.36	1	1	0.5000	1.6250	1.35

7983A(1/2")	A	Yes	Ar (CfAe)	168.00 - 0.00	0.0000	0.45	1	1	0.5000	0.5800	0.08
9207(5/16")	A	Yes	Ar (CfAe)	168.00 - 0.00	0.0000	0.48	3	3	0.3300	0.0000	0.60
1 1/2" Rigid Conduit	A	Yes	Ar (CfAe)	168.00 - 0.00	0.0000	0.48	2	2	0.5000	1.5000	1.00
FB-L98B-002-75000(3/8")	C	Yes	Ar (CfAe)	158.00 - 0.00	0.0000	-0.4	1	1	0.3937	0.0000	0.06
WR-VG86ST-BRD(3/4")	C	Yes	Ar (CfAe)	158.00 - 0.00	0.0000	-0.4	2	2	0.5000	0.0000	0.58
2" Rigid Conduit	C	Yes	Ar (CfAe)	158.00 - 0.00	0.0000	-0.4	1	1	2.0000	2.0000	2.80

LCF158-50JL(1-5/8")	A	Yes	Ar (CfAe)	148.00 - 0.00	0.0000	0.4	6	3	0.5000	1.9800	0.52

LDF4-50A(1/2")	A	Yes	Ar (CfAe)	40.00 - 0.00	0.0000	-0.45	1	1	0.5000	0.6300	0.15

Feedline Ladder (Af) 1.5"	A	Yes	Af (CfAe)	177.00 - 0.00	0.0000	-0.4	1	1	1.5000	1.5000	6.0000
Feedline Ladder (Af) 1.5"	A	Yes	Af (CfAe)	168.00 - 0.00	0.0000	0.4	1	1	1.5000	1.5000	6.0000
T-Brackets	A	Yes	Af (CfAe)	177.00 - 0.00	0.0000	-0.35	1	1	1.0000	1.0000	4.0000
Feedline Ladder (Af)	C	Yes	Af (CfAe)	180.00 - 0.00	-2.0000	-0.4	2	1	3.0000	3.0000	12.0000

Safety Line 3/8	C	Yes	Ar (CfAe)	180.00 - 0.00	0.0000	0.5	1	1	0.3750	0.3750	0.22

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{AA}	Weight

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 K
T1	180.00-160.00	A	9.293	4.542	0.000	0.000	0.58
		B	0.000	0.000	0.000	0.000	0.00
		C	40.225	5.000	0.000	0.000	0.64
T2	160.00-140.00	A	18.052	6.667	0.000	0.000	0.79
		B	0.000	0.000	0.000	0.000	0.00
		C	49.165	5.000	0.000	0.000	0.89
T3	140.00-120.00	A	23.992	6.667	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00

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Project

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Client

Crown Castle

Designed by

Jarel Duncan

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
T4	120.00-100.00	C	50.158	5.000	0.000	0.000	0.92
		A	23.992	6.667	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00
T5	100.00-80.00	C	50.158	5.000	0.000	0.000	0.92
		A	23.992	6.667	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00
T6	80.00-60.00	C	50.158	5.000	0.000	0.000	0.92
		A	23.992	6.667	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00
T7	60.00-40.00	C	50.158	5.000	0.000	0.000	0.92
		A	23.992	6.667	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00
T8	40.00-20.00	C	50.158	5.000	0.000	0.000	0.92
		A	25.042	6.667	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00
T9	20.00-0.00	C	50.158	5.000	0.000	0.000	0.92
		A	25.042	6.667	0.000	0.000	0.83
		B	0.000	0.000	0.000	0.000	0.00
		C	50.158	5.000	0.000	0.000	0.92

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
T1	180.00-160.00	A	0.913	14.817	13.586	0.000	0.000	1.15
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	10.012	52.496	0.000	0.000	0.000	1.69
T2	160.00-140.00	A	0.899	26.393	23.945	0.000	0.000	1.68
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	21.016	60.655	0.000	0.000	0.000	2.35
T3	140.00-120.00	A	0.884	29.866	28.802	0.000	0.000	1.85
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	21.994	61.531	0.000	0.000	0.000	2.40
T4	120.00-100.00	A	0.867	29.515	28.686	0.000	0.000	1.83
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	21.701	61.492	0.000	0.000	0.000	2.38
T5	100.00-80.00	A	0.846	29.102	28.548	0.000	0.000	1.81
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	21.358	61.447	0.000	0.000	0.000	2.36
T6	80.00-60.00	A	0.821	28.600	28.381	0.000	0.000	1.79
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	20.939	61.391	0.000	0.000	0.000	2.33
T7	60.00-40.00	A	0.788	27.950	28.164	0.000	0.000	1.75
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	20.397	61.319	0.000	0.000	0.000	2.29
T8	40.00-20.00	A	0.750	30.733	27.908	0.000	0.000	1.74
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	19.758	61.233	0.000	0.000	0.000	2.25
T9	20.00-0.00	A	0.750	30.733	27.908	0.000	0.000	1.74
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	19.758	61.233	0.000	0.000	0.000	2.25

Feed Line Shielding

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Section	Elevation	Face	A_R ft ²	A_R Ice ft ²	A_F ft ²	A_F Ice ft ²
T1	180.00-160.00	A	1.091	4.398	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.566	9.150	0.000	0.000
T2	160.00-140.00	A	1.818	7.134	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.984	11.057	0.000	0.000
T3	140.00-120.00	A	2.271	7.964	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	4.087	10.923	0.000	0.000
T4	120.00-100.00	A	1.865	6.109	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.355	8.416	0.000	0.000
T5	100.00-80.00	A	1.746	5.617	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.140	7.779	0.000	0.000
T6	80.00-60.00	A	1.789	5.475	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.219	7.632	0.000	0.000
T7	60.00-40.00	A	1.729	5.130	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.111	7.213	0.000	0.000
T8	40.00-20.00	A	1.953	5.517	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.398	7.384	0.000	0.000
T9	20.00-0.00	A	1.981	6.028	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.446	8.068	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
T1	180.00-160.00	10.7757	9.3880	6.1158	6.6655
T2	160.00-140.00	11.8260	7.7606	7.8387	6.4245
T3	140.00-120.00	12.3984	6.2351	8.7297	6.2458
T4	120.00-100.00	14.1226	7.0860	10.5080	7.3713
T5	100.00-80.00	16.2607	8.1440	12.1998	8.4672
T6	80.00-60.00	17.0383	8.5216	13.2280	9.0995
T7	60.00-40.00	18.8313	9.4086	14.8215	10.0803
T8	40.00-20.00	18.9568	10.0433	14.4273	11.2755
T9	20.00-0.00	19.0410	10.0803	14.5266	11.3727

Discrete Tower Loads

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Lightning Rod	C	From Leg	0.00 0.00 2.00	0.0000	180.00	No Ice 0.25 1/2" Ice 0.66 1" Ice 0.97 2" Ice 1.49 4" Ice 2.68	0.25 0.66 0.97 1.49 2.68	0.03 0.03 0.04 0.06 0.14

8'x2 1/2" Pipe Mount	B	From Leg	0.00 0.00 4.00	0.0000	180.00	No Ice 2.30 1/2" Ice 3.13 1" Ice 3.62 2" Ice 4.62 4" Ice 6.73	2.30 3.13 3.62 4.62 6.73	0.04 0.06 0.08 0.14 0.33
(3) AIR 21	B	From Leg	0.00 0.00 8.00	0.0000	180.00	No Ice 6.42 1/2" Ice 6.86 1" Ice 7.30 2" Ice 8.22 4" Ice 10.17	4.28 4.69 5.11 5.98 7.82	0.08 0.12 0.17 0.28 0.57
(6) ATMAA1412D-1A20	B	From Leg	0.00 0.00 0.00	0.0000	180.00	No Ice 1.17 1/2" Ice 1.31 1" Ice 1.47 2" Ice 1.81 4" Ice 2.58	0.47 0.57 0.69 0.95 1.57	0.01 0.02 0.03 0.06 0.14

(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 7.27 1/2" Ice 7.88 1" Ice 8.48 2" Ice 9.72 4" Ice 12.33	7.82 9.01 9.91 11.81 15.98	0.05 0.11 0.19 0.37 0.87
BXA-185063/12CFx2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 5.03 1/2" Ice 5.59 1" Ice 6.11 2" Ice 7.17 4" Ice 9.44	5.29 6.46 7.35 9.15 12.95	0.04 0.09 0.14 0.27 0.68
RRH2X40-AWS	A	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 2.52 1/2" Ice 2.75 1" Ice 2.99 2" Ice 3.50 4" Ice 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
BXA-171063/8CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 3.14 1/2" Ice 3.52 1" Ice 3.92 2" Ice 4.80 4" Ice 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49
BXA-70040/6CFx4 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 16.55 1/2" Ice 17.27 1" Ice 17.96 2" Ice 19.37 4" Ice 22.30	7.37 8.54 9.42 11.23 15.34	0.06 0.16 0.27 0.52 1.17
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
RRH2X40-AWS	B	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 2.52 1/2" Ice 2.75 1" Ice 2.99 2" Ice 3.50 4" Ice 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28

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	Client	Crown Castle	Designed by Jarel Duncan

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAA Front ft ²	CAA Side ft ²	Weight K
BXA-171063/8CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 3.14 1/2" Ice 3.52 1" Ice 3.92 2" Ice 4.80 4" Ice 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49
BXA-70040/6CFx4 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 16.55 1/2" Ice 17.27 1" Ice 17.96 2" Ice 19.37 4" Ice 22.30	7.37 8.54 9.42 11.23 15.34	0.06 0.16 0.27 0.52 1.17
(2) LPA-80063/6CFx5 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 10.55 1/2" Ice 11.21 1" Ice 11.84 2" Ice 13.13 4" Ice 15.83	10.65 11.91 12.88 14.89 19.13	0.05 0.14 0.25 0.48 1.09
APX18-206516L-CT0 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 3.74 1/2" Ice 4.16 1" Ice 4.59 2" Ice 5.54 4" Ice 7.57	3.29 4.00 4.66 6.04 9.02	0.04 0.07 0.11 0.21 0.52
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
DB-T1-6Z-8AB-0Z	C	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 5.60 1/2" Ice 5.92 1" Ice 6.24 2" Ice 6.91 4" Ice 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
RRH2X40-AWS	C	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 2.52 1/2" Ice 2.75 1" Ice 2.99 2" Ice 3.50 4" Ice 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
BXA-171063/8CF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 3.14 1/2" Ice 3.52 1" Ice 3.92 2" Ice 4.80 4" Ice 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49
BXA-70040/6CFx4 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 16.55 1/2" Ice 17.27 1" Ice 17.96 2" Ice 19.37 4" Ice 22.30	7.37 8.54 9.42 11.23 15.34	0.06 0.16 0.27 0.52 1.17
APX18-206516L-CT0 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 3.74 1/2" Ice 4.16 1" Ice 4.59 2" Ice 5.54 4" Ice 7.57	3.29 4.00 4.66 6.04 9.02	0.04 0.07 0.11 0.21 0.52
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 0.00	0.0000	177.00	No Ice 0.37 1/2" Ice 0.45 1" Ice 0.54 2" Ice 0.75 4" Ice 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
(2) SC-E 6014 rev2 w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	177.00	No Ice 3.78 1/2" Ice 4.18	4.40 5.01	0.03 0.07

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CA _A	CA _A	Weight K		
						Front	Side			
Sector Mount [SM 502-3]	C	None		0.0000	177.00	1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.44 7.29 33.02 47.36 61.70 90.38 147.74	5.64 6.96 9.90 33.02 47.36 61.70 90.38 147.74	0.12 0.22 0.54 1.67 2.22 2.77 3.88 6.08	
LLPX310R w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70 1.79 1.97 2.16 2.57 3.49	2.98 3.53 4.09 5.31 8.13 0.78 0.92 1.07 1.39 2.14	0.05 0.08 0.13 0.23 0.54 0.03 0.04 0.06 0.09 0.20	
FDD_R6_RRH	A	From Leg	4.00 0.00 0.00	0.0000	168.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49 1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14 0.03 0.04 0.06 0.09 0.20	
LLPX310R w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	168.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70 1.79 1.97 2.16 2.57 3.49	2.98 3.53 4.09 5.31 8.13 0.78 0.92 1.07 1.39 2.14	0.05 0.08 0.13 0.23 0.54 0.03 0.04 0.06 0.09 0.20
FDD_R6_RRH	B	From Leg	4.00 0.00 0.00	0.0000	168.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49 1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14 0.03 0.04 0.06 0.09 0.20	
LLPX310R w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	168.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70 1.79 1.97 2.16 2.57 3.49	2.98 3.53 4.09 5.31 8.13 0.78 0.92 1.07 1.39 2.14	0.05 0.08 0.13 0.23 0.54 0.03 0.04 0.06 0.09 0.20
FDD_R6_RRH	C	From Leg	4.00 0.00 0.00	0.0000	168.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.79 1.97 2.16 2.57 3.49 1.79 1.97 2.16 2.57 3.49	0.78 0.92 1.07 1.39 2.14 0.03 0.04 0.06 0.09 0.20	
Sector Mount [SM 411-3]	C	None		0.0000	168.00	168.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	21.88 30.68 39.48 57.08 92.28 21.88 30.68 39.48 57.08 92.28	21.88 30.68 39.48 57.08 92.28 1.07 1.48 1.90 2.73 4.40	
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	A	From Leg	4.00 0.00 2.00	0.0000	158.00	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.55 1.72 1.90 2.28 3.14 1.14 1.28 1.44 1.77 2.54	0.81 0.94 1.09 1.40 2.12 0.39 0.49 0.59 0.83 1.41	0.03 0.04 0.05 0.09 0.19 0.02 0.03 0.04 0.06 0.14
DTMABP7819VG12A	A	From Leg	4.00 0.00 2.00	0.0000	158.00	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54 2.94 3.17	0.39 0.49 0.59 0.83 1.41 1.25 1.41	0.02 0.03 0.04 0.06 0.14 0.06 0.07
(2) RRUS-11	A	From Leg	4.00 0.00	0.0000	158.00	158.00	No Ice 1/2" Ice	2.94 3.17	1.25 1.41	0.06 0.07

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	Project	14256O1400	Date
	Client	Crown Castle	Designed by Jarel Duncan

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CA _A	CA _A	Weight
						Front	Side	
			2.00			1" Ice	3.41	0.10
						2" Ice	3.91	0.15
						4" Ice	5.02	0.30
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	8.50	6.30
						1/2" Ice	9.15	7.48
						1" Ice	9.77	8.37
						2" Ice	11.03	10.18
						4" Ice	13.68	14.02
7020.00	A	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	0.12	0.20
						1/2" Ice	0.17	0.28
						1" Ice	0.23	0.36
						2" Ice	0.38	0.56
						4" Ice	0.78	1.05
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	6.12	4.25
						1/2" Ice	6.63	5.01
						1" Ice	7.13	5.71
						2" Ice	8.16	7.16
						4" Ice	10.36	10.41
(2) LGP13519	A	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	0.34	0.21
						1/2" Ice	0.42	0.28
						1" Ice	0.51	0.36
						2" Ice	0.73	0.55
						4" Ice	1.25	1.03
DC6-48-60-18-8F	A	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	2.57	4.32
						1/2" Ice	2.80	4.60
						1" Ice	3.04	4.88
						2" Ice	3.54	5.49
						4" Ice	4.66	6.80
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	B	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	1.55	0.81
						1/2" Ice	1.72	0.94
						1" Ice	1.90	1.09
						2" Ice	2.28	1.40
						4" Ice	3.14	2.12
(2) SBNH-1D6565C w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	11.68	9.84
						1/2" Ice	12.40	11.37
						1" Ice	13.14	12.91
						2" Ice	14.60	15.27
						4" Ice	17.87	20.14
DTMABP7819VG12A	B	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	1.14	0.39
						1/2" Ice	1.28	0.49
						1" Ice	1.44	0.59
						2" Ice	1.77	0.83
						4" Ice	2.54	1.41
(2) RRUS-11	B	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	2.94	1.25
						1/2" Ice	3.17	1.41
						1" Ice	3.41	1.59
						2" Ice	3.91	1.96
						4" Ice	5.02	2.82
7020.00	B	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	0.12	0.20
						1/2" Ice	0.17	0.28
						1" Ice	0.23	0.36
						2" Ice	0.38	0.56
						4" Ice	0.78	1.05
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice	6.12	4.25
						1/2" Ice	6.63	5.01
						1" Ice	7.13	5.71
						2" Ice	8.16	7.16

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	Client Crown Castle							Designed by Jarel Duncan

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	CAA Front	CAA Side	Weight K	
(2) LGP13519	B	From Leg	4.00 0.00 2.00	0.0000	158.00	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.36 0.34 0.42 0.51 0.73 1.25	10.41 0.21 0.28 0.36 0.55 1.03	0.66 0.01 0.01 0.01 0.02 0.07
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	C	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.55 1.72 1.90 2.28 3.14	0.81 0.94 1.09 1.40 2.12	0.03 0.04 0.05 0.09 0.19
DTMABP7819VG12A	C	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54	0.39 0.49 0.59 0.83 1.41	0.02 0.03 0.04 0.06 0.14
(2) RRUS-11	C	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.94 3.17 3.41 3.91 5.02	1.25 1.41 1.59 1.96 2.82	0.06 0.07 0.10 0.15 0.30
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
7020.00	C	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.78	0.20 0.28 0.36 0.56 1.05	0.00 0.01 0.01 0.02 0.07
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP13519	C	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.34 0.42 0.51 0.73 1.25	0.21 0.28 0.36 0.55 1.03	0.01 0.01 0.01 0.02 0.07
Sector Mount [SM 502-3]	C	None		0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	33.02 47.36 61.70 90.38 147.74	33.02 47.36 61.70 90.38 147.74	1.67 2.22 2.77 3.88 6.08

Empty Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 5.42	0.03 0.04 0.06 0.10 0.26
Empty Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	158.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 0.10 0.26	0.03 0.04 0.06 0.10 0.26

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Dishes

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Tower Pressures - No Ice

$$G_H = 1.121$$

Section Elevation	z	Kz	qz	AG	Fae	AF	AR	Aleg	Leg %	CAA In Face ft ²	CAA Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
T1 180.00-160.00	170.00	1.597	30	175.208	A	4.542	30.849	9.583	27.08	0.000	0.000
					B	0.000	22.647		42.32	0.000	0.000
					C	5.000	59.306		14.90	0.000	0.000
T2 160.00-140.00	150.00	1.541	29	197.508	A	6.667	41.766	11.688	24.13	0.000	0.000
					B	0.000	25.532		45.78	0.000	0.000
					C	5.000	70.713		15.44	0.000	0.000
T3 140.00-120.00	130.00	1.48	27	240.843	A	6.667	53.591	15.027	24.94	0.000	0.000
					B	0.000	31.871		47.15	0.000	0.000
					C	5.000	77.942		18.12	0.000	0.000
T4 120.00-100.00	110.00	1.411	26	285.953	A	6.667	57.230	18.582	29.08	0.000	0.000
					B	0.000	35.103		52.94	0.000	0.000
					C	5.000	81.906		21.38	0.000	0.000
T5 100.00-80.00	90.00	1.332	25	334.291	A	6.667	59.042	18.595	28.30	0.000	0.000
					B	0.000	36.796		50.53	0.000	0.000
					C	5.000	83.814		20.94	0.000	0.000
T6 80.00-60.00	70.00	1.24	23	386.897	A	6.667	65.788	22.141	30.56	0.000	0.000
					B	0.000	43.585		50.80	0.000	0.000
					C	5.000	90.524		23.18	0.000	0.000
T7 60.00-40.00	50.00	1.126	21	436.897	A	6.667	67.906	22.141	29.69	0.000	0.000
					B	0.000	45.644		48.51	0.000	0.000
					C	5.000	92.691		22.66	0.000	0.000
T8 40.00-20.00	30.00	1	18	488.253	A	6.667	74.136	22.147	27.41	0.000	0.000
					B	0.000	51.048		43.38	0.000	0.000
					C	5.000	97.808		21.54	0.000	0.000
T9 20.00-0.00	10.00	1	18	542.945	A	6.667	85.852	28.825	31.16	0.000	0.000
					B	0.000	59.180		48.71	0.000	0.000
					C	5.000	102.281		26.87	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.121$$

Section Elevation	z	Kz	qz	tz	AG	Fae	AF	AR	Aleg	Leg %	CAA In Face ft ²	CAA Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
T1 180.00-160.00	170.00	1.597	6	0.9130	178.252	A	13.586	49.953	15.670	24.66	0.000	0.000
						B	0.000	39.534		39.64	0.000	0.000
						C	52.496	40.396		16.87	0.000	0.000
T2 160.00-140.00	150.00	1.541	6	0.8994	200.510	A	23.945	62.090	17.695	20.57	0.000	0.000
						B	0.000	42.831		41.31	0.000	0.000
						C	60.655	52.790		15.60	0.000	0.000
T3 140.00-120.00	130.00	1.48	5	0.8841	.243.795	A	28.802	72.218	20.932	20.72	0.000	0.000
						B	0.000	50.316		41.60	0.000	0.000
						C	61.531	61.387		17.03	0.000	0.000
T4 120.00-100.00	110.00	1.411	5	0.8666	288.846	A	28.686	74.903	24.372	23.53	0.000	0.000
						B	0.000	51.497		47.33	0.000	0.000
						C	61.492	64.783		19.30	0.000	0.000

tnxTower

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Job	NHV 108 943133, CT (BU# 806362)	Page
		17 of 47
Project	14256O1400	Date
Client	Crown Castle	Designed by
		Jarel Duncan

Section Elevation	z	K _Z	q _z	t _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
	ft	ft	psf	in	ft ²	c e	ft ²	ft ²	ft ²	%	ft ²	ft ²
T5 100.00-80.00	90.00	1.332	5	0.8460	337.117	A	28.548	77.391	24.250	22.89	0.000	0.000
						B	0.000	53.905		44.99	0.000	0.000
						C	61.447	67.484		18.81	0.000	0.000
T6 80.00-60.00	70.00	1.24	4	0.8208	389.638	A	28.381	84.441	27.627	24.49	0.000	0.000
						B	0.000	61.317		45.06	0.000	0.000
						C	61.391	74.623		20.31	0.000	0.000
T7 60.00-40.00	50.00	1.126	4	0.7883	439.529	A	28.164	86.622	27.410	23.88	0.000	0.000
						B	0.000	63.802		42.96	0.000	0.000
						C	61.319	76.987		19.82	0.000	0.000
T8 40.00-20.00	30.00	1	4	0.7500	490.759	A	27.908	94.676	27.162	22.16	0.000	0.000
						B	0.000	69.460		39.10	0.000	0.000
						C	61.233	81.834		18.99	0.000	0.000
T9 20.00-0.00	10.00	1	4	0.7500	545.450	A	27.908	110.287	33.838	24.49	0.000	0.000
						B	0.000	80.086		42.25	0.000	0.000
						C	61.233	86.281		22.94	0.000	0.000

Tower Pressure - Service

$$G_H = 1.121$$

Section Elevation	z	K _Z	q _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
	ft	ft	psf	ft ²	c e	ft ²	ft ²	ft ²	%	ft ²	ft ²
T1 180.00-160.00	170.00	1.597	10	175.208	A	4.542	30.849	9.583	27.08	0.000	0.000
					B	0.000	22.647		42.32	0.000	0.000
					C	5.000	59.306		14.90	0.000	0.000
T2 160.00-140.00	150.00	1.541	10	197.508	A	6.667	41.766	11.688	24.13	0.000	0.000
					B	0.000	25.532		45.78	0.000	0.000
					C	5.000	70.713		15.44	0.000	0.000
T3 140.00-120.00	130.00	1.48	9	240.843	A	6.667	53.591	15.027	24.94	0.000	0.000
					B	0.000	31.871		47.15	0.000	0.000
					C	5.000	77.942		18.12	0.000	0.000
T4 120.00-100.00	110.00	1.411	9	285.953	A	6.667	57.230	18.582	29.08	0.000	0.000
					B	0.000	35.103		52.94	0.000	0.000
					C	5.000	81.906		21.38	0.000	0.000
T5 100.00-80.00	90.00	1.332	9	334.291	A	6.667	59.042	18.595	28.30	0.000	0.000
					B	0.000	36.796		50.53	0.000	0.000
					C	5.000	83.814		20.94	0.000	0.000
T6 80.00-60.00	70.00	1.24	8	386.897	A	6.667	65.788	22.141	30.56	0.000	0.000
					B	0.000	43.585		50.80	0.000	0.000
					C	5.000	90.524		23.18	0.000	0.000
T7 60.00-40.00	50.00	1.126	7	436.897	A	6.667	67.906	22.141	29.69	0.000	0.000
					B	0.000	45.644		48.51	0.000	0.000
					C	5.000	92.691		22.66	0.000	0.000
T8 40.00-20.00	30.00	1	6	488.253	A	6.667	74.136	22.147	27.41	0.000	0.000
					B	0.000	51.048		43.38	0.000	0.000
					C	5.000	97.808		21.54	0.000	0.000
T9 20.00-0.00	10.00	1	6	542.945	A	6.667	85.852	28.825	31.16	0.000	0.000
					B	0.000	59.180		48.71	0.000	0.000
					C	5.000	102.281		26.87	0.000	0.000

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Job	NHV 108 943133, CT (BU# 806362)	Page
Project	1425601400	Date
Client	Crown Castle	Designed by Jarel Duncan

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
									f ²	K	plf	
T1 180.00-160.00	1.22	1.14	A	0.202	2.589	0.591	1	1	22.768	3.03	151.44	C
			B	0.129	2.849	0.579	1	1	13.102			
			C	0.367	2.133	0.639	1	1	42.879			
T2 160.00-140.00	1.68	1.46	A	0.245	2.452	0.601	1	1	31.754	3.39	169.62	C
			B	0.129	2.849	0.579	1	1	14.771			
			C	0.383	2.098	0.645	1	1	50.606			
T3 140.00-120.00	1.74	1.95	A	0.25	2.437	0.602	1	1	38.924	3.63	181.40	C
			B	0.132	2.838	0.579	1	1	18.451			
			C	0.344	2.185	0.63	1	1	54.142			
T4 120.00-100.00	1.74	2.47	A	0.223	2.52	0.595	1	1	40.745	3.71	185.63	C
			B	0.123	2.874	0.578	1	1	20.278			
			C	0.304	2.286	0.617	1	1	55.545			
T5 100.00-80.00	1.74	2.65	A	0.197	2.608	0.59	1	1	41.484	3.68	184.20	C
			B	0.11	2.924	0.576	1	1	21.201			
			C	0.266	2.391	0.606	1	1	55.791			
T6 80.00-60.00	1.74	3.18	A	0.187	2.639	0.588	1	1	45.342	3.74	186.81	C
			B	0.113	2.914	0.576	1	1	25.126			
			C	0.247	2.447	0.601	1	1	59.413			
T7 60.00-40.00	1.74	4.16	A	0.171	2.697	0.585	1	1	46.382	3.54	177.00	C
			B	0.104	2.946	0.576	1	1	26.271			
			C	0.224	2.519	0.595	1	1	60.197			
T8 40.00-20.00	1.75	4.37	A	0.165	2.715	0.584	1	1	49.960	3.34	167.15	C
			B	0.105	2.946	0.576	1	1	29.382			
			C	0.211	2.561	0.593	1	1	62.962			
T9 20.00-0.00	1.75	4.51	A	0.17	2.698	0.585	1	1	56.874	3.53	176.36	C
			B	0.109	2.928	0.576	1	1	34.091			
			C	0.198	2.604	0.59	1	1	65.337			
Sum Weight:	15.12	25.88					OTM		2809.45 kip-ft	31.59		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
									f ²	K	plf	
T1 180.00-160.00	1.22	1.14	A	0.202	2.589	0.591	0.8	1	21.859	2.96	147.91	C
			B	0.129	2.849	0.579	0.8	1	13.102			
			C	0.367	2.133	0.639	0.8	1	41.879			
T2 160.00-140.00	1.68	1.46	A	0.245	2.452	0.601	0.8	1	30.420	3.33	166.27	C
			B	0.129	2.849	0.579	0.8	1	14.771			
			C	0.383	2.098	0.645	0.8	1	49.606			
T3 140.00-120.00	1.74	1.95	A	0.25	2.437	0.602	0.8	1	37.591	3.56	178.05	C
			B	0.132	2.838	0.579	0.8	1	18.451			
			C	0.344	2.185	0.63	0.8	1	53.142			
T4 120.00-100.00	1.74	2.47	A	0.223	2.52	0.595	0.8	1	39.412	3.65	182.29	C
			B	0.123	2.874	0.578	0.8	1	20.278			
			C	0.304	2.286	0.617	0.8	1	54.545			
T5 100.00-80.00	1.74	2.65	A	0.197	2.608	0.59	0.8	1	40.151	3.62	180.90	C
			B	0.11	2.924	0.576	0.8	1	21.201			
			C	0.266	2.391	0.606	0.8	1	54.791			
T6 80.00-60.00	1.74	3.18	A	0.187	2.639	0.588	0.8	1	44.009	3.67	183.67	C
			B	0.113	2.914	0.576	0.8	1	25.126			

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Job	NHV 108 943133, CT (BU# 806362)	Page	19 of 47
Project	14256O1400	Date	15:59:40 03/25/14
Client	Crown Castle	Designed by	Jarel Duncan

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T7 60.00-40.00	1.74	4.16	C	0.247	2.447	0.601	0.8	1	58.413			
			A	0.171	2.697	0.585	0.8	1	45.049	3.48	174.06	C
			B	0.104	2.946	0.576	0.8	1	26.271			
T8 40.00-20.00	1.75	4.37	C	0.224	2.519	0.595	0.8	1	59.197			
			A	0.165	2.715	0.584	0.8	1	48.627	3.29	164.50	C
			B	0.105	2.946	0.576	0.8	1	29.382			
T9 20.00-0.00	1.75	4.51	C	0.211	2.561	0.593	0.8	1	61.962			
			A	0.17	2.698	0.585	0.8	1	55.540	3.47	173.67	C
			B	0.109	2.928	0.576	0.8	1	34.091			
Sum Weight:	15.12	25.88	C	0.198	2.604	0.59	0.8	1	64.337			
							OTM		2755.90 kip-ft	31.03		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00-160.00	1.22	1.14	A	0.202	2.589	0.591	0.85	1	22.086	2.98	148.79	C
			B	0.129	2.849	0.579	0.85	1	13.102			
			C	0.367	2.133	0.639	0.85	1	42.129			
T2 160.00-140.00	1.68	1.46	A	0.245	2.452	0.601	0.85	1	30.754	3.34	167.11	C
			B	0.129	2.849	0.579	0.85	1	14.771			
			C	0.383	2.098	0.645	0.85	1	49.856			
T3 140.00-120.00	1.74	1.95	A	0.25	2.437	0.602	0.85	1	37.924	3.58	178.89	C
			B	0.132	2.838	0.579	0.85	1	18.451			
			C	0.344	2.185	0.63	0.85	1	53.392			
T4 120.00-100.00	1.74	2.47	A	0.223	2.52	0.595	0.85	1	39.745	3.66	183.12	C
			B	0.123	2.874	0.578	0.85	1	20.278			
			C	0.304	2.286	0.617	0.85	1	54.795			
T5 100.00-80.00	1.74	2.65	A	0.197	2.608	0.59	0.85	1	40.484	3.63	181.73	C
			B	0.11	2.924	0.576	0.85	1	21.201			
			C	0.266	2.391	0.606	0.85	1	55.041			
T6 80.00-60.00	1.74	3.18	A	0.187	2.639	0.588	0.85	1	44.342	3.69	184.45	C
			B	0.113	2.914	0.576	0.85	1	25.126			
			C	0.247	2.447	0.601	0.85	1	58.663			
T7 60.00-40.00	1.74	4.16	A	0.171	2.697	0.585	0.85	1	45.382	3.50	174.80	C
			B	0.104	2.946	0.576	0.85	1	26.271			
			C	0.224	2.519	0.595	0.85	1	59.447			
T8 40.00-20.00	1.75	4.37	A	0.165	2.715	0.584	0.85	1	48.960	3.30	165.16	C
			B	0.105	2.946	0.576	0.85	1	29.382			
			C	0.211	2.561	0.593	0.85	1	62.212			
T9 20.00-0.00	1.75	4.51	A	0.17	2.698	0.585	0.85	1	55.874	3.49	174.34	C
			B	0.109	2.928	0.576	0.85	1	34.091			
			C	0.198	2.604	0.59	0.85	1	64.587			
Sum Weight:	15.12	25.88					OTM		2769.29 kip-ft	31.17		

Tower Forces - With Ice - Wind Normal To Face

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Job

NHV 108 943133, CT (BU# 806362)

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Project

14256O1400

Date

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Client

Crown Castle

Designed by

Jarel Duncan

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00-160.00	2.84	2.31	A B C	0.356 0.222 0.521	2.157 2.525 1.874	0.635 0.595 0.709	1 1 1	1 1 1	45.296 23.526 81.116	0.99	49.25	C
T2 160.00-140.00	4.02	2.71	A B C	0.429 0.214 0.566	2.009 2.551 1.829	0.664 0.593 0.733	1 1 1	1 1 1	65.166 25.410 99.364	1.14	56.82	C
T3 140.00-120.00	4.25	3.43	A B C	0.414 0.206 0.504	2.036 2.575 1.895	0.658 0.592 0.7	1 1 1	1 1 1	76.291 29.773 104.480	1.19	59.40	C
T4 120.00-100.00	4.21	3.89	A B C	0.359 0.178 0.437	2.152 2.67 1.995	0.636 0.586 0.667	1 1 1	1 1 1	76.293 30.188 104.733	1.20	59.78	C
T5 100.00-80.00	4.17	4.17	A B C	0.314 0.16 0.382	2.259 2.735 2.1	0.62 0.583 0.645	1 1 1	1 1 1	76.558 31.429 104.947	1.19	59.54	C
T6 80.00-60.00	4.11	4.92	A B C	0.29 0.157 0.349	2.324 2.745 2.174	0.613 0.583 0.632	1 1 1	1 1 1	80.123 35.725 108.563	1.19	59.34	C
T7 60.00-40.00	4.04	5.98	A B C	0.261 0.145 0.315	2.404 2.789 2.258	0.605 0.581 0.62	1 1 1	1 1 1	80.552 37.053 109.089	1.13	56.25	C
T8 40.00-20.00	3.99	6.32	A B C	0.25 0.142 0.292	2.438 2.803 2.319	0.602 0.58 0.613	1 1 1	1 1 1	84.886 40.302 111.426	1.05	52.41	C
T9 20.00-0.00	3.99	6.47	A B C	0.253 0.147 0.27	2.427 2.783 2.378	0.603 0.581 0.607	1 1 1	1 1 1	94.383 46.530 113.632	1.10	54.80	C
Sum Weight:	35.63	40.20						OTM	kip-ft	912.79	10.15	

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00-160.00	2.84	2.31	A B C	0.356 0.222 0.521	2.157 2.525 1.874	0.635 0.595 0.709	0.8 0.8 0.8	1 1 1	42.579 23.526 70.617	0.86	42.88	C
T2 160.00-140.00	4.02	2.71	A B C	0.429 0.214 0.566	2.009 2.551 1.829	0.664 0.593 0.733	0.8 0.8 0.8	1 1 1	60.377 25.410 87.233	1.00	49.88	C
T3 140.00-120.00	4.25	3.43	A B C	0.414 0.206 0.504	2.036 2.575 1.895	0.658 0.592 0.7	0.8 0.8 0.8	1 1 1	70.530 29.773 92.174	1.05	52.41	C
T4 120.00-100.00	4.21	3.89	A B C	0.359 0.178 0.437	2.152 2.67 1.995	0.636 0.586 0.667	0.8 0.8 0.8	1 1 1	70.556 30.188 92.434	1.06	52.76	C
T5 100.00-80.00	4.17	4.17	A B C	0.314 0.16 0.382	2.259 2.735 2.1	0.62 0.583 0.645	0.8 0.8 0.8	1 1 1	70.849 31.429 92.657	1.05	52.56	C
T6 80.00-60.00	4.11	4.92	A B C	0.29 0.157 0.349	2.324 2.745 2.174	0.613 0.583 0.632	0.8 0.8 0.8	1 1 1	74.447 35.725 96.285	1.05	52.63	C
T7 60.00-40.00	4.04	5.98	A B	0.261 0.145	2.404 2.789	0.605 0.581	0.8 0.8	1 1	74.919 37.053	1.00	49.93	C

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NHV 108 943133, CT (BU# 806362)

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Project

1425601400

Date

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Client

Crown Castle

Designed by

Jarel Duncan

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
									f ²	K	plf	
T8 40.00-20.00	3.99	6.32	C A B C	0.315 0.25 0.142 0.292	2.258 2.438 2.803 2.319	0.62 0.602 0.58 0.613	0.8 0.8 0.8 0.8	1 1 1 1	96.825 79.304 40.302 99.179	0.93	46.65	C
T9 20.00-0.00	3.99	6.47	A B C	0.253 0.147 0.27	2.427 2.783 2.378	0.603 0.581 0.607	0.8 0.8 0.8	1 1 1	88.801 46.530 101.385	0.98	48.89	C
Sum Weight:	35.63	40.20						OTM	803.77 kip-ft	8.97		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
									f ²	K	plf	
T1 180.00-160.00	2.84	2.31	A B C	0.356 0.222 0.521	2.157 2.525 1.874	0.635 0.595 0.709	0.85 0.85 0.85	1 1 1	43.258 23.526 73.242	0.89	44.47	C
T2 160.00-140.00	4.02	2.71	A B C	0.429 0.214 0.566	2.009 2.551 1.829	0.664 0.593 0.733	0.85 0.85 0.85	1 1 1	61.574 25.410 90.265	1.03	51.62	C
T3 140.00-120.00	4.25	3.43	A B C	0.414 0.206 0.504	2.036 2.575 1.895	0.658 0.592 0.7	0.85 0.85 0.85	1 1 1	71.970 29.773 95.251	1.08	54.16	C
T4 120.00-100.00	4.21	3.89	A B C	0.359 0.178 0.437	2.152 2.67 1.995	0.636 0.586 0.667	0.85 0.85 0.85	1 1 1	71.990 30.188 95.509	1.09	54.52	C
T5 100.00-80.00	4.17	4.17	A B C	0.314 0.16 0.382	2.259 2.735 2.1	0.62 0.583 0.645	0.85 0.85 0.85	1 1 1	72.276 31.429 95.730	1.09	54.31	C
T6 80.00-60.00	4.11	4.92	A B C	0.29 0.157 0.349	2.324 2.745 2.174	0.613 0.583 0.632	0.85 0.85 0.85	1 1 1	75.866 35.725 99.355	1.09	54.30	C
T7 60.00-40.00	4.04	5.98	A B C	0.261 0.145 0.315	2.404 2.789 2.258	0.605 0.581 0.62	0.85 0.85 0.85	1 1 1	76.327 37.053 99.891	1.03	51.51	C
T8 40.00-20.00	3.99	6.32	A B C	0.25 0.142 0.292	2.438 2.803 2.319	0.602 0.58 0.613	0.85 0.85 0.85	1 1 1	80.700 40.302 102.241	0.96	48.09	C
T9 20.00-0.00	3.99	6.47	A B C	0.253 0.147 0.27	2.427 2.783 2.378	0.603 0.581 0.607	0.85 0.85 0.85	1 1 1	90.196 46.530 104.447	1.01	50.37	C
Sum Weight:	35.63	40.20						OTM	831.02 kip-ft	9.27		

Tower Forces - Service - Wind Normal To Face

tnxTower FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Job	NHV 108 943133, CT (BU# 806362)	Page
	Project	14256O1400	Date
	Client	Crown Castle	Designed by Jarel Duncan

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F	w plf	Ctrl. Face
T1 180.00-160.00	1.22	1.14	A	0.202	2.589	0.591	1	1	22.768	1.05	52.40	C
			B	0.129	2.849	0.579	1	1	13.102			
			C	0.367	2.133	0.639	1	1	42.879			
T2 160.00-140.00	1.68	1.46	A	0.245	2.452	0.601	1	1	31.754	1.17	58.69	C
			B	0.129	2.849	0.579	1	1	14.771			
			C	0.383	2.098	0.645	1	1	50.606			
T3 140.00-120.00	1.74	1.95	A	0.25	2.437	0.602	1	1	38.924	1.26	62.77	C
			B	0.132	2.838	0.579	1	1	18.451			
			C	0.344	2.185	0.63	1	1	54.142			
T4 120.00-100.00	1.74	2.47	A	0.223	2.52	0.595	1	1	40.745	1.28	64.23	C
			B	0.123	2.874	0.578	1	1	20.278			
			C	0.304	2.286	0.617	1	1	55.545			
T5 100.00-80.00	1.74	2.65	A	0.197	2.608	0.59	1	1	41.484	1.27	63.74	C
			B	0.11	2.924	0.576	1	1	21.201			
			C	0.266	2.391	0.606	1	1	55.791			
T6 80.00-60.00	1.74	3.18	A	0.187	2.639	0.588	1	1	45.342	1.29	64.64	C
			B	0.113	2.914	0.576	1	1	25.126			
			C	0.247	2.447	0.601	1	1	59.413			
T7 60.00-40.00	1.74	4.16	A	0.171	2.697	0.585	1	1	46.382	1.22	61.25	C
			B	0.104	2.946	0.576	1	1	26.271			
			C	0.224	2.519	0.595	1	1	60.197			
T8 40.00-20.00	1.75	4.37	A	0.165	2.715	0.584	1	1	49.960	1.16	57.84	C
			B	0.105	2.946	0.576	1	1	29.382			
			C	0.211	2.561	0.593	1	1	62.962			
T9 20.00-0.00	1.75	4.51	A	0.17	2.698	0.585	1	1	56.874	1.22	61.03	C
			B	0.109	2.928	0.576	1	1	34.091			
			C	0.198	2.604	0.59	1	1	65.337			
Sum Weight:	15.12	25.88					OTM		972.13 kip-ft	10.93		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F	w plf	Ctrl. Face
T1 180.00-160.00	1.22	1.14	A	0.202	2.589	0.591	0.8	1	21.859	1.02	51.18	C
			B	0.129	2.849	0.579	0.8	1	13.102			
			C	0.367	2.133	0.639	0.8	1	41.879			
T2 160.00-140.00	1.68	1.46	A	0.245	2.452	0.601	0.8	1	30.420	1.15	57.53	C
			B	0.129	2.849	0.579	0.8	1	14.771			
			C	0.383	2.098	0.645	0.8	1	49.606			
T3 140.00-120.00	1.74	1.95	A	0.25	2.437	0.602	0.8	1	37.591	1.23	61.61	C
			B	0.132	2.838	0.579	0.8	1	18.451			
			C	0.344	2.185	0.63	0.8	1	53.142			
T4 120.00-100.00	1.74	2.47	A	0.223	2.52	0.595	0.8	1	39.412	1.26	63.08	C
			B	0.123	2.874	0.578	0.8	1	20.278			
			C	0.304	2.286	0.617	0.8	1	54.545			
T5 100.00-80.00	1.74	2.65	A	0.197	2.608	0.59	0.8	1	40.151	1.25	62.60	C
			B	0.11	2.924	0.576	0.8	1	21.201			
			C	0.266	2.391	0.606	0.8	1	54.791			
T6 80.00-60.00	1.74	3.18	A	0.187	2.639	0.588	0.8	1	44.009	1.27	63.55	C
			B	0.113	2.914	0.576	0.8	1	25.126			
			C	0.247	2.447	0.601	0.8	1	58.413			
T7 60.00-40.00	1.74	4.16	A	0.171	2.697	0.585	0.8	1	45.049	1.20	60.23	C
			B	0.104	2.946	0.576	0.8	1	26.271			

tnxTower FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Job NHV 108 943133, CT (BU# 806362)	Page 23 of 47
	Project 14256O1400	Date 15:59:40 03/25/14
	Client Crown Castle	Designed by Jarel Duncan

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F	w plf	Ctrl. Face	
T8 40.00-20.00	1.75	4.37	C	0.224	2.519	0.595	0.8	1	59.197				
			A	0.165	2.715	0.584	0.8	1	48.627	1.14	56.92	C	
			B	0.105	2.946	0.576	0.8	1	29.382				
			C	0.211	2.561	0.593	0.8	1	61.962				
T9 20.00-0.00	1.75	4.51	A	0.17	2.698	0.585	0.8	1	55.540		1.20	60.09	C
			B	0.109	2.928	0.576	0.8	1	34.091				
			C	0.198	2.604	0.59	0.8	1	64.337				
Sum Weight:	15.12	25.88						OTM	953.60 kip-ft		10.74		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F	w plf	Ctrl. Face	
T1 180.00-160.00	1.22	1.14	A	0.202	2.589	0.591	0.85	1	22.086	1.03	51.49	C	
			B	0.129	2.849	0.579	0.85	1	13.102				
			C	0.367	2.133	0.639	0.85	1	42.129				
T2 160.00-140.00	1.68	1.46	A	0.245	2.452	0.601	0.85	1	30.754	1.16	57.82	C	
			B	0.129	2.849	0.579	0.85	1	14.771				
			C	0.383	2.098	0.645	0.85	1	49.856				
T3 140.00-120.00	1.74	1.95	A	0.25	2.437	0.602	0.85	1	37.924	1.24	61.90	C	
			B	0.132	2.838	0.579	0.85	1	18.451				
			C	0.344	2.185	0.63	0.85	1	53.392				
T4 120.00-100.00	1.74	2.47	A	0.223	2.52	0.595	0.85	1	39.745	1.27	63.36	C	
			B	0.123	2.874	0.578	0.85	1	20.278				
			C	0.304	2.286	0.617	0.85	1	54.795				
T5 100.00-80.00	1.74	2.65	A	0.197	2.608	0.59	0.85	1	40.484	1.26	62.88	C	
			B	0.11	2.924	0.576	0.85	1	21.201				
			C	0.266	2.391	0.606	0.85	1	55.041				
T6 80.00-60.00	1.74	3.18	A	0.187	2.639	0.588	0.85	1	44.342	1.28	63.82	C	
			B	0.113	2.914	0.576	0.85	1	25.126				
			C	0.247	2.447	0.601	0.85	1	58.663				
T7 60.00-40.00	1.74	4.16	A	0.171	2.697	0.585	0.85	1	45.382	1.21	60.48	C	
			B	0.104	2.946	0.576	0.85	1	26.271				
			C	0.224	2.519	0.595	0.85	1	59.447				
T8 40.00-20.00	1.75	4.37	A	0.165	2.715	0.584	0.85	1	48.960	1.14	57.15	C	
			B	0.105	2.946	0.576	0.85	1	29.382				
			C	0.211	2.561	0.593	0.85	1	62.212				
T9 20.00-0.00	1.75	4.51	A	0.17	2.698	0.585	0.85	1	55.874		1.21	60.33	C
			B	0.109	2.928	0.576	0.85	1	34.091				
			C	0.198	2.604	0.59	0.85	1	64.587				
Sum Weight:	15.12	25.88						OTM	958.23 kip-ft		10.78		

Discrete Appurtenance Pressures - No Ice $G_H = 1.121$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z psf	C _{Ac} Front ft ²	C _{Ac} Side ft ²
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 FDH Engineering, Inc. <i>6521 Meridien Drive</i> <i>Raleigh, NC 27616</i> <i>Phone: (919) 755-1012</i> <i>FAX: (919) 755-1031</i>	Job	NHV 108 943133, CT (BU# 806362)	Page
	Project	14256O1400	Date
	Client	Crown Castle	Designed by Jarel Duncan

Description	Aiming Azimuth °	Weight	Offset _x	Offset _z	z	K _z	q _z	C _{AAc} Front ft ²	C _{AAc} Side ft ²
	K	ft	ft	ft	psf				
Lightning Rod	240.0000	0.03	-4.25	2.45	182.00	1.629	30	0.25	0.25
8x2 1/2" Pipe Mount	120.0000	0.04	4.25	2.45	184.00	1.634	30	2.30	2.30
AIR 21	120.0000	0.24	4.25	2.45	188.00	1.644	30	19.25	12.83
ATMAA1412D-1A20	120.0000	0.06	4.25	2.45	180.00	1.624	30	7.00	2.80
DB846F65ZAXY w/ Mount Pipe	0.0000	0.10	0.00	-8.91	177.00	1.616	30	14.54	15.64
BXA-185063/12CFx2 w/ Mount Pipe	0.0000	0.04	0.00	-8.91	177.00	1.616	30	5.03	5.29
RRH2X40-AWS	0.0000	0.04	0.00	-8.91	177.00	1.616	30	2.52	1.59
BXA-171063/8CF w/ Mount Pipe	0.0000	0.03	0.00	-8.91	177.00	1.616	30	3.14	3.51
BXA-70040/6CFx4 w/ Mount Pipe	0.0000	0.06	0.00	-8.91	177.00	1.616	30	16.55	7.37
FD9R6004/2C-3L	0.0000	0.01	0.00	-8.91	177.00	1.616	30	0.73	0.17
RRH2X40-AWS	120.0000	0.04	7.72	4.46	177.00	1.616	30	2.52	1.59
BXA-171063/8CF w/ Mount Pipe	120.0000	0.03	7.72	4.46	177.00	1.616	30	3.14	3.51
BXA-70040/6CFx4 w/ Mount Pipe	120.0000	0.06	7.72	4.46	177.00	1.616	30	16.55	7.37
LPA-80063/6CFx5 w/ Mount Pipe	120.0000	0.10	7.72	4.46	177.00	1.616	30	21.09	21.29
APX18-206516L-CT0 w/ Mount Pipe	120.0000	0.04	7.72	4.46	177.00	1.616	30	3.74	3.29
FD9R6004/2C-3L	120.0000	0.01	7.72	4.46	177.00	1.616	30	0.73	0.17
DB-T1-6Z-8AB-0Z	240.0000	0.04	-7.72	4.46	177.00	1.616	30	5.60	2.33
RRH2X40-AWS	240.0000	0.04	-7.72	4.46	177.00	1.616	30	2.52	1.59
BXA-171063/8CF w/ Mount Pipe	240.0000	0.03	-7.72	4.46	177.00	1.616	30	3.14	3.51
BXA-70040/6CFx4 w/ Mount Pipe	240.0000	0.06	-7.72	4.46	177.00	1.616	30	16.55	7.37
APX18-206516L-CT0 w/ Mount Pipe	240.0000	0.04	-7.72	4.46	177.00	1.616	30	3.74	3.29
FD9R6004/2C-3L	240.0000	0.01	-7.72	4.46	177.00	1.616	30	0.73	0.17
SC-E 6014 rev2 w/ Mount Pipe	240.0000	0.06	-7.72	4.46	177.00	1.616	30	7.57	8.79
Sector Mount [SM 502-3]	0.0000	1.67	0.00	0.00	177.00	1.616	30	33.02	33.02
LLPX310R w/ Mount Pipe	0.0000	0.05	0.00	-8.92	168.00	1.592	29	5.07	2.98
FDD_R6_RRH	0.0000	0.03	0.00	-8.92	168.00	1.592	29	1.79	0.78
LLPX310R w/ Mount Pipe	120.0000	0.05	7.73	4.46	168.00	1.592	29	5.07	2.98
FDD_R6_RRH	120.0000	0.03	7.73	4.46	168.00	1.592	29	1.79	0.78
LLPX310R w/ Mount Pipe	240.0000	0.05	-7.73	4.46	168.00	1.592	29	5.07	2.98
FDD_R6_RRH	240.0000	0.03	-7.73	4.46	168.00	1.592	29	1.79	0.78
Sector Mount [SM 411-3]	0.0000	1.07	0.00	0.00	168.00	1.592	29	21.88	21.88
DUAL BAND 800/1900 FULL BAND MASTHEAD	0.0000	0.06	0.00	-9.05	160.00	1.570	29	3.10	1.62
DTMABP7819VG12A	0.0000	0.02	0.00	-9.05	160.00	1.570	29	1.14	0.39
RRUS-11	0.0000	0.12	0.00	-9.05	160.00	1.570	29	5.88	2.49
AM-X-CD-16-65-00T-R	0.0000	0.14	0.00	-9.05	160.00	1.570	29	17.00	12.61
ET w/ Mount Pipe 7020.00	0.0000	0.00	0.00	-9.05	160.00	1.570	29	0.12	0.20
7770.00 w/ Mount Pipe	0.0000	0.06	0.00	-9.05	160.00	1.570	29	6.12	4.25
LGP13519	0.0000	0.01	0.00	-9.05	160.00	1.570	29	0.68	0.41
DC6-48-60-18-8F	0.0000	0.03	0.00	-9.05	160.00	1.570	29	2.57	4.32
DUAL BAND 800/1900 FULL BAND	120.0000	0.06	7.84	4.53	160.00	1.570	29	3.10	1.62

tnxTower FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Job NHV 108 943133, CT (BU# 806362)	Page 25 of 47
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	Client Crown Castle	Designed by Jarel Duncan

Description	Aiming Azimuth °	Weight	Offset _x	Offset _z	z	K _z	q _z	C _{AAC} Front ft ²	C _{AAC} Side ft ²
		K	ft	ft	ft		psf		
MASTHEAD									
SBNH-1D6565C w/ Mount Pipe		120.0000	0.20	7.84	4.53	160.00	1.570	29	23.37
DTMABP7819VG12A		120.0000	0.02	7.84	4.53	160.00	1.570	29	1.14
RRUS-11		120.0000	0.12	7.84	4.53	160.00	1.570	29	5.88
7020.00		120.0000	0.00	7.84	4.53	160.00	1.570	29	0.12
7770.00 w/ Mount Pipe		120.0000	0.06	7.84	4.53	160.00	1.570	29	6.12
LGP13519		120.0000	0.01	7.84	4.53	160.00	1.570	29	0.68
DUAL BAND 800/1900		240.0000	0.06	-7.84	4.53	160.00	1.570	29	3.10
FULL BAND									
MASTHEAD									
DTMABP7819VG12A		240.0000	0.02	-7.84	4.53	160.00	1.570	29	1.14
RRUS-11		240.0000	0.12	-7.84	4.53	160.00	1.570	29	5.88
AM-X-CD-16-65-00T-R		240.0000	0.14	-7.84	4.53	160.00	1.570	29	17.00
ET w/ Mount Pipe									
7020.00		240.0000	0.00	-7.84	4.53	160.00	1.570	29	0.12
7770.00 w/ Mount Pipe		240.0000	0.06	-7.84	4.53	160.00	1.570	29	6.12
LGP13519		240.0000	0.01	-7.84	4.53	160.00	1.570	29	0.68
Sector Mount [SM 502-3]		0.0000	1.67	0.00	0.00	158.00	1.564	29	33.02
Empty Mount Pipe		0.0000	0.03	0.00	-9.05	160.00	1.570	29	1.40
Empty Mount Pipe		120.0000	0.03	7.84	4.53	160.00	1.570	29	1.40
Empty Mount Pipe		240.0000	0.03	-7.84	4.53	160.00	1.570	29	1.40
APXV18-206517S-C w/ Mount Pipe		0.0000	0.05	0.00	-6.15	148.00	1.535	28	5.40
APXV18-206517S-C w/ Mount Pipe		120.0000	0.05	5.33	3.08	148.00	1.535	28	5.40
APXV18-206517S-C w/ Mount Pipe		240.0000	0.05	-5.33	3.08	148.00	1.535	28	5.40
GPS_A		0.0000	0.00	0.00	-14.01	40.00	1.057	20	0.30
Side Arm Mount [SO 201-1]		0.0000	0.10	0.00	0.00	40.00	1.057	20	2.96
Sum Weight:			7.52						

Discrete Appurtenance Pressures - With Ice G_H = 1.121

Description	Aiming Azimuth °	Weight	Offset _x	Offset _z	z	K _z	q _z	C _{AAC} Front ft ²	C _{AAC} Side ft ²	t _z
		K	ft	ft	ft		psf			in
Lightning Rod		240.0000	0.04	-4.25	2.45	182.00	1.629	6	0.92	0.92
8'x2 1/2" Pipe Mount		120.0000	0.08	4.25	2.45	184.00	1.634	6	3.54	3.54
AIR 21		120.0000	0.49	4.25	2.45	188.00	1.644	6	21.69	15.13
ATMAA1412D-1A20		120.0000	0.17	4.25	2.45	180.00	1.624	6	8.66	4.04
DB846F65ZAXY w/ Mount Pipe		0.0000	0.35	0.00	-8.91	177.00	1.616	6	16.77	19.53
BXA-185063/12CFx2 w/ Mount Pipe		0.0000	0.13	0.00	-8.91	177.00	1.616	6	6.02	7.21
RREH2X40-AWS		0.0000	0.08	0.00	-8.91	177.00	1.616	6	2.95	1.97
BXA-171063/8CF w/ Mount Pipe		0.0000	0.09	0.00	-8.91	177.00	1.616	6	3.85	4.65
BXA-70040/6CFx4 w/ Mount Pipe		0.0000	0.25	0.00	-8.91	177.00	1.616	6	17.85	9.27
FD9R6004/2C-3L		0.0000	0.02	0.00	-8.91	177.00	1.616	6	1.06	0.37
RRH2X40-AWS		120.0000	0.08	7.72	4.46	177.00	1.616	6	2.95	1.97
BXA-171063/8CF w/ Mount Pipe		120.0000	0.09	7.72	4.46	177.00	1.616	6	3.85	4.65
BXA-70040/6CFx4 w/		120.0000	0.25	7.72	4.46	177.00	1.616	6	17.85	9.27

tnxTower

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Raleigh, NC 27616
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Job	NHV 108 943133, CT (BU# 806362)	Page
Project	14256O1400	Date
Client	Crown Castle	Designed by
		Jarel Duncan

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z psf	C _{AAC} Front ft ²	C _{AAC} Side ft ²	t _z in
Mount Pipe										
LPA-80063/6CFx5 w/ Mount Pipe		120.0000	0.46	7.72	4.46	177.00	1.616	6	23.47	25.45
APX18-206516L-CT0 w/ Mount Pipe		120.0000	0.11	7.72	4.46	177.00	1.616	6	4.52	4.55
FD9R6004/2C-3L		120.0000	0.02	7.72	4.46	177.00	1.616	6	1.06	0.37
DB-T1-6Z-8AB-0Z		240.0000	0.11	-7.72	4.46	177.00	1.616	6	6.19	2.75
RRH2X40-AWS		240.0000	0.08	-7.72	4.46	177.00	1.616	6	2.95	1.97
BXA-171063/8CF w/ Mount Pipe		240.0000	0.09	-7.72	4.46	177.00	1.616	6	3.85	4.65
BXA-70040/6CFx4 w/ Mount Pipe		240.0000	0.25	-7.72	4.46	177.00	1.616	6	17.85	9.27
APX18-206516L-CT0 w/ Mount Pipe		240.0000	0.11	-7.72	4.46	177.00	1.616	6	4.52	4.55
FD9R6004/2C-3L		240.0000	0.02	-7.72	4.46	177.00	1.616	6	1.06	0.37
SC-E 6014 rev2 w/ Mount Pipe		240.0000	0.22	-7.72	4.46	177.00	1.616	6	9.05	11.07
Sector Mount [SM 502-3]		0.0000	2.68	0.00	0.00	177.00	1.616	6	59.33	59.33
LLPX310R w/ Mount Pipe		0.0000	0.12	0.00	-8.92	168.00	1.592	6	5.83	3.99
FDD_R6_RRH		0.0000	0.06	0.00	-8.92	168.00	1.592	6	2.13	1.04
LLPX310R w/ Mount Pipe		120.0000	0.12	7.73	4.46	168.00	1.592	6	5.83	3.99
FDD_R6_RRH		120.0000	0.06	7.73	4.46	168.00	1.592	6	2.13	1.04
LLPX310R w/ Mount Pipe		240.0000	0.12	-7.73	4.46	168.00	1.592	6	5.83	3.99
FDD_R6_RRH		240.0000	0.06	-7.73	4.46	168.00	1.592	6	2.13	1.04
Sector Mount [SM 411-3]		0.0000	1.83	0.00	0.00	168.00	1.592	6	37.93	37.93
DUAL BAND 800/1900		0.0000	0.10	0.00	-9.05	160.00	1.570	6	3.72	2.12
FULL BAND MASTHEAD										
DTMABP7819VG12A		0.0000	0.03	0.00	-9.05	160.00	1.570	6	1.41	0.57
RRUS-11		0.0000	0.18	0.00	-9.05	160.00	1.570	6	6.73	3.11
AM-X-CD-16-65-00T-R		0.0000	0.40	0.00	-9.05	160.00	1.570	6	19.30	16.40
ET w/ Mount Pipe										
7020.00		0.0000	0.01	0.00	-9.05	160.00	1.570	6	0.22	0.35
7770.00 w/ Mount Pipe		0.0000	0.15	0.00	-9.05	160.00	1.570	6	7.03	5.58
LGP13519		0.0000	0.02	0.00	-9.05	160.00	1.570	6	0.99	0.69
DC6-48-60-18-8F		0.0000	0.09	0.00	-9.05	160.00	1.570	6	2.99	4.83
DUAL BAND 800/1900		120.0000	0.10	7.84	4.53	160.00	1.570	6	3.72	2.12
FULL BAND MASTHEAD										
SBNH-1D6565C w/ Mount Pipe		120.0000	0.54	7.84	4.53	160.00	1.570	6	25.99	25.24
DTMABP7819VG12A		120.0000	0.03	7.84	4.53	160.00	1.570	6	1.41	0.57
RRUS-11		120.0000	0.18	7.84	4.53	160.00	1.570	6	6.73	3.11
7020.00		120.0000	0.01	7.84	4.53	160.00	1.570	6	0.22	0.35
7770.00 w/ Mount Pipe		120.0000	0.15	7.84	4.53	160.00	1.570	6	7.03	5.58
LGP13519		120.0000	0.02	7.84	4.53	160.00	1.570	6	0.99	0.69
DUAL BAND 800/1900		240.0000	0.10	-7.84	4.53	160.00	1.570	6	3.72	2.12
FULL BAND MASTHEAD										
DTMABP7819VG12A		240.0000	0.03	-7.84	4.53	160.00	1.570	6	1.41	0.57
RRUS-11		240.0000	0.18	-7.84	4.53	160.00	1.570	6	6.73	3.11
AM-X-CD-16-65-00T-R		240.0000	0.40	-7.84	4.53	160.00	1.570	6	19.30	16.40
ET w/ Mount Pipe										
7020.00		240.0000	0.01	-7.84	4.53	160.00	1.570	6	0.22	0.35
7770.00 w/ Mount Pipe		240.0000	0.15	-7.84	4.53	160.00	1.570	6	7.03	5.58
LGP13519		240.0000	0.02	-7.84	4.53	160.00	1.570	6	0.99	0.69

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Client	Crown Castle	Designed by	Jarel Duncan

Description	Aiming Azimuth °	Weight	Offset _x	Offset _z	z	K _z	q _z	C _{AAc} Front ft ²	C _{AAc} Side ft ²	t _z
		K	ft	ft	ft		psf			in
Sector Mount [SM 502-3]	0.0000	2.67	0.00	0.00	158.00	1.564	6	58.98	58.98	0.9051
Empty Mount Pipe	0.0000	0.05	0.00	-9.05	160.00	1.570	6	2.58	2.58	0.9051
Empty Mount Pipe	120.0000	0.05	7.84	4.53	160.00	1.570	6	2.58	2.58	0.9051
Empty Mount Pipe	240.0000	0.05	-7.84	4.53	160.00	1.570	6	2.58	2.58	0.9051
APXV18-206517S-C w/ Mount Pipe	0.0000	0.14	0.00	-6.15	148.00	1.535	6	6.37	6.56	0.8980
APXV18-206517S-C w/ Mount Pipe	120.0000	0.14	5.33	3.08	148.00	1.535	6	6.37	6.56	0.8980
APXV18-206517S-C w/ Mount Pipe	240.0000	0.14	-5.33	3.08	148.00	1.535	6	6.37	6.56	0.8980
GPS_A	0.0000	0.01	0.00	-14.01	40.00	1.057	4	0.42	0.42	0.7675
Side Arm Mount [SO 201-1]	0.0000	0.13	0.00	0.00	40.00	1.057	4	4.71	3.37	0.7675
Sum Weight:		14.91								

Discrete Appurtenance Pressures - Service $G_H = 1.121$

Description	Aiming Azimuth °	Weight	Offset _x	Offset _z	z	K _z	q _z	C _{AAc} Front ft ²	C _{AAc} Side ft ²
		K	ft	ft	ft		psf		
Lightning Rod	240.0000	0.03	-4.25	2.45	182.00	1.629	10	0.25	0.25
8'x2 1/2" Pipe Mount	120.0000	0.04	4.25	2.45	184.00	1.634	10	2.30	2.30
AIR 21	120.0000	0.24	4.25	2.45	188.00	1.644	11	19.25	12.83
ATMAA1412D-1A20	120.0000	0.06	4.25	2.45	180.00	1.624	10	7.00	2.80
DB846F65ZAXY w/ Mount Pipe	0.0000	0.10	0.00	-8.91	177.00	1.616	10	14.54	15.64
BXA-185063/12CFx2 w/ Mount Pipe	0.0000	0.04	0.00	-8.91	177.00	1.616	10	5.03	5.29
RRH2X40-AWS	0.0000	0.04	0.00	-8.91	177.00	1.616	10	2.52	1.59
BXA-171063/8CF w/ Mount Pipe	0.0000	0.03	0.00	-8.91	177.00	1.616	10	3.14	3.51
BXA-70040/6CFx4 w/ Mount Pipe	0.0000	0.06	0.00	-8.91	177.00	1.616	10	16.55	7.37
FD9R6004/2C-3L	0.0000	0.01	0.00	-8.91	177.00	1.616	10	0.73	0.17
RRH2X40-AWS	120.0000	0.04	7.72	4.46	177.00	1.616	10	2.52	1.59
BXA-171063/8CF w/ Mount Pipe	120.0000	0.03	7.72	4.46	177.00	1.616	10	3.14	3.51
BXA-70040/6CFx4 w/ Mount Pipe	120.0000	0.06	7.72	4.46	177.00	1.616	10	16.55	7.37
LPA-80063/6CFx5 w/ Mount Pipe	120.0000	0.10	7.72	4.46	177.00	1.616	10	21.09	21.29
APX18-206516L-CT0 w/ Mount Pipe	120.0000	0.04	7.72	4.46	177.00	1.616	10	3.74	3.29
FD9R6004/2C-3L	120.0000	0.01	7.72	4.46	177.00	1.616	10	0.73	0.17
DB-T1-6Z-8AB-0Z	240.0000	0.04	-7.72	4.46	177.00	1.616	10	5.60	2.33
RRH2X40-AWS	240.0000	0.04	-7.72	4.46	177.00	1.616	10	2.52	1.59
BXA-171063/8CF w/ Mount Pipe	240.0000	0.03	-7.72	4.46	177.00	1.616	10	3.14	3.51
BXA-70040/6CFx4 w/ Mount Pipe	240.0000	0.06	-7.72	4.46	177.00	1.616	10	16.55	7.37
APX18-206516L-CT0 w/ Mount Pipe	240.0000	0.04	-7.72	4.46	177.00	1.616	10	3.74	3.29
FD9R6004/2C-3L	240.0000	0.01	-7.72	4.46	177.00	1.616	10	0.73	0.17
SC-E 6014 rev2 w/ Mount Pipe	240.0000	0.06	-7.72	4.46	177.00	1.616	10	7.57	8.79
Sector Mount [SM	0.0000	1.67	0.00	0.00	177.00	1.616	10	33.02	33.02

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z psf	C _{AAC} Front ft ²	C _{AAC} Side ft ²
502-3]									
LLPX310R w/ Mount Pipe	0.0000	0.05	0.00	-8.92	168.00	1.592	10	5.07	2.98
FDD_R6_RRH	0.0000	0.03	0.00	-8.92	168.00	1.592	10	1.79	0.78
LLPX310R w/ Mount Pipe	120.0000	0.05	7.73	4.46	168.00	1.592	10	5.07	2.98
FDD_R6_RRH	120.0000	0.03	7.73	4.46	168.00	1.592	10	1.79	0.78
LLPX310R w/ Mount Pipe	240.0000	0.05	-7.73	4.46	168.00	1.592	10	5.07	2.98
FDD_R6_RRH	240.0000	0.03	-7.73	4.46	168.00	1.592	10	1.79	0.78
Sector Mount [SM 411-3]	0.0000	1.07	0.00	0.00	168.00	1.592	10	21.88	21.88
DUAL BAND 800/1900 FULL BAND MASTHEAD	0.0000	0.06	0.00	-9.05	160.00	1.570	10	3.10	1.62
DTMABP7819VG12A	0.0000	0.02	0.00	-9.05	160.00	1.570	10	1.14	0.39
RRUS-11	0.0000	0.12	0.00	-9.05	160.00	1.570	10	5.88	2.49
AM-X-CD-16-65-00T-R	0.0000	0.14	0.00	-9.05	160.00	1.570	10	17.00	12.61
ET w/ Mount Pipe									
7020.00	0.0000	0.00	0.00	-9.05	160.00	1.570	10	0.12	0.20
7770.00 w/ Mount Pipe	0.0000	0.06	0.00	-9.05	160.00	1.570	10	6.12	4.25
LGP13519	0.0000	0.01	0.00	-9.05	160.00	1.570	10	0.68	0.41
DC6-48-60-18-8F	0.0000	0.03	0.00	-9.05	160.00	1.570	10	2.57	4.32
DUAL BAND 800/1900 FULL BAND MASTHEAD	120.0000	0.06	7.84	4.53	160.00	1.570	10	3.10	1.62
SBNH-1D6565C w/ Mount Pipe	120.0000	0.20	7.84	4.53	160.00	1.570	10	23.37	19.68
DTMABP7819VG12A	120.0000	0.02	7.84	4.53	160.00	1.570	10	1.14	0.39
RRUS-11	120.0000	0.12	7.84	4.53	160.00	1.570	10	5.88	2.49
7020.00	120.0000	0.00	7.84	4.53	160.00	1.570	10	0.12	0.20
7770.00 w/ Mount Pipe	120.0000	0.06	7.84	4.53	160.00	1.570	10	6.12	4.25
LGP13519	120.0000	0.01	7.84	4.53	160.00	1.570	10	0.68	0.41
DUAL BAND 800/1900 FULL BAND MASTHEAD	240.0000	0.06	-7.84	4.53	160.00	1.570	10	3.10	1.62
DTMABP7819VG12A	240.0000	0.02	-7.84	4.53	160.00	1.570	10	1.14	0.39
RRUS-11	240.0000	0.12	-7.84	4.53	160.00	1.570	10	5.88	2.49
AM-X-CD-16-65-00T-R	240.0000	0.14	-7.84	4.53	160.00	1.570	10	17.00	12.61
ET w/ Mount Pipe									
7020.00	240.0000	0.00	-7.84	4.53	160.00	1.570	10	0.12	0.20
7770.00 w/ Mount Pipe	240.0000	0.06	-7.84	4.53	160.00	1.570	10	6.12	4.25
LGP13519	240.0000	0.01	-7.84	4.53	160.00	1.570	10	0.68	0.41
Sector Mount [SM 502-3]	0.0000	1.67	0.00	0.00	158.00	1.564	10	33.02	33.02
Empty Mount Pipe	0.0000	0.03	0.00	-9.05	160.00	1.570	10	1.40	1.40
Empty Mount Pipe	120.0000	0.03	7.84	4.53	160.00	1.570	10	1.40	1.40
Empty Mount Pipe	240.0000	0.03	-7.84	4.53	160.00	1.570	10	1.40	1.40
APXV18-206517S-C w/ Mount Pipe	0.0000	0.05	0.00	-6.15	148.00	1.535	10	5.40	4.70
APXV18-206517S-C w/ Mount Pipe	120.0000	0.05	5.33	3.08	148.00	1.535	10	5.40	4.70
APXV18-206517S-C w/ Mount Pipe	240.0000	0.05	-5.33	3.08	148.00	1.535	10	5.40	4.70
GPS_A	0.0000	0.00	0.00	-14.01	40.00	1.057	7	0.30	0.30
Side Arm Mount [SO 201-1]	0.0000	0.10	0.00	0.00	40.00	1.057	7	2.96	2.11
Sum Weight:		7.52							

tnxTower

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Dish Pressures - No Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	K _z	A _A ft ²	q _z psf
168.00	A-ANT-18G-2-C		330.0000 Sum Weight:	0.03 0.03	-6.86	3.96	1.592	3.72 29

Dish Pressures - With Ice

Elevation ft	Dish Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	K _z	A _A ft ²	q _z psf	t _z in
168.00	A-ANT-18G-2-C		330.0000 Sum Weight:	0.07 0.07	-6.86	3.96	1.592	4.25	6 0.9118

Dish Pressures - Service

Elevation ft	Dish Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	K _z	A _A ft ²	q _z psf
168.00	A-ANT-18G-2-C		330.0000 Sum Weight:	0.03 0.03	-6.86	3.96	1.592	3.72 10

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M _x kip-ft	Sum of Overturning Moments, M _z kip-ft	Sum of Torques kip-ft
Leg Weight	11.17					
Bracing Weight	14.70					
Total Member Self-Weight	25.88			37.40	-16.36	
Total Weight	48.54			37.40	-16.36	
Wind 0 deg - No Ice		-0.12	-43.34	-4746.98	6.12	47.12
Wind 30 deg - No Ice		21.48	-37.09	-4057.90	-2392.78	51.93
Wind 60 deg - No Ice		37.20	-21.26	-2304.25	-4142.37	43.20
Wind 90 deg - No Ice		43.25	0.27	85.83	-4820.83	24.43
Wind 120 deg - No Ice		37.86	21.88	2467.36	-4219.68	-2.42
Wind 150 deg - No Ice		21.76	37.29	4169.00	-2442.53	-28.11
Wind 180 deg - No Ice		0.21	42.83	4777.84	-54.43	-45.68
Wind 210 deg - No Ice		-21.39	37.20	4151.77	2343.94	-50.83
Wind 240 deg - No Ice		-37.69	21.54	2405.40	4156.27	-43.93
Wind 270 deg - No Ice		-43.20	-0.13	12.47	4779.67	-23.21
Wind 300 deg - No Ice		-37.37	-21.49	-2347.48	4140.07	3.21
Wind 330 deg - No Ice		-21.72	-37.24	-4085.34	2404.69	28.59
Member Ice	14.32					
Total Weight Ice	90.80			79.12	-66.63	
Wind 0 deg - Ice		-0.02	-13.28	-1358.41	-63.11	11.12
Wind 30 deg - Ice		6.21	-10.72	-1092.78	-746.35	12.35

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Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 60 deg - Ice		10.51	-6.03	-581.12	-1223.64	10.78
Wind 90 deg - Ice		12.46	0.05	88.43	-1435.00	7.15
Wind 120 deg - Ice		11.57	6.68	805.02	-1323.46	1.11
Wind 150 deg - Ice		6.25	10.76	1257.62	-754.85	-5.33
Wind 180 deg - Ice		0.04	12.11	1409.76	-73.62	-9.85
Wind 210 deg - Ice		-6.19	10.75	1255.28	609.50	-12.10
Wind 240 deg - Ice		-11.54	6.62	793.79	1184.86	-12.06
Wind 270 deg - Ice		-12.45	-0.02	75.06	1299.86	-6.87
Wind 300 deg - Ice		-10.54	-6.07	-588.17	1095.67	-0.76
Wind 330 deg - Ice		-6.25	-10.75	-1097.40	620.46	5.44
Total Weight	48.54			37.40	-16.36	
Wind 0 deg - Service		-0.04	-15.00	-1654.48	6.20	16.30
Wind 30 deg - Service		7.43	-12.83	-1416.04	-823.87	17.97
Wind 60 deg - Service		12.87	-7.36	-809.24	-1429.27	14.95
Wind 90 deg - Service		14.97	0.09	17.77	-1664.03	8.45
Wind 120 deg - Service		13.10	7.57	841.83	-1456.02	-0.84
Wind 150 deg - Service		7.53	12.90	1430.63	-841.09	-9.73
Wind 180 deg - Service		0.07	14.82	1641.31	-14.76	-15.81
Wind 210 deg - Service		-7.40	12.87	1424.67	815.13	-17.59
Wind 240 deg - Service		-13.04	7.45	820.39	1442.23	-15.20
Wind 270 deg - Service		-14.95	-0.05	-7.61	1657.94	-8.03
Wind 300 deg - Service		-12.93	-7.44	-824.20	1436.63	1.11
Wind 330 deg - Service		-7.52	-12.89	-1425.54	836.15	9.89

Load Combinations

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

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Client	Crown Castle	Designed by	Jarel Duncan

Comb. No.	Description
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force <i>K</i>	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	12	8.57	0.15	0.05
			Max. Compression	6	-13.11	0.46	0.03
			Max. Mx	4	-0.35	2.25	-0.10
			Max. My	9	-1.25	0.00	-2.47
			Max. Vy	6	1.09	0.00	0.00
			Max. Vx	9	1.26	0.00	0.00
		Diagonal	Max Tension	5	6.18	0.00	0.00
			Max. Compression	5	-6.24	0.00	0.00
			Max. Mx	20	1.56	0.03	0.00
			Max. My	8	-0.76	0.00	0.00
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	8	-0.00	0.00	0.00
		Horizontal	Max Tension	5	3.33	0.00	0.00
			Max. Compression	5	-3.35	0.00	0.00
			Max. Mx	21	0.09	-0.02	-0.00
			Max. My	12	-0.76	-0.01	-0.01
			Max. Vy	21	-0.02	-0.02	-0.00
			Max. Vx	12	0.00	-0.01	-0.01
		Top Girt	Max Tension	8	1.42	-0.01	0.00
			Max. Compression	2	-1.41	-0.01	-0.00
			Max. Mx	21	-0.09	-0.02	-0.00
			Max. My	6	0.68	-0.01	0.00
			Max. Vy	21	-0.02	-0.02	-0.00
			Max. Vx	6	-0.00	0.00	0.00
		Inner Bracing	Max Tension	2	0.02	0.00	0.00
			Max. Compression	2	-0.02	0.00	0.00
			Max. Mx	14	-0.00	-0.01	0.00
			Max. My	19	0.00	0.00	-0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		T2	Max Tension	12	35.51	-0.02	0.01
			Max. Compression	6	-44.84	0.12	0.00
			Max. Mx	12	16.11	1.50	-0.02
			Max. My	3	-3.90	-0.03	1.61
			Max. Vy	12	-1.01	-0.51	-0.03
			Max. Vx	9	1.11	-0.03	0.58
		Diagonal	Max Tension	13	8.21	0.00	0.00
			Max. Compression	13	-8.28	0.00	0.00
			Max. Mx	20	2.04	0.04	0.00
			Max. My	8	-0.90	0.00	0.00
			Max. Vy	20	0.02	0.00	0.00
			Max. Vx	8	-0.00	0.00	0.00
		Horizontal	Max Tension	13	4.98	0.00	0.00

tnxTower

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Job	NHV 108 943133, CT (BU# 806362)	Page	32 of 47
Project	1425601400	Date	15:59:40 03/25/14
Client	Crown Castle	Designed by	Jarel Duncan

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T3	140 - 120	Leg	Max. Compression	13	-4.99	-0.01	0.00
			Max. Mx	21	0.23	-0.03	-0.00
			Max. My	6	1.07	0.00	0.01
			Max. Vy	21	-0.02	-0.03	-0.00
			Max. Vx	6	-0.00	0.00	0.01
			Max. Tension	3	0.00	0.00	0.00
			Max. Compression	8	-0.01	0.00	0.00
			Max. Mx	14	-0.00	-0.02	0.00
			Max. My	19	-0.00	0.00	-0.00
		Diagonal	Max. Vy	14	0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
			Max. Tension	12	62.91	-0.14	0.00
			Max. Compression	6	-75.21	0.33	0.01
			Max. Mx	12	62.74	-0.35	-0.00
			Max. My	9	-6.32	-0.01	0.40
			Max. Vy	12	0.07	-0.35	-0.00
			Max. Vx	3	0.11	-0.01	-0.40
			Max. Tension	13	7.84	0.00	0.00
		Horizontal	Max. Compression	13	-7.93	0.00	0.00
			Max. Mx	20	1.97	0.05	0.00
			Max. My	8	-0.99	0.00	0.00
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	8	-0.00	0.00	0.00
			Max. Tension	13	5.32	0.00	0.00
			Max. Compression	13	-5.34	-0.02	0.00
			Max. Mx	21	0.34	-0.04	-0.00
			Max. My	12	-0.69	-0.03	-0.01
		Inner Bracing	Max. Vy	21	-0.03	-0.04	-0.00
			Max. Vx	12	0.00	-0.03	-0.01
			Max. Tension	3	0.00	0.00	0.00
			Max. Compression	8	-0.01	0.00	0.00
			Max. Mx	14	-0.00	-0.03	0.00
			Max. My	19	-0.00	0.00	-0.00
			Max. Vy	14	0.02	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
			Max. Tension	12	82.79	-0.36	-0.00
T4	120 - 100	Leg	Max. Compression	6	-97.97	0.41	0.01
			Max. Mx	12	82.48	-0.43	-0.00
			Max. My	9	-7.77	-0.01	0.46
			Max. Vy	12	0.08	-0.43	-0.00
			Max. Vx	9	-0.12	-0.02	0.44
			Max. Tension	13	9.39	0.00	0.00
			Max. Compression	13	-9.53	0.00	0.00
			Max. Mx	20	2.38	0.11	0.00
			Max. My	8	-1.29	0.00	0.00
		Diagonal	Max. Vy	20	-0.04	0.00	0.00
			Max. Vx	8	0.00	0.00	0.00
			Max. Tension	13	5.56	0.00	0.00
			Max. Compression	13	-5.62	-0.02	-0.00
			Max. Mx	21	0.43	-0.05	-0.00
			Max. My	12	-0.90	-0.04	-0.01
			Max. Vy	21	-0.03	-0.05	-0.00
			Max. Vx	12	0.00	-0.04	-0.01
			Max. Tension	3	0.00	0.00	0.00
		Horizontal	Max. Compression	13	-0.01	0.00	0.00
			Max. Mx	14	-0.00	-0.03	0.00
			Max. My	19	-0.00	0.00	-0.00
			Max. Vy	14	-0.02	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
			Max. Tension	13	103.40	-0.36	-0.00
			Max. Compression	6	-122.03	0.41	0.01
			Max. Mx	12	-0.00	-0.03	0.00
			Max. My	19	-0.00	0.00	-0.00
			Max. Vy	14	-0.02	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T5	100 - 80	Leg					

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Client	Crown Castle	Designed by	Jarel Duncan

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T6	80 - 60	Leg	Diagonal	Max. Mx	12	103.08	-0.45
				Max. My	9	-9.39	-0.02
				Max. Vy	12	0.08	-0.45
				Max. Vx	3	0.12	-0.02
				Max Tension	13	8.47	0.00
				Max. Compression	13	-8.64	0.00
				Max. Mx	20	2.09	0.14
				Max. My	8	-1.32	0.00
			Horizontal	Max. Vy	20	-0.04	0.00
				Max. Vx	8	-0.00	0.00
				Max Tension	13	5.56	0.00
				Max. Compression	13	-5.62	-0.03
				Max. Mx	21	0.53	-0.07
				Max. My	2	1.43	-0.01
				Max. Vy	21	-0.04	-0.07
				Max. Vx	6	-0.00	-0.01
		Inner Bracing	Max Tension	3	0.00	0.00	0.00
			Max. Compression	13	-0.01	0.00	0.00
			Max. Mx	14	-0.01	-0.06	0.00
			Max. My	6	-0.00	0.00	-0.00
			Max. Vy	14	0.03	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
			Max Tension	8	121.71	-0.54	0.06
			Max. Compression	6	-143.99	0.49	0.01
T7	60 - 40	Leg	Diagonal	Max. Mx	12	112.19	-0.55
				Max. My	9	-11.13	-0.02
				Max. Vy	12	0.09	-0.55
				Max. Vx	3	0.12	-0.02
				Max Tension	13	8.76	0.00
				Max. Compression	13	-9.03	0.00
				Max. Mx	20	2.14	0.17
				Max. My	8	-1.34	0.00
		Horizontal	Max. Vy	20	-0.05	0.00	0.00
			Max. Vx	8	-0.00	0.00	0.00
			Max Tension	13	6.26	0.00	0.00
			Max. Compression	13	-6.28	-0.07	-0.00
			Max. Mx	21	0.63	-0.12	-0.00
			Max. My	12	-1.32	-0.10	-0.01
			Max. Vy	21	-0.06	-0.12	-0.00
			Max. Vx	12	0.00	-0.10	-0.01
		Inner Bracing	Max Tension	3	0.00	0.00	0.00
			Max. Compression	25	-0.01	0.00	0.00
			Max. Mx	14	-0.01	-0.09	0.00
			Max. My	6	-0.00	0.00	-0.00
			Max. Vy	14	0.04	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
			Max Tension	8	139.46	-0.51	0.05
			Max. Compression	6	-165.79	0.39	0.01
T8	40 - 0	Leg	Diagonal	Max. Mx	12	130.59	-0.53
				Max. My	9	-11.68	-0.02
				Max. Vy	12	-0.09	-0.52
				Max. Vx	3	-0.12	-0.02
				Max Tension	13	8.92	0.00
				Max. Compression	13	-9.31	0.00
				Max. Mx	20	2.13	0.24
				Max. My	8	-1.38	0.00
		Horizontal	Max. Vy	20	-0.06	0.00	0.00
			Max. Vx	8	-0.00	0.00	0.00
			Max Tension	13	6.82	0.00	0.00
			Max. Compression	13	-6.75	-0.09	-0.00
			Max. Mx	21	0.73	-0.15	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T8	40 - 20	Leg	Max. My	2	1.33	-0.05	0.01
			Max. Vy	21	-0.06	-0.15	-0.00
			Max. Vx	2	-0.00	-0.05	0.01
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	25	-0.01	0.00	0.00
			Max. Mx	14	-0.01	-0.16	0.00
			Max. My	6	-0.00	0.00	-0.00
			Max. Vy	14	-0.06	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
			Max Tension	8	155.86	-0.81	0.02
T9	20 - 0	Leg	Max. Compression	6	-186.64	-1.45	0.02
			Max. Mx	6	-186.64	-1.45	0.02
			Max. My	9	-15.32	-0.30	1.95
			Max. Vy	2	0.28	0.92	-0.01
			Max. Vx	9	-0.27	-0.30	1.95
			Max Tension	13	8.72	0.00	0.00
			Max. Compression	13	-9.17	0.00	0.00
			Max. Mx	20	2.02	0.29	0.00
			Max. My	2	1.05	0.00	-0.00
			Max. Vy	20	-0.07	0.00	0.00
Redund Horz 1 Bracing	Redund Diag 1 Bracing	Horizontal	Max. Vx	2	0.00	0.00	0.00
			Max Tension	13	7.05	0.00	0.00
			Max. Compression	13	-6.90	-0.11	-0.00
			Max. Mx	21	0.83	-0.17	-0.00
			Max. My	2	1.59	-0.07	0.01
			Max. Vy	21	-0.07	-0.17	-0.00
			Max. Vx	2	-0.00	-0.07	0.01
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	25	-0.01	0.00	0.00
			Max. Mx	14	-0.01	-0.19	0.00
Redund Horz 1 Bracing	Redund Diag 1 Bracing	Diagonal	Max. My	10	-0.00	0.00	-0.00
			Max. Vy	14	-0.06	0.00	0.00
			Max. Vx	10	0.00	0.00	0.00
			Max Tension	8	162.07	0.78	0.18
			Max. Compression	6	-196.38	-0.00	-0.00
			Max. Mx	6	-195.97	5.47	-0.02
			Max. My	9	-16.14	-0.30	1.96
			Max. Vy	6	-0.75	5.47	-0.02
			Max. Vx	9	0.45	-0.30	1.96
			Max Tension	13	13.71	-0.15	0.08
Redund Horz 1 Bracing	Redund Diag 1 Bracing	Inner Bracing	Max. Compression	13	-14.21	0.00	0.00
			Max. Mx	8	9.33	-0.18	0.06
			Max. My	7	-13.52	0.02	-0.10
			Max. Vy	21	0.05	-0.13	0.01
			Max. Vx	7	-0.01	0.00	0.00
			Max Tension	13	7.63	0.00	0.00
			Max. Compression	13	-7.72	-0.16	-0.00
			Max. Mx	21	-1.00	-0.24	-0.00
			Max. My	2	1.52	-0.09	0.02
			Max. Vy	21	0.09	-0.24	-0.00
Redund Horz 1 Bracing	Redund Diag 1 Bracing	Inner Bracing	Max. Vx	2	-0.00	-0.09	0.02
			Max Tension	6	3.41	0.00	0.00
			Max. Compression	6	-3.41	0.00	0.00
			Max. Mx	15	1.34	0.02	0.00
			Max. Vy	15	-0.01	0.00	0.00
			Max Tension	6	3.11	0.00	0.00
			Max. Compression	6	-3.11	0.00	0.00
			Max. Mx	19	1.36	0.04	0.00
			Max. My	2	3.02	0.00	-0.00

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Job	NHV 108 943133, CT (BU# 806362)	Page	35 of 47
Project	14256O1400	Date	15:59:40 03/25/14
Client	Crown Castle	Designed by	Jarel Duncan

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
Redund Hip 1 Bracing	Max. Vy		Max. Vy	19	0.01	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
			Max Tension	1	0.00	0.00	0.00
	Redund Hip Diagonal Bracing		Max. Compression	13	-0.04	0.00	0.00
			Max. Mx	14	-0.01	0.02	0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max Tension	13	0.07	0.00	0.00
			Max. Compression	10	-0.05	0.00	0.00
Inner Bracing	Max. Mx		Max. Mx	21	0.04	0.19	0.00
			Max. My	10	0.03	0.00	0.00
			Max. Vy	21	-0.05	0.00	0.00
			Max. Vx	10	-0.00	0.00	0.00
			Max Tension	1	0.00	0.00	0.00
	Max. Compression		Max. Compression	2	-0.01	0.00	0.00
			Max. Mx	14	-0.01	0.23	0.00
			Max. My	10	-0.00	0.00	0.00
			Max. Vy	14	-0.07	0.00	0.00
			Max. Vx	10	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	10	211.92	23.07	-12.24
	Max. H _x	10	211.92	23.07	-12.24
	Max. H _z	4	-177.04	-20.55	10.83
	Min. Vert	4	-177.04	-20.55	10.83
	Min. H _x	4	-177.04	-20.55	10.83
	Min. H _z	10	211.92	23.07	-12.24
Leg B	Max. Vert	6	215.52	-22.78	-13.19
	Max. H _x	12	-177.86	20.19	11.75
	Max. H _z	13	-151.99	16.05	12.38
	Min. Vert	12	-177.86	20.19	11.75
	Min. H _x	6	215.52	-22.78	-13.19
	Min. H _z	7	187.48	-18.44	-13.60
Leg A	Max. Vert	2	209.62	0.98	26.02
	Max. H _x	11	15.66	3.61	1.44
	Max. H _z	2	209.62	0.98	26.02
	Min. Vert	8	-178.64	-0.97	-23.23
	Min. H _x	6	-84.47	-3.66	-11.19
	Min. H _z	8	-178.64	-0.97	-23.23

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overshoring Moment, M _x kip-ft	Overshoring Moment, M _z kip-ft	Torque kip-ft
Dead Only	48.54	-0.00	-0.00	37.40	-16.35	-0.00
Dead+Wind 0 deg - No Ice	48.54	-0.12	-43.34	-4636.45	6.05	47.16
Dead+Wind 30 deg - No Ice	48.54	21.48	-37.09	-3963.40	-2338.50	52.05

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Client	Crown Castle	Designed by	Jarel Duncan

Load Combination	Vertical	Shear _x	Shear _z	Overspinning Moment, M _x	Overspinning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 60 deg - No Ice	48.54	37.20	-21.26	-2249.81	-4048.72	43.36
Dead+Wind 90 deg - No Ice	48.54	43.25	0.27	86.14	-4712.21	24.57
Dead+Wind 120 deg - No Ice	48.54	37.86	21.88	2412.39	-4124.31	-2.34
Dead+Wind 150 deg - No Ice	48.54	21.75	37.29	4074.87	-2388.34	-28.10
Dead+Wind 180 deg - No Ice	48.54	0.21	42.83	4669.61	-54.65	-45.74
Dead+Wind 210 deg - No Ice	48.54	-21.39	37.20	4057.64	2289.35	-50.95
Dead+Wind 240 deg - No Ice	48.54	-37.69	21.54	2350.28	4060.68	-44.08
Dead+Wind 270 deg - No Ice	48.54	-43.20	-0.13	12.53	4670.92	-23.34
Dead+Wind 300 deg - No Ice	48.54	-37.37	-21.49	-2293.26	4046.37	3.13
Dead+Wind 330 deg - No Ice	48.54	-21.72	-37.24	-3991.00	2350.32	28.57
Dead+Ice+Temp	90.80	-0.00	-0.00	79.44	-66.87	0.00
Dead+Wind 0 deg+Ice+Temp	90.80	-0.02	-13.28	-1324.93	-63.50	11.19
Dead+Wind 30 deg+Ice+Temp	90.80	6.21	-10.72	-1066.42	-731.82	12.44
Dead+Wind 60 deg+Ice+Temp	90.80	10.51	-6.03	-566.19	-1199.07	10.88
Dead+Wind 90 deg+Ice+Temp	90.80	12.46	0.05	88.95	-1405.58	7.23
Dead+Wind 120 deg+Ice+Temp	90.80	11.56	6.68	789.00	-1295.32	1.14
Dead+Wind 150 deg+Ice+Temp	90.80	6.25	10.76	1232.22	-740.35	-5.35
Dead+Wind 180 deg+Ice+Temp	90.80	0.04	12.11	1381.39	-74.05	-9.92
Dead+Wind 210 deg+Ice+Temp	90.80	-6.19	10.75	1229.87	594.16	-12.20
Dead+Wind 240 deg+Ice+Temp	90.80	-11.54	6.62	777.71	1155.93	-12.17
Dead+Wind 270 deg+Ice+Temp	90.80	-12.45	-0.02	75.49	1269.66	-6.95
Dead+Wind 300 deg+Ice+Temp	90.80	-10.54	-6.06	-573.31	1070.38	-0.80
Dead+Wind 330 deg+Ice+Temp	90.80	-6.25	-10.75	-1071.08	605.17	5.46
Dead+Wind 0 deg - Service	48.54	-0.04	-15.00	-1579.80	-8.62	16.32
Dead+Wind 30 deg - Service	48.54	7.43	-12.83	-1346.92	-819.87	18.01
Dead+Wind 60 deg - Service	48.54	12.87	-7.36	-753.94	-1411.67	15.00
Dead+Wind 90 deg - Service	48.54	14.97	0.09	54.33	-1641.27	8.50
Dead+Wind 120 deg - Service	48.54	13.10	7.57	859.28	-1437.84	-0.81
Dead+Wind 150 deg - Service	48.54	7.53	12.90	1434.54	-837.14	-9.72
Dead+Wind 180 deg - Service	48.54	0.07	14.82	1640.29	-29.66	-15.82
Dead+Wind 210 deg - Service	48.54	-7.40	12.87	1428.54	781.47	-17.63
Dead+Wind 240 deg - Service	48.54	-13.04	7.45	837.77	1394.38	-15.25
Dead+Wind 270 deg - Service	48.54	-14.95	-0.05	28.86	1605.52	-8.08
Dead+Wind 300 deg - Service	48.54	-12.93	-7.44	-768.99	1389.39	1.08
Dead+Wind 330 deg - Service	48.54	-7.52	-12.89	-1356.45	802.55	9.89

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-48.54	0.00	0.00	48.54	0.00	0.000%
2	-0.12	-48.54	-43.34	0.12	48.54	43.34	0.001%
3	21.48	-48.54	-37.09	-21.48	48.54	37.09	0.001%
4	37.20	-48.54	-21.26	-37.20	48.54	21.26	0.001%
5	43.25	-48.54	0.27	-43.25	48.54	-0.27	0.001%
6	37.86	-48.54	21.88	-37.86	48.54	-21.88	0.001%
7	21.76	-48.54	37.29	-21.75	48.54	-37.29	0.001%
8	0.21	-48.54	42.83	-0.21	48.54	-42.83	0.001%
9	-21.39	-48.54	37.20	21.39	48.54	-37.20	0.001%
10	-37.69	-48.54	21.54	37.69	48.54	-21.54	0.001%
11	-43.20	-48.54	-0.13	43.20	48.54	0.13	0.001%
12	-37.37	-48.54	-21.49	37.37	48.54	21.49	0.001%
13	-21.72	-48.54	-37.24	21.72	48.54	37.24	0.001%
14	0.00	-90.80	0.00	0.00	90.80	0.00	0.000%
15	-0.02	-90.80	-13.28	0.02	90.80	13.28	0.000%
16	6.21	-90.80	-10.72	-6.21	90.80	10.72	0.000%
17	10.51	-90.80	-6.03	-10.51	90.80	6.03	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
18	12.46	-90.80	0.05	-12.46	90.80	-0.05	0.000%
19	11.57	-90.80	6.68	-11.56	90.80	-6.68	0.000%
20	6.25	-90.80	10.76	-6.25	90.80	-10.76	0.000%
21	0.04	-90.80	12.11	-0.04	90.80	-12.11	0.000%
22	-6.19	-90.80	10.75	6.19	90.80	-10.75	0.000%
23	-11.54	-90.80	6.62	11.54	90.80	-6.62	0.000%
24	-12.45	-90.80	-0.02	12.45	90.80	0.02	0.000%
25	-10.54	-90.80	-6.07	10.54	90.80	6.06	0.000%
26	-6.25	-90.80	-10.75	6.25	90.80	10.75	0.000%
27	-0.04	-48.54	-15.00	0.04	48.54	15.00	0.000%
28	7.43	-48.54	-12.83	-7.43	48.54	12.83	0.000%
29	12.87	-48.54	-7.36	-12.87	48.54	7.36	0.000%
30	14.97	-48.54	0.09	-14.97	48.54	-0.09	0.000%
31	13.10	-48.54	7.57	-13.10	48.54	-7.57	0.000%
32	7.53	-48.54	12.90	-7.53	48.54	-12.90	0.000%
33	0.07	-48.54	14.82	-0.07	48.54	-14.82	0.000%
34	-7.40	-48.54	12.87	7.40	48.54	-12.87	0.000%
35	-13.04	-48.54	7.45	13.04	48.54	-7.45	0.000%
36	-14.95	-48.54	-0.05	14.95	48.54	0.05	0.000%
37	-12.93	-48.54	-7.44	12.93	48.54	7.44	0.000%
38	-7.52	-48.54	-12.89	7.52	48.54	12.89	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00001336
2	Yes	8	0.00000001	0.00008793
3	Yes	8	0.00000001	0.00008459
4	Yes	8	0.00000001	0.00008122
5	Yes	8	0.00000001	0.00008502
6	Yes	8	0.00000001	0.00008825
7	Yes	8	0.00000001	0.00008481
8	Yes	8	0.00000001	0.00008107
9	Yes	8	0.00000001	0.00008456
10	Yes	8	0.00000001	0.00008826
11	Yes	8	0.00000001	0.00008487
12	Yes	8	0.00000001	0.00008102
13	Yes	8	0.00000001	0.00008432
14	Yes	7	0.00000001	0.00006661
15	Yes	8	0.00000001	0.00013975
16	Yes	8	0.00000001	0.00013907
17	Yes	8	0.00000001	0.00014066
18	Yes	8	0.00000001	0.00014489
19	Yes	8	0.00000001	0.00014836
20	Yes	8	0.00000001	0.00014566
21	Yes	8	0.00000001	0.00014303
22	Yes	8	0.00000001	0.00014248
23	Yes	8	0.00000001	0.00014332
24	Yes	8	0.00000001	0.00013824
25	Yes	8	0.00000001	0.00013451
26	Yes	8	0.00000001	0.00013544
27	Yes	8	0.00000001	0.00008188
28	Yes	8	0.00000001	0.00008090
29	Yes	8	0.00000001	0.00008009
30	Yes	8	0.00000001	0.00008154

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31	Yes	8	0.00000001	0.00008263
32	Yes	8	0.00000001	0.00008136
33	Yes	8	0.00000001	0.00008011
34	Yes	8	0.00000001	0.00008118
35	Yes	8	0.00000001	0.00008244
36	Yes	8	0.00000001	0.00008125
37	Yes	8	0.00000001	0.00007984
38	Yes	8	0.00000001	0.00008068

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	3.795	31	0.1915	0.0715
T2	160 - 140	2.982	31	0.1819	0.0607
T3	140 - 120	2.228	31	0.1583	0.0458
T4	120 - 100	1.589	31	0.1312	0.0339
T5	100 - 80	1.074	31	0.1074	0.0254
T6	80 - 60	0.670	31	0.0812	0.0181
T7	60 - 40	0.371	31	0.0568	0.0125
T8	40 - 20	0.165	31	0.0369	0.0082
T9	20 - 0	0.042	27	0.0169	0.0041

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Lightning Rod	31	3.795	0.1915	0.0715	337572
177.00	(2) DB846F65ZAXY w/ Mount Pipe	31	3.671	0.1906	0.0701	337572
168.00	A-ANT-18G-2-C	31	3.303	0.1871	0.0655	140655
158.00	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	31	2.903	0.1802	0.0593	75177
148.00	APXV18-206517S-C w/ Mount Pipe	31	2.518	0.1690	0.0518	48942
40.00	GPS A	31	0.165	0.0369	0.0082	64359

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	10.805	6	0.5409	0.2067
T2	160 - 140	8.503	6	0.5157	0.1755
T3	140 - 120	6.359	6	0.4497	0.1323
T4	120 - 100	4.539	6	0.3731	0.0981
T5	100 - 80	3.072	6	0.3056	0.0735
T6	80 - 60	1.919	6	0.2312	0.0525
T7	60 - 40	1.066	6	0.1617	0.0361
T8	40 - 20	0.475	6	0.1051	0.0237
T9	20 - 0	0.118	2	0.0482	0.0120

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
				°	°

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Lightning Rod	6	10.805	0.5409	0.2067	128708
177.00	(2) DB846F65ZAXY w/ Mount Pipe	6	10.456	0.5386	0.2026	128708
168.00	A-ANT-18G-2-C	6	9.414	0.5296	0.1894	53628
158.00	(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	6	8.278	0.5109	0.1716	28172
148.00	APXV18-206517S-C w/ Mount Pipe	6	7.185	0.4798	0.1498	17564
40.00	GPS A	6	0.475	0.1051	0.0237	22653

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio		Criteria
									Load	Allowable	
T1	180	Leg	A325N	0.7500	4	2.14	19.44	0.110 ✓	1.333	Bolt Tension	
		Diagonal	A325N	0.6250	3	2.08	6.44	0.323 ✓	1.333	Bolt Shear	
		Horizontal	A325N	0.6250	2	1.68	6.44	0.260 ✓	1.333	Bolt Shear	
T2	160	Leg	A325N	0.8750	4	8.88	26.46	0.335 ✓	1.333	Bolt Tension	
		Diagonal	A325N	0.6250	3	2.76	6.44	0.428 ✓	1.333	Bolt Shear	
		Horizontal	A325N	0.6250	2	2.49	6.44	0.387 ✓	1.333	Bolt Shear	
T3	140	Leg	A325N	1.0000	4	15.73	34.56	0.455 ✓	1.333	Bolt Tension	
		Diagonal	A325N	0.6250	3	2.64	6.44	0.410 ✓	1.333	Bolt Shear	
		Horizontal	A325N	0.6250	2	2.67	6.44	0.414 ✓	1.333	Bolt Shear	
T4	120	Leg	A325N	1.0000	4	20.70	34.56	0.599 ✓	1.333	Bolt Tension	
		Diagonal	A325N	0.6250	3	3.18	6.44	0.493 ✓	1.333	Bolt Shear	
		Horizontal	A325N	0.6250	2	2.81	6.44	0.436 ✓	1.333	Bolt Shear	
T5	100	Leg	A325N	1.0000	6	17.23	34.56	0.499 ✓	1.333	Bolt Tension	
		Diagonal	A325N	0.6250	3	2.88	6.44	0.447 ✓	1.333	Bolt Shear	
		Horizontal	A325N	0.6250	2	2.81	6.44	0.436 ✓	1.333	Bolt Shear	
T6	80	Leg	A325N	1.0000	6	20.29	34.56	0.587 ✓	1.333	Bolt Tension	
		Diagonal	A325N	0.6250	3	3.01	6.44	0.467 ✓	1.333	Bolt Shear	
		Horizontal	A325N	0.6250	2	3.14	6.44	0.487 ✓	1.333	Bolt Shear	
T7	60	Leg	A325N	1.0000	6	23.24	34.56	0.673 ✓	1.333	Bolt Tension	
		Diagonal	A325N	0.6250	3	3.10	6.44	0.482 ✓	1.333	Bolt Shear	
		Horizontal	A325N	0.6250	2	3.41	6.44	0.530 ✓	1.333	Bolt Shear	
T8	40	Leg	A325N	1.0000	8	19.48	34.56	0.564 ✓	1.333	Bolt Tension	

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Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
	ft			in						
T9	20	Diagonal	A325N	0.6250	3	3.06	6.44	0.475 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	3.52	6.44	0.547 ✓	1.333	Bolt Shear
		Leg	A449	1.0000	8	20.22	31.10	0.650 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	3	4.74	6.44	0.735 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.6250	2	3.86	6.44	0.599 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T1	180 - 160	ROHN 2.5 STD	20.00	6.67	84.4 K=1.00	18.110	1.7040	-13.11	30.86	0.425 ✓
T2	160 - 140	ROHN 3 X-STR	20.04	6.68	70.5 K=1.00	20.840	3.0159	-44.84	62.85	0.713 ✓
T3	140 - 120	ROHN 4 X-STR	20.04	6.68	54.3 K=1.00	23.671	4.4074	-75.21	104.33	0.721 ✓
T4	120 - 100	ROHN 5 X-STR	20.04	10.02	65.4 K=1.00	21.776	6.1120	-97.97	133.10	0.736 ✓
T5	100 - 80	ROHN 5 X-STR	20.06	10.03	65.4 K=1.00	21.769	6.1120	-122.03	133.05	0.917 ✓
T6	80 - 60	ROHN 6 EHS	20.05	10.03	54.1 K=1.00	23.705	6.7133	-143.99	159.14	0.905 ✓
T7	60 - 40	ROHN 6 X-STR	20.05	10.03	54.8 K=1.00	23.583	8.4049	-165.79	198.21	0.836 ✓
T8	40 - 20	ROHN 6 X-STR	20.06	10.03	54.8 K=1.00	23.580	8.4049	-186.64	198.19	0.942 ✓
T9	20 - 0	ROHN 8 EHS	20.05	10.03	41.2 K=1.00	25.662	9.7193	-196.38	249.41	0.787 ✓

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T1	180 - 160	ROHN 2 STD	7.92	7.70	117.3 K=1.00	10.850	1.0745	-6.24	11.66	0.535 ✓
T2	160 - 140	ROHN 2 STD	8.53	8.29	126.4 K=1.00	9.342	1.0745	-8.06	10.04	0.802 ✓
T3	140 - 120	ROHN 2 STD	9.21	8.94	136.3 K=1.00	8.039	1.0745	-7.79	8.64	0.902 ✓

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Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T4	120 - 100	ROHN 2.5 STD	12.49	12.10	K=1.00 K=1.00	153.3	6.353	1.7040	-9.45	10.82 0.873 ✓
T5	100 - 80	ROHN 2.5 STD	13.31	12.96	K=1.00	164.1	5.546	1.7040	-8.61	9.45 0.911 ✓
T6	80 - 60	ROHN 2.5 STD	14.16	13.77	K=1.00	174.4	4.908	1.7040	-9.03	8.36 1.080 ✓
T7	60 - 40	ROHN 2.5 X-STR	15.07	14.70	K=1.00	190.9	4.096	2.2535	-9.31	9.23 1.009 ✓
T8	40 - 20	ROHN 3 STD	16.08	15.73	K=1.00	162.2	5.675	2.2285	-9.17	12.65 0.725 ✓
T9	20 - 0	ROHN 3 STD	24.33	12.17	K=1.00	125.5	9.486	2.2285	-14.21	21.14 0.672 ✓

Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T1	180 - 160	ROHN 1.5 STD	8.53	4.14	K=1.00	79.9	19.038	0.7995	-3.35	15.22 0.220 ✓
T2	160 - 140	ROHN 1.5 STD	9.93	4.82	K=1.00	92.9	16.310	0.7995	-4.99	13.04 0.383 ✓
T3	140 - 120	ROHN 2 STD	12.01	5.82	K=1.00	88.7	17.212	1.0745	-5.34	18.50 0.288 ✓
T4	120 - 100	ROHN 2 STD	13.83	6.68	K=1.00	101.9	14.260	1.0745	-5.62	15.32 0.367 ✓
T5	100 - 80	ROHN 2 STD	16.25	7.89	K=1.00	120.3	10.313	1.0745	-5.62	11.08 0.508 ✓
T6	80 - 60	ROHN 2.5 STD	18.79	9.12	K=1.00	115.5	11.192	1.7040	-6.28	19.07 0.329 ✓
T7	60 - 40	ROHN 2.5 STD	21.29	10.37	K=1.00	131.3	8.656	1.7040	-6.75	14.75 0.458 ✓
T8	40 - 20	ROHN 2.5 STD	23.86	11.65	K=1.00	147.6	6.854	1.7040	-6.90	11.68 0.590 ✓
T9	20 - 0	ROHN 3 STD	25.18	12.31	K=1.00	127.0	9.262	2.2285	-7.72	20.64 0.374 ✓

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T1	180 - 160	ROHN 1.5 STD	8.50	4.13	K=1.00	79.6	19.091	0.7995	-1.41	15.26 0.093 ✓

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Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P K	Allow. P _a K	Ratio P / P _a
T9	20 - 0	ROHN TS1.5x11 ga	6.29	5.93	145.4 K=1.00	7.062	0.5202	-3.41	3.67	0.928 ✓

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P K	Allow. P _a K	Ratio P / P _a
T9	20 - 0	ROHN 1.5 STD	11.50	10.94	210.9 K=1.00	3.357	0.7995	-3.11	2.68	1.160 ✓

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P K	Allow. P _a K	Ratio P / P _a
T9	20 - 0	ROHN TS1.5x11 ga	6.29	6.29	154.2 K=1.00	6.278	0.5202	-0.04	3.27	0.012 ✓

Redundant Hip Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P K	Allow. P _a K	Ratio P / P _a
T9	20 - 0	ROHN 2.5 STD	15.07	15.07	190.9 K=1.00	4.096	1.7040	-0.05	6.98	0.007 ✓

* DL controls

Inner Bracing Design Data (Compression)

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P K	Allow. P _a K	Ratio P / P _a
T1	180 - 160	L2x2x1/8	4.25	4.25	128.3 K=1.00	9.074	0.4844	-0.02	4.39	0.006 ✓
T2	160 - 140	L2x2x1/8	4.62	4.62	139.4 K=1.00	7.685	0.4844	-0.01	3.72	0.002 ✓

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T3	140 - 120	L2x2x1/8	6.01	6.01	181.3 K=1.00	4.542	0.4844	-0.01	2.20	0.003 ✓
T4	120 - 100	L2x2x1/8	6.92	6.92	208.8 K=1.00	3.426	0.4844	-0.01	1.66	0.004 ✓
T5	100 - 80	L2 1/2x2 1/2x3/16	8.13	8.13	197.0 K=1.00	3.849	0.9020	-0.01	3.47	0.002* ✓
T6	80 - 60	L3x3x3/16	9.40	9.40	189.2 K=1.00	4.173	1.0900	-0.01	4.55	0.002* ✓
T7	60 - 40	L3 1/2x3 1/2x1/4	10.65	10.65	184.1 K=1.00	4.407	1.6900	-0.01	7.45	0.001* ✓
T8	40 - 20	L3 1/2x3 1/2x1/4	11.93	11.93	206.3 K=1.00	3.510	1.6900	-0.01	5.93	0.002* ✓
T9	20 - 0	ROHN 3 STD	12.59	12.59	129.8 K=1.00	8.860	2.2285	-0.01	19.74	0.001* ✓

* DL controls

Tension Checks**Leg Design Data (Tension)**

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T1	180 - 160	ROHN 2.5 STD	20.00	6.67	84.4	30.000	1.7040	8.57	51.12	0.168 ✓
T2	160 - 140	ROHN 3 X-STR	20.04	6.68	70.5	30.000	3.0159	35.51	90.48	0.392 ✓
T3	140 - 120	ROHN 4 X-STR	20.04	6.68	54.3	30.000	4.4074	62.91	132.22	0.476 ✓
T4	120 - 100	ROHN 5 X-STR	20.04	10.02	65.4	30.000	6.1120	82.79	183.36	0.452 ✓
T5	100 - 80	ROHN 5 X-STR	20.06	10.03	65.4	30.000	6.1120	103.40	183.36	0.564 ✓
T6	80 - 60	ROHN 6 EHS	20.05	10.03	54.1	30.000	6.7133	121.71	201.40	0.604 ✓
T7	60 - 40	ROHN 6 X-STR	20.05	10.03	54.8	30.000	8.4049	139.46	252.15	0.553 ✓
T8	40 - 20	ROHN 6 X-STR	20.06	10.03	54.8	30.000	8.4049	155.86	252.15	0.618 ✓
T9	20 - 0	ROHN 8 EHS	20.05	10.03	41.2	30.000	9.7193	162.07	291.58	0.556 ✓

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T1	180 - 160	ROHN 2 STD	7.92	7.70	117.3	30.000	1.0745	6.18	32.24	0.192 ✓
T2	160 - 140	ROHN 2 STD	8.31	8.08	123.2	30.000	1.0745	8.21	32.24	0.255 ✓
T3	140 - 120	ROHN 2 STD	8.75	8.48	129.2	30.000	1.0745	7.84	32.24	0.243 ✓
T4	120 - 100	ROHN 2.5 STD	12.16	11.78	149.2	30.000	1.7040	9.39	51.12	0.184 ✓
T5	100 - 80	ROHN 2.5 STD	12.89	12.54	158.8	30.000	1.7040	8.47	51.12	0.166 ✓
T6	80 - 60	ROHN 2.5 STD	14.16	13.77	174.4	30.000	1.7040	8.76	51.12	0.171 ✓
T7	60 - 40	ROHN 2.5 X-STR	15.07	14.70	190.9	30.000	2.2535	8.92	67.61	0.132 ✓
T8	40 - 20	ROHN 3 STD	16.08	15.73	162.2	30.000	2.2285	8.72	66.85	0.130 ✓
T9	20 - 0	ROHN 3 STD	24.33	12.17	125.5	30.000	2.2285	13.71	66.85	0.205 ✓

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
	ft		ft	ft		ksi	in ²			
T1	180 - 160	ROHN 1.5 STD	8.53	4.14	79.9	30.000	0.7995	3.33	23.98	0.139 ✓
T2	160 - 140	ROHN 1.5 STD	9.93	4.82	92.9	30.000	0.7995	4.98	23.98	0.208 ✓
T3	140 - 120	ROHN 2 STD	12.01	5.82	88.7	30.000	1.0745	5.32	32.24	0.165 ✓
T4	120 - 100	ROHN 2 STD	13.83	6.68	101.9	30.000	1.0745	5.56	32.24	0.173 ✓
T5	100 - 80	ROHN 2 STD	16.25	7.89	120.3	30.000	1.0745	5.56	32.24	0.173 ✓
T6	80 - 60	ROHN 2.5 STD	18.79	9.12	115.5	30.000	1.7040	6.26	51.12	0.122 ✓
T7	60 - 40	ROHN 2.5 STD	21.29	10.37	131.3	30.000	1.7040	6.82	51.12	0.133 ✓
T8	40 - 20	ROHN 2.5 STD	23.86	11.65	147.6	30.000	1.7040	7.05	51.12	0.138 ✓
T9	20 - 0	ROHN 3 STD	25.18	12.31	127.0	30.000	2.2285	7.63	66.85	0.114 ✓

Top Girt Design Data (Tension)

tnxTower

FDH Engineering, Inc.
 6521 Meridien Drive
 Raleigh, NC 27616
 Phone: (919) 755-1012
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Job	NHV 108 943133, CT (BU# 806362)	Page	45 of 47
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Client	Crown Castle	Designed by	Jarel Duncan

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
T1	180 - 160	ROHN 1.5 STD	8.50	4.13	79.6	30.000	0.7995	1.42	23.98	0.059 ✓

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
T9	20 - 0	ROHN TS1.5x11 ga	6.29	5.93	145.4	30.000	0.5202	3.41	15.61	0.218 ✓

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
T9	20 - 0	ROHN 1.5 STD	11.50	10.94	210.9	30.000	0.7995	3.11	23.98	0.130 ✓

Redundant Hip Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
T9	20 - 0	ROHN 2.5 STD	15.07	15.07	190.9	30.000	1.7040	0.07	51.12	0.001 ✓

Inner Bracing Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P K	Allow. P _a K	Ratio P P _a
T1	180 - 160	L2x2x1/8	4.25	4.25	81.4	21.600	0.4844	0.02	10.46	0.002 ✓
T2	160 - 140	L2x2x1/8	4.27	4.27	81.8	21.600	0.4844	0.00	10.46	0.000
T3	140 - 120	L2x2x1/8	5.31	5.31	101.8	21.600	0.4844	0.00	10.46	0.000
T4	120 - 100	L2x2x1/8	6.35	6.35	121.8	21.600	0.4844	0.00	10.46	0.000
T5	100 - 80	L2 1/2x2 1/2x3/16	7.48	7.48	115.4	21.600	0.9020	0.00	19.48	0.000 ✓

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Client	Crown Castle	Designed by	Jarel Duncan

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P	Allow. P _a	Ratio P
			ft	ft		ksi	in ²	K	K	P _a
T6	80 - 60	L3x3x3/16	8.77	8.77	112.1	21.600	1.0900	0.00	23.54	0.000 ✓

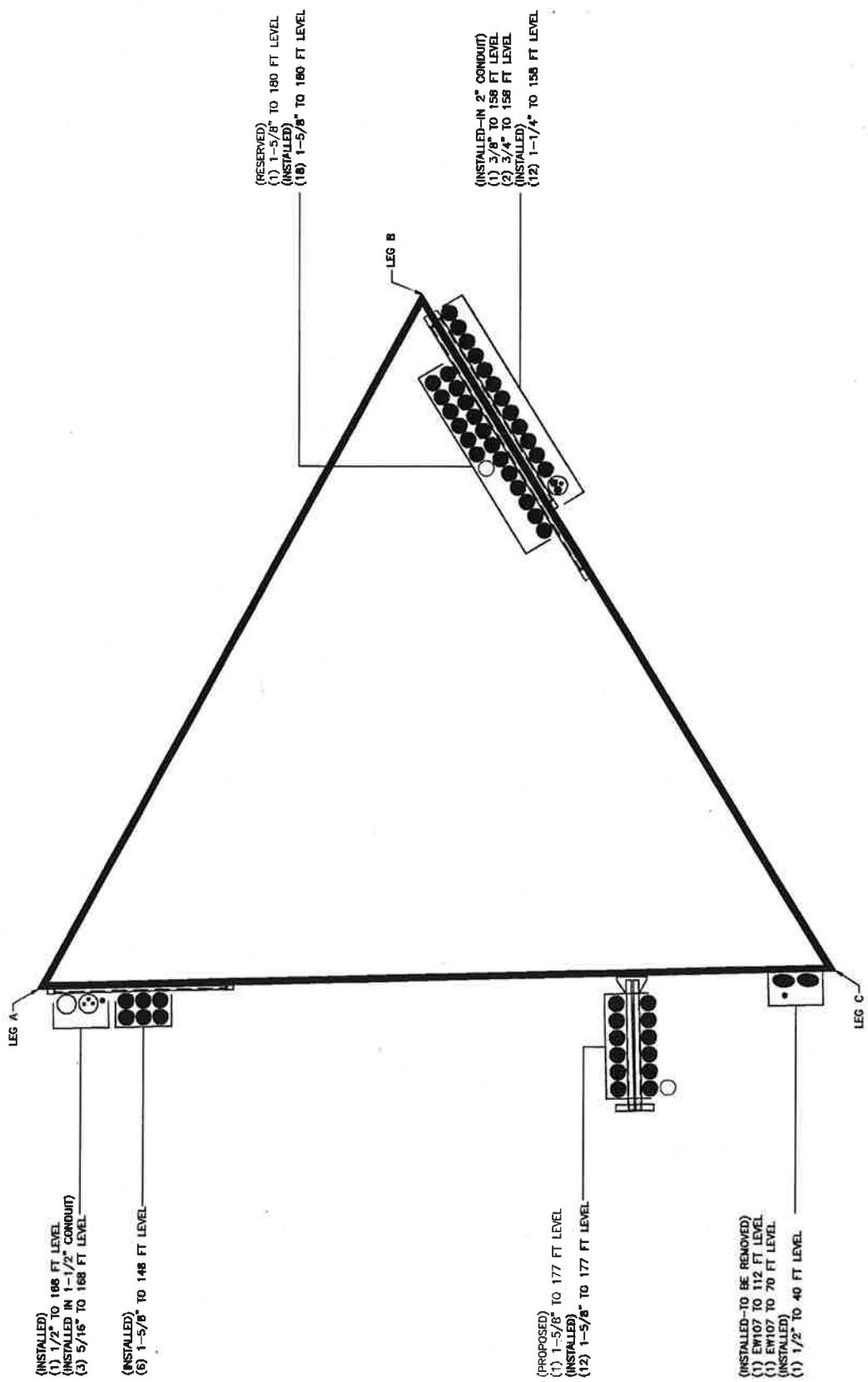
Section Capacity Table

Section No.	Elevation	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
	ft							
T1	180 - 160	Leg	ROHN 2.5 STD	2	-13.11	41.14	31.9	Pass
		Diagonal	ROHN 2 STD	9	-6.24	15.54	40.1	Pass
		Horizontal	ROHN 1.5 STD	7	-3.35	20.29	16.5	Pass
		Top Girt	ROHN 1.5 STD	5	-1.41	20.34	7.0	Pass
		Inner Bracing	L2x2x1/8	37	-0.02	5.86	0.4	Pass
		Leg	ROHN 3 X-STR	41	-44.84	83.78	53.5	Pass
T2	160 - 140	Diagonal	ROHN 2 STD	48	-8.06	13.38	60.2	Pass
		Horizontal	ROHN 1.5 STD	46	-4.99	17.38	28.7	Pass
		Top Girt	ROHN 1.5 STD	5	-1.41	20.34	7.0	Pass
		Inner Bracing	L2x2x1/8	37	-0.02	5.86	0.4	Pass
		Leg	ROHN 3 X-STR	41	-44.84	83.78	53.5	Pass
		Diagonal	ROHN 2 STD	48	-8.06	13.38	60.2	Pass
T3	140 - 120	Horizontal	ROHN 1.5 STD	46	-4.99	17.38	28.7	Pass
		Inner Bracing	L2x2x1/8	52	-0.01	4.29	0.3	Pass
		Leg	ROHN 4 X-STR	80	-75.21	139.07	54.1	Pass
		Diagonal	ROHN 2 STD	87	-7.79	11.51	67.7	Pass
		Horizontal	ROHN 2 STD	85	-5.34	24.65	21.6	Pass
		Top Girt	ROHN 1.5 STD	52	-0.01	4.29	0.3	Pass
T4	120 - 100	Inner Bracing	L2x2x1/8	92	-0.01	2.93	0.4	Pass
		Leg	ROHN 5 X-STR	119	-97.97	177.42	55.2	Pass
		Diagonal	ROHN 2.5 STD	126	-9.45	14.43	65.5	Pass
		Horizontal	ROHN 2 STD	124	-5.62	20.43	27.5	Pass
		Top Girt	ROHN 1.5 STD	92	-0.01	2.93	0.4	Pass
		Inner Bracing	L2x2x1/8	131	-0.01	2.21	0.4	Pass
T5	100 - 80	Leg	ROHN 5 X-STR	146	-122.03	177.35	68.8	Pass
		Diagonal	ROHN 2.5 STD	153	-8.61	12.60	68.4	Pass
		Horizontal	ROHN 2 STD	151	-5.62	14.77	38.1	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	157	-0.01	3.47	0.4	Pass
		Leg	ROHN 6 EHS	173	-143.99	212.13	67.9	Pass
		Diagonal	ROHN 2.5 STD	180	-9.03	11.15	81.0	Pass
T6	80 - 60	Horizontal	ROHN 2.5 STD	178	-6.28	25.42	24.7	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	131	-0.01	2.21	0.4	Pass
		Leg	ROHN 5 X-STR	146	-122.03	177.35	68.8	Pass
		Diagonal	ROHN 2.5 STD	153	-8.61	12.60	68.4	Pass
		Horizontal	ROHN 2 STD	151	-5.62	14.77	38.1	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	157	-0.01	3.47	0.4	Pass
T7	60 - 40	Leg	ROHN 6 EHS	173	-143.99	212.13	67.9	Pass
		Diagonal	ROHN 2.5 STD	180	-9.03	11.15	81.0	Pass
		Horizontal	ROHN 2.5 STD	178	-6.28	25.42	24.7	Pass
		Inner Bracing	L3x3x3/16	184	-0.01	4.55	0.5	Pass
		Leg	ROHN 6 X-STR	200	-165.79	264.22	62.7	Pass
		Diagonal	ROHN 2.5 X-STR	207	-9.31	12.30	75.7	Pass
T8	40 - 20	Horizontal	ROHN 2.5 STD	205	-6.75	19.66	34.3	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	212	-0.01	7.45	0.5	Pass
		Leg	ROHN 6 X-STR	227	-186.64	264.19	70.6	Pass
		Diagonal	ROHN 3 STD	234	-9.17	16.86	54.4	Pass
		Horizontal	ROHN 2.5 STD	232	-6.90	15.57	44.3	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	238	-0.01	5.93	0.5	Pass
T9	20 - 0	Leg	ROHN 8 EHS	254	-196.38	332.47	59.1	Pass
		Diagonal	ROHN 3 STD	267	-14.21	28.18	50.4	Pass
		Horizontal	ROHN 3 STD	263	-7.72	27.51	28.0	Pass
		Redund Horz 1	ROHN TS1.5x11 ga	261	-3.41	4.90	69.6	Pass
		Bracing	ROHN 1.5 STD	262	-3.11	3.58	87.0	Pass
		Redund Diag 1	ROHN 1.5 STD	262	-3.11	3.58	44.9 (b)	Pass
		Bracing	ROHN 1.5 STD	262	-3.11	3.58	87.0	Pass

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FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Project 14256O1400	Date 15:59:40 03/25/14
	Client Crown Castle	Designed by Jarel Duncan

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
		Redund Hip 1 Bracing	ROHN TS1.5x11 ga	270	-0.04	4.35	0.9	Pass
		Redund Hip Diagonal Bracing	ROHN 2.5 STD	282	-0.05	6.98	0.7	Pass
		Inner Bracing	ROHN 3 STD	285	-0.01	19.74	0.4	Pass
							Summary	
						Leg (T8)	70.6	Pass
						Diagonal (T6)	81.0	Pass
						Horizontal (T9)	44.9	Pass
						Top Girt (T1)	7.0	Pass
						Redund Horz 1	69.6	Pass
						Bracing (T9)		
						Redund Diag 1	87.0	Pass
						Bracing (T9)		
						Redund Hip 1 Bracing (T9)	0.9	Pass
						Redund Hip Diagonal Bracing (T9)	0.7	Pass
						Inner Bracing (T8)	0.5	Pass
						Bolt Checks	55.2	Pass
						RATING =	87.0	Pass

**APPENDIX B
BASE LEVEL DRAWING**



BUSINESS UNIT: B00002 TOWER ID: C-340001

APPENDIX C
ADDITIONAL CALCULATIONS

FDH

Project: BU 806362

Sheet _____ of _____

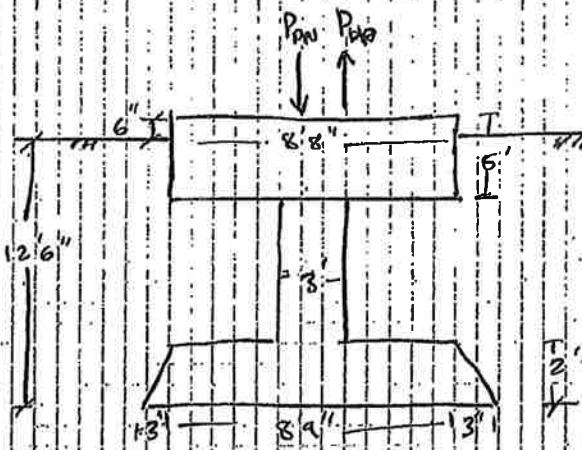
Date: _____

By: _____

FDH Project #: _____

Checked By: _____

Drawing #: _____



From TNG:

$$P_{up} = 179 \text{ k}$$

$$P_{DN} = 216 \text{ k}$$

$$W_C = (\sqrt{V_{DOP}} \times V_{P,BP} + \sqrt{V_{PAD}}) \cdot V_C$$

$$W_C = [(a_1^2 \times 2) + (B^2 \times 6) + (8.67^2 \times 5)] / (150)$$

$$W_C = 88.78 \text{ k}$$

$$W_S = 0.135 \text{ k/cf} \left[(9.25 \text{ ft})^2 \cdot (3 \text{ ft})^2 \right] \cdot (10.5' - 6')$$

$$+ 0.12 \text{ k/cf} \left[(9.25 \text{ ft})^2 \cdot (3 \text{ ft})^2 \right] \cdot (6' - 4.5')$$

$$+ 0.12 \text{ k/cf} \left[(9.25 \text{ ft})^2 \cdot (8.75 \text{ ft})^2 \right] \cdot 4.5' = 46.51 \text{ k} + 13.78 \text{ k}$$

$$+ 4.86 \text{ k}$$

$$W_S = 65.15 \text{ k}$$

COMPRESSION (ALLOWABLE BEARING CAPACITY = 8000 PSF) = FDH GEO

$$\text{P_BEARING RESIST} = (8 \text{ ksf})(3)(0.75) / (9.25)^2 = 1540.125 \text{ k}$$

$$P_{DN-TOT} = P_{DN} + W_C + W_S = 216 \text{ k} + 88.78 \text{ k} + 65.15 \text{ k} = 369.93 \text{ k}$$

$$\text{CAPACITY} = \frac{369.93 \text{ k}}{1540.125 \text{ k}}$$

$$= 24.0 \%$$

FDH

Project: BU 806362

Sheet _____ of _____

Date: _____

By: _____

FDH Project #: _____

Checked By: _____

Drawing #: _____

UPLIFT

UPLIFT RESISTANCE PIPE ID. COMFUSION (7 KSF FROM 67-1015)

$$(4)(9.25')(610.5 - 6') (7 KSF) = 1165.5 \text{ k}$$

$$\frac{88.78 \text{ k}}{2.8} + \frac{65.15 \text{ k}}{2.0} + \frac{1165.5 \text{ k}}{2.0} = 686.35 \text{ k}$$

Upstander?

$$\frac{88.78 \text{ k}}{1.5} + \frac{65.15 \text{ k}}{1.5} + \frac{1165.5 \text{ k}}{1.5} = 879.62 \text{ k}$$

CAPACITY

$$\frac{179 \text{ k}}{686.35 \text{ k}}$$

$$26.1 \%$$