STATE OF CONNECTICUT
*CONNECTICUT SITING COUNCIL*
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
Web Site: portal.ct.gov/csc

**VIA ELECTRONIC MAIL**

April 26, 2024

Jeffrey Barbadora
Permitting Specialist
Crown Castle
1800 West Park Drive
Westborough, MA 01581
Jeff.Barbadora@crowncastle.com

RE: **EM-VER-108-230809** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 691 Oxford Road, Oxford, Connecticut.
**Request for Project Change.**

Dear Jeffrey Barbadora:

The Connecticut Siting Council (Council) is in receipt of the correspondence dated April 24, 2024 and the associated Structural Analysis dated October 25, 2023, regarding a project change for the above-referenced exempt modification request acknowledged by the Council on September 6, 2023.

Pursuant to Condition No. 1 of the Council's September 6, 2023 exempt modification approval, the request to increase the number of Kaelus interference mitigation filters to be installed from three to six is hereby approved.

This approval applies only to the project change in the correspondence dated April 24, 2024.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/ANM/laf

c: The Honorable George R. Temple, First Selectperson, Town of Oxford (selectman@oxford-ct.gov)

**From:** Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
**Sent:** Wednesday, April 24, 2024 12:48 PM
**To:** CSC-DL Siting Council <Siting.Council@ct.gov>
**Subject:** EM-VER-108-230809 - 691 Oxford Road, Oxford, CT - 873645

Good afternoon,

Would the CSC please update the approval for EM-VER-108-230809 to include a total of 6 filters?

The original SA submitted with the application and dated 7/26/2023 stated only 3 filters and should have stated 6 filters.

Please see updated SA stating 6 filters and let me know if you have any questions.

Thanks,

**Jeffrey Barbadora**
Permitting Specialist
781-970-0053

**Crown Castle**
1800 W. Park Drive, Suite 250
Westborough, MA 01581

Date: **October 25, 2023**

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

| | | |
|---|---|---|
| ***Subject:*** | **Structural Analysis Report** | |
| ***Carrier Designation:*** | ***Verizon Wireless* Co-Locate** | |
| | **Site Number:** | 5000385034 |
| | **Site Name:** | OXFORD NORTH CT |
| ***Crown Castle Designation:*** | **BU Number:** | 873645 |
| | **Site Name:** | Oxford |
| | **JDE Job Number:** | 2103535 |
| | **Work Order Number:** | 2265106 |
| | **Order Number:** | 658829 Rev. 0 |
| ***Engineering Firm Designation:*** | **Crown Castle Project Number:** | 2265106 |
| ***Site Data:*** | **691 Oxford RD, OXFORD, NEW HAVEN County, CT** | |
| | **Latitude *41° 26' 49.51"*, Longitude *-73° 9' 8.316"*** | |
| | **150 Foot - Monopole Tower** | |

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:

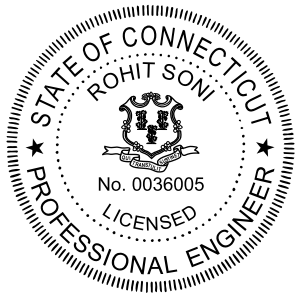
LC5: Proposed Equipment Configuration **Sufficient Capacity – 61.7%**

This analysis has been performed in accordance with the 2022 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 117 mph. Applicable Standard references and design criteria are listed in Section 2 - "Analysis Criteria".

Structural analysis prepared by: Steven Hu

Respectfully submitted by:

Rohit Soni, P.E.
Senior Project Engineer



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## 1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by SUMMIT.

## 2) ANALYSIS CRITERIA

| | |
|---|---|
| **TIA-222 Revision:** | TIA-222-H |
| **Risk Category:** | II |
| **Wind Speed:** | 117 mph |
| **Exposure Category:** | C |
| **Topographic Factor:** | 1 |
| **Ice Thickness:** | 1 in |
| **Wind Speed with Ice:** | 50 mph |
| **Service Wind Speed:** | 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) |
|---|---|---|---|---|---|---|
| 147.0 | 150.0 | 3 | commscope | CBC78T-DS-43-2X | 7 | 1-5/8 |
| | 148.0 | 1 | raycap | RHSDC-6627-PF-48 | | |
| | 147.0 | 6 | antel | LPA-80063/6CF w/ Mount Pipe | | |
| | | 6 | commscope | JAHH-65B-R3B w/ Mount Pipe | | |
| | | 6 | kaelus | BSF0020F3V1 | | |
| | | 3 | samsung telecommunications | MT6407-77A w/ Mount Pipe | | |
| | | 3 | samsung telecommunications | RFV01U-D1A | | |
| | | 3 | samsung telecommunications | RFV01U-D2A | | |
| | | 1 | tower mounts | Platform Mount [LP 303-1_HR-1] | | |

**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) |
|---|---|---|---|---|---|---|
| 139.0 | 140.0 | 4 | andrew | SBNH-1D6565C w/ Mount Pipe | 12<br>1<br>2<br>1 | 1-5/8<br>3/8<br>3/4<br>Conduit |
| | | 2 | kmw communications | AM-X-CD-16-65-00T-RET w/ Mount Pipe | | |
| | | 3 | powerwave technologies | 7770.00 w/ Mount Pipe | | |
| | 139.0 | 3 | ericsson | RRUS 11 B12 | | |
| | | 3 | ericsson | RRUS 12 B2 | | |
| | | 3 | powerwave technologies | TT19-08BP111-001 | | |
| | | 1 | raycap | DC6-48-60-18-8F | | |
| | | 1 | tower mounts | Platform Mount [LP 1201-1_KCKR-HR-1] | | |
| | 136.0 | 3 | communication | DTMABP7819VG12A | | |

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model | Number of Feed Lines | Feed Line Size (in) |
|---|---|---|---|---|---|---|
| | | | components inc. | | | |
| 125.0 | 129.0 | 3 | fujitsu | TA08025-B604 | 1 | 1-1/2 |
| | | 3 | fujitsu | TA08025-B605 | | |
| | | 1 | raycap | RDIDC-9181-PF-48 | | |
| | 127.0 | 3 | commscope | FFVV-65B-R2 w/ Mount Pipe | | |
| | 125.0 | 1 | tower mounts | Sabre_C10801018-32788 | | |

## 3) ANALYSIS PROCEDURE

**Table 3 - Documents Provided**

| Document | Reference | Source |
|---|---|---|
| 4-GEOTECHNICAL REPORTS | 2134249 | CCISITES |
| 4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS | 1339630 | CCISITES |
| 4-TOWER MANUFACTURER DRAWINGS | 1339644 | CCISITES |

### 3.1) Analysis Method

tnxTower (version 8.1.4.0), 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. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

### 3.2) Assumptions

1) Tower and structures were maintained in accordance with the TIA-222 Standard.
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 | 150 - 110.75 | Pole | TP31.38x24x0.219 | 1 | -13.82 | 1296.90 | 38.3 | Pass |
| L2 | 110.75 - 74.75 | Pole | TP37.711x30.19x0.25 | 2 | -19.13 | 1782.34 | 61.7 | Pass |
| L3 | 74.75 - 39.5 | Pole | TP43.839x36.318x0.313 | 3 | -26.48 | 2588.89 | 60.5 | Pass |
| L4 | 39.5 - 0 | Pole | TP50.64x42.18x0.375 | 4 | -39.28 | 3674.93 | 58.1 | Pass |
| | | | | | | | Summary | |
| | | | | | | Pole (L2) | 61.7 | Pass |
| | | | | | | Rating = | 61.7 | Pass |

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

| Notes | Component | Elevation (ft) | % Capacity | Pass / Fail |
|---|---|---|---|---|
| 1 | Anchor Rods | 0 | 49.2 | Pass |
| 1 | Base Plate | 0 | 42.5 | Pass |
| 1 | Base Foundation (Structure) | 0 | 36.6 | Pass |
| 1 | Base Foundation (Soil Interaction) | 0 | 45.7 | Pass |

| Structure Rating (max from all components) = | 61.7% |
|---|---|

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

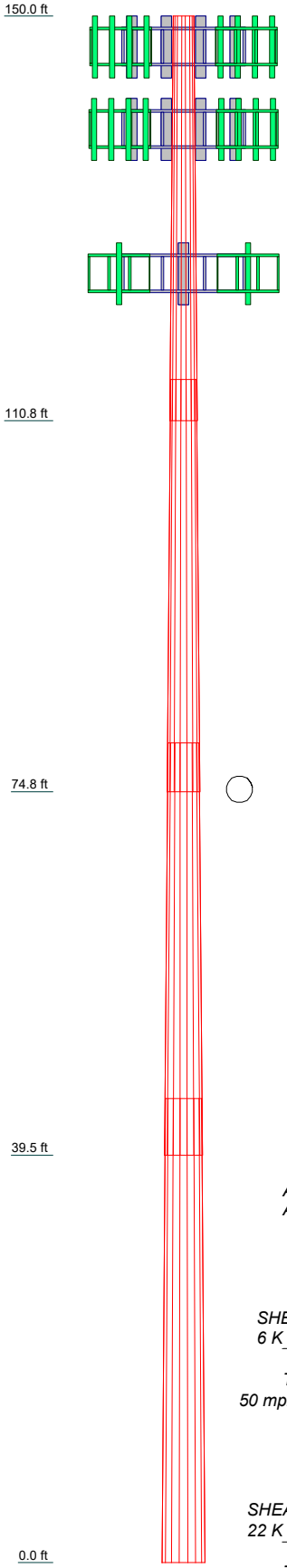
### 4.1) Recommendations

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

| Section | Length (ft) | Number of Sides | Thickness (in) | Socket Length (ft) | Top Dia (in) | Bot Dia (in) | Grade | Weight (K) |
|---|---|---|---|---|---|---|---|---|
| 1 | 39.25 | 18 | 0.219 | 4.00 | 24.000 | 31.380 | A607-65 | 2.5 |
| 2 | 40.00 | 18 | 0.250 | 4.75 | 30.190 | 37.711 | | 3.6 |
| 3 | 40.00 | 18 | 0.313 | 5.50 | 36.318 | 43.839 | | 5.4 |
| 4 | 45.00 | 18 | 0.375 | | 42.180 | 50.640 | | 8.4 |
| | | | | | | | | 19.9 |




## MATERIAL STRENGTH

| GRADE | Fy | Fu | GRADE | Fy | Fu |
|---|---|---|---|---|---|
| A607-65 | 65 ksi | 80 ksi | | | |

## TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 117 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 61.7%


CROWN CASTLE
The Pathway to Possible

*Crown Castle*
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX:


| | | | |
|---|---|---|---|
| Job: ***BU# 873645*** | | | |
| Project: | | | |
| Client: Crown Castle | Drawn by: SHu | App'd: | |
| Code: TIA-222-H | Date: 10/25/23 | Scale: NTS | |
| Path: C:\Users\shu\SAPI Work Area\873645\WO 2265106 - SA\Prod\873645.eri | | Dwg No. E-1 | |

# Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in New Haven County, Connecticut.
- Tower base elevation above sea level: 670.00 ft.
- Basic wind speed of 117 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.05.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

# Options

| | | | | | |
|---|---|---|---|---|---|
| | Consider Moments - Legs | | Distribute Leg Loads As Uniform | | Use ASCE 10 X-Brace Ly Rules |
| | Consider Moments - Horizontals | | Assume Legs Pinned | | Calculate Forces in Supporting Bracing Members |
| | Consider Moments - Diagonals | √ | Assume Rigid Index Plate | | Ignore Redundant Members in FEA |
| | Use Moment Magnification | √ | Use Clear Spans For Wind Area | | SR Leg Bolts Resist Compression |
| √ | Use Code Stress Ratios | | Use Clear Spans For KL/r | | All Leg Panels Have Same Allowable |
| √ | Use Code Safety Factors - Guys | | Retension Guys To Initial Tension | | Offset Girt At Foundation |
| | Escalate Ice | √ | Bypass Mast Stability Checks | √ | Consider Feed Line Torque |
| | Always Use Max Kz | √ | Use Azimuth Dish Coefficients | | Include Angle Block Shear Check |
| | Use Special Wind Profile | √ | Project Wind Area of Appurt. | | Use TIA-222-H Bracing Resist. Exemption |
| | Include Bolts In Member Capacity | | Autocalc Torque Arm Areas | | Use TIA-222-H Tension Splice Exemption |
| | Leg Bolts Are At Top Of Section | | Add IBC .6D+W Combination | | Poles |
| | Secondary Horizontal Braces Leg | √ | Sort Capacity Reports By Component | √ | Include Shear-Torsion Interaction |
| | Use Diamond Inner Bracing (4 Sided) | | Triangulate Diamond Inner Bracing | | Always Use Sub-Critical Flow |
| | SR Members Have Cut Ends | | Treat Feed Line Bundles As Cylinder | | Use Top Mounted Sockets |
| | SR Members Are Concentric | | Ignore KL/ry For 60 Deg. Angle Legs | √ | Pole Without Linear Attachments |
| | | | | | Pole With Shroud Or No Appurtenances |
| | | | | | Outside and Inside Corner Radii Are 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 | 150.00-110.75 | 39.25 | 4.000 | 18 | 24.000 | 31.380 | 0.219 | 0.875 | A607-65 (65 ksi) |

| Section | Elevation ft | Section Length ft | Splice Length ft | Number of Sides | Top Diameter in | Bottom Diameter in | Wall Thickness in | Bend Radius in | Pole Grade |
|---|---|---|---|---|---|---|---|---|---|
| L2 | 110.75-74.75 | 40.00 | 4.750 | 18 | 30.190 | 37.711 | 0.250 | 1.000 | A607-65 (65 ksi) |
| L3 | 74.75-39.50 | 40.00 | 5.500 | 18 | 36.318 | 43.839 | 0.313 | 1.250 | A607-65 (65 ksi) |
| L4 | 39.50-0.00 | 45.00 | | 18 | 42.180 | 50.640 | 0.375 | 1.500 | A607-65 (65 ksi) |

## Tapered Pole Properties

| Section | Tip Dia. in | Area $in^2$ | I $in^4$ | r in | C in | I/C $in^3$ | J $in^4$ | It/Q $in^2$ | w in | w/t |
|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 24.336 | 16.512 | 1179.768 | 8.442 | 12.192 | 96.766 | 2361.088 | 8.257 | 3.839 | 17.55 |
| | 31.830 | 21.636 | 2654.221 | 11.062 | 15.941 | 166.502 | 5311.934 | 10.820 | 5.138 | 23.487 |
| L2 | 31.381 | 23.758 | 2690.649 | 10.629 | 15.337 | 175.438 | 5384.839 | 11.881 | 4.874 | 19.494 |
| | 38.254 | 29.725 | 5270.144 | 13.299 | 19.157 | 275.100 | 10547.223 | 14.865 | 6.197 | 24.789 |
| L3 | 37.737 | 35.713 | 5849.225 | 12.782 | 18.450 | 317.040 | 11706.148 | 17.860 | 5.842 | 18.694 |
| | 44.467 | 43.173 | 10333.695 | 15.452 | 22.270 | 464.014 | 20680.987 | 21.591 | 7.166 | 22.93 |
| L4 | 43.823 | 49.758 | 10986.408 | 14.841 | 21.427 | 512.728 | 21987.273 | 24.884 | 6.764 | 18.036 |
| | 51.363 | 59.828 | 19097.332 | 17.844 | 25.725 | 742.361 | 38219.793 | 29.920 | 8.253 | 22.007 |

| Tower Elevation ft | Gusset Area (per face) $ft^2$ | Gusset Thickness in | Gusset Grade | Adjust. Factor $A_f$ | Adjust. Factor $A_r$ | Weight Mult. | Double Angle Stitch Bolt Spacing Diagonals in | Double Angle Stitch Bolt Spacing Horizontals in | Double Angle Stitch Bolt Spacing Redundants in |
|---|---|---|---|---|---|---|---|---|---|
| L1 150.00-110.75 | | | | 1 | 1 | 1 | | | |
| L2 110.75-74.75 | | | | 1 | 1 | 1 | | | |
| L3 74.75-39.50 | | | | 1 | 1 | 1 | | | |
| L4 39.50-0.00 | | | | 1 | 1 | 1 | | | |

## Feed Line/Linear Appurtenances - Entered As Round Or Flat

| Description | Sector | Exclude From Torque Calculation | Component Type | Placement ft | Total Number | Number Per Row | Start/End Position | Width or Diameter in | Perimeter in | Weight plf |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 rod/step | C | No | Surface Ar (CaAa) | 150.00 - 0.00 | 1 | 1 | 0.000<br>0.000 | 0.200 | | 0.274 |
| Safety Line 3/8<br>**** | C | No | Surface Ar (CaAa) | 150.00 - 0.00 | 1 | 1 | 0.000<br>0.000 | 0.375 | | 0.220 |

## Feed Line/Linear Appurtenances - Entered As Area

| Description | Face or Leg | Allow Shield | Exclude From Torque Calculation | Component Type | Placement ft | Total Number | | $C_AA_A$ $ft^2/ft$ | Weight plf |
|---|---|---|---|---|---|---|---|---|---|
| **147** | | | | | | | | | |
| AL7-50(1 5/8") | A | No | No | Inside Pole | 147.00 - 0.00 | 6 | No Ice | 0.00 | 0.520 |
| | | | | | | | 1/2" Ice | 0.00 | 0.520 |
| | | | | | | | 1" Ice | 0.00 | 0.520 |
| HB158-U12S24-XXX-LI(1-5/8) | A | No | No | Inside Pole | 147.00 - 0.00 | 1 | No Ice | 0.00 | 3.200 |
| | | | | | | | 1/2" Ice | 0.00 | 3.200 |

| Description | Face or Leg | Allow Shield | Exclude From Torque Calculation | Component Type | Placement ft | Total Number | | $C_AA_A$ $ft^2/ft$ | Weight plf |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1" Ice | 0.00 | 3.200 |
| **139** | | | | | | | | | |
| LCF158-50JA-A0(1-5/8) | B | No | No | Inside Pole | 139.00 - 0.00 | 12 | No Ice | 0.00 | 0.800 |
| | | | | | | | 1/2" Ice | 0.00 | 0.800 |
| | | | | | | | 1" Ice | 0.00 | 0.800 |
| FB-L98B-034-XXX(3/8) | B | No | No | Inside Pole | 139.00 - 0.00 | 1 | No Ice | 0.00 | 0.057 |
| | | | | | | | 1/2" Ice | 0.00 | 0.057 |
| | | | | | | | 1" Ice | 0.00 | 0.057 |
| WR-VG86ST-BRD(3/4) | B | No | No | Inside Pole | 139.00 - 0.00 | 2 | No Ice | 0.00 | 0.584 |
| | | | | | | | 1/2" Ice | 0.00 | 0.584 |
| | | | | | | | 1" Ice | 0.00 | 0.584 |
| 2" Rigid Conduit | B | No | No | Inside Pole | 139.00 - 0.00 | 1 | No Ice | 0.00 | 2.800 |
| | | | | | | | 1/2" Ice | 0.00 | 2.800 |
| | | | | | | | 1" Ice | 0.00 | 2.800 |
| ** | | | | | | | | | |
| CU12PSM9P6XXX (1-1/2) | A | No | No | Inside Pole | 125.00 - 0.00 | 1 | No Ice | 0.00 | 2.350 |
| | | | | | | | 1/2" Ice | 0.00 | 2.350 |
| | | | | | | | 1" Ice | 0.00 | 2.350 |
| **** | | | | | | | | | |

## Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation ft | Face | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|
| L1 | 150.00-110.75 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.26 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.38 |
| | | C | 0.000 | 0.000 | 2.257 | 0.000 | 0.02 |
| L2 | 110.75-74.75 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.31 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.49 |
| | | C | 0.000 | 0.000 | 2.070 | 0.000 | 0.02 |
| L3 | 74.75-39.50 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.31 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.48 |
| | | C | 0.000 | 0.000 | 2.027 | 0.000 | 0.02 |
| L4 | 39.50-0.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.34 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.54 |
| | | C | 0.000 | 0.000 | 2.271 | 0.000 | 0.02 |

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

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|
| L1 | 150.00-110.75 | A | 0.975 | 0.000 | 0.000 | 0.000 | 0.000 | 0.26 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.38 |
| | | C | | 0.000 | 0.000 | 17.559 | 0.000 | 0.14 |
| L2 | 110.75-74.75 | A | 0.942 | 0.000 | 0.000 | 0.000 | 0.000 | 0.31 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.49 |
| | | C | | 0.000 | 0.000 | 16.105 | 0.000 | 0.13 |
| L3 | 74.75-39.50 | A | 0.898 | 0.000 | 0.000 | 0.000 | 0.000 | 0.31 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.48 |
| | | C | | 0.000 | 0.000 | 15.311 | 0.000 | 0.12 |
| L4 | 39.50-0.00 | A | 0.808 | 0.000 | 0.000 | 0.000 | 0.000 | 0.34 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.54 |
| | | C | | 0.000 | 0.000 | 16.454 | 0.000 | 0.12 |

## Feed Line Center of Pressure

| Section | Elevation | $CP_X$ | $CP_Z$ | $CP_X$ Ice | $CP_Z$ Ice |
|---|---|---|---|---|---|
| | ft | in | in | in | in |
| L1 | 150.00-110.75 | 0.000 | 0.526 | 0.000 | 1.956 |
| L2 | 110.75-74.75 | 0.000 | 0.528 | 0.000 | 2.031 |
| L3 | 74.75-39.50 | 0.000 | 0.530 | 0.000 | 2.030 |
| L4 | 39.50-0.00 | 0.000 | 0.531 | 0.000 | 1.996 |

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. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| L1 | 1 | 5/8 rod/step | 110.75 - 150.00 | 1.0000 | 1.0000 |
| L1 | 2 | Safety Line 3/8 | 110.75 - 150.00 | 1.0000 | 1.0000 |
| L2 | 1 | 5/8 rod/step | 74.75 - 110.75 | 1.0000 | 1.0000 |
| L2 | 2 | Safety Line 3/8 | 74.75 - 110.75 | 1.0000 | 1.0000 |
| L3 | 1 | 5/8 rod/step | 39.50 - 74.75 | 1.0000 | 1.0000 |
| L3 | 2 | Safety Line 3/8 | 39.50 - 74.75 | 1.0000 | 1.0000 |
| L4 | 1 | 5/8 rod/step | 0.00 - 39.50 | 1.0000 | 1.0000 |
| L4 | 2 | Safety Line 3/8 | 0.00 - 39.50 | 1.0000 | 1.0000 |

## Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft |
|---|---|---|---|---|---|
| *** | | | | | |
| Lighting Rod 1/2" x 2' | C | None | | 0.000 | 150.00 |
| *** | | | | | |
| (2) LPA-80063/6CF w/ Mount Pipe | A | From Leg | 4.00<br>0.000<br>0.000 | 0.000 | 147.00 |
| (2) LPA-80063/6CF w/ Mount Pipe | B | From Leg | 4.00<br>0.000<br>0.000 | 0.000 | 147.00 |
| (2) LPA-80063/6CF w/ Mount Pipe | C | From Leg | 4.00<br>0.000<br>0.000 | 0.000 | 147.00 |
| (2) JAHH-65B-R3B w/ Mount Pipe | A | From Leg | 4.00<br>0.000<br>0.000 | 0.000 | 147.00 |
| (2) JAHH-65B-R3B w/ Mount Pipe | B | From Leg | 4.00 | 0.000 | 147.00 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft |
|---|---|---|---|---|---|
| | | | 0.000<br>0.000 | | |
| (2) JAHH-65B-R3B w/ Mount Pipe | C | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| MT6407-77A w/ Mount Pipe | A | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| MT6407-77A w/ Mount Pipe | B | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| MT6407-77A w/ Mount Pipe | C | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| CBC78T-DS-43-2X | A | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 3.000 | | |
| CBC78T-DS-43-2X | B | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 3.000 | | |
| CBC78T-DS-43-2X | C | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 3.000 | | |
| RFV01U-D1A | A | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| RFV01U-D1A | B | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| RFV01U-D1A | C | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| RFV01U-D2A | A | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| RFV01U-D2A | B | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| RFV01U-D2A | C | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| (2) BSF0020F3V1 | A | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| (2) BSF0020F3V1 | B | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| (2) BSF0020F3V1 | C | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 0.000 | | |
| RHSDC-6627-PF-48 | B | From Leg | 4.00<br>0.000 | 0.000 | 147.00 |
| | | | 1.000 | | |
| Platform Mount [LP 303-1_HR-1]<br>*** | C | None | | 0.000 | 147.00 |
| (2) SBNH-1D6565C w/ Mount Pipe | A | From Leg | 4.00<br>0.000 | 0.000 | 139.00 |
| | | | 1.000 | | |
| (2) SBNH-1D6565C w/ Mount Pipe | B | From Leg | 4.00<br>0.000 | 0.000 | 139.00 |
| | | | 1.000 | | |
| 7770.00 w/ Mount Pipe | A | From Leg | 4.00<br>0.000 | 0.000 | 139.00 |
| | | | 1.000 | | |
| 7770.00 w/ Mount Pipe | B | From Leg | 4.00 | 0.000 | 139.00 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft |
|---|---|---|---|---|---|
| 7770.00 w/ Mount Pipe | C | From Leg | 0.000<br>1.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| (2) AM-X-CD-16-65-00T-RET w/ Mount Pipe | C | From Leg | 1.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| DTMABP7819VG12A | A | From Leg | 1.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| DTMABP7819VG12A | B | From Leg | -3.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| DTMABP7819VG12A | C | From Leg | -3.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| RRUS 11 B12 | A | From Leg | -3.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| RRUS 11 B12 | B | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| RRUS 11 B12 | C | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| RRUS 12 B2 | A | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| RRUS 12 B2 | B | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| RRUS 12 B2 | C | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| TT19-08BP111-001 | A | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| TT19-08BP111-001 | B | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| TT19-08BP111-001 | C | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| DC6-48-60-18-8F | C | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 139.00 |
| Platform Mount [LP 1201-1_KCKR-HR-1] | C | None | 0.000 | 0.000 | 139.00 |
| *** | | | | | |
| TA08025-B604 | A | From Leg | 4.00<br>0.000 | 0.000 | 125.00 |
| TA08025-B604 | B | From Leg | 4.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| TA08025-B604 | C | From Leg | 4.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| TA08025-B605 | A | From Leg | 4.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| TA08025-B605 | B | From Leg | 4.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| TA08025-B605 | C | From Leg | 4.000<br>4.00 | 0.000 | 125.00 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft |
|---|---|---|---|---|---|
| FFVV-65B-R2 w/ Mount Pipe | A | From Leg | 0.000<br>4.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| FFVV-65B-R2 w/ Mount Pipe | B | From Leg | 2.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| FFVV-65B-R2 w/ Mount Pipe | C | From Leg | 2.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| RDIDC-9181-PF-48 | C | From Leg | 2.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| (2) 8' x 2" Mount Pipe | A | From Leg | 4.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| (2) 8' x 2" Mount Pipe | B | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| (2) 8' x 2" Mount Pipe | C | From Leg | 0.000<br>4.00<br>0.000 | 0.000 | 125.00 |
| Sabre_C10801018-32788<br>*** | C | None | 0.000 | 0.000 | 125.00 |

# Load Combinations

| Comb. No. | Description |
|---|---|
| 1 | Dead Only |
| 2 | 1.2 Dead+1.0 Wind 0 deg - No Ice |
| 3 | 0.9 Dead+1.0 Wind 0 deg - No Ice |
| 4 | 1.2 Dead+1.0 Wind 30 deg - No Ice |
| 5 | 0.9 Dead+1.0 Wind 30 deg - No Ice |
| 6 | 1.2 Dead+1.0 Wind 60 deg - No Ice |
| 7 | 0.9 Dead+1.0 Wind 60 deg - No Ice |
| 8 | 1.2 Dead+1.0 Wind 90 deg - No Ice |
| 9 | 0.9 Dead+1.0 Wind 90 deg - No Ice |
| 10 | 1.2 Dead+1.0 Wind 120 deg - No Ice |
| 11 | 0.9 Dead+1.0 Wind 120 deg - No Ice |
| 12 | 1.2 Dead+1.0 Wind 150 deg - No Ice |
| 13 | 0.9 Dead+1.0 Wind 150 deg - No Ice |
| 14 | 1.2 Dead+1.0 Wind 180 deg - No Ice |
| 15 | 0.9 Dead+1.0 Wind 180 deg - No Ice |
| 16 | 1.2 Dead+1.0 Wind 210 deg - No Ice |
| 17 | 0.9 Dead+1.0 Wind 210 deg - No Ice |
| 18 | 1.2 Dead+1.0 Wind 240 deg - No Ice |
| 19 | 0.9 Dead+1.0 Wind 240 deg - No Ice |
| 20 | 1.2 Dead+1.0 Wind 270 deg - No Ice |
| 21 | 0.9 Dead+1.0 Wind 270 deg - No Ice |
| 22 | 1.2 Dead+1.0 Wind 300 deg - No Ice |
| 23 | 0.9 Dead+1.0 Wind 300 deg - No Ice |
| 24 | 1.2 Dead+1.0 Wind 330 deg - No Ice |
| 25 | 0.9 Dead+1.0 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 |

| Comb. No. | Description |
|---|---|
| 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 | 150 - 110.75 | Pole | Max Tension | 21 | 0.00 | -0.00 | 0.00 |
| | | | Max. Compression | 26 | -24.77 | -0.49 | -0.45 |
| | | | Max. Mx | 8 | -13.82 | -340.09 | -0.28 |
| | | | Max. My | 14 | -13.83 | -0.14 | -339.08 |
| | | | Max. Vy | 8 | 14.53 | -340.09 | -0.28 |
| | | | Max. Vx | 14 | 14.48 | -0.14 | -339.08 |
| | | | Max. Torque | 3 | | | -0.75 |
| L2 | 110.75 - 74.75 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 26 | -31.54 | -0.49 | -0.63 |
| | | | Max. Mx | 8 | -19.13 | -898.21 | -0.10 |
| | | | Max. My | 14 | -19.14 | 0.06 | -895.61 |
| | | | Max. Vy | 8 | 17.11 | -898.21 | -0.10 |
| | | | Max. Vx | 14 | 17.07 | 0.06 | -895.61 |
| | | | Max. Torque | 17 | | | 0.61 |
| L3 | 74.75 - 39.5 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 26 | -40.42 | -0.49 | -0.83 |
| | | | Max. Mx | 8 | -26.48 | -1533.15 | 0.08 |
| | | | Max. My | 14 | -26.48 | 0.28 | -1529.02 |
| | | | Max. Vy | 8 | 19.64 | -1533.15 | 0.08 |
| | | | Max. Vx | 14 | 19.59 | 0.28 | -1529.02 |
| | | | Max. Torque | 17 | | | 0.61 |
| L4 | 39.5 - 0 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 26 | -55.19 | -0.49 | -1.11 |
| | | | Max. Mx | 8 | -39.28 | -2483.13 | 0.31 |
| | | | Max. My | 14 | -39.28 | 0.56 | -2477.07 |
| | | | Max. Vy | 8 | 22.40 | -2483.13 | 0.31 |
| | | | Max. Vx | 14 | 22.36 | 0.56 | -2477.07 |
| | | | Max. Torque | 17 | | | 0.61 |

## Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|---|---|---|---|---|---|
| Pole | Max. Vert | 30 | 55.19 | -6.41 | 0.00 |

| Location | Condition | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|---|---|---|---|---|---|
| | Max. $H_x$ | 21 | 29.47 | 22.38 | -0.01 |
| | Max. $H_z$ | 3 | 29.47 | -0.01 | 22.33 |
| | Max. $M_x$ | 2 | 2476.45 | -0.01 | 22.33 |
| | Max. $M_z$ | 8 | 2483.13 | -22.38 | 0.01 |
| | Max. Torsion | 17 | 0.61 | 11.19 | -19.34 |
| | Min. Vert | 25 | 29.47 | 11.18 | 19.34 |
| | Min. $H_x$ | 9 | 29.47 | -22.38 | 0.01 |
| | Min. $H_z$ | 15 | 29.47 | 0.01 | -22.33 |
| | Min. $M_x$ | 14 | -2477.07 | 0.01 | -22.33 |
| | Min. $M_z$ | 20 | -2483.01 | 22.38 | -0.01 |
| | Min. Torsion | 5 | -0.60 | -11.19 | 19.34 |

## Tower Mast Reaction Summary

| Load Combination | Vertical K | $Shear_x$ K | $Shear_z$ K | Overturning Moment, $M_x$ kip-ft | Overturning Moment, $M_z$ kip-ft | Torque kip-ft |
|---|---|---|---|---|---|---|
| Dead Only | 32.75 | 0.00 | 0.00 | 0.24 | -0.05 | 0.00 |
| 1.2 Dead+1.0 Wind 0 deg - No Ice | 39.29 | 0.01 | -22.33 | -2476.45 | -0.67 | 0.55 |
| 0.9 Dead+1.0 Wind 0 deg - No Ice | 29.47 | 0.01 | -22.33 | -2443.61 | -0.65 | 0.56 |
| 1.2 Dead+1.0 Wind 30 deg - No Ice | 39.29 | 11.19 | -19.34 | -2144.94 | -1242.13 | 0.60 |
| 0.9 Dead+1.0 Wind 30 deg - No Ice | 29.47 | 11.19 | -19.34 | -2116.51 | -1225.61 | 0.60 |
| 1.2 Dead+1.0 Wind 60 deg - No Ice | 39.29 | 19.38 | -11.17 | -1238.60 | -2150.77 | 0.49 |
| 0.9 Dead+1.0 Wind 60 deg - No Ice | 29.47 | 19.38 | -11.17 | -1222.22 | -2122.17 | 0.49 |
| 1.2 Dead+1.0 Wind 90 deg - No Ice | 39.29 | 22.38 | -0.01 | -0.31 | -2483.13 | 0.25 |
| 0.9 Dead+1.0 Wind 90 deg - No Ice | 29.47 | 22.38 | -0.01 | -0.38 | -2450.10 | 0.25 |
| 1.2 Dead+1.0 Wind 120 deg - No Ice | 39.29 | 19.38 | 11.16 | 1238.15 | -2150.16 | -0.06 |
| 0.9 Dead+1.0 Wind 120 deg - No Ice | 29.47 | 19.38 | 11.16 | 1221.62 | -2121.56 | -0.06 |
| 1.2 Dead+1.0 Wind 150 deg - No Ice | 39.29 | 11.18 | 19.34 | 2144.94 | -1241.07 | -0.36 |
| 0.9 Dead+1.0 Wind 150 deg - No Ice | 29.47 | 11.18 | 19.34 | 2116.35 | -1224.55 | -0.36 |
| 1.2 Dead+1.0 Wind 180 deg - No Ice | 39.29 | -0.01 | 22.33 | 2477.07 | 0.56 | -0.56 |
| 0.9 Dead+1.0 Wind 180 deg - No Ice | 29.47 | -0.01 | 22.33 | 2444.06 | 0.57 | -0.56 |
| 1.2 Dead+1.0 Wind 210 deg - No Ice | 39.29 | -11.19 | 19.34 | 2145.55 | 1242.02 | -0.61 |
| 0.9 Dead+1.0 Wind 210 deg - No Ice | 29.47 | -11.19 | 19.34 | 2116.96 | 1225.52 | -0.61 |
| 1.2 Dead+1.0 Wind 240 deg - No Ice | 39.29 | -19.38 | 11.17 | 1239.21 | 2150.65 | -0.49 |
| 0.9 Dead+1.0 Wind 240 deg - No Ice | 29.47 | -19.38 | 11.17 | 1222.67 | 2122.08 | -0.49 |
| 1.2 Dead+1.0 Wind 270 deg - No Ice | 39.29 | -22.38 | 0.01 | 0.92 | 2483.01 | -0.25 |
| 0.9 Dead+1.0 Wind 270 deg - No Ice | 29.47 | -22.38 | 0.01 | 0.83 | 2450.01 | -0.25 |
| 1.2 Dead+1.0 Wind 300 deg - No Ice | 39.29 | -19.38 | -11.16 | -1237.53 | 2150.04 | 0.07 |
| 0.9 Dead+1.0 Wind 300 deg - No Ice | 29.47 | -19.38 | -11.16 | -1221.16 | 2121.47 | 0.06 |
| 1.2 Dead+1.0 Wind 330 deg - No Ice | 39.29 | -11.18 | -19.34 | -2144.32 | 1240.95 | 0.36 |
| 0.9 Dead+1.0 Wind 330 deg | 29.47 | -11.18 | -19.34 | -2115.90 | 1224.47 | 0.36 |

| Load Combination | Vertical | $Shear_x$ | $Shear_z$ | Overturning Moment, $M_x$ | Overturning Moment, $M_z$ | Torque |
|---|---|---|---|---|---|---|
| | K | K | K | kip-ft | kip-ft | kip-ft |
| - No Ice | | | | | | |
| 1.2 Dead+1.0 Ice+1.0 Temp | 55.19 | 0.00 | 0.00 | 1.11 | -0.49 | 0.00 |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp | 55.19 | 0.00 | -6.40 | -692.90 | -0.70 | 0.10 |
| 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp | 55.19 | 3.21 | -5.54 | -599.96 | -348.38 | 0.12 |
| 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp | 55.19 | 5.55 | -3.20 | -345.94 | -602.86 | 0.10 |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp | 55.19 | 6.41 | -0.00 | 1.10 | -695.97 | 0.06 |
| 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp | 55.19 | 5.55 | 3.20 | 348.18 | -602.74 | 0.00 |
| 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp | 55.19 | 3.20 | 5.54 | 602.30 | -348.16 | -0.06 |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp | 55.19 | -0.00 | 6.40 | 695.36 | -0.45 | -0.10 |
| 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp | 55.19 | -3.21 | 5.54 | 602.42 | 347.23 | -0.12 |
| 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp | 55.19 | -5.55 | 3.20 | 348.40 | 601.71 | -0.10 |
| 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp | 55.19 | -6.41 | 0.00 | 1.36 | 694.81 | -0.06 |
| 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp | 55.19 | -5.55 | -3.20 | -345.72 | 601.59 | -0.00 |
| 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp | 55.19 | -3.20 | -5.54 | -599.84 | 347.01 | 0.06 |
| Dead+Wind 0 deg - Service | 32.75 | 0.00 | -5.53 | -608.62 | -0.20 | 0.14 |
| Dead+Wind 30 deg - Service | 32.75 | 2.77 | -4.79 | -527.12 | -305.40 | 0.15 |
| Dead+Wind 60 deg - Service | 32.75 | 4.80 | -2.77 | -304.31 | -528.77 | 0.12 |
| Dead+Wind 90 deg - Service | 32.75 | 5.54 | -0.00 | 0.10 | -610.48 | 0.06 |
| Dead+Wind 120 deg - Service | 32.75 | 4.80 | 2.77 | 304.56 | -528.62 | -0.01 |
| Dead+Wind 150 deg - Service | 32.75 | 2.77 | 4.79 | 527.48 | -305.13 | -0.09 |
| Dead+Wind 180 deg - Service | 32.75 | -0.00 | 5.53 | 609.13 | 0.10 | -0.14 |
| Dead+Wind 210 deg - Service | 32.75 | -2.77 | 4.79 | 527.63 | 305.29 | -0.15 |
| Dead+Wind 240 deg - Service | 32.75 | -4.80 | 2.77 | 304.82 | 528.67 | -0.12 |
| Dead+Wind 270 deg - Service | 32.75 | -5.54 | 0.00 | 0.41 | 610.37 | -0.06 |
| Dead+Wind 300 deg - Service | 32.75 | -4.80 | -2.77 | -304.05 | 528.52 | 0.01 |
| Dead+Wind 330 deg - Service | 32.75 | -2.77 | -4.79 | -526.97 | 305.03 | 0.09 |

# Solution Summary

| | Sum of Applied Forces | | | Sum of Reactions | | | |
|---|---|---|---|---|---|---|---|
| Load Comb. | PX | PY | PZ | PX | PY | PZ | % Error |
| | K | K | K | K | K | K | |
| 1 | 0.00 | -32.75 | 0.00 | 0.00 | 32.75 | 0.00 | 0.000% |
| 2 | 0.01 | -39.29 | -22.33 | -0.01 | 39.29 | 22.33 | 0.000% |
| 3 | 0.01 | -29.47 | -22.33 | -0.01 | 29.47 | 22.33 | 0.000% |
| 4 | 11.19 | -39.29 | -19.34 | -11.19 | 39.29 | 19.34 | 0.000% |
| 5 | 11.19 | -29.47 | -19.34 | -11.19 | 29.47 | 19.34 | 0.000% |
| 6 | 19.38 | -39.29 | -11.17 | -19.38 | 39.29 | 11.17 | 0.000% |
| 7 | 19.38 | -29.47 | -11.17 | -19.38 | 29.47 | 11.17 | 0.000% |
| 8 | 22.38 | -39.29 | -0.01 | -22.38 | 39.29 | 0.01 | 0.000% |
| 9 | 22.38 | -29.47 | -0.01 | -22.38 | 29.47 | 0.01 | 0.000% |
| 10 | 19.38 | -39.29 | 11.16 | -19.38 | 39.29 | -11.16 | 0.000% |
| 11 | 19.38 | -29.47 | 11.16 | -19.38 | 29.47 | -11.16 | 0.000% |
| 12 | 11.18 | -39.29 | 19.34 | -11.18 | 39.29 | -19.34 | 0.000% |
| 13 | 11.18 | -29.47 | 19.34 | -11.18 | 29.47 | -19.34 | 0.000% |
| 14 | -0.01 | -39.29 | 22.33 | 0.01 | 39.29 | -22.33 | 0.000% |

| Load Comb. | Sum of Applied Forces PX K | PY K | PZ K | Sum of Reactions PX K | PY K | PZ K | % Error |
|---|---|---|---|---|---|---|---|
| 15 | -0.01 | -29.47 | 22.33 | 0.01 | 29.47 | -22.33 | 0.000% |
| 16 | -11.19 | -39.29 | 19.34 | 11.19 | 39.29 | -19.34 | 0.000% |
| 17 | -11.19 | -29.47 | 19.34 | 11.19 | 29.47 | -19.34 | 0.000% |
| 18 | -19.38 | -39.29 | 11.17 | 19.38 | 39.29 | -11.17 | 0.000% |
| 19 | -19.38 | -29.47 | 11.17 | 19.38 | 29.47 | -11.17 | 0.000% |
| 20 | -22.38 | -39.29 | 0.01 | 22.38 | 39.29 | -0.01 | 0.000% |
| 21 | -22.38 | -29.47 | 0.01 | 22.38 | 29.47 | -0.01 | 0.000% |
| 22 | -19.38 | -39.29 | -11.16 | 19.38 | 39.29 | 11.16 | 0.000% |
| 23 | -19.38 | -29.47 | -11.16 | 19.38 | 29.47 | 11.16 | 0.000% |
| 24 | -11.18 | -39.29 | -19.34 | 11.18 | 39.29 | 19.34 | 0.000% |
| 25 | -11.18 | -29.47 | -19.34 | 11.18 | 29.47 | 19.34 | 0.000% |
| 26 | 0.00 | -55.19 | 0.00 | 0.00 | 55.19 | 0.00 | 0.000% |
| 27 | 0.00 | -55.19 | -6.40 | -0.00 | 55.19 | 6.40 | 0.000% |
| 28 | 3.21 | -55.19 | -5.54 | -3.21 | 55.19 | 5.54 | 0.000% |
| 29 | 5.55 | -55.19 | -3.20 | -5.55 | 55.19 | 3.20 | 0.000% |
| 30 | 6.41 | -55.19 | -0.00 | -6.41 | 55.19 | 0.00 | 0.000% |
| 31 | 5.55 | -55.19 | 3.20 | -5.55 | 55.19 | -3.20 | 0.000% |
| 32 | 3.20 | -55.19 | 5.54 | -3.20 | 55.19 | -5.54 | 0.000% |
| 33 | -0.00 | -55.19 | 6.40 | 0.00 | 55.19 | -6.40 | 0.000% |
| 34 | -3.21 | -55.19 | 5.54 | 3.21 | 55.19 | -5.54 | 0.000% |
| 35 | -5.55 | -55.19 | 3.20 | 5.55 | 55.19 | -3.20 | 0.000% |
| 36 | -6.41 | -55.19 | 0.00 | 6.41 | 55.19 | -0.00 | 0.000% |
| 37 | -5.55 | -55.19 | -3.20 | 5.55 | 55.19 | 3.20 | 0.000% |
| 38 | -3.20 | -55.19 | -5.54 | 3.20 | 55.19 | 5.54 | 0.000% |
| 39 | 0.00 | -32.75 | -5.53 | -0.00 | 32.75 | 5.53 | 0.000% |
| 40 | 2.77 | -32.75 | -4.79 | -2.77 | 32.75 | 4.79 | 0.000% |
| 41 | 4.80 | -32.75 | -2.77 | -4.80 | 32.75 | 2.77 | 0.000% |
| 42 | 5.54 | -32.75 | -0.00 | -5.54 | 32.75 | 0.00 | 0.000% |
| 43 | 4.80 | -32.75 | 2.77 | -4.80 | 32.75 | -2.77 | 0.000% |
| 44 | 2.77 | -32.75 | 4.79 | -2.77 | 32.75 | -4.79 | 0.000% |
| 45 | -0.00 | -32.75 | 5.53 | 0.00 | 32.75 | -5.53 | 0.000% |
| 46 | -2.77 | -32.75 | 4.79 | 2.77 | 32.75 | -4.79 | 0.000% |
| 47 | -4.80 | -32.75 | 2.77 | 4.80 | 32.75 | -2.77 | 0.000% |
| 48 | -5.54 | -32.75 | 0.00 | 5.54 | 32.75 | -0.00 | 0.000% |
| 49 | -4.80 | -32.75 | -2.77 | 4.80 | 32.75 | 2.77 | 0.000% |
| 50 | -2.77 | -32.75 | -4.79 | 2.77 | 32.75 | 4.79 | 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 | 5 | 0.00000001 | 0.00006720 |
| 3 | Yes | 4 | 0.00000001 | 0.00072721 |
| 4 | Yes | 6 | 0.00000001 | 0.00015779 |
| 5 | Yes | 6 | 0.00000001 | 0.00005305 |
| 6 | Yes | 6 | 0.00000001 | 0.00015375 |
| 7 | Yes | 6 | 0.00000001 | 0.00005152 |
| 8 | Yes | 5 | 0.00000001 | 0.00003545 |
| 9 | Yes | 4 | 0.00000001 | 0.00042759 |
| 10 | Yes | 6 | 0.00000001 | 0.00015530 |
| 11 | Yes | 6 | 0.00000001 | 0.00005209 |
| 12 | Yes | 6 | 0.00000001 | 0.00015686 |
| 13 | Yes | 6 | 0.00000001 | 0.00005269 |
| 14 | Yes | 5 | 0.00000001 | 0.00006522 |
| 15 | Yes | 4 | 0.00000001 | 0.00070852 |
| 16 | Yes | 6 | 0.00000001 | 0.00015328 |
| 17 | Yes | 6 | 0.00000001 | 0.00005135 |
| 18 | Yes | 6 | 0.00000001 | 0.00015755 |
| 19 | Yes | 6 | 0.00000001 | 0.00005293 |
| 20 | Yes | 5 | 0.00000001 | 0.00003707 |
| 21 | Yes | 4 | 0.00000001 | 0.00044132 |
| 22 | Yes | 6 | 0.00000001 | 0.00015573 |
| 23 | Yes | 6 | 0.00000001 | 0.00005227 |
| 24 | Yes | 6 | 0.00000001 | 0.00015394 |

| | | | | |
|---|---|---|---|---|
| 25 | Yes | 6 | 0.00000001 | 0.00005162 |
| 26 | Yes | 4 | 0.00000001 | 0.00000001 |
| 27 | Yes | 5 | 0.00000001 | 0.00052297 |
| 28 | Yes | 5 | 0.00000001 | 0.00068095 |
| 29 | Yes | 5 | 0.00000001 | 0.00067790 |
| 30 | Yes | 5 | 0.00000001 | 0.00052632 |
| 31 | Yes | 5 | 0.00000001 | 0.00068303 |
| 32 | Yes | 5 | 0.00000001 | 0.00068345 |
| 33 | Yes | 5 | 0.00000001 | 0.00052562 |
| 34 | Yes | 5 | 0.00000001 | 0.00067809 |
| 35 | Yes | 5 | 0.00000001 | 0.00068205 |
| 36 | Yes | 5 | 0.00000001 | 0.00052428 |
| 37 | Yes | 5 | 0.00000001 | 0.00067633 |
| 38 | Yes | 5 | 0.00000001 | 0.00067502 |
| 39 | Yes | 4 | 0.00000001 | 0.00011289 |
| 40 | Yes | 4 | 0.00000001 | 0.00073329 |
| 41 | Yes | 4 | 0.00000001 | 0.00067867 |
| 42 | Yes | 4 | 0.00000001 | 0.00009893 |
| 43 | Yes | 4 | 0.00000001 | 0.00070038 |
| 44 | Yes | 4 | 0.00000001 | 0.00072083 |
| 45 | Yes | 4 | 0.00000001 | 0.00011278 |
| 46 | Yes | 4 | 0.00000001 | 0.00067486 |
| 47 | Yes | 4 | 0.00000001 | 0.00072961 |
| 48 | Yes | 4 | 0.00000001 | 0.00009904 |
| 49 | Yes | 4 | 0.00000001 | 0.00070353 |
| 50 | Yes | 4 | 0.00000001 | 0.00068301 |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| L1 | 150 - 110.75 | 22.588 | 42 | 1.295 | 0.002 |
| L2 | 114.75 - 74.75 | 13.378 | 42 | 1.138 | 0.001 |
| L3 | 79.5 - 39.5 | 6.239 | 42 | 0.758 | 0.000 |
| L4 | 45 - 0 | 1.970 | 42 | 0.401 | 0.000 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 150.00 | Lighting Rod 1/2" x 2' | 42 | 22.588 | 1.295 | 0.002 | 43842 |
| 147.00 | (2) LPA-80063/6CF w/ Mount Pipe | 42 | 21.771 | 1.287 | 0.002 | 43842 |
| 139.00 | (2) SBNH-1D6565C w/ Mount Pipe | 42 | 19.602 | 1.263 | 0.002 | 19928 |
| 125.00 | TA08025-B604 | 42 | 15.916 | 1.204 | 0.001 | 8768 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| L1 | 150 - 110.75 | 92.006 | 8 | 5.282 | 0.008 |
| L2 | 114.75 - 74.75 | 54.496 | 8 | 4.639 | 0.004 |
| L3 | 79.5 - 39.5 | 25.411 | 8 | 3.091 | 0.002 |
| L4 | 45 - 0 | 8.020 | 8 | 1.633 | 0.001 |

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 150.00 | Lighting Rod 1/2" x 2' | 8 | 92.006 | 5.282 | 0.008 | 10918 |
| 147.00 | (2) LPA-80063/6CF w/ Mount Pipe | 8 | 88.676 | 5.248 | 0.008 | 10918 |
| 139.00 | (2) SBNH-1D6565C w/ Mount Pipe | 8 | 79.843 | 5.150 | 0.006 | 4962 |
| 125.00 | TA08025-B604 | 8 | 64.831 | 4.912 | 0.005 | 2180 |

## *Compression Checks*

## Pole Design Data

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ K | $\phi P_n$ K | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 150 - 110.75 (1) | TP31.38x24x0.219 | 39.25 | 0.00 | 0.0 | 21.114 | -13.82 | 1235.14 | 0.011 |
| L2 | 110.75 - 74.75 (2) | TP37.711x30.19x0.25 | 40.00 | 0.00 | 0.0 | 29.017 | -19.13 | 1697.47 | 0.011 |
| L3 | 74.75 - 39.5 (3) | TP43.839x36.318x0.313 | 40.00 | 0.00 | 0.0 | 42.147 | -26.48 | 2465.61 | 0.011 |
| L4 | 39.5 - 0 (4) | TP50.64x42.18x0.375 | 45.00 | 0.00 | 0.0 | 59.828 | -39.28 | 3499.93 | 0.011 |

## Pole Bending Design Data

| Section No. | Elevation ft | Size | $M_{ux}$ kip-ft | $\phi M_{nx}$ kip-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$ kip-ft | $\phi M_{ny}$ kip-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 150 - 110.75 (1) | TP31.38x24x0.219 | 340.09 | 873.35 | 0.389 | 0.00 | 873.35 | 0.000 |
| L2 | 110.75 - 74.75 (2) | TP37.711x30.19x0.25 | 898.22 | 1414.33 | 0.635 | 0.00 | 1414.33 | 0.000 |
| L3 | 74.75 - 39.5 (3) | TP43.839x36.318x0.313 | 1533.15 | 2456.62 | 0.624 | 0.00 | 2456.62 | 0.000 |
| L4 | 39.5 - 0 (4) | TP50.64x42.18x0.375 | 2483.13 | 4146.91 | 0.599 | 0.00 | 4146.91 | 0.000 |

## Pole Shear Design Data

| Section No. | Elevation ft | Size | Actual $V_u$ K | $\phi V_n$ K | Ratio $\frac{V_u}{\phi V_n}$ | Actual $T_u$ kip-ft | $\phi T_n$ kip-ft | Ratio $\frac{T_u}{\phi T_n}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 150 - 110.75 (1) | TP31.38x24x0.219 | 14.53 | 370.54 | 0.039 | 0.25 | 986.78 | 0.000 |
| L2 | 110.75 - 74.75 (2) | TP37.711x30.19x0.25 | 17.11 | 509.24 | 0.034 | 0.25 | 1630.82 | 0.000 |
| L3 | 74.75 - 39.5 (3) | TP43.839x36.318x0.313 | 19.64 | 739.68 | 0.027 | 0.25 | 2752.55 | 0.000 |
| L4 | 39.5 - 0 (4) | TP50.64x42.18x0.375 | 22.40 | 1049.98 | 0.021 | 0.25 | 4621.97 | 0.000 |

# Pole Interaction Design Data

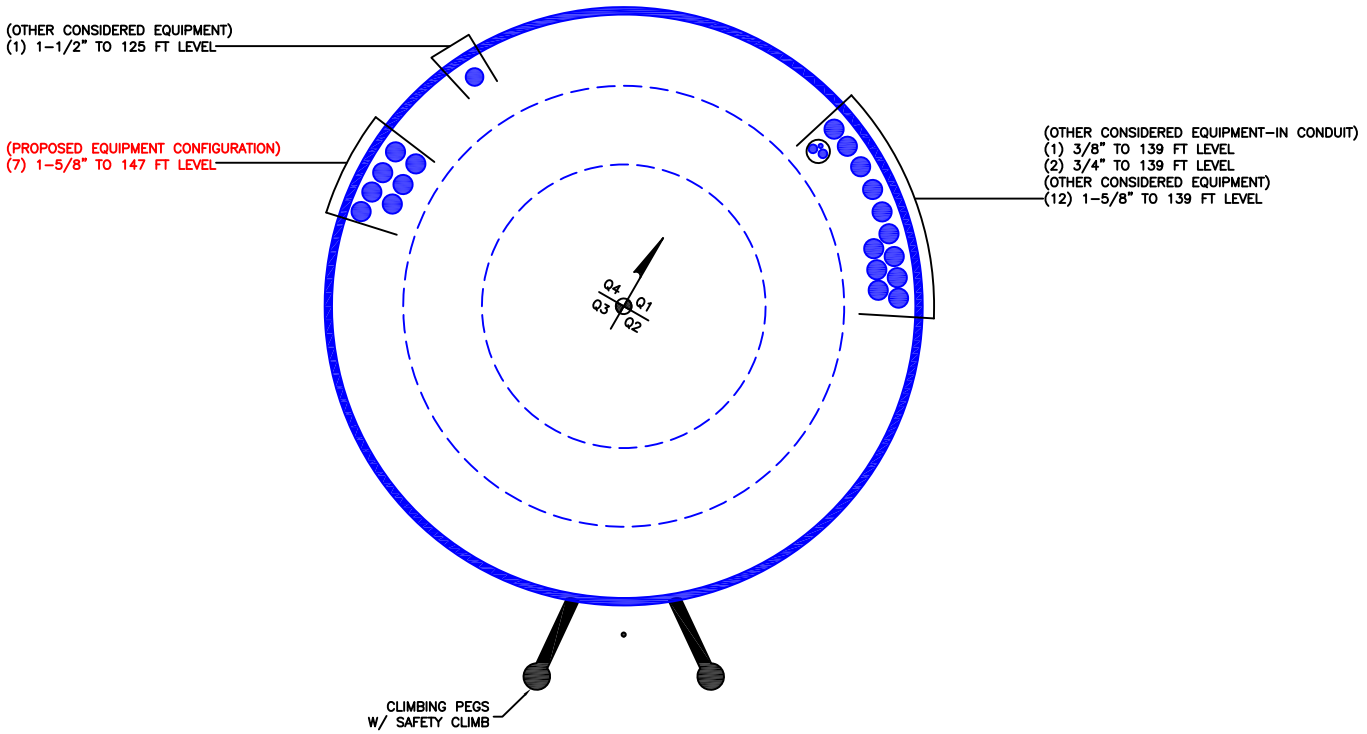
| Section No. | Elevation ft | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Ratio $\frac{V_u}{\phi V_n}$ | Ratio $\frac{T_u}{\phi T_n}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 150 - 110.75 (1) | 0.011 | 0.389 | 0.000 | 0.039 | 0.000 | 0.402 | 1.050 | 4.8.2 |
| L2 | 110.75 - 74.75 (2) | 0.011 | 0.635 | 0.000 | 0.034 | 0.000 | 0.647 | 1.050 | 4.8.2 |
| L3 | 74.75 - 39.5 (3) | 0.011 | 0.624 | 0.000 | 0.027 | 0.000 | 0.636 | 1.050 | 4.8.2 |
| L4 | 39.5 - 0 (4) | 0.011 | 0.599 | 0.000 | 0.021 | 0.000 | 0.610 | 1.050 | 4.8.2 |

# Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | $\phi P_{allow}$ K | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| L1 | 150 - 110.75 | Pole | TP31.38x24x0.219 | 1 | -13.82 | 1296.90 | 38.3 | Pass |
| L2 | 110.75 - 74.75 | Pole | TP37.711x30.19x0.25 | 2 | -19.13 | 1782.34 | 61.7 | Pass |
| L3 | 74.75 - 39.5 | Pole | TP43.839x36.318x0.313 | 3 | -26.48 | 2588.89 | 60.5 | Pass |
| L4 | 39.5 - 0 | Pole | TP50.64x42.18x0.375 | 4 | -39.28 | 3674.93 | 58.1 | Pass |
| | | | | | | | Summary | |
| | | | | | | Pole (L2) | 61.7 | Pass |
| | | | | | | **RATING =** | **61.7** | **Pass** |

## APPENDIX B

## BASE LEVEL DRAWING


(OTHER CONSIDERED EQUIPMENT)
(1) 1-1/2" TO 125 FT LEVEL
(PROPOSED EQUIPMENT CONFIGURATION)
(7) 1-5/8" TO 147 FT LEVEL
(OTHER CONSIDERED EQUIPMENT-IN CONDUIT)
(1) 3/8" TO 139 FT LEVEL
(2) 3/4" TO 139 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(12) 1-5/8" TO 139 FT LEVEL
Q4
Q1
Q3
Q2
CLIMBING PEGS
W/ SAFETY CLIMB

# APPENDIX C

# ADDITIONAL CALCULATIONS

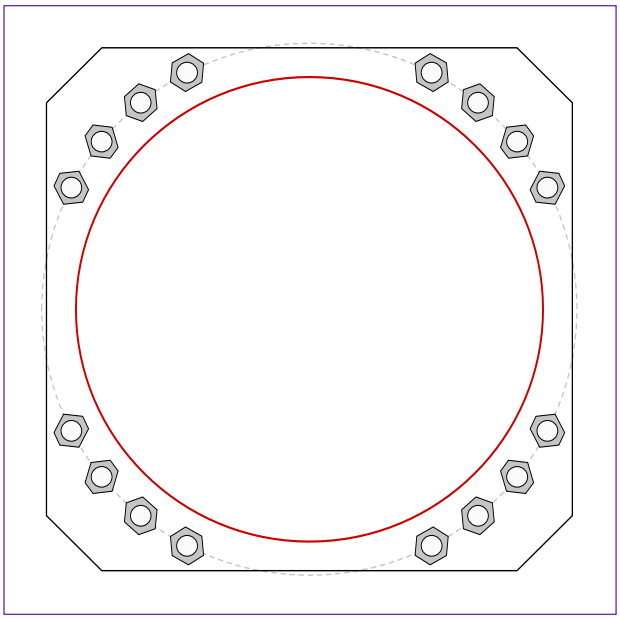
# Monopole Base Plate Connection

| Site Info | |
|---|---|
| BU # | 873645 |
| Site Name | Oxford |
| Order # | 658829 Rev.0 |

| Analysis Considerations | |
|---|---|
| TIA-222 Revision | H |
| Grout Considered: | No |
| $l_{ar}$ (in) | 0.75 |

| Applied Loads | |
|---|---|
| Moment (kip-ft) | 2483.13 |
| Axial Force (kips) | 39.28 |
| Shear Force (kips) | 22.40 |

**TIA-222-H Section 15.5 Applied*



## Connection Properties

**Anchor Rod Data**

(16) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 58" BC

*Anchor Spacing: 6 in*

**Base Plate Data**

57" W x 3" Plate (A572-55; Fy=55 ksi, Fu=70 ksi); Clip: 6 in

**Stiffener Data**

N/A

**Pole Data**

50.64" x 0.375" 18-sided pole (A607-65; Fy=65 ksi, Fu=80 ksi)

## Analysis Results

**Anchor Rod Summary** *(units of kips, kip-in)*

| | | |
|---|---|---|
| Pu_t = 125.9 | ϕPn_t = 243.75 | **Stress Rating** |
| Vu = 1.4 | ϕVn = 149.1 | **49.2%** |
| Mu = n/a | ϕMn = n/a | **Pass** |

**Base Plate Summary**

| | | |
|---|---|---|
| Max Stress (ksi): | 22.07 | (Flexural) |
| Allowable Stress (ksi): | 49.5 | |
| Stress Rating: | **42.5%** | **Pass** |

# Pier and Pad Foundation

| | |
|---|---|
| **BU # :** | 873645 |
| **Site Name:** | Oxford |
| **App. Number:** | 65882 Rev.0 |

| | |
|---|---|
| TIA-222 Revision: | H |
| Tower Type: | Monopole |

| | |
|---|---|
| Top & Bot. Pad Rein. Different?: | ☐ |
| Block Foundation?: | ☐ |
| Rectangular Pad?: | ☐ |

| Superstructure Analysis Reactions | | |
|---|---|---|
| Compression, $P_{comp}$: | 39.29 | kips |
| Base Shear, Vu_comp: | 22.38 | kips |
| | | |
| | | |
| Moment, $M_u$: | 2483.13 | ft-kips |
| Tower Height, **H**: | 150 | ft |
| | | |
| BP Dist. Above Fdn, $bp_{dist}$: | 3 | in |

| Pier Properties | | |
|---|---|---|
| Pier Shape: | Square | |
| Pier Diameter, **dpier**: | 7 | ft |
| Ext. Above Grade, **E**: | 0.5 | ft |
| Pier Rebar Size, **Sc**: | 11 | |
| Pier Rebar Quantity, **mc**: | 28 | |
| Pier Tie/Spiral Size, **St**: | 4 | |
| Pier Tie/Spiral Quantity, **mt**: | 7 | |
| Pier Reinforcement Type: | Tie | |
| Pier Clear Cover, $cc_{pier}$: | 3 | in |

| Pad Properties | | |
|---|---|---|
| Depth, **D**: | 7 | ft |
| Pad Width, $W_1$: | 23.5 | ft |
| Pad Thickness, **T**: | 3 | ft |
| Pad Rebar Size (Bottom dir. 2), $Sp_2$: | 10 | |
| Pad Rebar Quantity (Bottom dir. 2), $mp_2$: | 26 | |
| Pad Clear Cover, $cc_{pad}$: | 3 | in |

| Material Properties | | |
|---|---|---|
| Rebar Grade, **Fy**: | 60 | ksi |
| Concrete Compressive Strength, **F'c**: | 3 | ksi |
| Dry Concrete Density, $\delta$**c**: | 150 | pcf |

| Soil Properties | | |
|---|---|---|
| Total Soil Unit Weight, $\gamma$: | 125 | pcf |
| Ultimate Gross Bearing, Qult: | 12.000 | ksf |
| Cohesion, **Cu**: | 0.000 | ksf |
| Friction Angle, $\varphi$: | 30 | degrees |
| SPT Blow Count, $N_{blows}$: | | |
| Base Friction, $\mu$: | 0.3 | |
| Neglected Depth, **N**: | 3.50 | ft |
| Foundation Bearing on Rock? | No | |
| Groundwater Depth, **gw**: | None | ft |

<--Toggle between Gross and Net

| Foundation Analysis Checks | Capacity | Demand | Rating* | Check |
|---|---|---|---|---|
| | | | | |
| *Lateral (Sliding) (kips)* | 227.35 | 22.38 | **9.4%** | **Pass** |
| *Bearing Pressure (ksf)* | 9.00 | 2.09 | **22.1%** | **Pass** |
| *Overturning (kip*ft)* | 5816.43 | 2656.58 | **45.7%** | **Pass** |
| *Pier Flexure (Comp.) (kip*ft)* | 6720.89 | 2583.84 | **36.6%** | **Pass** |
| | | | | |
| *Pier Compression (kip)* | 23390.64 | 78.98 | **0.3%** | **Pass** |
| *Pad Flexure (kip*ft)* | 4415.72 | 836.62 | **18.0%** | **Pass** |
| *Pad Shear - 1-way (kips)* | 720.43 | 137.92 | **18.2%** | **Pass** |
| *Pad Shear - 2-way (Comp) (ksi)* | 0.164 | 0.027 | **15.6%** | **Pass** |
| *Flexural 2-way (Comp) (kip*ft)* | 5938.20 | 1550.30 | **24.9%** | **Pass** |

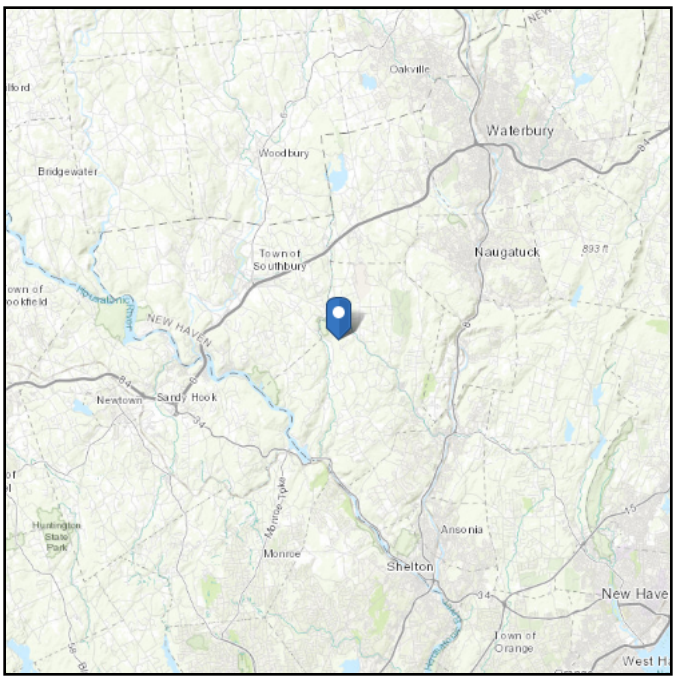
**Rating per TIA-222-H Section 15.5*

| | |
|---|---|
| Structural Rating*: | **36.6%** |
| Soil Rating*: | **45.7%** |

# ASCE 7 Hazards Report

**Address:**
No Address at This Location

| | | | |
|---|---|---|---|
| **Standard:** | ASCE/SEI 7-16 | **Latitude:** | 41.447086 |
| **Risk Category:** | II | **Longitude:** | -73.15231 |
| **Soil Class:** | D - Default (see Section 11.4.3) | **Elevation:** | 669.86 ft (NAVD 88) |


## Wind

**Results:**

| | |
|---|---|
| Wind Speed | 117 Vmph |
| 10-year MRI | 75 Vmph |
| 25-year MRI | 84 Vmph |
| 50-year MRI | 90 Vmph |
| 100-year MRI | 97 Vmph |

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Fri Dec 16 2022

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 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

## Seismic

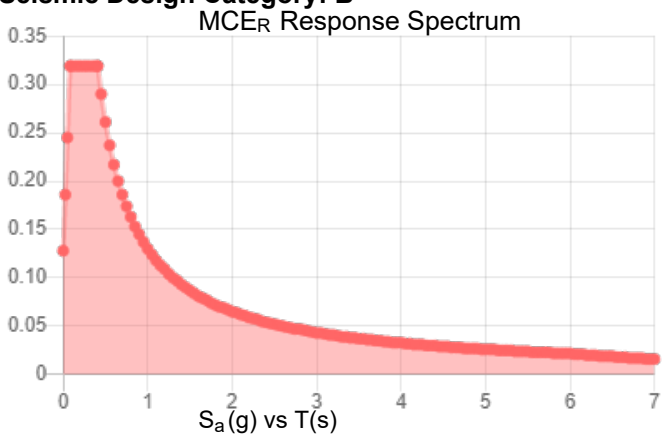
D - Default (see Section 11.4.3)

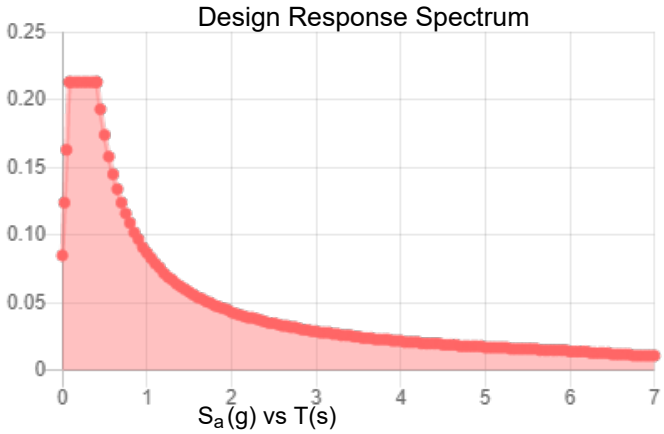
**Site Soil Class:**

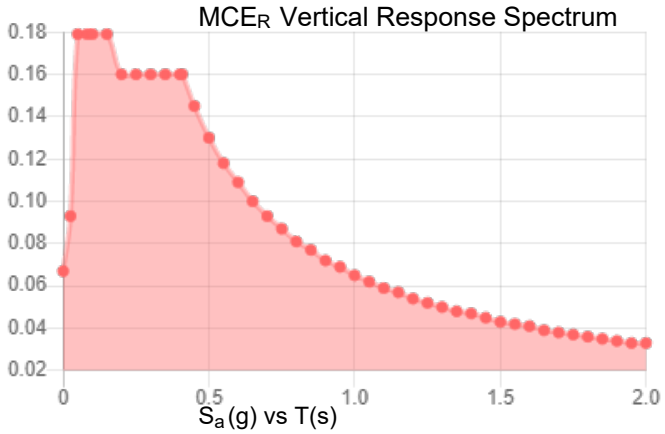
**Results:**

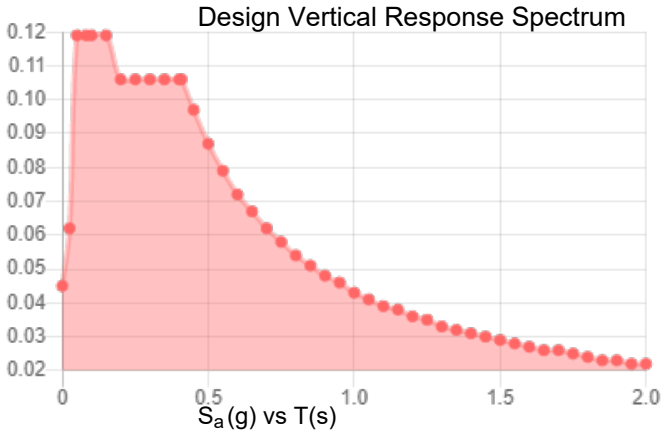
| | | | |
|---|---|---|---|
| $S_S$ : | 0.199 | $S_{D1}$ : | 0.087 |
| $S_1$ : | 0.054 | $T_L$ : | 6 |
| $F_a$ : | 1.6 | PGA : | 0.111 |
| $F_v$ : | 2.4 | $PGA_M$ : | 0.176 |
| $S_{MS}$ : | 0.319 | $F_{PGA}$ : | 1.577 |
| $S_{M1}$ : | 0.13 | $I_e$ : | 1 |
| $S_{DS}$ : | 0.213 | $C_v$ : | 0.7 |

**Seismic Design Category: B**




**Data Accessed:** **Fri Dec 16 2022**

**Date Source:**

**USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.**

# Ice

**Results:**

| | |
|---|---|
| Ice Thickness: | 1.00 in. |
| Concurrent Temperature: | 15 F |
| Gust Speed | 50 mph |
| **Data Source:** | Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8 |
| **Date Accessed:** | Fri Dec 16 2022 |

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 500-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.