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Fax (860) 275-8299
kbaldwin@rc.com
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Also admitted in Massachusetts

December 5, 2013

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

Re: **Notice of Exempt Modification – Facility Modification
Route 34 (Berkshire Road), Newtown, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the top of the existing 185-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco’s use of this tower in 1988 (Docket No. 89). Cellco now intends to add three (3) model BXA-171063-12CF AWS antennas on the tower, for a total of fifteen (15) antennas. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its AWS antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for the replacement antennas, RRHs and HYBRIFLEX™ cable.

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 E. Patricia Llodra, First Selectwoman of the Town of Newtown. A copy of this letter is also being sent to Carmine V. Renzulli, the owner of the property where the tower is located.

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



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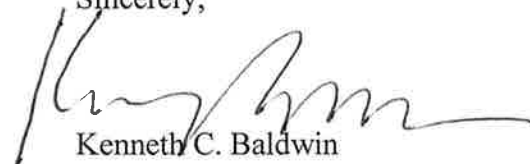
ROBINSON & COLE_{LLP}

Melanie A. Bachman
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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's additional AWS antennas and RRHs will be located at the 185-foot level on the 185-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 modified facility 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 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:

E. Patricia Llodra, Newtown First Selectwoman
Carmine V. Renzulli
Sandy M. Carter



ATTACHMENT 1

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

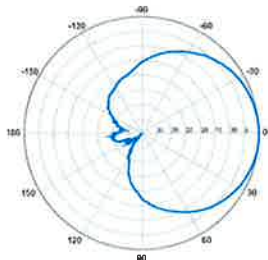
Replace "X" with desired electrical downtilt.

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

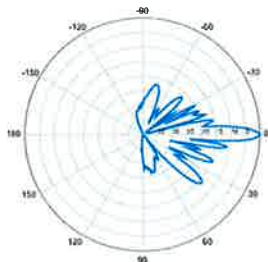


Electrical Characteristics	1710-2170 MHz			
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz	
Polarization	±45°	±45°	±45°	
Horizontal beamwidth	68°	65°	60°	
Vertical beamwidth	4.5°	4.5°	4.5°	
Gain	16,1 dBd / 18,2 dBi	16,5 dBd / 18,6 dBi	16,9 dBd / 19,0 dBi	
Electrical downtilt (X)	0, 2, 5			
Impedance	50Ω			
VSWR	≤1.5:1			
First upper sidelobe	< -17 dB			
Front-to-back ratio	> 30 dB			
In-band isolation	< -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	1842 x 154 x 105 mm		72,5 x 6,1 x 4,1 in	
Depth with z-brackets	133 mm		5,2 in	
Weight without mounting brackets	5,8 kg		12,8 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0,28 m ² Side: 0,19 m ²	Front: 3,1 ft ² Side: 2,1 ft ²		
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N	Front: 103 lbf Side: 68 lbf		
Mounting Options	Part Number	Fits Pipe Diameter		Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm	2,0-4,0 in	2,3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm	2,0-4,0 in	3,6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12CF-EDIN-X-FP			

BXA-171063-12CF-EDIN-X

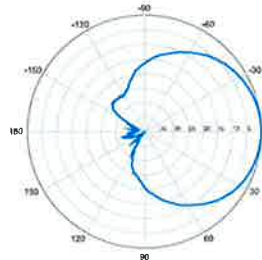


Horizontal | 1710-1880 MHz
BXA-171063-12CF-EDIN-0

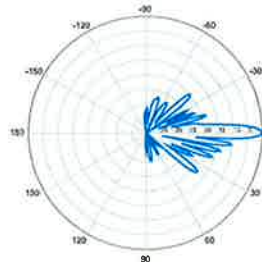


0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-X

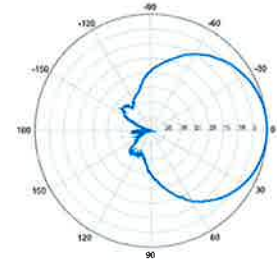


Horizontal | 1850-1990 MHz
BXA-171063-12CF-EDIN-0

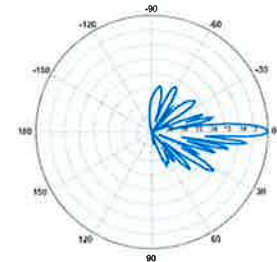


0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1920-2170 MHz
BXA-171063-12CF-EDIN-0



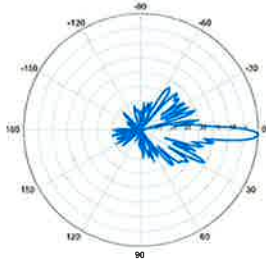
0° | Vertical | 1920-2170 MHz

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-171063-12CF-EDIN-X

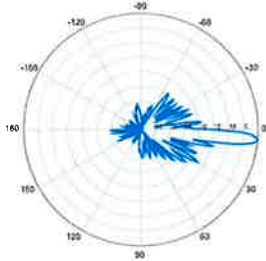
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



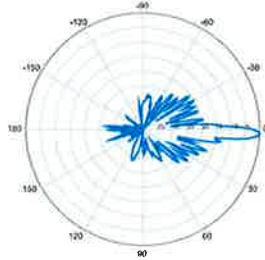
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



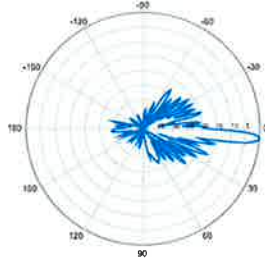
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



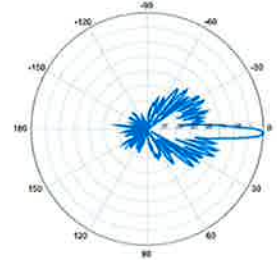
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5



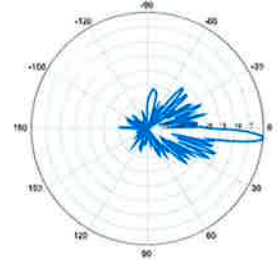
5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1920-2170 MHz

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

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

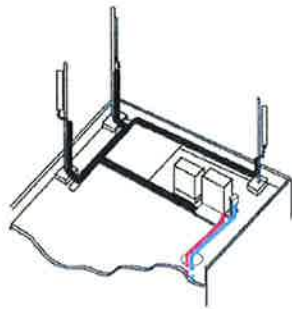
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent 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

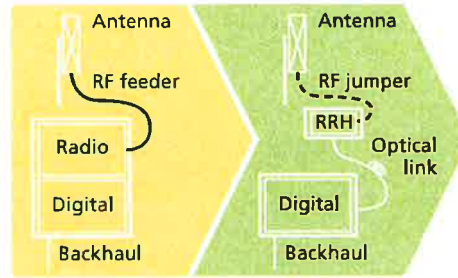
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation 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.



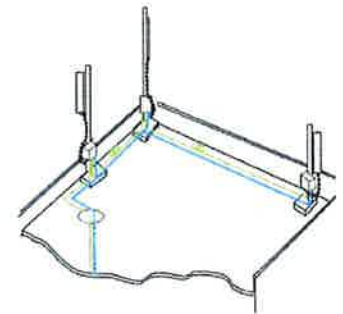
Macro

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



RRH for space-constrained cell sites



Distributed

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

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (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)

- 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

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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-connected 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

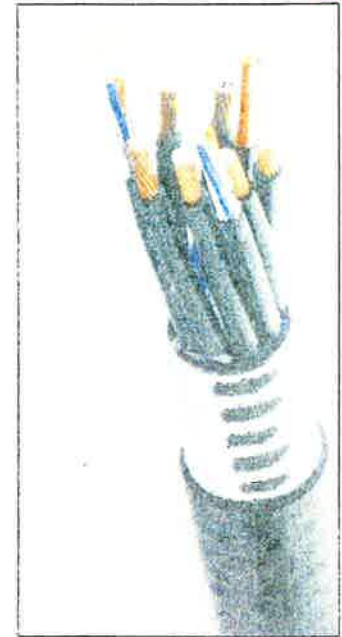


Figure 1: HYBRIFLEX Series

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Approximate Physical Properties			
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)
Optical 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
Power 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, ICEA S-95-658 UL Type XH-HW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Temperature Properties			
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

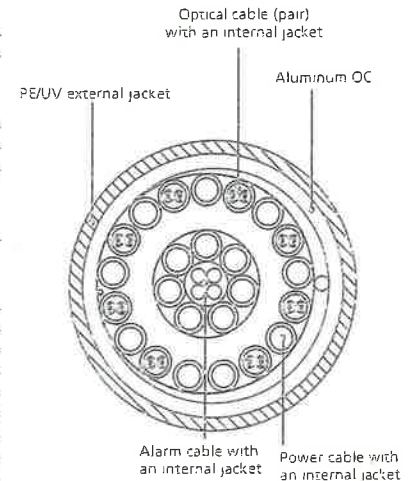


Figure 2: Construction Detail

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

ATTACHMENT 2

		General		Power		Density							
Site Name: Newtown													
Tower Height: Verizon @ 185ft													
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*AT&T UMTS	1	500	177	0.0057	880	0.5867	0.98%						
*AT&T UMTS	1	500	177	0.0057	1900	1.0000	0.57%						
*AT&T GSM	6	296	177	0.0204	880	0.5867	3.47%						
*AT&T GSM	6	427	177	0.0294	1900	1.0000	2.94%						
*AT&T LTE	1	500	177	0.0057	740	0.4933	1.16%						
*MetroPCS	3	443.61	135	0.0263	2140	1.0000	2.63%						
*Sprint CDMA/LTE	3	778	164.5	0.0310	1900	1.0000	3.10%						
*Sprint CDMA/LTE	1	438	164.5	0.0058	850	0.5667	1.03%						
*Nextel	9	100	155	0.0135	851	0.5673	2.37%						
*T-Mobile GSM	8	129	145	0.0176	1945	1.0000	1.76%						
*T-Mobile UMTS	2	730	145	0.0250	2100	1.0000	2.50%						
Verizon PCS	15	376	185	0.0593	1970	1.0000	5.93%						
Verizon Cellular	9	366	185	0.0346	869	0.5793	5.97%						
Verizon AWS	1	1750	185	0.0184	2145	1.0000	1.84%						
Verizon 700	1	768	185	0.0081	698	0.4653	1.73%						
								37.99%					
* Source: Siting Council													

ATTACHMENT 3



Pier Structural Engineering Corp.
 55 Northfield Drive E, Suite 198
 Waterloo, ON N2K 3T6
 Tel: 519-885-3806
 Fax: 519-886-0076
 www.p-sec.ca

October 25, 2013

Veronica Harris, Tower Structural Analyst
 Crown Castle USA Inc.
 1200 McArthur Blvd
 Mahwah, NJ 07430

Subject: Structural Analysis Report

Carrier Designation: Carrier Co-Locate: **Verizon Wireless**
 Carrier Site Number: **N/A**
 Carrier Site Name: **Newtown, CT**

Crown Castle Designation: Crown Castle BU Number: **806354**
 Crown Castle Site Name: **BRG 123 943084**
 Crown Castle JDE Job Number: **246092**
 Crown Castle WO Number: **659638**

Engineering Firm Designation: P-SEC Project Number: **9884**

Site Data: **ROUTE 34 - WASHINGTON AVEUNE, NEWTOWN, Fairfield County, CT**
Latitude 41° 24' 45.53", Longitude -73° 16' 12.34"
185-ft Monopole Tower

Dear Veronica Harris,

Pier Structural Engineering Corp. (P-SEC) 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 588012, in accordance with application 200495, 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 local code requirements based upon a wind speed of 85 mph fastest mile.

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

Structural analysis prepared by: Ahmed Iftikhar, E.I.T.

Respectfully submitted by:

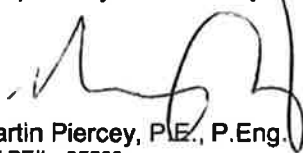

 Martin Piercey, P.E., P.Eng.
 CT PE# 25582



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1) INTRODUCTION

This tower is a 185-ft Monopole tower originally designed by ENGINEERED ENDEAVORS, INC. in August of 1999 for a wind speed of 90 mph per TIA/EIA-222-F. The tower was later modified per Vertical Structures Inc. modification drawings dated February of 2009.

2) ANALYSIS CRITERIA

The following design parameters have been used in our analysis:

Design Standard: TIA/EIA-222-F standard and 2005 CT State Building Code
 County/State: Fairfield County, CT
 Wind Speeds: *CASE 1* 85 mph (fastest mile)
 CASE 2 37.6 mph (fastest mile) with 0.75" radial solid ice (*per ASCE7 ice map*)
 CASE 3 50 mph (fastest mile) for Serviceability
 Allowable Stress: Increased 1/3rd

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
185.0	188.0	3	alcatel lucent	RRH2X40-AWS	1	1 5/8	1
	187.0	3	antel	BXA-171063-12CF-EDIN-X			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

Notes:

1) Proposed equipment

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
185.0	187.0	3	antel	BXA-171063-12BF	12	1 5/8	1
		3	antel	BXA-70063-6CF-2			
		6	decibel	DB846F65ZAXY			
		6	rfs celwave	FD9R6004/2C-3L			
	185.0	1	---	Platform Mount [LP 601-1]	1	1/2	1
		1	---	Side Arm Mount [SO 103-3]			
182.0	188.0	1	decibel	ASP-601	1	1/2	1
	182.0	1	---	Side Arm Mount [SO 102-3]			
175.0	177.0	6	ericsson	RRUS-11	12	1 5/8	1
		6	powerwave tech.	7770.00			
		6	powerwave tech.	LGP2140X			
		3	powerwave tech.	P65-16-XLH-RR			
		3	powerwave tech.	TT19-08BP111-001			
	1	raycap	DC6-48-60-18-8F	2	5/8		
175.0	1	---	Platform Mount [LP 601-1]	1	---	---	
167.0	167.0	3	alcatel lucent	1900MHz RRH (65MHz)	---	---	1
		3	alcatel lucent	800MHZ RRH			
		1	---	Side Arm Mount [SO 102-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
165.0	165.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	3	1 1/4	1
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20			
		1	---	Platform Mount [LP 601-1]			
155.0	158.0	12	decibel	DB844H90	12	1 1/4	1
	155.0	1	---	Platform Mount [LP 602-1]			
145.0	148.0	3	rfs celwave	APX16DWV-16DWV-S-E-A20	6	1-5/8	2
		3	rfs celwave	ATMAA1412D-1A20			
		3	rfs celwave	ATMPP1412D-1CWA			
		6	ericsson	KRY 112 71			
	3	andrew	RR90-17-02DPL2	6	1 5/8	1	
	145.0	1	---	Platform Mount [LP 601-1]			
135.0	137.0	3	kathrein	800 10504	6	1 5/8	1
		3	kathrein	860 10025			
	1	---	T-Arm Mount [TA 602-3]				

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
185	185	12	swedcom	ALP 9212	--	--
175	175	12	swedcom	ALP 11011	--	--
165	165	9	decibel	DB 980	--	--
155	155	12	swedcom	ALP 9011	--	--
145	145	6	ems wireless	RR65-18	--	--
		1	scala	OGB9-900		
110	110	1	generic	GPS	--	--
50	50	1	generic	GPS	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welte, dated 2/14/1999	2297011	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	VSI, Proj. No. 2009-004-030 dated 6/12/2009	2381114	CCISITES
4-POST MODIFICATION INSPECTION	VSI, Proj. No. 2009-004-030 dated 6/12/2009	2381114	CCISITES

Document	Remarks	Reference	Source
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEl, Proj. No. 4743 dated 7/22/1999	822037	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEl, Proj. No. GS51352 dated 7/22/1999	822035	CCISITES
APPLICATION	Sprint PCS, Revision # 4 dated 5/21/2012	143917	CCISITES

3.1) Analysis Method

tnxTower (6.1.3.1), 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.
- 5) P-SEC did not analyze antenna supporting mounts as part of this analysis report and assumed they are structurally sufficient. It is the carrier's responsibility to ensure structural compliance of their existing and/or proposed antenna supporting mounts.
- 6) All equipment model numbers, quantities, and centerline elevations are as provided in the CCI CAD package dated October 09, 2013 with any adjustments as noted below:

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail	
L1	185 - 149.497	Pole	TP36.0404x29x0.25	1	-7.9	1435.5	45.7	Pass	
L2	149.497 - 114.096	Pole	TP42.4605x34.5478x0.3125	2	-15.3	2114.7	83.7	Pass	
L3	114.096 - 76.6771	Pole	TP49.157x40.6983x0.375	3	-23.3	2938.0	96.7	Pass	
L4	76.6771 - 38.2552	Pole	TP55.9285x47.1065x0.4375	4	-34.5	3900.1	98.0	Pass	
L5	38.2552 - 0	Pole	TP62.5x53.5669x0.5	5	-51.9	5115.2	95.4	Pass	
							Summary		
							Pole (L4)	98.0	Pass
							Rating =	98.0	Pass

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
2	Anchor Rods	---	85.4	Pass
2	Base Plate	---	51.5	Pass
2	Base Foundation	---	71.1	Pass
Structure Rating (max from all components) =				98.0%

- Notes: 1) See full member breakdown and section capacities in Appendix A.
2) See additional documentation in Appendix C for supporting calculations.
3) Stresses up to 105% (steel) and 110% (foundations) are within engineering tolerance and considered acceptable.

4.1) Recommendations

The existing 185-ft self-support tower located in Fairfield County (BRG 123 943084) is structurally acceptable based on the TIA/EIA-222-F Standard and local code requirements based upon a wind speed of 85 mph fastest mile.

No modifications are required for the proposed loading.

Should you have any questions, please call us anytime at 519-885-3806.

encl.
806354_200495 SA Report_20131025_SA.doc

APPENDIX A
TNXTOWER OUTPUT

tnxTower Pier Structural Engineering Corp. 55 Northfield Drive E Suite 198 Waterloo, ON N2K 3T6 Phone: (519) 885-3806 FAX: (519) 886-0076	Job PSEC 9884 (for Verizon Wireles)	Page 1 of 15
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	Client CROWN CASTLE	Designed by aiftikhar

Tower Input Data

There is a pole section.

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

The following design criteria apply:

Tower is located in Fairfield County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

E - Existing, R - Reserved, P - Proposed.

Proposed loading revision at 185ft elevation.

Reserved loading included at 145ft elevation.

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

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

Options

<ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys √ Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity Leg Bolts Are At Top Of Section √ Secondary Horizontal Braces Leg √ Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination 	<ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. √ Autocalc Torque Arm Areas SR Members Have Cut Ends √ Sort Capacity Reports By Component √ Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption 	<ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression √ All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feedline Torque √ Include Angle Block Shear Check <li style="text-align: center;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
--	---	---

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	185'-149'6"	35'6"	5'1/8"	18	29.0000	36.0404	0.2500	1.0000	A572-65 (65 ksi)
L2	149'6"-114'1-3/16"	40'4-29/32"	5'9-23/32"	18	34.5478	42.4605	0.3125	1.2500	A572-65 (65 ksi)

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	Client CROWN CASTLE	Designed by aiftikhar

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	114'-1-3/16"-76'-5/32"	43'-2-3/4"	6'-7-13/16"	18	40.6983	49.1570	0.3750	1.5000	A572-65 (65 ksi)
L4	76'-8-5/32"-38'-3-1/8"	45'-27/32"	7'-5-7/8"	18	47.1065	55.9285	0.4375	1.7500	A572-65 (65 ksi)
L5	38'-3-1/8"-0'	45'-9"		18	53.5869	62.5000	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	29.4474	22.8131	2382.3081	10.2063	14.7320	161.7098	4767.7509	11.4087	4.6640	18.656
	36.5964	28.3997	4596.0425	12.7056	18.3085	251.0329	9198.1326	14.2025	5.9031	23.612
L2	36.0761	33.9572	5028.2644	12.1535	17.5503	286.5059	10063.1450	16.9818	5.5304	17.697
	43.1155	41.8055	9382.6455	14.9625	21.5699	434.9872	18777.6370	20.9067	6.9230	22.154
L3	42.4800	47.9948	9859.2279	14.3148	20.6747	476.8735	19731.4288	24.0019	6.5029	17.341
	49.9153	58.0628	17456.3904	17.3176	24.9718	699.0454	34935.7504	29.0369	7.9916	21.311
L4	49.1542	64.8058	17832.3445	16.5675	23.9301	745.1843	35688.1533	32.4090	7.5207	17.19
	56.7913	77.0562	29977.1322	19.6993	28.4117	1055.0990	59993.7092	38.5354	9.0734	20.739
L5	55.8958	84.2489	29996.9203	18.8459	27.2221	1101.9306	60033.3114	42.1325	8.5513	17.103
	63.4642	98.3940	47784.7640	22.0100	31.7500	1505.0319	95632.4044	49.2063	10.1200	20.24

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Multi.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 185'-149'6"				1	1	1		
L2				1	1	1		
149'6"-114'-1-3/16"				1	1	1		
L3				1	1	1		
114'-1-3/16"-76'-8-5/32"				1	1	1		
L4				1	1	1		
76'-8-5/32"-38'-3-1/8"				1	1	1		
L5 38'-3-1/8"-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Shield Leg	Allow	Component Type	Placement ft	Total Number	C _{AA}	Weight plf
HJ7-50A(1-5/8") (Carrier 185' E)	A	No	Inside Pole	185' - 5'	12	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
						2" Ice	0.00
						4" Ice	0.00
HB158-1-08U8-S8J18(1-5/8) (Carrier 185' P)	A	No	CaAa (Out Of Face)	185' - 5'	1	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A		Weight plf
						ft ² /ft		
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00

LDF4P-50A(1/2") (Carrier 182' E)	C	No	Inside Pole	182' - 5'	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00

CR 50 1873PE(1-5/8") (Carrier 175' E)	C	No	CaAa (Out Of Face)	175' - 5'	12	No Ice	0.02	0.20
						1/2" Ice	0.02	0.20
						1" Ice	0.03	0.20
						2" Ice	0.03	0.20
						4" Ice	0.05	0.20
FB-L98B-002-75000(3/8") (Carrier 175' E)	C	No	Inside Pole	175' - 5'	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
WR-VG82ST-BRDA(5/8") (Carrier 175' E)	C	No	Inside Pole	175' - 5'	2	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00

HB114-1-0813U4-M5J(1 1/4") (Carrier 165' E)	C	No	Inside Pole	165' - 5'	3	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00

LDF6-50A(1-1/4") (Carrier 155' E)	B	No	Inside Pole	155' - 5'	12	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00

LDF7-50A(1-5/8") (Carrier 145' E)	C	No	Inside Pole	145' - 5'	6	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
LDF7-50A(1-5/8") (Carrier 145' R)	C	No	CaAa (Out Of Face)	145' - 5'	6	No Ice	0.00	0.02
						1/2" Ice	0.00	0.02
						1" Ice	0.00	0.02
						2" Ice	0.00	0.02
						4" Ice	0.00	0.02

CR 50 1873(1-5/8") (Carrier 135' E)	B	No	Inside Pole	135' - 5'	6	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00

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Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Lateral					
			Vert						
			ft	ft	°	ft	ft ²	ft ²	K
(2) DB846F65ZAXY (Carrier 185' E)	A	From Leg	4.00	0.0000	185'	No Ice	7.03	6.16	0.0
			0'			1/2" Ice	7.54	6.62	0.1
			2'			1" Ice	8.08	7.09	0.1
						2" Ice	9.20	8.11	0.3
						4" Ice	11.53	10.40	0.6
(2) DB846F65ZAXY (Carrier 185' E)	B	From Leg	4.00	0.0000	185'	No Ice	7.03	6.16	0.0
			0'			1/2" Ice	7.54	6.62	0.1
			2'			1" Ice	8.08	7.09	0.1
						2" Ice	9.20	8.11	0.3
						4" Ice	11.53	10.40	0.6
(2) DB846F65ZAXY (Carrier 185' E)	C	From Leg	4.00	0.0000	185'	No Ice	7.03	6.16	0.0
			0'			1/2" Ice	7.54	6.62	0.1
			2'			1" Ice	8.08	7.09	0.1
						2" Ice	9.20	8.11	0.3
						4" Ice	11.53	10.40	0.6
BXA-171063-12BF w/ Mount Pipe (Carrier 185' E)	A	From Leg	4.00	0.0000	185'	No Ice	4.97	5.23	0.0
			0'			1/2" Ice	5.52	6.39	0.1
			2'			1" Ice	6.04	7.26	0.1
						2" Ice	7.09	9.05	0.3
						4" Ice	9.36	12.82	0.7
BXA-171063-12BF w/ Mount Pipe (Carrier 185' E)	B	From Leg	4.00	0.0000	185'	No Ice	4.97	5.23	0.0
			0'			1/2" Ice	5.52	6.39	0.1
			2'			1" Ice	6.04	7.26	0.1
						2" Ice	7.09	9.05	0.3
						4" Ice	9.36	12.82	0.7
BXA-171063-12BF w/ Mount Pipe (Carrier 185' E)	C	From Leg	4.00	0.0000	185'	No Ice	4.97	5.23	0.0
			0'			1/2" Ice	5.52	6.39	0.1
			2'			1" Ice	6.04	7.26	0.1
						2" Ice	7.09	9.05	0.3
						4" Ice	9.36	12.82	0.7
BXA-70063-6CF-2 w/ Mount Pipe (Carrier 185' E)	A	From Leg	4.00	0.0000	185'	No Ice	7.97	5.80	0.0
			0'			1/2" Ice	8.61	6.95	0.1
			2'			1" Ice	9.22	7.82	0.2
						2" Ice	10.46	9.60	0.3
						4" Ice	13.07	13.37	0.8
BXA-70063-6CF-2 w/ Mount Pipe (Carrier 185' E)	B	From Leg	4.00	0.0000	185'	No Ice	7.97	5.80	0.0
			0'			1/2" Ice	8.61	6.95	0.1
			2'			1" Ice	9.22	7.82	0.2
						2" Ice	10.46	9.60	0.3
						4" Ice	13.07	13.37	0.8
BXA-70063-6CF-2 w/ Mount Pipe (Carrier 185' E)	C	From Leg	4.00	0.0000	185'	No Ice	7.97	5.80	0.0
			0'			1/2" Ice	8.61	6.95	0.1
			2'			1" Ice	9.22	7.82	0.2
						2" Ice	10.46	9.60	0.3
						4" Ice	13.07	13.37	0.8
(2) FD9R6004/2C-3L (Carrier 185' E)	A	From Leg	4.00	0.0000	185'	No Ice	0.37	0.08	0.0
			0'			1/2" Ice	0.45	0.14	0.0
			2'			1" Ice	0.54	0.20	0.0
						2" Ice	0.75	0.34	0.0
						4" Ice	1.28	0.74	0.1
(2) FD9R6004/2C-3L (Carrier 185' E)	B	From Leg	4.00	0.0000	185'	No Ice	0.37	0.08	0.0
			0'			1/2" Ice	0.45	0.14	0.0
			2'			1" Ice	0.54	0.20	0.0
						2" Ice	0.75	0.34	0.0
						4" Ice	1.28	0.74	0.1

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
(2) FD9R6004/2C-3L (Carrier 185' E)	C	From Leg	4.00	0.0000	185'	4" Ice	1.28	0.74	0.1
						No Ice	0.37	0.08	0.0
						1/2" Ice	0.45	0.14	0.0
						1" Ice	0.54	0.20	0.0
						2" Ice	0.75	0.34	0.0
BXA-171063-12CF-EDIN-X w/ Mount Pipe (Carrier 185' P)	A	From Leg	4.00	0.0000	185'	4" Ice	1.28	0.74	0.1
						No Ice	5.03	5.29	0.0
						1/2" Ice	5.58	6.46	0.1
						1" Ice	6.10	7.35	0.1
						2" Ice	7.17	9.15	0.3
BXA-171063-12CF-EDIN-X w/ Mount Pipe (Carrier 185' P)	B	From Leg	4.00	0.0000	185'	4" Ice	9.44	12.95	0.7
						No Ice	5.03	5.29	0.0
						1/2" Ice	5.58	6.46	0.1
						1" Ice	6.10	7.35	0.1
						2" Ice	7.17	9.15	0.3
BXA-171063-12CF-EDIN-X w/ Mount Pipe (Carrier 185' P)	C	From Leg	4.00	0.0000	185'	4" Ice	9.44	12.95	0.7
						No Ice	5.03	5.29	0.0
						1/2" Ice	5.58	6.46	0.1
						1" Ice	6.10	7.35	0.1
						2" Ice	7.17	9.15	0.3
RRH2X40-AWS (Carrier 185' P)	A	From Leg	4.00	0.0000	185'	4" Ice	9.44	12.95	0.7
						No Ice	2.98	1.60	0.0
						1/2" Ice	3.24	1.82	0.1
						1" Ice	3.50	2.06	0.1
						2" Ice	4.07	2.56	0.1
RRH2X40-AWS (Carrier 185' P)	B	From Leg	4.00	0.0000	185'	4" Ice	5.30	3.66	0.3
						No Ice	2.98	1.60	0.0
						1/2" Ice	3.24	1.82	0.1
						1" Ice	3.50	2.06	0.1
						2" Ice	4.07	2.56	0.1
RRH2X40-AWS (Carrier 185' P)	C	From Leg	4.00	0.0000	185'	4" Ice	5.30	3.66	0.3
						No Ice	2.98	1.60	0.0
						1/2" Ice	3.24	1.82	0.1
						1" Ice	3.50	2.06	0.1
						2" Ice	4.07	2.56	0.1
DB-T1-6Z-8AB-0Z (Carrier 185' P)	B	From Leg	4.00	0.0000	185'	4" Ice	5.30	3.66	0.3
						No Ice	5.60	2.33	0.0
						1/2" Ice	5.92	2.56	0.1
						1" Ice	6.24	2.79	0.1
						2" Ice	6.91	3.28	0.2
Platform Mount [LP 601-1] (Carrier 185' E)	C	None	0.0000	185'	4" Ice	8.37	4.37	0.5	
					No Ice	28.47	28.47	1.1	
					1/2" Ice	33.59	33.59	1.5	
					1" Ice	38.71	38.71	1.9	
					2" Ice	48.95	48.95	2.7	
Side Arm Mount [SO 103-3] (Carrier 185' E)	C	None	0.0000	185'	4" Ice	69.43	69.43	4.3	
					No Ice	9.50	9.50	0.2	
					1/2" Ice	11.80	11.80	0.3	
					1" Ice	14.10	14.10	0.4	
					2" Ice	18.70	18.70	0.6	
*** ASP-601 (Carrier 182'E)	A	From Leg	2.00	0.0000	182'	4" Ice	27.90	27.90	1.0
						No Ice	2.34	2.34	0.0
						1/2" Ice	4.21	4.21	0.0
						1" Ice	6.08	6.08	0.0
						2" Ice	9.83	9.83	0.1
						4" Ice	17.32	17.32	0.1

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight
			Horz	Lateral			Front	Side	
			ft	ft	°	ft	ft ²	ft ²	K
Side Arm Mount [SO 102-3] (Carrier 182'E)	A	None			0.0000	182'	No Ice 3.00 1/2" Ice 3.48 1" Ice 3.96 2" Ice 4.92 4" Ice 6.84	3.00 3.48 3.96 4.92 6.84	0.1 0.1 0.1 0.2 0.3

(2) 7770.00 w/ Mount Pipe (Carrier 175' E)	A	From Leg	4.00 0' 2'		0.0000	175'	No Ice 6.12 1/2" Ice 6.63 1" Ice 7.13 2" Ice 8.16 4" Ice 10.36	4.25 5.01 5.71 7.16 10.41	0.1 0.1 0.2 0.3 0.7
(2) 7770.00 w/ Mount Pipe (Carrier 175' E)	B	From Leg	4.00 0' 2'		0.0000	175'	No Ice 6.12 1/2" Ice 6.63 1" Ice 7.13 2" Ice 8.16 4" Ice 10.36	4.25 5.01 5.71 7.16 10.41	0.1 0.1 0.2 0.3 0.7
(2) 7770.00 w/ Mount Pipe (Carrier 175' E)	C	From Leg	4.00 0' 2'		0.0000	175'	No Ice 6.12 1/2" Ice 6.63 1" Ice 7.13 2" Ice 8.16 4" Ice 10.36	4.25 5.01 5.71 7.16 10.41	0.1 0.1 0.2 0.3 0.7
P65-16-XLH-RR (Carrier 175' E)	A	From Leg	4.00 0' 2'		0.0000	175'	No Ice 8.40 1/2" Ice 8.95 1" Ice 9.51 2" Ice 10.65 4" Ice 13.03	4.70 5.15 5.60 6.53 8.52	0.1 0.1 0.2 0.3 0.6
P65-16-XLH-RR (Carrier 175' E)	B	From Leg	4.00 0' 2'		0.0000	175'	No Ice 8.40 1/2" Ice 8.95 1" Ice 9.51 2" Ice 10.65 4" Ice 13.03	4.70 5.15 5.60 6.53 8.52	0.1 0.1 0.2 0.3 0.6
P65-16-XLH-RR (Carrier 175' E)	C	From Leg	4.00 0' 2'		0.0000	175'	No Ice 8.40 1/2" Ice 8.95 1" Ice 9.51 2" Ice 10.65 4" Ice 13.03	4.70 5.15 5.60 6.53 8.52	0.1 0.1 0.2 0.3 0.6
(2) LGP2140X (Carrier 175' E)	A	From Leg	4.00 0' 2'		0.0000	175'	No Ice 1.26 1/2" Ice 1.42 1" Ice 1.58 2" Ice 1.94 4" Ice 2.75	0.38 0.49 0.62 0.89 1.54	0.0 0.0 0.0 0.1 0.1
(2) LGP2140X (Carrier 175' E)	B	From Leg	4.00 0' 2'		0.0000	175'	No Ice 1.26 1/2" Ice 1.42 1" Ice 1.58 2" Ice 1.94 4" Ice 2.75	0.38 0.49 0.62 0.89 1.54	0.0 0.0 0.0 0.1 0.1
(2) LGP2140X (Carrier 175' E)	C	From Leg	4.00 0' 2'		0.0000	175'	No Ice 1.26 1/2" Ice 1.42 1" Ice 1.58 2" Ice 1.94 4" Ice 2.75	0.38 0.49 0.62 0.89 1.54	0.0 0.0 0.0 0.1 0.1
(2) RRUS-11 (Carrier 175' E)	A	From Leg	4.00 0' 2'		0.0000	175'	No Ice 3.25 1/2" Ice 3.49 1" Ice 3.74 2" Ice 4.27 4" Ice 5.43	1.37 1.55 1.74 2.14 3.04	0.0 0.1 0.1 0.2 0.3
(2) RRUS-11	B	From Leg	4.00		0.0000	175'	No Ice 3.25	1.37	0.0

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
(Carrier 175' E)			0'			1/2" Ice	3.49	1.55	0.1	
			2'			1" Ice	3.74	1.74	0.1	
						2" Ice	4.27	2.14	0.2	
						4" Ice	5.43	3.04	0.3	
(2) RRUS-11 (Carrier 175' E)	C	From Leg	4.00		0.0000	175'	No Ice	3.25	1.37	0.0
			0'				1/2" Ice	3.49	1.55	0.1
			2'				1" Ice	3.74	1.74	0.1
							2" Ice	4.27	2.14	0.2
							4" Ice	5.43	3.04	0.3
TT19-08BP111-001 (Carrier 175' E)	A	From Leg	4.00		0.0000	175'	No Ice	0.64	0.52	0.0
			0'				1/2" Ice	0.75	0.62	0.0
			2'				1" Ice	0.87	0.73	0.0
							2" Ice	1.13	0.98	0.0
							4" Ice	1.77	1.58	0.1
TT19-08BP111-001 (Carrier 175' E)	B	From Leg	4.00		0.0000	175'	No Ice	0.64	0.52	0.0
			0'				1/2" Ice	0.75	0.62	0.0
			2'				1" Ice	0.87	0.73	0.0
							2" Ice	1.13	0.98	0.0
							4" Ice	1.77	1.58	0.1
TT19-08BP111-001 (Carrier 175' E)	C	From Leg	4.00		0.0000	175'	No Ice	0.64	0.52	0.0
			0'				1/2" Ice	0.75	0.62	0.0
			2'				1" Ice	0.87	0.73	0.0
							2" Ice	1.13	0.98	0.0
							4" Ice	1.77	1.58	0.1
DC6-48-60-18-8F (Carrier 175' E)	C	From Leg	4.00		0.0000	175'	No Ice	2.57	2.57	0.0
			0'				1/2" Ice	2.80	2.80	0.0
			2'				1" Ice	3.04	3.04	0.1
							2" Ice	3.54	3.54	0.1
							4" Ice	4.66	4.66	0.3
Platform Mount [LP 601-1] (Carrier 175' E)	C	None			0.0000	175'	No Ice	28.47	28.47	1.1
							1/2" Ice	33.59	33.59	1.5
							1" Ice	38.71	38.71	1.9
							2" Ice	48.95	48.95	2.7
							4" Ice	69.43	69.43	4.3

1900MHz RRH (65MHz) (Carrier 167' E)	A	From Leg	4.00		0.0000	167'	No Ice	2.70	2.77	0.1
			0'				1/2" Ice	2.94	3.01	0.1
			0'				1" Ice	3.18	3.26	0.1
							2" Ice	3.70	3.78	0.2
							4" Ice	4.85	4.93	0.4
1900MHz RRH (65MHz) (Carrier 167' E)	B	From Leg	4.00		0.0000	167'	No Ice	2.70	2.77	0.1
			0'				1/2" Ice	2.94	3.01	0.1
			0'				1" Ice	3.18	3.26	0.1
							2" Ice	3.70	3.78	0.2
							4" Ice	4.85	4.93	0.4
1900MHz RRH (65MHz) (Carrier 167' E)	C	From Leg	4.00		0.0000	167'	No Ice	2.70	2.77	0.1
			0'				1/2" Ice	2.94	3.01	0.1
			0'				1" Ice	3.18	3.26	0.1
							2" Ice	3.70	3.78	0.2
							4" Ice	4.85	4.93	0.4
800MHz RRH (Carrier 167' E)	A	From Leg	4.00		0.0000	167'	No Ice	2.49	2.07	0.1
			0'				1/2" Ice	2.71	2.27	0.1
			0'				1" Ice	2.93	2.48	0.1
							2" Ice	3.41	2.93	0.2
							4" Ice	4.46	3.93	0.3
800MHz RRH (Carrier 167' E)	B	From Leg	4.00		0.0000	167'	No Ice	2.49	2.07	0.1
			0'				1/2" Ice	2.71	2.27	0.1

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight		
			Horz	Lateral Vert							
			ft	ft	°	ft	ft ²	ft ²	K		
Platform Mount [LP 601-1] (Carrier 165' E)	C	None			0.0000	165'	2" Ice	1.30	0.79	0.0	
							4" Ice	1.97	1.34	0.1	
							No Ice	28.47	28.47	1.1	
							1/2" Ice	33.59	33.59	1.5	
							1" Ice	38.71	38.71	1.9	
							2" Ice	48.95	48.95	2.7	
6' x 2" Mount Pipe (Carrier 165' E)	A	From Leg	4.00	0' 0'	0.0000	165'	4" Ice	69.43	69.43	4.3	
							No Ice	1.20	1.20	0.0	
							1/2" Ice	1.80	1.80	0.0	
							1" Ice	2.17	2.17	0.0	
							2" Ice	2.93	2.93	0.1	
							4" Ice	4.57	4.57	0.2	
6' x 2" Mount Pipe (Carrier 165' E)	B	From Leg	4.00	0' 0'	0.0000	165'	No Ice	1.20	1.20	0.0	
							1/2" Ice	1.80	1.80	0.0	
							1" Ice	2.17	2.17	0.0	
							2" Ice	2.93	2.93	0.1	
							4" Ice	4.57	4.57	0.2	
							No Ice	1.20	1.20	0.0	
6' x 2" Mount Pipe (Carrier 165' E)	C	From Leg	4.00	0' 0'	0.0000	165'	No Ice	1.20	1.20	0.0	
							1/2" Ice	1.80	1.80	0.0	
							1" Ice	2.17	2.17	0.0	
							2" Ice	2.93	2.93	0.1	
							4" Ice	4.57	4.57	0.2	
							No Ice	1.20	1.20	0.0	
****	(4) DB844H90 w/ Mount Pipe (Carrier 155' E)	A	From Leg	4.00	0' 3'	0.0000	155'	No Ice	3.30	4.92	0.0
1/2" Ice								3.69	5.60	0.1	
1" Ice								4.12	6.28	0.1	
2" Ice								5.01	7.71	0.2	
4" Ice								6.92	10.83	0.6	
No Ice								3.30	4.92	0.0	
(4) DB844H90 w/ Mount Pipe (Carrier 155' E)	B	From Leg	4.00	0' 3'	0.0000	155'	1/2" Ice	3.69	5.60	0.1	
							1" Ice	4.12	6.28	0.1	
							2" Ice	5.01	7.71	0.2	
							4" Ice	6.92	10.83	0.6	
							No Ice	3.30	4.92	0.0	
							1/2" Ice	3.69	5.60	0.1	
(4) DB844H90 w/ Mount Pipe (Carrier 155' E)	C	From Leg	4.00	0' 3'	0.0000	155'	1" Ice	4.12	6.28	0.1	
							2" Ice	5.01	7.71	0.2	
							4" Ice	6.92	10.83	0.6	
							No Ice	3.30	4.92	0.0	
							1/2" Ice	3.69	5.60	0.1	
							1" Ice	4.12	6.28	0.1	
Platform Mount [LP 602-1] (Carrier 155' E)	C	None			0.0000	155'	2" Ice	5.01	7.71	0.2	
							4" Ice	6.92	10.83	0.6	
							No Ice	32.03	32.03	1.3	
							1/2" Ice	38.71	38.71	1.8	
							1" Ice	45.39	45.39	2.3	
							2" Ice	58.75	58.75	3.2	
****	RR90-17-02DPL2 w/ Mount Pipe (Carrier 145' E)	A	From Leg	4.00	0' 3'	0.0000	145'	4" Ice	85.47	85.47	5.0
No Ice								4.59	3.34	0.0	
1/2" Ice								5.09	4.11	0.1	
1" Ice								5.58	4.81	0.1	
2" Ice								6.59	6.25	0.2	
4" Ice								8.73	9.33	0.6	
RR90-17-02DPL2 w/ Mount Pipe (Carrier 145' E)	B	From Leg	4.00	0' 3'	0.0000	145'	No Ice	4.59	3.34	0.0	
							1/2" Ice	5.09	4.11	0.1	
							1" Ice	5.58	4.81	0.1	
							2" Ice	6.59	6.25	0.2	
							4" Ice	8.73	9.33	0.6	
							No Ice	4.59	3.34	0.0	
RR90-17-02DPL2 w/ Mount Pipe (Carrier 145' E)	C	From Leg	4.00	0' 3'	0.0000	145'	1/2" Ice	5.09	4.11	0.1	
							1" Ice	5.58	4.81	0.1	
							2" Ice	6.59	6.25	0.2	
							4" Ice	8.73	9.33	0.6	
							No Ice	4.59	3.34	0.0	
							1/2" Ice	5.09	4.11	0.1	

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe (Carrier 145' R)	A	From Leg	4.00	0'	0.0000	145'	2" Ice	6.59	6.25	0.2
							4" Ice	8.73	9.33	0.6
							No Ice	7.47	3.50	0.1
							1/2" Ice	8.00	4.27	0.1
							1" Ice	8.52	4.96	0.2
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe (Carrier 145' R)	B	From Leg	4.00	0'	0.0000	145'	2" Ice	9.60	6.41	0.3
							4" Ice	11.88	9.50	0.7
							No Ice	7.47	3.50	0.1
							1/2" Ice	8.00	4.27	0.1
							1" Ice	8.52	4.96	0.2
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe (Carrier 145' R)	C	From Leg	4.00	0'	0.0000	145'	2" Ice	9.60	6.41	0.3
							4" Ice	11.88	9.50	0.7
							No Ice	7.47	3.50	0.1
							1/2" Ice	8.00	4.27	0.1
							1" Ice	8.52	4.96	0.2
ATMPP1412D-1CWA (Carrier 145' R)	A	From Leg	4.00	0'	0.0000	145'	2" Ice	9.60	6.41	0.3
							4" Ice	11.88	9.50	0.7
							No Ice	1.17	0.42	0.0
							1/2" Ice	1.32	0.53	0.0
							1" Ice	1.48	0.65	0.0
ATMPP1412D-1CWA (Carrier 145' R)	B	From Leg	4.00	0'	0.0000	145'	2" Ice	1.82	0.92	0.1
							4" Ice	2.61	1.57	0.1
							No Ice	1.17	0.42	0.0
							1/2" Ice	1.32	0.53	0.0
							1" Ice	1.48	0.65	0.0
ATMPP1412D-1CWA (Carrier 145' R)	C	From Leg	4.00	0'	0.0000	145'	2" Ice	1.82	0.92	0.1
							4" Ice	2.61	1.57	0.1
							No Ice	1.17	0.42	0.0
							1/2" Ice	1.32	0.53	0.0
							1" Ice	1.48	0.65	0.0
ATMAA1412D-1A20 (Carrier 145' R)	A	From Leg	4.00	0'	0.0000	145'	2" Ice	1.81	0.95	0.1
							4" Ice	2.58	1.57	0.1
							No Ice	1.17	0.47	0.0
							1/2" Ice	1.31	0.57	0.0
							1" Ice	1.47	0.69	0.0
ATMAA1412D-1A20 (Carrier 145' R)	B	From Leg	4.00	0'	0.0000	145'	2" Ice	1.81	0.95	0.1
							4" Ice	2.58	1.57	0.1
							No Ice	1.17	0.47	0.0
							1/2" Ice	1.31	0.57	0.0
							1" Ice	1.47	0.69	0.0
ATMAA1412D-1A20 (Carrier 145' R)	C	From Leg	4.00	0'	0.0000	145'	2" Ice	1.81	0.95	0.1
							4" Ice	2.58	1.57	0.1
							No Ice	1.17	0.47	0.0
							1/2" Ice	1.31	0.57	0.0
							1" Ice	1.47	0.69	0.0
Platform Mount [LP 601-1] (Carrier 145' R)	C	None			0.0000	145'	2" Ice	1.81	0.95	0.1
							4" Ice	2.58	1.57	0.1
							No Ice	28.47	28.47	1.1
							1/2" Ice	33.59	33.59	1.5
							1" Ice	38.71	38.71	1.9
6' x 2" Mount Pipe (Carrier 145' E)	A	From Leg	4.00	0'	0.0000	145'	2" Ice	48.95	48.95	2.7
							4" Ice	69.43	69.43	4.3
							No Ice	1.20	1.20	0.0
							1/2" Ice	1.80	1.80	0.0
							1" Ice	2.17	2.17	0.0
							2" Ice	2.93	2.93	0.1
							4" Ice	4.57	4.57	0.2

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
6' x 2" Mount Pipe (Carrier 145' E)	B	From Leg	4.00		0.0000	145'	No Ice	1.20	1.20	0.0
			0'				1/2" Ice	1.80	1.80	0.0
			0'				1" Ice	2.17	2.17	0.0
							2" Ice	2.93	2.93	0.1
							4" Ice	4.57	4.57	0.2
6' x 2" Mount Pipe (Carrier 145' E)	C	From Leg	4.00		0.0000	145'	No Ice	1.20	1.20	0.0
			0'				1/2" Ice	1.80	1.80	0.0
			0'				1" Ice	2.17	2.17	0.0
							2" Ice	2.93	2.93	0.1
							4" Ice	4.57	4.57	0.2

800 10504 w/ Mount Pipe (Carrier 135' E)	A	From Leg	4.00		0.0000	135'	No Ice	3.59	3.18	0.0
			0'				1/2" Ice	4.01	3.91	0.1
			2'				1" Ice	4.42	4.58	0.1
							2" Ice	5.34	5.98	0.2
							4" Ice	7.38	8.98	0.5
800 10504 w/ Mount Pipe (Carrier 135' E)	B	From Leg	4.00		0.0000	135'	No Ice	3.59	3.18	0.0
			0'				1/2" Ice	4.01	3.91	0.1
			2'				1" Ice	4.42	4.58	0.1
							2" Ice	5.34	5.98	0.2
							4" Ice	7.38	8.98	0.5
800 10504 w/ Mount Pipe (Carrier 135' E)	C	From Leg	4.00		0.0000	135'	No Ice	3.59	3.18	0.0
			0'				1/2" Ice	4.01	3.91	0.1
			2'				1" Ice	4.42	4.58	0.1
							2" Ice	5.34	5.98	0.2
							4" Ice	7.38	8.98	0.5
860 10025 (Carrier 135' E)	A	From Leg	4.00		0.0000	135'	No Ice	0.18	0.15	0.0
			0'				1/2" Ice	0.25	0.21	0.0
			2'				1" Ice	0.33	0.29	0.0
							2" Ice	0.51	0.47	0.0
							4" Ice	0.98	0.93	0.1
860 10025 (Carrier 135' E)	B	From Leg	4.00		0.0000	135'	No Ice	0.18	0.15	0.0
			0'				1/2" Ice	0.25	0.21	0.0
			2'				1" Ice	0.33	0.29	0.0
							2" Ice	0.51	0.47	0.0
							4" Ice	0.98	0.93	0.1
860 10025 (Carrier 135' E)	C	From Leg	4.00		0.0000	135'	No Ice	0.18	0.15	0.0
			0'				1/2" Ice	0.25	0.21	0.0
			2'				1" Ice	0.33	0.29	0.0
							2" Ice	0.51	0.47	0.0
							4" Ice	0.98	0.93	0.1
T-Arm Mount [TA 602-3] (Carrier 135' E)	C	None			0.0000	135'	No Ice	11.59	11.59	0.8
							1/2" Ice	15.44	15.44	1.0
							1" Ice	19.29	19.29	1.2
							2" Ice	26.99	26.99	1.6
							4" Ice	42.39	42.39	2.5
6' x 2" Mount Pipe (Carrier 135' E)	A	From Leg	4.00		0.0000	135'	No Ice	1.20	1.20	0.0
			0'				1/2" Ice	1.80	1.80	0.0
			0'				1" Ice	2.17	2.17	0.0
							2" Ice	2.93	2.93	0.1
							4" Ice	4.57	4.57	0.2
6' x 2" Mount Pipe (Carrier 135' E)	B	From Leg	4.00		0.0000	135'	No Ice	1.20	1.20	0.0
			0'				1/2" Ice	1.80	1.80	0.0
			0'				1" Ice	2.17	2.17	0.0
							2" Ice	2.93	2.93	0.1
							4" Ice	4.57	4.57	0.2
6' x 2" Mount Pipe	C	From Leg	4.00		0.0000	135'	No Ice	1.20	1.20	0.0

tnxTower Pier Structural Engineering Corp. 55 Northfield Drive E Suite 198 Waterloo, ON N2K 3T6 Phone: (519) 885-3806 FAX: (519) 886-0076	Job PSEC 9884 (for Verizon Wireles)	Page 12 of 15
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	Client CROWN CASTLE	Designed by aiftikhar

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral Vert					
			ft	ft	°	ft	ft ²	ft ²	K
(Carrier 135' E)			0'			1/2" Ice	1.80	1.80	0.0
			0'			1" Ice	2.17	2.17	0.0
						2" Ice	2.93	2.93	0.1
						4" Ice	4.57	4.57	0.2

Load Combinations

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

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	Client	CROWN CASTLE	Designed by	aiftikhar

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	71.9	0.0	-0.0
	Max. H _x	11	51.9	44.4	0.1
	Max. H _z	2	51.9	0.1	44.3
	Max. M _x	2	6131.5	0.1	44.3
	Max. M _z	5	6147.6	-44.4	-0.1
	Max. Torsion	12	0.6	38.5	22.2
	Min. Vert	11	51.9	44.4	0.1
	Min. H _x	5	51.9	-44.4	-0.1
	Min. H _z	8	51.9	-0.1	-44.3
	Min. M _x	8	-6132.5	-0.1	-44.3
	Min. M _z	11	-6148.8	44.4	0.1
	Min. Torsion	6	-0.6	-38.5	-22.2

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	185 - 149.497	47.682	37	2.2450	0.0007
L2	154.503 - 114.096	33.710	37	2.0787	0.0005
L3	119.904 - 76.6771	20.032	37	1.6327	0.0003
L4	83.3229 - 38.2552	9.451	37	1.0832	0.0002
L5	45.7474 - 0	2.837	37	0.5594	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185'	(2) DB846F65ZAXY	37	47.682	2.2450	0.0007	35902
182'	ASP-601	37	46.277	2.2337	0.0007	35902
175'	(2) 7770.00 w/ Mount Pipe	37	43.008	2.2058	0.0006	17951
167'	1900MHz RRH (65MHz)	37	39.314	2.1670	0.0006	9972
165'	APXVSPP18-C-A20 w/ Mount Pipe	37	38.401	2.1556	0.0006	8975
155'	(4) DB844H90 w/ Mount Pipe	37	33.927	2.0831	0.0005	6042
145'	RR90-17-02DPL2 w/ Mount Pipe	37	29.650	1.9803	0.0005	5077
135'	800 10504 w/ Mount Pipe	37	25.609	1.8525	0.0004	4436

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	185 - 149.497	137.129	12	6.4652	0.0018
L2	154.503 - 114.096	97.008	12	5.9878	0.0015
L3	119.904 - 76.6771	57.698	12	4.7047	0.0009

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	Client CROWN CASTLE	Designed by aiftikhar

Section No.	Elevation ft	Horz Deflection in	Gov. Load Comb.	Tilt °	Twist °
L4	83.3229 - 38.2552	27.241	12	3.1226	0.0005
L5	45.7474 - 0	8.182	12	1.6133	0.0002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185'	(2) DB846F65ZAXY	12	137.129	6.4652	0.0023	12804
182'	ASP-601	12	133.094	6.4329	0.0022	12804
175'	(2) 7770.00 w/ Mount Pipe	12	123.709	6.3528	0.0020	6401
167'	1900MHz RRH (65MHz)	12	113.102	6.2415	0.0018	3554
165'	APXVSPP18-C-A20 w/ Mount Pipe	12	110.481	6.2085	0.0017	3198
155'	(4) DB844H90 w/ Mount Pipe	12	97.633	6.0003	0.0015	2150
145'	RR90-17-02DPL2 w/ Mount Pipe	12	85.345	5.7047	0.0013	1801
135'	800 10504 w/ Mount Pipe	12	73.731	5.3370	0.0012	1569

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
L1	185 - 149.497 (1)	TP36.0404x29x0.25	35'6"	0'	0.0	39.00	27.6121	-7.9	1076.9	0.007
L2	149.497 - 114.096 (2)	TP42.4605x34.5478x0.3125	40'4-29/3 2"	0'	0.0	39.00	40.6776	-15.3	1586.4	0.010
L3	114.096 - 76.6771 (3)	TP49.157x40.6983x0.375	43'2-3/4"	0'	0.0	39.00	56.5149	-23.3	2204.1	0.011
L4	76.6771 - 38.2552 (4)	TP55.9285x47.1065x0.4375	45'27/32"	0'	0.0	39.00	75.0196	-34.5	2925.8	0.012
L5	38.2552 - 0 (5)	TP62.5x53.5869x0.5	45'9"	0'	0.0	39.00	98.3940	-51.9	3837.4	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} /F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} /F _{by}
L1	185 - 149.497 (1)	TP36.0404x29x0.25	464.5	-23.50	39.00	0.602	0.0	0.00	39.00	0.000
L2	149.497 - 114.096 (2)	TP42.4605x34.5478x0.3125	1479.3	-43.11	39.00	1.105	0.0	0.00	39.00	0.000
L3	114.096 - 76.6771 (3)	TP49.157x40.6983x0.375	2751.2	-49.86	39.00	1.278	0.0	0.00	39.00	0.000
L4	76.6771 -	TP55.9285x47.1065x0.4375	4207.9	-50.50	39.00	1.295	0.0	0.00	39.00	0.000

tnxTower Pier Structural Engineering Corp. 55 Northfield Drive E Suite 198 Waterloo, ON N2K 3T6 Phone: (519) 883-3806 FAX: (519) 886-0076	Job PSEC 9884 (for Verizon Wireles)	Page 15 of 15
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	Client CROWN CASTLE	Designed by aiftikhar

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L5	38.2552 (4) 38.2552 - 0 (5)	TP62.5x53.5869x0.5	6157.2	-49.09	39.00	1.259	0.0	0.00	39.00	0.000

Pole Interaction Design Data

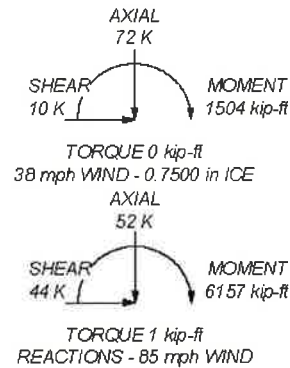
Section No.	Elevation ft	Size	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	185 - 149.497 (1)	TP36.0404x29x0.25	0.007	0.602	0.000	0.610	1.333	H1-3 ✓
L2	149.497 - 114.096 (2)	TP42.4605x34.5478x0.3125	0.010	1.105	0.000	1.115	1.333	H1-3 ✓
L3	114.096 - 76.6771 (3)	TP49.157x40.6983x0.375	0.011	1.278	0.000	1.289	1.333	H1-3 ✓
L4	76.6771 - 38.2552 (4)	TP55.9285x47.1065x0.4375	0.012	1.295	0.000	1.307	1.333	H1-3 ✓
L5	38.2552 - 0 (5)	TP62.5x53.5869x0.5	0.014	1.259	0.000	1.272	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* P_{allow} K	% Capacity	Pass Fail	
L1	185 - 149.497	Pole	TP36.0404x29x0.25	1	-7.9	1435.5	45.7	Pass	
L2	149.497 - 114.096	Pole	TP42.4605x34.5478x0.3125	2	-15.3	2114.7	83.7	Pass	
L3	114.096 - 76.6771	Pole	TP49.157x40.6983x0.375	3	-23.3	2938.0	96.7	Pass	
L4	76.6771 - 38.2552	Pole	TP55.9285x47.1065x0.4375	4	-34.5	3900.1	98.0	Pass	
L5	38.2552 - 0	Pole	TP62.5x53.5869x0.5	5	-51.9	5115.2	95.4	Pass	
							Summary		
							Pole (L4)	98.0	Pass
							RATING =	98.0	Pass

APPENDIX B
BASE LEVEL DRAWING

Section	1	2	3	4	5
Length (ft)	356"	404-29.82"	432-34"	4527.82"	45'9"
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.4375	0.5000
Socket Length (ft)	51.6"	59-23.62"	67-13/16"	75-7/8"	53.5869
Top Dia (in)	29.0000	34.5478	40.8863	47.1065	52.5000
Bot Dia (in)	36.0404	42.4605	49.1570	55.9265	62.5000
Grade			A572-65		
Weight (K)	3.1	5.2	7.8	10.9	14.2



MATERIAL STRENGTH

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

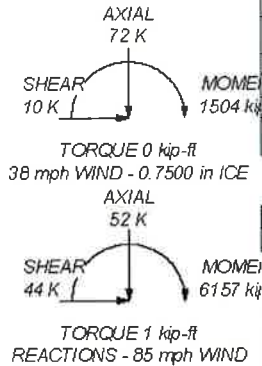
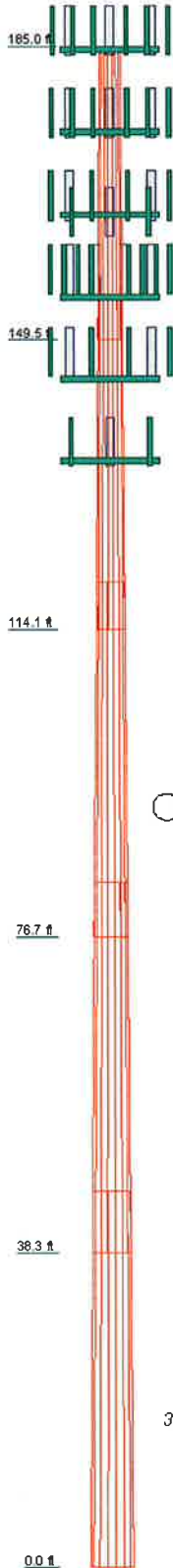
TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. -----
6. E - Existing, R - Reserved, P - Proposed
7. Proposed loading revision at 185ft elevation
8. Reserved loading included at 145ft elevation
9. TOWER RATING: 98%

Pier Structural Engineering Corp.
 55 Northfield Drive E Suite 198
 Waterloo, ON N2K 3T6
 Phone: (519) 885-3806
 FAX: (519) 888-0076

Job: PSEC 9884 (for Verizon Wires)		
Project: 806354 - BRG 123 943084		
Client: CROWN CASTLE	Drawn by: aiftikhar	App'd:
Code: TIA/EIA-222-F	Date: 10/25/13	Scale: NTS
Path:		Dwg No. E-1

Section	Length (ft)	Number of Slides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	356"	18	0.2500	51.6"	29.0000	36.0404		3.1
2	404.29632"	18	0.3125	59.2332"	34.5478	42.4605		5.2
3	432.314"	18	0.3750	67.13916"	40.8983	49.1570	A572-85	7.8
4	452.782"	18	0.4375	75.776"	47.1085	55.9285		10.9
5	459"	18	0.5000	83.813"	53.5869	62.5000		14.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB846F65 ZAXY (Carrier 185' E)	185	AP XVSP18-C-A20 w/ Mount Pipe (Carrier 185' E)	185
(2) DB846F65 ZAXY (Carrier 185' E)	185	AP XVSP18-C-A20 w/ Mount Pipe (Carrier 185' E)	185
(2) DB846F65 ZAXY (Carrier 185' E)	185	AP XVSP18-C-A20 w/ Mount Pipe (Carrier 185' E)	185
BXA-171063-12BF w/ Mount Pipe (Carrier 185' E)	185	AP XVSP18-C-A20 w/ Mount Pipe (Carrier 185' E)	185
BXA-171063-12BF w/ Mount Pipe (Carrier 185' E)	185	(3) ACU-A20-N (Carrier 165' E)	165
BXA-171063-12BF w/ Mount Pipe (Carrier 185' E)	185	(3) ACU-A20-N (Carrier 165' E)	165
BXA-171063-12BF w/ Mount Pipe (Carrier 185' E)	185	(3) ACU-A20-N (Carrier 165' E)	165
BXA-70063-8CF-2 w/ Mount Pipe (Carrier 185' E)	185	800 EXTERNAL NOTCH FILTER (Carrier 165' E)	165
BXA-70063-8CF-2 w/ Mount Pipe (Carrier 185' E)	185	800 EXTERNAL NOTCH FILTER (Carrier 165' E)	165
BXA-70063-8CF-2 w/ Mount Pipe (Carrier 185' E)	185	800 EXTERNAL NOTCH FILTER (Carrier 165' E)	165
(2) FD9R6004/2C-3L (Carrier 185' E)	185	Platform Mount [LP 601-1] (Carrier 185' E)	165
(2) FD9R6004/2C-3L (Carrier 185' E)	185	6' x 2" Mount Pipe (Carrier 165' E)	165
(2) FD9R6004/2C-3L (Carrier 185' E)	185	6' x 2" Mount Pipe (Carrier 165' E)	165
BXA-171063-12CF-EDIN-X w/ Mount Pipe (Carrier 185' P)	185	6' x 2" Mount Pipe (Carrier 165' E)	165
BXA-171063-12CF-EDIN-X w/ Mount Pipe (Carrier 185' P)	185	(4) DB844H90 w/ Mount Pipe (Carrier 155' E)	155
BXA-171063-12CF-EDIN-X w/ Mount Pipe (Carrier 185' P)	185	(4) DB844H90 w/ Mount Pipe (Carrier 155' E)	155
RRH2X40-AWVS (Carrier 185' P)	185	(4) DB844H90 w/ Mount Pipe (Carrier 155' E)	155
RRH2X40-AWVS (Carrier 185' P)	185	Platform Mount [LP 602-1] (Carrier 155' E)	155
RRH2X40-AWVS (Carrier 185' P)	185	Platform Mount [LP 602-1] (Carrier 155' E)	155
DB-T1-6Z-8AB-0Z (Carrier 185' P)	185	RR90-17-02DPL2 w/ Mount Pipe (Carrier 145' E)	145
Platform Mount [LP 601-1] (Carrier 185' E)	185	RR90-17-02DPL2 w/ Mount Pipe (Carrier 145' E)	145
Side Arm Mount [SO 103-3] (Carrier 185' E)	185	RR90-17-02DPL2 w/ Mount Pipe (Carrier 145' E)	145
ASP-601 (Carrier 182'E)	182	RR90-17-02DPL2 w/ Mount Pipe (Carrier 145' E)	145
Side Arm Mount [SO 102-3] (Carrier 182'E)	182	AP X16DWW-16DWW-S-E-A20 w/ Mount Pipe (Carrier 145' R)	145
(2) 7770.00 w/ Mount Pipe (Carrier 175' E)	175	AP X16DWW-16DWW-S-E-A20 w/ Mount Pipe (Carrier 145' R)	145
(2) 7770.00 w/ Mount Pipe (Carrier 175' E)	175	AP X16DWW-16DWW-S-E-A20 w/ Mount Pipe (Carrier 145' R)	145
(2) 7770.00 w/ Mount Pipe (Carrier 175' E)	175	ATMP P1412D-1CWA (Carrier 145' R)	145
P65-16-XLH-RR (Carrier 175' E)	175	ATMP P1412D-1CWA (Carrier 145' R)	145
P65-16-XLH-RR (Carrier 175' E)	175	ATMP P1412D-1CWA (Carrier 145' R)	145
P65-16-XLH-RR (Carrier 175' E)	175	ATMP P1412D-1CWA (Carrier 145' R)	145
(2) LGP2140X (Carrier 175' E)	175	ATMP P1412D-1A20 (Carrier 145' R)	145
(2) LGP2140X (Carrier 175' E)	175	ATMP P1412D-1A20 (Carrier 145' R)	145
(2) LGP2140X (Carrier 175' E)	175	Platform Mount [LP 601-1] (Carrier 145' R)	145
(2) RRUS-11 (Carrier 175' E)	175	6' x 2" Mount Pipe (Carrier 145' E)	145
(2) RRUS-11 (Carrier 175' E)	175	6' x 2" Mount Pipe (Carrier 145' E)	145
(2) RRUS-11 (Carrier 175' E)	175	6' x 2" Mount Pipe (Carrier 145' E)	145
TT19-08BP111-001 (Carrier 175' E)	175	800 10504 w/ Mount Pipe (Carrier 135' E)	135
TT19-08BP111-001 (Carrier 175' E)	175	800 10504 w/ Mount Pipe (Carrier 135' E)	135
TT19-08BP111-001 (Carrier 175' E)	175	800 10504 w/ Mount Pipe (Carrier 135' E)	135
DC6-48-60-18-8F (Carrier 175' E)	175	800 10504 w/ Mount Pipe (Carrier 135' E)	135
Platform Mount [LP 601-1] (Carrier 175' E)	175	800 10504 w/ Mount Pipe (Carrier 135' E)	135
1900MHz RRR (65MHz) (Carrier 167' E)	167	860 10025 (Carrier 135' E)	135
1900MHz RRR (65MHz) (Carrier 167' E)	167	860 10025 (Carrier 135' E)	135
1900MHz RRR (65MHz) (Carrier 167' E)	167	860 10025 (Carrier 135' E)	135
800MHz RRR (Carrier 167' E)	167	T-Arm Mount [TA 602-3] (Carrier 135' E)	135
800MHz RRR (Carrier 167' E)	167	6' x 2" Mount Pipe (Carrier 135' E)	135
800MHz RRR (Carrier 167' E)	167	6' x 2" Mount Pipe (Carrier 135' E)	135
800MHz RRR (Carrier 167' E)	167	6' x 2" Mount Pipe (Carrier 135' E)	135
Side Arm Mount [SO 102-3] (Carrier 167' E)	167		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-85	65 ksi	90 ksi			

TOWER DESIGN NOTES

- Tower is located in Fairfield County, Connecticut.
- Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
- Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
- Deflections are based upon a 50 mph wind.
-
- E - Existing, R - Reserved, P - Proposed
- Proposed loading revision at 145ft elevation
- Proposed loading included at 145ft elevation

	Pier Structural Engineering Corp. 55 Northfield Drive E Suite 198 Waterloo, ON N2K 3T6 Phone: (519) 885-3806 FAX: (519) 886-0076		Job: PSEC 9884 (for Verizon Wireless) Project: 806354 - BRG 123 943084 Client: CROWN CASTLE Code: TIA/EIA-222-F Path:		Drawn by: aiftikhar Date: 10/25/13 Scale: NTS Dwg No: E-1
	Consulting Engineers		App'd:		Scale: NTS Dwg No: E-1

APPENDIX C
ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data	
BU#:	806354
Site Name:	BRG 123 943084
App #:	200495 rev.2
Pole Manufacturer:	Other

Reactions		
Moment:	6157	ft-kips
Axial:	52	kips
Shear:	44	kips

Anchor Rod Data		
Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	73	in

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

Anchor Rod Results

Maximum Rod Tension: 166.5 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 85.4% **Pass**

Stiffened
Service, ASD
Fy*ASIF

Plate Data		
Diam:	79	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	8.27	in

Base Plate Results

Base Plate Stress: 30.9 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 51.5% **Pass**

Flexural Check

Stiffened
Service, ASD
0.75*Fy*ASIF
Y.L Length:
N/A, Roark

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<- Disregard
Groove Angle:		<- Disregard
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.375	in
Width:	7	in
Height:	15	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

Stiffener Results

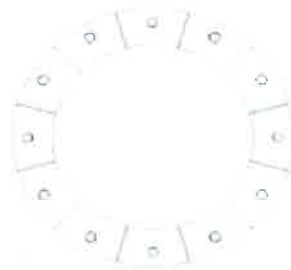
Horizontal Weld: 88.4% **Pass**
 Vertical Weld: 61.1% **Pass**
 Plate Flex+Shear, $t_b/F_b + (t_w/F_w)^2$: 31.3% **Pass**
 Plate Tension+Shear, $t_t/F_t + (t_w/F_w)^2$: 64.1% **Pass**
 Plate Comp. (AISC Bracket): 82.6% **Pass**

Pole Results

Pole Punching Shear Check: 15.4% **Pass**

Pole Data		
Diam:	62.5	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	



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

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

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

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

Site Data	
BU#: 806354	
Site Name: BRG 123 943084	
App #: 200495	

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties	
Concrete:	
Pier Diameter =	8.0 ft
Concrete Area =	7238.2 in ²
Reinforcement:	
Clear Cover to Tie=	3.00 in
Horiz. Tie Bar Size=	4
Vert. Cage Diameter =	7.32 ft
Vert. Cage Diameter =	87.87 in
Vertical Bar Size =	9
Bar Diameter =	1.13 in
Bar Area =	1 in ²
Number of Bars =	48
As Total=	48 in ²
A s/ Aconc, Rho:	0.0066 0.66%

ACI 10.5, ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(fc)/Fy:	0.0032	
200 / Fy:	0.0033	
IBC 1810.1.2:	0.0025	SDC C
Governing:	0.0033	0.33%

ACI 10.8 and 10.9

Min As for Columns, Comp. Controlled, Shafts:

Min As:	0.0050	0.50%
---------	--------	--------------

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.66%	OK

Maximum Shaft Superimposed Forces		
TIA Revision:	G	
Max. Factored Shaft Mu:	6333	ft-kips (* Note)
Max. Factored Shaft Pu:	52	kips
Max Axial Force Type:	Comp.	

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

Load Factor	Shaft Factored Loads	
1.00	Mu:	6333 ft-kips
1.00	Pu:	52 kips

Material Properties		
Concrete Comp. strength, fc =	4000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

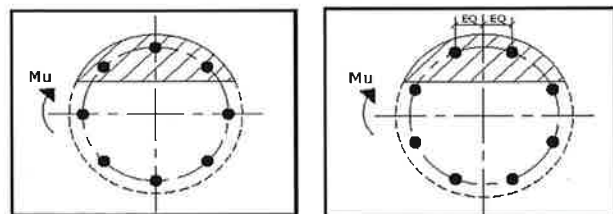
ACI 318 Code	
Select Analysis ACI Code=	2005

Seismic Properties	
Seismic Design Category =	C
Seismic Risk =	Moderate

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

Results:

Governing Orientation Case: 1



Case 1

Case 2

Dist. From Edge to Neutral Axis: **14.06** in

Extreme Steel Strain, ϵ_t : **0.0166**

$\epsilon_t > 0.0050$, Tension Controlled

Reduction Factor, ϕ : **0.900**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = ($\phi=0.65$) Pn.		
Pn per ACI 318 (10-2)	14209.93	kips
at Mu=($\phi=0.65$)Mn=	9962.72	ft-kips
Max Tu, ($\phi=0.9$) Tn =	2592	kips
at Mu= $\phi=(0.90)$ Mn=	0.00	ft-kips

Output Note: Negative Pu=Tension
 For Axial Compression, ϕ Pn = Pu: 52.00 kips
 Drilled Shaft Moment Capacity, ϕ Mn: **8913.69** ft-kips
 Drilled Shaft Superimposed Mu: **6333.00** ft-kips

(Mu/ ϕ Mn, Drilled Shaft Flexure CSR): 71.05%



PROJECT No: 9884
 PROJECT NAME: 806354 - BRG 123 943084
CROWN CASTLE
 DATE: 25/10/2013 15:25

ENG: AI
 CHK: SH
 PAGE: of

EIA-222-F

SINGLE GLOBAL FOUNDATION WITH PIER(S) CHECKS

Capacity up to 105% considered acceptable

Global Tower Reactions		Allowable Loads	Calculated Reactions	Allowable Resistance		SF=2.13	
○TIA-G	Maximum Moment	6,157.00 k-ft	Disturbing Moment	6,465.0	6,895.1 k-ft	PASS	93.8% [GOVERNS]
●EIA-F	Axial Load	52.00 kips	Maximum Bearing	3.35	6.00 kips	PASS	55.9%
	Shear Load	44.00 kips	Punching Shear	854.1	3,025.5 kips	PASS	28.2%
	Pier Rebar Required	(47) # 9 @ 7.66 in **MINIMUM**	Actual Pier Rebar	(48) # 9 verts	**Check with other software**		
	Pad Rebar Required	(23) # 9 @ 15.00 in	Actual Pad Rebar	(45) # 9 bars	PASS		53.0%

Soil Parameters	Soils Report	Pier Geometry	Pad Geometry
φ	30.0 °	Qty of Piers	1
Water Level	20.00 ft (6.10 m)	Width (Bp)	8.00 ft
Soil Dry Density (γ _{dry})	0.120 kcf (18.8 kN/m ³)	Width (Wp)	8.00 ft
Soil Sub Density (γ _{sub})	0.057 kcf (8.95 kN/m ³)	Height (Hp)	4.00 ft
All. Bearing Pressure	6.000 ksf (287.3 kPa)	Pier Type	S (Rnd or Sq) <input type="checkbox"/> Check If Mat is a Square Bell (This is for small foundations)
Bearing Safety Factor	2	Conc γ _{dry}	0.150 kcf (23.6)

Volume of Concrete/Soil	Concrete (98.6cuyd)			Soil	ft
	1 Pier	Mat			
Depth (above)	1.00	--	--		
Depth (dry)	3.00	3.00	3.00		
Depth (submerged)	0.00	0.00	0.00		
Volume (above)	64.00	--	--		ft ³
Volume (dry)	192.00	2,352.00	2462.98		ft ³
Volume (submerged)	0.00	0	0.00		ft ³
Total	256	2352	2483		ft ³

Calculations	Factored	Allowable
Axial Download	--	52.0 kips
Weight of Concrete (not factored)	--	391.2 kips(96.6yds)
Weight of Soil (not factored)	--	295.6 kips
Total Download (P)	--	738.8 kips
Resisting Moment Arm	--	14.0 ft
Moment Resistance	--	6895.1 k-ft (divide by 1.5 - cl. 7.2.4.5)

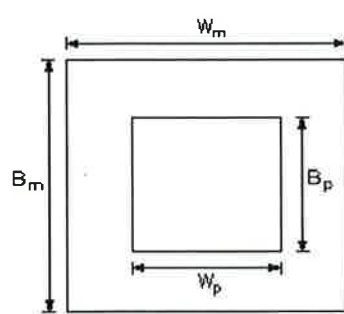
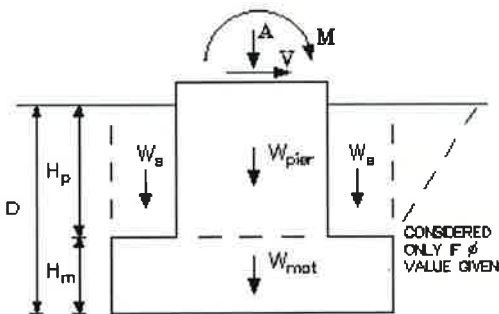
Concrete Reinforcing Design	Concrete	Steel
f _c	4.000 ksi (27.6 MPa)	
f _y	60.000 ksi (413.7 MPa)	
Steel (Metric/ASTM)	MAT	PIER
Bar Quantity	ASTM 45	ASTM 48
Bar size	9 # 1.000 in ²	9 # 1.000 in ²

Bearing Capacity Check	Factored	Allowable
Contact Area	--	784.00 ft ²
Calculate eccentricity e	--	8.75 ft [> L/6]
Calculate (c = L/2 - e)	--	5.25 ft
1) q _{max} = P/A * (1+6e/L)	--	--
2) q _{max} = 2P / b*3c	--	3.35 ksf [GOV]
q _{allowable}	--	6.00 ksf (not factored)

Slab Reinforcing	Values	Wgt of Rebar
1/2 Disturbing Moment	3232.50 kip-ft	8,609 lbs
Ku	117.75	
ρ	0.00222	
4/3*ρ if ρ < ρ _{min}	0.00296	
ρ _{min} ≥ 0.0018	0.00180	23 Qty
As Required (based on ρ)	23.369 in ²	15.00 in c/c
As Actual	45.000 in ²	φMn = 6,101.5 kip-ft

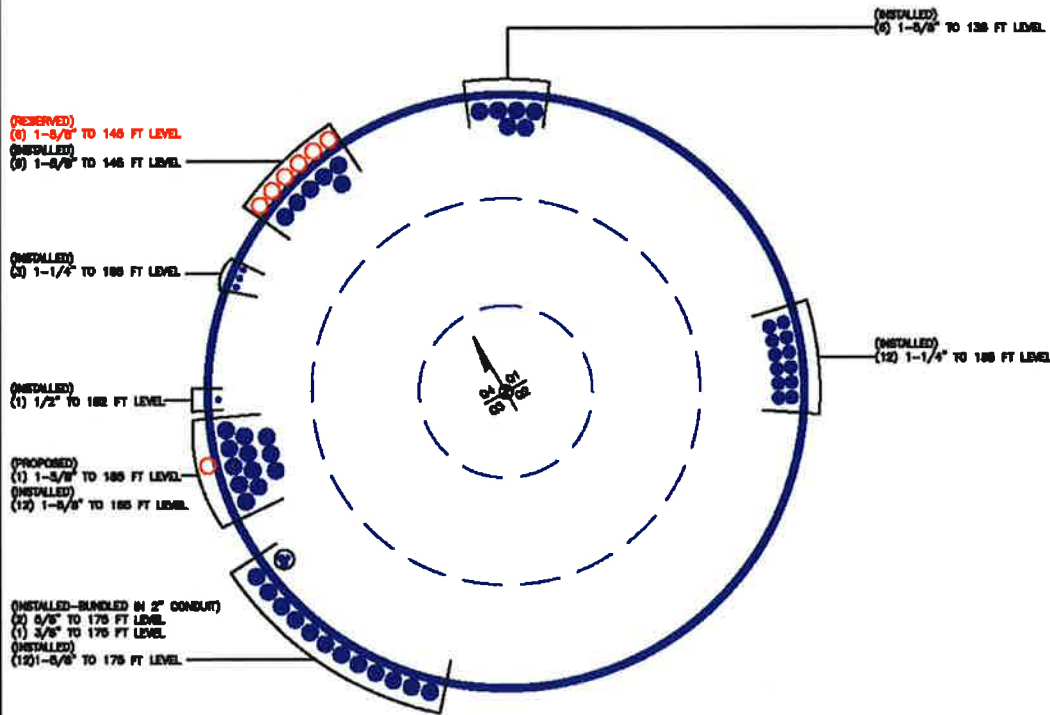
Check for 2-Way Shear (Punching)	Factored	Allowable
Shear Area (b _o x d)	--	110.74 ft ²
Factored Bearing Stress	--	1.27 ksf
Factored Shear Force	--	854.14 kips
Factored Shear Resistance	--	3025.5 kips
Check for 2-way Shear	--	0.28 (ACI-318)

Note: The 1/2 moment is derived from a bending moment diagram that considered the uplift and download components at the exact face width of the tower.



M =	6157.0 k-ft
A =	52.0 kips
V =	44.0 kips
B _p =	8.00 ft
W _p =	8.00 ft
H _p =	4.00 ft
B _m =	28.00 ft
W _m =	28.00 ft
H _m =	3.00 ft
D =	6.00 ft
V _{mat} =	2608.0 cuft
Rebar =	(23) # 9 @ 15.00 in

TX LINE LAYOUT



NUMBER UNITS 600004 THREE IN CIRCLES

Client



Revised Stamp

Revisions

No.	Description	Date
A	ISSUED FOR REVIEW	10.25.13

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PIER Job No. **9884**

Rev No. **806354**
BRG 123 943084

Site Design

Sheet Title **TX LINES**

Drawn by **AI**
 Checked by
 Approved by **A-I**

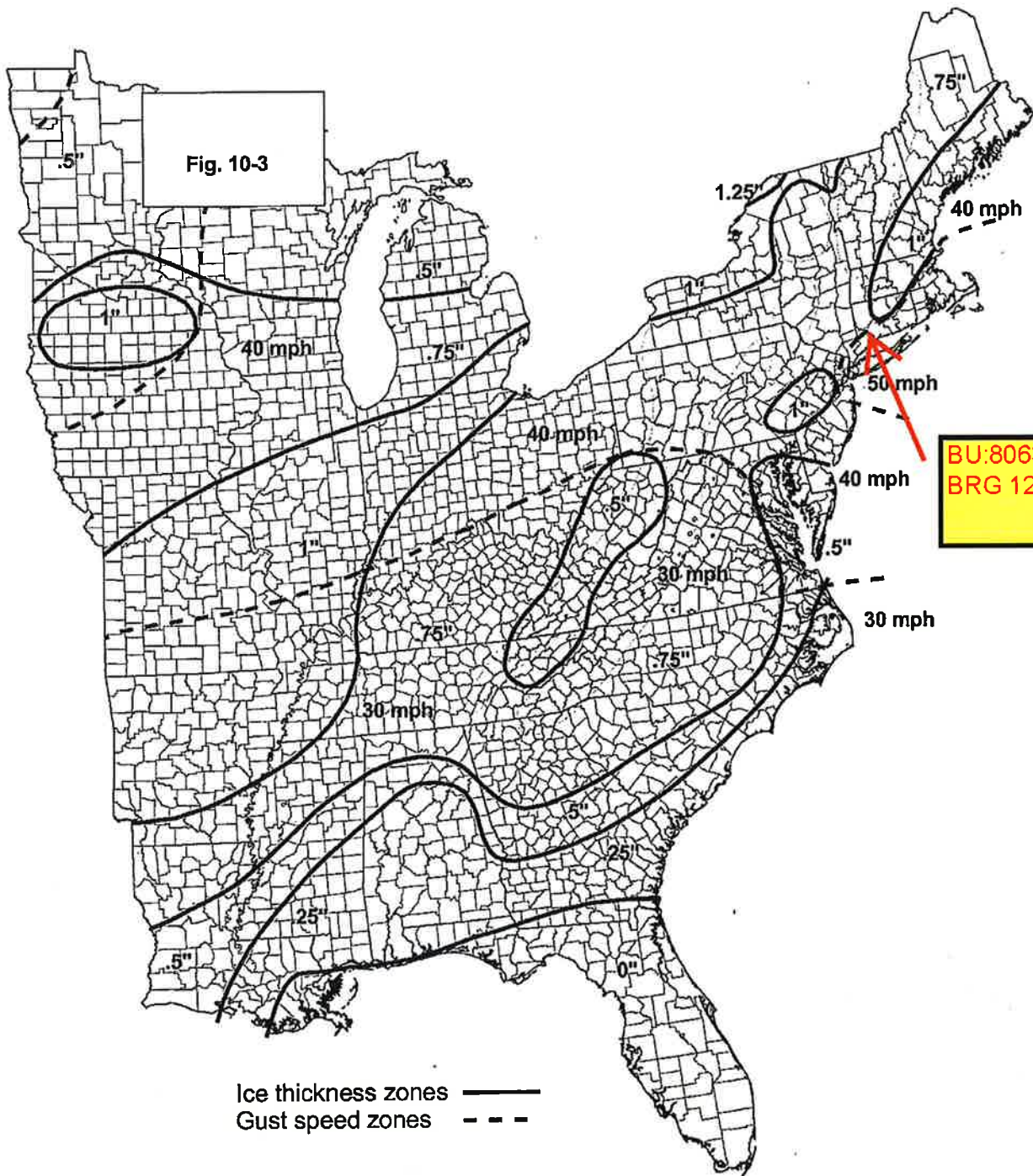


FIGURE 10-2 (continued) 50-YEAR MEAN RECURRENCE INTERVAL UNIFORM ICE THICKNESSES DUE TO FREEZING RAIN WITH CONCURRENT 3-SECOND GUST SPEEDS: CONTIGUOUS 48 STATES.