



Northeast Site Solutions  
Denise Sabo  
4 Angela's Way  
Burlington, CT 06013  
860-209-4690  
[denise@northeastsitesolutions.com](mailto:denise@northeastsitesolutions.com)

June 5, 2019

Members of the Siting Council  
Connecticut Siting Council  
Ten Franklin Square  
New Britain, CT 06051

RE: Notice of Exempt Modification  
37 Carmen Hill Road, Brookfield CT 06804  
Latitude: 41.4934  
Longitude: -73.4288  
T-Mobile Site#: CT11196A\_Anchor

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 280-foot level of the existing 455-foot guyed tower at 37 Carmen Hill Road, Brookfield CT. The 455-foot guyed tower is owned by Vertical Bridge and property is owned by American Tower LLC. T-Mobile now intends to replace the existing mount and add three (3) new 1900/2100 MHz antennas and three (3) new 2500MHz antennas. The new antennas would be installed at the 280-foot level of the tower.

Planned Modifications:

Tower:  
Remove: NONE

Remove and Replace: Antenna Mount (Remove) – Site Pro 1 VFA14-HD (Replace)

Install New:

(3)AIR6488 Antenna 2500 MHz  
(3)AIR32 Antenna 1900/2100 MHz  
(3) RRU 4415  
(5) Hybrid Lines

Existing to Remain:

(12) 1-5/8" Coax  
(1) Hybrid

(3)APX16 DWV Antenna 1900/2100 MHz  
(3)APXVAARR24 Antenna 600/700/1900 MHz  
(3) RRU 4449  
(6) TMA

Ground:

Install New:

(3) PPC to Existing H-Frame  
(1)Site Support Cabinet  
(1)B160 Battery Cabinet

This facility was approved by Town of Brookfield PZC on February 24, 1994 with special permit #SP94-1. The original decision does not have any conditions of approval. Please see attached.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-SOj-73, a copy of this letter is being sent to First Selectman, Stephen C. Dunn, Elected Official and Alice Dew, Land Use Official for the Town of Brookfield, as well as the property owner and the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modifications will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b) (2).

Sincerely,

Denise Sabo  
Mobile: 860-209-4690  
Fax: 413-521-0558  
Office: 4 Angela's Way, Burlington CT 06013  
Email: denise@northeastitesolutions.com

Attachments

cc:

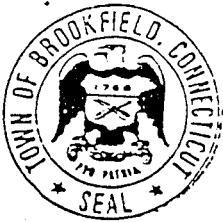
Town of Brookfield CT  
100 Pocono Road, Brookfield CT 06804  
Attn: First Selectman's Office  
First Selectman, Stephen C. Dunn, Elected Official

Alice Dew – Land Use Officer  
Town of Brookfield CT  
100 Pocono Road, Brookfield CT 06804  
Attn: Land Use Dept.  
Alice Dew – Land Use Officer

American Tower LLC - as property owner  
10 Presidential Way  
Woburn, MA 01801  
Attn: Kathleen Burke  
Project Manager, Site Development

Vertical Bridge - as tower owner  
750 Park of Commerce Drive, Suite 200  
Boca Raton, FL 33487  
Attn: Regional Leasing Manager

# Exhibit A



TOWN OF BROOKFIELD  
ZONING COMMISSION

Permit No.: SP94-1  
Page 1 of 4

SPECIAL PERMIT - DESIGN REVIEW APPROVAL

|   |  |
|---|--|
| <u>Issued to:</u><br>Danbury Broadcasting, Inc.<br>1004 Federal Road<br>Brookfield, CT 06804  | <u>Owner of Record:</u><br>Danbury Broadcasting, Inc.<br>1004 Federal Road<br>Brookfield, CT 06804 |
| <u>Location:</u> Lot No. B05013, 39 Carmen Hill Road, Brookfield, Connecticut.  |  |
| <u>Project Description:</u> Replacement of an existing radio tower.<br><br><u>Permitted Use:</u> Existing/non-conforming <u>Zoning District:</u> R-100<br><u>Application Date:</u> 1-12-94 <u>Public Hearing Date:</u> 2-10-94<br><u>Decision Date:</u> 2-24-94 <u>Publication Date:</u> 3-1-94   |  |
| <u>Approval and Conditions:</u><br><br>This Special Permit is issued pursuant to Title 8, Chapter 124, Sect. 3c of CGS and Chapter 242, Section 301C. of the Code of the Town of Brookfield. It is subject to the General Conditions, Special Stipulations, plans, drawings and documents as set forth hereinafter.   |  |
| <u>Effectivity:</u> <u>This approval IS NOT VALID UNTIL:</u><br><br>A. This document is filed by the record owner of the property with (i) The Town Clerk, and (ii) upon the land records of the Town of Brookfield prior to the commencement of any site work, but in no event later than sixty (60) days from the date hereof.<br><br>B. A performance bond in the form of an irrevokable, unconditional, automatically renewable, bank letter of credit in the amount of: \$ <u>7,500</u> is on file in the Office of the First Selectman, Town of Brookfield, prior to the commencement of any site work, but in no event later than six (6) months from the date hereof.<br><br>You are required to PROMPTLY RETURN the following documents to the Office of the Zoning Commission: (1) Certificate of Filing and Recording executed by the Town Clerk, (2) Site Work Bond and Agreement executed by you, (3) A signed copy of this Special Permit acknowledging both receipt hereof and your obligations hereunder. |  |
| <u>Attachments</u> (a part of this Special Permit):<br><br>(1) General Conditions of Approval, (2) Special Stipulations,<br>(3) Document Listing, (4) Certificate of Filing and Recording,<br>(5) Site Work and Bond Agreement, (6) Acknowledgment copy of Permit   |  |
| <u>Approval and Certification:</u><br><br>Approved and certified to be a true copy of the Special Permit granted this <u>24th</u> day of <u>February</u> , <u>1994</u> at Brookfield, Connecticut.<br><br><u>E. Polyzos</u> for The Brookfield Zoning Commission  |  |

## SPECIAL PERMIT - DESIGN REVIEW APPROVAL

## GENERAL CONDITIONS OF APPROVAL

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- (1) This approval shall be void and of no effect unless construction of all improvements, buildings and structures shown on the site plan is completed within two (2) years of the date of this letter. However, the Commission may extend said two (2) year period up to an additional three (3) years, if the Commission finds exceptional difficulty would result in applying the original two (2) year completion period. Any renewal periods shall be upon the same terms and conditions as originally approved unless modified by the Commission.
  - (2) If any activity on the site creates an impact upon the inland wetlands of the Town of Brookfield, then this approval is subject to such condition, if any, as may be imposed by the Inland Wetland Commission, Town of Brookfield.
  - (3) Prior to the construction of any structure(s), water supply or drainage system, or connection to a septic treatment facility or sewer, you shall conform to the requirements placed upon you by the Building Official, Health Department and Water Pollution Control Authority, Town of Brookfield,. Copies of documents reflecting final approval of these systems shall be filed by you with this Commission within fifteen (15) days after such approval is given.
  - (4) Any additions to the exterior lighting or the parking areas shall require specific approval of the Commission and shall be in accordance with the appropriate requirements of the Zoning Regulations, Town of Brookfield.
  - (5) If landscaping is required by the Commission per the approved site plan, you shall maintain such landscaping in a healthy growing condition throughout the duration of the use it is intended to serve. The Commission shall require the replacement of any landscaping which does not survive its initial planting.
  - (6) You are required to meet all the requirements of Section 242-602, "Technical Standards" of the Brookfield Code.
  - (7) Prior to the occupancy of any structure, you shall conform to such requirements as may be placed upon you by the Fire Marshal and Fire Chief, Town of Brookfield, relative to: emergency vehicle access, building egress, and provisions for an adequate supply of water for fire fighting purposes.
  - (8) During construction of the project, you shall take such precautions as may be prescribed by the Building Official, the Highway and Police Departments, Town of Brookfield, and the Zoning Commission, so as to protect the general health, safety, and welfare, and to preclude undue nuisance to residents of the general area. Construction trailers, equipment and the like shall be kept to a minimum of twenty-five (25) feet inside the property lines at all times.

## SPECIAL PERMIT - DESIGN REVIEW APPROVAL

GENERAL CONDITIONS OF APPROVAL

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- (9) During construction of the project, the Erosion and Sediment Protection, (ESP), measures must be fully implemented in accordance with the approved plan. This shall apply not only to the installation of the required ESP measures but also to all maintenance procedures contained in the plan. Status reports on the ESP plan shall be filed with the Z.E.O. on a monthly basis.
- (10) Upon application for a Zoning Certificate of Compliance, you must provide a complete set of drawings revised to indicate the true "as built" condition of the project. These drawings shall be submitted in two (2) blue line copies and one (1) reproducible copy. The Zoning Enforcement Officer will then inspect the property to verify that the project has been completed in accordance with this approval. Only then will a Certificate of Compliance be issued. Occupancy shall not be permitted until such certificate is issued.
- (11) An "as built" plot plan shall be submitted to the Commission after the foundations and/or footings are poured. This plot plan shall contain all dimensions enabling the locations of the foundations, footings, drainage pipes, catch basins, galleries, underground utility lines, etc., to be compared for conformity to the approved site plan. No further earth covering over or building on these structures may be initiated until the submitted "as built" is approved by the Commission or the Zoning Enforcement Officer. The Commission will interpret failure to comply with this stipulation as grounds to deny any and all requests for subsequent modifications of the original site plan.

SPECIAL PERMIT - DESIGN REVIEW APPROVAL

SPECIAL STIPULATIONS

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1. The bond shall be set at \$7,500.

DOCUMENT LISTING

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1. Real Estate Impact Study, Proposed Radio Tower Replacement, Prepared by Leshner-Glendinning & Co., Inc./Appraisers & Counselors, P. O. BOX 402, Georgetown, Conn. 06829, Dated 2/8/94.
2. General Arrangement Drawing of WINE/WRKI RADIO, No. E-1, prepared by Stainless, Inc., 3rd St. and Montgomery Ave., North Wales, PA 19454, dated 12/15/93.
3. Site Plan Proposed Radio Tower Replacement, prepared for Danbury Broadcasting, Inc., 39 Carmen Hill Road, by Carroccio-Covill & Associates, Inc., 40 Old New Milford Road, Brookfield, CT 06804, Drawing No. 1465, Sheet 1 of 1, dated 1/24/94.



APPLICATION FOR DESIGN REVIEW APPROVAL

NO. SP 94-1



PROJECT DATA

Project Name: Proposed Radio Tower Replacement  
 Street Address: 39 Carmen Hill Road, Brookfield CT  
 Zoning District: R-100 Lot No.: B05013  
 Permitted Use: No; Existing/Non conform Permitted Use No.: N.A.  
 Acreage: 4.31 Ac Soil Types Present: Cr, Wx  
 Building Footprint: 1205 S.F. Intervious Area Footprint: 6205 S.F.  
 Total Building Sq. Ft. 1205 S.F. No. of Stories 1  
 No. of Occupants: 0 No. of Parking Spaces: 2  
 No. of Buildings: 2 (1 Building 1 Tower) Flood Plain Designation: N.A.  
 Wetlands Approval Req'd.? NO Wetlands Approval Obtained? N.A.  
 Steep Slopes Present? NO On Sewer Line? NO  
 Fences/Walls Present? YES Wooded Areas Present? YES  
 Fuel Tank Size: 275 gal. ± Fire Tank Size: N.A.  
 Phased Construction? NO Adjacent to Residential Zone? YES  
 Estimated Project Cost: \$300,000.00 Estimated Cost of Site Work: \$5100.00

Note: Application must be accompanied by all data specified in Section 242-301 C.(3) of the Brookfield Code, the required fee, and an itemized breakdown of site work costs.

APPLICANT DATA

| <u>Owner of Record</u>   | <u>Agent/Developer</u>                         |
|--|--|
| Name: <u>Danbury Broadcasting, Inc.</u>                                | Attorney <u>Ted D. Backer</u>                  |
| Street: <u>c/o 1004 Federal Road</u>                                   | <u>Lee-Earn Corp. Park, 83 Wooster Heights</u> |
| City/Zip: <u>Brookfield, CT 06804</u>                                  | <u>Danbury, CT 06813-3499</u>                  |
| Phone: <u>(203) 775-1212</u>   | <u>(203) 743-2721</u>                          |
| Name of Proposed Occupant: <u>WINE/WRKI Radio Stations (Existing)</u>  |  |
| Occupant's Products/Services: <u>Broadcast Transmission (Existing)</u> |  |

AUTHORITY OF AGENT

I hereby authorize the above designated Agent/Developer to act in my behalf in all matters related to this application.

Owner of Record's Signature: Danbury Broadcasting, Inc. Date: Jan. 12/94  
 BY: [Signature]

APPLICANT'S REPRESENTATION

I hereby make application for Design Review Approval in accordance with the Zoning Regulations, Town of Brookfield. I agree herewith to hold the Town of Brookfield and its agents harmless for any and all expenses incurred as a result of the applicant/occupant's lack of compliance with the aforementioned regulations and any enforcement action resulting therefrom.

Applicant's Signature Ted D. Backer Date: Jan. 12/94

FOR COMMISSION USE

Date Received: 1/13/94 Date Application Accepted: 1/13/94  
 Fee Calculation: Amount \$ 190<sup>00</sup> + 10<sup>00</sup>  
 Hearing set for: 2/10/94 Publication Dates: 1/27 & 2/3 & 3/1/94  
 Disposition: approved w/ stip. Date: 2/24/94  
 Bond Posted: \_\_\_\_\_ Approval Filed: \_\_\_\_\_



TOWN OF BROCKFIELD - ZONING COMMISSION

Rev. 4/87

DESIGN REVIEW APPROVAL - CHECKLIST

PROJECT ADDRESS: 39 Carmen Hill Road

PROJECT NAME: Danbury Broadcasting, Inc.

PART I - SITE PLAN REQUIRED DATA per Sect. 242-301 C. (3) (a & b)

| SECT. No.   | DATA ITEM                                | SECT. No.    | DATA ITEM                           |
|-------------|--|--------------|-------------------------------------|
| ( X ) a.    | Key Map                                  | ( X ) b.7a.  | Road and Drives, Configuration      |
| ( X ) b.    | Four (4) copies of site plan             | (NA ) b.7b.  | Road/Drives Profiles                |
| ( X ) b.    | Scale, not greater than 1"=100'          | (NA ) b.7c.  | Pavement Cross Section              |
| ( X ) b.1a. | Project Name                             | ( X ) b.7d.  | Walkways, Malls, Paths              |
| ( X ) b.1b. | Developer Name                           | ( X ) b.7e.  | Entranceways & Exits                |
| ( X ) b.1c. | Land Owner of Record                     | (NA ) b.8a.  | Loading & Storage Areas             |
| ( X ) b.1d. | Zoning District                          | (NA ) b.8b.  | Refuse Areas & Screening            |
| (NA ) b.1e. | Permitted Use Identification             | ( X ) b.8c.  | Machine & Equipment Areas           |
| ( X ) b.1f. | Names, Abutting Property Owners          | ( X ) b.8d.  | Parking Areas, loc., dim.           |
| ( X ) b.1g. | Northpoint                               | ( X ) b.8e.  | Total Vehicle Number                |
| ( X ) b.1h. | Scale                                    | (NA ) b.8f.  | Curbs, Barriers, Wheel Guards       |
| ( X ) b.1i. | Date of Preparation                      | ( X ) b.8g.  | Dustless Pavement Type              |
| ( X ) b.2a. | Boundary Lines                           | ( X ) b.8h.  | Catch Basins, loc., dim.            |
| ( X ) b.2b. | Bearings and Distances                   | ( X ) b.8i.  | Culverts & Pipe, loc., dim.         |
| ( X ) b.2c. | Total Property Area                      | (NA ) b.8j.  | Parking Area Landscaping            |
| ( X ) b.2d. | Easements, purpose, loc., dim.           | (NA ) b.9a.  | Open Space, loc., dim., type        |
| ( X ) b.2e. | Names, Adjoining Streets                 | (NA ) b.9b.  | Recreational Areas                  |
| ( X ) b.2f. | Dimensions, Adjoining Streets            | (NA ) b.10a. | Water Supply Plan                   |
| ( X ) b.3a. | Buildings & Structures, type, loc., dim. | (NA ) b.10b. | Sewage Disposal Plan                |
| ( X ) b.3b. | Number of Occupants                      | (NA ) b.10c. | Reserve Areas, Septic               |
| ( X ) b.3c. | Distances to Property Lines & Buildings  | (NA ) b.10d. | Drainage Plan & Calculations        |
| ( X ) b.4a. | Existing Contours @ 2' intervals         | ( X ) b.10e. | Electric, Phone, Gas Lines          |
| (NA ) b.4b. | Proposed Contours @ 2' intervals         | (NA ) b.10f. | Grades/Elevations, Basins/Piping    |
| ( X ) b.4c. | Watercourses, Wetlands, Soil Types       | (NA ) b.11a. | Signs, description, loc., dim.      |
| ( X ) b.4d. | Proposed Site Alterations (fill etc.)    | ( X ) b.12a. | Walls/Fences, type, loc., dim.      |
| ( X ) b.4e. | Unusual Site Features                    | ( X ) b.12b. | Unique Items, specify               |
| ( X ) b.5a. | Erosion & Sedimentation Plans (ESP)      | ( X ) b.13a. | Technical Data per 242-602 A thru H |
| ( X ) b.5b. | ESP Design & Details                     | ( X ) b.14a. | Prof. Engr. Seal, > 80,000 sq. ft.  |
| ( X ) b.5c. | ESP Procedures/Measures/Reports          | ( X ) b.15a. | Start/Completion Dates              |
| ( X ) b.6a. | Trees & Shrubs, Existing/Proposed        | ( X ) b.15b. | Milestone/Schedule                  |
| ( X ) b.6b. | Tree/Shrub Names/Type/Size               | ( X ) b.15c. | Phases of Construction Shown        |
| ( ) other   | _____                                    | ( ) other    | _____                               |
| ( ) other   | _____                                    | ( ) other    | _____                               |

PART II - ARCHITECTURAL REQUIRED DATA per Sect. 242-301 C. (3)

| SECT. No.   | DATA ITEM                            | SECT. No.   | DATA ITEM                     |
|-------------|--------------------------------------|-------------|-------------------------------|
| ( NA ) c.1. | Building Elevations & Floor Plans    | ( NA ) c.5. | Screening Details             |
| ( NA ) c.2. | Color & Texture of Building Material | ( NA ) c.6. | Sign Details                  |
| ( NA ) c.3. | Facade & Window Details              | ( X ) c.7.  | Lighting Fixture Details      |
| ( NA ) c.4. | Roofscape Details                    | ( NA ) c.8. | Illumination & Intensity Data |

PART III - ADDITIONAL REQUIRED DATA per Sect. 242-301 C. (4). See cited Section to determine applicability.

|               |                        |                |                      |
|---------------|------------------------|----------------|----------------------|
| ( NA ) 602 F. | Hydrogeological Report | ( NA ) 501 D2. | Water Retention Plan |
| ( NA ) 602 G. | Traffic Report         | ( ) other      | _____                |
| ( NA ) 502 E. | Spill Containment Plan | ( ) other      | _____                |

## DESIGN REVIEW APPROVAL - CHECKLIST

Danbury Broadcasting, Inc.

## PART IV - APPROVAL CRITERIA, STANDARDS, AND REQUIREMENTS (Industrial and Commercial Applications)

| SECTION No.    | ITEM                          | STANDARD/REQUIREMENT      | PROPOSED | COMMENTS                         |
|----------------|-------------------------------|---------------------------|----------|----------------------------------|
| <b>GENERAL</b> |                               |                           |          |                                  |
| *****          |                               |                           |          |                                  |
| 501 B.         | Permitted use:                | identify                  | N.A.     | Existing Non-Conforming          |
| 501 C.         | Lot Area:                     | I=80/C=40k sq. ft.        | 4.31 ac. | Conforms                         |
| 501 C.         | Lot Width:                    | I=200'/C=150'             | 295' ±   | Conforms                         |
| 501 C.         | Side Yard:                    | I=50'/C=30'               | 64' ±    | Conforms                         |
| 501 C.         | Rear Yard:                    | I=50'/C=30'               | 465' ±   | Conforms                         |
| 501 C.         | Building Height:              | I=40'/C=30'               | 250' +/- | Tower to be 499'                 |
| 501 D.         | Land Coverage:                | 75%                       | 3.3%     |                                  |
| 501 D.         | Foundation Plantings:         | req'd                     | N.A.     |                                  |
| 501 D.         | Water Retention Plan:         | >50% coverage, req'd      | N.A.     |                                  |
| 501 E.         | Set Back:                     | 100' fm: lot line         | N.A.     |                                  |
| 501 E.         | Set Back (no front parking):  | 50' fm: lot line          | 119' ±   | Conforms                         |
| 308 B.         | Set Back, watercourse:        | 25'                       | N.A.     |                                  |
| 308 H.         | Residential Buffer:           | 100' side/rear, 25' front | N.A.     |                                  |
| 501 F.         | Drive Design:                 | per Road Ordinance        | N.A.     | Existing Drives Servicable       |
| 501 F.         | Pavement:                     | 10"/2"/1 1/2"/1 1/2"      | N.A.     | Existing Drives Servicable       |
| 201 C.         | Lot Access:                   | >50' frontage             | YES      | 300' ± Available                 |
| 201 C.         | R.O.W. Width:                 | >50'                      | 50' ±    | Site is 26'to30' from centerline |
| 201 E.         | Pre-existing Lot, Y / N:      | prior to 6/60             | YES      |                                  |
| 309.           | Non-conforming status:        | See 242-309               | YES      | Existing Non-Conforming          |
| 203 C.         | Zoning Boundry Verified:      | Y / N                     | YES      |                                  |
| 203 D.         | Lot in 2 Districts:           | (30' intrusion            | NO       |                                  |
| 301 C.         | Alteration:                   | (25%/10K sq. ft.          | YES      |                                  |
| 301 C.         | Inland Wetland Approval:      | rec'd                     | N.A.     |                                  |
| 301 C.         | Erosion Control Plan:         | See 242-602 D.            | N.A.     |                                  |
| 301 C.         | Landscape:                    | adequate                  | N.A.     |                                  |
| 301 C.         | Drainage:                     | per Town Engr.            | N.A.     |                                  |
| 301 C.         | Height, walls/fences:         | (8'                       | 6' ±     | Around Tower Base                |
| 308 E.         | Sight Obstruction, intersect. | (3'h@20' distance         | N.A.     | Existing is Adequate             |
| 302.           | Natural Resources Removal:    | See 242-302               | N.A.     |                                  |
| 303 A.         | Fill Impact:                  | See 242-303 A.            | N.A.     |                                  |
| 303 B.         | Fill, below structures:       | See 242-303 B.            | N.A.     |                                  |
| 303 C.         | Burial of Material:           | See 242-303 C.            | N.A.     |                                  |
| <b>PARKING</b> |                               |                           |          |                                  |
| *****          |                               |                           |          |                                  |
| 305 C1.        | Parking Space Size:           | 9' x 20' min.             | YES      |                                  |
| 305 C1.        | Pavement Type:                | dustless                  | YES      | Existing Bituminous Concrete     |
| 305 C1.        | Pavement Markings:            | req'd                     | YES      |                                  |
| 305 C2.        | Off-site Parking              | (250' fm: building        | N.A.     |                                  |
| 305 C3.        | Ingress/Egress:               | defined drive req'd       | YES      | Existing Drive Entrance          |
| 305 C4.        | Aisles:                       | 24'@90 deg., 14'@parallel | YES      | 24' ± Available                  |
| 305 C5.        | Drive Width:                  | 22'                       | NO       | Intermittent Access:Satisfactory |
| 305 C6.        | Set Back, road pavement       | 20'                       | YES      | Exists                           |
| 305 C6.        | Set Back, buildings           | 10'                       | YES      | Exists                           |
| 305 C7.        | Walkways:                     | Commission option         | YES      | Exists                           |
| 305 C8.        | Curbing, perimeter            | 6"                        | NO       | Wheel Stops to be Used           |
| 305 C9.        | Set Back, intersection:       | 75'                       | N.A.     |                                  |
| 305 C10.       | Lighting:                     | See 242-602 B.            | NO       | No Parking illumination proposed |
| 305 D.         | Parking Space Calculation:    | See 242-305 D.            | YES      |                                  |

| SECTION No.                    | ITEM                        | STANDARD/REQUIREMENT      | PROPOSED | COMMENTS                                    |
|--------------------------------|-----------------------------|---------------------------|----------|---|
| 305 E.                         | Trailers, construction:     | water/septic req'd        | NO       | None Required                               |
| 305 E.                         | Trailer, mat'l storage:     | 60 day permit             | NO       | None Required                               |
| 305 G.                         | Loading Area Calculation:   | See 242-305 G.            | N.A.     |   |
| 305 H.                         | Landscape:                  | 8% of parking area        | N.A.     |   |
| 305 H.                         | 8' Planters:                | >50 cars                  | N.A.     |   |
| 305 H.                         | Trees, 2 1/2" @ 3'height:   | 1 per 12 cars             | N.A.     |   |
| PERFORMANCE STANDARDS<br>***** |                             |                           |          |   |
| 602 A.                         | NOISE:                      |                           |          |   |
| 602 A2.                        | Ind'l DEB                   | Day 65, Night 55          | N.A.     |   |
| 602 A2.                        | Comm'l DBA                  | Day 60, Night 50          | N.A.     |   |
| 602 A2.                        | Resd'l DBA                  | Day 55, Night 45          | N.A.     |   |
| 602 B.                         | GLARE:                      |                           |          |   |
| 602 B2a.                       | Light Source Visability:    | none @ prop. line         | YES      | Aircraft Warning Lights<br>242-602 B.2.F.4. |
| 602 B2a.                       | Foot Candles:               | ( I/C=1.0, R=.5           | YES      |   |
| 602 B2c.                       | Upward Angle, no contact:   | not permitted             | N.A.     |   |
| 602 B2d.                       | Signs, flashing, animated:  | not permitted             | N.A.     |   |
| 602 C.                         | WASTEWATER:                 |                           |          |   |
| 602 C2.                        | Soil Map Data:              | req'd                     | N.A.     |   |
| 602 C3.                        | Test Hole Analysis:         | req'd                     | N.A.     |   |
| 602 C4.                        | Discharge Rates:            | Table I                   | N.A.     |   |
| 602 C6.                        | Loading Rates:              | Table II                  | N.A.     |   |
| 602 C.                         | Sewer, municipal:           | WPCA approval req'd       | N.A.     |   |
| 602 D.                         | EROSION/SEDIMENT PLAN:      | See 242-602 D.            | YES      | See Plans                                   |
| 602 E.                         | WOODCUTTING:                | See 242-602 F.            | N.A.     |   |
| 602 F.                         | WATERSUPPLY:                |                           |          |   |
| 602 F2.                        | Hydrogeological Report:     | >2,500 gpd                | N.A.     | No new use proposed                         |
| 602 F3a.                       | Water Source:               | on-site/other             | YES      | Existing                                    |
| 602 F3b.                       | Demand/Availability:        | in balance                | YES      | No previous problems reported               |
| 602 F3c.                       | DPUC/DHS Certificate:       | >25 persons, 15 conc't'ns | N.A.     |   |
| 602 F3d.                       | Stand-by Well:              | >2,500 gpd                | N.A.     |   |
| 602 F3e.                       | Yield, multi-well project:  | 2 x avg daily demand      | N.A.     |   |
| 602 F3f.                       | Demand, drought periods:    | > available supply        | N.A.     |   |
| 602 F3g.                       | Recharge Provisions:        | maximize                  | N.A.     |   |
| 602 F3h.                       | Yield Tests:                | 36hr/10gpa, 72hr/50gpa    | N.A.     |   |
| 602 F3i.                       | Long Term Supply Reduction: | Not permitted             | N.A.     |   |
| 602 F3j.                       | Conservation Plan:          | >5,000 gpd                | N.A.     |   |
| 602 F3k.                       | Process Water:              | (5,000 gpd                | NO       | None required                               |
| 602 F3l.                       | Location, well sites:       | contamination proof       | YES      | Existing                                    |
| 602 F3m.                       | Construction Start:         | DH app'l of well/yield    | N.A.     |   |
| 602 F4.                        | Water Monitoring Program:   | case-by-case              | N.A.     |   |
| 602 G.                         | TRAFFIC:                    |                           |          |   |
| 602 G2.                        | Traffic Report:             | >50 spaces/100 TPD        | N.A.     |   |
| 602 G3a&f.                     | Access/Circulation:         | avoid queing              | YES      | Existing Adequate                           |
| 602 G3b.                       | Access by resd'l streets:   | avoid                     | YES      | Exists                                      |
| 602 G3c.                       | Access on 2 streets:        | use lesser impact steet.  | N.A.     | Exists                                      |
| 602 G3d.                       | Street Capacity:            | adequate/calculated       | N.A.     | Use Exists                                  |
| 602 G3e.                       | Turn Lane/Controls:         | case-by-case              | N.A.     |   |
| 602 G3g.                       | Grade/Algn't/Sight lines:   | good engr. practice       | YES      | Existing Adequate                           |
| 602 G3h.                       | Curb Cuts:                  | minimize                  | YES      | One Existing                                |
| 602 G3i.                       | Emergency Access:           | req'd                     | NO       | Not Required                                |
| 602 G3i.                       | Interconnecting drives:     | case-by-case              | N.A.     |   |
| 602 G3i.                       | Driveway Width:             | (30'                      | 20'      | At R.O.W. Line                              |
| 602 G3j.                       | Shoulder Improvements:      | case-by-case              | N.A.     |   |
| 602 G3k.                       | Level of Service:           | ( Level "D"               | N.A.     |   |

| SECTION No. | ITEM                            | STANDARD/REQUIREMENT   | PROPOSED    | COMMENTS                             |
|-------------|---------------------------------|--|-------------|--------------------------------------|
| 602 H.      | FIRE PROTECTION:                |  |             |                                      |
| 602 H2.     | Storage Tank, or:               | 20,000 gal   | <u>N.A.</u> | <u>Non-Flammable Alteration</u>      |
| 602 H2.     | Other Supply, or                | 20,000 gal   | <u>N.A.</u> | <u>Non-Flammable Alteration</u>      |
| 602 H2.     | Sprinkler                       | option   | <u>N.A.</u> | <u>Non-Flammable Alteration</u>      |
| 602 H3.     | Location:                       | per Fire Marshall  | <u>N.A.</u> | <u>Non-Flammable Alteration</u>      |
| 602 H3.     | Fixturing:                      | per Fire Marshall  | <u>N.A.</u> | <u>Non-Flammable Alteration</u>      |
| 602 H3.     | Alarms/Key Box:                 | case-by-case   | <u>N.A.</u> | <u>Non-Flammable Alteration</u>      |
| 301 C.      | ENVIRONMENTAL                   |  |             |                                      |
|             | *****                           |  |             |                                      |
| 301 C5b.    | Hazardous Material Storage:     | case-by-case   | <u>N.A.</u> | <u>None Proposed</u>                 |
| 301 C5c.    | Dust:                           | minimize   | <u>N.A.</u> | <u>None Proposed</u>                 |
| 301 C5c.    | Odor:                           | not noticeable off-prem.   | <u>N.A.</u> | <u>None Proposed</u>                 |
| 301 C5c.    | Vibration:                      | case-by-case   | <u>N.A.</u> | <u>None Proposed</u>                 |
|             | ARCHITECTURAL                   |  |             |                                      |
|             | *****                           |  |             |                                      |
| 301 C5d.    | Color:                          | identify Orange & White  | <u>N.A.</u> | <u>As Required by FAA &amp; FCC*</u> |
| 301 C5d.    | Type/Texture of Siding:         | identify Paint   | <u>N.A.</u> | <u>Smooth Paint on Metal</u>         |
| 301 C5d.    | Facade/Window Detail:           | identify   | <u>N.A.</u> |                                      |
| 301 C5d.    | Roofscape:                      | minimize appurtenances   | <u>N.A.</u> |                                      |
| 301 C5d.    | Screening:                      | mech. areas req'd  | <u>N.A.</u> |                                      |
| 301 C5d.    | Lighting:                       | See 242-602 B.   | <u>YES</u>  | <u>Per FAA &amp; FCC*</u>            |
| 301 C5d.    | Area Compatibility:             | req'd  | <u>N.A.</u> | <u>Replacement of Existing</u>       |
| 301 C5d.    | Preservation of Site Features:  | maximize   | <u>YES</u>  | <u>Minimal disturbance</u>           |
| 301 C5d.    | Landscaping, f'n'd'n plantings: | req'd  | <u>N.A.</u> | <u>Minimal disturbance</u>           |
| 301 C5d.    | Overall appearance:             | case-by-case   | <u>YES</u>  | <u>Similar to Existing</u>           |
| 301 C5d.    | Property Values:                | No lessening impact  | <u>YES</u>  | <u>Similar to Existing</u>           |
| 503.        | AQUIFER PROTECTION              |  |             |                                      |
|             | *****                           |  |             |                                      |
| 503 B.      | Prohibited uses:                | Salt, hazardous/toxic, land fills, truck terminals, service stations, industrial wastes, metalworking, publishing and reproduction services. |             | <u>NOT APPLICABLE</u>                |
| 503 C.      | Water Quality Impact:           | not (Fed/State stds.   |             |                                      |
| 503 C.      | DH/TE/IWL/PC opinion:           | req'd  |             |                                      |
| 503 D.      | Data:                           | See 242-503 D.   |             |                                      |
| 503 D.      | Analysis/Compliance Report:     | req'd.   |             |                                      |
| 503 E.      | Spill Control Plan:             | req'd.   |             |                                      |
| 502.        | FLOOD PLAIN                     |  |             |                                      |
|             | *****                           |  |             |                                      |
| 502 B.      | Mean Flood Elevation at Site:   | identify   |             | <u>NOT APPLICABLE</u>                |
| 502 B.      | Lowest Floor Elevation:         | identify   |             |                                      |
| 502 E.      | Fill:                           | See 242-301 C.   |             |                                      |
| 502.        | Other Requirements:             | See 242-502  |             |                                      |

\* Federal Aviation Administration  
Federal Communications Commission

PART V - STIPULATIONS:

PART VI - DISPOSITION: \_\_\_\_\_ BOND SET @: \$ \_\_\_\_\_ BY: \_\_\_\_\_ DATE: \_\_\_\_\_

ADJOINING PROPERTY OWNERS  
WINE RADIO TOWER SITE  
37 TO 41 CARMEN HILL ROAD  
BROOKFIELD, CONNECTICUT  
DECEMBER 6, 1993

| ASSESSOR'S LOT # | OWNER/ADDRESS   |
|------------------|---|
| B05010           | CROWN MEDIA, INC.<br>1 GALLERIA TOWER<br>13355 NOEL ROAD<br>SUITE 1500<br>DALLAS, TEXAS 75240 |
| B05011           | DAVID HESAM SAADATMANDI<br>33 CARMEN HILL ROAD<br>BROOKFIELD, CONNECTICUT 06804               |
| B05012           | ROBERT J. & RITA GARRETT<br>33A CARMEN HILL ROAD<br>BROOKFIELD, CONNECTICUT 06804             |
| B05014           | RICHARD & J. PATRICIA ALEXANDER<br>43 CARMEN HILL ROAD<br>BROOKFIELD, CONNECTICUT 06804       |
| B05020           | NORMAN TUCHMANN<br>46 River Street<br>New Haven, Connecticut 06513                            |





January 6, 1994

Mr. Mike Lillis  
CCA Engineering And Surveyors  
40 Old New Milford Road  
Brookfield, CT. 06804

RE: WINE/WRKI Radio  
499 FT. Tower

Dear Mr. Lillis,

Please find enclosed the preliminary drawings for the tower project. The following descriptive statement can be utilized for submittal to the local government.

- Stainless, Inc. 499 ft., triangular, 48 inch face, open lattice type guyed tower.

Tower will be designed in accordance with the ANSI/EIA/TIA Standard RS 222-E.

Tower will be constructed of solid round structural steel vertical and angle horizontal and diagonal members. Guy cables will be made of extra high strength strand.


All tower materials will be hot dipped galvanized after fabrication.

Tower painting and lighting will conform to the FAA and FCC rules and regulations.

If you should have any questions or need any further information, please call me at extension 3002.

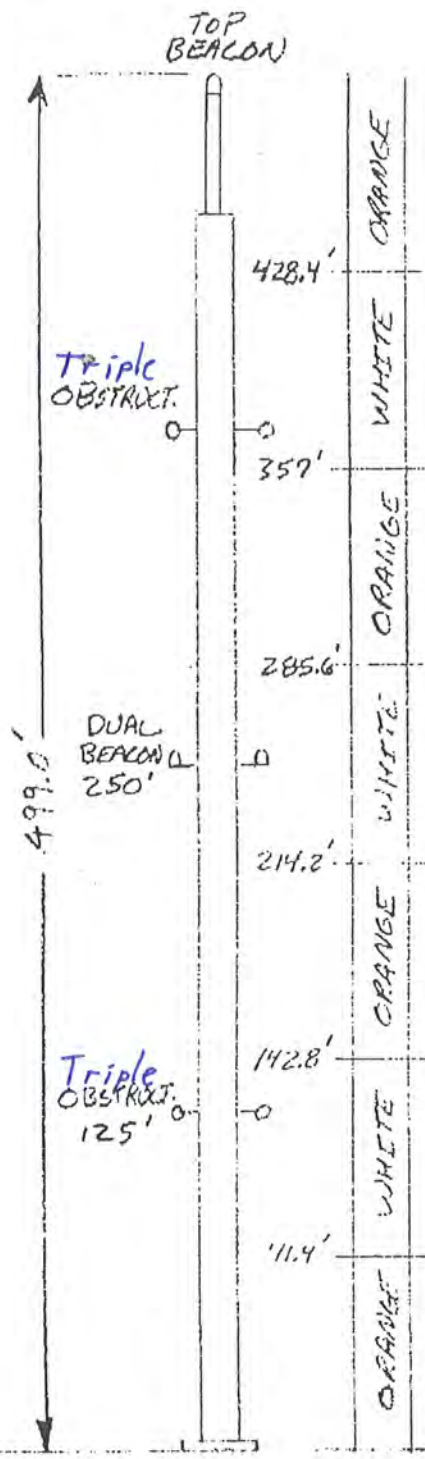
Sincerely,

STAINLESS, INC.



Peter A. Starke  
Manager/Tower

cc: Mr. Pat Carlone



PAINTING

7 BANDS OF ALTERNATE AVIATION ORANGE AND AVIATION WHITE PER FAA + FCC SPECIFICATIONS

LIGHTING

'A-2' REDLIGHTING KIT IN ACCORDANCE WITH FAA + FCC SPECIFICATIONS

\* NOT TO SCALE



**BILL OF MATERIALS**

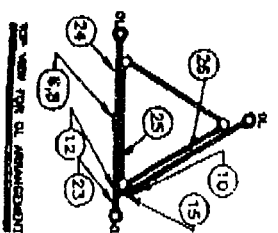
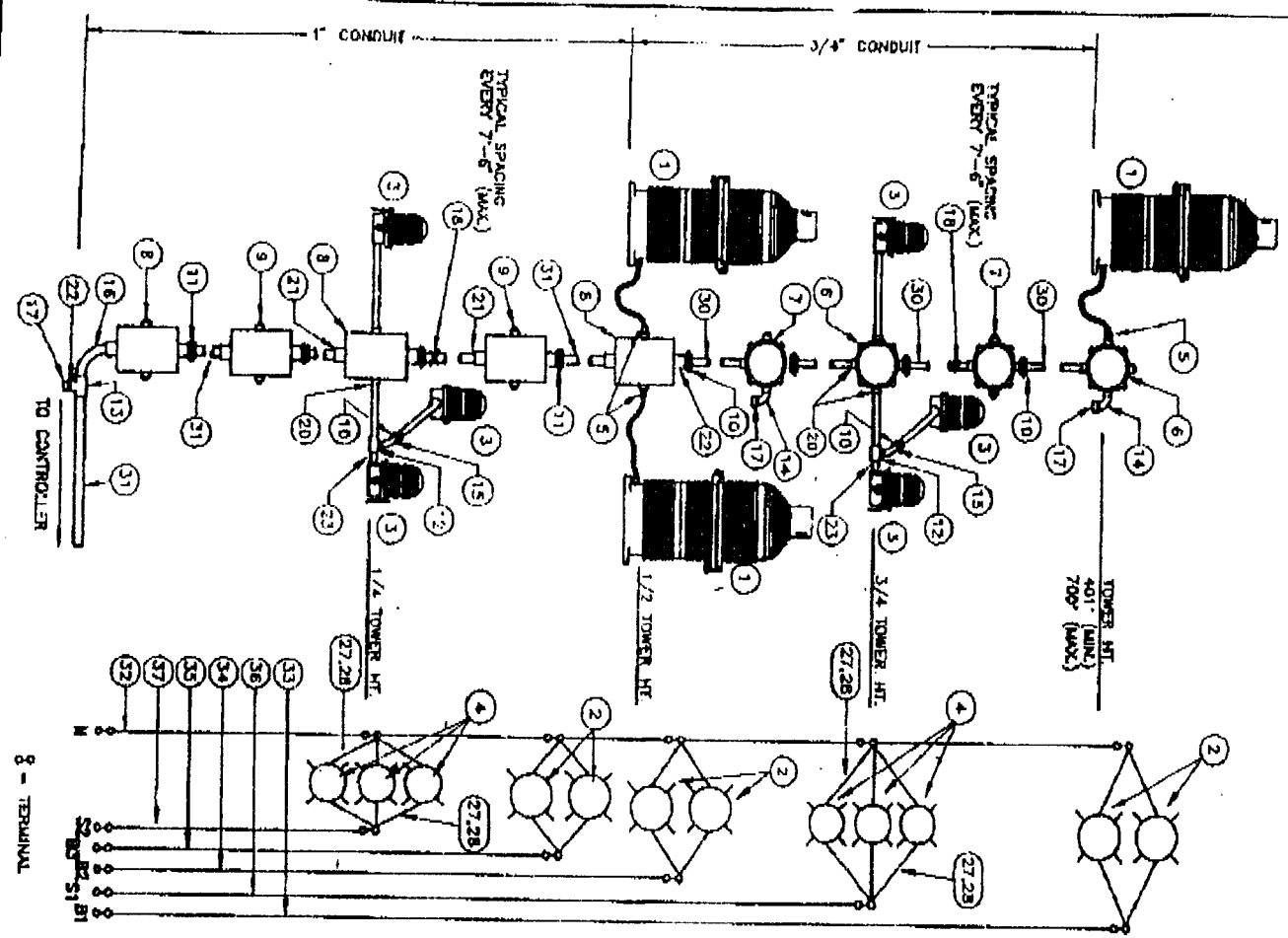
| ITEM NO. | QTY. | TWR PART NO. | DESCRIPTION            |
|----------|------|--------------|------------------------|
| 1        | 1    | STATION      | 500 MM BEACON RED      |
| 2        | 1    | BEACON SCOP  | 800 WATT 120 VOLT KAMP |
| 3        | 1    | Q.T.         | 120 VOLT LAMP          |
| 4        | 1    | Q.T.         | 120 VOLT LAMP          |
| 5        | 1    | Q.T.         | 120 VOLT LAMP          |
| 6        | 1    | Q.T.         | 120 VOLT LAMP          |
| 7        | 1    | Q.T.         | 120 VOLT LAMP          |
| 8        | 1    | Q.T.         | 120 VOLT LAMP          |
| 9        | 1    | Q.T.         | 120 VOLT LAMP          |
| 10       | 1    | Q.T.         | 120 VOLT LAMP          |
| 11       | 1    | Q.T.         | 120 VOLT LAMP          |
| 12       | 1    | Q.T.         | 120 VOLT LAMP          |
| 13       | 1    | Q.T.         | 120 VOLT LAMP          |
| 14       | 1    | Q.T.         | 120 VOLT LAMP          |
| 15       | 1    | Q.T.         | 120 VOLT LAMP          |
| 16       | 1    | Q.T.         | 120 VOLT LAMP          |
| 17       | 1    | Q.T.         | 120 VOLT LAMP          |
| 18       | 1    | Q.T.         | 120 VOLT LAMP          |
| 19       | 1    | Q.T.         | 120 VOLT LAMP          |
| 20       | 1    | Q.T.         | 120 VOLT LAMP          |
| 21       | 1    | Q.T.         | 120 VOLT LAMP          |
| 22       | 1    | Q.T.         | 120 VOLT LAMP          |
| 23       | 1    | Q.T.         | 120 VOLT LAMP          |
| 24       | 1    | Q.T.         | 120 VOLT LAMP          |
| 25       | 1    | Q.T.         | 120 VOLT LAMP          |
| 26       | 1    | Q.T.         | 120 VOLT LAMP          |
| 27       | 1    | Q.T.         | 120 VOLT LAMP          |
| 28       | 1    | Q.T.         | 120 VOLT LAMP          |
| 29       | 1    | Q.T.         | 120 VOLT LAMP          |
| 30       | 1    | Q.T.         | 120 VOLT LAMP          |
| 31       | 1    | Q.T.         | 120 VOLT LAMP          |
| 32       | 1    | Q.T.         | 120 VOLT LAMP          |
| 33       | 1    | Q.T.         | 120 VOLT LAMP          |
| 34       | 1    | Q.T.         | 120 VOLT LAMP          |
| 35       | 1    | Q.T.         | 120 VOLT LAMP          |
| 36       | 1    | Q.T.         | 120 VOLT LAMP          |
| 37       | 1    | Q.T.         | 120 VOLT LAMP          |
| 38       | 1    | Q.T.         | 120 VOLT LAMP          |
| 39       | 1    | Q.T.         | 120 VOLT LAMP          |
| 40       | 1    | Q.T.         | 120 VOLT LAMP          |
| 41       | 1    | Q.T.         | 120 VOLT LAMP          |
| 42       | 1    | Q.T.         | 120 VOLT LAMP          |
| 43       | 1    | Q.T.         | 120 VOLT LAMP          |
| 44       | 1    | Q.T.         | 120 VOLT LAMP          |
| 45       | 1    | Q.T.         | 120 VOLT LAMP          |
| 46       | 1    | Q.T.         | 120 VOLT LAMP          |
| 47       | 1    | Q.T.         | 120 VOLT LAMP          |
| 48       | 1    | Q.T.         | 120 VOLT LAMP          |
| 49       | 1    | Q.T.         | 120 VOLT LAMP          |
| 50       | 1    | Q.T.         | 120 VOLT LAMP          |
| 51       | 1    | Q.T.         | 120 VOLT LAMP          |
| 52       | 1    | Q.T.         | 120 VOLT LAMP          |
| 53       | 1    | Q.T.         | 120 VOLT LAMP          |
| 54       | 1    | Q.T.         | 120 VOLT LAMP          |
| 55       | 1    | Q.T.         | 120 VOLT LAMP          |
| 56       | 1    | Q.T.         | 120 VOLT LAMP          |
| 57       | 1    | Q.T.         | 120 VOLT LAMP          |
| 58       | 1    | Q.T.         | 120 VOLT LAMP          |
| 59       | 1    | Q.T.         | 120 VOLT LAMP          |
| 60       | 1    | Q.T.         | 120 VOLT LAMP          |
| 61       | 1    | Q.T.         | 120 VOLT LAMP          |
| 62       | 1    | Q.T.         | 120 VOLT LAMP          |
| 63       | 1    | Q.T.         | 120 VOLT LAMP          |
| 64       | 1    | Q.T.         | 120 VOLT LAMP          |
| 65       | 1    | Q.T.         | 120 VOLT LAMP          |
| 66       | 1    | Q.T.         | 120 VOLT LAMP          |
| 67       | 1    | Q.T.         | 120 VOLT LAMP          |
| 68       | 1    | Q.T.         | 120 VOLT LAMP          |
| 69       | 1    | Q.T.         | 120 VOLT LAMP          |
| 70       | 1    | Q.T.         | 120 VOLT LAMP          |
| 71       | 1    | Q.T.         | 120 VOLT LAMP          |
| 72       | 1    | Q.T.         | 120 VOLT LAMP          |
| 73       | 1    | Q.T.         | 120 VOLT LAMP          |
| 74       | 1    | Q.T.         | 120 VOLT LAMP          |
| 75       | 1    | Q.T.         | 120 VOLT LAMP          |
| 76       | 1    | Q.T.         | 120 VOLT LAMP          |
| 77       | 1    | Q.T.         | 120 VOLT LAMP          |
| 78       | 1    | Q.T.         | 120 VOLT LAMP          |
| 79       | 1    | Q.T.         | 120 VOLT LAMP          |
| 80       | 1    | Q.T.         | 120 VOLT LAMP          |
| 81       | 1    | Q.T.         | 120 VOLT LAMP          |
| 82       | 1    | Q.T.         | 120 VOLT LAMP          |
| 83       | 1    | Q.T.         | 120 VOLT LAMP          |
| 84       | 1    | Q.T.         | 120 VOLT LAMP          |
| 85       | 1    | Q.T.         | 120 VOLT LAMP          |
| 86       | 1    | Q.T.         | 120 VOLT LAMP          |
| 87       | 1    | Q.T.         | 120 VOLT LAMP          |
| 88       | 1    | Q.T.         | 120 VOLT LAMP          |
| 89       | 1    | Q.T.         | 120 VOLT LAMP          |
| 90       | 1    | Q.T.         | 120 VOLT LAMP          |
| 91       | 1    | Q.T.         | 120 VOLT LAMP          |
| 92       | 1    | Q.T.         | 120 VOLT LAMP          |
| 93       | 1    | Q.T.         | 120 VOLT LAMP          |
| 94       | 1    | Q.T.         | 120 VOLT LAMP          |
| 95       | 1    | Q.T.         | 120 VOLT LAMP          |
| 96       | 1    | Q.T.         | 120 VOLT LAMP          |
| 97       | 1    | Q.T.         | 120 VOLT LAMP          |
| 98       | 1    | Q.T.         | 120 VOLT LAMP          |
| 99       | 1    | Q.T.         | 120 VOLT LAMP          |
| 100      | 1    | Q.T.         | 120 VOLT LAMP          |

ITEM NUMBERS #30-#37 ARE NOT INCLUDED IN THE KIT BUT ARE AVAILABLE UPON REQUEST, AND REQUIRED FOR INSTALLATION.

| ITEM NO. | QTY. | TWR PART NO. | DESCRIPTION                   |
|----------|------|--------------|-------------------------------|
| 30       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |
| 31       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |
| 32       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |
| 33       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |
| 34       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |
| 35       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |
| 36       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |
| 37       | 1    | CONDUIT      | 3/4" CONDUIT (1/2" TOWER HT.) |

ITEMS NOT SHOWN

- NOTES:**
- 1) CONDUIT SIZE BASED ON USING TYPE THIN WIRE
  - 2) USE RIGID GALVANIZED STEEL CONDUIT.
  - 3) BREATHERS ALLOW FOR CIRCULATION OF AIR TO PREVENT CONDENSATION.



DWG. = D SIZE

(401' TO 700' TOWERS)  
(WITH BOOST TRANSFORMER)

402 TOWER LIGHTING KIT W/STEEL  
BEACON AN INTERMEDIATE TOWER

**TWR** LIGHTING INC.

12/15/92 261-328

# NORTHEAST SOILS, INC.

ENVIRONMENTAL ASSESSMENTS • INLAND WETLANDS IDENTIFICATION

88 NOB HILL ROAD • CHESHIRE, CONNECTICUT 06410

TELEPHONE (203) 272-1100

Oct. 19, 1993

Job No. 10-93-419-BROK

Carroccio-Covill & Associates, Inc.  
40 Old New Milford Rd.  
Brookfield, CT 06804

PROJECT LOCATION: WINE/WRKI Radio, Carmen Hill Rd., Brookfield, CT.

## SOIL REPORT

In conducting the field investigation, many soil borings were taken in which the soil scientist notes many important soil properties. They are as follows; the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the soil profile, thickness, color, and texture are also noted. The areas shown on the soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. The information in this report is based on examination and interpretation of soils to a maximum depth of about 60 inches. The classification of the National Cooperative Soil Survey, USDA, Soil Conservation Service and the County Soil Legend were used in this investigation.

Inspection Date: Oct. 19, 1993

Map: Property map

Scale: 100

Contour: None

Size of project: N/A

Wetland soils field marked for survey: NONE FOUND

Nonwetland soils field identified and sketched: YES

Soil conditions at the time of survey: MOIST

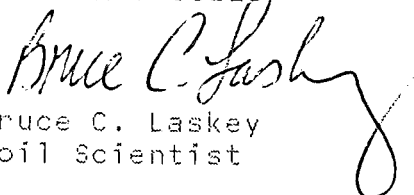
Property lines field surveyed at the time of soil inspection: YES

Property lines identifiable: YES

Vegetation type wetlands---: N/A

Vegetation type nonwetlands: OPEN FIELD, HARDWOODS

NORTHEAST SOILS

  
Bruce C. Laskey  
Soil Scientist

PROJECT: WINE/WRKI Radio, Carmen Hill RD., Brookfield, CT

Marking sequence of wetland boundaries

N/A

| <u>Soil Type</u><br><u>Wetland Soils</u>          | <u>Depth To</u><br><u>Mottling</u> | <u>Depth To</u><br><u>Bedrock</u> | <u>Depth To Seasonal</u><br><u>High Water Table</u> | <u>% Bedrock</u><br><u>in Soil Unit</u> |
|---|------------------------------------|-----------------------------------|---|---|
| No wetland soil types found on the property site. |                                    |                                   |   |   |
| NONWETLAND SOILS                                  |                                    |                                   |   |   |
| (Cr) Charlton-Hollis                              | >40"                               | >60"<br><24"                      | >72"  | 5-15%                                   |
| (Wx) Woodbridge                                   | 15-39"                             | >60"                              | 18-36" Nov-May                                      | none                                    |

Comments: None

Soil descriptions begin on page 3.

## SOIL DESCRIPTIONS

### WETLAND SOILS

No wetland soil types found on the property site.

## SOIL DESCRIPTIONS

## NONWETLAND SOILS

Charlton-Hollis fine sandy loams, very rocky (Cr) This complex consists of well drained and somewhat excessively drained upland soils that developed in very friable to firm glacial till, derived mainly from gneiss and schist. The well drained Charlton soil has a surface soil and subsoil texture to a depth of 20 to 30 inches of fine sandy loam. The underlying material is sandy loam or fine sandy loam with numerous rock fragments. The Hollis soil is somewhat excessively drained, friable to very friable fine sandy loam less than 20 inches deep to bedrock. These soils have moderate or moderately rapid permeability, but drainage is restricted by the underlying bedrock.

Woodbridge fine sandy loam (Wx) This soil series consists of moderately well drained soils that formed in compact glacial till derived mainly from gneiss and schist. Typically, this soil has a surface layer of very dark grayish brown fine sandy loam 8 inches thick. The subsoil is yellowish brown fine sandy loam 24 inches thick that is mottled in the lower part. Mottles generally occur within 20 inches of the surface. The substratum is firm, grayish brown, mottled fine sandy loam.

# NORTHEAST SOILS, INC.

ENVIRONMENTAL ASSESSMENTS • INLAND WETLANDS IDENTIFICATION

88 NOB HILL ROAD • CHESHIRE, CONNECTICUT 06410

TELEPHONE (203) 272-1100

Oct. 19, 1993

Job No. 10-93-419-BROK

Carroccio-Covill & Associates, Inc.  
40 Old New Milford Rd.  
Brookfield, CT 06804

PROJECT LOCATION: WINE/WRKI Radio, Carmen Hill Rd., Brookfield, CT.

Test holes taken on Oct. 19, 1993

## Test hole A

A 0-9" 10YR3/3 Fine sandy loam  
B 9-28" 10YR4/6 " " "  
C 28-41" 10YR4/4 " " "

## Test hole B

A 0-6" 10YR3/3 Fine sandy loam  
B 6-25" 10YR4/5 " " "  
C 25-36" 10YR4/4 " " "  
Few faint mottles at 25"

## Test hole C

A 0-5" 10YR3/2 Fine sandy loam  
B 5-24" 10YR4/5 " " "  
C 24-35" 10YR4/4 " " "  
Few faint mottles at 23"

## Test hole D

A 0-6" 10YR3/3 Fine sandy loam  
B 6-27" 2.5Y5/4 " " "  
C 27-40" 2.5Y4/4 " " "  
Few faint mottles at 22"

## Test hole E

A 0-9" 10YR3/3 Fine sandy loam  
B 9-25" 2.5Y5/4 " " "  
C 25-34" 2.5Y4/4 " " "  
Few faint mottles at 21"

## Test hole F

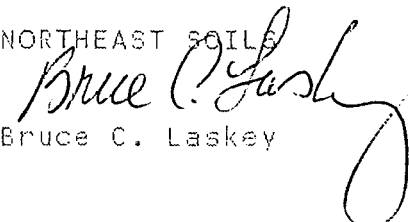
A 0-7" 10YR3/3 FSL  
B 7-24" 2.5Y5/4 FSL  
C 24-38" 2.5Y4/4 FSL  
Few faint mottles at 23"

## Test hole G

A 0-6" 10YR3/2 FSL  
B 6-22" 2.5Y5/4 FSL  
C 22-34" 2.5Y4/4 FSL  
Few faint mottles at 22"

NORTHEAST SOILS

Bruce C. Laskey



DANBURY BROADCASTING, INC.  
 39 CARMEN HILL ROAD, BROOKFIELD, CT.  
 PRELIMINARY OPINION OF COST FOR BONDING PURPOSES  
 JANUARY 11, 1994

| ITEM                  | UNITS | QUANTITY | UNIT COST  | TOTAL      |
|-----------------------|-------|----------|------------|------------|
| CLEAR AND STRIP       | AC    | 0.25     | \$3,000.00 | \$750.00   |
| SEDIMENT FENCE        | LF    | 380.00   | \$2.50     | \$950.00   |
| FENCE                 | LF    | 112.00   | \$14.00    | \$1,568.00 |
| TOPSOIL, SEED & MULCH | SY    | 1210.00  | \$1.50     | \$1,815.00 |
| TOTAL                 |       |          |            | \$5,083.00 |

THIS ESTIMATE FOR BONDING PURPOSES - ACTUAL COSTS MAY VARY.

# Exhibit B



# 37 CARMEN HILL RD

**Location** 37 CARMEN HILL RD

**Mblu** B05/ / 010/ /

**Acct#** 02704000

**Owner** AMERICAN TOWERS LLC

**Assessment** \$354,230

**Appraisal** \$506,040

**PID** 814

**Building Count** 1

## Current Value

| Appraisal      |              |           |           |
|----------------|--------------|-----------|-----------|
| Valuation Year | Improvements | Land      | Total     |
| 2018           | \$16,030     | \$490,010 | \$506,040 |

| Assessment     |              |           |           |
|----------------|--------------|-----------|-----------|
| Valuation Year | Improvements | Land      | Total     |
| 2018           | \$11,220     | \$343,010 | \$354,230 |

## Owner of Record

**Owner** AMERICAN TOWERS LLC  
**Co-Owner** C/O PROPERTY TAX DEPT  
**Address** PO BOX 723597  
ATLANTA, GA 31139

**Sale Price** \$352,340  
**Certificate**  
**Book & Page** 692/ 597  
**Sale Date** 11/20/2014  
**Instrument** 25

## Ownership History

| Ownership History                        |            |             |             |            |            |
|--|------------|-------------|-------------|------------|------------|
| Owner                                    | Sale Price | Certificate | Book & Page | Instrument | Sale Date  |
| AMERICAN TOWERS LLC                      | \$352,340  |             | 692/ 597    | 25         | 11/20/2014 |
| FLORIDA TOWER PARTNERS LLC               | \$525,000  |             | 683/ 643    |            | 04/10/2014 |
| CHARTER COMMUNICATIONS ENTERTAINMENT 1LP | \$37,800   |             | 313/ 836    |            | 10/31/1996 |

## Building Information

### Building 1 : Section 1

**Year Built:**

**Living Area:** 0

| Building Attributes |              |
|---------------------|--------------|
| Field               | Description  |
| Style               | Outbuildings |

|                    |  |
|--------------------|--|
| Model              |  |
| Stories:           |  |
| Occupancy          |  |
| Exterior Wall 1    |  |
| Exterior Wall 2    |  |
| Roof Structure:    |  |
| Roof Cover         |  |
| Interior Wall 1    |  |
| Interior Wall 2    |  |
| Interior Flr 1     |  |
| Interior Flr 2     |  |
| Heat Fuel          |  |
| Heat Type:         |  |
| AC Type:           |  |
| Total Bedrooms:    |  |
| Total Bathrooms    |  |
| Total Half Baths:  |  |
| Total Xtra Fixtrs: |  |
| Total Rooms:       |  |
| Kitchens           |  |
| Whirlpool Tub      |  |
| Hot Tubs           |  |
| Fireplaces         |  |
| Fin Bsmt Area      |  |
| Fin Bsmt Quality   |  |
| Bsmt Garages       |  |

### Building Photo



(<http://images.vgsi.com/photos2/BrookfieldCTPhotos//\01\00\47>)

### Building Layout

Building Layout

| Building Sub-Areas (sq ft)     |
|--------------------------------|
| No Data for Building Sub-Areas |

### Extra Features

| Extra Features             |
|----------------------------|
| No Data for Extra Features |

### Land

#### Land Use

**Use Code** 435  
**Description** Cell Site Vac Lnd  
**Zone** R100

#### Land Line Valuation

**Size (Acres)** 4  
**Depth**  
**Assessed Value** \$343,010  
**Appraised Value** \$490,010

### Outbuildings

| <b>Outbuildings</b> |                    |                 |                        |             |              |               |
|---------------------|--------------------|-----------------|------------------------|-------------|--------------|---------------|
| <b>Code</b>         | <b>Description</b> | <b>Sub Code</b> | <b>Sub Description</b> | <b>Size</b> | <b>Value</b> | <b>Bldg #</b> |
| SHD3                | Comm Shed          | FR              |                        | 240 S.F.    | \$8,640      | 1             |
| ANTG                | Guyed Tower        | R               | Radio                  | 80 L.F.     | \$7,390      | 1             |

### Valuation History

| <b>Appraisal</b>      |                     |             |              |
|-----------------------|---------------------|-------------|--------------|
| <b>Valuation Year</b> | <b>Improvements</b> | <b>Land</b> | <b>Total</b> |
| 2018                  | \$16,030            | \$490,010   | \$506,040    |
| 2017                  | \$16,030            | \$490,010   | \$506,040    |
| 2015                  | \$13,340            | \$490,010   | \$503,350    |

| <b>Assessment</b>     |                     |             |              |
|-----------------------|---------------------|-------------|--------------|
| <b>Valuation Year</b> | <b>Improvements</b> | <b>Land</b> | <b>Total</b> |
| 2018                  | \$11,220            | \$343,010   | \$354,230    |
| 2017                  | \$11,220            | \$343,010   | \$354,230    |
| 2015                  | \$9,330             | \$343,010   | \$352,340    |

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# Town of Brookfield, Connecticut - Assessment Parcel Map

Parcel: **B05010**

Address: 37 CARMEN HILL RD



Map Produced Aug 2017



Approximate Scale: 1 inch = 100 feet

Disclaimer: This map is for informational purposes only. All information is subject to verification by any user. The Town of Brookfield and its mapping contractors assume no legal responsibility for the information contained herein.

# Exhibit C



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ANTENNA UPGRADES BY

# T-Mobile

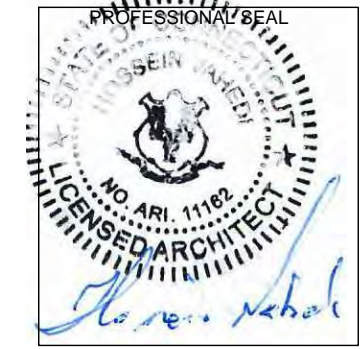
## T-MOBILE NORTHEAST LLC

**PROJECT: ANCHOR**  
**SITE NUMBER: CT11196A**  
**SITE NAME: BROOKFIELD/JUNCTION RD.**  
**SITE ADDRESS: 37 CARMEN HILL ROAD**  
**BROOKFIELD, CT 06804**  
(RF CONFIGURATION: 67D5994DB\_2XAIR+1QP+1OP)

**APPLICANT:**  
  
**T-MOBILE NORTHEAST LLC**  
35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002  
860-692-7100

**PROJECT MANAGER:**  
  
**NSS NORTHEAST**  
SITE SOLUTIONS  
Turkey Wireless Development  
420 MAIN STREET, BLDG 4  
STURBRIDGE, MA 01566  
203-275-6669

**CONSULTANT:**  
  
**FORESITE LLC**  
Architects . Engineers . Surveyors  
462 WALNUT STREET  
NEWTON, MA 02460  
617-212-3123



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| REV | DESCRIPTION             | DATE     |
|-----|-------------------------|----------|
| A   | PRELIMINARY             | 04/13/19 |
| B   | SA REFERENCED           | 04/30/19 |
| C   | CONDUITS ADDED          | 05/02/19 |
| D   | PROJECT DESC. CORRECTED | 05/16/19 |
| 0   | FINAL ISSUED            | 05/16/19 |
| 1   | CABLE COUNT ADJUSTED    | 05/23/19 |

**SITE NUMBER: CT11196A**  
**SITE NAME: BROOKFIELD/JUNCTION RD.**  
**SITE ADDRESS: 37 CARMEN HILL ROAD**  
**BROOKFIELD, CT 06804**

SHEET TITLE:  
**T-1: TITLE SHEET**

**PROJECT NOTES:**

- THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION. HANDICAPPED ACCESS IS NOT REQUIRED. POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED. NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
- CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACES THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
- DEVELOPMENT AND USE OF THE SITE WILL CONFORM TO ALL APPLICABLE CODES, ORDINANCES AND SPECIFICATIONS.
- PRIOR TO INSTALLATION OF THE PROPOSED EQUIPMENT, A STRUCTURAL ANALYSIS SHOULD BE PERFORMED TO CERTIFY THAT THE EXISTING/PROPOSED STRUCTURE AND COMPONENTS HAVE ADEQUATE STRUCTURAL CAPACITY PER ALL THE APPLICABLE CODES AND STANDARDS IN THE PROJECT JURISDICTION. CONTRACTOR SHOULD REVIEW THE REPORT AND ADHERE TO THE REPORT FULLY AND ALL THE RECOMMENDATIONS THEREIN, INCLUDING BUT NOT LIMITED TO ANTENNA PLACEMENT, COAX ROUTING, STRUCTURAL IMPROVEMENTS, ETC. REFER TO 'STRUCTURAL ANALYSIS REPORT AND MOUNT REVIEW LETTER', BOTH DATED APRIL 29, 2019 PREPARED BY VERTICAL BRIDGE ENGINEERING, LLC.

**APPLICABLE STATE ADOPTED CODES:**

LATEST EDITION OF:  
CONNECTICUT STATE BUILDING CODE (CSBC).  
ANSI/TIA-222-G STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.  
NATIONAL ELECTRICAL CODE (NEC) FOR POWER AND GROUNDING REQUIREMENTS.  
OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).  
NFPA - NATIONAL FIRE PROTECTION ASSOCIATION.

**APPROVALS:**

|                                      |      |
|--------------------------------------|------|
| FSA CM                               | DATE |
| RF ENGINEER                          | DATE |
| FOPS                                 | DATE |
| T-MOBILE ENGINEERING AND DEVELOPMENT | DATE |
|                                      | DATE |
|                                      | DATE |

**SITE IMAGE:**



**VICINITY MAP:**



**PROJECT SCOPE:**

UPGRADE OF EXISTING WIRELESS FACILITY AS FOLLOWS:  
  
UPGRADE EXISTING RBS 6102 CABINET INTERNALLY.  
ADD (6) NEW ANTENNAS FOR A TOTAL OF (12).  
ADD (1) 6160 AND (1) B160 CABINETS ON EXISTING CONCRETE PAD.  
ADD (3) REMOTE RADIO UNITS AT ANTENNA, FOR A TOTAL OF (6).  
  
FINAL CABLE COUNT: (12) 1-5/8" COAX, (1) 1-5/8" HYBRID AND (5) 1-1/4" HYBRID.

**PROJECT INFORMATION:**

ADDRESS: 37 CARMEN HILL ROAD  
BROOKFIELD, CT 06804  
  
STRUCTURE TYPE: GUYED TOWER  
COORDINATES: 41°29'36.35" N 73°25'43.43" W  
ZONING DISTRICT: R100

**PROJECT TEAM:**

APPLICANT: T-MOBILE NORTHEAST, LLC.  
35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002  
860-692-7100  
  
LANDLORD: AMERICAN TOWERS LLC  
C/O PROPERTY TAX DEPARTMENT  
PO BOX 723597  
ATLANTA, GA 31139  
  
PROJECT MANAGER: NORTHEAST SITE SOLUTIONS  
420 MAIN STREET, BLDG 4  
STURBRIDGE, MA 01566  
SHELDON FREINCKLE  
SHELDON@NORTHEASTSITE SOLUTIONS.COM  
201-776-8521  
  
CONSULTANTS: FORESITE LLC  
462 WALNUT ST  
NEWTON, MA 02460  
SAEED MOSSAVAT  
SMOSSAVAT@FORESITELLC.COM  
617-212-3123

**SHEET INDEX:**

- T-1: TITLE SHEET
- N-1: GENERAL NOTES
- A-1: PLAN
- A-2: ELEVATION AND ANTENNA PLANS AND DETAILS
- A-3: ANTENNA AND EQUIPMENT SPECIFICATIONS
- E-1: ONE LINE DIAGRAM AND GROUNDING DETAILS



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**GENERAL NOTES:**

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAS MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE CLIENT'S REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.
6. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S / VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
7. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT SECTIONS OF THE BASIC STATE BUILDING CODE, LATEST EDITION, AND ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJEC
9. THE CONTRACTOR SHALL NOTIFY THE CLIENT'S REPRESENTATIVE IN WRITING WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE CLIENT'S REPRESENTATIVE.
10. THE WORK SHALL CONFORM TO THE CODES AND STANDARDS OF THE FOLLOWING AGENCIES AS FURTHER CITED HEREIN:
  - A. ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS, AS PUBLISHED IN "COMPILATION OF ASTM STANDARDS BUILDING CODES" OR LATEST EDITION.
  - B. AWS: AMERICAN WELDING SOCIETY INC. AS PUBLISHED IN "STANDARD D1.1-08, STRUCTURAL WELDING CODE" OR LATEST EDITION.
  - C. AISC: AMERICAN INSTITUTE FOR STEEL CONSTRUCTION AS PUBLISHED IN "CODE FOR STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"; "SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" (LATEST EDITION).
11. BOLTING:
  - A. BOLTS SHALL BE CONFORMING TO ASTM A325 HIGH STRENGTH, HOT DIP GALVANIZED WITH ASTM A153 HEAVY HEX TYPE NUTS.
  - B. BOLTS SHALL BE 3/4"Ø MINIMUM (UNLESS OTHERWISE NOTED)
  - C. ALL CONNECTIONS SHALL BE 2 BOLTS MINIMUM.
12. FABRICATION:
  - A. FABRICATION OF STEEL SHALL CONFORM TO THE AISC AND AWS STANDARDS AND CODES (LATEST EDITION).
  - B. ALL STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 (LATEST EDITION), UNLESS OTHERWISE NOTED.
13. ERECTION OF STEEL:
  - A. PROVIDE ALL ERECTION EQUIPMENT, BRACING, PLANKING, FIELD BOLTS, NUTS, WASHERS, DRIFT PINS, AND SIMILAR MATERIALS WHICH DO NOT FORM A PART OF THE COMPLETED CONSTRUCTION BUT ARE NECESSARY FOR ITS PROPER ERECTION.
  - B. ERECT AND ANCHOR ALL STRUCTURAL STEEL IN ACCORDANCE WITH AISC REFERENCE STANDARDS. ALL WORK SHALL BE ACCURATELY SET TO ESTABLISHED LINES AND ELEVATIONS AND RIGIDLY FASTENED IN PLACE WITH SUITABLE ATTACHMENTS TO THE CONSTRUCTION OF THE BUILDING.
  - C. TEMPORARY BRACING, GUYING AND SUPPORT SHALL BE PROVIDED TO KEEP THE STRUCTURE SAFE AND ALIGNED AT ALL TIMES DURING CONSTRUCTION, AND TO PREVENT DANGER TO PERSONS AND PROPERTY. CHECK ALL TEMPORARY LOADS AND STAY WITHIN SAFE CAPACITY OF ALL BUILDING COMPONENTS.

14. ANTENNA INSTALLATION:
  - A. INSTALL ANTENNAS AS INDICATED ON DRAWINGS AND CLIENT'S REPRESENTATIVE SPECIFICATIONS.
  - B. INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.
  - C. INSTALL COAXIAL / FIBER CABLES AND TERMINATIONS BETWEEN ANTENNAS AND EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. WEATHERPROOF ALL CONNECTORS BETWEEN THE ANTENNA AND EQUIPMENT PER MANUFACTURER'S REQUIREMENTS.
15. ANTENNA AND COAXIAL / FIBER CABLE GROUNDING:
  - A. ALL EXTERIOR #6 GREEN GROUND WIRE "DAISY CHAIN" CONNECTIONS ARE TO BE WEATHER SEALED WITH ANDREWS CONNECTOR/SPLICE WEATHERPROOFING KIT TYPE #221213 OR EQUAL.
  - B. ALL COAXIAL / FIBER CABLE GROUNDING KITS ARE TO BE INSTALLED ON STRAIGHT RUNS OF COAXIAL / FIBER CABLE (NOT WITHIN BENDS).
16. RELATED WORK, FURNISH THE FOLLOWING WORK AS SPECIFIED UNDER CONSTRUCTION DOCUMENTS, BUT COORDINATE WITH OTHER TRADES PRIOR TO BID:
  - A. FLASHING OF OPENING INTO OUTSIDE WALLS
  - B. SEALING AND CAULKING ALL OPENINGS
  - C. PAINTING
  - D. CUTTING AND PATCHING
17. REQUIREMENTS OF REGULATORY AGENCIES:
  - A. FURNISH U.L. LISTED EQUIPMENT WHERE SUCH LABEL IS AVAILABLE. INSTALL IN CONFORMANCE WITH U.L. STANDARDS WHERE APPLICABLE.
  - B. INSTALL ANTENNA, ANTENNA CABLES, GROUNDING SYSTEM IN ACCORDANCE WITH DRAWINGS AND SPECIFICATION IN EFFECT AT PROJECT LOCATION AND RECOMMENDATIONS OF STATE AND LOCAL BUILDING CODES, AND SPECIAL CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS OF WORK. THIS WORK INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:
    - C. TIA-EIA - 222 (LATEST EDITION). STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.
    - D. FAA - FEDERAL AVIATION ADMINISTRATION ADVISORY CIRCULAR AC 70/7460-IH, OBSTRUCTION MARKING AND LIGHTING.
    - E. FCC - FEDERAL COMMUNICATIONS COMMISSION RULES AND REGULATIONS FORM 715, OBSTRUCTION MARKING AND LIGHTING SPECIFICATION FOR ANTENNA STRUCTURES AND FORM 715A, HIGH INTENSITY OBSTRUCTION LIGHTING SPECIFICATIONS FOR ANTENNA STRUCTURES.
    - F. AISC - AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 BOLTS (LATEST EDITION).
    - G. NEC - NATIONAL ELECTRICAL CODE - ON TOWER LIGHTING KITS.
    - H. UL - UNDERWRITER'S LABORATORIES APPROVED ELECTRICAL PRODUCTS.
    - I. IN ALL CASES, PART 77 OF THE FAA RULES AND PARTS 17 AND 22 OF THE FCC RULES ARE APPLICABLE AND IN THE EVENT OF CONFLICT, SUPERSEDE ANY OTHER STANDARDS OR SPECIFICATIONS.
    - J. 2009 LIFE SAFETY CODE NFPA - 101.

**APPLICANT:**

**T-Mobile**  
**T-MOBILE NORTHEAST LLC**


35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002  
860-692-7100

**PROJECT MANAGER**

**NSS NORTHEAST**  
SITE SOLUTIONS  
*Turnkey Wireless Development*  
420 MAIN STREET, BLDG 4  
STURBRIDGE, MA 01566  
203-275-6669

**CONSULTANT:**

**FORESITE** LLC  
Architects . Engineers . Surveyors  
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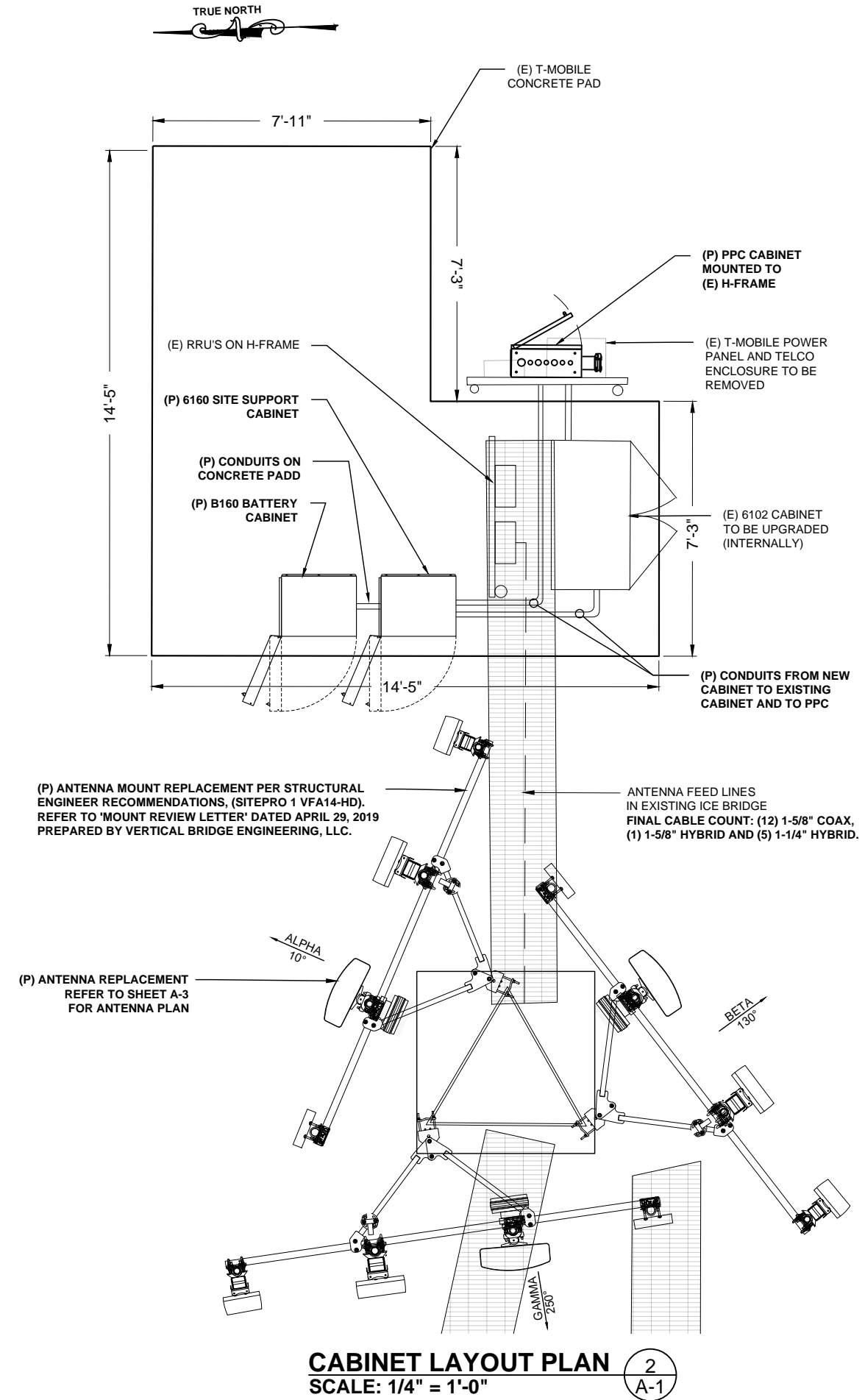
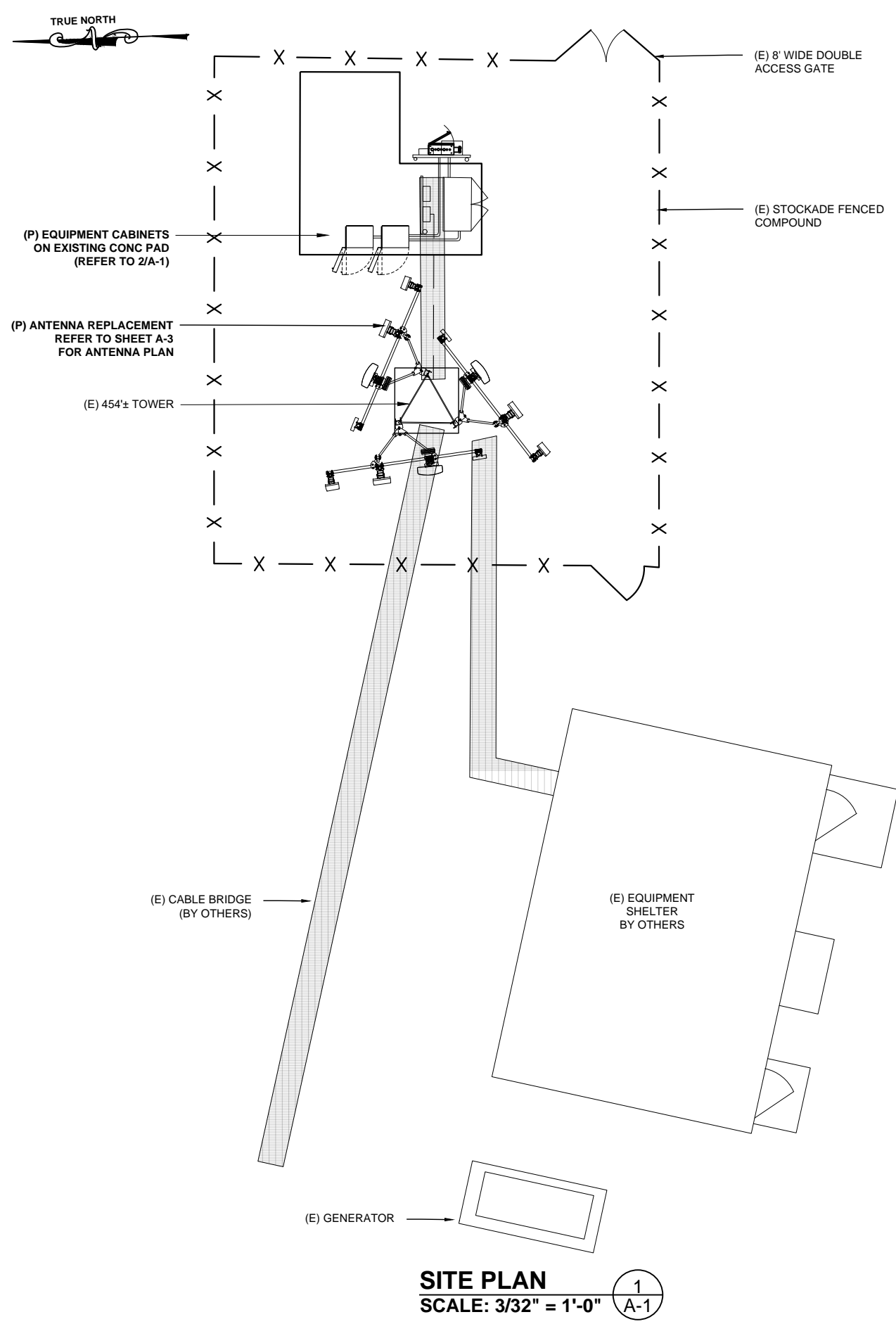
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| REV | DESCRIPTION             | DATE     |
|-----|-------------------------|----------|
| A   | PRELIMINARY             | 04/13/19 |
| B   | SA REFERENCED           | 04/30/19 |
| C   | CONDUITS ADDED          | 05/02/19 |
| D   | PROJECT DESC. CORRECTED | 05/16/19 |
| 0   | FINAL ISSUED            | 05/16/19 |
| 1   | CABLE COUNT ADJUSTED    | 05/23/19 |
|     |                         |          |

**SITE NUMBER: CT11196A**  
SITE NAME: BROOKFIELD/JUNCTION RD.  
SITE ADDRESS: 37 CARMEN HILL ROAD  
BROOKFIELD, CT 06804

SHEET TITLE:  
**N-1: NOTES AND DISCLAIMERS**

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APPLICANT:  
**T-Mobile**  
**T-MOBILE NORTHEAST LLC**  
35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002  
860-692-7100

PROJECT MANAGER  
**NSS NORTHEAST**  
SITE SOLUTIONS  
*Turnkey Wireless Development*  
420 MAIN STREET, BLDG 4  
STURBRIDGE, MA 01566  
203-275-6669

CONSULTANT:  
**FORESITE** LLC  
Architects . Engineers . Surveyors  
462 WALNUT STREET  
NEWTON, MA 02460  
617-212-3123

PROFESSIONAL SEAL  
NO. ARI. 11162  
LICENSED ARCHITECT  
*Haroon Nebel*

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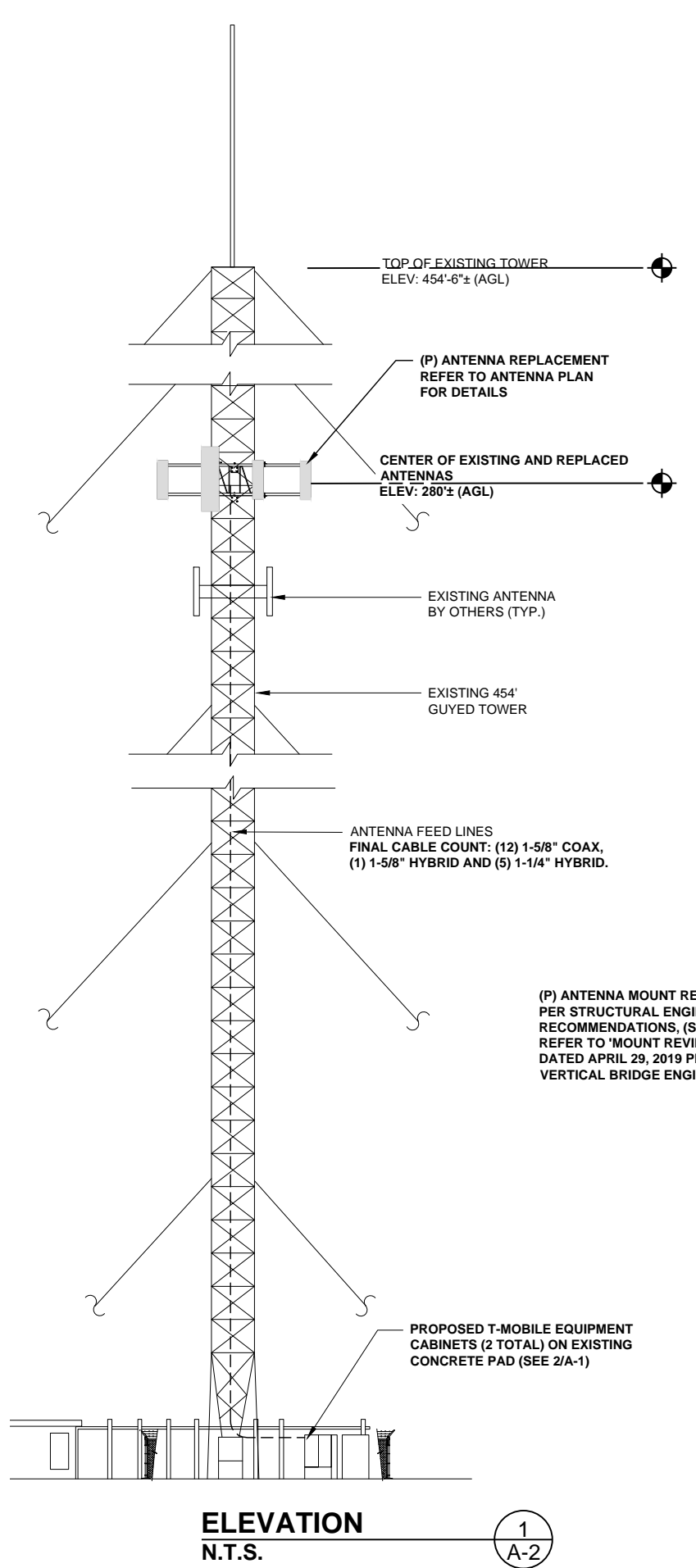
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|     |                         |          |

SITE NUMBER: CT11196A  
SITE NAME: BROOKFIELD/JUNCTION RD.  
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BROOKFIELD, CT 06804

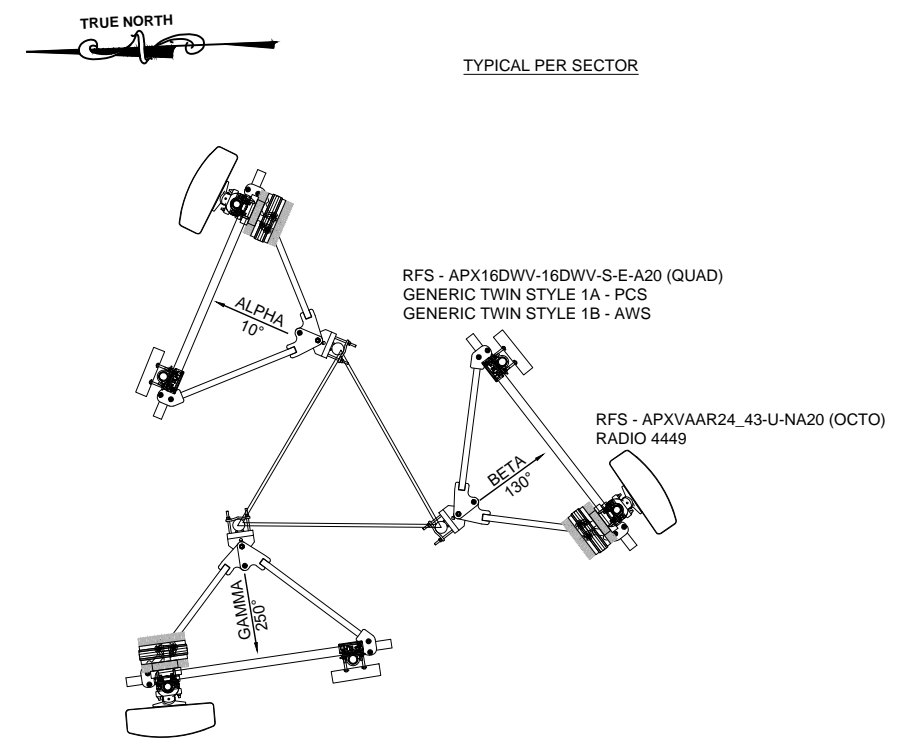
SHEET TITLE:  
A-1: PLAN



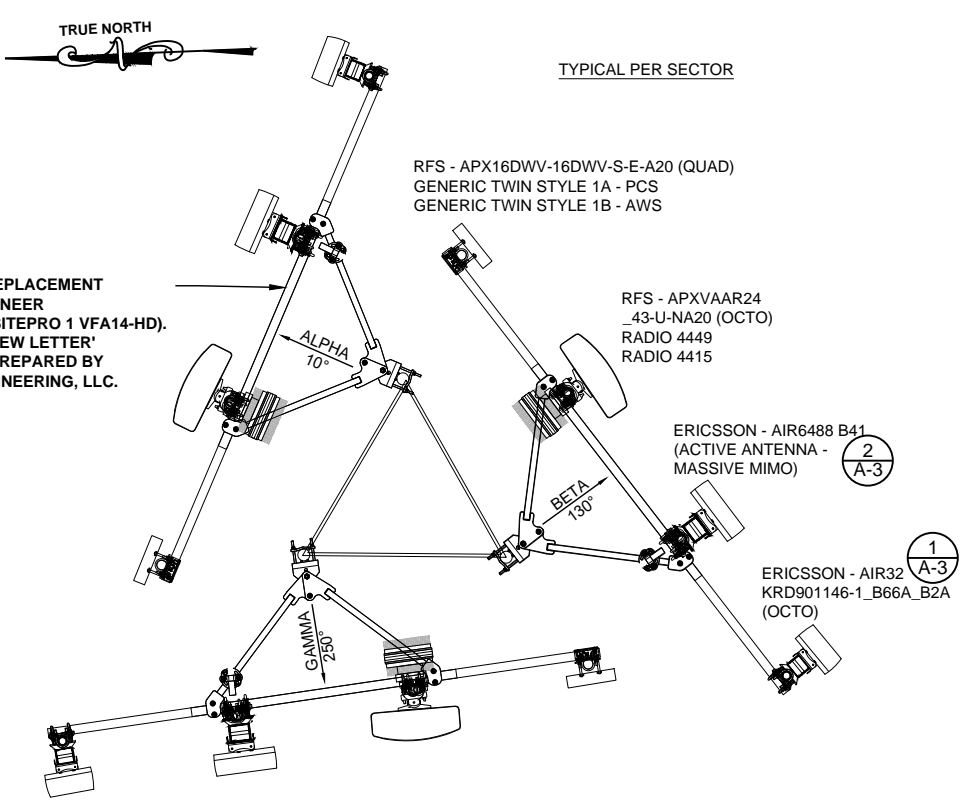
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**ELEVATION**  
N.T.S. 1  
A-2

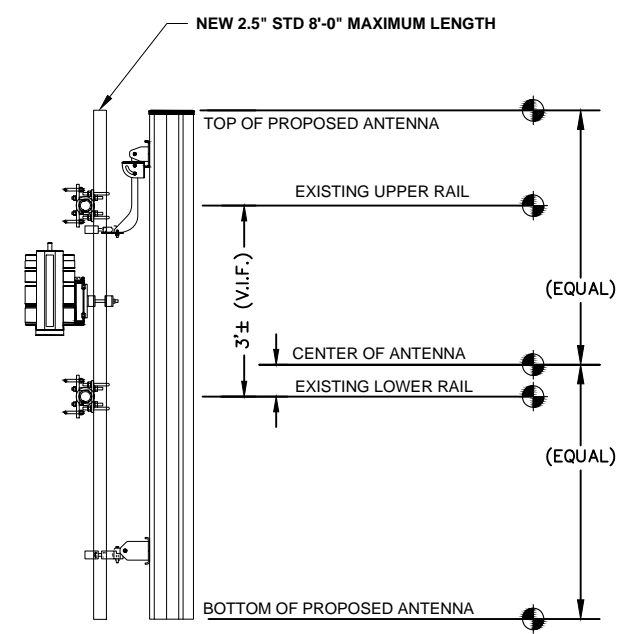


**EXISTING ANTENNA PLAN**  
N.T.S. 2  
A-2

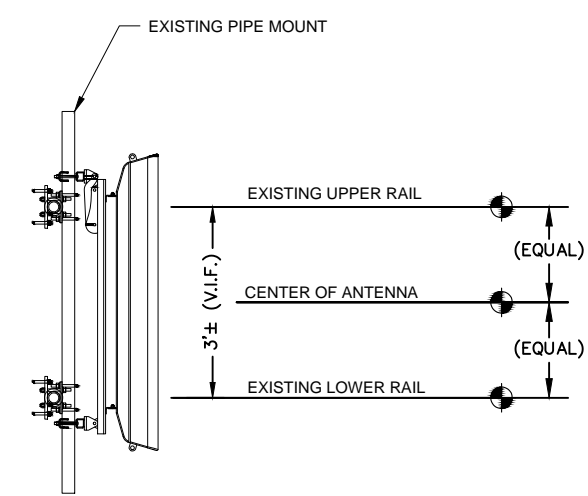


**FINAL ANTENNA PLAN**  
N.T.S. 3  
A-2

**STRUCTURAL NOTES:**  
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO TOWER STRUCTURAL ANALYSIS REPORT AND MOUNT ASSESSMENT TO DETERMINE IF THERE IS ANY SUPPLEMENTAL OF SPECIAL INSTALLATION REQUIRED FOR LATTICE TOWER EQUIPMENT AND FOR CABLE BUNDLING, SHIELDING, MOUNTING, OR RELOCATION ARRANGEMENTS.  
  
REFER TO 'STRUCTURAL ANALYSIS REPORT AND MOUNT REVIEW LETTER', BOTH DATED APRIL 29, 2019 PREPARED BY VERTICAL BRIDGE ENGINEERING, LLC.



**APXVAAR24\_43-U-NA20**  
**ANTENNA MOUNTING**  
N.T.S. 4  
A-2



**AIR32 KRD901146-1\_B66A\_B2A**  
**ANTENNA MOUNTING**  
N.T.S. 5  
A-2

**APPLICANT:**  
**T-Mobile**  
**T-MOBILE NORTHEAST LLC**  
35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002  
860-692-7100

**PROJECT MANAGER**  
**NSS NORTHEAST**  
SITE SOLUTIONS  
Turnkey Wireless Development  
420 MAIN STREET, BLDG 4  
STURBRIDGE, MA 01566  
203-275-6669

**CONSULTANT:**  
**FORESITE** LLC  
Architects . Engineers . Surveyors  
462 WALNUT STREET  
NEWTON, MA 02460  
617-212-3123  
  
PROFESSIONAL SEAL  
NO. ARI. 11162  
LICENSED ARCHITECT  
*Haroon Nebel*

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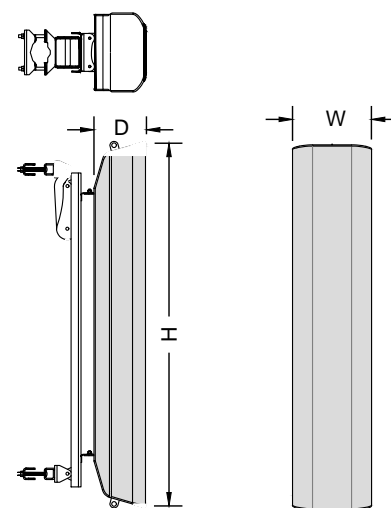
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| REV | DESCRIPTION             | DATE     |
|-----|-------------------------|----------|
| A   | PRELIMINARY             | 04/13/19 |
| B   | SA REFERENCED           | 04/30/19 |
| C   | CONDUITS ADDED          | 05/02/19 |
| D   | PROJECT DESC. CORRECTED | 05/16/19 |
| 0   | FINAL ISSUED            | 05/16/19 |
| 1   | CABLE COUNT ADJUSTED    | 05/23/19 |

**SITE NUMBER: CT11196A**  
SITE NAME: BROOKFIELD/JUNCTION RD.  
SITE ADDRESS: 37 CARMEN HILL ROAD  
BROOKFIELD, CT 06804

SHEET TITLE:  
A-2: ELEVATIONS, ANTENNA PLANS AND DETAILS

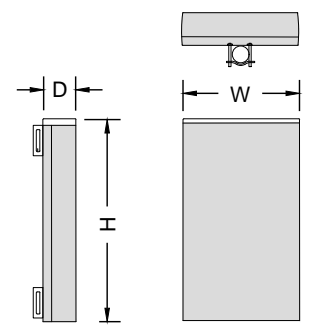
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| ERICSSON ANTENNA SPECIFICATIONS |                            |
|---------------------------------|----------------------------|
| MODEL #                         | AIR32 KRD901146-1 B66A_B2A |
| MANUF.                          | ERICSSON                   |
| HEIGHT                          | 56.6"                      |
| WIDTH                           | 12.9"                      |
| DEPTH                           | 8.7"                       |
| WEIGHT                          | 132.2 LB                   |

**AIR32 ANTENNA**  
N.T.S.

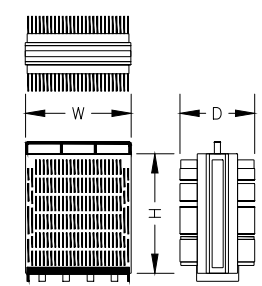
1  
A-3



| ERICSON ANTENNA SPECIFICATIONS |             |
|--------------------------------|-------------|
| MODEL #                        | AIR6488 B41 |
| MANUF.                         | ERICSSON    |
| HEIGHT                         | 34.8"       |
| WIDTH                          | 20.5"       |
| DEPTH                          | 7.2"        |
| WEIGHT                         | 128 LB      |

**AIR6488 ANTENNA**  
N.T.S.

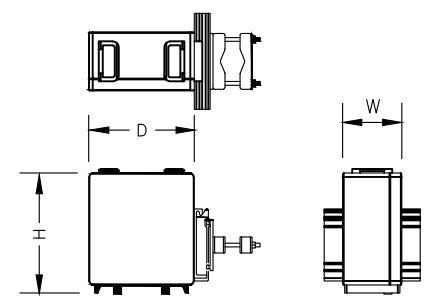
2  
A-3



| REMOTE RADIO UNIT SPECIFICATIONS |                    |
|----------------------------------|--------------------|
| MODEL #                          | RADIO 4449 B71+B12 |
| MANUF.                           | ERICSSON           |
| HEIGHT                           | 14.9"              |
| WIDTH                            | 13.2"              |
| DEPTH                            | 10.4"              |
| WEIGHT                           | 74 LB              |

**REMOTE RADIO UNIT**  
N.T.S.

3  
A-3



| REMOTE RADIO UNIT SPECIFICATIONS |                |
|----------------------------------|----------------|
| MODEL #                          | RADIO 4415 B25 |
| MANUF.                           | ERICSSON       |
| HEIGHT                           | 14.9"          |
| WIDTH                            | 13.2"          |
| DEPTH                            | 5.4"           |
| WEIGHT                           | 46.3 LB        |

**REMOTE RADIO UNIT**  
N.T.S.

4  
A-3



| SITE SUPPORT CABINET SPECIFICATIONS |          |
|-------------------------------------|----------|
| MODEL #                             | 6160     |
| MANUF.                              | ERICSSON |
| HEIGHT                              | 63"      |
| WIDTH                               | 25.6"    |
| DEPTH                               | 25.6"    |
| WEIGHT                              |          |

**SITE SUPPORT CABINET**  
N.T.S.

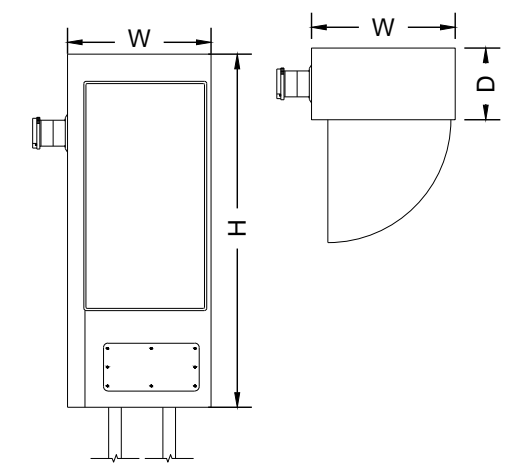
5  
A-3



| BATTERY CABINET SPECIFICATIONS |          |
|--------------------------------|----------|
| MODEL #                        | B160     |
| MANUF.                         | ERICSSON |
| HEIGHT                         | 63"      |
| WIDTH                          | 26"      |
| DEPTH                          | 26"      |
| WEIGHT                         |          |

**BATTERY CABINET**  
N.T.S.

6  
A-3



| PPC CABINET SPECIFICATIONS |            |
|----------------------------|------------|
| MODEL #                    | CS2S2-W738 |
| MANUF.                     | ERICSSON   |
| HEIGHT                     | 48"        |
| WIDTH                      | 24"        |
| DEPTH                      | 12"        |
| WEIGHT                     | 150 LBS    |

**PPC CABINET**  
N.T.S.

7  
A-3

APPLICANT:  
**T-Mobile**  
**T-MOBILE NORTHEAST LLC**  
 35 GRIFFIN ROAD SOUTH  
 BLOOMFIELD, CT 06002  
 860-692-7100

PROJECT MANAGER  
**NSS NORTHEAST**  
 SITE SOLUTIONS  
*Turkey Wireless Development*  
 420 MAIN STREET, BLDG 4  
 STURBRIDGE, MA 01566  
 203-275-6669

CONSULTANT:  
**FORESITE** LLC  
 Architects . Engineers . Surveyors  
 462 WALNUT STREET  
 NEWTON, MA 02460  
 617-212-3123

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SITE NUMBER: CT1196A  
 SITE NAME: BROOKFIELD/JUNCTION RD.  
 SITE ADDRESS: 37 CARMEN HILL ROAD  
 BROOKFIELD, CT 06804

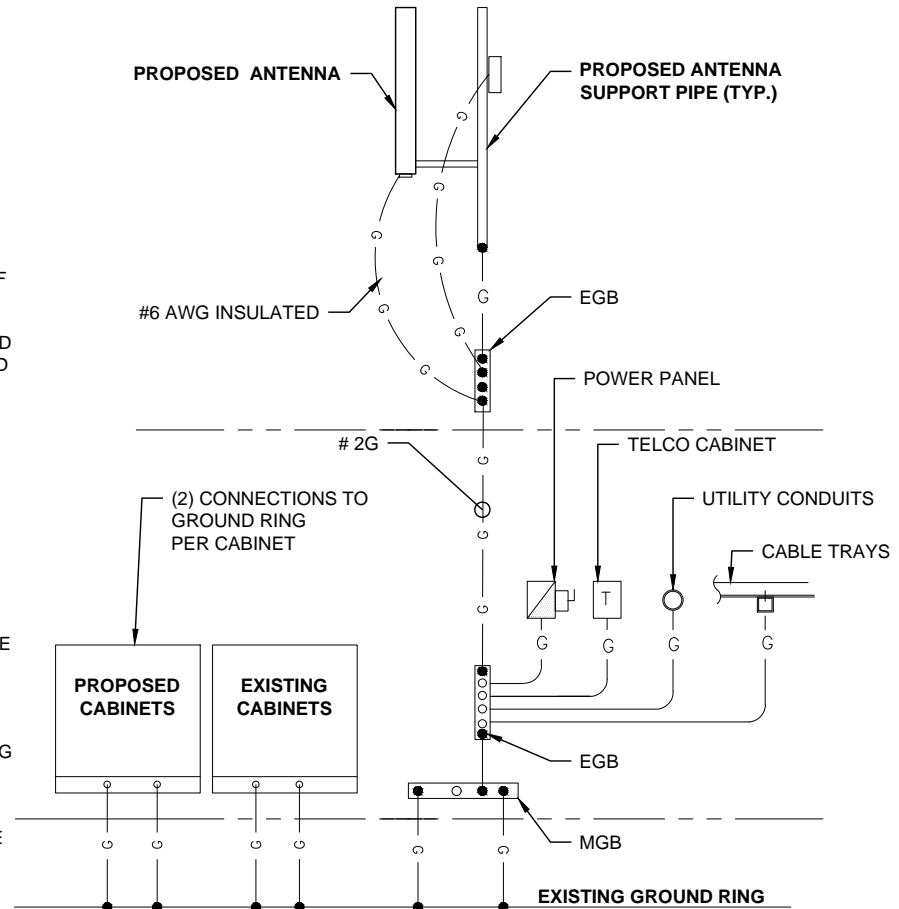
SHEET TITLE:  
 A-3: ANTENNA AND  
 EQUIPMENT SPECIFICATIONS



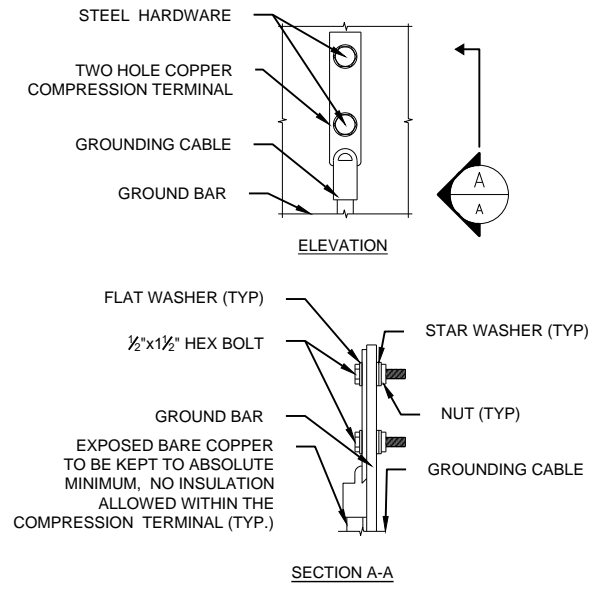
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**ELECTRICAL & GROUNDING NOTES**

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PRODUCED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) ND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLING BETWEEN ELECTRICAL ROOM AND PROPOSED CELL SITE ARE PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELECOM CABINET AND RBS CABINET AS INDICATED ON DRAWING A -1. PROVIDE FULL LENGTH PULL ROPE INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NAME 3R ENCLOSURE.
11. GROUNDING SHALL COMPLY WITH NEC ART. 250.
12. GROUNDING COAX CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURES COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
13. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSTALLATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE GROUND.
14. ALL GROUND CONNECTION TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
15. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AS RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY BOND ANY METER OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
16. CONNECTIONS TO MGB SHALL BE ARRANGED IN THREE MAIN GROUPS: SURGE PROCEDURES (COAXIAL CABLE GROUND KITS, TELCO AND POWER PANEL GROUND); (GROUNDING ELECTRODE RING OR BUILDING STEEL); NON-SURGING OBJECTS (EGB GROUND IN RBS UNIT).
17. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
18. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTION.
19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.
20. BOND ANTENNA EGB'S AND MGB TO WATER MAIN.
21. TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION.
22. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
23. VERIFY PROPOSED SERVICE UPGRADE WITH LOCAL UTILITY COMPANY PRIOR TO CONSTRUCTION.

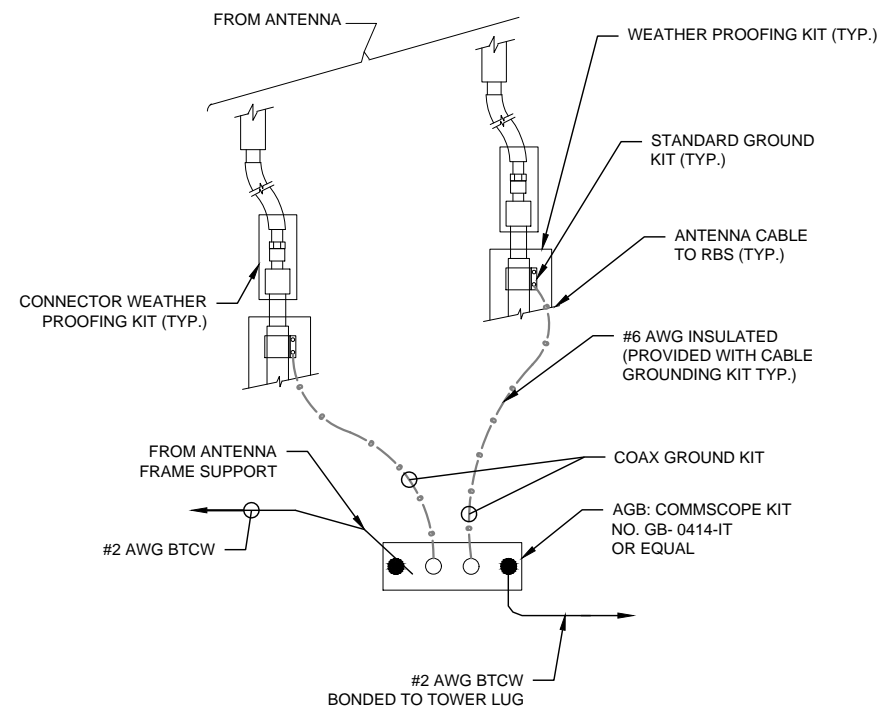


**GROUNDING RISER DIAGRAM** 1  
N.T.S. E-1



- NOTES:  
 1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.  
 2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

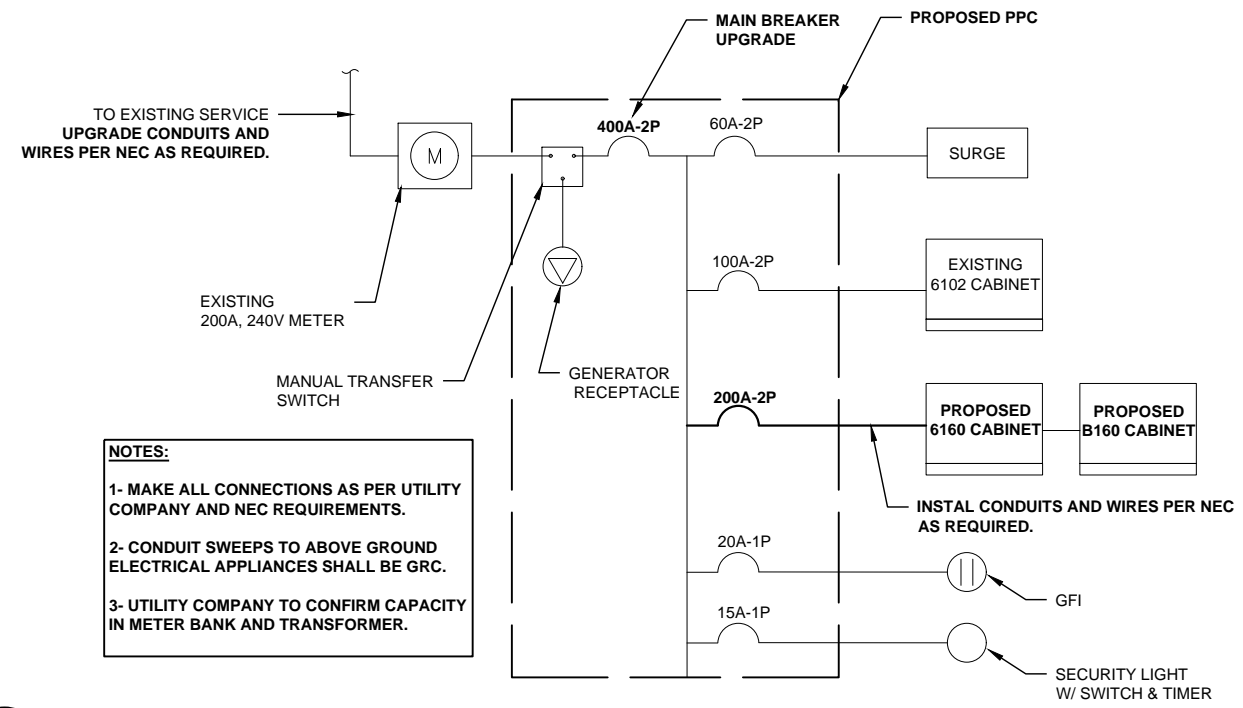
**GROUND BAR CONNECTIONS** 3  
N.T.S. E-1



- NOTES:  
 INSTALL CABLE GROUND KIT ABOVE HORIZONTAL BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO AGB/EGB

**ANTENNA CABLE GROUNDING** 2  
N.T.S. E-1

- NOTE:  
 CONTRACTOR TO VERIFY THE POWER FEED & PHASE OF METER BANK AND THAT THE EXISTING AND PROPOSED CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSED LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.



- NOTES:  
 1- MAKE ALL CONNECTIONS AS PER UTILITY COMPANY AND NEC REQUIREMENTS.  
 2- CONDUIT SWEEPS TO ABOVE GROUND ELECTRICAL APPLIANCES SHALL BE GRC.  
 3- UTILITY COMPANY TO CONFIRM CAPACITY IN METER BANK AND TRANSFORMER.

**TYPICAL ONE LINE DIAGRAM** 4  
N.T.S. E-1

APPLICANT:  
**T-Mobile**  
**T-MOBILE NORTHEAST LLC**  
 35 GRIFFIN ROAD SOUTH  
 BLOOMFIELD, CT 06002  
 860-692-7100

PROJECT MANAGER  
  
**NSS NORTHEAST**  
 SITE SOLUTIONS  
*Turnkey Wireless Development*  
 420 MAIN STREET, BLDG 4  
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| 1   | CABLE COUNT ADJUSTED    | 05/23/19 |

SITE NUMBER: CT11196A  
 SITE NAME: BROOKFIELD/JUNCTION RD.  
 SITE ADDRESS: 37 CARMEN HILL ROAD  
 BROOKFIELD, CT 06804

SHEET TITLE:  
 E-1: GROUNDING DETAILS AND ONE LINE DIAGRAM

# Exhibit D



## Structural Analysis Report

**Structure** : 492 Foot Guyed Tower  
**VB Site Name** : WRKI-FM  
**VB Site Number** : US-CT-5009  
**Proposed Carrier** : T-Mobile  
**Carrier Site Name** : Brookfield/Junction Rd.  
**Carrier Site Number** : CT11196A  
**Site Location** : 0.3 Mi. Sse of Intersection of Carmen Hill Rd. & Se Trail  
Brookfield, CT 06804 (Fairfield County)  
41.4934, -73.4288  
**Date** : April 29, 2019  
**Max Member Stress Level** : 99%  
**Result** : PASS



Prepared by:

04/29/2019



VERTICAL BRIDGE ENGINEERING, LLC

**Table of Contents**

**Introduction ..... 1**

**Existing Structural Information ..... 1**

**Final Proposed Equipment Loading for T-Mobile ..... 1**

**Design Criteria ..... 2**

**Analysis Results ..... 2**

**Assumptions ..... 2**

**Conclusions ..... 3**

**Standard Conditions ..... 4**

**Disclaimer of Warranties ..... 4**

**Calculations..... Attached**

**Collocation Application ..... Attached**

**Introduction**

We have completed our structural analysis of the proposed equipment installation on the foregoing tower to determine its ability to support the new loads proposed by **T-Mobile**. The objective of the analysis was to determine if the tower meets the current structural codes and standards with the proposed equipment installation.

**Existing Structural Information**

The following documents for the existing structure were made available for our structural analysis.

|  |   |
|--|---|
| <b>Tower Information</b>               | Structural Components Tower Mapping Dated June 12, 2015.      |
| <b>Foundation Information</b>          | Structural Components Foundation Mapping Dated April 7, 2016. |
| <b>Geotechnical Information</b>        | Delta Oaks Group Job No. GEO16-00237-03 dated April 11, 2016. |
| <b>Existing Equipment Information</b>  | Vertical Bridge Collocation Application dated March 19, 2019. |
| <b>Tower Reinforcement Information</b> | Tower has not been reinforced.                                |

**Final Proposed Equipment Loading for T-Mobile**

The following proposed loading was obtained from the Vertical Bridge Collocation Application:

| Antenna/Equipment |           |          |                                |       | Coax                |   |
|-------------------|-----------|----------|--------------------------------|-------|---------------------|---|
| Mount (Ft.)       | RAD (Ft.) | Qty.     | Antenna                        | Type  | Qty.                | Size/Type   |
| 280.0             | -         | <b>3</b> | <b>Site Pro 1 VFA14-HD</b>     | Mount | 12<br>1<br><b>5</b> | 1-5/8" Coax<br>1-5/8" Hybrid<br><b>1-1/4" Fiber</b> |
|                   | 280.0     | 3        | RFS APX16DWV-16DWV-S-E-ACU     | Panel |                     |   |
|                   |           | 3        | RFS APXVAARR24_43-U-NA20       | Panel |                     |   |
|                   |           | 3        | Ericsson KRY 112144            | TMA   |                     |   |
|                   |           | 3        | Ericsson KRY 112 89-4          | TMA   |                     |   |
|                   |           | 3        | Ericsson RRU 4449 B71B12       | RRU   |                     |   |
|                   |           | <b>3</b> | <b>Ericsson AIR6488 2.5GHz</b> | Panel |                     |   |
|                   |           | <b>3</b> | <b>Ericsson AIR 3246 B66</b>   | Panel |                     |   |
|                   |           | <b>3</b> | <b>Ericsson 4415 B25</b>       | RRU   |                     |   |

Note: Proposed equipment shown in bold.

Note: Other existing loading can be found on the tower profile attached.

Note: (6) 1-5/8" Coax feedlines are to be removed.

## Design Criteria

The tower was analyzed using tnxTower (Version 8.0.5.0) tower analysis software using the following design criteria.

|                                      |   |
|--------------------------------------|---|
| <b>State</b>                         | Connecticut   |
| <b>City/County Building Code</b>     | Fairfield County (IBC 2015)                         |
| <b>TIA/EIA Standard Code</b>         | TIA-222-G   |
| <b>Basic Wind Speed</b>              | 89 MPH ( $V_{asd}$ ) / 115 MPH ( $V_{ult}$ )        |
| <b>Basic Wind Speed w/ Ice</b>       | 50 MPH w/ 0.75" Ice                                 |
| <b>Steel Grade</b>                   | 50 ksi Legs / 36 ksi All Other Members / A325 Bolts |
| <b>Exposure Category</b>             | B   |
| <b>Topographic Category (height)</b> | 5 (449.0 Ft.)                                       |
| <b>Structure Class</b>               | II  |

## Analysis Results

Based on the foregoing information, our structural analysis determined that **the existing tower is structurally capable of supporting the proposed equipment loads without modification.** The existing tower base, inner, and outer anchor foundations have also been evaluated. The tower base, inner, and outer anchor foundations **are structurally capable of supporting the proposed equipment loads.**

## Assumptions

The below assumptions are true, complete, and accurate.

1. The existing tower has been maintained to manufacturer's specifications and is in good condition.
2. Foundations are considered to have been properly designed for the original design loads.
3. All member connections are considered to have been designed to meet the load carrying capacity of the connected member.
4. Antenna mount loads have been estimated based on generally accepted industry standards.
5. The mounts for the proposed antennas have been analyzed and designed by others.
6. See additional assumptions contained in the report attached.
7. Tower is within acceptable engineering tolerance at 105%.
8. Foundations are within acceptable engineering tolerance at 110%.



## Conclusions

The existing tower described above **has sufficient capacity** to support the proposed loading based on the governing Building Code. The tower base, inner, and outer anchor foundations have also been evaluated and are acceptable.

We appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance please call us anytime at 561-948-6367.

Sincerely,

Analysis by:



Luke Myrick, EIT  
Design Engineer

Reviewed by:



Michael T. De Boer, PE  
Vice President of Structural Engineering

04/29/2019

## **Standard Conditions**

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but not necessarily limited, to:

- Information supplied by the client regarding the structure itself, the antenna and transmission line loading on the structure and its components, or relevant information.
- Information from drawings in possession of Vertical Bridge Engineering, LLC, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to Vertical Bridge Engineering, LLC and used in the performance of our engineering services is correct and complete. In the absence of information contrary, we consider that all structures were constructed in accordance with the drawings and specifications and are in a un-corroded condition and have not deteriorated; and we, therefore consider that their capacity has not significantly changed from the original design condition.

All services will be performed to the codes and standards specified by the client, and we do not imply to meet any other code and standard requirements unless explicitly agreed to in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes and standards, the client shall specify the exact requirements. In the absence of information to the contrary, all work will be performed in accordance with the revision of ANSI/TIA/EIA-222-G requested.

All services are performed, results obtained and recommendations made in accordance with the generally accepted engineering principles and practices. Vertical Bridge Engineering LLC, is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

## **Disclaimer of Warranties**

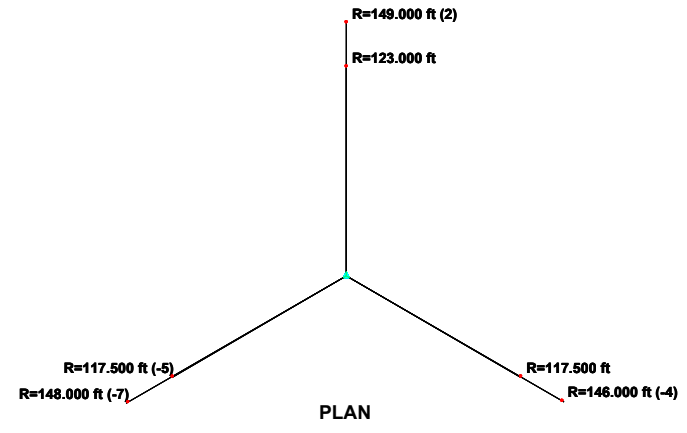
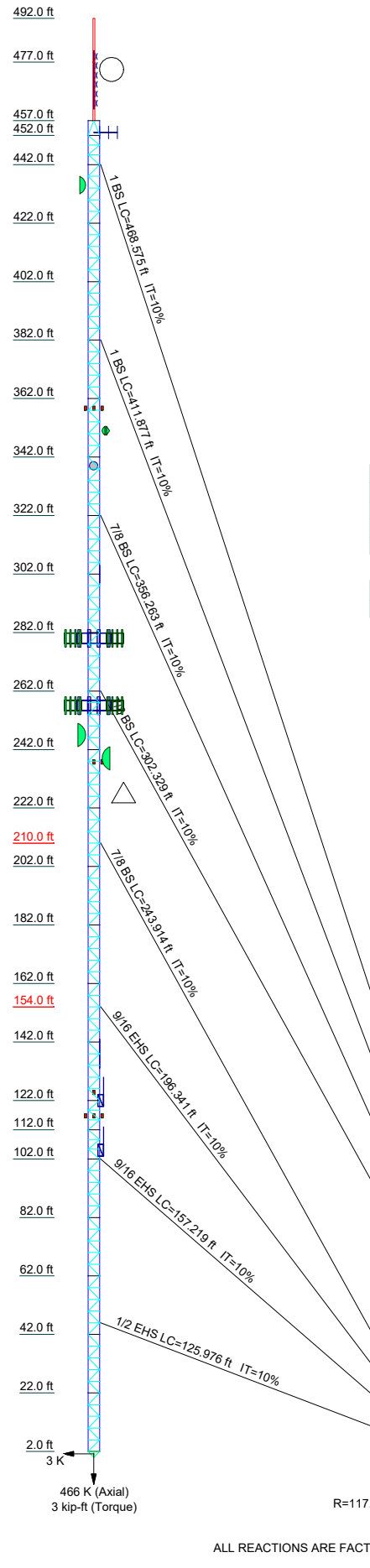
The engineering services by Vertical Bridge Engineering, LLC in connection with this Structural Analysis are limited to a computer analysis of the tower structure, size and capacity of its members. Vertical Bridge Engineering, LLC does not analyze the fabrication, including welding, except as may be expressly included in this report.

The purpose of this report is to assess the feasibility of adding appurtenances usually accompanied by transmission lines. Any mention of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from Vertical Bridge Engineering, LLC but are beyond the scope of this report.

Vertical Bridge Engineering, LLC makes no warranties, express or implied, in connection with this report and disclaims any liability arising from material, fabrication and erection of this tower, or installation and compliance with legal and permitting requirements of the proposed equipment. Vertical Bridge Engineering, LLC 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 Vertical Bridge Engineering, LLC pursuant to this report will be limited to the total fee received for preparation of this report.

## Attachment 1: Calculations

|                 |          |    |          |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |          |     |     |     |     |                   |  |  |  |  |                   |  |  |  |  |
|-----------------|----------|----|----------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|-----|-----|-----|-----|-------------------|--|--|--|--|-------------------|--|--|--|--|
| Section         | L1       | L2 | T1       | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | T12 | T13 | T14 | T15 | T16 | T17 | T18 | T19 | T20 | T21      | T22 | T23 | T24 | T25 |                   |  |  |  |  |                   |  |  |  |  |
| Legs            | SR 2 1/4 |    | SR 2 1/2 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | SR 2 3/4 |     |     |     |     | SR 3              |  |  |  |  |                   |  |  |  |  |
| Leg Grade       | A53-B-35 |    | A        |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | B        |     |     |     |     | C                 |  |  |  |  | D                 |  |  |  |  |
| Diagonals       | N.A.     |    | L2x2x1/4 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | L2x2x1/4 |     |     |     |     | L1 3/4x1 3/4x3/16 |  |  |  |  | L1 3/4x1 3/4x3/16 |  |  |  |  |
| Diagonal Grade  | N.A.     |    | E        |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | N.A.     |     |     |     |     | A36               |  |  |  |  | L2x2x3/16         |  |  |  |  |
| Top Girts       | N.A.     |    | N.A.     |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | N.A.     |     |     |     |     | L2x2x3/16         |  |  |  |  | L2x2x3/16         |  |  |  |  |
| Bottom Girts    | N.A.     |    | N.A.     |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | N.A.     |     |     |     |     | L2x2x3/16         |  |  |  |  | L2x2x3/16         |  |  |  |  |
| Horizontals     | N.A.     |    | N.A.     |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | N.A.     |     |     |     |     | L2x2x3/16         |  |  |  |  | L2x2x3/16         |  |  |  |  |
| Face Width (ft) | 0.71875  |    | 0.71875  |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | 0.71875  |     |     |     |     | 0.71875           |  |  |  |  | 0.71875           |  |  |  |  |
| # Panels @ (ft) | N.A.     |    | N.A.     |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | N.A.     |     |     |     |     | N.A.              |  |  |  |  | N.A.              |  |  |  |  |
| Weight (K)      | 0.5      |    | 0.5      |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     | 0.5      |     |     |     |     | 0.5               |  |  |  |  | 0.5               |  |  |  |  |



**SYMBOL LIST**

| MARK | SIZE                          | MARK | SIZE        |
|------|-------------------------------|------|-------------|
| A    | L2 1/2x2x3/16                 | E    | C6x10.5     |
| B    | L1 3/4x1 3/4x3/16             | F    | 1 @ 5       |
| C    | L2 1/2x2 1/2x3/8              | G    | 3 @ 3.33333 |
| D    | L1 3/4x1 3/4x3/16 w/ L2x2x1/4 |      |             |

**MATERIAL STRENGTH**

| GRADE   | Fy     | Fu     | GRADE | Fy     | Fu     |
|---------|--------|--------|-------|--------|--------|
| A572-50 | 50 ksi | 65 ksi | A36   | 36 ksi | 58 ksi |

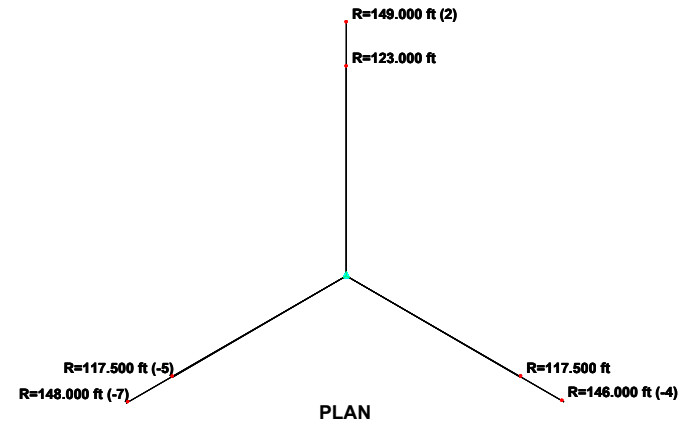
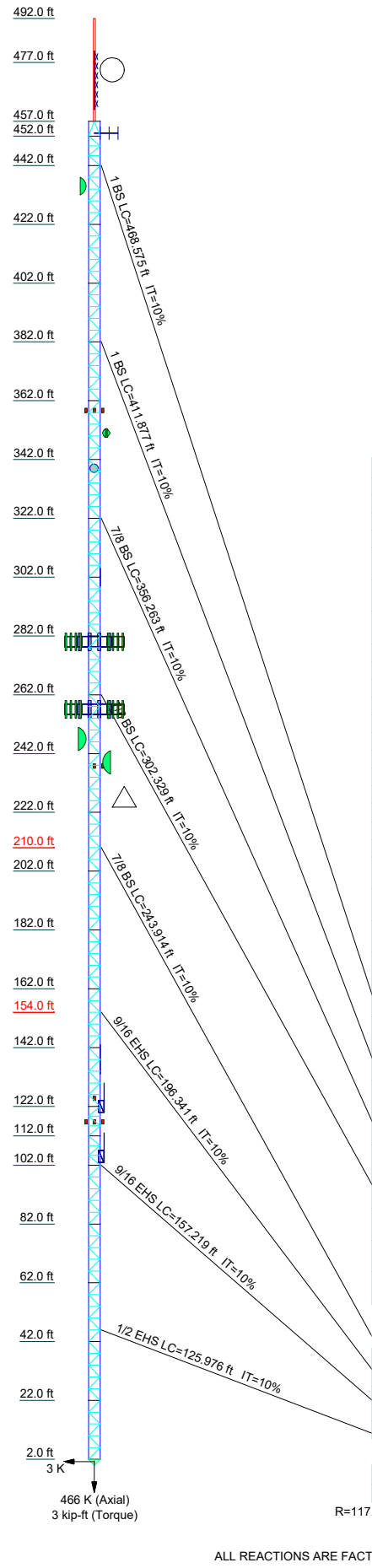
- TOWER DESIGN NOTES**
1. Tower is located in Fairfield County, Connecticut.
  2. Tower designed for Exposure B to the TIA-222-G Standard.
  3. Tower designed for a 89 mph basic wind in accordance with the TIA-222-G Standard.
  4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
  5. Deflections are based upon a 60 mph wind.
  6. Tower Structure Class II.
  7. Topographic Category 5 with Crest Height of 449.000 ft
  8. TOWER RATING: 99.2%

ALL REACTIONS ARE FACTORED

|  |   |                              |
|--|---|------------------------------|
| <b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | Job: <b>US-CT-5009</b>                          |                              |
|  | Project: <b>Guyed Tower Structural Analysis</b> |                              |
|  | Client:   | Drawn by: <b>Luke Myrick</b> |
|  | Code: <b>TIA-222-G</b>                          | Date: <b>04/29/19</b>        |
|  | Path:   | Scale: <b>NTS</b>            |

Dwg No. E-1

|                 |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Section         | L1 | L2 | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | T12 | T13 | T14 | T15 | T16 | T17 | T18 | T19 | T20 | T21 | T22 | T23 | T24 | T25 |
| Legs            |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Leg Grade       |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Diagonals       |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Diagonal Grade  |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Top Girts       |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Bottom Girts    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Horizontals     |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Face Width (ft) |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| # Panels @ (ft) |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Weight (K)      |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |



**DESIGNED APPURTENANCE LOADING**

| TYPE   | ELEVATION | TYPE   | ELEVATION |
|--|-----------|--|-----------|
| Beacon (.075k 2.250CAAA) (Tower)                       | 490       | Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile) | 280       |
| 2 Bay FM Antenna                                       | 471       | Ericsson 4415 B25 (15x13.2x5.4) (T-Mobile)       | 280       |
| 3' Yagi(.03k,2.08CAAA)                                 | 453       | Ericsson 4415 B25 (15x13.2x5.4) (T-Mobile)       | 280       |
| 6' Grid Dish   | 435       | Ericsson 4415 B25 (15x13.2x5.4) (T-Mobile)       | 280       |
| Obstruction Light(.01k,.8CAAA) (Tower)                 | 358       | Ericsson 4415 B25 (15x13.2x5.4) (T-Mobile)       | 280       |
| Obstruction Light(.01k,.8CAAA) (Tower)                 | 358       | SM 408-3 (Sprint)                                | 257       |
| Obstruction Light(.01k,.8CAAA) (Tower)                 | 358       | PCS 1900MHz 4x45W-65MHz (Sprint)                 | 257       |
| 3' Dish w/ Radomes                                     | 351       | 800 EXTERNAL NOTCH FILTER (Sprint)               | 257       |
| 3' Grid Dish   | 339       | Alcatel Lucent RRH-4x45-1900 (25x12x12) (Sprint) | 257       |
| 2' Side arm (25lbs 0.5CaAa)                            | 302       | Alcatel Lucent RRH-4x45-1900 (25x12x12) (Sprint) | 257       |
| Kathrein CA5-FM/CP/RM                                  | 300       | Alcatel Lucent RRH 2x50-800 (16x13x10) (Sprint)  | 257       |
| KRY 112 89/4 (T-Mobile)                                | 280       | Alcatel Lucent RRH 2x50-800 (16x13x10) (Sprint)  | 257       |
| KRY 112 89/4 (T-Mobile)                                | 280       | Alcatel Lucent RRH 2x50-800 (16x13x10) (Sprint)  | 257       |
| KRY 112 89/4 (T-Mobile)                                | 280       | Nokia AAHC MIMO (25.6x19.7x9.64) (Sprint)        | 257       |
| VFA14-HD (T-Mobile)                                    | 280       | Nokia AAHC MIMO (25.6x19.7x9.64) (Sprint)        | 257       |
| KRY 112 144/1 (T-Mobile)                               | 280       | Nokia AAHC MIMO (25.6x19.7x9.64) (Sprint)        | 257       |
| RFS APX16DWV-16DWV-S-E-A20 (55.9x13.3x3.15) (T-Mobile) | 280       | CommScope NNVV-65B-R4 (72x19.6x7.8) (Sprint)     | 257       |
| RFS APX16DWV-16DWV-S-E-A20 (55.9x13.3x3.15) (T-Mobile) | 280       | CommScope NNVV-65B-R4 (72x19.6x7.8) (Sprint)     | 257       |
| RFS APXVAARR24_43-U-NA20 (95.9x24x8.7) (T-Mobile)      | 280       | CommScope NNVV-65B-R4 (72x19.6x7.8) (Sprint)     | 257       |
| RFS APXVAARR24_43-U-NA20 (95.9x24x8.7) (T-Mobile)      | 280       | 8' Grid Dish (140lbs 20.1CaAa)                   | 247       |
| RFS APXVAARR24_43-U-NA20 (95.9x24x8.7) (T-Mobile)      | 280       | 8' Grid Dish (140lbs 20.1CaAa)                   | 239       |
| Ericsson RRU 4449 B71B12 (14.9x13.2x10.4) (T-Mobile)   | 280       | Beacon (.075k 2.250CAAA) (Tower)                 | 237       |
| Ericsson RRU 4449 B71B12 (14.9x13.2x10.4) (T-Mobile)   | 280       | Beacon (.075k 2.250CAAA) (Tower)                 | 237       |
| Ericsson RRU 4449 B71B12 (14.9x13.2x10.4) (T-Mobile)   | 280       | 3' Side Arm                                      | 138       |
| Ericsson AIR6488 2.5GHz (34.8x20.5x7.2) (T-Mobile)     | 280       | 10' Dipole                                       | 138       |
| Ericsson AIR6488 2.5GHz (34.8x20.5x7.2) (T-Mobile)     | 280       | 3' Side Arm                                      | 125       |
| Ericsson AIR6488 2.5GHz (34.8x20.5x7.2) (T-Mobile)     | 280       | 10' Dipole                                       | 125       |
| Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile)       | 280       | Beacon (.075k 2.250CAAA) (Tower)                 | 124       |
| Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile)       | 280       | Obstruction Light(.01k,.8CAAA) (Tower)           | 116       |
| Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile)       | 280       | Obstruction Light(.01k,.8CAAA) (Tower)           | 116       |
| Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile)       | 280       | Obstruction Light(.01k,.8CAAA) (Tower)           | 116       |
| Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile)       | 280       | Obstruction Light(.01k,.8CAAA) (Tower)           | 116       |
| Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile)       | 280       | 10' Dipole                                       | 108       |
| Ericsson AIR 3246 B66 (58.1x15.7x9.4) (T-Mobile)       | 280       | 3' Side Arm                                      | 108       |

**SYMBOL LIST**

| MARK | SIZE                          | MARK | SIZE        |
|------|-------------------------------|------|-------------|
| A    | L2 1/2x2x3/16                 | E    | C6x10.5     |
| B    | L1 3/4x1 3/4x3/16             | F    | 1 @ 5       |
| C    | L2 1/2x2 1/2x3/8              | G    | 3 @ 3.33333 |
| D    | L1 3/4x1 3/4x3/16 w/ L2x2x1/4 |      |             |

**MATERIAL STRENGTH**

| GRADE   | Fy     | Fu     | GRADE | Fy     | Fu     |
|---------|--------|--------|-------|--------|--------|
| A572-50 | 50 ksi | 65 ksi | A36   | 36 ksi | 58 ksi |

**TOWER DESIGN NOTES**

- ALL REACTIONS ARE FACT
1. Tower is located in Fairfield County, Connecticut.
  2. Tower designed for Exposure B to the TIA-222-G Standard.
  3. Tower designed for a 89 mph basic wind in accordance with the TIA-222-G Standard

|  |   |   |
|--|---|---|
| <b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | Job: <b>US-CT-5009</b>                          |   |
|  | Project: <b>Guyed Tower Structural Analysis</b> |   |
|  | Client:   | Drawn by: <b>Luke Myrick</b>                            |
|  | Code: <b>TIA-222-G</b>                          | Date: <b>04/29/19</b>                                   |
|  | Path:   | App'd: _____<br>Scale: <b>NTS</b><br>Dwg No. <b>E-1</b> |

|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <b>Job</b><br><p style="text-align: center;">US-CT-5009</p>                          | <b>Page</b><br><p style="text-align: center;">1 of 76</p>            |
|   | <b>Project</b><br><p style="text-align: center;">Guyed Tower Structural Analysis</p> | <b>Date</b><br><p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <b>Client</b>  | <b>Designed by</b><br><p style="text-align: center;">Luke Myrick</p> |

## Tower Input Data

The main tower is a 3x guyed tower with an overall height of 492.000 ft above the ground line.

The base of the tower is set at an elevation of 0.000 ft above the ground line.

The face width of the tower is 4.000 ft at the top and 4.000 ft at the base.

An index plate is provided at the 3x guyed -tower connection.

There is a pole section.

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

The following design criteria apply:

Tower is located in Fairfield County, Connecticut.

Basic wind speed of 89 mph.

Structure Class II.

Exposure Category B.

Topographic Category 5.

Crest Height 449.000 ft.

SEAW RSM-03 procedures for wind speed-up calculations are used.

Topographic Feature: Continuous Ridge.

Slope Distance L: 2954.000 ft.

Distance from Crest x: 807.000 ft.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56.000 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50.000 °F.

Deflections calculated using a wind speed of 60 mph.

I-Beam base is 2.000 ft above the pivot.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Safety factor used in guy design is 1.

Stress ratio used in tower member design is 1.

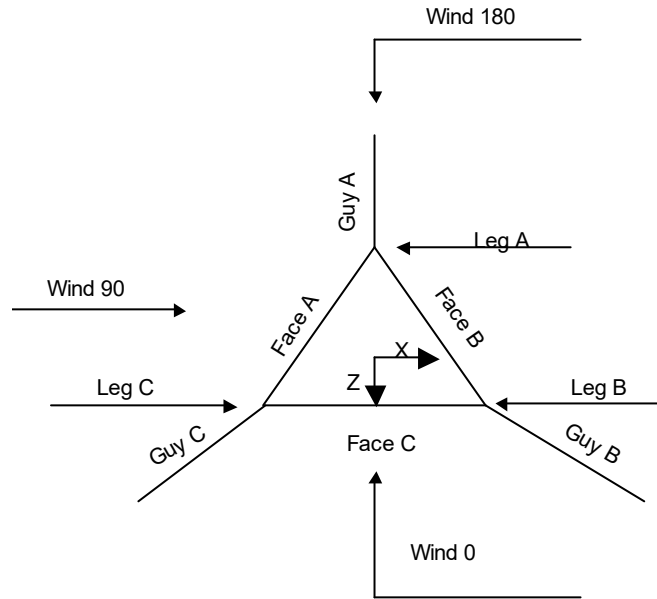
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>Include Bolts In Member Capacity</li> <li>Leg Bolts Are At Top Of Section</li> <li>Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>√ SR Members Have Cut Ends</li> <li>√ SR Members Are Concentric</li> </ul> | <ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>√ Use Clear Spans For KL/r</li> <li>√ Retension Guys To Initial Tension</li> <li>Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>√ Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>√ Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> <li>Ignore KL/ry For 60 Deg. Angle Legs</li> </ul> | <ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>√ Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>√ SR Leg Bolts Resist Compression</li> <li>√ All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feed Line Torque</li> <li>Include Angle Block Shear Check</li> <li>Use TIA-222-G Bracing Resist. Exemption</li> <li>Use TIA-222-G Tension Splice Exemption</li> <li style="text-align: center;"><b>Poles</b></li> <li>Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> <li>Pole Without Linear Attachments</li> <li>Pole With Shroud Or No Appurtenances</li> <li>Outside and Inside Corner Radii Are</li> </ul> |
|--|---|--|

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>2 of 76            |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

Known



**Corner & Starmount Guyed Tower**

**Pole Section Geometry**

| Section | Elevation<br>ft | Section Length<br>ft | Pole Size | Pole Grade           | Socket Length<br>ft |
|---------|-----------------|----------------------|-----------|----------------------|---------------------|
| L1      | 492.000-477.000 | 15.000               | P8x.406   | A53-B-35<br>(35 ksi) |                     |
| L2      | 477.000-457.000 | 20.000               | P8x.406   | A53-B-35<br>(35 ksi) |                     |

| Tower Elevation<br>ft | Gusset Area<br>(per face)<br>ft <sup>2</sup> | Gusset Thickness<br>in | Gusset Grade | Adjust. Factor<br><i>A<sub>f</sub></i> | Adjust. Factor<br><i>A<sub>r</sub></i> | Weight Mult. | Double Angle<br>Stitch Bolt<br>Spacing<br>Diagonals<br>in | Double Angle<br>Stitch Bolt<br>Spacing<br>Horizontals<br>in | Double Angle<br>Stitch Bolt<br>Spacing<br>Redundants<br>in |
|-----------------------|--|------------------------|--------------|--|--|--------------|---|---|--|
| L1<br>492.000-477.000 |  |                        |              | 1                                      | 1                                      | 1            |   |   |  |
| L2<br>477.000-457.000 |  |                        |              | 1                                      | 1                                      | 1            |   |   |  |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 3 of 76           |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

### Tower Section Geometry

| Tower Section | Tower Elevation | Assembly Database | Description | Section Width | Number of Sections | Section Length |
|---------------|-----------------|-------------------|-------------|---------------|--------------------|----------------|
|               | ft              |                   |             | ft            |                    | ft             |
| T1            | 457.000-452.000 |                   |             | 4.000         | 1                  | 5.000          |
| T2            | 452.000-442.000 |                   |             | 4.000         | 1                  | 10.000         |
| T3            | 442.000-422.000 |                   |             | 4.000         | 1                  | 20.000         |
| T4            | 422.000-402.000 |                   |             | 4.000         | 1                  | 20.000         |
| T5            | 402.000-382.000 |                   |             | 4.000         | 1                  | 20.000         |
| T6            | 382.000-362.000 |                   |             | 4.000         | 1                  | 20.000         |
| T7            | 362.000-342.000 |                   |             | 4.000         | 1                  | 20.000         |
| T8            | 342.000-322.000 |                   |             | 4.000         | 1                  | 20.000         |
| T9            | 322.000-302.000 |                   |             | 4.000         | 1                  | 20.000         |
| T10           | 302.000-282.000 |                   |             | 4.000         | 1                  | 20.000         |
| T11           | 282.000-262.000 |                   |             | 4.000         | 1                  | 20.000         |
| T12           | 262.000-242.000 |                   |             | 4.000         | 1                  | 20.000         |
| T13           | 242.000-222.000 |                   |             | 4.000         | 1                  | 20.000         |
| T14           | 222.000-202.000 |                   |             | 4.000         | 1                  | 20.000         |
| T15           | 202.000-182.000 |                   |             | 4.000         | 1                  | 20.000         |
| T16           | 182.000-162.000 |                   |             | 4.000         | 1                  | 20.000         |
| T17           | 162.000-142.000 |                   |             | 4.000         | 1                  | 20.000         |
| T18           | 142.000-122.000 |                   |             | 4.000         | 1                  | 20.000         |
| T19           | 122.000-112.000 |                   |             | 4.000         | 1                  | 10.000         |
| T20           | 112.000-102.000 |                   |             | 4.000         | 1                  | 10.000         |
| T21           | 102.000-82.000  |                   |             | 4.000         | 1                  | 20.000         |
| T22           | 82.000-62.000   |                   |             | 4.000         | 1                  | 20.000         |
| T23           | 62.000-42.000   |                   |             | 4.000         | 1                  | 20.000         |
| T24           | 42.000-22.000   |                   |             | 4.000         | 1                  | 20.000         |
| T25           | 22.000-2.000    |                   |             | 4.000         | 1                  | 20.000         |

### Tower Section Geometry (cont'd)

| Tower Section | Tower Elevation | Diagonal Spacing | Bracing Type  | Has K Brace End Panels | Has Horizontals | Top Girt Offset | Bottom Girt Offset |
|---------------|-----------------|------------------|---------------|------------------------|-----------------|-----------------|--------------------|
|               | ft              | ft               |               |                        |                 | in              | in                 |
| T1            | 457.000-452.000 | 5.000            | K Brace Down  | No                     | Yes             | 0.0000          | 0.0000             |
| T2            | 452.000-442.000 | 3.333            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T3            | 442.000-422.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T4            | 422.000-402.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T5            | 402.000-382.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T6            | 382.000-362.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T7            | 362.000-342.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T8            | 342.000-322.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T9            | 322.000-302.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T10           | 302.000-282.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T11           | 282.000-262.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T12           | 262.000-242.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T13           | 242.000-222.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T14           | 222.000-202.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T15           | 202.000-182.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T16           | 182.000-162.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T17           | 162.000-142.000 | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |



|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 4 of 76           |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Tower Section | Tower Elevation | Diagonal Spacing | Bracing Type  | Has K Brace End Panels | Has Horizontals | Top Girt Offset | Bottom Girt Offset |
|---------------|-----------------|------------------|---------------|------------------------|-----------------|-----------------|--------------------|
|               | ft              | ft               |               |                        |                 | in              | in                 |
| T18           | 142.000-122.000 | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T19           | 122.000-112.000 | 3.333            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T20           | 112.000-102.000 | 3.333            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T21           | 102.000-82.000  | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T22           | 82.000-62.000   | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T23           | 62.000-42.000   | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |
| T24           | 42.000-22.000   | 4.000            | K Brace Right | No                     | Yes             | 0.0000          | 0.0000             |
| T25           | 22.000-2.000    | 4.000            | K Brace Left  | No                     | Yes             | 0.0000          | 0.0000             |

### Tower Section Geometry (cont'd)

| Tower Elevation | Leg Type | Leg Size    | Leg Grade | Diagonal Type    | Diagonal Size   | Diagonal Grade                |              |
|-----------------|----------|-------------|-----------|------------------|-----------------|-------------------------------|--------------|
| ft              |          |             |           |                  |                 |                               |              |
| 457.000-452.000 | T1       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2 1/2x2x3/16                 | A36 (36 ksi) |
| 452.000-442.000 | T2       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 442.000-422.000 | T3       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 422.000-402.000 | T4       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 402.000-382.000 | T5       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 382.000-362.000 | T6       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 362.000-342.000 | T7       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 342.000-322.000 | T8       | Solid Round | 2 1/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 322.000-302.000 | T9       | Solid Round | 2 1/2     | A572-50 (50 ksi) | Single Angle    | L1 3/4x1 3/4x3/16             | A36 (36 ksi) |
| 302.000-282.000 | T10      | Solid Round | 2 1/2     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 282.000-262.000 | T11      | Solid Round | 2 3/4     | A572-50 (50 ksi) | Single Angle    | L2 1/2x2 1/2x3/8              | A36 (36 ksi) |
| 262.000-242.000 | T12      | Solid Round | 2 3/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 242.000-222.000 | T13      | Solid Round | 2 3/4     | A572-50 (50 ksi) | Single Angle    | L2x2x1/4                      | A36 (36 ksi) |
| 222.000-202.000 | T14      | Solid Round | 3         | A572-50 (50 ksi) | Single Angle    | L2 1/2x2 1/2x3/8              | A36 (36 ksi) |
| 202.000-182.000 | T15      | Solid Round | 3         | A572-50 (50 ksi) | Single Angle    | L1 3/4x1 3/4x3/16             | A36 (36 ksi) |
| 182.000-162.000 | T16      | Solid Round | 3         | A572-50 (50 ksi) | Single Angle    | L1 3/4x1 3/4x3/16             | A36 (36 ksi) |
| 162.000-142.000 | T17      | Solid Round | 3         | A572-50 (50 ksi) | Single Angle    | L1 3/4x1 3/4x3/16             | A36 (36 ksi) |
| 142.000-122.000 | T18      | Solid Round | 3         | A572-50 (50 ksi) | Single Angle    | L1 3/4x1 3/4x3/16             | A36 (36 ksi) |
| 122.000-112.000 | T19      | Solid Round | 3         | A572-50 (50 ksi) | Single Angle    | L1 3/4x1 3/4x3/16             | A36 (36 ksi) |
| 112.000-102.000 | T20      | Solid Round | 3         | A572-50 (50 ksi) | Arbitrary Shape | L1 3/4x1 3/4x3/16 w/ L2x2x1/4 | A36 (36 ksi) |
| 102.000-82.000  | T21      | Solid Round | 3         | A572-50 (50 ksi) | Single Angle    | L1 3/4x1 3/4x3/16             | A36 (36 ksi) |
|                 | T22      | Solid Round | 3         | A572-50          | Single Angle    | L1 3/4x1 3/4x3/16             | A36          |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">5 of 76</p>            |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Elevation<br>ft | Leg Type    | Leg Size | Leg Grade           | Diagonal Type | Diagonal Size     | Diagonal Grade  |
|-----------------------|-------------|----------|---------------------|---------------|-------------------|-----------------|
| 82.000-62.000<br>T23  | Solid Round | 3        | (50 ksi)<br>A572-50 | Single Angle  | L1 3/4x1 3/4x3/16 | (36 ksi)<br>A36 |
| 62.000-42.000<br>T24  | Solid Round | 3        | (50 ksi)<br>A572-50 | Single Angle  | L1 3/4x1 3/4x3/16 | (36 ksi)<br>A36 |
| 42.000-22.000<br>T25  | Solid Round | 3        | (50 ksi)<br>A572-50 | Single Angle  | L1 3/4x1 3/4x3/16 | (36 ksi)<br>A36 |
| 22.000-2.000          |             |          | (50 ksi)            |               |                   | (36 ksi)        |

### Tower Section Geometry (cont'd)

| Tower Elevation<br>ft  | Top Girt Type | Top Girt Size | Top Girt Grade  | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|------------------------|---------------|---------------|-----------------|------------------|------------------|-------------------|
| T1<br>457.000-452.000  | Channel       | C6x10.5       | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T2<br>452.000-442.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T3<br>442.000-422.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T4<br>422.000-402.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T5<br>402.000-382.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T6<br>382.000-362.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T7<br>362.000-342.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T8<br>342.000-322.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T9<br>322.000-302.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T10<br>302.000-282.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T11<br>282.000-262.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T12<br>262.000-242.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T13<br>242.000-222.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T14<br>222.000-202.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T15<br>202.000-182.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T16<br>182.000-162.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T17<br>162.000-142.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T18<br>142.000-122.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T19<br>122.000-112.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T20<br>112.000-102.000 | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T21<br>102.000-82.000  | Single Angle  | L2x2x3/16     | A36<br>(36 ksi) | Single Angle     | L2x2x3/16        | A36<br>(36 ksi)   |
| T22                    | Single Angle  | L2x2x3/16     | A36             | Single Angle     | L2x2x3/16        | A36               |

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| <p style="text-align: center;"><b><i>tnxTower</i></b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">6 of 76</p>            |
|  | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|  | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Elevation<br>ft | Top Girt Type | Top Girt Size | Top Girt Grade | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|-----------------------|---------------|---------------|----------------|------------------|------------------|-------------------|
| 82.000-62.000         |               |               | (36 ksi)       |                  |                  | (36 ksi)          |
| T23                   | Single Angle  | L2x2x3/16     | A36            | Single Angle     | L2x2x3/16        | A36               |
| 62.000-42.000         |               |               | (36 ksi)       |                  |                  | (36 ksi)          |
| T24                   | Single Angle  | L2x2x3/16     | A36            | Single Angle     | L2x2x3/16        | A36               |
| 42.000-22.000         |               |               | (36 ksi)       |                  |                  | (36 ksi)          |
| T25 22.000-2.000      | Single Angle  | L2x2x3/16     | A36            | Single Angle     | L2x2x3/16        | A36               |
|                       |               |               | (36 ksi)       |                  |                  | (36 ksi)          |

### Tower Section Geometry (cont'd)

| Tower Elevation<br>ft | No. of Mid Girts | Mid Girt Type | Mid Girt Size | Mid Girt Grade | Horizontal Type | Horizontal Size | Horizontal Grade |
|-----------------------|------------------|---------------|---------------|----------------|-----------------|-----------------|------------------|
| T1                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 457.000-452.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T2                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 452.000-442.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T3                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 442.000-422.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T4                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 422.000-402.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T5                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 402.000-382.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T6                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 382.000-362.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T7                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 362.000-342.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T8                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 342.000-322.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T9                    | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 322.000-302.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T10                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 302.000-282.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T11                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 282.000-262.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T12                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 262.000-242.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T13                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 242.000-222.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T14                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 222.000-202.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T15                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 202.000-182.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T16                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 182.000-162.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T17                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 162.000-142.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T18                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 142.000-122.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T19                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 122.000-112.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T20                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 112.000-102.000       |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |
| T21                   | None             | Solid Round   |               | A572-50        | Single Angle    | L2x2x3/16       | A36              |
| 102.000-82.000        |                  |               |               | (50 ksi)       |                 |                 | (36 ksi)         |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">7 of 76</p>            |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Elevation<br><i>ft</i> | No. of Mid Girts | Mid Girt Type | Mid Girt Size | Mid Girt Grade      | Horizontal Type | Horizontal Size | Horizontal Grade |
|------------------------------|------------------|---------------|---------------|---------------------|-----------------|-----------------|------------------|
| T22<br>82.000-62.000         | None             | Solid Round   |               | A572-50<br>(50 ksi) | Single Angle    | L2x2x3/16       | A36<br>(36 ksi)  |
| T23<br>62.000-42.000         | None             | Solid Round   |               | A572-50<br>(50 ksi) | Single Angle    | L2x2x3/16       | A36<br>(36 ksi)  |
| T24<br>42.000-22.000         | None             | Solid Round   |               | A572-50<br>(50 ksi) | Single Angle    | L2x2x3/16       | A36<br>(36 ksi)  |
| T25<br>22.000-2.000          | None             | Solid Round   |               | A572-50<br>(50 ksi) | Single Angle    | L2x2x3/16       | A36<br>(36 ksi)  |

### Tower Section Geometry (cont'd)

| Tower Elevation<br><i>ft</i> | Gusset Area<br>(per face)<br><i>ft<sup>2</sup></i> | Gusset Thickness<br><i>in</i> | Gusset Grade    | Adjust. Factor<br><i>A<sub>f</sub></i> | Adjust. Factor<br><i>A<sub>r</sub></i> | Weight Mult. | Double Angle<br>Stitch Bolt<br>Spacing<br>Diagonals<br><i>in</i> | Double Angle<br>Stitch Bolt<br>Spacing<br>Horizontals<br><i>in</i> | Double Angle<br>Stitch Bolt<br>Spacing<br>Redundants<br><i>in</i> |
|------------------------------|--|-------------------------------|-----------------|--|--|--------------|--|--|---|
| T1<br>457.000-452.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T2<br>452.000-442.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T3<br>442.000-422.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T4<br>422.000-402.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T5<br>402.000-382.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T6<br>382.000-362.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T7<br>362.000-342.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T8<br>342.000-322.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T9<br>322.000-302.000        | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T10<br>302.000-282.000       | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T11<br>282.000-262.000       | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T12<br>262.000-242.000       | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |
| T13<br>242.000-222.000       | 0.000  | 0.0000                        | A36<br>(36 ksi) | 1                                      | 1                                      | 1            | 36.0000  | 36.0000  | 36.0000   |







|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">11 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Elevation<br>ft  | Leg                       |   | Diagonal                  |      | Top Girt                  |      | Bottom Girt                  |      | Mid Girt                     |      | Long Horizontal              |      | Short Horizontal             |      |
|------------------------|---------------------------|---|---------------------------|------|---------------------------|------|------------------------------|------|------------------------------|------|------------------------------|------|------------------------------|------|
|                        | Net Width<br>Deduct<br>in | U | Net Width<br>Deduct<br>in | U    | Net Width<br>Deduct<br>in | U    | Net<br>Width<br>Deduct<br>in | U    | Net<br>Width<br>Deduct<br>in | U    | Net<br>Width<br>Deduct<br>in | U    | Net<br>Width<br>Deduct<br>in | U    |
| T17<br>162.000-142.000 | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T18<br>142.000-122.000 | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T19<br>122.000-112.000 | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T20<br>112.000-102.000 | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T21<br>102.000-82.000  | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T22<br>82.000-62.000   | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T23<br>62.000-42.000   | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T24<br>42.000-22.000   | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |
| T25<br>22.000-2.000    | 0.0000                    | 1 | 0.0000                    | 0.75 | 0.0000                    | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 | 0.0000                       | 0.75 |

### Guy Data

| Guy Elevation<br>ft | Guy Grade | Guy Size | Initial Tension<br>K | %      | Guy Modulus<br>ksi | Guy Weight<br>plf | L <sub>u</sub><br>ft | Anchor Radius<br>ft | Anchor Azimuth Adj.<br>° | Anchor Elevation<br>ft | End Fitting Efficiency<br>% |      |
|---------------------|-----------|----------|----------------------|--------|--------------------|-------------------|----------------------|---------------------|--------------------------|------------------------|-----------------------------|------|
| 442                 | BS        | A        | 1                    | 12.200 | 10%                | 24000.000         | 2.100                | 463.412             | 149.000                  | 0.0000                 | 2.000                       | 100% |
|                     |           | B        | 1                    | 12.200 | 10%                | 24000.000         | 2.100                | 468.175             | 146.000                  | 0.0000                 | -4.000                      | 100% |
|                     |           | C        | 1                    | 12.200 | 10%                | 24000.000         | 2.100                | 471.642             | 148.000                  | 0.0000                 | -7.000                      | 100% |
| 382                 | BS        | A        | 1                    | 12.200 | 10%                | 24000.000         | 2.100                | 406.985             | 149.000                  | 0.0000                 | 2.000                       | 100% |
|                     |           | B        | 1                    | 12.200 | 10%                | 24000.000         | 2.100                | 411.527             | 146.000                  | 0.0000                 | -4.000                      | 100% |
|                     |           | C        | 1                    | 12.200 | 10%                | 24000.000         | 2.100                | 415.034             | 148.000                  | 0.0000                 | -7.000                      | 100% |
| 322                 | BS        | A        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 351.727             | 149.000                  | 0.0000                 | 2.000                       | 100% |
|                     |           | B        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 355.966             | 146.000                  | 0.0000                 | -4.000                      | 100% |
|                     |           | C        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 359.515             | 148.000                  | 0.0000                 | -7.000                      | 100% |
| 262                 | BS        | A        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 298.280             | 149.000                  | 0.0000                 | 2.000                       | 100% |
|                     |           | B        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 302.079             | 146.000                  | 0.0000                 | -4.000                      | 100% |
|                     |           | C        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 305.666             | 148.000                  | 0.0000                 | -7.000                      | 100% |
| 210                 | BS        | A        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 242.010             | 123.000                  | 0.0000                 | 0.000                       | 100% |
|                     |           | B        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 239.318             | 117.500                  | 0.0000                 | 0.000                       | 100% |
|                     |           | C        | 7/8                  | 9.200  | 10%                | 24000.000         | 1.610                | 243.710             | 117.500                  | 0.0000                 | -5.000                      | 100% |
| 154                 | EHS       | A        | 9/16                 | 3.500  | 10%                | 21000.000         | 0.671                | 195.493             | 123.000                  | 0.0000                 | 0.000                       | 100% |
|                     |           | B        | 9/16                 | 3.500  | 10%                | 21000.000         | 0.671                | 192.151             | 117.500                  | 0.0000                 | 0.000                       | 100% |
|                     |           | C        | 9/16                 | 3.500  | 10%                | 21000.000         | 0.671                | 196.174             | 117.500                  | 0.0000                 | -5.000                      | 100% |
| 102                 | EHS       | A        | 9/16                 | 3.500  | 10%                | 21000.000         | 0.671                | 157.886             | 123.000                  | 0.0000                 | 0.000                       | 100% |
|                     |           | B        | 9/16                 | 3.500  | 10%                | 21000.000         | 0.671                | 153.730             | 117.500                  | 0.0000                 | 0.000                       | 100% |
|                     |           | C        | 9/16                 | 3.500  | 10%                | 21000.000         | 0.671                | 157.086             | 117.500                  | 0.0000                 | -5.000                      | 100% |



|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 12 of 76          |
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|    |     |   |     |       |     |           |       |         |         |        |        |      |
|----|-----|---|-----|-------|-----|-----------|-------|---------|---------|--------|--------|------|
| 46 | EHS | A | 1/2 | 2.690 | 10% | 21000.000 | 0.517 | 129.052 | 123.000 | 0.0000 | 0.000  | 100% |
|    |     | B | 1/2 | 2.690 | 10% | 21000.000 | 0.517 | 123.932 | 117.500 | 0.0000 | 0.000  | 100% |
|    |     | C | 1/2 | 2.690 | 10% | 21000.000 | 0.517 | 125.870 | 117.500 | 0.0000 | -5.000 | 100% |

**Guy Data(cont'd)**

| Guy Elevation<br>ft | Mount Type | Torque-Arm Spread<br>ft | Torque-Arm Leg Angle<br>° | Torque-Arm Style | Torque-Arm Grade | Torque-Arm Type | Torque-Arm Size |
|---------------------|------------|-------------------------|---------------------------|------------------|------------------|-----------------|-----------------|
| 442                 | Corner     |                         |                           |                  |                  |                 |                 |
| 382                 | Corner     |                         |                           |                  |                  |                 |                 |
| 322                 | Corner     |                         |                           |                  |                  |                 |                 |
| 262                 | Corner     |                         |                           |                  |                  |                 |                 |
| 210                 | Corner     |                         |                           |                  |                  |                 |                 |
| 154                 | Corner     |                         |                           |                  |                  |                 |                 |
| 102                 | Corner     |                         |                           |                  |                  |                 |                 |
| 46                  | Corner     |                         |                           |                  |                  |                 |                 |

**Guy Data (cont'd)**

| Guy Elevation<br>ft | Diagonal Grade      | Diagonal Type | Upper Diagonal Size | Lower Diagonal Size | Is Strap. | Pull-Off Grade      | Pull-Off Type | Pull-Off Size |
|---------------------|---------------------|---------------|---------------------|---------------------|-----------|---------------------|---------------|---------------|
| 442.000             | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |
| 382.000             | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |
| 322.000             | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |
| 262.000             | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |
| 210.000             | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |
| 154.000             | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |
| 102.000             | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |
| 46.000              | A572-50<br>(50 ksi) | Solid Round   |                     |                     |           | A572-50<br>(50 ksi) | Flat Bar      |               |

**Guy Data (cont'd)**

| Guy Elevation<br>ft | Cable Weight<br>A<br>K | Cable Weight<br>B<br>K | Cable Weight<br>C<br>K | Cable Weight<br>D<br>K | Tower Intercept<br>A<br>ft | Tower Intercept<br>B<br>ft | Tower Intercept<br>C<br>ft | Tower Intercept<br>D<br>ft |
|---------------------|------------------------|------------------------|------------------------|------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 442                 | 0.973                  | 0.983                  | 0.990                  |                        | 17.825                     | 18.185                     | 18.450                     |                            |
| 382                 | 0.855                  | 0.864                  | 0.872                  |                        | 7.3 sec/pulse<br>13.817    | 7.4 sec/pulse<br>14.120    | 7.4 sec/pulse<br>14.359    |                            |

|   |                |                                 |             |                    |                   |
|---|----------------|---------------------------------|-------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b> | 13 of 76           |                   |
|   | <b>Project</b> | Guyed Tower Structural Analysis |             | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 |             | <b>Designed by</b> | Luke Myrick       |

| Guy Elevation<br>ft | Cable Weight<br>A<br>K | Cable Weight<br>B<br>K | Cable Weight<br>C<br>K | Cable Weight<br>D<br>K | Tower Intercept         | Tower Intercept         | Tower Intercept         | Tower Intercept |
|---------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-----------------|
|                     |                        |                        |                        |                        | A<br>ft                 | B<br>ft                 | C<br>ft                 | D<br>ft         |
| 322                 | 0.566                  | 0.573                  | 0.579                  |                        | 6.4 sec/pulse<br>10.540 | 6.5 sec/pulse<br>10.790 | 6.5 sec/pulse<br>11.003 |                 |
| 262                 | 0.480                  | 0.486                  | 0.492                  |                        | 5.6 sec/pulse<br>7.619  | 5.7 sec/pulse<br>7.810  | 5.7 sec/pulse<br>7.995  |                 |
| 210                 | 0.390                  | 0.385                  | 0.392                  |                        | 4.8 sec/pulse<br>5.037  | 4.8 sec/pulse<br>4.925  | 4.9 sec/pulse<br>5.106  |                 |
| 154                 | 0.131                  | 0.129                  | 0.132                  |                        | 3.9 sec/pulse<br>3.613  | 3.8 sec/pulse<br>3.491  | 3.9 sec/pulse<br>3.637  |                 |
| 102                 | 0.106                  | 0.103                  | 0.105                  |                        | 3.3 sec/pulse<br>2.369  | 3.2 sec/pulse<br>2.245  | 3.3 sec/pulse<br>2.344  |                 |
| 46                  | 0.067                  | 0.064                  | 0.065                  |                        | 2.7 sec/pulse<br>1.595  | 2.6 sec/pulse<br>1.471  | 2.6 sec/pulse<br>1.516  |                 |
|                     |                        |                        |                        |                        | 2.2 sec/pulse           | 2.1 sec/pulse           | 2.1 sec/pulse           |                 |

### Guy Data (cont'd)

| Guy Elevation<br>ft | Calc<br>K<br>Single<br>Angles | Calc<br>K<br>Solid<br>Rounds | Torque Arm     |                | Pull Off       |                | Diagonal       |                |
|---------------------|-------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                     |                               |                              | K <sub>x</sub> | K <sub>y</sub> | K <sub>x</sub> | K <sub>y</sub> | K <sub>x</sub> | K <sub>y</sub> |
| 442                 | No                            | No                           |                |                | 1              | 1              | 1              | 1              |
| 382                 | No                            | No                           |                |                | 1              | 1              | 1              | 1              |
| 322                 | No                            | No                           |                |                | 1              | 1              | 1              | 1              |
| 262                 | No                            | No                           |                |                | 1              | 1              | 1              | 1              |
| 210                 | No                            | No                           |                |                | 1              | 1              | 1              | 1              |
| 154                 | No                            | No                           |                |                | 1              | 1              | 1              | 1              |
| 102                 | No                            | No                           |                |                | 1              | 1              | 1              | 1              |
| 46                  | No                            | No                           |                |                | 1              | 1              | 1              | 1              |

### Guy Data (cont'd)

| Guy Elevation<br>ft | Torque-Arm      |        |                           |   | Pull Off        |        |                           |      | Diagonal        |        |                           |      |
|---------------------|-----------------|--------|---------------------------|---|-----------------|--------|---------------------------|------|-----------------|--------|---------------------------|------|
|                     | Bolt Size<br>in | Number | Net Width<br>Deduct<br>in | U | Bolt Size<br>in | Number | Net Width<br>Deduct<br>in | U    | Bolt Size<br>in | Number | Net Width<br>Deduct<br>in | U    |
| 442                 | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |
| 382                 | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |
| 322                 | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |
| 262                 | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |
| 210                 | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |
| 154                 | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |
| 102                 | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |
| 46                  | 0.0000          | 0      | 0.0000                    | 1 | 0.6250          | 0      | 0.0000                    | 0.75 | 0.6250          | 0      | 0.0000                    | 0.75 |
|                     | A325N           |        |                           |   | A325N           |        |                           |      | A325N           |        |                           |      |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 14 of 76          |
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### Guy Pressures

| Guy Elevation<br>ft | Guy Location | z<br>ft | q <sub>z</sub><br>ksf | q <sub>z</sub><br>Ice<br>ksf | Ice Thickness<br>in |
|---------------------|--------------|---------|-----------------------|------------------------------|---------------------|
| 442                 | A            | 222.000 | 0.029                 | 0.009                        | 2.0138              |
|                     | B            | 219.000 | 0.029                 | 0.009                        | 2.0122              |
|                     | C            | 217.500 | 0.029                 | 0.009                        | 2.0114              |
| 382                 | A            | 192.000 | 0.028                 | 0.009                        | 1.9968              |
|                     | B            | 189.000 | 0.028                 | 0.009                        | 1.9949              |
|                     | C            | 187.500 | 0.028                 | 0.009                        | 1.9939              |
| 322                 | A            | 162.000 | 0.027                 | 0.009                        | 1.9757              |
|                     | B            | 159.000 | 0.027                 | 0.009                        | 1.9733              |
|                     | C            | 157.500 | 0.027                 | 0.009                        | 1.9720              |
| 262                 | A            | 132.000 | 0.026                 | 0.008                        | 1.9486              |
|                     | B            | 129.000 | 0.026                 | 0.008                        | 1.9455              |
|                     | C            | 127.500 | 0.026                 | 0.008                        | 1.9439              |
| 210                 | A            | 105.000 | 0.025                 | 0.008                        | 1.9166              |
|                     | B            | 105.000 | 0.025                 | 0.008                        | 1.9166              |
|                     | C            | 102.500 | 0.025                 | 0.008                        | 1.9132              |
| 154                 | A            | 77.000  | 0.023                 | 0.007                        | 1.8709              |
|                     | B            | 77.000  | 0.023                 | 0.007                        | 1.8709              |
|                     | C            | 74.500  | 0.023                 | 0.007                        | 1.8659              |
| 102                 | A            | 51.000  | 0.021                 | 0.007                        | 1.8075              |
|                     | B            | 51.000  | 0.021                 | 0.007                        | 1.8075              |
|                     | C            | 48.500  | 0.021                 | 0.007                        | 1.7996              |
| 46                  | A            | 23.000  | 0.019                 | 0.006                        | 1.6817              |
|                     | B            | 23.000  | 0.019                 | 0.006                        | 1.6817              |
|                     | C            | 20.500  | 0.019                 | 0.006                        | 1.6636              |

### Guy-Tensioning Information

|                     |         | Temperature At Time Of Tensioning |                      |                 |                      |                 |                      |                 |                      |                 |                      |                 |                      |                 |                      |                 |       |
|---------------------|---------|-----------------------------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|-------|
| Guy Elevation<br>ft | H<br>ft | V<br>ft                           | 0 F                  |                 | 20 F                 |                 | 40 F                 |                 | 60 F                 |                 | 80 F                 |                 | 100 F                |                 | 120 F                |                 |       |
|                     |         |                                   | Initial Tension<br>K | Intercept<br>ft | Initial Tension<br>K | Intercept<br>ft | Initial Tension<br>K | Intercept<br>ft | Initial Tension<br>K | Intercept<br>ft | Initial Tension<br>K | Intercept<br>ft | Initial Tension<br>K | Intercept<br>ft | Initial Tension<br>K | Intercept<br>ft |       |
| 442                 | A       | 146.69                            | 440.00               | 12.735          | 17.10                | 12.556          | 17.33                | 12.378          | 17.58                | 12.200          | 17.83                | 12.023          | 18.08                | 11.846          | 18.34                | 11.670          | 18.61 |
|                     | B       | 143.69                            | 446.00               | 12.704          | 17.48                | 12.535          | 17.71                | 12.367          | 17.95                | 12.200          | 18.18                | 12.033          | 18.43                | 11.866          | 18.68                | 11.700          | 18.94 |
|                     | C       | 145.69                            | 449.00               | 12.709          | 17.73                | 12.539          | 17.96                | 12.369          | 18.20                | 12.200          | 18.45                | 12.031          | 18.70                | 11.862          | 18.96                | 11.694          | 19.22 |
| 382                 | A       | 146.69                            | 380.00               | 12.893          | 13.09                | 12.662          | 13.33                | 12.430          | 13.57                | 12.200          | 13.82                | 11.970          | 14.08                | 11.741          | 14.34                | 11.513          | 14.62 |
|                     | B       | 143.69                            | 386.00               | 12.852          | 13.42                | 12.634          | 13.65                | 12.417          | 13.88                | 12.200          | 14.12                | 11.984          | 14.37                | 11.769          | 14.62                | 11.554          | 14.89 |
|                     | C       | 145.69                            | 389.00               | 12.858          | 13.64                | 12.638          | 13.87                | 12.419          | 14.11                | 12.200          | 14.36                | 11.982          | 14.61                | 11.765          | 14.88                | 11.548          | 15.15 |
| 322                 | A       | 146.69                            | 320.00               | 9.909           | 9.80                 | 9.672           | 10.04                | 9.435           | 10.28                | 9.200           | 10.54                | 8.966           | 10.81                | 8.733           | 11.09                | 8.501           | 11.39 |
|                     | B       | 143.69                            | 326.00               | 9.865           | 10.08                | 9.643           | 10.30                | 9.421           | 10.54                | 9.200           | 10.79                | 8.980           | 11.05                | 8.761           | 11.32                | 8.543           | 11.60 |
|                     | C       | 145.69                            | 329.00               | 9.869           | 10.27                | 9.645           | 10.51                | 9.422           | 10.75                | 9.200           | 11.00                | 8.979           | 11.27                | 8.758           | 11.54                | 8.539           | 11.83 |
| 262                 | A       | 146.69                            | 260.00               | 10.187          | 6.89                 | 9.856           | 7.12                 | 9.527           | 7.36                 | 9.200           | 7.62                 | 8.875           | 7.89                 | 8.552           | 8.18                 | 8.232           | 8.50  |
|                     | B       | 143.69                            | 266.00               | 10.125          | 7.11                 | 9.815           | 7.33                 | 9.507           | 7.56                 | 9.200           | 7.81                 | 8.895           | 8.07                 | 8.592           | 8.35                 | 8.291           | 8.65  |
|                     | C       | 145.69                            | 269.00               | 10.127          | 7.28                 | 9.817           | 7.50                 | 9.507           | 7.74                 | 9.200           | 7.99                 | 8.894           | 8.26                 | 8.591           | 8.55                 | 8.289           | 8.85  |
| 210                 | A       | 120.69                            | 210.00               | 10.231          | 4.54                 | 9.886           | 4.69                 | 9.542           | 4.86                 | 9.200           | 5.04                 | 8.859           | 5.23                 | 8.520           | 5.43                 | 8.184           | 5.65  |
|                     | B       | 115.19                            | 210.00               | 10.163          | 4.46                 | 9.841           | 4.61                 | 9.520           | 4.76                 | 9.200           | 4.93                 | 8.881           | 5.10                 | 8.564           | 5.29                 | 8.249           | 5.48  |
|                     | C       | 115.19                            | 215.00               | 10.129          | 4.64                 | 9.818           | 4.79                 | 9.508           | 4.94                 | 9.200           | 5.11                 | 8.893           | 5.28                 | 8.587           | 5.46                 | 8.282           | 5.66  |
| 154                 | A       | 120.69                            | 154.00               | 4.083           | 3.10                 | 3.887           | 3.26                 | 3.693           | 3.43                 | 3.500           | 3.61                 | 3.308           | 3.82                 | 3.119           | 4.05                 | 2.931           | 4.30  |
|                     | B       | 115.19                            | 154.00               | 4.052           | 3.02                 | 3.867           | 3.16                 | 3.683           | 3.32                 | 3.500           | 3.49                 | 3.318           | 3.68                 | 3.138           | 3.89                 | 2.961           | 4.12  |
|                     | C       | 115.19                            | 159.00               | 4.029           | 3.16                 | 3.852           | 3.31                 | 3.675           | 3.47                 | 3.500           | 3.64                 | 3.326           | 3.83                 | 3.153           | 4.03                 | 2.981           | 4.26  |
| 102                 | A       | 120.69                            | 102.00               | 4.397           | 1.89                 | 4.096           | 2.03                 | 3.796           | 2.18                 | 3.500           | 2.37                 | 3.207           | 2.58                 | 2.919           | 2.84                 | 2.638           | 3.13  |
|                     | B       | 115.19                            | 102.00               | 4.364           | 1.80                 | 4.074           | 1.93                 | 3.786           | 2.08                 | 3.500           | 2.25                 | 3.217           | 2.44                 | 2.939           | 2.67                 | 2.666           | 2.94  |
|                     | C       | 115.19                            | 107.00               | 4.328           | 1.90                 | 4.050           | 2.03                 | 3.774           | 2.17                 | 3.500           | 2.34                 | 3.229           | 2.54                 | 2.962           | 2.76                 | 2.700           | 3.03  |
| 46                  | A       | 120.69                            | 46.00                | 3.729           | 1.15                 | 3.379           | 1.27                 | 3.033           | 1.42                 | 2.690           | 1.59                 | 2.354           | 1.82                 | 2.027           | 2.11                 | 1.717           | 2.49  |
|                     | B       | 115.19                            | 46.00                | 3.719           | 1.06                 | 3.373           | 1.17                 | 3.030           | 1.31                 | 2.690           | 1.47                 | 2.356           | 1.68                 | 2.031           | 1.95                 | 1.721           | 2.29  |
|                     | C       | 115.19                            | 51.00                | 3.687           | 1.11                 | 3.352           | 1.22                 | 3.019           | 1.35                 | 2.690           | 1.52                 | 2.366           | 1.72                 | 2.051           | 1.99                 | 1.749           | 2.33  |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 15 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

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

| Description                  | Face or Leg | Allow Shield | Exclude From Torque Calculation | Component Type | Placement ft    | Face Offset in | Lateral Offset (Frac FW) | # | # Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight klf |
|------------------------------|-------------|--------------|---------------------------------|----------------|-----------------|----------------|--------------------------|---|-----------|------------------|----------------------|--------------|------------|
| 3" Coax                      | B           | No           | No                              | Ar (CaAa)      | 435.000 - 8.000 | -1.0000        | -0.3                     | 1 | 1         | 0.0000           | 3.0100               |              | 0.002      |
| AVA5-50(7/8")                | B           | No           | No                              | Ar (CaAa)      | 435.000 - 8.000 | -1.0000        | -0.2                     | 1 | 1         | 0.0000           | 1.1020               |              | 0.000      |
| 1" Conduit (Tower)           | C           | No           | Yes                             | Ar (CaAa)      | 435.000 - 8.000 | -1.0000        | -0.25                    | 1 | 1         | 0.0000           | 1.1630               |              | 0.001      |
| LDF4.5-50(5/8")              | C           | No           | Yes                             | Ar (CaAa)      | 351.000 - 8.000 | -1.0000        | 0                        | 1 | 1         | 0.0000           | 0.8650               |              | 0.000      |
| 1 5/8" OD Conduit            | C           | No           | Yes                             | Ar (CaAa)      | 430.000 - 8.000 | -1.0000        | 0.4                      | 1 | 1         | 0.0000           | 1.6250               |              | 0.001      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 108.000 - 8.000 | -1.0000        | 0.31                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 124.000 - 8.000 | -1.0000        | 0.38                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 138.000 - 8.000 | -1.0000        | 0.32                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 239.000 - 8.000 | -1.0000        | 0.33                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 247.000 - 8.000 | -1.0000        | 0.34                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 339.000 - 8.000 | -1.0000        | 0.37                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 435.000 - 8.000 | -1.0000        | 0.36                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF5-50A(7/8")               | A           | No           | Yes                             | Ar (CaAa)      | 435.000 - 8.000 | -1.0000        | 0.35                     | 1 | 1         | 0.0000           | 1.0900               |              | 0.000      |
| LDF6-50A(1-1/4") (Berkshire) | A           | No           | Yes                             | Ar (CaAa)      | 302.000 - 8.000 | 0.0000         | 0.35                     | 1 | 1         | 0.0000           | 1.5500               |              | 0.001      |
| LDF2-50A(3/8") SC (Tower)    | C           | No           | Yes                             | Ar (CaAa)      | 445.000 - 8.000 | -5.0000        | 0.35                     | 1 | 1         | 0.0000           | 0.4400               |              | 0.000      |
| LDF4.5-50(5/8")              | A           | No           | Yes                             | Ar (CaAa)      | 455.000 - 8.000 | 0.0000         | 0                        | 1 | 1         | 0.0000           | 0.8650               |              | 0.000      |
| LDF4-50A(1/2")               | C           | No           | Yes                             | Ar (CaAa)      | 289.000 - 8.000 | -1.0000        | -0.35                    | 1 | 1         | 0.0000           | 0.6300               |              | 0.000      |
| LDF6-50A(1-1/4") (T-Mobile)  | A           | No           | Yes                             | Ar (CaAa)      | 280.000 - 8.000 | 0.0000         | 0.25                     | 5 | 5         | 0.0000           | 1.5500               |              | 0.001      |
| LDF7-50A(1-5/8") (T-Mobile)  | B           | No           | Yes                             | Ar (CaAa)      | 280.000 - 8.000 | -1.0000        | 0                        | 6 | 3         | 0.0000           | 1.9800               |              | 0.001      |
| LDF7-50A(1-5/8") (T-Mobile)  | A           | No           | Yes                             | Ar (CaAa)      | 280.000 - 8.000 | 0.0000         | 0.25                     | 6 | 3         | 0.0000           | 1.9800               |              | 0.001      |
| LDF7-50A(1-5/8") (T-Mobile)  | C           | No           | Yes                             | Ar (CaAa)      | 280.000 - 8.000 | 0.0000         | 0                        | 1 | 1         | 0.0000           | 1.9800               |              | 0.001      |
| LDF6-50A(1-1/4") (Sprint)    | C           | No           | Yes                             | Ar (CaAa)      | 257.000 - 8.000 | -1.0000        | -0.35                    | 1 | 1         | 0.0000           | 1.5500               |              | 0.001      |
| LDF6-50A(1-1/4") (Sprint)    | C           | No           | Yes                             | Ar (CaAa)      | 257.000 - 8.000 | -1.0000        | 0.35                     | 3 | 3         | 0.0000           | 1.5500               |              | 0.001      |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 16 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Description            | Face or Leg | Allow Shield | Exclude From Torque Calculation | Component Type | Placement ft    | Face Offset in | Lateral Offset (Frac FW) | # | # Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight klf |
|------------------------|-------------|--------------|---------------------------------|----------------|-----------------|----------------|--------------------------|---|-----------|------------------|----------------------|--------------|------------|
| LDF2-50(3/8") (AT&T)   | C           | No           | Yes                             | Ar (CaAa)      | 165.000 - 8.000 | 0.0000         | 0.4                      | 2 | 2         | 0.0000           | 0.4400               |              | 0.000      |
| LDF4.5-50(5/8") (AT&T) | C           | No           | Yes                             | Ar (CaAa)      | 165.000 - 8.000 | 0.0000         | 0.1                      | 6 | 3         | 0.0000           | 0.8650               |              | 0.000      |

### Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation ft | Face | A <sub>R</sub> ft <sup>2</sup> | A <sub>F</sub> ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup> | Weight K |
|---------------|--------------------|------|--------------------------------|--------------------------------|---|--|----------|
| L1            | 492.000-477.000    | A    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
|               |                    | B    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
|               |                    | C    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
| L2            | 477.000-457.000    | A    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
|               |                    | B    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
|               |                    | C    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
| T1            | 457.000-452.000    | A    | 0.000                          | 0.000                          | 0.260   | 0.000  | 0.000    |
|               |                    | B    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
|               |                    | C    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
| T2            | 452.000-442.000    | A    | 0.000                          | 0.000                          | 0.865   | 0.000  | 0.002    |
|               |                    | B    | 0.000                          | 0.000                          | 0.000   | 0.000  | 0.000    |
|               |                    | C    | 0.000                          | 0.000                          | 0.132   | 0.000  | 0.000    |
| T3            | 442.000-422.000    | A    | 0.000                          | 0.000                          | 4.564   | 0.000  | 0.012    |
|               |                    | B    | 0.000                          | 0.000                          | 5.346   | 0.000  | 0.027    |
|               |                    | C    | 0.000                          | 0.000                          | 3.692   | 0.000  | 0.017    |
| T4            | 422.000-402.000    | A    | 0.000                          | 0.000                          | 6.090   | 0.000  | 0.016    |
|               |                    | B    | 0.000                          | 0.000                          | 8.224   | 0.000  | 0.042    |
|               |                    | C    | 0.000                          | 0.000                          | 6.456   | 0.000  | 0.031    |
| T5            | 402.000-382.000    | A    | 0.000                          | 0.000                          | 6.090   | 0.000  | 0.016    |
|               |                    | B    | 0.000                          | 0.000                          | 8.224   | 0.000  | 0.042    |
|               |                    | C    | 0.000                          | 0.000                          | 6.456   | 0.000  | 0.031    |
| T6            | 382.000-362.000    | A    | 0.000                          | 0.000                          | 6.090   | 0.000  | 0.016    |
|               |                    | B    | 0.000                          | 0.000                          | 8.224   | 0.000  | 0.042    |
|               |                    | C    | 0.000                          | 0.000                          | 6.456   | 0.000  | 0.031    |
| T7            | 362.000-342.000    | A    | 0.000                          | 0.000                          | 6.090   | 0.000  | 0.016    |
|               |                    | B    | 0.000                          | 0.000                          | 8.224   | 0.000  | 0.042    |
|               |                    | C    | 0.000                          | 0.000                          | 7.235   | 0.000  | 0.033    |
| T8            | 342.000-322.000    | A    | 0.000                          | 0.000                          | 7.943   | 0.000  | 0.022    |
|               |                    | B    | 0.000                          | 0.000                          | 8.224   | 0.000  | 0.042    |
|               |                    | C    | 0.000                          | 0.000                          | 8.186   | 0.000  | 0.034    |
| T9            | 322.000-302.000    | A    | 0.000                          | 0.000                          | 8.270   | 0.000  | 0.023    |
|               |                    | B    | 0.000                          | 0.000                          | 8.224   | 0.000  | 0.042    |
|               |                    | C    | 0.000                          | 0.000                          | 8.186   | 0.000  | 0.034    |
| T10           | 302.000-282.000    | A    | 0.000                          | 0.000                          | 11.370  | 0.000  | 0.036    |
|               |                    | B    | 0.000                          | 0.000                          | 8.224   | 0.000  | 0.042    |
|               |                    | C    | 0.000                          | 0.000                          | 8.627   | 0.000  | 0.035    |
| T11           | 282.000-262.000    | A    | 0.000                          | 0.000                          | 46.704  | 0.000  | 0.184    |
|               |                    | B    | 0.000                          | 0.000                          | 29.608  | 0.000  | 0.130    |
|               |                    | C    | 0.000                          | 0.000                          | 13.010  | 0.000  | 0.052    |
| T12           | 262.000-242.000    | A    | 0.000                          | 0.000                          | 51.175  | 0.000  | 0.202    |
|               |                    | B    | 0.000                          | 0.000                          | 31.984  | 0.000  | 0.140    |
|               |                    | C    | 0.000                          | 0.000                          | 22.706  | 0.000  | 0.093    |
| T13           | 242.000-222.000    | A    | 0.000                          | 0.000                          | 54.663  | 0.000  | 0.213    |
|               |                    | B    | 0.000                          | 0.000                          | 31.984  | 0.000  | 0.140    |
|               |                    | C    | 0.000                          | 0.000                          | 25.806  | 0.000  | 0.107    |

|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">17 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Tower Elevation<br>ft | Face | $A_R$<br>ft <sup>2</sup> | $A_F$<br>ft <sup>2</sup> | $C_{AA}$<br>In Face<br>ft <sup>2</sup> | $C_{AA}$<br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|---------------|-----------------------|------|--------------------------|--------------------------|--|---|-------------|
| T14           | 222.000-202.000       | A    | 0.000                    | 0.000                    | 54.990                                 | 0.000                                   | 0.214       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 25.806                                 | 0.000                                   | 0.107       |
| T15           | 202.000-182.000       | A    | 0.000                    | 0.000                    | 54.990                                 | 0.000                                   | 0.214       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 25.806                                 | 0.000                                   | 0.107       |
| T16           | 182.000-162.000       | A    | 0.000                    | 0.000                    | 54.990                                 | 0.000                                   | 0.214       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 27.627                                 | 0.000                                   | 0.110       |
| T17           | 162.000-142.000       | A    | 0.000                    | 0.000                    | 54.990                                 | 0.000                                   | 0.214       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 37.946                                 | 0.000                                   | 0.128       |
| T18           | 142.000-122.000       | A    | 0.000                    | 0.000                    | 56.952                                 | 0.000                                   | 0.220       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 37.946                                 | 0.000                                   | 0.128       |
| T19           | 122.000-112.000       | A    | 0.000                    | 0.000                    | 29.675                                 | 0.000                                   | 0.113       |
|               |                       | B    | 0.000                    | 0.000                    | 15.992                                 | 0.000                                   | 0.070       |
|               |                       | C    | 0.000                    | 0.000                    | 18.973                                 | 0.000                                   | 0.064       |
| T20           | 112.000-102.000       | A    | 0.000                    | 0.000                    | 30.329                                 | 0.000                                   | 0.115       |
|               |                       | B    | 0.000                    | 0.000                    | 15.992                                 | 0.000                                   | 0.070       |
|               |                       | C    | 0.000                    | 0.000                    | 18.973                                 | 0.000                                   | 0.064       |
| T21           | 102.000-82.000        | A    | 0.000                    | 0.000                    | 61.530                                 | 0.000                                   | 0.233       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 37.946                                 | 0.000                                   | 0.128       |
| T22           | 82.000-62.000         | A    | 0.000                    | 0.000                    | 61.530                                 | 0.000                                   | 0.233       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 37.946                                 | 0.000                                   | 0.128       |
| T23           | 62.000-42.000         | A    | 0.000                    | 0.000                    | 61.530                                 | 0.000                                   | 0.233       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 37.946                                 | 0.000                                   | 0.128       |
| T24           | 42.000-22.000         | A    | 0.000                    | 0.000                    | 61.530                                 | 0.000                                   | 0.233       |
|               |                       | B    | 0.000                    | 0.000                    | 31.984                                 | 0.000                                   | 0.140       |
|               |                       | C    | 0.000                    | 0.000                    | 37.946                                 | 0.000                                   | 0.128       |
| T25           | 22.000-2.000          | A    | 0.000                    | 0.000                    | 43.071                                 | 0.000                                   | 0.163       |
|               |                       | B    | 0.000                    | 0.000                    | 22.389                                 | 0.000                                   | 0.098       |
|               |                       | C    | 0.000                    | 0.000                    | 26.562                                 | 0.000                                   | 0.089       |

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

| Tower Section | Tower Elevation<br>ft | Face or Leg | Ice Thickness<br>in | $A_R$<br>ft <sup>2</sup> | $A_F$<br>ft <sup>2</sup> | $C_{AA}$<br>In Face<br>ft <sup>2</sup> | $C_{AA}$<br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|---------------|-----------------------|-------------|---------------------|--------------------------|--------------------------|--|---|-------------|
| L1            | 492.000-477.000       | A           | 2.090               | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
|               |                       | C           |                     | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
| L2            | 477.000-457.000       | A           | 2.086               | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
|               |                       | C           |                     | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
| T1            | 457.000-452.000       | A           | 2.084               | 0.000                    | 0.000                    | 1.510                                  | 0.000                                   | 0.023       |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
|               |                       | C           |                     | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
| T2            | 452.000-442.000       | A           | 2.083               | 0.000                    | 0.000                    | 5.030                                  | 0.000                                   | 0.077       |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                  | 0.000                                   | 0.000       |
|               |                       | C           |                     | 0.000                    | 0.000                    | 1.382                                  | 0.000                                   | 0.019       |
| T3            | 442.000-422.000       | A           | 2.080               | 0.000                    | 0.000                    | 23.697                                 | 0.000                                   | 0.371       |
|               |                       | B           |                     | 0.000                    | 0.000                    | 16.160                                 | 0.000                                   | 0.300       |
|               |                       | C           |                     | 0.000                    | 0.000                    | 20.745                                 | 0.000                                   | 0.327       |
| T4            | 422.000-402.000       | A           | 2.076               | 0.000                    | 0.000                    | 30.996                                 | 0.000                                   | 0.486       |

|  |                |                                 |                    |                   |
|--|----------------|---------------------------------|--------------------|-------------------|
| <p style="text-align: center;"><b><i>tnxTower</i></b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 18 of 76          |
|  | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|  | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| <i>Tower Section</i> | <i>Tower Elevation<br/>ft</i> | <i>Face or Leg</i> | <i>Ice Thickness<br/>in</i> | $A_R$<br><i>ft<sup>2</sup></i> | $A_F$<br><i>ft<sup>2</sup></i> | $C_{AA}$<br><i>In Face<br/>ft<sup>2</sup></i> | $C_{AA}$<br><i>Out Face<br/>ft<sup>2</sup></i> | <i>Weight<br/>K</i> |
|----------------------|-------------------------------|--------------------|-----------------------------|--------------------------------|--------------------------------|---|--|---------------------|
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 24.828  | 0.000  | 0.461               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 31.362  | 0.000  | 0.511               |
| T5                   | 402.000-382.000               | A                  | 2.071                       | 0.000                          | 0.000                          | 30.943  | 0.000  | 0.485               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 24.793  | 0.000  | 0.459               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 31.309  | 0.000  | 0.509               |
| T6                   | 382.000-362.000               | A                  | 2.066                       | 0.000                          | 0.000                          | 30.886  | 0.000  | 0.483               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 24.755  | 0.000  | 0.458               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 31.252  | 0.000  | 0.507               |
| T7                   | 362.000-342.000               | A                  | 2.061                       | 0.000                          | 0.000                          | 30.825  | 0.000  | 0.481               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 24.714  | 0.000  | 0.456               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 35.680  | 0.000  | 0.573               |
| T8                   | 342.000-322.000               | A                  | 2.056                       | 0.000                          | 0.000                          | 39.602  | 0.000  | 0.619               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 24.670  | 0.000  | 0.455               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 41.078  | 0.000  | 0.653               |
| T9                   | 322.000-302.000               | A                  | 2.050                       | 0.000                          | 0.000                          | 41.066  | 0.000  | 0.641               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 24.622  | 0.000  | 0.453               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 40.982  | 0.000  | 0.650               |
| T10                  | 302.000-282.000               | A                  | 2.043                       | 0.000                          | 0.000                          | 52.233  | 0.000  | 0.830               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 24.569  | 0.000  | 0.451               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 44.178  | 0.000  | 0.695               |
| T11                  | 282.000-262.000               | A                  | 2.036                       | 0.000                          | 0.000                          | 110.421                                       | 0.000  | 1.703               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 53.391  | 0.000  | 0.916               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 61.057  | 0.000  | 0.973               |
| T12                  | 262.000-242.000               | A                  | 2.028                       | 0.000                          | 0.000                          | 119.202                                       | 0.000  | 1.832               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 56.478  | 0.000  | 0.963               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 89.896  | 0.000  | 1.374               |
| T13                  | 242.000-222.000               | A                  | 2.019                       | 0.000                          | 0.000                          | 135.296                                       | 0.000  | 2.078               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 56.342  | 0.000  | 0.958               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 98.853  | 0.000  | 1.492               |
| T14                  | 222.000-202.000               | A                  | 2.008                       | 0.000                          | 0.000                          | 136.407                                       | 0.000  | 2.088               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 56.187  | 0.000  | 0.953               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 98.496  | 0.000  | 1.481               |
| T15                  | 202.000-182.000               | A                  | 1.997                       | 0.000                          | 0.000                          | 135.918                                       | 0.000  | 2.072               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 56.012  | 0.000  | 0.947               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 98.087  | 0.000  | 1.469               |
| T16                  | 182.000-162.000               | A                  | 1.983                       | 0.000                          | 0.000                          | 135.355                                       | 0.000  | 2.054               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 55.808  | 0.000  | 0.940               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 103.330                                       | 0.000  | 1.511               |
| T17                  | 162.000-142.000               | A                  | 1.967                       | 0.000                          | 0.000                          | 134.696                                       | 0.000  | 2.033               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 55.571  | 0.000  | 0.931               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 134.938                                       | 0.000  | 1.810               |
| T18                  | 142.000-122.000               | A                  | 1.949                       | 0.000                          | 0.000                          | 142.889                                       | 0.000  | 2.144               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 55.288  | 0.000  | 0.921               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 134.017                                       | 0.000  | 1.785               |
| T19                  | 122.000-112.000               | A                  | 1.932                       | 0.000                          | 0.000                          | 76.517  | 0.000  | 1.142               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 27.519  | 0.000  | 0.456               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 66.600  | 0.000  | 0.882               |
| T20                  | 112.000-102.000               | A                  | 1.919                       | 0.000                          | 0.000                          | 79.160  | 0.000  | 1.177               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 27.424  | 0.000  | 0.453               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 66.291  | 0.000  | 0.873               |
| T21                  | 102.000-82.000                | A                  | 1.897                       | 0.000                          | 0.000                          | 161.089                                       | 0.000  | 2.376               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 54.519  | 0.000  | 0.894               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 131.508                                       | 0.000  | 1.718               |
| T22                  | 82.000-62.000                 | A                  | 1.861                       | 0.000                          | 0.000                          | 159.120                                       | 0.000  | 2.316               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 53.968  | 0.000  | 0.875               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 129.710                                       | 0.000  | 1.671               |
| T23                  | 62.000-42.000                 | A                  | 1.810                       | 0.000                          | 0.000                          | 156.423                                       | 0.000  | 2.234               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 53.213  | 0.000  | 0.850               |
|                      |                               | C                  |                             | 0.000                          | 0.000                          | 127.246                                       | 0.000  | 1.608               |
| T24                  | 42.000-22.000                 | A                  | 1.734                       | 0.000                          | 0.000                          | 152.316                                       | 0.000  | 2.112               |
|                      |                               | B                  |                             | 0.000                          | 0.000                          | 52.062  | 0.000  | 0.811               |



|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 19 of 76          |
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|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Tower Section | Tower Elevation<br>ft | Face or Leg | Ice Thickness<br>in | $A_R$<br>ft <sup>2</sup> | $A_F$<br>ft <sup>2</sup> | $C_{AA}$<br>In Face<br>ft <sup>2</sup> | $C_{AA}$<br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|---------------|-----------------------|-------------|---------------------|--------------------------|--------------------------|--|---|-------------|
| T25           | 22.000-2.000          | C           | 1.581               | 0.000                    | 0.000                    | 123.494                                | 0.000                                   | 1.513       |
|               |                       | A           |                     | 0.000                    | 0.000                    | 100.868                                | 0.000                                   | 1.316       |
|               |                       | B           |                     | 0.000                    | 0.000                    | 34.831                                 | 0.000                                   | 0.516       |
|               |                       | C           |                     | 0.000                    | 0.000                    | 81.189                                 | 0.000                                   | 0.933       |

### Feed Line Center of Pressure

| Section | Elevation<br>ft | $CP_X$<br>in | $CP_Z$<br>in | $CP_X$<br>Ice<br>in | $CP_Z$<br>Ice<br>in |
|---------|-----------------|--------------|--------------|---------------------|---------------------|
| L1      | 492.000-477.000 | 0.0000       | 0.0000       | 0.0000              | 0.0000              |
| L2      | 477.000-457.000 | 0.0000       | 0.0000       | 0.0000              | 0.0000              |
| T1      | 457.000-452.000 | 0.0000       | 0.0000       | 0.0000              | 0.0000              |
| T2      | 452.000-442.000 | 0.0000       | 0.0000       | 0.0000              | 0.0000              |
| T3      | 442.000-422.000 | 0.2805       | -1.4914      | 0.3473              | -1.4762             |
| T4      | 422.000-402.000 | 0.3896       | -2.0549      | 0.4674              | -1.9812             |
| T5      | 402.000-382.000 | 0.3896       | -2.0549      | 0.4677              | -1.9827             |
| T6      | 382.000-362.000 | 0.3896       | -2.0549      | 0.4680              | -1.9843             |
| T7      | 362.000-342.000 | 0.3855       | -2.0319      | 0.4586              | -1.9438             |
| T8      | 342.000-322.000 | 0.3716       | -1.9530      | 0.4302              | -1.8216             |
| T9      | 322.000-302.000 | 0.3731       | -1.9507      | 0.4284              | -1.8112             |
| T10     | 302.000-282.000 | 0.3480       | -1.8191      | 0.3975              | -1.6810             |
| T11     | 282.000-262.000 | 0.2410       | -1.1277      | 0.2982              | -1.2157             |
| T12     | 262.000-242.000 | 0.2235       | -1.0667      | 0.2756              | -1.1375             |
| T13     | 242.000-222.000 | 0.2126       | -1.0261      | 0.2578              | -1.0700             |
| T14     | 222.000-202.000 | 0.2043       | -0.9903      | 0.2498              | -1.0392             |
| T15     | 202.000-182.000 | 0.2131       | -1.0254      | 0.2574              | -1.0679             |
| T16     | 182.000-162.000 | 0.2111       | -1.0193      | 0.2546              | -1.0583             |
| T17     | 162.000-142.000 | 0.2008       | -0.9865      | 0.2395              | -1.0027             |
| T18     | 142.000-122.000 | 0.1981       | -0.9731      | 0.2344              | -0.9817             |
| T19     | 122.000-112.000 | 0.1902       | -0.9379      | 0.2188              | -0.9182             |
| T20     | 112.000-102.000 | 0.1860       | -0.9191      | 0.2187              | -0.9262             |
| T21     | 102.000-82.000  | 0.1920       | -0.9434      | 0.2234              | -0.9368             |
| T22     | 82.000-62.000   | 0.1920       | -0.9434      | 0.2237              | -0.9394             |
| T23     | 62.000-42.000   | 0.1920       | -0.9434      | 0.2242              | -0.9428             |
| T24     | 42.000-22.000   | 0.1920       | -0.9434      | 0.2249              | -0.9478             |
| T25     | 22.000-2.000    | 0.1629       | -0.8114      | 0.1971              | -0.8390             |

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

### Shielding Factor $K_a$

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$<br>No Ice | $K_a$<br>Ice |
|---------------|----------------------|-------------------|-------------------------|-----------------|--------------|
| T1            | 16                   | LDF4.5-50(5/8")   | 452.00 -                | 0.6000          | 0.3701       |
|               |                      |                   | 455.00                  |                 |              |
| T2            | 15                   | LDF2-50A(3/8") SC | 442.00 -                | 0.6000          | 0.4659       |
|               |                      |                   | 445.00                  |                 |              |
| T2            | 16                   | LDF4.5-50(5/8")   | 442.00 -                | 0.6000          | 0.4659       |

|   |  |  |
|---|--|--|
| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>20 of 76</p>           |
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|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
|               |                      |                   | 452.00                  |              |           |
| T3            | 1                    | 3" Coax           | 422.00 - 435.00         | 0.6000       | 0.5039    |
| T3            | 2                    | AVA5-50( 7/8")    | 422.00 - 435.00         | 0.6000       | 0.5039    |
| T3            | 3                    | 1" Conduit        | 422.00 - 435.00         | 0.6000       | 0.5039    |
| T3            | 5                    | 1 5/8" OD Conduit | 422.00 - 430.00         | 0.6000       | 0.5039    |
| T3            | 12                   | LDF5-50A(7/8")    | 422.00 - 435.00         | 0.6000       | 0.5039    |
| T3            | 13                   | LDF5-50A(7/8")    | 422.00 - 435.00         | 0.6000       | 0.5039    |
| T3            | 15                   | LDF2-50A(3/8") SC | 422.00 - 442.00         | 0.6000       | 0.5039    |
| T3            | 16                   | LDF4.5-50(5/8")   | 422.00 - 442.00         | 0.6000       | 0.5039    |
| T4            | 1                    | 3" Coax           | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T4            | 2                    | AVA5-50( 7/8")    | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T4            | 3                    | 1" Conduit        | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T4            | 5                    | 1 5/8" OD Conduit | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T4            | 12                   | LDF5-50A(7/8")    | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T4            | 13                   | LDF5-50A(7/8")    | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T4            | 15                   | LDF2-50A(3/8") SC | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T4            | 16                   | LDF4.5-50(5/8")   | 402.00 - 422.00         | 0.6000       | 0.5045    |
| T5            | 1                    | 3" Coax           | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T5            | 2                    | AVA5-50( 7/8")    | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T5            | 3                    | 1" Conduit        | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T5            | 5                    | 1 5/8" OD Conduit | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T5            | 12                   | LDF5-50A(7/8")    | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T5            | 13                   | LDF5-50A(7/8")    | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T5            | 15                   | LDF2-50A(3/8") SC | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T5            | 16                   | LDF4.5-50(5/8")   | 382.00 - 402.00         | 0.6000       | 0.5051    |
| T6            | 1                    | 3" Coax           | 362.00 - 382.00         | 0.6000       | 0.5058    |
| T6            | 2                    | AVA5-50( 7/8")    | 362.00 - 382.00         | 0.6000       | 0.5058    |
| T6            | 3                    | 1" Conduit        | 362.00 - 382.00         | 0.6000       | 0.5058    |
| T6            | 5                    | 1 5/8" OD Conduit | 362.00 - 382.00         | 0.6000       | 0.5058    |
| T6            | 12                   | LDF5-50A(7/8")    | 362.00 - 382.00         | 0.6000       | 0.5058    |
| T6            | 13                   | LDF5-50A(7/8")    | 362.00 - 382.00         | 0.6000       | 0.5058    |
| T6            | 15                   | LDF2-50A(3/8") SC | 362.00 -                | 0.6000       | 0.5058    |

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|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">21 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
|               |                      |                   | 382.00                  |              |           |
| T6            | 16                   | LDF4.5-50(5/8")   | 362.00 - 382.00         | 0.6000       | 0.5058    |
| T7            | 1                    | 3" Coax           | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T7            | 2                    | AVA5-50( 7/8")    | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T7            | 3                    | 1" Conduit        | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T7            | 4                    | LDF4.5-50(5/8")   | 342.00 - 351.00         | 0.6000       | 0.5065    |
| T7            | 5                    | 1 5/8" OD Conduit | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T7            | 12                   | LDF5-50A(7/8")    | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T7            | 13                   | LDF5-50A(7/8")    | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T7            | 15                   | LDF2-50A(3/8") SC | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T7            | 16                   | LDF4.5-50(5/8")   | 342.00 - 362.00         | 0.6000       | 0.5065    |
| T8            | 1                    | 3" Coax           | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 2                    | AVA5-50( 7/8")    | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 3                    | 1" Conduit        | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 4                    | LDF4.5-50(5/8")   | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 5                    | 1 5/8" OD Conduit | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 11                   | LDF5-50A(7/8")    | 322.00 - 339.00         | 0.6000       | 0.5073    |
| T8            | 12                   | LDF5-50A(7/8")    | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 13                   | LDF5-50A(7/8")    | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 15                   | LDF2-50A(3/8") SC | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T8            | 16                   | LDF4.5-50(5/8")   | 322.00 - 342.00         | 0.6000       | 0.5073    |
| T9            | 1                    | 3" Coax           | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 2                    | AVA5-50( 7/8")    | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 3                    | 1" Conduit        | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 4                    | LDF4.5-50(5/8")   | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 5                    | 1 5/8" OD Conduit | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 11                   | LDF5-50A(7/8")    | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 12                   | LDF5-50A(7/8")    | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 13                   | LDF5-50A(7/8")    | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 15                   | LDF2-50A(3/8") SC | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T9            | 16                   | LDF4.5-50(5/8")   | 302.00 - 322.00         | 0.6000       | 0.5085    |
| T10           | 1                    | 3" Coax           | 282.00 -                | 0.6000       | 0.5035    |

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|---|--|--|
| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>22 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
| T10           | 2                    | AVA5-50( 7/8")    | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 3                    | 1" Conduit        | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 4                    | LDF4.5-50(5/8")   | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 5                    | 1 5/8" OD Conduit | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 11                   | LDF5-50A(7/8")    | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 12                   | LDF5-50A(7/8")    | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 13                   | LDF5-50A(7/8")    | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 14                   | LDF6-50A(1-1/4")  | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 15                   | LDF2-50A(3/8") SC | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 16                   | LDF4.5-50(5/8")   | 302.00 - 282.00         | 0.6000       | 0.5035    |
| T10           | 17                   | LDF4-50A(1/2")    | 289.00 - 282.00         | 0.6000       | 0.5035    |
| T11           | 1                    | 3" Coax           | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 2                    | AVA5-50( 7/8")    | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 3                    | 1" Conduit        | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 4                    | LDF4.5-50(5/8")   | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 5                    | 1 5/8" OD Conduit | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 11                   | LDF5-50A(7/8")    | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 12                   | LDF5-50A(7/8")    | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 13                   | LDF5-50A(7/8")    | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 14                   | LDF6-50A(1-1/4")  | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 15                   | LDF2-50A(3/8") SC | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 16                   | LDF4.5-50(5/8")   | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 17                   | LDF4-50A(1/2")    | 262.00 - 282.00         | 0.6000       | 0.4867    |
| T11           | 21                   | LDF6-50A(1-1/4")  | 262.00 - 280.00         | 0.6000       | 0.4867    |
| T11           | 22                   | LDF7-50A(1-5/8")  | 262.00 - 280.00         | 0.6000       | 0.4867    |
| T11           | 23                   | LDF7-50A(1-5/8")  | 262.00 - 280.00         | 0.6000       | 0.4867    |
| T11           | 24                   | LDF7-50A(1-5/8")  | 262.00 - 280.00         | 0.6000       | 0.4867    |
| T12           | 1                    | 3" Coax           | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 2                    | AVA5-50( 7/8")    | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 3                    | 1" Conduit        | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 4                    | LDF4.5-50(5/8")   | 242.00 -                | 0.6000       | 0.5002    |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">23 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
|               |                      |                   | 262.00                  |              |           |
| T12           | 5                    | 1 5/8" OD Conduit | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 10                   | LDF5-50A(7/8")    | 242.00 - 247.00         | 0.6000       | 0.5002    |
| T12           | 11                   | LDF5-50A(7/8")    | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 12                   | LDF5-50A(7/8")    | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 13                   | LDF5-50A(7/8")    | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 14                   | LDF6-50A(1-1/4")  | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 15                   | LDF2-50A(3/8") SC | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 16                   | LDF4.5-50(5/8")   | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 17                   | LDF4-50A(1/2")    | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 21                   | LDF6-50A(1-1/4")  | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 22                   | LDF7-50A(1-5/8")  | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 23                   | LDF7-50A(1-5/8")  | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 24                   | LDF7-50A(1-5/8")  | 242.00 - 262.00         | 0.6000       | 0.5002    |
| T12           | 25                   | LDF6-50A(1-1/4")  | 242.00 - 257.00         | 0.6000       | 0.5002    |
| T12           | 26                   | LDF6-50A(1-1/4")  | 242.00 - 257.00         | 0.6000       | 0.5002    |
| T13           | 1                    | 3" Coax           | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 2                    | AVA5-50( 7/8")    | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 3                    | 1" Conduit        | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 4                    | LDF4.5-50(5/8")   | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 5                    | 1 5/8" OD Conduit | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 9                    | LDF5-50A(7/8")    | 222.00 - 239.00         | 0.6000       | 0.5014    |
| T13           | 10                   | LDF5-50A(7/8")    | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 11                   | LDF5-50A(7/8")    | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 12                   | LDF5-50A(7/8")    | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 13                   | LDF5-50A(7/8")    | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 14                   | LDF6-50A(1-1/4")  | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 15                   | LDF2-50A(3/8") SC | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 16                   | LDF4.5-50(5/8")   | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 17                   | LDF4-50A(1/2")    | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 21                   | LDF6-50A(1-1/4")  | 222.00 - 242.00         | 0.6000       | 0.5014    |
| T13           | 22                   | LDF7-50A(1-5/8")  | 222.00 -                | 0.6000       | 0.5014    |

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| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>24 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
| T13           | 23                   | LDF7-50A(1-5/8")  | 242.00 - 222.00         | 0.6000       | 0.5014    |
| T13           | 24                   | LDF7-50A(1-5/8")  | 242.00 - 222.00         | 0.6000       | 0.5014    |
| T13           | 25                   | LDF6-50A(1-1/4")  | 242.00 - 222.00         | 0.6000       | 0.5014    |
| T13           | 26                   | LDF6-50A(1-1/4")  | 242.00 - 222.00         | 0.6000       | 0.5014    |
| T14           | 1                    | 3" Coax           | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 2                    | AVA5-50( 7/8")    | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 3                    | 1" Conduit        | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 4                    | LDF4.5-50(5/8")   | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 5                    | 1 5/8" OD Conduit | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 9                    | LDF5-50A(7/8")    | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 10                   | LDF5-50A(7/8")    | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 11                   | LDF5-50A(7/8")    | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 12                   | LDF5-50A(7/8")    | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 13                   | LDF5-50A(7/8")    | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 14                   | LDF6-50A(1-1/4")  | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 15                   | LDF2-50A(3/8") SC | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 16                   | LDF4.5-50(5/8")   | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 17                   | LDF4-50A(1/2")    | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 21                   | LDF6-50A(1-1/4")  | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 22                   | LDF7-50A(1-5/8")  | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 23                   | LDF7-50A(1-5/8")  | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 24                   | LDF7-50A(1-5/8")  | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 25                   | LDF6-50A(1-1/4")  | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T14           | 26                   | LDF6-50A(1-1/4")  | 202.00 - 222.00         | 0.6000       | 0.4851    |
| T15           | 1                    | 3" Coax           | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 2                    | AVA5-50( 7/8")    | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 3                    | 1" Conduit        | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 4                    | LDF4.5-50(5/8")   | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 5                    | 1 5/8" OD Conduit | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 9                    | LDF5-50A(7/8")    | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 10                   | LDF5-50A(7/8")    | 182.00 - 202.00         | 0.6000       | 0.5050    |

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| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>25 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
|               |                      |                   | 202.00                  |              |           |
| T15           | 11                   | LDF5-50A(7/8")    | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 12                   | LDF5-50A(7/8")    | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 13                   | LDF5-50A(7/8")    | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 14                   | LDF6-50A(1-1/4")  | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 15                   | LDF2-50A(3/8") SC | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 16                   | LDF4.5-50(5/8")   | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 17                   | LDF4-50A(1/2")    | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 21                   | LDF6-50A(1-1/4")  | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 22                   | LDF7-50A(1-5/8")  | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 23                   | LDF7-50A(1-5/8")  | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 24                   | LDF7-50A(1-5/8")  | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 25                   | LDF6-50A(1-1/4")  | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T15           | 26                   | LDF6-50A(1-1/4")  | 182.00 - 202.00         | 0.6000       | 0.5050    |
| T16           | 1                    | 3" Coax           | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 2                    | AVA5-50( 7/8")    | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 3                    | 1" Conduit        | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 4                    | LDF4.5-50(5/8")   | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 5                    | 1 5/8" OD Conduit | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 9                    | LDF5-50A(7/8")    | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 10                   | LDF5-50A(7/8")    | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 11                   | LDF5-50A(7/8")    | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 12                   | LDF5-50A(7/8")    | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 13                   | LDF5-50A(7/8")    | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 14                   | LDF6-50A(1-1/4")  | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 15                   | LDF2-50A(3/8") SC | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 16                   | LDF4.5-50(5/8")   | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 17                   | LDF4-50A(1/2")    | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 21                   | LDF6-50A(1-1/4")  | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 22                   | LDF7-50A(1-5/8")  | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 23                   | LDF7-50A(1-5/8")  | 162.00 - 182.00         | 0.6000       | 0.5069    |
| T16           | 24                   | LDF7-50A(1-5/8")  | 162.00 - 182.00         | 0.6000       | 0.5069    |



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| <p style="text-align: center;"><b><i>tnxTower</i></b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">26 of 76</p>           |
|  | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|  | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$<br>No Ice | $K_a$<br>Ice |
|---------------|----------------------|-------------------|-------------------------|-----------------|--------------|
|               |                      |                   | 182.00                  |                 |              |
| T16           | 25                   | LDF6-50A(1-1/4")  | 162.00 - 182.00         | 0.6000          | 0.5069       |
| T16           | 26                   | LDF6-50A(1-1/4")  | 162.00 - 182.00         | 0.6000          | 0.5069       |
| T16           | 27                   | LDF2-50(3/8")     | 162.00 - 165.00         | 0.6000          | 0.5069       |
| T16           | 28                   | LDF4.5-50(5/8")   | 162.00 - 165.00         | 0.6000          | 0.5069       |
| T17           | 1                    | 3" Coax           | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 2                    | AVA5-50( 7/8")    | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 3                    | 1" Conduit        | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 4                    | LDF4.5-50(5/8")   | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 5                    | 1 5/8" OD Conduit | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 9                    | LDF5-50A(7/8")    | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 10                   | LDF5-50A(7/8")    | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 11                   | LDF5-50A(7/8")    | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 12                   | LDF5-50A(7/8")    | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 13                   | LDF5-50A(7/8")    | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 14                   | LDF6-50A(1-1/4")  | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 15                   | LDF2-50A(3/8") SC | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 16                   | LDF4.5-50(5/8")   | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 17                   | LDF4-50A(1/2")    | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 21                   | LDF6-50A(1-1/4")  | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 22                   | LDF7-50A(1-5/8")  | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 23                   | LDF7-50A(1-5/8")  | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 24                   | LDF7-50A(1-5/8")  | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 25                   | LDF6-50A(1-1/4")  | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 26                   | LDF6-50A(1-1/4")  | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 27                   | LDF2-50(3/8")     | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T17           | 28                   | LDF4.5-50(5/8")   | 142.00 - 162.00         | 0.6000          | 0.5090       |
| T18           | 1                    | 3" Coax           | 122.00 - 142.00         | 0.6000          | 0.5116       |
| T18           | 2                    | AVA5-50( 7/8")    | 122.00 - 142.00         | 0.6000          | 0.5116       |
| T18           | 3                    | 1" Conduit        | 122.00 - 142.00         | 0.6000          | 0.5116       |
| T18           | 4                    | LDF4.5-50(5/8")   | 122.00 - 142.00         | 0.6000          | 0.5116       |
| T18           | 5                    | 1 5/8" OD Conduit | 122.00 -                | 0.6000          | 0.5116       |

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| <p style="text-align: center;"><b><i>tnxTower</i></b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">27 of 76</p>           |
|  | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|  | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev.      | $K_a$<br>No Ice | $K_a$<br>Ice |
|---------------|----------------------|-------------------|------------------------------|-----------------|--------------|
| T18           | 7                    | LDF5-50A(7/8")    | 142.00<br>122.00 -<br>124.00 | 0.6000          | 0.5116       |
| T18           | 8                    | LDF5-50A(7/8")    | 122.00 -<br>138.00           | 0.6000          | 0.5116       |
| T18           | 9                    | LDF5-50A(7/8")    | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 10                   | LDF5-50A(7/8")    | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 11                   | LDF5-50A(7/8")    | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 12                   | LDF5-50A(7/8")    | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 13                   | LDF5-50A(7/8")    | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 14                   | LDF6-50A(1-1/4")  | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 15                   | LDF2-50A(3/8") SC | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 16                   | LDF4.5-50(5/8")   | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 17                   | LDF4-50A(1/2")    | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 21                   | LDF6-50A(1-1/4")  | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 22                   | LDF7-50A(1-5/8")  | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 23                   | LDF7-50A(1-5/8")  | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 24                   | LDF7-50A(1-5/8")  | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 25                   | LDF6-50A(1-1/4")  | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 26                   | LDF6-50A(1-1/4")  | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 27                   | LDF2-50(3/8")     | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T18           | 28                   | LDF4.5-50(5/8")   | 122.00 -<br>142.00           | 0.6000          | 0.5116       |
| T19           | 1                    | 3" Coax           | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 2                    | AVA5-50( 7/8")    | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 3                    | 1" Conduit        | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 4                    | LDF4.5-50(5/8")   | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 5                    | 1 5/8" OD Conduit | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 7                    | LDF5-50A(7/8")    | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 8                    | LDF5-50A(7/8")    | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 9                    | LDF5-50A(7/8")    | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 10                   | LDF5-50A(7/8")    | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 11                   | LDF5-50A(7/8")    | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 12                   | LDF5-50A(7/8")    | 112.00 -<br>122.00           | 0.6000          | 0.4797       |
| T19           | 13                   | LDF5-50A(7/8")    | 112.00 -                     | 0.6000          | 0.4797       |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">28 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
| T19           | 14                   | LDF6-50A(1-1/4")  | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 15                   | LDF2-50A(3/8") SC | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 16                   | LDF4.5-50(5/8")   | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 17                   | LDF4-50A(1/2")    | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 21                   | LDF6-50A(1-1/4")  | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 22                   | LDF7-50A(1-5/8")  | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 23                   | LDF7-50A(1-5/8")  | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 24                   | LDF7-50A(1-5/8")  | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 25                   | LDF6-50A(1-1/4")  | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 26                   | LDF6-50A(1-1/4")  | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 27                   | LDF2-50(3/8")     | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T19           | 28                   | LDF4.5-50(5/8")   | 112.00 - 122.00         | 0.6000       | 0.4797    |
| T20           | 1                    | 3" Coax           | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 2                    | AVA5-50( 7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 3                    | 1" Conduit        | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 4                    | LDF4.5-50(5/8")   | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 5                    | 1 5/8" OD Conduit | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 6                    | LDF5-50A(7/8")    | 102.00 - 108.00         | 0.6000       | 0.5090    |
| T20           | 7                    | LDF5-50A(7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 8                    | LDF5-50A(7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 9                    | LDF5-50A(7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 10                   | LDF5-50A(7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 11                   | LDF5-50A(7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 12                   | LDF5-50A(7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 13                   | LDF5-50A(7/8")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 14                   | LDF6-50A(1-1/4")  | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 15                   | LDF2-50A(3/8") SC | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 16                   | LDF4.5-50(5/8")   | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 17                   | LDF4-50A(1/2")    | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 21                   | LDF6-50A(1-1/4")  | 102.00 - 112.00         | 0.6000       | 0.5090    |
| T20           | 22                   | LDF7-50A(1-5/8")  | 102.00 -                | 0.6000       | 0.5090    |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">29 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev.   | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|---------------------------|--------------|-----------|
| T20           | 23                   | LDF7-50A(1-5/8")  | 112.00<br>102.00 - 112.00 | 0.6000       | 0.5090    |
| T20           | 24                   | LDF7-50A(1-5/8")  | 112.00<br>102.00 - 112.00 | 0.6000       | 0.5090    |
| T20           | 25                   | LDF6-50A(1-1/4")  | 112.00<br>102.00 - 112.00 | 0.6000       | 0.5090    |
| T20           | 26                   | LDF6-50A(1-1/4")  | 112.00<br>102.00 - 112.00 | 0.6000       | 0.5090    |
| T20           | 27                   | LDF2-50(3/8")     | 112.00<br>102.00 - 112.00 | 0.6000       | 0.5090    |
| T20           | 28                   | LDF4.5-50(5/8")   | 112.00<br>102.00 - 112.00 | 0.6000       | 0.5090    |
| T21           | 1                    | 3" Coax           | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 2                    | AVA5-50( 7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 3                    | 1" Conduit        | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 4                    | LDF4.5-50(5/8")   | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 5                    | 1 5/8" OD Conduit | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 6                    | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 7                    | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 8                    | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 9                    | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 10                   | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 11                   | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 12                   | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 13                   | LDF5-50A(7/8")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 14                   | LDF6-50A(1-1/4")  | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 15                   | LDF2-50A(3/8") SC | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 16                   | LDF4.5-50(5/8")   | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 17                   | LDF4-50A(1/2")    | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 21                   | LDF6-50A(1-1/4")  | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 22                   | LDF7-50A(1-5/8")  | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 23                   | LDF7-50A(1-5/8")  | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 24                   | LDF7-50A(1-5/8")  | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 25                   | LDF6-50A(1-1/4")  | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 26                   | LDF6-50A(1-1/4")  | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 27                   | LDF2-50(3/8")     | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T21           | 28                   | LDF4.5-50(5/8")   | 82.00 - 102.00            | 0.6000       | 0.5187    |
| T22           | 1                    | 3" Coax           | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 2                    | AVA5-50( 7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 3                    | 1" Conduit        | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 4                    | LDF4.5-50(5/8")   | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 5                    | 1 5/8" OD Conduit | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 6                    | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 7                    | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 8                    | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 9                    | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 10                   | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 11                   | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 12                   | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 13                   | LDF5-50A(7/8")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 14                   | LDF6-50A(1-1/4")  | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 15                   | LDF2-50A(3/8") SC | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 16                   | LDF4.5-50(5/8")   | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 17                   | LDF4-50A(1/2")    | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 21                   | LDF6-50A(1-1/4")  | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 22                   | LDF7-50A(1-5/8")  | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 23                   | LDF7-50A(1-5/8")  | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 24                   | LDF7-50A(1-5/8")  | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 25                   | LDF6-50A(1-1/4")  | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 26                   | LDF6-50A(1-1/4")  | 62.00 - 82.00             | 0.6000       | 0.5237    |
| T22           | 27                   | LDF2-50(3/8")     | 62.00 - 82.00             | 0.6000       | 0.5237    |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">30 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
| T22           | 28                   | LDF4.5-50(5/8")   | 62.00 - 82.00           | 0.6000       | 0.5237    |
| T23           | 1                    | 3" Coax           | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 2                    | AVA5-50( 7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 3                    | 1" Conduit        | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 4                    | LDF4.5-50(5/8")   | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 5                    | 1 5/8" OD Conduit | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 6                    | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 7                    | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 8                    | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 9                    | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 10                   | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 11                   | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 12                   | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 13                   | LDF5-50A(7/8")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 14                   | LDF6-50A(1-1/4")  | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 15                   | LDF2-50A(3/8") SC | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 16                   | LDF4.5-50(5/8")   | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 17                   | LDF4-50A(1/2")    | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 21                   | LDF6-50A(1-1/4")  | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 22                   | LDF7-50A(1-5/8")  | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 23                   | LDF7-50A(1-5/8")  | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 24                   | LDF7-50A(1-5/8")  | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 25                   | LDF6-50A(1-1/4")  | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 26                   | LDF6-50A(1-1/4")  | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 27                   | LDF2-50(3/8")     | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T23           | 28                   | LDF4.5-50(5/8")   | 42.00 - 62.00           | 0.6000       | 0.5307    |
| T24           | 1                    | 3" Coax           | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 2                    | AVA5-50( 7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 3                    | 1" Conduit        | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 4                    | LDF4.5-50(5/8")   | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 5                    | 1 5/8" OD Conduit | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 6                    | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 7                    | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 8                    | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 9                    | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 10                   | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 11                   | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 12                   | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 13                   | LDF5-50A(7/8")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 14                   | LDF6-50A(1-1/4")  | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 15                   | LDF2-50A(3/8") SC | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 16                   | LDF4.5-50(5/8")   | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 17                   | LDF4-50A(1/2")    | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 21                   | LDF6-50A(1-1/4")  | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 22                   | LDF7-50A(1-5/8")  | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 23                   | LDF7-50A(1-5/8")  | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 24                   | LDF7-50A(1-5/8")  | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 25                   | LDF6-50A(1-1/4")  | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 26                   | LDF6-50A(1-1/4")  | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 27                   | LDF2-50(3/8")     | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T24           | 28                   | LDF4.5-50(5/8")   | 22.00 - 42.00           | 0.6000       | 0.5414    |
| T25           | 1                    | 3" Coax           | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 2                    | AVA5-50( 7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 3                    | 1" Conduit        | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 4                    | LDF4.5-50(5/8")   | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 5                    | 1 5/8" OD Conduit | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 6                    | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 7                    | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 8                    | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 9                    | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 10                   | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 11                   | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 31 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Tower Section | Feed Line Record No. | Description       | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---------------|----------------------|-------------------|-------------------------|--------------|-----------|
| T25           | 12                   | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 13                   | LDF5-50A(7/8")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 14                   | LDF6-50A(1-1/4")  | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 15                   | LDF2-50A(3/8") SC | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 16                   | LDF4.5-50(5/8")   | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 17                   | LDF4-50A(1/2")    | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 21                   | LDF6-50A(1-1/4")  | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 22                   | LDF7-50A(1-5/8")  | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 23                   | LDF7-50A(1-5/8")  | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 24                   | LDF7-50A(1-5/8")  | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 25                   | LDF6-50A(1-1/4")  | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 26                   | LDF6-50A(1-1/4")  | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 27                   | LDF2-50(3/8")     | 8.00 - 22.00            | 0.6000       | 0.5451    |
| T25           | 28                   | LDF4.5-50(5/8")   | 8.00 - 22.00            | 0.6000       | 0.5451    |

### Discrete Tower Loads

| Description                            | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | $C_{AA}$ Front<br>ft <sup>2</sup> | $C_{AA}$ Side<br>ft <sup>2</sup> | Weight<br>K |       |
|--|-------------|-------------|--|-------------------------|-----------------|-----------------------------------|----------------------------------|-------------|-------|
| 10' Dipole                             | B           | From Face   | 1.500  | 0.0000                  | 108.000         | No Ice                            | 3.000                            | 3.000       | 0.030 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 4.000                            | 4.000       | 0.055 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 5.000                            | 5.000       | 0.080 |
| 10' Dipole                             | B           | From Face   | 1.500  | 0.0000                  | 125.000         | No Ice                            | 3.000                            | 3.000       | 0.030 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 4.000                            | 4.000       | 0.055 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 5.000                            | 5.000       | 0.080 |
| Obstruction Light(.01k,.8CAAA) (Tower) | A           | From Leg    | 1.000  | 0.0000                  | 116.000         | No Ice                            | 0.800                            | 0.800       | 0.010 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 1.000                            | 1.000       | 0.016 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 1.200                            | 1.200       | 0.022 |
| Obstruction Light(.01k,.8CAAA) (Tower) | B           | From Leg    | 1.000  | 0.0000                  | 116.000         | No Ice                            | 0.800                            | 0.800       | 0.010 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 1.000                            | 1.000       | 0.016 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 1.200                            | 1.200       | 0.022 |
| Obstruction Light(.01k,.8CAAA) (Tower) | C           | From Leg    | 1.000  | 0.0000                  | 116.000         | No Ice                            | 0.800                            | 0.800       | 0.010 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 1.000                            | 1.000       | 0.016 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 1.200                            | 1.200       | 0.022 |
| 3' Side Arm                            | B           | From Leg    | 1.500  | 0.0000                  | 108.000         | No Ice                            | 0.450                            | 2.750       | 0.040 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 0.570                            | 3.860       | 0.060 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 0.690                            | 4.970       | 0.080 |
| 3' Side Arm                            | B           | From Leg    | 1.500  | 0.0000                  | 125.000         | No Ice                            | 0.450                            | 2.750       | 0.040 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 0.570                            | 3.860       | 0.060 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 0.690                            | 4.970       | 0.080 |
| Beacon (.075k 2.250CAAA) (Tower)       | A           | From Leg    | 1.000  | 0.0000                  | 124.000         | No Ice                            | 2.250                            | 2.250       | 0.075 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 2.500                            | 2.500       | 0.100 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 2.750                            | 2.750       | 0.125 |
| 10' Dipole                             | A           | From Leg    | 1.500  | 0.0000                  | 138.000         | No Ice                            | 3.000                            | 3.000       | 0.030 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 4.000                            | 4.000       | 0.055 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 5.000                            | 5.000       | 0.080 |
| 3' Side Arm                            | A           | From Leg    | 1.500  | 0.0000                  | 138.000         | No Ice                            | 0.450                            | 2.750       | 0.040 |
|  |             |             | 0.000  |                         |                 | 1/2" Ice                          | 0.570                            | 3.860       | 0.060 |
|  |             |             | 0.000  |                         |                 | 1" Ice                            | 0.690                            | 4.970       | 0.080 |
| Beacon (.075k 2.250CAAA)               | A           | From Leg    | 1.000  | 0.0000                  | 237.000         | No Ice                            | 2.250                            | 2.250       | 0.075 |

|   |                |  |                                 |  |  |  |                    |  |                   |  |
|---|----------------|--|---------------------------------|--|--|--|--------------------|--|-------------------|--|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     |  | US-CT-5009                      |  |  |  | <b>Page</b>        |  | 32 of 76          |  |
|   | <b>Project</b> |  | Guyed Tower Structural Analysis |  |  |  | <b>Date</b>        |  | 09:08:12 04/29/19 |  |
|   | <b>Client</b>  |  |                                 |  |  |  | <b>Designed by</b> |  | Luke Myrick       |  |

| Description                                      | Face or Leg | Offset Type | Offsets: Horz Lateral Vert | Azimuth Adjustment | Placement | C <sub>AA</sub> Front | C <sub>AA</sub> Side | Weight |
|--|-------------|-------------|----------------------------|--------------------|-----------|-----------------------|----------------------|--------|
|  |             |             | ft<br>ft<br>ft             | °                  | ft        | ft <sup>2</sup>       | ft <sup>2</sup>      | K      |
| (Tower)  |             |             | 0.000                      |                    | 1/2" Ice  | 2.500                 | 2.500                | 0.100  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.750                 | 2.750                | 0.125  |
| Beacon (.075k 2.250CAAA)                         | B           | From Leg    | 1.000                      | 0.0000             | 237.000   | No Ice                | 2.250                | 2.250  |
| (Tower)  |             |             | 0.000                      |                    | 1/2" Ice  | 2.500                 | 2.500                | 0.100  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.750                 | 2.750                | 0.125  |
| 6' Omni  | A           | From Leg    | 2.000                      | 0.0000             | 302.000   | No Ice                | 2.250                | 2.250  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 2.619                 | 2.619                | 0.029  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.998                 | 2.998                | 0.052  |
| 2' Side arm (25lbs 0.5CaAa)                      | A           | From Leg    | 1.000                      | 0.0000             | 302.000   | No Ice                | 0.500                | 0.500  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 0.000                 | 0.000                | 0.033  |
|  |             |             | 0.000                      |                    | 1" Ice    | 0.000                 | 0.000                | 0.040  |
| 3' Yagi(.03k,2.08CAAA)                           | A           | From Leg    | 2.000                      | 0.0000             | 453.000   | No Ice                | 2.080                | 2.080  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 3.790                 | 3.790                | 0.050  |
|  |             |             | 0.000                      |                    | 1" Ice    | 5.500                 | 5.500                | 0.070  |
| 2 Bay FM Antenna                                 | A           | From Leg    | 2.000                      | 0.0000             | 471.000   | No Ice                | 5.000                | 5.000  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 8.000                 | 8.000                | 0.090  |
|  |             |             | 0.000                      |                    | 1" Ice    | 11.000                | 11.000               | 0.130  |
| Beacon (.075k 2.250CAAA)                         | C           | None        |                            | 0.0000             | 490.000   | No Ice                | 2.250                | 2.250  |
| (Tower)  |             |             |                            |                    | 1/2" Ice  | 2.500                 | 2.500                | 0.100  |
|  |             |             |                            |                    | 1" Ice    | 2.750                 | 2.750                | 0.125  |
| Obstruction Light(.01k,.8CAAA)                   | A           | From Leg    | 1.000                      | 0.0000             | 358.000   | No Ice                | 0.800                | 0.800  |
| (Tower)  |             |             | 0.000                      |                    | 1/2" Ice  | 1.000                 | 1.000                | 0.016  |
|  |             |             | 0.000                      |                    | 1" Ice    | 1.200                 | 1.200                | 0.022  |
| Obstruction Light(.01k,.8CAAA)                   | B           | From Leg    | 1.000                      | 0.0000             | 358.000   | No Ice                | 0.800                | 0.800  |
| (Tower)  |             |             | 0.000                      |                    | 1/2" Ice  | 1.000                 | 1.000                | 0.016  |
|  |             |             | 0.000                      |                    | 1" Ice    | 1.200                 | 1.200                | 0.022  |
| Obstruction Light(.01k,.8CAAA)                   | C           | From Leg    | 1.000                      | 0.0000             | 358.000   | No Ice                | 0.800                | 0.800  |
| (Tower)  |             |             | 0.000                      |                    | 1/2" Ice  | 1.000                 | 1.000                | 0.016  |
|  |             |             | 0.000                      |                    | 1" Ice    | 1.200                 | 1.200                | 0.022  |
| Kathrein CA5-FM/CP/RM                            | C           | From Leg    | 1.500                      | 0.0000             | 300.000   | No Ice                | 4.500                | 3.500  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 5.500                 | 4.400                | 0.023  |
|  |             |             | 0.000                      |                    | 1" Ice    | 6.500                 | 5.300                | 0.029  |
| SM 408-3 (Sprint)                                | A           | From Leg    | 2.000                      | 0.0000             | 257.000   | No Ice                | 22.450               | 22.450 |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 33.500                | 33.500               | 1.500  |
|  |             |             | 0.000                      |                    | 1" Ice    | 44.550                | 44.550               | 2.000  |
| PCS 1900MHz 4x45W-65MHz (Sprint)                 | A           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 2.322                | 2.238  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 2.527                 | 2.441                | 0.083  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.739                 | 2.651                | 0.110  |
| 800 EXTERNAL NOTCH FILTER (Sprint)               | A           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 0.660                | 0.321  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 0.763                 | 0.398                | 0.017  |
|  |             |             | 0.000                      |                    | 1" Ice    | 0.873                 | 0.483                | 0.024  |
| Alcatel Lucent RRH-4x45-1900 (25x12x12) (Sprint) | B           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 2.500                | 2.500  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 2.709                 | 2.709                | 0.095  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.926                 | 2.926                | 0.124  |
| Alcatel Lucent RRH-4x45-1900 (25x12x12) (Sprint) | C           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 2.500                | 2.500  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 2.709                 | 2.709                | 0.095  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.926                 | 2.926                | 0.124  |
| Alcatel Lucent RRH 2x50-800 (16x13x10) (Sprint)  | B           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 1.701                | 1.282  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 1.864                 | 1.428                | 0.053  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.035                 | 1.580                | 0.070  |
| Alcatel Lucent RRH 2x50-800 (16x13x10) (Sprint)  | C           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 1.701                | 1.282  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 1.864                 | 1.428                | 0.053  |
|  |             |             | 0.000                      |                    | 1" Ice    | 2.035                 | 1.580                | 0.070  |
| Nokia AAHC MIMO (25.6x19.7x9.64) (Sprint)        | A           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 4.203                | 2.068  |
|  |             |             | 0.000                      |                    | 1/2" Ice  | 4.458                 | 2.260                | 0.103  |
|  |             |             | 0.000                      |                    | 1" Ice    | 4.721                 | 2.463                | 0.135  |
| Nokia AAHC MIMO                                  | B           | From Leg    | 4.000                      | 0.0000             | 257.000   | No Ice                | 4.203                | 2.068  |



|   |                |  |                                 |  |  |  |  |                    |  |                   |
|---|----------------|--|---------------------------------|--|--|--|--|--------------------|--|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     |  | US-CT-5009                      |  |  |  |  | <b>Page</b>        |  | 33 of 76          |
|   | <b>Project</b> |  | Guyed Tower Structural Analysis |  |  |  |  | <b>Date</b>        |  | 09:08:12 04/29/19 |
|   | <b>Client</b>  |  |                                 |  |  |  |  | <b>Designed by</b> |  | Luke Myrick       |

| Description   | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | C <sub>AA</sub> Front<br>ft <sup>2</sup> | C <sub>AA</sub> Side<br>ft <sup>2</sup> | Weight<br>K |
|---|-------------|-------------|--|-------------------------|-----------------|--|---|-------------|
| (25.6x19.7x9.64)  |             |             | 0.000  |                         |                 | 1/2" Ice 4.458                           | 2.260                                   | 0.135       |
| (Sprint)  |             |             | 0.000  |                         |                 | 1" Ice 4.721                             | 2.463                                   | 0.171       |
| Nokia AAHC MIMO (25.6x19.7x9.64)                        | C           | From Leg    | 4.000  | 0.0000                  | 257.000         | No Ice 4.203                             | 2.068                                   | 0.103       |
| (Sprint)  |             |             | 0.000  |                         |                 | 1/2" Ice 4.458                           | 2.260                                   | 0.135       |
|   |             |             | 0.000  |                         |                 | 1" Ice 4.721                             | 2.463                                   | 0.171       |
| CommScope NNVV-65B-R4 (72x19.6x7.8)                     | A           | From Leg    | 4.000  | 0.0000                  | 257.000         | No Ice 12.271                            | 5.750                                   | 0.085       |
| (Sprint)  |             |             | 0.000  |                         |                 | 1/2" Ice 12.766                          | 6.207                                   | 0.157       |
|   |             |             | 0.000  |                         |                 | 1" Ice 13.268                            | 6.671                                   | 0.236       |
| CommScope NNVV-65B-R4 (72x19.6x7.8)                     | B           | From Leg    | 4.000  | 0.0000                  | 257.000         | No Ice 12.271                            | 5.750                                   | 0.085       |
| (Sprint)  |             |             | 0.000  |                         |                 | 1/2" Ice 12.766                          | 6.207                                   | 0.157       |
|   |             |             | 0.000  |                         |                 | 1" Ice 13.268                            | 6.671                                   | 0.236       |
| CommScope NNVV-65B-R4 (72x19.6x7.8)                     | C           | From Leg    | 4.000  | 0.0000                  | 257.000         | No Ice 12.271                            | 5.750                                   | 0.085       |
| (Sprint)  |             |             | 0.000  |                         |                 | 1/2" Ice 12.766                          | 6.207                                   | 0.157       |
|   |             |             | 0.000  |                         |                 | 1" Ice 13.268                            | 6.671                                   | 0.236       |
| KRY 112 89/4 (T-Mobile)                                 | A           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 0.559                             | 0.362                                   | 0.015       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 0.658                           | 0.445                                   | 0.020       |
|   |             |             | 0.000  |                         |                 | 1" Ice 0.764                             | 0.538                                   | 0.027       |
| KRY 112 89/4 (T-Mobile)                                 | B           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 0.559                             | 0.362                                   | 0.015       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 0.658                           | 0.445                                   | 0.020       |
|   |             |             | 0.000  |                         |                 | 1" Ice 0.764                             | 0.538                                   | 0.027       |
| KRY 112 89/4 (T-Mobile)                                 | C           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 0.559                             | 0.362                                   | 0.015       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 0.658                           | 0.445                                   | 0.020       |
|   |             |             | 0.000  |                         |                 | 1" Ice 0.764                             | 0.538                                   | 0.027       |
| Sector Frames (T-Mobile)                                | C           | None        |  | 0.0000                  | 280.000         | No Ice 25.000                            | 25.000                                  | 1.000       |
|   |             |             |  |                         |                 | 1/2" Ice 30.000                          | 30.000                                  | 1.250       |
|   |             |             |  |                         |                 | 1" Ice 35.000                            | 35.000                                  | 1.500       |
| KRY 112 144/1 (T-Mobile)                                | A           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 0.350                             | 0.175                                   | 0.011       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 0.426                           | 0.234                                   | 0.014       |
|   |             |             | 0.000  |                         |                 | 1" Ice 0.509                             | 0.301                                   | 0.019       |
| KRY 112 144/1 (T-Mobile)                                | B           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 0.350                             | 0.175                                   | 0.011       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 0.426                           | 0.234                                   | 0.014       |
|   |             |             | 0.000  |                         |                 | 1" Ice 0.509                             | 0.301                                   | 0.019       |
| KRY 112 144/1 (T-Mobile)                                | C           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 0.350                             | 0.175                                   | 0.011       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 0.426                           | 0.234                                   | 0.014       |
|   |             |             | 0.000  |                         |                 | 1" Ice 0.509                             | 0.301                                   | 0.019       |
| RFS APX16DWV-16DWV-S-E-A 20 (55.9x13.3x3.15) (T-Mobile) | A           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 6.586                             | 2.150                                   | 0.041       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 6.962                           | 2.490                                   | 0.074       |
|   |             |             | 0.000  |                         |                 | 1" Ice 7.344                             | 2.837                                   | 0.113       |
| RFS APX16DWV-16DWV-S-E-A 20 (55.9x13.3x3.15) (T-Mobile) | B           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 6.586                             | 2.150                                   | 0.041       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 6.962                           | 2.490                                   | 0.074       |
|   |             |             | 0.000  |                         |                 | 1" Ice 7.344                             | 2.837                                   | 0.113       |
| RFS APX16DWV-16DWV-S-E-A 20 (55.9x13.3x3.15) (T-Mobile) | C           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 6.586                             | 2.150                                   | 0.041       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 6.962                           | 2.490                                   | 0.074       |
|   |             |             | 0.000  |                         |                 | 1" Ice 7.344                             | 2.837                                   | 0.113       |
| RFS APXVAARR24_43-U-NA20 (95.9x24x8.7) (T-Mobile)       | A           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 20.267                            | 8.744                                   | 0.101       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 20.915                          | 9.342                                   | 0.213       |
|   |             |             | 0.000  |                         |                 | 1" Ice 21.570                            | 9.947                                   | 0.334       |
| RFS APXVAARR24_43-U-NA20 (95.9x24x8.7) (T-Mobile)       | B           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 20.267                            | 8.744                                   | 0.101       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 20.915                          | 9.342                                   | 0.213       |
|   |             |             | 0.000  |                         |                 | 1" Ice 21.570                            | 9.947                                   | 0.334       |
| RFS APXVAARR24_43-U-NA20                                | C           | From Leg    | 4.000  | 0.0000                  | 280.000         | No Ice 20.267                            | 8.744                                   | 0.101       |
|   |             |             | 0.000  |                         |                 | 1/2" Ice 20.915                          | 9.342                                   | 0.213       |



|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 35 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Description        | Face or Leg | Dish Type           | Offset Type | Offsets: Horz Lateral<br>ft | Azimuth Adjustment<br>° | 3 dB Beam Width<br>° | Elevation<br>ft | Outside Diameter<br>ft | Aperture Area<br>ft <sup>2</sup> | Weight<br>K |       |
|--------------------|-------------|---------------------|-------------|-----------------------------|-------------------------|----------------------|-----------------|------------------------|----------------------------------|-------------|-------|
| 3' Grid Dish       | A           | Grid                | From Leg    | 0.000                       | 0.0000                  |                      | 339.000         | 3.000                  | 1" Ice                           | 25.894      | 0.590 |
|                    |             |                     |             | 1.000                       |                         |                      |                 |                        | No Ice                           | 2.830       | 0.030 |
|                    |             |                     |             | 0.000                       |                         |                      |                 |                        | 1/2" Ice                         | 7.467       | 0.068 |
| 3' Dish w/ Radomes | B           | Paraboloid w/Radome | From Leg    | 0.000                       | 0.0000                  |                      | 351.000         | 3.000                  | 1" Ice                           | 12.103      | 0.107 |
|                    |             |                     |             | 1.000                       |                         |                      |                 |                        | No Ice                           | 7.069       | 0.035 |
|                    |             |                     |             | 0.000                       |                         |                      |                 |                        | 1/2" Ice                         | 7.467       | 0.073 |
| 6' Grid Dish       | C           | Grid                | From Leg    | 0.000                       | 0.0000                  |                      | 435.000         | 6.000                  | 1" Ice                           | 7.865       | 0.112 |
|                    |             |                     |             | 1.000                       |                         |                      |                 |                        | No Ice                           | 11.000      | 0.250 |
|                    |             |                     |             | 0.000                       |                         |                      |                 |                        | 1/2" Ice                         | 14.000      | 0.399 |
|                    |             |                     |             | 0.000                       |                         |                      |                 |                        | 1" Ice                           | 18.000      | 0.548 |

### Tower Pressures - No Ice

$G_H = 0.850$  (base tower),  $1.350$  (upper structure)

| Section Elevation<br>ft | z<br>ft | $K_Z$ | $q_z$<br>ksf | $A_G$<br>ft <sup>2</sup> | F a c e<br>A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg %  | C <sub>A</sub> A <sub>A</sub><br>In Face<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Out Face<br>ft <sup>2</sup> |
|-------------------------|---------|-------|--------------|--------------------------|--|-----------------------------------|-------------------------------------|--------|---|--|
| 492.000-477.000<br>L1   | 484.500 | 1.551 | 0.032        | 10.781                   | A  | 0.000                             | 10.781                              | 100.00 | 0.000   | 0.000  |
|                         |         |       |              |                          | B  | 0.000                             | 10.781                              | 100.00 | 0.000   | 0.000  |
|                         |         |       |              |                          | C  | 0.000                             | 10.781                              | 100.00 | 0.000   | 0.000  |
| 477.000-457.000<br>L2   | 467.000 | 1.535 | 0.032        | 14.375                   | A  | 0.000                             | 14.375                              | 100.00 | 0.000   | 0.000  |
|                         |         |       |              |                          | B  | 0.000                             | 14.375                              | 100.00 | 0.000   | 0.000  |
|                         |         |       |              |                          | C  | 0.000                             | 14.375                              | 100.00 | 0.000   | 0.000  |
| 457.000-452.000<br>T1   | 454.500 | 1.523 | 0.032        | 20.938                   | A  | 4.045                             | 1.875                               | 31.67  | 0.260   | 0.000  |
|                         |         |       |              |                          | B  | 4.045                             | 1.875                               | 31.67  | 0.000   | 0.000  |
|                         |         |       |              |                          | C  | 4.045                             | 1.875                               | 31.67  | 0.000   | 0.000  |
| 452.000-442.000<br>T2   | 447.000 | 1.516 | 0.032        | 41.875                   | A  | 4.388                             | 3.750                               | 46.08  | 0.865   | 0.000  |
|                         |         |       |              |                          | B  | 4.388                             | 3.750                               | 46.08  | 0.000   | 0.000  |
|                         |         |       |              |                          | C  | 4.388                             | 3.750                               | 46.08  | 0.132   | 0.000  |
| 442.000-422.000<br>T3   | 432.000 | 1.501 | 0.032        | 83.750                   | A  | 7.670                             | 7.500                               | 49.44  | 4.564   | 0.000  |
|                         |         |       |              |                          | B  | 7.670                             | 7.500                               | 49.44  | 5.346   | 0.000  |
|                         |         |       |              |                          | C  | 7.670                             | 7.500                               | 49.44  | 3.692   | 0.000  |
| 422.000-402.000<br>T4   | 412.000 | 1.481 | 0.031        | 83.750                   | A  | 7.670                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |       |              |                          | B  | 7.670                             | 7.500                               | 49.44  | 8.224   | 0.000  |
|                         |         |       |              |                          | C  | 7.670                             | 7.500                               | 49.44  | 6.456   | 0.000  |
| 402.000-382.000<br>T5   | 392.000 | 1.46  | 0.031        | 83.750                   | A  | 7.670                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |       |              |                          | B  | 7.670                             | 7.500                               | 49.44  | 8.224   | 0.000  |
|                         |         |       |              |                          | C  | 7.670                             | 7.500                               | 49.44  | 6.456   | 0.000  |
| 382.000-362.000<br>T6   | 372.000 | 1.438 | 0.031        | 83.750                   | A  | 7.670                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |       |              |                          | B  | 7.670                             | 7.500                               | 49.44  | 8.224   | 0.000  |
|                         |         |       |              |                          | C  | 7.670                             | 7.500                               | 49.44  | 6.456   | 0.000  |
| 362.000-342.000<br>T7   | 352.000 | 1.416 | 0.031        | 83.750                   | A  | 7.670                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |       |              |                          | B  | 7.670                             | 7.500                               | 49.44  | 8.224   | 0.000  |
|                         |         |       |              |                          | C  | 7.670                             | 7.500                               | 49.44  | 7.235   | 0.000  |
| 342.000-322.000<br>T8   | 332.000 | 1.392 | 0.031        | 83.750                   | A  | 7.670                             | 7.500                               | 49.44  | 7.943   | 0.000  |
|                         |         |       |              |                          | B  | 7.670                             | 7.500                               | 49.44  | 8.224   | 0.000  |
|                         |         |       |              |                          | C  | 7.670                             | 7.500                               | 49.44  | 8.186   | 0.000  |
| 322.000-302.000<br>T9   | 312.000 | 1.368 | 0.030        | 84.167                   | A  | 7.075                             | 8.333                               | 54.08  | 8.270   | 0.000  |
|                         |         |       |              |                          | B  | 7.075                             | 8.333                               | 54.08  | 8.224   | 0.000  |
|                         |         |       |              |                          | C  | 7.075                             | 8.333                               | 54.08  | 8.186   | 0.000  |
| 302.000-282.000<br>T10  | 292.000 | 1.342 | 0.030        | 84.167                   | A  | 7.628                             | 8.333                               | 52.21  | 11.370  | 0.000  |
|                         |         |       |              |                          | B  | 7.628                             | 8.333                               | 52.21  | 8.224   | 0.000  |
|                         |         |       |              |                          | C  | 7.628                             | 8.333                               | 52.21  | 8.627   | 0.000  |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 36 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section Elevation<br>ft | z<br>ft | K <sub>Z</sub> | q <sub>z</sub><br>ksf | A <sub>G</sub><br>ft <sup>2</sup> | F<br>a<br>c<br>e | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg<br>% | C <sub>AA</sub><br>In<br>Face<br>ft <sup>2</sup> | C <sub>AA</sub><br>Out<br>Face<br>ft <sup>2</sup> |
|-------------------------|---------|----------------|-----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------|--|---|
| T11                     | 272.000 | 1.315          | 0.030                 | 84.583                            | A                | 8.704                             | 9.167                             | 9.167                               | 51.29    | 46.704   | 0.000   |
| 282.000-262.000         |         |                |                       |                                   | B                | 8.704                             | 9.167                             |                                     | 51.29    | 29.608   | 0.000   |
|                         |         |                |                       |                                   | C                | 8.704                             | 9.167                             |                                     | 51.29    | 13.010   | 0.000   |
| T12                     | 252.000 | 1.287          | 0.029                 | 84.583                            | A                | 7.586                             | 9.167                             | 9.167                               | 54.72    | 51.175   | 0.000   |
| 262.000-242.000         |         |                |                       |                                   | B                | 7.586                             | 9.167                             |                                     | 54.72    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 7.586                             | 9.167                             |                                     | 54.72    | 22.706   | 0.000   |
| T13                     | 232.000 | 1.257          | 0.029                 | 84.583                            | A                | 7.586                             | 9.167                             | 9.167                               | 54.72    | 54.663   | 0.000   |
| 242.000-222.000         |         |                |                       |                                   | B                | 7.586                             | 9.167                             |                                     | 54.72    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 7.586                             | 9.167                             |                                     | 54.72    | 25.806   | 0.000   |
| T14                     | 212.000 | 1.225          | 0.029                 | 85.000                            | A                | 8.656                             | 10.000                            | 10.000                              | 53.60    | 54.990   | 0.000   |
| 222.000-202.000         |         |                |                       |                                   | B                | 8.656                             | 10.000                            |                                     | 53.60    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 8.656                             | 10.000                            |                                     | 53.60    | 25.806   | 0.000   |
| T15                     | 192.000 | 1.191          | 0.028                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 54.990   | 0.000   |
| 202.000-182.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 25.806   | 0.000   |
| T16                     | 172.000 | 1.154          | 0.028                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 54.990   | 0.000   |
| 182.000-162.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 27.627   | 0.000   |
| T17                     | 152.000 | 1.114          | 0.027                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 54.990   | 0.000   |
| 162.000-142.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T18                     | 132.000 | 1.07           | 0.026                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 56.952   | 0.000   |
| 142.000-122.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T19                     | 117.000 | 1.034          | 0.026                 | 42.500                            | A                | 4.011                             | 5.000                             | 5.000                               | 55.49    | 29.675   | 0.000   |
| 122.000-112.000         |         |                |                       |                                   | B                | 4.011                             | 5.000                             |                                     | 55.49    | 15.992   | 0.000   |
|                         |         |                |                       |                                   | C                | 4.011                             | 5.000                             |                                     | 55.49    | 18.973   | 0.000   |
| T20                     | 107.000 | 1.008          | 0.025                 | 42.500                            | A                | 4.319                             | 5.000                             | 5.000                               | 53.65    | 30.329   | 0.000   |
| 112.000-102.000         |         |                |                       |                                   | B                | 4.319                             | 5.000                             |                                     | 53.65    | 15.992   | 0.000   |
|                         |         |                |                       |                                   | C                | 4.319                             | 5.000                             |                                     | 53.65    | 18.973   | 0.000   |
| T21                     | 92.000  | 0.965          | 0.024                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 102.000-82.000          |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T22                     | 72.000  | 0.9            | 0.023                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 82.000-62.000           |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T23                     | 52.000  | 0.82           | 0.021                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 62.000-42.000           |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T24                     | 32.000  | 0.714          | 0.019                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 42.000-22.000           |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T25                     | 12.000  | 0.7            | 0.019                 | 85.000                            | A                | 7.617                             | 10.000                            | 10.000                              | 56.76    | 43.071   | 0.000   |
| 22.000-2.000            |         |                |                       |                                   | B                | 7.617                             | 10.000                            |                                     | 56.76    | 22.389   | 0.000   |
|                         |         |                |                       |                                   | C                | 7.617                             | 10.000                            |                                     | 56.76    | 26.562   | 0.000   |

### Tower Pressure - With Ice

*G<sub>H</sub> = 0.850 (base tower), 1.350 (upper structure)*

| Section Elevation<br>ft | z<br>ft | K <sub>Z</sub> | q <sub>z</sub><br>ksf | t <sub>z</sub><br>in | A <sub>G</sub><br>ft <sup>2</sup> | F<br>a<br>c<br>e | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg<br>% | C <sub>AA</sub><br>In<br>Face<br>ft <sup>2</sup> | C <sub>AA</sub><br>Out<br>Face<br>ft <sup>2</sup> |
|-------------------------|---------|----------------|-----------------------|----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------|--|---|
| L1                      | 484.500 | 1.551          | 0.010                 | 2.0896               | 16.005                            | A                | 0.000                             | 16.005                            | 16.005                              | 100.00   | 0.000  | 0.000   |
| 492.000-477.000         |         |                |                       |                      |                                   | B                | 0.000                             | 16.005                            |                                     | 100.00   | 0.000  | 0.000   |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 37 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section Elevation<br>ft | z<br>ft | Kz    | qz<br>ksf | tz<br>in | AG<br>ft <sup>2</sup> | F<br>a<br>c<br>e | AF<br>ft <sup>2</sup> | AR<br>ft <sup>2</sup> | Aleg<br>ft <sup>2</sup> | Leg<br>% | CAAI<br>In<br>Face<br>ft <sup>2</sup> | CAAI<br>Out<br>Face<br>ft <sup>2</sup> |
|-------------------------|---------|-------|-----------|----------|-----------------------|------------------|-----------------------|-----------------------|-------------------------|----------|---------------------------------------|--|
| L2<br>477.000-457.000   | 467.000 | 1.535 | 0.010     | 2.0864   | 21.330                | C                | 0.000                 | 16.005                |                         | 100.00   | 0.000                                 | 0.000                                  |
|                         |         |       |           |          |                       | A                | 0.000                 | 21.330                | 21.330                  | 100.00   | 0.000                                 | 0.000                                  |
|                         |         |       |           |          |                       | B                | 0.000                 | 21.330                |                         | 100.00   | 0.000                                 | 0.000                                  |
|                         |         |       |           |          |                       | C                | 0.000                 | 21.330                |                         | 100.00   | 0.000                                 | 0.000                                  |
| T1<br>457.000-452.000   | 454.500 | 1.523 | 0.010     | 2.0841   | 22.674                | A                | 4.045                 | 10.238                | 5.348                   | 37.45    | 1.510                                 | 0.000                                  |
|                         |         |       |           |          |                       | B                | 4.045                 | 10.238                |                         | 37.45    | 0.000                                 | 0.000                                  |
|                         |         |       |           |          |                       | C                | 4.045                 | 10.238                |                         | 37.45    | 0.000                                 | 0.000                                  |
| T2<br>452.000-442.000   | 447.000 | 1.516 | 0.010     | 2.0826   | 45.346                | A                | 4.388                 | 19.830                | 10.692                  | 44.15    | 5.030                                 | 0.000                                  |
|                         |         |       |           |          |                       | B                | 4.388                 | 19.830                |                         | 44.15    | 0.000                                 | 0.000                                  |
|                         |         |       |           |          |                       | C                | 4.388                 | 19.830                |                         | 44.15    | 1.382                                 | 0.000                                  |
| T3<br>442.000-422.000   | 432.000 | 1.501 | 0.010     | 2.0797   | 90.682                | A                | 7.670                 | 37.316                | 21.365                  | 47.49    | 23.697                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.670                 | 37.316                |                         | 47.49    | 16.160                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.670                 | 37.316                |                         | 47.49    | 20.745                                | 0.000                                  |
| T4<br>422.000-402.000   | 412.000 | 1.481 | 0.010     | 2.0755   | 90.668                | A                | 7.670                 | 37.257                | 21.337                  | 47.49    | 30.996                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.670                 | 37.257                |                         | 47.49    | 24.828                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.670                 | 37.257                |                         | 47.49    | 31.362                                | 0.000                                  |
| T5<br>402.000-382.000   | 392.000 | 1.46  | 0.010     | 2.0711   | 90.654                | A                | 7.670                 | 37.193                | 21.307                  | 47.49    | 30.943                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.670                 | 37.193                |                         | 47.49    | 24.793                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.670                 | 37.193                |                         | 47.49    | 31.309                                | 0.000                                  |
| T6<br>382.000-362.000   | 372.000 | 1.438 | 0.010     | 2.0664   | 90.638                | A                | 7.670                 | 37.125                | 21.276                  | 47.50    | 30.886                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.670                 | 37.125                |                         | 47.50    | 24.755                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.670                 | 37.125                |                         | 47.50    | 31.252                                | 0.000                                  |
| T7<br>362.000-342.000   | 352.000 | 1.416 | 0.010     | 2.0613   | 90.621                | A                | 7.670                 | 37.052                | 21.242                  | 47.50    | 30.825                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.670                 | 37.052                |                         | 47.50    | 24.714                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.670                 | 37.052                |                         | 47.50    | 35.680                                | 0.000                                  |
| T8<br>342.000-322.000   | 332.000 | 1.392 | 0.010     | 2.0558   | 90.603                | A                | 7.670                 | 36.973                | 21.205                  | 47.50    | 39.602                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.670                 | 36.973                |                         | 47.50    | 24.670                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.670                 | 36.973                |                         | 47.50    | 41.078                                | 0.000                                  |
| T9<br>322.000-302.000   | 312.000 | 1.368 | 0.010     | 2.0497   | 90.999                | A                | 7.075                 | 37.646                | 21.998                  | 49.19    | 41.066                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.075                 | 37.646                |                         | 49.19    | 24.622                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.075                 | 37.646                |                         | 49.19    | 40.982                                | 0.000                                  |
| T10<br>302.000-282.000  | 292.000 | 1.342 | 0.009     | 2.0432   | 90.977                | A                | 7.628                 | 37.540                | 21.954                  | 48.61    | 52.233                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.628                 | 37.540                |                         | 48.61    | 24.569                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.628                 | 37.540                |                         | 48.61    | 44.178                                | 0.000                                  |
| T11<br>282.000-262.000  | 272.000 | 1.315 | 0.009     | 2.0359   | 91.370                | A                | 8.704                 | 38.196                | 22.739                  | 48.48    | 110.421                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 8.704                 | 38.196                |                         | 48.48    | 53.391                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 8.704                 | 38.196                |                         | 48.48    | 61.057                                | 0.000                                  |
| T12<br>262.000-242.000  | 252.000 | 1.287 | 0.009     | 2.0278   | 91.343                | A                | 7.586                 | 38.069                | 22.685                  | 49.69    | 119.202                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.586                 | 38.069                |                         | 49.69    | 56.478                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.586                 | 38.069                |                         | 49.69    | 89.896                                | 0.000                                  |
| T13<br>242.000-222.000  | 232.000 | 1.257 | 0.009     | 2.0187   | 91.312                | A                | 7.586                 | 37.940                | 22.625                  | 49.70    | 135.296                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 7.586                 | 37.940                |                         | 49.70    | 56.342                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 7.586                 | 37.940                |                         | 49.70    | 98.853                                | 0.000                                  |
| T14<br>222.000-202.000  | 212.000 | 1.225 | 0.009     | 2.0085   | 91.695                | A                | 8.656                 | 38.555                | 23.390                  | 49.54    | 136.407                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 8.656                 | 38.555                |                         | 49.54    | 56.187                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 8.656                 | 38.555                |                         | 49.54    | 98.496                                | 0.000                                  |
| T15<br>202.000-182.000  | 192.000 | 1.191 | 0.009     | 1.9968   | 91.656                | A                | 6.992                 | 38.376                | 23.312                  | 51.38    | 135.918                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 6.992                 | 38.376                |                         | 51.38    | 56.012                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 6.992                 | 38.376                |                         | 51.38    | 98.087                                | 0.000                                  |
| T16<br>182.000-162.000  | 172.000 | 1.154 | 0.009     | 1.9833   | 91.611                | A                | 6.992                 | 38.184                | 23.222                  | 51.40    | 135.355                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 6.992                 | 38.184                |                         | 51.40    | 55.808                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 6.992                 | 38.184                |                         | 51.40    | 103.330                               | 0.000                                  |
| T17<br>162.000-142.000  | 152.000 | 1.114 | 0.009     | 1.9674   | 91.558                | A                | 6.992                 | 37.959                | 23.116                  | 51.42    | 134.696                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 6.992                 | 37.959                |                         | 51.42    | 55.571                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 6.992                 | 37.959                |                         | 51.42    | 134.938                               | 0.000                                  |
| T18<br>142.000-122.000  | 132.000 | 1.07  | 0.008     | 1.9486   | 91.495                | A                | 6.992                 | 37.692                | 22.991                  | 51.45    | 142.889                               | 0.000                                  |
|                         |         |       |           |          |                       | B                | 6.992                 | 37.692                |                         | 51.45    | 55.288                                | 0.000                                  |
|                         |         |       |           |          |                       | C                | 6.992                 | 37.692                |                         | 51.45    | 134.017                               | 0.000                                  |
| T19<br>122.000-112.000  | 117.000 | 1.034 | 0.008     | 1.9320   | 45.720                | A                | 4.011                 | 19.778                | 11.440                  | 48.09    | 76.517                                | 0.000                                  |
|                         |         |       |           |          |                       | B                | 4.011                 | 19.778                |                         | 48.09    | 27.519                                | 0.000                                  |

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>38 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

| Section Elevation<br>ft | z<br>ft | K <sub>Z</sub> | q <sub>z</sub><br>ksf | t <sub>z</sub><br>in | A <sub>G</sub><br>ft <sup>2</sup> | F a c e<br>ft <sup>2</sup> | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg % | C <sub>A</sub> A <sub>A</sub><br>In Face<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Out Face<br>ft <sup>2</sup> |
|-------------------------|---------|----------------|-----------------------|----------------------|-----------------------------------|----------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-------|---|--|
| T20<br>112.000-102.000  | 107.000 | 1.008          | 0.008                 | 1.9193               | 45.699                            | C                          | 4.011                             | 19.778                            | 11.398                              | 48.09 | 66.600  | 0.000  |
|                         |         |                |                       |                      |                                   | A                          | 7.442                             | 14.997                            |                                     | 50.79 | 79.160  | 0.000  |
|                         |         |                |                       |                      |                                   | B                          | 7.442                             | 14.997                            |                                     | 50.79 | 27.424  | 0.000  |
|                         |         |                |                       |                      |                                   | C                          | 7.442                             | 14.997                            |                                     | 50.79 | 66.291  | 0.000  |
| T21<br>102.000-82.000   | 92.000  | 0.965          | 0.008                 | 1.8975               | 91.325                            | A                          | 6.992                             | 36.965                            | 22.650                              | 51.53 | 161.089   | 0.000  |
|                         |         |                |                       |                      |                                   | B                          | 6.992                             | 36.965                            |                                     | 51.53 | 54.519  | 0.000  |
|                         |         |                |                       |                      |                                   | C                          | 6.992                             | 36.965                            |                                     | 51.53 | 131.508   | 0.000  |
| T22<br>82.000-62.000    | 72.000  | 0.9            | 0.007                 | 1.8608               | 91.203                            | A                          | 6.992                             | 36.444                            | 22.405                              | 51.58 | 159.120   | 0.000  |
|                         |         |                |                       |                      |                                   | B                          | 6.992                             | 36.444                            |                                     | 51.58 | 53.968  | 0.000  |
|                         |         |                |                       |                      |                                   | C                          | 6.992                             | 36.444                            |                                     | 51.58 | 129.710   | 0.000  |
| T23<br>62.000-42.000    | 52.000  | 0.82           | 0.007                 | 1.8105               | 91.035                            | A                          | 6.992                             | 35.729                            | 22.070                              | 51.66 | 156.423   | 0.000  |
|                         |         |                |                       |                      |                                   | B                          | 6.992                             | 35.729                            |                                     | 51.66 | 53.213  | 0.000  |
|                         |         |                |                       |                      |                                   | C                          | 6.992                             | 35.729                            |                                     | 51.66 | 127.246   | 0.000  |
| T24<br>42.000-22.000    | 32.000  | 0.714          | 0.006                 | 1.7339               | 90.780                            | A                          | 6.992                             | 34.641                            | 21.559                              | 51.78 | 152.316   | 0.000  |
|                         |         |                |                       |                      |                                   | B                          | 6.992                             | 34.641                            |                                     | 51.78 | 52.062  | 0.000  |
|                         |         |                |                       |                      |                                   | C                          | 6.992                             | 34.641                            |                                     | 51.78 | 123.494   | 0.000  |
| T25<br>22.000-2.000     | 12.000  | 0.7            | 0.006                 | 1.5806               | 90.269                            | A                          | 7.617                             | 33.450                            | 20.537                              | 50.01 | 100.868   | 0.000  |
|                         |         |                |                       |                      |                                   | B                          | 7.617                             | 33.450                            |                                     | 50.01 | 34.831  | 0.000  |
|                         |         |                |                       |                      |                                   | C                          | 7.617                             | 33.450                            |                                     | 50.01 | 81.189  | 0.000  |

## Tower Pressure - Service

*G<sub>H</sub> = 0.850 (base tower), 1.350 (upper structure)*

| Section Elevation<br>ft | z<br>ft | K <sub>Z</sub> | q <sub>z</sub><br>ksf | A <sub>G</sub><br>ft <sup>2</sup> | F a c e<br>ft <sup>2</sup> | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg %  | C <sub>A</sub> A <sub>A</sub><br>In Face<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Out Face<br>ft <sup>2</sup> |
|-------------------------|---------|----------------|-----------------------|-----------------------------------|----------------------------|-----------------------------------|-----------------------------------|-------------------------------------|--------|---|--|
| L1<br>492.000-477.000   | 484.500 | 1.551          | 0.015                 | 10.781                            | A                          | 0.000                             | 10.781                            | 10.781                              | 100.00 | 0.000   | 0.000  |
|                         |         |                |                       |                                   | B                          | 0.000                             | 10.781                            |                                     | 100.00 | 0.000   | 0.000  |
|                         |         |                |                       |                                   | C                          | 0.000                             | 10.781                            |                                     | 100.00 | 0.000   | 0.000  |
| L2<br>477.000-457.000   | 467.000 | 1.535          | 0.014                 | 14.375                            | A                          | 0.000                             | 14.375                            | 14.375                              | 100.00 | 0.000   | 0.000  |
|                         |         |                |                       |                                   | B                          | 0.000                             | 14.375                            |                                     | 100.00 | 0.000   | 0.000  |
|                         |         |                |                       |                                   | C                          | 0.000                             | 14.375                            |                                     | 100.00 | 0.000   | 0.000  |
| T1<br>457.000-452.000   | 454.500 | 1.523          | 0.014                 | 20.938                            | A                          | 4.045                             | 1.875                             | 1.875                               | 31.67  | 0.260   | 0.000  |
|                         |         |                |                       |                                   | B                          | 4.045                             | 1.875                             |                                     | 31.67  | 0.000   | 0.000  |
|                         |         |                |                       |                                   | C                          | 4.045                             | 1.875                             |                                     | 31.67  | 0.000   | 0.000  |
| T2<br>452.000-442.000   | 447.000 | 1.516          | 0.014                 | 41.875                            | A                          | 4.388                             | 3.750                             | 3.750                               | 46.08  | 0.865   | 0.000  |
|                         |         |                |                       |                                   | B                          | 4.388                             | 3.750                             |                                     | 46.08  | 0.000   | 0.000  |
|                         |         |                |                       |                                   | C                          | 4.388                             | 3.750                             |                                     | 46.08  | 0.132   | 0.000  |
| T3<br>442.000-422.000   | 432.000 | 1.501          | 0.014                 | 83.750                            | A                          | 7.670                             | 7.500                             | 7.500                               | 49.44  | 4.564   | 0.000  |
|                         |         |                |                       |                                   | B                          | 7.670                             | 7.500                             |                                     | 49.44  | 5.346   | 0.000  |
|                         |         |                |                       |                                   | C                          | 7.670                             | 7.500                             |                                     | 49.44  | 3.692   | 0.000  |
| T4<br>422.000-402.000   | 412.000 | 1.481          | 0.014                 | 83.750                            | A                          | 7.670                             | 7.500                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |                |                       |                                   | B                          | 7.670                             | 7.500                             |                                     | 49.44  | 8.224   | 0.000  |
|                         |         |                |                       |                                   | C                          | 7.670                             | 7.500                             |                                     | 49.44  | 6.456   | 0.000  |
| T5<br>402.000-382.000   | 392.000 | 1.46           | 0.014                 | 83.750                            | A                          | 7.670                             | 7.500                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |                |                       |                                   | B                          | 7.670                             | 7.500                             |                                     | 49.44  | 8.224   | 0.000  |
|                         |         |                |                       |                                   | C                          | 7.670                             | 7.500                             |                                     | 49.44  | 6.456   | 0.000  |
| T6<br>382.000-362.000   | 372.000 | 1.438          | 0.014                 | 83.750                            | A                          | 7.670                             | 7.500                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |                |                       |                                   | B                          | 7.670                             | 7.500                             |                                     | 49.44  | 8.224   | 0.000  |
|                         |         |                |                       |                                   | C                          | 7.670                             | 7.500                             |                                     | 49.44  | 6.456   | 0.000  |
| T7<br>362.000-342.000   | 352.000 | 1.416          | 0.014                 | 83.750                            | A                          | 7.670                             | 7.500                             | 7.500                               | 49.44  | 6.090   | 0.000  |
|                         |         |                |                       |                                   | B                          | 7.670                             | 7.500                             |                                     | 49.44  | 8.224   | 0.000  |
|                         |         |                |                       |                                   | C                          | 7.670                             | 7.500                             |                                     | 49.44  | 7.235   | 0.000  |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 39 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section Elevation<br>ft | z<br>ft | K <sub>Z</sub> | q <sub>z</sub><br>ksf | A <sub>G</sub><br>ft <sup>2</sup> | F<br>a<br>c<br>e | A <sub>F</sub><br>ft <sup>2</sup> | A <sub>R</sub><br>ft <sup>2</sup> | A <sub>leg</sub><br>ft <sup>2</sup> | Leg<br>% | C <sub>AA</sub><br>In<br>Face<br>ft <sup>2</sup> | C <sub>AA</sub><br>Out<br>Face<br>ft <sup>2</sup> |
|-------------------------|---------|----------------|-----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------|--|---|
| T8                      | 332.000 | 1.392          | 0.014                 | 83.750                            | A                | 7.670                             | 7.500                             | 7.500                               | 49.44    | 7.943  | 0.000   |
| 342.000-322.000         |         |                |                       |                                   | B                | 7.670                             | 7.500                             |                                     | 49.44    | 8.224  | 0.000   |
|                         |         |                |                       |                                   | C                | 7.670                             | 7.500                             |                                     | 49.44    | 8.186  | 0.000   |
| T9                      | 312.000 | 1.368          | 0.014                 | 84.167                            | A                | 7.075                             | 8.333                             | 8.333                               | 54.08    | 8.270  | 0.000   |
| 322.000-302.000         |         |                |                       |                                   | B                | 7.075                             | 8.333                             |                                     | 54.08    | 8.224  | 0.000   |
|                         |         |                |                       |                                   | C                | 7.075                             | 8.333                             |                                     | 54.08    | 8.186  | 0.000   |
| T10                     | 292.000 | 1.342          | 0.014                 | 84.167                            | A                | 7.628                             | 8.333                             | 8.333                               | 52.21    | 11.370   | 0.000   |
| 302.000-282.000         |         |                |                       |                                   | B                | 7.628                             | 8.333                             |                                     | 52.21    | 8.224  | 0.000   |
|                         |         |                |                       |                                   | C                | 7.628                             | 8.333                             |                                     | 52.21    | 8.627  | 0.000   |
| T11                     | 272.000 | 1.315          | 0.013                 | 84.583                            | A                | 8.704                             | 9.167                             | 9.167                               | 51.29    | 46.704   | 0.000   |
| 282.000-262.000         |         |                |                       |                                   | B                | 8.704                             | 9.167                             |                                     | 51.29    | 29.608   | 0.000   |
|                         |         |                |                       |                                   | C                | 8.704                             | 9.167                             |                                     | 51.29    | 13.010   | 0.000   |
| T12                     | 252.000 | 1.287          | 0.013                 | 84.583                            | A                | 7.586                             | 9.167                             | 9.167                               | 54.72    | 51.175   | 0.000   |
| 262.000-242.000         |         |                |                       |                                   | B                | 7.586                             | 9.167                             |                                     | 54.72    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 7.586                             | 9.167                             |                                     | 54.72    | 22.706   | 0.000   |
| T13                     | 232.000 | 1.257          | 0.013                 | 84.583                            | A                | 7.586                             | 9.167                             | 9.167                               | 54.72    | 54.663   | 0.000   |
| 242.000-222.000         |         |                |                       |                                   | B                | 7.586                             | 9.167                             |                                     | 54.72    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 7.586                             | 9.167                             |                                     | 54.72    | 25.806   | 0.000   |
| T14                     | 212.000 | 1.225          | 0.013                 | 85.000                            | A                | 8.656                             | 10.000                            | 10.000                              | 53.60    | 54.990   | 0.000   |
| 222.000-202.000         |         |                |                       |                                   | B                | 8.656                             | 10.000                            |                                     | 53.60    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 8.656                             | 10.000                            |                                     | 53.60    | 25.806   | 0.000   |
| T15                     | 192.000 | 1.191          | 0.013                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 54.990   | 0.000   |
| 202.000-182.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 25.806   | 0.000   |
| T16                     | 172.000 | 1.154          | 0.013                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 54.990   | 0.000   |
| 182.000-162.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 27.627   | 0.000   |
| T17                     | 152.000 | 1.114          | 0.012                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 54.990   | 0.000   |
| 162.000-142.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T18                     | 132.000 | 1.07           | 0.012                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 56.952   | 0.000   |
| 142.000-122.000         |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T19                     | 117.000 | 1.034          | 0.012                 | 42.500                            | A                | 4.011                             | 5.000                             | 5.000                               | 55.49    | 29.675   | 0.000   |
| 122.000-112.000         |         |                |                       |                                   | B                | 4.011                             | 5.000                             |                                     | 55.49    | 15.992   | 0.000   |
|                         |         |                |                       |                                   | C                | 4.011                             | 5.000                             |                                     | 55.49    | 18.973   | 0.000   |
| T20                     | 107.000 | 1.008          | 0.011                 | 42.500                            | A                | 4.319                             | 5.000                             | 5.000                               | 53.65    | 30.329   | 0.000   |
| 112.000-102.000         |         |                |                       |                                   | B                | 4.319                             | 5.000                             |                                     | 53.65    | 15.992   | 0.000   |
|                         |         |                |                       |                                   | C                | 4.319                             | 5.000                             |                                     | 53.65    | 18.973   | 0.000   |
| T21                     | 92.000  | 0.965          | 0.011                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 102.000-82.000          |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T22                     | 72.000  | 0.9            | 0.010                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 82.000-62.000           |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T23                     | 52.000  | 0.82           | 0.010                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 62.000-42.000           |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T24                     | 32.000  | 0.714          | 0.009                 | 85.000                            | A                | 6.992                             | 10.000                            | 10.000                              | 58.85    | 61.530   | 0.000   |
| 42.000-22.000           |         |                |                       |                                   | B                | 6.992                             | 10.000                            |                                     | 58.85    | 31.984   | 0.000   |
|                         |         |                |                       |                                   | C                | 6.992                             | 10.000                            |                                     | 58.85    | 37.946   | 0.000   |
| T25                     | 12.000  | 0.7            | 0.009                 | 85.000                            | A                | 7.617                             | 10.000                            | 10.000                              | 56.76    | 43.071   | 0.000   |
| 22.000-2.000            |         |                |                       |                                   | B                | 7.617                             | 10.000                            |                                     | 56.76    | 22.389   | 0.000   |
|                         |         |                |                       |                                   | C                | 7.617                             | 10.000                            |                                     | 56.76    | 26.562   | 0.000   |

**Tower Forces - No Ice - Wind Normal To Face**

|   |  |  |
|---|--|--|
| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>40 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Section Elevation    | Add Weight | Self Weight | F a c e | e     | C <sub>F</sub> | q <sub>z</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F     | w     | Ctrl. Face |
|----------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|-------|-------|------------|
| ft                   | K          | K           |         |       |                | ksf            |                |                | ft <sup>2</sup> | K     | klf   |            |
| L1<br>492.000-477.0  | 0.000      | 0.535       | A       | 1     | 0.6            | 0.032          | 1              | 1              | 10.781          | 0.279 | 0.019 | C          |
| 00                   |            |             | B       | 1     | 0.6            |                | 1              | 1              | 10.781          |       |       |            |
|                      |            |             | C       | 1     | 0.6            |                | 1              | 1              | 10.781          |       |       |            |
| L2<br>477.000-457.0  | 0.000      | 0.713       | A       | 1     | 0.6            | 0.032          | 1              | 1              | 14.375          | 0.371 | 0.019 | C          |
| 00                   |            |             | B       | 1     | 0.6            |                | 1              | 1              | 14.375          |       |       |            |
|                      |            |             | C       | 1     | 0.6            |                | 1              | 1              | 14.375          |       |       |            |
| T1<br>457.000-452.0  | 0.000      | 0.418       | A       | 0.283 | 2.343          | 0.032          | 1              | 1              | 5.158           | 0.330 | 0.066 | C          |
| 00                   |            |             | B       | 0.283 | 2.343          |                | 1              | 1              | 5.158           |       |       |            |
|                      |            |             | C       | 0.283 | 2.343          |                | 1              | 1              | 5.158           |       |       |            |
| T2<br>452.000-442.0  | 0.002      | 0.643       | A       | 0.194 | 2.615          | 0.032          | 1              | 1              | 6.538           | 0.477 | 0.048 | C          |
| 00                   |            |             | B       | 0.194 | 2.615          |                | 1              | 1              | 6.538           |       |       |            |
|                      |            |             | C       | 0.194 | 2.615          |                | 1              | 1              | 6.538           |       |       |            |
| T3<br>442.000-422.0  | 0.055      | 1.229       | A       | 0.181 | 2.66           | 0.032          | 1              | 1              | 11.956          | 1.072 | 0.054 | C          |
| 00                   |            |             | B       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
|                      |            |             | C       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
| T4<br>422.000-402.0  | 0.089      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 1              | 1              | 11.956          | 1.181 | 0.059 | C          |
| 00                   |            |             | B       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
|                      |            |             | C       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
| T5<br>402.000-382.0  | 0.089      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 1              | 1              | 11.956          | 1.174 | 0.059 | C          |
| 00                   |            |             | B       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
|                      |            |             | C       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
| T6<br>382.000-362.0  | 0.089      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 1              | 1              | 11.956          | 1.166 | 0.058 | C          |
| 00                   |            |             | B       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
|                      |            |             | C       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
| T7<br>362.000-342.0  | 0.091      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 1              | 1              | 11.956          | 1.170 | 0.059 | C          |
| 00                   |            |             | B       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
|                      |            |             | C       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
| T8<br>342.000-322.0  | 0.098      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 1              | 1              | 11.956          | 1.205 | 0.060 | C          |
| 00                   |            |             | B       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
|                      |            |             | C       | 0.181 | 2.66           |                | 1              | 1              | 11.956          |       |       |            |
| T9<br>322.000-302.0  | 0.099      | 1.328       | A       | 0.183 | 2.654          | 0.030          | 1              | 1              | 11.840          | 1.190 | 0.059 | C          |
| 00                   |            |             | B       | 0.183 | 2.654          |                | 1              | 1              | 11.840          |       |       |            |
|                      |            |             | C       | 0.183 | 2.654          |                | 1              | 1              | 11.840          |       |       |            |
| T10<br>302.000-282.0 | 0.113      | 1.419       | A       | 0.19  | 2.631          | 0.030          | 1              | 1              | 12.401          | 1.264 | 0.063 | C          |
| 00                   |            |             | B       | 0.19  | 2.631          |                | 1              | 1              | 12.401          |       |       |            |
|                      |            |             | C       | 0.19  | 2.631          |                | 1              | 1              | 12.401          |       |       |            |
| T11<br>282.000-262.0 | 0.366      | 1.858       | A       | 0.211 | 2.559          | 0.030          | 1              | 1              | 13.989          | 1.963 | 0.098 | A          |
| 00                   |            |             | B       | 0.211 | 2.559          |                | 1              | 1              | 13.989          |       |       |            |
|                      |            |             | C       | 0.211 | 2.559          |                | 1              | 1              | 13.989          |       |       |            |
| T12<br>262.000-242.0 | 0.435      | 1.629       | A       | 0.198 | 2.602          | 0.029          | 1              | 1              | 12.849          | 2.058 | 0.103 | A          |
| 00                   |            |             | B       | 0.198 | 2.602          |                | 1              | 1              | 12.849          |       |       |            |
|                      |            |             | C       | 0.198 | 2.602          |                | 1              | 1              | 12.849          |       |       |            |
| T13<br>242.000-222.0 | 0.459      | 1.629       | A       | 0.198 | 2.602          | 0.029          | 1              | 1              | 12.849          | 2.117 | 0.106 | A          |
| 00                   |            |             | B       | 0.198 | 2.602          |                | 1              | 1              | 12.849          |       |       |            |
|                      |            |             | C       | 0.198 | 2.602          |                | 1              | 1              | 12.849          |       |       |            |
| T14<br>222.000-202.0 | 0.460      | 2.089       | A       | 0.219 | 2.532          | 0.029          | 1              | 1              | 14.437          | 2.167 | 0.108 | A          |
| 00                   |            |             | B       | 0.219 | 2.532          |                | 1              | 1              | 14.437          |       |       |            |
|                      |            |             | C       | 0.219 | 2.532          |                | 1              | 1              | 14.437          |       |       |            |
| T15<br>202.000-182.0 | 0.460      | 1.768       | A       | 0.2   | 2.596          | 0.028          | 1              | 1              | 12.737          | 2.047 | 0.102 | A          |
| 00                   |            |             | B       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |
|                      |            |             | C       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |
| T16<br>182.000-162.0 | 0.463      | 1.768       | A       | 0.2   | 2.596          | 0.028          | 1              | 1              | 12.737          | 2.021 | 0.101 | A          |
| 00                   |            |             | B       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |
|                      |            |             | C       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |
| T17<br>162.000-142.0 | 0.481      | 1.768       | A       | 0.2   | 2.596          | 0.027          | 1              | 1              | 12.737          | 2.048 | 0.102 | A          |
| 00                   |            |             | B       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |
|                      |            |             | C       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |
| T18<br>142.000-122.0 | 0.487      | 1.768       | A       | 0.2   | 2.596          | 0.026          | 1              | 1              | 12.737          | 2.019 | 0.101 | A          |
| 00                   |            |             | B       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |
|                      |            |             | C       | 0.2   | 2.596          |                | 1              | 1              | 12.737          |       |       |            |



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| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>41 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| T19<br>122.000-112.000  | 0.247           | 0.908            | A       | 0.212 | 2.556          | 0.026                 | 1              | 1              | 6.894                             | 1.024  | 0.102    | A          |
|                         |                 |                  | B       | 0.212 | 2.556          |                       | 1              | 1              | 6.894                             |        |          |            |
|                         |                 |                  | C       | 0.212 | 2.556          |                       | 1              | 1              | 6.894                             |        |          |            |
| T20<br>112.000-102.000  | 0.249           | 1.060            | A       | 0.219 | 2.533          | 0.025                 | 1              | 1              | 7.210                             | 1.027  | 0.103    | A          |
|                         |                 |                  | B       | 0.219 | 2.533          |                       | 1              | 1              | 7.210                             |        |          |            |
|                         |                 |                  | C       | 0.219 | 2.533          |                       | 1              | 1              | 7.210                             |        |          |            |
| T21<br>102.000-82.000   | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.024                 | 1              | 1              | 12.737                            | 1.928  | 0.096    | A          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T22<br>82.000-62.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.023                 | 1              | 1              | 12.737                            | 1.823  | 0.091    | A          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T23<br>62.000-42.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.021                 | 1              | 1              | 12.737                            | 1.686  | 0.084    | A          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T24<br>42.000-22.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.019                 | 1              | 1              | 12.737                            | 1.490  | 0.075    | A          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T25<br>22.000-2.000     | 0.351           | 1.798            | A       | 0.207 | 2.572          | 0.019                 | 1              | 1              | 13.375                            | 1.218  | 0.061    | A          |
|                         |                 |                  | B       | 0.207 | 2.572          |                       | 1              | 1              | 13.375                            |        |          |            |
|                         |                 |                  | C       | 0.207 | 2.572          |                       | 1              | 1              | 13.375                            |        |          |            |
| Sum Weight:             | 7.191           | 37.547           |         |       |                |                       |                |                |                                   | 37.519 |          |            |

**Tower Forces - No Ice - Wind 60 To Face**

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| L1<br>492.000-477.000   | 0.000           | 0.535            | A       | 1     | 0.6            | 0.032                 | 1              | 1              | 10.781                            | 0.279  | 0.019    | C          |
|                         |                 |                  | B       | 1     | 0.6            |                       | 1              | 1              | 10.781                            |        |          |            |
|                         |                 |                  | C       | 1     | 0.6            |                       | 1              | 1              | 10.781                            |        |          |            |
| L2<br>477.000-457.000   | 0.000           | 0.713            | A       | 1     | 0.6            | 0.032                 | 1              | 1              | 14.375                            | 0.371  | 0.019    | C          |
|                         |                 |                  | B       | 1     | 0.6            |                       | 1              | 1              | 14.375                            |        |          |            |
|                         |                 |                  | C       | 1     | 0.6            |                       | 1              | 1              | 14.375                            |        |          |            |
| T1<br>457.000-452.000   | 0.000           | 0.418            | A       | 0.283 | 2.343          | 0.032                 | 0.8            | 1              | 4.349                             | 0.279  | 0.056    | C          |
|                         |                 |                  | B       | 0.283 | 2.343          |                       | 0.8            | 1              | 4.349                             |        |          |            |
|                         |                 |                  | C       | 0.283 | 2.343          |                       | 0.8            | 1              | 4.349                             |        |          |            |
| T2<br>452.000-442.000   | 0.002           | 0.643            | A       | 0.194 | 2.615          | 0.032                 | 0.8            | 1              | 5.661                             | 0.415  | 0.041    | C          |
|                         |                 |                  | B       | 0.194 | 2.615          |                       | 0.8            | 1              | 5.661                             |        |          |            |
|                         |                 |                  | C       | 0.194 | 2.615          |                       | 0.8            | 1              | 5.661                             |        |          |            |
| T3<br>442.000-422.000   | 0.055           | 1.229            | A       | 0.181 | 2.66           | 0.032                 | 0.8            | 1              | 10.422                            | 0.963  | 0.048    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| T4<br>422.000-402.000   | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.031                 | 0.8            | 1              | 10.422                            | 1.072  | 0.054    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| T5<br>402.000-382.000   | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.031                 | 0.8            | 1              | 10.422                            | 1.065  | 0.053    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| T6<br>382.000-362.000   | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.031                 | 0.8            | 1              | 10.422                            | 1.059  | 0.053    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| T7                      | 0.091           | 1.229            | A       | 0.181 | 2.66           | 0.031                 | 0.8            | 1              | 10.422                            | 1.063  | 0.053    | C          |

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>42 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 362.000-342.000         |                 |                  | B       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| 00                      |                 |                  | C       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| T8                      | 0.098           | 1.229            | A       | 0.181 | 2.66           | 0.031                 | 0.8            | 1              | 10.422                            | 1.099  | 0.055    | C          |
| 342.000-322.000         |                 |                  | B       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| 00                      |                 |                  | C       | 0.181 | 2.66           |                       | 0.8            | 1              | 10.422                            |        |          |            |
| T9                      | 0.099           | 1.328            | A       | 0.183 | 2.654          | 0.030                 | 0.8            | 1              | 10.425                            | 1.093  | 0.055    | C          |
| 322.000-302.000         |                 |                  | B       | 0.183 | 2.654          |                       | 0.8            | 1              | 10.425                            |        |          |            |
| 00                      |                 |                  | C       | 0.183 | 2.654          |                       | 0.8            | 1              | 10.425                            |        |          |            |
| T10                     | 0.113           | 1.419            | A       | 0.19  | 2.631          | 0.030                 | 0.8            | 1              | 10.875                            | 1.162  | 0.058    | C          |
| 302.000-282.000         |                 |                  | B       | 0.19  | 2.631          |                       | 0.8            | 1              | 10.875                            |        |          |            |
| 00                      |                 |                  | C       | 0.19  | 2.631          |                       | 0.8            | 1              | 10.875                            |        |          |            |
| T11                     | 0.366           | 1.858            | A       | 0.211 | 2.559          | 0.030                 | 0.8            | 1              | 12.248                            | 1.851  | 0.093    | B          |
| 282.000-262.000         |                 |                  | B       | 0.211 | 2.559          |                       | 0.8            | 1              | 12.248                            |        |          |            |
| 00                      |                 |                  | C       | 0.211 | 2.559          |                       | 0.8            | 1              | 12.248                            |        |          |            |
| T12                     | 0.435           | 1.629            | A       | 0.198 | 2.602          | 0.029                 | 0.8            | 1              | 11.332                            | 1.960  | 0.098    | B          |
| 262.000-242.000         |                 |                  | B       | 0.198 | 2.602          |                       | 0.8            | 1              | 11.332                            |        |          |            |
| 00                      |                 |                  | C       | 0.198 | 2.602          |                       | 0.8            | 1              | 11.332                            |        |          |            |
| T13                     | 0.459           | 1.629            | A       | 0.198 | 2.602          | 0.029                 | 0.8            | 1              | 11.332                            | 2.019  | 0.101    | B          |
| 242.000-222.000         |                 |                  | B       | 0.198 | 2.602          |                       | 0.8            | 1              | 11.332                            |        |          |            |
| 00                      |                 |                  | C       | 0.198 | 2.602          |                       | 0.8            | 1              | 11.332                            |        |          |            |
| T14                     | 0.460           | 2.089            | A       | 0.219 | 2.532          | 0.029                 | 0.8            | 1              | 12.706                            | 2.060  | 0.103    | B          |
| 222.000-202.000         |                 |                  | B       | 0.219 | 2.532          |                       | 0.8            | 1              | 12.706                            |        |          |            |
| 00                      |                 |                  | C       | 0.219 | 2.532          |                       | 0.8            | 1              | 12.706                            |        |          |            |
| T15                     | 0.460           | 1.768            | A       | 0.2   | 2.596          | 0.028                 | 0.8            | 1              | 11.338                            | 1.961  | 0.098    | B          |
| 202.000-182.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 00                      |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T16                     | 0.463           | 1.768            | A       | 0.2   | 2.596          | 0.028                 | 0.8            | 1              | 11.338                            | 1.936  | 0.097    | B          |
| 182.000-162.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 00                      |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T17                     | 0.481           | 1.768            | A       | 0.2   | 2.596          | 0.027                 | 0.8            | 1              | 11.338                            | 1.965  | 0.098    | B          |
| 162.000-142.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 00                      |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T18                     | 0.487           | 1.768            | A       | 0.2   | 2.596          | 0.026                 | 0.8            | 1              | 11.338                            | 1.938  | 0.097    | B          |
| 142.000-122.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 00                      |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T19                     | 0.247           | 0.908            | A       | 0.212 | 2.556          | 0.026                 | 0.8            | 1              | 6.092                             | 0.980  | 0.098    | B          |
| 122.000-112.000         |                 |                  | B       | 0.212 | 2.556          |                       | 0.8            | 1              | 6.092                             |        |          |            |
| 00                      |                 |                  | C       | 0.212 | 2.556          |                       | 0.8            | 1              | 6.092                             |        |          |            |
| T20                     | 0.249           | 1.060            | A       | 0.219 | 2.533          | 0.025                 | 0.8            | 1              | 6.346                             | 0.981  | 0.098    | B          |
| 112.000-102.000         |                 |                  | B       | 0.219 | 2.533          |                       | 0.8            | 1              | 6.346                             |        |          |            |
| 00                      |                 |                  | C       | 0.219 | 2.533          |                       | 0.8            | 1              | 6.346                             |        |          |            |
| T21                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.024                 | 0.8            | 1              | 11.338                            | 1.853  | 0.093    | B          |
| 102.000-82.000          |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 0                       |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T22                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.023                 | 0.8            | 1              | 11.338                            | 1.753  | 0.088    | B          |
| 82.000-62.000           |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 00                      |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T23                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.021                 | 0.8            | 1              | 11.338                            | 1.621  | 0.081    | B          |
| 62.000-42.000           |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 00                      |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T24                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.019                 | 0.8            | 1              | 11.338                            | 1.432  | 0.072    | B          |
| 42.000-22.000           |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| 00                      |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T25                     | 0.351           | 1.798            | A       | 0.207 | 2.572          | 0.019                 | 0.8            | 1              | 11.851                            | 1.156  | 0.058    | B          |
| 22.000-2.000            |                 |                  | B       | 0.207 | 2.572          |                       | 0.8            | 1              | 11.851                            |        |          |            |
| 00                      |                 |                  | C       | 0.207 | 2.572          |                       | 0.8            | 1              | 11.851                            |        |          |            |
| Sum Weight:             | 7.191           | 37.547           |         |       |                |                       |                |                |                                   | 35.386 |          |            |

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>43 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

**Tower Forces - No Ice - Wind 90 To Face**

| Section Elevation | Add Weight | Self Weight | F a c e | e     | C <sub>F</sub> | q <sub>z</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F     | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|-------|-------|------------|
| ft                | K          | K           |         |       |                | ksf            |                |                | ft <sup>2</sup> | K     | klf   |            |
| L1                | 0.000      | 0.535       | A       | 1     | 0.6            | 0.032          | 1              | 1              | 10.781          | 0.279 | 0.019 | C          |
| 492.000-477.0     |            |             | B       | 1     | 0.6            |                | 1              | 1              | 10.781          |       |       |            |
| 00                |            |             | C       | 1     | 0.6            |                | 1              | 1              | 10.781          |       |       |            |
| L2                | 0.000      | 0.713       | A       | 1     | 0.6            | 0.032          | 1              | 1              | 14.375          | 0.371 | 0.019 | C          |
| 477.000-457.0     |            |             | B       | 1     | 0.6            |                | 1              | 1              | 14.375          |       |       |            |
| 00                |            |             | C       | 1     | 0.6            |                | 1              | 1              | 14.375          |       |       |            |
| T1                | 0.000      | 0.418       | A       | 0.283 | 2.343          | 0.032          | 0.85           | 1              | 4.551           | 0.292 | 0.058 | C          |
| 457.000-452.0     |            |             | B       | 0.283 | 2.343          |                | 0.85           | 1              | 4.551           |       |       |            |
| 00                |            |             | C       | 0.283 | 2.343          |                | 0.85           | 1              | 4.551           |       |       |            |
| T2                | 0.002      | 0.643       | A       | 0.194 | 2.615          | 0.032          | 0.85           | 1              | 5.880           | 0.430 | 0.043 | C          |
| 452.000-442.0     |            |             | B       | 0.194 | 2.615          |                | 0.85           | 1              | 5.880           |       |       |            |
| 00                |            |             | C       | 0.194 | 2.615          |                | 0.85           | 1              | 5.880           |       |       |            |
| T3                | 0.055      | 1.229       | A       | 0.181 | 2.66           | 0.032          | 0.85           | 1              | 10.805          | 0.990 | 0.050 | C          |
| 442.000-422.0     |            |             | B       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| 00                |            |             | C       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| T4                | 0.089      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 0.85           | 1              | 10.805          | 1.099 | 0.055 | C          |
| 422.000-402.0     |            |             | B       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| 00                |            |             | C       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| T5                | 0.089      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 0.85           | 1              | 10.805          | 1.093 | 0.055 | C          |
| 402.000-382.0     |            |             | B       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| 00                |            |             | C       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| T6                | 0.089      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 0.85           | 1              | 10.805          | 1.085 | 0.054 | C          |
| 382.000-362.0     |            |             | B       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| 00                |            |             | C       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| T7                | 0.091      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 0.85           | 1              | 10.805          | 1.090 | 0.054 | C          |
| 362.000-342.0     |            |             | B       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| 00                |            |             | C       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| T8                | 0.098      | 1.229       | A       | 0.181 | 2.66           | 0.031          | 0.85           | 1              | 10.805          | 1.125 | 0.056 | C          |
| 342.000-322.0     |            |             | B       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| 00                |            |             | C       | 0.181 | 2.66           |                | 0.85           | 1              | 10.805          |       |       |            |
| T9                | 0.099      | 1.328       | A       | 0.183 | 2.654          | 0.030          | 0.85           | 1              | 10.778          | 1.117 | 0.056 | C          |
| 322.000-302.0     |            |             | B       | 0.183 | 2.654          |                | 0.85           | 1              | 10.778          |       |       |            |
| 00                |            |             | C       | 0.183 | 2.654          |                | 0.85           | 1              | 10.778          |       |       |            |
| T10               | 0.113      | 1.419       | A       | 0.19  | 2.631          | 0.030          | 0.85           | 1              | 11.257          | 1.187 | 0.059 | C          |
| 302.000-282.0     |            |             | B       | 0.19  | 2.631          |                | 0.85           | 1              | 11.257          |       |       |            |
| 00                |            |             | C       | 0.19  | 2.631          |                | 0.85           | 1              | 11.257          |       |       |            |
| T11               | 0.366      | 1.858       | A       | 0.211 | 2.559          | 0.030          | 0.85           | 1              | 12.683          | 1.896 | 0.095 | C          |
| 282.000-262.0     |            |             | B       | 0.211 | 2.559          |                | 0.85           | 1              | 12.683          |       |       |            |
| 00                |            |             | C       | 0.211 | 2.559          |                | 0.85           | 1              | 12.683          |       |       |            |
| T12               | 0.435      | 1.629       | A       | 0.198 | 2.602          | 0.029          | 0.85           | 1              | 11.711          | 1.987 | 0.099 | B          |
| 262.000-242.0     |            |             | B       | 0.198 | 2.602          |                | 0.85           | 1              | 11.711          |       |       |            |
| 00                |            |             | C       | 0.198 | 2.602          |                | 0.85           | 1              | 11.711          |       |       |            |
| T13               | 0.459      | 1.629       | A       | 0.198 | 2.602          | 0.029          | 0.85           | 1              | 11.711          | 2.059 | 0.103 | B          |
| 242.000-222.0     |            |             | B       | 0.198 | 2.602          |                | 0.85           | 1              | 11.711          |       |       |            |
| 00                |            |             | C       | 0.198 | 2.602          |                | 0.85           | 1              | 11.711          |       |       |            |
| T14               | 0.460      | 2.089       | A       | 0.219 | 2.532          | 0.029          | 0.85           | 1              | 13.139          | 2.102 | 0.105 | B          |
| 222.000-202.0     |            |             | B       | 0.219 | 2.532          |                | 0.85           | 1              | 13.139          |       |       |            |
| 00                |            |             | C       | 0.219 | 2.532          |                | 0.85           | 1              | 13.139          |       |       |            |
| T15               | 0.460      | 1.768       | A       | 0.2   | 2.596          | 0.028          | 0.85           | 1              | 11.688          | 1.997 | 0.100 | B          |
| 202.000-182.0     |            |             | B       | 0.2   | 2.596          |                | 0.85           | 1              | 11.688          |       |       |            |
| 00                |            |             | C       | 0.2   | 2.596          |                | 0.85           | 1              | 11.688          |       |       |            |
| T16               | 0.463      | 1.768       | A       | 0.2   | 2.596          | 0.028          | 0.85           | 1              | 11.688          | 1.975 | 0.099 | B          |
| 182.000-162.0     |            |             | B       | 0.2   | 2.596          |                | 0.85           | 1              | 11.688          |       |       |            |
| 00                |            |             | C       | 0.2   | 2.596          |                | 0.85           | 1              | 11.688          |       |       |            |

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>44 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| T17<br>162.000-142.000  | 0.481           | 1.768            | A       | 0.2   | 2.596          | 0.027                 | 0.85           | 1              | 11.688                            | 2.020  | 0.101    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T18<br>142.000-122.000  | 0.487           | 1.768            | A       | 0.2   | 2.596          | 0.026                 | 0.85           | 1              | 11.688                            | 1.992  | 0.100    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T19<br>122.000-112.000  | 0.247           | 0.908            | A       | 0.212 | 2.556          | 0.026                 | 0.85           | 1              | 6.292                             | 1.007  | 0.101    | B          |
|                         |                 |                  | B       | 0.212 | 2.556          |                       | 0.85           | 1              | 6.292                             |        |          |            |
|                         |                 |                  | C       | 0.212 | 2.556          |                       | 0.85           | 1              | 6.292                             |        |          |            |
| T20<br>112.000-102.000  | 0.249           | 1.060            | A       | 0.219 | 2.533          | 0.025                 | 0.85           | 1              | 6.562                             | 1.008  | 0.101    | B          |
|                         |                 |                  | B       | 0.219 | 2.533          |                       | 0.85           | 1              | 6.562                             |        |          |            |
|                         |                 |                  | C       | 0.219 | 2.533          |                       | 0.85           | 1              | 6.562                             |        |          |            |
| T21<br>102.000-82.000   | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.024                 | 0.85           | 1              | 11.688                            | 1.903  | 0.095    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T22<br>82.000-62.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.023                 | 0.85           | 1              | 11.688                            | 1.799  | 0.090    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T23<br>62.000-42.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.021                 | 0.85           | 1              | 11.688                            | 1.664  | 0.083    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T24<br>42.000-22.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.019                 | 0.85           | 1              | 11.688                            | 1.471  | 0.074    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T25<br>22.000-2.000     | 0.351           | 1.798            | A       | 0.207 | 2.572          | 0.019                 | 0.85           | 1              | 12.232                            | 1.188  | 0.059    | B          |
|                         |                 |                  | B       | 0.207 | 2.572          |                       | 0.85           | 1              | 12.232                            |        |          |            |
|                         |                 |                  | C       | 0.207 | 2.572          |                       | 0.85           | 1              | 12.232                            |        |          |            |
| Sum Weight:             | 7.191           | 37.547           |         |       |                |                       |                |                |                                   | 36.226 |          |            |

### Tower Forces - With Ice - Wind Normal To Face

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| L1<br>492.000-477.000   | 0.000           | 0.945            | A       | 1     | 1.2            | 0.010                 | 1              | 1              | 16.005                            | 0.262  | 0.017    | C          |
|                         |                 |                  | B       | 1     | 1.2            |                       | 1              | 1              | 16.005                            |        |          |            |
|                         |                 |                  | C       | 1     | 1.2            |                       | 1              | 1              | 16.005                            |        |          |            |
| L2<br>477.000-457.000   | 0.000           | 1.260            | A       | 1     | 1.2            | 0.010                 | 1              | 1              | 21.330                            | 0.347  | 0.017    | C          |
|                         |                 |                  | B       | 1     | 1.2            |                       | 1              | 1              | 21.330                            |        |          |            |
|                         |                 |                  | C       | 1     | 1.2            |                       | 1              | 1              | 21.330                            |        |          |            |
| T1<br>457.000-452.000   | 0.023           | 1.276            | A       | 0.63  | 1.788          | 0.010                 | 1              | 1              | 11.858                            | 0.185  | 0.037    | C          |
|                         |                 |                  | B       | 0.63  | 1.788          |                       | 1              | 1              | 11.858                            |        |          |            |
|                         |                 |                  | C       | 0.63  | 1.788          |                       | 1              | 1              | 11.858                            |        |          |            |
| T2<br>452.000-442.000   | 0.096           | 2.009            | A       | 0.534 | 1.86           | 0.010                 | 1              | 1              | 18.347                            | 0.315  | 0.032    | C          |
|                         |                 |                  | B       | 0.534 | 1.86           |                       | 1              | 1              | 18.347                            |        |          |            |
|                         |                 |                  | C       | 0.534 | 1.86           |                       | 1              | 1              | 18.347                            |        |          |            |
| T3<br>442.000-422.000   | 0.998           | 3.695            | A       | 0.496 | 1.905          | 0.010                 | 1              | 1              | 33.153                            | 0.793  | 0.040    | C          |
|                         |                 |                  | B       | 0.496 | 1.905          |                       | 1              | 1              | 33.153                            |        |          |            |
|                         |                 |                  | C       | 0.496 | 1.905          |                       | 1              | 1              | 33.153                            |        |          |            |
| T4<br>422.000-402.000   | 1.458           | 3.688            | A       | 0.496 | 1.906          | 0.010                 | 1              | 1              | 33.101                            | 0.901  | 0.045    | C          |
|                         |                 |                  | B       | 0.496 | 1.906          |                       | 1              | 1              | 33.101                            |        |          |            |
|                         |                 |                  | C       | 0.496 | 1.906          |                       | 1              | 1              | 33.101                            |        |          |            |
| T5<br>402.000-382.000   | 1.453           | 3.680            | A       | 0.495 | 1.907          | 0.010                 | 1              | 1              | 33.045                            | 0.895  | 0.045    | C          |

|   |  |  |
|---|--|--|
| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>45 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 402.000-382.000         |                 |                  | B       | 0.495 | 1.907          |                       | 1              | 1              | 33.045                            |        |          |            |
|                         |                 |                  | C       | 0.495 | 1.907          |                       | 1              | 1              | 33.045                            |        |          |            |
| T6                      | 1.448           | 3.672            | A       | 0.494 | 1.908          | 0.010                 | 1              | 1              | 32.986                            | 0.888  | 0.044    | C          |
| 382.000-362.000         |                 |                  | B       | 0.494 | 1.908          |                       | 1              | 1              | 32.986                            |        |          |            |
|                         |                 |                  | C       | 0.494 | 1.908          |                       | 1              | 1              | 32.986                            |        |          |            |
| T7                      | 1.510           | 3.664            | A       | 0.494 | 1.909          | 0.010                 | 1              | 1              | 32.922                            | 0.900  | 0.045    | C          |
| 362.000-342.000         |                 |                  | B       | 0.494 | 1.909          |                       | 1              | 1              | 32.922                            |        |          |            |
|                         |                 |                  | C       | 0.494 | 1.909          |                       | 1              | 1              | 32.922                            |        |          |            |
| T8                      | 1.727           | 3.654            | A       | 0.493 | 1.91           | 0.010                 | 1              | 1              | 32.853                            | 0.952  | 0.048    | C          |
| 342.000-322.000         |                 |                  | B       | 0.493 | 1.91           |                       | 1              | 1              | 32.853                            |        |          |            |
|                         |                 |                  | C       | 0.493 | 1.91           |                       | 1              | 1              | 32.853                            |        |          |            |
| T9                      | 1.743           | 3.706            | A       | 0.491 | 1.911          | 0.010                 | 1              | 1              | 32.691                            | 0.948  | 0.047    | C          |
| 322.000-302.000         |                 |                  | B       | 0.491 | 1.911          |                       | 1              | 1              | 32.691                            |        |          |            |
|                         |                 |                  | C       | 0.491 | 1.911          |                       | 1              | 1              | 32.691                            |        |          |            |
| T10                     | 1.975           | 3.861            | A       | 0.496 | 1.905          | 0.009                 | 1              | 1              | 33.272                            | 1.000  | 0.050    | C          |
| 302.000-282.000         |                 |                  | B       | 0.496 | 1.905          |                       | 1              | 1              | 33.272                            |        |          |            |
|                         |                 |                  | C       | 0.496 | 1.905          |                       | 1              | 1              | 33.272                            |        |          |            |
| T11                     | 3.593           | 4.474            | A       | 0.513 | 1.883          | 0.009                 | 1              | 1              | 35.146                            | 1.326  | 0.066    | A          |
| 282.000-262.000         |                 |                  | B       | 0.513 | 1.883          |                       | 1              | 1              | 35.146                            |        |          |            |
|                         |                 |                  | C       | 0.513 | 1.883          |                       | 1              | 1              | 35.146                            |        |          |            |
| T12                     | 4.169           | 4.082            | A       | 0.5   | 1.9            | 0.009                 | 1              | 1              | 33.660                            | 1.438  | 0.072    | A          |
| 262.000-242.000         |                 |                  | B       | 0.5   | 1.9            |                       | 1              | 1              | 33.660                            |        |          |            |
|                         |                 |                  | C       | 0.5   | 1.9            |                       | 1              | 1              | 33.660                            |        |          |            |
| T13                     | 4.529           | 4.067            | A       | 0.499 | 1.902          | 0.009                 | 1              | 1              | 33.546                            | 1.491* | 0.075    | A          |
| 242.000-222.000         |                 |                  | B       | 0.499 | 1.902          |                       | 1              | 1              | 33.546                            |        |          |            |
|                         |                 |                  | C       | 0.499 | 1.902          |                       | 1              | 1              | 33.546                            |        |          |            |
| T14                     | 4.522           | 4.693            | A       | 0.515 | 1.881          | 0.009                 | 1              | 1              | 35.379                            | 1.476* | 0.074    | A          |
| 222.000-202.000         |                 |                  | B       | 0.515 | 1.881          |                       | 1              | 1              | 35.379                            |        |          |            |
|                         |                 |                  | C       | 0.515 | 1.881          |                       | 1              | 1              | 35.379                            |        |          |            |
| T15                     | 4.488           | 4.132            | A       | 0.495 | 1.907          | 0.009                 | 1              | 1              | 33.176                            | 1.451* | 0.073    | A          |
| 202.000-182.000         |                 |                  | B       | 0.495 | 1.907          |                       | 1              | 1              | 33.176                            |        |          |            |
|                         |                 |                  | C       | 0.495 | 1.907          |                       | 1              | 1              | 33.176                            |        |          |            |
| T16                     | 4.504           | 4.109            | A       | 0.493 | 1.909          | 0.009                 | 1              | 1              | 33.007                            | 1.422* | 0.071    | A          |
| 182.000-162.000         |                 |                  | B       | 0.493 | 1.909          |                       | 1              | 1              | 33.007                            |        |          |            |
|                         |                 |                  | C       | 0.493 | 1.909          |                       | 1              | 1              | 33.007                            |        |          |            |
| T17                     | 4.774           | 4.083            | A       | 0.491 | 1.912          | 0.009                 | 1              | 1              | 32.810                            | 1.389* | 0.069    | C          |
| 162.000-142.000         |                 |                  | B       | 0.491 | 1.912          |                       | 1              | 1              | 32.810                            |        |          |            |
|                         |                 |                  | C       | 0.491 | 1.912          |                       | 1              | 1              | 32.810                            |        |          |            |
| T18                     | 4.850           | 4.051            | A       | 0.488 | 1.916          | 0.008                 | 1              | 1              | 32.577                            | 1.351* | 0.068    | C          |
| 142.000-122.000         |                 |                  | B       | 0.488 | 1.916          |                       | 1              | 1              | 32.577                            |        |          |            |
|                         |                 |                  | C       | 0.488 | 1.916          |                       | 1              | 1              | 32.577                            |        |          |            |
| T19                     | 2.480           | 2.149            | A       | 0.52  | 1.875          | 0.008                 | 1              | 1              | 17.779                            | 0.659* | 0.066    | C          |
| 122.000-112.000         |                 |                  | B       | 0.52  | 1.875          |                       | 1              | 1              | 17.779                            |        |          |            |
|                         |                 |                  | C       | 0.52  | 1.875          |                       | 1              | 1              | 17.779                            |        |          |            |
| T20                     | 2.503           | 2.087            | A       | 0.491 | 1.912          | 0.008                 | 1              | 1              | 17.643                            | 0.646* | 0.065    | C          |
| 112.000-102.000         |                 |                  | B       | 0.491 | 1.912          |                       | 1              | 1              | 17.643                            |        |          |            |
|                         |                 |                  | C       | 0.491 | 1.912          |                       | 1              | 1              | 17.643                            |        |          |            |
| T21                     | 4.989           | 3.967            | A       | 0.481 | 1.925          | 0.008                 | 1              | 1              | 31.947                            | 1.250* | 0.062    | C          |
| 102.000-82.000          |                 |                  | B       | 0.481 | 1.925          |                       | 1              | 1              | 31.947                            |        |          |            |
|                         |                 |                  | C       | 0.481 | 1.925          |                       | 1              | 1              | 31.947                            |        |          |            |
| T22                     | 4.862           | 3.907            | A       | 0.476 | 1.933          | 0.007                 | 1              | 1              | 31.499                            | 1.180* | 0.059    | C          |
| 82.000-62.000           |                 |                  | B       | 0.476 | 1.933          |                       | 1              | 1              | 31.499                            |        |          |            |
|                         |                 |                  | C       | 0.476 | 1.933          |                       | 1              | 1              | 31.499                            |        |          |            |
| T23                     | 4.691           | 3.827            | A       | 0.469 | 1.943          | 0.007                 | 1              | 1              | 30.891                            | 1.089* | 0.054    | C          |
| 62.000-42.000           |                 |                  | B       | 0.469 | 1.943          |                       | 1              | 1              | 30.891                            |        |          |            |
|                         |                 |                  | C       | 0.469 | 1.943          |                       | 1              | 1              | 30.891                            |        |          |            |
| T24                     | 4.437           | 3.707            | A       | 0.459 | 1.96           | 0.006                 | 1              | 1              | 29.977                            | 0.960* | 0.048    | C          |
| 42.000-22.000           |                 |                  | B       | 0.459 | 1.96           |                       | 1              | 1              | 29.977                            |        |          |            |
|                         |                 |                  | C       | 0.459 | 1.96           |                       | 1              | 1              | 29.977                            |        |          |            |
| T25                     | 2.765           | 3.606            | A       | 0.455 | 1.965          | 0.006                 | 1              | 1              | 29.751                            | 0.814  | 0.041    | A          |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 46 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section Elevation | Add Weight | Self Weight | Face | e     | C <sub>F</sub>           | q <sub>z</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F      | w   | Ctrl. Face |
|-------------------|------------|-------------|------|-------|--------------------------|----------------|----------------|----------------|-----------------|--------|-----|------------|
| ft                | K          | K           |      |       |                          | ksf            |                |                | ft <sup>2</sup> | K      | klf |            |
| 22.000-2.000      |            |             | B    | 0.455 | 1.965                    |                | 1              | 1              | 29.751          |        |     |            |
|                   |            |             | C    | 0.455 | 1.965                    |                | 1              | 1              | 29.751          |        |     |            |
| Sum Weight:       | 74.588     | 92.051      |      |       | *2.1A <sub>g</sub> limit |                |                |                |                 | 26.333 |     |            |

### Tower Forces - With Ice - Wind 60 To Face

| Section Elevation | Add Weight | Self Weight | Face | e     | C <sub>F</sub> | q <sub>z</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F     | w     | Ctrl. Face |
|-------------------|------------|-------------|------|-------|----------------|----------------|----------------|----------------|-----------------|-------|-------|------------|
| ft                | K          | K           |      |       |                | ksf            |                |                | ft <sup>2</sup> | K     | klf   |            |
| L1                | 0.000      | 0.945       | A    | 1     | 1.2            | 0.010          | 1              | 1              | 16.005          | 0.262 | 0.017 | C          |
| 492.000-477.0     |            |             | B    | 1     | 1.2            |                | 1              | 1              | 16.005          |       |       |            |
| 00                |            |             | C    | 1     | 1.2            |                | 1              | 1              | 16.005          |       |       |            |
| L2                | 0.000      | 1.260       | A    | 1     | 1.2            | 0.010          | 1              | 1              | 21.330          | 0.347 | 0.017 | C          |
| 477.000-457.0     |            |             | B    | 1     | 1.2            |                | 1              | 1              | 21.330          |       |       |            |
| 00                |            |             | C    | 1     | 1.2            |                | 1              | 1              | 21.330          |       |       |            |
| T1                | 0.023      | 1.276       | A    | 0.63  | 1.788          | 0.010          | 0.8            | 1              | 11.049          | 0.173 | 0.035 | C          |
| 457.000-452.0     |            |             | B    | 0.63  | 1.788          |                | 0.8            | 1              | 11.049          |       |       |            |
| 00                |            |             | C    | 0.63  | 1.788          |                | 0.8            | 1              | 11.049          |       |       |            |
| T2                | 0.096      | 2.009       | A    | 0.534 | 1.86           | 0.010          | 0.8            | 1              | 17.470          | 0.302 | 0.030 | C          |
| 452.000-442.0     |            |             | B    | 0.534 | 1.86           |                | 0.8            | 1              | 17.470          |       |       |            |
| 00                |            |             | C    | 0.534 | 1.86           |                | 0.8            | 1              | 17.470          |       |       |            |
| T3                | 0.998      | 3.695       | A    | 0.496 | 1.905          | 0.010          | 0.8            | 1              | 31.619          | 0.769 | 0.038 | C          |
| 442.000-422.0     |            |             | B    | 0.496 | 1.905          |                | 0.8            | 1              | 31.619          |       |       |            |
| 00                |            |             | C    | 0.496 | 1.905          |                | 0.8            | 1              | 31.619          |       |       |            |
| T4                | 1.458      | 3.688       | A    | 0.496 | 1.906          | 0.010          | 0.8            | 1              | 31.567          | 0.877 | 0.044 | C          |
| 422.000-402.0     |            |             | B    | 0.496 | 1.906          |                | 0.8            | 1              | 31.567          |       |       |            |
| 00                |            |             | C    | 0.496 | 1.906          |                | 0.8            | 1              | 31.567          |       |       |            |
| T5                | 1.453      | 3.680       | A    | 0.495 | 1.907          | 0.010          | 0.8            | 1              | 31.511          | 0.871 | 0.044 | C          |
| 402.000-382.0     |            |             | B    | 0.495 | 1.907          |                | 0.8            | 1              | 31.511          |       |       |            |
| 00                |            |             | C    | 0.495 | 1.907          |                | 0.8            | 1              | 31.511          |       |       |            |
| T6                | 1.448      | 3.672       | A    | 0.494 | 1.908          | 0.010          | 0.8            | 1              | 31.452          | 0.864 | 0.043 | C          |
| 382.000-362.0     |            |             | B    | 0.494 | 1.908          |                | 0.8            | 1              | 31.452          |       |       |            |
| 00                |            |             | C    | 0.494 | 1.908          |                | 0.8            | 1              | 31.452          |       |       |            |
| T7                | 1.510      | 3.664       | A    | 0.494 | 1.909          | 0.010          | 0.8            | 1              | 31.388          | 0.876 | 0.044 | C          |
| 362.000-342.0     |            |             | B    | 0.494 | 1.909          |                | 0.8            | 1              | 31.388          |       |       |            |
| 00                |            |             | C    | 0.494 | 1.909          |                | 0.8            | 1              | 31.388          |       |       |            |
| T8                | 1.727      | 3.654       | A    | 0.493 | 1.91           | 0.010          | 0.8            | 1              | 31.319          | 0.928 | 0.046 | C          |
| 342.000-322.0     |            |             | B    | 0.493 | 1.91           |                | 0.8            | 1              | 31.319          |       |       |            |
| 00                |            |             | C    | 0.493 | 1.91           |                | 0.8            | 1              | 31.319          |       |       |            |
| T9                | 1.743      | 3.706       | A    | 0.491 | 1.911          | 0.010          | 0.8            | 1              | 31.276          | 0.926 | 0.046 | C          |
| 322.000-302.0     |            |             | B    | 0.491 | 1.911          |                | 0.8            | 1              | 31.276          |       |       |            |
| 00                |            |             | C    | 0.491 | 1.911          |                | 0.8            | 1              | 31.276          |       |       |            |
| T10               | 1.975      | 3.861       | A    | 0.496 | 1.905          | 0.009          | 0.8            | 1              | 31.746          | 0.977 | 0.049 | C          |
| 302.000-282.0     |            |             | B    | 0.496 | 1.905          |                | 0.8            | 1              | 31.746          |       |       |            |
| 00                |            |             | C    | 0.496 | 1.905          |                | 0.8            | 1              | 31.746          |       |       |            |
| T11               | 3.593      | 4.474       | A    | 0.513 | 1.883          | 0.009          | 0.8            | 1              | 33.405          | 1.300 | 0.065 | B          |
| 282.000-262.0     |            |             | B    | 0.513 | 1.883          |                | 0.8            | 1              | 33.405          |       |       |            |
| 00                |            |             | C    | 0.513 | 1.883          |                | 0.8            | 1              | 33.405          |       |       |            |
| T12               | 4.169      | 4.082       | A    | 0.5   | 1.9            | 0.009          | 0.8            | 1              | 32.143          | 1.416 | 0.071 | B          |
| 262.000-242.0     |            |             | B    | 0.5   | 1.9            |                | 0.8            | 1              | 32.143          |       |       |            |
| 00                |            |             | C    | 0.5   | 1.9            |                | 0.8            | 1              | 32.143          |       |       |            |
| T13               | 4.529      | 4.067       | A    | 0.499 | 1.902          | 0.009          | 0.8            | 1              | 32.029          | 1.486 | 0.074 | B          |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 47 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 242.000-222.000         |                 |                  | B       | 0.499 | 1.902          |                       | 0.8            | 1              | 32.029                            |        |          |            |
| T14                     | 4.522           | 4.693            | C       | 0.499 | 1.902          |                       | 0.8            | 1              | 32.029                            |        |          |            |
| 222.000-202.000         |                 |                  | A       | 0.515 | 1.881          | 0.009                 | 0.8            | 1              | 33.648                            | 1.453  | 0.073    | B          |
| T15                     | 4.488           | 4.132            | B       | 0.515 | 1.881          |                       | 0.8            | 1              | 33.648                            |        |          |            |
| 202.000-182.000         |                 |                  | A       | 0.495 | 1.907          | 0.009                 | 0.8            | 1              | 31.778                            | 1.444  | 0.072    | B          |
| T16                     | 4.504           | 4.109            | B       | 0.495 | 1.907          |                       | 0.8            | 1              | 31.778                            |        |          |            |
| 182.000-162.000         |                 |                  | A       | 0.493 | 1.909          | 0.009                 | 0.8            | 1              | 31.609                            | 1.422* | 0.071    | B          |
| T17                     | 4.774           | 4.083            | B       | 0.493 | 1.909          |                       | 0.8            | 1              | 31.609                            |        |          |            |
| 162.000-142.000         |                 |                  | A       | 0.491 | 1.912          | 0.009                 | 0.8            | 1              | 31.412                            | 1.389* | 0.069    | C          |
| T18                     | 4.850           | 4.051            | B       | 0.491 | 1.912          |                       | 0.8            | 1              | 31.412                            |        |          |            |
| 142.000-122.000         |                 |                  | A       | 0.488 | 1.916          | 0.008                 | 0.8            | 1              | 31.179                            | 1.351* | 0.068    | C          |
| T19                     | 2.480           | 2.149            | B       | 0.488 | 1.916          |                       | 0.8            | 1              | 31.179                            |        |          |            |
| 122.000-112.000         |                 |                  | A       | 0.52  | 1.875          | 0.008                 | 0.8            | 1              | 16.977                            | 0.659* | 0.066    | C          |
| T20                     | 2.503           | 2.087            | B       | 0.52  | 1.875          |                       | 0.8            | 1              | 16.977                            |        |          |            |
| 112.000-102.000         |                 |                  | A       | 0.491 | 1.912          | 0.008                 | 0.8            | 1              | 16.154                            | 0.646* | 0.065    | C          |
| T21                     | 4.989           | 3.967            | B       | 0.491 | 1.912          |                       | 0.8            | 1              | 16.154                            |        |          |            |
| 102.000-82.000          |                 |                  | A       | 0.481 | 1.925          | 0.008                 | 0.8            | 1              | 30.548                            | 1.250* | 0.062    | C          |
| T22                     | 4.862           | 3.907            | B       | 0.481 | 1.925          |                       | 0.8            | 1              | 30.548                            |        |          |            |
| 82.000-62.000           |                 |                  | A       | 0.476 | 1.933          | 0.007                 | 0.8            | 1              | 30.100                            | 1.180* | 0.059    | C          |
| T23                     | 4.691           | 3.827            | B       | 0.476 | 1.933          |                       | 0.8            | 1              | 30.100                            |        |          |            |
| 62.000-42.000           |                 |                  | A       | 0.469 | 1.943          | 0.007                 | 0.8            | 1              | 29.493                            | 1.089* | 0.054    | C          |
| T24                     | 4.437           | 3.707            | B       | 0.469 | 1.943          |                       | 0.8            | 1              | 29.493                            |        |          |            |
| 42.000-22.000           |                 |                  | A       | 0.459 | 1.96           | 0.006                 | 0.8            | 1              | 28.579                            | 0.960* | 0.048    | C          |
| T25                     | 2.765           | 3.606            | B       | 0.459 | 1.96           |                       | 0.8            | 1              | 28.579                            |        |          |            |
| 22.000-2.000            |                 |                  | A       | 0.455 | 1.965          | 0.006                 | 0.8            | 1              | 28.228                            | 0.799  | 0.040    | B          |
| Sum Weight:             | 74.588          | 92.051           | C       | 0.455 | 1.965          |                       | 0.8            | 1              | 28.228                            | 26.017 |          |            |

### Tower Forces - With Ice - Wind 90 To Face

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e    | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 492.000-477.000         | 0.000           | 0.945            | A       | 1    | 1.2            | 0.010                 | 1              | 1              | 16.005                            | 0.262  | 0.017    | C          |
| L1                      |                 |                  | B       | 1    | 1.2            |                       | 1              | 1              | 16.005                            |        |          |            |
| 477.000-457.000         | 0.000           | 1.260            | C       | 1    | 1.2            |                       | 1              | 1              | 16.005                            |        |          |            |
| T1                      | 0.023           | 1.276            | A       | 1    | 1.2            | 0.010                 | 1              | 1              | 21.330                            | 0.347  | 0.017    | C          |
|                         |                 |                  | B       | 1    | 1.2            |                       | 1              | 1              | 21.330                            |        |          |            |
|                         |                 |                  | C       | 1    | 1.2            |                       | 1              | 1              | 21.330                            |        |          |            |
|                         |                 |                  | A       | 0.63 | 1.788          | 0.010                 | 0.85           | 1              | 11.251                            | 0.176  | 0.035    | C          |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 48 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 457.000-452.00          |                 |                  | B       | 0.63  | 1.788          |                       | 0.85           | 1              | 11.251                            |        |          |            |
| 00                      |                 |                  | C       | 0.63  | 1.788          |                       | 0.85           | 1              | 11.251                            |        |          |            |
| T2                      | 0.096           | 2.009            | A       | 0.534 | 1.86           | 0.010                 | 0.85           | 1              | 17.689                            | 0.305  | 0.031    | C          |
| 452.000-442.00          |                 |                  | B       | 0.534 | 1.86           |                       | 0.85           | 1              | 17.689                            |        |          |            |
| 00                      |                 |                  | C       | 0.534 | 1.86           |                       | 0.85           | 1              | 17.689                            |        |          |            |
| T3                      | 0.998           | 3.695            | A       | 0.496 | 1.905          | 0.010                 | 0.85           | 1              | 32.003                            | 0.775  | 0.039    | C          |
| 442.000-422.00          |                 |                  | B       | 0.496 | 1.905          |                       | 0.85           | 1              | 32.003                            |        |          |            |
| 00                      |                 |                  | C       | 0.496 | 1.905          |                       | 0.85           | 1              | 32.003                            |        |          |            |
| T4                      | 1.458           | 3.688            | A       | 0.496 | 1.906          | 0.010                 | 0.85           | 1              | 31.950                            | 0.883  | 0.044    | C          |
| 422.000-402.00          |                 |                  | B       | 0.496 | 1.906          |                       | 0.85           | 1              | 31.950                            |        |          |            |
| 00                      |                 |                  | C       | 0.496 | 1.906          |                       | 0.85           | 1              | 31.950                            |        |          |            |
| T5                      | 1.453           | 3.680            | A       | 0.495 | 1.907          | 0.010                 | 0.85           | 1              | 31.895                            | 0.877  | 0.044    | C          |
| 402.000-382.00          |                 |                  | B       | 0.495 | 1.907          |                       | 0.85           | 1              | 31.895                            |        |          |            |
| 00                      |                 |                  | C       | 0.495 | 1.907          |                       | 0.85           | 1              | 31.895                            |        |          |            |
| T6                      | 1.448           | 3.672            | A       | 0.494 | 1.908          | 0.010                 | 0.85           | 1              | 31.835                            | 0.870  | 0.044    | C          |
| 382.000-362.00          |                 |                  | B       | 0.494 | 1.908          |                       | 0.85           | 1              | 31.835                            |        |          |            |
| 00                      |                 |                  | C       | 0.494 | 1.908          |                       | 0.85           | 1              | 31.835                            |        |          |            |
| T7                      | 1.510           | 3.664            | A       | 0.494 | 1.909          | 0.010                 | 0.85           | 1              | 31.771                            | 0.882  | 0.044    | C          |
| 362.000-342.00          |                 |                  | B       | 0.494 | 1.909          |                       | 0.85           | 1              | 31.771                            |        |          |            |
| 00                      |                 |                  | C       | 0.494 | 1.909          |                       | 0.85           | 1              | 31.771                            |        |          |            |
| T8                      | 1.727           | 3.654            | A       | 0.493 | 1.91           | 0.010                 | 0.85           | 1              | 31.702                            | 0.934  | 0.047    | C          |
| 342.000-322.00          |                 |                  | B       | 0.493 | 1.91           |                       | 0.85           | 1              | 31.702                            |        |          |            |
| 00                      |                 |                  | C       | 0.493 | 1.91           |                       | 0.85           | 1              | 31.702                            |        |          |            |
| T9                      | 1.743           | 3.706            | A       | 0.491 | 1.911          | 0.010                 | 0.85           | 1              | 31.629                            | 0.932  | 0.047    | C          |
| 322.000-302.00          |                 |                  | B       | 0.491 | 1.911          |                       | 0.85           | 1              | 31.629                            |        |          |            |
| 00                      |                 |                  | C       | 0.491 | 1.911          |                       | 0.85           | 1              | 31.629                            |        |          |            |
| T10                     | 1.975           | 3.861            | A       | 0.496 | 1.905          | 0.009                 | 0.85           | 1              | 32.128                            | 0.983  | 0.049    | C          |
| 302.000-282.00          |                 |                  | B       | 0.496 | 1.905          |                       | 0.85           | 1              | 32.128                            |        |          |            |
| 00                      |                 |                  | C       | 0.496 | 1.905          |                       | 0.85           | 1              | 32.128                            |        |          |            |
| T11                     | 3.593           | 4.474            | A       | 0.513 | 1.883          | 0.009                 | 0.85           | 1              | 33.840                            | 1.297  | 0.065    | C          |
| 282.000-262.00          |                 |                  | B       | 0.513 | 1.883          |                       | 0.85           | 1              | 33.840                            |        |          |            |
| 00                      |                 |                  | C       | 0.513 | 1.883          |                       | 0.85           | 1              | 33.840                            |        |          |            |
| T12                     | 4.169           | 4.082            | A       | 0.5   | 1.9            | 0.009                 | 0.85           | 1              | 32.522                            | 1.408  | 0.070    | B          |
| 262.000-242.00          |                 |                  | B       | 0.5   | 1.9            |                       | 0.85           | 1              | 32.522                            |        |          |            |
| 00                      |                 |                  | C       | 0.5   | 1.9            |                       | 0.85           | 1              | 32.522                            |        |          |            |
| T13                     | 4.529           | 4.067            | A       | 0.499 | 1.902          | 0.009                 | 0.85           | 1              | 32.408                            | 1.482  | 0.074    | B          |
| 242.000-222.00          |                 |                  | B       | 0.499 | 1.902          |                       | 0.85           | 1              | 32.408                            |        |          |            |
| 00                      |                 |                  | C       | 0.499 | 1.902          |                       | 0.85           | 1              | 32.408                            |        |          |            |
| T14                     | 4.522           | 4.693            | A       | 0.515 | 1.881          | 0.009                 | 0.85           | 1              | 34.081                            | 1.450  | 0.073    | B          |
| 222.000-202.00          |                 |                  | B       | 0.515 | 1.881          |                       | 0.85           | 1              | 34.081                            |        |          |            |
| 00                      |                 |                  | C       | 0.515 | 1.881          |                       | 0.85           | 1              | 34.081                            |        |          |            |
| T15                     | 4.488           | 4.132            | A       | 0.495 | 1.907          | 0.009                 | 0.85           | 1              | 32.128                            | 1.440  | 0.072    | B          |
| 202.000-182.00          |                 |                  | B       | 0.495 | 1.907          |                       | 0.85           | 1              | 32.128                            |        |          |            |
| 00                      |                 |                  | C       | 0.495 | 1.907          |                       | 0.85           | 1              | 32.128                            |        |          |            |
| T16                     | 4.504           | 4.109            | A       | 0.493 | 1.909          | 0.009                 | 0.85           | 1              | 31.959                            | 1.422* | 0.071    | B          |
| 182.000-162.00          |                 |                  | B       | 0.493 | 1.909          |                       | 0.85           | 1              | 31.959                            |        |          |            |
| 00                      |                 |                  | C       | 0.493 | 1.909          |                       | 0.85           | 1              | 31.959                            |        |          |            |
| T17                     | 4.774           | 4.083            | A       | 0.491 | 1.912          | 0.009                 | 0.85           | 1              | 31.762                            | 1.389* | 0.069    | C          |
| 162.000-142.00          |                 |                  | B       | 0.491 | 1.912          |                       | 0.85           | 1              | 31.762                            |        |          |            |
| 00                      |                 |                  | C       | 0.491 | 1.912          |                       | 0.85           | 1              | 31.762                            |        |          |            |
| T18                     | 4.850           | 4.051            | A       | 0.488 | 1.916          | 0.008                 | 0.85           | 1              | 31.528                            | 1.351* | 0.068    | C          |
| 142.000-122.00          |                 |                  | B       | 0.488 | 1.916          |                       | 0.85           | 1              | 31.528                            |        |          |            |
| 00                      |                 |                  | C       | 0.488 | 1.916          |                       | 0.85           | 1              | 31.528                            |        |          |            |
| T19                     | 2.480           | 2.149            | A       | 0.52  | 1.875          | 0.008                 | 0.85           | 1              | 17.178                            | 0.659* | 0.066    | C          |
| 122.000-112.00          |                 |                  | B       | 0.52  | 1.875          |                       | 0.85           | 1              | 17.178                            |        |          |            |
| 00                      |                 |                  | C       | 0.52  | 1.875          |                       | 0.85           | 1              | 17.178                            |        |          |            |
| T20                     | 2.503           | 2.087            | A       | 0.491 | 1.912          | 0.008                 | 0.85           | 1              | 16.527                            | 0.646* | 0.065    | C          |
| 112.000-102.00          |                 |                  | B       | 0.491 | 1.912          |                       | 0.85           | 1              | 16.527                            |        |          |            |
| 00                      |                 |                  | C       | 0.491 | 1.912          |                       | 0.85           | 1              | 16.527                            |        |          |            |
| T21                     | 4.989           | 3.967            | A       | 0.481 | 1.925          | 0.008                 | 0.85           | 1              | 30.898                            | 1.250* | 0.062    | C          |



|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>49 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub>           | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|--------------------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 102.000-82.000          |                 |                  | B       | 0.481 | 1.925                    |                       | 0.85           | 1              | 30.898                            |        |          |            |
| 0                       |                 |                  | C       | 0.481 | 1.925                    |                       | 0.85           | 1              | 30.898                            |        |          |            |
| T22                     | 4.862           | 3.907            | A       | 0.476 | 1.933                    | 0.007                 | 0.85           | 1              | 30.450                            | 1.180* | 0.059    | C          |
| 82.000-62.000           |                 |                  | B       | 0.476 | 1.933                    |                       | 0.85           | 1              | 30.450                            |        |          |            |
|                         |                 |                  | C       | 0.476 | 1.933                    |                       | 0.85           | 1              | 30.450                            |        |          |            |
| T23                     | 4.691           | 3.827            | A       | 0.469 | 1.943                    | 0.007                 | 0.85           | 1              | 29.842                            | 1.089* | 0.054    | C          |
| 62.000-42.000           |                 |                  | B       | 0.469 | 1.943                    |                       | 0.85           | 1              | 29.842                            |        |          |            |
|                         |                 |                  | C       | 0.469 | 1.943                    |                       | 0.85           | 1              | 29.842                            |        |          |            |
| T24                     | 4.437           | 3.707            | A       | 0.459 | 1.96                     | 0.006                 | 0.85           | 1              | 28.928                            | 0.960* | 0.048    | C          |
| 42.000-22.000           |                 |                  | B       | 0.459 | 1.96                     |                       | 0.85           | 1              | 28.928                            |        |          |            |
|                         |                 |                  | C       | 0.459 | 1.96                     |                       | 0.85           | 1              | 28.928                            |        |          |            |
| T25                     | 2.765           | 3.606            | A       | 0.455 | 1.965                    | 0.006                 | 0.85           | 1              | 28.609                            | 0.801  | 0.040    | B          |
| 22.000-2.000            |                 |                  | B       | 0.455 | 1.965                    |                       | 0.85           | 1              | 28.609                            |        |          |            |
|                         |                 |                  | C       | 0.455 | 1.965                    |                       | 0.85           | 1              | 28.609                            |        |          |            |
| Sum Weight:             | 74.588          | 92.051           |         |       | *2.1A <sub>g</sub> limit |                       |                |                |                                   | 26.052 |          |            |

### Tower Forces - Service - Wind Normal To Face

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| L1                      | 0.000           | 0.535            | A       | 1     | 0.654          | 0.015                 | 1              | 1              | 10.781                            | 0.138  | 0.009    | C          |
| 492.000-477.000         |                 |                  | B       | 1     | 0.654          |                       | 1              | 1              | 10.781                            |        |          |            |
|                         |                 |                  | C       | 1     | 0.654          |                       | 1              | 1              | 10.781                            |        |          |            |
| L2                      | 0.000           | 0.713            | A       | 1     | 0.655          | 0.014                 | 1              | 1              | 14.375                            | 0.184  | 0.009    | C          |
| 477.000-457.000         |                 |                  | B       | 1     | 0.655          |                       | 1              | 1              | 14.375                            |        |          |            |
|                         |                 |                  | C       | 1     | 0.655          |                       | 1              | 1              | 14.375                            |        |          |            |
| T1                      | 0.000           | 0.418            | A       | 0.283 | 2.343          | 0.014                 | 1              | 1              | 5.158                             | 0.150  | 0.030    | C          |
| 457.000-452.000         |                 |                  | B       | 0.283 | 2.343          |                       | 1              | 1              | 5.158                             |        |          |            |
|                         |                 |                  | C       | 0.283 | 2.343          |                       | 1              | 1              | 5.158                             |        |          |            |
| T2                      | 0.002           | 0.643            | A       | 0.194 | 2.615          | 0.014                 | 1              | 1              | 6.538                             | 0.217  | 0.022    | C          |
| 452.000-442.000         |                 |                  | B       | 0.194 | 2.615          |                       | 1              | 1              | 6.538                             |        |          |            |
|                         |                 |                  | C       | 0.194 | 2.615          |                       | 1              | 1              | 6.538                             |        |          |            |
| T3                      | 0.055           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 1              | 1              | 11.956                            | 0.487  | 0.024    | C          |
| 442.000-422.000         |                 |                  | B       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
| T4                      | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 1              | 1              | 11.956                            | 0.537  | 0.027    | C          |
| 422.000-402.000         |                 |                  | B       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
| T5                      | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 1              | 1              | 11.956                            | 0.533  | 0.027    | C          |
| 402.000-382.000         |                 |                  | B       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
| T6                      | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 1              | 1              | 11.956                            | 0.530  | 0.026    | C          |
| 382.000-362.000         |                 |                  | B       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
| T7                      | 0.091           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 1              | 1              | 11.956                            | 0.532  | 0.027    | C          |
| 362.000-342.000         |                 |                  | B       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
| T8                      | 0.098           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 1              | 1              | 11.956                            | 0.548  | 0.027    | C          |
| 342.000-322.000         |                 |                  | B       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 1              | 1              | 11.956                            |        |          |            |
| T9                      | 0.099           | 1.328            | A       | 0.183 | 2.654          | 0.014                 | 1              | 1              | 11.840                            | 0.541  | 0.027    | C          |

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>50 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 322.000-302.000         |                 |                  | B       | 0.183 | 2.654          |                       | 1              | 1              | 11.840                            |        |          |            |
|                         |                 |                  | C       | 0.183 | 2.654          |                       | 1              | 1              | 11.840                            |        |          |            |
| T10                     | 0.113           | 1.419            | A       | 0.19  | 2.631          | 0.014                 | 1              | 1              | 12.401                            | 0.574  | 0.029    | C          |
| 302.000-282.000         |                 |                  | B       | 0.19  | 2.631          |                       | 1              | 1              | 12.401                            |        |          |            |
|                         |                 |                  | C       | 0.19  | 2.631          |                       | 1              | 1              | 12.401                            |        |          |            |
| T11                     | 0.366           | 1.858            | A       | 0.211 | 2.559          | 0.013                 | 1              | 1              | 13.989                            | 0.892  | 0.045    | A          |
| 282.000-262.000         |                 |                  | B       | 0.211 | 2.559          |                       | 1              | 1              | 13.989                            |        |          |            |
|                         |                 |                  | C       | 0.211 | 2.559          |                       | 1              | 1              | 13.989                            |        |          |            |
| T12                     | 0.435           | 1.629            | A       | 0.198 | 2.602          | 0.013                 | 1              | 1              | 12.849                            | 0.936  | 0.047    | A          |
| 262.000-242.000         |                 |                  | B       | 0.198 | 2.602          |                       | 1              | 1              | 12.849                            |        |          |            |
|                         |                 |                  | C       | 0.198 | 2.602          |                       | 1              | 1              | 12.849                            |        |          |            |
| T13                     | 0.459           | 1.629            | A       | 0.198 | 2.602          | 0.013                 | 1              | 1              | 12.849                            | 0.962  | 0.048    | A          |
| 242.000-222.000         |                 |                  | B       | 0.198 | 2.602          |                       | 1              | 1              | 12.849                            |        |          |            |
|                         |                 |                  | C       | 0.198 | 2.602          |                       | 1              | 1              | 12.849                            |        |          |            |
| T14                     | 0.460           | 2.089            | A       | 0.219 | 2.532          | 0.013                 | 1              | 1              | 14.437                            | 0.985  | 0.049    | A          |
| 222.000-202.000         |                 |                  | B       | 0.219 | 2.532          |                       | 1              | 1              | 14.437                            |        |          |            |
|                         |                 |                  | C       | 0.219 | 2.532          |                       | 1              | 1              | 14.437                            |        |          |            |
| T15                     | 0.460           | 1.768            | A       | 0.2   | 2.596          | 0.013                 | 1              | 1              | 12.737                            | 0.931  | 0.047    | A          |
| 202.000-182.000         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T16                     | 0.463           | 1.768            | A       | 0.2   | 2.596          | 0.013                 | 1              | 1              | 12.737                            | 0.919  | 0.046    | A          |
| 182.000-162.000         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T17                     | 0.481           | 1.768            | A       | 0.2   | 2.596          | 0.012                 | 1              | 1              | 12.737                            | 0.931  | 0.047    | A          |
| 162.000-142.000         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T18                     | 0.487           | 1.768            | A       | 0.2   | 2.596          | 0.012                 | 1              | 1              | 12.737                            | 0.918  | 0.046    | A          |
| 142.000-122.000         |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T19                     | 0.247           | 0.908            | A       | 0.212 | 2.556          | 0.012                 | 1              | 1              | 6.894                             | 0.466  | 0.047    | A          |
| 122.000-112.000         |                 |                  | B       | 0.212 | 2.556          |                       | 1              | 1              | 6.894                             |        |          |            |
|                         |                 |                  | C       | 0.212 | 2.556          |                       | 1              | 1              | 6.894                             |        |          |            |
| T20                     | 0.249           | 1.060            | A       | 0.219 | 2.533          | 0.011                 | 1              | 1              | 7.210                             | 0.467  | 0.047    | A          |
| 112.000-102.000         |                 |                  | B       | 0.219 | 2.533          |                       | 1              | 1              | 7.210                             |        |          |            |
|                         |                 |                  | C       | 0.219 | 2.533          |                       | 1              | 1              | 7.210                             |        |          |            |
| T21                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.011                 | 1              | 1              | 12.737                            | 0.876  | 0.044    | A          |
| 102.000-82.000          |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T22                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.010                 | 1              | 1              | 12.737                            | 0.829  | 0.041    | A          |
| 82.000-62.000           |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T23                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.010                 | 1              | 1              | 12.737                            | 0.766  | 0.038    | A          |
| 62.000-42.000           |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T24                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.009                 | 1              | 1              | 12.737                            | 0.677  | 0.034    | A          |
| 42.000-22.000           |                 |                  | B       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 1              | 1              | 12.737                            |        |          |            |
| T25                     | 0.351           | 1.798            | A       | 0.207 | 2.572          | 0.009                 | 1              | 1              | 13.375                            | 0.554  | 0.028    | A          |
| 22.000-2.000            |                 |                  | B       | 0.207 | 2.572          |                       | 1              | 1              | 13.375                            |        |          |            |
|                         |                 |                  | C       | 0.207 | 2.572          |                       | 1              | 1              | 13.375                            |        |          |            |
| Sum Weight:             | 7.191           | 37.547           |         |       |                |                       |                |                |                                   | 17.079 |          |            |

**Tower Forces - Service - Wind 60 To Face**

|   |  |  |
|---|--|--|
| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>51 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Section Elevation<br><i>ft</i> | Add Weight<br><i>K</i> | Self Weight<br><i>K</i> | <i>F a c e</i> | <i>e</i> | <i>C<sub>F</sub></i> | <i>q<sub>z</sub></i><br><i>ksf</i> | <i>D<sub>F</sub></i> | <i>D<sub>R</sub></i> | <i>A<sub>E</sub></i><br><i>ft<sup>2</sup></i> | <i>F</i><br><i>K</i> | <i>w</i><br><i>klf</i> | <i>Ctrl. Face</i> |
|--------------------------------|------------------------|-------------------------|----------------|----------|----------------------|------------------------------------|----------------------|----------------------|---|----------------------|------------------------|-------------------|
| L1                             | 0.000                  | 0.535                   | A              | 1        | 0.654                | 0.015                              | 1                    | 1                    | 10.781  | 0.138                | 0.009                  | C                 |
| 492.000-477.0                  |                        |                         | B              | 1        | 0.654                |                                    | 1                    | 1                    | 10.781  |                      |                        |                   |
| 00                             |                        |                         | C              | 1        | 0.654                |                                    | 1                    | 1                    | 10.781  |                      |                        |                   |
| L2                             | 0.000                  | 0.713                   | A              | 1        | 0.655                | 0.014                              | 1                    | 1                    | 14.375  | 0.184                | 0.009                  | C                 |
| 477.000-457.0                  |                        |                         | B              | 1        | 0.655                |                                    | 1                    | 1                    | 14.375  |                      |                        |                   |
| 00                             |                        |                         | C              | 1        | 0.655                |                                    | 1                    | 1                    | 14.375  |                      |                        |                   |
| T1                             | 0.000                  | 0.418                   | A              | 0.283    | 2.343                | 0.014                              | 0.8                  | 1                    | 4.349   | 0.127                | 0.025                  | C                 |
| 457.000-452.0                  |                        |                         | B              | 0.283    | 2.343                |                                    | 0.8                  | 1                    | 4.349   |                      |                        |                   |
| 00                             |                        |                         | C              | 0.283    | 2.343                |                                    | 0.8                  | 1                    | 4.349   |                      |                        |                   |
| T2                             | 0.002                  | 0.643                   | A              | 0.194    | 2.615                | 0.014                              | 0.8                  | 1                    | 5.661   | 0.189                | 0.019                  | C                 |
| 452.000-442.0                  |                        |                         | B              | 0.194    | 2.615                |                                    | 0.8                  | 1                    | 5.661   |                      |                        |                   |
| 00                             |                        |                         | C              | 0.194    | 2.615                |                                    | 0.8                  | 1                    | 5.661   |                      |                        |                   |
| T3                             | 0.055                  | 1.229                   | A              | 0.181    | 2.66                 | 0.014                              | 0.8                  | 1                    | 10.422  | 0.438                | 0.022                  | C                 |
| 442.000-422.0                  |                        |                         | B              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| T4                             | 0.089                  | 1.229                   | A              | 0.181    | 2.66                 | 0.014                              | 0.8                  | 1                    | 10.422  | 0.487                | 0.024                  | C                 |
| 422.000-402.0                  |                        |                         | B              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| T5                             | 0.089                  | 1.229                   | A              | 0.181    | 2.66                 | 0.014                              | 0.8                  | 1                    | 10.422  | 0.484                | 0.024                  | C                 |
| 402.000-382.0                  |                        |                         | B              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| T6                             | 0.089                  | 1.229                   | A              | 0.181    | 2.66                 | 0.014                              | 0.8                  | 1                    | 10.422  | 0.481                | 0.024                  | C                 |
| 382.000-362.0                  |                        |                         | B              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| T7                             | 0.091                  | 1.229                   | A              | 0.181    | 2.66                 | 0.014                              | 0.8                  | 1                    | 10.422  | 0.483                | 0.024                  | C                 |
| 362.000-342.0                  |                        |                         | B              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| T8                             | 0.098                  | 1.229                   | A              | 0.181    | 2.66                 | 0.014                              | 0.8                  | 1                    | 10.422  | 0.499                | 0.025                  | C                 |
| 342.000-322.0                  |                        |                         | B              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.181    | 2.66                 |                                    | 0.8                  | 1                    | 10.422  |                      |                        |                   |
| T9                             | 0.099                  | 1.328                   | A              | 0.183    | 2.654                | 0.014                              | 0.8                  | 1                    | 10.425  | 0.497                | 0.025                  | C                 |
| 322.000-302.0                  |                        |                         | B              | 0.183    | 2.654                |                                    | 0.8                  | 1                    | 10.425  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.183    | 2.654                |                                    | 0.8                  | 1                    | 10.425  |                      |                        |                   |
| T10                            | 0.113                  | 1.419                   | A              | 0.19     | 2.631                | 0.014                              | 0.8                  | 1                    | 10.875  | 0.528                | 0.026                  | C                 |
| 302.000-282.0                  |                        |                         | B              | 0.19     | 2.631                |                                    | 0.8                  | 1                    | 10.875  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.19     | 2.631                |                                    | 0.8                  | 1                    | 10.875  |                      |                        |                   |
| T11                            | 0.366                  | 1.858                   | A              | 0.211    | 2.559                | 0.013                              | 0.8                  | 1                    | 12.248  | 0.841                | 0.042                  | B                 |
| 282.000-262.0                  |                        |                         | B              | 0.211    | 2.559                |                                    | 0.8                  | 1                    | 12.248  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.211    | 2.559                |                                    | 0.8                  | 1                    | 12.248  |                      |                        |                   |
| T12                            | 0.435                  | 1.629                   | A              | 0.198    | 2.602                | 0.013                              | 0.8                  | 1                    | 11.332  | 0.891                | 0.045                  | B                 |
| 262.000-242.0                  |                        |                         | B              | 0.198    | 2.602                |                                    | 0.8                  | 1                    | 11.332  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.198    | 2.602                |                                    | 0.8                  | 1                    | 11.332  |                      |                        |                   |
| T13                            | 0.459                  | 1.629                   | A              | 0.198    | 2.602                | 0.013                              | 0.8                  | 1                    | 11.332  | 0.918                | 0.046                  | B                 |
| 242.000-222.0                  |                        |                         | B              | 0.198    | 2.602                |                                    | 0.8                  | 1                    | 11.332  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.198    | 2.602                |                                    | 0.8                  | 1                    | 11.332  |                      |                        |                   |
| T14                            | 0.460                  | 2.089                   | A              | 0.219    | 2.532                | 0.013                              | 0.8                  | 1                    | 12.706  | 0.936                | 0.047                  | B                 |
| 222.000-202.0                  |                        |                         | B              | 0.219    | 2.532                |                                    | 0.8                  | 1                    | 12.706  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.219    | 2.532                |                                    | 0.8                  | 1                    | 12.706  |                      |                        |                   |
| T15                            | 0.460                  | 1.768                   | A              | 0.2      | 2.596                | 0.013                              | 0.8                  | 1                    | 11.338  | 0.891                | 0.045                  | B                 |
| 202.000-182.0                  |                        |                         | B              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |
| T16                            | 0.463                  | 1.768                   | A              | 0.2      | 2.596                | 0.013                              | 0.8                  | 1                    | 11.338  | 0.880                | 0.044                  | B                 |
| 182.000-162.0                  |                        |                         | B              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |
| T17                            | 0.481                  | 1.768                   | A              | 0.2      | 2.596                | 0.012                              | 0.8                  | 1                    | 11.338  | 0.893                | 0.045                  | B                 |
| 162.000-142.0                  |                        |                         | B              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |
| T18                            | 0.487                  | 1.768                   | A              | 0.2      | 2.596                | 0.012                              | 0.8                  | 1                    | 11.338  | 0.881                | 0.044                  | B                 |
| 142.000-122.0                  |                        |                         | B              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |
| 00                             |                        |                         | C              | 0.2      | 2.596                |                                    | 0.8                  | 1                    | 11.338  |                      |                        |                   |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 52 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| T19<br>122.000-112.000  | 0.247           | 0.908            | A       | 0.212 | 2.556          | 0.012                 | 0.8            | 1              | 6.092                             | 0.445  | 0.045    | B          |
|                         |                 |                  | B       | 0.212 | 2.556          |                       | 0.8            | 1              | 6.092                             |        |          |            |
|                         |                 |                  | C       | 0.212 | 2.556          |                       | 0.8            | 1              | 6.092                             |        |          |            |
| T20<br>112.000-102.000  | 0.249           | 1.060            | A       | 0.219 | 2.533          | 0.011                 | 0.8            | 1              | 6.346                             | 0.446  | 0.045    | B          |
|                         |                 |                  | B       | 0.219 | 2.533          |                       | 0.8            | 1              | 6.346                             |        |          |            |
|                         |                 |                  | C       | 0.219 | 2.533          |                       | 0.8            | 1              | 6.346                             |        |          |            |
| T21<br>102.000-82.000   | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.011                 | 0.8            | 1              | 11.338                            | 0.842  | 0.042    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T22<br>82.000-62.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.010                 | 0.8            | 1              | 11.338                            | 0.797  | 0.040    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T23<br>62.000-42.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.010                 | 0.8            | 1              | 11.338                            | 0.737  | 0.037    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T24<br>42.000-22.000    | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.009                 | 0.8            | 1              | 11.338                            | 0.651  | 0.033    | B          |
|                         |                 |                  | B       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.8            | 1              | 11.338                            |        |          |            |
| T25<br>22.000-2.000     | 0.351           | 1.798            | A       | 0.207 | 2.572          | 0.009                 | 0.8            | 1              | 11.851                            | 0.525  | 0.026    | B          |
|                         |                 |                  | B       | 0.207 | 2.572          |                       | 0.8            | 1              | 11.851                            |        |          |            |
|                         |                 |                  | C       | 0.207 | 2.572          |                       | 0.8            | 1              | 11.851                            |        |          |            |
| Sum Weight:             | 7.191           | 37.547           |         |       |                |                       |                |                |                                   | 16.110 |          |            |

### Tower Forces - Service - Wind 90 To Face

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| L1<br>492.000-477.000   | 0.000           | 0.535            | A       | 1     | 0.654          | 0.015                 | 1              | 1              | 10.781                            | 0.138  | 0.009    | C          |
|                         |                 |                  | B       | 1     | 0.654          |                       | 1              | 1              | 10.781                            |        |          |            |
|                         |                 |                  | C       | 1     | 0.654          |                       | 1              | 1              | 10.781                            |        |          |            |
| L2<br>477.000-457.000   | 0.000           | 0.713            | A       | 1     | 0.655          | 0.014                 | 1              | 1              | 14.375                            | 0.184  | 0.009    | C          |
|                         |                 |                  | B       | 1     | 0.655          |                       | 1              | 1              | 14.375                            |        |          |            |
|                         |                 |                  | C       | 1     | 0.655          |                       | 1              | 1              | 14.375                            |        |          |            |
| T1<br>457.000-452.000   | 0.000           | 0.418            | A       | 0.283 | 2.343          | 0.014                 | 0.85           | 1              | 4.551                             | 0.133  | 0.027    | C          |
|                         |                 |                  | B       | 0.283 | 2.343          |                       | 0.85           | 1              | 4.551                             |        |          |            |
|                         |                 |                  | C       | 0.283 | 2.343          |                       | 0.85           | 1              | 4.551                             |        |          |            |
| T2<br>452.000-442.000   | 0.002           | 0.643            | A       | 0.194 | 2.615          | 0.014                 | 0.85           | 1              | 5.880                             | 0.196  | 0.020    | C          |
|                         |                 |                  | B       | 0.194 | 2.615          |                       | 0.85           | 1              | 5.880                             |        |          |            |
|                         |                 |                  | C       | 0.194 | 2.615          |                       | 0.85           | 1              | 5.880                             |        |          |            |
| T3<br>442.000-422.000   | 0.055           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 0.85           | 1              | 10.805                            | 0.450  | 0.022    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
| T4<br>422.000-402.000   | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 0.85           | 1              | 10.805                            | 0.500  | 0.025    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
| T5<br>402.000-382.000   | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 0.85           | 1              | 10.805                            | 0.497  | 0.025    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
| T6<br>382.000-362.000   | 0.089           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 0.85           | 1              | 10.805                            | 0.493  | 0.025    | C          |
|                         |                 |                  | B       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
| T7                      | 0.091           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 0.85           | 1              | 10.805                            | 0.495  | 0.025    | C          |

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>53 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

| Section Elevation<br>ft | Add Weight<br>K | Self Weight<br>K | F a c e | e     | C <sub>F</sub> | q <sub>z</sub><br>ksf | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub><br>ft <sup>2</sup> | F<br>K | w<br>klf | Ctrl. Face |
|-------------------------|-----------------|------------------|---------|-------|----------------|-----------------------|----------------|----------------|-----------------------------------|--------|----------|------------|
| 362.000-342.000         |                 |                  | B       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
| T8                      | 0.098           | 1.229            | A       | 0.181 | 2.66           | 0.014                 | 0.85           | 1              | 10.805                            | 0.511  | 0.026    | C          |
| 342.000-322.000         |                 |                  | B       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
|                         |                 |                  | C       | 0.181 | 2.66           |                       | 0.85           | 1              | 10.805                            |        |          |            |
| T9                      | 0.099           | 1.328            | A       | 0.183 | 2.654          | 0.014                 | 0.85           | 1              | 10.778                            | 0.508  | 0.025    | C          |
| 322.000-302.000         |                 |                  | B       | 0.183 | 2.654          |                       | 0.85           | 1              | 10.778                            |        |          |            |
|                         |                 |                  | C       | 0.183 | 2.654          |                       | 0.85           | 1              | 10.778                            |        |          |            |
| T10                     | 0.113           | 1.419            | A       | 0.19  | 2.631          | 0.014                 | 0.85           | 1              | 11.257                            | 0.540  | 0.027    | C          |
| 302.000-282.000         |                 |                  | B       | 0.19  | 2.631          |                       | 0.85           | 1              | 11.257                            |        |          |            |
|                         |                 |                  | C       | 0.19  | 2.631          |                       | 0.85           | 1              | 11.257                            |        |          |            |
| T11                     | 0.366           | 1.858            | A       | 0.211 | 2.559          | 0.013                 | 0.85           | 1              | 12.683                            | 0.862  | 0.043    | C          |
| 282.000-262.000         |                 |                  | B       | 0.211 | 2.559          |                       | 0.85           | 1              | 12.683                            |        |          |            |
|                         |                 |                  | C       | 0.211 | 2.559          |                       | 0.85           | 1              | 12.683                            |        |          |            |
| T12                     | 0.435           | 1.629            | A       | 0.198 | 2.602          | 0.013                 | 0.85           | 1              | 11.711                            | 0.903  | 0.045    | B          |
| 262.000-242.000         |                 |                  | B       | 0.198 | 2.602          |                       | 0.85           | 1              | 11.711                            |        |          |            |
|                         |                 |                  | C       | 0.198 | 2.602          |                       | 0.85           | 1              | 11.711                            |        |          |            |
| T13                     | 0.459           | 1.629            | A       | 0.198 | 2.602          | 0.013                 | 0.85           | 1              | 11.711                            | 0.936  | 0.047    | B          |
| 242.000-222.000         |                 |                  | B       | 0.198 | 2.602          |                       | 0.85           | 1              | 11.711                            |        |          |            |
|                         |                 |                  | C       | 0.198 | 2.602          |                       | 0.85           | 1              | 11.711                            |        |          |            |
| T14                     | 0.460           | 2.089            | A       | 0.219 | 2.532          | 0.013                 | 0.85           | 1              | 13.139                            | 0.955  | 0.048    | B          |
| 222.000-202.000         |                 |                  | B       | 0.219 | 2.532          |                       | 0.85           | 1              | 13.139                            |        |          |            |
|                         |                 |                  | C       | 0.219 | 2.532          |                       | 0.85           | 1              | 13.139                            |        |          |            |
| T15                     | 0.460           | 1.768            | A       | 0.2   | 2.596          | 0.013                 | 0.85           | 1              | 11.688                            | 0.908  | 0.045    | B          |
| 202.000-182.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T16                     | 0.463           | 1.768            | A       | 0.2   | 2.596          | 0.013                 | 0.85           | 1              | 11.688                            | 0.898  | 0.045    | B          |
| 182.000-162.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T17                     | 0.481           | 1.768            | A       | 0.2   | 2.596          | 0.012                 | 0.85           | 1              | 11.688                            | 0.918  | 0.046    | B          |
| 162.000-142.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T18                     | 0.487           | 1.768            | A       | 0.2   | 2.596          | 0.012                 | 0.85           | 1              | 11.688                            | 0.905  | 0.045    | B          |
| 142.000-122.000         |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T19                     | 0.247           | 0.908            | A       | 0.212 | 2.556          | 0.012                 | 0.85           | 1              | 6.292                             | 0.458  | 0.046    | B          |
| 122.000-112.000         |                 |                  | B       | 0.212 | 2.556          |                       | 0.85           | 1              | 6.292                             |        |          |            |
|                         |                 |                  | C       | 0.212 | 2.556          |                       | 0.85           | 1              | 6.292                             |        |          |            |
| T20                     | 0.249           | 1.060            | A       | 0.219 | 2.533          | 0.011                 | 0.85           | 1              | 6.562                             | 0.458  | 0.046    | B          |
| 112.000-102.000         |                 |                  | B       | 0.219 | 2.533          |                       | 0.85           | 1              | 6.562                             |        |          |            |
|                         |                 |                  | C       | 0.219 | 2.533          |                       | 0.85           | 1              | 6.562                             |        |          |            |
| T21                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.011                 | 0.85           | 1              | 11.688                            | 0.865  | 0.043    | B          |
| 102.000-82.000          |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T22                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.010                 | 0.85           | 1              | 11.688                            | 0.818  | 0.041    | B          |
| 82.000-62.000           |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T23                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.010                 | 0.85           | 1              | 11.688                            | 0.756  | 0.038    | B          |
| 62.000-42.000           |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T24                     | 0.501           | 1.768            | A       | 0.2   | 2.596          | 0.009                 | 0.85           | 1              | 11.688                            | 0.668  | 0.033    | B          |
| 42.000-22.000           |                 |                  | B       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
|                         |                 |                  | C       | 0.2   | 2.596          |                       | 0.85           | 1              | 11.688                            |        |          |            |
| T25                     | 0.351           | 1.798            | A       | 0.207 | 2.572          | 0.009                 | 0.85           | 1              | 12.232                            | 0.540  | 0.027    | B          |
| 22.000-2.000            |                 |                  | B       | 0.207 | 2.572          |                       | 0.85           | 1              | 12.232                            |        |          |            |
|                         |                 |                  | C       | 0.207 | 2.572          |                       | 0.85           | 1              | 12.232                            |        |          |            |
| Sum Weight:             | 7.191           | 37.547           |         |       |                |                       |                |                |                                   | 16.491 |          |            |

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>54 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

### Force Totals (Does not include forces on guys)

| Load Case                | Vertical Forces<br>K | Sum of Forces<br>X<br>K | Sum of Forces<br>Z<br>K | Sum of Torques<br>kip-ft |
|--------------------------|----------------------|-------------------------|-------------------------|--------------------------|
| Leg Weight               | 28.245               |                         |                         |                          |
| Bracing Weight           | 9.302                |                         |                         |                          |
| Total Member Self-Weight | 37.547               |                         |                         |                          |
| Guy Weight               | 10.784               |                         |                         |                          |
| Total Weight             | 61.351               |                         |                         |                          |
| Wind 0 deg - No Ice      |                      | 0.041                   | -41.772                 | 1.109                    |
| Wind 30 deg - No Ice     |                      | 19.896                  | -34.365                 | -2.304                   |
| Wind 60 deg - No Ice     |                      | 34.374                  | -19.826                 | -4.316                   |
| Wind 90 deg - No Ice     |                      | 41.472                  | -0.037                  | -5.243                   |
| Wind 120 deg - No Ice    |                      | 37.398                  | 21.508                  | -5.409                   |
| Wind 150 deg - No Ice    |                      | 20.805                  | 36.081                  | -4.213                   |
| Wind 180 deg - No Ice    |                      | -0.077                  | 39.603                  | -1.110                   |
| Wind 210 deg - No Ice    |                      | -19.919                 | 34.352                  | 2.232                    |
| Wind 240 deg - No Ice    |                      | -36.303                 | 20.923                  | 4.300                    |
| Wind 270 deg - No Ice    |                      | -41.523                 | 0.069                   | 5.277                    |
| Wind 300 deg - No Ice    |                      | -35.574                 | -20.430                 | 5.427                    |
| Wind 330 deg - No Ice    |                      | -20.885                 | -36.094                 | 4.251                    |
| Member Ice               | 54.504               |                         |                         |                          |
| Guy Ice                  | 44.918               |                         |                         |                          |
| Total Weight Ice         | 242.203              |                         |                         |                          |
| Wind 0 deg - Ice         |                      | 0.245                   | -29.816                 | 1.094                    |
| Wind 30 deg - Ice        |                      | 14.970                  | -25.245                 | -1.332                   |
| Wind 60 deg - Ice        |                      | 25.511                  | -14.720                 | -3.882                   |
| Wind 90 deg - Ice        |                      | 29.648                  | -0.347                  | -5.395                   |
| Wind 120 deg - Ice       |                      | 26.164                  | 14.711                  | -5.315                   |
| Wind 150 deg - Ice       |                      | 14.588                  | 25.542                  | -3.326                   |
| Wind 180 deg - Ice       |                      | -0.040                  | 29.237                  | -0.700                   |
| Wind 210 deg - Ice       |                      | -14.517                 | 25.368                  | 2.081                    |
| Wind 240 deg - Ice       |                      | -25.855                 | 14.816                  | 4.251                    |
| Wind 270 deg - Ice       |                      | -29.580                 | -0.177                  | 4.961                    |
| Wind 300 deg - Ice       |                      | -25.642                 | -14.748                 | 4.558                    |
| Wind 330 deg - Ice       |                      | -14.904                 | -25.419                 | 3.010                    |
| Total Weight             | 61.351               |                         |                         |                          |
| Wind 0 deg - Service     |                      | 0.019                   | -19.012                 | 0.504                    |
| Wind 30 deg - Service    |                      | 9.056                   | -15.641                 | -1.047                   |
| Wind 60 deg - Service    |                      | 15.646                  | -9.024                  | -1.962                   |
| Wind 90 deg - Service    |                      | 18.875                  | -0.017                  | -2.383                   |
| Wind 120 deg - Service   |                      | 17.020                  | 9.788                   | -2.458                   |
| Wind 150 deg - Service   |                      | 9.469                   | 16.422                  | -1.915                   |
| Wind 180 deg - Service   |                      | -0.035                  | 18.026                  | -0.505                   |
| Wind 210 deg - Service   |                      | -9.066                  | 15.636                  | 1.014                    |
| Wind 240 deg - Service   |                      | -16.523                 | 9.523                   | 1.954                    |
| Wind 270 deg - Service   |                      | -18.899                 | 0.031                   | 2.399                    |
| Wind 300 deg - Service   |                      | -16.191                 | -9.299                  | 2.466                    |
| Wind 330 deg - Service   |                      | -9.506                  | -16.428                 | 1.932                    |

### Load Combinations

|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">55 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Comb. No. | Description  |
|-----------|--|
| 1         | Dead Only  |
| 2         | 1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy           |
| 3         | 1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy          |
| 4         | 1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy          |
| 5         | 1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy          |
| 6         | 1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy         |
| 7         | 1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy         |
| 8         | 1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy         |
| 9         | 1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy         |
| 10        | 1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy         |
| 11        | 1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy         |
| 12        | 1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy         |
| 13        | 1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy         |
| 14        | 1.2 Dead+1.0 Ice+1.0 Temp+Guy                      |
| 15        | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy   |
| 16        | 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy  |
| 17        | 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy  |
| 18        | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy  |
| 19        | 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 20        | 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 21        | 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 22        | 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 23        | 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 24        | 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 25        | 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 26        | 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 27        | Dead+Wind 0 deg - Service+Guy                      |
| 28        | Dead+Wind 30 deg - Service+Guy                     |
| 29        | Dead+Wind 60 deg - Service+Guy                     |
| 30        | Dead+Wind 90 deg - Service+Guy                     |
| 31        | Dead+Wind 120 deg - Service+Guy                    |
| 32        | Dead+Wind 150 deg - Service+Guy                    |
| 33        | Dead+Wind 180 deg - Service+Guy                    |
| 34        | Dead+Wind 210 deg - Service+Guy                    |
| 35        | Dead+Wind 240 deg - Service+Guy                    |
| 36        | Dead+Wind 270 deg - Service+Guy                    |
| 37        | Dead+Wind 300 deg - Service+Guy                    |
| 38        | Dead+Wind 330 deg - Service+Guy                    |

## Maximum Reactions

| Location  | Condition           | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|---|---------------------|-----------------|------------|-----------------|-----------------|
| Guy C @ 148 ft<br>Elev -7 ft<br>Azimuth 240 deg | Max. Vert           | 23              | -13.015    | -4.723          | 2.728           |
|   | Max. H <sub>x</sub> | 10              | -14.268    | -2.999          | 1.734           |
|   | Max. H <sub>z</sub> | 3               | -113.936   | -43.206         | 27.034          |
|   | Min. Vert           | 5               | -115.643   | -45.781         | 24.370          |
|   | Min. H <sub>x</sub> | 5               | -115.643   | -45.781         | 24.370          |
|   | Min. H <sub>z</sub> | 9               | -18.306    | -5.296          | 1.544           |
| Guy B @ 146 ft<br>Elev -4 ft<br>Azimuth 120 deg | Max. Vert           | 19              | -13.318    | 4.746           | 2.742           |
|   | Max. H <sub>x</sub> | 11              | -116.430   | 45.798          | 24.375          |
|   | Max. H <sub>z</sub> | 13              | -115.253   | 43.573          | 27.258          |
|   | Min. Vert           | 11              | -116.430   | 45.798          | 24.375          |
|   | Min. H <sub>x</sub> | 6               | -14.297    | 2.975           | 1.719           |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 56 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Location  | Condition           | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|---|---------------------|-----------------|------------|-----------------|-----------------|
| Guy A @ 149 ft<br>Elev 2 ft<br>Azimuth 0 deg      | Min. H <sub>z</sub> | 7               | -18.350    | 5.254           | 1.527           |
|   | Max. Vert           | 15              | -11.681    | -0.000          | -5.114          |
|   | Max. H <sub>x</sub> | 11              | -64.417    | 3.144           | -28.243         |
|   | Max. H <sub>z</sub> | 2               | -13.270    | 0.000           | -3.286          |
|   | Min. Vert           | 8               | -111.332   | 0.005           | -51.380         |
|   | Min. H <sub>x</sub> | 5               | -64.057    | -3.138          | -28.095         |
| Guy C @ 117.5 ft<br>Elev -5 ft<br>Azimuth 240 deg | Min. H <sub>z</sub> | 7               | -111.281   | -1.773          | -51.423         |
|   | Max. Vert           | 10              | -1.647     | -0.659          | 0.381           |
|   | Max. H <sub>x</sub> | 10              | -1.647     | -0.659          | 0.381           |
|   | Max. H <sub>z</sub> | 5               | -57.328    | -40.939         | 22.901          |
|   | Min. Vert           | 5               | -57.328    | -40.939         | 22.901          |
|   | Min. H <sub>x</sub> | 5               | -57.328    | -40.939         | 22.901          |
| Guy B @ 117.5 ft<br>Elev 0 ft<br>Azimuth 120 deg  | Min. H <sub>z</sub> | 10              | -1.647     | -0.659          | 0.381           |
|   | Max. Vert           | 6               | -1.451     | 0.592           | 0.342           |
|   | Max. H <sub>x</sub> | 11              | -55.615    | 40.907          | 22.901          |
|   | Max. H <sub>z</sub> | 13              | -56.018    | 40.768          | 24.308          |
|   | Min. Vert           | 13              | -56.018    | 40.768          | 24.308          |
|   | Min. H <sub>x</sub> | 6               | -1.451     | 0.592           | 0.342           |
| Guy A @ 123 ft<br>Elev 0 ft<br>Azimuth 0 deg      | Min. H <sub>z</sub> | 6               | -1.451     | 0.592           | 0.342           |
|   | Max. Vert           | 2               | -1.374     | -0.000          | -0.704          |
|   | Max. H <sub>x</sub> | 24              | -18.963    | 1.000           | -19.842         |
|   | Max. H <sub>z</sub> | 2               | -1.374     | -0.000          | -0.704          |
|   | Min. Vert           | 7               | -53.453    | -0.644          | -47.327         |
|   | Min. H <sub>x</sub> | 6               | -47.162    | -1.051          | -41.611         |
| Mast  | Min. H <sub>z</sub> | 7               | -53.453    | -0.644          | -47.327         |
|   | Max. Vert           | 25              | 465.543    | -0.549          | -0.500          |
|   | Max. H <sub>x</sub> | 6               | 386.073    | 2.319           | 1.083           |
|   | Max. H <sub>z</sub> | 6               | 386.073    | 2.319           | 1.083           |
|   | Max. M <sub>x</sub> | 1               | 0.000      | 0.000           | -0.030          |
|   | Max. M <sub>z</sub> | 1               | 0.000      | 0.000           | -0.030          |
|   | Max. Torsion        | 5               | 3.135      | 1.670           | 0.820           |
|   | Min. Vert           | 1               | 221.201    | 0.000           | -0.030          |
|   | Min. H <sub>x</sub> | 10              | 380.755    | -1.942          | 0.989           |
|   | Min. H <sub>z</sub> | 2               | 383.796    | 0.108           | -2.448          |
|   | Min. M <sub>x</sub> | 1               | 0.000      | 0.000           | -0.030          |
|   | Min. M <sub>z</sub> | 1               | 0.000      | 0.000           | -0.030          |
|   | Min. Torsion        | 12              | -3.267     | -0.170          | -0.078          |

### Tower Mast Reaction Summary

| Load Combination                          | Vertical K | Shear <sub>x</sub> K | Shear <sub>z</sub> K | Overtuning Moment, M <sub>x</sub> kip-ft | Overtuning Moment, M <sub>z</sub> kip-ft | Torque kip-ft |
|---|------------|----------------------|----------------------|--|--|---------------|
| Dead Only                                 | 221.201    | -0.000               | 0.030                | 0.000                                    | 0.000                                    | -0.033        |
| 1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy  | 383.796    | -0.108               | 2.448                | 0.000                                    | 0.000                                    | 0.689         |
| 1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy | 351.995    | -0.033               | 1.667                | 0.000                                    | 0.000                                    | -0.763        |
| 1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy | 313.280    | -0.240               | 0.142                | 0.000                                    | 0.000                                    | -2.482        |



|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">57 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Load Combination                                   | Vertical<br>K | Shear <sub>x</sub><br>K | Shear <sub>z</sub><br>K | Overturning<br>Moment, M <sub>x</sub><br>kip-ft | Overturning<br>Moment, M <sub>z</sub><br>kip-ft | Torque<br>kip-ft |
|--|---------------|-------------------------|-------------------------|---|---|------------------|
| Ice+1.0 Guy  |               |                         |                         |   |   |                  |
| 1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy          | 356.661       | -1.670                  | -0.820                  | 0.000   | 0.000   | -3.135           |
| 1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy         | 386.073       | -2.319                  | -1.083                  | 0.000   | 0.000   | -2.830           |
| 1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy         | 353.739       | -1.536                  | -0.604                  | 0.000   | 0.000   | -2.137           |
| 1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy         | 310.538       | 0.033                   | 0.068                   | 0.000   | 0.000   | -0.973           |
| 1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy         | 347.888       | 1.276                   | -0.483                  | 0.000   | 0.000   | 0.589            |
| 1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy         | 380.755       | 1.942                   | -0.989                  | 0.000   | 0.000   | 1.918            |
| 1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy         | 356.341       | 1.495                   | -0.851                  | 0.000   | 0.000   | 2.999            |
| 1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy         | 315.127       | 0.170                   | 0.078                   | 0.000   | 0.000   | 3.267            |
| 1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy         | 357.922       | -0.112                  | 1.874                   | 0.000   | 0.000   | 1.982            |
| 1.2 Dead+1.0 Ice+1.0 Temp+Guy                      | 436.409       | 0.019                   | 0.190                   | 0.000   | 0.000   | -0.099           |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy   | 452.147       | -0.006                  | 1.099                   | 0.000   | 0.000   | 0.366            |
| 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy  | 461.001       | -0.283                  | 0.899                   | 0.000   | 0.000   | -0.171           |
| 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy  | 465.321       | -0.563                  | 0.531                   | 0.000   | 0.000   | -1.358           |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy  | 460.246       | -0.749                  | 0.105                   | 0.000   | 0.000   | -2.222           |
| 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy | 450.689       | -0.732                  | -0.178                  | 0.000   | 0.000   | -1.963           |
| 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy | 459.205       | -0.432                  | -0.316                  | 0.000   | 0.000   | -1.045           |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy | 463.611       | 0.027                   | -0.364                  | 0.000   | 0.000   | -0.496           |
| 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy | 458.620       | 0.442                   | -0.305                  | 0.000   | 0.000   | 0.160            |
| 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy | 449.541       | 0.713                   | -0.166                  | 0.000   | 0.000   | 1.292            |
| 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy | 459.928       | 0.725                   | 0.094                   | 0.000   | 0.000   | 1.912            |
| 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy | 465.543       | 0.549                   | 0.500                   | 0.000   | 0.000   | 1.510            |
| 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy | 461.321       | 0.263                   | 0.891                   | 0.000   | 0.000   | 0.711            |
| Dead+Wind 0 deg - Service+Guy                      | 223.885       | -0.010                  | -0.246                  | 0.000   | 0.000   | 0.263            |
| Dead+Wind 30 deg - Service+Guy                     | 224.686       | 0.087                   | -0.176                  | 0.000   | 0.000   | -0.352           |
| Dead+Wind 60 deg - Service+Guy                     | 225.504       | 0.154                   | -0.072                  | 0.000   | 0.000   | -0.887           |
| Dead+Wind 90 deg - Service+Guy                     | 225.055       | 0.201                   | 0.045                   | 0.000   | 0.000   | -1.208           |
| Dead+Wind 120 deg - Service+Guy                    | 224.468       | 0.214                   | 0.175                   | 0.000   | 0.000   | -1.181           |
| Dead+Wind 150 deg - Service+Guy                    | 225.460       | 0.120                   | 0.244                   | 0.000   | 0.000   | -0.855           |
| Dead+Wind 180 deg - Service+Guy                    | 226.156       | 0.008                   | 0.256                   | 0.000   | 0.000   | -0.328           |
| Dead+Wind 210 deg - Service+Guy                    | 225.508       | -0.103                  | 0.230                   | 0.000   | 0.000   | 0.269            |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
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|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Load Combination                   | Vertical<br>K | Shear <sub>x</sub><br>K | Shear <sub>z</sub><br>K | Overturning<br>Moment, M <sub>x</sub><br>kip-ft | Overturning<br>Moment, M <sub>z</sub><br>kip-ft | Torque<br>kip-ft |
|------------------------------------|---------------|-------------------------|-------------------------|---|---|------------------|
| Dead+Wind 240 deg -<br>Service+Guy | 224.654       | -0.200                  | 0.160                   | 0.000   | 0.000   | 0.817            |
| Dead+Wind 270 deg -<br>Service+Guy | 225.345       | -0.204                  | 0.032                   | 0.000   | 0.000   | 1.144            |
| Dead+Wind 300 deg -<br>Service+Guy | 225.837       | -0.170                  | -0.087                  | 0.000   | 0.000   | 1.114            |
| Dead+Wind 330 deg -<br>Service+Guy | 224.937       | -0.108                  | -0.189                  | 0.000   | 0.000   | 0.801            |

## Solution Summary

| Load Comb. | Sum of Applied Forces |          |         | Sum of Reactions |         |         | % Error |
|------------|-----------------------|----------|---------|------------------|---------|---------|---------|
|            | PX<br>K               | PY<br>K  | PZ<br>K | PX<br>K          | PY<br>K | PZ<br>K |         |
| 1          | 0.000                 | -61.348  | 0.000   | 0.000            | 61.348  | -0.013  | 0.021%  |
| 2          | 0.066                 | -71.669  | -84.806 | -0.066           | 71.667  | 84.731  | 0.068%  |
| 3          | 40.851                | -71.456  | -70.548 | -40.859          | 71.455  | 70.487  | 0.057%  |
| 4          | 70.642                | -71.247  | -40.714 | -70.614          | 71.246  | 40.680  | 0.041%  |
| 5          | 84.427                | -71.487  | -0.056  | -84.379          | 71.486  | 0.093   | 0.056%  |
| 6          | 75.485                | -71.720  | 43.408  | -75.420          | 71.719  | -43.372 | 0.066%  |
| 7          | 42.307                | -71.492  | 73.295  | -42.252          | 71.491  | -73.275 | 0.053%  |
| 8          | -0.122                | -71.255  | 81.336  | 0.112            | 71.254  | -81.297 | 0.037%  |
| 9          | -40.886               | -71.467  | 70.527  | 40.832           | 71.466  | -70.506 | 0.054%  |
| 10         | -73.729               | -71.677  | 42.470  | 73.664           | 71.675  | -42.434 | 0.067%  |
| 11         | -84.510               | -71.437  | 0.108   | 84.459           | 71.436  | -0.071  | 0.057%  |
| 12         | -72.566               | -71.203  | -41.683 | 72.530           | 71.202  | 41.657  | 0.040%  |
| 13         | -42.436               | -71.431  | -73.316 | 42.445           | 71.431  | 73.255  | 0.056%  |
| 14         | 0.000                 | -252.304 | 0.000   | -0.014           | 252.304 | -0.036  | 0.015%  |
| 15         | 0.248                 | -252.542 | -48.991 | -0.246           | 252.542 | 49.001  | 0.004%  |
| 16         | 24.576                | -252.297 | -41.817 | -24.564          | 252.297 | 41.799  | 0.008%  |
| 17         | 42.180                | -252.040 | -24.296 | -42.160          | 252.040 | 24.280  | 0.010%  |
| 18         | 48.904                | -252.331 | -0.346  | -48.883          | 252.330 | 0.340   | 0.008%  |
| 19         | 42.827                | -252.618 | 24.282  | -42.830          | 252.618 | -24.293 | 0.004%  |
| 20         | 24.191                | -252.338 | 42.109  | -24.185          | 252.338 | -42.091 | 0.007%  |
| 21         | -0.043                | -252.050 | 48.370  | 0.039            | 252.050 | -48.348 | 0.009%  |
| 22         | -24.122               | -252.311 | 41.940  | 24.111           | 252.311 | -41.925 | 0.007%  |
| 23         | -42.526               | -252.567 | 24.394  | 42.528           | 252.567 | -24.404 | 0.004%  |
| 24         | -48.836               | -252.277 | -0.177  | 48.814           | 252.277 | 0.176   | 0.008%  |
| 25         | -42.312               | -251.993 | -24.323 | 42.289           | 251.993 | 24.310  | 0.010%  |
| 26         | -24.507               | -252.270 | -41.987 | 24.494           | 252.270 | 41.970  | 0.008%  |
| 27         | 0.019                 | -61.407  | -24.116 | -0.019           | 61.407  | 24.108  | 0.013%  |
| 28         | 11.617                | -61.347  | -20.063 | -11.611          | 61.347  | 20.056  | 0.014%  |
| 29         | 20.089                | -61.287  | -11.578 | -20.082          | 61.287  | 11.573  | 0.014%  |
| 30         | 24.009                | -61.355  | -0.016  | -24.001          | 61.355  | 0.013   | 0.014%  |
| 31         | 21.465                | -61.422  | 12.344  | -21.458          | 61.422  | -12.340 | 0.013%  |
| 32         | 12.031                | -61.357  | 20.843  | -12.030          | 61.357  | -20.835 | 0.012%  |
| 33         | -0.035                | -61.290  | 23.131  | 0.034            | 61.290  | -23.123 | 0.012%  |
| 34         | -11.627               | -61.350  | 20.057  | 11.625           | 61.350  | -20.049 | 0.012%  |
| 35         | -20.966               | -61.409  | 12.077  | 20.959           | 61.409  | -12.074 | 0.012%  |
| 36         | -24.032               | -61.341  | 0.031   | 24.024           | 61.341  | -0.034  | 0.014%  |
| 37         | -20.636               | -61.275  | -11.854 | 20.628           | 61.275  | 11.849  | 0.014%  |
| 38         | -12.068               | -61.340  | -20.849 | 12.061           | 61.340  | 20.843  | 0.014%  |

## Non-Linear Convergence Results

|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">59 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| <i>Load<br/>Combination</i> | <i>Converged?</i> | <i>Number<br/>of Cycles</i> | <i>Displacement<br/>Tolerance</i> | <i>Force<br/>Tolerance</i> |
|-----------------------------|-------------------|-----------------------------|-----------------------------------|----------------------------|
| 1                           | Yes               | 22                          | 0.0002000                         | 0.00001043                 |
| 2                           | Yes               | 164                         | 0.00019684                        | 0.00007559                 |
| 3                           | Yes               | 152                         | 0.00019833                        | 0.00006608                 |
| 4                           | Yes               | 65                          | 0.00019557                        | 0.00006434                 |
| 5                           | Yes               | 143                         | 0.00019656                        | 0.00006577                 |
| 6                           | Yes               | 155                         | 0.00019774                        | 0.00007488                 |
| 7                           | Yes               | 142                         | 0.00019939                        | 0.00006337                 |
| 8                           | Yes               | 61                          | 0.00019817                        | 0.00006121                 |
| 9                           | Yes               | 148                         | 0.00019831                        | 0.00006395                 |
| 10                          | Yes               | 159                         | 0.00019864                        | 0.00007591                 |
| 11                          | Yes               | 145                         | 0.00019961                        | 0.00006724                 |
| 12                          | Yes               | 64                          | 0.00019827                        | 0.00006702                 |
| 13                          | Yes               | 149                         | 0.00019702                        | 0.00006520                 |
| 14                          | Yes               | 27                          | 0.0002000                         | 0.00001693                 |
| 15                          | Yes               | 71                          | 0.00019556                        | 0.00001895                 |
| 16                          | Yes               | 110                         | 0.00019668                        | 0.00002261                 |
| 17                          | Yes               | 109                         | 0.00019773                        | 0.00002704                 |
| 18                          | Yes               | 106                         | 0.00019880                        | 0.00002327                 |
| 19                          | Yes               | 67                          | 0.00019707                        | 0.00001664                 |
| 20                          | Yes               | 104                         | 0.00019724                        | 0.00002061                 |
| 21                          | Yes               | 107                         | 0.00019489                        | 0.00002408                 |
| 22                          | Yes               | 111                         | 0.00019564                        | 0.00002040                 |
| 23                          | Yes               | 58                          | 0.00019333                        | 0.00001618                 |
| 24                          | Yes               | 110                         | 0.00019576                        | 0.00002299                 |
| 25                          | Yes               | 109                         | 0.00019515                        | 0.00002708                 |
| 26                          | Yes               | 108                         | 0.00019608                        | 0.00002281                 |
| 27                          | Yes               | 33                          | 0.00019381                        | 0.00001847                 |
| 28                          | Yes               | 43                          | 0.00019905                        | 0.00001926                 |
| 29                          | Yes               | 48                          | 0.00019463                        | 0.00001974                 |
| 30                          | Yes               | 42                          | 0.00019656                        | 0.00001896                 |
| 31                          | Yes               | 32                          | 0.00019347                        | 0.00001780                 |
| 32                          | Yes               | 42                          | 0.00019618                        | 0.00001757                 |
| 33                          | Yes               | 48                          | 0.00019539                        | 0.00001791                 |
| 34                          | Yes               | 44                          | 0.00019209                        | 0.00001736                 |
| 35                          | Yes               | 35                          | 0.00019116                        | 0.00001781                 |
| 36                          | Yes               | 43                          | 0.00019846                        | 0.00001953                 |
| 37                          | Yes               | 48                          | 0.00019715                        | 0.00002035                 |
| 38                          | Yes               | 43                          | 0.00019726                        | 0.00001933                 |

### Maximum Tower Deflections - Service Wind

| <i>Section<br/>No.</i> | <i>Elevation<br/>ft</i> | <i>Horz.<br/>Deflection<br/>in</i> | <i>Gov.<br/>Load<br/>Comb.</i> | <i>Tilt<br/>°</i> | <i>Twist<br/>°</i> |
|------------------------|-------------------------|------------------------------------|--------------------------------|-------------------|--------------------|
| L1                     | 492 - 477               | 7.773                              | 37                             | 0.4037            | 0.4888             |
| L2                     | 477 - 457               | 6.529                              | 37                             | 0.3750            | 0.4888             |
| T1                     | 457 - 452               | 5.415                              | 37                             | 0.0812            | 0.4754             |
| T2                     | 452 - 442               | 5.329                              | 37                             | 0.0788            | 0.4727             |
| T3                     | 442 - 422               | 5.168                              | 37                             | 0.0701            | 0.4661             |
| T4                     | 422 - 402               | 4.884                              | 37                             | 0.0673            | 0.4765             |
| T5                     | 402 - 382               | 4.606                              | 37                             | 0.0616            | 0.4633             |
| T6                     | 382 - 362               | 4.370                              | 37                             | 0.0409            | 0.4572             |
| T7                     | 362 - 342               | 4.224                              | 37                             | 0.0341            | 0.4786             |
| T8                     | 342 - 322               | 4.083                              | 37                             | 0.0318            | 0.4685             |
| T9                     | 322 - 302               | 3.958                              | 37                             | 0.0199            | 0.4618             |
| T10                    | 302 - 282               | 3.891                              | 37                             | 0.0263            | 0.4657             |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 60 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|------------------------|--------------------|-----------|------------|
| T11         | 282 - 262       | 3.750                  | 37                 | 0.0446    | 0.4684     |
| T12         | 262 - 242       | 3.527                  | 37                 | 0.0510    | 0.4380     |
| T13         | 242 - 222       | 3.301                  | 37                 | 0.0595    | 0.4525     |
| T14         | 222 - 202       | 3.033                  | 30                 | 0.0607    | 0.4152     |
| T15         | 202 - 182       | 2.833                  | 30                 | 0.0492    | 0.4205     |
| T16         | 182 - 162       | 2.666                  | 30                 | 0.0512    | 0.3836     |
| T17         | 162 - 142       | 2.448                  | 30                 | 0.0563    | 0.3746     |
| T18         | 142 - 122       | 2.218                  | 30                 | 0.0595    | 0.3335     |
| T19         | 122 - 112       | 1.949                  | 30                 | 0.0681    | 0.3122     |
| T20         | 112 - 102       | 1.793                  | 30                 | 0.0705    | 0.2666     |
| T21         | 102 - 82        | 1.640                  | 30                 | 0.0689    | 0.2849     |
| T22         | 82 - 62         | 1.385                  | 31                 | 0.0711    | 0.2157     |
| T23         | 62 - 42         | 1.077                  | 31                 | 0.0779    | 0.2009     |
| T24         | 42 - 22         | 0.733                  | 31                 | 0.0792    | 0.1158     |
| T25         | 22 - 2          | 0.402                  | 31                 | 0.0831    | 0.0991     |

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

| Elevation<br>ft | Appurtenance                   | Gov. Load<br>Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of<br>Curvature<br>ft |
|-----------------|--------------------------------|--------------------|------------------|-----------|------------|------------------------------|
| 490.000         | Beacon (.075k 2.250CAAA)       | 37                 | 7.601            | 0.4087    | 0.4892     | 31892                        |
| 471.000         | 2 Bay FM Antenna               | 37                 | 6.090            | 0.2846    | 0.4853     | 5777                         |
| 453.000         | 3' Yagi(.03k,2.08CAAA)         | 37                 | 5.344            | 0.0780    | 0.4735     | 15034                        |
| 442.000         | Guy                            | 37                 | 5.168            | 0.0701    | 0.4661     | 49115                        |
| 435.000         | 6' Grid Dish                   | 37                 | 5.062            | 0.0654    | 0.4732     | 62140                        |
| 382.000         | Guy                            | 37                 | 4.370            | 0.0409    | 0.4572     | 38595                        |
| 358.000         | Obstruction Light(.01k,.8CAAA) | 37                 | 4.197            | 0.0341    | 0.4724     | 173300                       |
| 351.000         | 3' Dish w/ Radomes             | 37                 | 4.148            | 0.0339    | 0.4516     | 290235                       |
| 339.000         | 3' Grid Dish                   | 37                 | 4.062            | 0.0302    | 0.4663     | 198201                       |
| 322.000         | Guy                            | 37                 | 3.958            | 0.0199    | 0.4618     | 43754                        |
| 302.000         | 6' Omni                        | 37                 | 3.891            | 0.0263    | 0.4657     | 46757                        |
| 300.000         | Kathrein CA5-FM/CP/RM          | 37                 | 3.882            | 0.0281    | 0.4637     | 43745                        |
| 280.000         | KRY 112 89/4                   | 37                 | 3.730            | 0.0458    | 0.4682     | 53135                        |
| 262.000         | Guy                            | 37                 | 3.527            | 0.0510    | 0.4380     | 98493                        |
| 257.000         | SM 408-3                       | 37                 | 3.472            | 0.0528    | 0.4397     | 199286                       |
| 247.000         | 8' Grid Dish (140lbs 20.1CaAa) | 37                 | 3.361            | 0.0574    | 0.4541     | 64781                        |
| 239.000         | 8' Grid Dish (140lbs 20.1CaAa) | 37                 | 3.262            | 0.0606    | 0.4454     | 53830                        |
| 237.000         | Beacon (.075k 2.250CAAA)       | 37                 | 3.236            | 0.0611    | 0.4386     | 66953                        |
| 210.000         | Guy                            | 30                 | 2.906            | 0.0534    | 0.4099     | 68420                        |
| 154.000         | Guy                            | 30                 | 2.357            | 0.0573    | 0.3470     | 634473                       |
| 138.000         | 10' Dipole                     | 30                 | 2.168            | 0.0608    | 0.3203     | 94499                        |
| 125.000         | 10' Dipole                     | 30                 | 1.993            | 0.0668    | 0.3194     | 63758                        |
| 124.000         | Beacon (.075k 2.250CAAA)       | 30                 | 1.979            | 0.0672    | 0.3179     | 63206                        |
| 116.000         | Obstruction Light(.01k,.8CAAA) | 30                 | 1.857            | 0.0701    | 0.2809     | 135190                       |
| 108.000         | 10' Dipole                     | 30                 | 1.730            | 0.0701    | 0.2706     | 96947                        |
| 102.000         | Guy                            | 30                 | 1.640            | 0.0689    | 0.2849     | 52501                        |
| 46.000          | Guy                            | 31                 | 0.801            | 0.0789    | 0.1220     | 133920                       |

### Maximum Tower Deflections - Design Wind

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 61 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|------------------------|-----------------|-----------|------------|
| L1          | 492 - 477       | 49.960                 | 2               | 1.5024    | 1.2758     |
| L2          | 477 - 457       | 45.410                 | 2               | 1.4066    | 1.2758     |
| T1          | 457 - 452       | 41.140                 | 2               | 0.4475    | 1.2288     |
| T2          | 452 - 442       | 40.708                 | 2               | 0.4394    | 1.2192     |
| T3          | 442 - 422       | 39.873                 | 2               | 0.4097    | 1.1966     |
| T4          | 422 - 402       | 38.333                 | 2               | 0.4054    | 1.2091     |
| T5          | 402 - 382       | 36.781                 | 2               | 0.3884    | 1.1868     |
| T6          | 382 - 362       | 35.360                 | 2               | 0.3129    | 1.1655     |
| T7          | 362 - 342       | 34.259                 | 2               | 0.2866    | 1.2002     |
| T8          | 342 - 322       | 33.148                 | 2               | 0.2799    | 1.1818     |
| T9          | 322 - 302       | 32.054                 | 2               | 0.2408    | 1.1636     |
| T10         | 302 - 282       | 31.134                 | 2               | 0.2687    | 1.1802     |
| T11         | 282 - 262       | 29.898                 | 2               | 0.3431    | 1.1848     |
| T12         | 262 - 242       | 28.527                 | 6               | 0.3729    | 1.1432     |
| T13         | 242 - 222       | 27.161                 | 6               | 0.4144    | 1.1622     |
| T14         | 222 - 202       | 25.506                 | 6               | 0.4304    | 1.0563     |
| T15         | 202 - 182       | 23.896                 | 6               | 0.4014    | 1.0932     |
| T16         | 182 - 162       | 22.335                 | 6               | 0.4260    | 0.9913     |
| T17         | 162 - 142       | 20.479                 | 6               | 0.4652    | 0.9931     |
| T18         | 142 - 122       | 18.461                 | 6               | 0.5073    | 0.8715     |
| T19         | 122 - 112       | 16.191                 | 6               | 0.5674    | 0.8503     |
| T20         | 112 - 102       | 14.937                 | 6               | 0.5868    | 0.7584     |
| T21         | 102 - 82        | 13.675                 | 6               | 0.5900    | 0.7699     |
| T22         | 82 - 62         | 11.233                 | 6               | 0.6126    | 0.5870     |
| T23         | 62 - 42         | 8.572                  | 6               | 0.6463    | 0.5173     |
| T24         | 42 - 22         | 5.787                  | 6               | 0.6493    | 0.3026     |
| T25         | 22 - 2          | 3.092                  | 6               | 0.6586    | 0.2204     |

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

| Elevation<br>ft | Appurtenance                   | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|-----------------|--------------------------------|-----------------|------------------|-----------|------------|---------------------------|
| 490.000         | Beacon (.075k 2.250CAAA)       | 2               | 49.335           | 1.5185    | 1.2771     | 9508                      |
| 471.000         | 2 Bay FM Antenna               | 2               | 43.786           | 1.1113    | 1.2642     | 1758                      |
| 453.000         | 3' Yagi(.03k.2.08CAAA)         | 2               | 40.786           | 0.4368    | 1.2214     | 4574                      |
| 442.000         | Guy                            | 2               | 39.873           | 0.4097    | 1.1966     | 14882                     |
| 435.000         | 6' Grid Dish                   | 2               | 39.314           | 0.3955    | 1.2038     | 19124                     |
| 382.000         | Guy                            | 2               | 35.360           | 0.3129    | 1.1655     | 10315                     |
| 358.000         | Obstruction Light(.01k,.8CAAA) | 2               | 34.044           | 0.2865    | 1.1913     | 44314                     |
| 351.000         | 3' Dish w/ Radomes             | 2               | 33.658           | 0.2865    | 1.1602     | 60899                     |
| 339.000         | 3' Grid Dish                   | 2               | 32.976           | 0.2747    | 1.1776     | 38008                     |
| 322.000         | Guy                            | 2               | 32.054           | 0.2408    | 1.1636     | 12630                     |
| 302.000         | 6' Omni                        | 2               | 31.134           | 0.2687    | 1.1802     | 11187                     |
| 300.000         | Kathrein CA5-FM/CP/RM          | 2               | 31.031           | 0.2758    | 1.1772     | 10558                     |
| 280.000         | KRY 112 89/4                   | 2               | 29.750           | 0.3480    | 1.1850     | 12515                     |
| 262.000         | Guy                            | 6               | 28.527           | 0.3729    | 1.1432     | 27271                     |
| 257.000         | SM 408-3                       | 6               | 28.197           | 0.3817    | 1.1478     | 45229                     |
| 247.000         | 8' Grid Dish (140lbs 20.1CaAa) | 6               | 27.525           | 0.4037    | 1.1667     | 13873                     |
| 239.000         | 8' Grid Dish (140lbs 20.1CaAa) | 6               | 26.929           | 0.4201    | 1.1503     | 11840                     |
| 237.000         | Beacon (.075k 2.250CAAA)       | 6               | 26.769           | 0.4234    | 1.1392     | 14017                     |
| 210.000         | Guy                            | 6               | 24.522           | 0.4110    | 1.0813     | 17309                     |
| 154.000         | Guy                            | 6               | 19.691           | 0.4800    | 0.9459     | 29423                     |
| 138.000         | 10' Dipole                     | 6               | 18.032           | 0.5187    | 0.8679     | 16478                     |
| 125.000         | 10' Dipole                     | 6               | 16.553           | 0.5590    | 0.8680     | 13335                     |
| 124.000         | Beacon (.075k 2.250CAAA)       | 6               | 16.433           | 0.5619    | 0.8635     | 13321                     |
| 116.000         | Obstruction Light(.01k,.8CAAA) | 6               | 15.444           | 0.5811    | 0.7886     | 27508                     |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 62 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Elevation | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|-----------|--------------|-----------------|---------------|--------|---------|------------------------|
| 108.000   | 10' Dipole   | 6               | 14.428        | 0.5890 | 0.7579  | 26216                  |
| 102.000   | Guy          | 6               | 13.675        | 0.5900 | 0.7699  | 14614                  |
| 46.000    | Guy          | 6               | 6.338         | 0.6493 | 0.3400  | 28830                  |

### Guy Design Data

| Section No. | Elevation ft      | Size     | Initial Tension K | Breaking Load K | Actual $T_u$ K | Allowable $\phi T_n$ K | Required S.F. | Actual S.F. |
|-------------|-------------------|----------|-------------------|-----------------|----------------|------------------------|---------------|-------------|
| T3          | 442.000 (A) (776) | 1 BS     | 12.200            | 122.000         | 33.510         | 73.200                 | 1.000         | 2.184 ✓     |
|             | 442.000 (B) (775) | 1 BS     | 12.200            | 122.000         | 34.109         | 73.200                 | 1.000         | 2.146 ✓     |
|             | 442.000 (C) (774) | 1 BS     | 12.200            | 122.000         | 34.011         | 73.200                 | 1.000         | 2.152 ✓     |
| T6          | 382.000 (A) (779) | 1 BS     | 12.200            | 122.000         | 33.797         | 73.200                 | 1.000         | 2.166 ✓     |
|             | 382.000 (B) (778) | 1 BS     | 12.200            | 122.000         | 34.813         | 73.200                 | 1.000         | 2.103 ✓     |
|             | 382.000 (C) (777) | 1 BS     | 12.200            | 122.000         | 34.551         | 73.200                 | 1.000         | 2.119 ✓     |
| T9          | 322.000 (A) (782) | 7/8 BS   | 9.200             | 92.000          | 27.911         | 55.200                 | 1.000         | 1.978 ✓     |
|             | 322.000 (B) (781) | 7/8 BS   | 9.200             | 92.000          | 29.154         | 55.200                 | 1.000         | 1.893 ✓     |
|             | 322.000 (C) (780) | 7/8 BS   | 9.200             | 92.000          | 28.963         | 55.200                 | 1.000         | 1.906 ✓     |
| T12         | 262.000 (A) (785) | 7/8 BS   | 9.200             | 92.000          | 32.217         | 55.200                 | 1.000         | 1.713 ✓     |
|             | 262.000 (B) (784) | 7/8 BS   | 9.200             | 92.000          | 33.438         | 55.200                 | 1.000         | 1.651 ✓     |
|             | 262.000 (C) (783) | 7/8 BS   | 9.200             | 92.000          | 33.639         | 55.200                 | 1.000         | 1.641 ✓     |
| T14         | 210.000 (A) (788) | 7/8 BS   | 9.200             | 92.000          | 33.459         | 55.200                 | 1.000         | 1.650 ✓     |
|             | 210.000 (B) (787) | 7/8 BS   | 9.200             | 92.000          | 34.670         | 55.200                 | 1.000         | 1.592 ✓     |
|             | 210.000 (C) (786) | 7/8 BS   | 9.200             | 92.000          | 34.872         | 55.200                 | 1.000         | 1.583 ✓     |
| T17         | 154.000 (A) (791) | 9/16 EHS | 3.500             | 35.000          | 14.850         | 21.000                 | 1.000         | 1.414 ✓     |
|             | 154.000 (B) (790) | 9/16 EHS | 3.500             | 35.000          | 15.231         | 21.000                 | 1.000         | 1.379 ✓     |
|             | 154.000 (C) (789) | 9/16 EHS | 3.500             | 35.000          | 15.370         | 21.000                 | 1.000         | 1.366 ✓     |
| T21         | 102.000 (A) (794) | 9/16 EHS | 3.500             | 35.000          | 15.947         | 21.000                 | 1.000         | 1.317 ✓     |
|             | 102.000 (B) (793) | 9/16 EHS | 3.500             | 35.000          | 16.280         | 21.000                 | 1.000         | 1.290 ✓     |
|             | 102.000 (C) (792) | 9/16 EHS | 3.500             | 35.000          | 16.361         | 21.000                 | 1.000         | 1.284 ✓     |
| T23         | 46.000 (A) (797)  | 1/2 EHS  | 2.690             | 26.900          | 9.568          | 16.140                 | 1.000         | 1.687 ✓     |
|             | 46.000 (B) (796)  | 1/2 EHS  | 2.690             | 26.900          | 9.785          | 16.140                 | 1.000         | 1.649 ✓     |
|             | 46.000 (C)        | 1/2 EHS  | 2.690             | 26.900          | 9.838          | 16.140                 | 1.000         | 1.641 ✓     |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
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|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section No. | Elevation<br>ft<br>(795) | Size | Initial Tension<br>K | Breaking Load<br>K | Actual $T_u$<br>K | Allowable $\phi T_n$<br>K | Required S.F. | Actual S.F. |
|-------------|--------------------------|------|----------------------|--------------------|-------------------|---------------------------|---------------|-------------|
|-------------|--------------------------|------|----------------------|--------------------|-------------------|---------------------------|---------------|-------------|

### Compression Checks

### Pole Design Data

| Section No. | Elevation<br>ft | Size    | L<br>ft | $L_u$<br>ft | $Kl/r$ | A<br>$in^2$ | $P_u$<br>K | $\phi P_n$<br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|---------|---------|-------------|--------|-------------|------------|-----------------|---------------------------------|
| L1          | 492 - 477 (1)   | P8x.406 | 15.000  | 35.000      | 144.4  | 10.4832     | -0.719     | 113.643         | 0.006                           |
| L2          | 477 - 457 (2)   | P8x.406 | 20.000  | 35.000      | 144.4  | 10.4832     | -1.636     | 113.643         | 0.014                           |

### Pole Bending Design Data

| Section No. | Elevation<br>ft | Size    | $M_{ux}$<br>kip-ft | $\phi M_{nx}$<br>kip-ft | Ratio<br>$\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$<br>kip-ft | $\phi M_{ny}$<br>kip-ft | Ratio<br>$\frac{M_{uy}}{\phi M_{ny}}$ |
|-------------|-----------------|---------|--------------------|-------------------------|---------------------------------------|--------------------|-------------------------|---------------------------------------|
| L1          | 492 - 477 (1)   | P8x.406 | 5.440              | 72.052                  | 0.075                                 | 0.000              | 72.052                  | 0.000                                 |
| L2          | 477 - 457 (2)   | P8x.406 | 28.337             | 72.052                  | 0.393                                 | 0.000              | 72.052                  | 0.000                                 |

### Pole Shear Design Data

| Section No. | Elevation<br>ft | Size    | Actual $V_u$<br>K | $\phi V_n$<br>K | Ratio<br>$\frac{V_u}{\phi V_n}$ | Actual $T_u$<br>kip-ft | $\phi T_n$<br>kip-ft | Ratio<br>$\frac{T_u}{\phi T_n}$ |
|-------------|-----------------|---------|-------------------|-----------------|---------------------------------|------------------------|----------------------|---------------------------------|
| L1          | 492 - 477 (1)   | P8x.406 | 0.664             | 165.111         | 0.004                           | 0.000                  | 108.027              | 0.000                           |
| L2          | 477 - 457 (2)   | P8x.406 | 1.517             | 165.111         | 0.009                           | 0.403                  | 108.027              | 0.004                           |

### Pole Interaction Design Data

| Section No. | Elevation<br>ft | Ratio<br>$\frac{P_u}{\phi P_n}$ | Ratio<br>$\frac{M_{ux}}{\phi M_{nx}}$ | Ratio<br>$\frac{M_{uy}}{\phi M_{ny}}$ | Ratio<br>$\frac{V_u}{\phi V_n}$ | Ratio<br>$\frac{T_u}{\phi T_n}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|-------------|-----------------|---------------------------------|---------------------------------------|---------------------------------------|---------------------------------|---------------------------------|--------------------|---------------------|----------|
| L1          | 492 - 477 (1)   | 0.006                           | 0.075                                 | 0.000                                 | 0.004                           | 0.000                           | 0.082              | 1.000               | 4.8.2 ✓  |
| L2          | 477 - 457 (2)   | 0.014                           | 0.393                                 | 0.000                                 | 0.009                           | 0.004                           | 0.408              | 1.000               | 4.8.2 ✓  |

|   |                |                                 |                    |                   |
|---|----------------|---------------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 64 of 76          |
|   | <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
|   | <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

### Leg Design Data (Compression)

| Section No. | Elevation<br>ft | Size  | L<br>ft | L <sub>u</sub><br>ft | Kl/r  | A<br>in <sup>2</sup> | Mast Stability Index | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>P <sub>u</sub> /<br>φP <sub>n</sub> |
|-------------|-----------------|-------|---------|----------------------|-------|----------------------|----------------------|---------------------|----------------------|--|
| T1          | 457 - 452       | 2 1/4 | 5.000   | 5.000                | 106.7 | 3.9761               | 1.00                 | -8.092              | 77.870               | 0.104 <sup>1</sup>                           |
| T2          | 452 - 442       | 2 1/4 | 10.000  | 3.333                | 71.1  | 3.9761               | 1.00                 | -17.417             | 123.621              | 0.141 <sup>1</sup>                           |
| T3          | 442 - 422       | 2 1/4 | 20.000  | 4.000                | 85.3  | 3.9761               | 1.00                 | -24.987             | 105.060              | 0.238 <sup>1</sup>                           |
| T4          | 422 - 402       | 2 1/4 | 20.000  | 4.000                | 85.3  | 3.9761               | 1.00                 | -30.161             | 105.060              | 0.287 <sup>1</sup>                           |
| T5          | 402 - 382       | 2 1/4 | 20.000  | 4.000                | 85.3  | 3.9761               | 1.00                 | -48.868             | 105.060              | 0.465 <sup>1</sup>                           |
| T6          | 382 - 362       | 2 1/4 | 20.000  | 4.000                | 85.3  | 3.9761               | 1.00                 | -54.247             | 105.060              | 0.516 <sup>1</sup>                           |
| T7          | 362 - 342       | 2 1/4 | 20.000  | 4.000                | 85.3  | 3.9761               | 1.00                 | -52.079             | 105.060              | 0.496 <sup>1</sup>                           |
| T8          | 342 - 322       | 2 1/4 | 20.000  | 4.000                | 85.3  | 3.9761               | 1.00                 | -61.580             | 105.060              | 0.586 <sup>1</sup>                           |
| T9          | 322 - 302       | 2 1/2 | 20.000  | 4.000                | 76.8  | 4.9087               | 1.00                 | -71.457             | 143.512              | 0.498 <sup>1</sup>                           |
| T10         | 302 - 282       | 2 1/2 | 20.000  | 4.000                | 76.8  | 4.9087               | 1.00                 | -77.554             | 143.512              | 0.540 <sup>1</sup>                           |
| T11         | 282 - 262       | 2 3/4 | 20.000  | 4.000                | 69.8  | 5.9396               | 1.00                 | -81.210             | 187.145              | 0.434 <sup>1</sup>                           |
| T12         | 262 - 242       | 2 3/4 | 20.000  | 4.000                | 69.8  | 5.9396               | 1.00                 | -95.277             | 187.145              | 0.509 <sup>1</sup>                           |
| T13         | 242 - 222       | 2 3/4 | 20.000  | 4.000                | 69.8  | 5.9396               | 1.00                 | -101.607            | 187.145              | 0.543 <sup>1</sup>                           |
| T14         | 222 - 202       | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -115.084            | 235.765              | 0.488 <sup>1</sup>                           |
| T15         | 202 - 182       | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -119.056            | 235.765              | 0.505 <sup>1</sup>                           |
| T16         | 182 - 162       | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -123.297            | 235.765              | 0.523 <sup>1</sup>                           |
| T17         | 162 - 142       | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -135.645            | 235.765              | 0.575 <sup>1</sup>                           |
| T18         | 142 - 122       | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -138.928            | 235.765              | 0.589 <sup>1</sup>                           |
| T19         | 122 - 112       | 3     | 10.000  | 3.333                | 53.3  | 7.0686               | 1.00                 | -137.358            | 258.358              | 0.532 <sup>1</sup>                           |
| T20         | 112 - 102       | 3     | 10.000  | 3.333                | 53.3  | 7.0686               | 1.00                 | -136.184            | 258.358              | 0.527 <sup>1</sup>                           |
| T21         | 102 - 82        | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -146.411            | 235.765              | 0.621 <sup>1</sup>                           |
| T22         | 82 - 62         | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -149.432            | 235.765              | 0.634 <sup>1</sup>                           |
| T23         | 62 - 42         | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -150.767            | 235.765              | 0.639 <sup>1</sup>                           |
| T24         | 42 - 22         | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -155.413            | 235.765              | 0.659 <sup>1</sup>                           |
| T25         | 22 - 2          | 3     | 20.000  | 4.000                | 64.0  | 7.0686               | 1.00                 | -156.043            | 235.765              | 0.662 <sup>1</sup>                           |



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|---|---|-----------------------------------|
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|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

<sup>1</sup>  $P_u / \phi P_n$  controls

### Leg Bending Design Data (Compression)

| Section No. | Elevation<br>ft | Size  | $M_{ux}$ | $\phi M_{nx}$ | Ratio                        | $M_{uy}$ | $\phi M_{ny}$ | Ratio                        |
|-------------|-----------------|-------|----------|---------------|------------------------------|----------|---------------|------------------------------|
|             |                 |       | kip-ft   | kip-ft        | $\frac{M_{ux}}{\phi M_{nx}}$ | kip-ft   | kip-ft        | $\frac{M_{uy}}{\phi M_{ny}}$ |
| T1          | 457 - 452       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T2          | 452 - 442       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T3          | 442 - 422       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T4          | 422 - 402       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T5          | 402 - 382       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T6          | 382 - 362       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T7          | 362 - 342       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T8          | 342 - 322       | 2 1/4 | 0.000    | 7.119         | 0.000                        | 0.000    | 7.119         | 0.000                        |
| T9          | 322 - 302       | 2 1/2 | 0.000    | 9.766         | 0.000                        | 0.000    | 9.766         | 0.000                        |
| T10         | 302 - 282       | 2 1/2 | 0.000    | 9.766         | 0.000                        | 0.000    | 9.766         | 0.000                        |
| T11         | 282 - 262       | 2 3/4 | 0.000    | 12.998        | 0.000                        | 0.000    | 12.998        | 0.000                        |
| T12         | 262 - 242       | 2 3/4 | 0.000    | 12.998        | 0.000                        | 0.000    | 12.998        | 0.000                        |
| T13         | 242 - 222       | 2 3/4 | 0.000    | 12.998        | 0.000                        | 0.000    | 12.998        | 0.000                        |
| T14         | 222 - 202       | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T15         | 202 - 182       | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T16         | 182 - 162       | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T17         | 162 - 142       | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T18         | 142 - 122       | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T19         | 122 - 112       | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T20         | 112 - 102       | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T21         | 102 - 82        | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T22         | 82 - 62         | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T23         | 62 - 42         | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T24         | 42 - 22         | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |
| T25         | 22 - 2          | 3     | 0.000    | 16.875        | 0.000                        | 0.000    | 16.875        | 0.000                        |

### Leg Interaction Design Data (Compression)

| Section No. | Elevation<br>ft | Size  | Ratio                  | Ratio                        | Ratio                        | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|-------------|-----------------|-------|------------------------|------------------------------|------------------------------|--------------------|---------------------|----------|
|             |                 |       | $\frac{P_u}{\phi P_n}$ | $\frac{M_{ux}}{\phi M_{nx}}$ | $\frac{M_{uy}}{\phi M_{ny}}$ |                    |                     |          |
| T1          | 457 - 452       | 2 1/4 | 0.104                  | 0.000                        | 0.000                        | 0.104 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T2          | 452 - 442       | 2 1/4 | 0.141                  | 0.000                        | 0.000                        | 0.141 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T3          | 442 - 422       | 2 1/4 | 0.238                  | 0.000                        | 0.000                        | 0.238 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T4          | 422 - 402       | 2 1/4 | 0.287                  | 0.000                        | 0.000                        | 0.287 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T5          | 402 - 382       | 2 1/4 | 0.465                  | 0.000                        | 0.000                        | 0.465 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T6          | 382 - 362       | 2 1/4 | 0.516                  | 0.000                        | 0.000                        | 0.516 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T7          | 362 - 342       | 2 1/4 | 0.496                  | 0.000                        | 0.000                        | 0.496 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T8          | 342 - 322       | 2 1/4 | 0.586                  | 0.000                        | 0.000                        | 0.586 <sup>1</sup> | 1.000               | 4.8.1 ✓  |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">66 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation<br>ft | Size  | Ratio                  | Ratio                        | Ratio                        | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|-------------|-----------------|-------|------------------------|------------------------------|------------------------------|--------------------|---------------------|----------|
|             |                 |       | $\frac{P_u}{\phi P_n}$ | $\frac{M_{ux}}{\phi M_{nx}}$ | $\frac{M_{uy}}{\phi M_{ny}}$ |                    |                     |          |
| T9          | 322 - 302       | 2 1/2 | 0.498                  | 0.000                        | 0.000                        | 0.498 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T10         | 302 - 282       | 2 1/2 | 0.540                  | 0.000                        | 0.000                        | 0.540 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T11         | 282 - 262       | 2 3/4 | 0.434                  | 0.000                        | 0.000                        | 0.434 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T12         | 262 - 242       | 2 3/4 | 0.509                  | 0.000                        | 0.000                        | 0.509 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T13         | 242 - 222       | 2 3/4 | 0.543                  | 0.000                        | 0.000                        | 0.543 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T14         | 222 - 202       | 3     | 0.488                  | 0.000                        | 0.000                        | 0.488 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T15         | 202 - 182       | 3     | 0.505                  | 0.000                        | 0.000                        | 0.505 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T16         | 182 - 162       | 3     | 0.523                  | 0.000                        | 0.000                        | 0.523 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T17         | 162 - 142       | 3     | 0.575                  | 0.000                        | 0.000                        | 0.575 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T18         | 142 - 122       | 3     | 0.589                  | 0.000                        | 0.000                        | 0.589 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T19         | 122 - 112       | 3     | 0.532                  | 0.000                        | 0.000                        | 0.532 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T20         | 112 - 102       | 3     | 0.527                  | 0.000                        | 0.000                        | 0.527 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T21         | 102 - 82        | 3     | 0.621                  | 0.000                        | 0.000                        | 0.621 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T22         | 82 - 62         | 3     | 0.634                  | 0.000                        | 0.000                        | 0.634 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T23         | 62 - 42         | 3     | 0.639                  | 0.000                        | 0.000                        | 0.639 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T24         | 42 - 22         | 3     | 0.659                  | 0.000                        | 0.000                        | 0.659 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T25         | 22 - 2          | 3     | 0.662                  | 0.000                        | 0.000                        | 0.662 <sup>1</sup> | 1.000               | 4.8.1 ✓  |

<sup>1</sup>  $P_u / \phi P_n$  controls

### Diagonal Design Data (Compression)

| Section No. | Elevation<br>ft | Size          | $L$   | $L_u$ | $Kl/r$          | $A$             | $P_u$  | $\phi P_n$ | Ratio                  |
|-------------|-----------------|---------------|-------|-------|-----------------|-----------------|--------|------------|------------------------|
|             |                 |               | ft    | ft    |                 | in <sup>2</sup> | K      | K          | $\frac{P_u}{\phi P_n}$ |
| T1          | 457 - 452       | L2 1/2x2x3/16 | 5.385 | 5.133 | 134.9<br>K=0.94 | 0.8090          | -2.142 | 10.041     | 0.213 <sup>1</sup> ✓   |
| T2          | 452 - 442       | L2x2x1/4      | 5.207 | 4.963 | 139.9<br>K=0.92 | 0.9380          | -2.496 | 10.832     | 0.230 <sup>1</sup> ✓   |
| T3          | 442 - 422       | L2x2x1/4      | 5.657 | 5.392 | 148.0<br>K=0.89 | 0.9380          | -1.261 | 9.679      | 0.130 <sup>1</sup> ✓   |
| T4          | 422 - 402       | L2x2x1/4      | 5.657 | 5.392 | 148.0<br>K=0.89 | 0.9380          | -2.384 | 9.679      | 0.246 <sup>1</sup> ✓   |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p style="text-align: center;"><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p style="text-align: center;"><b>Page</b></p> <p style="text-align: center;">67 of 76</p>           |
|   | <p style="text-align: center;"><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p style="text-align: center;"><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p style="text-align: center;"><b>Client</b></p>   | <p style="text-align: center;"><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation<br>ft | Size                             | L<br>ft | L <sub>u</sub><br>ft | Kl/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|----------------------------------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T5          | 402 - 382       | L2x2x1/4                         | 5.657   | 5.392                | 148.0<br>K=0.89 | 0.9380               | -3.989              | 9.679                | 0.412 <sup>1</sup> ✓            |
| T6          | 382 - 362       | L2x2x1/4                         | 5.657   | 5.392                | 148.0<br>K=0.89 | 0.9380               | -2.573              | 9.679                | 0.266 <sup>1</sup> ✓            |
| T7          | 362 - 342       | L2x2x1/4                         | 5.657   | 5.392                | 148.0<br>K=0.89 | 0.9380               | -1.273              | 9.679                | 0.131 <sup>1</sup> ✓            |
| T8          | 342 - 322       | L2x2x1/4                         | 5.657   | 5.392                | 148.0<br>K=0.89 | 0.9380               | -3.054              | 9.679                | 0.316 <sup>1</sup> ✓            |
| T9          | 322 - 302       | L1 3/4x1 3/4x3/16                | 5.657   | 5.362                | 161.4<br>K=0.86 | 0.6211               | -4.353              | 5.385                | 0.808 <sup>1</sup> ✓            |
| T10         | 302 - 282       | L2x2x1/4                         | 5.657   | 5.362                | 147.4<br>K=0.90 | 0.9380               | -2.639              | 9.752                | 0.271 <sup>1</sup> ✓            |
| T11         | 282 - 262       | L2 1/2x2 1/2x3/8                 | 5.657   | 5.333                | 127.0<br>K=0.97 | 1.7300               | -6.840              | 23.975               | 0.285 <sup>1</sup> ✓            |
| T12         | 262 - 242       | L2x2x1/4                         | 5.657   | 5.333                | 146.9<br>K=0.90 | 0.9380               | -5.024              | 9.826                | 0.511 <sup>1</sup> ✓            |
| T13         | 242 - 222       | L2x2x1/4                         | 5.657   | 5.333                | 146.9<br>K=0.90 | 0.9380               | -5.735              | 9.826                | 0.584 <sup>1</sup> ✓            |
| T14         | 222 - 202       | L2 1/2x2 1/2x3/8                 | 5.657   | 5.303                | 126.6<br>K=0.97 | 1.7300               | -7.559              | 24.118               | 0.313 <sup>1</sup> ✓            |
| T15         | 202 - 182       | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -4.939              | 5.470                | 0.903 <sup>1</sup> ✓            |
| T16         | 182 - 162       | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -3.223              | 5.470                | 0.589 <sup>1</sup> ✓            |
| T17         | 162 - 142       | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -4.292              | 5.470                | 0.785 <sup>1</sup> ✓            |
| T18         | 142 - 122       | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -3.536              | 5.470                | 0.646 <sup>1</sup> ✓            |
| T19         | 122 - 112       | L1 3/4x1 3/4x3/16                | 5.207   | 4.881                | 151.1<br>K=0.89 | 0.6211               | -5.138              | 6.146                | 0.836 <sup>1</sup> ✓            |
| T20         | 112 - 102       | L1 3/4x1 3/4x3/16 w/<br>L2x2x1/4 | 5.207   | 4.881                | 99.8<br>K=1.00  | 1.5710               | -6.731              | 30.133               | 0.223 <sup>1</sup> ✓            |
| T21         | 102 - 82        | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -5.066              | 5.470                | 0.926 <sup>1</sup> ✓            |
| T22         | 82 - 62         | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -3.774              | 5.470                | 0.690 <sup>1</sup> ✓            |
| T23         | 62 - 42         | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 156.7<br>K=0.85 | 0.6211               | -5.664              | 5.711                | 0.992 <sup>1</sup> ✓            |
| T24         | 42 - 22         | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -4.659              | 5.470                | 0.852 <sup>1</sup> ✓            |
| T25         | 22 - 2          | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 160.2<br>K=0.86 | 0.6211               | -3.710              | 5.470                | 0.678 <sup>1</sup> ✓            |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

**Horizontal Design Data (Compression)**

|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">68 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation<br>ft | Size      | L<br>ft | L <sub>u</sub><br>ft | Kl/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-----------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T2          | 452 - 442       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.302              | 11.122               | 0.027 <sup>1</sup><br>✓         |
| T3          | 442 - 422       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.433              | 11.122               | 0.039 <sup>1</sup><br>✓         |
| T4          | 422 - 402       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.522              | 11.122               | 0.047 <sup>1</sup><br>✓         |
| T5          | 402 - 382       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.846              | 11.122               | 0.076 <sup>1</sup><br>✓         |
| T6          | 382 - 362       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.940              | 11.122               | 0.084 <sup>1</sup><br>✓         |
| T7          | 362 - 342       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.902              | 11.122               | 0.081 <sup>1</sup><br>✓         |
| T8          | 342 - 322       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -1.067              | 11.122               | 0.096 <sup>1</sup><br>✓         |
| T9          | 322 - 302       | L2x2x3/16 | 4.000   | 3.792                | 117.7<br>K=1.02 | 0.7150               | -1.238              | 11.166               | 0.111 <sup>1</sup><br>✓         |
| T10         | 302 - 282       | L2x2x3/16 | 4.000   | 3.792                | 117.7<br>K=1.02 | 0.7150               | -1.343              | 11.166               | 0.120 <sup>1</sup><br>✓         |
| T11         | 282 - 262       | L2x2x3/16 | 4.000   | 3.771                | 117.4<br>K=1.02 | 0.7150               | -1.407              | 11.210               | 0.125 <sup>1</sup><br>✓         |
| T12         | 262 - 242       | L2x2x3/16 | 4.000   | 3.771                | 117.4<br>K=1.02 | 0.7150               | -1.650              | 11.210               | 0.147 <sup>1</sup><br>✓         |
| T13         | 242 - 222       | L2x2x3/16 | 4.000   | 3.771                | 117.4<br>K=1.02 | 0.7150               | -1.760              | 11.210               | 0.157 <sup>1</sup><br>✓         |
| T14         | 222 - 202       | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -1.993              | 11.254               | 0.177 <sup>1</sup><br>✓         |
| T15         | 202 - 182       | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.062              | 11.254               | 0.183 <sup>1</sup><br>✓         |
| T16         | 182 - 162       | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.136              | 11.254               | 0.190 <sup>1</sup><br>✓         |
| T17         | 162 - 142       | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.349              | 11.254               | 0.209 <sup>1</sup><br>✓         |
| T18         | 142 - 122       | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.406              | 11.254               | 0.214 <sup>1</sup><br>✓         |
| T19         | 122 - 112       | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.379              | 11.254               | 0.211 <sup>1</sup><br>✓         |
| T20         | 112 - 102       | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.359              | 11.254               | 0.210 <sup>1</sup><br>✓         |
| T21         | 102 - 82        | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.536              | 11.254               | 0.225 <sup>1</sup><br>✓         |
| T22         | 82 - 62         | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.588              | 11.254               | 0.230 <sup>1</sup><br>✓         |
| T23         | 62 - 42         | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.611              | 11.254               | 0.232 <sup>1</sup><br>✓         |
| T24         | 42 - 22         | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.692              | 11.254               | 0.239 <sup>1</sup><br>✓         |
| T25         | 22 - 2          | L2x2x3/16 | 4.000   | 3.750                | 117.1<br>K=1.03 | 0.7150               | -2.703              | 11.254               | 0.240 <sup>1</sup><br>✓         |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

|   |   |                                   |
|---|---|-----------------------------------|
| <b>tnxTower</b><br><br><b>Vertical Bridge Engineering, LLC</b><br>550 River Dr.<br>North Sioux City, SD 57049<br>Phone: 605-540-4622<br>FAX: 605-540-4622 | <b>Job</b><br>US-CT-5009                          | <b>Page</b><br>69 of 76           |
|   | <b>Project</b><br>Guyed Tower Structural Analysis | <b>Date</b><br>09:08:12 04/29/19  |
|   | <b>Client</b>                                     | <b>Designed by</b><br>Luke Myrick |

### Top Girt Design Data (Compression)

| Section No. | Elevation<br>ft | Size      | L<br>ft | L <sub>u</sub><br>ft | Kl/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ <sup>1</sup> |
|-------------|-----------------|-----------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|--|
| T1          | 457 - 452       | C6x10.5   | 4.000   | 2.859                | 64.9<br>K=1.00  | 3.0900               | -0.000              | 80.226               | 0.000 <sup>1</sup><br>✓                      |
| T2          | 452 - 442       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.778              | 11.122               | 0.070 <sup>1</sup><br>✓                      |
| T4          | 422 - 402       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.029              | 11.122               | 0.003 <sup>1</sup><br>✓                      |
| T5          | 402 - 382       | L2x2x3/16 | 4.000   | 3.813                | 118.1<br>K=1.02 | 0.7150               | -0.025              | 11.122               | 0.002 <sup>1</sup><br>✓                      |
| T11         | 282 - 262       | L2x2x3/16 | 4.000   | 3.792                | 117.7<br>K=1.02 | 0.7150               | -0.691              | 11.166               | 0.062 <sup>1</sup><br>✓                      |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Tension Checks

### Leg Design Data (Tension)

| Section No. | Elevation<br>ft | Size  | L<br>ft | L <sub>u</sub><br>ft | Kl/r  | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ <sup>1</sup> |
|-------------|-----------------|-------|---------|----------------------|-------|----------------------|---------------------|----------------------|--|
| T1          | 457 - 452       | 2 1/4 | 5.000   | 5.000                | 106.7 | 3.9761               | 7.125               | 178.924              | 0.040 <sup>1</sup>                           |
| T2          | 452 - 442       | 2 1/4 | 10.000  | 3.333                | 71.1  | 3.9761               | 15.441              | 178.924              | 0.086 <sup>1</sup>                           |
| T5          | 402 - 382       | 2 1/4 | 20.000  | 4.000                | 85.3  | 3.9761               | 4.427               | 178.924              | 0.025 <sup>1</sup>                           |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Leg Bending Design Data (Tension)

| Section No. | Elevation<br>ft | Size  | M <sub>ux</sub><br>kip-ft | φM <sub>rx</sub><br>kip-ft | Ratio<br>$\frac{M_{ux}}{\phi M_{rx}}$ | M <sub>uy</sub><br>kip-ft | φM <sub>ny</sub><br>kip-ft | Ratio<br>$\frac{M_{uy}}{\phi M_{ny}}$ |
|-------------|-----------------|-------|---------------------------|----------------------------|---------------------------------------|---------------------------|----------------------------|---------------------------------------|
| T1          | 457 - 452       | 2 1/4 | 0.000                     | 7.119                      | 0.000                                 | 0.000                     | 7.119                      | 0.000                                 |
| T2          | 452 - 442       | 2 1/4 | 0.000                     | 7.119                      | 0.000                                 | 0.000                     | 7.119                      | 0.000                                 |
| T5          | 402 - 382       | 2 1/4 | 0.000                     | 7.119                      | 0.000                                 | 0.000                     | 7.119                      | 0.000                                 |

### Leg Interaction Design Data (Tension)

|   |  |  |
|---|--|--|
| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">70 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation<br>ft | Size  | Ratio<br>$\frac{P_u}{\phi P_n}$ | Ratio<br>$\frac{M_{ux}}{\phi M_{nx}}$ | Ratio<br>$\frac{M_{uy}}{\phi M_{ny}}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|-------------|-----------------|-------|---------------------------------|---------------------------------------|---------------------------------------|--------------------|---------------------|----------|
| T1          | 457 - 452       | 2 1/4 | 0.040                           | 0.000                                 | 0.000                                 | 0.040 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T2          | 452 - 442       | 2 1/4 | 0.086                           | 0.000                                 | 0.000                                 | 0.086 <sup>1</sup> | 1.000               | 4.8.1 ✓  |
| T5          | 402 - 382       | 2 1/4 | 0.025                           | 0.000                                 | 0.000                                 | 0.025 <sup>1</sup> | 1.000               | 4.8.1 ✓  |

<sup>1</sup>  $P_u / \phi P_n$  controls

### Diagonal Design Data (Tension)

| Section No. | Elevation<br>ft | Size              | L<br>ft | $L_u$<br>ft | Kl/r  | A<br>in <sup>2</sup> | $P_u$<br>K | $\phi P_n$<br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-------------------|---------|-------------|-------|----------------------|------------|-----------------|---------------------------------|
| T1          | 457 - 452       | L2 1/2x2x3/16     | 5.385   | 5.133       | 102.7 | 0.8090               | 1.869      | 26.212          | 0.071 <sup>1</sup>              |
| T2          | 452 - 442       | L2x2x1/4          | 5.207   | 4.963       | 97.8  | 0.9380               | 2.503      | 30.391          | 0.082 <sup>1</sup>              |
| T3          | 442 - 422       | L2x2x1/4          | 5.657   | 5.392       | 106.2 | 0.9380               | 1.178      | 30.391          | 0.039 <sup>1</sup>              |
| T4          | 422 - 402       | L2x2x1/4          | 5.657   | 5.392       | 106.2 | 0.9380               | 2.094      | 30.391          | 0.069 <sup>1</sup>              |
| T5          | 402 - 382       | L2x2x1/4          | 5.657   | 5.392       | 106.2 | 0.9380               | 3.640      | 30.391          | 0.120 <sup>1</sup>              |
| T6          | 382 - 362       | L2x2x1/4          | 5.657   | 5.392       | 106.2 | 0.9380               | 2.276      | 30.391          | 0.075 <sup>1</sup>              |
| T7          | 362 - 342       | L2x2x1/4          | 5.657   | 5.392       | 106.2 | 0.9380               | 0.754      | 30.391          | 0.025 <sup>1</sup>              |
| T8          | 342 - 322       | L2x2x1/4          | 5.657   | 5.392       | 106.2 | 0.9380               | 2.449      | 30.391          | 0.081 <sup>1</sup>              |
| T9          | 322 - 302       | L1 3/4x1 3/4x3/16 | 5.657   | 5.362       | 119.8 | 0.6211               | 3.651      | 20.123          | 0.181 <sup>1</sup>              |
| T10         | 302 - 282       | L2x2x1/4          | 5.657   | 5.362       | 105.7 | 0.9380               | 1.774      | 30.391          | 0.058 <sup>1</sup>              |
| T11         | 282 - 262       | L2 1/2x2 1/2x3/8  | 5.657   | 5.333       | 85.0  | 1.7300               | 5.788      | 56.052          | 0.103 <sup>1</sup>              |
| T12         | 262 - 242       | L2x2x1/4          | 5.657   | 5.333       | 105.1 | 0.9380               | 3.883      | 30.391          | 0.128 <sup>1</sup>              |
| T13         | 242 - 222       | L2x2x1/4          | 5.657   | 5.333       | 105.1 | 0.9380               | 4.281      | 30.391          | 0.141 <sup>1</sup>              |
| T14         | 222 - 202       | L2 1/2x2 1/2x3/8  | 5.657   | 5.303       | 84.5  | 1.7300               | 5.898      | 56.052          | 0.105 <sup>1</sup>              |
| T15         | 202 - 182       | L1 3/4x1 3/4x3/16 | 5.657   | 5.303       | 118.5 | 0.6211               | 2.973      | 20.123          | 0.148 <sup>1</sup>              |
| T16         | 182 - 162       | L1 3/4x1 3/4x3/16 | 5.657   | 5.303       | 118.5 | 0.6211               | 1.305      | 20.123          | 0.065 <sup>1</sup>              |
| T17         | 162 - 142       | L1 3/4x1 3/4x3/16 | 5.657   | 5.303       | 118.5 | 0.6211               | 2.455      | 20.123          | 0.122 <sup>1</sup>              |
| T18         | 142 - 122       | L1 3/4x1 3/4x3/16 | 5.657   | 5.303       | 118.5 | 0.6211               | 1.607      | 20.123          | 0.080 <sup>1</sup>              |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">71 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation<br>ft | Size                             | L<br>ft | L <sub>u</sub><br>ft | Kl/r  | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|----------------------------------|---------|----------------------|-------|----------------------|---------------------|----------------------|---------------------------------|
| T19         | 122 - 112       | L1 3/4x1 3/4x3/16                | 5.207   | 4.881                | 109.1 | 0.6211               | 2.972               | 20.123               | 0.148 <sup>1</sup> ✓            |
| T20         | 112 - 102       | L1 3/4x1 3/4x3/16 w/<br>L2x2x1/4 | 5.207   | 4.881                | 99.8  | 1.5710               | 4.511               | 50.900               | 0.089 <sup>1</sup> ✓            |
| T21         | 102 - 82        | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 118.5 | 0.6211               | 3.236               | 20.123               | 0.161 <sup>1</sup> ✓            |
| T22         | 82 - 62         | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 118.5 | 0.6211               | 1.686               | 20.123               | 0.084 <sup>1</sup> ✓            |
| T23         | 62 - 42         | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 118.5 | 0.6211               | 3.719               | 20.123               | 0.185 <sup>1</sup> ✓            |
| T24         | 42 - 22         | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 118.5 | 0.6211               | 2.565               | 20.123               | 0.127 <sup>1</sup> ✓            |
| T25         | 22 - 2          | L1 3/4x1 3/4x3/16                | 5.657   | 5.303                | 118.5 | 0.6211               | 1.445               | 20.123               | 0.072 <sup>1</sup> ✓            |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Horizontal Design Data (Tension)

| Section No. | Elevation<br>ft | Size      | L<br>ft | L <sub>u</sub><br>ft | Kl/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-----------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| T2          | 452 - 442       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.302               | 23.166               | 0.013 <sup>1</sup> ✓            |
| T3          | 442 - 422       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.433               | 23.166               | 0.019 <sup>1</sup> ✓            |
| T4          | 422 - 402       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.522               | 23.166               | 0.023 <sup>1</sup> ✓            |
| T5          | 402 - 382       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.846               | 23.166               | 0.037 <sup>1</sup> ✓            |
| T6          | 382 - 362       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.940               | 23.166               | 0.041 <sup>1</sup> ✓            |
| T7          | 362 - 342       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.902               | 23.166               | 0.039 <sup>1</sup> ✓            |
| T8          | 342 - 322       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 1.067               | 23.166               | 0.046 <sup>1</sup> ✓            |
| T9          | 322 - 302       | L2x2x3/16 | 4.000   | 3.792                | 73.7 | 0.7150               | 1.238               | 23.166               | 0.053 <sup>1</sup> ✓            |
| T10         | 302 - 282       | L2x2x3/16 | 4.000   | 3.792                | 73.7 | 0.7150               | 1.343               | 23.166               | 0.058 <sup>1</sup> ✓            |
| T11         | 282 - 262       | L2x2x3/16 | 4.000   | 3.771                | 73.3 | 0.7150               | 1.574               | 23.166               | 0.068 <sup>1</sup> ✓            |
| T12         | 262 - 242       | L2x2x3/16 | 4.000   | 3.771                | 73.3 | 0.7150               | 1.650               | 23.166               | 0.071 <sup>1</sup> ✓            |
| T13         | 242 - 222       | L2x2x3/16 | 4.000   | 3.771                | 73.3 | 0.7150               | 1.760               | 23.166               | 0.076 <sup>1</sup> ✓            |
| T14         | 222 - 202       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 10.215              | 23.166               | 0.441 <sup>1</sup> ✓            |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">72 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation<br>ft | Size      | L<br>ft | L <sub>u</sub><br>ft | Kl/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-----------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| T15         | 202 - 182       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.062               | 23.166               | 0.089 <sup>1</sup>              |
| T16         | 182 - 162       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.136               | 23.166               | 0.092 <sup>1</sup>              |
| T17         | 162 - 142       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 5.898               | 23.166               | 0.255 <sup>1</sup>              |
| T18         | 142 - 122       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.406               | 23.166               | 0.104 <sup>1</sup>              |
| T19         | 122 - 112       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.379               | 23.166               | 0.103 <sup>1</sup>              |
| T20         | 112 - 102       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.359               | 23.166               | 0.102 <sup>1</sup>              |
| T21         | 102 - 82        | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.536               | 23.166               | 0.109 <sup>1</sup>              |
| T22         | 82 - 62         | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.588               | 23.166               | 0.112 <sup>1</sup>              |
| T23         | 62 - 42         | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 5.789               | 23.166               | 0.250 <sup>1</sup>              |
| T24         | 42 - 22         | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.692               | 23.166               | 0.116 <sup>1</sup>              |
| T25         | 22 - 2          | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 2.703               | 23.166               | 0.117 <sup>1</sup>              |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Tension)

| Section No. | Elevation<br>ft | Size      | L<br>ft | L <sub>u</sub><br>ft | Kl/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-----------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| T1          | 457 - 452       | C6x10.5   | 4.000   | 2.859                | 64.9 | 3.0900               | 0.000               | 100.116              | 0.000 <sup>1</sup>              |
| T2          | 452 - 442       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.852               | 23.166               | 0.037 <sup>1</sup>              |
| T3          | 442 - 422       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 5.911               | 23.166               | 0.255 <sup>1</sup>              |
| T4          | 422 - 402       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.239               | 23.166               | 0.010 <sup>1</sup>              |
| T5          | 402 - 382       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.242               | 23.166               | 0.010 <sup>1</sup>              |
| T6          | 382 - 362       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 7.072               | 23.166               | 0.305 <sup>1</sup>              |
| T7          | 362 - 342       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.321               | 23.166               | 0.014 <sup>1</sup>              |
| T8          | 342 - 322       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 0.338               | 23.166               | 0.015 <sup>1</sup>              |
| T9          | 322 - 302       | L2x2x3/16 | 4.000   | 3.813                | 74.1 | 0.7150               | 7.093               | 23.166               | 0.306 <sup>1</sup>              |
| T10         | 302 - 282       | L2x2x3/16 | 4.000   | 3.792                | 73.7 | 0.7150               | 0.591               | 23.166               | 0.026 <sup>1</sup>              |



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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering, LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">73 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation<br>ft | Size      | L<br>ft | L <sub>u</sub><br>ft | Kl/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-----------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| T11         | 282 - 262       | L2x2x3/16 | 4.000   | 3.792                | 73.7 | 0.7150               | 1.411               | 23.166               | 0.061 <sup>1</sup> ✓            |
| T12         | 262 - 242       | L2x2x3/16 | 4.000   | 3.771                | 73.3 | 0.7150               | 9.788               | 23.166               | 0.423 <sup>1</sup> ✓            |
| T13         | 242 - 222       | L2x2x3/16 | 4.000   | 3.771                | 73.3 | 0.7150               | 0.787               | 23.166               | 0.034 <sup>1</sup> ✓            |
| T14         | 222 - 202       | L2x2x3/16 | 4.000   | 3.771                | 73.3 | 0.7150               | 0.818               | 23.166               | 0.035 <sup>1</sup> ✓            |
| T15         | 202 - 182       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 0.951               | 23.166               | 0.041 <sup>1</sup> ✓            |
| T16         | 182 - 162       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 0.926               | 23.166               | 0.040 <sup>1</sup> ✓            |
| T17         | 162 - 142       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 0.916               | 23.166               | 0.040 <sup>1</sup> ✓            |
| T18         | 142 - 122       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 0.985               | 23.166               | 0.043 <sup>1</sup> ✓            |
| T19         | 122 - 112       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 1.062               | 23.166               | 0.046 <sup>1</sup> ✓            |
| T20         | 112 - 102       | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 1.180               | 23.166               | 0.051 <sup>1</sup> ✓            |
| T21         | 102 - 82        | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 7.612               | 23.166               | 0.329 <sup>1</sup> ✓            |
| T22         | 82 - 62         | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 1.030               | 23.166               | 0.044 <sup>1</sup> ✓            |
| T23         | 62 - 42         | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 1.038               | 23.166               | 0.045 <sup>1</sup> ✓            |
| T24         | 42 - 22         | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 0.977               | 23.166               | 0.042 <sup>1</sup> ✓            |
| T25         | 22 - 2          | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 1.055               | 23.166               | 0.046 <sup>1</sup> ✓            |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

**Bottom Girt Design Data (Tension)**

| Section No. | Elevation<br>ft | Size      | L<br>ft | L <sub>u</sub><br>ft | Kl/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|-----------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| T25         | 22 - 2          | L2x2x3/16 | 4.000   | 3.750                | 72.9 | 0.7150               | 3.276               | 23.166               | 0.141 <sup>1</sup> ✓            |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

**Section Capacity Table**

|                |                                 |                    |                   |
|----------------|---------------------------------|--------------------|-------------------|
| <b>Job</b>     | US-CT-5009                      | <b>Page</b>        | 74 of 76          |
| <b>Project</b> | Guyed Tower Structural Analysis | <b>Date</b>        | 09:08:12 04/29/19 |
| <b>Client</b>  |                                 | <b>Designed by</b> | Luke Myrick       |

| Section No. | Elevation ft | Component Type | Size                          | Critical Element | P K      | $\phi P_{allow}$ K | % Capacity | Pass Fail |
|-------------|--------------|----------------|-------------------------------|------------------|----------|--------------------|------------|-----------|
| L1          | 492 - 477    | Pole           | P8x.406                       | 1                | -0.719   | 113.643            | 8.2        | Pass      |
| L2          | 477 - 457    | Pole           | P8x.406                       | 2                | -1.636   | 113.643            | 40.8       | Pass      |
| T1          | 457 - 452    | Leg            | 2 1/4                         | 5                | -8.092   | 77.870             | 10.4       | Pass      |
| T2          | 452 - 442    | Leg            | 2 1/4                         | 19               | -17.417  | 123.621            | 14.1       | Pass      |
| T3          | 442 - 422    | Leg            | 2 1/4                         | 39               | -24.987  | 105.060            | 23.8       | Pass      |
| T4          | 422 - 402    | Leg            | 2 1/4                         | 72               | -30.161  | 105.060            | 28.7       | Pass      |
| T5          | 402 - 382    | Leg            | 2 1/4                         | 105              | -48.868  | 105.060            | 46.5       | Pass      |
| T6          | 382 - 362    | Leg            | 2 1/4                         | 138              | -54.247  | 105.060            | 51.6       | Pass      |
| T7          | 362 - 342    | Leg            | 2 1/4                         | 172              | -52.079  | 105.060            | 49.6       | Pass      |
| T8          | 342 - 322    | Leg            | 2 1/4                         | 205              | -61.580  | 105.060            | 58.6       | Pass      |
| T9          | 322 - 302    | Leg            | 2 1/2                         | 238              | -71.457  | 143.512            | 49.8       | Pass      |
| T10         | 302 - 282    | Leg            | 2 1/2                         | 271              | -77.554  | 143.512            | 54.0       | Pass      |
| T11         | 282 - 262    | Leg            | 2 3/4                         | 303              | -81.210  | 187.145            | 43.4       | Pass      |
| T12         | 262 - 242    | Leg            | 2 3/4                         | 338              | -95.277  | 187.145            | 50.9       | Pass      |
| T13         | 242 - 222    | Leg            | 2 3/4                         | 371              | -101.607 | 187.145            | 54.3       | Pass      |
| T14         | 222 - 202    | Leg            | 3                             | 402              | -115.084 | 235.765            | 48.8       | Pass      |
| T15         | 202 - 182    | Leg            | 3                             | 435              | -119.056 | 235.765            | 50.5       | Pass      |
| T16         | 182 - 162    | Leg            | 3                             | 468              | -123.297 | 235.765            | 52.3       | Pass      |
| T17         | 162 - 142    | Leg            | 3                             | 501              | -135.645 | 235.765            | 57.5       | Pass      |
| T18         | 142 - 122    | Leg            | 3                             | 534              | -138.928 | 235.765            | 58.9       | Pass      |
| T19         | 122 - 112    | Leg            | 3                             | 567              | -137.358 | 258.358            | 53.2       | Pass      |
| T20         | 112 - 102    | Leg            | 3                             | 588              | -136.184 | 258.358            | 52.7       | Pass      |
| T21         | 102 - 82     | Leg            | 3                             | 611              | -146.411 | 235.765            | 62.1       | Pass      |
| T22         | 82 - 62      | Leg            | 3                             | 644              | -149.432 | 235.765            | 63.4       | Pass      |
| T23         | 62 - 42      | Leg            | 3                             | 675              | -150.767 | 235.765            | 63.9       | Pass      |
| T24         | 42 - 22      | Leg            | 3                             | 708              | -155.413 | 235.765            | 65.9       | Pass      |
| T25         | 22 - 2       | Leg            | 3                             | 741              | -156.043 | 235.765            | 66.2       | Pass      |
| T1          | 457 - 452    | Diagonal       | L2 1/2x2x3/16                 | 14               | -2.142   | 10.041             | 21.3       | Pass      |
| T2          | 452 - 442    | Diagonal       | L2x2x1/4                      | 26               | -2.496   | 10.832             | 23.0       | Pass      |
| T3          | 442 - 422    | Diagonal       | L2x2x1/4                      | 69               | -1.261   | 9.679              | 13.0       | Pass      |
| T4          | 422 - 402    | Diagonal       | L2x2x1/4                      | 80               | -2.384   | 9.679              | 24.6       | Pass      |
| T5          | 402 - 382    | Diagonal       | L2x2x1/4                      | 113              | -3.989   | 9.679              | 41.2       | Pass      |
| T6          | 382 - 362    | Diagonal       | L2x2x1/4                      | 169              | -2.573   | 9.679              | 26.6       | Pass      |
| T7          | 362 - 342    | Diagonal       | L2x2x1/4                      | 178              | -1.273   | 9.679              | 13.1       | Pass      |
| T8          | 342 - 322    | Diagonal       | L2x2x1/4                      | 211              | -3.054   | 9.679              | 31.6       | Pass      |
| T9          | 322 - 302    | Diagonal       | L1 3/4x1 3/4x3/16             | 268              | -4.353   | 5.385              | 80.8       | Pass      |
| T10         | 302 - 282    | Diagonal       | L2x2x1/4                      | 300              | -2.639   | 9.752              | 27.1       | Pass      |
| T11         | 282 - 262    | Diagonal       | L2 1/2x2 1/2x3/8              | 311              | -6.840   | 23.975             | 28.5       | Pass      |
| T12         | 262 - 242    | Diagonal       | L2x2x1/4                      | 367              | -5.024   | 9.826              | 51.1       | Pass      |
| T13         | 242 - 222    | Diagonal       | L2x2x1/4                      | 376              | -5.735   | 9.826              | 58.4       | Pass      |
| T14         | 222 - 202    | Diagonal       | L2 1/2x2 1/2x3/8              | 421              | -7.559   | 24.118             | 31.3       | Pass      |
| T15         | 202 - 182    | Diagonal       | L1 3/4x1 3/4x3/16             | 465              | -4.939   | 5.470              | 90.3       | Pass      |
| T16         | 182 - 162    | Diagonal       | L1 3/4x1 3/4x3/16             | 475              | -3.223   | 5.470              | 58.9       | Pass      |
| T17         | 162 - 142    | Diagonal       | L1 3/4x1 3/4x3/16             | 526              | -4.292   | 5.470              | 78.5       | Pass      |
| T18         | 142 - 122    | Diagonal       | L1 3/4x1 3/4x3/16             | 541              | -3.536   | 5.470              | 64.6       | Pass      |
| T19         | 122 - 112    | Diagonal       | L1 3/4x1 3/4x3/16             | 574              | -5.138   | 6.146              | 83.6       | Pass      |
| T20         | 112 - 102    | Diagonal       | L1 3/4x1 3/4x3/16 w/ L2x2x1/4 | 595              | -6.731   | 30.133             | 22.3       | Pass      |
| T21         | 102 - 82     | Diagonal       | L1 3/4x1 3/4x3/16             | 639              | -5.066   | 5.470              | 92.6       | Pass      |
| T22         | 82 - 62      | Diagonal       | L1 3/4x1 3/4x3/16             | 649              | -3.774   | 5.470              | 69.0       | Pass      |
| T23         | 62 - 42      | Diagonal       | L1 3/4x1 3/4x3/16             | 688              | -5.664   | 5.711              | 99.2       | Pass      |
| T24         | 42 - 22      | Diagonal       | L1 3/4x1 3/4x3/16             | 738              | -4.659   | 5.470              | 85.2       | Pass      |
| T25         | 22 - 2       | Diagonal       | L1 3/4x1 3/4x3/16             | 748              | -3.710   | 5.470              | 67.8       | Pass      |
| T2          | 452 - 442    | Horizontal     | L2x2x3/16                     | 27               | -0.302   | 11.122             | 2.7        | Pass      |
| T3          | 442 - 422    | Horizontal     | L2x2x3/16                     | 48               | -0.433   | 11.122             | 3.9        | Pass      |
| T4          | 422 - 402    | Horizontal     | L2x2x3/16                     | 81               | -0.522   | 11.122             | 4.7        | Pass      |
| T5          | 402 - 382    | Horizontal     | L2x2x3/16                     | 116              | -0.846   | 11.122             | 7.6        | Pass      |
| T6          | 382 - 362    | Horizontal     | L2x2x3/16                     | 153              | -0.940   | 11.122             | 8.4        | Pass      |
| T7          | 362 - 342    | Horizontal     | L2x2x3/16                     | 180              | -0.902   | 11.122             | 8.1        | Pass      |
| T8          | 342 - 322    | Horizontal     | L2x2x3/16                     | 213              | -1.067   | 11.122             | 9.6        | Pass      |
| T9          | 322 - 302    | Horizontal     | L2x2x3/16                     | 246              | -1.238   | 11.166             | 11.1       | Pass      |
| T10         | 302 - 282    | Horizontal     | L2x2x3/16                     | 279              | -1.343   | 11.166             | 12.0       | Pass      |

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| <p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>Vertical Bridge Engineering,<br/>LLC</b></p> <p style="text-align: center;">550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p style="text-align: center;">US-CT-5009</p>                          | <p><b>Page</b></p> <p style="text-align: center;">75 of 76</p>           |
|   | <p><b>Project</b></p> <p style="text-align: center;">Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p style="text-align: center;">09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p style="text-align: center;">Luke Myrick</p> |

| Section No. | Elevation ft | Component Type | Size      | Critical Element | P K    | $\phi P_{allow}$ K | % Capacity | Pass Fail |
|-------------|--------------|----------------|-----------|------------------|--------|--------------------|------------|-----------|
| T11         | 282 - 262    | Horizontal     | L2x2x3/16 | 312              | -1.407 | 11.210             | 12.5       | Pass      |
| T12         | 262 - 242    | Horizontal     | L2x2x3/16 | 346              | -1.650 | 11.210             | 14.7       | Pass      |
| T13         | 242 - 222    | Horizontal     | L2x2x3/16 | 380              | -1.760 | 11.210             | 15.7       | Pass      |
| T14         | 222 - 202    | Horizontal     | L2x2x3/16 | 418              | 10.215 | 23.166             | 44.1       | Pass      |
| T15         | 202 - 182    | Horizontal     | L2x2x3/16 | 450              | -2.062 | 11.254             | 18.3       | Pass      |
| T16         | 182 - 162    | Horizontal     | L2x2x3/16 | 483              | -2.136 | 11.254             | 19.0       | Pass      |
| T17         | 162 - 142    | Horizontal     | L2x2x3/16 | 523              | 5.898  | 23.166             | 25.5       | Pass      |
| T18         | 142 - 122    | Horizontal     | L2x2x3/16 | 543              | -2.406 | 11.254             | 21.4       | Pass      |
| T19         | 122 - 112    | Horizontal     | L2x2x3/16 | 576              | -2.379 | 11.254             | 21.1       | Pass      |
| T20         | 112 - 102    | Horizontal     | L2x2x3/16 | 603              | -2.359 | 11.254             | 21.0       | Pass      |
| T21         | 102 - 82     | Horizontal     | L2x2x3/16 | 625              | -2.536 | 11.254             | 22.5       | Pass      |
| T22         | 82 - 62      | Horizontal     | L2x2x3/16 | 652              | -2.588 | 11.254             | 23.0       | Pass      |
| T23         | 62 - 42      | Horizontal     | L2x2x3/16 | 685              | 5.789  | 23.166             | 25.0       | Pass      |
| T24         | 42 - 22      | Horizontal     | L2x2x3/16 | 717              | -2.692 | 11.254             | 23.9       | Pass      |
| T25         | 22 - 2       | Horizontal     | L2x2x3/16 | 752              | -2.703 | 11.254             | 24.0       | Pass      |
| T1          | 457 - 452    | Top Girt       | C6x10.5   | 8                | -0.000 | 80.226             | 1.2        | Pass      |
| T2          | 452 - 442    | Top Girt       | L2x2x3/16 | 11               | -0.778 | 11.122             | 7.0        | Pass      |
| T3          | 442 - 422    | Top Girt       | L2x2x3/16 | 22               | 5.911  | 23.166             | 25.5       | Pass      |
| T4          | 422 - 402    | Top Girt       | L2x2x3/16 | 43               | 0.239  | 23.166             | 1.0        | Pass      |
| T5          | 402 - 382    | Top Girt       | L2x2x3/16 | 77               | 0.242  | 23.166             | 1.0        | Pass      |
| T6          | 382 - 362    | Top Girt       | L2x2x3/16 | 110              | 7.072  | 23.166             | 30.5       | Pass      |
| T7          | 362 - 342    | Top Girt       | L2x2x3/16 | 143              | 0.321  | 23.166             | 1.4        | Pass      |
| T8          | 342 - 322    | Top Girt       | L2x2x3/16 | 175              | 0.338  | 23.166             | 1.5        | Pass      |
| T9          | 322 - 302    | Top Girt       | L2x2x3/16 | 208              | 7.093  | 23.166             | 30.6       | Pass      |
| T10         | 302 - 282    | Top Girt       | L2x2x3/16 | 241              | 0.591  | 23.166             | 2.6        | Pass      |
| T11         | 282 - 262    | Top Girt       | L2x2x3/16 | 275              | -0.691 | 11.166             | 6.2        | Pass      |
| T12         | 262 - 242    | Top Girt       | L2x2x3/16 | 308              | 9.788  | 23.166             | 42.3       | Pass      |
| T13         | 242 - 222    | Top Girt       | L2x2x3/16 | 340              | 0.787  | 23.166             | 3.4        | Pass      |
| T14         | 222 - 202    | Top Girt       | L2x2x3/16 | 373              | 0.818  | 23.166             | 3.5        | Pass      |
| T15         | 202 - 182    | Top Girt       | L2x2x3/16 | 406              | 0.951  | 23.166             | 4.1        | Pass      |
| T16         | 182 - 162    | Top Girt       | L2x2x3/16 | 439              | 0.926  | 23.166             | 4.0        | Pass      |
| T17         | 162 - 142    | Top Girt       | L2x2x3/16 | 473              | 0.916  | 23.166             | 4.0        | Pass      |
| T18         | 142 - 122    | Top Girt       | L2x2x3/16 | 505              | 0.985  | 23.166             | 4.3        | Pass      |
| T19         | 122 - 112    | Top Girt       | L2x2x3/16 | 539              | 1.062  | 23.166             | 4.6        | Pass      |
| T20         | 112 - 102    | Top Girt       | L2x2x3/16 | 571              | 1.180  | 23.166             | 5.1        | Pass      |
| T21         | 102 - 82     | Top Girt       | L2x2x3/16 | 592              | 7.612  | 23.166             | 32.9       | Pass      |
| T22         | 82 - 62      | Top Girt       | L2x2x3/16 | 613              | 1.030  | 23.166             | 4.4        | Pass      |
| T23         | 62 - 42      | Top Girt       | L2x2x3/16 | 647              | 1.038  | 23.166             | 4.5        | Pass      |
| T24         | 42 - 22      | Top Girt       | L2x2x3/16 | 679              | 0.977  | 23.166             | 4.2        | Pass      |
| T25         | 22 - 2       | Top Girt       | L2x2x3/16 | 713              | 1.055  | 23.166             | 4.6        | Pass      |
| T25         | 22 - 2       | Bottom Girt    | L2x2x3/16 | 745              | 3.276  | 23.166             | 14.1       | Pass      |
| T3          | 442 - 422    | Guy A@442      | 1         | 776              | 33.510 | 73.200             | 45.8       | Pass      |
| T6          | 382 - 362    | Guy A@382      | 1         | 779              | 33.797 | 73.200             | 46.2       | Pass      |
| T9          | 322 - 302    | Guy A@322      | 7/8       | 782              | 27.911 | 55.200             | 50.6       | Pass      |
| T12         | 262 - 242    | Guy A@262      | 7/8       | 785              | 32.217 | 55.200             | 58.4       | Pass      |
| T14         | 222 - 202    | Guy A@210      | 7/8       | 788              | 33.459 | 55.200             | 60.6       | Pass      |
| T17         | 162 - 142    | Guy A@154      | 9/16      | 791              | 14.850 | 21.000             | 70.7       | Pass      |
| T21         | 102 - 82     | Guy A@102      | 9/16      | 794              | 15.947 | 21.000             | 75.9       | Pass      |
| T23         | 62 - 42      | Guy A@46       | 1/2       | 797              | 9.568  | 16.140             | 59.3       | Pass      |
| T3          | 442 - 422    | Guy B@442      | 1         | 775              | 34.109 | 73.200             | 46.6       | Pass      |
| T6          | 382 - 362    | Guy B@382      | 1         | 778              | 34.813 | 73.200             | 47.6       | Pass      |
| T9          | 322 - 302    | Guy B@322      | 7/8       | 781              | 29.154 | 55.200             | 52.8       | Pass      |
| T12         | 262 - 242    | Guy B@262      | 7/8       | 784              | 33.438 | 55.200             | 60.6       | Pass      |
| T14         | 222 - 202    | Guy B@210      | 7/8       | 787              | 34.670 | 55.200             | 62.8       | Pass      |
| T17         | 162 - 142    | Guy B@154      | 9/16      | 790              | 15.231 | 21.000             | 72.5       | Pass      |
| T21         | 102 - 82     | Guy B@102      | 9/16      | 793              | 16.280 | 21.000             | 77.5       | Pass      |
| T23         | 62 - 42      | Guy B@46       | 1/2       | 796              | 9.785  | 16.140             | 60.6       | Pass      |
| T3          | 442 - 422    | Guy C@442      | 1         | 774              | 34.011 | 73.200             | 46.5       | Pass      |
| T6          | 382 - 362    | Guy C@382      | 1         | 777              | 34.551 | 73.200             | 47.2       | Pass      |
| T9          | 322 - 302    | Guy C@322      | 7/8       | 780              | 28.963 | 55.200             | 52.5       | Pass      |
| T12         | 262 - 242    | Guy C@262      | 7/8       | 783              | 33.639 | 55.200             | 60.9       | Pass      |

|   |  |  |
|---|--|--|
| <p><b>tnxTower</b></p> <p><b>Vertical Bridge Engineering, LLC</b></p> <p>550 River Dr.<br/>North Sioux City, SD 57049<br/>Phone: 605-540-4622<br/>FAX: 605-540-4622</p> | <p><b>Job</b></p> <p>US-CT-5009</p>                          | <p><b>Page</b></p> <p>76 of 76</p>           |
|   | <p><b>Project</b></p> <p>Guyed Tower Structural Analysis</p> | <p><b>Date</b></p> <p>09:08:12 04/29/19</p>  |
|   | <p><b>Client</b></p>   | <p><b>Designed by</b></p> <p>Luke Myrick</p> |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K    | $\phi P_{allow}$ K | % Capacity        | Pass Fail   |             |
|-------------|--------------|----------------|------|------------------|--------|--------------------|-------------------|-------------|-------------|
| T14         | 222 - 202    | Guy C@210      | 7/8  | 786              | 34.872 | 55.200             | 63.2              | Pass        |             |
| T17         | 162 - 142    | Guy C@154      | 9/16 | 789              | 15.370 | 21.000             | 73.2              | Pass        |             |
| T21         | 102 - 82     | Guy C@102      | 9/16 | 792              | 16.361 | 21.000             | 77.9              | Pass        |             |
| T23         | 62 - 42      | Guy C@46       | 1/2  | 795              | 9.838  | 16.140             | 61.0              | Pass        |             |
|             |              |                |      |                  |        |                    | Summary           |             |             |
|             |              |                |      |                  |        |                    | Pole (L2)         | 40.8        | Pass        |
|             |              |                |      |                  |        |                    | Leg (T25)         | 66.2        | Pass        |
|             |              |                |      |                  |        |                    | Diagonal (T23)    | 99.2        | Pass        |
|             |              |                |      |                  |        |                    | Horizontal (T14)  | 44.1        | Pass        |
|             |              |                |      |                  |        |                    | Top Girt (T12)    | 42.3        | Pass        |
|             |              |                |      |                  |        |                    | Bottom Girt (T25) | 14.1        | Pass        |
|             |              |                |      |                  |        |                    | Guy A (T21)       | 75.9        | Pass        |
|             |              |                |      |                  |        |                    | Guy B (T21)       | 77.5        | Pass        |
|             |              |                |      |                  |        |                    | Guy C (T21)       | 77.9        | Pass        |
|             |              |                |      |                  |        |                    | <b>RATING =</b>   | <b>99.2</b> | <b>Pass</b> |

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TIA-222-G

**TOWER BASE CHECKS - GUYED TOWER**

| Tower Reactions                        |                                | Factored Loads                                | Factored Resistance |                     | % Capacity           | Column Rebar   |
|--|--------------------------------|---|---------------------|---------------------|----------------------|--|
| <input checked="" type="radio"/> TIA-G | Download                       | <b>466.00</b> kips                            | Bearing Capacity    | <b>2847.10</b> kips | pass 16.4%           | PCA COL<br>466.0 kips<br><br>19.5 k-ft<br>Max. Pier<br>Moment @ 6.5 ft |
| <input type="radio"/> EIA-F            | Horizontal                     | <b>3.00</b> kips                              | Horizontal Capacity | <b>66.31</b> kips   | pass 4.5%            |  |
|  | Overturing Check ( $q_{max}$ ) | <b>3.85</b> ksf                               | Overturing Capacity | <b>14.53</b> ksf    | pass 26.5% [GOVERNS] |  |
|  | Punching Shear Check           | <b>283.97</b> kips                            | 2-way Capacity      | <b>2277.43</b> kips | pass 12.5%           |  |
|  | Flexural Shear Check           | <b>41.61</b> kips                             | 1-way Capacity      | <b>455.49</b> kips  | pass 9.1%            |  |
|  | Pier Rebar Required            | (minimum only, use PCACOL for total quantity) |                     | <b>#/N/A</b>        |                      |  |
|  | Mat Rebar Required             | (checked rebar for 6" min to 24" max spacing) |                     | <b>#/N/A</b>        | SF=7.54              |  |

| Soil Parameters                     | Soils Report                               | Foundation Geometry                                      | FDN Dwgs        |
|-------------------------------------|--|--|-----------------|
| $\phi$                              | <b>28</b> °                                | B (width)  | <b>14.00</b> ft |
| water level                         | <b>8.00</b> ft (2.44 m)                    | T (thickness)  | <b>3.00</b> ft  |
| Soil Dry Density ( $\gamma_{dry}$ ) | <b>0.105</b> kcf (16.5 kN/m <sup>3</sup> ) | L (length)   | <b>14.00</b> ft |
| Soil Sub Density ( $\gamma_{sub}$ ) | <b>0.050</b> kcf (7.85 kN/m <sup>3</sup> ) | D (depth to bottom surface)                              | <b>9.00</b> ft  |
| Passive earth coefficient           | <b>2.770</b>                               | $\phi$ (pier diameter)                                   | <b>6.00</b> ft  |
| Allowable bearing pressure          | <b>12.105</b> ksf (579.6 kPa)              | <input checked="" type="checkbox"/> Check if Square Pier |                 |

**Concrete parameters**

$f_c$  = **3.000** ksi (20.7 MPa)  
 Dry Density ( $\gamma_{dry}$ ) = 0.150 kcf  
 Sub Density ( $\gamma_{sub}$ ) = 0.087 kcf

**Volume of concrete**

**822.0 cuft (30.5 cuyd)**  
 Mat d (dry) = 2.00 ft 392.00  
 d (sub) = 1.00 ft 196.00  
 Pier d (above) = **0.50** ft 18.00  
 d (dry) = 6.00 ft 216.00  
 d (sub) = 0.00 ft 0.00

**Passive Earth pressure resistance**

press. - top of concrete = 1.74 -- ksf  
 press. - bottom of concr. = 2.47 -- ksf  
 Total resistance = **88.41** -- kips  
 Horizontal resistance = **66.31** -- kips  
 (x 0.75, Cl 9.4.1)

**Depth of Soil**

d (overall) = 6.00 2.D.Tan $\phi$  Area  
 d (dry) = 6.00 6.381 415.37  
 d (submerged) = 0.00 0.000 196.00

**Bearing capacity**

contact area = 196.00 -- ft<sup>2</sup>  
 allowable net pressure = **12.105** -- ksf  
 Download resistance = **2847.10** -- kips  
 (2 \* 0.60, Cl 9.4)

**Volume of Soil**

Vol (total) = 1577.4 ft<sup>3</sup>  
 Vol (dry) = 1577.4 ft<sup>3</sup>  
 Vol (submerged) = 0.0 ft<sup>3</sup>  
 Frustum  
 Volume  
 Method

**Overturing - Bearing**

Moment = Shear x Arm = 21.000 -- k-ft  
 ORTHO  $q_{max} = P/A + M/S (S=b^3/6)$  = **3.835** -- ksf  
 DIAG  $q_{max} = P/A + M/S (S=b^3/6\sqrt{2})$  = **3.854** -- ksf  
 (not factored)

**Concrete Reinforcing**

(Already Factored Loads)  
 $f_c$  = 3.00 ksi  
 $f_y$  = 60 ksi  
 Steel (Metric/ASTM) = **ASTM 0** # **ASTM 0**  
 Bar size = #/N/A in<sup>2</sup> #/N/A  
 Bar area = #/N/A in<sup>2</sup> #/N/A

**Check for 2-Way Shear**

Shear Area ( $b_o \times d$ ) = 96.25 -- ft<sup>2</sup>  
 Factored bearing stress = 2.378 -- ksf  
 Factored shear force = 283.97 -- kips  
 Factored shear resistance = **2277.4** -- kips  
 Check for 2-way shear = **Pass** --  
 $d=33.000"$

**Slab Reinforcing**

Download  
 w = 2.38 ksf  
 lv = 4.0 ft  
 $M_u = \frac{1}{2} wL \cdot lv^2$  = 266.29 kip-ft  
 Ku = 17.4659  
 $\rho$  = 0.00032 choose larger  
 $\rho \min \geq 0.0018$  = 0.0018 of  $\rho$   
 $4/3 \cdot \rho$  if  $\rho < \rho \min$  = 0.00043 or  $\rho \min$   
 As Required = 9.9792 in<sup>2</sup>  
 Number of bars = #/N/A bars  
 spacing = #/N/A in

**Check for 1-Way Shear**

Shear Area ( $b \times d$ ) = 38.50 -- ft<sup>2</sup>  
 Factored bearing stress = 2.378 -- ksf  
 Factored shear force = 41.61 -- kips  
 Factored shear resistance = **455.5** -- kips  
 Check for 2-way shear = **Pass** --  
 $d=33.000"$

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TIA-222-G

**GUY ANCHOR - DEADMAN CHECKS**

| Tower Reactions                        |            | Factored Loads   | Factored Resistance                   | % Capacity                  | SF=3.16 |
|--|------------|------------------|---------------------------------------|-----------------------------|---------|
| <input checked="" type="radio"/> TIA-G | Uplift     | <b>57.0</b> kips | Uplift Capacity <b>128.69</b> kips    | pass <b>44.3%</b>           |         |
| <input type="radio"/> EIA-F            | Horizontal | <b>47.0</b> kips | Horizontal Capacity <b>74.25</b> kips | pass <b>63.3% [GOVERNS]</b> |         |

| Soil Parameters    |             | From Soils Report |         |                                   |                                       | Dead-man geometry          |  | From Fdn Dwgs |  |
|--------------------|-------------|-------------------|---------|-----------------------------------|---------------------------------------|----------------------------|--|---------------|--|
|                    | Depth (ft)  | $\phi$ (°)        | C (psf) | $\gamma$ (pcf)                    |                                       |                            |  |               |  |
| Layer 1            | 4.0         | 28.0              | 0.0     | 105.0                             | B (width)                             | <b>4.50</b> ft             |  |               |  |
| Layer 2            | 6.0         | 0.0               | 1250.0  | 110.0                             | T (thickness / height)                | <b>2.50</b> ft             |  |               |  |
| Layer 3            | 8.0         | 0.0               | 400.0   | 105.0                             | L (length)                            | <b>15.00</b> ft            |  |               |  |
| Layer 4            | 9.5         | 0.0               | 750.0   | 105.0                             | D (depth to bottom surface)           | <b>9.50</b> ft             |  |               |  |
| Layer 5            |             |                   |         |                                   |                                       |                            |  |               |  |
| All. Top Friction  | <b>138</b>  | psf (FS=2)        |         |                                   | f <sub>c</sub> (compressive strength) | <b>3.00</b> ksi (20.7 MPa) |  |               |  |
| All. Side Friction | <b>138</b>  | psf (FS=2)        |         |                                   | Water Table                           | <b>30.00</b> ft (9.15 m)   |  |               |  |
| Frost Depth        | <b>4.00</b> | ft                |         |                                   |                                       |                            |  |               |  |
| Ignored Depth      | <b>0.00</b> | ft                |         | Depth is taken to bottom of layer |                                       |                            |  |               |  |

| Depth (ft) | Kp    | 1/2Cu (psf) | tan (1/2φ) | Ca (Kulhawy) | $\gamma_d$ (psf) | Kp Pressure | Cu Pressure | Total Layer Pressure | Front of Block Area | 1/2Cu Thickness | 1/2Cu Area | 1/2Cu Area |
|------------|-------|-------------|------------|--------------|------------------|-------------|-------------|----------------------|---------------------|-----------------|------------|------------|
| 0.00       |       |             |            |              | 0.0              | 0.000       | 0.000       | 0.000                | 0.00                | 0.00            | 0.000      | 0.000      |
| 4.00       | 2.770 | 0.0         | 0.338      | 0.000        | 420.0            | 1.163       | 0.000       | 1.163                | 0.00                | 0.00            | 0.000      | 0.000      |
| 4.00       | 1.000 | 625.0       | 0.000      | 0.582        | 420.0            | 0.420       | 2.500       | 2.920                | 0.00                | 2.00            | 78.000     | 48.750     |
| 6.00       | 1.000 | 200.0       | 0.000      | 1.000        | 640.0            | 0.640       | 2.500       | 3.140                | 0.00                | 1.00            | 39.000     | 7.800      |
| 6.00       | 1.000 | 200.0       | 0.000      | 1.000        | 640.0            | 0.640       | 0.800       | 1.440                | 15.00               | 1.00            | 39.000     | 7.800      |
| 8.00       | 1.000 | 375.0       | 0.000      | 0.763        | 850.0            | 0.850       | 1.500       | 2.350                | 22.50               | 0.00            | 0.000      | 0.000      |
| 8.00       | 1.000 | 375.0       | 0.000      | 0.763        | 850.0            | 0.850       | 1.500       | 2.350                | 22.50               | 0.00            | 0.000      | 0.000      |
| 9.50       | 1.000 | 375.0       | 0.000      | 0.763        | 1007.5           | 1.008       | 1.500       | 2.508                |                     |                 |            |            |
| 9.50       |       |             |            |              |                  |             |             |                      |                     |                 |            |            |

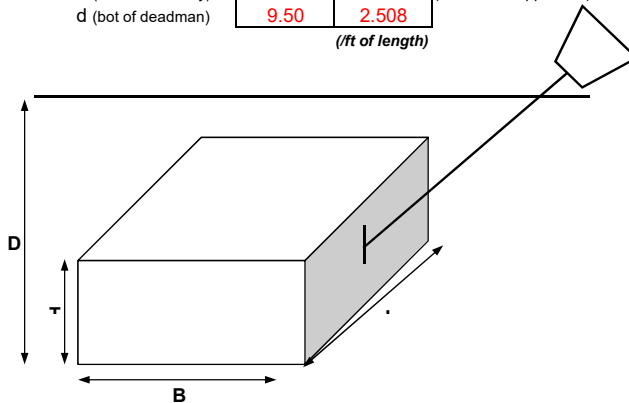
| Uplift Resistance                 |  | Factored           |    |      |
|-----------------------------------|--|--------------------|----|------|
| Weight of concrete                |  | <b>25.31</b>       | -- | kips |
|                                   |  | (x 0.90, Cl 2.3.2) |    |      |
| Weight of soil (all layers)       |  | <b>69.92</b>       | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| 1/2Cu Resistance                  |  | <b>56.55</b>       | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| Total Side Friction (2 x BT)      |  | <b>4.39</b>        | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| Total Front Friction (T x L)      |  | <b>10.35</b>       | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| <b>Total Uplift Resistance</b>    |  | <b>166.52</b>      | -- | kips |
| <b>Factored Uplift Resistance</b> |  | <b>128.69</b>      | -- | kips |

| Concrete Parameters            |              | Depth | Weight                       | Volume |
|--------------------------------|--------------|-------|------------------------------|--------|
| Dry Density ( $\gamma_{dry}$ ) | <b>0.150</b> | 2.50  | 25.31                        | 168.75 |
| Sub Density ( $\gamma_{sub}$ ) | <b>0.087</b> | 0.00  | 0.00                         | 0.00   |
|                                |              |       | <b>168.8 cuft (6.3 cuyd)</b> |        |

| Depth of Soil      |      | 2 · D · Tan φ | Area   | Volume |
|--------------------|------|---------------|--------|--------|
| d (top of layer 1) | 0.00 | 4.254         | 168.54 | 456.9  |
| d (top of layer 2) | 4.00 | 0.000         | 67.50  | 135.0  |
| d (top of layer 3) | 6.00 | 0.000         | 67.50  | 67.5   |
| d (top of layer 4) |      | 0.000         | 0.00   | 0.0    |
| d (top of layer 5) |      | 0.000         | 0.00   | 0.0    |
| d (top of deadman) | 7.00 |               | 67.50  | 659.4  |

| Depth of Deadman   |  | Depth | Pressure                        |
|--------------------|--|-------|---------------------------------|
| d (top of deadman) |  | 7.00  | 1.545                           |
| d (above boundary) |  | 7.00  | 1.545 (overwrite if applicable) |
| d (below boundary) |  | 9.50  | 2.508 (overwrite if applicable) |
| d (bot of deadman) |  | 9.50  | 2.508                           |

| Horizontal Pressure Resistance   |  |                    |    |      |
|----------------------------------|--|--------------------|----|------|
| Total Front Pressure (P x L)     |  | <b>75.98</b>       | -- | kips |
| Total Side Friction (2 x BT)     |  | <b>4.39</b>        | -- | kips |
| Total Top Friction (B x L)       |  | <b>18.63</b>       | -- | kips |
| <b>Total Horiz Resistance</b>    |  | <b>99.01</b>       | -- | kips |
| <b>Factored Horiz Resistance</b> |  | <b>74.25</b>       | -- | kips |
|                                  |  | (x 0.75, Cl 9.4.1) |    |      |



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TIA-222-G

**GUY ANCHOR - DEADMAN CHECKS**

| Tower Reactions                        |            | Factored Loads    | Factored Resistance |                    | % Capacity | SF=8.84                |
|--|------------|-------------------|---------------------|--------------------|------------|------------------------|
| <input checked="" type="radio"/> TIA-G | Uplift     | <b>116.0</b> kips | Uplift Capacity     | <b>512.45</b> kips | pass       | <b>22.6%</b> [GOVERNS] |
| <input type="radio"/> EIA-F            | Horizontal | <b>52.0</b> kips  | Horizontal Capacity | <b>279.65</b> kips | pass       | <b>18.6%</b>           |

| Soil Parameters    |             | From Soils Report |         |                |                                       | Dead-man geometry |                | From Fdn Dwgs |  |
|--------------------|-------------|-------------------|---------|----------------|---------------------------------------|-------------------|----------------|---------------|--|
|                    | Depth (ft)  | $\phi$ (°)        | C (psf) | $\gamma$ (pcf) |                                       |                   |                |               |  |
| Layer 1            | 4.0         | 28.0              | 0.0     | 105.0          | B (width)                             | <b>11.00</b>      | ft             |               |  |
| Layer 2            | 6.0         | 0.0               | 1250.0  | 110.0          | T (thickness / height)                | <b>4.50</b>       | ft             |               |  |
| Layer 3            | 8.0         | 0.0               | 400.0   | 105.0          | L (length)                            | <b>28.00</b>      | ft             |               |  |
| Layer 4            | 11.5        | 0.0               | 750.0   | 105.0          | D (depth to bottom surface)           | <b>11.50</b>      | ft             |               |  |
| Layer 5            |             |                   |         |                |                                       |                   |                |               |  |
| All. Top Friction  | <b>138</b>  | psf (FS=2)        |         |                | f <sub>c</sub> (compressive strength) | <b>3.00</b>       | ksi (20.7 MPa) |               |  |
| All. Side Friction | <b>138</b>  | psf (FS=2)        |         |                | Water Table                           | <b>30.00</b>      | ft (9.15 m)    |               |  |
| Frost Depth        | <b>3.33</b> | ft                |         |                |                                       |                   |                |               |  |
| Ignored Depth      | <b>0.00</b> | ft                |         |                |                                       |                   |                |               |  |

Depth is taken to bottom of layer

| Depth (ft) | Kp    | 1/2Cu (psf) | tan (1/2φ) | Ca (Kulhawy) | $\gamma_d$ (psf) | Kp Pressure | Cu Pressure | Total Layer Pressure | Front of Block Area | 1/2Cu Thickness | 1/2Cu Area | 1/2Cu Area |
|------------|-------|-------------|------------|--------------|------------------|-------------|-------------|----------------------|---------------------|-----------------|------------|------------|
| 0.00       |       |             |            |              | 0.0              | 0.000       | 0.000       | 0.000                | 0.00                | 0.67            | 52.260     | 0.000      |
| 4.00       | 2.770 | 0.0         | 0.338      | 0.000        | 420.0            | 1.163       | 0.000       | 1.163                | 0.00                | 2.00            | 156.000    | 97.500     |
| 4.00       | 1.000 | 625.0       | 0.000      | 0.582        | 420.0            | 0.420       | 2.500       | 2.920                | 0.00                | 1.00            | 78.000     | 15.600     |
| 6.00       | 1.000 | 200.0       | 0.000      | 1.000        | 640.0            | 0.640       | 0.800       | 1.440                | 28.00               | 0.00            | 0.000      | 0.000      |
| 8.00       | 1.000 | 375.0       | 0.000      | 0.763        | 850.0            | 0.850       | 1.500       | 2.350                | 98.00               |                 |            |            |
| 11.50      | 1.000 | 375.0       | 0.000      | 0.763        | 1217.5           | 1.218       | 1.500       | 2.718                |                     |                 |            |            |
| 11.50      |       |             |            |              |                  |             |             |                      |                     |                 |            |            |

| Uplift Resistance                 |  | Factored           |    |      |
|-----------------------------------|--|--------------------|----|------|
| Weight of concrete                |  | <b>207.90</b>      | -- | kips |
|                                   |  | (x 0.90, Cl 2.3.2) |    |      |
| Weight of soil (all layers)       |  | <b>266.60</b>      | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| 1/2Cu Resistance                  |  | <b>113.10</b>      | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| Total Side Friction (2 x BT)      |  | <b>19.32</b>       | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| Total Front Friction (T x L)      |  | <b>34.78</b>       | -- | kips |
|                                   |  | (x 0.75, Cl 9.4.1) |    |      |
| <b>Total Uplift Resistance</b>    |  | <b>641.69</b>      | -- | kips |
| <b>Factored Uplift Resistance</b> |  | <b>512.45</b>      | -- | kips |

| Concrete Parameters            |              | Depth | Weight                         | Volume  |
|--------------------------------|--------------|-------|--------------------------------|---------|
| Dry Density ( $\gamma_{dry}$ ) | <b>0.150</b> | 4.50  | 207.90                         | 1386.00 |
| Sub Density ( $\gamma_{sub}$ ) | <b>0.087</b> | 0.00  | 0.00                           | 0.00    |
|                                |              |       | <b>1386.0 cuft (51.4 cuyd)</b> |         |

| Depth of Soil      |      | 2 · D · Tan φ | Area   | Volume |
|--------------------|------|---------------|--------|--------|
| d (top of layer 1) | 0.00 | 4.254         | 491.99 | 1585.7 |
| d (top of layer 2) | 4.00 | 0.000         | 308.00 | 616.0  |
| d (top of layer 3) | 6.00 | 0.000         | 308.00 | 308.0  |
| d (top of layer 4) |      | 0.000         | 0.00   | 0.0    |
| d (top of layer 5) |      | 0.000         | 0.00   | 0.0    |
| d (top of deadman) | 7.00 |               | 308.00 | 2509.7 |

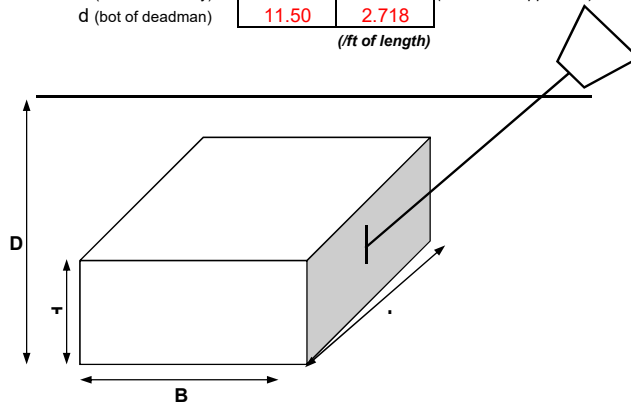
| Depth of Deadman   |  | Depth | Pressure |
|--------------------|--|-------|----------|
| d (top of deadman) |  | 7.00  | 1.545    |
| d (above boundary) |  | 7.00  | 1.545    |
| d (below boundary) |  | 11.50 | 2.718    |
| d (bot of deadman) |  | 11.50 | 2.718    |

(ft of length)

(overwrite if applicable)

(overwrite if applicable)

| Horizontal Pressure Resistance   |  |                    |    |      |
|----------------------------------|--|--------------------|----|------|
| Total Front Pressure (P x L)     |  | <b>268.54</b>      | -- | kips |
| Total Side Friction (2 x BT)     |  | <b>19.32</b>       | -- | kips |
| Total Top Friction (B x L)       |  | <b>85.01</b>       | -- | kips |
| <b>Total Horiz Resistance</b>    |  | <b>372.87</b>      | -- | kips |
| <b>Factored Horiz Resistance</b> |  | <b>279.65</b>      | -- | kips |
|                                  |  | (x 0.75, Cl 9.4.1) |    |      |



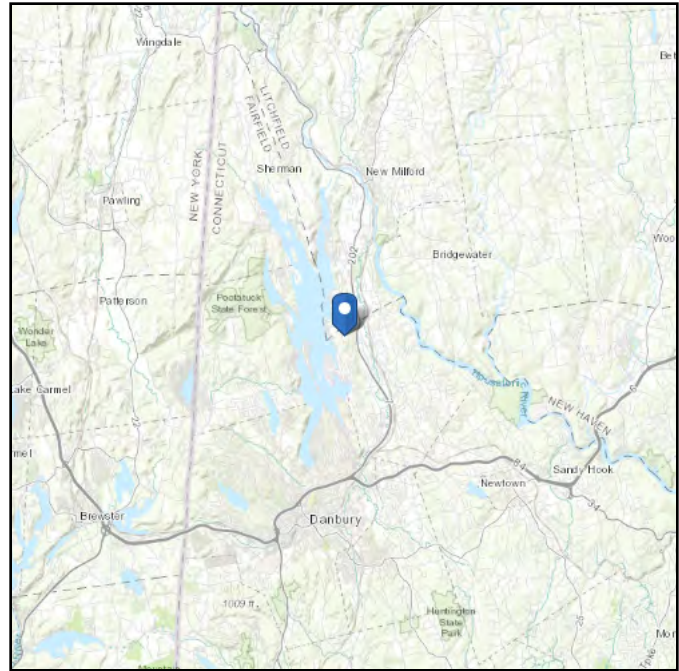


# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** II  
**Soil Class:** D - Stiff Soil

**Elevation:** 718.96 ft (NAVD 88)  
**Latitude:** 41.493439  
**Longitude:** -73.428817



## Wind

### Results:

|              |          |
|--------------|----------|
| Wind Speed:  | 115 Vmph |
| 10-year MRI  | 76 Vmph  |
| 25-year MRI  | 85 Vmph  |
| 50-year MRI  | 90 Vmph  |
| 100-year MRI | 96 Vmph  |

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

**Date Accessed:** Wed Apr 24 2019

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

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

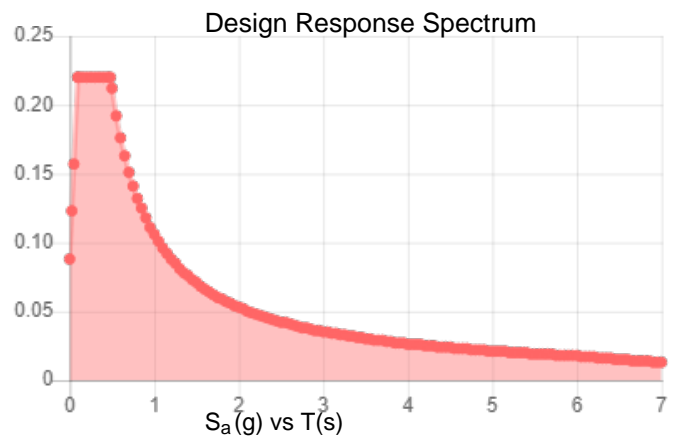
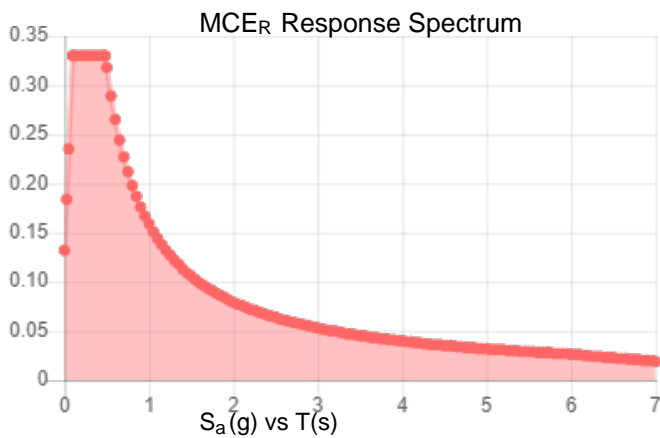


**Site Soil Class:** D - Stiff Soil

**Results:**

|            |       |                    |       |
|------------|-------|--------------------|-------|
| $S_s$ :    | 0.207 | $S_{DS}$ :         | 0.22  |
| $S_1$ :    | 0.066 | $S_{D1}$ :         | 0.106 |
| $F_a$ :    | 1.6   | $T_L$ :            | 6     |
| $F_v$ :    | 2.4   | PGA :              | 0.111 |
| $S_{MS}$ : | 0.33  | PGA <sub>M</sub> : | 0.175 |
| $S_{M1}$ : | 0.159 | F <sub>PGA</sub> : | 1.579 |
|            |       | $I_e$ :            | 1     |

**Seismic Design Category** B



**Data Accessed:**

Wed Apr 24 2019

**Date Source:**

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

## Ice

---

**Results:**

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

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

**Date Accessed:** Wed Apr 24 2019

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

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

---

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

Attachment 2:  
Collocation Application



|  |                          |
|--|--------------------------|
| <input type="checkbox"/> NEW LEASE <input type="checkbox"/> AMENDMENT TO EXISTING LEASE <input type="checkbox"/> RECONTRACT <input type="checkbox"/> BTS ANCHOR TENANT | <b>INTERNAL USE ONLY</b> |
|  | APP VERSION #            |
|  | LEASE #                  |
|  | AMENDMENT #              |

|   |                      |
|---|----------------------|
| <b>PLEASE RETURN THIS APPLICATION VIA EMAIL TO:</b>   | VB Site Number:      |
| <b>Vertical Bridge</b><br>750 Park of Commerce Drive<br>Suite 200<br>Boca Raton, FL 33487<br>Attn: Regional Leasing Manager | VB Site Name:        |
| E-Mail:   | Application Date:    |
| Phone:  | Revision Dates:      |
|   | <b>RSM Approval:</b> |

**APPLICANT / CARRIER INFORMATION**

|   |  |                           |  |
|---|--|---------------------------|--|
| <b>Carrier Name:</b>  |  | <b>Contact Name:</b>      |  |
| <b>Carrier Site Number:</b>                                 |  | <b>Contact Number:</b>    |  |
| <b>Carrier Site Name:</b>                                   |  | <b>Contact Fax:</b>       |  |
| <b>Carrier Legal Entity Name:</b>                           |  | <b>Contact Address:</b>   |  |
| <b>State of registration:</b>                               |  |                           |  |
| <b>Type of entity (LP, LLC, Corp) d/b/a (if applicable)</b> |  |                           |  |
| <b>Notice Address for Lease:</b>                            |  | <b>Contact E-mail:</b>    |  |
| <b>With copies to:</b>                                      |  | <b>Additional E-mail:</b> |  |
| <b>Carrier Invoice Address:</b>                             |  | <b>Other:</b>             |  |
| <b>Carrier Invoice Contact - Name, Title, Phone No.</b>     |  | <b>Carrier NOC#</b>       |  |

**ADDITIONAL CONTACT INFORMATION**

|  |  |
|--|--|
| <b>Leasing Contact Name/Number:</b>      |  |
| <b>RF Contact Name/Number:</b>           |  |
| <b>Construction Contact Name/Number:</b> |  |
| <b>Emergency Contact Name/Number:</b>    |  |

**SITE INFORMATION – This information can be found and should match the information on [www.verticalbridge.com](http://www.verticalbridge.com)**

|                      |  |          |                                   |
|----------------------|--|----------|-----------------------------------|
| <b>Latitude:</b>     |  | <b>N</b> | <b>Existing Structure Type:</b>   |
| <b>Longitude:</b>    |  | <b>W</b> | <b>Existing Structure Height:</b> |
| <b>Site Address:</b> |  |          |                                   |

**FREQUENCY/TECHNOLOGY INFORMATION**

|  |  |
|--|--|
| <b>Type of Technology for all equipment (i.e., 3G, LTE, CMDA, MW, WiFi, TV, etc.)</b>  |  |
| <b>TX Frequency (MHz)</b>  |  |
| <b>RX Frequency (MHz)</b>  |  |
| <b>Tenants using an unlicensed band must provide exact Frequency Channels and Call Sign(s) to be utilized. (Providing the band range only will not be accepted.)</b> |  |

**PLEASE PROVIDE BRIEF DESCRIPTION OF GENERAL SCOPE OF WORK**







| PROPOSED FINAL CONFIGURATION TOTALS |       |
|-------------------------------------|-------|
| EQUIPMENT TYPE                      | TOTAL |
| Panel Antennas                      |       |
| Omni/Whip Antennas                  |       |
| RRU                                 |       |
| TMA                                 |       |
| Diplexer / Triplexer                |       |
| Bias T                              |       |
| Surge Suppressor                    |       |
| MW Dish                             |       |
| Ice Shield                          |       |
| ODU                                 |       |
| Filter                              |       |
| Combiner                            |       |
| Junction Box                        |       |
| RET                                 |       |
| Equipment Cabinets                  |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |

| PROPOSED FINAL CONFIGURATION TOTALS |       |
|-------------------------------------|-------|
| LINE TYPE                           | TOTAL |
| Coax                                |       |
| Hybrid                              |       |
| CAT5                                |       |
| DC/Power                            |       |
| RET                                 |       |
| Fiber                               |       |

| ADDITIONAL EQUIPMENT INFORMATION  |
|---|
| <ul style="list-style-type: none"> <li>• RRUs, TMAs and ODUs are required to be installed directly behind the antennas / MW dish. Otherwise there will be an additional charge.</li> <li>• All equipment lines are required to be installed inside the tower when space is available. Carriers will be charged an additional \$25.00 per line per month if equipment lines are installed on the outside of the tower even though there is available space inside the tower. Vertical Bridge must approve any installation of lines on the outside of the tower.</li> <li>• All tenant equipment must be installed within one continuous 10 ft vertical envelope. Exceeding this vertical space will be subject to additional rent.</li> </ul> |



**GROUND / INTERIOR SPACE REQUIREMENTS**

|  |          |  |          |  |          |
|--|----------|--|----------|--|----------|
| <u>Total Ground / Interior Area Dimensions:</u><br><b>L' x W' = Total Square Feet Required</b> | <b>X</b> | (Including all Equipment (i.e., Shelter, Equipment Platform or Pad, Generator Pad, Generator Fuel Tank Pad, Antenna Sleds, etc. – provide details below) |          |  |          |
| Cabinet Area Dimensions (Pad/Platform)   | <b>X</b> | Cabinet Installation Type  |          |  |          |
| Shelter Pad Dimensions   | <b>X</b> | Shelter Manufacturer   |          |  |          |
| Rooftop Antenna Total Area Required  | <b>X</b> | Antenna Sled Dimensions (per sector)   | <b>X</b> | Antenna Wall Mount Dimensions (per sector) | <b>X</b> |

**EQUIPMENT CABINET REQUIREMENTS (Required for rooftops or Vertical Bridge interior space)**

|                                    |  |                                   |  |               |  |
|------------------------------------|--|-----------------------------------|--|---------------|--|
| <b>Number of Cabinets Required</b> |  | Cabinet Dimensions (L' x W' x H') |  | Manufacturer: |  |
| <b>Number of Cabinets Required</b> |  | Cabinet Dimensions (L' x W' x H') |  | Manufacturer: |  |
| <b>Number of Cabinets Required</b> |  | Cabinet Dimensions (L' x W' x H') |  | Manufacturer: |  |
| Equipment Cabinet Comments         |  |                                   |  |               |  |

**GENERATOR REQUIREMENTS**

|                                    |  |                     |                        |                |  |
|------------------------------------|--|---------------------|------------------------|----------------|--|
| <b>Generator Required?:</b>        |  | Generator Fuel Type |                        | Generator Size |  |
| Generator Pad Dimensions           |  |                     | Generator Manufacturer |                |  |
| Generator Fuel Tank Pad Dimensions |  |                     | Fuel Tank Manufacturer |                |  |

**AC POWER REQUIREMENTS**

|                   |  |  |  |
|-------------------|--|--|--|
| <b>Meter Type</b> |  | Estimated Monthly Utility Usage Amount |  |
| Voltage           |  | Total Amperage                         |  |

**FIBER / BACKHAUL**

|                                  |  |                           |  |                                |  |
|----------------------------------|--|---------------------------|--|--------------------------------|--|
| <b>Fiber Installation Status</b> |  | Fiber Provider            |  |                                |  |
| Cable Type                       |  | Number of Points of Entry |  | Conduit/Riser Size (in inches) |  |

**STRUCTURAL ANALYSIS DETAILS**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| <b>Structural Hardcopies Required?</b> |  | If wet seals required, please provide address: |  |  |  |
|--|--|--|--|--|--|

**ADDITIONAL COMMENTS**

|  |
|--|
|  |
|--|



# Exhibit E



Vertical Bridge Engineering, LLC  
750 Park of Commerce Drive  
Suite 200  
Boca Raton, FL 33487  
561-406-4094  
VerticalBridge.com

April 29, 2019

**T-Mobile**

40 Holiday Drive, #155  
Kingston, PA 18704

**Attention:** Sheldon Freinle

**Reference:** Mount Review Letter (US-CT-5009)

**Carrier Info:** Co-Locate Applicant: T-Mobile  
Site Number: CT11196A  
Site Name: Brookfield/Junction Rd.

**Vertical Bridge Info:** VB Site Name: WRKI-FM  
VB Site Number: US-CT-5009

**Site Data:** Latitude: 41.4934 Longitude: -73.4288

**Mount Analysis:** Site Pro 1  
**Mount Model Number:** VFA14-HD  
**Job Number:** N/A  
**Job Date:** January 25, 2017

Dear Sheldon Freinle,

We are pleased to submit this '**Mount Review Letter**' for the structural assessment of the aforementioned tower mounting device. The objective of this assessment is to determine the suitability of the existing tower mount to support the complete loading as specified in the attached Collocation Application.

Per the Collocation Application dated March 19, 2019 **T-Mobile** is a current tenant and is proposing to install new equipment. Proposed equipment is listed below in the attached Collocation Application.



Vertical Bridge Engineering, LLC  
 750 Park of Commerce Drive  
 Suite 200  
 Boca Raton, FL 33487  
 561-406-4094  
 VerticalBridge.com

**Table 1 – Proposed Equipment to be installed:**

| Antenna/Equipment |           |          |                                |              |
|-------------------|-----------|----------|--------------------------------|--------------|
| Mount (ft.)       | RAD (ft.) | Qty.     | Antenna                        | Type         |
| 280.0             | -         | <b>3</b> | <b>Site Pro 1 VFA14-HD</b>     | <b>Mount</b> |
|                   | 280.0     | 3        | RFS APX16DWV-16DWV-S-E-ACU     | Panel        |
|                   |           | 3        | RFS APXVAARR24_43-U-NA20       | Panel        |
|                   |           | 3        | Ericsson KRY 112144            | TMA          |
|                   |           | 3        | Ericsson KRY 112 89-4          | TMA          |
|                   |           | 3        | Ericsson RRU 4449 B71B12       | RRU          |
|                   |           | <b>3</b> | <b>Ericsson AIR6488 2.5GHz</b> | Panel        |
|                   |           | <b>3</b> | <b>Ericsson AIR 3246 B66</b>   | Panel        |
|                   |           | <b>3</b> | <b>Ericsson 4415 B25</b>       | RRU          |

Note: Proposed equipment shown in bold.

**Mount Analysis Criteria**

The mount was reviewed comparatively using the following design criteria.

| Company                       | Site Pro 1            | Vertical Bridge                                 |
|-------------------------------|-----------------------|---|
| State                         | N/A                   | Connecticut                                     |
| City / County Building Code   | N/A                   | Fairfield County (IBC 2015)                     |
| TIA/EIA Standard Code         | TIA-222-G             | TIA-222-G                                       |
| Basic Wind Speed              | 180 MPH ( $V_{ult}$ ) | 115 MPH ( $V_{ult}$ )<br>/ 89 MPH ( $V_{asd}$ ) |
| Basic Wind Speed w/ Ice       | 60 MPH / 2.75" Ice    | 50 MPH / 0.75" Ice                              |
| Exposure Category             | B or C                | C   |
| Topographic Category (Height) | 1 (0.0 ft)            | 1 (0.0 ft)                                      |
| Risk Category                 | I or II               | II  |
| Mount Height                  | 400 ft                | 280 ft  |
| Normal Wind Load              | 2400 lbs              | 525 lbs   |
| Normal Wind Load (Ice)        | 700 lbs               | 166 lbs   |
| Tangential Wind Load          | 2400 lbs              | 208 lbs   |
| Tangential Wind Load (Ice)    | 700 lbs               | 66 lbs  |
| Weight Per Mount Pipe         | 1200 lbs              | 227 lbs   |
| Weight Per Mount Pipe (Ice)   | 2800 lbs              | 439 lbs   |

Note: Loads are given per mounting location and assume (4) locations per sector and symmetric loading.



Vertical Bridge Engineering, LLC  
750 Park of Commerce Drive  
Suite 200  
Boca Raton, FL 33487  
561-406-4094  
VerticalBridge.com

Based on **Site Pro 1's** evaluation and **Vertical Bridge Engineering's** review, **it is acceptable** for the proposed equipment described in Table 1 above to be installed on the existing mount. This review is only valid for the Site Pro 1 VFA14-HD. If any other mount is used another mount analysis should be completed.

If the final antenna configuration installed differs from what is proposed above, an additional assessment should be completed to verify the structural impact.

### **DISCLAIMER OF WARRANTIES**

The engineering services provided by Vertical Bridge Engineering, LLC in connection with the Mount Review Letter are limited to a structural assessment of the existing mount structure to support the proposed equipment. Vertical Bridge Engineering, LLC did not analyze the capacity or assess the condition of the existing structure to support the original tower design loads. The design of all structural systems to support the proposed loads and transfer them to the existing building structure will be prepared by others.

Vertical Bridge Engineering, LLC makes no warranties, expressed or implied, in connection with this report and disclaims any liability arising from the ability of the existing structure to support the design loads for which the mount was originally designed. Vertical Bridge Engineering, LLC will not be responsible whatsoever for or on account of, direct, indirect, punitive, special, consequential and/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 Vertical Bridge Engineering, LLC pursuant to this report will be limited to the total fee received for preparation of this report.

We appreciate the opportunity of providing our professional services to you. If you have any questions or need further assistance on this project, please feel free to give us a call.

Sincerely,

Review and Report by:

Luke Myrick, EIT  
Design Engineer

Reviewed by:

Michael T. De Boer, PE  
Vice President of Structural Engineering



Vertical Bridge Engineering, LLC  
750 Park of Commerce Drive  
Suite 200  
Boca Raton, FL 33487  
561-406-4094  
VerticalBridge.com

## Attachment 1: Calculations

## SUPER XLD Heavy-Duty V-Frames



### Sector Frames - Super XLD HD V-Frame

- SUPER XLD - Our most robust Sector Frame designed for the most extreme loading conditions
- Features our **New BCAM™** Taper Adjustment System  
Easily adjust taper of a fully loaded frame while mounted to tower with battery operated impact gun, by tightening or loosening one nut (Infinitely adjustable from -2.5 to 6 degrees)
- Features our **New Quick-Plate™** for easy grounding and addition of RRU Mounting pipes or Unistrut  
Integrated plates accommodate up to eight lugs per plate for grounding (there are four plates per V-Frame)  
Slotted holes allow attachment of 2-3/8" - 4-1/2" OD pipes to support RRU's (Pipe and U-Bolts purchased separately in hardware section)  
The 3/8" holes can also be used to attach Unistrut to the frame
- Includes Two Stiff Arms and hardware to mount 2-3/8" & 2-7/8" Antenna Mounting Pipes (ordered separately this page or in hardware section)
- Frames rotate for easy azimuth adjustment
- Typical Loading info for VFA10-HD (per antenna pipe)
- 400' Mount Height / Structure Class I or II / Exposure Category B or C
- 180 mph Ultimate Wind Speed / 2.75" Ice Thickness
- Equip Wind Load: 2,400 lb • Equip Dead Load: 1,200 lb
- Equip Wind Load with Ice: 700 lb
- Equip Dead Load with Ice: 2,800lb
- **LEG SIZES 1-1/2" to 9-1/2" Round Legs and 3" to 6" Angle**

On Mon, Apr 29, 2019 at 12:43 PM Mike De Boer <[MDeboer@verticalbridge.com](mailto:MDeboer@verticalbridge.com)> wrote:

This is not our place to decide if the mount will support (12) pipes or not.

We have been issued a PO to do a review of a provided mount analysis.

- **VFA14-HD • Super XLD HD V-Frame - Stiff Arm 2, FW 14'-6"**

- Face Width 14'-6" • Stiff Arms - 2
- Weight - 701 lbs
- Hardware to mount (4) Antennas
- Leg Sizes 1-1/2" to 9-1/2" Round Legs and 3" to 6" Angles
- SUPER XLD - Our most robust Sector Frame designed for the most extreme loading conditions
- Features our New BCAM™ Taper Adjustment System  
Easily adjust taper of fully loaded frame while mounted to tower with a battery operated impact gun by tightening or loosening one nut (Infinitely adjustable from -2.5 to 6 degrees)
- Features our new Quick-Plate™ for easy grounding and addition of RRU Mounting pipes or Unistrut  
Integrated plates accommodate up to eight lugs per plate for grounding (there are four plates per V-Frame)  
Slotted holes allow attachment of 2-3/8" - 4-1/2" OD pipes to support RRU's (Pipe and U-Bolts purchased separately in hardware section)  
The 3/8" holes can also be used to attach Unistrut to the frame
- Includes Two Stiff Arms and hardware to mount 2-3/8" and 2-7/8" Antenna Mounting Pipes (ordered separately in hardware section)
- Frames rotate for easy azimuth adjustment
- Typical Loading info for VFA10-HD (per antenna pipe)
- 400' Mount Height / Structure Class I or II / Exposure Category B or C
- 180 mph Ultimate Wind Speed / 2.75" Ice Thickness
- Equipment Wind Load: 2,400 lb
- Equipment Dead Load: 1,200 lb
- Equipment Wind Load with Ice: 700 lb
- Equipment Dead Load with Ice: 2,800lb
- **Additional Sizes and other Sector Frames** ( [http://www.sitepro1.com/store/cart.php?m=product\\_list&c=56](http://www.sitepro1.com/store/cart.php?m=product_list&c=56))
- **Tower Steel Products** ( [http://www.sitepro1.com/store/cart.php?m=product\\_list&c=53](http://www.sitepro1.com/store/cart.php?m=product_list&c=53))
- **Complete Product Catalog** (<http://www.sitepro1.com/store/cart.php>)

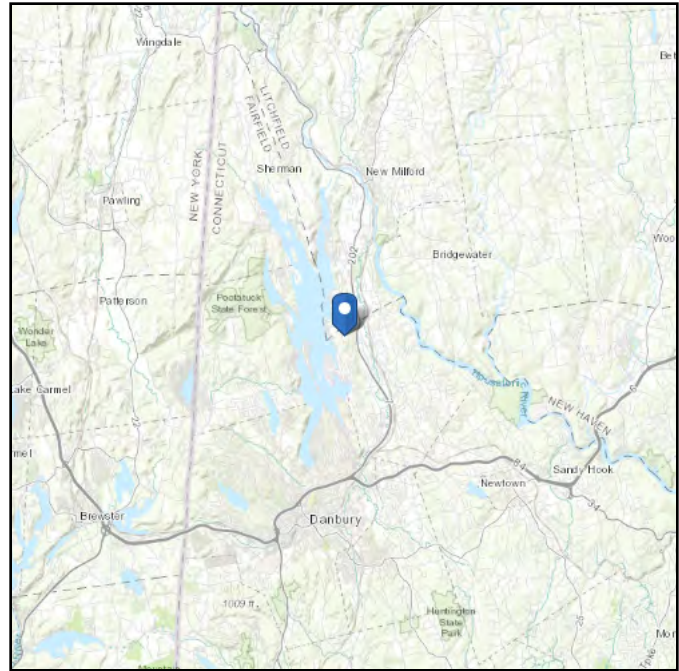


# ASCE 7 Hazards Report

**Address:**  
No Address at This Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** II  
**Soil Class:** D - Stiff Soil

**Elevation:** 718.96 ft (NAVD 88)  
**Latitude:** 41.493439  
**Longitude:** -73.428817



## Wind

### Results:

|              |          |
|--------------|----------|
| Wind Speed:  | 115 Vmph |
| 10-year MRI  | 76 Vmph  |
| 25-year MRI  | 85 Vmph  |
| 50-year MRI  | 90 Vmph  |
| 100-year MRI | 96 Vmph  |

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

**Date Accessed:** Mon Apr 29 2019

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

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

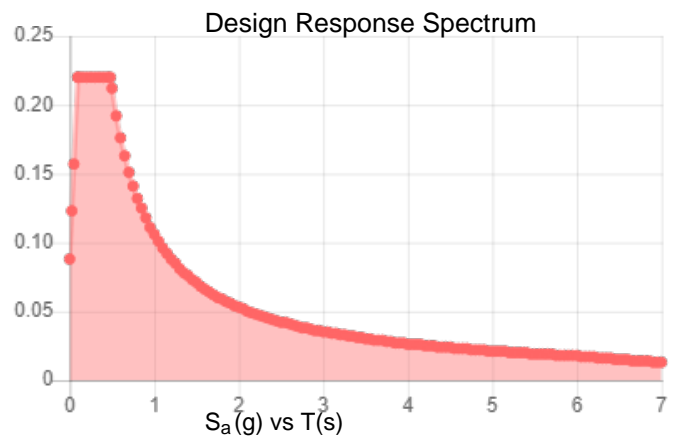
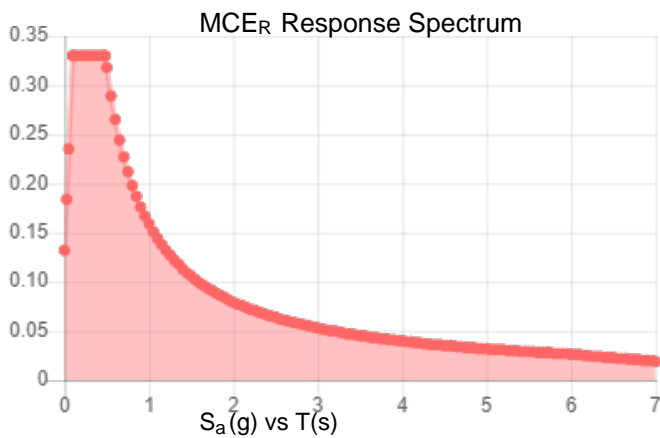


**Site Soil Class:** D - Stiff Soil

**Results:**

|            |       |                    |       |
|------------|-------|--------------------|-------|
| $S_S$ :    | 0.207 | $S_{DS}$ :         | 0.22  |
| $S_1$ :    | 0.066 | $S_{D1}$ :         | 0.106 |
| $F_a$ :    | 1.6   | $T_L$ :            | 6     |
| $F_v$ :    | 2.4   | PGA :              | 0.111 |
| $S_{MS}$ : | 0.33  | PGA <sub>M</sub> : | 0.175 |
| $S_{M1}$ : | 0.159 | F <sub>PGA</sub> : | 1.579 |
|            |       | $I_e$ :            | 1     |

**Seismic Design Category** B



**Data Accessed:**

Mon Apr 29 2019

**Date Source:**

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

## Ice

---

### Results:

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

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

**Date Accessed:** Mon Apr 29 2019

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

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

---

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

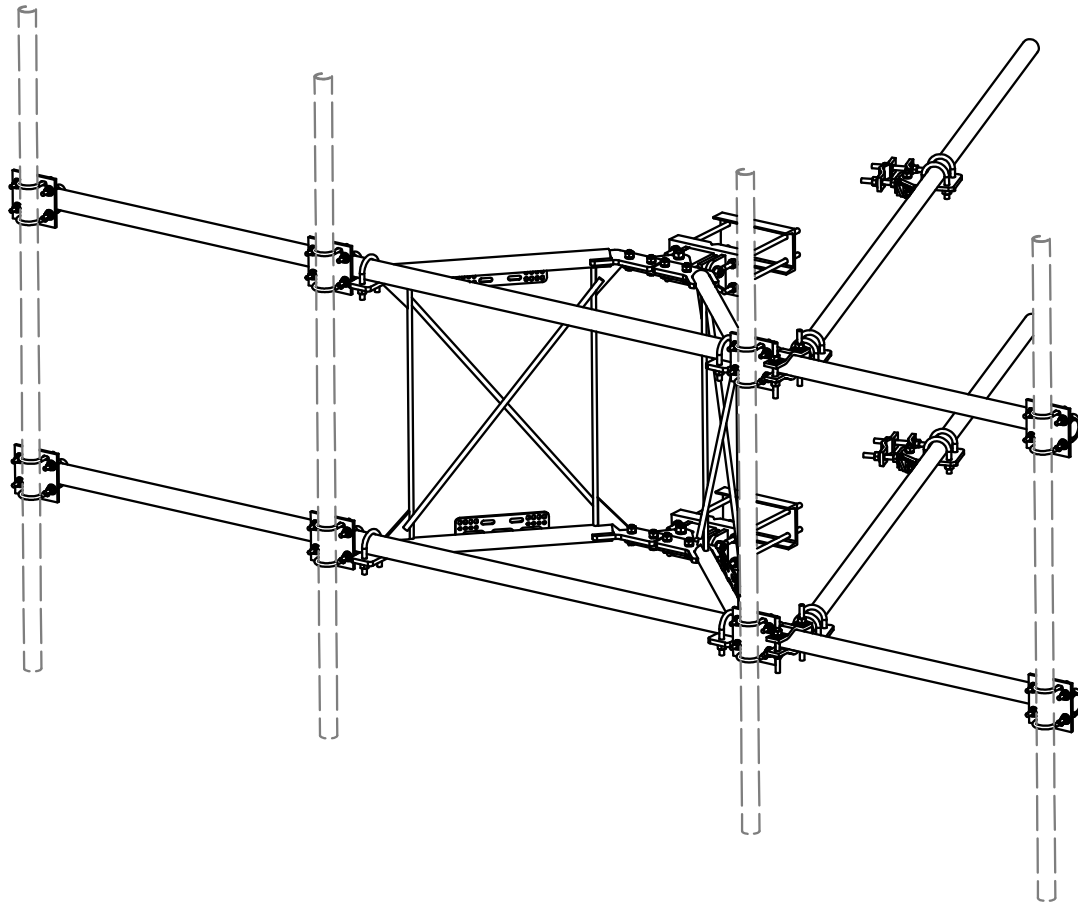
ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.



Vertical Bridge Engineering, LLC  
750 Park of Commerce Drive  
Suite 200  
Boca Raton, FL 33487  
561-406-4094  
VerticalBridge.com

## Attachment 2: Mount Drawings




| PARTS LIST |     |          |   |            |             |         |
|------------|-----|----------|---|------------|-------------|---------|
| ITEM       | QTY | PART NO. | PART DESCRIPTION                            | LENGTH     | UNIT WT.    | NET WT. |
| 1          | 2   | X-VFAW   | SUPPORT ARM                                 |            | 71.41       | 142.81  |
| 2          | 2   | X-HDPMW  | HEAVY DUTY PIPE MOUNT WELDMENT              |            | 18.61       | 37.21   |
| 3          | 2   | X-HDPMBP | HEAVY DUTY PIPE MOUNT BACKING PLATE         | 12 in      | 13.44       | 26.89   |
| 4          | 2   | X-VFAPL3 | VFA-HD PIVOT PLATE                          | 24 in      | 9.69        | 19.38   |
| 5          | 1   | X-LPB    | LOWER PIVOT BRACKET                         |            | 8.84        | 8.84    |
| 6          | 1   | X-UPB    | UPPER PIVOT BRACKET                         |            | 8.84        | 8.84    |
| 7          | 4   | X-SPTB   | SLIDING PIPE TIE BACK PLATE                 | 5 1/2 in   | 5.87        | 23.49   |
| 8          | 4   | X-TBCA   | TIE BACK CLIP ANGLE                         |            | 2.01        | 8.02    |
| 9          | 8   | SCX2     | CROSSOVER PLATE                             | 7 in       | 4.80        | 38.37   |
| 10         | 4   | MCP      | CLAMP HALF 1/2" THICK, 11-5/8" LONG         | 12 1/16 in | 3.59        | 14.37   |
| 11         | 8   | DCP      | 1/2" THICK, 5-3/4" CTR TO CENTER CLAMP HALF | 8 1/8 in   | 2.42        | 19.36   |
| 13         | 2   | P2126    | 2-3/8" X 126" (2" SCH. 40) GALVANIZED PIPE  | 126 in     | 40.75       | 81.50   |
| 12         | 2   | P30174   | 2-7/8" O.D. x 174" SCH. 40 PIPE             | 174 in     | 84.20       | 168.39  |
| 14         | 6   | A34212   | 3/4" x 2-1/2" UNC HEX BOLT (A325)           | 2 1/2 in   | 0.48        | 2.87    |
| 15         | 6   | G34LW    | 3/4" HDG LOCKWASHER                         |            | 0.04        | 0.26    |
| 16         | 6   | G34NUT   | 3/4" HDG HEAVY 2H HEX NUT                   |            | 0.21        | 1.27    |
| 19         | 8   | G58R-18  | 5/8" x 18" THREADED ROD (HDG.)              | 18 in      | 0.40        | 3.19    |
| 20         | 4   | G58R-12  | 5/8" x 12" THREADED ROD (HDG.)              |            | 1.05        | 4.18    |
| 21         | 8   | G58R-8   | 5/8" x 8" THREADED ROD (HDG.)               |            | 0.70        | 5.58    |
| 17         | 4   | X-UB5300 | 5/8" X 3" X 5-1/4" X 2-1/2" U-BOLT (HDG.)   |            | 1.15        | 4.60    |
| 18         | 8   | X-UB5258 | 5/8" X 2-5/8" X 4-1/2" X 2" U-BOLT (HDG.)   |            | 1.00        | 8.00    |
| 23         | 8   | A582114  | 5/8" x 2-1/4" HDG A325 HEX BOLT             | 2 1/4 in   | 0.31        | 2.50    |
| 22         | 8   | G5804    | 5/8" x 4" HDG HEX BOLT GR5                  |            | 0.44        | 3.55    |
| 24         | 4   | G5802    | 5/8" x 2" HDG HEX BOLT GR5                  |            | 0.27        | 1.08    |
| 25         | 20  | G58FW    | 5/8" HDG USS FLATWASHER                     | 1/8 in     | 0.07        | 1.41    |
| 26         | 66  | G58LW    | 5/8" HDG LOCKWASHER                         |            | 0.03        | 1.72    |
| 27         | 70  | G58NUT   | 5/8" HDG HEAVY 2H HEX NUT                   |            | 0.13        | 9.09    |
| 28         | 32  | X-UB1300 | 1/2" X 3" X 5" X 2" GALV U-BOLT             |            | 0.74        | 23.64   |
| 29         | 16  | X-UB1212 | 1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)   |            | 0.63        | 10.00   |
| 30         | 64  | G12FW    | 1/2" HDG USS FLATWASHER                     | 3/32 in    | 0.03        | 2.18    |
| 31         | 64  | G12LW    | 1/2" HDG LOCKWASHER                         | 1/8 in     | 0.01        | 0.89    |
| 32         | 64  | G12NUT   | 1/2" HDG HEAVY 2H HEX NUT                   |            | 0.07        | 4.58    |
|            |     |          |   |            | TOTAL WT. # | 700.78  |

| REV              | DESCRIPTION OF REVISIONS          | CPD | BY  | DATE      |
|------------------|-----------------------------------|-----|-----|-----------|
| B                | CHANGED TIE-BACK BACK CONNECTION  |     | CEK | 7/31/2017 |
| A                | CHANGED TIE-BACK FRONT CONNECTION |     | CEK | 2/2/2017  |
| REVISION HISTORY |                                   |     |     |           |

**TOLERANCE NOTES**  
 TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:  
 SAWED, SHEARED AND GAS CUT EDGES ( $\pm 0.030"$ )  
 DRILLED AND GAS CUT HOLES ( $\pm 0.030"$ ) - NO CONING OF HOLES  
 LASER CUT EDGES AND HOLES ( $\pm 0.010"$ ) - NO CONING OF HOLES  
 BENDS ARE  $\pm 1/2$  DEGREE  
 ALL OTHER MACHINING ( $\pm 0.030"$ )  
 ALL OTHER ASSEMBLY ( $\pm 0.060"$ )

PROPRIETARY NOTE:  
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

| DESCRIPTION  |          |               |
|--|----------|---------------|
| 14' 6" HEAVY DUTY<br>V-FRAME ASSEMBLY<br>WITH TWO STIFF ARMS |          |               |
| CPD NO.  | DRAWN BY | ENG. APPROVAL |
|  | CEK      | 1/25/2017     |
| CLASS  | SUB      | DRAWING USAGE |
| 81   | 02       | CUSTOMER      |
|  |          | CHECKED BY    |
|  |          | BMC           |
|  |          | 8/4/2017      |



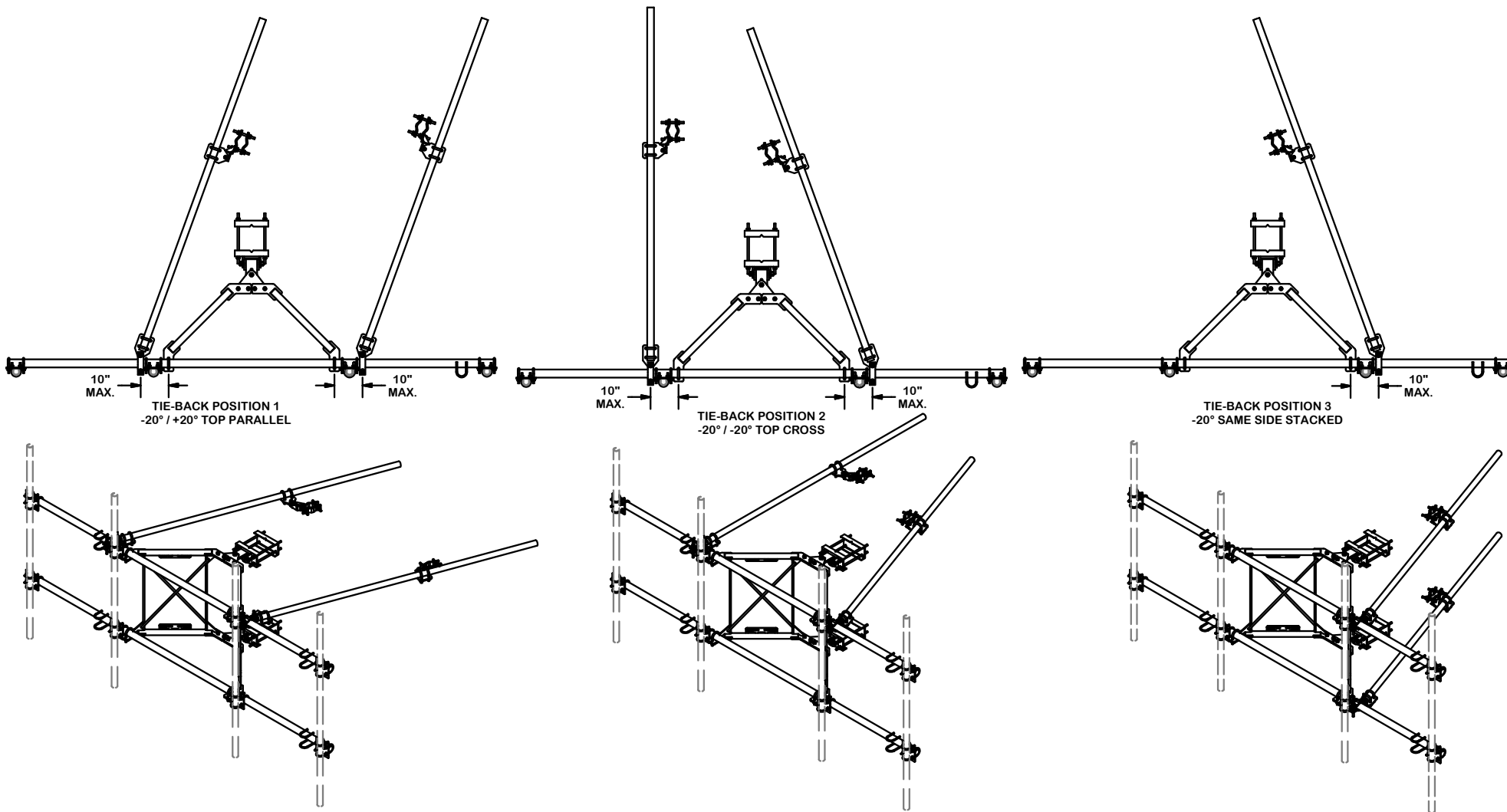
**A valmont COMPANY**

Locations:  
 New York, NY  
 Atlanta, GA  
 Los Angeles, CA  
 Plymouth, IN  
 Salem, OR  
 Dallas, TX

Engineering  
 Support Team:  
 1-888-753-7446

|          |          |
|----------|----------|
| PART NO. | VFA14-HD |
| DWG. NO. | VFA14-HD |

# TIE-BACK POSITIONS



| REV              | DESCRIPTION OF REVISIONS          | CPD | BY  | DATE      |
|------------------|-----------------------------------|-----|-----|-----------|
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| A                | CHANGED TIE-BACK FRONT CONNECTION |     | CEK | 2/2/2017  |
| REVISION HISTORY |                                   |     |     |           |

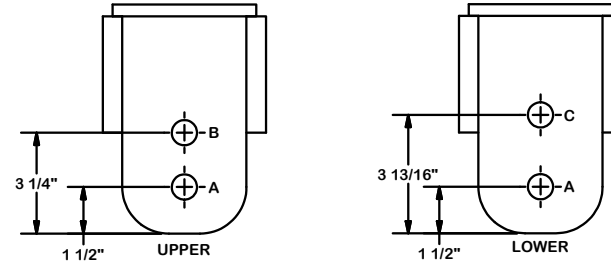
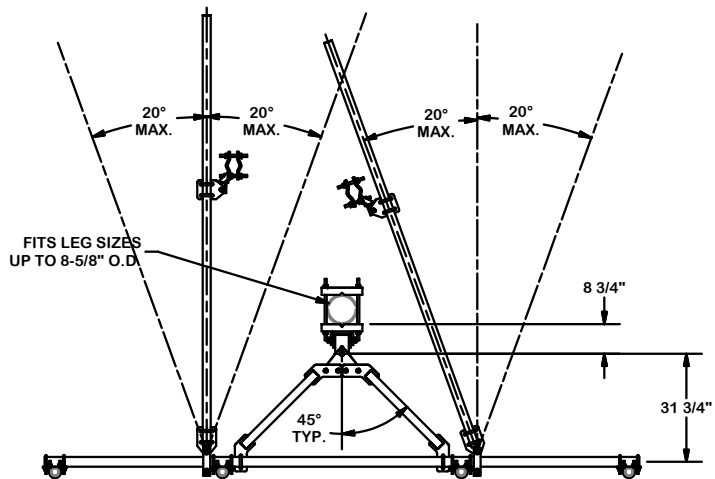
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 ALL OTHER ASSEMBLY ( $\pm 0.060"$ )

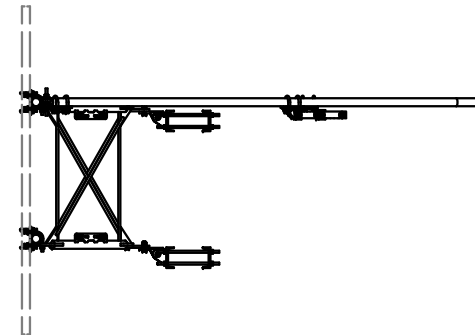
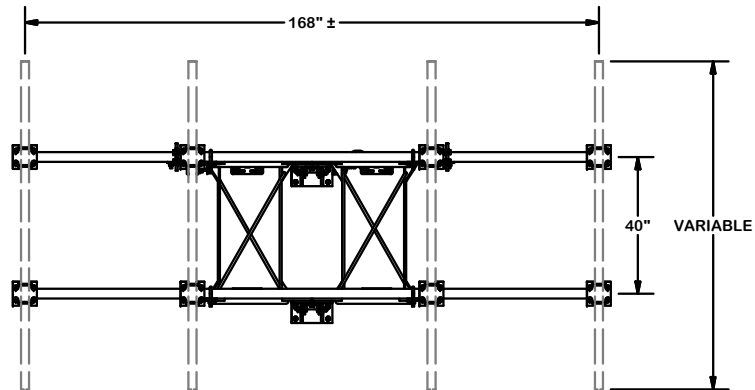
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| DESCRIPTION  |               |
|--|---------------|
| 14' 6" HEAVY DUTY<br>V-FRAME ASSEMBLY<br>WITH TWO STIFF ARMS |               |
| CPD NO.  | DRAWN BY      |
|  | CEK 1/25/2017 |
| CLASS  | DRAWING USAGE |
| 81   | CUSTOMER      |
| SUB  | CHECKED BY    |
| 02   | BMC 8/4/2017  |
| ENG. APPROVAL  |               |

|   |  |          |          |          |  |      |        |
|---|--|----------|----------|----------|--|------|--------|
| <br><small>A valmont COMPANY</small>  | <small>Locations:<br/>         New York, NY<br/>         Atlanta, GA<br/>         Los Angeles, CA<br/>         Plymouth, IN<br/>         Salem, OR<br/>         Dallas, TX</small> |          |          |          |  |      |        |
|   | <small>Engineering<br/>         Support Team:<br/>         1-888-753-7446</small>  |          |          |          |  |      |        |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">PART NO.</td> <td style="text-align: center;">VFA14-HD</td> </tr> <tr> <td style="width: 50%;">DWG. NO.</td> <td style="text-align: center;">VFA14-HD</td> </tr> </table> | PART NO.   | VFA14-HD | DWG. NO. | VFA14-HD | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">PAGE</td> <td style="text-align: center;">2 OF 5</td> </tr> </table> | PAGE | 2 OF 5 |
| PART NO.  | VFA14-HD   |          |          |          |  |      |        |
| DWG. NO.  | VFA14-HD   |          |          |          |  |      |        |
| PAGE  | 2 OF 5   |          |          |          |  |      |        |



- NOTES:**
1. USE HOLE "A" IN UPPER AND LOWER BRACKETS FOR STRAIGHT LEGS.
  2. USE HOLE "A" IN UPPER BRACKET AND HOLE "C" IN LOWER BRACKET FOR 2" IN 20' TAPER LEGS (3.309°)
  3. USE HOLE "B" IN UPPER BRACKET AND HOLE "C" IN LOWER BRACKET FOR 6" IN 20' TAPER LEGS. (0.827°)



| REV              | DESCRIPTION OF REVISIONS          | CPD | BY  | DATE      |
|------------------|-----------------------------------|-----|-----|-----------|
| B                | CHANGED TIE-BACK BACK CONNECTION  |     | CEK | 7/31/2017 |
| A                | CHANGED TIE-BACK FRONT CONNECTION |     | CEK | 2/2/2017  |
| REVISION HISTORY |                                   |     |     |           |

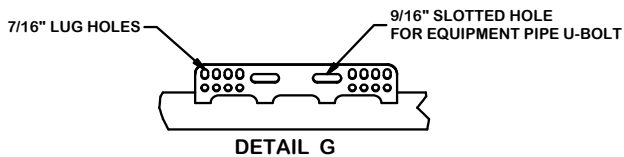
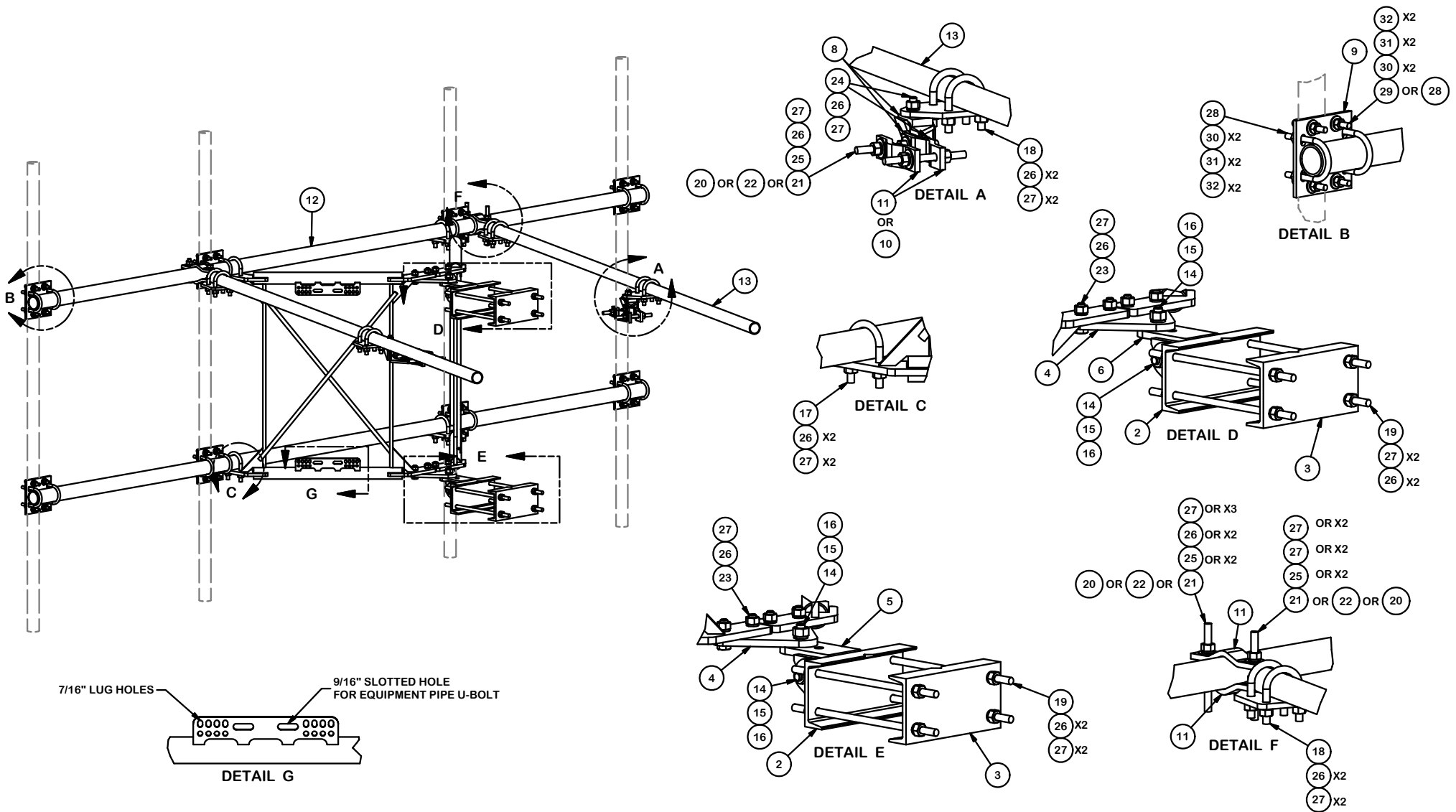
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 ALL OTHER ASSEMBLY ( $\pm 0.060"$ )

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| DESCRIPTION |               | 14' 6" HEAVY DUTY V-FRAME ASSEMBLY WITH TWO STIFF ARMS |              |
|-------------|---------------|--|--------------|
| CPD NO.     | DRAWN BY      | ENG. APPROVAL  |              |
|             | CEK 1/25/2017 |  |              |
| CLASS       | SUB           | DRAWING USAGE  | CHECKED BY   |
| 81          | 02            | CUSTOMER   | BMC 8/4/2017 |

| SITE PRO 1                                  |  | Locations:<br>New York, NY<br>Atlanta, GA<br>Los Angeles, CA<br>Plymouth, IN<br>Salem, OR<br>Dallas, TX |          |
|---|--|---|----------|
| Engineering Support Team:<br>1-888-753-7446 |  | PART NO.  | VFA14-HD |
| A valmont COMPANY                           |  | DWG. NO.  | VFA14-HD |



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DESCRIPTION  
 14' 6" HEAVY DUTY  
 V-FRAME ASSEMBLY  
 WITH TWO STIFF ARMS

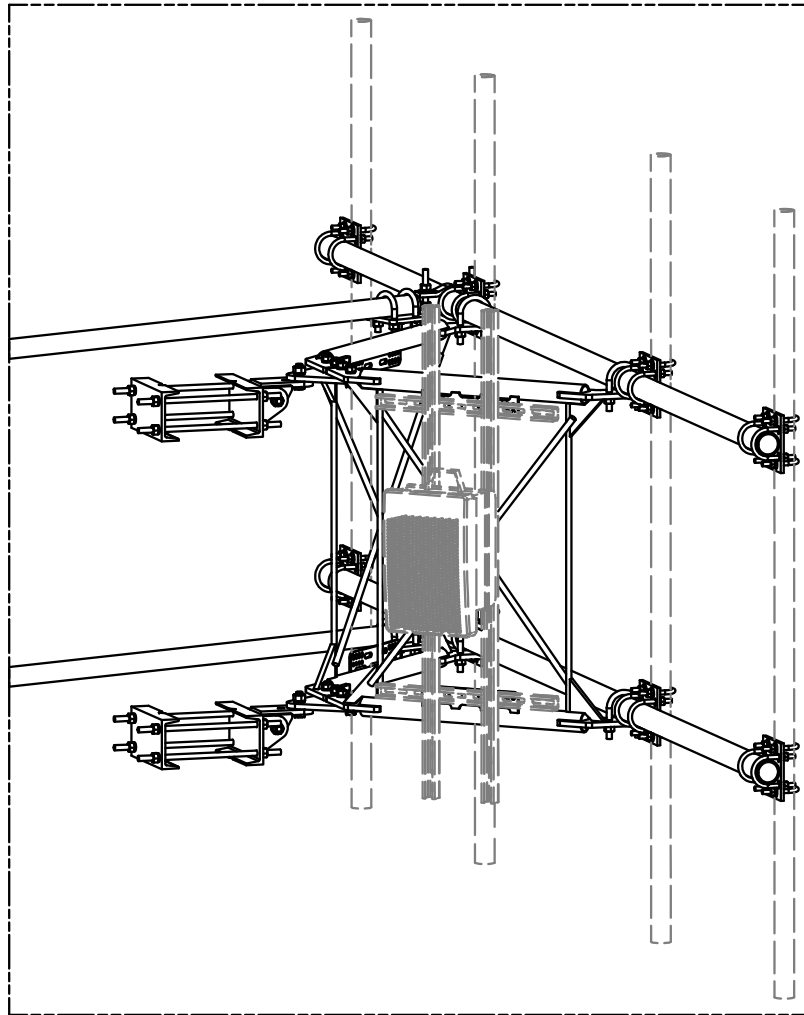
**SITE PRO 1**  
 Engineering Support Team:  
 1-888-753-7446

Locations:  
 New York, NY  
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 Plymouth, IN  
 Salem, OR  
 Dallas, TX

| REV              | DESCRIPTION OF REVISIONS          | CPD | BY  | DATE      |
|------------------|-----------------------------------|-----|-----|-----------|
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| REVISION HISTORY |                                   |     |     |           |

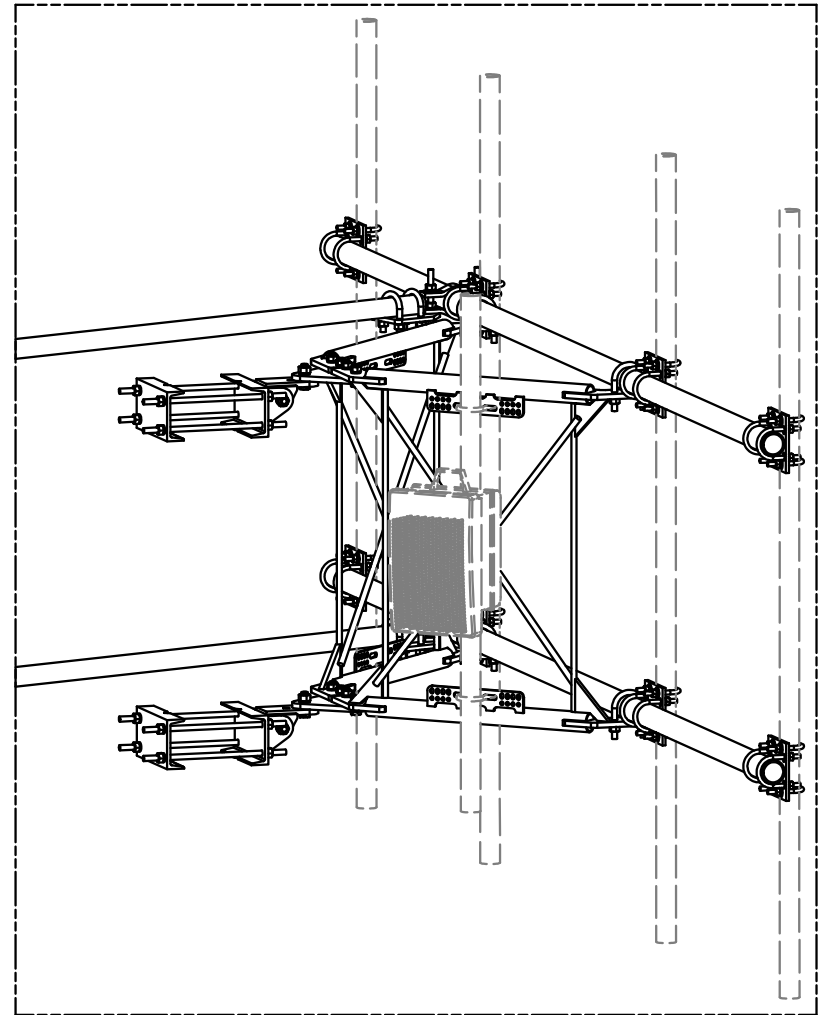
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| CPD NO. | DRAWN BY      | ENG. APPROVAL |
|         | CEK 1/25/2017 |               |
| CLASS   | DRAWING USAGE | CHECKED BY    |
| 81      | CUSTOMER      | BMC 8/4/2017  |

|          |          |        |
|----------|----------|--------|
| PART NO. | VFA14-HD | PAGE   |
| DWG. NO. | VFA14-HD | 4 OF 5 |



UNISTRUT AND HARDWARE  
SOLD SEPARATELY.

REQUIRES 3/8" HARDWARE



EQUIPMENT PIPE AND HARDWARE  
SOLD SEPARATELY.

REQUIRES 1/2" HARDWARE  
AND 2-3/8" TO 4-1/2" O.D. PIPE

**TOLERANCE NOTES**

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DESCRIPTION  
 14' 6" HEAVY DUTY  
 V-FRAME ASSEMBLY  
 WITH TWO STIFF ARMS

**SITE PRO 1**  
 A valmont COMPANY

Locations:  
 New York, NY  
 Atlanta, GA  
 Los Angeles, CA  
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Engineering  
 Support Team:  
 1-888-753-7446

| REV              | DESCRIPTION OF REVISIONS          | CPD | BY  | DATE      |
|------------------|-----------------------------------|-----|-----|-----------|
| B                | CHANGED TIE-BACK BACK CONNECTION  |     | CEK | 7/31/2017 |
| A                | CHANGED TIE-BACK FRONT CONNECTION |     | CEK | 2/2/2017  |
| REVISION HISTORY |                                   |     |     |           |

| CPD NO. | DRAWN BY      | ENG. APPROVAL |
|---------|---------------|---------------|
|         | CEK 1/25/2017 |               |
| CLASS   | SUB           | DRAWING USAGE |
| 81      | 02            | CUSTOMER      |
|         |               | CHECKED BY    |
|         |               | BMC 8/4/2017  |

| PART NO. | DWG. NO. |
|----------|----------|
| VFA14-HD | VFA14-HD |





Vertical Bridge Engineering, LLC  
750 Park of Commerce Drive  
Suite 200  
Boca Raton, FL 33487  
561-406-4094  
VerticalBridge.com

## Attachment 3: Collocation Application



|  |                   |
|--|-------------------|
| <input type="checkbox"/> NEW LEASE <input type="checkbox"/> AMENDMENT TO EXISTING LEASE <input type="checkbox"/> RECONTRACT <input type="checkbox"/> BTS ANCHOR TENANT | INTERNAL USE ONLY |
|  | APP VERSION #     |
|  | LEASE #           |
|  | AMENDMENT #       |

|  |                               |   |  |
|--|-------------------------------|---|--|
| <b>PLEASE RETURN THIS APPLICATION VIA EMAIL TO:</b><br><b>Vertical Bridge</b><br>750 Park of Commerce Drive<br>Suite 200<br>Boca Raton, FL 33487<br>Attn: Regional Leasing Manager | E-Mail:<br><br><br><br>Phone: | VB Site Number:<br>VB Site Name:<br>Application Date:<br>Revision Dates:<br>RSM Approval: |  |
|--|-------------------------------|---|--|

APPLICANT / CARRIER INFORMATION

|   |  |                           |  |
|---|--|---------------------------|--|
| <b>Carrier Name:</b>  |  | <b>Contact Name:</b>      |  |
| <b>Carrier Site Number:</b>                                 |  | <b>Contact Number:</b>    |  |
| <b>Carrier Site Name:</b>                                   |  | <b>Contact Fax:</b>       |  |
| <b>Carrier Legal Entity Name:</b>                           |  | <b>Contact Address:</b>   |  |
| <b>State of registration:</b>                               |  |                           |  |
| <b>Type of entity (LP, LLC, Corp) d/b/a (if applicable)</b> |  |                           |  |
| <b>Notice Address for Lease:</b>                            |  | <b>Contact E-mail:</b>    |  |
| <b>With copies to:</b>                                      |  | <b>Additional E-mail:</b> |  |
| <b>Carrier Invoice Address:</b>                             |  | <b>Other:</b>             |  |
| <b>Carrier Invoice Contact - Name, Title, Phone No.</b>     |  | <b>Carrier NOC#</b>       |  |

ADDITIONAL CONTACT INFORMATION

|  |  |
|--|--|
| <b>Leasing Contact Name/Number:</b>      |  |
| <b>RF Contact Name/Number:</b>           |  |
| <b>Construction Contact Name/Number:</b> |  |
| <b>Emergency Contact Name/Number:</b>    |  |

SITE INFORMATION – This information can be found and should match the information on [www.verticalbridge.com](http://www.verticalbridge.com)

|                      |  |   |                                   |  |
|----------------------|--|---|-----------------------------------|--|
| <b>Latitude:</b>     |  | N | <b>Existing Structure Type:</b>   |  |
| <b>Longitude:</b>    |  | W | <b>Existing Structure Height:</b> |  |
| <b>Site Address:</b> |  |   |                                   |  |

FREQUENCY/TECHNOLOGY INFORMATION

|   |  |
|---|--|
| <b>Type of Technology for all equipment (i.e., 3G, LTE, CMDA, MW, WiFi, TV, etc.)</b>   |  |
| <b>TX Frequency (MHz)</b>   |  |
| <b>RX Frequency (MHz)</b>   |  |
| Tenants using an unlicensed band must provide exact Frequency Channels and Call Sign(s) to be utilized. (Providing the band range only will not be accepted.) |  |

PLEASE PROVIDE BRIEF DESCRIPTION OF GENERAL SCOPE OF WORK







| PROPOSED FINAL CONFIGURATION TOTALS |       |
|-------------------------------------|-------|
| EQUIPMENT TYPE                      | TOTAL |
| Panel Antennas                      |       |
| Omni/Whip Antennas                  |       |
| RRU                                 |       |
| TMA                                 |       |
| Diplexer / Triplexer                |       |
| Bias T                              |       |
| Surge Suppressor                    |       |
| MW Dish                             |       |
| Ice Shield                          |       |
| ODU                                 |       |
| Filter                              |       |
| Combiner                            |       |
| Junction Box                        |       |
| RET                                 |       |
| Equipment Cabinets                  |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |
| Other (Please specify)              |       |

| PROPOSED FINAL CONFIGURATION TOTALS |       |
|-------------------------------------|-------|
| LINE TYPE                           | TOTAL |
| Coax                                |       |
| Hybrid                              |       |
| CAT5                                |       |
| DC/Power                            |       |
| RET                                 |       |
| Fiber                               |       |

| ADDITIONAL EQUIPMENT INFORMATION  |
|---|
| <ul style="list-style-type: none"> <li>• RRUs, TMAs and ODUs are required to be installed directly behind the antennas / MW dish. Otherwise there will be an additional charge.</li> <li>• All equipment lines are required to be installed inside the tower when space is available. Carriers will be charged an additional \$25.00 per line per month if equipment lines are installed on the outside of the tower even though there is available space inside the tower. Vertical Bridge must approve any installation of lines on the outside of the tower.</li> <li>• All tenant equipment must be installed within one continuous 10 ft vertical envelope. Exceeding this vertical space will be subject to additional rent.</li> </ul> |



**GROUND / INTERIOR SPACE REQUIREMENTS**

|  |          |  |          |  |          |
|--|----------|--|----------|--|----------|
| <u>Total Ground / Interior Area Dimensions:</u><br><b>L' x W' = Total Square Feet Required</b> | <b>X</b> | (Including all Equipment (i.e., Shelter, Equipment Platform or Pad, Generator Pad, Generator Fuel Tank Pad, Antenna Sleds, etc. – provide details below) |          |  |          |
| Cabinet Area Dimensions (Pad/Platform)   | <b>X</b> | Cabinet Installation Type  |          |  |          |
| Shelter Pad Dimensions   | <b>X</b> | Shelter Manufacturer   |          |  |          |
| Rooftop Antenna Total Area Required  | <b>X</b> | Antenna Sled Dimensions (per sector)   | <b>X</b> | Antenna Wall Mount Dimensions (per sector) | <b>X</b> |

**EQUIPMENT CABINET REQUIREMENTS (Required for rooftops or Vertical Bridge interior space)**

|                                    |  |                                   |  |               |  |
|------------------------------------|--|-----------------------------------|--|---------------|--|
| <b>Number of Cabinets Required</b> |  | Cabinet Dimensions (L' x W' x H') |  | Manufacturer: |  |
| <b>Number of Cabinets Required</b> |  | Cabinet Dimensions (L' x W' x H') |  | Manufacturer: |  |
| <b>Number of Cabinets Required</b> |  | Cabinet Dimensions (L' x W' x H') |  | Manufacturer: |  |
| Equipment Cabinet Comments         |  |                                   |  |               |  |

**GENERATOR REQUIREMENTS**

|                                    |  |                     |                        |                |  |
|------------------------------------|--|---------------------|------------------------|----------------|--|
| <b>Generator Required?:</b>        |  | Generator Fuel Type |                        | Generator Size |  |
| Generator Pad Dimensions           |  |                     | Generator Manufacturer |                |  |
| Generator Fuel Tank Pad Dimensions |  |                     | Fuel Tank Manufacturer |                |  |

**AC POWER REQUIREMENTS**

|                   |  |  |  |
|-------------------|--|--|--|
| <b>Meter Type</b> |  | Estimated Monthly Utility Usage Amount |  |
| Voltage           |  | Total Amperage                         |  |

**FIBER / BACKHAUL**

|                                  |  |                           |  |                                |  |
|----------------------------------|--|---------------------------|--|--------------------------------|--|
| <b>Fiber Installation Status</b> |  | Fiber Provider            |  |                                |  |
| Cable Type                       |  | Number of Points of Entry |  | Conduit/Riser Size (in inches) |  |

**STRUCTURAL ANALYSIS DETAILS**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| <b>Structural Hardcopies Required?</b> |  | If wet seals required, please provide address: |  |  |  |
|--|--|--|--|--|--|

**ADDITIONAL COMMENTS**

|  |
|--|
|  |
|--|

# Exhibit F



## RADIO FREQUENCY EMISSIONS ANALYSIS REPORT EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11196A

Brookfield/Junction RD.  
37 Carmen Hill Road  
Brookfield, Connecticut 06804

**May 15, 2019**

**EBI Project Number: 6219001633**

| Site Compliance Summary                                    |                  |
|--|------------------|
| Compliance Status:   | <b>COMPLIANT</b> |
| Site total MPE% of FCC general population allowable limit: | <b>32.10%</b>    |



May 15, 2019

T-Mobile

Attn: Jason Overbey, RF Manager  
35 Griffin Road South  
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CT11196A - Brookfield/Junction RD.

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **37 Carmen Hill Road in Brookfield, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits; therefore, it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately  $400 \mu\text{W}/\text{cm}^2$  and  $467 \mu\text{W}/\text{cm}^2$ , respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is  $1000 \mu\text{W}/\text{cm}^2$ . Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

## **CALCULATIONS**

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 37 Carmen Hill Road in Brookfield, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

- 1) 1 LTE channel (600 MHz Band) was considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 3) 6 GSM/UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 5) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

- 6) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 7) 4 LTE channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 8) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 9) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 10) The antennas used in this modeling are the RFS APX16DWV-I6DWV-S-E-A20 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24\_43-U-NA20 for the 600 MHz / 700 MHz / 1900 MHz channel(s), the Ericsson AIR6488 for the 2500 MHz channel(s), the Ericsson AIR32 for the 1900 MHz / 2100 MHz channel(s) in Sector A, the RFS APX16DWV-I6DWV-S-E-A20 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24\_43-U-NA20 for the 600 MHz / 700 MHz / 1900 MHz channel(s), the Ericsson AIR6488 for the 2500 MHz channel(s), the Ericsson AIR32 for the 1900 MHz / 2100 MHz channel(s) in Sector B, the RFS APX16DWV-I6DWV-S-E-A20 for the 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24\_43-U-NA20 for the 600 MHz / 700 MHz / 1900 MHz channel(s), the Ericsson AIR6488 for the 2500 MHz channel(s), the Ericsson AIR32 for the 1900 MHz / 2100 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.



# EBI Consulting

environmental | engineering | due diligence

---

- 11) The antenna mounting height centerline of the proposed antennas is 280 feet above ground level (AGL).
- 12) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.
- 13) All calculations were done with respect to uncontrolled / general population threshold limits.

## T-Mobile Site Inventory and Power Data

|                     |                                   |                     |                                   |                     |                                   |
|---------------------|-----------------------------------|---------------------|-----------------------------------|---------------------|-----------------------------------|
| Sector:             | A                                 | Sector:             | B                                 | Sector:             | C                                 |
| Antenna #:          | 1                                 | Antenna #:          | 1                                 | Antenna #:          | 1                                 |
| Make / Model:       | RFS APX16DWV-16DWV-S-E-A20        | Make / Model:       | RFS APX16DWV-16DWV-S-E-A20        | Make / Model:       | RFS APX16DWV-16DWV-S-E-A20        |
| Frequency Bands:    | 1900 MHz / 2100 MHz               | Frequency Bands:    | 1900 MHz / 2100 MHz               | Frequency Bands:    | 1900 MHz / 2100 MHz               |
| Gain:               | 15.9 dBd / 15.9 dBd               | Gain:               | 15.9 dBd / 15.9 dBd               | Gain:               | 15.9 dBd / 15.9 dBd               |
| Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          |
| Channel Count:      | 6                                 | Channel Count:      | 6                                 | Channel Count:      | 6                                 |
| Total TX Power (W): | 180 Watts                         | Total TX Power (W): | 180 Watts                         | Total TX Power (W): | 180 Watts                         |
| ERP (W):            | 7,002.81                          | ERP (W):            | 7,002.81                          | ERP (W):            | 7,002.81                          |
| Antenna A1 MPE %:   | <b>0.32%</b>                      | Antenna B1 MPE %:   | <b>0.32%</b>                      | Antenna C1 MPE %:   | <b>0.32%</b>                      |
| Antenna #:          | 2                                 | Antenna #:          | 2                                 | Antenna #:          | 2                                 |
| Make / Model:       | RFS APXVAARR24_43-U-NA20          | Make / Model:       | RFS APXVAARR24_43-U-NA20          | Make / Model:       | RFS APXVAARR24_43-U-NA20          |
| Frequency Bands:    | 600 MHz / 700 MHz / 1900 MHz      | Frequency Bands:    | 600 MHz / 700 MHz / 1900 MHz      | Frequency Bands:    | 600 MHz / 700 MHz / 1900 MHz      |
| Gain:               | 12.95 dBd / 13.35 dBd / 15.65 dBd | Gain:               | 12.95 dBd / 13.35 dBd / 15.65 dBd | Gain:               | 12.95 dBd / 13.35 dBd / 15.65 dBd |
| Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          |
| Channel Count:      | 4                                 | Channel Count:      | 4                                 | Channel Count:      | 4                                 |
| Total TX Power (W): | 180 Watts                         | Total TX Power (W): | 180 Watts                         | Total TX Power (W): | 180 Watts                         |
| ERP (W):            | 5,647.93                          | ERP (W):            | 5,647.93                          | ERP (W):            | 5,647.93                          |
| Antenna A2 MPE %:   | <b>0.33%</b>                      | Antenna B2 MPE %:   | <b>0.33%</b>                      | Antenna C2 MPE %:   | <b>0.33%</b>                      |
| Antenna #:          | 3                                 | Antenna #:          | 3                                 | Antenna #:          | 3                                 |
| Make / Model:       | Ericsson AIR6488                  | Make / Model:       | Ericsson AIR6488                  | Make / Model:       | Ericsson AIR6488                  |
| Frequency Bands:    | 2500 MHz                          | Frequency Bands:    | 2500 MHz                          | Frequency Bands:    | 2500 MHz                          |
| Gain:               | 20.85 dBd                         | Gain:               | 20.85 dBd                         | Gain:               | 20.85 dBd                         |
| Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          |
| Channel Count:      | 4                                 | Channel Count:      | 4                                 | Channel Count:      | 4                                 |
| Total TX Power (W): | 160 Watts                         | Total TX Power (W): | 160 Watts                         | Total TX Power (W): | 160 Watts                         |
| ERP (W):            | 19,458.98                         | ERP (W):            | 19,458.98                         | ERP (W):            | 19,458.98                         |
| Antenna A3 MPE %:   | <b>0.89%</b>                      | Antenna B3 MPE %:   | <b>0.89%</b>                      | Antenna C3 MPE %:   | <b>0.89%</b>                      |
| Antenna #:          | 4                                 | Antenna #:          | 4                                 | Antenna #:          | 4                                 |
| Make / Model:       | Ericsson AIR32                    | Make / Model:       | Ericsson AIR32                    | Make / Model:       | Ericsson AIR32                    |
| Frequency Bands:    | 1900 MHz / 2100 MHz               | Frequency Bands:    | 1900 MHz / 2100 MHz               | Frequency Bands:    | 1900 MHz / 2100 MHz               |
| Gain:               | 15.35 dBd / 15.85 dBd             | Gain:               | 15.35 dBd / 15.85 dBd             | Gain:               | 15.35 dBd / 15.85 dBd             |
| Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          | Height (AGL):       | 280 feet                          |
| Channel Count:      | 4                                 | Channel Count:      | 4                                 | Channel Count:      | 4                                 |
| Total TX Power (W): | 180 Watts                         | Total TX Power (W): | 180 Watts                         | Total TX Power (W): | 180 Watts                         |
| ERP (W):            | 6,671.71                          | ERP (W):            | 6,671.71                          | ERP (W):            | 6,671.71                          |
| Antenna A4 MPE %:   | <b>0.31%</b>                      | Antenna B4 MPE %:   | <b>0.31%</b>                      | Antenna C4 MPE %:   | <b>0.31%</b>                      |

| Site Composite MPE %        |               |
|-----------------------------|---------------|
| Carrier                     | MPE %         |
| T-Mobile (Max at Sector A): | 1.85%         |
| Verizon                     | 21.43%        |
| Town                        | 3.54%         |
| Sprint                      | 0.88%         |
| Clearwire                   | 0.07%         |
| AT&T                        | 0.62%         |
|                             |               |
| <b>Site Total MPE % :</b>   | <b>32.10%</b> |

|                          |               |
|--------------------------|---------------|
| T-Mobile Sector A Total: | 1.85%         |
| T-Mobile Sector B Total: | 1.85%         |
| T-Mobile Sector C Total: | 1.85%         |
|                          |               |
| <b>Site Total:</b>       | <b>32.10%</b> |

### T-Mobile Maximum MPE Power Values (Sector A)

| T-Mobile Frequency Band / Technology (Sector A) | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density ( $\mu\text{W}/\text{cm}^2$ ) | Frequency (MHz) | Allowable MPE ( $\mu\text{W}/\text{cm}^2$ ) | Calculated % MPE |
|---|------------|-------------------------|---------------|---|-----------------|---|------------------|
| T-Mobile 1900 MHz PCS                           | 4          | 1167.14                 | 280.0         | 2.14  | 1900 MHz PCS    | 1000  | 0.21%            |
| T-Mobile 2100 MHz AWS                           | 2          | 1167.14                 | 280.0         | 1.07  | 2100 MHz AWS    | 1000  | 0.11%            |
| T-Mobile 600 MHz LTE                            | 1          | 591.73                  | 280.0         | 0.27  | 600 MHz LTE     | 400   | 0.07%            |
| T-Mobile 700 MHz LTE                            | 1          | 648.82                  | 280.0         | 0.30  | 700 MHz LTE     | 467   | 0.06%            |
| T-Mobile 1900 MHz LTE                           | 2          | 2203.69                 | 280.0         | 2.02  | 1900 MHz LTE    | 1000  | 0.20%            |
| T-Mobile 2500 MHz LTE                           | 4          | 4864.74                 | 280.0         | 8.92  | 2500 MHz LTE    | 1000  | 0.89%            |
| T-Mobile 1900 MHz PCS                           | 2          | 1028.30                 | 280.0         | 0.94  | 1900 MHz PCS    | 1000  | 0.09%            |
| T-Mobile 2100 MHz LTE                           | 2          | 2307.55                 | 280.0         | 2.12  | 2100 MHz LTE    | 1000  | 0.21%            |
|   |            |                         |               |   |                 | <b>Total:</b>                               | <b>5.56%</b>     |

## Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:


| T-Mobile Sector                    | Power Density Value (%) |
|------------------------------------|-------------------------|
| Sector A:                          | 1.85%                   |
| Sector B:                          | 1.85%                   |
| Sector C:                          | 1.85%                   |
| T-Mobile Maximum MPE % (Sector A): | 1.85%                   |
|                                    |                         |
| Site Total:                        | 32.10%                  |
|                                    |                         |
| Site Compliance Status:            | <b>COMPLIANT</b>        |

The anticipated composite MPE value for this site assuming all carriers present is **32.10%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

# Exhibit G






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 \$7.35

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06/06/2019

Mailed from 06002 062S00000000310

**PRIORITY MAIL 2-DAY™**

Expected Delivery Date: 06/08/19  
 Ref#: 196-ZAPANC  
**0004**

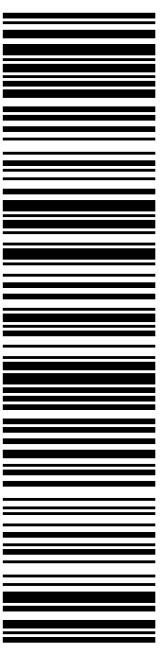
DEBORAH CHASE  
 T-MOBILE/NSS  
 35 GRIFFIN RD S  
 BLOOMFIELD CT 06002-1351

**Carrier -- Leave if No Response**

**R014**

SHIP TO: STEPHEN C DUNN  
 FIRST SELECTMAN-TOWN OF BROOKFIELD  
 100 POCONO RD  
 BROOKFIELD CT 06804-3322

**USPS TRACKING #**



**9405 5036 9930 0025 7505 69**

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1. Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
2. Place your label so it does not wrap around the edge of the package.
3. Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.
4. To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
5. Mail your package on the "Ship Date" you selected when creating this label.

### Click-N-Ship® Label Record

**USPS TRACKING # :**  
**9405 5036 9930 0025 7505 69**

|                                    |                                       |
|------------------------------------|---------------------------------------|
| Trans. #: 465534568                | Priority Mail® Postage: <b>\$7.35</b> |
| Print Date: 06/05/2019             | Total: <b>\$7.35</b>                  |
| Ship Date: 06/06/2019              |                                       |
| Expected Delivery Date: 06/08/2019 |                                       |

**From:** DEBORAH CHASE  
 T-MOBILE/NSS  
 35 GRIFFIN RD S  
 BLOOMFIELD CT 06002-1351


Ref#: 196-ZAPANC

**To:** STEPHEN C DUNN  
 FIRST SELECTMAN-TOWN OF BROOKFIELD  
 100 POCONO RD  
 BROOKFIELD CT 06804-3322

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06/06/2019

Mailed from 06002 062S0000000314

**PRIORITY MAIL 2-DAY™**

Expected Delivery Date: 06/08/19  
 Ref#: 196ZAPANC  
**0004**


DEBORAH CHASE  
 T-MOBILE USA- NSS  
 35 GRIFFIN RD S  
 BLOOMFIELD CT 06002-1351

Carrier -- Leave if No Response

**R014**

SHIP TO: ALICE DEW  
 LAND USE OFFICER-TOWN OF BROOKFIELD  
 100 POCONO RD  
 BROOKFIELD CT 06804-3322

**USPS TRACKING #**



**9405 5036 9930 0025 7505 83**

Electronic Rate Approved #038555749



Cut on dotted line.

### Instructions

1. Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
2. Place your label so it does not wrap around the edge of the package.
3. Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.
4. To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
5. Mail your package on the "Ship Date" you selected when creating this label.

### Click-N-Ship® Label Record

**USPS TRACKING # :**  
**9405 5036 9930 0025 7505 83**

|                                    |                                       |
|------------------------------------|---------------------------------------|
| Trans. #: 465534568                | Priority Mail® Postage: <b>\$7.35</b> |
| Print Date: 06/05/2019             | Total: <b>\$7.35</b>                  |
| Ship Date: 06/06/2019              |                                       |
| Expected Delivery Date: 06/08/2019 |                                       |

**From:** DEBORAH CHASE  
 T-MOBILE USA- NSS  
 35 GRIFFIN RD S  
 BLOOMFIELD CT 06002-1351


Ref#: 196ZAPANC

**To:** ALICE DEW  
 LAND USE OFFICER-TOWN OF BROOKFIELD  
 100 POCONO RD  
 BROOKFIELD CT 06804-3322

\* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.



Thank you for shipping with the United States Postal Service!  
 Check the status of your shipment on the USPS Tracking® page at usps.com




**UNITED STATES  
POSTAL SERVICE®**

**Click-N-Ship®**

**P**

usps.com  
**US POSTAGE** \$7.35  
 Flat Rate Env  
 9405 5036 9930 0025 7506 06 0073 5000 0020 1801



06/06/2019 Mailed from 06002 062S0000000314

**PRIORITY MAIL 2-DAY™**

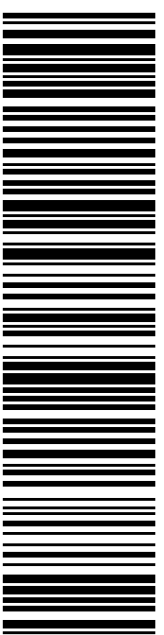
Expected Delivery Date: 06/08/19  
 Ref#: 196ZAPANC  
**0004**

**Carrier -- Leave if No Response**

**C046**

SHIP TO: KATHLEEN BURKE  
 AMERICAN TOWERS LLC  
 10 PRESIDENTIAL WAY  
 WOBURN MA 01801-1053

**USPS TRACKING #**



**9405 5036 9930 0025 7506 06**

Electronic Rate Approved #038555749



Cut on dotted line.

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### Click-N-Ship® Label Record

**USPS TRACKING # :**  
**9405 5036 9930 0025 7506 06**

|                                    |                                       |
|------------------------------------|---------------------------------------|
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| Print Date: 06/05/2019             | Total: <b>\$7.35</b>                  |
| Ship Date: 06/06/2019              |                                       |
| Expected Delivery Date: 06/08/2019 |                                       |

**From:** DEBORAH CHASE  
 T-MOBILE/NSS  
 35 GRIFFIN RD S  
 BLOOMFIELD CT 06002-1351


Ref#: 196ZAPANC

**To:** KATHLEEN BURKE  
 AMERICAN TOWERS LLC  
 10 PRESIDENTIAL WAY  
 WOBURN MA 01801-1053

\* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.



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**UNITED STATES  
POSTAL SERVICE®**

**Click-N-Ship®**

**P**

usps.com  
**US POSTAGE** \$7.35  
 Flat Rate Env  
 9405 5036 9930 0025 7506 13 0073 5000 0063 3487



06/06/2019 Mailed from 06002 062S0000000314

**PRIORITY MAIL 2-DAY™**

DEBORAH CHASE  
 T-MOBILE USA- NSS  
 35 GRIFFIN RD S  
 BLOOMFIELD CT 06002-1351


Expected Delivery Date: 06/08/19  
 Ref#: 196ZAPANC  
**0004**

**Carrier -- Leave if No Response**

**C057**

SHIP TO: REGIONAL LEASING MANAGER  
 VERTICAL BRIDGE  
 750 PARK OF COMMERCE DR  
 STE 200  
 BOCA RATON FL 33487-3650

**USPS TRACKING #**



**9405 5036 9930 0025 7506 13**

Electronic Rate Approved #038555749



Cut on dotted line.

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**From:** DEBORAH CHASE  
 T-MOBILE USA- NSS  
 35 GRIFFIN RD S  
 BLOOMFIELD CT 06002-1351

Ref#: 196ZAPANC

**To:** REGIONAL LEASING MANAGER  
 VERTICAL BRIDGE  
 750 PARK OF COMMERCE DR  
 STE 200  
 BOCA RATON FL 33487-3650

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