

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

Also admitted in Massachusetts

February 24, 2014

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

Re: **Notice of Exempt Modification – Facility Modification  
Indian Ledge Park, Trumbull, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 155-foot level of the existing 195-foot tower at Indian Ledge Park off Whitney Avenue in Trumbull, Connecticut (the “Property”). The tower is owned by Crown Castle. The Council approved Cellco’s use of the existing tower in 2002. Cellco now intends to modify its facility by adding three (3) model 742 213V01, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 127-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 attached to the outside of the tower. Included in Attachment 1 are specifications for Cellco’s additional 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 Timothy M. Herbst, First Selectman for the Town of Trumbull. The Town of Trumbull is the owner 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).



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# ROBINSON & COLE<sub>LLP</sub>

Melanie A. Bachman  
February 24, 2014  
Page 2

1. The proposed modifications will not result in an increase in the height of the existing tower. The new antennas and RRHs will be located at the 155-foot level on the 195-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 worst-case RF emissions calculation 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:

Timothy M. Herbst, Trumbull First Selectman  
Sandy M. Carter



# **ATTACHMENT 1**

# KATHREIN SCALA DIVISION

742 213V01  
65° Panel Antenna

Kathrein's X-polarized adjustable electrical downtilt antennas offer the wireless carrier the ability to tailor polarization diversity sites for optimum performance. Using variable downtilt, only a few models need be procured to accommodate the needs of widely varying conditions. Remotely controlled downtilt is available as a retrofitable option.

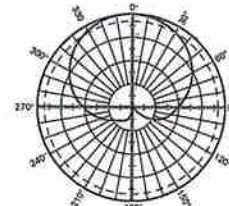
- 0-6° downtilt range.
- UV resistant pulltruded fiberglass radome.
- DC Grounded metallic parts for impulse suppression.
- No moving electrical connections.
- Wideband vector dipole technology.
- Optional remote downtilt Control.
- Will accommodate future 3G / UMTS applications.

### General specifications:

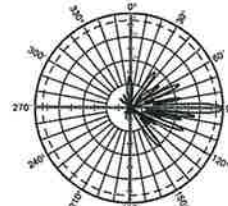
Frequency range	1710–2200 MHz	
VSWR	< 1.5:1	
Impedance	50 ohms	
Intermodulation (2x20w)	IM3: <-150 dBc	
Polarization	+45° and -45°	
Front-to-back ratio (180°±30°)	>30 dB (co-polar) >25 dB (total power)	
Maximum input power	300 watts per input (at 50°C)	
Electrical downtilt continuously adjustable	0–6 degrees	
Connector	2 x 7-16 DIN female	
Isolation	>30 dB	
Cross polar ratio		
Main direction 0°	25 dB (typical)	
Sector ±60°	>10 dB	
Tracking, average	0.5 dB	
Squint	±2.0°	
Weight	19.8 lb (9 kg) 24.3 lb (11 kg) clamps included	
Dimensions	76.9 x 6.1 x 2.8 inches (1954 x 155 x 70 mm)	
Wind load	at 93 mph (150kph)	
Front/Side/Rear	115 lbf / 32 lbf / 115 lbf (510 N) / (140 N) / (510 N)	
Mounting category	M (Medium)	
Wind survival rating*	120 mph (200 kph)	
Shipping dimensions	88 x 6.8 x 3.6 inches (2235 x 172 x 92 mm)	
Shipping weight	28.7 lb (13 kg)	
Mounting	Fixed mounts for 2 to 4.6 inch (50 to 115 mm) OD masts are included and tilt options are available.	

See reverse for order information.

Specifications:	1710–1880 MHz	1850–1990 MHz	1920–2200 MHz
Gain	19 dBi	19.2 dBi	19.5 dBi
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)	63° (half-power)
+45° and -45° polarization vertical beamwidth	4.7° (half-power)	4.5° (half-power)	4.3° (half-power)
Sidelobe suppression for first sidelobe above main beam	0° 2° 4° 6° T 18 18 16 15 dB	0° 2° 4° 6° T 18 18 17 16 dB	0° 2° 4° 6° T 18 18 18 18 dB



Horizontal pattern  
±45° polarization



Vertical pattern  
±45° polarization  
0°–6° electrical downtilt



11271-B  
936.3740/b



\* Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

## 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

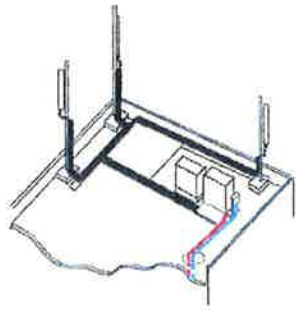
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent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

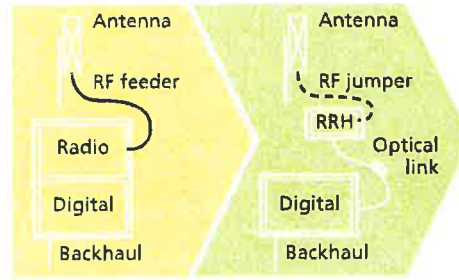
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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



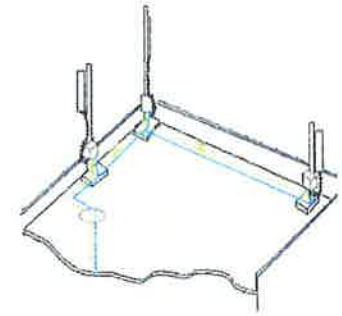
Macro

## 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-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

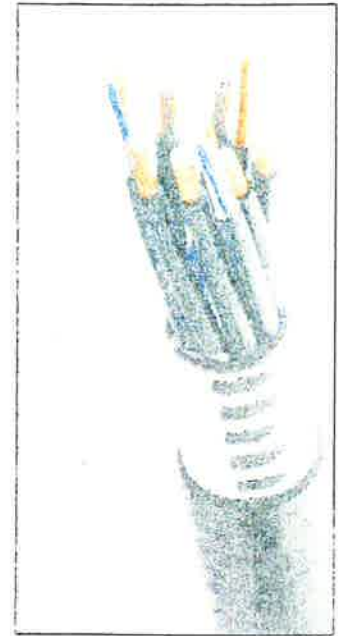


Figure 1: HYBRIFLEX Series

**Technical Specifications**

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
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)
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	0.68 (0.255)
DC-Resistance Power Cable 8.4mm <sup>2</sup> (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
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 (.5 D8)
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)			UL94-V0 UL1666 RoHS Compliant
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 XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
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

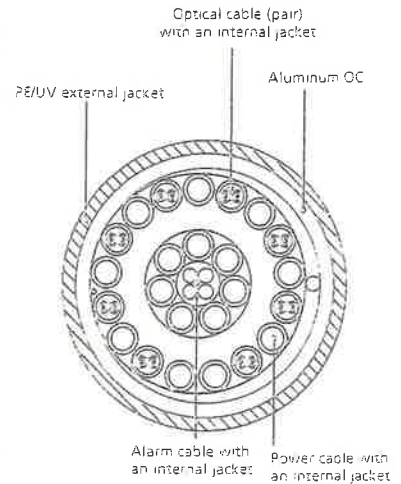


Figure 2: Construction Detail

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

# **ATTACHMENT 2**



Site Name: Trumbull 3		General		Power		Density							
Tower Height: Verizon @ 155ft													
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*Town Antennas (cum.)							4.80%						
*AT&T UMTS	1	500	187	0.0051	880	0.5867	0.88%						
*AT&T UMTS	1	500	187	0.0051	1900	1.0000	0.51%						
*AT&T GSM	6	296	187	0.0183	880	0.5867	3.11%						
*AT&T GSM	6	427	187	0.0263	1900	1.0000	2.63%						
*AT&T LTE	1	500	187	0.0051	740	0.4933	1.04%						
*Sprint CDMA/LTE	2	778	165.5	0.0204	1900	1.0000	2.04%						
*Sprint CDMA/LTE	1	438	165.5	0.0057	850	0.5667	1.01%						
*Sprint WiMAX	3	562	164	0.0225	2657	1.0000	2.25%						
*Sprint microwave	2	31.6	164	0.0008	22500	1.0000	0.08%						
*Clearwire	2	153	164	0.0041	2496	1.0000	0.41%						
*Clearwire	1	211	164	0.0028	11 GHz	1.0000	0.28%						
*T-Mobile GSM	8	173	145	0.0237	1945	1.0000	2.37%						
*T-Mobile UMTS	2	692	145	0.0237	2100	1.0000	2.37%						
*Nextel	12	100	135	0.0237	851	0.5673	4.17%						
<b>Verizon</b>	<b>15</b>	<b>305</b>	<b>155</b>	<b>0.0685</b>	<b>1970</b>	<b>1.0000</b>	<b>6.85%</b>						
<b>Verizon</b>	<b>9</b>	<b>541</b>	<b>155</b>	<b>0.0729</b>	<b>869</b>	<b>0.5793</b>	<b>12.58%</b>						
<b>Verizon</b>	<b>1</b>	<b>1750</b>	<b>155</b>	<b>0.0262</b>	<b>2145</b>	<b>1.0000</b>	<b>2.62%</b>						
<b>Verizon</b>	<b>1</b>	<b>798</b>	<b>155</b>	<b>0.0119</b>	<b>698</b>	<b>0.4653</b>	<b>2.57%</b>						
								<b>52.59%</b>					
* Source: Siting Council													

# **ATTACHMENT 3**

Date: **January 16, 2014**

Veronica Harris  
Crown Castle  
1200 McArthur Blvd  
Mahwah, NJ 07430  
(201) 236-9094



GPD Group  
520 South Main Street, Suite 2531  
Akron, OH 44311  
(614) 859-1607  
dpalkovic@gpdgroup.com

**Subject:** **Structural Analysis Report**

**Carrier Designation:** **Verizon Wireless Co-Locate**  
**Customer Site Name:** Trumbull 3 CT

**Crown Castle Designation:** **Crown Castle BU Number:** 881535  
**Crown Castle Site Name:** TRUMBULL TOWER  
**Crown Castle JDE Job Number:** 255902  
**Crown Castle Work Order Number:** 697713  
**Crown Castle Application Number:** 211132 Rev. 0

**Engineering Firm Designation:** **GPD Group Project Number:** 2014777.881535.03

**Site Data:** **Indian Ledge Park - Whitney Avenue, Trumbull, Fairfield County, CT 06611**  
**Latitude 41° 16' 23.81"; Longitude -73° 12' 47.18"**  
**195 Foot - EEI Monopole Tower**

Dear Veronica Harris,

GPD Group 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 608646, in accordance with application 211132, revision 0.

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

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

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

We at GPD Group 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:

John N. Kabak, P.E.  
Connecticut #: PEN.0028336

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- tnxTower Output

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- Base Level Drawing

### 8) APPENDIX C

- Additional Calculations

**1) INTRODUCTION**

The existing 195' monopole has eighteen sides and is evenly tapered from 68" (flat-flat) at the base to 25" (flat-flat) at the top. It has five major sections connected with slip joints. The tower is galvanized and has no tower lighting.

The tower was originally designed by Engineered Endeavors, Inc. of Mentor, Ohio in July of 2001. The tower was also originally designed for a basic wind speed of 85 mph with 1/2" radial ice in accordance with TIA/EIA-222-F.

**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 mph with 0.75 inch ice thickness (in accordance with ASCE 7-05 ice conditions), 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
154	155	3	Kathrein	742 213	1	1-5/8	1
		3	Alcatel Lucent	RRH2x40-AWS			
		1	RFS Celwave	DB-B1-6C-8AB-OZ			

Notes:

- 1) See Appendix B for the proposed coax layout.

**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	187	6	Powerwave	7770.00	12 2 1	1-1/4 5/8 3/8	
		3	Powerwave	P65-16-XLH-RR			
		12	Powerwave	LGP21401			
		6	Ericsson	RRUS-11			
		1	Raycap	DC6-48-60-18-8F			
	185	1		Platform Mount [LP 601-1]			
174	174	1		Platform Mount [LP 601-1]			1
164	166	3	Argus Technologies	LLPX310R	1 6 3	1/2 5/16 1-1/4	
		3	Samsung	FDD_R6_RRH			
		1	Dragonwave	A-ANT-23G-2-C			
		3	RFS/Celwave	APXVSP18-C-A20			
		3	Alcatel Lucent	1900 MHz RRH (65 MHz)			
		3	Alcatel Lucent	800MHZ RRH			
		3	Alcatel Lucent	800 EXTERNAL NOTCH FILTER			
	9	RFS/Celwave	ACU-A20-N				
	164	1		Platform Mount [LP 601-1]			
154	155	4	Decibel	DB844G65ZAXY	18	1-5/8	
		3	Ryma Wireless	MG D3-800TV			
		3	Antel	BXA-70063/6CF			
		2	Antel	LPA-4016			
	154	1		Platform Mount [LP 601-1]			
144	146	3	EMS Wireless	DR65-18-00DPL2Q	12	1-5/8	
		3	Ericsson	KRY 112 144/1			
		3	Ericsson	KRY 112 89/5			
	144	1		Platform Mount [LP 601-1]			
134	135	12	Decibel	DB844H90E-XY	3	1-5/8	
	134	1		Platform Mount [LP 303-1]	9	1-1/4	

Notes:

1) Empty Mount

**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)
195	195	2		5' Omni Whip Antenna		
185	185	12	Allgon	7120.16		
175	175	12	Allgon	7120.16		
165	165	12	Allgon	7120.16		
155	155	12	Allgon	7120.16		
145	145	12	Allgon	7120.16		
135	135	12	Allgon	7120.16		
125	125	12	Allgon	7120.16		

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
Manufacturer Drawings	EI Project #: 9569, Dated 07/25/2001	Doc ID #: 1405789	CCIsites
Foundation Drawing	EI Project #: 9569, Dated 07/07/2001	Doc ID #: 1405798	CCIsites
Geotechnical Report	Dr. Clarence Welti, P.E., P.C., Dated 06/08/2001	Doc ID #: 1406210	CCIsites
Previous Analysis	Crown Castle Project #: 402785, dated 4/28/11	Doc ID #: 2877160	CCIsites
Previous Analysis	GPD Project #: 2013775.881535.02, Dated 2/11/13	Doc ID #: 3466359	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) The tower and structures were built and have been maintained in accordance with the manufacturer's specifications.
- 2) The configuration of antennas, transmission cables, mounts, and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 3) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by EIA/TIA-222-F.
- 4) Mount sizes, weights, and manufacturers are best estimates based on site photos provided and were determined without the benefit of a site visit by GPD.
- 5) All member connections and foundation steel reinforcing are assumed designed to meet or exceed the load carrying capacity of the connected member and surrounding soils respectively, unless otherwise specified in this report.
- 6) The tower geometry has been based on the analysis by Crown Castle (Project #: 402785, dated 4/28/11) and is assumed to be accurate.
- 7) All equipment model numbers, quantities, and centerline elevations are as provided in the CCI CAD package dated 1/8/2014 with any adjustments as noted below.

This analysis may be affected if any assumptions are not valid or have been made in error. GPD Group 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 <sub>allow</sub> (K)	% Capacity	Pass / Fail
L1	195 - 157.62	Pole	TP33.86x25x0.25	1	-7.48	1340.02	26.3	Pass
L2	157.62 - 117.039	Pole	TP42.87x32.2341x0.3125	2	-18.86	2122.84	70.8	Pass
L3	117.039 - 81.5782	Pole	TP50.53x40.8562x0.375	3	-28.58	3004.66	83.2	Pass
L4	81.5782 - 39.9896	Pole	TP59.51x48.1831x0.5	4	-44.58	4714.13	74.4	Pass
L5	39.9896 - 0	Pole	TP68x56.6385x0.5	5	-66.60	5568.98	81.1	Pass
							Summary	
							Pole (L3)	Pass
							Rating =	Pass

**Table 6 - Tower Component Stresses vs. Capacity - LC7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	81.5	Pass
1	Base Plate	0	77.0	Pass
1	Base Foundation	0	6.5	Pass
1	Base Foundation (Soil Interaction)	0	66.5	Pass

<b>Structure Rating (Maximum From All Components) =</b>	<b>83.2%</b>
---	--------------

Notes:

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

**4.1) Recommendations**

The existing tower and its foundation are sufficient for the proposed loading and do not require modifications.



## 5) DISCLAIMER OF WARRANTIES

GPD GROUP has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD GROUP in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. All tower components have been assumed to only resist dead loads when no other loads are applied. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

GPD GROUP does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD GROUP provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the feasibility of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD GROUP, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

GPD GROUP makes no warranties, expressed and/or implied, in connection with this report, and disclaims any liability arising from material, fabrication, and erection of this tower. GPD GROUP will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD GROUP pursuant to this report will be limited to the total fee received for preparation of this report.

**APPENDIX A**  
**TNXTOWER OUTPUT**

Section	1	2	3	4	5
Length (ft)	37.38	45.33	41.38	48.42	47.59
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.5000	0.5000
Socket Length (ft)	4.75	5.82	6.83	8.00	8.00
Top Dia (in)	25.0000	32.2341	40.9562	48.1831	56.6385
Bot Dia (in)	33.8600	42.8700	50.5300	59.5100	68.0000
Grade			A572-65		
Weight (K)	2.9	5.7	7.6	13.9	16.0

195.0 ft

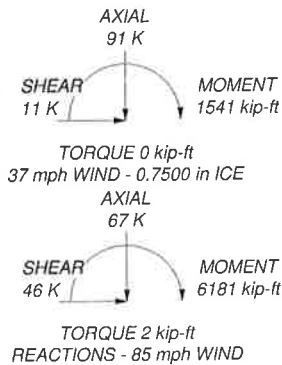
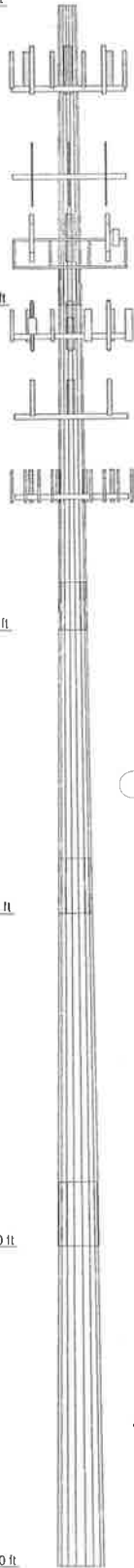
157.6 ft

117.0 ft

81.6 ft

40.0 ft

0.0 ft



**DESIGNED APPURTENANCE LOADING**


TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	185	(3) ACU-A20-N	164
(2) 7770.00 w/ Mount Pipe	185	(2) 8' x 2" Mount Pipe	164
(2) 7770.00 w/ Mount Pipe	185	(2) 8' x 2" Mount Pipe	164
P65-16-XLH-RR w/ Mount Pipe	185	(2) 8' x 2" Mount Pipe	164
P65-16-XLH-RR w/ Mount Pipe	185	Platform Mount [LP 601-1]	164
P65-16-XLH-RR w/ Mount Pipe	185	A-ANT-23G-2-C	164
(4) LGP21401	185	(2) LPA-4016 w/ Mount Pipe	154
(4) LGP21401	185	(2) DB844G65ZAXY w/ Mount Pipe	154
DC6-48-60-18-9F	185	MG D3-800TV w/ Mount Pipe	154
(2) RRUS-11	185	MG D3-800TV w/ Mount Pipe	154
(2) RRUS-11	185	BXA-70063/6CF w/ Mount Pipe	154
(2) RRUS-11	185	BXA-70063/6CF w/ Mount Pipe	154
Platform Mount [LP 601-1]	185	BXA-70063/6CF w/ Mount Pipe	154
(4) 8' x 2" Mount Pipe	174	Platform Mount [LP 601-1]	154
(4) 8' x 2" Mount Pipe	174	742 213 w/ Mount Pipe	154
(4) 8' x 2" Mount Pipe	174	RRH2x40-AWS	154
Platform Mount [LP 601-1]	174	742 213 w/ Mount Pipe	154
LLPX310R w/ Mount Pipe	164	RRH2x40-AWS	154
LLPX310R w/ Mount Pipe	164	742 213 w/ Mount Pipe	154
LLPX310R w/ Mount Pipe	164	RRH2x40-AWS	154
FDD_R6_RRH	164	DB-B1-6C-8AB-0Z	154
FDD_R6_RRH	164	(2) DB844G65ZAXY w/ Mount Pipe	154
FDD_R6_RRH	164	DR65-18-00DPL2Q w/ Mount Pipe	144
APXVSP18-C-A20 w/ Mount Pipe	164	DR65-18-00DPL2Q w/ Mount Pipe	144
APXVSP18-C-A20 w/ Mount Pipe	164	KRY 112 144/1	144
APXVSP18-C-A20 w/ Mount Pipe	164	KRY 112 144/1	144
1900 MHz RRH (65 MHz)	164	KRY 112 144/1	144
1900 MHz RRH (65 MHz)	164	KRY 112 89/5	144
1900 MHz RRH (65 MHz)	164	KRY 112 89/5	144
800MHz RRH	164	KRY 112 89/5	144
800MHz RRH	164	Platform Mount [LP 601-1]	144
800MHz RRH	164	DR65-18-00DPL2Q w/ Mount Pipe	144
800 EXTERNAL NOTCH FILTER	164	(4) DB844H90E-XY w/ Mount Pipe	134
800 EXTERNAL NOTCH FILTER	164	(4) DB844H90E-XY w/ Mount Pipe	134
800 EXTERNAL NOTCH FILTER	164	Platform Mount [LP 303-1]	134
(3) ACU-A20-N	164	(4) DB844H90E-XY w/ Mount Pipe	134
(3) ACU-A20-N	164		

**MATERIAL STRENGTH**

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

**TOWER DESIGN NOTES**

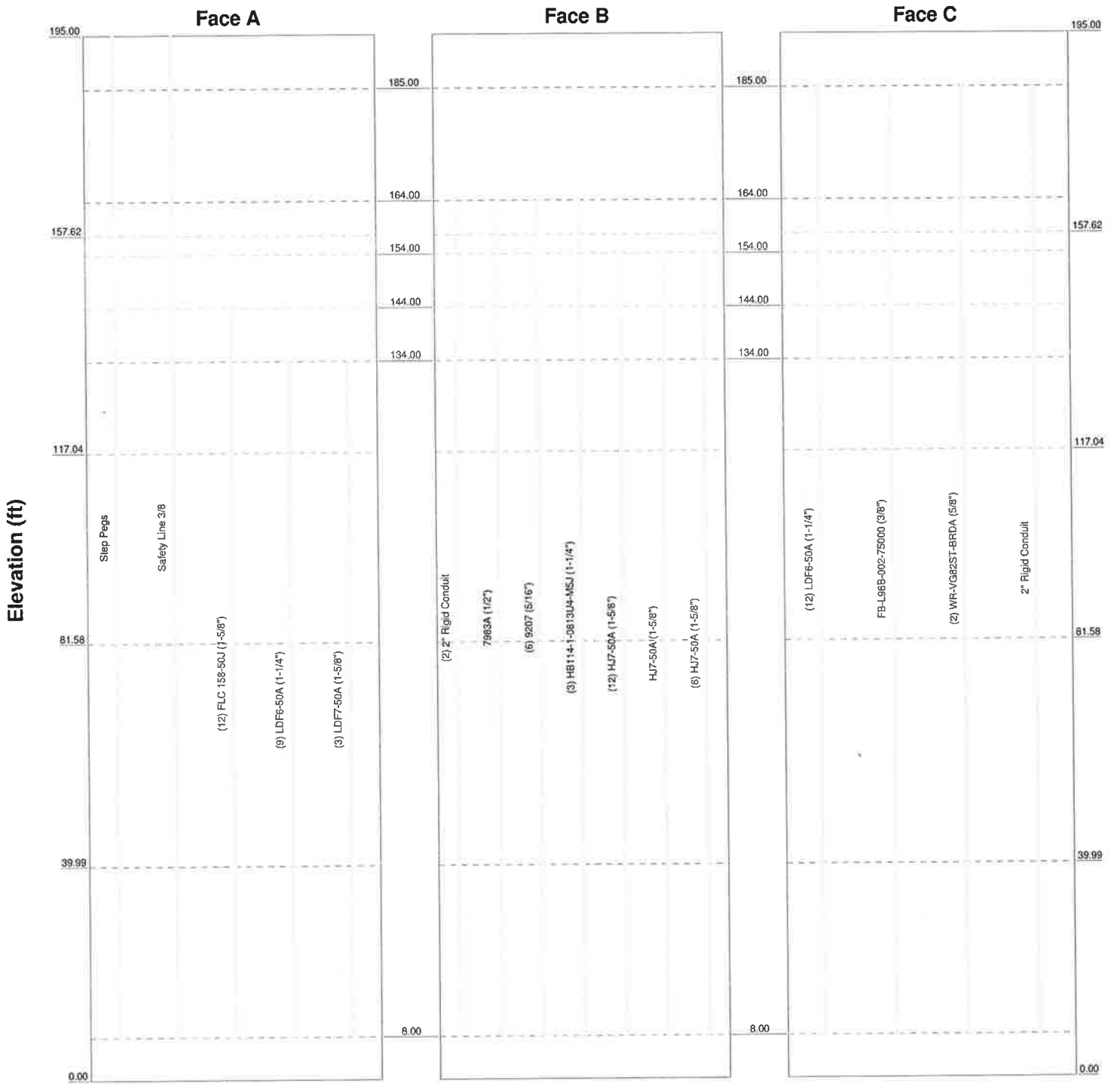
1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 83.2%


 <p><b>GPD Group</b> 520 South Main St; Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101</p>	<p>Job: <b>TRUMBULL TOWER - BU #: 881535</b></p> <p>Project: <b>2014777.881535.03</b></p>	
	<p>Client: Crown Castle</p> <p>Code: TIA/EIA-222-F</p> <p>Path: \\AKRN05.gpdco.com\TELECOM\Crown\881535\03\trxTower\881535.w</p>	<p>Drawn by: bchristy</p> <p>Date: 01/16/14</p>

# Feed Line Distribution Chart

## 0' - 195'

Round
Flat
App In Face
App Out Face
Truss Leg



 <b>GPD Group</b> Consulting Engineers	520 South Main St, Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101		<b>Job: TRUMBULL TOWER - BU #: 881535</b>	
	Project: 2014777.881535.03		App'd:	
	Client: Crown Castle		Drawn by: bchristy	
	Code: TIA/EIA-222-F		Date: 01/16/14	
	Path: \\AKR05.gpdco.com\TELECOM\Crown\881535\03\TruTower\881535.erl		Scale: NTS Dwg No. E-7	

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	<b>Client</b> Crown Castle	<b>Designed by</b> bchristy

## 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 37 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

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

## Options

<ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>√ Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>Include Bolts In Member Capacity</li> <li>Leg Bolts Are At Top Of Section</li> <li>Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>Add IBC .6D+W Combination</li> </ul>	<ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>Use Clear Spans For KL/r</li> <li>Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>Autocalc Torque Arm Areas</li> <li>SR Members Have Cut Ends</li> <li>Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Use TIA-222-G Tension Splice Capacity Exemption</li> </ul>	<ul style="list-style-type: none"> <li>Treat Feedline Bundles As Cylinder</li> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>SR Leg Bolts Resist Compression</li> <li>All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feedline Torque</li> <li>Include Angle Block Shear Check</li> <li style="padding-left: 40px;">Poles</li> <li>√ Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> </ul>
--	---	---

## Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	195.00-157.62	37.38	4.75	18	25.0000	33.8600	0.2500	1.0000	A572-65 (65 ksi)
L2	157.62-117.04	45.33	5.92	18	32.2341	42.8700	0.3125	1.2500	A572-65 (65 ksi)
L3	117.04-81.58	41.38	6.83	18	40.8562	50.5300	0.3750	1.5000	A572-65 (65 ksi)
L4	81.58-39.99	48.42	8.00	18	48.1831	59.5100	0.5000	2.0000	A572-65 (65 ksi)
L5	39.99-0.00	47.99		18	56.6385	68.0000	0.5000	2.0000	A572-65

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	<b>Client</b> Crown Castle	<b>Designed by</b> bchristy

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	(65 ksi)

### Tapered Pole Properties

Section	Tip Dia.	Area	I	r	C	I/C	J	I/Q	w	w/t
	in	in <sup>2</sup>	in <sup>4</sup>	in	in	in <sup>3</sup>	in <sup>4</sup>	in <sup>2</sup>	in	
L1	25.3857	19.6391	1519.8824	8.7863	12.7000	119.6758	3041.7647	9.8214	3.9600	15.84
	34.3823	26.6695	3806.1852	11.9316	17.2009	221.2785	7617.3787	13.3373	5.5194	22.077
L2	33.8631	31.6623	4076.1472	11.3322	16.3749	248.9259	8157.6579	15.8341	5.1232	16.394
	43.5313	42.2117	9658.7899	15.1079	21.7780	443.5122	19330.2890	21.1099	6.9951	22.384
L3	42.8916	48.1827	9975.4994	14.3708	20.7549	480.6327	19964.1249	24.0959	6.5307	17.415
	51.3095	59.6970	18972.2284	17.8050	25.6692	739.1036	37969.4210	29.8542	8.2333	21.955
L4	50.5490	75.6731	21737.4442	16.9275	24.4770	888.0753	43503.4910	37.8437	7.6002	15.2
	60.4280	93.6489	41199.4313	20.9486	30.2311	1362.8171	82453.0738	46.8333	9.5938	19.188
L5	59.4355	89.0919	35472.9741	19.9292	28.7724	1232.8830	70992.6245	44.5544	9.0884	18.177
	69.0490	107.1225	61663.1484	23.9625	34.5440	1785.0610	123407.434	53.5714	11.0880	22.176

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft <sup>2</sup>	in					in	in
L1				1	1	1		
195.00-157.62				1	1	1		
L2				1	1	1		
157.62-117.04				1	1	1		
L3				1	1	1		
117.04-81.58				1	1	1		
L4				1	1	1		
81.58-39.99				1	1	1		
L5				1	1	1		
39.99-0.00				1	1	1		

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

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C <sub>A</sub> A	Weight
				ft		ft <sup>2</sup> /ft	plf
Step Pegs	A	No	CaAa (Out Of Face)	195.00 - 8.00	1	No Ice	2.72
						1/2" Ice	3.51
						1" Ice	4.92
						2" Ice	9.56
						4" Ice	26.18
Safety Line 3/8	A	No	CaAa (Out Of Face)	195.00 - 8.00	1	No Ice	0.22
						1/2" Ice	0.75
						1" Ice	1.28
						2" Ice	2.34
						4" Ice	4.46
LDF6-50A (1-1/4")	C	No	Inside Pole	185.00 - 8.00	12	No Ice	0.66
						1/2" Ice	0.66
						1" Ice	0.66
						2" Ice	0.66
						4" Ice	0.66

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	<b>Client</b>	Crown Castle	<b>Designed by</b>	bchristy

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	CAAA		Weight
						ft <sup>2</sup> /ft	plf	
FB-L98B-002-75000 (3/8")	C	No	Inside Pole	185.00 - 8.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
WR-VG82ST-BRDA (5/8")	C	No	Inside Pole	185.00 - 8.00	2	No Ice	0.00	0.31
						1/2" Ice	0.00	0.31
						1" Ice	0.00	0.31
						2" Ice	0.00	0.31
						4" Ice	0.00	0.31
2" Rigid Conduit	C	No	Inside Pole	185.00 - 8.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
						2" Ice	0.00	2.80
						4" Ice	0.00	2.80
2" Rigid Conduit	B	No	Inside Pole	164.00 - 8.00	2	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
						2" Ice	0.00	2.80
						4" Ice	0.00	2.80
7983A (1/2")	B	No	Inside Pole	164.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
9207 (5/16")	B	No	Inside Pole	164.00 - 8.00	6	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
HB114-1-0813U4-M5J (1-1/4")	B	No	Inside Pole	164.00 - 8.00	3	No Ice	0.00	1.20
						1/2" Ice	0.00	1.20
						1" Ice	0.00	1.20
						2" Ice	0.00	1.20
						4" Ice	0.00	1.20
HJ7-50A (1-5/8")	B	No	Inside Pole	154.00 - 8.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
HJ7-50A (1-5/8")	B	No	CaAa (Out Of Face)	154.00 - 8.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
						1" Ice	0.40	4.68
						2" Ice	0.60	10.76
						4" Ice	1.00	30.26
HJ7-50A (1-5/8")	B	No	CaAa (Out Of Face)	154.00 - 8.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
						1" Ice	0.00	4.68
						2" Ice	0.00	10.76
						4" Ice	0.00	30.26
FLC 158-50J (1-5/8")	A	No	Inside Pole	144.00 - 8.00	12	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92
						2" Ice	0.00	0.92
						4" Ice	0.00	0.92
LDF6-50A (1-1/4")	A	No	Inside Pole	134.00 - 8.00	9	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
LDF7-50A (1-5/8")	A	No	Inside Pole	134.00 - 8.00	3	No Ice	0.00	0.82

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	<b>Client</b>	Crown Castle	<b>Designed by</b>	bchristy

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C <sub>A</sub> A <sub>A</sub>	Weight
				ft		ft <sup>2</sup> /ft	plf
					1/2" Ice	0.00	0.82
					1" Ice	0.00	0.82
					2" Ice	0.00	0.82
					4" Ice	0.00	0.82

**Feed Line/Linear Appurtenances Section Areas**

Tower Section	Tower Elevation	Face	A <sub>R</sub>	A <sub>F</sub>	C <sub>A</sub> A <sub>A</sub> In Face	C <sub>A</sub> A <sub>A</sub> Out Face	Weight
	ft		ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	K
L1	195.00-157.62	A	0.000	0.000	0.000	4.392	0.11
		B	0.000	0.000	0.000	0.000	0.06
		C	0.000	0.000	0.000	0.000	0.31
L2	157.62-117.04	A	0.000	0.000	0.000	4.768	0.56
		B	0.000	0.000	0.000	7.318	1.12
		C	0.000	0.000	0.000	0.000	0.46
L3	117.04-81.58	A	0.000	0.000	0.000	4.167	0.79
		B	0.000	0.000	0.000	7.021	1.05
		C	0.000	0.000	0.000	0.000	0.40
L4	81.58-39.99	A	0.000	0.000	0.000	4.887	0.93
		B	0.000	0.000	0.000	8.235	1.23
		C	0.000	0.000	0.000	0.000	0.47
L5	39.99-0.00	A	0.000	0.000	0.000	3.759	0.72
		B	0.000	0.000	0.000	6.334	0.94
		C	0.000	0.000	0.000	0.000	0.36

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

Tower Section	Tower Elevation	Face or Leg	Ice Thickness	A <sub>R</sub>	A <sub>F</sub>	C <sub>A</sub> A <sub>A</sub> In Face	C <sub>A</sub> A <sub>A</sub> Out Face	Weight
	ft		in	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	K
L1	195.00-157.62	A	0.917	0.000	0.000	0.000	18.096	0.22
		B		0.000	0.000	0.000	0.000	0.06
		C		0.000	0.000	0.000	0.000	0.31
L2	157.62-117.04	A	0.889	0.000	0.000	0.000	19.646	0.68
		B		0.000	0.000	0.000	14.094	1.97
		C		0.000	0.000	0.000	0.000	0.46
L3	117.04-81.58	A	0.856	0.000	0.000	0.000	16.783	0.89
		B		0.000	0.000	0.000	13.330	1.83
		C		0.000	0.000	0.000	0.000	0.40
L4	81.58-39.99	A	0.807	0.000	0.000	0.000	19.121	1.04
		B		0.000	0.000	0.000	15.352	2.11
		C		0.000	0.000	0.000	0.000	0.47
L5	39.99-0.00	A	0.750	0.000	0.000	0.000	14.083	0.80
		B		0.000	0.000	0.000	11.496	1.57
		C		0.000	0.000	0.000	0.000	0.36

**Feed Line Center of Pressure**



<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St: Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>	TRUMBULL TOWER - BU #: 881535	<b>Page</b>	5 of 15
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Section	Elevation	CP <sub>x</sub>	CP <sub>z</sub>	CP <sub>x</sub> Ice	CP <sub>z</sub> Ice
	ft	in	in	in	in
L1	195.00-157.62	0.0000	-0.1682	0.0000	-0.5765
L2	157.62-117.04	0.2166	-0.0361	0.3483	-0.3533
L3	117.04-81.58	0.2378	-0.0257	0.3881	-0.3402
L4	81.58-39.99	0.2405	-0.0260	0.3952	-0.3402
L5	39.99-0.00	0.1934	-0.0209	0.3208	-0.2685

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>A</sub> A <sub>A</sub> Front	C <sub>A</sub> A <sub>A</sub> Side	Weight K	
						ft <sup>2</sup>	ft <sup>2</sup>		
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	185.00	No Ice	6.22	4.35	0.06
			0.00			1/2" Ice	6.77	5.20	0.11
			2.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	185.00	No Ice	6.22	4.35	0.06
			0.00			1/2" Ice	6.77	5.20	0.11
			2.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	185.00	No Ice	6.22	4.35	0.06
			0.00			1/2" Ice	6.77	5.20	0.11
			2.00			1" Ice	7.30	5.92	0.16
						2" Ice	8.38	7.41	0.29
						4" Ice	10.69	10.76	0.68
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.00	0.0000	185.00	No Ice	8.64	6.36	0.08
			0.00			1/2" Ice	9.29	7.54	0.14
			2.00			1" Ice	9.91	8.43	0.22
						2" Ice	11.18	10.24	0.39
						4" Ice	13.83	14.10	0.89
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.00	0.0000	185.00	No Ice	8.64	6.36	0.08
			0.00			1/2" Ice	9.29	7.54	0.14
			2.00			1" Ice	9.91	8.43	0.22
						2" Ice	11.18	10.24	0.39
						4" Ice	13.83	14.10	0.89
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.00	0.0000	185.00	No Ice	8.64	6.36	0.08
			0.00			1/2" Ice	9.29	7.54	0.14
			2.00			1" Ice	9.91	8.43	0.22
						2" Ice	11.18	10.24	0.39
						4" Ice	13.83	14.10	0.89
(4) LGP21401	A	From Leg	4.00	0.0000	185.00	No Ice	1.29	0.23	0.01
			0.00			1/2" Ice	1.45	0.31	0.02
			2.00			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(4) LGP21401	B	From Leg	4.00	0.0000	185.00	No Ice	1.29	0.23	0.01
			0.00			1/2" Ice	1.45	0.31	0.02
			2.00			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(4) LGP21401	C	From Leg	4.00	0.0000	185.00	No Ice	1.29	0.23	0.01

<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St; Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b> TRUMBULL TOWER - BU #: 881535	<b>Page</b> 6 of 15
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	<b>Client</b> Crown Castle	<b>Designed by</b> bchristy

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
			0.00			1/2" Ice	1.45	0.31	0.02
			2.00			1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
DC6-48-60-18-8F	A	From Leg	4.00	0.0000	185.00	No Ice	2.57	2.57	0.02
			0.00			1/2" Ice	2.80	2.80	0.04
			2.00			1" Ice	3.04	3.04	0.07
						2" Ice	3.54	3.54	0.13
(2) RRUS-11	A	From Leg	4.00	0.0000	185.00	4" Ice	4.66	4.66	0.30
			0.00			No Ice	2.94	1.19	0.06
			2.00			1/2" Ice	3.17	1.35	0.07
						1" Ice	3.41	1.52	0.10
						2" Ice	3.91	1.89	0.15
(2) RRUS-11	B	From Leg	4.00	0.0000	185.00	4" Ice	5.02	2.72	0.30
			0.00			No Ice	2.94	1.19	0.06
			2.00			1/2" Ice	3.17	1.35	0.07
						1" Ice	3.41	1.52	0.10
						2" Ice	3.91	1.89	0.15
(2) RRUS-11	C	From Leg	4.00	0.0000	185.00	4" Ice	5.02	2.72	0.30
			0.00			No Ice	2.94	1.19	0.06
			2.00			1/2" Ice	3.17	1.35	0.07
						1" Ice	3.41	1.52	0.10
						2" Ice	3.91	1.89	0.15
Platform Mount [LP 601-1]	C	None		0.0000	185.00	4" Ice	5.02	2.72	0.30
						No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
						2" Ice	48.95	48.95	2.69
						4" Ice	69.43	69.43	4.26
(4) 8' x 2" Mount Pipe	A	From Leg	4.00	0.0000	174.00	No Ice	1.90	1.90	0.03
			0.00			1/2" Ice	2.73	2.73	0.04
			0.00			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
						4" Ice	6.50	6.50	0.30
(4) 8' x 2" Mount Pipe	B	From Leg	4.00	0.0000	174.00	No Ice	1.90	1.90	0.03
			0.00			1/2" Ice	2.73	2.73	0.04
			0.00			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
						4" Ice	6.50	6.50	0.30
(4) 8' x 2" Mount Pipe	C	From Leg	4.00	0.0000	174.00	No Ice	1.90	1.90	0.03
			0.00			1/2" Ice	2.73	2.73	0.04
			0.00			1" Ice	3.40	3.40	0.06
						2" Ice	4.40	4.40	0.12
						4" Ice	6.50	6.50	0.30
Platform Mount [LP 601-1]	C	None		0.0000	174.00	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
						2" Ice	48.95	48.95	2.69
						4" Ice	69.43	69.43	4.26
LLPX310R w/ Mount Pipe	A	From Leg	4.00	0.0000	164.00	No Ice	5.28	3.45	0.07
			0.00			1/2" Ice	5.73	4.03	0.11
			2.00			1" Ice	6.19	4.62	0.16
						2" Ice	7.13	5.91	0.28
						4" Ice	9.20	8.90	0.62
LLPX310R w/ Mount Pipe	B	From Leg	4.00	0.0000	164.00	No Ice	5.28	3.45	0.07
			0.00			1/2" Ice	5.73	4.03	0.11
			2.00			1" Ice	6.19	4.62	0.16

<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St; Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>		TRUMBULL TOWER - BU #: 881535		<b>Page</b>		7 of 15	
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	<b>Client</b>		Crown Castle		<b>Designed by</b>		bchristy	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Lateral					
LLPX310R w/ Mount Pipe	C	From Leg	4.00	0.0000	164.00	2" Ice	7.13	5.91	0.28
			0.00			4" Ice	9.20	8.90	0.62
			2.00			No Ice	5.28	3.45	0.07
						1/2" Ice	5.73	4.03	0.11
						1" Ice	6.19	4.62	0.16
						2" Ice	7.13	5.91	0.28
						4" Ice	9.20	8.90	0.62
FDD_R6_RRH	A	From Leg	4.00	0.0000	164.00	No Ice	1.79	0.78	0.03
			0.00			1/2" Ice	1.97	0.92	0.04
			2.00			1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
FDD_R6_RRH	B	From Leg	4.00	0.0000	164.00	No Ice	1.79	0.78	0.03
			0.00			1/2" Ice	1.97	0.92	0.04
			2.00			1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
FDD_R6_RRH	C	From Leg	4.00	0.0000	164.00	No Ice	1.79	0.78	0.03
			0.00			1/2" Ice	1.97	0.92	0.04
			2.00			1" Ice	2.16	1.07	0.06
						2" Ice	2.57	1.39	0.09
						4" Ice	3.49	2.14	0.20
APXVSP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.0000	164.00	No Ice	8.26	6.71	0.08
			0.00			1/2" Ice	8.81	7.66	0.14
			2.00			1" Ice	9.36	8.49	0.22
						2" Ice	10.50	10.20	0.39
						4" Ice	12.88	13.98	0.87
APXVSP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.0000	164.00	No Ice	8.26	6.71	0.08
			0.00			1/2" Ice	8.81	7.66	0.14
			2.00			1" Ice	9.36	8.49	0.22
						2" Ice	10.50	10.20	0.39
						4" Ice	12.88	13.98	0.87
APXVSP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.0000	164.00	No Ice	8.26	6.71	0.08
			0.00			1/2" Ice	8.81	7.66	0.14
			2.00			1" Ice	9.36	8.49	0.22
						2" Ice	10.50	10.20	0.39
						4" Ice	12.88	13.98	0.87
1900 MHz RRH (65 MHz)	A	From Leg	4.00	0.0000	164.00	No Ice	2.70	2.77	0.06
			0.00			1/2" Ice	2.94	3.01	0.08
			2.00			1" Ice	3.18	3.26	0.11
						2" Ice	3.70	3.78	0.18
						4" Ice	4.85	4.93	0.35
1900 MHz RRH (65 MHz)	B	From Leg	4.00	0.0000	164.00	No Ice	2.70	2.77	0.06
			0.00			1/2" Ice	2.94	3.01	0.08
			2.00			1" Ice	3.18	3.26	0.11
						2" Ice	3.70	3.78	0.18
						4" Ice	4.85	4.93	0.35
1900 MHz RRH (65 MHz)	C	From Leg	4.00	0.0000	164.00	No Ice	2.70	2.77	0.06
			0.00			1/2" Ice	2.94	3.01	0.08
			2.00			1" Ice	3.18	3.26	0.11
						2" Ice	3.70	3.78	0.18
						4" Ice	4.85	4.93	0.35
800MHZ RRH	A	From Leg	4.00	0.0000	164.00	No Ice	2.49	2.07	0.05
			0.00			1/2" Ice	2.71	2.27	0.07
			2.00			1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32



<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St; Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>		TRUMBULL TOWER - BU #: 881535		<b>Page</b>		9 of 15	
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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub>		Weight
			Horz	Vert			Front	Side	
			Lateral	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
						1" Ice	38.71	38.71	1.91
						2" Ice	48.95	48.95	2.69
						4" Ice	69.43	69.43	4.26
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.00		0.0000	No Ice	4.90	4.92	0.03
			0.00			1/2" Ice	5.35	5.60	0.08
			1.00			1" Ice	5.80	6.28	0.13
						2" Ice	6.73	7.71	0.26
						4" Ice	8.73	10.83	0.62
(2) LPA-4016 w/ Mount Pipe	B	From Leg	4.00		0.0000	No Ice	10.01	7.46	0.04
			0.00			1/2" Ice	10.52	8.15	0.12
			1.00			1" Ice	11.04	8.87	0.21
						2" Ice	12.11	10.35	0.40
						4" Ice	14.39	13.59	0.91
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.00		0.0000	No Ice	4.90	4.92	0.03
			0.00			1/2" Ice	5.35	5.60	0.08
			1.00			1" Ice	5.80	6.28	0.13
						2" Ice	6.73	7.71	0.26
						4" Ice	8.73	10.83	0.62
MG D3-800TV w/ Mount Pipe	A	From Leg	4.00		0.0000	No Ice	3.71	3.56	0.04
			0.00			1/2" Ice	4.19	4.39	0.07
			1.00			1" Ice	4.63	5.09	0.12
						2" Ice	5.65	6.54	0.22
						4" Ice	7.82	9.69	0.54
MG D3-800TV w/ Mount Pipe	B	From Leg	4.00		0.0000	No Ice	3.71	3.56	0.04
			0.00			1/2" Ice	4.19	4.39	0.07
			1.00			1" Ice	4.63	5.09	0.12
						2" Ice	5.65	6.54	0.22
						4" Ice	7.82	9.69	0.54
MG D3-800TV w/ Mount Pipe	C	From Leg	4.00		0.0000	No Ice	3.71	3.56	0.04
			0.00			1/2" Ice	4.19	4.39	0.07
			1.00			1" Ice	4.63	5.09	0.12
						2" Ice	5.65	6.54	0.22
						4" Ice	7.82	9.69	0.54
BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.00		0.0000	No Ice	8.23	5.66	0.05
			0.00			1/2" Ice	8.99	6.92	0.11
			1.00			1" Ice	9.71	8.04	0.18
						2" Ice	11.09	9.94	0.34
						4" Ice	13.97	13.94	0.83
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00		0.0000	No Ice	8.23	5.66	0.05
			0.00			1/2" Ice	8.99	6.92	0.11
			1.00			1" Ice	9.71	8.04	0.18
						2" Ice	11.09	9.94	0.34
						4" Ice	13.97	13.94	0.83
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00		0.0000	No Ice	8.23	5.66	0.05
			0.00			1/2" Ice	8.99	6.92	0.11
			1.00			1" Ice	9.71	8.04	0.18
						2" Ice	11.09	9.94	0.34
						4" Ice	13.97	13.94	0.83
Platform Mount [LP 601-1]	C	None			0.0000	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
						2" Ice	48.95	48.95	2.69
						4" Ice	69.43	69.43	4.26
742 213 w/ Mount Pipe	A	From Leg	4.00		0.0000	No Ice	5.52	4.77	0.05
			0.00			1/2" Ice	6.16	6.21	0.10
			1.00			1" Ice	6.78	7.35	0.15
						2" Ice	7.97	9.29	0.29

<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St: Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>	TRUMBULL TOWER - BU #: 881535	<b>Page</b>	10 of 15
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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
RRH2x40-AWS	A	From Leg	4.00	0.0000	154.00	4" Ice	10.45	13.37	0.71
			0.00			No Ice	2.51	1.66	0.04
			1.00			1/2" Ice	2.75	1.87	0.06
						1" Ice	2.99	2.08	0.08
						2" Ice	3.49	2.54	0.13
742 213 w/ Mount Pipe	B	From Leg	4.00	0.0000	154.00	4" Ice	4.61	3.57	0.28
			0.00			No Ice	5.52	4.77	0.05
			1.00			1/2" Ice	6.16	6.21	0.10
						1" Ice	6.78	7.35	0.15
						2" Ice	7.97	9.29	0.29
RRH2x40-AWS	B	From Leg	4.00	0.0000	154.00	4" Ice	10.45	13.37	0.71
			0.00			No Ice	2.51	1.66	0.04
			1.00			1/2" Ice	2.75	1.87	0.06
						1" Ice	2.99	2.08	0.08
						2" Ice	3.49	2.54	0.13
742 213 w/ Mount Pipe	C	From Leg	4.00	0.0000	154.00	4" Ice	4.61	3.57	0.28
			0.00			No Ice	5.52	4.77	0.05
			1.00			1/2" Ice	6.16	6.21	0.10
						1" Ice	6.78	7.35	0.15
						2" Ice	7.97	9.29	0.29
RRH2x40-AWS	C	From Leg	4.00	0.0000	154.00	4" Ice	10.45	13.37	0.71
			0.00			No Ice	2.51	1.66	0.04
			1.00			1/2" Ice	2.75	1.87	0.06
						1" Ice	2.99	2.08	0.08
						2" Ice	3.49	2.54	0.13
DB-B1-6C-8AB-0Z	C	From Leg	4.00	0.0000	154.00	4" Ice	4.61	3.57	0.28
			0.00			No Ice	5.60	2.33	0.04
			1.00			1/2" Ice	5.92	2.56	0.08
						1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
DR65-18-00DPL2Q w/ Mount Pipe	A	From Leg	4.00	0.0000	144.00	4" Ice	8.37	4.37	0.45
			0.00			No Ice	6.54	3.73	0.04
			2.00			1/2" Ice	7.04	4.46	0.09
						1" Ice	7.54	5.14	0.14
						2" Ice	8.58	6.56	0.27
DR65-18-00DPL2Q w/ Mount Pipe	B	From Leg	4.00	0.0000	144.00	4" Ice	10.78	9.66	0.64
			0.00			No Ice	6.54	3.73	0.04
			2.00			1/2" Ice	7.04	4.46	0.09
						1" Ice	7.54	5.14	0.14
						2" Ice	8.58	6.56	0.27
DR65-18-00DPL2Q w/ Mount Pipe	C	From Leg	4.00	0.0000	144.00	4" Ice	10.78	9.66	0.64
			0.00			No Ice	6.54	3.73	0.04
			2.00			1/2" Ice	7.04	4.46	0.09
						1" Ice	7.54	5.14	0.14
						2" Ice	8.58	6.56	0.27
KRY 112 144/1	A	From Leg	4.00	0.0000	144.00	4" Ice	10.78	9.66	0.64
			0.00			No Ice	0.00	0.19	0.01
			2.00			1/2" Ice	0.00	0.26	0.01
						1" Ice	0.00	0.33	0.02
						2" Ice	0.00	0.51	0.03
KRY 112 144/1	B	From Leg	4.00	0.0000	144.00	4" Ice	0.00	0.97	0.08
			0.00			No Ice	0.00	0.19	0.01
			2.00			1/2" Ice	0.00	0.26	0.01
						1" Ice	0.00	0.33	0.02
						2" Ice	0.00	0.51	0.03
KRY 112 144/1	C	From Leg	4.00	0.0000	144.00	4" Ice	0.00	0.97	0.08
						No Ice	0.00	0.19	0.01
						No Ice	0.00	0.19	0.01

<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St; Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>	TRUMBULL TOWER - BU #: 881535	<b>Page</b>	11 of 15
	<b>Project</b>	2014777.881535.03	<b>Date</b>	14:42:02 01/16/14
	<b>Client</b>	Crown Castle	<b>Designed by</b>	bchristy

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>A</sub>		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
			0.00			1/2" Ice	0.00	0.26	0.01	
			2.00			1" Ice	0.00	0.33	0.02	
						2" Ice	0.00	0.51	0.03	
						4" Ice	0.00	0.97	0.08	
KRY 112 89/5	A	From Leg	4.00		0.0000	144.00	No Ice	0.00	0.43	0.02
			0.00				1/2" Ice	0.00	0.53	0.02
			2.00				1" Ice	0.00	0.64	0.03
							2" Ice	0.00	0.89	0.05
							4" Ice	0.00	1.48	0.11
KRY 112 89/5	B	From Leg	4.00		0.0000	144.00	No Ice	0.00	0.43	0.02
			0.00				1/2" Ice	0.00	0.53	0.02
			2.00				1" Ice	0.00	0.64	0.03
							2" Ice	0.00	0.89	0.05
							4" Ice	0.00	1.48	0.11
KRY 112 89/5	C	From Leg	4.00		0.0000	144.00	No Ice	0.00	0.43	0.02
			0.00				1/2" Ice	0.00	0.53	0.02
			2.00				1" Ice	0.00	0.64	0.03
							2" Ice	0.00	0.89	0.05
							4" Ice	0.00	1.48	0.11
Platform Mount [LP 601-1]	C	None			0.0000	144.00	No Ice	28.47	28.47	1.12
							1/2" Ice	33.59	33.59	1.51
							1" Ice	38.71	38.71	1.91
							2" Ice	48.95	48.95	2.69
							4" Ice	69.43	69.43	4.26
(4) DB844H90E-XY w/ Mount Pipe	A	From Leg	4.00		0.0000	134.00	No Ice	4.01	5.63	0.04
			0.00				1/2" Ice	4.75	6.83	0.09
			1.00				1" Ice	5.46	7.88	0.14
							2" Ice	6.71	9.65	0.27
							4" Ice	9.38	13.41	0.66
(4) DB844H90E-XY w/ Mount Pipe	B	From Leg	4.00		0.0000	134.00	No Ice	4.01	5.63	0.04
			0.00				1/2" Ice	4.75	6.83	0.09
			1.00				1" Ice	5.46	7.88	0.14
							2" Ice	6.71	9.65	0.27
							4" Ice	9.38	13.41	0.66
(4) DB844H90E-XY w/ Mount Pipe	C	From Leg	4.00		0.0000	134.00	No Ice	4.01	5.63	0.04
			0.00				1/2" Ice	4.75	6.83	0.09
			1.00				1" Ice	5.46	7.88	0.14
							2" Ice	6.71	9.65	0.27
							4" Ice	9.38	13.41	0.66
Platform Mount [LP 303-1]	C	None			0.0000	134.00	No Ice	14.66	14.66	1.25
							1/2" Ice	18.87	18.87	1.48
							1" Ice	23.08	23.08	1.71
							2" Ice	31.50	31.50	2.18
							4" Ice	48.34	48.34	3.10

**Dishes**

<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St, Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>	TRUMBULL TOWER - BU #: 881535	<b>Page</b>	12 of 15
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Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft <sup>2</sup>	Weight K	
A-ANT-23G-2-C	B	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 2.00	40.0000		164.00	2.17	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.01 0.02 0.03 0.05 0.08

### Load Combinations

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

### Maximum Tower Deflections - Service Wind



<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St; Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>	TRUMBULL TOWER - BU #: 881535	<b>Page</b>	13 of 15
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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	195 - 157.62	41.010	31	1.7822	0.0022
L2	162.37 - 117.039	28.977	31	1.7015	0.0021
L3	122.958 - 81.5782	16.268	31	1.3086	0.0010
L4	88.4089 - 39.9896	8.229	31	0.8750	0.0005
L5	47.9896 - 0	2.461	31	0.4627	0.0002

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	(2) 7770.00 w/ Mount Pipe	31	37.265	1.7722	0.0023	33564
174.00	(4) 8' x 2" Mount Pipe	31	33.188	1.7502	0.0022	15982
166.00	A-ANT-23G-2-C	31	30.277	1.7204	0.0022	11572
164.00	LLPX310R w/ Mount Pipe	31	29.559	1.7105	0.0021	10812
154.00	(2) DB844G65ZAXY w/ Mount Pipe	31	26.041	1.6439	0.0019	7935
144.00	DR65-18-00DPL2Q w/ Mount Pipe	31	22.674	1.5527	0.0017	6228
134.00	(4) DB844H90E-XY w/ Mount Pipe	31	19.499	1.4432	0.0013	5122

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	195 - 157.62	118.179	12	5.1415	0.0064
L2	162.37 - 117.039	83.531	12	4.9089	0.0061
L3	122.958 - 81.5782	46.923	12	3.7758	0.0029
L4	88.4089 - 39.9896	23.743	12	2.5251	0.0014
L5	47.9896 - 0	7.104	12	1.3356	0.0006

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	(2) 7770.00 w/ Mount Pipe	12	107.396	5.1126	0.0065	11841
174.00	(4) 8' x 2" Mount Pipe	12	95.657	5.0494	0.0064	5637
166.00	A-ANT-23G-2-C	12	87.275	4.9633	0.0062	4079
164.00	LLPX310R w/ Mount Pipe	12	85.207	4.9347	0.0061	3811
154.00	(2) DB844G65ZAXY w/ Mount Pipe	12	75.076	4.7425	0.0057	2791
144.00	DR65-18-00DPL2Q w/ Mount Pipe	12	65.378	4.4795	0.0048	2187
134.00	(4) DB844H90E-XY w/ Mount Pipe	12	56.233	4.1638	0.0039	1796

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	<b>Client</b>	Crown Castle	<b>Designed by</b>	bchristy

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
L1	195 - 157.62 (1)	TP33.86x25x0.25	37.38	0.00	0.0	39.000	25.7762	-7.48	1005.27	0.007
L2	157.62 - 117.039 (2)	TP42.87x32.2341x0.3125	45.33	0.00	0.0	39.000	40.8342	-18.86	1592.53	0.012
L3	117.039 - 81.5782 (3)	TP50.53x40.8562x0.375	41.38	0.00	0.0	39.000	57.7963	-28.58	2254.06	0.013
L4	81.5782 - 39.9896 (4)	TP59.51x48.1831x0.5	48.42	0.00	0.0	39.000	90.6789	-44.58	3536.48	0.013
L5	39.9896 - 0 (5)	TP68x56.6385x0.5	47.99	0.00	0.0	39.000	107.1220	-66.60	4177.78	0.016

### Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M <sub>x</sub> kip-ft	Actual f <sub>bx</sub> ksi	Allow. F <sub>bx</sub> ksi	Ratio f <sub>bx</sub> F <sub>bx</sub>	Actual M <sub>y</sub> kip-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio f <sub>by</sub> F <sub>by</sub>
L1	195 - 157.62 (1)	TP33.86x25x0.25	230.41	13.380	39.000	0.343	0.00	0.000	39.000	0.000
L2	157.62 - 117.039 (2)	TP42.87x32.2341x0.3125	1256.21	36.330	39.000	0.932	0.00	0.000	39.000	0.000
L3	117.039 - 81.5782 (3)	TP50.53x40.8562x0.375	2467.57	42.752	39.000	1.096	0.00	0.000	39.000	0.000
L4	81.5782 - 39.9896 (4)	TP59.51x48.1831x0.5	4064.17	38.179	39.000	0.979	0.00	0.000	39.000	0.000
L5	39.9896 - 0 (5)	TP68x56.6385x0.5	6181.24	41.553	39.000	1.065	0.00	0.000	39.000	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio f <sub>v</sub> F <sub>v</sub>	Actual T kip-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio f <sub>vt</sub> F <sub>vt</sub>
L1	195 - 157.62 (1)	TP33.86x25x0.25	16.55	0.642	26.000	0.050	0.90	0.026	26.000	0.001
L2	157.62 - 117.039 (2)	TP42.87x32.2341x0.3125	32.98	0.808	26.000	0.062	0.66	0.009	26.000	0.000
L3	117.039 - 81.5782 (3)	TP50.53x40.8562x0.375	37.10	0.642	26.000	0.049	0.71	0.006	26.000	0.000
L4	81.5782 - 39.9896 (4)	TP59.51x48.1831x0.5	41.78	0.461	26.000	0.035	0.77	0.004	26.000	0.000
L5	39.9896 - 0 (5)	TP68x56.6385x0.5	46.32	0.432	26.000	0.033	0.82	0.003	26.000	0.000

### Pole Interaction Design Data

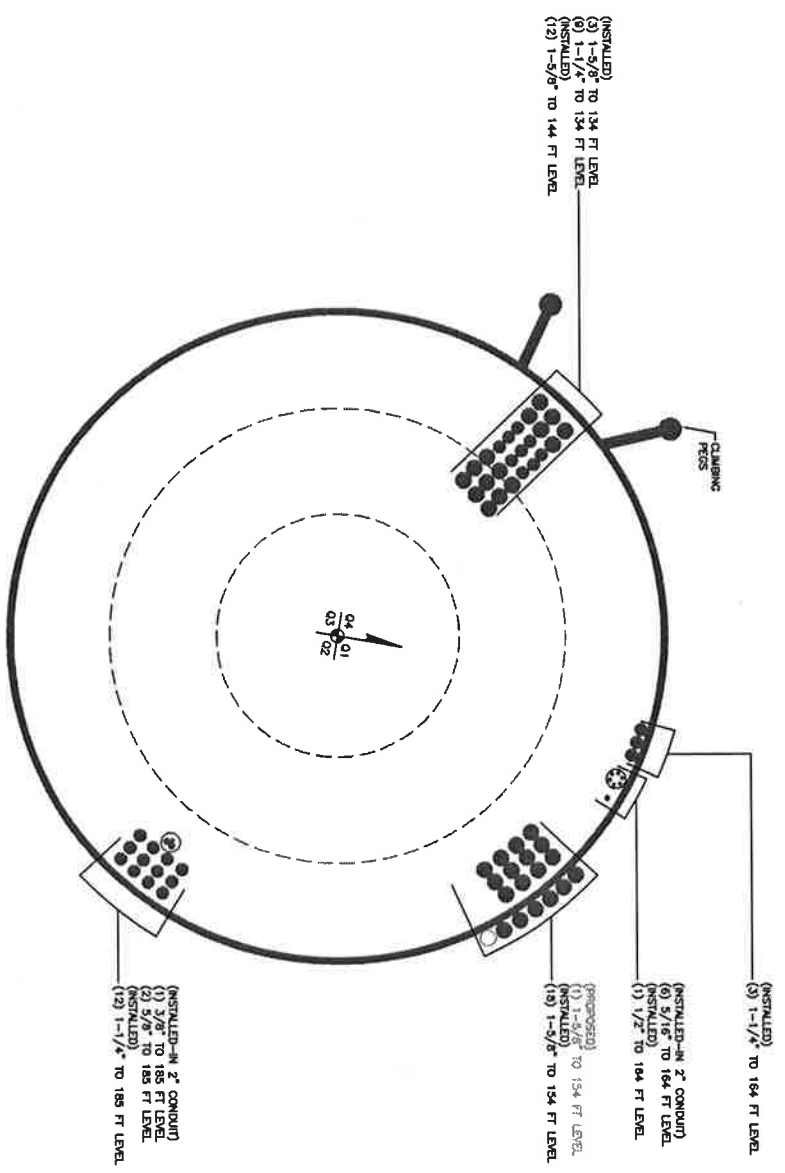
<b>tnxTower</b>  <b>GPD Group</b> 520 South Main St; Suite 2531 Akron, OH 44311 Phone: (330) 572-2100 FAX: (330) 572-2101	<b>Job</b>	TRUMBULL TOWER - BU #: 881535	<b>Page</b>	15 of 15
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	<b>Client</b>	Crown Castle	<b>Designed by</b>	bchristy

Section No.	Elevation ft	Ratio $\frac{P}{P_u}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	195 - 157.62 (1)	0.007	0.343	0.000	0.050	0.001	0.351	1.333	H1-3+VT ✓
L2	157.62 - 117.039 (2)	0.012	0.932	0.000	0.062	0.000	0.944	1.333	H1-3+VT ✓
L3	117.039 - 81.5782 (3)	0.013	1.096	0.000	0.049	0.000	1.110	1.333	H1-3+VT ✓
L4	81.5782 - 39.9896 (4)	0.013	0.979	0.000	0.035	0.000	0.992	1.333	H1-3+VT ✓
L5	39.9896 - 0 (5)	0.016	1.065	0.000	0.033	0.000	1.082	1.333	H1-3+VT ✓

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail
L1	195 - 157.62	Pole	TP33.86x25x0.25	1	-7.48	1340.02	26.3	Pass
L2	157.62 - 117.039	Pole	TP42.87x32.2341x0.3125	2	-18.86	2122.84	70.8	Pass
L3	117.039 - 81.5782	Pole	TP50.53x40.8562x0.375	3	-28.58	3004.66	83.2	Pass
L4	81.5782 - 39.9896	Pole	TP59.51x48.1831x0.5	4	-44.58	4714.13	74.4	Pass
L5	39.9896 - 0	Pole	TP68x56.6385x0.5	5	-66.60	5568.98	81.1	Pass
Summary							ELC:	Load Case 5
Pole (L3)							83.2	Pass
Rating =							83.2	Pass

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



BUSINESS UNIT: 881535 TOWER ID: C.BASELEVEL

**BASE LEVEL DRAWING**

SCALE: 1" = 1'-0" 1

**TRIMBELLS TOWER**

SHEET NUMBER \_\_\_\_\_

SHEET TITLE **BASE LEVEL**

FAIRFIELD COUNTY, OHIO

SITE ADDRESS 881535

BUSINESS UNIT NUMBER 881535

SITE NAME TRIMBELLS TOWER

SITE NUMBER \_\_\_\_\_

SITE NUMBER \_\_\_\_\_

DRAWN BY: JEP

CHECKED BY: DMK

DRAWING DATE: 2/28/07

**A1-0**

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REVISIONS

NO.	DATE	DESCRIPTION
01	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
02	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
03	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
04	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
05	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
06	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
07	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
08	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
09	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
10	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
11	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
12	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
13	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
14	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
15	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
16	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
17	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
18	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
19	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
20	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
21	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
22	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
23	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
24	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
25	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
26	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
27	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
28	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
29	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
30	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
31	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
32	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
33	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
34	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
35	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
36	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
37	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
38	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
39	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790
40	02/27/07	AS-BUILT INFORMATION ADDED PER WORK ORDER # 22790

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

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

## TIA Rev F

### Site Data

BU#: 881535	
Site Name: TRUMBULL TOWER	
App #: 211132 Rev 0	
Pole Manufacturer:	Other

Reactions		
Moment:	6181	ft-kips
Axial:	67	kips
Shear:	46	kips

Anchor Rod Data		
Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	76.5	in

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

### Anchor Rod Results

Maximum Rod Tension: 158.8 Kips  
 Allowable Tension: 195.0 Kips  
 Anchor Rod Stress Ratio: 81.5%

Rigid
Service, ASD
Fty*ASIF

Plate Data		
Diam:	82.5	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	8.99	in

### Base Plate Results

Base Plate Stress: 46.2 ksi  
 Allowable Plate Stress: 60.0 ksi  
 Base Plate Stress Ratio: 77.0%

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
35.05

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

### Stiffener Results

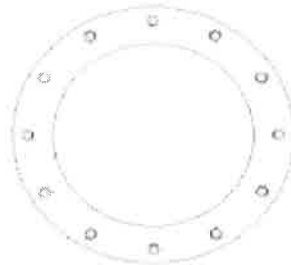
Horizontal Weld : n/a  
 Vertical Weld: n/a  
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a  
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: n/a  
 Plate Comp. (AISC Bracket): n/a

### Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	68	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



**Mat Foundation Analysis**  
**Trumbull Tower BU #: 881535**  
**GPD Project Number: 2014777.881535.03**

General Info	
Code	TIA/EIA-222-F (LRFD)
Bearing On	Soil
Foundation Type	Mono Pad
Pier Type	Square
Reinforcing Known	Yes
Max Capacity	1

Tower Reactions	
Moment, M	6181 k-ft
Axial, P	67 k
Shear, V	46 k

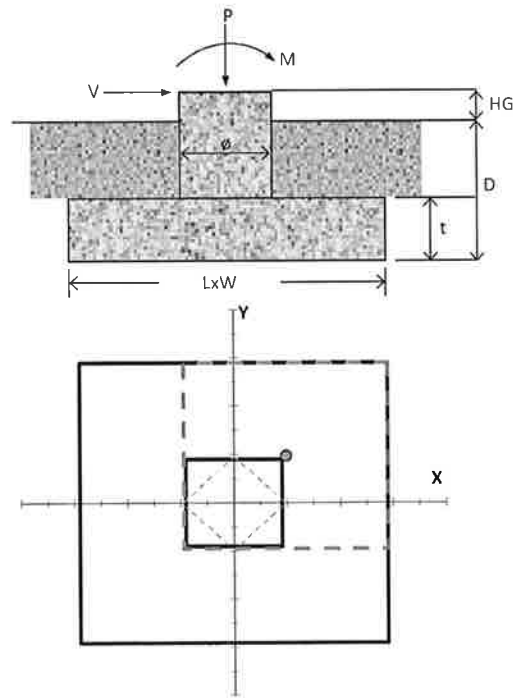
Pad & Pier Geometry	
Pier Width, $\phi$	9 ft
Pad Length, L	29 ft
Pad Width, W	29 ft
Pad Thickness, t	3 ft
Depth, D	7 ft
Height Above Grade, HG	1 ft

Pad & Pier Reinforcing	
Rebar Fy	60 ksi
Concrete Fc'	4 ksi
Clear Cover	3 in
Reinforced Top & Bottom?	Yes
Pad Reinforcing Size	#8
Pad Quantity Per Layer	55
Pier Rebar Size	#8
Pier Quantity of Rebar	54

Soil Properties	
Soil Type	Granular
Soil Unit Weight	125 pcf
Angle of Friction, $\phi$	34 °
Bearing Type	Gross
Ultimate Bearing	12 ksf
Water Table Depth	15 ft
Frost Depth	3.5 ft

Bearing Summary			Load Case
Qxmax	2.83	ksf	0.9D+1.6W
Qymax	2.83	ksf	0.9D+1.6W
Qmax @ 45°	3.10	ksf	0.9D+1.6W
Q <sub>(all) Gross</sub>	9.00	ksf	
<b>Controlling Capacity</b>	<b>34.5%</b>	<b>Pass</b>	

Overturning Summary (Required FS=1.0)			Load Case
FS(ot)x	1.50	≥1.0	0.9D+1.6W
FS(ot)y	1.50	≥1.0	0.9D+1.6W
<b>Controlling Capacity</b>	<b>66.5%</b>	<b>Pass</b>	







**Base Foundation Reinforcement Check**  
**Trumbull Tower BU #: 881535**  
**GPD Project Number: 2014777.881535.03**

Code  
**TIA/EIA-222-F**

Tower Reactions	
Moment	6181 k-ft
Axial	67 k
Shear	46 k

Overall Capacities		
Reinforcement Capacity	6.5%	OK
As Min Met?	No	
Controlling Capacity	6.5%	OK

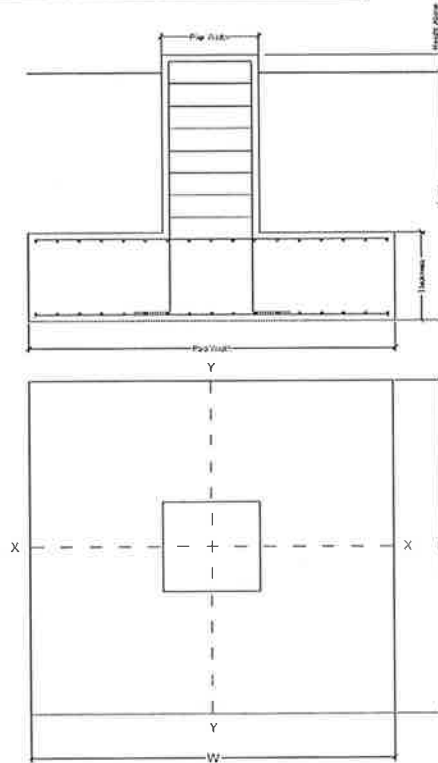
Pad & Pier Geometry	
Height	7 ft
Height above Grade	1 ft
Pad Length, L	29 ft
Pad Width, W	29 ft
Pad Thickness	3 ft
Pier Shape	Square
Square Pier Width	25 ft

Pad & Pier Reinforcing	
Reinforcing Known	Yes
$f'_c$	4 ksi
Clear Cover	3 in
Rebar $F_y$	60 ksi
Pad Rebar Size	# 8
Pad Rebar Quantity	55
Pier Rebar Size	# 8
Pier Rebar Quantity	54

Unit Weights	
Concrete Unit Weight	150 pcf
Soil Unit Weight	125 pcf

Orthogonal Bearing	
$Q_{max}$	3.31 ksf
$Q_{min}$	0.00 ksf
Bearing Length	18.89 ft

Pad Moment Capacity	
$\phi$ (bending)=	0.90
$M_u$ =	3.92 k-ft
$\phi M_n$ =	204.95 k-ft
Moment Capacity	1.9% <b>OK</b>
One-Way (Wide-Beam) Shear	
$V_u$ =	0.00 psi
$\phi V_n$ =	94.87 psi
Shear Capacity	0.0% <b>OK</b>
Two-Way (Punching) Shear	
$V_u$ =	9.03 psi
$\phi V_n$ =	139.94 psi
Shear Capacity	6.5% <b>OK</b>
Pier Compression	
$P_u$ =	87.10 k
$\phi P_n$ =	118795.36 k
Compression Capacity	0.1% <b>OK</b>



<---As min not met, pier checked as plain concrete member