

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

November 26, 2013

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

Re: **Notice of Exempt Modification – Antenna Swap**  
**374 Three Mile Road, Glastonbury, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 148-foot level on the existing 150-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco’s use of this tower in Docket No. 174 in 1996. Cellco now intends to add three (3) model BXA-171063-12CF AWS antennas to its antenna platform at the 148-foot level, for a total of fifteen (15) antennas. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its AWS antennas and one (1) HYBRIFLEX<sup>TM</sup> antenna cable. Included in Attachment 1 are specifications for the replacement antennas, RRHs and HYBRIFLEX<sup>TM</sup> 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 Richard J. Johnson, Town Manager of the Town of Glastonbury. A copy of this letter is also being sent to Josephine I. Flanagan, Trustee, the owner of the property where the tower is located.

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



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12571494-v1

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

Melanie A. Bachman

November 26, 2013

Page 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 located at the 148-foot level on the 150-foot tower.
2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for the facility, as modified, is included behind Tab 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:

Richard J. Johnson, Glastonbury Town Manger  
Josephine I. Flanagan, Trustee  
Sandy M. Carter



# **ATTACHMENT 1**

## BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

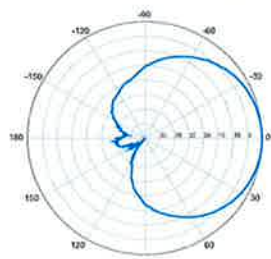
Replace "X" with desired electrical downtilt.

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

| Electrical Characteristics              | 1710-2170 MHz                                                   |                      |                     |               |                     |
|-----------------------------------------|-----------------------------------------------------------------|----------------------|---------------------|---------------|---------------------|
| Frequency bands                         | 1710-1880 MHz                                                   |                      | 1850-1990 MHz       |               | 1920-2170 MHz       |
| Polarization                            | ±45°                                                            |                      | ±45°                |               | ±45°                |
| Horizontal beamwidth                    | 68°                                                             |                      | 65°                 |               | 60°                 |
| Vertical beamwidth                      | 4.5°                                                            |                      | 4.5°                |               | 4.5°                |
| Gain                                    | 16.1 dBd / 18.2 dBi                                             |                      | 16.5 dBd / 18.6 dBi |               | 16.9 dBd / 19.0 dBi |
| Electrical downtilt (X)                 | 0, 2, 5                                                         |                      |                     |               |                     |
| Impedance                               | 50Ω                                                             |                      |                     |               |                     |
| VSWR                                    | ≤1.5:1                                                          |                      |                     |               |                     |
| First upper sidelobe                    | < -17 dB                                                        |                      |                     |               |                     |
| Front-to-back ratio                     | > 30 dB                                                         |                      |                     |               |                     |
| In-band isolation                       | < -25 dB                                                        |                      |                     |               |                     |
| IM3 (20W carrier)                       | < -150 dBc                                                      |                      |                     |               |                     |
| Input power                             | 300 W                                                           |                      |                     |               |                     |
| Lightning protection                    | Direct Ground                                                   |                      |                     |               |                     |
| Connector(s)                            | 2 Ports / EDIN or NE / Female / Center (Back)                   |                      |                     |               |                     |
| Operating temperature                   | -40° to +60° C / -40° to +140° F                                |                      |                     |               |                     |
| Mechanical Characteristics              |                                                                 |                      |                     |               |                     |
| Dimensions Length x Width x Depth       | 1842 x 154 x 105 mm                                             |                      | 72.5 x 6.1 x 4.1 in |               |                     |
| Depth with z-brackets                   | 133 mm                                                          |                      | 5.2 in              |               |                     |
| Weight without mounting brackets        | 5.8 kg                                                          |                      | 12.8 lbs            |               |                     |
| Survival wind speed                     | > 201 km/hr                                                     |                      | > 125 mph           |               |                     |
| Wind area                               | Front: 0.28 m²                                                  | Side: 0.19 m²        | Front: 3.1 ft²      | Side: 2.1 ft² |                     |
| Wind load @ 161 km/hr (100 mph)         | Front: 460 N                                                    | Side: 304 N          | Front: 103 lbf      | Side: 68 lbf  |                     |
| Mounting Options                        | Part Number                                                     | Fits Pipe Diameter   |                     | Weight        |                     |
| 2-Point Mounting Bracket Kit            | 26799997                                                        | 50-102 mm 2.0-4.0 in |                     | 2.3 kg        | 5 lbs               |
| 2-Point Mounting & Downtilt Bracket Kit | 26799999                                                        | 50-102 mm 2.0-4.0 in |                     | 3.6 kg        | 8 lbs               |
| Concealment Configurations              | For concealment configurations, order BXA-171063-12CF-EDIN-X-FP |                      |                     |               |                     |

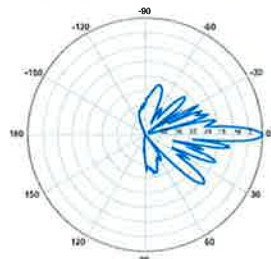


BXA-171063-12CF-EDIN-X



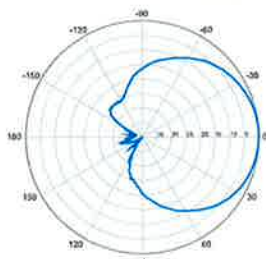
Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



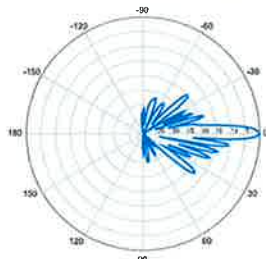
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1850-1990 MHz

BXA-171063-12CF-EDIN-0



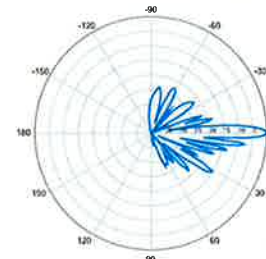
0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



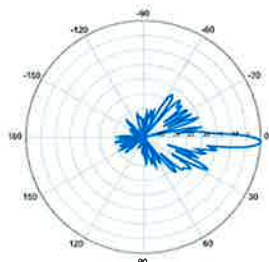
0° | Vertical | 1920-2170 MHz

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

## BXA-171063-12CF-EDIN-X

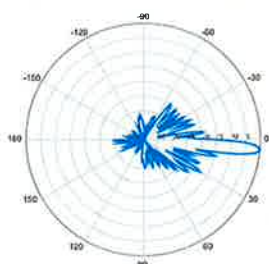
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



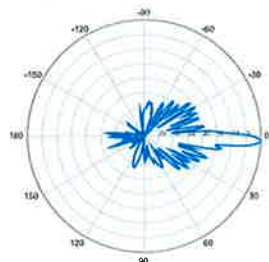
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



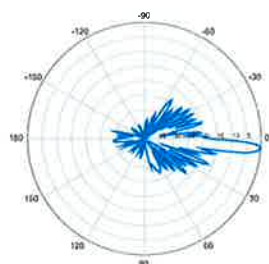
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



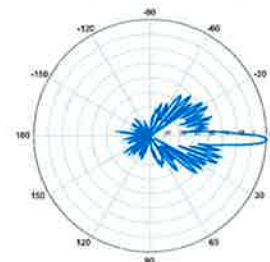
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5



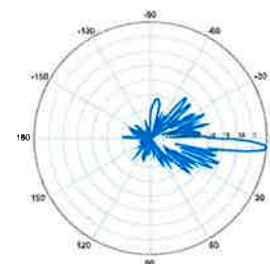
5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1920-2170 MHz

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

## Alcatel-Lucent RRH2x40-07-U

### REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-07-U is a high-power, small form-factor Remote Radio Head (RRH) operating in the North American Digital Dividend / 700MHz frequency band (3GPP Band 13). The Alcatel-Lucent RRH2x40-07-U 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 RRH2x40-07-U 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 RRH2x40-07-U has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to two-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 10 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-07-U is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

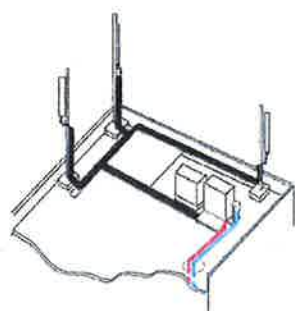
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-07-U 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 RRH2x40-07-U 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 RRH2x40-07-U is compact and weighs less than 23 kg (50 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

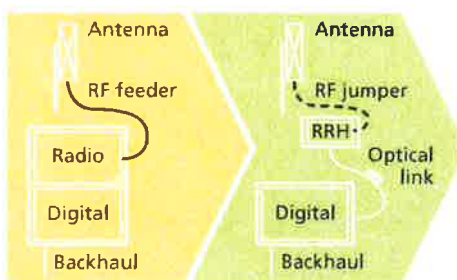
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and 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 RRH2x40-07-U provides more RF power while at the same time consuming less electricity.



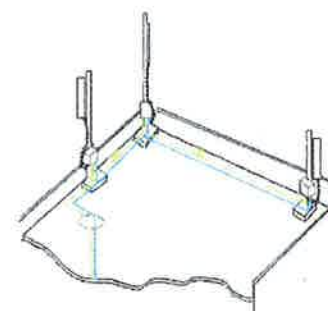
Macro

## 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, and heaterless unit
- 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: 390 mm (15.4 in.)
- Width: 380 mm (15 in.)
- Depth: 210 mm (8.2 in.)
- Weight (without mounting kit): less than 23 kg (50 lb)

### Power

- Power supply: -48V

### 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: 700 MHz; 3GPP Band 13
- Bandwidth: up to 10 MHz
- RF output power at antenna port:
  - 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way
- Noise figure: below 2.5 dB typical
- ALD features
  - TMA
  - Remote electrical tilt (RET) support (AISG v2.0)

### Optical characteristics

#### Type/number of fibers

- Up to 3.12 Gb/s line bit rate
- Single-mode variant
  - One SM fiber (9/125 μm) per RRH2x, carrying UL and DL using CWDM (at 1550/1310 nm)
- Multi-mode variant
  - Two MM fibers (50/125 μm) per RRH2x: one carrying UL, the other carrying DL (at 850 nm)

### Optical fiber length

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

### Alarms and ports

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

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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

**Mechanical Specifications**

|                                          |                                |                |                        |
|------------------------------------------|--------------------------------|----------------|------------------------|
| Outer Conductor Armor                    | Corrugated Aluminum            | [mm (in)]      | 45.5 (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 (0.205) |
| 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 (0.08)                        |
| Minimum Bending Radius                | (mm (in)) | 104 (4.1)                         |
| Insertion Loss @ wavelength 850nm     | dB/km     | 3.0                               |
| Insertion Loss @ wavelength 1310nm    | dB/km     | 1.0                               |
| Standards (Meets or exceeds)          |           | UL34-V0, UL1666<br>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 5-95-658<br>UL Type XHHW-2, UL 44<br>UL-L5 Limited Smoke, UL VW-1<br>IEEE-383 (1974), IEEE1202/FT4<br>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 1: HYBRIFLEX Series

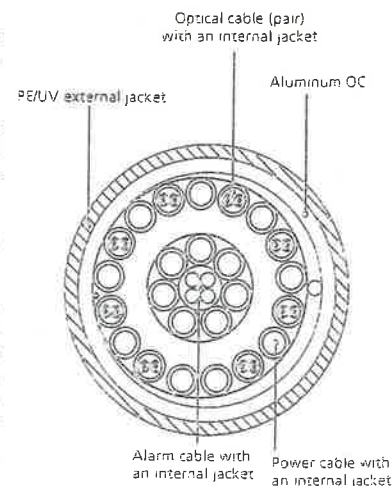


Figure 2: Construction Detail

# **ATTACHMENT 2**

|                               | General    | Power     | Density |                  |       |                    |              |
|-------------------------------|------------|-----------|---------|------------------|-------|--------------------|--------------|
| Site Name: East Glastonbury   |            |           |         |                  |       |                    |              |
| Tower Height: Verizon @ 148ft |            |           |         |                  |       |                    |              |
| CARRIER                       | # OF CHAN. | WATTS ERP | HEIGHT  | CALC. POWER DENS | FREQ. | MAX. PERMISS. EXP. | FRACTION MPE |
| *Nextel                       | 9          | 100       | 126     | 0.0204           | 851   | 0.5673             | 3.59%        |
| *T-Mobile GSM                 | 8          | 137       | 116     | 0.0293           | 1945  | 1.0000             | 2.93%        |
| *T-Mobile UMTS                | 2          | 770       | 116     | 0.0412           | 2100  | 1.0000             | 4.12%        |
| *AT&T UMTS                    | 2          | 565       | 138     | 0.0213           | 880   | 0.5867             | 3.64%        |
| *AT&T UMTS                    | 2          | 875       | 138     | 0.0330           | 1900  | 1.0000             | 3.30%        |
| *AT&T GSM                     | 4          | 813       | 138     | 0.0614           | 1900  | 1.0000             | 6.14%        |
| *AT&T GSM                     | 1          | 647       | 138     | 0.0122           | 880   | 0.5867             | 2.08%        |
| *AT&T LTE                     | 1          | 1615      | 138     | 0.0305           | 734   | 0.4893             | 6.23%        |
| *Sprint                       |            |           |         | 0.0042           | 1900  | 1.0000             | 0.42%        |
| *XM Sat Radio                 | 2          | 4552      | 99      | 0.3340           | 2337  | 1.0000             | 33.40%       |
| Verizon PCS                   | 11         | 293       | 148     | 0.0529           | 1970  | 1.0000             | 5.29%        |
| Verizon Cellular              | 9          | 386       | 148     | 0.0570           | 869   | 0.5793             | 9.84%        |
| Verizon AWS                   | 1          | 1750      | 148     | 0.0287           | 2145  | 1.0000             | 2.87%        |
| Verizon 700                   | 1          | 804       | 148     | 0.0132           | 698   | 0.4653             | 2.84%        |
|                               |            |           |         |                  |       |                    | 86.70%       |
| * Source: Siting Council      |            |           |         |                  |       |                    |              |
|                               |            |           |         |                  |       |                    |              |
|                               |            |           |         |                  |       |                    |              |
|                               |            |           |         |                  |       |                    |              |

# **ATTACHMENT 3**



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

Date: **October 25, 2013**

Cheryl Schultz  
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  
jmartin@pjfweb.com

**Subject: Structural Analysis Report**

|                                      |                                                             |                    |
|--------------------------------------|-------------------------------------------------------------|--------------------|
| <b>Carrier Designation:</b>          | <b>Verizon Wireless Co-Locate</b>                           |                    |
|                                      | <b>Carrier Site Number:</b>                                 | N/a                |
|                                      | <b>Carrier Site Name:</b>                                   | E. Glastonbury, CT |
| <b>Crown Castle Designation:</b>     | <b>Crown Castle BU Number:</b>                              | 806368             |
|                                      | <b>Crown Castle Site Name:</b>                              | HRT 049B 943215    |
|                                      | <b>Crown Castle JDE Job Number:</b>                         | 247147             |
|                                      | <b>Crown Castle Work Order Number:</b>                      | 665299             |
|                                      | <b>Crown Castle Application Number:</b>                     | 201490 Rev. 1      |
| <b>Engineering Firm Designation:</b> | <b>Paul J Ford and Company Project Number:</b>              | 37513-2359         |
| <b>Site Data:</b>                    | <b>374 Three Mile Rd., GLASTONBURY, Hartford County, CT</b> |                    |
|                                      | <b>Latitude 41° 41' 36.93", Longitude -72° 32' 50.11"</b>   |                    |
|                                      | <b>145 Foot - Monopole Tower</b>                            |                    |

Dear Cheryl Schultz,

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 588971, in accordance with application 201490, 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

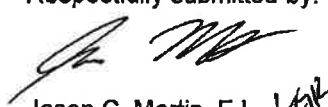
**Sufficient Capacity**

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

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 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:

  
Jason C. Martin, E.I.  
Structural Designer



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## 1) INTRODUCTION

This tower is a 145 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in January of 1997. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F. This monopole has been modified to include base plate stiffeners per the referenced reinforcing drawings by GPD dated 3/8/2005 (See assumption #5).

## 2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 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 |
|---------------------|----------------------------|--------------------|----------------------|--------------------------------------|----------------------|---------------------|------|
| 147.0               | 148.0                      | 3                  | Alcatel lucent       | RRH2x40-AWS **                       | 1                    | 1-5/8               | --   |
|                     |                            | 3                  | antel                | BXA-171063-12CF-EDIN-2 w/ Mount Pipe |                      |                     |      |
|                     |                            | 1                  | rfs celwave          | DB-T1-6Z-8AB-0Z                      |                      |                     |      |

\*\* To be installed behind antenna

**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 |
|---------------------|----------------------------|--------------------|------------------------|--------------------------------------|----------------------|----------------------------|------|
| 147.0               | 150.0                      | 1                  | unknown                | GPS                                  | 1                    | 1/2                        | 4    |
|                     | 148.0                      | 3                  | antel                  | BXA-171063-8BF-2 w/ Mount Pipe       | 12                   | 1-5/8                      | 1    |
|                     |                            | 1                  |                        | BXA-70063-6CF-EDIN-6 w/ Mount Pipe   |                      |                            |      |
|                     |                            | 2                  |                        | LPA-80063/6CF w/ Mount Pipe          |                      |                            |      |
|                     |                            | 4                  | swedcom                | SC-E 6014 rev2 w/ Mount Pipe         |                      |                            |      |
|                     |                            | 2                  | swedcom                | SLCP 2x6014 w/ Mount Pipe            |                      |                            |      |
|                     | 145.0                      | 6                  | rfs celwave            | FD9R6004/2C-3L                       |                      |                            |      |
|                     |                            | 1                  | tower mounts           | Platform Mount [LP 1001-1]           |                      |                            |      |
| 137.0               | 138.0                      | 6                  | ericsson               | RRUS-11                              | 12                   | 3/8<br>1/2<br>3/4<br>1-1/4 | 1    |
|                     |                            | 3                  | Comm. components       | DTMABP7819VG12A                      |                      |                            |      |
|                     |                            | 3                  | powerwave technologies | 7020.00                              |                      |                            |      |
|                     |                            | 6                  |                        | LGP13519                             |                      |                            |      |
|                     |                            | 3                  |                        | TT19-08BP111-001                     |                      |                            |      |
|                     |                            | 1                  | raycap                 | DC6-48-60-18-8F                      |                      |                            |      |
|                     |                            | 2                  | kmw comm.              | AM-X-CD-16-65-00T-RET w/ Mount Pipe  |                      |                            |      |
|                     |                            | 3                  | powerwave technologies | 7770.00 w/ Mount Pipe                |                      |                            |      |
|                     |                            | 4                  |                        | P65-17-XLH-RR w/ Mount Pipe          |                      |                            |      |
|                     | 137.0                      | 1                  | tower mounts           | Platform Mount [LP 1001-1]           |                      |                            |      |
| 126.0               | 130.0                      | 2                  | gps                    | GPS_A                                | 12                   | 1-1/4                      | 1    |
|                     | 128.0                      | 12                 | decibel                | DB844G65ZAXY w/ Mount Pipe           |                      |                            |      |
|                     | 126.0                      | 1                  | tower mounts           | Platform Mount [LP 601-1]            |                      |                            |      |
| 116.0               | 117.0                      | 6                  | ericsson               | KRY 112 71                           | --                   | --                         | 4    |
|                     |                            | 3                  | rfs celwave            | APX16DWV-16DWV-S-E-A20 w/ Mount Pipe | 6                    | 1-5/8                      | 2    |
|                     |                            | 3                  |                        | ATMAA1412D-1A20                      |                      |                            |      |
|                     |                            | 3                  |                        | ATMPP1412D-1CWA                      |                      |                            |      |
|                     |                            | 3                  | andrew                 | RR90-17-02DPL2 w/ Mount Pipe         | 6                    | 1-5/8                      | 1    |
|                     | 116.0                      | 1                  | tower mounts           | Platform Mount [LP 601-1]            |                      |                            |      |
| 95.0                | 97.0                       | 1                  | ems wireless           | RR65-18-02DP w/ Mount Pipe           | 3                    | 1-1/4                      | 1    |
|                     | 96.0                       | 1                  | repeater technologies  | DA1900-39                            |                      |                            |      |
|                     | 95.0                       | 2                  | tower mounts           | Side Arm Mount [SO 701-1]            |                      |                            |      |
| 87.0                | 87.0                       | 3                  | allgon                 | 7250.02 w/ Mount Pipe                | 6                    | 1-1/4                      | 3    |
|                     |                            | 1                  | tower mounts           | Pipe Mount [PM 601-3]                |                      |                            |      |

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment
- 3) Abandoned Equipment
- 4) Equipment To Be Removed – Not Included in this Report

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

| Document                                   | Remarks                        | Reference | Source   |
|--------------------------------------------|--------------------------------|-----------|----------|
| 4-GEOTECHNICAL REPORTS                     | Dr. Clarence Welti, 12/16/1996 | 262197    | CCISITES |
| 4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS   | EEI, 2310, 03/25/1997          | 974245    | CCISITES |
| 4-TOWER MANUFACTURER DRAWINGS              | EEI, 2310, 01/10/1997          | 262188    | CCISITES |
| 4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA | GPD, 2005078.57, 03/08/2005    | 1037241   | CCISITES |
| 4-TOWER STRUCTURAL ANALYSIS REPORTS        | Crown, 440146, 09/30/2011      | 2969149   | CCISITES |

#### 3.1) Analysis Method

tnxTower (version 6.1.3.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

#### 3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) At the time of this analysis, sufficient foundation information was not available at CCI sites. However, we were able to obtain a copy of the original monopole design. This drawing contained the original foundation design reactions. Based on these reactions we were able to compare to the current analysis. By doing this we have assumed the existing foundation was properly designed to handle the loading from the original monopole design.
- 5) The existing monopole base plate has been reinforced using a Crown-approved system in accordance with the above referenced documents. However, in this analysis we found that the existing base plate without modifications has adequate capacity and therefore, we did not consider the existing base plate stiffeners in the strength calculations

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 4 - Section Capacity (Summary)**

| Section No. | Elevation (ft) | Component Type | Size                   | Critical Element | P (K)  | SF*P_allow (K)  | % Capacity  | Pass / Fail |
|-------------|----------------|----------------|------------------------|------------------|--------|-----------------|-------------|-------------|
| L1          | 145 - 92.5     | Pole           | TP35.64x20.5x0.3438    | 1                | -16.00 | 1948.09         | 63.7        | Pass        |
| L2          | 92.5 - 44.71   | Pole           | TP48.61x33.5106x0.4375 | 2                | -28.41 | 3390.15         | 67.9        | Pass        |
| L3          | 44.71 - 0      | Pole           | TP60.5x45.8529x0.4688  | 3                | -46.78 | 4563.49         | 71.0        | Pass        |
|             |                |                |                        |                  |        |                 | Summary     |             |
|             |                |                |                        |                  |        | Pole (L3)       | 71.0        | Pass        |
|             |                |                |                        |                  |        | <b>RATING =</b> | <b>71.0</b> | <b>Pass</b> |

**Table 5 - Tower Component Stresses vs. Capacity – LC7**

| Notes | Component                                  | Elevation (ft) | % Capacity | Pass / Fail |
|-------|--------------------------------------------|----------------|------------|-------------|
| 1     | Anchor Rods                                | 0              | 67.5       | Pass        |
| 1     | Base Plate                                 | 0              | 80.5       | Pass        |
| 1,2   | Base Foundation (Compared w/ Design Loads) | 0              | 78.1       | Pass        |

|                                                     |              |
|-----------------------------------------------------|--------------|
| <b>Structure Rating (max from all components) =</b> | <b>80.5%</b> |
|-----------------------------------------------------|--------------|

**Notes:**

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Foundation capacity determined by comparing analysis reactions to original design reactions.

## **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 Hartford County, Connecticut.
- 2) Basic wind speed of 80.00 mph.
- 3) Nominal ice thickness of 1.0000 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56.00 pcf.
- 6) A wind speed of 37.60 mph is used in combination with ice.
- 7) Deflections calculated using a wind speed of 60.00 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    | Treat Feedline Bundles As Cylinder  |
| Consider Moments - Horizontals      | Assume Legs Pinned                 | Use ASCE 10 X-Brace Ly Rules        |
| Consider Moments - Diagonals        | √ Assume Rigid Index Plate         | Calculate Redundant Bracing Forces  |
| Use Moment Magnification            | √ Use Clear Spans For Wind Area    | Ignore Redundant Members in FEA     |
| √ Use Code Stress Ratios            | √ Use Clear Spans For KL/r         | SR Leg Bolts Resist Compression     |
| √ Use Code Safety Factors - Guys    | Retension Guys To Initial Tension  | All Leg Panels Have Same Allowable  |
| √ Escalate Ice                      | √ Bypass Mast Stability Checks     | Offset Girt At Foundation           |
| Always Use Max Kz                   | √ Use Azimuth Dish Coefficients    | √ Consider Feedline Torque          |
| Use Special Wind Profile            | √ Project Wind Area of Appurt.     | Include Angle Block Shear Check     |
| Include Bolts In Member Capacity    | Autocalc Torque Arm Areas          | Poles                               |
| Leg Bolts Are At Top Of Section     | SR Members Have Cut Ends           | √ Include Shear-Torsion Interaction |
| Secondary Horizontal Braces Leg     | Sort Capacity Reports By Component | Always Use Sub-Critical Flow        |
| Use Diamond Inner Bracing (4 Sided) | Triangulate Diamond Inner Bracing  | Use Top Mounted Sockets             |
| Add IBC .6D+W Combination           | Use TIA-222-G Tension Splice       |                                     |
|                                     | Capacity Exemption                 |                                     |

## Tapered Pole Section Geometry

| Section | Elevation<br>ft      | Section<br>Length<br>ft | Splice<br>Length<br>ft | Number<br>of<br>Sides | Top<br>Diameter<br>in | Bottom<br>Diameter<br>in | Wall<br>Thickness<br>in | Bend<br>Radius<br>in | Pole Grade          |
|---------|----------------------|-------------------------|------------------------|-----------------------|-----------------------|--------------------------|-------------------------|----------------------|---------------------|
| L1      | 145.0000-<br>92.5000 | 52.5000                 | 5.00                   | 12                    | 20.5000               | 35.6400                  | 0.3438                  | 1.3750               | A572-65<br>(65 ksi) |
| L2      | 92.5000-<br>44.7100  | 52.7900                 | 6.58                   | 12                    | 33.5106               | 48.6100                  | 0.4375                  | 1.7500               | A572-65<br>(65 ksi) |
| L3      | 44.7100-<br>0.0000   | 51.2900                 |                        | 12                    | 45.8529               | 60.5000                  | 0.4688                  | 1.8750               | A572-65<br>(65 ksi) |

## Tapered Pole Properties

| Section | Tip Dia.<br>in     | Area<br>in <sup>2</sup> | I<br>in <sup>4</sup>   | r<br>in           | C<br>in            | I/C<br>in <sup>3</sup> | J<br>in <sup>4</sup>   | It/Q<br>in <sup>2</sup> | w<br>in          | w/t              |
|---------|--------------------|-------------------------|------------------------|-------------------|--------------------|------------------------|------------------------|-------------------------|------------------|------------------|
| L1      | 21.2232<br>36.8972 | 22.3104<br>39.0685      | 1156.9477<br>6212.5548 | 7.2159<br>12.6361 | 10.6190<br>18.4615 | 108.9507<br>336.5137   | 2344.2898<br>12588.320 | 10.9805<br>19.2283      | 4.5728<br>8.6303 | 13.303<br>25.106 |
| L2      | 36.1733            | 46.5917                 | 6504.9566              | 11.8402           | 17.3585            | 374.7421               | 13180.805              | 22.9310                 | 7.8083           | 17.848           |

| Section | Tip Dia.<br>in | Area<br>in <sup>2</sup> | I<br>in <sup>4</sup> | r<br>in | C<br>in | I/C<br>in <sup>3</sup> | J<br>in <sup>4</sup> | It/Q<br>in <sup>2</sup> | w<br>in | w/t    |
|---------|----------------|-------------------------|----------------------|---------|---------|------------------------|----------------------|-------------------------|---------|--------|
|         | 50.3248        | 67.8630                 | 20100.989            | 17.2458 | 25.1800 | 798.2925               | 40730.054            | 33.4001                 | 11.8550 | 27.097 |
| L3      | 49.4158        | 68.5018                 | 18009.298            | 16.2475 | 23.7518 | 758.2281               | 36491.721            | 33.7145                 | 11.0323 | 23.536 |
|         | 62.6342        | 90.6097                 | 41678.805            | 21.4912 | 31.3390 | 1329.9341              | 84452.559            | 44.5953                 | 14.9578 | 31.91  |
|         |                |                         |                      |         |         |                        |                      |                         |         |        |

| Tower<br>Elevation      | Gusset<br>Area<br>(per face) | Gusset<br>Thickness | Gusset Grade | Adjust. Factor<br>A <sub>r</sub> | Adjust.<br>Factor<br>A <sub>r</sub> | Weight Mult. | Double Angle<br>Stitch Bolt<br>Spacing<br>Diagonals<br>in | Double Angle<br>Stitch Bolt<br>Spacing<br>Horizontals<br>in |
|-------------------------|------------------------------|---------------------|--------------|----------------------------------|-------------------------------------|--------------|-----------------------------------------------------------|-------------------------------------------------------------|
| ft                      | ft <sup>2</sup>              | in                  |              |                                  |                                     |              |                                                           |                                                             |
| L1 145.0000-<br>92.5000 |                              |                     |              | 1                                | 1                                   | 1            |                                                           |                                                             |
| L2 92.5000-<br>44.7100  |                              |                     |              | 1                                | 1                                   | 1            |                                                           |                                                             |
| L3 44.7100-<br>0.0000   |                              |                     |              | 1                                | 1                                   | 1            |                                                           |                                                             |

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

| Description                   | Face<br>or<br>Leg | Allow<br>Shield | Component<br>Type | Placement<br>ft   | Total<br>Number |          | C <sub>A</sub> A <sub>A</sub><br>ft <sup>2</sup> /ft | Weight<br>plf |
|-------------------------------|-------------------|-----------------|-------------------|-------------------|-----------------|----------|------------------------------------------------------|---------------|
| HB158-1-08U8-S8J18(<br>1-5/8) | C                 | No              | Inside Pole       | 145.0000 - 0.0000 | 1               | No Ice   | 0.0000                                               | 1.30          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 1.30          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 1.30          |
|                               |                   |                 |                   |                   |                 | 2" Ice   | 0.0000                                               | 1.30          |
|                               |                   |                 |                   |                   |                 | 4" Ice   | 0.0000                                               | 1.30          |
| HJ7-50A(1-5/8")               | C                 | No              | Inside Pole       | 145.0000 - 0.0000 | 12              | No Ice   | 0.0000                                               | 1.04          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 1.04          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 1.04          |
|                               |                   |                 |                   |                   |                 | 2" Ice   | 0.0000                                               | 1.04          |
|                               |                   |                 |                   |                   |                 | 4" Ice   | 0.0000                                               | 1.04          |
| ***                           |                   |                 |                   |                   |                 |          |                                                      |               |
| LCF12-50J(1/2)                | C                 | No              | Inside Pole       | 137.0000 - 0.0000 | 1               | No Ice   | 0.0000                                               | 0.15          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 0.15          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 0.15          |
|                               |                   |                 |                   |                   |                 | 2" Ice   | 0.0000                                               | 0.15          |
|                               |                   |                 |                   |                   |                 | 4" Ice   | 0.0000                                               | 0.15          |
| LCF114-50J(1-1/4")            | C                 | No              | Inside Pole       | 137.0000 - 0.0000 | 12              | No Ice   | 0.0000                                               | 0.70          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 0.70          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 0.70          |
|                               |                   |                 |                   |                   |                 | 2" Ice   | 0.0000                                               | 0.70          |
|                               |                   |                 |                   |                   |                 | 4" Ice   | 0.0000                                               | 0.70          |
| FB-L98B-002-75000(<br>3/8")   | C                 | No              | Inside Pole       | 137.0000 - 0.0000 | 1               | No Ice   | 0.0000                                               | 0.06          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 0.06          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 0.06          |
|                               |                   |                 |                   |                   |                 | 2" Ice   | 0.0000                                               | 0.06          |
|                               |                   |                 |                   |                   |                 | 4" Ice   | 0.0000                                               | 0.06          |
| WR-VG86ST-BRD(<br>3/4)        | C                 | No              | Inside Pole       | 137.0000 - 0.0000 | 2               | No Ice   | 0.0000                                               | 0.59          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 0.59          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 0.59          |
|                               |                   |                 |                   |                   |                 | 2" Ice   | 0.0000                                               | 0.59          |
|                               |                   |                 |                   |                   |                 | 4" Ice   | 0.0000                                               | 0.59          |
| ***                           |                   |                 |                   |                   |                 |          |                                                      |               |
| LDF6-50A(1-1/4")              | C                 | No              | Inside Pole       | 126.0000 - 0.0000 | 12              | No Ice   | 0.0000                                               | 0.66          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 0.66          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 0.66          |
|                               |                   |                 |                   |                   |                 | 2" Ice   | 0.0000                                               | 0.66          |
|                               |                   |                 |                   |                   |                 | 4" Ice   | 0.0000                                               | 0.66          |
| ***                           |                   |                 |                   |                   |                 |          |                                                      |               |
| LDF7-50A(1-5/8")              | C                 | No              | Inside Pole       | 116.0000 - 0.0000 | 6               | No Ice   | 0.0000                                               | 0.82          |
|                               |                   |                 |                   |                   |                 | 1/2" Ice | 0.0000                                               | 0.82          |
|                               |                   |                 |                   |                   |                 | 1" Ice   | 0.0000                                               | 0.82          |

| Description      | Face<br>or<br>Leg | Allow<br>Shield | Component<br>Type     | Placement         | Total<br>Number |          | C <sub>A</sub> A <sub>A</sub> | Weight |
|------------------|-------------------|-----------------|-----------------------|-------------------|-----------------|----------|-------------------------------|--------|
|                  |                   |                 |                       | ft                |                 |          | ft <sup>2</sup> /ft           | plf    |
| LDF7-50A(1-5/8") | C                 | No              | CaAa (Out Of<br>Face) | 116.0000 - 0.0000 | 1               | 2" Ice   | 0.0000                        | 0.82   |
|                  |                   |                 |                       |                   |                 | 4" Ice   | 0.0000                        | 0.82   |
|                  |                   |                 |                       |                   |                 | No Ice   | 0.1980                        | 0.82   |
|                  |                   |                 |                       |                   |                 | 1/2" Ice | 0.2980                        | 2.33   |
|                  |                   |                 |                       |                   |                 | 1" Ice   | 0.3980                        | 4.46   |
| LDF7-50A(1-5/8") | C                 | No              | CaAa (Out Of<br>Face) | 116.0000 - 0.0000 | 5               | 2" Ice   | 0.5980                        | 10.54  |
|                  |                   |                 |                       |                   |                 | 4" Ice   | 0.9980                        | 30.04  |
|                  |                   |                 |                       |                   |                 | No Ice   | 0.0000                        | 0.82   |
|                  |                   |                 |                       |                   |                 | 1/2" Ice | 0.0000                        | 2.33   |
|                  |                   |                 |                       |                   |                 | 1" Ice   | 0.0000                        | 4.46   |
|                  |                   |                 |                       |                   |                 | 2" Ice   | 0.0000                        | 10.54  |
|                  |                   |                 |                       |                   |                 | 4" Ice   | 0.0000                        | 30.04  |
| ***              |                   |                 |                       |                   |                 |          |                               |        |
| LDF6-50A(1-1/4") | A                 | No              | CaAa (Out Of<br>Face) | 95.0000 - 0.0000  | 1               | No Ice   | 0.1550                        | 0.66   |
|                  |                   |                 |                       |                   |                 | 1/2" Ice | 0.2550                        | 1.91   |
|                  |                   |                 |                       |                   |                 | 1" Ice   | 0.3550                        | 3.78   |
|                  |                   |                 |                       |                   |                 | 2" Ice   | 0.5550                        | 9.33   |
|                  |                   |                 |                       |                   |                 | 4" Ice   | 0.9550                        | 27.78  |
| LDF6-50A(1-1/4") | A                 | No              | CaAa (Out Of<br>Face) | 95.0000 - 0.0000  | 2               | No Ice   | 0.0000                        | 0.66   |
|                  |                   |                 |                       |                   |                 | 1/2" Ice | 0.0000                        | 1.91   |
|                  |                   |                 |                       |                   |                 | 1" Ice   | 0.0000                        | 3.78   |
|                  |                   |                 |                       |                   |                 | 2" Ice   | 0.0000                        | 9.33   |
|                  |                   |                 |                       |                   |                 | 4" Ice   | 0.0000                        | 27.78  |
|                  |                   |                 |                       |                   |                 | ***      |                               |        |

### Feed Line/Linear Appurtenances Section Areas

| Tower<br>Section | Tower<br>Elevation<br>ft | Face | $A_R$<br>ft <sup>2</sup> | $A_F$<br>ft <sup>2</sup> | $C_A A_A$<br>In Face<br>ft <sup>2</sup> | $C_A A_A$<br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|------------------|--------------------------|------|--------------------------|--------------------------|-----------------------------------------|------------------------------------------|-------------|
| L1               | 145.0000-<br>92.5000     | A    | 0.000                    | 0.000                    | 0.000                                   | 0.388                                    | 0.00        |
|                  |                          | B    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
|                  |                          | C    | 0.000                    | 0.000                    | 0.000                                   | 4.653                                    | 1.66        |
| L2               | 92.5000-44.7100          | A    | 0.000                    | 0.000                    | 0.000                                   | 7.408                                    | 0.09        |
|                  |                          | B    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
|                  |                          | C    | 0.000                    | 0.000                    | 0.000                                   | 9.462                                    | 1.98        |
| L3               | 44.7100-0.0000           | A    | 0.000                    | 0.000                    | 0.000                                   | 6.930                                    | 0.09        |
|                  |                          | B    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
|                  |                          | C    | 0.000                    | 0.000                    | 0.000                                   | 8.853                                    | 1.85        |

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

| Tower<br>Section | Tower<br>Elevation<br>ft | Face<br>or<br>Leg | Ice<br>Thickness<br>in | $A_R$<br>ft <sup>2</sup> | $A_F$<br>ft <sup>2</sup> | $C_A A_A$<br>In Face<br>ft <sup>2</sup> | $C_A A_A$<br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|------------------|--------------------------|-------------------|------------------------|--------------------------|--------------------------|-----------------------------------------|------------------------------------------|-------------|
| L1               | 145.0000-<br>92.5000     | A                 | 1.164                  | 0.000                    | 0.000                    | 0.000                                   | 0.969                                    | 0.04        |
|                  |                          | B                 |                        | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
|                  |                          | C                 |                        | 0.000                    | 0.000                    | 0.000                                   | 10.123                                   | 2.31        |
| L2               | 92.5000-44.7100          | A                 | 1.090                  | 0.000                    | 0.000                    | 0.000                                   | 18.531                                   | 0.67        |
|                  |                          | B                 |                        | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
|                  |                          | C                 |                        | 0.000                    | 0.000                    | 0.000                                   | 20.586                                   | 3.30        |
| L3               | 44.7100-0.0000           | A                 | 1.000                  | 0.000                    | 0.000                    | 0.000                                   | 16.681                                   | 0.57        |
|                  |                          | B                 |                        | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
|                  |                          | C                 |                        | 0.000                    | 0.000                    | 0.000                                   | 18.603                                   | 2.97        |

### Feed Line Center of Pressure

| Section | Elevation        | CP <sub>x</sub> | CP <sub>z</sub> | CP <sub>x</sub><br>Ice | CP <sub>z</sub><br>Ice |
|---------|------------------|-----------------|-----------------|------------------------|------------------------|
|         | ft               | in              | in              | in                     | in                     |
| L1      | 145.0000-92.5000 | -0.1271         | 0.0600          | -0.2453                | 0.1119                 |
| L2      | 92.5000-44.7100  | -0.2335         | -0.0763         | -0.4335                | -0.2003                |
| L3      | 44.7100-0.0000   | -0.2385         | -0.0779         | -0.4448                | -0.2037                |

### Discrete Tower Loads

| Description                             | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t<br>° | Placement<br>ft |                                                     | C <sub>A</sub> A <sub>A</sub><br>Front<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K                          |
|-----------------------------------------|-------------------|----------------|-------------------------------------------------------|--------------------------------|-----------------|-----------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|--------------------------------------|
| BXA-171063-12CF-EDIN-2<br>w/ Mount Pipe | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 5.0290<br>5.5830<br>6.1033<br>7.1662<br>9.4380            | 5.2887<br>6.4594<br>7.3479<br>9.1478<br>12.9475          | 0.04<br>0.09<br>0.14<br>0.27<br>0.68 |
| BXA-171063-12CF-EDIN-2<br>w/ Mount Pipe | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 5.0290<br>5.5830<br>6.1033<br>7.1662<br>9.4380            | 5.2887<br>6.4594<br>7.3479<br>9.1478<br>12.9475          | 0.04<br>0.09<br>0.14<br>0.27<br>0.68 |
| BXA-171063-12CF-EDIN-2<br>w/ Mount Pipe | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 5.0290<br>5.5830<br>6.1033<br>7.1662<br>9.4380            | 5.2887<br>6.4594<br>7.3479<br>9.1478<br>12.9475          | 0.04<br>0.09<br>0.14<br>0.27<br>0.68 |
| RRH2x40-AWS                             | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 0.0000<br>0.0000<br>0.0000<br>0.0000<br>0.0000            | 2.0229<br>2.2440<br>2.4738<br>2.9592<br>4.0339           | 0.04<br>0.06<br>0.09<br>0.15<br>0.31 |
| RRH2x40-AWS                             | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 0.0000<br>0.0000<br>0.0000<br>0.0000<br>0.0000            | 2.0229<br>2.2440<br>2.4738<br>2.9592<br>4.0339           | 0.04<br>0.06<br>0.09<br>0.15<br>0.31 |
| RRH2x40-AWS                             | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 0.0000<br>0.0000<br>0.0000<br>0.0000<br>0.0000            | 2.0229<br>2.2440<br>2.4738<br>2.9592<br>4.0339           | 0.04<br>0.06<br>0.09<br>0.15<br>0.31 |
| DB-T1-6Z-8AB-0Z                         | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 5.6000<br>5.9154<br>6.2395<br>6.9136<br>8.3654            | 2.3333<br>2.5580<br>2.7914<br>3.2839<br>4.3728           | 0.04<br>0.08<br>0.12<br>0.21<br>0.45 |
| BXA-171063-8BF-2 w/<br>Mount Pipe       | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 3.1789<br>3.5550<br>3.9637<br>4.8533<br>6.7671            | 3.3529<br>3.9709<br>4.5950<br>5.8933<br>8.8855           | 0.03<br>0.06<br>0.10<br>0.19<br>0.49 |
| BXA-171063-8BF-2 w/<br>Mount Pipe       | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | No Ice<br>1/2"<br>Ice<br>1" Ice<br>1" Ice           | 3.1789<br>3.5550<br>3.9637<br>4.8533                      | 3.3529<br>3.9709<br>4.5950<br>5.8933                     | 0.03<br>0.06<br>0.10<br>0.19         |

| Description                           | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t<br>° | Placement<br>ft |        | C <sub>A</sub> A <sub>A</sub><br>Front<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K |
|---------------------------------------|-------------------|----------------|-------------------------------------------------------|--------------------------------|-----------------|--------|-----------------------------------------------------------|----------------------------------------------------------|-------------|
| BXA-171063-8BF-2 w/<br>Mount Pipe     | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | 2" Ice | 6.7671                                                    | 8.8855                                                   | 0.49        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 3.1789                                                    | 3.3529                                                   | 0.03        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 3.5550                                                    | 3.9709                                                   | 0.06        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 3.9637                                                    | 4.5950                                                   | 0.10        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 4.8533                                                    | 5.8933                                                   | 0.19        |
| (2) SC-E 6014 rev2 w/<br>Mount Pipe   | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | 2" Ice | 6.7671                                                    | 8.8855                                                   | 0.49        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 3.7829                                                    | 4.3959                                                   | 0.03        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 4.1817                                                    | 5.0091                                                   | 0.07        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 4.5912                                                    | 5.6403                                                   | 0.12        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 5.4423                                                    | 6.9563                                                   | 0.22        |
| (2) SC-E 6014 rev2 w/<br>Mount Pipe   | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | 2" Ice | 7.2927                                                    | 9.8967                                                   | 0.54        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 3.7829                                                    | 4.3959                                                   | 0.03        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 4.1817                                                    | 5.0091                                                   | 0.07        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 4.5912                                                    | 5.6403                                                   | 0.12        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 5.4423                                                    | 6.9563                                                   | 0.22        |
| (2) LPA-80063/6CF w/<br>Mount Pipe    | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | 2" Ice | 7.2927                                                    | 9.8967                                                   | 0.54        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 10.5771                                                   | 10.6706                                                  | 0.05        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 11.2413                                                   | 11.9322                                                  | 0.14        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 11.8720                                                   | 12.9107                                                  | 0.25        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 13.1633                                                   | 14.9215                                                  | 0.48        |
| SLCP 2x6014 w/ Mount<br>Pipe          | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | 2" Ice | 15.8657                                                   | 19.1577                                                  | 1.09        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 7.4514                                                    | 6.9545                                                   | 0.04        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 7.9606                                                    | 7.7563                                                   | 0.10        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 8.4698                                                    | 8.5195                                                   | 0.18        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 9.5191                                                    | 10.0997                                                  | 0.34        |
| SLCP 2x6014 w/ Mount<br>Pipe          | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | 2" Ice | 11.7421                                                   | 13.4750                                                  | 0.80        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 7.4514                                                    | 6.9545                                                   | 0.04        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 7.9606                                                    | 7.7563                                                   | 0.10        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 8.4698                                                    | 8.5195                                                   | 0.18        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 9.5191                                                    | 10.0997                                                  | 0.34        |
| BXA-70063-6CF-EDIN-6<br>w/ Mount Pipe | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                         | 147.0000        | 2" Ice | 11.7421                                                   | 13.4750                                                  | 0.80        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 7.9686                                                    | 5.8008                                                   | 0.04        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 8.6091                                                    | 6.9529                                                   | 0.10        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 9.2158                                                    | 7.8191                                                   | 0.17        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 10.4591                                                   | 9.6015                                                   | 0.34        |
| (2) FD9R6004/2C-3L                    | A                 | From Leg       | 4.0000<br>0.00<br>-2.00                               | 0.0000                         | 147.0000        | 2" Ice | 13.0655                                                   | 13.3662                                                  | 0.80        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 0.3665                                                    | 0.0846                                                   | 0.00        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 0.4506                                                    | 0.1362                                                   | 0.01        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 0.5433                                                    | 0.1965                                                   | 0.01        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 0.7546                                                    | 0.3430                                                   | 0.02        |
| (2) FD9R6004/2C-3L                    | B                 | From Leg       | 4.0000<br>0.00<br>-2.00                               | 0.0000                         | 147.0000        | 2" Ice | 1.2809                                                    | 0.7396                                                   | 0.06        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 0.3665                                                    | 0.0846                                                   | 0.00        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 0.4506                                                    | 0.1362                                                   | 0.01        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 0.5433                                                    | 0.1965                                                   | 0.01        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 0.7546                                                    | 0.3430                                                   | 0.02        |
| (2) FD9R6004/2C-3L                    | C                 | From Leg       | 4.0000<br>0.00<br>-2.00                               | 0.0000                         | 147.0000        | 2" Ice | 1.2809                                                    | 0.7396                                                   | 0.06        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 0.3665                                                    | 0.0846                                                   | 0.00        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 0.4506                                                    | 0.1362                                                   | 0.01        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 0.5433                                                    | 0.1965                                                   | 0.01        |
|                                       |                   |                |                                                       |                                |                 | 1" Ice | 0.7546                                                    | 0.3430                                                   | 0.02        |
| Platform Mount [LP 1001-<br>1]        | C                 | None           |                                                       | 0.0000                         | 147.0000        | 2" Ice | 1.2809                                                    | 0.7396                                                   | 0.06        |
|                                       |                   |                |                                                       |                                |                 | 4" Ice |                                                           |                                                          |             |
|                                       |                   |                |                                                       |                                |                 | No Ice | 47.7000                                                   | 47.7000                                                  | 3.02        |
|                                       |                   |                |                                                       |                                |                 | 1/2"   | 59.5000                                                   | 59.5000                                                  | 3.62        |
|                                       |                   |                |                                                       |                                |                 | Ice    | 71.3000                                                   | 71.3000                                                  | 4.22        |

| Description                            | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t | Placement<br><br>ft |        | C <sub>A</sub> A <sub>A</sub><br>Front<br><br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br><br>ft <sup>2</sup> | Weight<br><br>K |
|----------------------------------------|-------------------|----------------|-------------------------------------------------------|---------------------------|---------------------|--------|---------------------------------------------------------------|--------------------------------------------------------------|-----------------|
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 94.9000                                                       | 94.9000                                                      | 5.43            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 142.1000                                                      | 142.1000                                                     | 7.85            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| ***                                    |                   |                |                                                       |                           |                     |        |                                                               |                                                              |                 |
| 7770.00 w/ Mount Pipe                  | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 6.1194                                                        | 4.2543                                                       | 0.06            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 6.6258                                                        | 5.0137                                                       | 0.10            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 7.1283                                                        | 5.7109                                                       | 0.16            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 8.1643                                                        | 7.1553                                                       | 0.29            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 10.3599                                                       | 10.4117                                                      | 0.66            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| 7770.00 w/ Mount Pipe                  | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 6.1194                                                        | 4.2543                                                       | 0.06            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 6.6258                                                        | 5.0137                                                       | 0.10            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 7.1283                                                        | 5.7109                                                       | 0.16            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 8.1643                                                        | 7.1553                                                       | 0.29            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 10.3599                                                       | 10.4117                                                      | 0.66            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| 7770.00 w/ Mount Pipe                  | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 6.1194                                                        | 4.2543                                                       | 0.06            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 6.6258                                                        | 5.0137                                                       | 0.10            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 7.1283                                                        | 5.7109                                                       | 0.16            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 8.1643                                                        | 7.1553                                                       | 0.29            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 10.3599                                                       | 10.4117                                                      | 0.66            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| (2) LGP13519                           | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 0.3379                                                        | 0.2074                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 0.4220                                                        | 0.2804                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 0.5147                                                        | 0.3621                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 0.7260                                                        | 0.5513                                                       | 0.02            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 1.2523                                                        | 1.0335                                                       | 0.07            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| (2) LGP13519                           | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 0.3379                                                        | 0.2074                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 0.4220                                                        | 0.2804                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 0.5147                                                        | 0.3621                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 0.7260                                                        | 0.5513                                                       | 0.02            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 1.2523                                                        | 1.0335                                                       | 0.07            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| (2) LGP13519                           | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 0.3379                                                        | 0.2074                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 0.4220                                                        | 0.2804                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 0.5147                                                        | 0.3621                                                       | 0.01            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 0.7260                                                        | 0.5513                                                       | 0.02            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 1.2523                                                        | 1.0335                                                       | 0.07            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| AM-X-CD-16-65-00T-RET<br>w/ Mount Pipe | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 8.4975                                                        | 6.3042                                                       | 0.07            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 9.1490                                                        | 7.4790                                                       | 0.14            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 9.7672                                                        | 8.3676                                                       | 0.21            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 11.0311                                                       | 10.1785                                                      | 0.38            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 13.6786                                                       | 14.0237                                                      | 0.87            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| AM-X-CD-16-65-00T-RET<br>w/ Mount Pipe | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 8.4975                                                        | 6.3042                                                       | 0.07            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 9.1490                                                        | 7.4790                                                       | 0.14            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 9.7672                                                        | 8.3676                                                       | 0.21            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 11.0311                                                       | 10.1785                                                      | 0.38            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 13.6786                                                       | 14.0237                                                      | 0.87            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| P65-17-XLH-RR w/ Mount<br>Pipe         | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 11.8229                                                       | 9.0563                                                       | 0.09            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 12.5940                                                       | 10.6186                                                      | 0.18            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 13.3752                                                       | 12.2051                                                      | 0.28            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 14.9400                                                       | 14.6968                                                      | 0.51            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 18.3336                                                       | 19.6430                                                      | 1.14            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| P65-17-XLH-RR w/ Mount<br>Pipe         | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice | 11.8229                                                       | 9.0563                                                       | 0.09            |
|                                        |                   |                |                                                       |                           |                     | 1/2"   | 12.5940                                                       | 10.6186                                                      | 0.18            |
|                                        |                   |                |                                                       |                           |                     | Ice    | 13.3752                                                       | 12.2051                                                      | 0.28            |
|                                        |                   |                |                                                       |                           |                     | 1" Ice | 14.9400                                                       | 14.6968                                                      | 0.51            |
|                                        |                   |                |                                                       |                           |                     | 2" Ice | 18.3336                                                       | 19.6430                                                      | 1.14            |
|                                        |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| (2) P65-17-XLH-RR w/                   | C                 | From Leg       | 4.0000                                                | 0.0000                    | 137.0000            | No Ice | 11.8229                                                       | 9.0563                                                       | 0.09            |

| Description      | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t | Placement<br><br>ft | C <sub>A</sub> A <sub>A</sub><br>Front<br><br>ft <sup>2</sup>                          | C <sub>A</sub> A <sub>A</sub><br>Side<br><br>ft <sup>2</sup> | Weight<br><br>K                      |
|------------------|-------------------|----------------|-------------------------------------------------------|---------------------------|---------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------|
| Mount Pipe       |                   |                | 0.00<br>1.00                                          |                           |                     | 1/2"<br>Ice 12.5940<br>1" Ice 13.3752<br>2" Ice 14.9400<br>4" Ice 18.3336              | 10.6186<br>12.2051<br>14.6968<br>19.6430                     | 0.18<br>0.28<br>0.51<br>1.14         |
| TT19-08BP111-001 | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 0.6362<br>1/2" 0.7474<br>Ice 0.8672<br>1" Ice 1.1328<br>2" Ice 1.7678<br>4" Ice | 0.5156<br>0.6187<br>0.7304<br>0.9796<br>1.5819               | 0.02<br>0.02<br>0.03<br>0.05<br>0.12 |
| TT19-08BP111-001 | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 0.6362<br>1/2" 0.7474<br>Ice 0.8672<br>1" Ice 1.1328<br>2" Ice 1.7678<br>4" Ice | 0.5156<br>0.6187<br>0.7304<br>0.9796<br>1.5819               | 0.02<br>0.02<br>0.03<br>0.05<br>0.12 |
| TT19-08BP111-001 | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 0.6362<br>1/2" 0.7474<br>Ice 0.8672<br>1" Ice 1.1328<br>2" Ice 1.7678<br>4" Ice | 0.5156<br>0.6187<br>0.7304<br>0.9796<br>1.5819               | 0.02<br>0.02<br>0.03<br>0.05<br>0.12 |
| 7020.00          | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 0.1191<br>1/2" 0.1714<br>Ice 0.2323<br>1" Ice 0.3801<br>2" Ice 0.7793<br>4" Ice | 0.2042<br>0.2791<br>0.3627<br>0.5559<br>1.0459               | 0.00<br>0.01<br>0.01<br>0.02<br>0.07 |
| 7020.00          | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 0.1191<br>1/2" 0.1714<br>Ice 0.2323<br>1" Ice 0.3801<br>2" Ice 0.7793<br>4" Ice | 0.2042<br>0.2791<br>0.3627<br>0.5559<br>1.0459               | 0.00<br>0.01<br>0.01<br>0.02<br>0.07 |
| 7020.00          | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 0.1191<br>1/2" 0.1714<br>Ice 0.2323<br>1" Ice 0.3801<br>2" Ice 0.7793<br>4" Ice | 0.2042<br>0.2791<br>0.3627<br>0.5559<br>1.0459               | 0.00<br>0.01<br>0.01<br>0.02<br>0.07 |
| DTMABP7819VG12A  | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 1.1389<br>1/2" 1.2835<br>Ice 1.4368<br>1" Ice 1.7693<br>2" Ice 2.5380<br>4" Ice | 0.3907<br>0.4884<br>0.5947<br>0.8334<br>1.4144               | 0.02<br>0.03<br>0.04<br>0.06<br>0.14 |
| DTMABP7819VG12A  | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 1.1389<br>1/2" 1.2835<br>Ice 1.4368<br>1" Ice 1.7693<br>2" Ice 2.5380<br>4" Ice | 0.3907<br>0.4884<br>0.5947<br>0.8334<br>1.4144               | 0.02<br>0.03<br>0.04<br>0.06<br>0.14 |
| DTMABP7819VG12A  | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 1.1389<br>1/2" 1.2835<br>Ice 1.4368<br>1" Ice 1.7693<br>2" Ice 2.5380<br>4" Ice | 0.3907<br>0.4884<br>0.5947<br>0.8334<br>1.4144               | 0.02<br>0.03<br>0.04<br>0.06<br>0.14 |
| DC6-48-60-18-8F  | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice 2.5667<br>1/2" 2.7978<br>Ice 3.0377<br>1" Ice 3.5432<br>2" Ice 4.6580<br>4" Ice | 2.5667<br>2.7978<br>3.0377<br>3.5432<br>4.6580               | 0.02<br>0.04<br>0.07<br>0.13<br>0.30 |

| Description                       | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t | Placement<br><br>ft |                                                     | C <sub>A</sub> A <sub>A</sub><br>Front<br><br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br><br>ft <sup>2</sup> | Weight<br><br>K                      |
|-----------------------------------|-------------------|----------------|-------------------------------------------------------|---------------------------|---------------------|-----------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------|
| (2) RRUS-11                       | A                 | From Leg       | 1.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 3.2486<br>3.4905<br>3.7411<br>4.2682<br>5.4260                | 1.3726<br>1.5510<br>1.7380<br>2.1381<br>3.0418               | 0.05<br>0.07<br>0.09<br>0.15<br>0.31 |
| (2) RRUS-11                       | B                 | From Leg       | 1.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 3.2486<br>3.4905<br>3.7411<br>4.2682<br>5.4260                | 1.3726<br>1.5510<br>1.7380<br>2.1381<br>3.0418               | 0.05<br>0.07<br>0.09<br>0.15<br>0.31 |
| (2) RRUS-11                       | C                 | From Leg       | 1.0000<br>0.00<br>1.00                                | 0.0000                    | 137.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 3.2486<br>3.4905<br>3.7411<br>4.2682<br>5.4260                | 1.3726<br>1.5510<br>1.7380<br>2.1381<br>3.0418               | 0.05<br>0.07<br>0.09<br>0.15<br>0.31 |
| Platform Mount [LP 1001-1]        | C                 | None           |                                                       | 0.0000                    | 137.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 47.7000<br>59.5000<br>71.3000<br>94.9000<br>142.1000          | 47.7000<br>59.5000<br>71.3000<br>94.9000<br>142.1000         | 3.02<br>3.62<br>4.22<br>5.43<br>7.85 |
| ***                               |                   |                |                                                       |                           |                     |                                                     |                                                               |                                                              |                                      |
| (4) DB844G65ZAXY w/<br>Mount Pipe | A                 | From Leg       | 4.0000<br>0.00<br>2.00                                | 0.0000                    | 126.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 4.9042<br>5.3460<br>5.7972<br>6.7311<br>8.7345                | 4.9208<br>5.5962<br>6.2837<br>7.7123<br>10.8330              | 0.03<br>0.08<br>0.13<br>0.26<br>0.62 |
| (4) DB844G65ZAXY w/<br>Mount Pipe | B                 | From Leg       | 4.0000<br>0.00<br>2.00                                | 0.0000                    | 126.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 4.9042<br>5.3460<br>5.7972<br>6.7311<br>8.7345                | 4.9208<br>5.5962<br>6.2837<br>7.7123<br>10.8330              | 0.03<br>0.08<br>0.13<br>0.26<br>0.62 |
| (4) DB844G65ZAXY w/<br>Mount Pipe | C                 | From Leg       | 4.0000<br>0.00<br>2.00                                | 0.0000                    | 126.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 4.9042<br>5.3460<br>5.7972<br>6.7311<br>8.7345                | 4.9208<br>5.5962<br>6.2837<br>7.7123<br>10.8330              | 0.03<br>0.08<br>0.13<br>0.26<br>0.62 |
| GPS_A                             | A                 | From Leg       | 4.0000<br>0.00<br>4.00                                | 0.0000                    | 126.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 0.2975<br>0.3739<br>0.4589<br>0.6549<br>1.1506                | 0.2975<br>0.3739<br>0.4589<br>0.6549<br>1.1506               | 0.00<br>0.00<br>0.01<br>0.02<br>0.08 |
| GPS_A                             | B                 | From Leg       | 4.0000<br>0.00<br>4.00                                | 0.0000                    | 126.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 0.2975<br>0.3739<br>0.4589<br>0.6549<br>1.1506                | 0.2975<br>0.3739<br>0.4589<br>0.6549<br>1.1506               | 0.00<br>0.00<br>0.01<br>0.02<br>0.08 |
| Platform Mount [LP 601-1]         | C                 | None           |                                                       | 0.0000                    | 126.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 28.4700<br>33.5900<br>38.7100<br>48.9500<br>69.4300           | 28.4700<br>33.5900<br>38.7100<br>48.9500<br>69.4300          | 1.12<br>1.51<br>1.91<br>2.69<br>4.26 |
| 8-ft Ladder                       | C                 | None           |                                                       | 0.0000                    | 124.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice                     | 5.0000<br>9.7300<br>11.1900<br>13.9800                        | 7.0700<br>9.7300<br>11.1900<br>13.9800                       | 0.04<br>0.07<br>0.08<br>0.11         |

| Description                              | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t | Placement<br><br>ft |                                                     | C <sub>A</sub> A <sub>A</sub><br>Front<br><br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br><br>ft <sup>2</sup> | Weight<br><br>K                      |
|------------------------------------------|-------------------|----------------|-------------------------------------------------------|---------------------------|---------------------|-----------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------|
|                                          |                   |                |                                                       |                           |                     | 2" Ice<br>4" Ice                                    | 18.8900<br>18.8900                                            |                                                              | 0.15                                 |
| ***<br>RR90-17-02DPL2 w/<br>Mount Pipe   | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 4.5931<br>5.0883<br>5.5778<br>6.5876<br>8.7306                | 3.3421<br>4.1118<br>4.8076<br>6.2492<br>9.3325               | 0.03<br>0.07<br>0.12<br>0.22<br>0.56 |
| RR90-17-02DPL2 w/<br>Mount Pipe          | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 4.5931<br>5.0883<br>5.5778<br>6.5876<br>8.7306                | 3.3421<br>4.1118<br>4.8076<br>6.2492<br>9.3325               | 0.03<br>0.07<br>0.12<br>0.22<br>0.56 |
| RR90-17-02DPL2 w/<br>Mount Pipe          | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 4.5931<br>5.0883<br>5.5778<br>6.5876<br>8.7306                | 3.3421<br>4.1118<br>4.8076<br>6.2492<br>9.3325               | 0.03<br>0.07<br>0.12<br>0.22<br>0.56 |
| APX16DWV-16DWV-S-E-<br>A20 w/ Mount Pipe | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 7.4657<br>7.9944<br>8.5176<br>9.5949<br>11.8728               | 3.4938<br>4.2631<br>4.9598<br>6.4031<br>9.4897               | 0.06<br>0.11<br>0.16<br>0.30<br>0.68 |
| APX16DWV-16DWV-S-E-<br>A20 w/ Mount Pipe | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 7.4657<br>7.9944<br>8.5176<br>9.5949<br>11.8728               | 3.4938<br>4.2631<br>4.9598<br>6.4031<br>9.4897               | 0.06<br>0.11<br>0.16<br>0.30<br>0.68 |
| APX16DWV-16DWV-S-E-<br>A20 w/ Mount Pipe | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 7.4657<br>7.9944<br>8.5176<br>9.5949<br>11.8728               | 3.4938<br>4.2631<br>4.9598<br>6.4031<br>9.4897               | 0.06<br>0.11<br>0.16<br>0.30<br>0.68 |
| ATMAA1412D-1A20                          | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 1.1667<br>1.3136<br>1.4691<br>1.8062<br>2.5840                | 0.4667<br>0.5747<br>0.6914<br>0.9506<br>1.5728               | 0.01<br>0.02<br>0.03<br>0.06<br>0.14 |
| ATMAA1412D-1A20                          | B                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 1.1667<br>1.3136<br>1.4691<br>1.8062<br>2.5840                | 0.4667<br>0.5747<br>0.6914<br>0.9506<br>1.5728               | 0.01<br>0.02<br>0.03<br>0.06<br>0.14 |
| ATMAA1412D-1A20                          | C                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 1.1667<br>1.3136<br>1.4691<br>1.8062<br>2.5840                | 0.4667<br>0.5747<br>0.6914<br>0.9506<br>1.5728               | 0.01<br>0.02<br>0.03<br>0.06<br>0.14 |
| ATMPP1412D-1CWA                          | A                 | From Leg       | 4.0000<br>0.00<br>1.00                                | 0.0000                    | 116.0000            | No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 1.1672<br>1.3174<br>1.4762<br>1.8197<br>2.6105                | 0.4159<br>0.5298<br>0.6523<br>0.9232<br>1.5688               | 0.01<br>0.02<br>0.03<br>0.05<br>0.13 |
| ATMPP1412D-1CWA                          | B                 | From Leg       | 4.0000<br>0.00                                        | 0.0000                    | 116.0000            | No Ice<br>1/2"                                      | 1.1672<br>1.3174                                              | 0.4159<br>0.5298                                             | 0.01<br>0.02                         |

| Description                   | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t | Placement<br><br>ft |        | C <sub>A</sub> A <sub>A</sub><br>Front<br><br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br><br>ft <sup>2</sup> | Weight<br><br>K |
|-------------------------------|-------------------|----------------|-------------------------------------------------------|---------------------------|---------------------|--------|---------------------------------------------------------------|--------------------------------------------------------------|-----------------|
|                               |                   |                | 1.00                                                  |                           |                     | Ice    | 1.4762                                                        | 0.6523                                                       | 0.03            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 1.8197                                                        | 0.9232                                                       | 0.05            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 2.6105                                                        | 1.5688                                                       | 0.13            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| ATMPP1412D-1CWA               | C                 | From Leg       | 4.0000                                                | 0.0000                    | 116.0000            | No Ice | 1.1672                                                        | 0.4159                                                       | 0.01            |
|                               |                   |                | 0.00                                                  |                           |                     | 1/2"   | 1.3174                                                        | 0.5298                                                       | 0.02            |
|                               |                   |                | 1.00                                                  |                           |                     | Ice    | 1.4762                                                        | 0.6523                                                       | 0.03            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 1.8197                                                        | 0.9232                                                       | 0.05            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 2.6105                                                        | 1.5688                                                       | 0.13            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| Platform Mount [LP 601-1]     | C                 | None           |                                                       | 0.0000                    | 116.0000            | No Ice | 28.4700                                                       | 28.4700                                                      | 1.12            |
|                               |                   |                |                                                       |                           |                     | 1/2"   | 33.5900                                                       | 33.5900                                                      | 1.51            |
|                               |                   |                |                                                       |                           |                     | Ice    | 38.7100                                                       | 38.7100                                                      | 1.91            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 48.9500                                                       | 48.9500                                                      | 2.69            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 69.4300                                                       | 69.4300                                                      | 4.26            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| 8-ft Ladder                   | C                 | None           |                                                       | 0.0000                    | 114.0000            | No Ice | 5.0000                                                        | 7.0700                                                       | 0.04            |
|                               |                   |                |                                                       |                           |                     | 1/2"   | 9.7300                                                        | 9.7300                                                       | 0.07            |
|                               |                   |                |                                                       |                           |                     | Ice    | 11.1900                                                       | 11.1900                                                      | 0.08            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 13.9800                                                       | 13.9800                                                      | 0.11            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 18.8900                                                       | 18.8900                                                      | 0.15            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| ***                           |                   |                |                                                       |                           |                     |        |                                                               |                                                              |                 |
| RR65-18-02DP w/ Mount<br>Pipe | B                 | From Leg       | 2.0000                                                | 0.0000                    | 95.0000             | No Ice | 4.5931                                                        | 3.3194                                                       | 0.03            |
|                               |                   |                | 0.00                                                  |                           |                     | 1/2"   | 5.0883                                                        | 4.0888                                                       | 0.07            |
|                               |                   |                | 2.00                                                  |                           |                     | Ice    | 5.5778                                                        | 4.7844                                                       | 0.12            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 6.5876                                                        | 6.2255                                                       | 0.22            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 8.7306                                                        | 9.3076                                                       | 0.56            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| Side Arm Mount [SO 701-<br>1] | B                 | None           |                                                       | 0.0000                    | 95.0000             | No Ice | 0.8500                                                        | 1.6700                                                       | 0.07            |
|                               |                   |                |                                                       |                           |                     | 1/2"   | 1.1400                                                        | 2.3400                                                       | 0.08            |
|                               |                   |                |                                                       |                           |                     | Ice    | 1.4300                                                        | 3.0100                                                       | 0.09            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 2.0100                                                        | 4.3500                                                       | 0.12            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 3.1700                                                        | 7.0300                                                       | 0.18            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| Side Arm Mount [SO 701-<br>1] | C                 | None           |                                                       | 0.0000                    | 95.0000             | No Ice | 0.8500                                                        | 1.6700                                                       | 0.07            |
|                               |                   |                |                                                       |                           |                     | 1/2"   | 1.1400                                                        | 2.3400                                                       | 0.08            |
|                               |                   |                |                                                       |                           |                     | Ice    | 1.4300                                                        | 3.0100                                                       | 0.09            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 2.0100                                                        | 4.3500                                                       | 0.12            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 3.1700                                                        | 7.0300                                                       | 0.18            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| Ice Shield 1.5' x 2.0'        | C                 | None           |                                                       | 0.0000                    | 97.0000             | No Ice | 0.3500                                                        | 0.4667                                                       | 0.03            |
|                               |                   |                |                                                       |                           |                     | 1/2"   | 0.4840                                                        | 0.6395                                                       | 0.04            |
|                               |                   |                |                                                       |                           |                     | Ice    | 0.6265                                                        | 0.8210                                                       | 0.06            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 0.9377                                                        | 1.2099                                                       | 0.12            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 1.6636                                                        | 2.0914                                                       | 0.27            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| ***                           |                   |                |                                                       |                           |                     |        |                                                               |                                                              |                 |
| 7250.02 w/ Mount Pipe         | A                 | From Leg       | 1.0000                                                | 0.0000                    | 87.0000             | No Ice | 4.2362                                                        | 3.3238                                                       | 0.04            |
|                               |                   |                | 0.00                                                  |                           |                     | 1/2"   | 4.7096                                                        | 4.3022                                                       | 0.07            |
|                               |                   |                | 0.00                                                  |                           |                     | Ice    | 5.1662                                                        | 5.0504                                                       | 0.12            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 6.1061                                                        | 6.5968                                                       | 0.22            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 8.3213                                                        | 9.8896                                                       | 0.56            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| 7250.02 w/ Mount Pipe         | B                 | From Leg       | 1.0000                                                | 0.0000                    | 87.0000             | No Ice | 4.2362                                                        | 3.3238                                                       | 0.04            |
|                               |                   |                | 0.00                                                  |                           |                     | 1/2"   | 4.7096                                                        | 4.3022                                                       | 0.07            |
|                               |                   |                | 0.00                                                  |                           |                     | Ice    | 5.1662                                                        | 5.0504                                                       | 0.12            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 6.1061                                                        | 6.5968                                                       | 0.22            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 8.3213                                                        | 9.8896                                                       | 0.56            |
|                               |                   |                |                                                       |                           |                     | 4" Ice |                                                               |                                                              |                 |
| 7250.02 w/ Mount Pipe         | C                 | From Leg       | 1.0000                                                | 0.0000                    | 87.0000             | No Ice | 4.2362                                                        | 3.3238                                                       | 0.04            |
|                               |                   |                | 0.00                                                  |                           |                     | 1/2"   | 4.7096                                                        | 4.3022                                                       | 0.07            |
|                               |                   |                | 0.00                                                  |                           |                     | Ice    | 5.1662                                                        | 5.0504                                                       | 0.12            |
|                               |                   |                |                                                       |                           |                     | 1" Ice | 6.1061                                                        | 6.5968                                                       | 0.22            |
|                               |                   |                |                                                       |                           |                     | 2" Ice | 8.3213                                                        | 9.8896                                                       | 0.56            |

| Description           | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustmen<br>t<br>° | Placement<br>ft | C <sub>A</sub> A <sub>A</sub><br>Front<br>ft <sup>2</sup>     | C <sub>A</sub> A <sub>A</sub><br>Side<br>ft <sup>2</sup>             | Weight<br>K                          |
|-----------------------|-------------------|----------------|-------------------------------------------------------|--------------------------------|-----------------|---------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------|
| Pipe Mount [PM 601-3] | C                 | None           |                                                       | 0.0000                         | 87.0000         | 4" Ice<br>No Ice<br>1/2"<br>Ice<br>1" Ice<br>2" Ice<br>4" Ice | 4.3900<br>4.3900<br>5.4800<br>6.5700<br>8.7500<br>13.1100<br>13.1100 | 0.20<br>0.24<br>0.28<br>0.36<br>0.53 |
| ***                   |                   |                |                                                       |                                |                 |                                                               |                                                                      |                                      |

### Dishes

| Description | Face<br>or<br>Leg | Dish<br>Type             | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft | Azimuth<br>Adjustment<br>° | 3 dB<br>Beam<br>Width<br>° | Elevation<br>ft | Outside<br>Diameter<br>ft | Aperture<br>Area<br>ft <sup>2</sup>              | Weight<br>K                                        |
|-------------|-------------------|--------------------------|----------------|-------------------------------------------|----------------------------|----------------------------|-----------------|---------------------------|--------------------------------------------------|----------------------------------------------------|
| DA1900-39   | C                 | Paraboloid w/o<br>Radome | From<br>Leg    | 1.0000<br>0.00<br>1.00                    | 30.0000                    |                            | 95.0000         | 3.5417                    | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice<br>4" Ice | 9.8500<br>10.3200<br>10.7900<br>11.7300<br>13.6000 |
|             |                   |                          |                |                                           |                            |                            |                 |                           |                                                  | 0.05<br>0.10<br>0.15<br>0.26<br>0.47               |

### Tower Pressures - No Ice

$$G_H = 1.690$$

| Section<br>Elevation<br>ft | z<br>ft  | K <sub>Z</sub> | q <sub>z</sub><br>psf | A <sub>G</sub><br>ft <sup>2</sup> | F<br>a<br>c<br>e | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg<br>%                   | C <sub>A</sub> A <sub>A</sub><br>In<br>Face<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Out<br>Face<br>ft <sup>2</sup> |
|----------------------------|----------|----------------|-----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|
| L1 145.0000-<br>92.5000    | 116.7975 | 1.435          | 23.46                 | 122.80<br>6                       | A<br>B<br>C      | 0.000<br>0.000<br>0.000           | 122.806<br>122.806<br>122.806     | 122.806                             | 100.00<br>100.00<br>100.00 | 0.000<br>0.000<br>0.000                                        | 0.388<br>0.000<br>4.653                                         |
| L2 92.5000-<br>44.7100     | 67.9006  | 1.229          | 20.02                 | 166.37<br>0                       | A<br>B<br>C      | 0.000<br>0.000<br>0.000           | 166.370<br>166.370<br>166.370     | 166.370                             | 100.00<br>100.00<br>100.00 | 0.000<br>0.000<br>0.000                                        | 7.408<br>0.000<br>9.462                                         |
| L3 44.7100-<br>0.0000      | 21.4903  | 1              | 16.40                 | 201.62<br>7                       | A<br>B<br>C      | 0.000<br>0.000<br>0.000           | 201.627<br>201.627<br>201.627     | 201.627                             | 100.00<br>100.00<br>100.00 | 0.000<br>0.000<br>0.000                                        | 6.930<br>0.000<br>8.853                                         |

### Tower Pressure - With Ice

$$G_H = 1.690$$

| Section<br>Elevation<br>ft | z<br>ft  | K <sub>Z</sub> | q <sub>z</sub><br>psf | t <sub>z</sub><br>in | A <sub>G</sub><br>ft <sup>2</sup> | F<br>a<br>c<br>e | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg<br>%                   | C <sub>A</sub> A <sub>A</sub><br>In<br>Face<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Out<br>Face<br>ft <sup>2</sup> |
|----------------------------|----------|----------------|-----------------------|----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|
| L1 145.0000-<br>92.5000    | 116.7975 | 1.435          | 5.18                  | 1.1638               | 132.989                           | A<br>B<br>C      | 0.000<br>0.000<br>0.000           | 132.989<br>132.989<br>132.989     | 132.989                             | 100.00<br>100.00<br>100.00 | 0.000<br>0.000<br>0.000                                        | 0.969<br>0.000<br>10.123                                        |
| L2 92.5000-                | 67.9006  | 1.229          | 4.42                  | 1.0904               | 175.640                           | A                | 0.000                             | 175.640                           | 175.640                             | 100.00                     | 0.000                                                          | 18.531                                                          |

| Section<br>Elevation<br>ft | z<br>ft | K <sub>z</sub> | q <sub>z</sub><br>psf | t <sub>z</sub><br>in | A <sub>G</sub><br>ft <sup>2</sup> | F<br>a<br>c<br>e | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg<br>% | C <sub>A</sub> A <sub>A</sub><br>In<br>Face<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Out<br>Face<br>ft <sup>2</sup> |
|----------------------------|---------|----------------|-----------------------|----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------|----------------------------------------------------------------|-----------------------------------------------------------------|
| 44.7100                    |         |                |                       |                      |                                   | B                | 0.000                             | 175.640                           |                                     | 100.00   | 0.000                                                          | 0.000                                                           |
| L3 44.7100-<br>0.0000      | 21.4903 | 1              | 3.62                  | 1.0000               | 209.753                           | C                | 0.000                             | 175.640                           |                                     | 100.00   | 0.000                                                          | 20.586                                                          |
|                            |         |                |                       |                      |                                   | A                | 0.000                             | 209.753                           | 209.753                             | 100.00   | 0.000                                                          | 16.681                                                          |
|                            |         |                |                       |                      |                                   | B                | 0.000                             | 209.753                           |                                     | 100.00   | 0.000                                                          | 0.000                                                           |
|                            |         |                |                       |                      |                                   | C                | 0.000                             | 209.753                           |                                     | 100.00   | 0.000                                                          | 18.603                                                          |

### Tower Pressure - Service

$$G_H = 1.690$$

| Section<br>Elevation<br>ft | z<br>ft  | K <sub>z</sub> | q <sub>z</sub><br>psf | A <sub>G</sub><br>ft <sup>2</sup> | F<br>a<br>c<br>e | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg<br>% | C <sub>A</sub> A <sub>A</sub><br>In<br>Face<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Out<br>Face<br>ft <sup>2</sup> |
|----------------------------|----------|----------------|-----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------|----------------------------------------------------------------|-----------------------------------------------------------------|
| L1 145.0000-<br>92.5000    | 116.7975 | 1.435          | 13.19                 | 122.80<br>6                       | A                | 0.000                             | 122.806                           | 122.806                             | 100.00   | 0.000                                                          | 0.388                                                           |
|                            |          |                |                       |                                   | B                | 0.000                             | 122.806                           |                                     | 100.00   | 0.000                                                          | 0.000                                                           |
|                            |          |                |                       |                                   | C                | 0.000                             | 122.806                           |                                     | 100.00   | 0.000                                                          | 4.653                                                           |
| L2 92.5000-<br>44.7100     | 67.9006  | 1.229          | 11.26                 | 166.37<br>0                       | A                | 0.000                             | 166.370                           | 166.370                             | 100.00   | 0.000                                                          | 7.408                                                           |
|                            |          |                |                       |                                   | B                | 0.000                             | 166.370                           |                                     | 100.00   | 0.000                                                          | 0.000                                                           |
|                            |          |                |                       |                                   | C                | 0.000                             | 166.370                           |                                     | 100.00   | 0.000                                                          | 9.462                                                           |
| L3 44.7100-<br>0.0000      | 21.4903  | 1              | 9.23                  | 201.62<br>7                       | A                | 0.000                             | 201.627                           | 201.627                             | 100.00   | 0.000                                                          | 6.930                                                           |
|                            |          |                |                       |                                   | B                | 0.000                             | 201.627                           |                                     | 100.00   | 0.000                                                          | 0.000                                                           |
|                            |          |                |                       |                                   | C                | 0.000                             | 201.627                           |                                     | 100.00   | 0.000                                                          | 8.853                                                           |

### Force Totals

| Load<br>Case             | Vertical<br>Forces<br>K | Sum of<br>Forces<br>X<br>K | Sum of<br>Forces<br>Z<br>K | Sum of<br>Overturning<br>Moments, M <sub>x</sub><br>kip-ft | Sum of<br>Overturning<br>Moments, M <sub>z</sub><br>kip-ft | Sum of<br>Torques<br>kip-ft |
|--------------------------|-------------------------|----------------------------|----------------------------|------------------------------------------------------------|------------------------------------------------------------|-----------------------------|
| Leg Weight               | 29.65                   |                            |                            |                                                            |                                                            |                             |
| Bracing Weight           | 0.00                    |                            |                            |                                                            |                                                            |                             |
| Total Member Self-Weight | 29.65                   |                            |                            | 0.12                                                       | 1.18                                                       |                             |
| Total Weight             | 46.80                   |                            |                            | 0.12                                                       | 1.18                                                       |                             |
| Wind 0 deg - No Ice      |                         | 0.04                       | -37.28                     | -3773.52                                                   | -5.19                                                      | -2.85                       |
| Wind 30 deg - No Ice     |                         | 19.20                      | -32.28                     | -3269.37                                                   | -1939.95                                                   | -1.12                       |
| Wind 60 deg - No Ice     |                         | 32.73                      | -18.60                     | -1885.37                                                   | -3307.96                                                   | 0.08                        |
| Wind 90 deg - No Ice     |                         | 37.68                      | -0.04                      | -6.67                                                      | -3807.28                                                   | 1.28                        |
| Wind 120 deg - No Ice    |                         | 32.69                      | 18.53                      | 1873.84                                                    | -3301.16                                                   | 2.33                        |
| Wind 150 deg - No Ice    |                         | 19.13                      | 32.24                      | 3262.82                                                    | -1928.18                                                   | 3.19                        |
| Wind 180 deg - No Ice    |                         | -0.04                      | 37.28                      | 3773.76                                                    | 8.40                                                       | 2.84                        |
| Wind 210 deg - No Ice    |                         | -18.76                     | 32.36                      | 3277.25                                                    | 1899.99                                                    | 2.13                        |
| Wind 240 deg - No Ice    |                         | -32.44                     | 18.75                      | 1900.60                                                    | 3282.58                                                    | 0.80                        |
| Wind 270 deg - No Ice    |                         | -37.50                     | 0.04                       | 6.92                                                       | 3792.03                                                    | -1.06                       |
| Wind 300 deg - No Ice    |                         | -32.40                     | -18.69                     | -1888.58                                                   | 3275.78                                                    | -2.50                       |
| Wind 330 deg - No Ice    |                         | -18.69                     | -32.32                     | -3270.21                                                   | 1888.22                                                    | -3.12                       |
| Member Ice               | 8.12                    |                            |                            |                                                            |                                                            |                             |
| Total Weight Ice         | 71.52                   |                            |                            | 1.13                                                       | 7.38                                                       |                             |
| Wind 0 deg - Ice         |                         | 0.00                       | -10.44                     | -1087.87                                                   | 7.08                                                       | -0.82                       |
| Wind 30 deg - Ice        |                         | 5.34                       | -9.03                      | -941.68                                                    | -548.41                                                    | -0.38                       |
| Wind 60 deg - Ice        |                         | 9.13                       | -5.20                      | -541.95                                                    | -943.57                                                    | -0.03                       |
| Wind 90 deg - Ice        |                         | 10.52                      | -0.00                      | 0.73                                                       | -1088.33                                                   | 0.33                        |
| Wind 120 deg - Ice       |                         | 9.13                       | 5.20                       | 543.52                                                     | -943.17                                                    | 0.65                        |
| Wind 150 deg - Ice       |                         | 5.34                       | 9.03                       | 943.55                                                     | -547.72                                                    | 0.90                        |
| Wind 180 deg - Ice       |                         | -0.00                      | 10.44                      | 1090.13                                                    | 7.88                                                       | 0.82                        |
| Wind 210 deg - Ice       |                         | -5.23                      | 9.05                       | 945.82                                                     | 552.81                                                     | 0.62                        |
| Wind 240 deg - Ice       |                         | -9.06                      | 5.24                       | 547.88                                                     | 951.54                                                     | 0.25                        |
| Wind 270 deg - Ice       |                         | -10.48                     | 0.00                       | 1.53                                                       | 1098.78                                                    | -0.27                       |
| Wind 300 deg - Ice       |                         | -9.06                      | -5.24                      | -544.92                                                    | 951.14                                                     | -0.69                       |
| Wind 330 deg - Ice       |                         | -5.23                      | -9.05                      | -943.15                                                    | 552.12                                                     | -0.88                       |

| Load Case              | Vertical Forces<br>K | Sum of Forces X<br>K | Sum of Forces Z<br>K | Sum of Overturning Moments, $M_x$<br>kip-ft | Sum of Overturning Moments, $M_z$<br>kip-ft | Sum of Torques<br>kip-ft |
|------------------------|----------------------|----------------------|----------------------|---------------------------------------------|---------------------------------------------|--------------------------|
| Total Weight           | 46.80                |                      |                      | 0.12                                        | 1.18                                        |                          |
| Wind 0 deg - Service   |                      | 0.02                 | -20.97               | -2122.71                                    | -3.32                                       | -1.60                    |
| Wind 30 deg - Service  |                      | 10.80                | -18.16               | -1839.13                                    | -1091.62                                    | -0.63                    |
| Wind 60 deg - Service  |                      | 18.41                | -10.46               | -1060.62                                    | -1861.13                                    | 0.05                     |
| Wind 90 deg - Service  |                      | 21.19                | -0.02                | -3.86                                       | -2142.00                                    | 0.72                     |
| Wind 120 deg - Service |                      | 18.39                | 10.42                | 1053.93                                     | -1857.31                                    | 1.31                     |
| Wind 150 deg - Service |                      | 10.76                | 18.14                | 1835.23                                     | -1085.00                                    | 1.79                     |
| Wind 180 deg - Service |                      | -0.02                | 20.97                | 2122.64                                     | 4.32                                        | 1.60                     |
| Wind 210 deg - Service |                      | -10.55               | 18.20                | 1843.35                                     | 1068.35                                     | 1.20                     |
| Wind 240 deg - Service |                      | -18.25               | 10.55                | 1068.98                                     | 1846.05                                     | 0.45                     |
| Wind 270 deg - Service |                      | -21.09               | 0.02                 | 3.79                                        | 2132.61                                     | -0.59                    |
| Wind 300 deg - Service |                      | -18.23               | -10.51               | -1062.43                                    | 1842.23                                     | -1.41                    |
| Wind 330 deg - Service |                      | -10.51               | -18.18               | -1839.60                                    | 1061.72                                     | -1.76                    |

### 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                    |
| 15        | Dead+Wind 0 deg+Ice         |
| 16        | Dead+Wind 30 deg+Ice        |
| 17        | Dead+Wind 60 deg+Ice        |
| 18        | Dead+Wind 90 deg+Ice        |
| 19        | Dead+Wind 120 deg+Ice       |
| 20        | Dead+Wind 150 deg+Ice       |
| 21        | Dead+Wind 180 deg+Ice       |
| 22        | Dead+Wind 210 deg+Ice       |
| 23        | Dead+Wind 240 deg+Ice       |
| 24        | Dead+Wind 270 deg+Ice       |
| 25        | Dead+Wind 300 deg+Ice       |
| 26        | Dead+Wind 330 deg+Ice       |
| 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          | 145 - 92.5   | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |              |                | Max. Compression | 14              | -31.62  | 2.51                     | -0.27                    |
|             |              |                | Max. Mx          | 11              | -16.00  | 837.65                   | -2.95                    |
|             |              |                | Max. My          | 2               | -16.00  | -2.70                    | 840.94                   |
|             |              |                | Max. Vy          | 5               | 23.96   | -836.97                  | 3.10                     |
|             |              |                | Max. Vx          | 8               | 24.03   | 3.36                     | -840.77                  |
| L2          | 92.5 - 44.71 | Pole           | Max. Torque      | 8               |         |                          | -2.56                    |
|             |              |                | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |              |                | Max. Compression | 14              | -48.87  | 4.60                     | -0.91                    |
|             |              |                | Max. Mx          | 5               | -28.41  | -2137.73                 | 4.89                     |
|             |              |                | Max. My          | 8               | -28.42  | 5.88                     | -2123.90                 |
|             |              |                | Max. Vy          | 5               | 31.28   | -2137.73                 | 4.89                     |
| L3          | 44.71 - 0    | Pole           | Max. Vx          | 8               | 30.87   | 5.88                     | -2123.90                 |
|             |              |                | Max. Torque      | 7               |         |                          | -3.11                    |
|             |              |                | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |              |                | Max. Compression | 14              | -72.26  | 7.50                     | -1.15                    |
|             |              |                | Max. Mx          | 5               | -46.78  | -3905.21                 | 6.91                     |
|             |              |                | Max. My          | 8               | -46.78  | 8.66                     | -3871.14                 |
|             |              |                | Max. Vy          | 5               | 37.70   | -3905.21                 | 6.91                     |
|             |              |                | Max. Vx          | 8               | 37.30   | 8.66                     | -3871.14                 |
|             |              |                | Max. Torque      | 7               |         |                          | -3.21                    |
|             |              |                |                  |                 |         |                          |                          |

### Maximum Reactions

| Location | Condition           | Gov. Load Comb. | Vertical K | Horizontal, X' K | Horizontal, Z K |
|----------|---------------------|-----------------|------------|------------------|-----------------|
| Pole     | Max. Vert           | 14              | 72.26      | -0.00            | 0.00            |
|          | Max. H <sub>x</sub> | 11              | 46.80      | 37.49            | -0.04           |
|          | Max. H <sub>z</sub> | 2               | 46.80      | -0.04            | 37.28           |
|          | Max. M <sub>x</sub> | 2               | 3870.89    | -0.04            | 37.28           |
|          | Max. M <sub>z</sub> | 5               | 3905.21    | -37.68           | 0.04            |
|          | Max. Torsion        | 13              | 3.10       | 18.69            | 32.32           |
|          | Min. Vert           | 30              | 46.80      | -21.19           | 0.02            |
|          | Min. H <sub>x</sub> | 5               | 46.80      | -37.68           | 0.04            |
|          | Min. H <sub>z</sub> | 8               | 46.80      | 0.04             | -37.28          |
|          | Min. M <sub>x</sub> | 8               | -3871.14   | 0.04             | -37.28          |
|          | Min. M <sub>z</sub> | 11              | -3889.67   | 37.49            | -0.04           |
|          | Min. Torsion        | 7               | -3.21      | -19.13           | -32.24          |
|          |                     |                 |            |                  |                 |

### Tower Mast Reaction Summary

| Load Combination           | Vertical K | Shear <sub>x</sub> K | Shear <sub>z</sub> K | Overturning Moment, M <sub>x</sub> kip-ft | Overturning Moment, M <sub>z</sub> kip-ft | Torque kip-ft |
|----------------------------|------------|----------------------|----------------------|-------------------------------------------|-------------------------------------------|---------------|
| Dead Only                  | 46.80      | -0.00                | 0.00                 | 0.12                                      | 1.18                                      | 0.00          |
| Dead+Wind 0 deg - No Ice   | 46.80      | 0.04                 | -37.28               | -3870.89                                  | -5.39                                     | -2.83         |
| Dead+Wind 30 deg - No Ice  | 46.80      | 19.20                | -32.28               | -3353.82                                  | -1989.78                                  | -1.15         |
| Dead+Wind 60 deg - No Ice  | 46.80      | 32.73                | -18.60               | -1934.13                                  | -3393.11                                  | 0.05          |
| Dead+Wind 90 deg - No Ice  | 46.80      | 37.68                | -0.04                | -6.91                                     | -3905.21                                  | 1.25          |
| Dead+Wind 120 deg - No Ice | 46.80      | 32.69                | 18.53                | 1922.22                                   | -3386.11                                  | 2.32          |
| Dead+Wind 150 deg - No Ice | 46.80      | 19.13                | 32.24                | 3347.07                                   | -1977.64                                  | 3.21          |
| Dead+Wind 180 deg - No Ice | 46.80      | -0.04                | 37.28                | 3871.14                                   | 8.66                                      | 2.84          |
| Dead+Wind 210 deg - No Ice | 46.80      | -18.76               | 32.36                | 3361.88                                   | 1949.02                                   | 2.13          |
| Dead+Wind 240 deg - No Ice | 46.80      | -32.44               | 18.75                | 1949.69                                   | 3367.23                                   | 0.80          |
| Dead+Wind 270 deg - No Ice | 46.80      | -37.49               | 0.04                 | 7.14                                      | 3889.67                                   | -1.05         |
| Dead+Wind 300 deg - No Ice | 46.80      | -32.40               | -18.69               | -1937.29                                  | 3360.23                                   | -2.48         |
| Dead+Wind 330 deg - No Ice | 46.80      | -18.69               | -32.32               | -3354.64                                  | 1936.86                                   | -3.10         |
| Dead+Ice                   | 72.26      | 0.00                 | -0.00                | 1.15                                      | 7.50                                      | 0.00          |
| Dead+Wind 0 deg+Ice        | 72.26      | 0.00                 | -10.43               | -1141.10                                  | 7.48                                      | -0.85         |
| Dead+Wind 30 deg+Ice       | 72.26      | 5.34                 | -9.03                | -987.77                                   | -575.04                                   | -0.40         |

| Load<br>Combination         | Vertical<br>K | Shear <sub>x</sub><br>K | Shear <sub>z</sub><br>K | Overturning<br>Moment, M <sub>x</sub><br>kip-ft | Overturning<br>Moment, M <sub>z</sub><br>kip-ft | Torque<br>kip-ft |
|-----------------------------|---------------|-------------------------|-------------------------|-------------------------------------------------|-------------------------------------------------|------------------|
| Dead+Wind 60 deg+Ice        | 72.26         | 9.13                    | -5.20                   | -568.48                                         | -989.55                                         | -0.05            |
| Dead+Wind 90 deg+Ice        | 72.26         | 10.52                   | -0.00                   | 0.78                                            | -1141.38                                        | 0.33             |
| Dead+Wind 120 deg+Ice       | 72.26         | 9.13                    | 5.20                    | 570.15                                          | -989.12                                         | 0.66             |
| Dead+Wind 150 deg+Ice       | 72.26         | 5.34                    | 9.03                    | 989.75                                          | -574.30                                         | 0.93             |
| Dead+Wind 180 deg+Ice       | 72.26         | -0.00                   | 10.43                   | 1143.51                                         | 8.34                                            | 0.85             |
| Dead+Wind 210 deg+Ice       | 72.26         | -5.23                   | 9.05                    | 992.12                                          | 579.89                                          | 0.65             |
| Dead+Wind 240 deg+Ice       | 72.26         | -9.06                   | 5.24                    | 574.71                                          | 998.10                                          | 0.26             |
| Dead+Wind 270 deg+Ice       | 72.26         | -10.47                  | 0.00                    | 1.64                                            | 1152.51                                         | -0.27            |
| Dead+Wind 300 deg+Ice       | 72.26         | -9.06                   | -5.24                   | -571.55                                         | 997.67                                          | -0.70            |
| Dead+Wind 330 deg+Ice       | 72.26         | -5.23                   | -9.05                   | -989.28                                         | 579.15                                          | -0.91            |
| Dead+Wind 0 deg - Service   | 46.80         | 0.02                    | -20.97                  | -2178.30                                        | -2.50                                           | -1.60            |
| Dead+Wind 30 deg - Service  | 46.80         | 10.80                   | -18.16                  | -1887.44                                        | -1119.29                                        | -0.64            |
| Dead+Wind 60 deg - Service  | 46.80         | 18.41                   | -10.46                  | -1088.46                                        | -1909.06                                        | 0.03             |
| Dead+Wind 90 deg - Service  | 46.80         | 21.19                   | -0.02                   | -3.83                                           | -2197.13                                        | 0.71             |
| Dead+Wind 120 deg - Service | 46.80         | 18.39                   | 10.42                   | 1081.85                                         | -1905.11                                        | 1.31             |
| Dead+Wind 150 deg - Service | 46.80         | 10.76                   | 18.14                   | 1883.74                                         | -1112.44                                        | 1.80             |
| Dead+Wind 180 deg - Service | 46.80         | -0.02                   | 20.97                   | 2178.55                                         | 5.41                                            | 1.60             |
| Dead+Wind 210 deg - Service | 46.80         | -10.55                  | 18.20                   | 1892.08                                         | 1097.42                                         | 1.20             |
| Dead+Wind 240 deg - Service | 46.80         | -18.25                  | 10.55                   | 1097.31                                         | 1895.57                                         | 0.45             |
| Dead+Wind 270 deg - Service | 46.80         | -21.09                  | 0.02                    | 4.08                                            | 2189.46                                         | -0.59            |
| Dead+Wind 300 deg - Service | 46.80         | -18.22                  | -10.51                  | -1090.22                                        | 1891.62                                         | -1.40            |
| Dead+Wind 330 deg - Service | 46.80         | -10.51                  | -18.18                  | -1887.88                                        | 1090.57                                         | -1.75            |

## Solution Summary

| Load<br>Comb. | Sum of Applied Forces |         |         | Sum of Reactions |         |         | % Error |
|---------------|-----------------------|---------|---------|------------------|---------|---------|---------|
|               | PX<br>K               | PY<br>K | PZ<br>K | PX<br>K          | PY<br>K | PZ<br>K |         |
| 1             | 0.00                  | -46.80  | 0.00    | 0.00             | 46.80   | 0.00    | 0.000%  |
| 2             | 0.04                  | -46.80  | -37.28  | -0.04            | 46.80   | 37.28   | 0.001%  |
| 3             | 19.20                 | -46.80  | -32.28  | -19.20           | 46.80   | 32.28   | 0.000%  |
| 4             | 32.73                 | -46.80  | -18.60  | -32.73           | 46.80   | 18.60   | 0.000%  |
| 5             | 37.68                 | -46.80  | -0.04   | -37.68           | 46.80   | 0.04    | 0.001%  |
| 6             | 32.69                 | -46.80  | 18.53   | -32.69           | 46.80   | -18.53  | 0.000%  |
| 7             | 19.13                 | -46.80  | 32.24   | -19.13           | 46.80   | -32.24  | 0.000%  |
| 8             | -0.04                 | -46.80  | 37.28   | 0.04             | 46.80   | -37.28  | 0.001%  |
| 9             | -18.76                | -46.80  | 32.36   | 18.76            | 46.80   | -32.36  | 0.000%  |
| 10            | -32.44                | -46.80  | 18.75   | 32.44            | 46.80   | -18.75  | 0.000%  |
| 11            | -37.50                | -46.80  | 0.04    | 37.49            | 46.80   | -0.04   | 0.001%  |
| 12            | -32.40                | -46.80  | -18.69  | 32.40            | 46.80   | 18.69   | 0.000%  |
| 13            | -18.69                | -46.80  | -32.32  | 18.69            | 46.80   | 32.32   | 0.000%  |
| 14            | 0.00                  | -72.26  | 0.00    | -0.00            | 72.26   | 0.00    | 0.001%  |
| 15            | 0.00                  | -72.26  | -10.44  | -0.00            | 72.26   | 10.43   | 0.001%  |
| 16            | 5.34                  | -72.26  | -9.03   | -5.34            | 72.26   | 9.03    | 0.001%  |
| 17            | 9.13                  | -72.26  | -5.20   | -9.13            | 72.26   | 5.20    | 0.001%  |
| 18            | 10.52                 | -72.26  | -0.00   | -10.52           | 72.26   | 0.00    | 0.001%  |
| 19            | 9.13                  | -72.26  | 5.20    | -9.13            | 72.26   | -5.20   | 0.001%  |
| 20            | 5.34                  | -72.26  | 9.03    | -5.34            | 72.26   | -9.03   | 0.001%  |
| 21            | -0.00                 | -72.26  | 10.44   | 0.00             | 72.26   | -10.43  | 0.001%  |
| 22            | -5.23                 | -72.26  | 9.05    | 5.23             | 72.26   | -9.05   | 0.001%  |
| 23            | -9.06                 | -72.26  | 5.24    | 9.06             | 72.26   | -5.24   | 0.001%  |
| 24            | -10.48                | -72.26  | 0.00    | 10.47            | 72.26   | -0.00   | 0.001%  |
| 25            | -9.06                 | -72.26  | -5.24   | 9.06             | 72.26   | 5.24    | 0.001%  |
| 26            | -5.23                 | -72.26  | -9.05   | 5.23             | 72.26   | 9.05    | 0.001%  |
| 27            | 0.02                  | -46.80  | -20.97  | -0.02            | 46.80   | 20.97   | 0.004%  |
| 28            | 10.80                 | -46.80  | -18.16  | -10.80           | 46.80   | 18.16   | 0.001%  |
| 29            | 18.41                 | -46.80  | -10.46  | -18.41           | 46.80   | 10.46   | 0.001%  |
| 30            | 21.19                 | -46.80  | -0.02   | -21.19           | 46.80   | 0.02    | 0.004%  |

| Load Comb. | Sum of Applied Forces |         |         | Sum of Reactions |         |         | % Error |
|------------|-----------------------|---------|---------|------------------|---------|---------|---------|
|            | PX<br>K               | PY<br>K | PZ<br>K | PX<br>K          | PY<br>K | PZ<br>K |         |
| 31         | 18.39                 | -46.80  | 10.42   | -18.39           | 46.80   | -10.42  | 0.001%  |
| 32         | 10.76                 | -46.80  | 18.14   | -10.76           | 46.80   | -18.14  | 0.001%  |
| 33         | -0.02                 | -46.80  | 20.97   | 0.02             | 46.80   | -20.97  | 0.004%  |
| 34         | -10.55                | -46.80  | 18.20   | 10.55            | 46.80   | -18.20  | 0.001%  |
| 35         | -18.25                | -46.80  | 10.55   | 18.25            | 46.80   | -10.55  | 0.001%  |
| 36         | -21.09                | -46.80  | 0.02    | 21.09            | 46.80   | -0.02   | 0.004%  |
| 37         | -18.23                | -46.80  | -10.51  | 18.22            | 46.80   | 10.51   | 0.001%  |
| 38         | -10.51                | -46.80  | -18.18  | 10.51            | 46.80   | 18.18   | 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        | 11               | 0.00000001             | 0.00007082      |
| 3                | Yes        | 13               | 0.00000001             | 0.00004133      |
| 4                | Yes        | 13               | 0.00000001             | 0.00004169      |
| 5                | Yes        | 11               | 0.00000001             | 0.00005179      |
| 6                | Yes        | 13               | 0.00000001             | 0.00004286      |
| 7                | Yes        | 13               | 0.00000001             | 0.00003959      |
| 8                | Yes        | 11               | 0.00000001             | 0.00007544      |
| 9                | Yes        | 13               | 0.00000001             | 0.00004333      |
| 10               | Yes        | 13               | 0.00000001             | 0.00004109      |
| 11               | Yes        | 11               | 0.00000001             | 0.00005289      |
| 12               | Yes        | 13               | 0.00000001             | 0.00003941      |
| 13               | Yes        | 13               | 0.00000001             | 0.00004356      |
| 14               | Yes        | 6                | 0.00000001             | 0.00001641      |
| 15               | Yes        | 11               | 0.00000001             | 0.00002592      |
| 16               | Yes        | 11               | 0.00000001             | 0.00002221      |
| 17               | Yes        | 11               | 0.00000001             | 0.00002463      |
| 18               | Yes        | 11               | 0.00000001             | 0.00002435      |
| 19               | Yes        | 11               | 0.00000001             | 0.00002884      |
| 20               | Yes        | 11               | 0.00000001             | 0.00002040      |
| 21               | Yes        | 11               | 0.00000001             | 0.00002602      |
| 22               | Yes        | 11               | 0.00000001             | 0.00002934      |
| 23               | Yes        | 11               | 0.00000001             | 0.00002374      |
| 24               | Yes        | 11               | 0.00000001             | 0.00002464      |
| 25               | Yes        | 11               | 0.00000001             | 0.00002138      |
| 26               | Yes        | 11               | 0.00000001             | 0.00003119      |
| 27               | Yes        | 10               | 0.00008304             | 0.00014111      |
| 28               | Yes        | 11               | 0.00000001             | 0.00011108      |
| 29               | Yes        | 11               | 0.00000001             | 0.00011513      |
| 30               | Yes        | 10               | 0.00008297             | 0.00012881      |
| 31               | Yes        | 11               | 0.00000001             | 0.00012375      |
| 32               | Yes        | 11               | 0.00000001             | 0.00010312      |
| 33               | Yes        | 10               | 0.00008304             | 0.00014294      |
| 34               | Yes        | 11               | 0.00000001             | 0.00012468      |
| 35               | Yes        | 11               | 0.00000001             | 0.00011144      |
| 36               | Yes        | 10               | 0.00008300             | 0.00012871      |
| 37               | Yes        | 11               | 0.00000001             | 0.00010359      |
| 38               | Yes        | 11               | 0.00000001             | 0.00012778      |

### Maximum Tower Deflections - Service Wind

| Section No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|
| L1          | 145 - 92.5      | 38.491                    | 29                    | 2.4818    | 0.0126     |
| L2          | 97.5 - 44.71    | 16.754                    | 29                    | 1.7062    | 0.0035     |
| L3          | 51.29 - 0       | 4.445                     | 29                    | 0.8083    | 0.0011     |

| Section No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|

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

| Elevation<br>ft | Appurtenance                            | Gov.<br>Load<br>Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of<br>Curvature<br>ft |
|-----------------|-----------------------------------------|-----------------------|------------------|-----------|------------|------------------------------|
| 147.0000        | BXA-171063-12CF-EDIN-2 w/<br>Mount Pipe | 29                    | 38.491           | 2.4818    | 0.0128     | 22536                        |
| 137.0000        | 7770.00 w/ Mount Pipe                   | 29                    | 34.519           | 2.3594    | 0.0110     | 14085                        |
| 126.0000        | (4) DB844G65ZAXY w/ Mount<br>Pipe       | 29                    | 29.158           | 2.1884    | 0.0085     | 5930                         |
| 124.0000        | 8-ft Ladder                             | 29                    | 28.205           | 2.1567    | 0.0081     | 5365                         |
| 116.0000        | RR90-17-02DPL2 w/ Mount Pipe            | 29                    | 24.492           | 2.0274    | 0.0065     | 3884                         |
| 114.0000        | 8-ft Ladder                             | 29                    | 23.593           | 1.9943    | 0.0061     | 3633                         |
| 97.0000         | Ice Shield 1.5' x 2.0'                  | 29                    | 16.566           | 1.6970    | 0.0035     | 2409                         |
| 96.0000         | DA1900-39                               | 29                    | 16.194           | 1.6784    | 0.0034     | 2398                         |
| 95.0000         | RR65-18-02DP w/ Mount Pipe              | 29                    | 15.826           | 1.6597    | 0.0032     | 2395                         |
| 87.0000         | 7250.02 w/ Mount Pipe                   | 29                    | 13.065           | 1.5062    | 0.0025     | 2452                         |

### Maximum Tower Deflections - Design Wind

| Section No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|
| L1          | 145 - 92.5      | 68.337                    | 4                     | 4.4076    | 0.0222     |
| L2          | 97.5 - 44.71    | 29.761                    | 4                     | 3.0312    | 0.0061     |
| L3          | 51.29 - 0       | 7.898                     | 4                     | 1.4363    | 0.0020     |

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

| Elevation<br>ft | Appurtenance                            | Gov.<br>Load<br>Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of<br>Curvature<br>ft |
|-----------------|-----------------------------------------|-----------------------|------------------|-----------|------------|------------------------------|
| 147.0000        | BXA-171063-12CF-EDIN-2 w/<br>Mount Pipe | 4                     | 68.337           | 4.4076    | 0.0229     | 12796                        |
| 137.0000        | 7770.00 w/ Mount Pipe                   | 4                     | 61.289           | 4.1904    | 0.0196     | 7997                         |
| 126.0000        | (4) DB844G65ZAXY w/ Mount<br>Pipe       | 4                     | 51.775           | 3.8869    | 0.0152     | 3365                         |
| 124.0000        | 8-ft Ladder                             | 4                     | 50.085           | 3.8306    | 0.0144     | 3044                         |
| 116.0000        | RR90-17-02DPL2 w/ Mount Pipe            | 4                     | 43.496           | 3.6010    | 0.0115     | 2203                         |
| 114.0000        | 8-ft Ladder                             | 4                     | 41.900           | 3.5423    | 0.0109     | 2061                         |
| 97.0000         | Ice Shield 1.5' x 2.0'                  | 4                     | 29.427           | 3.0148    | 0.0062     | 1365                         |
| 96.0000         | DA1900-39                               | 4                     | 28.766           | 2.9818    | 0.0060     | 1358                         |
| 95.0000         | RR65-18-02DP w/ Mount Pipe              | 4                     | 28.113           | 2.9486    | 0.0057     | 1356                         |
| 87.0000         | 7250.02 w/ Mount Pipe                   | 4                     | 23.211           | 2.6760    | 0.0044     | 1386                         |

### Compression Checks

### Pole Design Data

| Section No. | Elevation<br>ft     | Size                   | L<br>ft | L <sub>u</sub><br>ft | Kl/r | F <sub>a</sub><br>ksi | A<br>in <sup>2</sup> | Actual<br>P<br>K | Allow.<br>P <sub>a</sub><br>K | Ratio<br>P<br>P <sub>a</sub> |
|-------------|---------------------|------------------------|---------|----------------------|------|-----------------------|----------------------|------------------|-------------------------------|------------------------------|
| L1          | 145 - 92.5 (1)      | TP35.64x20.5x0.3438    | 52.5000 | 0.0000               | 0.0  | 39.000                | 37.4725              | -16.00           | 1461.43                       | 0.011                        |
| L2          | 92.5 - 44.71<br>(2) | TP48.61x33.5106x0.4375 | 52.7900 | 0.0000               | 0.0  | 39.000                | 65.2117              | -28.41           | 2543.25                       | 0.011                        |
| L3          | 44.71 - 0 (3)       | TP60.5x45.8529x0.4688  | 51.2900 | 0.0000               | 0.0  | 37.783                | 90.6097              | -46.78           | 3423.47                       | 0.014                        |

### Pole Bending Design Data

| Section No. | Elevation<br>ft     | Size                   | Actual<br>M <sub>x</sub><br>kip-ft | Actual<br>f <sub>bx</sub><br>ksi | Allow.<br>F <sub>bx</sub><br>ksi | Ratio<br>$\frac{f_{bx}}{F_{bx}}$ | Actual<br>M <sub>y</sub><br>kip-ft | Actual<br>f <sub>by</sub><br>ksi | Allow.<br>F <sub>by</sub><br>ksi | Ratio<br>$\frac{f_{by}}{F_{by}}$ |
|-------------|---------------------|------------------------|------------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------------------------|----------------------------------|----------------------------------|----------------------------------|
| L1          | 145 - 92.5 (1)      | TP35.64x20.5x0.3438    | 842.73                             | 32.679                           | 39.000                           | 0.838                            | 0.00                               | 0.000                            | 39.000                           | 0.000                            |
| L2          | 92.5 - 44.71<br>(2) | TP48.61x33.5106x0.4375 | 2139.8                             | 34.848                           | 39.000                           | 0.894                            | 0.00                               | 0.000                            | 39.000                           | 0.000                            |
| L3          | 44.71 - 0 (3)       | TP60.5x45.8529x0.4688  | 3905.6<br>4                        | 35.241                           | 37.783                           | 0.933                            | 0.00                               | 0.000                            | 37.783                           | 0.000                            |

### Pole Shear Design Data

| Section No. | Elevation<br>ft     | Size                   | Actual<br>V<br>K | Actual<br>f <sub>v</sub><br>ksi | Allow.<br>F <sub>v</sub><br>ksi | Ratio<br>$\frac{f_v}{F_v}$ | Actual<br>T<br>kip-ft | Actual<br>f <sub>vt</sub><br>ksi | Allow.<br>F <sub>vt</sub><br>ksi | Ratio<br>$\frac{f_{vt}}{F_{vt}}$ |
|-------------|---------------------|------------------------|------------------|---------------------------------|---------------------------------|----------------------------|-----------------------|----------------------------------|----------------------------------|----------------------------------|
| L1          | 145 - 92.5 (1)      | TP35.64x20.5x0.3438    | 24.06            | 0.642                           | 26.000                          | 0.050                      | 1.97                  | 0.036                            | 26.000                           | 0.001                            |
| L2          | 92.5 - 44.71<br>(2) | TP48.61x33.5106x0.4375 | 31.25            | 0.479                           | 26.000                          | 0.037                      | 0.16                  | 0.001                            | 26.000                           | 0.000                            |
| L3          | 44.71 - 0 (3)       | TP60.5x45.8529x0.4688  | 37.67            | 0.416                           | 26.000                          | 0.032                      | 0.05                  | 0.000                            | 26.000                           | 0.000                            |

### Pole Interaction Design Data

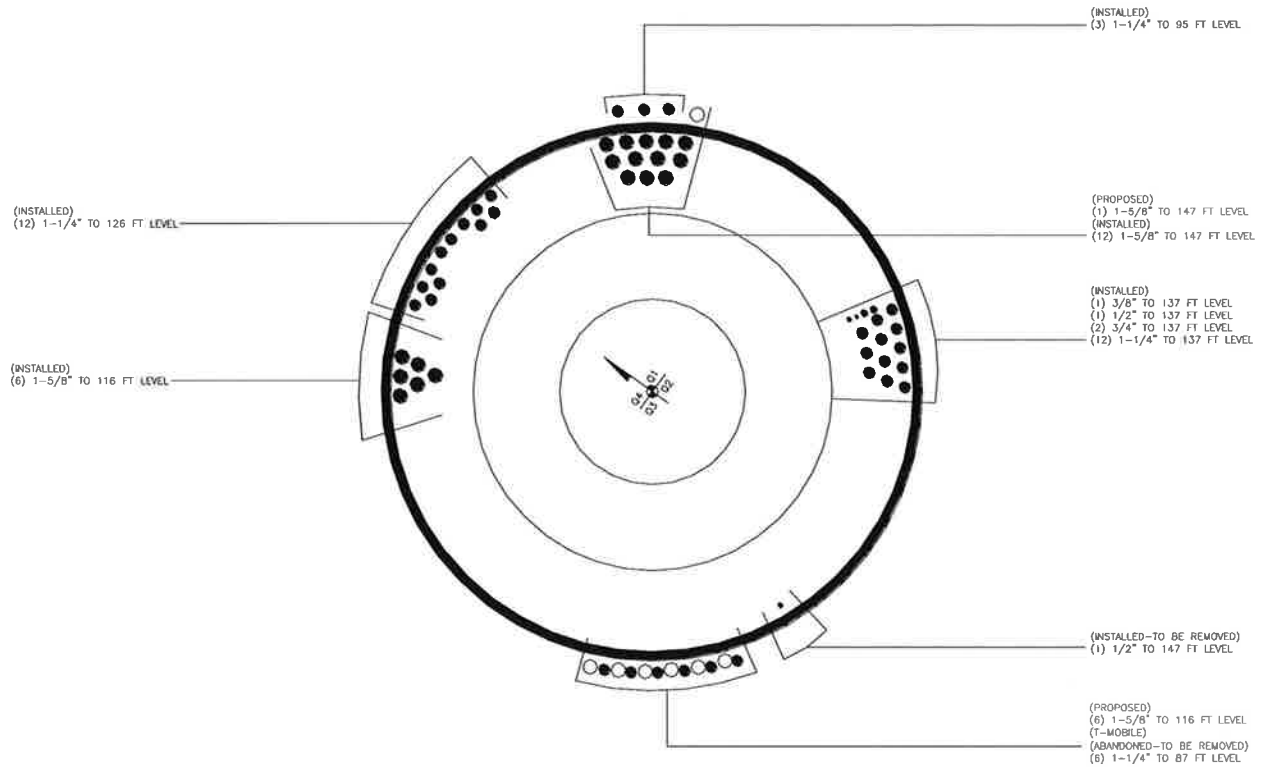
| Section No. | Elevation<br>ft     | Ratio<br>P<br>P <sub>a</sub> | Ratio<br>f <sub>bx</sub><br>F <sub>bx</sub> | Ratio<br>f <sub>by</sub><br>F <sub>by</sub> | Ratio<br>f <sub>v</sub><br>F <sub>v</sub> | Ratio<br>f <sub>vt</sub><br>F <sub>vt</sub> | Comb.<br>Stress<br>Ratio | Allow.<br>Stress<br>Ratio | Criteria  |
|-------------|---------------------|------------------------------|---------------------------------------------|---------------------------------------------|-------------------------------------------|---------------------------------------------|--------------------------|---------------------------|-----------|
| L1          | 145 - 92.5 (1)      | 0.011                        | 0.838                                       | 0.000                                       | 0.050                                     | 0.001                                       | 0.850<br>✓               | 1.333                     | H1-3+VT ✓ |
| L2          | 92.5 - 44.71<br>(2) | 0.011                        | 0.894                                       | 0.000                                       | 0.037                                     | 0.000                                       | 0.905<br>✓               | 1.333                     | H1-3+VT ✓ |
| L3          | 44.71 - 0 (3)       | 0.014                        | 0.933                                       | 0.000                                       | 0.032                                     | 0.000                                       | 0.947<br>✓               | 1.333                     | H1-3+VT ✓ |

### Section Capacity Table

| Section No. | Elevation<br>ft | Component<br>Type | Size                   | Critical<br>Element | P<br>K | SF*P <sub>allow</sub><br>K | %<br>Capacity | Pass<br>Fail |
|-------------|-----------------|-------------------|------------------------|---------------------|--------|----------------------------|---------------|--------------|
| L1          | 145 - 92.5      | Pole              | TP35.64x20.5x0.3438    | 1                   | -16.00 | 1948.09                    | 63.7          | Pass         |
| L2          | 92.5 - 44.71    | Pole              | TP48.61x33.5106x0.4375 | 2                   | -28.41 | 3390.15                    | 67.9          | Pass         |
| L3          | 44.71 - 0       | Pole              | TP60.5x45.8529x0.4688  | 3                   | -46.78 | 4563.49                    | 71.0          | Pass         |
|             |                 |                   |                        |                     |        |                            | Summary       |              |
|             |                 |                   |                        |                     |        |                            | Pole (L3)     | Pass         |
|             |                 |                   |                        |                     |        |                            | RATING = 71.0 | Pass         |

## APPENDIX B

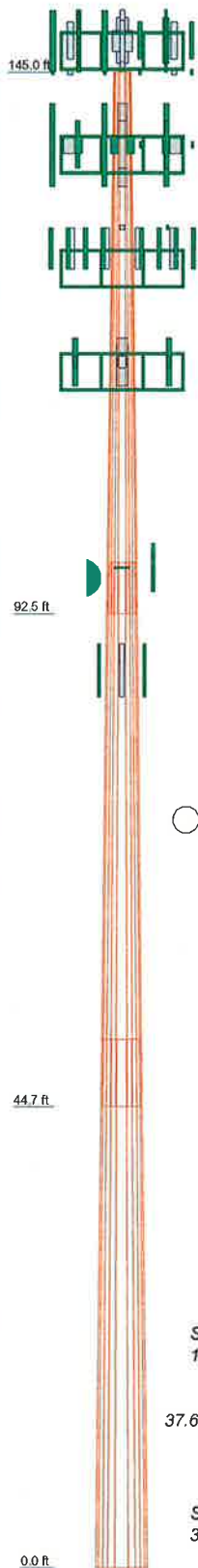
### BASE LEVEL DRAWING



## **APPENDIX C**

### **ADDITIONAL CALCULATIONS**

| Section            | 1       | 2       | 3       |
|--------------------|---------|---------|---------|
| Length (ft)        | 52.5000 | 52.7900 | 51.2900 |
| Number of Sides    | 12      | 12      | 12      |
| Thickness (in)     | 0.3438  | 0.4375  | 0.4688  |
| Socket Length (ft) | 5.0000  | 6.5800  |         |
| Top Dia (in)       | 20.5000 | 33.5106 | 45.8529 |
| Bot Dia (in)       | 35.6400 | 48.6100 | 60.5000 |
| Grade              |         | A572-65 |         |
| Weight (K)         | 5.5     | 10.3    | 13.9    |



## DESIGNED APPURTENANCE LOADING

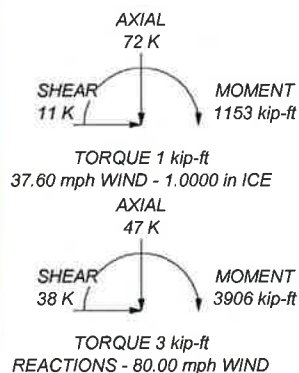
| TYPE                                 | ELEVATION | TYPE                                 | ELEVATION |
|--------------------------------------|-----------|--------------------------------------|-----------|
| BXA-171063-12CF-EDIN-2 w/ Mount Pipe | 147       | 7020.00                              | 137       |
| BXA-171063-12CF-EDIN-2 w/ Mount Pipe | 147       | DTMABP7819VG12A                      | 137       |
| BXA-171063-12CF-EDIN-2 w/ Mount Pipe | 147       | DTMABP7819VG12A                      | 137       |
| BXA-171063-12CF-EDIN-2 w/ Mount Pipe | 147       | DTMABP7819VG12A                      | 137       |
| RRH2x40-AWS                          | 147       | DC6-48-60-18-8F                      | 137       |
| RRH2x40-AWS                          | 147       | (2) RRUS-11                          | 137       |
| RRH2x40-AWS                          | 147       | (2) RRUS-11                          | 137       |
| DB-T1-6Z-8AB-0Z                      | 147       | (2) RRUS-11                          | 137       |
| BXA-171063-8BF-2 w/ Mount Pipe       | 147       | Platform Mount [LP 1001-1]           | 137       |
| BXA-171063-8BF-2 w/ Mount Pipe       | 147       | (4) DB844G65ZAXY w/ Mount Pipe       | 126       |
| BXA-171063-8BF-2 w/ Mount Pipe       | 147       | (4) DB844G65ZAXY w/ Mount Pipe       | 126       |
| BXA-171063-8BF-2 w/ Mount Pipe       | 147       | (4) DB844G65ZAXY w/ Mount Pipe       | 126       |
| (2) SC-E 6014 rev2 w/ Mount Pipe     | 147       | GPS_A                                | 126       |
| (2) SC-E 6014 rev2 w/ Mount Pipe     | 147       | GPS_A                                | 126       |
| (2) LPA-80063/6CF w/ Mount Pipe      | 147       | Platform Mount [LP 601-1]            | 126       |
| SLCP 2x6014 w/ Mount Pipe            | 147       | 8-ft Ladder                          | 124       |
| SLCP 2x6014 w/ Mount Pipe            | 147       | RR90-17-02DPL2 w/ Mount Pipe         | 116       |
| BXA-70063-8CF-EDIN-6 w/ Mount Pipe   | 147       | RR90-17-02DPL2 w/ Mount Pipe         | 116       |
| (2) FD9R6004/2C-3L                   | 147       | RR90-17-02DPL2 w/ Mount Pipe         | 116       |
| (2) FD9R6004/2C-3L                   | 147       | APX16DWV-16DWV-S-E-A20 w/ Mount Pipe | 116       |
| (2) FD9R6004/2C-3L                   | 147       | APX16DWV-16DWV-S-E-A20 w/ Mount Pipe | 116       |
| Platform Mount [LP 1001-1]           | 147       | APX16DWV-16DWV-S-E-A20 w/ Mount Pipe | 116       |
| 7770.00 w/ Mount Pipe                | 137       | APX16DWV-16DWV-S-E-A20 w/ Mount Pipe | 116       |
| 7770.00 w/ Mount Pipe                | 137       | ATMAA1412D-1A20                      | 116       |
| 7770.00 w/ Mount Pipe                | 137       | ATMAA1412D-1A20                      | 116       |
| (2) LGP13519                         | 137       | ATMAA1412D-1A20                      | 116       |
| (2) LGP13519                         | 137       | ATMPP1412D-1CWA                      | 116       |
| (2) LGP13519                         | 137       | ATMPP1412D-1CWA                      | 116       |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe  | 137       | ATMPP1412D-1CWA                      | 116       |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe  | 137       | Platform Mount [LP 601-1]            | 116       |
| P65-17-XLH-RR w/ Mount Pipe          | 137       | 8-ft Ladder                          | 114       |
| P65-17-XLH-RR w/ Mount Pipe          | 137       | Ice Shield 1.5' x 2.0'               | 97        |
| (2) P65-17-XLH-RR w/ Mount Pipe      | 137       | Side Arm Mount [SO 701-1]            | 95        |
| TT19-08BP111-001                     | 137       | Side Arm Mount [SO 701-1]            | 95        |
| TT19-08BP111-001                     | 137       | RR65-18-02DP w/ Mount Pipe           | 95        |
| TT19-08BP111-001                     | 137       | DA1900-39                            | 95        |
| 7020.00                              | 137       | 7250.02 w/ Mount Pipe                | 87        |
| 7020.00                              | 137       | 7250.02 w/ Mount Pipe                | 87        |
|                                      |           | Pipe Mount [PM 601-3]                | 87        |
|                                      |           | 7250.02 w/ Mount Pipe                | 87        |

## MATERIAL STRENGTH

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

## TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80.00 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.60 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60.00 mph wind.
5. TOWER RATING: 71%



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

Job: **Ex. 145-ft Monopole in Hartford Co., CT**

Project: **PJF: 37513-2359 (BU: 806368)**

Client: **Crown Castle**

Drawn by: **Jason Martin, E.I.**

App'd:

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

Date: **10/28/13**

Scale: **NTS**

Path:

Dwg No. **E-1**

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

## TIA Rev F

### Site Data

|                    |        |
|--------------------|--------|
| BU#:               | 806368 |
| Site Name:         |        |
| App #:             |        |
| Pole Manufacturer: | Other  |

### Anchor Rod Data

|                |        |     |
|----------------|--------|-----|
| Qty:           | 20     |     |
| Diam:          | 2.25   | in  |
| Rod Material:  | A615-J |     |
| Strength (Fu): | 100    | ksi |
| Yield (Fy):    | 75     | ksi |
| Bolt Circle:   | 70     | in  |

### Plate Data

|                   |      |     |
|-------------------|------|-----|
| Diam:             | 76.5 | in  |
| Thick:            | 2.25 | in  |
| Grade:            | 60   | ksi |
| Single-Rod B-eff: | 9.73 | in  |

### Stiffener Data (Welding at both sides)

|                 |  |               |
|-----------------|--|---------------|
| Config:         |  | *             |
| 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           |

### Pole Data

|                    |         |              |
|--------------------|---------|--------------|
| Diam:              | 60.5    | in           |
| Thick:             | 0.46875 | in           |
| Grade:             | 65      | ksi          |
| # of Sides:        | 12      | "0" IF Round |
| Fu                 | 80      | ksi          |
| Reinf. Fillet Weld | 0       | "0" if None  |

### Stress Increase Factor

|       |       |  |
|-------|-------|--|
| ASIF: | 1.333 |  |
|-------|-------|--|

### Reactions

|         |      |         |
|---------|------|---------|
| Moment: | 3906 | ft-kips |
| Axial:  | 47   | kips    |
| Shear:  | 38   | kips    |

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

### Anchor Rod Results

|                          |            |
|--------------------------|------------|
| Maximum Rod Tension:     | 131.6 Kips |
| Allowable Tension:       | 195.0 Kips |
| Anchor Rod Stress Ratio: | 67.5% Pass |

### Rigid

|              |
|--------------|
| Service, ASD |
| Fty*ASIF     |

### Base Plate Results

|                          |            |
|--------------------------|------------|
| Base Plate Stress:       | 48.3 ksi   |
| Allowable Plate Stress:  | 60.0 ksi   |
| Base Plate Stress Ratio: | 80.5% Pass |

### Flexural Check

### Rigid

|              |
|--------------|
| Service ASD  |
| 0.75*Fy*ASIF |
| Y.L. Length: |
| 35.21        |

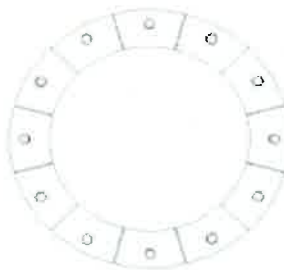
n/a

### Stiffener Results

|                                                |     |
|------------------------------------------------|-----|
| Horizontal Weld :                              | n/a |
| Vertical Weld:                                 | n/a |
| Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$ :    | n/a |
| Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$ : | n/a |
| Plate Comp. (AISC Bracket):                    | n/a |

### Pole Results

|                            |     |
|----------------------------|-----|
| Pole Punching Shear Check: | n/a |
|----------------------------|-----|



\* 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



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

Page 1 of 1  
By JCM Date 10/28/2013  
Project 37513-2033  
Client Crown Castle USA  
PROJ# 879129

### **Foundation Comparison**

| Reactions        | Original Design | Current Analysis | Ratio |
|------------------|-----------------|------------------|-------|
| Moment (ft-kips) | 5001.4          | 3906.0           | 78.1% |
| Shear (kips)     | 44.6            | 38.0             | 85.2% |
| Axial (kips)     | 50.6            | 47.0             | 92.9% |

Note: Although the shear capacity is at 85.2% and the Axial capacity is at 92.9%, the moment reaction is the governing criteria for a monopole drilled shaft foundation, therefore, the overall capacity for this foundation 78.1%.