Robinson+Cole

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September 15, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
111 Schoolhouse Road, Milford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 104-foot level of the existing 140-foot tower at 111 Schoolhouse Road in Milford, Connecticut (the Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of this tower in 2000. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model LNX-6514DS-VTM, 850 MHz antennas and three (3) BXA-171063-8BF, 2100 MHz antennas, all at the same 104-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's 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 Benjamin G. Blake, Mayor of the City of Milford. A copy of this letter is also being sent to Milford FFI LLC, 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).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be installed at the 104-foot level on the existing 140-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative 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 Evaluation 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:
Benjamin G. Blake, Milford Mayor
Milford FFI LLC
Sandy M. Carter

ATTACHMENT 1

Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	17.6 kg | 38.8 lb
Model with factory installed AISG 2.0 RET	LNX-6514DS-A1M

BXA-171063-8BF-EDIN-X

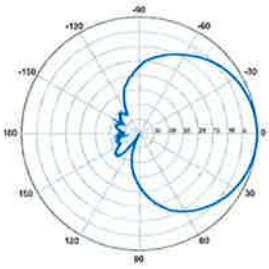
Replace "X" with desired electrical downtilt

X-Pol | FET Panel | 63° | 17.4 dBi

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

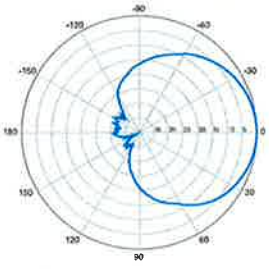
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

BXA-171063-8BF-EDIN-X



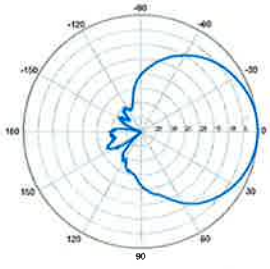
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



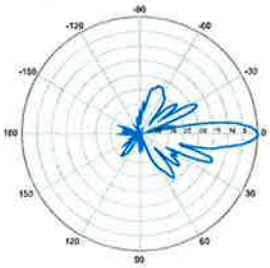
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



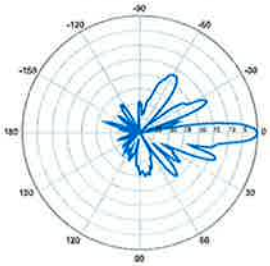
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

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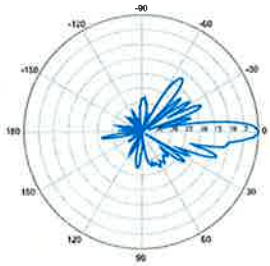
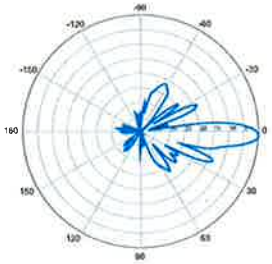


0° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-X

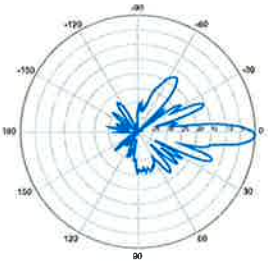
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8BF-EDIN-2



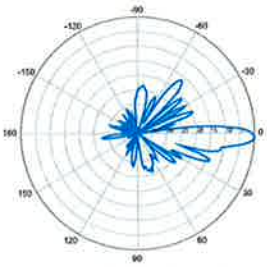
2° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-2



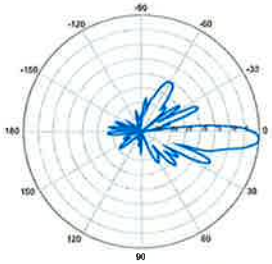
2° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-2



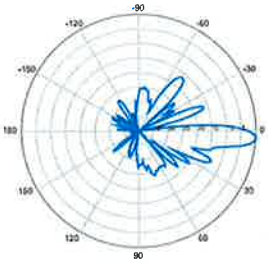
2° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-4



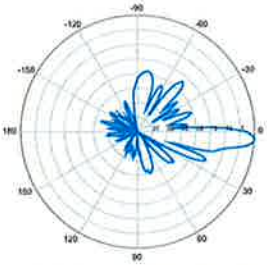
4° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-4



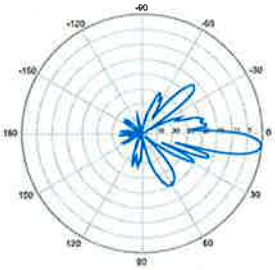
4° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-4



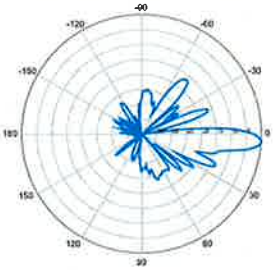
4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-6



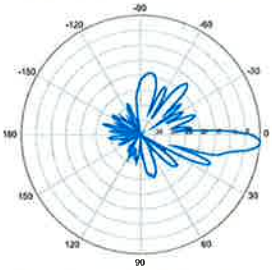
6° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-6



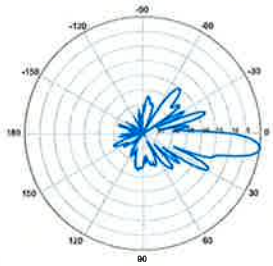
6° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-6



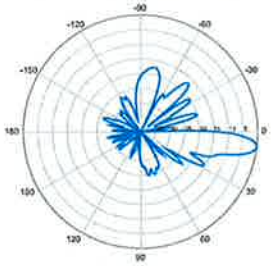
6° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-8



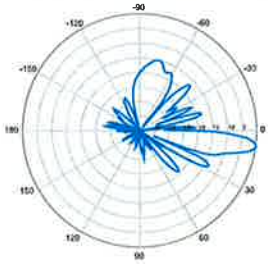
8° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-8



8° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-8



8° | Vertical | 1920-2170 MHz

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

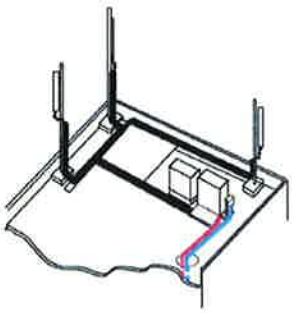
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

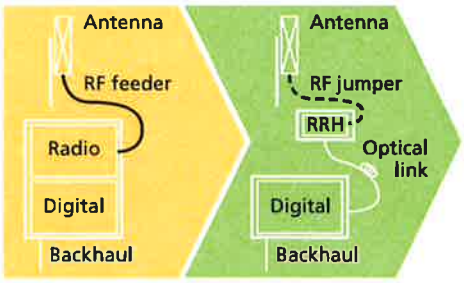
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

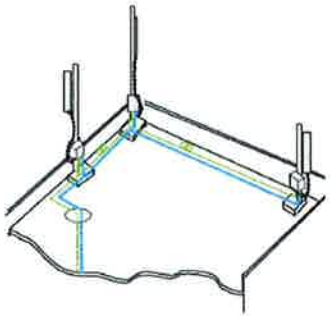
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- 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

www.alcatel-lucent.com

CPG2809100912 (09)

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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.

Figure 1: HYBRIFLEX Series

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

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)]	.068 (0.205)
DC-Resistance Power Cable, 8.4mm² (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 (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)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (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 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

* This data is provisional and subject to change

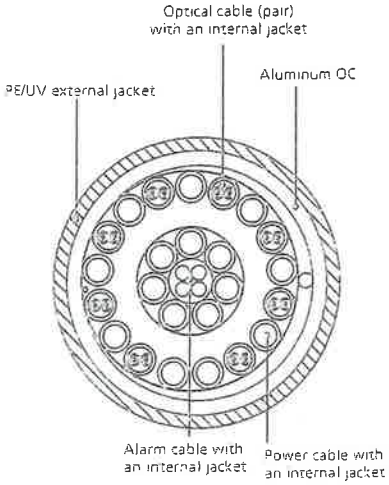


Figure 2: Construction Detail

ATTACHMENT 2

	General	Power	Density					
Site Name: Milford 2								
Tower Height: Verizon @ 140 ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Pocket (now MetroPCS)	3	631	95	0.0754	2130	1.0000	7.54%	
*Clearwire	2	153	138	0.0058	2496	1.0000	0.58%	
*Clearwire	1	211	142	0.0038	11 GHz	1.0000	0.38%	
*Sprint CDMA/LTE	4	778	140	0.0571	1962.5	1.0000	5.71%	
*Sprint CDMA/LTE	1	438	140	0.0080	850	0.5667	1.42%	
*AT&T UMTS	2	875	125	0.0403	1900	1.0000	4.03%	
*AT&T UMTS	2	565	125	0.0260	880	0.5867	4.43%	
*AT&T GSM	4	525	125	0.0483	1900	1.0000	4.83%	
*AT&T GSM	1	283	125	0.0065	880	0.5867	1.11%	
*AT&T LTE	1	1313	125	0.0302	734	0.4893	6.17%	
*T-Mobile GSM	8	122	115	0.0265	1945	1.0000	2.65%	
*T-Mobile UMTS	2	770	115	0.0419	2100	1.0000	4.19%	
Verizon	**7**	**351**	**104**	**0.0817**	**1970**	**1.0000**	**8.17%**	
Verizon	**9**	**341**	**104**	**0.1020**	**869**	**0.5793**	**17.61%**	
Verizon	**1**	**1265**	**104**	**0.0421**	**2145**	**1.0000**	**4.21%**	
Verizon	**1**	**736**	**104**	**0.0245**	**698**	**0.4653**	**5.26%**	
								78.28%
* Source: Siting Council								

ATTACHMENT 3

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **August 26, 2014**

Charles Trask
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
614.221.6679

Subject: Structural Analysis Report

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	117577
	Carrier Site Name:	Milford 2 CT
Crown Castle Designation:	**Crown Castle BU Number:**	876342
	Crown Castle Site Name:	BIC DRIVE (SSUSA)
	Crown Castle JDE Job Number:	304207
	Crown Castle Work Order Number:	918175
	Crown Castle Application Number:	262496 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-2020.005.7805
Site Data:	**111 School House Road, a/k/a Bic Drive, MILFORD, New Haven County, CT** **Latitude *41° 12' 46.06"*, Longitude *-73° 5' 7.1"*** **140 Foot - Monopole Tower**	

Dear Charles Trask,

Paul J Ford and Company 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 685676, in accordance with application 262496, revision 1.

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

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

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

We at *Paul J Ford and Company* 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:

Seth Tschanen
Structural Designer

8-27-14

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 140 ft Monopole tower designed by SUMMIT in October of 1999. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
104.0	104.0	3	alcatel lucent	RRH2X40-AWS	1	1 5/8	--
		3	andrew	LNX-6514DS-VTM w/ Mount Pipe			
		3	antel	BXA-171063-8BF-EDIN-0 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
140.0	142.0	1	andrew	VHLP1-23	3	1/2	3
		1	andrew	VHLP2-11			
		1	andrew	VHLP2-23			
		3	argus technologies	LLPX310R w/ Mount Pipe			
		3	samsung telecommunications	FDD_R6_RRH			
	140.0	1	tower mounts	Handrail Kit [NA 507-1]	1	1 1/4	2
		3	alcatel lucent	TD-RRH8x20-25			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	alcatel lucent	1900MHz RRH (65MHz)	3	1 1/4	1
		3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		3	alcatel lucent	800MHZ RRH			
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 401-1]			
123.0	123.0	6	ericsson	TME-RRUS-11	--	--	1
		1	tower mounts	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
121.0	125.0	3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe	1 2 14	3/8 7/16 1 5/8	1
		1	raycap	DC6-48-60-18-8F			
	123.0	6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21901			
	121.0	1	tower mounts	Platform Mount [LP 401-1]			
115.0	116.0	3	andrew	ETW200VS12UB	6 12	1 5/8 1 1/4	1
		6	ems wireless	RR90-17-02DP w/ Mount Pipe			
		6	remec	S20070A1			
		3	rfs celwave	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe			
	115.0	1	tower mounts	Platform Mount [LP 401-1]			
104.0	107.0	1	trimble	ACUTIME 2000	1 12	1/2 1 1/4	1
	105.0	3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			
	104.0	2	antel	BXA-70063/6CF w/ Mount Pipe			
		1	powerwave technologies	P65.16.XL.2 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 303-1]			
		4	decibel	DB846F65ZAXY w/ Mount Pipe	--	--	3
		2	decibel	DB846H80E-SX w/ Mount Pipe			
95.0	95.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1 5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
87.0	91.0	8	andrew	931LG65R1E-B w/ Mount Pipe	12	1 5/8	3
		6	powerwave technologies	TS07-AWDB111-001			
	87.0	1	tower mounts	Sector Mount [SM 802-3]			
	83.0	4	andrew	931LG65R1E-B w/ Mount Pipe			
80.0	82.0	1	kathrein	OG-860/1920/GPS-A	1	1/2	1
	80.0	1	tower mounts	Side Arm Mount [SO 202-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
--	--	--	--	--	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 08-12040E G1, 12/05/2008	1531894	CCISITES
4-POST-MODIFICATION INSPECTION	PJF, 41709-0132, 12/04/2009	2547672	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit, 5403, 09/29/1999	1631615	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit, 5403, 10/29/1999	1630877	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole was reinforced in conformance with the referenced modification drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company 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	140 - 98.5	Pole	TP24.4257x16x0.25	1	-10.88	1011.74	97.7	Pass
L2	98.5 - 88.5	Pole	TP26.456x24.4257x0.4933	2	-12.44	1851.64	67.1	Pass
L3	88.5 - 71.75	Pole	TP29.3572x24.8095x0.5231	3	-17.22	2253.49	85.3	Pass
L4	71.75 - 47.25	Pole	TP34.332x29.3572x0.5889	4	-22.55	2890.54	86.6	Pass
L5	47.25 - 41.75	Pole	TP34.8235x32.2913x0.6414	5	-25.34	3197.01	86.0	Pass
L6	41.75 - 23.5	Pole	TP38.5288x34.8235x0.6656	6	-32.34	3807.13	86.0	Pass
L7	23.5 - 20.75	Pole	TP39.0872x38.5288x0.7405	7	-33.37	4146.31	80.8	Pass
L8	20.75 - 0	Pole	TP43.3x39.0872x0.6628	8	-40.95	4334.21	87.9	Pass
							Summary	
						Pole (L1)	97.7	Pass
						Rating =	97.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	91.2	Pass
1	Base Plate	0	64.0	Pass
1	Base Foundation Steel	0	57.1	Pass
1	Base Foundation Soil Interaction	0	67.0	Pass

Structure Rating (max from all components) =	97.7%

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

4.1) Recommendations

- Remove Clearwire equipment at 140' level.
- Remove equipment at 87' level.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

1) Tower is located in New Haven County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.7500 in.
4) Ice density of 56.00 pcf.
5) A wind speed of 38 mph is used in combination with ice.
6) Temperature drop of 50 °F.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform
	Consider Moments - Horizontals		Assume Legs Pinned
	Consider Moments - Diagonals	√	Assume Rigid Index Plate
	Use Moment Magnification	√	Use Clear Spans For Wind Area
√	Use Code Stress Ratios		Use Clear Spans For KL/r
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension
	Escalate Ice	√	Bypass Mast Stability Checks
	Always Use Max Kz	√	Use Azimuth Dish Coefficients
	Use Special Wind Profile	√	Project Wind Area of Appurt.
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing
	Add IBC .6D+W Combination		Use TIA-222-G Tension Splice
			Capacity Exemption

√	Treat Feedline Bundles As Cylinder
	Use ASCE 10 X-Brace Ly Rules
	Calculate Redundant Bracing Forces
	Ignore Redundant Members in FEA
	SR Leg Bolts Resist Compression
	All Leg Panels Have Same Allowable
	Offset Girt At Foundation
√	Consider Feedline Torque
	Include Angle Block Shear Check
	Poles
√	Include Shear-Torsion Interaction
	Always Use Sub-Critical Flow
	Use Top Mounted Sockets

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	140.0000-98.5000	41.5000	0.00	12	16.0000	24.4257	0.2500	1.0000	A607-65 (65 ksi)
L2	98.5000-88.5000	10.0000	3.25	12	24.4257	26.4560	0.4933	1.9733	Reinf 57.60 ksi (58 ksi)
L3	88.5000-71.7500	20.0000	0.00	12	24.8095	29.3572	0.5231	2.0925	Reinf 58.01 ksi (58 ksi)
L4	71.7500-47.2500	24.5000	4.25	12	29.3572	34.3320	0.5888	2.3554	Reinf 57.97 ksi (58 ksi)
L5	47.2500-41.7500	9.7500	0.00	12	32.2913	34.8235	0.6414	2.5655	Reinf 58.08 ksi (58 ksi)
L6	41.7500-23.5000	18.2500	0.00	12	34.8235	38.5288	0.6656	2.6623	Reinf 58.66 ksi (59 ksi)
L7	23.5000-20.7500	2.7500	0.00	12	38.5288	39.0872	0.7405	2.9619	Reinf 56.70 ksi (57 ksi)
L8	20.7500-0.0000	20.7500		12	39.0872	43.3000	0.6628	2.6513	Reinf 59.55 ksi (60 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	It/Q in^2	w in	w/t
L1	16.5644	12.6788	401.4426	5.6385	8.2880	48.4366	813.4316	6.2401	3.6180	14.472
	25.2874	19.4614	1451.8426	8.6549	12.6525	114.7473	2941.8268	9.5783	5.8761	23.504
L2	25.2874	38.0164	2779.2573	8.5678	12.6525	219.6604	5631.5288	18.7105	5.2240	10.589
	27.3893	41.2415	3548.2900	9.2946	13.7042	258.9197	7189.7975	20.2978	5.7681	11.692
L3	26.4498	40.9099	3079.9249	8.6945	12.8513	239.6581	6240.7629	20.1346	5.2470	10.03
	30.3928	48.5704	5154.3114	10.3226	15.2070	338.9423	10444.0322	23.9049	6.4657	12.36
L4	30.3928	54.5476	5762.2583	10.2991	15.2070	378.9203	11675.8975	26.8467	6.2896	10.681
	35.5431	63.9803	9298.2960	12.0800	17.7840	522.8469	18840.8687	31.4892	7.6229	12.945
L5	34.5732	65.3639	8357.3764	11.3307	16.7269	499.6366	16934.3103	32.1701	6.9352	10.813
	36.0520	70.5934	10528.0750	12.2372	18.0386	583.6418	21332.7343	34.7439	7.6138	11.871
L6	36.0520	73.2062	10902.2837	12.2285	18.0386	604.3867	22090.9826	36.0299	7.5490	11.342
	39.8880	81.1473	14848.9385	13.5550	19.9579	744.0120	30087.9751	39.9382	8.5420	12.834
L7	39.8880	90.1005	16422.0964	13.5282	19.9579	822.8357	33275.6196	44.3447	8.3412	11.265
	40.4660	91.4317	17160.8234	13.7281	20.2471	847.5676	34772.4808	44.9999	8.4909	11.467
L8	40.4660	82.0095	15454.7701	13.7559	20.2471	763.3062	31315.5543	40.3626	8.6990	13.124
	44.8275	91.0010	21115.8755	15.2641	22.4294	941.4374	42786.4885	44.7879	9.8280	14.827

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 140.0000-98.5000				1	1	1		
L2 98.5000-88.5000				1	1	1		
L3 88.5000-71.7500				1	1	1		
L4 71.7500-47.2500				1	1	1		
L5 47.2500-41.7500				1	1	1		
L6 41.7500-23.5000				1	1	1		
L7 23.5000-20.7500				1	1	1		
L8 20.7500-0.0000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
HB114-1-0813U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	140.0000 - 0.0000	3	No Ice	0.0000	1.20
						1/2" Ice	0.0000	2.45
						1" Ice	0.0000	4.30
HB114-13U3M12-XXXF(1-1/4")	C	No	CaAa (Out Of Face)	115.0000 - 0.0000	1	No Ice	0.0000	1.20
						1/2" Ice	0.0000	2.45
						1" Ice	0.0000	4.30
HB114-13U3M12-XXXF(1-1/4")	C	No	CaAa (Out Of Face)	140.0000 - 115.0000	1	No Ice	0.1540	0.99
						1/2" Ice	0.2540	2.24

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.3540	4.10
**********								
LDF7-50A(1-5/8")	C	No	Inside Pole	121.0000 - 0.0000	14	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
FB-L98B-002-75000(3/8")	C	No	Inside Pole	121.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
WR-VG122ST-BRDA(7/16)	C	No	Inside Pole	121.0000 - 0.0000	2	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.14
						1" Ice	0.0000	0.14
**********								
HJ7-50A(1-5/8")	C	No	CaAa (Out Of Face)	115.0000 - 0.0000	5	No Ice	0.0000	1.04
						1/2" Ice	0.0000	2.55
						1" Ice	0.0000	4.68
LDF6-50A(1-1/4")	C	No	Inside Pole	115.0000 - 0.0000	12	No Ice	0.0000	0.66
						1/2" Ice	0.0000	0.66
						1" Ice	0.0000	0.66
HJ7-50A(1-5/8")	C	No	CaAa (Out Of Face)	115.0000 - 0.0000	1	No Ice	0.1980	1.04
						1/2" Ice	0.2980	2.55
						1" Ice	0.3980	4.68
**********								
LDF4-50A(1/2")	C	No	Inside Pole	104.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
FLC 114-50J(1-1/4")	C	No	Inside Pole	104.0000 - 0.0000	12	No Ice	0.0000	0.70
						1/2" Ice	0.0000	0.70
						1" Ice	0.0000	0.70
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	104.0000 - 0.0000	1	No Ice	0.0000	1.30
						1/2" Ice	0.0000	1.30
						1" Ice	0.0000	1.30
**********								
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	95.0000 - 0.0000	1	No Ice	0.1980	0.83
						1/2" Ice	0.2980	2.34
						1" Ice	0.3980	4.47
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	95.0000 - 0.0000	5	No Ice	0.0000	0.83
						1/2" Ice	0.0000	2.34
						1" Ice	0.0000	4.47
**********								
**********								
LDF4-50A(1/2")	C	No	Inside Pole	80.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
**********								
Aero MP3-08	C	No	CaAa (Out Of Face)	41.7500 - 0.0000	2	No Ice	0.4667	0.00
						1/2" Ice	0.5778	0.00
						1" Ice	0.6889	0.00
Aero MP3-06	C	No	CaAa (Out Of Face)	71.7500 - 41.7500	1	No Ice	0.4343	0.00
						1/2" Ice	0.5454	0.00
						1" Ice	0.6566	0.00
Aero MP3-05	C	No	CaAa (Out Of Face)	100.7500 - 71.7500	1	No Ice	0.3478	0.00
						1/2" Ice	0.4001	0.00
						1" Ice	0.6566	0.00
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	107.0000 - 100.7500	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	140.0000-98.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	9.202	0.75
L2	98.5000-88.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	6.745	0.44
L3	88.5000-71.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	12.459	0.77
L4	71.7500-47.2500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	20.343	1.12
L5	47.2500-41.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.567	0.25
L6	41.7500-23.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	24.260	0.84
L7	23.5000-20.7500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.656	0.13
L8	20.7500-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	27.584	0.95

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	140.0000-	A	0.750	0.000	0.000	0.000	0.000	0.00
	98.5000	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	16.875	1.36
L2	98.5000-88.5000	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.025	0.78
L3	88.5000-71.7500	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	20.507	1.43
L4	71.7500-47.2500	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	31.777	2.09
L5	47.2500-41.7500	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	7.134	0.47
L6	41.7500-23.5000	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	35.819	1.56
L7	23.5000-20.7500	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.397	0.23
L8	20.7500-0.0000	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	40.725	1.77

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	140.0000-98.5000	-0.2669	0.1541	-0.4178	0.2412
L2	98.5000-88.5000	-0.6665	0.3848	-0.9096	0.5252
L3	88.5000-71.7500	-0.7292	0.4210	-1.0004	0.5776
L4	71.7500-47.2500	-0.8216	0.4743	-1.0970	0.6334
L5	47.2500-41.7500	-0.8348	0.4820	-1.1230	0.6484
L6	41.7500-23.5000	-1.2034	0.6948	-1.5148	0.8746
L7	23.5000-20.7500	-1.2238	0.7066	-1.5494	0.8945
L8	20.7500-0.0000	-1.2448	0.7187	-1.5854	0.9153

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	8.4975 9.1490 9.7672	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	8.4975 9.1490 9.7672	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	8.4975 9.1490 9.7672	6.9458 8.1266 9.0212	0.08 0.15 0.23
800 EXTERNAL NOTCH FILTER	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	0.7701 0.8898 1.0181	0.3747 0.4647 0.5634	0.01 0.02 0.02
800 EXTERNAL NOTCH FILTER	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	0.7701 0.8898 1.0181	0.3747 0.4647 0.5634	0.01 0.02 0.02
800 EXTERNAL NOTCH FILTER	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	0.7701 0.8898 1.0181	0.3747 0.4647 0.5634	0.01 0.02 0.02
800MHZ RRH	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	2.4899 2.7061 2.9310	2.0685 2.2705 2.4812	0.05 0.07 0.10
800MHZ RRH	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	2.4899 2.7061 2.9310	2.0685 2.2705 2.4812	0.05 0.07 0.10
800MHZ RRH	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	2.4899 2.7061 2.9310	2.0685 2.2705 2.4812	0.05 0.07 0.10
1900MHz RRH (65MHz)	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	2.7087 2.9477 3.1953	2.6087 2.8450 3.0899	0.06 0.08 0.11
1900MHz RRH (65MHz)	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	2.7087 2.9477 3.1953	2.6087 2.8450 3.0899	0.06 0.08 0.11
1900MHz RRH (65MHz)	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	2.7087 2.9477 3.1953	2.6087 2.8450 3.0899	0.06 0.08 0.11
(3) ACU-A20-N	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	0.0778 0.1210 0.1728	0.1361 0.1890 0.2506	0.00 0.00 0.00
(3) ACU-A20-N	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	0.0778 0.1210 0.1728	0.1361 0.1890 0.2506	0.00 0.00 0.00
(3) ACU-A20-N	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice	0.0778 0.1210 0.1728	0.1361 0.1890 0.2506	0.00 0.00 0.00
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.0000 0.00	0.00	140.0000	No Ice 1/2"	7.1342 7.6618	4.9591 5.7544	0.08 0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	8.1830	6.4723	0.19
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.0000	0.00	140.0000	No Ice	7.1342	4.9591	0.08
			0.00			1/2"	7.6618	5.7544	0.13
			0.00			Ice	8.1830	6.4723	0.19
						1" Ice			
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.0000	0.00	140.0000	No Ice	7.1342	4.9591	0.08
			0.00			1/2"	7.6618	5.7544	0.13
			0.00			Ice	8.1830	6.4723	0.19
						1" Ice			
TD-RRH8x20-25	A	From Leg	4.0000	0.00	140.0000	No Ice	4.7198	1.7027	0.07
			0.00			1/2"	5.0138	1.9196	0.10
			0.00			Ice	5.3165	2.1453	0.13
						1" Ice			
TD-RRH8x20-25	B	From Leg	4.0000	0.00	140.0000	No Ice	4.7198	1.7027	0.07
			0.00			1/2"	5.0138	1.9196	0.10
			0.00			Ice	5.3165	2.1453	0.13
						1" Ice			
TD-RRH8x20-25	C	From Leg	4.0000	0.00	140.0000	No Ice	4.7198	1.7027	0.07
			0.00			1/2"	5.0138	1.9196	0.10
			0.00			Ice	5.3165	2.1453	0.13
						1" Ice			
Handrail Kit [NA 507-1]	C	None		0.00	140.0000	No Ice	4.8000	4.8000	0.25
						1/2"	6.7000	6.7000	0.29
						Ice	8.6000	8.6000	0.34
						1" Ice			
Platform Mount [LP 401-1]	C	None		0.00	140.0000	No Ice	24.3300	24.3300	1.65
						1/2"	30.2200	30.2200	2.03
						Ice	36.1100	36.1100	2.41
						1" Ice			
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(2) TME-RRUS-11	A	From Leg	2.0000	0.00	123.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2"	3.4905	1.5510	0.07
			0.00			Ice	3.7411	1.7380	0.09
						1" Ice			
(2) TME-RRUS-11	B	From Leg	2.0000	0.00	123.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2"	3.4905	1.5510	0.07
			0.00			Ice	3.7411	1.7380	0.09
						1" Ice			
(2) TME-RRUS-11	C	From Leg	2.0000	0.00	123.0000	No Ice	3.2486	1.3726	0.05
			0.00			1/2"	3.4905	1.5510	0.07
			0.00			Ice	3.7411	1.7380	0.09
						1" Ice			
Side Arm Mount [SO 102-3]	C	None		0.00	123.0000	No Ice	3.0000	3.0000	0.08
						1/2"	3.4800	3.4800	0.11
						Ice	3.9600	3.9600	0.14
						1" Ice			
**********									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.0000	0.00	121.0000	No Ice	6.1194	4.2543	0.06
			0.00			1/2"	6.6258	5.0137	0.10
			2.00			Ice	7.1283	5.7109	0.16
						1" Ice			
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.0000	0.00	121.0000	No Ice	6.1194	4.2543	0.06
			0.00			1/2"	6.6258	5.0137	0.10
			2.00			Ice	7.1283	5.7109	0.16
						1" Ice			
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.0000	0.00	121.0000	No Ice	6.1194	4.2543	0.06
			0.00			1/2"	6.6258	5.0137	0.10
			2.00			Ice	7.1283	5.7109	0.16
						1" Ice			
(2) LGP21401	A	From Leg	4.0000	0.00	121.0000	No Ice	1.2880	0.3640	0.01
			0.00			1/2"	1.4453	0.4785	0.02
			2.00			Ice	1.6112	0.6017	0.03
						1" Ice			
(2) LGP21401	B	From Leg	4.0000	0.00	121.0000	No Ice	1.2880	0.3640	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	1.4453	0.4785	0.02
			2.00			1" Ice	1.6112	0.6017	0.03
(2) LGP21401	C	From Leg	4.0000	0.00	121.0000	No Ice	1.2880	0.3640	0.01
			0.00			1/2" Ice	1.4453	0.4785	0.02
			2.00			1" Ice	1.6112	0.6017	0.03
(2) LGP21901	A	From Leg	4.0000	0.00	121.0000	No Ice	0.2695	0.1838	0.01
			0.00			1/2" Ice	0.3432	0.2483	0.01
			2.00			1" Ice	0.4255	0.3216	0.01
(2) LGP21901	B	From Leg	4.0000	0.00	121.0000	No Ice	0.2695	0.1838	0.01
			0.00			1/2" Ice	0.3432	0.2483	0.01
			2.00			1" Ice	0.4255	0.3216	0.01
(2) LGP21901	C	From Leg	4.0000	0.00	121.0000	No Ice	0.2695	0.1838	0.01
			0.00			1/2" Ice	0.3432	0.2483	0.01
			2.00			1" Ice	0.4255	0.3216	0.01
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.0000	0.00	121.0000	No Ice	8.4975	6.3042	0.07
			0.00			1/2" Ice	9.1490	7.4790	0.14
			4.00			1" Ice	9.7672	8.3676	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.0000	0.00	121.0000	No Ice	8.4975	6.3042	0.07
			0.00			1/2" Ice	9.1490	7.4790	0.14
			4.00			1" Ice	9.7672	8.3676	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.0000	0.00	121.0000	No Ice	8.4975	6.3042	0.07
			0.00			1/2" Ice	9.1490	7.4790	0.14
			4.00			1" Ice	9.7672	8.3676	0.21
DC6-48-60-18-8F	B	From Leg	4.0000	0.00	121.0000	No Ice	1.2664	1.2664	0.02
			0.00			1/2" Ice	1.4564	1.4564	0.03
			4.00			1" Ice	1.6575	1.6575	0.05
Platform Mount [LP 401-1]	C	None		0.00	121.0000	No Ice	24.3300	24.3300	1.65
						1/2" Ice	30.2200	30.2200	2.03
						1" Ice	36.1100	36.1100	2.41
**********									
(2) RR90-17-02DP w/ Mount Pipe	A	From Leg	4.0000	0.00	115.0000	No Ice	4.5931	3.3194	0.03
			0.00			1/2" Ice	5.0883	4.0888	0.07
			1.00			1" Ice	5.5778	4.7844	0.12
(2) RR90-17-02DP w/ Mount Pipe	B	From Leg	4.0000	0.00	115.0000	No Ice	4.5931	3.3194	0.03
			0.00			1/2" Ice	5.0883	4.0888	0.07
			1.00			1" Ice	5.5778	4.7844	0.12
(2) RR90-17-02DP w/ Mount Pipe	C	From Leg	4.0000	0.00	115.0000	No Ice	4.5931	3.3194	0.03
			0.00			1/2" Ice	5.0883	4.0888	0.07
			1.00			1" Ice	5.5778	4.7844	0.12
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	A	From Leg	4.0000	0.00	115.0000	No Ice	7.4657	3.4938	0.06
			0.00			1/2" Ice	7.9944	4.2631	0.11
			1.00			1" Ice	8.5176	4.9598	0.16
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	B	From Leg	4.0000	0.00	115.0000	No Ice	7.4657	3.4938	0.06
			0.00			1/2" Ice	7.9944	4.2631	0.11
			1.00			1" Ice	8.5176	4.9598	0.16
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	C	From Leg	4.0000	0.00	115.0000	No Ice	7.4657	3.4938	0.06
			0.00			1/2" Ice	7.9944	4.2631	0.11
			1.00			1" Ice	8.5176	4.9598	0.16
(2) S20070A1	A	From Leg	4.0000	0.00	115.0000	No Ice	0.7653	0.3588	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 1.00			1/2" Ice 1" Ice	0.8909 1.0250	0.4622 0.5744	0.01 0.02
(2) S20070A1	B	From Leg	4.0000 0.00 1.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice	0.7653 0.8909 1.0250	0.3588 0.4622 0.5744	0.01 0.01 0.02
(2) S20070A1	C	From Leg	4.0000 0.00 1.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice	0.7653 0.8909 1.0250	0.3588 0.4622 0.5744	0.01 0.01 0.02
ETW200VS12UB	A	From Leg	4.0000 0.00 1.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice	0.4716 0.5667 0.6704	0.1899 0.2551 0.3290	0.01 0.01 0.02
ETW200VS12UB	B	From Leg	4.0000 0.00 1.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice	0.4716 0.5667 0.6704	0.1899 0.2551 0.3290	0.01 0.01 0.02
ETW200VS12UB	C	From Leg	4.0000 0.00 1.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice	0.4716 0.5667 0.6704	0.1899 0.2551 0.3290	0.01 0.01 0.02
Platform Mount [LP 401-1]	C	None		0.00	115.0000	No Ice 1/2" Ice 1" Ice	24.3300 30.2200 36.1100	24.3300 30.2200 36.1100	1.65 2.03 2.41
**********									
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	3.5703 3.9790 4.3870	3.4178 4.1193 4.7842	0.03 0.07 0.11
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	3.5703 3.9790 4.3870	3.4178 4.1193 4.7842	0.03 0.07 0.11
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	3.5703 3.9790 4.3870	3.4178 4.1193 4.7842	0.03 0.07 0.11
P65.16.XL.2 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	8.6375 9.2903 9.9098	5.7792 6.9491 7.8329	0.06 0.12 0.19
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	7.9795 8.6208 9.2281	5.4071 6.5581 7.4216	0.04 0.10 0.17
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	7.9795 8.6208 9.2281	5.4071 6.5581 7.4216	0.04 0.10 0.17
ACUTIME 2000	A	From Leg	4.0000 0.00 3.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	0.2975 0.3739 0.4589	0.2975 0.3739 0.4589	0.00 0.00 0.01
(2) FD9R6004/2C-3L	A	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	0.3665 0.4506 0.5433	0.0846 0.1362 0.1965	0.00 0.01 0.01
(2) FD9R6004/2C-3L	B	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	0.3665 0.4506 0.5433	0.0846 0.1362 0.1965	0.00 0.01 0.01
(2) FD9R6004/2C-3L	C	From Leg	4.0000	0.00	104.0000	No Ice	0.3665	0.0846	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice	0.4506 0.5433	0.1362 0.1965	0.01 0.01
LNX-6514DS-VTM w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	8.6346 9.2852 9.9050	7.0679 8.2532 9.1523	0.06 0.13 0.21
LNX-6514DS-VTM w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	8.6346 9.2852 9.9050	7.0679 8.2532 9.1523	0.06 0.13 0.21
LNX-6514DS-VTM w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	8.6346 9.2852 9.9050	7.0679 8.2532 9.1523	0.06 0.13 0.21
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	3.1789 3.5550 3.9637	3.3530 3.9709 4.5951	0.03 0.06 0.10
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	3.1789 3.5550 3.9637	3.3530 3.9709 4.5951	0.03 0.06 0.10
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	3.1789 3.5550 3.9637	3.3530 3.9709 4.5951	0.03 0.06 0.10
RRH2X40-AWS	A	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	2.5217 2.7530 2.9931	1.5894 1.7953 2.0098	0.04 0.06 0.08
RRH2X40-AWS	B	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	2.5217 2.7530 2.9931	1.5894 1.7953 2.0098	0.04 0.06 0.08
RRH2X40-AWS	C	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	2.5217 2.7530 2.9931	1.5894 1.7953 2.0098	0.04 0.06 0.08
DB-T1-6Z-8AB-0Z	A	From Leg	4.0000 0.00 0.00	0.00	104.0000	No Ice 1/2" Ice 1" Ice	5.6000 5.9154 6.2395	2.3333 2.5580 2.7914	0.04 0.08 0.12
Platform Mount [LP 303-1]	C	None		0.00	104.0000	No Ice 1/2" Ice 1" Ice	14.6600 18.8700 23.0800	14.6600 18.8700 23.0800	1.25 1.48 1.71
**********									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.0000 0.00 0.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice	5.4042 5.9597 6.4808	4.7000 5.8600 6.7338	0.05 0.10 0.15
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.0000 0.00 0.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice	5.4042 5.9597 6.4808	4.7000 5.8600 6.7338	0.05 0.10 0.15
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.0000 0.00 0.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice	5.4042 5.9597 6.4808	4.7000 5.8600 6.7338	0.05 0.10 0.15
Pipe Mount [PM 601-3]	C	None		0.00	95.0000	No Ice 1/2" Ice 1" Ice	4.3900 5.4800 6.5700	4.3900 5.4800 6.5700	0.20 0.24 0.28
**********									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
**********									
OG-860/1920/GPS-A	A	From Leg	2.0000 0.00 2.00	0.00	80.0000	No Ice 1/2" Ice 1" Ice	0.3286 0.4340 0.5481	0.4044 0.5138 0.6317	0.00 0.01 0.01
Side Arm Mount [SO 202-1]	A	None		0.00	80.0000	No Ice 1/2" Ice 1" Ice	2.9600 4.1000 5.2400	2.5300 3.5100 4.4900	0.11 0.13 0.16

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 140.0000-98.5000	118.0637	1.439	26.586	69.903	A	0.000	69.903	69.903	100.00	0.000	0.000
					B	0.000	69.903		100.00	0.000	0.000
					C	0.000	69.903		100.00	0.000	9.202
L2 98.5000-88.5000	93.4335	1.346	24.901	21.201	A	0.000	21.201	21.201	100.00	0.000	0.000
					B	0.000	21.201		100.00	0.000	0.000
					C	0.000	21.201		100.00	0.000	6.745
L3 88.5000-71.7500	79.9313	1.288	23.815	38.320	A	0.000	38.320	38.320	100.00	0.000	0.000
					B	0.000	38.320		100.00	0.000	0.000
					C	0.000	38.320		100.00	0.000	12.459
L4 71.7500-47.2500	59.1811	1.182	21.855	65.016	A	0.000	65.016	65.016	100.00	0.000	0.000
					B	0.000	65.016		100.00	0.000	0.000
					C	0.000	65.016		100.00	0.000	20.343
L5 47.2500-41.7500	44.4808	1.089	20.143	15.633	A	0.000	15.633	15.633	100.00	0.000	0.000
					B	0.000	15.633		100.00	0.000	0.000
					C	0.000	15.633		100.00	0.000	4.567
L6 41.7500-23.5000	32.4714	1	18.496	55.778	A	0.000	55.778	55.778	100.00	0.000	0.000
					B	0.000	55.778		100.00	0.000	0.000
					C	0.000	55.778		100.00	0.000	24.260
L7 23.5000-20.7500	22.1217	1	18.496	8.893	A	0.000	8.893	8.893	100.00	0.000	0.000
					B	0.000	8.893		100.00	0.000	0.000
					C	0.000	8.893		100.00	0.000	3.656
L8 20.7500-0.0000	10.1982	1	18.496	71.231	A	0.000	71.231	71.231	100.00	0.000	0.000
					B	0.000	71.231		100.00	0.000	0.000
					C	0.000	71.231		100.00	0.000	27.584

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 140.0000-98.5000	118.0637	1.439	5.202	0.7500	75.090	A	0.000	75.090	75.090	100.00	0.000	0.000
						B	0.000	75.090		100.00	0.000	0.000
						C	0.000	75.090		100.00	0.000	16.875
L2 98.5000-88.5000	93.4335	1.346	4.873	0.7500	22.451	A	0.000	22.451	22.451	100.00	0.000	0.000
						B	0.000	22.451		100.00	0.000	0.000
						C	0.000	22.451		100.00	0.000	11.025
L3 88.5000-71.7500	79.9313	1.288	4.660	0.7500	40.413	A	0.000	40.413	40.413	100.00	0.000	0.000
						B	0.000	40.413		100.00	0.000	0.000
						C	0.000	40.413		100.00	0.000	20.507
L4 71.7500-	59.1811	1.182	4.277	0.7500	68.079	A	0.000	68.079	68.079	100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
47.2500						B	0.000	68.079		100.00	0.000	0.000
						C	0.000	68.079		100.00	0.000	31.777
L5 47.2500-41.7500	44.4808	1.089	3.941	0.7500	16.321	A	0.000	16.321	16.321	100.00	0.000	0.000
						B	0.000	16.321		100.00	0.000	0.000
						C	0.000	16.321		100.00	0.000	7.134
L6 41.7500-23.5000	32.4714	1	3.619	0.7500	58.060	A	0.000	58.060	58.060	100.00	0.000	0.000
						B	0.000	58.060		100.00	0.000	0.000
						C	0.000	58.060		100.00	0.000	35.819
L7 23.5000-20.7500	22.1217	1	3.619	0.7500	9.237	A	0.000	9.237	9.237	100.00	0.000	0.000
						B	0.000	9.237		100.00	0.000	0.000
						C	0.000	9.237		100.00	0.000	5.397
L8 20.7500-0.0000	10.1982	1	3.619	0.7500	73.824	A	0.000	73.824	73.824	100.00	0.000	0.000
						B	0.000	73.824		100.00	0.000	0.000
						C	0.000	73.824		100.00	0.000	40.725

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 140.0000-98.5000	118.0637	1.439	9.199	69.903	A	0.000	69.903	69.903	100.00	0.000	0.000
					B	0.000	69.903		100.00	0.000	0.000
					C	0.000	69.903		100.00	0.000	9.202
L2 98.5000-88.5000	93.4335	1.346	8.616	21.201	A	0.000	21.201	21.201	100.00	0.000	0.000
					B	0.000	21.201		100.00	0.000	0.000
					C	0.000	21.201		100.00	0.000	6.745
L3 88.5000-71.7500	79.9313	1.288	8.240	38.320	A	0.000	38.320	38.320	100.00	0.000	0.000
					B	0.000	38.320		100.00	0.000	0.000
					C	0.000	38.320		100.00	0.000	12.459
L4 71.7500-47.2500	59.1811	1.182	7.562	65.016	A	0.000	65.016	65.016	100.00	0.000	0.000
					B	0.000	65.016		100.00	0.000	0.000
					C	0.000	65.016		100.00	0.000	20.343
L5 47.2500-41.7500	44.4808	1.089	6.970	15.633	A	0.000	15.633	15.633	100.00	0.000	0.000
					B	0.000	15.633		100.00	0.000	0.000
					C	0.000	15.633		100.00	0.000	4.567
L6 41.7500-23.5000	32.4714	1	6.400	55.778	A	0.000	55.778	55.778	100.00	0.000	0.000
					B	0.000	55.778		100.00	0.000	0.000
					C	0.000	55.778		100.00	0.000	24.260
L7 23.5000-20.7500	22.1217	1	6.400	8.893	A	0.000	8.893	8.893	100.00	0.000	0.000
					B	0.000	8.893		100.00	0.000	0.000
					C	0.000	8.893		100.00	0.000	3.656
L8 20.7500-0.0000	10.1982	1	6.400	71.231	A	0.000	71.231	71.231	100.00	0.000	0.000
					B	0.000	71.231		100.00	0.000	0.000
					C	0.000	71.231		100.00	0.000	27.584

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

Comb. No.	Description
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	140 - 98.5	Pole	Max Tension	14	0.00	-0.00	0.00
			Max. Compression	14	-20.16	0.59	0.11
			Max. Mx	11	-10.90	478.57	0.09
			Max. My	2	-10.88	0.18	479.48
			Max. Vy	11	-20.88	478.57	0.09
			Max. Vx	8	21.04	0.18	-479.24
			Max. Torque	6			0.48
L2	98.5 - 88.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.37	0.91	-0.07
			Max. Mx	11	-12.46	625.02	0.04
			Max. My	2	-12.44	0.27	626.85
			Max. Vy	11	-22.55	625.02	0.04
			Max. Vx	8	22.71	0.27	-626.72
			Max. Torque	6			0.47
L3	88.5 - 71.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-28.23	2.03	-0.69
			Max. Mx	11	-17.23	1102.68	-0.13
			Max. My	8	-17.22	0.58	-1107.38
			Max. Vy	11	-25.20	1102.68	-0.13
			Max. Vx	8	25.36	0.58	-1107.38
			Max. Torque	5			0.42
L4	71.75 - 47.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.60	3.37	-1.46
			Max. Mx	11	-22.56	1638.05	-0.34
			Max. My	8	-22.55	0.97	-1645.75
			Max. Vy	11	-27.69	1638.05	-0.34
			Max. Vx	8	27.85	0.97	-1645.75
			Max. Torque	5			0.39
L5	47.25 - 41.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38.92	4.01	-1.83
			Max. Mx	11	-26.32	1914.65	-0.45
			Max. My	8	-26.31	1.16	-1923.78
			Max. Vy	11	-28.96	1914.65	-0.45
			Max. Vx	8	29.11	1.16	-1923.78

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	9			-0.38
L6	41.75 - 23.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-45.91	5.32	-2.59
			Max. Mx	11	-32.35	2463.52	-0.67
			Max. My	8	-32.34	1.55	-2475.31
			Max. Vy	11	-31.20	2463.52	-0.67
			Max. Vx	8	31.36	1.55	-2475.31
			Max. Torque	2			0.56
L7	23.5 - 20.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.10	5.53	-2.71
			Max. Mx	11	-33.38	2549.83	-0.71
			Max. My	8	-33.37	1.61	-2562.01
			Max. Vy	11	-31.56	2549.83	-0.71
			Max. Vx	8	31.71	1.61	-2562.01
			Max. Torque	2			0.60
L8	20.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-55.79	7.22	-3.69
			Max. Mx	11	-40.95	3231.50	-0.99
			Max. My	8	-40.95	2.10	-3246.64
			Max. Vy	11	-34.16	3231.50	-0.99
			Max. Vx	8	34.31	2.10	-3246.64
			Max. Torque	2			0.92

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	55.79	-0.00	0.00
	Max. H_x	11	40.96	34.14	0.00
	Max. H_z	2	40.96	-0.00	34.29
	Max. M_x	2	3244.66	-0.00	34.29
	Max. M_z	5	3227.30	-34.14	0.00
	Max. Torsion	2	0.92	-0.00	34.29
	Min. Vert	8	40.96	-0.00	-34.29
	Min. H_x	5	40.96	-34.14	0.00
	Min. H_z	8	40.96	-0.00	-34.29
	Min. M_x	8	-3246.64	-0.00	-34.29
	Min. M_z	11	-3231.50	34.14	0.00
	Min. Torsion	8	-0.92	-0.00	-34.29

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	40.96	-0.00	0.00	0.97	2.04	0.00
Dead+Wind 0 deg - No Ice	40.96	0.00	-34.29	-3244.66	2.10	-0.92
Dead+Wind 30 deg - No Ice	40.96	17.07	-29.70	-2810.23	-1612.81	-0.73
Dead+Wind 60 deg - No Ice	40.96	29.57	-17.15	-1622.08	-2795.03	-0.35
Dead+Wind 90 deg - No Ice	40.96	34.14	-0.00	0.99	-3227.30	0.13
Dead+Wind 120 deg - No Ice	40.96	29.57	17.15	1624.07	-2795.02	0.57
Dead+Wind 150 deg - No Ice	40.96	17.07	29.70	2812.22	-1612.80	0.86
Dead+Wind 180 deg - No Ice	40.96	0.00	34.29	3246.64	2.10	0.92
Dead+Wind 210 deg - No Ice	40.96	-17.07	29.70	2812.21	1617.01	0.74
Dead+Wind 240 deg - No Ice	40.96	-29.57	17.15	1624.06	2799.23	0.35
Dead+Wind 270 deg - No Ice	40.96	-34.14	-0.00	0.99	3231.50	-0.13
Dead+Wind 300 deg - No Ice	40.96	-29.57	-17.15	-1622.08	2799.23	-0.57
Dead+Wind 330 deg - No Ice	40.96	-17.07	-29.70	-2810.23	1617.02	-0.87
Dead+Ice+Temp	55.79	0.00	-0.00	3.69	7.22	-0.00
Dead+Wind 0 deg+Ice+Temp	55.79	0.00	-8.09	-785.16	7.47	-0.29
Dead+Wind 30 deg+Ice+Temp	55.79	4.03	-7.01	-679.46	-385.33	-0.21

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 60 deg+Ice+Temp	55.79	6.98	-4.05	-390.68	-672.88	-0.08
Dead+Wind 90 deg+Ice+Temp	55.79	8.06	-0.00	3.80	-778.13	0.08
Dead+Wind 120 deg+Ice+Temp	55.79	6.98	4.05	398.30	-672.90	0.22
Dead+Wind 150 deg+Ice+Temp	55.79	4.03	7.01	687.08	-385.34	0.30
Dead+Wind 180 deg+Ice+Temp	55.79	0.00	8.09	792.76	7.47	0.29
Dead+Wind 210 deg+Ice+Temp	55.79	-4.03	7.01	687.08	400.28	0.21
Dead+Wind 240 deg+Ice+Temp	55.79	-6.98	4.05	398.29	687.83	0.08
Dead+Wind 270 deg+Ice+Temp	55.79	-8.06	-0.00	3.80	793.06	-0.08
Dead+Wind 300 deg+Ice+Temp	55.79	-6.98	-4.05	-390.69	687.83	-0.22
Dead+Wind 330 deg+Ice+Temp	55.79	-4.03	-7.01	-679.47	400.28	-0.30
Dead+Wind 0 deg - Service	40.96	0.00	-11.87	-1123.78	2.11	-0.32
Dead+Wind 30 deg - Service	40.96	5.91	-10.28	-973.18	-557.51	-0.26
Dead+Wind 60 deg - Service	40.96	10.23	-5.93	-561.47	-967.21	-0.12
Dead+Wind 90 deg - Service	40.96	11.81	-0.00	0.99	-1117.02	0.04
Dead+Wind 120 deg - Service	40.96	10.23	5.93	563.45	-967.21	0.20
Dead+Wind 150 deg - Service	40.96	5.91	10.28	975.16	-557.51	0.30
Dead+Wind 180 deg - Service	40.96	0.00	11.87	1125.76	2.11	0.32
Dead+Wind 210 deg - Service	40.96	-5.91	10.28	975.20	561.74	0.26
Dead+Wind 240 deg - Service	40.96	-10.23	5.93	563.43	971.39	0.12
Dead+Wind 270 deg - Service	40.96	-11.81	-0.00	0.99	1121.23	-0.04
Dead+Wind 300 deg - Service	40.96	-10.23	-5.93	-561.47	971.42	-0.20
Dead+Wind 330 deg - Service	40.96	-5.91	-10.28	-973.21	561.74	-0.30

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-40.96	0.00	0.00	40.96	-0.00	0.000%
2	0.00	-40.96	-34.30	-0.00	40.96	34.29	0.008%
3	17.07	-40.96	-29.70	-17.07	40.96	29.70	0.000%
4	29.57	-40.96	-17.15	-29.57	40.96	17.15	0.000%
5	34.15	-40.96	0.00	-34.14	40.96	0.00	0.008%
6	29.57	-40.96	17.15	-29.57	40.96	-17.15	0.000%
7	17.07	-40.96	29.70	-17.07	40.96	-29.70	0.000%
8	0.00	-40.96	34.30	-0.00	40.96	-34.29	0.008%
9	-17.07	-40.96	29.70	17.07	40.96	-29.70	0.000%
10	-29.57	-40.96	17.15	29.57	40.96	-17.15	0.000%
11	-34.15	-40.96	0.00	34.14	40.96	0.00	0.008%
12	-29.57	-40.96	-17.15	29.57	40.96	17.15	0.000%
13	-17.07	-40.96	-29.70	17.07	40.96	29.70	0.000%
14	0.00	-55.79	0.00	-0.00	55.79	0.00	0.002%
15	0.00	-55.79	-8.09	-0.00	55.79	8.09	0.000%
16	4.03	-55.79	-7.01	-4.03	55.79	7.01	0.000%
17	6.98	-55.79	-4.05	-6.98	55.79	4.05	0.000%
18	8.06	-55.79	0.00	-8.06	55.79	0.00	0.000%
19	6.98	-55.79	4.05	-6.98	55.79	-4.05	0.000%
20	4.03	-55.79	7.01	-4.03	55.79	-7.01	0.000%
21	0.00	-55.79	8.09	-0.00	55.79	-8.09	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
22	-4.03	-55.79	7.01	4.03	55.79	-7.01	0.000%
23	-6.98	-55.79	4.05	6.98	55.79	-4.05	0.000%
24	-8.06	-55.79	0.00	8.06	55.79	0.00	0.000%
25	-6.98	-55.79	-4.05	6.98	55.79	4.05	0.000%
26	-4.03	-55.79	-7.01	4.03	55.79	7.01	0.000%
27	0.00	-40.96	-11.87	-0.00	40.96	11.87	0.004%
28	5.91	-40.96	-10.28	-5.91	40.96	10.28	0.001%
29	10.23	-40.96	-5.93	-10.23	40.96	5.93	0.001%
30	11.82	-40.96	0.00	-11.81	40.96	0.00	0.004%
31	10.23	-40.96	5.93	-10.23	40.96	-5.93	0.001%
32	5.91	-40.96	10.28	-5.91	40.96	-10.28	0.001%
33	0.00	-40.96	11.87	-0.00	40.96	-11.87	0.004%
34	-5.91	-40.96	10.28	5.91	40.96	-10.28	0.001%
35	-10.23	-40.96	5.93	10.23	40.96	-5.93	0.001%
36	-11.82	-40.96	0.00	11.81	40.96	0.00	0.004%
37	-10.23	-40.96	-5.93	10.23	40.96	5.93	0.001%
38	-5.91	-40.96	-10.28	5.91	40.96	10.28	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	13	0.00008705	0.00012375
3	Yes	18	0.00000001	0.00005888
4	Yes	18	0.00000001	0.00005945
5	Yes	13	0.00008712	0.00011374
6	Yes	18	0.00000001	0.00005916
7	Yes	18	0.00000001	0.00005912
8	Yes	13	0.00008705	0.00012380
9	Yes	18	0.00000001	0.00005970
10	Yes	18	0.00000001	0.00005906
11	Yes	13	0.00008710	0.00011385
12	Yes	18	0.00000001	0.00005934
13	Yes	18	0.00000001	0.00005945
14	Yes	7	0.00000001	0.00002680
15	Yes	15	0.00000001	0.00012810
16	Yes	15	0.00000001	0.00014952
17	Yes	15	0.00000001	0.00014952
18	Yes	15	0.00000001	0.00012701
19	Yes	16	0.00000001	0.00006247
20	Yes	16	0.00000001	0.00006252
21	Yes	15	0.00000001	0.00012903
22	Yes	16	0.00000001	0.00006362
23	Yes	16	0.00000001	0.00006344
24	Yes	15	0.00000001	0.00012912
25	Yes	16	0.00000001	0.00006302
26	Yes	16	0.00000001	0.00006315
27	Yes	13	0.00009330	0.00005342
28	Yes	14	0.00000001	0.00014806
29	Yes	15	0.00000001	0.00006361
30	Yes	13	0.00009332	0.00005253
31	Yes	15	0.00000001	0.00006272
32	Yes	14	0.00000001	0.00014994
33	Yes	13	0.00009329	0.00005348
34	Yes	15	0.00000001	0.00006448
35	Yes	14	0.00000001	0.00014946
36	Yes	13	0.00009331	0.00005270
37	Yes	15	0.00000001	0.00006330
38	Yes	15	0.00000001	0.00006367

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 98.5	35.90	33	2.42	0.00
L2	98.5 - 88.5	16.99	33	1.71	0.00
L3	91.75 - 71.75	14.65	33	1.59	0.00
L4	71.75 - 47.25	8.73	33	1.20	0.00
L5	51.5 - 41.75	4.44	33	0.82	0.00
L6	41.75 - 23.5	2.89	33	0.68	0.00
L7	23.5 - 20.75	0.90	33	0.37	0.00
L8	20.75 - 0	0.70	33	0.33	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.0000	APXVSPP18-C-A20 w/ Mount Pipe	33	35.90	2.42	0.00	15076
123.0000	(2) TME-RRUS-11	33	27.50	2.13	0.00	4433
121.0000	(2) 7770.00 w/ Mount Pipe	33	26.55	2.10	0.00	3966
115.0000	(2) RR90-17-02DP w/ Mount Pipe	33	23.78	2.00	0.00	3014
104.0000	MG D3-800Tx w/ Mount Pipe	33	19.08	1.81	0.00	2092
95.0000	APXV18-206517S-C w/ Mount Pipe	33	15.75	1.65	0.00	2533
80.0000	OG-860/1920/GPS-A	33	10.98	1.37	0.00	2985

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 98.5	103.28	8	6.96	0.00
L2	98.5 - 88.5	48.93	8	4.93	0.00
L3	91.75 - 71.75	42.21	8	4.58	0.00
L4	71.75 - 47.25	25.17	8	3.47	0.00
L5	51.5 - 41.75	12.81	8	2.36	0.00
L6	41.75 - 23.5	8.34	8	1.95	0.00
L7	23.5 - 20.75	2.60	8	1.06	0.00
L8	20.75 - 0	2.02	8	0.94	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.0000	APXVSPP18-C-A20 w/ Mount Pipe	8	103.28	6.96	0.00	5370
123.0000	(2) TME-RRUS-11	8	79.16	6.14	0.00	1577
121.0000	(2) 7770.00 w/ Mount Pipe	8	76.43	6.05	0.00	1410
115.0000	(2) RR90-17-02DP w/ Mount Pipe	8	68.45	5.75	0.00	1070
104.0000	MG D3-800Tx w/ Mount Pipe	8	54.96	5.21	0.00	740
95.0000	APXV18-206517S-C w/ Mount Pipe	8	45.36	4.75	0.00	892
80.0000	OG-860/1920/GPS-A	8	31.65	3.94	0.00	1046

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 $\frac{P}{P_a}$
L1	140 - 98.5 (1)	TP24.4257x16x0.25	41.5000	0.0000	0.0	39.00	19.4614	-10.88	759.00	0.014
L2	98.5 - 88.5 (2)	TP26.456x24.4257x0.4933	10.0000	0.0000	0.0	34.56	40.1933	-12.44	1389.08	0.009
L3	88.5 - 71.75 (3)	TP29.3572x24.8095x0.523 1	20.0000	0.0000	0.0	34.81	48.5704	-17.22	1690.54	0.010
L4	71.75 - 47.25 (4)	TP34.332x29.3572x0.5889	24.5000	0.0000	0.0	34.78	62.3440	-22.55	2168.45	0.010
L5	47.25 - 41.75 (5)	TP34.8235x32.2913x0.641 4	9.7500	0.0000	0.0	34.85	68.8234	-25.34	2398.36	0.011
L6	41.75 - 23.5 (6)	TP38.5288x34.8235x0.665 6	18.2500	0.0000	0.0	35.20	81.1473	-32.34	2856.06	0.011
L7	23.5 - 20.75 (7)	TP39.0872x38.5288x0.740 5	2.7500	0.0000	0.0	34.02	91.4317	-33.37	3110.51	0.011
L8	20.75 - 0 (8)	TP43.3x39.0872x0.6628	20.7500	0.0000	0.0	35.73	91.0011	-40.95	3251.47	0.013

Pole Bending Design Data

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 $\frac{f_{by}}{F_{by}}$
L1	140 - 98.5 (1)	TP24.4257x16x0.25	479.48	50.14	39.00	1.286	0.00	0.00	39.00	0.000
L2	98.5 - 88.5 (2)	TP26.456x24.4257x0.493 3	626.85	30.60	34.56	0.885	0.00	0.00	34.56	0.000
L3	88.5 - 71.75 (3)	TP29.3572x24.8095x0.52 31	1107.3 8	39.21	34.81	1.126	0.00	0.00	34.81	0.000
L4	71.75 - 47.25 (4)	TP34.332x29.3572x0.588 9	1645.7 5	39.80	34.78	1.144	0.00	0.00	34.78	0.000
L5	47.25 - 41.75 (5)	TP34.8235x32.2913x0.64 14	1828.3 6	39.57	34.85	1.135	0.00	0.00	34.85	0.000
L6	41.75 - 23.5 (6)	TP38.5288x34.8235x0.66 56	2475.3 1	39.92	35.20	1.134	0.00	0.00	35.20	0.000
L7	23.5 - 20.75 (7)	TP39.0872x38.5288x0.74 05	2562.0 1	36.27	34.02	1.066	0.00	0.00	34.02	0.000
L8	20.75 - 0 (8)	TP43.3x39.0872x0.6628	3246.6 4	41.38	35.73	1.158	0.00	0.00	35.73	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	140 - 98.5 (1)	TP24.4257x16x0.25	21.04	1.08	26.00	0.084	0.17	0.01	26.00	0.000
L2	98.5 - 88.5 (2)	TP26.456x24.4257x0.493 3	22.70	0.56	23.04	0.050	0.12	0.00	23.04	0.000
L3	88.5 - 71.75 (3)	TP29.3572x24.8095x0.52 31	25.36	0.52	23.20	0.046	0.03	0.00	23.20	0.000
L4	71.75 - 47.25 (4)	TP34.332x29.3572x0.588 9	27.85	0.45	23.19	0.039	0.21	0.00	23.19	0.000
L5	47.25 - 41.75 (5)	TP34.8235x32.2913x0.64 14	28.86	0.42	23.23	0.036	0.28	0.00	23.23	0.000
L6	41.75 - 23.5 (6)	TP38.5288x34.8235x0.66 56	31.36	0.39	23.46	0.033	0.56	0.00	23.46	0.000
L7	23.5 - 20.75 (7)	TP39.0872x38.5288x0.74 05	31.71	0.35	22.68	0.031	0.60	0.00	22.68	0.000
L8	20.75 - 0 (8)	TP43.3x39.0872x0.6628	34.31	0.38	23.82	0.032	0.92	0.01	23.82	0.000

Pole Interaction Design Data

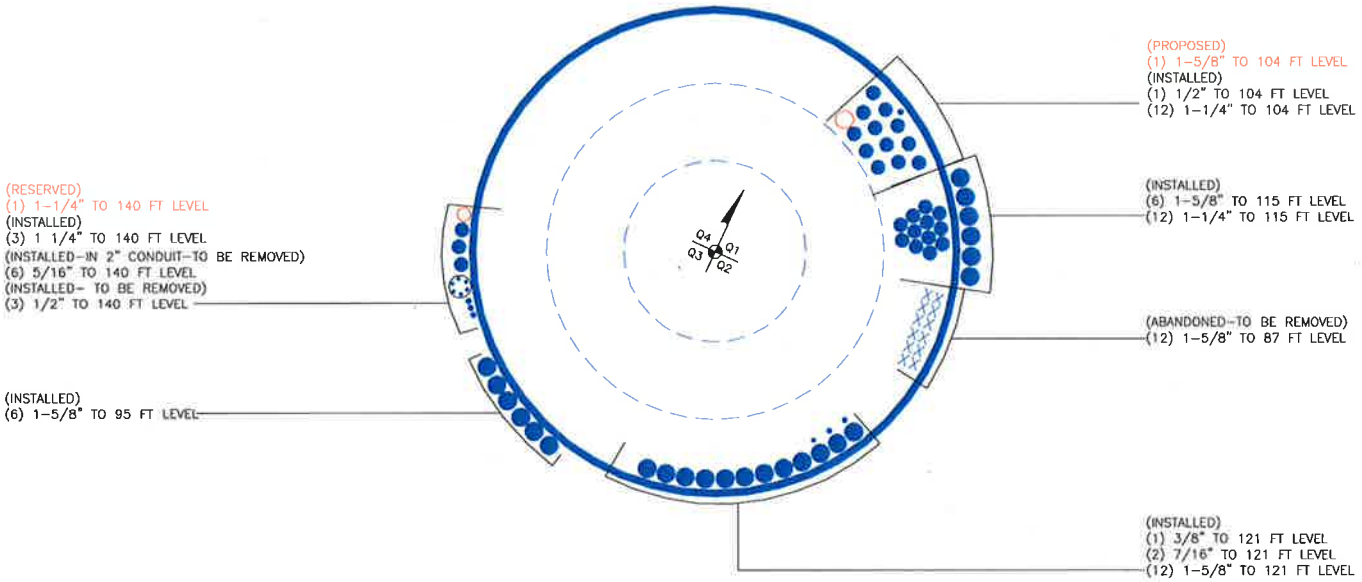
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 98.5 (1)	0.014	1.286	0.000	0.084	0.000	1.302 ✔	1.333	H1-3+VT ✔
L2	98.5 - 88.5 (2)	0.009	0.885	0.000	0.050	0.000	0.895 ✔	1.333	H1-3+VT ✔
L3	88.5 - 71.75 (3)	0.010	1.126	0.000	0.046	0.000	1.137 ✔	1.333	H1-3+VT ✔
L4	71.75 - 47.25 (4)	0.010	1.144	0.000	0.039	0.000	1.155 ✔	1.333	H1-3+VT ✔
L5	47.25 - 41.75 (5)	0.011	1.135	0.000	0.036	0.000	1.146 ✔	1.333	H1-3+VT ✔
L6	41.75 - 23.5 (6)	0.011	1.134	0.000	0.033	0.000	1.146 ✔	1.333	H1-3+VT ✔
L7	23.5 - 20.75 (7)	0.011	1.066	0.000	0.031	0.000	1.077 ✔	1.333	H1-3+VT ✔
L8	20.75 - 0 (8)	0.013	1.158	0.000	0.032	0.000	1.171 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	140 - 98.5	Pole	TP24.4257x16x0.25	1	-10.88	1011.74	97.7	Pass
L2	98.5 - 88.5	Pole	TP26.456x24.4257x0.4933	2	-12.44	1851.64	67.1	Pass
L3	88.5 - 71.75	Pole	TP29.3572x24.8095x0.5231	3	-17.22	2253.49	85.3	Pass
L4	71.75 - 47.25	Pole	TP34.332x29.3572x0.5889	4	-22.55	2890.54	86.6	Pass
L5	47.25 - 41.75	Pole	TP34.8235x32.2913x0.6414	5	-25.34	3197.01	86.0	Pass
L6	41.75 - 23.5	Pole	TP38.5288x34.8235x0.6656	6	-32.34	3807.13	86.0	Pass
L7	23.5 - 20.75	Pole	TP39.0872x38.5288x0.7405	7	-33.37	4146.31	80.8	Pass
L8	20.75 - 0	Pole	TP43.3x39.0872x0.6628	8	-40.95	4334.21	87.9	Pass
							Summary	
						Pole (L1)	97.7	Pass
						RATING =	**97.7**	**Pass**

APPENDIX B

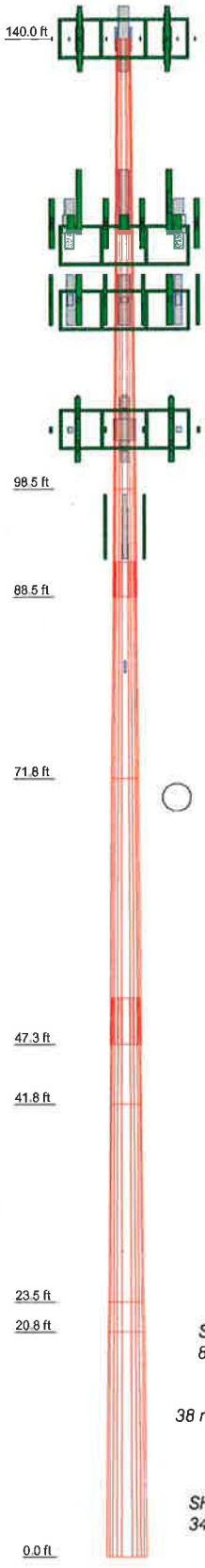
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8
Length (ft)	41.5000	10.0000	20.0000	24.5000	9.7500	18.2500	2.7500	20.7500
Number of Sides	12	12	12	12	12	12	12	12
Thickness (in)	0.2500	0.4933	0.5231	0.5888	0.6414	0.6656	0.7405	0.6628
Socket Length (ft)		3.2500		4.2500				
Top Dia (in)	16.0000	24.4257	24.8095	29.3572	32.2913	34.8235	38.5288	39.0872
Bot Dia (in)	24.4257	26.4560	29.3572	34.3320	34.8235	38.5288	39.0872	43.3000
Grade	A607-65		Reinf 57.60 ksi	Reinf 58.01 ksi	Reinf 57.97 ksi	Reinf 58.08 ksi	Reinf 58.66 ksi	Reinf 56.70 ksi / Reinf 59.55 ksi
Weight (K)	23	1.3	3.0	4.9	2.3	4.8	0.8	6.1



AXIAL
56 K

SHEAR
8 K

MOMENT
795 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 0.7500 in ICE

AXIAL
41 K

SHEAR
34 K

MOMENT
3247 kip-ft

TORQUE 1 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe	140	(2) RR90-17-02DP w/ Mount Pipe	115
APXVSPP18-C-A20 w/ Mount Pipe	140	(2) RR90-17-02DP w/ Mount Pipe	115
APXVSPP18-C-A20 w/ Mount Pipe	140	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	115
800 EXTERNAL NOTCH FILTER	140	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	115
800 EXTERNAL NOTCH FILTER	140	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	115
800 EXTERNAL NOTCH FILTER	140	(2) S20070A1	115
800MHZ RRH	140	(2) S20070A1	115
800MHZ RRH	140	(2) S20070A1	115
800MHZ RRH	140	ETW200VS12UB	115
1900MHz RRH (65MHz)	140	ETW200VS12UB	115
1900MHz RRH (65MHz)	140	ETW200VS12UB	115
1900MHz RRH (65MHz)	140	Platform Mount [LP 401-1]	115
(3) ACU-A20-N	140	MG D3-800Tx w/ Mount Pipe	104
(3) ACU-A20-N	140	MG D3-800Tx w/ Mount Pipe	104
(3) ACU-A20-N	140	MG D3-800Tx w/ Mount Pipe	104
APXVTM14-C-120 w/ Mount Pipe	140	P65.16.XL.2 w/ Mount Pipe	104
APXVTM14-C-120 w/ Mount Pipe	140	BXA-70063/6CF w/ Mount Pipe	104
APXVTM14-C-120 w/ Mount Pipe	140	BXA-70063/6CF w/ Mount Pipe	104
TD-RRH8x20-25	140	ACUTIME 2000	104
TD-RRH8x20-25	140	(2) FD9R6004/2C-3L	104
TD-RRH8x20-25	140	(2) FD9R6004/2C-3L	104
Handrail Kit [NA 507-1]	140	(2) FD9R6004/2C-3L	104
Platform Mount [LP 401-1]	140	LNX-6514DS-VTM w/ Mount Pipe	104
(2) TME-RRUS-11	123	LNX-6514DS-VTM w/ Mount Pipe	104
(2) TME-RRUS-11	123	LNX-6514DS-VTM w/ Mount Pipe	104
(2) TME-RRUS-11	123	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	104
Side Arm Mount [SO 102-3]	123	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	104
(2) 7770.00 w/ Mount Pipe	121	BXA-171063-8BF-EDIN-0 w/ Mount Pipe	104
(2) 7770.00 w/ Mount Pipe	121	RRH2X40-AWS	104
(2) 7770.00 w/ Mount Pipe	121	RRH2X40-AWS	104
(2) LGP21401	121	RRH2X40-AWS	104
(2) LGP21401	121	DB-T1-6Z-8AB-0Z	104
(2) LGP21401	121	Platform Mount [LP 303-1]	104
(2) LGP21901	121	APXV18-206517S-C w/ Mount Pipe	95
(2) LGP21901	121	APXV18-206517S-C w/ Mount Pipe	95
(2) LGP21901	121	APXV18-206517S-C w/ Mount Pipe	95
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	Pipe Mount [PM 601-3]	95
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	OG-860/1920/GPS-A	80
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	Side Arm Mount [SO 202-1]	80
DC6-48-60-18-8F	121		
Platform Mount [LP 401-1]	121		
(2) RR90-17-02DP w/ Mount Pipe	115		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi	Reinf 58.08 ksi	58 ksi	73 ksi
Reinf 57.60 ksi	58 ksi	72 ksi	Reinf 58.66 ksi	59 ksi	74 ksi
Reinf 58.01 ksi	58 ksi	73 ksi	Reinf 56.70 ksi	57 ksi	71 ksi
Reinf 57.97 ksi	58 ksi	73 ksi	Reinf 59.55 ksi	60 ksi	75 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 97.7%

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: 140' Monopole / Bic Drive (SSUSA)			
Project: 37513-2020.005.7805 / BU 876342			
Client: Crown Castle	Drawn by: Seth Tschanen	App'd:	
Code: TIA/EIA-222-F	Date: 08/27/14	Scale: NTS	
Path:		Dwg No. E-1	

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *876342*
Site Name: *Bic Drive (SSUSA)*
App #:

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	54	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	56	in
Thick:	3	in
Grade:	50	ksi
Clip Distance:	0	in

Stiffener Data (Welding at both sides)		
Configuration:	Stiffened	
Weld Type:	Both	**
Groove Depth:	0.5	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.3125	in
Width:	7.75	in
Height:	18	in
Thick:	1.25	in
Notch:	0.75	in
Grade:	65	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	43.3	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3247	ft-kips
Unfactored Axial, P:	41	kips
Unfactored Shear, V:	34	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	177.8 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	91.2% **Pass**

Base Plate Results Shear Check Only

Base Plate Stress:	3.9 ksi
Allowable PL Bending Stress:	26.7 ksi
Base Plate Stress Ratio:	14.8% **Pass**

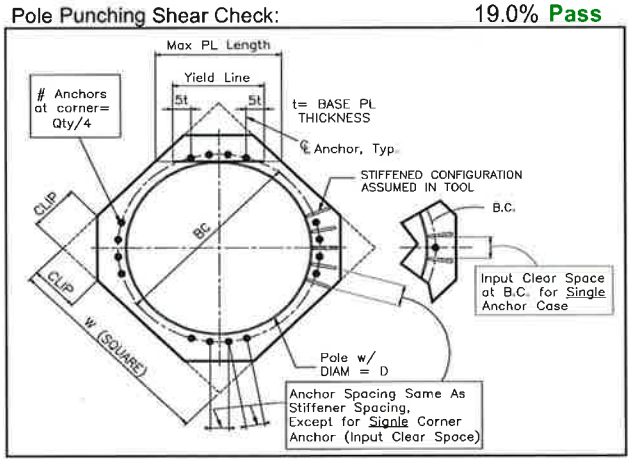
PL Ref. Data
Yield Line (in): N/A, Roark
Max PL Length: 35.90

Stiffener Results

Horizontal Weld :	64.0% **Pass**
Vertical Weld:	71.1% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	10.4% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	29.7% **Pass**
Plate Comp. (AISC Bracket):	37.8% **Pass**

Pole Results

Pole Punching Shear Check: 19.0% **Pass**



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

PJF job no. **37513-2020.005** Project name **Bic Drive (SSUSA)**

Foundation Loads:

Pole weight or tower leg compression =	41	(kips)
Horizontal load at top of pier =	34	(kips)
Overturning moment at top of pier=	3247	(ft-kips)

Design criteria:

Safety factor against overturning =	1.5	

Soil Properties:

Soil density =	120	(pcf)
Allowable soil bearing =	10	(ksf)
Depth to water table =	99	(ft)

Dimensions:

Pier shape (round or square)	S	("R" or "S")
Pier width =	7	(ft)
Pier height above grade =	0.5	(ft)
depth to bottom of footing =	10	(ft)
Footing thickness =	4	(ft)
Footing width =	22.5	(ft)
Footing length =	22.5	(ft)

Concrete:

Concrete strength =	3	(ksi)
Rebar strength =	60	(ksi)
ultimate load factor =	1.3	

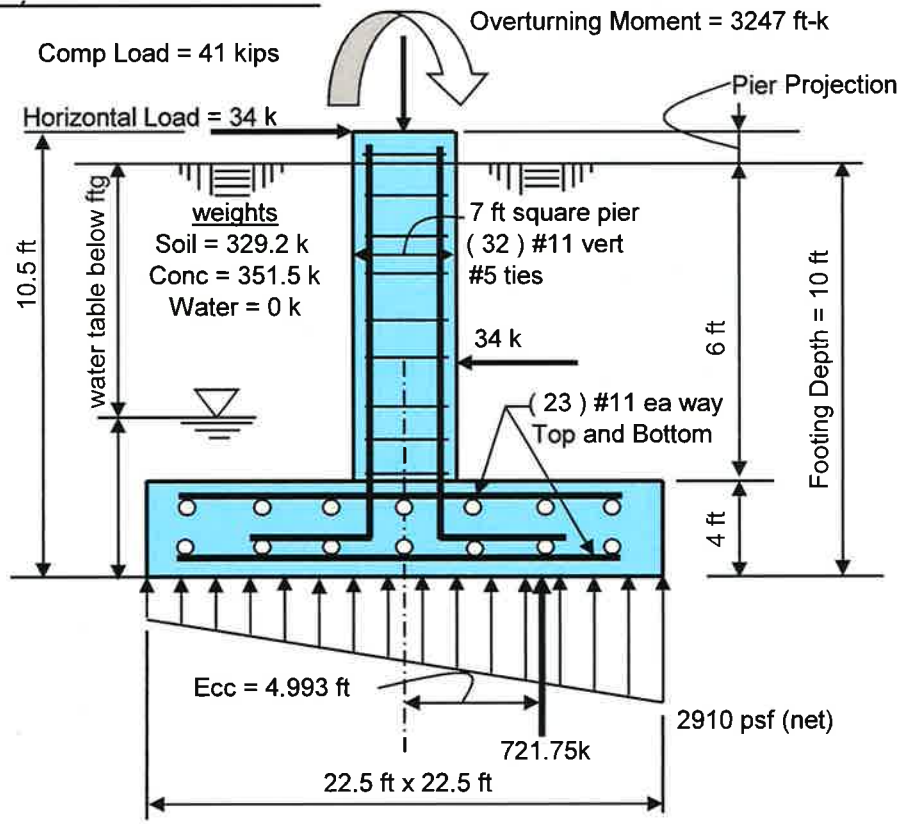
Reinforcing Steel:

	Pad	
minimum cover over rebar =	3	inches
size of pad rebar =	#11	bar
quantity of pad rebar =	23	(ea direction)

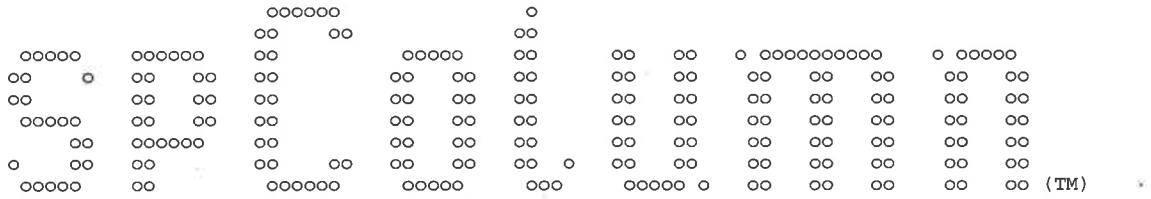
Reinforcing Steel:

	Pier	
size of vert rebar in pier=	#11	bar
vertical rebar quantity =	32	
size of pier ties =	#5	bar
minimum cover over rebar =	3	inches

Total volume of concrete = 86.8 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 2.91 ksf Allowable Net Soil Bearing = 10 ksf **Soil Bearing Stress Ratio = 0.29 Okay**	Ult Bending Shear Capacity = 110 psi Ult Bending Shear Stress = 28 psi **Bending Shear Stress Ratio = 0.25 Okay**
Ftg Overturning Resistance = 8120 ft-kips Overturning Moment = 3604 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 2.253 **Ratio = 0.67 Okay**	Pad Bending Moment Capacity= 6680 ft-k Pad Bending Moment = 1430 ft-k **Bending Moment Stress Ratio = 0.21 OK**



spColumn v4.80 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

General Information:
==========
File Name: g:\tower\375_crown_castle\2013\37513-2020 bu 876342\wo 918175 ...\37513-2020.005.7805.col
Project: 37513-2020.005
Column: Engineer: SJT
Code: ACI 318-02 Units: English

Run Option: Investigation Slenderness: Not considered
Run Axis: X-axis Column Type: Architectural

Material Properties:
==========
f'c = 3 ksi fy = 60 ksi
Ec = 3122.02 ksi Es = 29000 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

Section:
==========
Rectangular: Width = 84 in Depth = 84 in

Gross section area, Ag = 7056 in^2
Ix = 4.14893e+006 in^4 Iy = 4.14893e+006 in^4
rx = 24.2487 in ry = 24.2487 in
Xo = 0 in Yo = 0 in

Reinforcement:
==========
Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #5 ties with #10 bars, #5 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular
Pattern: All Sides Equal (Cover to longitudinal reinforcement)
Total steel area: As = 49.92 in^2 at rho = 0.71% (Note: rho < 1.0%)
Minimum clear spacing = 6.10 in

32 #11 Cover = 3 in

Factored Loads and Moments with Corresponding Capacities:
==========

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	41.00	4612.44	8081.34	1.752	13.43	80.29	0.01494	0.900

*** End of output ***