



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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VIA ELECTRONIC MAIL

July 20, 2018

Mark Roberts
QC Development
P.O. Box 916
Storrs, CT 06268

RE: **EM-CING-025-180403** - New Cingular Wireless PCS, LLC (AT&T) notice of intent to modify an existing telecommunications facility located at 500 Highland Avenue, Cheshire, Connecticut.

Dear Mr. Roberts:

The Connecticut Siting Council (Council) is in receipt of your email correspondence of July 20, 2018, submitted in response to the Council's April 12, 2018 and June 7, 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/CMW/jmb



From: Mark Roberts [<mailto:mark.roberts@qcdevelopment.net>]

Sent: Friday, July 20, 2018 10:34 AM

To: CSC-DL Siting Council <Siting.Council@ct.gov>

Cc: Mark Roberts <mark.roberts@qcdevelopment.net>

Subject: RE: Council Second Incomplete Letter for EM-CING-025-180403-HighlandAve-Cheshire

Importance: High

Hello – in response to your second incomplete letter dated June 7th, 2018 – please find attached a revised Tower Structural Analysis which includes the proposed dual RRU mounts referenced in the Construction Drawings originally submitted.

Please let me know if you have any questions.

Thanks

Mark Roberts
QC Development
860-670-9068



STRUCTURAL ANALYSIS REPORT

160' Monopole Tower

500 Highland Avenue
Cheshire, CT 06410

SBA Site Name: 500 Highland Ave / Light Tower
SBA Site Number: CT33762-M

AT&T Site Name: Cheshire Police Department
AT&T Site Number: CT2081

GPD Project Number: 2018778.33762.10

Analysis Results

| | | |
|----------------------------------|--------|--|
| Tower Components | 87.3% | Sufficient |
| Foundation | 67.6% | Sufficient |
| Net Change in Tower Stress Ratio | - 2.3% | As compared to the Previous Structural Analysis detailed on Page 2 |

July 19, 2018

Respectfully submitted by:



Christopher J. Scheks

7/19/2018

Christopher J. Scheks, P.E.
Connecticut #: 30026

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APPENDICES

1. TNX TOWER OUTPUT
2. ADDITIONAL CALCULATIONS

Executive Summary

The purpose of this analysis is to verify whether the existing monopole tower is structurally capable of carrying the proposed antenna and coax loads as specified by AT&T to SBA. This report was commissioned by Ms. Connie Rybarczyk of SBA Site Management.

The existing structure and its foundations have been analyzed using the following requirements:

| | |
|-----------------------------|---------------------------------|
| Governing Codes | TIA-222-G, 2012 IBC & 2016 CTBC |
| Wind Speed* | 105 MPH 3-Second Gust |
| Wind Speed w/ Ice | 50 MPH 3-Second Gust |
| Radial Ice Thickness | 3/4" |
| Risk Category | III |
| Exposure Class | B |
| Topographic Category | 1 |

*This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 135 MPH converted to a nominal 3-second wind speed of 105 MPH per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category III were used in this analysis.

Conclusions & Recommendations

The designs of the tower and its foundation are sufficient for the proposed loading configuration considering the above analysis criteria and will not require modification.

Tower Description

The existing 160' monopole tower is located in Cheshire, Connecticut. The tower was originally designed by Sabre in September of 2003. All structural information was obtained from a previous structural analysis performed by URS. The original design load for the tower was not available at the time of analysis.

Documents Provided:

| Document Type | Remarks | Source |
|------------------------------|---|--------|
| Foundation Calculations | URS Corporation Job #: 36917370, dated: 10/10/2012 | SBA |
| Previous Structural Analysis | Hudson Design Group dated: 05/06/2013 | SBA |
| Previous Structural Analysis | GPD Project #: 2017778.33762.08, dated: 10/20/2017 | SBA |

Tower Materials:

| Structural Components | Material Strength |
|-----------------------|-----------------------------------|
| Pole | ASTM A572 (65 KSI Yield Strength) |
| Base Plate | ASTM A572 (60 KSI Yield Strength) |
| Anchor Rods | ASTM A615 (75 KSI Yield Strength) |

Tower Loading

The following data shows the major loading that the tower supports. All existing, leased, and proposed loading information was provided by SBA or taken from the previous structural analysis.

Existing/Leased Loading

| Carrier | Mounting Level (ft) | Center Line Elevation (ft) | # of Antennas | Antenna Manufact. | Antenna/Mount Model | # of Coax | Coax Size (in) | Note |
|------------------|---------------------|----------------------------|---------------|-------------------|----------------------|--------------|------------------------------|------|
| Town of Cheshire | 160.0 | 170.0 | 1 | | 20' Omni | 4 | 1/2 | |
| | | 168.0 | 2 | Decibel | DB224 | | | |
| | | 166.17 | 1 | | 6' Omni | | | |
| | | 160.0 | 3 | | T-Arms | | | |
| Sprint | 160.0 | 160.0 | 1 | | Low Profile Platform | 6 | 1-1/4 | |
| | | 158.0 | 3 | RFS | APXVSP18-C-A20 | | | |
| | | | 3 | RFS | APXVTM14-C-I20 | | | |
| | | | 4 | RFS | ACU-A20-N | | | |
| | | | 3 | Alcatel Lucent | 1900 MHz RRH | | | |
| | | | 3 | Alcatel Lucent | 800 MHz RRH | | | |
| | | | 3 | Alcatel Lucent | 2500 MHz RRH | | | |
| | | | 3 | Alcatel Lucent | 800 MHz Filter | | | |
| T-Mobile | 152.0 | 152.0 | 1 | | Low Profile Platform | 18 12 | 1-5/8 1/2 | |
| | | 149.0 | 3 | Ericsson | AIR21 B2A/B4P | | | |
| | | | 3 | Ericsson | AIR21 B4A/B2P | | | |
| | | | 3 | Commscope | LNx-6515DS-VTM | | | |
| | | | 3 | Ericsson | KRY 112 144 | | | |
| | | | 3 | RFS | ATMAA1412D1A20 | | | |
| | | | 3 | Ericsson | S11B12 | | | |
| Pocket | 141.08 | 141.08 | 3 | RFS | APXV18-206517S-C | 6 | 1-5/8 | |
| | | | 3 | | T-Arms | | | |
| AT&T | 130.0 | 130.0 | 6 | Kathrein | 800 10121 | 12 1 6 | 1-5/8 1/2 Fiber 3/4 DC | |
| | | | 2 | CCI | OPA-65R-LCUU-H8 | | | |
| | | | 1 | CCI | OPA-65R-LCUU-H6 | | | |
| | | | 3 | Powerwave | TT19-08BP111-001 | | | |
| | | | 6 | Powerwave | LGP 21401 | | | |
| | | | 6 | Kathrein | 860 10025 | | | |
| | | | 3 | Ericsson | RRUS-11 | | | |
| | | | 3 | Ericsson | RRUS 12 | | | |
| | | | 3 | Ericsson | RRUS A2 Module | | | |
| | | | 2 | Raycap | DC6-48-60-18-8F | | | |
| | | | 1 | Commscope | MTC3607 Platform | | | |
| | | | Verizon | 122.5 | 122.5 | | | |
| 3 | Andrew | LNx 6514DS-VTM | | | | | | |
| 3 | Andrew | HBXX 6517DS-A2M | | | | | | |
| 3 | ALU | RRH 4x45 AWS | | | | | | |
| 3 | ALU | RRH 2x60 PCS | | | | | | |
| 3 | ALU | RRH 2x60 700 | | | | | | |
| 6 | RFS | FD9R6004/2C-3L | | | | | | |
| 2 | | DB-T1-6Z-8AB-0Z | | | | | | |
| 1 | | Low Profile Platform | | | | | | |

Existing/Leased Loading Contd.

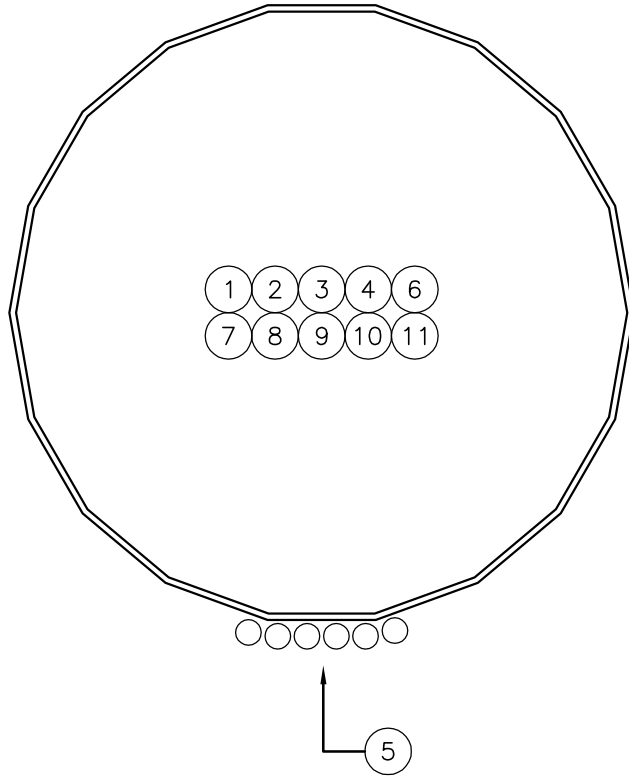
| Carrier | Mounting Level (ft) | Center Line Elevation (ft) | # of Antennas | Antenna Manufact. | Antenna/Mount Model | # of Coax | Coax Size (in) | Note |
|------------------|---------------------|----------------------------|---------------|-------------------|---------------------|-----------|----------------|------|
| Town of Cheshire | 89.08 | 89.08 | 1 | | Dipole Antenna | 5 | 1/2 | |
| | | | 1 | | Collar Mount | | | |
| | | 81.25 | 1 | | Yagi Antenna | | | |
| | | 79.33 | 1 | | Yagi Antenna | | | |
| | 83.17 | 83.17 | 1 | PCTEL | GPS-TMG-HR-26N | | | |
| | | | 1 | | Collar Mount | | | |
| | | 81.17 | 1 | | Yagi Antenna | | | |

Final Proposed Loading Configuration

| Carrier | Mounting Level (ft) | Center Line Elevation (ft) | # of Antennas | Antenna Manufact. | Antenna/Mount Model | # of Coax | Coax Size (in) | Note |
|---------|---------------------|----------------------------|---------------|-------------------|---------------------|-------------------|--|------|
| AT&T | 130.0 | 130.0 | 3 | Kathrein | 800 10121 | 12 1 2 6 | 1-5/8 1/2 Fiber 7/16 Fiber 3/4 DC | 1 |
| | | | 2 | CCI | OPA-65R-LCUU-H8 | | | |
| | | | 1 | CCI | OPA-65R-LCUU-H6 | | | |
| | | | 2 | KMW | EPBQ-654L8H8-L2 | | | |
| | | | 1 | KMW | EPBQ-654L8H6-L2 | | | |
| | | | 3 | Powerwave | TT19-08BP111-001 | | | |
| | | | 6 | Powerwave | LGP 21401 | | | |
| | | | 6 | Kathrein | 860 10025 | | | |
| | | | 3 | Ericsson | RRUS-11 | | | |
| | | | 3 | Ericsson | RRUS 12 | | | |
| | | | 6 | Ericsson | RRUS-32 | | | |
| | | | 3 | Ericsson | 4478 | | | |
| | | | 3 | Ericsson | RRUS A2 Module | | | |
| | | | 2 | Raycap | DC6-48-60-18-8F | | | |
| | | | 1 | Raycap | DC6-48-60-18-8C | | | |
| | | | 3 | Ericsson | B2B RRU Mount | | | |
| | | | 1 | Commscope | MTC3607 Platform | | | |

Notes:
 1) This loading represents AT&T's final configuration on the tower. See the next page for the proposed coax layout.

Proposed Coax Configuration



| # | CARRIER | SIZE | QTY. | ELEVATION | NOTES |
|----|------------------|--------|------|-----------|-----------------------|
| 1 | Town of Cheshire | 1/2" | 4 | 160.0' | |
| 2 | Sprint | 1-1/4" | 6 | 160.0' | Fiber Cables |
| 3 | T-Mobile | 1-5/8" | 18 | 152.0' | |
| 4 | T-Mobile | 1/2" | 12 | 152.0' | |
| 5 | Pocket | 1-5/8" | 6 | 141.08' | |
| 6 | AT&T | 1-5/8" | 12 | 130.0' | |
| 7 | AT&T | 1/2" | 1 | 130.0' | Fiber Cable |
| 8 | AT&T | 7/16" | 2 | 130.0' | Proposed Fiber Cables |
| 9 | AT&T | 3/4" | 6 | 130.0' | Power Cables |
| 10 | Verizon | 1-5/8" | 13 | 122.5' | (2) Fiber Cables |
| 11 | Town of Cheshire | 1/2" | 5 | 89.08' | |

Assumptions

This structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in the Existing/Reserved Loading and Proposed Loading Tables, and the specified documents.
- 4) All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
- 5) Mount sizes, weights, and manufacturers are best estimates based on photos provided and determined without the benefit of a site visit by GPD.
- 6) All member connections and foundation steel reinforcing are assumed designed to meet or exceed the load carrying capacity of the connected member and surrounding soils respectively unless otherwise specified in this report.
- 7) The existing feedline layout has been based upon the previous structural analysis.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the tower.

Tower Section Results

Capacity Summary of Structural Components

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | ϕP_{allow} K | % Capacity | Pass/Fail |
|-------------|---------------|----------------|------------------------|------------------|--------|--------------------|-------------|-------------|
| L1 | 160 - 146.5 | Pole | TP20.91x16.75x0.1875 | 1 | -4.69 | 865.69 | 20.1 | Pass |
| L2 | 146.5 - 95.75 | Pole | TP36.16x19.6876x0.25 | 2 | -19.55 | 1841.20 | 87.1 | Pass |
| L3 | 95.75 - 46.75 | Pole | TP50.76x34.2745x0.3125 | 3 | -32.65 | 3077.94 | 87.3 | Pass |
| L4 | 46.75 - 0 | Pole | TP64.53x48.1321x0.375 | 4 | -52.54 | 4662.89 | 76.0 | Pass |
| | | | | | | | Summary | |
| | | | | | | Pole (L3) | 87.3 | Pass |
| | | | | | | RATING = | 87.3 | Pass |

Additional Capacities

| Notes | Component | Elevation (ft) | % Capacity | Pass / Fail |
|-------|-----------------------|----------------|------------|-------------|
| | Anchor Rods | 0 | 77.1 | Pass |
| | Base Plate | 0 | 48.3 | Pass |
| | Tower Base Foundation | 0 | 67.6 | Pass |

Disclaimer of Warranties

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

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

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

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

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

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report. Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

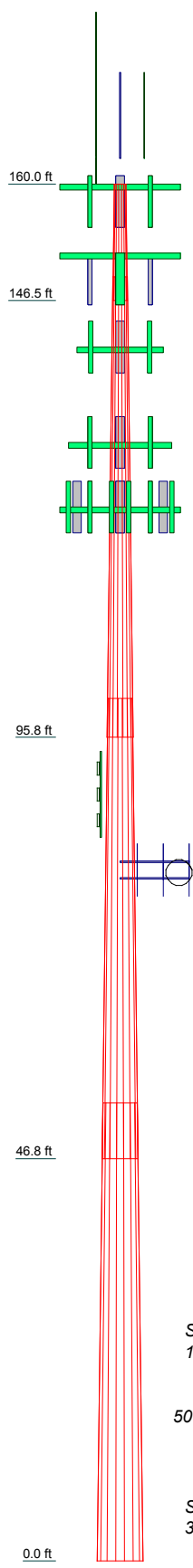
GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm,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

TNX TOWER OUTPUT

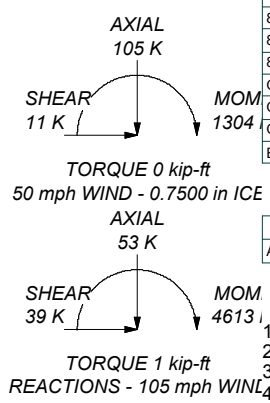
DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|-----------|--|-----------|
| MTS 36" Standoff (3) | 160 | EPBQ-654L8H6-L2 w/ 8' Mount Pipe | 130 |
| 20' Omni (3" Diam) | 160 | EPBQ-654L8H8-L2 w/ 8' Mount Pipe | 130 |
| DB224 | 160 | TT19-08BP111-001 | 130 |
| DB224 | 160 | TT19-08BP111-001 | 130 |
| 6' Omni | 160 | TT19-08BP111-001 | 130 |
| Sabre 12' LP Platform | 160 | (2) LGP21401 | 130 |
| APXVSP18-C-A20 w/ Mount Pipe | 160 | (2) LGP21401 | 130 |
| APXVSP18-C-A20 w/ Mount Pipe | 160 | (2) LGP21401 | 130 |
| APXVSP18-C-A20 w/ Mount Pipe | 160 | (2) 860 10025 | 130 |
| APXVTM14-C-120 w/ Mount Pipe | 160 | (2) 860 10025 | 130 |
| APXVTM14-C-120 w/ Mount Pipe | 160 | (2) 860 10025 | 130 |
| APXVTM14-C-120 w/ Mount Pipe | 160 | RRUS-11 | 130 |
| (2) ACU-A20-N | 160 | RRUS-11 | 130 |
| ACU-A20-N | 160 | RRUS-11 | 130 |
| ACU-A20-N | 160 | RRUS-12 | 130 |
| 1900MHz RRH | 160 | RRUS-12 | 130 |
| 1900MHz RRH | 160 | RRUS-12 | 130 |
| 1900MHz RRH | 160 | (2) RRUS-32 | 130 |
| RRH 800 MHz | 160 | (2) RRUS-32 | 130 |
| RRH 800 MHz | 160 | (2) RRUS-32 | 130 |
| RRH 800 MHz | 160 | 4478 | 130 |
| RRH 2500MHz | 160 | 4478 | 130 |
| RRH 2500MHz | 160 | 4478 | 130 |
| RRH 2500MHz | 160 | RRUS A2 MODULE | 130 |
| 800 MHz Filter | 160 | RRUS A2 MODULE | 130 |
| 800 MHz Filter | 160 | RRUS A2 MODULE | 130 |
| 800 MHz Filter | 160 | DC6-48-60-18-8C Surge Suppression Unit | 130 |
| Sabre 12' LP Platform | 152 | DC6-48-60-18-8F Surge Suppression Unit | 130 |
| AIR21 B2A/B4P w/ mount pipe | 152 | DC6-48-60-18-8F Surge Suppression Unit | 130 |
| AIR21 B2A/B4P w/ mount pipe | 152 | DC6-48-60-18-8F Surge Suppression Unit | 130 |
| AIR21 B2A/B4P w/ mount pipe | 152 | MTS 14.5' LP Platform | 122.5 |
| AIR21 B4A/B2P w/ mount pipe | 152 | (2) SBNHH-1D65B w/ Mount Pipe | 122.5 |
| AIR21 B4A/B2P w/ mount pipe | 152 | (2) SBNHH-1D65B w/ Mount Pipe | 122.5 |
| AIR21 B4A/B2P w/ mount pipe | 152 | (2) SBNHH-1D65B w/ Mount Pipe | 122.5 |
| LNx-6515DS-VTM w/ mount pipe | 152 | LNx-6514DS-VTM w/ Mount Pipe | 122.5 |
| LNx-6515DS-VTM w/ mount pipe | 152 | LNx-6514DS-VTM w/ Mount Pipe | 122.5 |
| LNx-6515DS-VTM w/ mount pipe | 152 | LNx-6514DS-VTM w/ Mount Pipe | 122.5 |
| KRY 112 144 | 152 | LNx-6514DS-VTM w/ Mount Pipe | 122.5 |
| KRY 112 144 | 152 | HBXX-6517DS-A2M w/ Mount Pipe | 122.5 |
| KRY 112 144 | 152 | HBXX-6517DS-A2M w/ Mount Pipe | 122.5 |
| ATMAA1412D-1A20 | 152 | HBXX-6517DS-A2M w/ Mount Pipe | 122.5 |
| ATMAA1412D-1A20 | 152 | RRH4X45-AWS | 122.5 |
| ATMAA1412D-1A20 | 152 | RRH4X45-AWS | 122.5 |
| S11B12 | 152 | RRH4X45-AWS | 122.5 |
| S11B12 | 152 | RRH2X60-PCS | 122.5 |
| S11B12 | 152 | RRH2X60-PCS | 122.5 |
| MTS 36" Standoff (3) | 141.08 | RRH2X60-PCS | 122.5 |
| APXV18-206517S-C w/ Mount Pipe | 141.08 | RRH2x60-700 | 122.5 |
| APXV18-206517S-C w/ Mount Pipe | 141.08 | RRH2x60-700 | 122.5 |
| APXV18-206517S-C w/ Mount Pipe | 141.08 | RRH2x60-700 | 122.5 |
| Commscope MTC3607 Platform w/ Reinforcing Kit | 130 | (2) FD9R6004/2C-3L | 122.5 |
| Andrew Collar Mount | 130 | (2) FD9R6004/2C-3L | 122.5 |
| B2B RRU Mount | 130 | (2) FD9R6004/2C-3L | 122.5 |
| B2B RRU Mount | 130 | DB-T1-6Z-8AB-OZ | 122.5 |
| B2B RRU Mount | 130 | DB-T1-6Z-8AB-OZ | 122.5 |
| 800 10121 w/ Mount Pipe | 130 | Andrew Collar Mount | 89.08 |
| 800 10121 w/ Mount Pipe | 130 | 14' Dipole | 89.08 |
| 800 10121 w/ Mount Pipe | 130 | 3' Yagi | 89.08 |
| OPA-65R-LCUU-H8 w/ Mount Pipe | 130 | 3' Yagi | 89.08 |
| OPA-65R-LCUU-H6 w/ Mount Pipe | 130 | Andrew Collar Mount | 83.17 |
| OPA-65R-LCUU-H8 w/ Mount Pipe | 130 | GPS-TMG-HR-26N | 83.17 |
| EPBQ-654L8H8-L2 w/ 8' Mount Pipe | 130 | 3' Yagi | 83.17 |

| Section | Length (ft) | Number of Sides | Thickness (in) | Socket Length (ft) | Top Dia (in) | Bot Dia (in) | Grade | Weight (K) |
|---------|-------------|-----------------|----------------|--------------------|--------------|--------------|---------|------------|
| 1 | 13.50 | 18 | 0.1875 | 2.75 | 16.7500 | 20.9100 | A572-65 | 0.5 |
| 2 | 53.50 | 18 | 0.2500 | 4.50 | 19.6876 | 36.1600 | A572-65 | 4.0 |
| 3 | 53.50 | 18 | 0.3125 | 6.50 | 34.2745 | 50.7600 | A572-65 | 7.6 |
| 4 | 53.25 | 18 | 0.3750 | 48.1321 | 64.5300 | | A572-65 | 12.1 |
| | | | | | | | | 24.2 |



ALL REACTIONS ARE FACTORED




MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 105 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 III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 87.3%

| | | | |
|--|---|---|--|
|  <p>GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235</p> | <p>Job: CT33762-M, Cheshire, CT</p> <p>Project: 2018778.33762.10</p> | | |
| | <p>Client: SBA</p> <p>Code: TIA-222-G</p> <p>Path: T:\SBA\33762.10.SA.AT&T\Tnx Tower\CT33762-M-02, Cheshire AT&T-FirstNet.tnx.dwg</p> | <p>Drawn by: zfarelli</p> <p>Date: 07/19/18</p> | <p>App'd:</p> <p>Scale: NTS</p> <p>Dwg No. E-1</p> |

| | | |
|--|---------------------------------------|----------------------------------|
| tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235 | Job CT33762-M, Cheshire, CT | Page 1 of 11 |
| | Project 2018778.33762.10 | Date 12:59:48 07/19/18 |
| | Client SBA | Designed by zfarelli |

Tower Input Data

The tower is a monopole.

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

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).

Basic wind speed of 105 mph.

Structure Class III.

Exposure Category B.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.7500 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.

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

Feed Line/Linear Appurtenances - Entered As Round Or Flat

| Description | Sector | Component Type | Placement ft | Total Number | Number Per Row | Start/End Position | Width or | Perimeter | Weight |
|-----------------------|--------|-------------------|-----------------|--------------|----------------|--------------------|----------|-----------|--------|
| | | | | | | | Diameter | in | |
| Step Pegs | B | Surface Ar (CaAa) | 160.00 - 0.00 | 1 | 1 | 0.000 0.000 | 0.8000 | | 2.72 |
| *** | | | | | | | | | |
| LDF7-50A (1-5/8 FOAM) | C | Surface Ar (CaAa) | 141.08 - 8.00 | 6 | 6 | 0.000 0.000 | 1.9800 | | 0.82 |

Feed Line/Linear Appurtenances - Entered As Area

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Total Number | | C _{AA} | Weight |
|-----------------------|-------------|--------------|--------------------|-----------------|--------------|------------------------------|----------------------|----------------------|
| | | | | | | | ft ² /ft | plf |
| Safety Line (3/8") | B | No | CaAa (Out Of Face) | 160.00 - 0.00 | 1 | No Ice 1/2" Ice 1" Ice | 0.04 0.14 0.24 | 0.22 0.75 1.28 |
| *** | | | | | | | | |
| LDF6-50A (1-1/4 FOAM) | A | No | Inside Pole | 160.00 - 8.00 | 6 | No Ice 1/2" Ice 1" Ice | 0.00 0.00 0.00 | 0.66 0.66 0.66 |
| *** | | | | | | | | |
| LDF7-50A (1-5/8 FOAM) | A | No | Inside Pole | 152.00 - 8.00 | 18 | No Ice 1/2" Ice 1" Ice | 0.00 0.00 0.00 | 0.82 0.82 0.82 |
| LDF4-50A (1/2 FOAM) | C | No | Inside Pole | 152.00 - 8.00 | 12 | No Ice | 0.00 | 0.15 |

| | | | | |
|--|----------------|-------------------------|--------------------|-------------------|
| tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235 | Job | CT33762-M, Cheshire, CT | Page | 2 of 11 |
| | Project | 2018778.33762.10 | Date | 12:59:48 07/19/18 |
| | Client | SBA | Designed by | zfarelli |

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Total Number | | C _{AA} ft ² /ft | Weight plf |
|-----------------------------|-------------|--------------|----------------|-----------------|--------------|----------|--|---------------|
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| *** | | | | | | | | |
| LDF7-50A (1-5/8 FOAM) | A | No | Inside Pole | 130.00 - 8.00 | 12 | No Ice | 0.00 | 0.82 |
| | | | | | | 1/2" Ice | 0.00 | 0.82 |
| | | | | | | 1" Ice | 0.00 | 0.82 |
| 1/2" Fiber Cable | A | No | Inside Pole | 130.00 - 8.00 | 1 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| 7/16" Fiber Cable | A | No | Inside Pole | 130.00 - 8.00 | 2 | No Ice | 0.00 | 0.17 |
| | | | | | | 1/2" Ice | 0.00 | 0.17 |
| | | | | | | 1" Ice | 0.00 | 0.17 |
| 3/4" DC Power Line | A | No | Inside Pole | 130.00 - 8.00 | 6 | No Ice | 0.00 | 0.33 |
| | | | | | | 1/2" Ice | 0.00 | 0.33 |
| | | | | | | 1" Ice | 0.00 | 0.33 |
| *** | | | | | | | | |
| LDF7-50A (1-5/8 FOAM) | A | No | Inside Pole | 122.50 - 8.00 | 11 | No Ice | 0.00 | 0.82 |
| | | | | | | 1/2" Ice | 0.00 | 0.82 |
| | | | | | | 1" Ice | 0.00 | 0.82 |
| HB158-1-08U8-S8J18 (1-5/8") | A | No | Inside Pole | 122.50 - 8.00 | 2 | No Ice | 0.00 | 1.30 |
| | | | | | | 1/2" Ice | 0.00 | 1.30 |
| | | | | | | 1" Ice | 0.00 | 1.30 |
| *** | | | | | | | | |
| LDF4-50A (1/2 FOAM) | A | No | Inside Pole | 160.00 - 89.08 | 4 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| LDF4-50A (1/2 FOAM) | A | No | Inside Pole | 89.08 - 83.17 | 5 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| LDF4-50A (1/2 FOAM) | A | No | Inside Pole | 83.17 - 81.25 | 6 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| LDF4-50A (1/2 FOAM) | A | No | Inside Pole | 81.25 - 81.17 | 7 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| LDF4-50A (1/2 FOAM) | A | No | Inside Pole | 81.17 - 79.33 | 8 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| LDF4-50A (1/2 FOAM) | A | No | Inside Pole | 79.33 - 8.00 | 9 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |

Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert ft ft ft | Azimuth Adjustment ° | Placement ft | C _{AA} Front ft ² | C _{AA} Side ft ² | Weight K |
|----------------------|-------------|-------------|---|-------------------------|-----------------|---|--|-------------|
| MTS 36" Standoff (3) | A | None | | 0.0000 | 160.00 | No Ice | 2.64 | 0.09 |
| | | | | | | 1/2" Ice | 4.10 | 0.13 |
| | | | | | | 1" Ice | 5.56 | 0.17 |
| 20' Omni (3" Diam) | C | From Leg | 2.50 0.00 10.00 | 0.0000 | 160.00 | No Ice | 6.00 | 0.05 |
| | | | | | | 1/2" Ice | 8.03 | 0.09 |
| | | | | | | 1" Ice | 10.08 | 0.14 |
| DB224 | A | From Leg | 2.50 | 0.0000 | 160.00 | No Ice | 3.15 | 0.03 |

| | | | | |
|--|----------------|-------------------------|--------------------|-------------------|
| tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235 | Job | CT33762-M, Cheshire, CT | Page | 4 of 11 |
| | Project | 2018778.33762.10 | Date | 12:59:48 07/19/18 |
| | Client | SBA | Designed by | zfarelli |

| Description | Face or Leg | Offset Type | Offsets: | | Azimuth Adjustment | Placement | C _{AA} | | Weight | |
|------------------------------|-------------------|----------------|-----------------|--------|-----------------------|-----------|-----------------|-----------------|--------|------|
| | | | Horz Lateral | Vert | | | Front | Side | | |
| | | | ft | ft | ° | ft | ft ² | ft ² | K | |
| RRH 2500MHz | A | From | 4.00 | 0.0000 | | 160.00 | No Ice | 3.76 | 2.23 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 4.03 | 2.46 | 0.08 |
| | | g | -2.00 | | | | 1" Ice | 4.30 | 2.69 | 0.11 |
| RRH 2500MHz | B | From | 4.00 | 0.0000 | | 160.00 | No Ice | 3.76 | 2.23 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 4.03 | 2.46 | 0.08 |
| | | g | -2.00 | | | | 1" Ice | 4.30 | 2.69 | 0.11 |
| RRH 2500MHz | C | From | 4.00 | 0.0000 | | 160.00 | No Ice | 3.76 | 2.23 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 4.03 | 2.46 | 0.08 |
| | | g | -2.00 | | | | 1" Ice | 4.30 | 2.69 | 0.11 |
| 800 MHz Filter | A | From | 4.00 | 0.0000 | | 160.00 | No Ice | 0.49 | 0.48 | 0.01 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.60 | 0.59 | 0.01 |
| | | g | -2.00 | | | | 1" Ice | 0.71 | 0.70 | 0.02 |
| 800 MHz Filter | B | From | 4.00 | 0.0000 | | 160.00 | No Ice | 0.49 | 0.48 | 0.01 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.60 | 0.59 | 0.01 |
| | | g | -2.00 | | | | 1" Ice | 0.71 | 0.70 | 0.02 |
| 800 MHz Filter | C | From | 4.00 | 0.0000 | | 160.00 | No Ice | 0.49 | 0.48 | 0.01 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.60 | 0.59 | 0.01 |
| | | g | -2.00 | | | | 1" Ice | 0.71 | 0.70 | 0.02 |
| *** | | | | | | | | | | |
| Sabre 12' LP Platform | A | None | | 0.0000 | | 152.00 | No Ice | 28.47 | 28.47 | 1.12 |
| | | | | | | | 1/2" Ice | 33.59 | 33.59 | 1.51 |
| | | | | | | | 1" Ice | 38.71 | 38.71 | 1.91 |
| AIR21 B2A/B4P w/ mount pipe | A | From | 4.00 | 0.0000 | | 152.00 | No Ice | 6.13 | 5.50 | 0.10 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 6.52 | 6.16 | 0.15 |
| | | ce | -3.00 | | | | 1" Ice | 6.92 | 6.82 | 0.21 |
| AIR21 B2A/B4P w/ mount pipe | B | From | 4.00 | 0.0000 | | 152.00 | No Ice | 6.13 | 5.50 | 0.10 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 6.52 | 6.16 | 0.15 |
| | | ce | -3.00 | | | | 1" Ice | 6.92 | 6.82 | 0.21 |
| AIR21 B2A/B4P w/ mount pipe | C | From | 4.00 | 0.0000 | | 152.00 | No Ice | 6.13 | 5.50 | 0.10 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 6.52 | 6.16 | 0.15 |
| | | ce | -3.00 | | | | 1" Ice | 6.92 | 6.82 | 0.21 |
| AIR21 B4A/B2P w/ mount pipe | A | From | 4.00 | 0.0000 | | 152.00 | No Ice | 6.13 | 5.54 | 0.10 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 6.52 | 6.20 | 0.16 |
| | | ce | -3.00 | | | | 1" Ice | 6.92 | 6.87 | 0.22 |
| AIR21 B4A/B2P w/ mount pipe | B | From | 4.00 | 0.0000 | | 152.00 | No Ice | 6.13 | 5.54 | 0.10 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 6.52 | 6.20 | 0.16 |
| | | ce | -3.00 | | | | 1" Ice | 6.92 | 6.87 | 0.22 |
| AIR21 B4A/B2P w/ mount pipe | C | From | 4.00 | 0.0000 | | 152.00 | No Ice | 6.13 | 5.54 | 0.10 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 6.52 | 6.20 | 0.16 |
| | | ce | -3.00 | | | | 1" Ice | 6.92 | 6.87 | 0.22 |
| LNX-6515DS-VTM w/ mount pipe | A | From | 4.00 | 0.0000 | | 152.00 | No Ice | 11.43 | 9.35 | 0.08 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 12.05 | 10.67 | 0.16 |
| | | ce | -3.00 | | | | 1" Ice | 12.67 | 11.70 | 0.25 |
| LNX-6515DS-VTM w/ mount pipe | B | From | 4.00 | 0.0000 | | 152.00 | No Ice | 11.43 | 9.35 | 0.08 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 12.05 | 10.67 | 0.16 |
| | | ce | -3.00 | | | | 1" Ice | 12.67 | 11.70 | 0.25 |
| LNX-6515DS-VTM w/ mount pipe | C | From | 4.00 | 0.0000 | | 152.00 | No Ice | 11.43 | 9.35 | 0.08 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 12.05 | 10.67 | 0.16 |
| | | ce | -3.00 | | | | 1" Ice | 12.67 | 11.70 | 0.25 |
| KRY 112 144 | A | From | 4.00 | 0.0000 | | 152.00 | No Ice | 0.35 | 0.17 | 0.01 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 0.43 | 0.23 | 0.01 |
| | | ce | -3.00 | | | | 1" Ice | 0.51 | 0.30 | 0.02 |
| KRY 112 144 | B | From | 4.00 | 0.0000 | | 152.00 | No Ice | 0.35 | 0.17 | 0.01 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 0.43 | 0.23 | 0.01 |
| | | ce | -3.00 | | | | 1" Ice | 0.51 | 0.30 | 0.02 |
| KRY 112 144 | C | From | 4.00 | 0.0000 | | 152.00 | No Ice | 0.35 | 0.17 | 0.01 |
| | | Centroid-Fa | 0.00 | | | | 1/2" Ice | 0.43 | 0.23 | 0.01 |

| | | | |
|----------------|-------------------------|--------------------|-------------------|
| Job | CT33762-M, Cheshire, CT | Page | 5 of 11 |
| Project | 2018778.33762.10 | Date | 12:59:48 07/19/18 |
| Client | SBA | Designed by | zfarelli |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert ft ft ft | Azimuth Adjustment ° | Placement ft | C _{AA} Front ft ² | C _{AA} Side ft ² | Weight K | |
|---|-------------|-------------|--|-------------------------|-----------------|--|---|-------------|------|
| ATMAA1412D-1A20 | A | ce | -3.00 | | | 1" Ice | 0.51 | 0.30 | 0.02 |
| | | From | 4.00 | 0.0000 | 152.00 | No Ice | 1.00 | 0.41 | 0.01 |
| | | Centroid-Fa | 0.00 | | | 1/2" Ice | 1.13 | 0.50 | 0.02 |
| | | ce | -3.00 | | | 1" Ice | 1.26 | 0.59 | 0.03 |
| ATMAA1412D-1A20 | B | From | 4.00 | 0.0000 | 152.00 | No Ice | 1.00 | 0.41 | 0.01 |
| | | Centroid-Fa | 0.00 | | | 1/2" Ice | 1.13 | 0.50 | 0.02 |
| | | ce | -3.00 | | | 1" Ice | 1.26 | 0.59 | 0.03 |
| ATMAA1412D-1A20 | C | From | 4.00 | 0.0000 | 152.00 | No Ice | 1.00 | 0.41 | 0.01 |
| | | Centroid-Fa | 0.00 | | | 1/2" Ice | 1.13 | 0.50 | 0.02 |
| | | ce | -3.00 | | | 1" Ice | 1.26 | 0.59 | 0.03 |
| S11B12 | A | From | 4.00 | 0.0000 | 152.00 | No Ice | 3.31 | 1.36 | 0.05 |
| | | Centroid-Fa | 0.00 | | | 1/2" Ice | 3.55 | 1.54 | 0.07 |
| | | ce | -3.00 | | | 1" Ice | 3.80 | 1.73 | 0.10 |
| S11B12 | B | From | 4.00 | 0.0000 | 152.00 | No Ice | 3.31 | 1.36 | 0.05 |
| | | Centroid-Fa | 0.00 | | | 1/2" Ice | 3.55 | 1.54 | 0.07 |
| | | ce | -3.00 | | | 1" Ice | 3.80 | 1.73 | 0.10 |
| S11B12 | C | From | 4.00 | 0.0000 | 152.00 | No Ice | 3.31 | 1.36 | 0.05 |
| | | Centroid-Fa | 0.00 | | | 1/2" Ice | 3.55 | 1.54 | 0.07 |
| | | ce | -3.00 | | | 1" Ice | 3.80 | 1.73 | 0.10 |
| *** | | | | | | | | | |
| MTS 36" Standoff (3) | A | None | | 0.0000 | 141.08 | No Ice | 2.64 | 2.64 | 0.09 |
| | | | | | | 1/2" Ice | 4.10 | 4.10 | 0.13 |
| | | | | | | 1" Ice | 5.56 | 5.56 | 0.17 |
| APXV18-206517S-C w/ Mount Pipe | A | From Leg | 3.00 | 0.0000 | 141.08 | No Ice | 5.17 | 4.46 | 0.05 |
| | | | 0.00 | | | 1/2" Ice | 5.62 | 5.39 | 0.09 |
| | | | 0.00 | | | 1" Ice | 6.08 | 6.20 | 0.14 |
| APXV18-206517S-C w/ Mount Pipe | B | From Leg | 3.00 | 0.0000 | 141.08 | No Ice | 5.17 | 4.46 | 0.05 |
| | | | 0.00 | | | 1/2" Ice | 5.62 | 5.39 | 0.09 |
| | | | 0.00 | | | 1" Ice | 6.08 | 6.20 | 0.14 |
| APXV18-206517S-C w/ Mount Pipe | C | From Leg | 3.00 | 0.0000 | 141.08 | No Ice | 5.17 | 4.46 | 0.05 |
| | | | 0.00 | | | 1/2" Ice | 5.62 | 5.39 | 0.09 |
| | | | 0.00 | | | 1" Ice | 6.08 | 6.20 | 0.14 |
| *** | | | | | | | | | |
| Commscope MTC3607 Platform w/ Reinforcing Kit | A | None | | 0.0000 | 130.00 | No Ice | 51.70 | 51.70 | 2.26 |
| | | | | | | 1/2" Ice | 62.70 | 62.70 | 2.94 |
| | | | | | | 1" Ice | 73.70 | 73.70 | 3.61 |
| Andrew Collar Mount | A | None | | 0.0000 | 130.00 | No Ice | 2.14 | 2.14 | 0.19 |
| | | | | | | 1/2" Ice | 2.35 | 2.35 | 0.25 |
| | | | | | | 1" Ice | 2.57 | 2.57 | 0.30 |
| B2B RRU Mount | A | From | 4.00 | 0.0000 | 130.00 | No Ice | 1.20 | 1.20 | 0.02 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 0.03 |
| | | g | 0.00 | | | 1" Ice | 2.17 | 2.17 | 0.04 |
| B2B RRU Mount | B | From | 4.00 | 0.0000 | 130.00 | No Ice | 1.20 | 1.20 | 0.02 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 0.03 |
| | | g | 0.00 | | | 1" Ice | 2.17 | 2.17 | 0.04 |
| B2B RRU Mount | C | From | 4.00 | 0.0000 | 130.00 | No Ice | 1.20 | 1.20 | 0.02 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 0.03 |
| | | g | 0.00 | | | 1" Ice | 2.17 | 2.17 | 0.04 |
| 800 10121 w/ Mount Pipe | A | From | 4.00 | 0.0000 | 130.00 | No Ice | 5.26 | 4.47 | 0.06 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 5.64 | 5.13 | 0.11 |
| | | g | 0.00 | | | 1" Ice | 6.03 | 5.79 | 0.16 |
| 800 10121 w/ Mount Pipe | B | From | 4.00 | 0.0000 | 130.00 | No Ice | 5.26 | 4.47 | 0.06 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 5.64 | 5.13 | 0.11 |
| | | g | 0.00 | | | 1" Ice | 6.03 | 5.79 | 0.16 |
| 800 10121 w/ Mount Pipe | C | From | 4.00 | 0.0000 | 130.00 | No Ice | 5.26 | 4.47 | 0.06 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 5.64 | 5.13 | 0.11 |
| | | g | 0.00 | | | 1" Ice | 6.03 | 5.79 | 0.16 |

| | | | | |
|--|----------------|-------------------------|--------------------|-------------------|
| tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235 | Job | CT33762-M, Cheshire, CT | Page | 6 of 11 |
| | Project | 2018778.33762.10 | Date | 12:59:48 07/19/18 |
| | Client | SBA | Designed by | zfarelli |

| Description | Face or Leg | Offset Type | Offsets: | | Azimuth Adjustment | Placement | C _{AA} Front | C _{AA} Side | Weight |
|----------------------------------|-------------|-------------|----------|--------|--------------------|-----------|-----------------------|----------------------|--------|
| | | | Horz | Vert | | | | | |
| | | | Lateral | ft | ° | ft | ft ² | ft ² | K |
| OPA-65R-LCUU-H8 w/ Mount Pipe | A | From | 4.00 | 0.0000 | 130.00 | No Ice | 12.98 | 9.32 | 0.12 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 13.67 | 10.79 | 0.21 |
| | | g | 0.00 | | | 1" Ice | 14.36 | 12.24 | 0.32 |
| OPA-65R-LCUU-H6 w/ Mount Pipe | B | From | 4.00 | 0.0000 | 130.00 | No Ice | 9.66 | 7.24 | 0.11 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 10.13 | 8.06 | 0.18 |
| | | g | 0.00 | | | 1" Ice | 10.61 | 8.89 | 0.27 |
| OPA-65R-LCUU-H8 w/ Mount Pipe | C | From | 4.00 | 0.0000 | 130.00 | No Ice | 12.98 | 9.32 | 0.12 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 13.67 | 10.79 | 0.21 |
| | | g | 0.00 | | | 1" Ice | 14.36 | 12.24 | 0.32 |
| EPBQ-654L8H8-L2 w/ 8' Mount Pipe | A | From | 4.00 | 0.0000 | 130.00 | No Ice | 18.09 | 8.93 | 0.13 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 18.72 | 10.35 | 0.24 |
| | | g | 0.00 | | | 1" Ice | 19.36 | 11.61 | 0.37 |
| EPBQ-654L8H6-L2 w/ 8' Mount Pipe | B | From | 4.00 | 0.0000 | 130.00 | No Ice | 13.69 | 6.86 | 0.11 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 14.40 | 8.14 | 0.21 |
| | | g | 0.00 | | | 1" Ice | 15.07 | 9.28 | 0.31 |
| EPBQ-654L8H8-L2 w/ 8' Mount Pipe | C | From | 4.00 | 0.0000 | 130.00 | No Ice | 18.09 | 8.93 | 0.13 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 18.72 | 10.35 | 0.24 |
| | | g | 0.00 | | | 1" Ice | 19.36 | 11.61 | 0.37 |
| TT19-08BP111-001 | A | From | 4.00 | 0.0000 | 130.00 | No Ice | 0.55 | 0.45 | 0.02 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 0.65 | 0.53 | 0.02 |
| | | g | 0.00 | | | 1" Ice | 0.75 | 0.63 | 0.03 |
| TT19-08BP111-001 | B | From | 4.00 | 0.0000 | 130.00 | No Ice | 0.55 | 0.45 | 0.02 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 0.65 | 0.53 | 0.02 |
| | | g | 0.00 | | | 1" Ice | 0.75 | 0.63 | 0.03 |
| TT19-08BP111-001 | C | From | 4.00 | 0.0000 | 130.00 | No Ice | 0.55 | 0.45 | 0.02 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 0.65 | 0.53 | 0.02 |
| | | g | 0.00 | | | 1" Ice | 0.75 | 0.63 | 0.03 |
| (2) LGP21401 | A | From | 4.00 | 0.0000 | 130.00 | No Ice | 1.10 | 0.21 | 0.01 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 1.24 | 0.27 | 0.02 |
| | | g | 0.00 | | | 1" Ice | 1.38 | 0.35 | 0.03 |
| (2) LGP21401 | B | From | 4.00 | 0.0000 | 130.00 | No Ice | 1.10 | 0.21 | 0.01 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 1.24 | 0.27 | 0.02 |
| | | g | 0.00 | | | 1" Ice | 1.38 | 0.35 | 0.03 |
| (2) LGP21401 | C | From | 4.00 | 0.0000 | 130.00 | No Ice | 1.10 | 0.21 | 0.01 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 1.24 | 0.27 | 0.02 |
| | | g | 0.00 | | | 1" Ice | 1.38 | 0.35 | 0.03 |
| (2) 860 10025 | A | From | 4.00 | 0.0000 | 130.00 | No Ice | 0.14 | 0.12 | 0.00 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 0.19 | 0.17 | 0.00 |
| | | g | 0.00 | | | 1" Ice | 0.25 | 0.23 | 0.01 |
| (2) 860 10025 | B | From | 4.00 | 0.0000 | 130.00 | No Ice | 0.14 | 0.12 | 0.00 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 0.19 | 0.17 | 0.00 |
| | | g | 0.00 | | | 1" Ice | 0.25 | 0.23 | 0.01 |
| (2) 860 10025 | C | From | 4.00 | 0.0000 | 130.00 | No Ice | 0.14 | 0.12 | 0.00 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 0.19 | 0.17 | 0.00 |
| | | g | 0.00 | | | 1" Ice | 0.25 | 0.23 | 0.01 |
| RRUS-11 | A | From | 2.00 | 0.0000 | 130.00 | No Ice | 2.78 | 1.19 | 0.05 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 2.99 | 1.33 | 0.07 |
| | | g | 0.00 | | | 1" Ice | 3.21 | 1.49 | 0.09 |
| RRUS-11 | B | From | 2.00 | 0.0000 | 130.00 | No Ice | 2.78 | 1.19 | 0.05 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 2.99 | 1.33 | 0.07 |
| | | g | 0.00 | | | 1" Ice | 3.21 | 1.49 | 0.09 |
| RRUS-11 | C | From | 2.00 | 0.0000 | 130.00 | No Ice | 2.78 | 1.19 | 0.05 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 2.99 | 1.33 | 0.07 |
| | | g | 0.00 | | | 1" Ice | 3.21 | 1.49 | 0.09 |
| RRUS-12 | A | From | 2.00 | 0.0000 | 130.00 | No Ice | 3.15 | 1.29 | 0.06 |
| | | Centroid-Le | 0.00 | | | 1/2" Ice | 3.36 | 1.44 | 0.08 |
| | | g | 0.00 | | | 1" Ice | 3.59 | 1.60 | 0.11 |

| | | | |
|----------------|-------------------------|--------------------|-------------------|
| Job | CT33762-M, Cheshire, CT | Page | 7 of 11 |
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| Client | SBA | Designed by | zfarelli |

| Description | Face or Leg | Offset Type | Offsets: | | Azimuth Adjustment | Placement | C _{AA} | | Weight | |
|--|-------------|-------------|--------------|--------|--------------------|-----------|-----------------|-----------------|--------|------|
| | | | Horz Lateral | Vert | | | Front | Side | | |
| | | | ft | ft | ° | ft | ft ² | ft ² | K | |
| RRUS-12 | B | From | 2.00 | 0.0000 | | 130.00 | No Ice | 3.15 | 1.29 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 3.36 | 1.44 | 0.08 |
| | | g | 0.00 | | | | 1" Ice | 3.59 | 1.60 | 0.11 |
| RRUS-12 | C | From | 2.00 | 0.0000 | | 130.00 | No Ice | 3.15 | 1.29 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 3.36 | 1.44 | 0.08 |
| | | g | 0.00 | | | | 1" Ice | 3.59 | 1.60 | 0.11 |
| (2) RRUS-32 | A | From | 4.00 | 0.0000 | | 130.00 | No Ice | 3.31 | 2.42 | 0.08 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 3.56 | 2.64 | 0.10 |
| | | g | 0.00 | | | | 1" Ice | 3.81 | 2.86 | 0.14 |
| (2) RRUS-32 | B | From | 4.00 | 0.0000 | | 130.00 | No Ice | 3.31 | 2.42 | 0.08 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 3.56 | 2.64 | 0.10 |
| | | g | 0.00 | | | | 1" Ice | 3.81 | 2.86 | 0.14 |
| (2) RRUS-32 | C | From | 4.00 | 0.0000 | | 130.00 | No Ice | 3.31 | 2.42 | 0.08 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 3.56 | 2.64 | 0.10 |
| | | g | 0.00 | | | | 1" Ice | 3.81 | 2.86 | 0.14 |
| 4478 | A | From | 4.00 | 0.0000 | | 130.00 | No Ice | 0.42 | 0.41 | 0.01 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.51 | 0.50 | 0.01 |
| | | g | 0.00 | | | | 1" Ice | 0.61 | 0.60 | 0.02 |
| 4478 | B | From | 4.00 | 0.0000 | | 130.00 | No Ice | 0.42 | 0.41 | 0.01 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.51 | 0.50 | 0.01 |
| | | g | 0.00 | | | | 1" Ice | 0.61 | 0.60 | 0.02 |
| 4478 | C | From | 4.00 | 0.0000 | | 130.00 | No Ice | 0.42 | 0.41 | 0.01 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.51 | 0.50 | 0.01 |
| | | g | 0.00 | | | | 1" Ice | 0.61 | 0.60 | 0.02 |
| RRUS A2 MODULE | A | From | 4.00 | 0.0000 | | 130.00 | No Ice | 0.00 | 0.38 | 0.02 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.00 | 0.47 | 0.03 |
| | | g | 0.00 | | | | 1" Ice | 0.00 | 0.57 | 0.04 |
| RRUS A2 MODULE | B | From | 4.00 | 0.0000 | | 130.00 | No Ice | 0.00 | 0.38 | 0.02 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.00 | 0.47 | 0.03 |
| | | g | 0.00 | | | | 1" Ice | 0.00 | 0.57 | 0.04 |
| RRUS A2 MODULE | C | From | 4.00 | 0.0000 | | 130.00 | No Ice | 0.00 | 0.38 | 0.02 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 0.00 | 0.47 | 0.03 |
| | | g | 0.00 | | | | 1" Ice | 0.00 | 0.57 | 0.04 |
| DC6-48-60-18-8C Surge Suppression Unit | C | From | 2.00 | 0.0000 | | 130.00 | No Ice | 0.92 | 0.92 | 0.02 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 1.46 | 1.46 | 0.04 |
| | | g | 0.00 | | | | 1" Ice | 1.64 | 1.64 | 0.06 |
| DC6-48-60-18-8F Surge Suppression Unit | A | From | 2.00 | 0.0000 | | 130.00 | No Ice | 0.92 | 0.92 | 0.02 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 1.46 | 1.46 | 0.04 |
| | | g | 0.00 | | | | 1" Ice | 1.64 | 1.64 | 0.06 |
| DC6-48-60-18-8F Surge Suppression Unit | B | From | 2.00 | 0.0000 | | 130.00 | No Ice | 0.92 | 0.92 | 0.02 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 1.46 | 1.46 | 0.04 |
| | | g | 0.00 | | | | 1" Ice | 1.64 | 1.64 | 0.06 |
| *** | | | | | | | | | | |
| MTS 14.5' LP Platform | A | None | | 0.0000 | | 122.50 | No Ice | 17.46 | 17.46 | 1.35 |
| | | | | | | | 1/2" Ice | 22.44 | 22.44 | 1.62 |
| | | | | | | | 1" Ice | 27.42 | 27.42 | 1.90 |
| (2) SBNHH-1D65B w/ Mount Pipe | A | From | 4.00 | 0.0000 | | 122.50 | No Ice | 8.16 | 6.16 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 8.62 | 6.82 | 0.12 |
| | | g | 0.00 | | | | 1" Ice | 9.09 | 7.51 | 0.19 |
| (2) SBNHH-1D65B w/ Mount Pipe | B | From | 4.00 | 0.0000 | | 122.50 | No Ice | 8.16 | 6.16 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 8.62 | 6.82 | 0.12 |
| | | g | 0.00 | | | | 1" Ice | 9.09 | 7.51 | 0.19 |
| (2) SBNHH-1D65B w/ Mount Pipe | C | From | 4.00 | 0.0000 | | 122.50 | No Ice | 8.16 | 6.16 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 8.62 | 6.82 | 0.12 |
| | | g | 0.00 | | | | 1" Ice | 9.09 | 7.51 | 0.19 |
| LNx-6514DS-VTM w/ Mount Pipe | A | From | 4.00 | 0.0000 | | 122.50 | No Ice | 8.17 | 6.83 | 0.06 |
| | | Centroid-Le | 0.00 | | | | 1/2" Ice | 8.63 | 7.79 | 0.13 |

| | | | | |
|--|----------------|-------------------------|--------------------|-------------------|
| tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235 | Job | CT33762-M, Cheshire, CT | Page | 8 of 11 |
| | Project | 2018778.33762.10 | Date | 12:59:48 07/19/18 |
| | Client | SBA | Designed by | zfarelli |

| Description | Face or Leg | Offset Type | Offsets: | | Azimuth Adjustment | Placement | C _{AA} | | Weight |
|-------------------------------|-------------|--------------------------|----------------------|--------|--------------------|-----------|-----------------|-----------------|--------|
| | | | Horz | Vert | | | Front | Side | |
| | | | Lateral | ft | ° | ft | ft ² | ft ² | K |
| LNX-6514DS-VTM w/ Mount Pipe | B | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 9.10 | 8.62 | 0.20 |
| | | | | | | No Ice | 8.17 | 6.83 | 0.06 |
| | | | | | | 1/2" Ice | 8.63 | 7.79 | 0.13 |
| LNX-6514DS-VTM w/ Mount Pipe | C | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 9.10 | 8.62 | 0.20 |
| | | | | | | No Ice | 8.17 | 6.83 | 0.06 |
| | | | | | | 1/2" Ice | 8.63 | 7.79 | 0.13 |
| HBXX-6517DS-A2M w/ Mount Pipe | A | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 9.10 | 8.62 | 0.20 |
| | | | | | | No Ice | 8.95 | 7.14 | 0.07 |
| | | | | | | 1/2" Ice | 9.60 | 8.44 | 0.14 |
| HBXX-6517DS-A2M w/ Mount Pipe | B | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 10.23 | 9.58 | 0.22 |
| | | | | | | No Ice | 8.95 | 7.14 | 0.07 |
| | | | | | | 1/2" Ice | 9.60 | 8.44 | 0.14 |
| HBXX-6517DS-A2M w/ Mount Pipe | C | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 10.23 | 9.58 | 0.22 |
| | | | | | | No Ice | 8.95 | 7.14 | 0.07 |
| | | | | | | 1/2" Ice | 9.60 | 8.44 | 0.14 |
| RRH4X45-AWS | C | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 10.23 | 9.58 | 0.22 |
| | | | | | | No Ice | 3.10 | 1.76 | 0.06 |
| | | | | | | 1/2" Ice | 3.36 | 1.98 | 0.08 |
| RRH4X45-AWS | A | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 3.62 | 2.21 | 0.11 |
| | | | | | | No Ice | 3.10 | 1.76 | 0.06 |
| | | | | | | 1/2" Ice | 3.36 | 1.98 | 0.08 |
| RRH4X45-AWS | B | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 3.62 | 2.21 | 0.11 |
| | | | | | | No Ice | 3.10 | 1.76 | 0.06 |
| | | | | | | 1/2" Ice | 3.36 | 1.98 | 0.08 |
| RRH2X60-PCS | A | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 3.62 | 2.21 | 0.11 |
| | | | | | | No Ice | 2.20 | 1.36 | 0.06 |
| | | | | | | 1/2" Ice | 2.39 | 1.52 | 0.07 |
| RRH2X60-PCS | B | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 2.59 | 1.68 | 0.09 |
| | | | | | | No Ice | 2.20 | 1.36 | 0.06 |
| | | | | | | 1/2" Ice | 2.39 | 1.52 | 0.07 |
| RRH2X60-PCS | C | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 2.59 | 1.68 | 0.09 |
| | | | | | | No Ice | 2.20 | 1.36 | 0.06 |
| | | | | | | 1/2" Ice | 2.39 | 1.52 | 0.07 |
| RRH2x60-700 | A | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 2.59 | 1.68 | 0.09 |
| | | | | | | No Ice | 3.50 | 1.82 | 0.06 |
| | | | | | | 1/2" Ice | 3.76 | 2.05 | 0.08 |
| RRH2x60-700 | B | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 4.03 | 2.29 | 0.11 |
| | | | | | | No Ice | 3.50 | 1.82 | 0.06 |
| | | | | | | 1/2" Ice | 3.76 | 2.05 | 0.08 |
| RRH2x60-700 | C | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 4.03 | 2.29 | 0.11 |
| | | | | | | No Ice | 3.50 | 1.82 | 0.06 |
| | | | | | | 1/2" Ice | 3.76 | 2.05 | 0.08 |
| (2) FD9R6004/2C-3L | A | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 4.03 | 2.29 | 0.11 |
| | | | | | | No Ice | 0.31 | 0.08 | 0.00 |
| | | | | | | 1/2" Ice | 0.39 | 0.12 | 0.01 |
| (2) FD9R6004/2C-3L | B | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 0.47 | 0.17 | 0.01 |
| | | | | | | No Ice | 0.31 | 0.08 | 0.00 |
| | | | | | | 1/2" Ice | 0.39 | 0.12 | 0.01 |
| (2) FD9R6004/2C-3L | C | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 0.47 | 0.17 | 0.01 |
| | | | | | | No Ice | 0.31 | 0.08 | 0.00 |
| | | | | | | 1/2" Ice | 0.39 | 0.12 | 0.01 |
| DB-T1-6Z-8AB-0Z | B | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 0.47 | 0.17 | 0.01 |
| | | | | | | No Ice | 4.80 | 2.00 | 0.05 |
| | | | | | | 1/2" Ice | 5.07 | 2.19 | 0.09 |
| DB-T1-6Z-8AB-0Z | C | g From Centroid-Le | 0.00 4.00 0.00 | 0.0000 | 122.50 | 1" Ice | 5.35 | 2.39 | 0.13 |
| | | | | | | No Ice | 4.80 | 2.00 | 0.05 |
| | | | | | | 1/2" Ice | 5.07 | 2.19 | 0.09 |

| | | | | |
|--|----------------|-------------------------|--------------------|-------------------|
| tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235 | Job | CT33762-M, Cheshire, CT | Page | 9 of 11 |
| | Project | 2018778.33762.10 | Date | 12:59:48 07/19/18 |
| | Client | SBA | Designed by | zfarelli |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert | Azimuth Adjustment | Placement | C _{AA} Front | C _{AA} Side | Weight |
|---------------------|-------------|-------------|----------------------------|--------------------|-----------|---|----------------------|----------------------|
| | | | ft ft ft | ° | ft | ft ² | ft ² | K |
| *** | | g | 0.00 | | 1" Ice | 5.35 | 2.39 | 0.13 |
| Andrew Collar Mount | A | None | | 0.0000 | 89.08 | No Ice 2.14 1/2" Ice 2.35 1" Ice 2.57 | 2.14 2.35 2.57 | 0.19 0.25 0.30 |
| 14' Dipole | C | From Leg | 1.00 0.00 0.00 | 0.0000 | 89.08 | No Ice 2.80 1/2" Ice 4.22 1" Ice 5.67 | 2.80 4.22 5.67 | 0.03 0.05 0.08 |
| 3' Yagi | A | From Leg | 1.50 0.00 -7.83 | 0.0000 | 89.08 | No Ice 0.52 1/2" Ice 0.71 1" Ice 0.90 | 0.52 0.71 0.90 | 0.02 0.02 0.03 |
| 3' Yagi | A | From Leg | 1.50 0.00 -9.75 | 0.0000 | 89.08 | No Ice 0.52 1/2" Ice 0.71 1" Ice 0.90 | 0.52 0.71 0.90 | 0.02 0.02 0.03 |
| *** | | | | | | | | |
| Andrew Collar Mount | A | None | | 0.0000 | 83.17 | No Ice 2.14 1/2" Ice 2.35 1" Ice 2.57 | 2.14 2.35 2.57 | 0.19 0.25 0.30 |
| GPS-TMG-HR-26N | B | From Leg | 1.00 0.00 0.00 | 0.0000 | 83.17 | No Ice 0.13 1/2" Ice 0.18 1" Ice 0.24 | 0.13 0.18 0.24 | 0.00 0.00 0.01 |
| 3' Yagi | A | From Leg | 1.50 0.00 -1.92 | 0.0000 | 83.17 | No Ice 0.52 1/2" Ice 0.71 1" Ice 0.90 | 0.52 0.71 0.90 | 0.02 0.02 0.03 |

Critical Deflections and Radius of Curvature - Service Wind

| Elevation | Appurtenance | Gov. Load Comb. | Deflection | Tilt | Twist | Radius of Curvature |
|-----------|--|-----------------|------------|--------|--------|---------------------|
| ft | | | in | ° | ° | ft |
| 160.00 | MTS 36" Standoff (3) | 46 | 22.721 | 1.4021 | 0.0037 | 17507 |
| 152.00 | Sabre 12' LP Platform | 46 | 20.386 | 1.3775 | 0.0027 | 11027 |
| 141.08 | MTS 36" Standoff (3) | 46 | 17.315 | 1.3133 | 0.0017 | 7155 |
| 130.00 | Commscope MTC3607 Platform w/ Reinforcing Kit | 46 | 14.403 | 1.2091 | 0.0011 | 6145 |
| 122.50 | MTS 14.5' LP Platform | 46 | 12.566 | 1.1230 | 0.0009 | 5608 |
| 89.08 | Andrew Collar Mount | 46 | 5.984 | 0.7060 | 0.0006 | 4739 |
| 83.17 | Andrew Collar Mount | 46 | 5.117 | 0.6397 | 0.0005 | 4907 |

Compression Checks

Pole Design Data

| Section No. | Elevation | Size | L | L _u | Kl/r | A | P _u | φP _n | Ratio P _u /φP _n |
|-------------|-----------------|----------------------|-------|----------------|------|-----------------|----------------|-----------------|---------------------------------------|
| | ft | | ft | ft | | in ² | K | K | |
| L1 | 160 - 146.5 (1) | TP20.91x16.75x0.1875 | 13.50 | 0.00 | 0.0 | 11.8282 | -4.69 | 865.69 | 0.005 |
| L2 | 146.5 - 95.75 | TP36.16x19.6876x0.25 | 53.50 | 0.00 | 0.0 | 27.3952 | -19.55 | 1841.20 | 0.011 |

| | | | | |
|--|----------------|-------------------------|--------------------|-------------------|
| tnxTower GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235 | Job | CT33762-M, Cheshire, CT | Page | 10 of 11 |
| | Project | 2018778.33762.10 | Date | 12:59:48 07/19/18 |
| | Client | SBA | Designed by | zfarelli |

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | A in ² | P _u K | φP _n K | Ratio $\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|------------------------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| | (2) | | | | | | | | |
| L3 | 95.75 - 46.75 | TP50.76x34.2745x0.3125 | 53.50 | 0.00 | 0.0 | 48.0510 | -32.65 | 3077.94 | 0.011 |
| | (3) | | | | | | | | |
| L4 | 46.75 - 0 (4) | TP64.53x48.1321x0.375 | 53.25 | 0.00 | 0.0 | 76.3605 | -52.54 | 4662.89 | 0.011 |

Pole Bending Design Data

| Section No. | Elevation ft | Size | M _{ux} kip-ft | φM _{ux} kip-ft | Ratio $\frac{M_{ux}}{\phi M_{ux}}$ | M _{uy} kip-ft | φM _{uy} kip-ft | Ratio $\frac{M_{uy}}{\phi M_{uy}}$ |
|-------------|-----------------|------------------------|---------------------------|----------------------------|---------------------------------------|---------------------------|----------------------------|---------------------------------------|
| L1 | 160 - 146.5 (1) | TP20.91x16.75x0.1875 | 69.01 | 353.25 | 0.195 | 0.00 | 353.25 | 0.000 |
| L2 | 146.5 - 95.75 | TP36.16x19.6876x0.25 | 1123.83 | 1307.93 | 0.859 | 0.00 | 1307.93 | 0.000 |
| | (2) | | | | | | | |
| L3 | 95.75 - 46.75 | TP50.76x34.2745x0.3125 | 2647.61 | 3070.47 | 0.862 | 0.00 | 3070.47 | 0.000 |
| | (3) | | | | | | | |
| L4 | 46.75 - 0 (4) | TP64.53x48.1321x0.375 | 4613.36 | 6163.78 | 0.748 | 0.00 | 6163.78 | 0.000 |

Pole Shear Design Data

| Section No. | Elevation ft | Size | Actual V _u K | φV _n K | Ratio $\frac{V_u}{\phi V_n}$ | Actual T _u kip-ft | φT _n kip-ft | Ratio $\frac{T_u}{\phi T_n}$ |
|-------------|-----------------|------------------------|-------------------------------|----------------------|---------------------------------|------------------------------------|---------------------------|---------------------------------|
| L1 | 160 - 146.5 (1) | TP20.91x16.75x0.1875 | 11.24 | 432.84 | 0.026 | 0.01 | 708.37 | 0.000 |
| L2 | 146.5 - 95.75 | TP36.16x19.6876x0.25 | 30.09 | 920.60 | 0.033 | 0.22 | 2621.93 | 0.000 |
| | (2) | | | | | | | |
| L3 | 95.75 - 46.75 | TP50.76x34.2745x0.3125 | 34.59 | 1538.97 | 0.022 | 0.26 | 6154.45 | 0.000 |
| | (3) | | | | | | | |
| L4 | 46.75 - 0 (4) | TP64.53x48.1321x0.375 | 39.21 | 2331.45 | 0.017 | 0.12 | 12353.58 | 0.000 |

Pole Interaction Design Data

| Section No. | Elevation ft | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{ux}}$ | Ratio $\frac{M_{uy}}{\phi M_{uy}}$ | Ratio $\frac{V_u}{\phi V_n}$ | Ratio $\frac{T_u}{\phi T_n}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|-------------|-----------------|---------------------------------|---------------------------------------|---------------------------------------|---------------------------------|---------------------------------|--------------------------|---------------------------|----------|
| L1 | 160 - 146.5 (1) | 0.005 | 0.195 | 0.000 | 0.026 | 0.000 | 0.201 | 1.000 | 4.8.2 |
| L2 | 146.5 - 95.75 | 0.011 | 0.859 | 0.000 | 0.033 | 0.000 | 0.871 | 1.000 | 4.8.2 |
| | (2) | | | | | | | | |
| L3 | 95.75 - 46.75 | 0.011 | 0.862 | 0.000 | 0.022 | 0.000 | 0.873 | 1.000 | 4.8.2 |
| | (3) | | | | | | | | |
| L4 | 46.75 - 0 (4) | 0.011 | 0.748 | 0.000 | 0.017 | 0.000 | 0.760 | 1.000 | 4.8.2 |

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|--|---------------------------------------|----------------------------------|
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| | Client SBA | Designed by zfarelli |

Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | ϕP_{allow} K | % Capacity | Pass Fail | |
|-------------|---------------|----------------|------------------------|------------------|--------|--------------------|-----------------|-------------|-------------|
| L1 | 160 - 146.5 | Pole | TP20.91x16.75x0.1875 | 1 | -4.69 | 865.69 | 20.1 | Pass | |
| L2 | 146.5 - 95.75 | Pole | TP36.16x19.6876x0.25 | 2 | -19.55 | 1841.20 | 87.1 | Pass | |
| L3 | 95.75 - 46.75 | Pole | TP50.76x34.2745x0.3125 | 3 | -32.65 | 3077.94 | 87.3 | Pass | |
| L4 | 46.75 - 0 | Pole | TP64.53x48.1321x0.375 | 4 | -52.54 | 4662.89 | 76.0 | Pass | |
| | | | | | | | Summary | | |
| | | | | | | | Pole (L3) | 87.3 | Pass |
| | | | | | | | RATING = | 87.3 | Pass |

ADDITIONAL CALCULATIONS



**Anchor Rod and Base Plate Stresses, TIA-222-G-1
CT33762-M, Cheshire
2018778.33762.10**

| | | |
|---------------------|---------|------|
| Overturing Moment = | 4613.00 | k*ft |
| Axial Force = | 53.00 | k |
| Shear Force = | 39.00 | k |

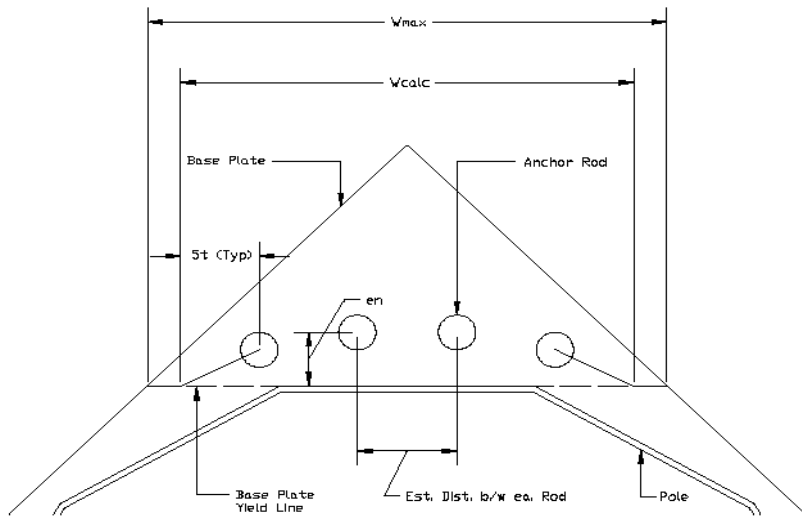
| | |
|---------------------------|--------|
| Acceptable Stress Ratio = | 105.0% |
|---------------------------|--------|

| Anchor Rods | | |
|-----------------------------------|--------------|-----------------|
| Pole Diameter = | 64.53 | in |
| Number of Rods = | 16 | |
| ϕ = | 0.8 | |
| Rod Ultimate Strength (F_u) = | 100 | ksi |
| Base Plate Detail Type* = | d | |
| Rod Circle = | 71.651 | in |
| Rod Diameter = | 2.25 | in |
| Net Tensile Area = | 3.25 | in ² |
| Max Tension on Rod = | 189.06 | kips |
| Max Compression on Rod = | 195.68 | kips |
| P_u = | 195.68 | kips |
| V_u = | 2.44 | kips |
| η = | 0.50 | |
| $P_u + V_u / \eta$ = | 200.56 | kips |
| ϕR_{nt} = | 260.00 | kips |
| Anchor Rod Capacity = | 77.1% | OK |

| Base Plate | | |
|------------------------------|--------------|-----------------|
| Plate Strength (F_y) = | 60 | ksi |
| ϕ = | 0.9 | |
| Plate Thickness = | 3 | in |
| Plate Width = | 73 | in |
| Est. Dist. b/w ea. Rod = | 6 | in |
| W_{calc} = | 47.83 | in |
| W_{max} = | 38.71 | in |
| w = | 38.71 | in |
| Z = | 87.09 | in ³ |
| M_u = | 2270.29 | k-in |
| ϕM_n = | 4702.97 | k-in |
| Base Plate Capacity = | 48.3% | OK |

(Section 4.9.9, TIA-222-G-1)

***This analysis assumes the clear distance from the top of the concrete to the bottom of the leveling nut is less than the diameter of the anchor rod. Notify GPD Group immediately if existing field conditions do not meet this assumption.**





Mat Foundation Analysis
CT33762-M, Cheshire
2018778.33762.10

| General Info | |
|--------------------------|--------------|
| Foundation Criteria | GPD |
| TIA Code | TIA-222-G |
| Soil Code | AASHTO 2012 |
| Concrete Code | ACI 318-11 |
| Seismic Design Category | B |
| Tower Height | 160 ft |
| Bearing On | Soil |
| Foundation Type | Monopole Pad |
| Pier Type | Round |
| Reinforcing Known | Yes |
| Max Bearing Capacity | 105% |
| Max Overturning Capacity | 105% |

| Tower Reactions | |
|-----------------|-----------|
| Moment, M | 4613 k-ft |
| Axial, P | 53 k |
| Shear, V | 39 k |

| Pad & Pier Geometry | |
|------------------------|-----------|
| Pier Diameter, ϕ | 8 ft |
| Pad Length, L [y] | 27 ft |
| Pad Width, W [x] | 27 ft |
| Pad Thickness, t | 5 ft |
| Depth, D | 13.25 ft |
| Height Above Grade, HG | 0 ft |
| Tower Centroid, X | 13.5 ft |
| Tower Centroid, Y | 13.5 ft |
| Tower Eccentricity | 0.0000 ft |

| Pad & Pier Reinforcing | |
|------------------------------|--------|
| Rebar Fy | 60 ksi |
| Concrete F'c | 4 ksi |
| Pier Reinforcing Clear Cover | 3 in |
| Shear Rebar Type | Tie |
| Shear Rebar Size | # 4 |
| Pad Reinforcing Clear Cover | 3 in |
| Reinforced Top & Bottom? | Yes |
| Pad Reinforcing Size | # 8 |
| Pad Quantity Per Layer | 42 |
| Pier Rebar Size | # 9 |
| Pier Quantity of Rebar | 38 |

| Soil Properties | |
|---------------------------------------|----------|
| Soil Type | Granular |
| Soil Unit Weight | 100 pcf |
| Angle of Friction, ϕ | 35 |
| Base Friction Coeff. Provided in Geo? | Yes |
| Base Friction Coefficient, μ | 0.45 |
| Bearing Type | Gross |
| Ultimate Bearing | 8 ksf |
| Water Table Depth | 0 ft |
| Frost Depth | 3.333 ft |

| Bearing Summary | | | | | |
|-----------------------------|---------------|-----------------------|-------------|--------------|-----------|
| Case | Demand/Limits | Capacity/Availability | Check | Eccentricity | Load Case |
| Qxmax | 2.25 ksf | 6.00 ksf | OK, <= 105% | L/5.3 | 1.2D+1.6W |
| Qymax | 2.25 ksf | 6.00 ksf | OK, <= 105% | W/5.3 | 1.2D+1.6W |
| Qmax @ 45° | 1.67 ksf | 6.00 ksf | OK, <= 105% | W/8.9 | 1.2D+1.6W |
| Controlling Capacity | | 37.5% | Pass | | |

| Overturning Summary | | | | | |
|-----------------------------|---------------|-----------------------|-------------|-----------|--|
| Case | Demand/Limits | Capacity/Availability | Check | Load Case | |
| Ovtx | 3678.0 k-ft | 7415.6 k-ft | 49.6% OK | 0.9D+1.6W | |
| Ovty | 3678.0 k-ft | 7415.6 k-ft | 49.6% OK | 0.9D+1.6W | |
| Ovtxy | 2198.0 k-ft | 7415.6 k-ft | 29.6% OK | 0.9D+1.6W | |
| Controlling Capacity | | 49.6% | Pass | | |

| Sliding Summary | | | | | |
|-----------------------------|---------------|-----------------------|-------------|-----------|--|
| Case | Demand/Limits | Capacity/Availability | Check | Load Case | |
| Slidingx | 39.0 k | 360.1 k | 10.8% OK | 0.9D+1.6W | |
| Slidingy | 39.0 k | 360.1 k | 10.8% OK | 0.9D+1.6W | |
| Controlling Capacity | | 10.8% | Pass | | |

| Reinforcement Summary | | | | | |
|-----------------------------|---------------|-----------------------|-------------|-----------|--|
| Component | Demand/Limits | Capacity/Availability | Check | Load Case | |
| Pad Flexural Bending | 48.3 k-ft | 301.9 k-ft | 16.0% OK | 0.9D+1.6W | |
| One-Way Shear in Pad | 151.2 k | 1705.9 k | 8.9% OK | 0.9D+1.6W | |
| Two-Way Shear in Pad | 566.9 k | 5921.4 k | 9.6% OK | 0.9D+1.6W | |
| Compression on Pier | 96.6 k | 31993.0 k | 0.3% OK | 1.2D+1.6W | |
| Moment on Pier | 4884.7 k-ft | 7222.4 k-ft | 67.6% OK | 1.2D+1.6W | |
| As Min Pad Met? | 2.46 sq. in. | 0.16 sq. in. | Yes | | |
| As Min Pier Met? | 38.00 sq. in. | 36.19 sq. in. | Yes | | |
| Controlling Capacity | | 67.6% | Pass | | |

