



# STATE OF CONNECTICUT

## CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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### VIA ELECTRONIC MAIL

September 20, 2018

Jeffrey Barbadora  
Crown Castle  
Real Estate Specialist  
12 Gill Street, Suite 5800  
Woburn, MA 01801

RE: **EM-SPRINT-079-180813** – Sprint notice of intent to modify an existing telecommunications facility locate at 73 North Main Street, Marlborough, Connecticut.

Dear Mr. Barbadora:

The Connecticut Siting Council (Council) is in receipt of your correspondence of September 19, 2018, submitted in response to the Council's August 15, 2018 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman  
Executive Director

MAB/FC/IN

## Robidoux, Evan

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**From:** Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>  
**Sent:** Wednesday, September 19, 2018 10:54 AM  
**To:** Robidoux, Evan  
**Cc:** CSC-DL Siting Council  
**Subject:** RE: Correction: Council Extension Letter for EM-SPRINT-079-180813-NoMainSt-Marlborough  
**Attachments:** SA-09-19-18.pdf

Good morning,

Please find a new structural analysis attached that includes the AT&T antenna issue.

Please let me know if you need me to fedex three copies of the structural analysis.

Thanks,

**Jeffrey Barbadora**

781-970-0053

12 Gill Street, Suite 5800, Woburn, MA 01801

[CrownCastle.com](http://CrownCastle.com)

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**From:** Robidoux, Evan  
**Sent:** Wednesday, September 12, 2018 4:10 PM  
**To:** Barbadora, Jeff  
**Cc:** CSC-DL Siting Council  
**Subject:** Correction: Council Extension Letter for EM-SPRINT-079-180813-NoMainSt-Marlborough

Hi Jeff,

I sent an email yesterday with a subject line for a Council Response and Acknowledgement letter. The letter in question was actually the extension letter that you requested for the incomplete on this EM. I am reattaching it here.

I am also sending a hard copy through the mail as it appears I did not send one out yet.

I apologize for any confusion, and I hope you have a nice day!

Sincerely,

Evan Robidoux  
Clerk Typist  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051

This email may contain confidential or privileged material. Use or disclosure of it by anyone other than the recipient is unauthorized. If you are not an intended recipient, please delete this email.



Date: **September 17, 2018**

Denice Nicholson  
Crown Castle  
3 Corporate Park Drive Suite 101  
Clifton Park, NY 12065



2000 Corporate Dr  
Canonsburg, PA 15317  
(724) 416-2000

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

**Carrier Designation:** **Sprint PCS Co-Locate**  
**Carrier Site Number:** CT03XC210  
**Carrier Site Name:** HRT 107

**Crown Castle Designation:** **Crown Castle BU Number:** 806366  
**Crown Castle Site Name:** HRT 107(C) 943204  
**Crown Castle JDE Job Number:** 465318  
**Crown Castle Work Order Number:** 1634292  
**Crown Castle Order Number:** 410917 Rev. 2

**Engineering Firm Designation:** **Crown Castle Project Number:** 1634292

**Site Data:** **73 North Main Street, MARLBOROUGH, Hartford County, CT**  
**Latitude 41° 37' 47.3", Longitude -72° 27' 59.4"**  
**155.5 Foot - Monopole Tower**

Dear Denice Nicholson,

Crown Castle is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above mentioned tower.

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

LC5: Proposed Equipment Configuration

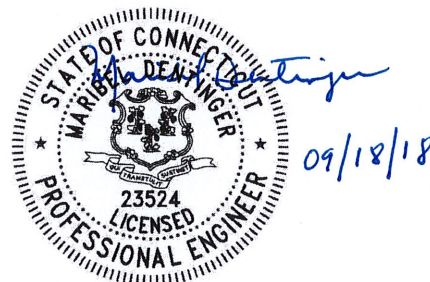
**Sufficient Capacity**

The analysis has been performed in accordance with the TIA-222-G Standard. This analysis utilizes an ultimate 3-second gust wind speed of 130 mph (converted an equivalent 101 mph nominal 3-second gust wind speed per Section 1609.3.1 for use with TIA-222 G) as required by the 2016 Connecticut State Building Code. Exposure Category B and Risk Category II were used in this analysis.

Structural analysis prepared by: Tyler Ho, E.I.T. / Shan

Respectfully submitted by:

  
Maribel Dentinger, P. E.  
Senior Project Engineer



## TABLE OF CONTENTS

### 1) INTRODUCTION

### 2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Other Considered Equipment

### 3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

### 4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Table 5 – Tower Component Stresses vs. Capacity – LC5

4.1) Recommendations

### 5) APPENDIX A

tnxTower Output

### 6) APPENDIX B

Base Level Drawing

### 7) APPENDIX C

Additional Calculations

## 1) INTRODUCTION

This tower is a 155.5 ft. Monopole tower designed by FWT INC.

## 2) ANALYSIS CRITERIA

|                             |                                      |
|-----------------------------|--------------------------------------|
| <b>Building Code:</b>       | 2016 Connecticut State Building Code |
| <b>TIA-222 Revision:</b>    | TIA-222-G                            |
| <b>Risk Category:</b>       | II                                   |
| <b>Wind Speed:</b>          | 101 mph                              |
| <b>Exposure Category:</b>   | B                                    |
| <b>Topographic Factor:</b>  | 1                                    |
| <b>Ice Thickness:</b>       | 0.75 in                              |
| <b>Wind Speed with Ice:</b> | 50 mph                               |
| <b>Service Wind Speed:</b>  | 60 mph                               |

**Table 1 - Proposed Equipment Configuration**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer           | Antenna Model             | Number of Feed Lines | Feed Line Size (in) |
|---------------------|----------------------------|--------------------|--------------------------------|---------------------------|----------------------|---------------------|
| 128.0               | 130.0                      | 3                  | alcatel lucent                 | PCS 1900MHZ 4X45W-65MHZ   | 3<br>1               | 1-1/4<br>7/8        |
|                     |                            | 6                  | alcatel lucent                 | RRH2X50-800               |                      |                     |
|                     |                            | 3                  | alcatel lucent                 | TD-RRH8X20-25             |                      |                     |
|                     |                            | 3                  | commscope                      | NNVV-65B-R4 w/ Mount Pipe |                      |                     |
|                     | 3                          | rfs celwave        | APXVTM14-ALU-I20 w/ Mount Pipe |                           |                      |                     |
|                     | 128.0                      | 2                  | tower mounts                   | T-Arm Mount [TA 602-3]    |                      |                     |

**Table 2 – Other Considered Equipment**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model                       | Number of Feed Lines | Feed Line Size (in)            |
|---------------------|----------------------------|--------------------|----------------------|-------------------------------------|----------------------|--------------------------------|
| 156.0               | 159.0                      | 3x                 | alcatel lucent       | RRH2x60-700                         | 17                   | 1-5/8                          |
|                     |                            | 3x                 | alcatel lucent       | RRH2x60-AWS                         |                      |                                |
|                     |                            | 3x                 | alcatel lucent       | RRH2x60-PCS                         |                      |                                |
|                     |                            | 6x                 | andrew               | SBNHH-1D65B w/ Mount Pipe           |                      |                                |
|                     |                            | 5                  | commscope            | LNx-6514DS-A1M w/ Mount Pipe        |                      |                                |
|                     |                            | 1                  | commscope            | LNx-8513DS-VTM w/ Mount Pipe        |                      |                                |
|                     |                            | 3                  | decibel              | DB809K-Y                            |                      |                                |
|                     | 2                          | rfs celwave        | DB-T1-6Z-8AB-0Z      |                                     |                      |                                |
|                     | 156.0                      | 1                  | tower mounts         | Platform Mount [LP 1001-1]          |                      |                                |
| 144.0               | 144.0                      | 3                  | ericsson             | RRUS 12                             | 12<br>2<br>1<br>1    | 1-1/4<br>3/4<br>3/8<br>Conduit |
|                     |                            | 3                  | ericsson             | RRUS-11                             |                      |                                |
|                     |                            | 12                 | kathrein             | 860 10025                           |                      |                                |
|                     |                            | 3                  | kmw com              | AM-X-CD-16-65-00T-RET w/ Mount Pipe |                      |                                |
|                     |                            | 3                  | powerwave tech       | 1001940                             |                      |                                |
|                     |                            | 6                  | powerwave tech       | 7770.00 w/ Mount Pipe               |                      |                                |
|                     |                            | 6                  | powerwave tech       | LGP 17201                           |                      |                                |
| 6                   | powerwave tech             | LGP21903           |                      |                                     |                      |                                |

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model                | Number of Feed Lines | Feed Line Size (in) |
|---------------------|----------------------------|--------------------|----------------------|------------------------------|----------------------|---------------------|
|                     |                            | 1                  | raycap               | DC6-48-60-18-8F              |                      |                     |
|                     |                            | 1                  | tower mounts         | Platform Mount [LP 1001-1]   |                      |                     |
| 135.0               | 135.0                      | 3                  | kathrein             | 742 213 w/ Mount Pipe        | 6                    | 1-1/4               |
| 100.0               | 100.0                      | 6                  | andrew               | ETM19V2S12UB                 | 12                   | 1-1/4               |
|                     |                            | 3                  | commscope            | ATBT-BOTTOM-24V              |                      |                     |
|                     |                            | 3                  | commscope            | LNx-6515DS-VTM w/ Mount Pipe |                      |                     |
|                     |                            | 3                  | ems wireless         | RV90-17-00DP w/ Mount Pipe   |                      |                     |
|                     |                            | 1                  | tower mounts         | Side Arm Mount [SO 701-3]    |                      |                     |

### 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

| Document                                 | Remarks         | Reference | Source   |
|------------------------------------------|-----------------|-----------|----------|
| 4-GEOTECHNICAL REPORTS                   | FDH Engineering | 2208816   | CCISITES |
| 4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS | FWT, Inc.       | 823125    | CCISITES |
| 4-TOWER MANUFACTURER DRAWINGS            | FWT, Inc.       | 823126    | CCISITES |

#### 3.1) Analysis Method

tnxTower (version 8.0.2.1), 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 and maintained in accordance with the manufacturer's specifications.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle 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          | 155.5 - 110    | Pole           | TP64.606x58.6x0.375  | 1                | -26.38 | 3989.11        | 15.2       | Pass        |
| L2          | 110 - 72.5     | Pole           | TP68.805x62.8x0.4375 | 2                | -45.20 | 5321.74        | 28.6       | Pass        |
| L3          | 72.5 - 36      | Pole           | TP72.748x66.8082x0.5 | 3                | -66.88 | 6775.62        | 37.7       | Pass        |
| L4          | 36 - 0         | Pole           | TP76.5x70.56x0.5     | 4                | -95.75 | 6928.62        | 56.7       | Pass        |
|             |                |                |                      |                  |        |                | Summary    |             |
|             |                |                |                      |                  |        | Pole (L4)      | 56.7       | Pass        |
|             |                |                |                      |                  |        | Rating =       | 56.7       | Pass        |

**Table 5 - Tower Component Stresses vs. Capacity – LC5**

| Notes                                               | Component                          | Elevation (ft) | % Capacity | Pass / Fail  |
|-----------------------------------------------------|------------------------------------|----------------|------------|--------------|
| 1                                                   | Anchor Rods                        | 0              | 57.3       | Pass         |
| 1                                                   | Base Plate                         | 0              | 25.8       | Pass         |
| 1                                                   | Base Foundation - Structure        | 0              | 33.1       | Pass         |
| 1                                                   | Base Foundation - Soil Interaction | 0              | 34.0       | Pass         |
| <b>Structure Rating (max from all components) =</b> |                                    |                |            | <b>57.3%</b> |

Notes:

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

**4.1) Recommendations**

The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

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



**DESIGNED APPURTENANCE LOADING**

| TYPE                                | ELEVATION | TYPE                           | ELEVATION |
|-------------------------------------|-----------|--------------------------------|-----------|
| DB809K-Y                            | 156       | RRUS-11                        | 144       |
| DB809K-Y                            | 156       | (3) RRUS 12                    | 144       |
| DB809K-Y                            | 156       | 1001940                        | 144       |
| LNx-8513DS-VTM w/ Mount Pipe        | 156       | (2) 1001940                    | 144       |
| LNx-6514DS-A1M w/ Mount Pipe        | 156       | (8) 860 10025                  | 144       |
| LNx-6514DS-AIM w/ Mount Pipe        | 156       | (4) 860 10025                  | 144       |
| LNx-6514DS-AIM w/ Mount Pipe        | 156       | DC6-48-60-18-8F                | 144       |
| LNx-6514DS-A1M w/ Mount Pipe        | 156       | (2) 6' x 2" Mount Pipe         | 144       |
| LNx-6514DS-A1M w/ Mount Pipe        | 156       | (2) 6' x 2" Mount Pipe         | 144       |
| (2) SBNHH-1D65B w/ Mount Pipe       | 156       | (2) 6' x 2" Mount Pipe         | 144       |
| (2) SBNHH-1D65B w/ Mount Pipe       | 156       | Platform Mount [LP 1001-1]     | 144       |
| (2) SBNHH-1D65B w/ Mount Pipe       | 156       | 742 213 w/ Mount Pipe          | 135       |
| RRH2x60-AWS                         | 156       | 742 213 w/ Mount Pipe          | 135       |
| RRH2x60-AWS                         | 156       | 742 213 w/ Mount Pipe          | 135       |
| RRH2x60-AWS                         | 156       | NNVV-65B-R4 w/ Mount Pipe      | 128       |
| RRH2x60-AWS                         | 156       | NNVV-65B-R4 w/ Mount Pipe      | 128       |
| RRH2x60-PCS                         | 156       | NNVV-65B-R4 w/ Mount Pipe      | 128       |
| RRH2x60-PCS                         | 156       | NNVV-65B-R4 w/ Mount Pipe      | 128       |
| RRH2x60-PCS                         | 156       | APXVTM14-ALU-I20 w/ Mount Pipe | 128       |
| (2) DB-T1-6Z-8AB-OZ                 | 156       | APXVTM14-ALU-I20 w/ Mount Pipe | 128       |
| RRH2x60-700                         | 156       | APXVTM14-ALU-I20 w/ Mount Pipe | 128       |
| RRH2x60-700                         | 156       | RRH2X50-800                    | 128       |
| RRH2x60-700                         | 156       | RRH2X50-800                    | 128       |
| RRH2x60-700                         | 156       | (4) RRH2X50-800                | 128       |
| 6' x 2" Mount Pipe                  | 156       | RRH2X50-800                    | 128       |
| 6' x 2" Mount Pipe                  | 156       | (3) PCS 1900MHZ 4X45W-65MHZ    | 128       |
| 6' x 2" Mount Pipe                  | 156       | (3) TD-RRH8X20-25              | 128       |
| Platform Mount [LP 1001-1]          | 156       | T-Arm Mount [TA 602-3]         | 128       |
| (2) 7770.00 w/ Mount Pipe           | 144       | T-Arm Mount [TA 602-3]         | 128       |
| (2) 7770.00 w/ Mount Pipe           | 144       | 8' x 2" Mount Pipe             | 128       |
| (2) 7770.00 w/ Mount Pipe           | 144       | 8' x 2" Mount Pipe             | 128       |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe | 144       | 8' x 2" Mount Pipe             | 128       |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe | 144       | LNx-6515DS-VTM w/ Mount Pipe   | 100       |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe | 144       | LNx-6515DS-VTM w/ Mount Pipe   | 100       |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe | 144       | LNx-6515DS-VTM w/ Mount Pipe   | 100       |
| (2) LGP 17201                       | 144       | RV90-17-00DP w/ Mount Pipe     | 100       |
| (2) LGP 17201                       | 144       | RV90-17-00DP w/ Mount Pipe     | 100       |
| (2) LGP 17201                       | 144       | RV90-17-00DP w/ Mount Pipe     | 100       |
| (2) LGP21903                        | 144       | ATBT-BOTTOM-24V                | 100       |
| (2) LGP21903                        | 144       | ATBT-BOTTOM-24V                | 100       |
| (2) LGP21903                        | 144       | ATBT-BOTTOM-24V                | 100       |
| (2) LGP21903                        | 144       | (2) ETM19V2S12UB               | 100       |
| RRUS-11                             | 144       | (2) ETM19V2S12UB               | 100       |
| RRUS-11                             | 144       | (2) ETM19V2S12UB               | 100       |
| RRUS-11                             | 144       | Side Arm Mount [SO 701-3]      | 100       |

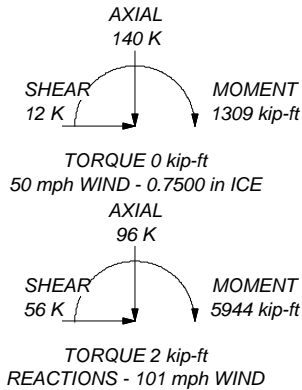
**MATERIAL STRENGTH**

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

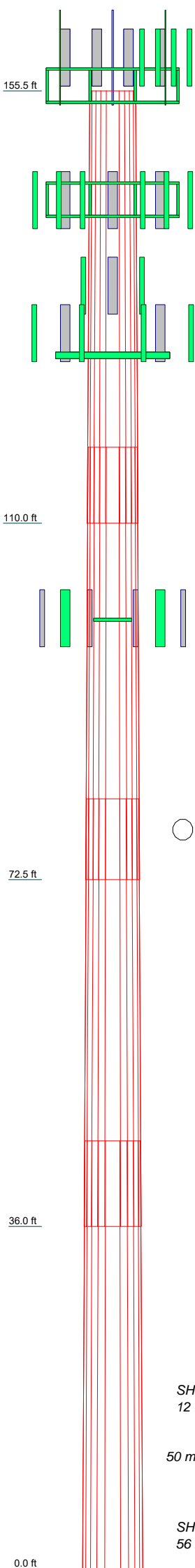
**TOWER DESIGN NOTES**

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. Wind speed converted per Section 1609.3.1 for use with TIA-222 G.
9. TOWER RATING: 56.7%

ALL REACTIONS ARE FACTORED



| Section | Length (ft) | Number of Sides | Thickness (in) | Socket Length (ft) | Top Dia (in) | Bot Dia (in) | Grade   | Weight (K) |
|---------|-------------|-----------------|----------------|--------------------|--------------|--------------|---------|------------|
| 1       | 45.50       | 12              | 0.3750         | 8.00               | 58.6000      | 64.6060      | A572-65 | 11.4       |
| 2       | 45.50       | 12              | 0.4375         | 8.50               | 62.8000      | 68.8050      | A572-65 | 14.3       |
| 3       | 45.00       | 12              | 0.5000         | 9.00               | 66.8082      | 72.7480      | A572-65 | 17.1       |
| 4       | 45.00       | 12              | 0.5000         | 70.5600            | 76.5000      |              | A572-65 | 18.0       |
|         |             |                 |                |                    |              |              |         | 60.8       |



|                                                                                                                                      |                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <p><b>Crown Castle</b><br/>2000 Corporate Dr<br/>Canonsburg, PA 15317<br/>The Pathway to Possible Phone: (724) 416-2000<br/>FAX:</p> | <p>Job: <b>BU# 806366</b></p>                                                      |
|                                                                                                                                      | <p>Project:</p>                                                                    |
|                                                                                                                                      | <p>Client: Crown Castle</p>                                                        |
|                                                                                                                                      | <p>Code: TIA-222-G</p>                                                             |
|                                                                                                                                      | <p>Path:</p>                                                                       |
| <p>Drawn by: THo</p>                                                                                                                 | <p>App'd:</p>                                                                      |
| <p>Date: 09/17/18</p>                                                                                                                | <p>Scale: NTS</p>                                                                  |
| <p>Dwg No. E-1</p>                                                                                                                   | <p>Path: R:\SA Models - Letters\Work Area\TIA\WIP\806366.WO 1634292\806366.dwg</p> |

## Tower Input Data

The tower is a monopole.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

- 1) Tower is located in Hartford County, Connecticut.
- 2) Basic wind speed of 101 mph.
- 3) Structure Class II.
- 4) Exposure Category B.
- 5) Topographic Category 1.
- 6) Crest Height 0.00 ft.
- 7) Nominal ice thickness of 0.7500 in.
- 8) Ice thickness is considered to increase with height.
- 9) Ice density of 56 pcf.
- 10) A wind speed of 50 mph is used in combination with ice.
- 11) Temperature drop of 50 °F.
- 12) Deflections calculated using a wind speed of 60 mph.
- 13) Wind speed converted per Section 1609.3.1 for use with TIA-222 G..
- 14) A non-linear (P-delta) analysis was used.
- 15) Pressures are calculated at each section.
- 16) Stress ratio used in pole design is 1.
- 17) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Consider Moments - Legs<br>Consider Moments - Horizontals<br>Consider Moments - Diagonals<br>Use Moment Magnification<br>✓ Use Code Stress Ratios<br>✓ Use Code Safety Factors - Guys<br>Escalate Ice<br>Always Use Max Kz<br>Use Special Wind Profile<br><br>Include Bolts In Member Capacity<br><br>Leg Bolts Are At Top Of Section<br>Secondary Horizontal Braces Leg<br>Use Diamond Inner Bracing (4 Sided)<br>SR Members Have Cut Ends<br>SR Members Are Concentric | Distribute Leg Loads As Uniform<br>Assume Legs Pinned<br>✓ Assume Rigid Index Plate<br>✓ Use Clear Spans For Wind Area<br>Use Clear Spans For KL/r<br>Retension Guys To Initial Tension<br>✓ Bypass Mast Stability Checks<br>✓ Use Azimuth Dish Coefficients<br>✓ Project Wind Area of Appurt.<br><br>Autocalc Torque Arm Areas<br><br>Add IBC .6D+W Combination<br>✓ Sort Capacity Reports By Component<br>Triangulate Diamond Inner Bracing<br>Treat Feed Line Bundles As Cylinder | Use ASCE 10 X-Brace Ly Rules<br>Calculate Redundant Bracing Forces<br>Ignore Redundant Members in FEA<br>SR Leg Bolts Resist Compression<br>All Leg Panels Have Same Allowable<br>Offset Girt At Foundation<br>✓ Consider Feed Line Torque<br>Include Angle Block Shear Check<br>Use TIA-222-G Bracing Resist.<br>Exemption<br>Use TIA-222-G Tension Splice<br>Exemption<br><br><div style="text-align: center; background-color: #e0e0e0; padding: 2px;"><b>Poles</b></div> ✓ Include Shear-Torsion Interaction<br>Always Use Sub-Critical Flow<br>Use Top Mounted Sockets<br>Pole Without Linear Attachments<br>Pole With Shroud Or No<br>Appurtenances<br>Outside and Inside Corner Radii Are<br>Known |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Tapered Pole Section Geometry

| Section | Elevation     | Section Length | Splice Length | Number of Sides | Top Diameter | Bottom Diameter | Wall Thickness | Bend Radius | Pole Grade          |
|---------|---------------|----------------|---------------|-----------------|--------------|-----------------|----------------|-------------|---------------------|
|         | ft            | ft             | ft            |                 | in           | in              | in             | in          |                     |
| L1      | 155.50-110.00 | 45.50          | 8.00          | 12              | 58.6000      | 64.6060         | 0.3750         | 1.5000      | A572-65<br>(65 ksi) |
| L2      | 110.00-72.50  | 45.50          | 8.50          | 12              | 62.8000      | 68.8050         | 0.4375         | 1.7500      | A572-65<br>(65 ksi) |
| L3      | 72.50-36.00   | 45.00          | 9.00          | 12              | 66.8082      | 72.7480         | 0.5000         | 2.0000      | A572-65<br>(65 ksi) |

| Section | Elevation<br>ft | Section Length<br>ft | Splice Length<br>ft | Number of Sides | Top Diameter<br>in | Bottom Diameter<br>in | Wall Thickness<br>in | Bend Radius<br>in | Pole Grade          |
|---------|-----------------|----------------------|---------------------|-----------------|--------------------|-----------------------|----------------------|-------------------|---------------------|
| L4      | 36.00-0.00      | 45.00                |                     | 12              | 70.5600            | 76.5000               | 0.5000               | 2.0000            | 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> | I/Q<br>in <sup>2</sup> | w<br>in | w/t    |
|---------|----------------|-------------------------|----------------------|---------|---------|------------------------|----------------------|------------------------|---------|--------|
| L1      | 60.5349        | 70.3067                 | 30422.9680           | 20.8446 | 30.3548 | 1002.2457              | 61645.1813           | 34.6028                | 14.6998 | 39.199 |
|         | 66.7528        | 77.5589                 | 40842.0131           | 22.9947 | 33.4659 | 1220.4065              | 82756.9913           | 38.1721                | 16.3094 | 43.492 |
| L2      | 65.9541        | 87.8532                 | 43610.4361           | 22.3258 | 32.5304 | 1340.6056              | 88366.5670           | 43.2387                | 15.6579 | 35.789 |
|         | 71.0778        | 96.3127                 | 57460.4440           | 24.4756 | 35.6410 | 1612.2011              | 116430.4378          | 47.4022                | 17.2672 | 39.468 |
| L3      | 70.1501        | 106.7562                | 59911.9263           | 23.7383 | 34.6066 | 1731.2263              | 121397.8056          | 52.5421                | 16.5646 | 33.129 |
|         | 75.1379        | 116.3193                | 77497.7893           | 25.8648 | 37.6835 | 2056.5463              | 157031.5318          | 57.2488                | 18.1565 | 36.313 |
| L4      | 74.1026        | 112.7967                | 70668.0195           | 25.0815 | 36.5501 | 1933.4563              | 143192.5665          | 55.5151                | 17.5701 | 35.14  |
|         | 79.0222        | 122.3600                | 90209.5680           | 27.2080 | 39.6270 | 2276.4673              | 182789.0418          | 60.2219                | 19.1620 | 38.324 |

| Tower Elevation<br>ft | Gusset Area<br>(per face)<br>ft <sup>2</sup> | Gusset Thickness<br>in | Gusset Grade | Adjust. Factor<br>A <sub>r</sub> | Adjust. 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>Horizontal<br>in | Double Angle<br>Stitch Bolt<br>Spacing<br>Redundants<br>in |
|-----------------------|----------------------------------------------|------------------------|--------------|----------------------------------|----------------------------------|--------------|-----------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|
| L1 155.50-110.00      |                                              |                        |              | 1                                | 1                                | 1            |                                                           |                                                            |                                                            |
| L2 110.00-72.50       |                                              |                        |              | 1                                | 1                                | 1            |                                                           |                                                            |                                                            |
| L3 72.50-36.00        |                                              |                        |              | 1                                | 1                                | 1            |                                                           |                                                            |                                                            |
| L4 36.00-0.00         |                                              |                        |              | 1                                | 1                                | 1            |                                                           |                                                            |                                                            |

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

| Description               | Face or Leg | Allow Shield | Component Type | Placement<br>ft | Total Number |          | C <sub>A</sub> A <sub>A</sub><br>ft <sup>2</sup> /ft | Weight<br>plf |
|---------------------------|-------------|--------------|----------------|-----------------|--------------|----------|------------------------------------------------------|---------------|
| LDF7-50A(1-5/8)           | C           | No           | Inside Pole    | 155.50 - 0.00   | 3            | No Ice   | 0.00                                                 | 0.82          |
|                           |             |              |                |                 |              | 1/2" Ice | 0.00                                                 | 0.82          |
|                           |             |              |                |                 |              | 1" Ice   | 0.00                                                 | 0.82          |
| 561(1-5/8)                | C           | No           | Inside Pole    | 155.50 - 0.00   | 12           | No Ice   | 0.00                                                 | 1.35          |
|                           |             |              |                |                 |              | 1/2" Ice | 0.00                                                 | 1.35          |
|                           |             |              |                |                 |              | 1" Ice   | 0.00                                                 | 1.35          |
| HB158-1-08U8-S8J18(1-5/8) | C           | No           | Inside Pole    | 155.50 - 0.00   | 2            | No Ice   | 0.00                                                 | 1.30          |
|                           |             |              |                |                 |              | 1/2" Ice | 0.00                                                 | 1.30          |
|                           |             |              |                |                 |              | 1" Ice   | 0.00                                                 | 1.30          |
| **<br>UCF114-50JA(1-1/4)  | C           | No           | Inside Pole    | 144.00 - 0.00   | 12           | No Ice   | 0.00                                                 | 0.55          |
|                           |             |              |                |                 |              | 1/2" Ice | 0.00                                                 | 0.55          |
|                           |             |              |                |                 |              | 1" Ice   | 0.00                                                 | 0.55          |
| FB-L98B-002-75000(3/8)    | C           | No           | Inside Pole    | 144.00 - 0.00   | 1            | No Ice   | 0.00                                                 | 0.06          |
|                           |             |              |                |                 |              | 1/2" Ice | 0.00                                                 | 0.06          |
|                           |             |              |                |                 |              | 1" Ice   | 0.00                                                 | 0.06          |
| WR-VG86ST-BRD(3/4)        | C           | No           | Inside Pole    | 144.00 - 0.00   | 2            | No Ice   | 0.00                                                 | 0.58          |
|                           |             |              |                |                 |              | 1/2" Ice | 0.00                                                 | 0.58          |

| Description             | Face or Leg | Allow Shield | Component Type | Placement<br>ft | Total Number | C <sub>AA</sub>    |      | Weight |
|-------------------------|-------------|--------------|----------------|-----------------|--------------|--------------------|------|--------|
|                         |             |              |                |                 |              | f <sup>2</sup> /ft | plf  |        |
| 2" Rigid Conduit        | C           | No           | Inside Pole    | 144.00 - 0.00   | 1            | 1" Ice             | 0.00 | 0.58   |
|                         |             |              |                |                 |              | No Ice             | 0.00 | 2.80   |
|                         |             |              |                |                 |              | 1/2" Ice           | 0.00 | 2.80   |
|                         |             |              |                |                 |              | 1" Ice             | 0.00 | 2.80   |
| **                      |             |              |                |                 |              |                    |      |        |
| AVA6-50(1-1/4)          | C           | No           | Inside Pole    | 135.00 - 0.00   | 6            | No Ice             | 0.00 | 0.46   |
|                         |             |              |                |                 |              | 1/2" Ice           | 0.00 | 0.46   |
|                         |             |              |                |                 |              | 1" Ice             | 0.00 | 0.46   |
| **                      |             |              |                |                 |              |                    |      |        |
| HB114-08U3M12-XXXF(7/8) | C           | No           | Inside Pole    | 128.00 - 0.00   | 1            | No Ice             | 0.00 | 0.68   |
|                         |             |              |                |                 |              | 1/2" Ice           | 0.00 | 0.68   |
|                         |             |              |                |                 |              | 1" Ice             | 0.00 | 0.68   |
| HB114-1-08U4-M5F(1-1/4) | C           | No           | Inside Pole    | 128.00 - 0.00   | 3            | No Ice             | 0.00 | 1.30   |
|                         |             |              |                |                 |              | 1/2" Ice           | 0.00 | 1.30   |
|                         |             |              |                |                 |              | 1" Ice             | 0.00 | 1.30   |
| **                      |             |              |                |                 |              |                    |      |        |
| AVA6-50(1-1/4)          | C           | No           | Inside Pole    | 100.00 - 0.00   | 6            | No Ice             | 0.00 | 0.46   |
|                         |             |              |                |                 |              | 1/2" Ice           | 0.00 | 0.46   |
|                         |             |              |                |                 |              | 1" Ice             | 0.00 | 0.46   |
| LDF6-50A(1-1/4)         | C           | No           | Inside Pole    | 100.00 - 0.00   | 6            | No Ice             | 0.00 | 0.60   |
|                         |             |              |                |                 |              | 1/2" Ice           | 0.00 | 0.60   |
|                         |             |              |                |                 |              | 1" Ice             | 0.00 | 0.60   |
|                         |             |              |                |                 |              | 1" Ice             | 0.00 | 0.60   |

### Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation<br>ft | Face | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>F</sub><br>ft <sup>2</sup> | C <sub>AA</sub><br>In Face<br>ft <sup>2</sup> | C <sub>AA</sub><br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|---------------|-----------------------|------|-----------------------------------|-----------------------------------|-----------------------------------------------|------------------------------------------------|-------------|
| L1            | 155.50-110.00         | A    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.48        |
| L2            | 110.00-72.50          | A    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.65        |
| L3            | 72.50-36.00           | A    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.66        |
| L4            | 36.00-0.00            | A    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C    | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.64        |

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

| Tower Section | Tower Elevation<br>ft | Face or Leg | Ice Thickness<br>in | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>F</sub><br>ft <sup>2</sup> | C <sub>AA</sub><br>In Face<br>ft <sup>2</sup> | C <sub>AA</sub><br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|---------------|-----------------------|-------------|---------------------|-----------------------------------|-----------------------------------|-----------------------------------------------|------------------------------------------------|-------------|
| L1            | 155.50-110.00         | A           | 1.724               | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.48        |
| L2            | 110.00-72.50          | A           | 1.661               | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.65        |
| L3            | 72.50-36.00           | A           | 1.577               | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.66        |
| L4            | 36.00-0.00            | A           | 1.410               | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | B           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 0.00        |
|               |                       | C           |                     | 0.000                             | 0.000                             | 0.000                                         | 0.000                                          | 1.64        |

### 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      | 155.50-110.00 | 0.0000          | 0.0000          | 0.0000                 | 0.0000                 |
| L2      | 110.00-72.50  | 0.0000          | 0.0000          | 0.0000                 | 0.0000                 |
| L3      | 72.50-36.00   | 0.0000          | 0.0000          | 0.0000                 | 0.0000                 |
| L4      | 36.00-0.00    | 0.0000          | 0.0000          | 0.0000                 | 0.0000                 |

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

### Shielding Factor Ka

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | K <sub>a</sub><br>No Ice | K <sub>a</sub><br>Ice |
|---------------|----------------------|-------------|-------------------------|--------------------------|-----------------------|
|               |                      |             |                         |                          |                       |

### Discrete Tower Loads

| Description                     | Face or Leg | Offset Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>t<br>° | Placement<br>ft | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K |      |
|---------------------------------|-------------|-------------|-------------------------------------------------------|------------------------------|-----------------|---------------------------------------------|--------------------------------------------|-------------|------|
| ***                             |             |             |                                                       |                              |                 |                                             |                                            |             |      |
| DB809K-Y                        | A           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | No Ice                                      | 2.85                                       | 2.85        | 0.03 |
|                                 |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 4.03                                       | 4.03        | 0.05 |
|                                 |             |             | 3.00                                                  |                              |                 | Ice                                         | 5.21                                       | 5.21        | 0.08 |
| DB809K-Y                        | B           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | 1" Ice                                      | 2.85                                       | 2.85        | 0.03 |
|                                 |             |             | 0.00                                                  |                              |                 | No Ice                                      | 4.03                                       | 4.03        | 0.05 |
|                                 |             |             | 3.00                                                  |                              |                 | 1/2"                                        | 5.21                                       | 5.21        | 0.08 |
| DB809K-Y                        | C           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | Ice                                         | 2.85                                       | 2.85        | 0.03 |
|                                 |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 4.03                                       | 4.03        | 0.05 |
|                                 |             |             | 3.00                                                  |                              |                 | Ice                                         | 5.21                                       | 5.21        | 0.08 |
| ***                             |             |             |                                                       |                              |                 |                                             |                                            |             |      |
| LNx-8513DS-VTM w/<br>Mount Pipe | A           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | No Ice                                      | 8.41                                       | 7.08        | 0.06 |
|                                 |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 8.97                                       | 8.27        | 0.13 |
|                                 |             |             | 3.00                                                  |                              |                 | Ice                                         | 9.50                                       | 9.18        | 0.21 |
| LNx-6514DS-A1M w/<br>Mount Pipe | A           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | 1" Ice                                      | 8.41                                       | 7.08        | 0.06 |
|                                 |             |             | 0.00                                                  |                              |                 | No Ice                                      | 8.97                                       | 8.27        | 0.13 |
|                                 |             |             | 3.00                                                  |                              |                 | 1/2"                                        | 9.50                                       | 9.18        | 0.21 |
| LNx-6514DS-AIM w/<br>Mount Pipe | B           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | Ice                                         | 8.41                                       | 7.08        | 0.06 |
|                                 |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 8.97                                       | 8.27        | 0.13 |
|                                 |             |             | 3.00                                                  |                              |                 | Ice                                         | 9.50                                       | 9.18        | 0.21 |
| LNx-6514DS-AIM w/<br>Mount Pipe | C           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | 1" Ice                                      | 8.41                                       | 7.08        | 0.06 |
|                                 |             |             | 0.00                                                  |                              |                 | No Ice                                      | 8.97                                       | 8.27        | 0.13 |
|                                 |             |             | 3.00                                                  |                              |                 | 1/2"                                        | 9.50                                       | 9.18        | 0.21 |
| LNx-6514DS-A1M w/<br>Mount Pipe | B           | From Leg    | 4.00                                                  | 0.0000                       | 156.00          | Ice                                         | 8.41                                       | 7.08        | 0.06 |
|                                 |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 8.97                                       | 8.27        | 0.13 |
|                                 |             |             | 3.00                                                  |                              |                 | Ice                                         | 9.50                                       | 9.18        | 0.21 |
|                                 |             |             |                                                       |                              |                 |                                             |                                            |             |      |
|                                 |             |             |                                                       |                              |                 |                                             |                                            |             |      |

| Description                      | Face or Leg | Offset Type | Offsets: |         | Azimuth Adjustment | Placement | C <sub>AA</sub> |                 | Weight |
|----------------------------------|-------------|-------------|----------|---------|--------------------|-----------|-----------------|-----------------|--------|
|                                  |             |             | Horz     | Lateral |                    |           | Front           | Side            |        |
|                                  |             |             | ft       | ft      | °                  | ft        | ft <sup>2</sup> | ft <sup>2</sup> | K      |
| LNX-6514DS-A1M w/<br>Mount Pipe  | C           | From Leg    | 4.00     | 0.0000  | 156.00             | No Ice    | 8.41            | 7.08            | 0.06   |
|                                  |             |             | 0.00     |         |                    | 1/2"      | 8.97            | 8.27            | 0.13   |
|                                  |             |             | 3.00     |         |                    | Ice       | 9.50            | 9.18            | 0.21   |
| (2) SBNHH-1D65B w/<br>Mount Pipe | A           | From Leg    | 4.00     | 0.0000  | 156.00             | 1" Ice    |                 |                 |        |
|                                  |             |             | 0.00     |         |                    | No Ice    | 8.39            | 7.08            | 0.08   |
|                                  |             |             | 3.00     |         |                    | 1/2"      | 8.95            | 8.28            | 0.15   |
| (2) SBNHH-1D65B w/<br>Mount Pipe | B           | From Leg    | 4.00     | 0.0000  | 156.00             | Ice       | 9.48            | 9.19            | 0.22   |
|                                  |             |             | 0.00     |         |                    | 1" Ice    |                 |                 |        |
|                                  |             |             | 3.00     |         |                    | No Ice    | 8.39            | 7.08            | 0.08   |
| (2) SBNHH-1D65B w/<br>Mount Pipe | C           | From Leg    | 4.00     | 0.0000  | 156.00             | 1/2"      | 8.95            | 8.28            | 0.15   |
|                                  |             |             | 0.00     |         |                    | Ice       | 9.48            | 9.19            | 0.22   |
|                                  |             |             | 3.00     |         |                    | 1" Ice    |                 |                 |        |
| RRH2x60-AWS                      | A           | From Leg    | 4.00     | 0.0000  | 156.00             | No Ice    | 3.50            | 1.82            | 0.06   |
|                                  |             |             | 0.00     |         |                    | 1/2"      | 3.76            | 2.05            | 0.08   |
|                                  |             |             | 3.00     |         |                    | Ice       | 4.03            | 2.29            | 0.11   |
| RRH2x60-AWS                      | B           | From Leg    | 4.00     | 0.0000  | 156.00             | 1" Ice    |                 |                 |        |
|                                  |             |             | 0.00     |         |                    | No Ice    | 3.50            | 1.82            | 0.06   |
|                                  |             |             | 3.00     |         |                    | 1/2"      | 3.76            | 2.05            | 0.08   |
| RRH2x60-AWS                      | C           | From Leg    | 4.00     | 0.0000  | 156.00             | Ice       | 4.03            | 2.29            | 0.11   |
|                                  |             |             | 0.00     |         |                    | 1" Ice    |                 |                 |        |
|                                  |             |             | 3.00     |         |                    | No Ice    | 3.50            | 1.82            | 0.06   |
| RRH2x60-PCS                      | A           | From Leg    | 4.00     | 0.0000  | 156.00             | 1/2"      | 3.76            | 2.05            | 0.08   |
|                                  |             |             | 0.00     |         |                    | Ice       | 4.03            | 2.29            | 0.11   |
|                                  |             |             | 3.00     |         |                    | 1" Ice    |                 |                 |        |
| RRH2x60-PCS                      | B           | From Leg    | 4.00     | 0.0000  | 156.00             | No Ice    | 2.20            | 1.72            | 0.06   |
|                                  |             |             | 0.00     |         |                    | 1/2"      | 2.39            | 1.90            | 0.08   |
|                                  |             |             | 3.00     |         |                    | Ice       | 2.59            | 2.09            | 0.10   |
| RRH2x60-PCS                      | C           | From Leg    | 4.00     | 0.0000  | 156.00             | 1" Ice    |                 |                 |        |
|                                  |             |             | 0.00     |         |                    | No Ice    | 2.20            | 1.72            | 0.06   |
|                                  |             |             | 3.00     |         |                    | 1/2"      | 2.39            | 1.90            | 0.08   |
| (2) DB-T1-6Z-8AB-0Z              | A           | From Leg    | 4.00     | 0.0000  | 156.00             | Ice       | 2.59            | 2.09            | 0.10   |
|                                  |             |             | 0.00     |         |                    | 1" Ice    |                 |                 |        |
|                                  |             |             | 3.00     |         |                    | No Ice    | 4.80            | 2.00            | 0.04   |
| RRH2x60-700                      | A           | From Leg    | 4.00     | 0.0000  | 156.00             | 1/2"      | 5.07            | 2.19            | 0.08   |
|                                  |             |             | 0.00     |         |                    | Ice       | 5.35            | 2.39            | 0.12   |
|                                  |             |             | 3.00     |         |                    | 1" Ice    |                 |                 |        |
| RRH2x60-700                      | B           | From Leg    | 4.00     | 0.0000  | 156.00             | No Ice    | 3.50            | 1.82            | 0.06   |
|                                  |             |             | 0.00     |         |                    | 1/2"      | 3.76            | 2.05            | 0.08   |
|                                  |             |             | 3.00     |         |                    | Ice       | 4.03            | 2.29            | 0.11   |
| RRH2x60-700                      | C           | From Leg    | 4.00     | 0.0000  | 156.00             | 1" Ice    |                 |                 |        |
|                                  |             |             | 0.00     |         |                    | No Ice    | 3.50            | 1.82            | 0.06   |
|                                  |             |             | 3.00     |         |                    | 1/2"      | 3.76            | 2.05            | 0.08   |
| 6' x 2" Mount Pipe               | A           | From Leg    | 4.00     | 0.0000  | 156.00             | Ice       | 4.03            | 2.29            | 0.11   |
|                                  |             |             | 0.00     |         |                    | 1" Ice    |                 |                 |        |
|                                  |             |             | 0.00     |         |                    | No Ice    | 1.43            | 1.43            | 0.02   |
| 6' x 2" Mount Pipe               | B           | From Leg    | 4.00     | 0.0000  | 156.00             | 1/2"      | 1.92            | 1.92            | 0.03   |
|                                  |             |             | 0.00     |         |                    | Ice       | 2.29            | 2.29            | 0.05   |
|                                  |             |             | 0.00     |         |                    | 1" Ice    |                 |                 |        |
| 6' x 2" Mount Pipe               | C           | From Leg    | 4.00     | 0.0000  | 156.00             | No Ice    | 1.43            | 1.43            | 0.02   |
|                                  |             |             | 0.00     |         |                    | 1/2"      | 1.92            | 1.92            | 0.03   |
|                                  |             |             | 0.00     |         |                    | Ice       | 2.29            | 2.29            | 0.05   |



| Description                         | Face or Leg | Offset Type | Offsets: |         |        | Azimuth Adjustment | Placement | C <sub>AA</sub> <sub>Front</sub> | C <sub>AA</sub> <sub>Side</sub> | Weight |
|-------------------------------------|-------------|-------------|----------|---------|--------|--------------------|-----------|----------------------------------|---------------------------------|--------|
|                                     |             |             | Horz     | Lateral | Vert   |                    |           |                                  |                                 |        |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 1.92                             | 1.92                            | 0.03   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 2.29                             | 2.29                            | 0.05   |
| Platform Mount [LP 1001-1]          | C           | None        |          |         | 0.0000 | 156.00             | 1" Ice    |                                  |                                 |        |
|                                     |             |             |          |         |        |                    | No Ice    | 47.70                            | 47.70                           | 3.02   |
|                                     |             |             |          |         |        |                    | 1/2"      | 59.50                            | 59.50                           | 3.62   |
|                                     |             |             |          |         |        |                    | Ice       | 71.30                            | 71.30                           | 4.22   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| ***                                 |             |             |          |         |        |                    |           |                                  |                                 |        |
| (2) 7770.00 w/ Mount Pipe           | A           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 5.75                             | 4.25                            | 0.06   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 6.18                             | 5.01                            | 0.10   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 6.61                             | 5.71                            | 0.16   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) 7770.00 w/ Mount Pipe           | B           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 5.75                             | 4.25                            | 0.06   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 6.18                             | 5.01                            | 0.10   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 6.61                             | 5.71                            | 0.16   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) 7770.00 w/ Mount Pipe           | C           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 5.75                             | 4.25                            | 0.06   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 6.18                             | 5.01                            | 0.10   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 6.61                             | 5.71                            | 0.16   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe | A           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 8.26                             | 6.30                            | 0.07   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 8.82                             | 7.48                            | 0.14   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 9.35                             | 8.37                            | 0.21   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe | B           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 8.26                             | 6.30                            | 0.07   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 8.82                             | 7.48                            | 0.14   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 9.35                             | 8.37                            | 0.21   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| AM-X-CD-16-65-00T-RET w/ Mount Pipe | C           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 8.26                             | 6.30                            | 0.07   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 8.82                             | 7.48                            | 0.14   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 9.35                             | 8.37                            | 0.21   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) LGP 17201                       | A           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 1.67                             | 0.47                            | 0.03   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 1.83                             | 0.57                            | 0.04   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 2.00                             | 0.68                            | 0.06   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) LGP 17201                       | B           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 1.67                             | 0.47                            | 0.03   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 1.83                             | 0.57                            | 0.04   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 2.00                             | 0.68                            | 0.06   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) LGP 17201                       | C           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 1.67                             | 0.47                            | 0.03   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 1.83                             | 0.57                            | 0.04   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 2.00                             | 0.68                            | 0.06   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) LGP21903                        | A           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 0.23                             | 0.16                            | 0.01   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 0.29                             | 0.21                            | 0.01   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 0.36                             | 0.28                            | 0.02   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) LGP21903                        | B           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 0.23                             | 0.16                            | 0.01   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 0.29                             | 0.21                            | 0.01   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 0.36                             | 0.28                            | 0.02   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| (2) LGP21903                        | C           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 0.23                             | 0.16                            | 0.01   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 0.29                             | 0.21                            | 0.01   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 0.36                             | 0.28                            | 0.02   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| RRUS-11                             | A           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 2.78                             | 1.19                            | 0.05   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 2.99                             | 1.33                            | 0.07   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 3.21                             | 1.49                            | 0.09   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| RRUS-11                             | B           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 2.78                             | 1.19                            | 0.05   |
|                                     |             |             | 0.00     |         |        |                    | 1/2"      | 2.99                             | 1.33                            | 0.07   |
|                                     |             |             | 0.00     |         |        |                    | Ice       | 3.21                             | 1.49                            | 0.09   |
|                                     |             |             |          |         |        |                    | 1" Ice    |                                  |                                 |        |
| RRUS-11                             | C           | From Leg    | 4.00     |         | 0.0000 | 144.00             | No Ice    | 2.78                             | 1.19                            | 0.05   |

| Description                | Face or Leg | Offset Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>t<br>° | Placement<br>ft | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K |      |
|----------------------------|-------------|-------------|-------------------------------------------------------|------------------------------|-----------------|---------------------------------------------|--------------------------------------------|-------------|------|
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 2.99                                       | 1.33        | 0.07 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 3.21                                       | 1.49        | 0.09 |
| (3) RRUS 12                | B           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 3.15                                       | 1.29        | 0.06 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 3.36                                       | 1.44        | 0.08 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 3.59                                       | 1.60        | 0.11 |
| 1001940                    | B           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 0.18                                       | 0.08        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 0.23                                       | 0.13        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 0.30                                       | 0.18        | 0.01 |
| (2) 1001940                | C           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 0.18                                       | 0.08        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 0.23                                       | 0.13        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 0.30                                       | 0.18        | 0.01 |
| (8) 860 10025              | A           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 0.14                                       | 0.12        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 0.20                                       | 0.17        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 0.26                                       | 0.23        | 0.01 |
| (4) 860 10025              | B           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 0.14                                       | 0.12        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 0.20                                       | 0.17        | 0.00 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 0.26                                       | 0.23        | 0.01 |
| DC6-48-60-18-8F            | B           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 0.79                                       | 0.79        | 0.02 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 1.27                                       | 1.27        | 0.04 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 1.45                                       | 1.45        | 0.05 |
| (2) 6' x 2" Mount Pipe     | A           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 1.43                                       | 1.43        | 0.02 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 1.92                                       | 1.92        | 0.03 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 2.29                                       | 2.29        | 0.05 |
| (2) 6' x 2" Mount Pipe     | B           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 1.43                                       | 1.43        | 0.02 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 1.92                                       | 1.92        | 0.03 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 2.29                                       | 2.29        | 0.05 |
| (2) 6' x 2" Mount Pipe     | C           | From Leg    | 4.00                                                  | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 1.43                                       | 1.43        | 0.02 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 1.92                                       | 1.92        | 0.03 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 2.29                                       | 2.29        | 0.05 |
| Platform Mount [LP 1001-1] | C           | None        |                                                       | 0.0000                       | 144.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             |                                                       |                              |                 | No Ice                                      | 47.70                                      | 47.70       | 3.02 |
|                            |             |             |                                                       |                              |                 | 1/2"                                        | 59.50                                      | 59.50       | 3.62 |
|                            |             |             |                                                       |                              |                 | Ice                                         | 71.30                                      | 71.30       | 4.22 |
|                            |             |             |                                                       |                              |                 | 1" Ice                                      |                                            |             |      |
| ***                        |             |             |                                                       |                              |                 |                                             |                                            |             |      |
| 742 213 w/ Mount Pipe      | A           | From Leg    | 1.00                                                  | 0.0000                       | 135.00          | No Ice                                      | 5.37                                       | 4.62        | 0.05 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 5.95                                       | 6.00        | 0.09 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 6.50                                       | 6.98        | 0.15 |
| 742 213 w/ Mount Pipe      | B           | From Leg    | 1.00                                                  | 0.0000                       | 135.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 5.37                                       | 4.62        | 0.05 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 5.95                                       | 6.00        | 0.09 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 6.50                                       | 6.98        | 0.15 |
| 742 213 w/ Mount Pipe      | C           | From Leg    | 1.00                                                  | 0.0000                       | 135.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 5.37                                       | 4.62        | 0.05 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 5.95                                       | 6.00        | 0.09 |
|                            |             |             | 0.00                                                  |                              |                 | Ice                                         | 6.50                                       | 6.98        | 0.15 |
|                            |             |             |                                                       |                              |                 | 1" Ice                                      |                                            |             |      |
| ***                        |             |             |                                                       |                              |                 |                                             |                                            |             |      |
| NNVV-65B-R4 w/ Mount Pipe  | A           | From Leg    | 4.00                                                  | 0.0000                       | 128.00          | No Ice                                      | 12.51                                      | 7.41        | 0.10 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 13.11                                      | 8.60        | 0.19 |
|                            |             |             | 2.00                                                  |                              |                 | Ice                                         | 13.67                                      | 9.50        | 0.29 |
| NNVV-65B-R4 w/ Mount Pipe  | B           | From Leg    | 4.00                                                  | 0.0000                       | 128.00          | 1" Ice                                      |                                            |             |      |
|                            |             |             | 0.00                                                  |                              |                 | No Ice                                      | 12.51                                      | 7.41        | 0.10 |
|                            |             |             | 0.00                                                  |                              |                 | 1/2"                                        | 13.11                                      | 8.60        | 0.19 |
|                            |             |             | 2.00                                                  |                              |                 | Ice                                         | 13.67                                      | 9.50        | 0.29 |
|                            |             |             |                                                       |                              |                 | 1" Ice                                      |                                            |             |      |

| Description                    | Face or Leg | Offset Type | Offsets: |         | Azimuth Adjustment | Placement | C <sub>A</sub> A <sub>A</sub> |                 | Weight |
|--------------------------------|-------------|-------------|----------|---------|--------------------|-----------|-------------------------------|-----------------|--------|
|                                |             |             | Horz     | Lateral |                    |           | Front                         | Side            |        |
|                                |             |             | ft       | ft      | °                  | ft        | ft <sup>2</sup>               | ft <sup>2</sup> | K      |
| NNVV-65B-R4 w/ Mount Pipe      | C           | From Leg    | 4.00     | 0.0000  | 128.00             | No Ice    | 12.51                         | 7.41            | 0.10   |
|                                |             |             | 0.00     |         |                    | 1/2"      | 13.11                         | 8.60            | 0.19   |
|                                |             |             | 2.00     |         |                    | Ice       | 13.67                         | 9.50            | 0.29   |
| APXVTM14-ALU-I20 w/ Mount Pipe | A           | From Leg    | 4.00     | 0.0000  | 128.00             | 1" Ice    |                               |                 |        |
|                                |             |             | 0.00     |         |                    | No Ice    | 6.58                          | 4.96            | 0.08   |
|                                |             |             | 2.00     |         |                    | 1/2"      | 7.03                          | 5.75            | 0.13   |
| APXVTM14-ALU-I20 w/ Mount Pipe | B           | From Leg    | 4.00     | 0.0000  | 128.00             | Ice       | 7.47                          | 6.47            | 0.19   |
|                                |             |             | 0.00     |         |                    | 1" Ice    |                               |                 |        |
|                                |             |             | 2.00     |         |                    | No Ice    | 6.58                          | 4.96            | 0.08   |
| APXVTM14-ALU-I20 w/ Mount Pipe | C           | From Leg    | 4.00     | 0.0000  | 128.00             | 1/2"      | 7.03                          | 5.75            | 0.13   |
|                                |             |             | 0.00     |         |                    | Ice       | 7.47                          | 6.47            | 0.19   |
|                                |             |             | 2.00     |         |                    | 1" Ice    |                               |                 |        |
| RRH2X50-800                    | A           | From Leg    | 4.00     | 0.0000  | 128.00             | No Ice    | 1.70                          | 1.28            | 0.05   |
|                                |             |             | 0.00     |         |                    | 1/2"      | 1.86                          | 1.43            | 0.07   |
|                                |             |             | 2.00     |         |                    | Ice       | 2.03                          | 1.58            | 0.09   |
| (4) RRH2X50-800                | B           | From Leg    | 4.00     | 0.0000  | 128.00             | 1" Ice    |                               |                 |        |
|                                |             |             | 0.00     |         |                    | No Ice    | 1.70                          | 1.28            | 0.05   |
|                                |             |             | 2.00     |         |                    | 1/2"      | 1.86                          | 1.43            | 0.07   |
| RRH2X50-800                    | C           | From Leg    | 4.00     | 0.0000  | 128.00             | Ice       | 2.03                          | 1.58            | 0.09   |
|                                |             |             | 0.00     |         |                    | 1" Ice    |                               |                 |        |
|                                |             |             | 2.00     |         |                    | No Ice    | 1.70                          | 1.28            | 0.05   |
| (3) PCS 1900MHZ 4X45W-65MHZ    | A           | From Leg    | 4.00     | 0.0000  | 128.00             | 1/2"      | 2.53                          | 2.44            | 0.08   |
|                                |             |             | 0.00     |         |                    | Ice       | 2.74                          | 2.65            | 0.11   |
|                                |             |             | 2.00     |         |                    | 1" Ice    |                               |                 |        |
| (3) TD-RRH8X20-25              | C           | From Leg    | 4.00     | 0.0000  | 128.00             | No Ice    | 4.05                          | 1.53            | 0.07   |
|                                |             |             | 0.00     |         |                    | 1/2"      | 4.30                          | 1.71            | 0.10   |
|                                |             |             | 2.00     |         |                    | Ice       | 4.56                          | 1.90            | 0.13   |
| T-Arm Mount [TA 602-3]         | C           | None        |          | 0.0000  | 128.00             | 1" Ice    |                               |                 |        |
|                                |             |             |          |         |                    | No Ice    | 11.59                         | 11.59           | 0.77   |
|                                |             |             |          |         |                    | 1/2"      | 15.44                         | 15.44           | 0.99   |
| T-Arm Mount [TA 602-3]         | C           | None        |          | 0.0000  | 128.00             | Ice       | 19.29                         | 19.29           | 1.21   |
|                                |             |             |          |         |                    | 1" Ice    |                               |                 |        |
|                                |             |             |          |         |                    | No Ice    | 11.59                         | 11.59           | 0.77   |
| 8' x 2" Mount Pipe             | A           | From Leg    | 4.00     | 0.0000  | 128.00             | 1/2"      | 15.44                         | 15.44           | 0.99   |
|                                |             |             | 0.00     |         |                    | Ice       | 19.29                         | 19.29           | 1.21   |
|                                |             |             | 0.00     |         |                    | 1" Ice    |                               |                 |        |
| 8' x 2" Mount Pipe             | B           | From Leg    | 4.00     | 0.0000  | 128.00             | No Ice    | 1.90                          | 1.90            | 0.03   |
|                                |             |             | 0.00     |         |                    | 1/2"      | 2.73                          | 2.73            | 0.04   |
|                                |             |             | 0.00     |         |                    | Ice       | 3.40                          | 3.40            | 0.06   |
| 8' x 2" Mount Pipe             | C           | From Leg    | 4.00     | 0.0000  | 128.00             | 1" Ice    |                               |                 |        |
|                                |             |             | 0.00     |         |                    | No Ice    | 1.90                          | 1.90            | 0.03   |
|                                |             |             | 0.00     |         |                    | 1/2"      | 2.73                          | 2.73            | 0.04   |
| LNx-6515DS-VTM w/ Mount Pipe   | A           | From Face   | 3.00     | 0.0000  | 100.00             | Ice       | 3.40                          | 3.40            | 0.06   |
|                                |             |             | 0.00     |         |                    | 1" Ice    |                               |                 |        |
|                                |             |             | 0.00     |         |                    | No Ice    | 11.68                         | 9.84            | 0.08   |
| LNx-6515DS-VTM w/ Mount Pipe   | B           | From Face   | 3.00     | 0.0000  | 100.00             | 1/2"      | 12.40                         | 11.37           | 0.17   |
|                                |             |             | 0.00     |         |                    | Ice       | 13.14                         | 12.91           | 0.27   |
|                                |             |             | 0.00     |         |                    | 1" Ice    |                               |                 |        |
| LNx-6515DS-VTM w/ Mount Pipe   | B           | From Face   | 3.00     | 0.0000  | 100.00             | No Ice    | 11.68                         | 9.84            | 0.08   |
|                                |             |             | 0.00     |         |                    | 1/2"      | 12.40                         | 11.37           | 0.17   |
|                                |             |             | 0.00     |         |                    | Ice       | 13.14                         | 12.91           | 0.27   |
| LNx-6515DS-VTM w/ Mount Pipe   | B           | From Face   | 3.00     | 0.0000  | 100.00             | 1" Ice    |                               |                 |        |
|                                |             |             | 0.00     |         |                    | No Ice    | 11.68                         | 9.84            | 0.08   |
|                                |             |             | 0.00     |         |                    | 1/2"      | 12.40                         | 11.37           | 0.17   |

| Description                  | Face or Leg | Offset Type | Offsets:     |        | Azimuth Adjustment | Placement | C <sub>AA</sub> <sub>Front</sub> | C <sub>AA</sub> <sub>Side</sub> | Weight |
|------------------------------|-------------|-------------|--------------|--------|--------------------|-----------|----------------------------------|---------------------------------|--------|
|                              |             |             | Horz Lateral | Vert   |                    |           |                                  |                                 |        |
|                              |             |             | ft           | ft     | °                  | ft        | ft <sup>2</sup>                  | ft <sup>2</sup>                 | K      |
| LNX-6515DS-VTM w/ Mount Pipe | C           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 11.68                            | 9.84                            | 0.08   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 12.40                            | 11.37                           | 0.17   |
|                              |             |             | 0.00         |        |                    | Ice       | 13.14                            | 12.91                           | 0.27   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| RV90-17-00DP w/ Mount Pipe   | A           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 4.59                             | 3.32                            | 0.04   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 5.02                             | 4.09                            | 0.08   |
|                              |             |             | 0.00         |        |                    | Ice       | 5.44                             | 4.78                            | 0.12   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| RV90-17-00DP w/ Mount Pipe   | B           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 4.59                             | 3.32                            | 0.04   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 5.02                             | 4.09                            | 0.08   |
|                              |             |             | 0.00         |        |                    | Ice       | 5.44                             | 4.78                            | 0.12   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| RV90-17-00DP w/ Mount Pipe   | C           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 4.59                             | 3.32                            | 0.04   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 5.02                             | 4.09                            | 0.08   |
|                              |             |             | 0.00         |        |                    | Ice       | 5.44                             | 4.78                            | 0.12   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| ATBT-BOTTOM-24V              | A           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 0.10                             | 0.06                            | 0.00   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 0.15                             | 0.10                            | 0.00   |
|                              |             |             | 0.00         |        |                    | Ice       | 0.20                             | 0.15                            | 0.01   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| ATBT-BOTTOM-24V              | B           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 0.10                             | 0.06                            | 0.00   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 0.15                             | 0.10                            | 0.00   |
|                              |             |             | 0.00         |        |                    | Ice       | 0.20                             | 0.15                            | 0.01   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| ATBT-BOTTOM-24V              | C           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 0.10                             | 0.06                            | 0.00   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 0.15                             | 0.10                            | 0.00   |
|                              |             |             | 0.00         |        |                    | Ice       | 0.20                             | 0.15                            | 0.01   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| (2) ETM19V2S12UB             | A           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 0.67                             | 0.20                            | 0.01   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 0.77                             | 0.27                            | 0.02   |
|                              |             |             | 0.00         |        |                    | Ice       | 0.88                             | 0.34                            | 0.02   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| (2) ETM19V2S12UB             | B           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 0.67                             | 0.20                            | 0.01   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 0.77                             | 0.27                            | 0.02   |
|                              |             |             | 0.00         |        |                    | Ice       | 0.88                             | 0.34                            | 0.02   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| (2) ETM19V2S12UB             | C           | From Face   | 3.00         | 0.0000 | 100.00             | No Ice    | 0.67                             | 0.20                            | 0.01   |
|                              |             |             | 0.00         |        |                    | 1/2"      | 0.77                             | 0.27                            | 0.02   |
|                              |             |             | 0.00         |        |                    | Ice       | 0.88                             | 0.34                            | 0.02   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |
| Side Arm Mount [SO 701-3]    | C           | None        |              | 0.0000 | 100.00             | No Ice    | 2.83                             | 2.83                            | 0.20   |
|                              |             |             |              |        |                    | 1/2"      | 3.92                             | 3.92                            | 0.24   |
|                              |             |             |              |        |                    | Ice       | 5.01                             | 5.01                            | 0.28   |
|                              |             |             |              |        |                    | 1" Ice    |                                  |                                 |        |

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### Load Combinations

| Comb. No. | Description                       |
|-----------|-----------------------------------|
| 1         | Dead Only                         |
| 2         | 1.2 Dead+1.6 Wind 0 deg - No Ice  |
| 3         | 0.9 Dead+1.6 Wind 0 deg - No Ice  |
| 4         | 1.2 Dead+1.6 Wind 30 deg - No Ice |
| 5         | 0.9 Dead+1.6 Wind 30 deg - No Ice |
| 6         | 1.2 Dead+1.6 Wind 60 deg - No Ice |
| 7         | 0.9 Dead+1.6 Wind 60 deg - No Ice |
| 8         | 1.2 Dead+1.6 Wind 90 deg - No Ice |
| 9         | 0.9 Dead+1.6 Wind 90 deg - No Ice |

| Comb. No. | Description                                |
|-----------|--------------------------------------------|
| 10        | 1.2 Dead+1.6 Wind 120 deg - No Ice         |
| 11        | 0.9 Dead+1.6 Wind 120 deg - No Ice         |
| 12        | 1.2 Dead+1.6 Wind 150 deg - No Ice         |
| 13        | 0.9 Dead+1.6 Wind 150 deg - No Ice         |
| 14        | 1.2 Dead+1.6 Wind 180 deg - No Ice         |
| 15        | 0.9 Dead+1.6 Wind 180 deg - No Ice         |
| 16        | 1.2 Dead+1.6 Wind 210 deg - No Ice         |
| 17        | 0.9 Dead+1.6 Wind 210 deg - No Ice         |
| 18        | 1.2 Dead+1.6 Wind 240 deg - No Ice         |
| 19        | 0.9 Dead+1.6 Wind 240 deg - No Ice         |
| 20        | 1.2 Dead+1.6 Wind 270 deg - No Ice         |
| 21        | 0.9 Dead+1.6 Wind 270 deg - No Ice         |
| 22        | 1.2 Dead+1.6 Wind 300 deg - No Ice         |
| 23        | 0.9 Dead+1.6 Wind 300 deg - No Ice         |
| 24        | 1.2 Dead+1.6 Wind 330 deg - No Ice         |
| 25        | 0.9 Dead+1.6 Wind 330 deg - No Ice         |
| 26        | 1.2 Dead+1.0 Ice+1.0 Temp                  |
| 27        | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp   |
| 28        | 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp  |
| 29        | 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp  |
| 30        | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp  |
| 31        | 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp |
| 32        | 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp |
| 33        | 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp |
| 34        | 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp |
| 35        | 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp |
| 36        | 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp |
| 37        | 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp |
| 38        | 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp |
| 39        | Dead+Wind 0 deg - Service                  |
| 40        | Dead+Wind 30 deg - Service                 |
| 41        | Dead+Wind 60 deg - Service                 |
| 42        | Dead+Wind 90 deg - Service                 |
| 43        | Dead+Wind 120 deg - Service                |
| 44        | Dead+Wind 150 deg - Service                |
| 45        | Dead+Wind 180 deg - Service                |
| 46        | Dead+Wind 210 deg - Service                |
| 47        | Dead+Wind 240 deg - Service                |
| 48        | Dead+Wind 270 deg - Service                |
| 49        | Dead+Wind 300 deg - Service                |
| 50        | Dead+Wind 330 deg - Service                |

**Maximum Member Forces**

| Section No. | Elevation ft | Component Type | Condition        | Gov. Load Comb. | Axial K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|-------------|--------------|----------------|------------------|-----------------|---------|--------------------------|--------------------------|
| L1          | 155.5 - 110  | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |              |                | Max. Compression | 26              | -49.97  | -2.47                    | 1.04                     |
|             |              |                | Max. Mx          | 8               | -26.38  | -741.72                  | -1.35                    |
|             |              |                | Max. My          | 14              | -26.38  | -2.14                    | -747.60                  |
|             |              |                | Max. Vy          | 8               | 28.82   | -741.72                  | -1.35                    |
|             |              |                | Max. Vx          | 14              | 28.84   | -2.14                    | -747.60                  |
|             |              |                | Max. Torque      | 22              |         |                          | -1.74                    |
| L2          | 110 - 72.5   | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |              |                | Max. Compression | 26              | -77.00  | -2.47                    | 1.04                     |
|             |              |                | Max. Mx          | 8               | -45.20  | -2014.33                 | -1.02                    |
|             |              |                | Max. My          | 14              | -45.20  | -1.84                    | -2020.80                 |
|             |              |                | Max. Vy          | 8               | 39.76   | -2014.33                 | -1.02                    |
|             |              |                | Max. Vx          | 14              | 39.77   | -1.84                    | -2020.80                 |
|             |              |                | Max. Torque      | 22              |         |                          | -1.74                    |
| L3          | 72.5 - 36    | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |              |                | Max. Compression | 26              | -104.84 | -2.47                    | 1.04                     |
|             |              |                | Max. Mx          | 8               | -66.88  | -3595.60                 | -0.70                    |
|             |              |                | Max. My          | 14              | -66.88  | -1.55                    | -3602.65                 |
|             |              |                | Max. Vy          | 8               | 47.81   | -3595.60                 | -0.70                    |
|             |              |                | Max. Vx          | 14              | 47.82   | -1.55                    | -3602.65                 |

| Section No. | Elevation ft | Component Type | Condition        | Gov. Load Comb. | Axial K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|-------------|--------------|----------------|------------------|-----------------|---------|--------------------------|--------------------------|
| L4          | 36 - 0       | Pole           | Max. Torque      | 22              |         |                          | -1.74                    |
|             |              |                | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |              |                | Max. Compression | 26              | -140.43 | -2.47                    | 1.04                     |
|             |              |                | Max. Mx          | 8               | -95.75  | -5936.53                 | -0.31                    |
|             |              |                | Max. My          | 14              | -95.75  | -1.16                    | -5944.26                 |
|             |              |                | Max. Vy          | 8               | 55.95   | -5936.53                 | -0.31                    |
|             |              |                | Max. Vx          | 14              | 55.97   | -1.16                    | -5944.26                 |
|             |              |                | Max. Torque      | 22              |         |                          | -1.73                    |

### Maximum Reactions

| Location | Condition           | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|----------|---------------------|-----------------|------------|-----------------|-----------------|
| Pole     | Max. Vert           | 26              | 140.43     | 0.00            | 0.00            |
|          | Max. H <sub>x</sub> | 20              | 95.77      | 55.92           | -0.01           |
|          | Max. H <sub>z</sub> | 2               | 95.77      | -0.01           | 55.94           |
|          | Max. M <sub>x</sub> | 2               | 5943.99    | -0.01           | 55.94           |
|          | Max. M <sub>z</sub> | 8               | 5936.53    | -55.92          | 0.01            |
|          | Max. Torsion        | 10              | 1.72       | -48.43          | -27.96          |
|          | Min. Vert           | 23              | 71.82      | 48.43           | 27.96           |
|          | Min. H <sub>x</sub> | 8               | 95.77      | -55.92          | 0.01            |
|          | Min. H <sub>z</sub> | 14              | 95.77      | 0.01            | -55.94          |
|          | Min. M <sub>x</sub> | 14              | -5944.26   | 0.01            | -55.94          |
|          | Min. M <sub>z</sub> | 20              | -5934.56   | 55.92           | -0.01           |
|          | Min. Torsion        | 22              | -1.73      | 48.43           | 27.96           |

### Tower Mast Reaction Summary

| Load Combination                   | Vertical K | Shear <sub>x</sub> K | Shear <sub>z</sub> K | Overtuning Moment, M <sub>x</sub> kip-ft | Overtuning Moment, M <sub>z</sub> kip-ft | Torque kip-ft |
|------------------------------------|------------|----------------------|----------------------|------------------------------------------|------------------------------------------|---------------|
| Dead Only                          | 79.80      | 0.00                 | 0.00                 | 0.11                                     | -0.80                                    | 0.00          |
| 1.2 Dead+1.6 Wind 0 deg - No Ice   | 95.77      | 0.01                 | -55.94               | -5943.99                                 | -0.81                                    | 0.93          |
| 0.9 Dead+1.6 Wind 0 deg - No Ice   | 71.82      | 0.01                 | -55.94               | -5918.47                                 | -0.56                                    | 0.93          |
| 1.2 Dead+1.6 Wind 30 deg - No Ice  | 95.77      | 27.97                | -48.45               | -5147.54                                 | -2968.60                                 | 0.07          |
| 0.9 Dead+1.6 Wind 30 deg - No Ice  | 71.82      | 27.97                | -48.45               | -5125.45                                 | -2955.61                                 | 0.07          |
| 1.2 Dead+1.6 Wind 60 deg - No Ice  | 95.77      | 48.43                | -27.98               | -2971.78                                 | -5141.23                                 | -0.81         |
| 0.9 Dead+1.6 Wind 60 deg - No Ice  | 71.82      | 48.43                | -27.98               | -2959.04                                 | -5118.90                                 | -0.81         |
| 1.2 Dead+1.6 Wind 90 deg - No Ice  | 95.77      | 55.92                | -0.01                | 0.31                                     | -5936.53                                 | -1.47         |
| 0.9 Dead+1.6 Wind 90 deg - No Ice  | 71.82      | 55.92                | -0.01                | 0.27                                     | -5910.78                                 | -1.46         |
| 1.2 Dead+1.6 Wind 120 deg - No Ice | 95.77      | 48.43                | 27.96                | 2972.35                                  | -5141.41                                 | -1.72         |
| 0.9 Dead+1.6 Wind 120 deg - No Ice | 71.82      | 48.43                | 27.96                | 2959.54                                  | -5119.07                                 | -1.72         |
| 1.2 Dead+1.6 Wind 150 deg - No Ice | 95.77      | 27.95                | 48.44                | 5147.99                                  | -2968.91                                 | -1.52         |
| 0.9 Dead+1.6 Wind 150 deg - No Ice | 71.82      | 27.95                | 48.44                | 5125.82                                  | -2955.91                                 | -1.52         |
| 1.2 Dead+1.6 Wind 180 deg - No Ice | 95.77      | -0.01                | 55.94                | 5944.26                                  | -1.16                                    | -0.92         |
| 0.9 Dead+1.6 Wind 180 deg - No Ice | 71.82      | -0.01                | 55.94                | 5918.68                                  | -0.91                                    | -0.92         |



| Load Combination                           | Vertical | Shear <sub>x</sub> | Shear <sub>z</sub> | Overtuning Moment, M <sub>x</sub> | Overtuning Moment, M <sub>z</sub> | Torque |
|--------------------------------------------|----------|--------------------|--------------------|-----------------------------------|-----------------------------------|--------|
|                                            | K        | K                  | K                  | kip-ft                            | kip-ft                            | kip-ft |
| 1.2 Dead+1.6 Wind 210 deg - No Ice         | 95.77    | -27.97             | 48.45              | 5147.81                           | 2966.63                           | -0.08  |
| 0.9 Dead+1.6 Wind 210 deg - No Ice         | 71.82    | -27.97             | 48.45              | 5125.65                           | 2954.14                           | -0.08  |
| 1.2 Dead+1.6 Wind 240 deg - No Ice         | 95.77    | -48.43             | 27.98              | 2972.05                           | 5139.26                           | 0.79   |
| 0.9 Dead+1.6 Wind 240 deg - No Ice         | 71.82    | -48.43             | 27.98              | 2959.24                           | 5117.43                           | 0.79   |
| 1.2 Dead+1.6 Wind 270 deg - No Ice         | 95.77    | -55.92             | 0.01               | -0.04                             | 5934.56                           | 1.46   |
| 0.9 Dead+1.6 Wind 270 deg - No Ice         | 71.82    | -55.92             | 0.01               | -0.07                             | 5909.32                           | 1.46   |
| 1.2 Dead+1.6 Wind 300 deg - No Ice         | 95.77    | -48.43             | -27.96             | -2972.08                          | 5139.44                           | 1.73   |
| 0.9 Dead+1.6 Wind 300 deg - No Ice         | 71.82    | -48.43             | -27.96             | -2959.34                          | 5117.61                           | 1.73   |
| 1.2 Dead+1.6 Wind 330 deg - No Ice         | 95.77    | -27.95             | -48.44             | -5147.72                          | 2966.94                           | 1.54   |
| 0.9 Dead+1.6 Wind 330 deg - No Ice         | 71.82    | -27.95             | -48.44             | -5125.62                          | 2954.44                           | 1.54   |
| 1.2 Dead+1.0 Ice+1.0 Temp                  | 140.43   | 0.00               | 0.00               | -1.04                             | -2.47                             | 0.00   |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp   | 140.43   | 0.00               | -11.77             | -1308.43                          | -2.50                             | 0.24   |
| 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp  | 140.43   | 5.89               | -10.20             | -1133.24                          | -655.50                           | 0.05   |
| 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp  | 140.43   | 10.20              | -5.89              | -654.68                           | -1133.54                          | -0.15  |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp  | 140.43   | 11.77              | -0.00              | -1.00                             | -1308.56                          | -0.31  |
| 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp | 140.43   | 10.19              | 5.89               | 652.66                            | -1133.64                          | -0.39  |
| 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp | 140.43   | 5.89               | 10.20              | 1131.15                           | -655.66                           | -0.36  |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp | 140.43   | -0.00              | 11.77              | 1306.26                           | -2.69                             | -0.24  |
| 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp | 140.43   | -5.89              | 10.20              | 1131.06                           | 650.31                            | -0.05  |
| 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp | 140.43   | -10.20             | 5.89               | 652.50                            | 1128.35                           | 0.15   |
| 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp | 140.43   | -11.77             | 0.00               | -1.18                             | 1303.37                           | 0.31   |
| 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp | 140.43   | -10.19             | -5.89              | -654.84                           | 1128.45                           | 0.39   |
| 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp | 140.43   | -5.89              | -10.20             | -1133.33                          | 650.47                            | 0.36   |
| Dead+Wind 0 deg - Service                  | 79.80    | 0.00               | -11.04             | -1169.72                          | -0.78                             | 0.18   |
| Dead+Wind 30 deg - Service                 | 79.80    | 5.52               | -9.56              | -1012.98                          | -584.86                           | 0.01   |
| Dead+Wind 60 deg - Service                 | 79.80    | 9.56               | -5.52              | -584.78                           | -1012.45                          | -0.16  |
| Dead+Wind 90 deg - Service                 | 79.80    | 11.04              | -0.00              | 0.15                              | -1168.97                          | -0.29  |
| Dead+Wind 120 deg - Service                | 79.80    | 9.56               | 5.52               | 585.06                            | -1012.48                          | -0.34  |
| Dead+Wind 150 deg - Service                | 79.80    | 5.52               | 9.56               | 1013.24                           | -584.92                           | -0.30  |
| Dead+Wind 180 deg - Service                | 79.80    | -0.00              | 11.04              | 1169.95                           | -0.85                             | -0.18  |
| Dead+Wind 210 deg - Service                | 79.80    | -5.52              | 9.56               | 1013.20                           | 583.23                            | -0.01  |
| Dead+Wind 240 deg - Service                | 79.80    | -9.56              | 5.52               | 585.00                            | 1010.81                           | 0.16   |
| Dead+Wind 270 deg - Service                | 79.80    | -11.04             | 0.00               | 0.08                              | 1167.33                           | 0.29   |
| Dead+Wind 300 deg - Service                | 79.80    | -9.56              | -5.52              | -584.84                           | 1010.85                           | 0.34   |
| Dead+Wind 330 deg - Service                | 79.80    | -5.52              | -9.56              | -1013.01                          | 583.29                            | 0.30   |

## Solution Summary

| 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 |         |
| 1          | 0.00                  | -79.80  | 0.00    | 0.00             | 79.80   | 0.00    | 0.000%  |
| 2          | 0.01                  | -95.77  | -55.94  | -0.01            | 95.77   | 55.94   | 0.000%  |
| 3          | 0.01                  | -71.82  | -55.94  | -0.01            | 71.82   | 55.94   | 0.000%  |
| 4          | 27.97                 | -95.77  | -48.45  | -27.97           | 95.77   | 48.45   | 0.000%  |
| 5          | 27.97                 | -71.82  | -48.45  | -27.97           | 71.82   | 48.45   | 0.000%  |
| 6          | 48.43                 | -95.77  | -27.98  | -48.43           | 95.77   | 27.98   | 0.000%  |
| 7          | 48.43                 | -71.82  | -27.98  | -48.43           | 71.82   | 27.98   | 0.000%  |
| 8          | 55.92                 | -95.77  | -0.01   | -55.92           | 95.77   | 0.01    | 0.000%  |
| 9          | 55.92                 | -71.82  | -0.01   | -55.92           | 71.82   | 0.01    | 0.000%  |
| 10         | 48.43                 | -95.77  | 27.96   | -48.43           | 95.77   | -27.96  | 0.000%  |
| 11         | 48.43                 | -71.82  | 27.96   | -48.43           | 71.82   | -27.96  | 0.000%  |
| 12         | 27.95                 | -95.77  | 48.44   | -27.95           | 95.77   | -48.44  | 0.000%  |
| 13         | 27.95                 | -71.82  | 48.44   | -27.95           | 71.82   | -48.44  | 0.000%  |
| 14         | -0.01                 | -95.77  | 55.94   | 0.01             | 95.77   | -55.94  | 0.000%  |
| 15         | -0.01                 | -71.82  | 55.94   | 0.01             | 71.82   | -55.94  | 0.000%  |
| 16         | -27.97                | -95.77  | 48.45   | 27.97            | 95.77   | -48.45  | 0.000%  |
| 17         | -27.97                | -71.82  | 48.45   | 27.97            | 71.82   | -48.45  | 0.000%  |
| 18         | -48.43                | -95.77  | 27.98   | 48.43            | 95.77   | -27.98  | 0.000%  |
| 19         | -48.43                | -71.82  | 27.98   | 48.43            | 71.82   | -27.98  | 0.000%  |
| 20         | -55.92                | -95.77  | 0.01    | 55.92            | 95.77   | -0.01   | 0.000%  |
| 21         | -55.92                | -71.82  | 0.01    | 55.92            | 71.82   | -0.01   | 0.000%  |
| 22         | -48.43                | -95.77  | -27.96  | 48.43            | 95.77   | 27.96   | 0.000%  |
| 23         | -48.43                | -71.82  | -27.96  | 48.43            | 71.82   | 27.96   | 0.000%  |
| 24         | -27.95                | -95.77  | -48.44  | 27.95            | 95.77   | 48.44   | 0.000%  |
| 25         | -27.95                | -71.82  | -48.44  | 27.95            | 71.82   | 48.44   | 0.000%  |
| 26         | 0.00                  | -140.43 | 0.00    | 0.00             | 140.43  | 0.00    | 0.000%  |
| 27         | 0.00                  | -140.43 | -11.77  | -0.00            | 140.43  | 11.77   | 0.000%  |
| 28         | 5.89                  | -140.43 | -10.20  | -5.89            | 140.43  | 10.20   | 0.000%  |
| 29         | 10.20                 | -140.43 | -5.89   | -10.20           | 140.43  | 5.89    | 0.000%  |
| 30         | 11.77                 | -140.43 | -0.00   | -11.77           | 140.43  | 0.00    | 0.000%  |
| 31         | 10.19                 | -140.43 | 5.89    | -10.19           | 140.43  | -5.89   | 0.000%  |
| 32         | 5.88                  | -140.43 | 10.20   | -5.89            | 140.43  | -10.20  | 0.000%  |
| 33         | -0.00                 | -140.43 | 11.77   | 0.00             | 140.43  | -11.77  | 0.000%  |
| 34         | -5.89                 | -140.43 | 10.20   | 5.89             | 140.43  | -10.20  | 0.000%  |
| 35         | -10.20                | -140.43 | 5.89    | 10.20            | 140.43  | -5.89   | 0.000%  |
| 36         | -11.77                | -140.43 | 0.00    | 11.77            | 140.43  | -0.00   | 0.000%  |
| 37         | -10.19                | -140.43 | -5.89   | 10.19            | 140.43  | 5.89    | 0.000%  |
| 38         | -5.88                 | -140.43 | -10.20  | 5.89             | 140.43  | 10.20   | 0.000%  |
| 39         | 0.00                  | -79.80  | -11.04  | -0.00            | 79.80   | 11.04   | 0.000%  |
| 40         | 5.52                  | -79.80  | -9.56   | -5.52            | 79.80   | 9.56    | 0.000%  |
| 41         | 9.56                  | -79.80  | -5.52   | -9.56            | 79.80   | 5.52    | 0.000%  |
| 42         | 11.04                 | -79.80  | -0.00   | -11.04           | 79.80   | 0.00    | 0.000%  |
| 43         | 9.56                  | -79.80  | 5.52    | -9.56            | 79.80   | -5.52   | 0.000%  |
| 44         | 5.52                  | -79.80  | 9.56    | -5.52            | 79.80   | -9.56   | 0.000%  |
| 45         | -0.00                 | -79.80  | 11.04   | 0.00             | 79.80   | -11.04  | 0.000%  |
| 46         | -5.52                 | -79.80  | 9.56    | 5.52             | 79.80   | -9.56   | 0.000%  |
| 47         | -9.56                 | -79.80  | 5.52    | 9.56             | 79.80   | -5.52   | 0.000%  |
| 48         | -11.04                | -79.80  | 0.00    | 11.04            | 79.80   | -0.00   | 0.000%  |
| 49         | -9.56                 | -79.80  | -5.52   | 9.56             | 79.80   | 5.52    | 0.000%  |
| 50         | -5.52                 | -79.80  | -9.56   | 5.52             | 79.80   | 9.56    | 0.000%  |

## Non-Linear Convergence Results

| Load Combination | Converged? | Number of Cycles | Displacement Tolerance | Force Tolerance |
|------------------|------------|------------------|------------------------|-----------------|
| 1                | Yes        | 4                | 0.00000001             | 0.00000001      |
| 2                | Yes        | 4                | 0.00000001             | 0.00007096      |
| 3                | Yes        | 4                | 0.00000001             | 0.00003784      |
| 4                | Yes        | 4                | 0.00000001             | 0.00073400      |
| 5                | Yes        | 4                | 0.00000001             | 0.00047647      |
| 6                | Yes        | 4                | 0.00000001             | 0.00074396      |
| 7                | Yes        | 4                | 0.00000001             | 0.00048326      |
| 8                | Yes        | 4                | 0.00000001             | 0.00007884      |
| 9                | Yes        | 4                | 0.00000001             | 0.00004429      |
| 10               | Yes        | 4                | 0.00000001             | 0.00070904      |
| 11               | Yes        | 4                | 0.00000001             | 0.00045948      |
| 12               | Yes        | 4                | 0.00000001             | 0.00075781      |
| 13               | Yes        | 4                | 0.00000001             | 0.00049264      |
| 14               | Yes        | 4                | 0.00000001             | 0.00007103      |
| 15               | Yes        | 4                | 0.00000001             | 0.00003790      |
| 16               | Yes        | 4                | 0.00000001             | 0.00073069      |
| 17               | Yes        | 4                | 0.00000001             | 0.00047434      |
| 18               | Yes        | 4                | 0.00000001             | 0.00071979      |
| 19               | Yes        | 4                | 0.00000001             | 0.00046698      |
| 20               | Yes        | 4                | 0.00000001             | 0.00007889      |
| 21               | Yes        | 4                | 0.00000001             | 0.00004434      |
| 22               | Yes        | 4                | 0.00000001             | 0.00075885      |
| 23               | Yes        | 4                | 0.00000001             | 0.00049358      |
| 24               | Yes        | 4                | 0.00000001             | 0.00071105      |
| 25               | Yes        | 4                | 0.00000001             | 0.00046100      |
| 26               | Yes        | 4                | 0.00000001             | 0.00000001      |
| 27               | Yes        | 4                | 0.00000001             | 0.00073006      |
| 28               | Yes        | 4                | 0.00000001             | 0.00074476      |
| 29               | Yes        | 4                | 0.00000001             | 0.00074465      |
| 30               | Yes        | 4                | 0.00000001             | 0.00073030      |
| 31               | Yes        | 4                | 0.00000001             | 0.00074363      |
| 32               | Yes        | 4                | 0.00000001             | 0.00074318      |
| 33               | Yes        | 4                | 0.00000001             | 0.00072791      |
| 34               | Yes        | 4                | 0.00000001             | 0.00073991      |
| 35               | Yes        | 4                | 0.00000001             | 0.00073879      |
| 36               | Yes        | 4                | 0.00000001             | 0.00072518      |
| 37               | Yes        | 4                | 0.00000001             | 0.00074040      |
| 38               | Yes        | 4                | 0.00000001             | 0.00074207      |
| 39               | Yes        | 4                | 0.00000001             | 0.00001104      |
| 40               | Yes        | 4                | 0.00000001             | 0.00001530      |
| 41               | Yes        | 4                | 0.00000001             | 0.00001547      |
| 42               | Yes        | 4                | 0.00000001             | 0.00001112      |
| 43               | Yes        | 4                | 0.00000001             | 0.00001505      |
| 44               | Yes        | 4                | 0.00000001             | 0.00001575      |
| 45               | Yes        | 4                | 0.00000001             | 0.00001105      |
| 46               | Yes        | 4                | 0.00000001             | 0.00001522      |
| 47               | Yes        | 4                | 0.00000001             | 0.00001508      |
| 48               | Yes        | 4                | 0.00000001             | 0.00001109      |
| 49               | Yes        | 4                | 0.00000001             | 0.00001575      |
| 50               | Yes        | 4                | 0.00000001             | 0.00001502      |

### Maximum Tower Deflections - Service Wind

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|------------------------|-----------------|-----------|------------|
| L1          | 155.5 - 110     | 6.090                  | 44              | 0.2810    | 0.0003     |
| L2          | 118 - 72.5      | 3.930                  | 44              | 0.2625    | 0.0002     |
| L3          | 81 - 36         | 2.059                  | 44              | 0.2104    | 0.0001     |
| L4          | 45 - 0          | 0.716                  | 44              | 0.1347    | 0.0001     |

### 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 |
|-----------------|---------------------------------|-----------------------|------------------|-----------|------------|------------------------------|
| 156.00          | DB809K-Y                        | 44                    | 6.090            | 0.2810    | 0.0003     | 438408                       |
| 144.00          | (2) 7770.00 w/ Mount Pipe       | 44                    | 5.415            | 0.2775    | 0.0003     | 190611                       |
| 135.00          | 742 213 w/ Mount Pipe           | 44                    | 4.891            | 0.2739    | 0.0003     | 106928                       |
| 128.00          | NNVV-65B-R4 w/ Mount Pipe       | 44                    | 4.490            | 0.2701    | 0.0002     | 79710                        |
| 100.00          | LNx-6515DS-VTM w/ Mount<br>Pipe | 44                    | 2.975            | 0.2411    | 0.0002     | 46451                        |

### Maximum Tower Deflections - Design Wind

| Section<br>No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|----------------|-----------------|---------------------------|-----------------------|-----------|------------|
| L1             | 155.5 - 110     | 30.948                    | 14                    | 1.4275    | 0.0015     |
| L2             | 118 - 72.5      | 19.973                    | 14                    | 1.3341    | 0.0010     |
| L3             | 81 - 36         | 10.464                    | 14                    | 1.0692    | 0.0006     |
| L4             | 45 - 0          | 3.636                     | 14                    | 0.6847    | 0.0003     |

### 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 |
|-----------------|---------------------------------|-----------------------|------------------|-----------|------------|------------------------------|
| 156.00          | DB809K-Y                        | 14                    | 30.948           | 1.4275    | 0.0016     | 86615                        |
| 144.00          | (2) 7770.00 w/ Mount Pipe       | 14                    | 27.514           | 1.4101    | 0.0014     | 37658                        |
| 135.00          | 742 213 w/ Mount Pipe           | 14                    | 24.855           | 1.3920    | 0.0013     | 21125                        |
| 128.00          | NNVV-65B-R4 w/ Mount Pipe       | 14                    | 22.817           | 1.3727    | 0.0012     | 15747                        |
| 100.00          | LNx-6515DS-VTM w/ Mount<br>Pipe | 14                    | 15.122           | 1.2255    | 0.0008     | 9159                         |

### Compression Checks

### Pole Design Data

| Section<br>No. | Elevation<br>ft    | Size                 | L<br>ft | L <sub>u</sub><br>ft | KI/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|----------------|--------------------|----------------------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| L1             | 155.5 - 110<br>(1) | TP64.606x58.6x0.375  | 45.50   | 0.00                 | 0.0  | 76.283<br>8          | -26.38              | 3989.11              | 0.007                           |
| L2             | 110 - 72.5 (2)     | TP68.805x62.8x0.4375 | 45.50   | 0.00                 | 0.0  | 94.732<br>4          | -45.20              | 5321.74              | 0.008                           |
| L3             | 72.5 - 36 (3)      | TP72.748x66.8082x0.5 | 45.00   | 0.00                 | 0.0  | 114.40<br>70         | -66.88              | 6775.62              | 0.010                           |
| L4             | 36 - 0 (4)         | TP76.5x70.56x0.5     | 45.00   | 0.00                 | 0.0  | 122.36<br>00         | -95.75              | 6928.62              | 0.014                           |

### Pole Bending Design Data

| Section No. | Elevation<br>ft    | Size                 | $M_{ux}$<br>kip-ft | $\phi M_{nx}$<br>kip-ft | Ratio<br>$\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$<br>kip-ft | $\phi M_{ny}$<br>kip-ft | Ratio<br>$\frac{M_{uy}}{\phi M_{ny}}$ |
|-------------|--------------------|----------------------|--------------------|-------------------------|---------------------------------------|--------------------|-------------------------|---------------------------------------|
| L1          | 155.5 - 110<br>(1) | TP64.606x58.6x0.375  | 747.60             | 5144.30                 | 0.145                                 | 0.00               | 5144.30                 | 0.000                                 |
| L2          | 110 - 72.5 (2)     | TP68.805x62.8x0.4375 | 2020.80            | 7300.90                 | 0.277                                 | 0.00               | 7300.90                 | 0.000                                 |
| L3          | 72.5 - 36 (3)      | TP72.748x66.8082x0.5 | 3602.64            | 9817.58                 | 0.367                                 | 0.00               | 9817.58                 | 0.000                                 |
| L4          | 36 - 0 (4)         | TP76.5x70.56x0.5     | 5944.26            | 10742.08                | 0.553                                 | 0.00               | 10742.08                | 0.000                                 |

### Pole Shear Design Data

| Section No. | Elevation<br>ft    | Size                 | Actual<br>$V_u$<br>K | $\phi V_n$<br>K | Ratio<br>$\frac{V_u}{\phi V_n}$ | Actual<br>$T_u$<br>kip-ft | $\phi T_n$<br>kip-ft | Ratio<br>$\frac{T_u}{\phi T_n}$ |
|-------------|--------------------|----------------------|----------------------|-----------------|---------------------------------|---------------------------|----------------------|---------------------------------|
| L1          | 155.5 - 110<br>(1) | TP64.606x58.6x0.375  | 28.84                | 1993.27         | 0.014                           | 0.92                      | 10452.08             | 0.000                           |
| L2          | 110 - 72.5 (2)     | TP68.805x62.8x0.4375 | 39.77                | 2658.49         | 0.015                           | 0.92                      | 14836.58             | 0.000                           |
| L3          | 72.5 - 36 (3)      | TP72.748x66.8082x0.5 | 47.82                | 3384.25         | 0.014                           | 0.92                      | 19954.50             | 0.000                           |
| L4          | 36 - 0 (4)         | TP76.5x70.56x0.5     | 55.97                | 3460.94         | 0.016                           | 0.92                      | 21830.17             | 0.000                           |

### Pole Interaction Design Data

| Section No. | Elevation<br>ft    | Ratio<br>$\frac{P_u}{\phi P_n}$ | Ratio<br>$\frac{M_{ux}}{\phi M_{nx}}$ | Ratio<br>$\frac{M_{uy}}{\phi M_{ny}}$ | Ratio<br>$\frac{V_u}{\phi V_n}$ | Ratio<br>$\frac{T_u}{\phi T_n}$ | Comb.<br>Stress<br>Ratio | Allow.<br>Stress<br>Ratio | Criteria |
|-------------|--------------------|---------------------------------|---------------------------------------|---------------------------------------|---------------------------------|---------------------------------|--------------------------|---------------------------|----------|
| L1          | 155.5 - 110<br>(1) | 0.007                           | 0.145                                 | 0.000                                 | 0.014                           | 0.000                           | 0.152                    | 1.000                     | 4.8.2    |
| L2          | 110 - 72.5 (2)     | 0.008                           | 0.277                                 | 0.000                                 | 0.015                           | 0.000                           | 0.286                    | 1.000                     | 4.8.2    |
| L3          | 72.5 - 36 (3)      | 0.010                           | 0.367                                 | 0.000                                 | 0.014                           | 0.000                           | 0.377                    | 1.000                     | 4.8.2    |
| L4          | 36 - 0 (4)         | 0.014                           | 0.553                                 | 0.000                                 | 0.016                           | 0.000                           | 0.567                    | 1.000                     | 4.8.2    |

### Section Capacity Table

| Section No.     | Elevation<br>ft | Component<br>Type | Size                 | Critical<br>Element | P<br>K | $\phi P_{allow}$<br>K | %<br>Capacity | Pass<br>Fail |
|-----------------|-----------------|-------------------|----------------------|---------------------|--------|-----------------------|---------------|--------------|
| L1              | 155.5 - 110     | Pole              | TP64.606x58.6x0.375  | 1                   | -26.38 | 3989.11               | 15.2          | Pass         |
| L2              | 110 - 72.5      | Pole              | TP68.805x62.8x0.4375 | 2                   | -45.20 | 5321.74               | 28.6          | Pass         |
| L3              | 72.5 - 36       | Pole              | TP72.748x66.8082x0.5 | 3                   | -66.88 | 6775.62               | 37.7          | Pass         |
| L4              | 36 - 0          | Pole              | TP76.5x70.56x0.5     | 4                   | -95.75 | 6928.62               | 56.7          | Pass         |
| Summary         |                 |                   |                      |                     |        |                       |               |              |
| Pole (L4)       |                 |                   |                      |                     |        |                       | 56.7          | Pass         |
| <b>RATING =</b> |                 |                   |                      |                     |        |                       | <b>56.7</b>   | <b>Pass</b>  |

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





(OTHER CONSIDERED EQUIPMENT)  
(12) 1-1/4" TO 100 FT LEVEL

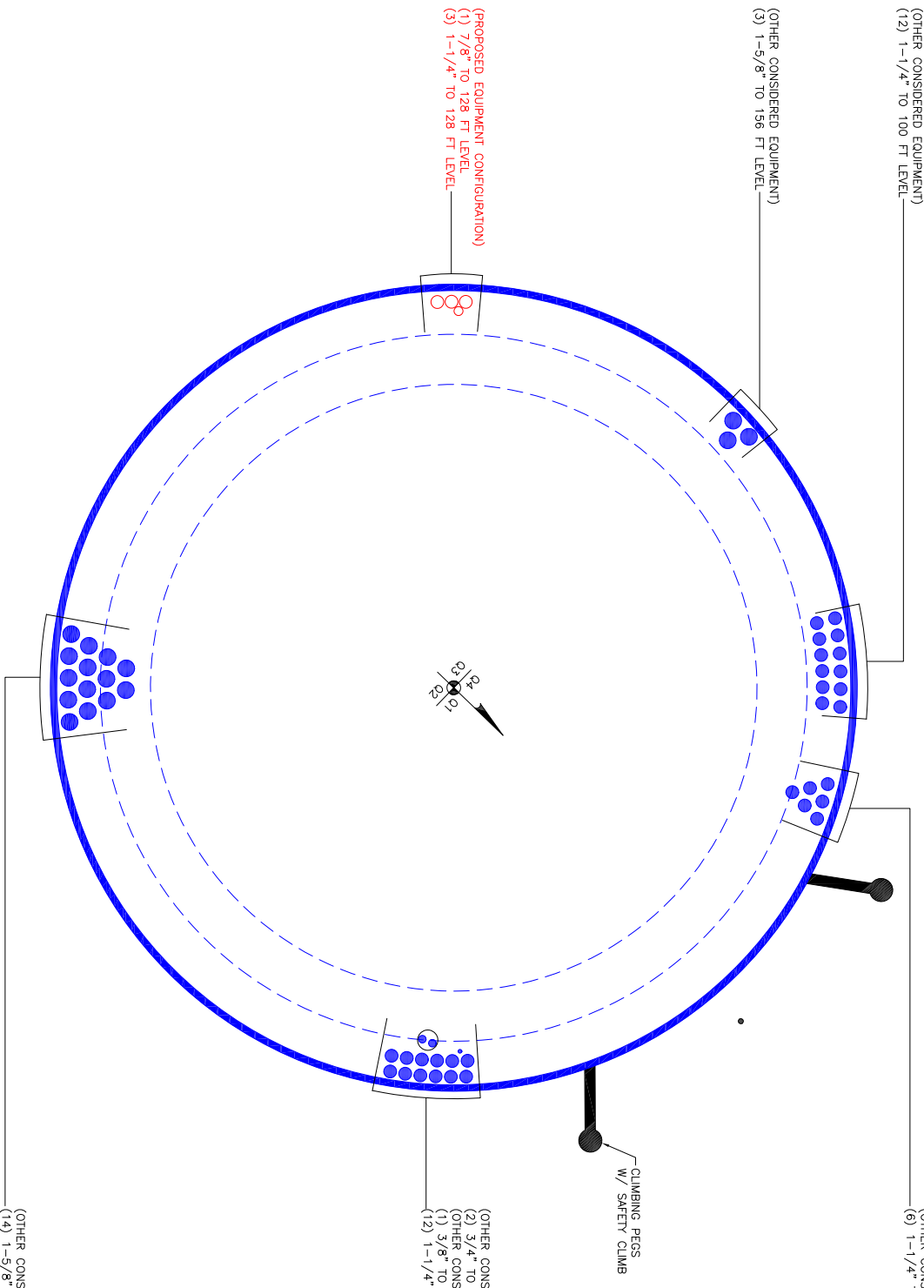
(OTHER CONSIDERED EQUIPMENT)  
(6) 1-1/4" TO 135 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)  
(3) 1-5/8" TO 156 FT LEVEL

(PROPOSED EQUIPMENT CONFIGURATION)  
(1) 7/8" TO 128 FT LEVEL  
(3) 1-1/4" TO 128 FT LEVEL

(OTHER CONSIDERED EQUIPMENT - IN 2" CONDUIT)  
(2) 3/4" TO 144 FT LEVEL  
(OTHER CONSIDERED EQUIPMENT)  
(1) 3/8" TO 144 FT LEVEL  
(12) 1-1/4" TO 144 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)  
(14) 1-5/8" TO 156 FT LEVEL



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

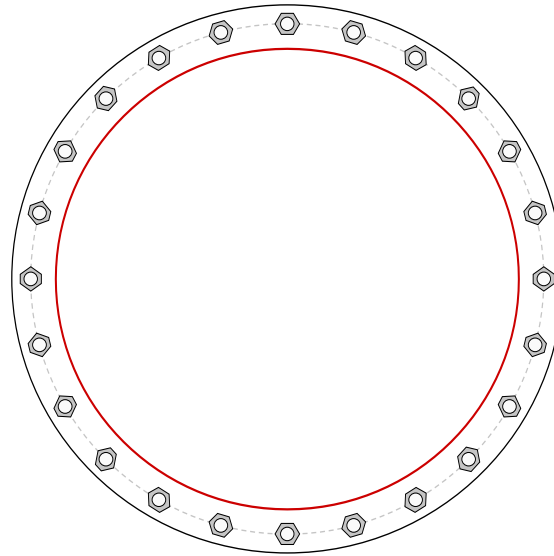
# Monopole Base Plate Connection



| Site Info |                   |
|-----------|-------------------|
| BU #      | 806366            |
| Site Name | HRT 107(C) 943204 |
| Order #   | 410917 Rev. 2     |

| Analysis Considerations |       |
|-------------------------|-------|
| TIA-222 Revision        | G     |
| Grout Considered:       | No    |
| $l_{ar}$ (in)           | 1.625 |
| Eta Factor, $\eta$      | 0.5   |

| Applied Loads      |         |
|--------------------|---------|
| Moment (kip-ft)    | 5944.26 |
| Axial Force (kips) | 95.75   |
| Shear Force (kips) | 55.97   |



| Connection Properties | Analysis Results |
|-----------------------|------------------|
|-----------------------|------------------|

| Anchor Rod Data                                                          |
|--------------------------------------------------------------------------|
| (24) 2-1/4" $\phi$ bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 84.75" BC |
| Base Plate Data                                                          |
| 91" OD x 3.25" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)                     |
| Stiffener Data                                                           |
| N/A                                                                      |
| Pole Data                                                                |
| 76.5" x 0.5" 12-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)               |

| Anchor Rod Summary      |                 | <i>(units of kips, kip-in)</i> |
|-------------------------|-----------------|--------------------------------|
| Pu = 144.23             | $\phi Pn = 260$ | <b>Stress Rating</b>           |
| Vu = 2.33               | $\phi Vn = n/a$ | <b>57.3%</b>                   |
| Mu = n/a                | $\phi Mn = n/a$ | <b>Pass</b>                    |
| Base Plate Summary      |                 |                                |
| Max Stress (ksi):       | 13.94           | (Flexural)                     |
| Allowable Stress (ksi): | 54              |                                |
| Stress Rating:          | <b>25.8%</b>    | <b>Pass</b>                    |

# Pier and Pad Foundation



BU #: 806366  
 Site Name: HRT 107(C) 94320  
 App. Number: 410917 Rev. 2

TIA-222 Revision: G  
 Tower Type: Monopole

Block Foundation?:

| Superstructure Analysis Reactions |       |         |
|-----------------------------------|-------|---------|
| Compression, $P_{comp}$ :         | 96    | kips    |
| Base Shear, $V_{u\_comp}$ :       | 56    | kips    |
| Moment, $M_u$ :                   | 5944  | ft-kips |
| Tower Height, $H$ :               | 155.5 | ft      |
| BP Dist. Above Fdn, $bp_{dist}$ : | 3.875 | in      |

| Foundation Analysis Checks            |          |         |        |       |
|---------------------------------------|----------|---------|--------|-------|
|                                       | Capacity | Demand  | Rating | Check |
| <i>Lateral (Sliding) (kips)</i>       | 682.06   | 56.00   | 8.2%   | Pass  |
| <i>Bearing Pressure (ksf)</i>         | 15.75    | 2.10    | 13.4%  | Pass  |
| <i>Overturing (kip*ft)</i>            | 18830.64 | 6410.08 | 34.0%  | Pass  |
| <i>Pier Flexure (Comp.) (kip*ft)</i>  | 18528.19 | 6140.00 | 33.1%  | Pass  |
| <i>Pier Compression (kip)</i>         | 51554.88 | 147.03  | 0.3%   | Pass  |
| <i>Pad Flexure (kip*ft)</i>           | 8428.18  | 2179.21 | 25.9%  | Pass  |
| <i>Pad Shear - 1-way (kips)</i>       | 1853.20  | 238.64  | 12.9%  | Pass  |
| <i>Pad Shear - 2-way (Comp) (ksi)</i> | 0.190    | 0.022   | 11.7%  | Pass  |

| Pier Properties                  |        |    |
|----------------------------------|--------|----|
| Pier Shape:                      | Square |    |
| Pier Diameter, $dpier$ :         | 9      | ft |
| Ext. Above Grade, $E$ :          | 0.5    | ft |
| Pier Rebar Size, $Sc$ :          | 11     |    |
| Pier Rebar Quantity, $mc$ :      | 59     |    |
| Pier Tie/Spiral Size, $St$ :     | 5      |    |
| Pier Tie/Spiral Quantity, $mt$ : | 7      |    |
| Pier Reinforcement Type:         | Tie    |    |
| Pier Clear Cover, $cc_{pier}$ :  | 3      | in |

Soil Rating: 34.0%  
 Structural Rating: 33.1%

| Pad Properties                |      |    |
|-------------------------------|------|----|
| Depth, $D$ :                  | 7.5  | ft |
| Pad Width, $W$ :              | 33.3 | ft |
| Pad Thickness, $T$ :          | 4.5  | ft |
| Pad Rebar Size, $Sp$ :        | 11   |    |
| Pad Rebar Quantity, $mp$ :    | 25   |    |
| Pad Clear Cover, $cc_{pad}$ : | 3    | in |

| Material Properties                     |       |     |
|-----------------------------------------|-------|-----|
| Rebar Grade, $F_y$ :                    | 60000 | psi |
| Concrete Compressive Strength, $F'_c$ : | 4000  | psi |
| Dry Concrete Density, $\delta_c$ :      | 150   | pcf |

| Soil Properties                     |        |         |
|-------------------------------------|--------|---------|
| Total Soil Unit Weight, $\gamma$ :  | 130    | pcf     |
| Ultimate Gross Bearing, $Q_{ult}$ : | 21.000 | ksf     |
| Cohesion, $C_u$ :                   | 0.000  | ksf     |
| Friction Angle, $\phi$ :            | 40     | degrees |
| SPT Blow Count, $N_{blows}$ :       | 100    |         |
| Base Friction, $\mu$ :              | 0.4    |         |
| Neglected Depth, $N$ :              | 3.30   | ft      |
| Foundation Bearing on Rock?         | No     |         |
| Groundwater Depth, $gw$ :           | 14.5   | ft      |

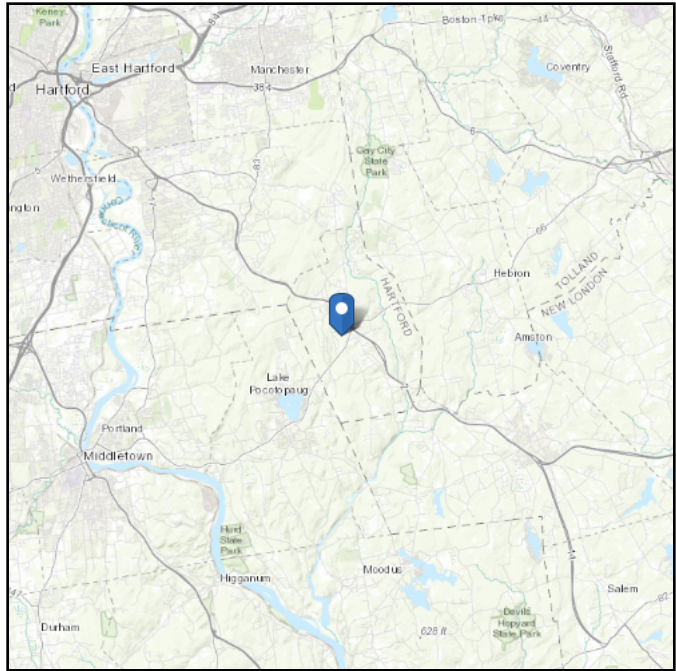
--Toggle between Gross and Net

# ASCE 7 Hazards Report

**Address:**  
No Address at This Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** II  
**Soil Class:** E - Soft Clay Soil

**Elevation:** 577.55 ft (NAVD 88)  
**Latitude:** 41.629806  
**Longitude:** -72.4665



## Wind

### Results:

|              |          |                                                                       |
|--------------|----------|-----------------------------------------------------------------------|
| Wind Speed:  | 126 Vmph | Marlborough Municipality wind speed = 130 mph (Vult) = 101 mph (Vnom) |
| 10-year MRI  | 78 Vmph  |                                                                       |
| 25-year MRI  | 87 Vmph  |                                                                       |
| 50-year MRI  | 95 Vmph  |                                                                       |
| 100-year MRI | 103 Vmph |                                                                       |

**Data Source:** ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

**Date Accessed:** Mon Sep 17 2018

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

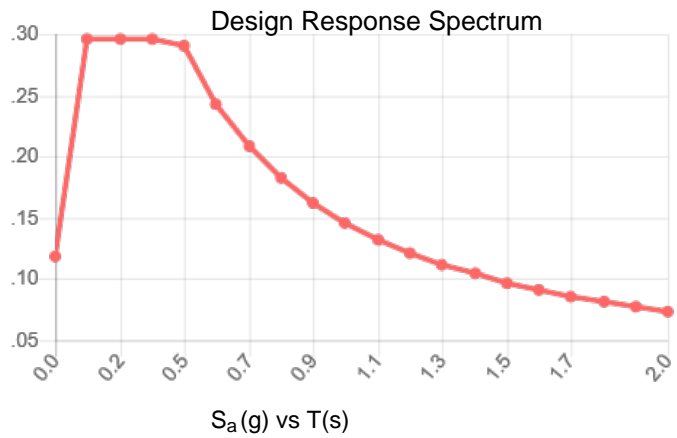
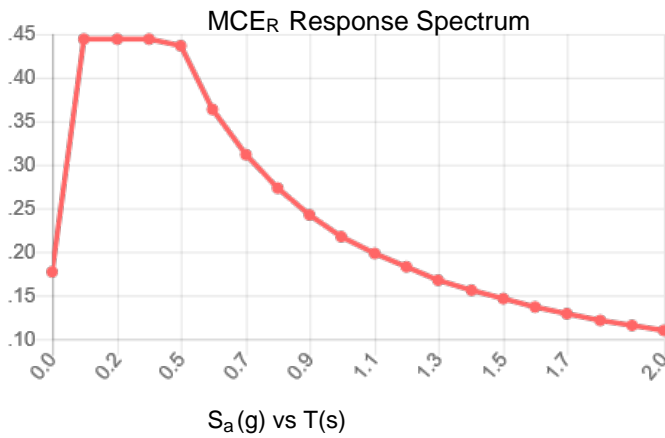
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

**Site Soil Class:** E - Soft Clay Soil

**Results:**

|            |       |                    |       |
|------------|-------|--------------------|-------|
| $S_S$ :    | 0.177 | $S_{DS}$ :         | 0.296 |
| $S_1$ :    | 0.062 | $S_{D1}$ :         | 0.146 |
| $F_a$ :    | 2.500 | $T_L$ :            | 6.000 |
| $F_v$ :    | 3.500 | PGA :              | 0.090 |
| $S_{MS}$ : | 0.444 | PGA <sub>M</sub> : | 0.224 |
| $S_{M1}$ : | 0.218 | F <sub>PGA</sub> : | 2.500 |
|            |       | $I_e$ :            | 1     |

**Seismic Design Category** C



**Data Accessed:** Mon Sep 17 2018  
**Date Source:** USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

## Ice

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**Results:**

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

**Date Accessed:** Mon Sep 17 2018

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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