4 Davis Road West, Suite 5 – Old Lyme, CT 06371

Ms. Melanie Bachman
Executive Director
CT Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Notice of Exempt Modification Application
169 Hampden Road, Stafford Springs, CT 06076

May 1, 2018

Dear Ms. Bachman:

Sprint Spectrum Realty Company, L.P. ("Sprint"), is submitting to the Connecticut Siting Council for a Notice of Exempt Modification for Proposed Modifications to an Existing Telecommunications Facility located at the above-referenced site. Sprint currently maintains 3 panel antennas and 6 Remote Radio at the 171' level of the Tower. Sprint proposes to add 3 new panel antennas (1 per sector) and 6 new Remote Radio Heads (2 per sector) and further proposes to add 1 new hybrid cable.

The earliest CT Siting Council submission I could find was issued to Sprint on May 31, 2011. The original Building permit for the actual tower construction issued by the Town was unavailable but there is a Building Permit from June 24, 2011. The attached construction and structural documents enclosed reflect the current reality of all the installations on the Tower.

If you have any questions, please feel free to contact me.

Thank you,

By: *Paul F. Sagristano*

Paul F. Sagristano
Cherundolo Consulting
917.841.0247
psagristano@lrivassoc.com

4 Davis Road West, Suite 5 – Old Lyme, CT 06371

Ms. Melanie Bachman
Executive Director
CT Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Notice of Exempt Modification Application
33 South Road, Stafford, CT 06067

Lat: N 41.9996
Long: W72.3556

May 1, 2018

Dear Ms. Bachman:

Sprint currently maintains 3 panel antennas and 6 Remote Radio Heads at the 171' level of the above noted wireless tower. Sprint proposes to add 3 panel antennas (1 per sector) and add 6 remote radio heads (2 per sector) at the 171' tower level as well as 1 new hybrid cable. Sprint is performing a new high-performance upgrade for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

The earliest CT Siting Council approval available was from May 31, 2011. The earliest building permit for the Tower construction was not available but a recent one from June 24, 2011 is included.
.
Attached is a summary of the planned modifications, including power density calculations reflecting the change in Sprint's operations at the site. Also included is documentation of the structural sufficiency of the tower with proposed modifications to accommodate the revised antenna configuration.

**Existing Facility**

The Eastford facility is located at 33 South Road Stafford. The Site coordinates are: N41.9996, W72.3556. The existing facility consists of a 180' Guyed Tower. Sprint currently operates wireless communications equipment on a platform on a concrete slab at the facility and has3 antennas and 6 remote radio heads at a centerline of 171' feet on the tower. Please accept this letter as notification to the Council, pursuant to R.C.S.A. Section 16-50j-73, for construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2).
In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter is being sent to:

Mary Mitta, 1st Selectman of Stafford – Via Fed Ex
David Perkins, Zoning Enforcement Officer – Via Fed Ex
Cordless Data Transfer, Inc., the tower owner – Via Fed Ex
Michael Angelo – Land Owner – Via Fed Ex

**Statutory Considerations**

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

1. The height of the overall structure will be unaffected.

2. The proposed changes will not require an extension of the property boundaries.

3. The proposed additions will not increase the noise level at the existing facility by

six decibels or more, or to levels that exceed state and/or local criteria

4. The changes will not increase the calculated "worst case" power density for the combined operations at the site 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, Sprint respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A Section §16-50j-72(b)(2).

Respectfully submitted,

*Paul F. Sagristano*

Paul F. Sagristano
Charles Cherundolo Consulting
917-841-0247
psagristano@lrivassoc.com

PFS/mtf

Additional Recipients:
Mary Mitta, 1st Selectman of Stafford – Via Fed Ex
David Perkins, Zoning Enforcement Officer – Via Fed Ex
Cordless Data Transfer, Inc., Tower Owner – Via Fed Ex
Michael Angelo – Land Owner – Via Fed Ex

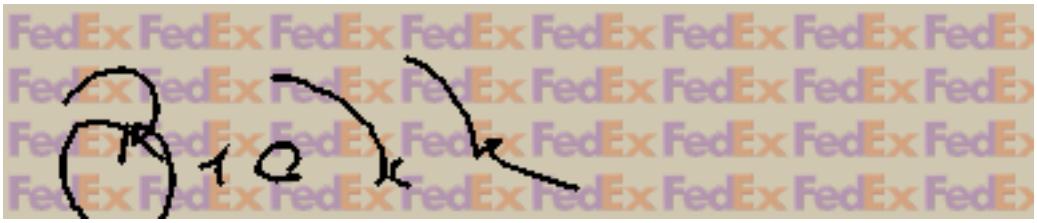
May 9,2018

Dear Customer:

The following is the proof-of-delivery for tracking number **772144771366**.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Receptionist/Front Desk |
| **Signed for by:** | B.DADALT | **Delivery location:** | 1 MAIN ST ,<br>STAFFORD SPRINGS, CT 06076 |
| **Service type:** | FedEx Express Saver | **Delivery date:** | May 8, 2018 11:54 |
| **Special Handling:** | Deliver Weekday<br>Direct Signature Required | | |



## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 772144771366 | **Ship date:** | May 3, 2018 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
Mary Mitta, 1st Selectman
Town of Stafford
1 Main St.,
2nd floor
STAFFORD SPRINGS, CT 06076 US
**Reference**

**Shipper:**
Paul Sagristano
CCC
4 Davis Road West
Suite 5
OLD LYME, CT 06371 US
CT33XC004 CSC sub

Thank you for choosing FedEx.

May 9,2018

Dear Customer:

The following is the proof-of-delivery for tracking number 772144708397.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Receptionist/Front Desk |
| **Signed for by:** | L.MURRAY | **Delivery location:** | 1 MAIN ST<br>STAFFORD SPRINGS, CT 06076 |
| **Service type:** | FedEx Express Saver | **Delivery date:** | May 8, 2018 11:52 |
| **Special Handling:** | Deliver Weekday<br>Direct Signature Required | | |

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 772144708397 | **Ship date:** | May 3, 2018 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
David Perkins, ZEO
Town of Stafford
1 Main St.,
1st floor
STAFFORD SPRINGS, CT 06076 US
**Reference**

**Shipper:**
Paul Sagristano
CCC
4 Davis Road West
Suite 5
OLD LYME, CT 06371 US
CT33XC004 CSC sub

Thank you for choosing FedEx.

May 9,2018

Dear Customer:

The following is the proof-of-delivery for tracking number **772147691423**.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Residence |
| **Signed for by:** | S.ANGELO | **Delivery location:** | 60 SUNSET RIDGE RD<br>STAFFORD SPRINGS, CT 06076 |
| **Service type:** | FedEx Express Saver | **Delivery date:** | May 8, 2018 11:40 |
| **Special Handling:** | Deliver Weekday<br>Residential Delivery<br>Direct Signature Required | | |

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 772147691423 | **Ship date:** | May 3, 2018 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
Michael Angelo
60 Sunset Ridge
STAFFORD SPRINGS, CT 06076 US

**Shipper:**
Paul Sagristano
CCC
4 Davis Road West
Suite 5
OLD LYME, CT 06371 US

**Reference**
CT33XC553 CSC Sub

Thank you for choosing FedEx.

May 9,2018

Dear Customer:

The following is the proof-of-delivery for tracking number 772144652140.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Residence |
| **Signed for by:** | J.LEGAULT | **Delivery location:** | 600 OLD HARTFORD ROAD<br>COLCHESTER, CT 06415 |
| **Service type:** | FedEx Express Saver | **Delivery date:** | May 8, 2018 12:19 |
| **Special Handling:** | Deliver Weekday<br>Residential Delivery<br>Direct Signature Required | | |

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 772144652140 | **Ship date:** | May 3, 2018 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

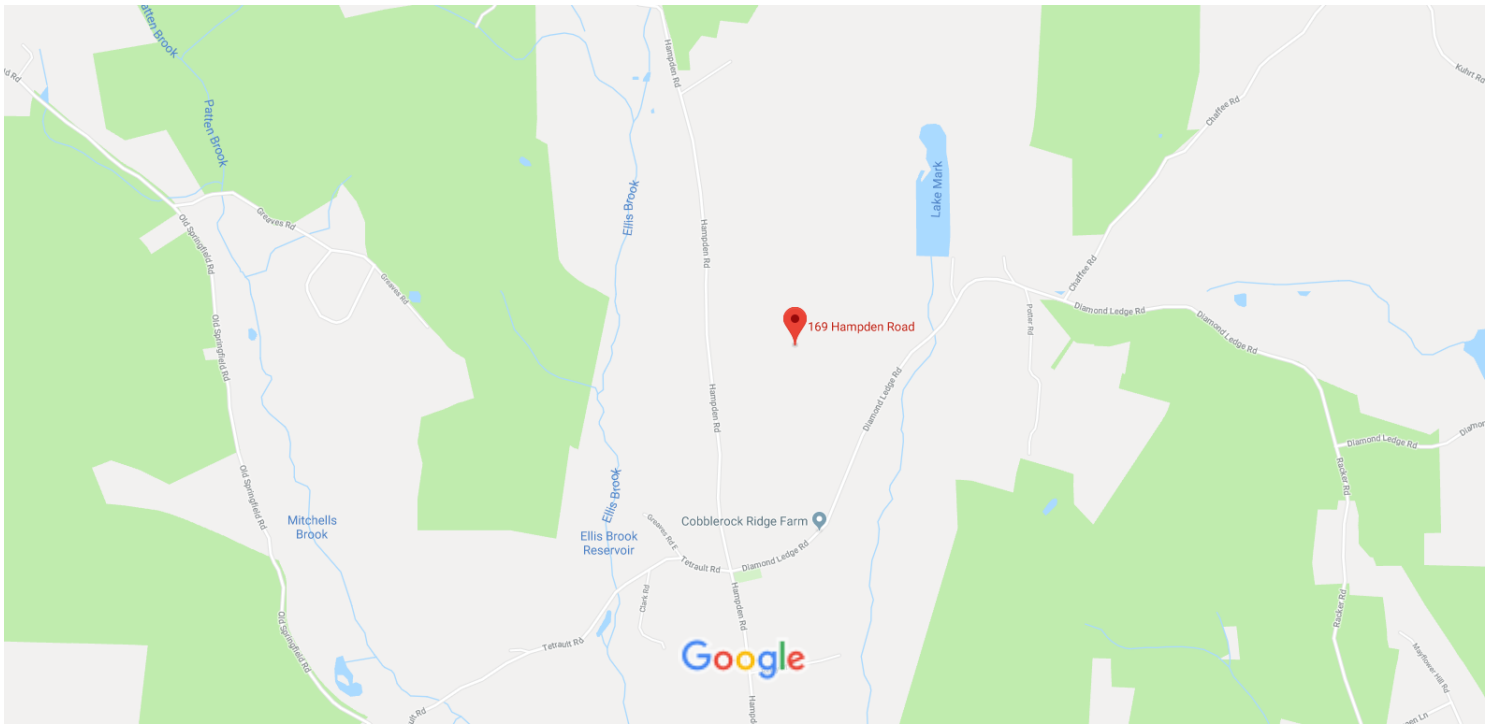
**Recipient:**
Mark Legault
CDT, Inc
600 Old Hartford Road
COLCHESTER, CT 06415 US

**Shipper:**
Paul Sagristano
CCC
4 Davis Road West
Suite 5
OLD LYME, CT 06371 US

**Reference**
CT33XC004 & 553 CSC Sub

Thank you for choosing FedEx.

Google Maps 169 Hampden Rd




Map data ©2018 Google 1000 ft

# 169 HAMPDEN RD

| | | | |
|---|---|---|---|
| **Location** | 169 HAMPDEN RD | **Mblu** | 23/ / 60/ / |
| **Acct#** | 00109700 | **Owner** | ANGELO MICHAEL+SHELLY M |
| **Assessment** | $245,370 | **Appraisal** | $475,500 |
| **PID** | 1227 | **Building Count** | 1 |

## Current Value

| Appraisal | | | |
|---|---|---|---|
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2015 | $99,100 | $376,400 | $475,500 |
| **Assessment** | | | |
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2015 | $69,370 | $176,000 | $245,370 |

## Owner of Record

| | | | |
|---|---|---|---|
| **Owner** | ANGELO MICHAEL+SHELLY M | **Sale Price** | $0 |
| **Co-Owner** | | **Certificate** | |
| **Address** | 60 SUNSET RIDGE<br>STAFFORD SPRINGS, CT 06076 | **Book & Page** | 595/ 5 |
| | | **Sale Date** | 09/24/2012 |
| | | **Instrument** | 01 |

## Ownership History

| Ownership History | | | | | |
|---|---|---|---|---|---|
| **Owner** | **Sale Price** | **Certificate** | **Book & Page** | **Instrument** | **Sale Date** |
| ANGELO MICHAEL+SHELLY M | $0 | | 595/ 5 | 01 | 09/24/2012 |
| ANGELO MICHAEL | $0 | | 595/ 2 | 01 | 09/24/2012 |
| ANGELO MICHAEL J | $0 | 1 | 326/ 545 | | 03/31/1995 |

## Building Information

### Building 1 : Section 1

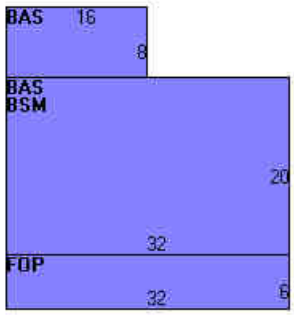
| | |
|---|---|
| **Year Built:** | 1999 |
| **Living Area:** | 768 |
| **Replacement Cost:** | $84,832 |
| **Building Percent Good:** | 90 |
| **Replacement Cost Less Depreciation:** | $76,300 |

| Building Attributes | |
|---|---|
| **Field** | **Description** |
| STYLE | Single Family |
| MODEL | Comm/Ind |
| Grade | C |
| Stories: | 1 |
| Occupancy | 1 |
| Exterior Wall 1 | Logs |
| Exterior Wall 2 | |
| Roof Structure | Gable |
| Roof Cover | Asph/F Gls/Cmp |
| Interior Wall 1 | Drywall/Sheet |
| Interior Wall 2 | |
| Interior Floor 1 | Average |
| Interior Floor 2 | |
| Heating Fuel | Gas |
| Heating Type | Forced Hot Air |
| AC Type | None |
| Bldg Use | SFD - Comm |
| Total Bedrooms | 2 |
| Total Baths | 1 |
| 1st Floor Use: | |
| Heat/AC | None |
| Frame Type | Wood Frame |
| Baths/Plumbing | Average |
| Ceiling/Wall | Ceil & Wall |
| Rooms/Prtns | Average |
| Wall Height | 8 |
| Num Fixtures | |

## Building Photo


(http://images.vgsi.com/photos2/StaffordCTPhotos//\00\01\26/2

## Building Layout




(http://images.vgsi.com/photos2/StaffordCTPhotos//Sketches/12

| Building Sub-Areas (sq ft) | | | Legend |
|---|---|---|---|
| **Code** | **Description** | **Gross Area** | **Living Area** |
| BAS | First Floor | 768 | 768 |
| BSM | Basement | 640 | 0 |
| FOP | Open Porch | 192 | 0 |
| | | 1,600 | 768 |

## Extra Features

| Extra Features | | | | Legend |
|---|---|---|---|---|
| **Code** | **Description** | **Size** | **Value** | **Bldg #** |
| FPL | | 1 UNITS | $0 | 1 |

## Land

### Land Use

**Use Code** 101C

### Land Line Valuation

**Size (Acres)** 43.54

| | | | |
|---|---|---|---|
| **Description** | SFD - Comm | **Frontage** | |
| **Zone** | | **Depth** | |
| **Neighborhood** | 502 | **Assessed Value** | $176,000 |
| **Alt Land Appr** | No | **Appraised Value** | $376,400 |
| **Category** | | | |

## Outbuildings

| Outbuildings | | | | | | Legend |
|---|---|---|---|---|---|---|
| **Code** | **Description** | **Sub Code** | **Sub Description** | **Size** | **Value** | **Bldg #** |
| FGR2 | Garage w/ Loft | | | 1024 S.F. | $13,300 | 1 |
| FGR2 | Garage w/ Loft | | | 676 S.F. | $8,800 | 1 |
| FN3 | FENCE-6' CHAIN | | | 150 L.F. | $700 | 1 |

## Valuation History

| Appraisal | | | |
|---|---|---|---|
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2017 | $99,100 | $376,400 | $475,500 |
| 2016 | $99,100 | $376,400 | $475,500 |
| 2014 | $98,400 | $376,400 | $474,800 |

| Assessment | | | |
|---|---|---|---|
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2017 | $69,370 | $176,000 | $245,370 |
| 2016 | $69,370 | $176,000 | $245,370 |
| 2014 | $68,880 | $173,000 | $241,880 |

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

May 31, 2011

Mark Hulshart, Principal
Hulshart & Associates, LLC
3009 Federal Hill Drive
Falls Church, VA 22044

RE: **EM-SPRINT-134-110505** – Sprint Spectrum L.P. notice of intent to modify an existing telecommunications facility located at 169 Hampden Road, Stafford, Connecticut.

Dear Mr. Hulshart:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated April 29, 2011. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable Michael P. Krol, First Selectman, Town of Stafford
Wendell Avery, Zoning Enforcement Officer, Town of Stafford
Michael Angelo



CSC
CONNECTICUT SITING COUNCIL

CT33XC553

# Town of Stafford
# BUILDING PERMIT

Building Official
1 Main Street - Town Hall
Stafford Springs, CT 06076
Tel. (860) 684-1775 • Fax: (860) 684-1768

*"A certificate of Use or Occupancy is required upon completion of new work, alteration or change of use." Separate permits are required for plumbing, heating and electrical*

Date: _____ License: _____ Expiration Date: _____

Estimated Cost: $14,000 Fee: 196.10 Map: 23 /060 Lot: _____ Permit #: 15406

Location of Construction: 169 Hampden Road, Stafford CT 06075

Owner's Name & Address: Sprint c/o Black & Veatch Corporation
30150 Telegraph Road, Suite 420, Bingham Farms, MI 48025

Contractor's Name & Address: Overland Contracting Inc.
8400 Ward Parkway, Kansas City MO 64114

| Signature of Applicant, Homeowner, ~~Agent~~ | Telephone Number | Building Official Signature | Date |
|---|---|---|---|
| Kristen M Karnes<br>KRISTEN M. KARNES | (248) 594-9330<br>(248) 613-3973 (cell) | DC Malanowich | 6-7-11 |

Describe Nature of Work: Add fuel cell & storage cabinets on 6' x 9' concrete pad inside existing lease area.

| TYPE | | FOUNDATIONS | | ROOF TYPE | | FOOTING | | FRAMING | SIZE | SPAN |
|---|---|---|---|---|---|---|---|---|---|---|
| Single Family | | Thickness | | Gable | | Size | | Joist | | |
| Two Family | | Concrete slab | X | Hip | | Stone | | 2nd Floor | | |
| Apt House | | Concrete Blocks | | Gambrel | | Concrete | | Rafter | | |
| Agricultural | | Piers | | Truss | | Drains | | Girder | | |
| Accessory | | Stone | | Flat | | Depth | | Column | | |
| Office | | | | Roof Pitch | | | | Sill | | |
| Factory | | CONSTRUCTION | | | | CHIMNEYS | | Post | | |
| Gas Station | | Frame | | ROOFING | N/A | Size / Flues | | Plate | | |
| Commercial | X | Masonry | | Asphalt Shingle | | Stone | | Stud | | |
| Demolition | | I.C.F. | | Wood Shingle | | Brick | | | | |
| Other: | | Other: | | Built-up | | Block | | Species & Grade | | |
| | | | | Other: | | Factory Built | | | | |
| Number of Rooms | | EXTERIOR | | | | Fire Place | | | | |
| Number of Bathrooms | | Clapboard or Wood Shingle | | Cellar N/A | | | | | | |
| Number of Bedrooms | | Vinyl | | Whole | | Built to Conform to: | | | | |
| Insulation | | Masonry | | Part | | Residential Code (IRC) | | | | |
| Ceiling | | Other | | None | | Commercial Code (IBC) | | | | |
| Walls | | | | Slab | | | | | | |
| Floors | | | | Other | | F.M. Approval | | | | |

**SWIMMING POOL:** Above Ground ☐ In Ground ☐ Fence ☐ N/A

Building Official Comments / Special Conditions

Work shall not proceed until the inspector has inspected and approved the various stages of construction. Final inspection is required upon completion of work. Permit will become null and void if construction work is not started within six months of the date the permit is issued. Permit grants the right to entry to any official from the building, health, or zoning departments during normal business hours for the purpose of inspection. If signed by other than the owner, applicant attests compliance with CGS20-388B and has authorization by owner to apply for this permit.

SBP 708 DD Printing

EBI Consulting
environmental | engineering | due diligence

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

SPRINT Existing Facility

Site ID: CT33XC553

169 Hampden Road
Stafford Springs, CT 06076

**February 12, 2018**

**EBI Project Number: 6218000956**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | **COMPLIANT** |
| Site total MPE% of FCC general population allowable limit: | **1.55 %** |

EBI Consulting
environmental | engineering | due diligence

February 12, 2018

SPRINT
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Emissions Analysis for Site: **CT33XC553 –**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **169 Hampden Road, Stafford Springs, CT**, for the purpose of determining whether the emissions from the Proposed SPRINT 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 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ 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.

General population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 850 MHz Band is approximately 567 $\mu W/cm^2$. The general population exposure limit for the 1900 MHz (PCS) and 2500 MHz (BRS) bands is 1000 $\mu W/cm^2$. 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 SPRINT Wireless antenna facility located at **169 Hampden Road, Stafford Springs, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since SPRINT 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 manufactures supplied specifications, minus 10 dB, 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 CDMA channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

2) 2 LTE channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

3) 5 CDMA channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 16 Watts per Channel.

4) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

5) 8 LTE channels (2500 MHz (BRS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

6) 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.

7) 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 manufactures supplied specifications minus 10 dB 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.

8) The antennas used in this modeling are the **RFS APXV9ERR18-C-A20 and the Commscope DT465B-2XR** for transmission in the 850 MHz, 1900 MHz (PCS) and 2500 MHz (BRS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, 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.

9) The antenna mounting height centerlines of the proposed antennas are **171 feet** above ground level (AGL) for **Sector A**, **171 feet** above ground level (AGL) for **Sector B** and **171 feet** above ground level (AGL) for Sector C.

10) 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.

All calculations were done with respect to uncontrolled / general population threshold limits.

## SPRINT Site Inventory and Power Data by Antenna

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | **1** | Antenna #: | **1** | Antenna #: | **1** |
| Make / Model: | RFS APXV9ERR18-C-A20 | Make / Model: | RFS APXV9ERR18-C-A20 | Make / Model: | RFS APXV9ERR18-C-A20 |
| Gain: | 11.9 / 14.9 dBd | Gain: | 11.9 / 14.9 dBd | Gain: | 11.9 / 14.9 dBd |
| Height (AGL): | **171 feet** | Height (AGL): | **171 feet** | Height (AGL): | **171 feet** |
| Frequency Bands | 850 MHz / 1900 MHz (PCS) | Frequency Bands | 850 MHz / 1900 MHz (PCS) | Frequency Bands | 850 MHz / 1900 MHz (PCS) |
| Channel Count | 10 | Channel Count | 10 | Channel Count | 10 |
| Total TX Power(W): | 220 Watts | Total TX Power(W): | 220 Watts | Total TX Power(W): | 220 Watts |
| ERP (W): | 5,873.76 | ERP (W): | 5,873.76 | ERP (W): | 5,873.76 |
| Antenna A1 MPE% | **0.87 %** | Antenna B1 MPE% | **0.87 %** | Antenna C1 MPE% | **0.87 %** |
| Antenna #: | **2** | Antenna #: | **2** | Antenna #: | **2** |
| Make / Model: | Commscope DT465B-2XR | Make / Model: | Commscope DT465B-2XR | Make / Model: | Commscope DT465B-2XR |
| Gain: | 15.05 dBd | Gain: | 15.05 dBd | Gain: | 15.05 dBd |
| Height (AGL): | **171 feet** | Height (AGL): | **171 feet** | Height (AGL): | **171 feet** |
| Frequency Bands | 2500 MHz (BRS) | Frequency Bands | 2500 MHz (BRS) | Frequency Bands | 2500 MHz (BRS) |
| Channel Count | 8 | Channel Count | 8 | Channel Count | 8 |
| Total TX Power(W): | 160 Watts | Total TX Power(W): | 160 Watts | Total TX Power(W): | 160 Watts |
| ERP (W): | 5,118.23 | ERP (W): | 5,118.23 | ERP (W): | 5,118.23 |
| Antenna A2 MPE% | **0.68 %** | Antenna B2 MPE% | **0.68 %** | Antenna C2 MPE% | **0.68 %** |

| **Site Composite MPE%** | |
|---|---|
| **Carrier** | **MPE%** |
| SPRINT – Max per sector | **1.55 %** |
| No Additional Carriers Listed per the CSC Active MPE Database | NA |
| **Site Total MPE %:** | **1.55 %** |

| | |
|---|---|
| SPRINT Sector A Total: | 1.55 % |
| SPRINT Sector B Total: | 1.55 % |
| SPRINT Sector C Total: | 1.55 % |
| | |
| Site Total: | 1.55 % |

| **SPRINT _ Frequency Band / Technology Max Power Values (Per Sector)** | **# Channels** | **Watts ERP (Per Channel)** | **Height (feet)** | **Total Power Density (μW/cm²)** | **Frequency (MHz)** | **Allowable MPE (μW/cm²)** | **Calculated % MPE** |
|---|---|---|---|---|---|---|---|
| Sprint 850 MHz CDMA | 1 | 309.76 | 171 | 0.41 | 850 MHz | 567 | 0.07% |
| Sprint 850 MHz LTE | 2 | 309.76 | 171 | 0.82 | 850 MHz | 567 | 0.14% |
| Sprint 1900 MHz (PCS) CDMA | 5 | 494.45 | 171 | 3.26 | 1900 MHz (PCS) | 1000 | 0.33% |
| Sprint 1900 MHz (PCS) LTE | 2 | 1,236.12 | 171 | 3.26 | 1900 MHz (PCS) | 1000 | 0.33% |
| Sprint 2500 MHz (BRS) LTE | 8 | 639.78 | 171 | 6.76 | 2500 MHz (BRS) | 1000 | 0.68% |
| | | | | | | **Total:** | **1.55%** |

## 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 SPRINT 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:

| SPRINT Sector | Power Density Value (%) |
|---|---|
| Sector A: | 1.55 % |
| Sector B: | 1.55 % |
| Sector C: | 1.55 % |
| SPRINT Maximum Total (per sector): | 1.55 % |
| | |
| Site Total: | 1.55 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **1.55 %** 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.

# FRED A. NUDD CORPORATION

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ONTARIO, NY 14519
(315) 524-2531 FAX (315) 524-4249

*www.nuddtowers.com*


Mark LeGault
Cordless Data Transfer, Inc.
600 Old Hartford Road
Colchester, CT 06415
January 14, 2018

Fred A. Nudd Job Number: 117-23243.1

Location: 169 Hampden Road, Stafford Springs, CT 06076, Tolland County

Subject: Structural Analysis of a 180 ft Guyed Tower

Fred A. Nudd Corporation has completed a structural analysis of an existing 180 ft guyed tower. The tower was originally designed by Rohn Industries, to #80 specifications. The tower analysis was completed considering TIA-222-G design standards, which is the enforced design standard of the 2012 International Building Code, including 2016 Connecticut Building Code and Errata. Tower dimensions have been taken from drawings by Rohn Industries, File Number 32343PH, dated April 17, 1995. Design criteria per each analysis are noted on the following page. The tower is assumed to be in good, undamaged and equivalent to as new condition and has been maintained / inspected per criteria by TIA-222.

The purpose of this analysis is to determine the structure's ability to support new Sprint equipment installed at a rad center of 171 ft above ground level (AGL). The new equipment to be installed, which included antennas, coax, mounts and associated hardware are listed on the following page in the appurtenance loading table.

Results of the analysis indicate the tower will be able to the support the design loads noted in the appurtenance loading table on the following pages when considering the existing and proposed loading. Specific section design loads, capacities and stress ratios are provided on the following pages. Maximum member usage was found to be 89%.

The tower base foundation was analyzed based on dimensions provide by CDT and assumed geotechnical values. The anchors were analyzed by comparing the reactions from this analysis to the original design loads. Based on comparison to the calculated results and comparison to the original design reaction, it is reasonable to expect to expect the foundations have adequate capacity to support the existing and proposed loading noted above.

In conclusion, the tower superstructure can support the existing and proposed equipment noted above. The tower substructure is expected to be able to support this loading as well.

We trust this report satisfies your needs. Please contact us with any questions or concerns regarding this report.

Best Regards,


Fred. A. Nudd Corporation

**Code Design Criteria**

ANSI/TIA-222-G
Windspeed = 97 mph, 3-Second Gust, $V_{asd}$ / 123 mph, 3-Second Gust, $V_{ult}$
Structure Class = II
Topographic Category = 1
Exposure = B
Radial Ice = 1.0 inch
Ice Windspeed = 50 mph, 3-Second Gust
$S_s$ < 1.0, thus seismic loading does not need to be considered

**Appurtenance Loading – Existing and To Remain on Tower**

| Height (ft) | Appurtenance | Mount | Coax (in) |
|---|---|---|---|
| 180 | (1) Station Master Antenna | Leg | (2) 7/8<br>(1) 1-1/4 |
| 179 | (1) Decibel DB809 | Side Arm | (1) 1-1/4 |
| 177 | (1) Decibel DB809 | Boom | (1) 7/8 |
| 163 | (1) Celwave PD201 | Pipe | (1) 7/8 |
| 150 | -- | Frame / Boom | -- |
| 127 | (1) Decibel DB420 | Side Arm | (1) 7/8 |
| 83 | (1) Celwave PD201 | Pipe | (1) 1/2 |

- *Height measurement taken as distance from top of base foundation to center of appurtenance.*

**Appurtenance Loading – Final Equipment Configuration For Sprint**

| Height (ft) | Carrier | Appurtenance | Mount | Coax (in) |
|---|---|---|---|---|
| 171 | Sprint | (3) RFS APXV9ERR18-C-A20<br>(3) Commscope DT465B-2XR<br>(3) Alcatel Lucent 4x45 RRH (1900 MHz)<br>(3) Alcatel Lucent TD-RRH8x200-25<br>(6) Alcatel Lucent 2x50 RRH (800 MHz) | (3) 12 ft Pipe Boom / Frame | (4) 1-1/4 Hybrid |

- *Height measurement taken as distance from top of base foundation to center of appurtenance.*
- *The proposed coax can be installed on any tower face.*

**Maximum Member Usage**

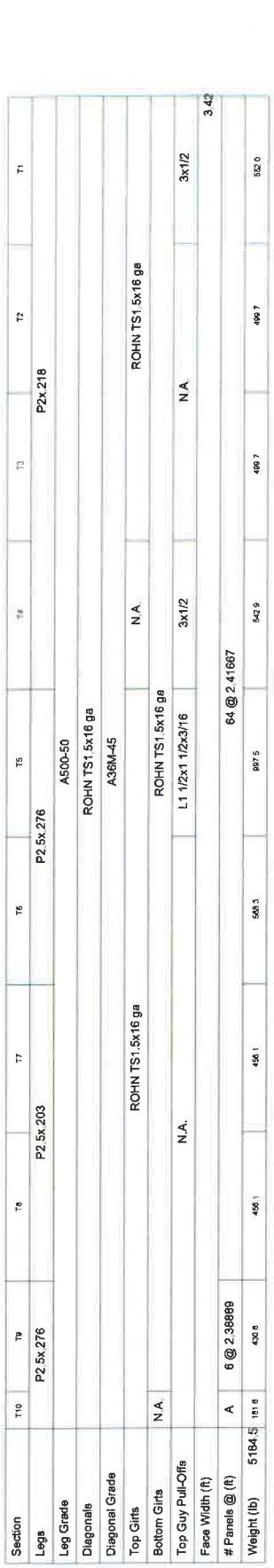
| Member | Percentage |
|---|---|
| Leg | 79 |
| Diagonal | 37 |
| Horizontal | 77 |
| Guys | 50 |
| Splice/Connection Bolts | 77 |

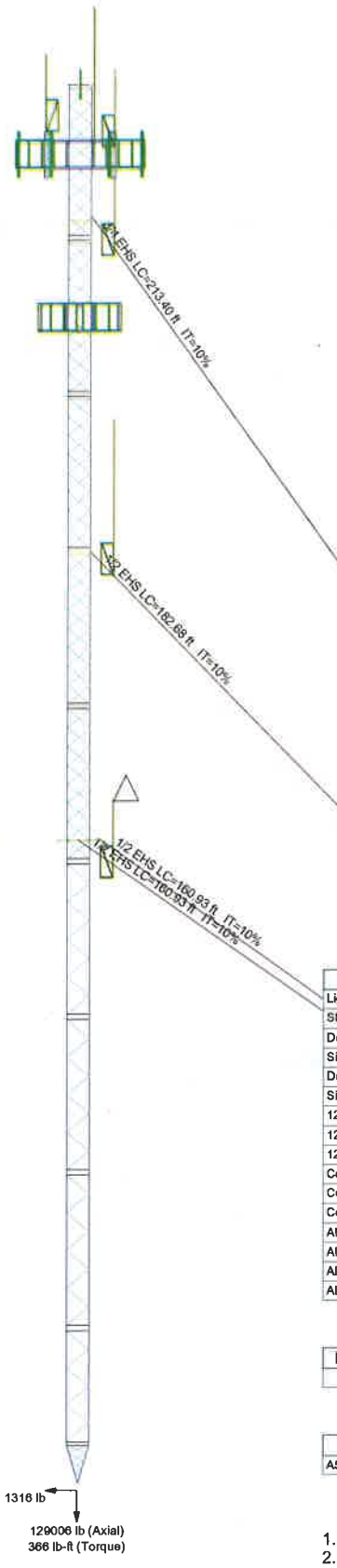
- *Percentage equal to or less than 100% denote member stress levels are satisfactory for loading.*
- *Percentage greater than 100% indicates member strengthening is required.*

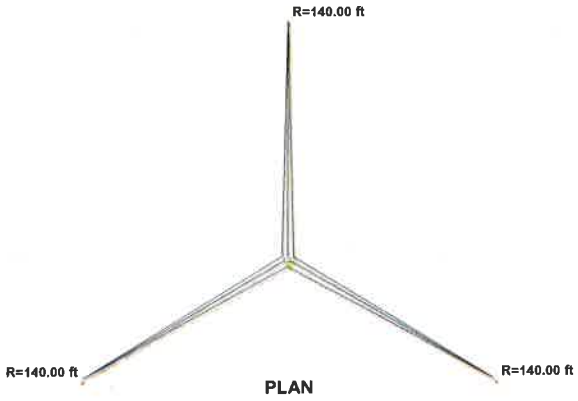
**Foundation Usage**

| Design Load | Original Design or Calculated Capacity (kips) | Analysis (kips) | Percentage |
|---|---|---|---|
| Base Axial | 150.0 (Calculated) | 129.0 | 89 |
| Anchor Uplift | 26.8 (Original Design) | 19.4 | 54 |
| Anchor Shear | 32.4 (Original Design) | 26.7 | 61 |

- *The anchor percentages are divided by 1.35 to account for unfactored to factored load comparison*
- *Percentage less than 100% denote foundation is satisfactory for loading*
- *Percentage greater than 100% indicates foundation analysis is required*




## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| Lightning Rod 5/8x4' | 180 | Alcatel Lucent 8x200-25 | 171 |
| Station Master Antenna | 180 | Alcatel Lucent 8x200-25 | 171 |
| Decibel DB809 | 179 | RFS APXV9ERR18-C-A20 | 171 |
| Side Arm | 179 | RFS APXV9ERR18-C-A20 | 171 |
| Decibel DB809 | 177 | RFS APXV9ERR18-C-A20 | 171 |
| Side Arm | 177 | (2) Alcatel Lucent 2x50 (Sprint) | 171 |
| 12 ft Boom / Frame (Sprint) | 171 | (2) Alcatel Lucent 2x50 (Sprint) | 171 |
| 12 ft Boom / Frame (Sprint) | 171 | (2) Alcatel Lucent 2x50 (Sprint) | 171 |
| 12 ft Boom / Frame (Sprint) | 171 | Celwave PD201 | 163 |
| Commscope DT465B-2XR | 171 | 12 ft Boom / Frame | 150 |
| Commscope DT465B-2XR | 171 | 12 ft Boom / Frame | 150 |
| Commscope DT465B-2XR | 171 | 12 ft Boom / Frame | 150 |
| Alcatel Lucent 4x45 | 171 | Side Arm | 127 |
| Alcatel Lucent 4x45 | 171 | Decibel DB420 | 127 |
| Alcatel Lucent 4x45 | 171 | Celwave PD201 | 83 |
| Alcatel Lucent 8x200-25 | 171 | | |

## SYMBOL LIST

| MARK | SIZE | MARK | SIZE |
|---|---|---|---|
| A | 5 @ 0.983333 | | |

## MATERIAL STRENGTH

| GRADE | Fy | Fu | GRADE | Fy | Fu |
|---|---|---|---|---|---|
| A500-50 | 50 ksi | 62 ksi | A36M-45 | 45 ksi | 60 ksi |

26725 lb
R=140.00 ft

## TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6.

| | | | |
|---|---|---|---|
| Phone: FAX: | Job: 117-23243.1 | | |
| | Project: 180 ft Rohn #80 - Stafford Springs CT | | |
| | Client: CDT | Drawn by: FAN | App'd: |
| | Code: TIA-222-G | Date: 01/14/18 | Scale: NTS |
| | Path: | | Dwg No. E-1 |

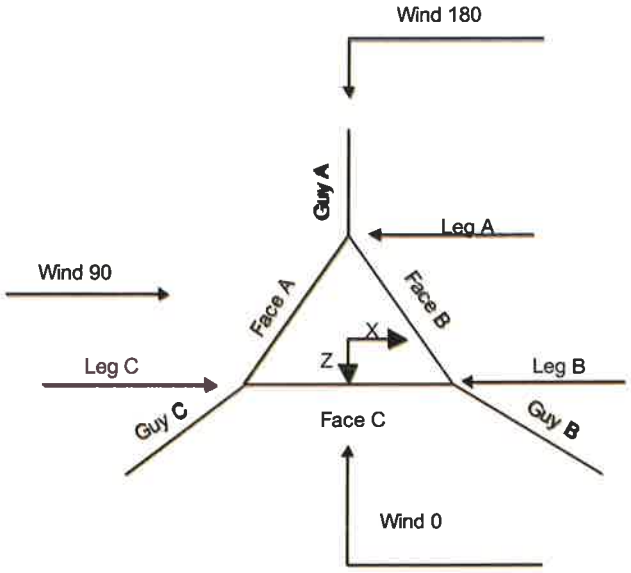
## Tower Input Data

The main tower is a 3x guyed tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.42 ft at the top and tapered at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

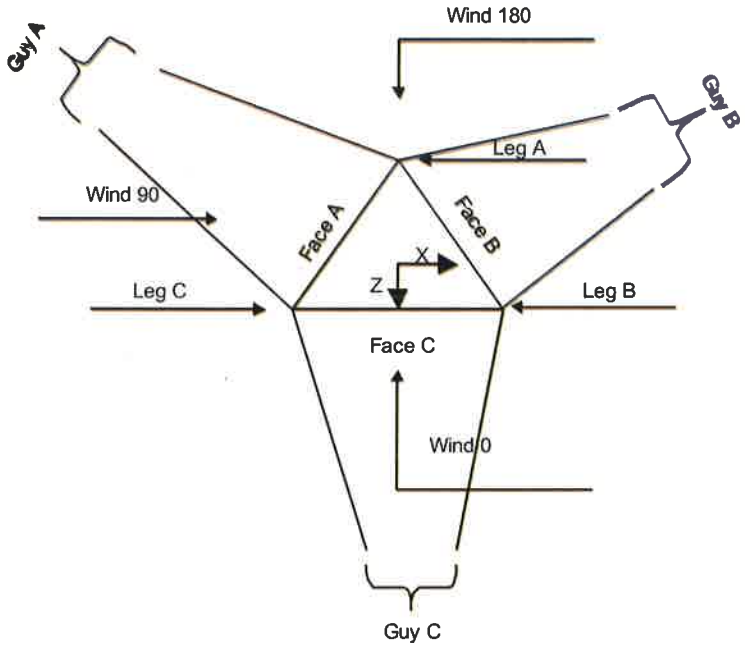
Tower is located in Tolland County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Safety factor used in guy design is 1.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

## Options

| | | |
|---|---|---|
| Consider Moments - Legs | Distribute Leg Loads As Uniform | Treat Feedline Bundles As Cylinder |
| Consider Moments - Horizontals | Assume Legs Pinned | Use ASCE 10 X-Brace Ly Rules |
| Consider Moments - Diagonals | √ Assume Rigid Index Plate | √ Calculate Redundant Bracing Forces |
| Use Moment Magnification | √ Use Clear Spans For Wind Area | Ignore Redundant Members in FEA |
| √ Use Code Stress Ratios | √ Use Clear Spans For KL/r | SR Leg Bolts Resist Compression |
| √ Use Code Safety Factors - Guys | √ Retension Guys To Initial Tension | √ All Leg Panels Have Same Allowable |
| Escalate Ice | Bypass Mast Stability Checks | Offset Girt At Foundation |
| Always Use Max Kz | √ Use Azimuth Dish Coefficients | √ Consider Feedline Torque |
| Use Special Wind Profile | √ Project Wind Area of Appurt. | Include Angle Block Shear Check |
| √ Include Bolts In Member Capacity | √ Autocalc Torque Arm Areas | Poles |
| √ Leg Bolts Are At Top Of Section | SR Members Have Cut Ends | Include Shear-Torsion Interaction |
| √ Secondary Horizontal Braces Leg | Sort Capacity Reports By Component | Always Use Sub-Critical Flow |
| Use Diamond Inner Bracing (4 Sided) | √ Triangulate Diamond Inner Bracing | Use Top Mounted Sockets |
| Add IBC .6D+W Combination | | |




***Corner & Starmount Guyed Tower***




***Face Guyed***

## Tower Section Geometry

| Tower Section | Tower Elevation ft | Assembly Database | Description | Section Width ft | Number of Sections | Section Length ft |
|---|---|---|---|---|---|---|
| T1 | 180.00-160.00 | | | 3.42 | 1 | 20.00 |
| T2 | 160.00-140.00 | | | 3.42 | 1 | 20.00 |
| T3 | 140.00-120.00 | | | 3.42 | 1 | 20.00 |
| T4 | 120.00-100.00 | | | 3.42 | 1 | 20.00 |
| T5 | 100.00-80.00 | | | 3.42 | 1 | 20.00 |
| T6 | 80.00-60.00 | | | 3.42 | 1 | 20.00 |
| T7 | 60.00-40.00 | | | 3.42 | 1 | 20.00 |
| T8 | 40.00-20.00 | | | 3.42 | 1 | 20.00 |
| T9 | 20.00-5.00 | | | 3.42 | 1 | 15.00 |
| T10 | 5.00-0.00 | | | 3.42 | 1 | 5.00 |

## Tower Section Geometry *(cont'd)*

| Tower Section | Tower Elevation ft | Diagonal Spacing ft | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset in | Bottom Girt Offset in |
|---|---|---|---|---|---|---|---|
| T1 | 180.00-160.00 | 2.42 | CX Brace | No | Yes | 4.0000 | 4.0000 |
| T2 | 160.00-140.00 | 2.42 | CX Brace | No | Yes | 4.0000 | 4.0000 |
| T3 | 140.00-120.00 | 2.42 | CX Brace | No | Yes | 4.0000 | 4.0000 |
| T4 | 120.00-100.00 | 2.42 | CX Brace | No | Yes | 4.0000 | 4.0000 |
| T5 | 100.00-80.00 | 2.42 | CX Brace | No | Yes | 4.0000 | 4.0000 |
| T6 | 80.00-60.00 | 2.42 | K Brace Left | No | Yes | 4.0000 | 4.0000 |
| T7 | 60.00-40.00 | 2.42 | K Brace Left | No | Yes | 4.0000 | 4.0000 |
| T8 | 40.00-20.00 | 2.42 | K Brace Left | No | Yes | 4.0000 | 4.0000 |
| T9 | 20.00-5.00 | 2.39 | K Brace Left | No | Yes | 4.0000 | 4.0000 |
| T10 | 5.00-0.00 | 0.98 | X Brace | No | Yes | 1.0000 | 0.0000 |

## Tower Section Geometry (cont'd)

| Tower Elevation ft | Leg Type | Leg Size | Leg Grade | Diagonal Type | Diagonal Size | Diagonal Grade |
|---|---|---|---|---|---|---|
| T1 180.00-160.00 | Pipe | P2x.218 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T2 160.00-140.00 | Pipe | P2x.218 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T3 140.00-120.00 | Pipe | P2x.218 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T4 120.00-100.00 | Pipe | P2x.218 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T5 100.00-80.00 | Pipe | P2.5x.276 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T6 80.00-60.00 | Pipe | P2.5x.276 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T7 60.00-40.00 | Pipe | P2.5x.203 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T8 40.00-20.00 | Pipe | P2.5x.203 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T9 20.00-5.00 | Pipe | P2.5x.276 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T10 5.00-0.00 | Pipe | P2.5x.276 | A500-50 (50 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |

## Tower Section Geometry (cont'd)

| Tower Elevation ft | Top Girt Type | Top Girt Size | Top Girt Grade | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|---|---|---|---|---|---|---|
| T1 180.00-160.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T2 160.00-140.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T3 140.00-120.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T4 120.00-100.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T5 100.00-80.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 | Pipe | ROHN TS1.5x16 ga | A36M-45 |

| Tower Elevation ft | Top Girt Type | Top Girt Size | Top Girt Grade | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|---|---|---|---|---|---|---|
| T6 80.00-60.00 | Pipe | ROHN TS1.5x16 ga | (45 ksi) A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | (45 ksi) A36M-45 (45 ksi) |
| T7 60.00-40.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T8 40.00-20.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T9 20.00-5.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |
| T10 5.00-0.00 | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) | Pipe | ROHN TS1.5x16 ga | A36M-45 (45 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Gusset Area (per face) $ft^2$ | Gusset Thickness in | Gusset Grade | Adjust. Factor $A_f$ | Adjust. Factor $A_r$ | Weight Mult. | Double Angle Stitch Bolt Spacing Diagonals in | Double Angle Stitch Bolt Spacing Horizontals in |
|---|---|---|---|---|---|---|---|---|
| T1 180.00-160.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T2 160.00-140.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T3 140.00-120.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T4 120.00-100.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T5 100.00-80.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T6 80.00-60.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T7 60.00-40.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T8 40.00-20.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T9 20.00-5.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |
| T10 5.00-0.00 | 0.00 | 0.0000 | A36 (36 ksi) | 1 | 1 | 1 | 36.0000 | 36.0000 |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Calc K Single Angles | Calc K Solid Rounds | K Factors[1] Legs | X Brace Diags X Y | K Brace Diags X Y | Single Diags X Y | Girts X Y | Horiz. X Y | Sec. Horiz. X Y | Inner Brace X Y |
|---|---|---|---|---|---|---|---|---|---|---|
| T1 180.00-160.00 | No | Yes | 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 |
| T2 160.00-140.00 | No | Yes | 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 |

| Tower Elevation ft | Calc K Single Angles | Calc K Solid Rounds | K Factors[1] Legs | X Brace Diags X | X Brace Diags Y | K Brace Diags X | K Brace Diags Y | Single Diags X | Single Diags Y | Girts X | Girts Y | Horiz. X | Horiz. Y | Sec. Horiz. X | Sec. Horiz. Y | Inner Brace X | Inner Brace Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T3 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| 140.00-120.00 | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| T4 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| 120.00-100.00 | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| T5 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| 100.00-80.00 | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| T6 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| 80.00-60.00 | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| T7 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| 60.00-40.00 | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| T8 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| 40.00-20.00 | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| T9 20.00-5.00 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| T10 5.00-0.00 | No | Yes | 1 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| | | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Leg Net Width Deduct in | Leg U | Diagonal Net Width Deduct in | Diagonal U | Top Girt Net Width Deduct in | Top Girt U | Bottom Girt Net Width Deduct in | Bottom Girt U | Mid Girt Net Width Deduct in | Mid Girt U | Long Horizontal Net Width Deduct in | Long Horizontal U | Short Horizontal Net Width Deduct in | Short Horizontal U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| 180.00-160.00 | | | | | | | | | | | | | | |
| T2 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| 160.00-140.00 | | | | | | | | | | | | | | |
| T3 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| 140.00-120.00 | | | | | | | | | | | | | | |
| T4 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| 120.00-100.00 | | | | | | | | | | | | | | |
| T5 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| 100.00-80.00 | | | | | | | | | | | | | | |
| T6 80.00-60.00 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| T7 60.00-40.00 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| T8 40.00-20.00 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| T9 20.00-5.00 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |
| T10 5.00-0.00 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 1 | 0.0000 | 0.75 |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Leg Connection Type | Leg Bolt Size in | Leg No. | Diagonal Bolt Size in | Diagonal No. | Top Girt Bolt Size in | Top Girt No. | Bottom Girt Bolt Size in | Bottom Girt No. | Mid Girt Bolt Size in | Mid Girt No. | Long Horizontal Bolt Size in | Long Horizontal No. | Short Horizontal Bolt Size in | Short Horizontal No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 180.00-160.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T2 160.00-140.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T3 140.00-120.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T4 120.00-100.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T5 100.00-80.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T6 80.00-60.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T7 60.00-40.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T8 40.00-20.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T9 20.00-5.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T10 5.00-0.00 | Flange | 0.7500 A325N | 4 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.5000 A325N | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |

## Guy Data

| Guy Elevation ft | Guy Grade | | Guy Size | Initial Tension lb | % | Guy Modulus ksi | Guy Weight plf | $L_u$ ft | Anchor Radius ft | Anchor Azimuth Adj. ° | Anchor Elevation ft | End Fitting Efficiency % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 82.75 | EHS | A | 1/2 | 2690.00 | 10% | 21000 | 0.517 | 160.79 | 140.00 | 0.0000 | 0.00 | 100% |
| | | B | 1/2 | 2690.00 | 10% | 21000 | 0.517 | 160.79 | 140.00 | 0.0000 | 0.00 | 100% |
| | | C | 1/2 | 2690.00 | 10% | 21000 | 0.517 | 160.79 | 140.00 | 0.0000 | 0.00 | 100% |
| 162.75 | EHS | A | 3/4 | 5830.00 | 10% | 19000 | 1.155 | 213.21 | 140.00 | 0.0000 | 0.00 | 100% |
| | | B | 3/4 | 5830.00 | 10% | 19000 | 1.155 | 213.21 | 140.00 | 0.0000 | 0.00 | 100% |
| | | C | 3/4 | 5830.00 | 10% | 19000 | 1.155 | 213.21 | 140.00 | 0.0000 | 0.00 | 100% |
| 119.667 | EHS | A | 1/2 | 2690.00 | 10% | 21000 | 0.517 | 182.52 | 140.00 | 0.0000 | 0.00 | 100% |
| | | B | 1/2 | 2690.00 | 10% | 21000 | 0.517 | 182.52 | 140.00 | 0.0000 | 0.00 | 100% |
| | | C | 1/2 | 2690.00 | 10% | 21000 | 0.517 | 182.52 | 140.00 | 0.0000 | 0.00 | 100% |

## Guy Data(cont'd)

| Guy Elevation ft | Mount Type | Torque-Arm Spread ft | Torque-Arm Leg Angle ° | Torque-Arm Style | Torque-Arm Grade | Torque-Arm Type | Torque-Arm Size |
|---|---|---|---|---|---|---|---|
| 82.75 | Torque Arm | 7.00 | 0.0000 | Channel | A36 (36 ksi) | Channel | C10x15.3 |
| 162.75 | Strap | | | | | | |
| 119.667 | Strap | | | | | | |

## Guy Data (cont'd)

| Guy Elevation ft | Diagonal Grade | Diagonal Type | Upper Diagonal Size | Lower Diagonal Size | Is Strap. | Pull-Off Grade | Pull-Off Type | Pull-Off Size |
|---|---|---|---|---|---|---|---|---|
| 82.75 | A572-50 (50 ksi) | Solid Round | | | No | A36 (36 ksi) | Equal Angle | L1 1/2x1 1/2x3/16 |
| 162.75 | A572-50 (50 ksi) | Solid Round | | | No | A36 (36 ksi) | Flat Bar | 3x1/2 |
| 119.67 | A572-50 (50 ksi) | Solid Round | | | No | A36 (36 ksi) | Flat Bar | 3x1/2 |

## Guy Data (cont'd)

| Guy Elevation ft | Cable Weight A lb | Cable Weight B lb | Cable Weight C lb | Cable Weight D lb | Tower Intercept A ft | Tower Intercept B ft | Tower Intercept C ft | Tower Intercept D ft |
|---|---|---|---|---|---|---|---|---|
| 82.75 | 83.13 | 83.13 | 83.13 | | 2.47<br>2.7 sec/pulse | 2.47<br>2.7 sec/pulse | 2.47<br>2.7 sec/pulse | |
| 162.75 | 246.25 | 246.25 | 246.25 | | 4.44<br>3.6 sec/pulse | 4.44<br>3.6 sec/pulse | 4.44<br>3.6 sec/pulse | |
| 119.667 | 94.37 | 94.37 | 94.37 | | 3.17<br>3.1 sec/pulse | 3.17<br>3.1 sec/pulse | 3.17<br>3.1 sec/pulse | |

## Guy Data (cont'd)

| Guy Elevation ft | Calc K Single Angles | Calc K Solid Rounds | Torque Arm $K_x$ | Torque Arm $K_y$ | Pull Off $K_x$ | Pull Off $K_y$ | Diagonal $K_x$ | Diagonal $K_y$ |
|---|---|---|---|---|---|---|---|---|
| 82.75 | No | No | 1 | 1 | 1 | 1 | 1 | 1 |
| 162.75 | No | No | | | 1 | 1 | 1 | 1 |
| 119.667 | No | No | | | 1 | 1 | 1 | 1 |

## Guy Data (cont'd)

| Guy Elevation ft | Torque-Arm Bolt Size in | Torque-Arm Number | Torque-Arm Net Width Deduct in | Torque-Arm U | Pull Off Bolt Size in | Pull Off Number | Pull Off Net Width Deduct in | Pull Off U | Diagonal Bolt Size in | Diagonal Number | Diagonal Net Width Deduct in | Diagonal U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 82.75 | 0.7500 A325N | 2 | 0.0000 | 1 | 0.0000 A325N | 0 | 0.0000 | 1 | 0.6250 A325N | 0 | 0.0000 | 1 |
| 162.75 | 0.6250 A325N | 0 | 0.0000 | 0.75 | 0.0000 A325N | 0 | 0.0000 | 1 | 0.6250 A325N | 0 | 0.0000 | 1 |
| 119.667 | 0.6250 A325N | 0 | 0.0000 | 0.75 | 0.0000 A325N | 0 | 0.0000 | 1 | 0.6250 A325N | 0 | 0.0000 | 1 |

## Guy Pressures

| Guy Elevation ft | Guy Location | z ft | $q_z$ psf | $q_z$ Ice psf | Ice Thickness in |
|---|---|---|---|---|---|
| 82.75 | A | 41.38 | 16 | 4 | 2.0457 |
| | B | 41.38 | 16 | 4 | 2.0457 |
| | C | 41.38 | 16 | 4 | 2.0457 |
| 162.75 | A | 81.38 | 19 | 5 | 2.1889 |
| | B | 81.38 | 19 | 5 | 2.1889 |
| | C | 81.38 | 19 | 5 | 2.1889 |
| 119.667 | A | 59.83 | 17 | 5 | 2.1226 |
| | B | 59.83 | 17 | 5 | 2.1226 |
| | C | 59.83 | 17 | 5 | 2.1226 |

## Guy-Mast Forces (Excluding Wind) - No Ice

| Guy Elevation ft | Guy Location | Chord Angle ° | Guy Tension Top / Bottom lb | $F_x$ lb | $F_y$ lb | $F_z$ lb | $M_x$ lb-ft | $M_y$ lb-ft | $M_z$ lb-ft |
|---|---|---|---|---|---|---|---|---|---|
| 82.75 | A | 30.9442 | 2732.74 / 2690.00 | -58.96 | 1435.72 | -2324.46 | -2901.19 | 8254.77 | -5025.01 |
| | A | 30.9442 | 2732.74 / 2690.00 | 58.96 | 1435.72 | -2324.46 | -2901.19 | -8254.77 | 5025.01 |
| | B | 30.9442 | 2732.74 / 2690.00 | 2042.53 | 1435.72 | 1111.17 | 5802.38 | 8254.77 | 0.00 |
| | B | 30.9442 | 2732.74 / 2690.00 | 1983.56 | 1435.72 | 1213.30 | -2901.19 | -8254.77 | -5025.01 |
| | C | 30.9442 | 2732.74 / 2690.00 | -1983.56 | 1435.72 | 1213.30 | -2901.19 | 8254.77 | 5025.01 |
| | C | 30.9442 | 2732.74 / 2690.00 | -2042.53 | 1435.72 | 1111.17 | 5802.38 | -8254.77 | 0.00 |
| | | | Sum: | 0.00 | 8614.30 | 0.00 | -0.00 | 0.00 | 0.00 |
| 162.75 | A | 49.6993 | 6017.80 / 5830.00 | 0.00 | 4640.87 | -3830.96 | -9163.58 | 0.00 | 0.00 |
| | B | 49.6993 | 6017.80 / 5830.00 | 3317.71 | 4640.87 | 1915.48 | 4581.79 | 0.00 | -7935.89 |
| | C | 49.6993 | 6017.80 / 5830.00 | -3317.71 | 4640.87 | 1915.48 | 4581.79 | -0.00 | 7935.89 |
| | | | Sum: | 0.00 | 13922.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| 119.667 | A | 40.9250 | 2751.81 / 2690.00 | 0.00 | 1829.52 | -2055.57 | -3612.45 | 0.00 | 0.00 |
| | B | 40.9250 | 2751.81 / 2690.00 | 1780.17 | 1829.52 | 1027.78 | 1806.22 | 0.00 | -3128.47 |
| | C | 40.9250 | 2751.81 / 2690.00 | -1780.17 | 1829.52 | 1027.78 | 1806.22 | -0.00 | 3128.47 |
| | | | Sum: | 0.00 | 5488.55 | -0.00 | 0.00 | 0.00 | 0.00 |

## Guy-Mast Forces (Excluding Wind) - Ice

| Guy Elevation | Guy Location | Chord Angle | Guy Tension Top Bottom lb | $F_x$ | $F_y$ | $F_z$ | $M_x$ | $M_y$ | $M_z$ |
|---|---|---|---|---|---|---|---|---|---|
| ft | | ° | | lb | lb | lb | lb-ft | lb-ft | lb-ft |
| 82.75 | A | 30.9442 | 6764.07<br>6195.76 | -140.46 | 3882.09 | -5537.35 | -7844.65 | 19664.57 | -13587.33 |
| | A | 30.9442 | 6764.07<br>6195.76 | 140.46 | 3882.09 | -5537.35 | -7844.65 | -19664.57 | 13587.33 |
| | B | 30.9442 | 6764.07<br>6195.76 | 4865.72 | 3882.09 | 2647.03 | 15689.29 | 19664.57 | 0.00 |
| | B | 30.9442 | 6764.07<br>6195.76 | 4725.26 | 3882.09 | 2890.32 | -7844.65 | -19664.57 | -13587.33 |
| | C | 30.9442 | 6764.07<br>6195.76 | -4725.26 | 3882.09 | 2890.32 | -7844.65 | 19664.57 | 13587.33 |
| | C | 30.9442 | 6764.07<br>6195.76 | -4865.72 | 3882.09 | 2647.03 | 15689.29 | -19664.57 | 0.00 |
| | | | Sum: | 0.00 | 23292.56 | 0.00 | -0.00 | 0.00 | 0.00 |
| 162.75 | A | 49.6993 | 11880.60<br>10415.60 | 0.00 | 9458.73 | -7188.96 | -18676.62 | 0.00 | 0.00 |
| | B | 49.6993 | 11880.60<br>10415.60 | 6225.82 | 9458.73 | 3594.48 | 9338.31 | 0.00 | -16174.43 |
| | C | 49.6993 | 11880.60<br>10415.60 | -6225.82 | 9458.73 | 3594.48 | 9338.31 | -0.00 | 16174.43 |
| | | | Sum: | 0.00 | 28376.19 | -0.00 | 0.00 | 0.00 | 0.00 |
| 119.667 | A | 40.9250 | 7118.36<br>6244.19 | 0.00 | 5040.37 | -5026.50 | -9952.40 | 0.00 | 0.00 |
| | B | 40.9250 | 7118.36<br>6244.19 | 4353.08 | 5040.37 | 2513.25 | 4976.20 | 0.00 | -8619.04 |
| | C | 40.9250 | 7118.36<br>6244.19 | -4353.08 | 5040.37 | 2513.25 | 4976.20 | -0.00 | 8619.04 |
| | | | Sum: | 0.00 | 15121.11 | -0.00 | 0.00 | 0.00 | 0.00 |

## Guy-Mast Forces (Excluding Wind) - Service

| Guy Elevation | Guy Location | Chord Angle | Guy Tension Top Bottom lb | $F_x$ | $F_y$ | $F_z$ | $M_x$ | $M_y$ | $M_z$ |
|---|---|---|---|---|---|---|---|---|---|
| ft | | ° | | lb | lb | lb | lb-ft | lb-ft | lb-ft |
| 82.75 | A | 30.9442 | 2732.74<br>2690.00 | -58.96 | 1435.72 | -2324.46 | -2901.19 | 8254.77 | -5025.01 |
| | A | 30.9442 | 2732.74<br>2690.00 | 58.96 | 1435.72 | -2324.46 | -2901.19 | -8254.77 | 5025.01 |
| | B | 30.9442 | 2732.74<br>2690.00 | 2042.53 | 1435.72 | 1111.17 | 5802.38 | 8254.77 | 0.00 |
| | B | 30.9442 | 2732.74<br>2690.00 | 1983.56 | 1435.72 | 1213.30 | -2901.19 | -8254.77 | -5025.01 |
| | C | 30.9442 | 2732.74<br>2690.00 | -1983.56 | 1435.72 | 1213.30 | -2901.19 | 8254.77 | 5025.01 |
| | C | 30.9442 | 2732.74<br>2690.00 | -2042.53 | 1435.72 | 1111.17 | 5802.38 | -8254.77 | 0.00 |
| | | | Sum: | 0.00 | 8614.30 | 0.00 | -0.00 | 0.00 | 0.00 |
| 162.75 | A | 49.6993 | 6017.80<br>5830.00 | 0.00 | 4640.87 | -3830.96 | -9163.58 | 0.00 | 0.00 |
| | B | 49.6993 | 6017.80<br>5830.00 | 3317.71 | 4640.87 | 1915.48 | 4581.79 | 0.00 | -7935.89 |
| | C | 49.6993 | 6017.80<br>5830.00 | -3317.71 | 4640.87 | 1915.48 | 4581.79 | -0.00 | 7935.89 |

| Guy Elevation ft | Guy Location | Chord Angle ° | Guy Tension Top Bottom lb | $F_x$ lb | $F_y$ lb | $F_z$ lb | $M_x$ lb-ft | $M_y$ lb-ft | $M_z$ lb-ft |
|---|---|---|---|---|---|---|---|---|---|
| | | | Sum: | 0.00 | 13922.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| 119.667 | A | 40.9250 | 2751.81<br>2690.00 | 0.00 | 1829.52 | -2055.57 | -3612.45 | 0.00 | 0.00 |
| | B | 40.9250 | 2751.81<br>2690.00 | 1780.17 | 1829.52 | 1027.78 | 1806.22 | 0.00 | -3128.47 |
| | C | 40.9250 | 2751.81<br>2690.00 | -1780.17 | 1829.52 | 1027.78 | 1806.22 | -0.00 | 3128.47 |
| | | | Sum: | 0.00 | 5488.55 | -0.00 | 0.00 | 0.00 | 0.00 |

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

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Face Offset in | Lateral Offset (Frac FW) | # | # Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight plf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feedline Ladder (Af) | C | No | Ar (CaAa) | 171.50 - 6.00 | 0.1000 | 0 | 1 | 1 | 3.0000 | 3.0000 | | 8.40 |
| Safety Line 3/8 | A | No | Ar (CaAa) | 180.00 - 6.00 | 0.0000 | 0 | 1 | 1 | 0.3750 | 0.3750 | | 0.22 |
| 1 1/4 | C | No | Ar (CaAa) | 171.00 - 6.00 | 0.1000 | 0 | 4 | 4 | 1.5500 | 1.5500 | | 0.66 |
| 1 1/4 | B | No | Ar (CaAa) | 180.00 - 6.00 | 0.1000 | 0 | 1 | 1 | 1.5500 | 1.5500 | | 0.66 |
| 7/8 | B | No | Ar (CaAa) | 180.00 - 6.00 | 0.1000 | 0 | 2 | 2 | 1.1100 | 1.1100 | | 0.54 |
| 1 1/4 | B | No | Ar (CaAa) | 179.00 - 6.00 | 0.1000 | 0 | 1 | 1 | 1.5500 | 1.5500 | | 0.66 |
| 7/8 | B | No | Ar (CaAa) | 177.00 - 6.00 | 0.1000 | 0 | 1 | 1 | 1.1100 | 1.1100 | | 0.54 |
| 7/8 | B | No | Ar (CaAa) | 163.00 - 6.00 | 0.1000 | 0 | 1 | 1 | 1.1100 | 1.1100 | | 0.54 |
| 7/8 | B | No | Ar (CaAa) | 127.00 - 6.00 | 0.1000 | 0 | 1 | 1 | 1.1100 | 1.1100 | | 0.54 |
| 1/2 | B | No | Ar (CaAa) | 83.00 - 6.00 | 0.1000 | 0 | 1 | 1 | 0.5800 | 0.5800 | | 0.25 |

## Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation ft | Face | $A_R$ ft² | $A_F$ ft² | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² | Weight lb |
|---|---|---|---|---|---|---|---|
| T1 | 180.00-160.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 12.705 | 0.000 | 58.14 |
| | | C | 0.000 | 0.000 | 10.270 | 0.000 | 125.64 |
| T2 | 160.00-140.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 15.080 | 0.000 | 69.60 |
| | | C | 0.000 | 0.000 | 18.400 | 0.000 | 220.80 |
| T3 | 140.00-120.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 15.857 | 0.000 | 73.38 |
| | | C | 0.000 | 0.000 | 18.400 | 0.000 | 220.80 |
| T4 | 120.00-100.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 17.300 | 0.000 | 80.40 |
| | | C | 0.000 | 0.000 | 18.400 | 0.000 | 220.80 |
| T5 | 100.00-80.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 17.474 | 0.000 | 81.15 |
| | | C | 0.000 | 0.000 | 18.400 | 0.000 | 220.80 |
| T6 | 80.00-60.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 18.460 | 0.000 | 85.40 |
| | | C | 0.000 | 0.000 | 18.400 | 0.000 | 220.80 |

| Tower Section | Tower Elevation ft | Face | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|
| T7 | 60.00-40.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 18.460 | 0.000 | 85.40 |
| | | C | 0.000 | 0.000 | 18.400 | 0.000 | 220.80 |
| T8 | 40.00-20.00 | A | 0.000 | 0.000 | 0.750 | 0.000 | 4.40 |
| | | B | 0.000 | 0.000 | 18.460 | 0.000 | 85.40 |
| | | C | 0.000 | 0.000 | 18.400 | 0.000 | 220.80 |
| T9 | 20.00-5.00 | A | 0.000 | 0.000 | 0.525 | 0.000 | 3.08 |
| | | B | 0.000 | 0.000 | 12.922 | 0.000 | 59.78 |
| | | C | 0.000 | 0.000 | 12.880 | 0.000 | 154.56 |
| T10 | 5.00-0.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |

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

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|
| T1 | 180.00-160.00 | A | 2.356 | 0.000 | 0.000 | 10.175 | 0.000 | 161.65 |
| | | B | | 0.000 | 0.000 | 60.891 | 0.000 | 988.84 |
| | | C | | 0.000 | 0.000 | 31.935 | 0.000 | 651.58 |
| T2 | 160.00-140.00 | A | 2.327 | 0.000 | 0.000 | 10.058 | 0.000 | 158.03 |
| | | B | | 0.000 | 0.000 | 72.489 | 0.000 | 1188.73 |
| | | C | | 0.000 | 0.000 | 57.056 | 0.000 | 1148.84 |
| T3 | 140.00-120.00 | A | 2.294 | 0.000 | 0.000 | 9.926 | 0.000 | 153.99 |
| | | B | | 0.000 | 0.000 | 75.718 | 0.000 | 1234.28 |
| | | C | | 0.000 | 0.000 | 56.709 | 0.000 | 1132.91 |
| T4 | 120.00-100.00 | A | 2.256 | 0.000 | 0.000 | 9.774 | 0.000 | 149.42 |
| | | B | | 0.000 | 0.000 | 82.100 | 0.000 | 1331.65 |
| | | C | | 0.000 | 0.000 | 56.310 | 0.000 | 1114.74 |
| T5 | 100.00-80.00 | A | 2.211 | 0.000 | 0.000 | 9.594 | 0.000 | 144.12 |
| | | B | | 0.000 | 0.000 | 82.391 | 0.000 | 1315.87 |
| | | C | | 0.000 | 0.000 | 55.840 | 0.000 | 1093.49 |
| T6 | 80.00-60.00 | A | 2.156 | 0.000 | 0.000 | 9.375 | 0.000 | 137.76 |
| | | B | | 0.000 | 0.000 | 89.195 | 0.000 | 1394.52 |
| | | C | | 0.000 | 0.000 | 55.265 | 0.000 | 1067.74 |
| T7 | 60.00-40.00 | A | 2.085 | 0.000 | 0.000 | 9.089 | 0.000 | 129.71 |
| | | B | | 0.000 | 0.000 | 86.986 | 0.000 | 1326.15 |
| | | C | | 0.000 | 0.000 | 54.519 | 0.000 | 1034.70 |
| T8 | 40.00-20.00 | A | 1.981 | 0.000 | 0.000 | 8.674 | 0.000 | 118.45 |
| | | B | | 0.000 | 0.000 | 83.771 | 0.000 | 1229.76 |
| | | C | | 0.000 | 0.000 | 53.435 | 0.000 | 987.51 |
| T9 | 20.00-5.00 | A | 1.815 | 0.000 | 0.000 | 5.607 | 0.000 | 71.06 |
| | | B | | 0.000 | 0.000 | 55.042 | 0.000 | 758.28 |
| | | C | | 0.000 | 0.000 | 36.194 | 0.000 | 639.95 |
| T10 | 5.00-0.00 | A | 1.545 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |

## Feed Line Center of Pressure

| Section | Elevation ft | $CP_X$ in | $CP_Z$ in | $CP_X$ Ice in | $CP_Z$ Ice in |
|---|---|---|---|---|---|

| Section | Elevation | $CP_X$ | $CP_Z$ | $CP_X$ Ice | $CP_Z$ Ice |
|---|---|---|---|---|---|
| | ft | in | in | in | in |
| T1 | 180.00-160.00 | 0.7192 | 0.2668 | 0.2937 | -0.0354 |
| T2 | 160.00-140.00 | 0.7120 | 0.6318 | 0.3973 | 0.0867 |
| T3 | 140.00-120.00 | 0.7398 | 0.6012 | 0.4337 | 0.0687 |
| T4 | 120.00-100.00 | 0.7826 | 0.5418 | 0.4893 | 0.0325 |
| T5 | 100.00-80.00 | 0.7627 | 0.5183 | 0.4759 | 0.0273 |
| T6 | 80.00-60.00 | 0.8700 | 0.5320 | 0.7936 | -0.0130 |
| T7 | 60.00-40.00 | 0.8700 | 0.5320 | 0.7969 | -0.0030 |
| T8 | 40.00-20.00 | 0.8700 | 0.5320 | 0.8013 | 0.0126 |
| T9 | 20.00-5.00 | 0.8455 | 0.5170 | 0.7804 | 0.0390 |
| T10 | 5.00-0.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

## Shielding Factor Ka

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| T1 | 1 | Feedline Ladder (Af) | 160.00 - 171.50 | 0.6000 | 0.2306 |
| T1 | 2 | Safety Line 3/8 | 160.00 - 180.00 | 0.6000 | 0.2306 |
| T1 | 3 | 1 1/4 | 160.00 - 171.00 | 0.6000 | 0.2306 |
| T1 | 4 | 1 1/4 | 160.00 - 180.00 | 0.6000 | 0.2306 |
| T1 | 5 | 7/8 | 160.00 - 180.00 | 0.6000 | 0.2306 |
| T1 | 6 | 1 1/4 | 160.00 - 179.00 | 0.6000 | 0.2306 |
| T1 | 7 | 7/8 | 160.00 - 177.00 | 0.6000 | 0.2306 |
| T1 | 8 | 7/8 | 160.00 - 163.00 | 0.6000 | 0.2306 |
| T2 | 1 | Feedline Ladder (Af) | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T2 | 2 | Safety Line 3/8 | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T2 | 3 | 1 1/4 | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T2 | 4 | 1 1/4 | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T2 | 5 | 7/8 | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T2 | 6 | 1 1/4 | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T2 | 7 | 7/8 | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T2 | 8 | 7/8 | 140.00 - 160.00 | 0.6000 | 0.2622 |
| T3 | 1 | Feedline Ladder (Af) | 120.00 - 140.00 | 0.6000 | 0.2688 |
| T3 | 2 | Safety Line 3/8 | 120.00 - 140.00 | 0.6000 | 0.2688 |
| T3 | 3 | 1 1/4 | 120.00 - 140.00 | 0.6000 | 0.2688 |
| T3 | 4 | 1 1/4 | 120.00 - 140.00 | 0.6000 | 0.2688 |

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| T3 | 5 | 7/8 | 120.00 - 140.00 | 0.6000 | 0.2688 |
| T3 | 6 | 1 1/4 | 120.00 - 140.00 | 0.6000 | 0.2688 |
| T3 | 7 | 7/8 | 120.00 - 140.00 | 0.6000 | 0.2688 |
| T3 | 8 | 7/8 | 120.00 - 140.00 | 0.6000 | 0.2688 |
| T3 | 9 | 7/8 | 120.00 - 127.00 | 0.6000 | 0.2688 |
| T4 | 1 | Feedline Ladder (Af) | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 2 | Safety Line 3/8 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 3 | 1 1/4 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 4 | 1 1/4 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 5 | 7/8 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 6 | 1 1/4 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 7 | 7/8 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 8 | 7/8 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T4 | 9 | 7/8 | 100.00 - 120.00 | 0.6000 | 0.2712 |
| T5 | 1 | Feedline Ladder (Af) | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 2 | Safety Line 3/8 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 3 | 1 1/4 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 4 | 1 1/4 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 5 | 7/8 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 6 | 1 1/4 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 7 | 7/8 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 8 | 7/8 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 9 | 7/8 | 80.00 - 100.00 | 0.6000 | 0.2579 |
| T5 | 10 | 1/2 | 80.00 - 83.00 | 0.6000 | 0.2579 |
| T6 | 1 | Feedline Ladder (Af) | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 2 | Safety Line 3/8 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 3 | 1 1/4 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 4 | 1 1/4 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 5 | 7/8 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 6 | 1 1/4 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 7 | 7/8 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 8 | 7/8 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 9 | 7/8 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T6 | 10 | 1/2 | 60.00 - 80.00 | 0.6000 | 0.4759 |
| T7 | 1 | Feedline Ladder (Af) | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 2 | Safety Line 3/8 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 3 | 1 1/4 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 4 | 1 1/4 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 5 | 7/8 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 6 | 1 1/4 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 7 | 7/8 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 8 | 7/8 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 9 | 7/8 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T7 | 10 | 1/2 | 40.00 - 60.00 | 0.6000 | 0.4858 |
| T8 | 1 | Feedline Ladder (Af) | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 2 | Safety Line 3/8 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 3 | 1 1/4 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 4 | 1 1/4 | 20.00 - 40.00 | 0.6000 | 0.5004 |

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| T8 | 5 | 7/8 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 6 | 1 1/4 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 7 | 7/8 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 8 | 7/8 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 9 | 7/8 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T8 | 10 | 1/2 | 20.00 - 40.00 | 0.6000 | 0.5004 |
| T9 | 1 | Feedline Ladder (Af) | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 2 | Safety Line 3/8 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 3 | 1 1/4 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 4 | 1 1/4 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 5 | 7/8 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 6 | 1 1/4 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 7 | 7/8 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 8 | 7/8 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 9 | 7/8 | 6.00 - 20.00 | 0.6000 | 0.5132 |
| T9 | 10 | 1/2 | 6.00 - 20.00 | 0.6000 | 0.5132 |

## Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft | Offsets: Vert ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|---|
| Lightning Rod 5/8x4' | C | None | | | 0.0000 | 180.00 | No Ice | 0.25 | 0.25 | 31.00 |
| | | | | | | | 1/2" Ice | 0.66 | 0.66 | 33.82 |
| | | | | | | | 1" Ice | 0.97 | 0.97 | 39.29 |
| 12 ft Boom / Frame | A | From Leg | 2.00 | 0.00 | 0.0000 | 150.00 | No Ice | 18.00 | 9.00 | 500.00 |
| | | | | | | | 1/2" Ice | 22.00 | 11.00 | 650.00 |
| | | | | | | | 1" Ice | 26.00 | 13.00 | 800.00 |
| 12 ft Boom / Frame | B | From Leg | 2.00 | 0.00 | 0.0000 | 150.00 | No Ice | 18.00 | 9.00 | 500.00 |
| | | | | | | | 1/2" Ice | 22.00 | 11.00 | 650.00 |
| | | | | | | | 1" Ice | 26.00 | 13.00 | 800.00 |
| 12 ft Boom / Frame | C | From Leg | 2.00 | 0.00 | 0.0000 | 150.00 | No Ice | 18.00 | 9.00 | 500.00 |
| | | | | | | | 1/2" Ice | 22.00 | 11.00 | 650.00 |
| | | | | | | | 1" Ice | 26.00 | 13.00 | 800.00 |
| Station Master Antenna | B | From Leg | 0.50 | 0.00 | 0.0000 | 180.00 | No Ice | 3.64 | 3.64 | 10.20 |
| | | | | | | | 1/2" Ice | 4.21 | 4.21 | 30.00 |
| | | | | | | | 1" Ice | 4.78 | 4.78 | 50.00 |
| Decibel DB809 | C | From Leg | 3.00 | 0.00 | 0.0000 | 179.00 | No Ice | 3.68 | 3.68 | 27.00 |
| | | | | | | | 1/2" Ice | 4.93 | 4.93 | 60.90 |
| | | | | | | | 1" Ice | 6.21 | 6.21 | 104.80 |
| Side Arm | C | From Leg | 2.00 | 0.00 | 0.0000 | 179.00 | No Ice | 4.97 | 4.97 | 70.00 |
| | | | | | | | 1/2" Ice | 6.12 | 6.12 | 130.00 |
| | | | | | | | 1" Ice | 7.27 | 7.27 | 190.00 |
| Decibel DB809 | B | From Leg | 3.00 | 0.00 | 0.0000 | 177.00 | No Ice | 3.68 | 3.68 | 27.00 |
| | | | | | | | 1/2" Ice | 4.93 | 4.93 | 60.90 |
| | | | | | | | 1" Ice | 6.21 | 6.21 | 104.80 |
| Side Arm | B | From Leg | 2.00 | 0.00 | 0.0000 | 177.00 | No Ice | 4.97 | 4.97 | 70.00 |
| | | | | | | | 1/2" Ice | 6.12 | 6.12 | 130.00 |
| | | | | | | | 1" Ice | 7.27 | 7.27 | 190.00 |
| Celwave PD201 | B | From Leg | 3.00 | 0.00 | 0.0000 | 163.00 | No Ice | 1.18 | 1.18 | 4.00 |
| | | | | | | | 1/2" Ice | 2.09 | 2.09 | 16.80 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft | Offsets: Vert ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0.00 | | | | 1" Ice | 3.02 | 3.02 | 36.90 |
| Celwave PD201 | B | From Leg | 3.00 | 0.0000 | | 83.00 | No Ice | 1.18 | 1.18 | 4.00 |
| | | | 0.00 | | | | 1/2" Ice | 2.09 | 2.09 | 16.80 |
| | | | 0.00 | | | | 1" Ice | 3.02 | 3.02 | 36.90 |
| Decibel DB420 | B | From Leg | 3.00 | 0.0000 | | 127.00 | No Ice | 5.19 | 5.19 | 35.00 |
| | | | 0.00 | | | | 1/2" Ice | 7.19 | 7.19 | 83.50 |
| | | | 0.00 | | | | 1" Ice | 9.20 | 9.20 | 147.80 |
| Side Arm | B | From Leg | 2.00 | 0.0000 | | 127.00 | No Ice | 4.97 | 4.97 | 70.00 |
| | | | 0.00 | | | | 1/2" Ice | 6.12 | 6.12 | 130.00 |
| | | | 0.00 | | | | 1" Ice | 7.27 | 7.27 | 190.00 |
| 12 ft Boom / Frame (Sprint) | A | From Leg | 2.00 | 0.0000 | | 171.00 | No Ice | 18.00 | 9.00 | 500.00 |
| | | | 0.00 | | | | 1/2" Ice | 22.00 | 11.00 | 650.00 |
| | | | 0.00 | | | | 1" Ice | 26.00 | 13.00 | 800.00 |
| 12 ft Boom / Frame (Sprint) | B | From Leg | 2.00 | 0.0000 | | 171.00 | No Ice | 18.00 | 9.00 | 500.00 |
| | | | 0.00 | | | | 1/2" Ice | 22.00 | 11.00 | 650.00 |
| | | | 0.00 | | | | 1" Ice | 26.00 | 13.00 | 800.00 |
| 12 ft Boom / Frame (Sprint) | C | From Leg | 2.00 | 0.0000 | | 171.00 | No Ice | 18.00 | 9.00 | 500.00 |
| | | | 0.00 | | | | 1/2" Ice | 22.00 | 11.00 | 650.00 |
| | | | 0.00 | | | | 1" Ice | 26.00 | 13.00 | 800.00 |
| Commscope DT465B-2XR | A | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 9.22 | 5.87 | 50.00 |
| | | | 0.00 | | | | 1/2" Ice | 9.68 | 6.33 | 108.00 |
| | | | 0.00 | | | | 1" Ice | 10.14 | 6.79 | 172.40 |
| Commscope DT465B-2XR | B | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 9.22 | 5.87 | 50.00 |
| | | | 0.00 | | | | 1/2" Ice | 9.68 | 6.33 | 108.00 |
| | | | 0.00 | | | | 1" Ice | 10.14 | 6.79 | 172.40 |
| Commscope DT465B-2XR | C | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 9.22 | 5.87 | 50.00 |
| | | | 0.00 | | | | 1/2" Ice | 9.68 | 6.33 | 108.00 |
| | | | 0.00 | | | | 1" Ice | 10.14 | 6.79 | 172.40 |
| Alcatel Lucent 4x45 | A | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 2.54 | 1.61 | 51.00 |
| | | | 0.00 | | | | 1/2" Ice | 2.72 | 1.78 | 71.10 |
| | | | 0.00 | | | | 1" Ice | 2.92 | 1.96 | 94.30 |
| Alcatel Lucent 4x45 | B | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 2.54 | 1.61 | 51.00 |
| | | | 0.00 | | | | 1/2" Ice | 2.72 | 1.78 | 71.10 |
| | | | 0.00 | | | | 1" Ice | 2.92 | 1.96 | 94.30 |
| Alcatel Lucent 4x45 | C | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 2.54 | 1.61 | 51.00 |
| | | | 0.00 | | | | 1/2" Ice | 2.72 | 1.78 | 71.10 |
| | | | 0.00 | | | | 1" Ice | 2.92 | 1.96 | 94.30 |
| Alcatel Lucent 8x200-25 | A | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 4.05 | 1.53 | 70.00 |
| | | | 0.00 | | | | 1/2" Ice | 4.27 | 1.70 | 97.10 |
| | | | 0.00 | | | | 1" Ice | 4.50 | 1.88 | 127.80 |
| Alcatel Lucent 8x200-25 | B | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 4.05 | 1.53 | 70.00 |
| | | | 0.00 | | | | 1/2" Ice | 4.27 | 1.70 | 97.10 |
| | | | 0.00 | | | | 1" Ice | 4.50 | 1.88 | 127.80 |
| Alcatel Lucent 8x200-25 | C | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 4.05 | 1.53 | 70.00 |
| | | | 0.00 | | | | 1/2" Ice | 4.27 | 1.70 | 97.10 |
| | | | 0.00 | | | | 1" Ice | 4.50 | 1.88 | 127.80 |
| RFS APXV9ERR18-C-A20 | A | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 8.02 | 5.81 | 62.00 |
| | | | 0.00 | | | | 1/2" Ice | 8.48 | 6.27 | 114.00 |
| | | | 0.00 | | | | 1" Ice | 8.93 | 6.73 | 172.10 |
| RFS APXV9ERR18-C-A20 | B | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 8.02 | 5.81 | 62.00 |
| | | | 0.00 | | | | 1/2" Ice | 8.48 | 6.27 | 114.00 |
| | | | 0.00 | | | | 1" Ice | 8.93 | 6.73 | 172.10 |
| RFS APXV9ERR18-C-A20 | C | From Leg | 4.00 | 0.0000 | | 171.00 | No Ice | 8.02 | 5.81 | 62.00 |
| | | | 0.00 | | | | 1/2" Ice | 8.48 | 6.27 | 114.00 |
| | | | 0.00 | | | | 1" Ice | 8.93 | 6.73 | 172.10 |
| (2) Alcatel Lucent 2x50 (Sprint) | A | From Leg | 3.00 | 0.0000 | | 171.00 | No Ice | 2.27 | 1.35 | 42.00 |
| | | | 0.00 | | | | 1/2" Ice | 2.45 | 1.51 | 59.30 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.00 | | | 1" Ice | 2.64 | 1.68 | 79.60 |
| (2) Alcatel Lucent 2x50 (Sprint) | B | From Leg | 3.00 | 0.0000 | 171.00 | No Ice | 2.27 | 1.35 | 42.00 |
| | | | 0.00 | | | 1/2" Ice | 2.45 | 1.51 | 59.30 |
| | | | 0.00 | | | 1" Ice | 2.64 | 1.68 | 79.60 |
| (2) Alcatel Lucent 2x50 (Sprint) | C | From Leg | 3.00 | 0.0000 | 171.00 | No Ice | 2.27 | 1.35 | 42.00 |
| | | | 0.00 | | | 1/2" Ice | 2.45 | 1.51 | 59.30 |
| | | | 0.00 | | | 1" Ice | 2.64 | 1.68 | 79.60 |

## Tower Pressures - No Ice

$G_H = 0.850$

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $A_G$ $ft^2$ | Face | $A_F$ $ft^2$ | $A_R$ $ft^2$ | $A_{leg}$ $ft^2$ | Leg % | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 170.00 | 1.15 | 24 | 72.358 | A | 0.806 | 16.613 | 7.917 | 45.45 | 0.750 | 0.000 |
| 180.00-160.00 | | | | | B | 0.806 | 16.613 | | 45.45 | 12.705 | 0.000 |
| | | | | | C | 0.806 | 16.613 | | 45.45 | 10.270 | 0.000 |
| T2 | 150.00 | 1.11 | 23 | 72.358 | A | 0.000 | 16.613 | 7.917 | 47.65 | 0.750 | 0.000 |
| 160.00-140.00 | | | | | B | 0.000 | 16.613 | | 47.65 | 15.080 | 0.000 |
| | | | | | C | 0.000 | 16.613 | | 47.65 | 18.400 | 0.000 |
| T3 | 130.00 | 1.065 | 22 | 72.358 | A | 0.000 | 16.613 | 7.917 | 47.65 | 0.750 | 0.000 |
| 140.00-120.00 | | | | | B | 0.000 | 16.613 | | 47.65 | 15.857 | 0.000 |
| | | | | | C | 0.000 | 16.613 | | 47.65 | 18.400 | 0.000 |
| T4 | 110.00 | 1.016 | 21 | 72.358 | A | 0.806 | 16.210 | 7.917 | 46.53 | 0.750 | 0.000 |
| 120.00-100.00 | | | | | B | 0.806 | 16.210 | | 46.53 | 17.300 | 0.000 |
| | | | | | C | 0.806 | 16.210 | | 46.53 | 18.400 | 0.000 |
| T5 | 90.00 | 0.959 | 20 | 73.192 | A | 0.398 | 18.167 | 9.583 | 51.62 | 0.750 | 0.000 |
| 100.00-80.00 | | | | | B | 0.398 | 18.167 | | 51.62 | 17.474 | 0.000 |
| | | | | | C | 0.398 | 18.167 | | 51.62 | 18.400 | 0.000 |
| T6 80.00-60.00 | 70.00 | 0.892 | 18 | 73.192 | A | 0.000 | 14.273 | 9.583 | 67.14 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 14.273 | | 67.14 | 18.460 | 0.000 |
| | | | | | C | 0.000 | 14.273 | | 67.14 | 18.400 | 0.000 |
| T7 60.00-40.00 | 50.00 | 0.811 | 17 | 73.192 | A | 0.000 | 14.273 | 9.583 | 67.14 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 14.273 | | 67.14 | 18.460 | 0.000 |
| | | | | | C | 0.000 | 14.273 | | 67.14 | 18.400 | 0.000 |
| T8 40.00-20.00 | 30.00 | 0.701 | 14 | 73.192 | A | 0.000 | 14.273 | 9.583 | 67.14 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 14.273 | | 67.14 | 18.460 | 0.000 |
| | | | | | C | 0.000 | 14.273 | | 67.14 | 18.400 | 0.000 |
| T9 20.00-5.00 | 12.50 | 0.7 | 14 | 54.894 | A | 0.000 | 10.892 | 7.188 | 65.99 | 0.525 | 0.000 |
| | | | | | B | 0.000 | 10.892 | | 65.99 | 12.922 | 0.000 |
| | | | | | C | 0.000 | 10.892 | | 65.99 | 12.880 | 0.000 |
| T10 5.00-0.00 | 2.50 | 0.7 | 14 | 9.816 | A | 0.000 | 4.968 | 2.576 | 51.85 | 0.000 | 0.000 |
| | | | | | B | 0.000 | 4.968 | | 51.85 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 4.968 | | 51.85 | 0.000 | 0.000 |

## Tower Pressure - With Ice

$G_H = 0.850$

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $t_Z$ in | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 180.00-160.00 | 170.00 | 1.15 | 6 | 2.3563 | 80.213 | A | 0.806 | 60.907 | 23.625 | 38.28 | 10.175 | 0.000 |
| | | | | | | B | 0.806 | 60.907 | | 38.28 | 60.891 | 0.000 |
| | | | | | | C | 0.806 | 60.907 | | 38.28 | 31.935 | 0.000 |
| T2 160.00-140.00 | 150.00 | 1.11 | 6 | 2.3270 | 80.115 | A | 0.000 | 59.107 | 23.430 | 39.64 | 10.058 | 0.000 |
| | | | | | | B | 0.000 | 59.107 | | 39.64 | 72.489 | 0.000 |
| | | | | | | C | 0.000 | 59.107 | | 39.64 | 57.056 | 0.000 |
| T3 140.00-120.00 | 130.00 | 1.065 | 6 | 2.2939 | 80.005 | A | 0.000 | 58.503 | 23.209 | 39.67 | 9.926 | 0.000 |
| | | | | | | B | 0.000 | 58.503 | | 39.67 | 75.718 | 0.000 |
| | | | | | | C | 0.000 | 58.503 | | 39.67 | 56.709 | 0.000 |
| T4 120.00-100.00 | 110.00 | 1.016 | 6 | 2.2559 | 79.878 | A | 0.806 | 57.406 | 22.956 | 39.44 | 9.774 | 0.000 |
| | | | | | | B | 0.806 | 57.406 | | 39.44 | 82.100 | 0.000 |
| | | | | | | C | 0.806 | 57.406 | | 39.44 | 56.310 | 0.000 |
| T5 100.00-80.00 | 90.00 | 0.959 | 5 | 2.2111 | 80.562 | A | 0.398 | 59.385 | 24.324 | 40.69 | 9.594 | 0.000 |
| | | | | | | B | 0.398 | 59.385 | | 40.69 | 82.391 | 0.000 |
| | | | | | | C | 0.398 | 59.385 | | 40.69 | 55.840 | 0.000 |
| T6 80.00-60.00 | 70.00 | 0.892 | 5 | 2.1562 | 80.379 | A | 0.000 | 42.129 | 23.958 | 56.87 | 9.375 | 0.000 |
| | | | | | | B | 0.000 | 42.129 | | 56.87 | 89.195 | 0.000 |
| | | | | | | C | 0.000 | 42.129 | | 56.87 | 55.265 | 0.000 |
| T7 60.00-40.00 | 50.00 | 0.811 | 4 | 2.0849 | 80.141 | A | 0.000 | 41.207 | 23.482 | 56.99 | 9.089 | 0.000 |
| | | | | | | B | 0.000 | 41.207 | | 56.99 | 86.986 | 0.000 |
| | | | | | | C | 0.000 | 41.207 | | 56.99 | 54.519 | 0.000 |
| T8 40.00-20.00 | 30.00 | 0.701 | 4 | 1.9810 | 79.795 | A | 0.000 | 39.866 | 22.790 | 57.17 | 8.674 | 0.000 |
| | | | | | | B | 0.000 | 39.866 | | 57.17 | 83.771 | 0.000 |
| | | | | | | C | 0.000 | 39.866 | | 57.17 | 53.435 | 0.000 |
| T9 20.00-5.00 | 12.50 | 0.7 | 4 | 1.8150 | 59.431 | A | 0.000 | 28.932 | 16.262 | 56.21 | 5.607 | 0.000 |
| | | | | | | B | 0.000 | 28.932 | | 56.21 | 55.042 | 0.000 |
| | | | | | | C | 0.000 | 28.932 | | 56.21 | 36.194 | 0.000 |
| T10 5.00-0.00 | 2.50 | 0.7 | 4 | 1.5452 | 11.177 | A | 0.000 | 12.665 | 5.345 | 42.20 | 0.000 | 0.000 |
| | | | | | | B | 0.000 | 12.665 | | 42.20 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 12.665 | | 42.20 | 0.000 | 0.000 |

## Tower Pressure - Service

$G_H = 0.850$

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 180.00-160.00 | 170.00 | 1.15 | 9 | 72.358 | A | 0.806 | 16.613 | 7.917 | 45.45 | 0.750 | 0.000 |
| | | | | | B | 0.806 | 16.613 | | 45.45 | 12.705 | 0.000 |
| | | | | | C | 0.806 | 16.613 | | 45.45 | 10.270 | 0.000 |
| T2 160.00-140.00 | 150.00 | 1.11 | 9 | 72.358 | A | 0.000 | 16.613 | 7.917 | 47.65 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 16.613 | | 47.65 | 15.080 | 0.000 |
| | | | | | C | 0.000 | 16.613 | | 47.65 | 18.400 | 0.000 |
| T3 140.00-120.00 | 130.00 | 1.065 | 8 | 72.358 | A | 0.000 | 16.613 | 7.917 | 47.65 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 16.613 | | 47.65 | 15.857 | 0.000 |
| | | | | | C | 0.000 | 16.613 | | 47.65 | 18.400 | 0.000 |
| T4 120.00-100.00 | 110.00 | 1.016 | 8 | 72.358 | A | 0.806 | 16.210 | 7.917 | 46.53 | 0.750 | 0.000 |
| | | | | | B | 0.806 | 16.210 | | 46.53 | 17.300 | 0.000 |
| | | | | | C | 0.806 | 16.210 | | 46.53 | 18.400 | 0.000 |
| T5 | 90.00 | 0.959 | 8 | 73.192 | A | 0.398 | 18.167 | 9.583 | 51.62 | 0.750 | 0.000 |

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 100.00-80.00 | | | | | B | 0.398 | 18.167 | | 51.62 | 17.474 | 0.000 |
| | | | | | C | 0.398 | 18.167 | | 51.62 | 18.400 | 0.000 |
| T6 80.00-60.00 | 70.00 | 0.892 | 7 | 73.192 | A | 0.000 | 14.273 | 9.583 | 67.14 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 14.273 | | 67.14 | 18.460 | 0.000 |
| | | | | | C | 0.000 | 14.273 | | 67.14 | 18.400 | 0.000 |
| T7 60.00-40.00 | 50.00 | 0.811 | 6 | 73.192 | A | 0.000 | 14.273 | 9.583 | 67.14 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 14.273 | | 67.14 | 18.460 | 0.000 |
| | | | | | C | 0.000 | 14.273 | | 67.14 | 18.400 | 0.000 |
| T8 40.00-20.00 | 30.00 | 0.701 | 5 | 73.192 | A | 0.000 | 14.273 | 9.583 | 67.14 | 0.750 | 0.000 |
| | | | | | B | 0.000 | 14.273 | | 67.14 | 18.460 | 0.000 |
| | | | | | C | 0.000 | 14.273 | | 67.14 | 18.400 | 0.000 |
| T9 20.00-5.00 | 12.50 | 0.7 | 5 | 54.894 | A | 0.000 | 10.892 | 7.188 | 65.99 | 0.525 | 0.000 |
| | | | | | B | 0.000 | 10.892 | | 65.99 | 12.922 | 0.000 |
| | | | | | C | 0.000 | 10.892 | | 65.99 | 12.880 | 0.000 |
| T10 5.00-0.00 | 2.50 | 0.7 | 5 | 9.816 | A | 0.000 | 4.968 | 2.576 | 51.85 | 0.000 | 0.000 |
| | | | | | B | 0.000 | 4.968 | | 51.85 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 4.968 | | 51.85 | 0.000 | 0.000 |

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

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 188.18 | 552.04 | A | 0.241 | 2.466 | 24 | 1 | 1 | 10.487 | 802.39 | 40.12 | C |
| 180.00-160.00 | | | B | 0.241 | 2.466 | | 1 | 1 | 10.487 | | | |
| | | | C | 0.241 | 2.466 | | 1 | 1 | 10.487 | | | |
| T2 | 294.80 | 499.67 | A | 0.23 | 2.5 | 23 | 1 | 1 | 9.640 | 862.01 | 43.10 | C |
| 160.00-140.00 | | | B | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| T3 | 298.58 | 499.67 | A | 0.23 | 2.5 | 22 | 1 | 1 | 9.640 | 836.12 | 41.81 | C |
| 140.00-120.00 | | | B | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| T4 | 305.60 | 542.87 | A | 0.235 | 2.483 | 21 | 1 | 1 | 10.232 | 835.46 | 41.77 | C |
| 120.00-100.00 | | | B | 0.235 | 2.483 | | 1 | 1 | 10.232 | | | |
| | | | C | 0.235 | 2.483 | | 1 | 1 | 10.232 | | | |
| T5 | 306.35 | 676.58 | A | 0.254 | 2.427 | 20 | 1 | 1 | 11.042 | 813.85 | 40.69 | C |
| 100.00-80.00 | | TA 320.88 | B | 0.254 | 2.427 | | 1 | 1 | 11.042 | | | |
| | | | C | 0.254 | 2.427 | | 1 | 1 | 11.042 | | | |
| T6 | 310.60 | 568.31 | A | 0.195 | 2.613 | 18 | 1 | 1 | 8.187 | 682.73 | 34.14 | C |
| 80.00-60.00 | | | B | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| T7 | 310.60 | 456.12 | A | 0.195 | 2.613 | 17 | 1 | 1 | 8.187 | 620.16 | 31.01 | C |
| 60.00-40.00 | | | B | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| T8 | 310.60 | 456.12 | A | 0.195 | 2.613 | 14 | 1 | 1 | 8.187 | 535.94 | 26.80 | C |
| 40.00-20.00 | | | B | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| T9 20.00-5.00 | 217.42 | 430.56 | A | 0.198 | 2.601 | 14 | 1 | 1 | 6.254 | 390.62 | 26.04 | C |
| | | | B | 0.198 | 2.601 | | 1 | 1 | 6.254 | | | |
| | | | C | 0.198 | 2.601 | | 1 | 1 | 6.254 | | | |
| T10 5.00-0.00 | 0.00 | 181.65 | A | 0.506 | 1.892 | 14 | 1 | 1 | 3.420 | 78.82 | 15.76 | C |
| | | | B | 0.506 | 1.892 | | 1 | 1 | 3.420 | | | |
| | | | C | 0.506 | 1.892 | | 1 | 1 | 3.420 | | | |
| Sum Weight: | 2542.73 | 5184.46 | | | | | | | | 6458.11 | | |

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

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 188.18 | 552.04 | A | 0.241 | 2.466 | 24 | 0.8 | 1 | 10.326 | 794.44 | 39.72 | C |
| 180.00-160.00 | | | B | 0.241 | 2.466 | | 0.8 | 1 | 10.326 | | | |
| | | | C | 0.241 | 2.466 | | 0.8 | 1 | 10.326 | | | |
| T2 | 294.80 | 499.67 | A | 0.23 | 2.5 | 23 | 0.8 | 1 | 9.640 | 862.01 | 43.10 | C |
| 160.00-140.00 | | | B | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| T3 | 298.58 | 499.67 | A | 0.23 | 2.5 | 22 | 0.8 | 1 | 9.640 | 836.12 | 41.81 | C |
| 140.00-120.00 | | | B | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| T4 | 305.60 | 542.87 | A | 0.235 | 2.483 | 21 | 0.8 | 1 | 10.071 | 828.39 | 41.42 | C |
| 120.00-100.00 | | | B | 0.235 | 2.483 | | 0.8 | 1 | 10.071 | | | |
| | | | C | 0.235 | 2.483 | | 0.8 | 1 | 10.071 | | | |
| T5 | 306.35 | 676.58 | A | 0.254 | 2.427 | 20 | 0.8 | 1 | 10.962 | 810.63 | 40.53 | C |
| 100.00-80.00 | | TA 320.88 | B | 0.254 | 2.427 | | 0.8 | 1 | 10.962 | | | |
| | | | C | 0.254 | 2.427 | | 0.8 | 1 | 10.962 | | | |
| T6 | 310.60 | 568.31 | A | 0.195 | 2.613 | 18 | 0.8 | 1 | 8.187 | 682.73 | 34.14 | C |
| 80.00-60.00 | | | B | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| T7 | 310.60 | 456.12 | A | 0.195 | 2.613 | 17 | 0.8 | 1 | 8.187 | 620.16 | 31.01 | C |
| 60.00-40.00 | | | B | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| T8 | 310.60 | 456.12 | A | 0.195 | 2.613 | 14 | 0.8 | 1 | 8.187 | 535.94 | 26.80 | C |
| 40.00-20.00 | | | B | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| T9 20.00-5.00 | 217.42 | 430.56 | A | 0.198 | 2.601 | 14 | 0.8 | 1 | 6.254 | 390.62 | 26.04 | C |
| | | | B | 0.198 | 2.601 | | 0.8 | 1 | 6.254 | | | |
| | | | C | 0.198 | 2.601 | | 0.8 | 1 | 6.254 | | | |
| T10 5.00-0.00 | 0.00 | 181.65 | A | 0.506 | 1.892 | 14 | 0.8 | 1 | 3.420 | 78.82 | 15.76 | C |
| | | | B | 0.506 | 1.892 | | 0.8 | 1 | 3.420 | | | |
| | | | C | 0.506 | 1.892 | | 0.8 | 1 | 3.420 | | | |
| Sum Weight: | 2542.73 | 5184.46 | | | | | | | | 6439.87 | | |

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

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 188.18 | 552.04 | A | 0.241 | 2.466 | 24 | 0.85 | 1 | 10.366 | 796.43 | 39.82 | C |
| 180.00-160.00 | | | B | 0.241 | 2.466 | | 0.85 | 1 | 10.366 | | | |
| | | | C | 0.241 | 2.466 | | 0.85 | 1 | 10.366 | | | |
| T2 | 294.80 | 499.67 | A | 0.23 | 2.5 | 23 | 0.85 | 1 | 9.640 | 862.01 | 43.10 | C |
| 160.00-140.00 | | | B | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| T3 | 298.58 | 499.67 | A | 0.23 | 2.5 | 22 | 0.85 | 1 | 9.640 | 836.12 | 41.81 | C |
| 140.00-120.00 | | | B | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| T4 | 305.60 | 542.87 | A | 0.235 | 2.483 | 21 | 0.85 | 1 | 10.111 | 830.16 | 41.51 | C |

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120.00-100.00 | | | B | 0.235 | 2.483 | | 0.85 | 1 | 10.111 | | | |
| | | | C | 0.235 | 2.483 | | 0.85 | 1 | 10.111 | | | |
| T5 | 306.35 | 676.58 | A | 0.254 | 2.427 | 20 | 0.85 | 1 | 10.982 | 811.43 | 40.57 | C |
| 100.00-80.00 | | TA 320.88 | B | 0.254 | 2.427 | | 0.85 | 1 | 10.982 | | | |
| | | | C | 0.254 | 2.427 | | 0.85 | 1 | 10.982 | | | |
| T6 | 310.60 | 568.31 | A | 0.195 | 2.613 | 18 | 0.85 | 1 | 8.187 | 682.73 | 34.14 | C |
| 80.00-60.00 | | | B | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| T7 | 310.60 | 456.12 | A | 0.195 | 2.613 | 17 | 0.85 | 1 | 8.187 | 620.16 | 31.01 | C |
| 60.00-40.00 | | | B | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| T8 | 310.60 | 456.12 | A | 0.195 | 2.613 | 14 | 0.85 | 1 | 8.187 | 535.94 | 26.80 | C |
| 40.00-20.00 | | | B | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| T9 20.00-5.00 | 217.42 | 430.56 | A | 0.198 | 2.601 | 14 | 0.85 | 1 | 6.254 | 390.62 | 26.04 | C |
| | | | B | 0.198 | 2.601 | | 0.85 | 1 | 6.254 | | | |
| | | | C | 0.198 | 2.601 | | 0.85 | 1 | 6.254 | | | |
| T10 5.00-0.00 | 0.00 | 181.65 | A | 0.506 | 1.892 | 14 | 0.85 | 1 | 3.420 | 78.82 | 15.76 | C |
| | | | B | 0.506 | 1.892 | | 0.85 | 1 | 3.420 | | | |
| | | | C | 0.506 | 1.892 | | 0.85 | 1 | 3.420 | | | |
| Sum Weight: | 2542.73 | 5184.46 | | | | | | | | 6444.43 | | |

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

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 1802.07 | 3987.87 | A | 0.769 | 1.797 | 6 | 1 | 1 | 53.310 | 635.61 | 31.78 | C |
| 180.00-160.00 | | | B | 0.769 | 1.797 | | 1 | 1 | 53.310 | | | |
| | | | C | 0.769 | 1.797 | | 1 | 1 | 53.310 | | | |
| T2 | 2495.59 | 3711.87 | A | 0.738 | 1.783 | 6 | 1 | 1 | 49.558 | 641.22 | 32.06 | C |
| 160.00-140.00 | | | B | 0.738 | 1.783 | | 1 | 1 | 49.558 | | | |
| | | | C | 0.738 | 1.783 | | 1 | 1 | 49.558 | | | |
| T3 | 2521.19 | 3640.14 | A | 0.731 | 1.781 | 6 | 1 | 1 | 48.771 | 616.29 | 30.81 | C |
| 140.00-120.00 | | | B | 0.731 | 1.781 | | 1 | 1 | 48.771 | | | |
| | | | C | 0.731 | 1.781 | | 1 | 1 | 48.771 | | | |
| T4 | 2595.81 | 3645.41 | A | 0.729 | 1.781 | 6 | 1 | 1 | 48.557 | 594.72 | 29.74 | C |
| 120.00-100.00 | | | B | 0.729 | 1.781 | | 1 | 1 | 48.557 | | | |
| | | | C | 0.729 | 1.781 | | 1 | 1 | 48.557 | | | |
| T5 | 2553.48 | 3841.79 | A | 0.742 | 1.785 | 5 | 1 | 1 | 50.377 | 567.69 | 28.38 | C |
| 100.00-80.00 | | TA | B | 0.742 | 1.785 | | 1 | 1 | 50.377 | | | |
| | | 1032.51 | C | 0.742 | 1.785 | | 1 | 1 | 50.377 | | | |
| T6 | 2600.02 | 2529.17 | A | 0.524 | 1.871 | 5 | 1 | 1 | 29.420 | 529.22 | 26.46 | C |
| 80.00-60.00 | | | B | 0.524 | 1.871 | | 1 | 1 | 29.420 | | | |
| | | | C | 0.524 | 1.871 | | 1 | 1 | 29.420 | | | |
| T7 | 2490.56 | 2319.20 | A | 0.514 | 1.882 | 4 | 1 | 1 | 28.547 | 475.67 | 23.78 | C |
| 60.00-40.00 | | | B | 0.514 | 1.882 | | 1 | 1 | 28.547 | | | |
| | | | C | 0.514 | 1.882 | | 1 | 1 | 28.547 | | | |
| T8 | 2335.71 | 2180.93 | A | 0.5 | 1.901 | 4 | 1 | 1 | 27.300 | 404.56 | 20.23 | C |
| 40.00-20.00 | | | B | 0.5 | 1.901 | | 1 | 1 | 27.300 | | | |
| | | | C | 0.5 | 1.901 | | 1 | 1 | 27.300 | | | |
| T9 20.00-5.00 | 1469.30 | 1601.34 | A | 0.487 | 1.918 | 4 | 1 | 1 | 19.615 | 282.62 | 18.84 | C |
| | | | B | 0.487 | 1.918 | | 1 | 1 | 19.615 | | | |

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | 0.487 | 1.918 | | 1 | 1 | 19.615 | | | |
| T10 5.00-0.00 | 0.00 | 689.01 | A | 1 | 2.1 | 4 | 1 | 1 | 12.665 | 75.97* | 15.19 | C |
| | | | B | 1 | 2.1 | | 1 | 1 | 12.665 | | | |
| | | | C | 1 | 2.1 | | 1 | 1 | 12.665 | | | |
| Sum Weight: | 20863.73 | 29179.25 | | | *2.1$A_g$ limit | | | | | 4823.57 | | |

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

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 1802.07 | 3987.87 | A | 0.769 | 1.797 | 6 | 0.8 | 1 | 53.149 | 634.07 | 31.70 | C |
| 180.00-160.00 | | | B | 0.769 | 1.797 | | 0.8 | 1 | 53.149 | | | |
| | | | C | 0.769 | 1.797 | | 0.8 | 1 | 53.149 | | | |
| T2 | 2495.59 | 3711.87 | A | 0.738 | 1.783 | 6 | 0.8 | 1 | 49.558 | 641.22 | 32.06 | C |
| 160.00-140.00 | | | B | 0.738 | 1.783 | | 0.8 | 1 | 49.558 | | | |
| | | | C | 0.738 | 1.783 | | 0.8 | 1 | 49.558 | | | |
| T3 | 2521.19 | 3640.14 | A | 0.731 | 1.781 | 6 | 0.8 | 1 | 48.771 | 616.29 | 30.81 | C |
| 140.00-120.00 | | | B | 0.731 | 1.781 | | 0.8 | 1 | 48.771 | | | |
| | | | C | 0.731 | 1.781 | | 0.8 | 1 | 48.771 | | | |
| T4 | 2595.81 | 3645.41 | A | 0.729 | 1.781 | 6 | 0.8 | 1 | 48.396 | 593.37 | 29.67 | C |
| 120.00-100.00 | | | B | 0.729 | 1.781 | | 0.8 | 1 | 48.396 | | | |
| | | | C | 0.729 | 1.781 | | 0.8 | 1 | 48.396 | | | |
| T5 | 2553.48 | 3841.79 | A | 0.742 | 1.785 | 5 | 0.8 | 1 | 50.298 | 567.06 | 28.35 | C |
| 100.00-80.00 | | TA | B | 0.742 | 1.785 | | 0.8 | 1 | 50.298 | | | |
| | | 1032.51 | C | 0.742 | 1.785 | | 0.8 | 1 | 50.298 | | | |
| T6 | 2600.02 | 2529.17 | A | 0.524 | 1.871 | 5 | 0.8 | 1 | 29.420 | 529.22 | 26.46 | C |
| 80.00-60.00 | | | B | 0.524 | 1.871 | | 0.8 | 1 | 29.420 | | | |
| | | | C | 0.524 | 1.871 | | 0.8 | 1 | 29.420 | | | |
| T7 | 2490.56 | 2319.20 | A | 0.514 | 1.882 | 4 | 0.8 | 1 | 28.547 | 475.67 | 23.78 | C |
| 60.00-40.00 | | | B | 0.514 | 1.882 | | 0.8 | 1 | 28.547 | | | |
| | | | C | 0.514 | 1.882 | | 0.8 | 1 | 28.547 | | | |
| T8 | 2335.71 | 2180.93 | A | 0.5 | 1.901 | 4 | 0.8 | 1 | 27.300 | 404.56 | 20.23 | C |
| 40.00-20.00 | | | B | 0.5 | 1.901 | | 0.8 | 1 | 27.300 | | | |
| | | | C | 0.5 | 1.901 | | 0.8 | 1 | 27.300 | | | |
| T9 20.00-5.00 | 1469.30 | 1601.34 | A | 0.487 | 1.918 | 4 | 0.8 | 1 | 19.615 | 282.62 | 18.84 | C |
| | | | B | 0.487 | 1.918 | | 0.8 | 1 | 19.615 | | | |
| | | | C | 0.487 | 1.918 | | 0.8 | 1 | 19.615 | | | |
| T10 5.00-0.00 | 0.00 | 689.01 | A | 1 | 2.1 | 4 | 0.8 | 1 | 12.665 | 75.97* | 15.19 | C |
| | | | B | 1 | 2.1 | | 0.8 | 1 | 12.665 | | | |
| | | | C | 1 | 2.1 | | 0.8 | 1 | 12.665 | | | |
| Sum Weight: | 20863.73 | 29179.25 | | | *2.1$A_g$ limit | | | | | 4820.05 | | |

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

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 1802.07 | 3987.87 | A | 0.769 | 1.797 | 6 | 0.85 | 1 | 53.190 | 634.46 | 31.72 | C |
| 180.00-160.00 | | | B | 0.769 | 1.797 | | 0.85 | 1 | 53.190 | | | |
| | | | C | 0.769 | 1.797 | | 0.85 | 1 | 53.190 | | | |
| T2 | 2495.59 | 3711.87 | A | 0.738 | 1.783 | 6 | 0.85 | 1 | 49.558 | 641.22 | 32.06 | C |
| 160.00-140.00 | | | B | 0.738 | 1.783 | | 0.85 | 1 | 49.558 | | | |
| | | | C | 0.738 | 1.783 | | 0.85 | 1 | 49.558 | | | |
| T3 | 2521.19 | 3640.14 | A | 0.731 | 1.781 | 6 | 0.85 | 1 | 48.771 | 616.29 | 30.81 | C |
| 140.00-120.00 | | | B | 0.731 | 1.781 | | 0.85 | 1 | 48.771 | | | |
| | | | C | 0.731 | 1.781 | | 0.85 | 1 | 48.771 | | | |
| T4 | 2595.81 | 3645.41 | A | 0.729 | 1.781 | 6 | 0.85 | 1 | 48.436 | 593.71 | 29.69 | C |
| 120.00-100.00 | | | B | 0.729 | 1.781 | | 0.85 | 1 | 48.436 | | | |
| | | | C | 0.729 | 1.781 | | 0.85 | 1 | 48.436 | | | |
| T5 | 2553.48 | 3841.79 | A | 0.742 | 1.785 | 5 | 0.85 | 1 | 50.317 | 567.21 | 28.36 | C |
| 100.00-80.00 | | TA | B | 0.742 | 1.785 | | 0.85 | 1 | 50.317 | | | |
| | | 1032.51 | C | 0.742 | 1.785 | | 0.85 | 1 | 50.317 | | | |
| T6 | 2600.02 | 2529.17 | A | 0.524 | 1.871 | 5 | 0.85 | 1 | 29.420 | 529.22 | 26.46 | C |
| 80.00-60.00 | | | B | 0.524 | 1.871 | | 0.85 | 1 | 29.420 | | | |
| | | | C | 0.524 | 1.871 | | 0.85 | 1 | 29.420 | | | |
| T7 | 2490.56 | 2319.20 | A | 0.514 | 1.882 | 4 | 0.85 | 1 | 28.547 | 475.67 | 23.78 | C |
| 60.00-40.00 | | | B | 0.514 | 1.882 | | 0.85 | 1 | 28.547 | | | |
| | | | C | 0.514 | 1.882 | | 0.85 | 1 | 28.547 | | | |
| T8 | 2335.71 | 2180.93 | A | 0.5 | 1.901 | 4 | 0.85 | 1 | 27.300 | 404.56 | 20.23 | C |
| 40.00-20.00 | | | B | 0.5 | 1.901 | | 0.85 | 1 | 27.300 | | | |
| | | | C | 0.5 | 1.901 | | 0.85 | 1 | 27.300 | | | |
| T9 20.00-5.00 | 1469.30 | 1601.34 | A | 0.487 | 1.918 | 4 | 0.85 | 1 | 19.615 | 282.62 | 18.84 | C |
| | | | B | 0.487 | 1.918 | | 0.85 | 1 | 19.615 | | | |
| | | | C | 0.487 | 1.918 | | 0.85 | 1 | 19.615 | | | |
| T10 5.00-0.00 | 0.00 | 689.01 | A | 1 | 2.1 | 4 | 0.85 | 1 | 12.665 | 75.97* | 15.19 | C |
| | | | B | 1 | 2.1 | | 0.85 | 1 | 12.665 | | | |
| | | | C | 1 | 2.1 | | 0.85 | 1 | 12.665 | | | |
| Sum Weight: | 20863.73 | 29179.25 | | | *2.1$A_g$ limit | | | | | 4820.93 | | |

## Tower Forces - Service - Wind Normal To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 188.18 | 552.04 | A | 0.241 | 2.466 | 9 | 1 | 1 | 10.487 | 307.01 | 15.35 | C |
| 180.00-160.00 | | | B | 0.241 | 2.466 | | 1 | 1 | 10.487 | | | |
| | | | C | 0.241 | 2.466 | | 1 | 1 | 10.487 | | | |
| T2 | 294.80 | 499.67 | A | 0.23 | 2.5 | 9 | 1 | 1 | 9.640 | 329.82 | 16.49 | C |
| 160.00-140.00 | | | B | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| T3 | 298.58 | 499.67 | A | 0.23 | 2.5 | 8 | 1 | 1 | 9.640 | 319.91 | 16.00 | C |
| 140.00-120.00 | | | B | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 1 | 1 | 9.640 | | | |
| T4 | 305.60 | 542.87 | A | 0.235 | 2.483 | 8 | 1 | 1 | 10.232 | 319.66 | 15.98 | C |
| 120.00-100.00 | | | B | 0.235 | 2.483 | | 1 | 1 | 10.232 | | | |
| | | | C | 0.235 | 2.483 | | 1 | 1 | 10.232 | | | |
| T5 | 306.35 | 676.58 | A | 0.254 | 2.427 | 8 | 1 | 1 | 11.042 | 311.39 | 15.57 | C |
| 100.00-80.00 | | TA 320.88 | B | 0.254 | 2.427 | | 1 | 1 | 11.042 | | | |
| | | | C | 0.254 | 2.427 | | 1 | 1 | 11.042 | | | |

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T6 | 310.60 | 568.31 | A | 0.195 | 2.613 | 7 | 1 | 1 | 8.187 | 261.22 | 13.06 | C |
| 80.00-60.00 | | | B | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| T7 | 310.60 | 456.12 | A | 0.195 | 2.613 | 6 | 1 | 1 | 8.187 | 237.28 | 11.86 | C |
| 60.00-40.00 | | | B | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| T8 | 310.60 | 456.12 | A | 0.195 | 2.613 | 5 | 1 | 1 | 8.187 | 205.06 | 10.25 | C |
| 40.00-20.00 | | | B | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 1 | 1 | 8.187 | | | |
| T9 20.00-5.00 | 217.42 | 430.56 | A | 0.198 | 2.601 | 5 | 1 | 1 | 6.254 | 149.46 | 9.96 | C |
| | | | B | 0.198 | 2.601 | | 1 | 1 | 6.254 | | | |
| | | | C | 0.198 | 2.601 | | 1 | 1 | 6.254 | | | |
| T10 5.00-0.00 | 0.00 | 181.65 | A | 0.506 | 1.892 | 5 | 1 | 1 | 3.420 | 30.16 | 6.03 | C |
| | | | B | 0.506 | 1.892 | | 1 | 1 | 3.420 | | | |
| | | | C | 0.506 | 1.892 | | 1 | 1 | 3.420 | | | |
| Sum Weight: | 2542.73 | 5184.46 | | | | | | | | 2470.95 | | |

## Tower Forces - Service - Wind 60 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 188.18 | 552.04 | A | 0.241 | 2.466 | 9 | 0.8 | 1 | 10.326 | 303.96 | 15.20 | C |
| 180.00-160.00 | | | B | 0.241 | 2.466 | | 0.8 | 1 | 10.326 | | | |
| | | | C | 0.241 | 2.466 | | 0.8 | 1 | 10.326 | | | |
| T2 | 294.80 | 499.67 | A | 0.23 | 2.5 | 9 | 0.8 | 1 | 9.640 | 329.82 | 16.49 | C |
| 160.00-140.00 | | | B | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| T3 | 298.58 | 499.67 | A | 0.23 | 2.5 | 8 | 0.8 | 1 | 9.640 | 319.91 | 16.00 | C |
| 140.00-120.00 | | | B | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.8 | 1 | 9.640 | | | |
| T4 | 305.60 | 542.87 | A | 0.235 | 2.483 | 8 | 0.8 | 1 | 10.071 | 316.95 | 15.85 | C |
| 120.00-100.00 | | | B | 0.235 | 2.483 | | 0.8 | 1 | 10.071 | | | |
| | | | C | 0.235 | 2.483 | | 0.8 | 1 | 10.071 | | | |
| T5 | 306.35 | 676.58 | A | 0.254 | 2.427 | 8 | 0.8 | 1 | 10.962 | 310.16 | 15.51 | C |
| 100.00-80.00 | | TA 320.88 | B | 0.254 | 2.427 | | 0.8 | 1 | 10.962 | | | |
| | | | C | 0.254 | 2.427 | | 0.8 | 1 | 10.962 | | | |
| T6 | 310.60 | 568.31 | A | 0.195 | 2.613 | 7 | 0.8 | 1 | 8.187 | 261.22 | 13.06 | C |
| 80.00-60.00 | | | B | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| T7 | 310.60 | 456.12 | A | 0.195 | 2.613 | 6 | 0.8 | 1 | 8.187 | 237.28 | 11.86 | C |
| 60.00-40.00 | | | B | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| T8 | 310.60 | 456.12 | A | 0.195 | 2.613 | 5 | 0.8 | 1 | 8.187 | 205.06 | 10.25 | C |
| 40.00-20.00 | | | B | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.8 | 1 | 8.187 | | | |
| T9 20.00-5.00 | 217.42 | 430.56 | A | 0.198 | 2.601 | 5 | 0.8 | 1 | 6.254 | 149.46 | 9.96 | C |
| | | | B | 0.198 | 2.601 | | 0.8 | 1 | 6.254 | | | |
| | | | C | 0.198 | 2.601 | | 0.8 | 1 | 6.254 | | | |
| T10 5.00-0.00 | 0.00 | 181.65 | A | 0.506 | 1.892 | 5 | 0.8 | 1 | 3.420 | 30.16 | 6.03 | C |
| | | | B | 0.506 | 1.892 | | 0.8 | 1 | 3.420 | | | |
| | | | C | 0.506 | 1.892 | | 0.8 | 1 | 3.420 | | | |
| Sum Weight: | 2542.73 | 5184.46 | | | | | | | | 2463.98 | | |

## Tower Forces - Service - Wind 90 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 188.18 | 552.04 | A | 0.241 | 2.466 | 9 | 0.85 | 1 | 10.366 | 304.72 | 15.24 | C |
| 180.00-160.00 | | | B | 0.241 | 2.466 | | 0.85 | 1 | 10.366 | | | |
| | | | C | 0.241 | 2.466 | | 0.85 | 1 | 10.366 | | | |
| T2 | 294.80 | 499.67 | A | 0.23 | 2.5 | 9 | 0.85 | 1 | 9.640 | 329.82 | 16.49 | C |
| 160.00-140.00 | | | B | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| T3 | 298.58 | 499.67 | A | 0.23 | 2.5 | 8 | 0.85 | 1 | 9.640 | 319.91 | 16.00 | C |
| 140.00-120.00 | | | B | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| | | | C | 0.23 | 2.5 | | 0.85 | 1 | 9.640 | | | |
| T4 | 305.60 | 542.87 | A | 0.235 | 2.483 | 8 | 0.85 | 1 | 10.111 | 317.63 | 15.88 | C |
| 120.00-100.00 | | | B | 0.235 | 2.483 | | 0.85 | 1 | 10.111 | | | |
| | | | C | 0.235 | 2.483 | | 0.85 | 1 | 10.111 | | | |
| T5 | 306.35 | 676.58 | A | 0.254 | 2.427 | 8 | 0.85 | 1 | 10.982 | 310.46 | 15.52 | C |
| 100.00-80.00 | | TA 320.88 | B | 0.254 | 2.427 | | 0.85 | 1 | 10.982 | | | |
| | | | C | 0.254 | 2.427 | | 0.85 | 1 | 10.982 | | | |
| T6 | 310.60 | 568.31 | A | 0.195 | 2.613 | 7 | 0.85 | 1 | 8.187 | 261.22 | 13.06 | C |
| 80.00-60.00 | | | B | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| T7 | 310.60 | 456.12 | A | 0.195 | 2.613 | 6 | 0.85 | 1 | 8.187 | 237.28 | 11.86 | C |
| 60.00-40.00 | | | B | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| T8 | 310.60 | 456.12 | A | 0.195 | 2.613 | 5 | 0.85 | 1 | 8.187 | 205.06 | 10.25 | C |
| 40.00-20.00 | | | B | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| | | | C | 0.195 | 2.613 | | 0.85 | 1 | 8.187 | | | |
| T9 20.00-5.00 | 217.42 | 430.56 | A | 0.198 | 2.601 | 5 | 0.85 | 1 | 6.254 | 149.46 | 9.96 | C |
| | | | B | 0.198 | 2.601 | | 0.85 | 1 | 6.254 | | | |
| | | | C | 0.198 | 2.601 | | 0.85 | 1 | 6.254 | | | |
| T10 5.00-0.00 | 0.00 | 181.65 | A | 0.506 | 1.892 | 5 | 0.85 | 1 | 3.420 | 30.16 | 6.03 | C |
| | | | B | 0.506 | 1.892 | | 0.85 | 1 | 3.420 | | | |
| | | | C | 0.506 | 1.892 | | 0.85 | 1 | 3.420 | | | |
| Sum Weight: | 2542.73 | 5184.46 | | | | | | | | 2465.72 | | |

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

| Load Case | Vertical Forces lb | Sum of Forces X lb | Sum of Forces Z lb | Sum of Torques lb-ft |
|---|---|---|---|---|
| Leg Weight | 3291.20 | | | |
| Bracing Weight | 1893.26 | | | |
| Total Member Self-Weight | 5184.46 | | | |
| Guy Weight | 1520.64 | | | |
| Total Weight | 13547.03 | | | |
| Wind 0 deg - No Ice | | 0.00 | -9656.45 | 1484.50 |
| Wind 30 deg - No Ice | | 4821.39 | -8350.88 | 2117.24 |
| Wind 60 deg - No Ice | | 8362.73 | -4828.22 | 2184.36 |

| Load Case | Vertical Forces lb | Sum of Forces X lb | Sum of Forces Z lb | Sum of Torques lb-ft |
|---|---|---|---|---|
| Wind 90 deg - No Ice | | 9642.77 | 0.00 | 1664.72 |
| Wind 120 deg - No Ice | | 8362.73 | 4828.22 | 699.85 |
| Wind 150 deg - No Ice | | 4821.39 | 8350.88 | -452.51 |
| Wind 180 deg - No Ice | | 0.00 | 9656.45 | -1484.50 |
| Wind 210 deg - No Ice | | -4821.39 | 8350.88 | -2117.24 |
| Wind 240 deg - No Ice | | -8362.73 | 4828.22 | -2184.36 |
| Wind 270 deg - No Ice | | -9642.77 | 0.00 | -1664.72 |
| Wind 300 deg - No Ice | | -8362.73 | -4828.22 | -699.85 |
| Wind 330 deg - No Ice | | -4821.39 | -8350.88 | 452.51 |
| Member Ice | 23994.80 | | | |
| Guy Ice | 14889.73 | | | |
| Total Weight Ice | 80273.81 | | | |
| Wind 0 deg - Ice | | 0.00 | -6716.25 | 1047.26 |
| Wind 30 deg - Ice | | 3356.81 | -5814.16 | 1391.84 |
| Wind 60 deg - Ice | | 5816.44 | -3358.12 | 1363.61 |
| Wind 90 deg - Ice | | 6713.61 | 0.00 | 969.92 |
| Wind 120 deg - Ice | | 5816.44 | 3358.12 | 316.35 |
| Wind 150 deg - Ice | | 3356.81 | 5814.16 | -421.91 |
| Wind 180 deg - Ice | | 0.00 | 6716.25 | -1047.26 |
| Wind 210 deg - Ice | | -3356.81 | 5814.16 | -1391.84 |
| Wind 240 deg - Ice | | -5816.44 | 3358.12 | -1363.61 |
| Wind 270 deg - Ice | | -6713.61 | 0.00 | -969.92 |
| Wind 300 deg - Ice | | -5816.44 | -3358.12 | -316.35 |
| Wind 330 deg - Ice | | -3356.81 | -5814.16 | 421.91 |
| Total Weight | 13547.03 | | | |
| Wind 0 deg - Service | | 0.00 | -3694.68 | 567.99 |
| Wind 30 deg - Service | | 1844.72 | -3195.15 | 810.08 |
| Wind 60 deg - Service | | 3199.68 | -1847.34 | 835.76 |
| Wind 90 deg - Service | | 3689.44 | 0.00 | 636.94 |
| Wind 120 deg - Service | | 3199.68 | 1847.34 | 267.77 |
| Wind 150 deg - Service | | 1844.72 | 3195.15 | -173.14 |
| Wind 180 deg - Service | | 0.00 | 3694.68 | -567.99 |
| Wind 210 deg - Service | | -1844.72 | 3195.15 | -810.08 |
| Wind 240 deg - Service | | -3199.68 | 1847.34 | -835.76 |
| Wind 270 deg - Service | | -3689.44 | 0.00 | -636.94 |
| Wind 300 deg - Service | | -3199.68 | -1847.34 | -267.77 |
| Wind 330 deg - Service | | -1844.72 | -3195.15 | 173.14 |

## Load Combinations

| Comb. No. | Description |
|---|---|
| 1 | Dead Only |
| 2 | 1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy |
| 3 | 1.2D+1.6W (pattern 1) 0 deg - No Ice+1.0 Guy |
| 4 | 1.2D+1.6W (pattern 2) 0 deg - No Ice+1.0 Guy |
| 5 | 1.2D+1.6W (pattern 3) 0 deg - No Ice+1.0 Guy |
| 6 | 1.2D+1.6W (pattern 4) 0 deg - No Ice+1.0 Guy |
| 7 | 1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy |
| 8 | 1.2D+1.6W (pattern 1) 30 deg - No Ice+1.0 Guy |
| 9 | 1.2D+1.6W (pattern 2) 30 deg - No Ice+1.0 Guy |
| 10 | 1.2D+1.6W (pattern 3) 30 deg - No Ice+1.0 Guy |
| 11 | 1.2D+1.6W (pattern 4) 30 deg - No Ice+1.0 Guy |
| 12 | 1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy |

| Comb. No. | Description |
|---|---|
| 13 | 1.2D+1.6W (pattern 1) 60 deg - No Ice+1.0 Guy |
| 14 | 1.2D+1.6W (pattern 2) 60 deg - No Ice+1.0 Guy |
| 15 | 1.2D+1.6W (pattern 3) 60 deg - No Ice+1.0 Guy |
| 16 | 1.2D+1.6W (pattern 4) 60 deg - No Ice+1.0 Guy |
| 17 | 1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy |
| 18 | 1.2D+1.6W (pattern 1) 90 deg - No Ice+1.0 Guy |
| 19 | 1.2D+1.6W (pattern 2) 90 deg - No Ice+1.0 Guy |
| 20 | 1.2D+1.6W (pattern 3) 90 deg - No Ice+1.0 Guy |
| 21 | 1.2D+1.6W (pattern 4) 90 deg - No Ice+1.0 Guy |
| 22 | 1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy |
| 23 | 1.2D+1.6W (pattern 1) 120 deg - No Ice+1.0 Guy |
| 24 | 1.2D+1.6W (pattern 2) 120 deg - No Ice+1.0 Guy |
| 25 | 1.2D+1.6W (pattern 3) 120 deg - No Ice+1.0 Guy |
| 26 | 1.2D+1.6W (pattern 4) 120 deg - No Ice+1.0 Guy |
| 27 | 1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy |
| 28 | 1.2D+1.6W (pattern 1) 150 deg - No Ice+1.0 Guy |
| 29 | 1.2D+1.6W (pattern 2) 150 deg - No Ice+1.0 Guy |
| 30 | 1.2D+1.6W (pattern 3) 150 deg - No Ice+1.0 Guy |
| 31 | 1.2D+1.6W (pattern 4) 150 deg - No Ice+1.0 Guy |
| 32 | 1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy |
| 33 | 1.2D+1.6W (pattern 1) 180 deg - No Ice+1.0 Guy |
| 34 | 1.2D+1.6W (pattern 2) 180 deg - No Ice+1.0 Guy |
| 35 | 1.2D+1.6W (pattern 3) 180 deg - No Ice+1.0 Guy |
| 36 | 1.2D+1.6W (pattern 4) 180 deg - No Ice+1.0 Guy |
| 37 | 1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy |
| 38 | 1.2D+1.6W (pattern 1) 210 deg - No Ice+1.0 Guy |
| 39 | 1.2D+1.6W (pattern 2) 210 deg - No Ice+1.0 Guy |
| 40 | 1.2D+1.6W (pattern 3) 210 deg - No Ice+1.0 Guy |
| 41 | 1.2D+1.6W (pattern 4) 210 deg - No Ice+1.0 Guy |
| 42 | 1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy |
| 43 | 1.2D+1.6W (pattern 1) 240 deg - No Ice+1.0 Guy |
| 44 | 1.2D+1.6W (pattern 2) 240 deg - No Ice+1.0 Guy |
| 45 | 1.2D+1.6W (pattern 3) 240 deg - No Ice+1.0 Guy |
| 46 | 1.2D+1.6W (pattern 4) 240 deg - No Ice+1.0 Guy |
| 47 | 1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy |
| 48 | 1.2D+1.6W (pattern 1) 270 deg - No Ice+1.0 Guy |
| 49 | 1.2D+1.6W (pattern 2) 270 deg - No Ice+1.0 Guy |
| 50 | 1.2D+1.6W (pattern 3) 270 deg - No Ice+1.0 Guy |
| 51 | 1.2D+1.6W (pattern 4) 270 deg - No Ice+1.0 Guy |
| 52 | 1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy |
| 53 | 1.2D+1.6W (pattern 1) 300 deg - No Ice+1.0 Guy |
| 54 | 1.2D+1.6W (pattern 2) 300 deg - No Ice+1.0 Guy |
| 55 | 1.2D+1.6W (pattern 3) 300 deg - No Ice+1.0 Guy |
| 56 | 1.2D+1.6W (pattern 4) 300 deg - No Ice+1.0 Guy |
| 57 | 1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy |
| 58 | 1.2D+1.6W (pattern 1) 330 deg - No Ice+1.0 Guy |
| 59 | 1.2D+1.6W (pattern 2) 330 deg - No Ice+1.0 Guy |
| 60 | 1.2D+1.6W (pattern 3) 330 deg - No Ice+1.0 Guy |
| 61 | 1.2D+1.6W (pattern 4) 330 deg - No Ice+1.0 Guy |
| 62 | 1.2 Dead+1.0 Ice+1.0 Temp+Guy |
| 63 | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 64 | 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 65 | 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 66 | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 67 | 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 68 | 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 69 | 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 70 | 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 71 | 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 72 | 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 73 | 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy |
| 74 | 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy |

| Comb. No. | Description |
|---|---|
| 75 | Dead+Wind 0 deg - Service+Guy |
| 76 | Dead+Wind 30 deg - Service+Guy |
| 77 | Dead+Wind 60 deg - Service+Guy |
| 78 | Dead+Wind 90 deg - Service+Guy |
| 79 | Dead+Wind 120 deg - Service+Guy |
| 80 | Dead+Wind 150 deg - Service+Guy |
| 81 | Dead+Wind 180 deg - Service+Guy |
| 82 | Dead+Wind 210 deg - Service+Guy |
| 83 | Dead+Wind 240 deg - Service+Guy |
| 84 | Dead+Wind 270 deg - Service+Guy |
| 85 | Dead+Wind 300 deg - Service+Guy |
| 86 | Dead+Wind 330 deg - Service+Guy |

## Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical lb | Horizontal, X lb | Horizontal, Z lb |
|---|---|---|---|---|---|
| Mast | Max. Vert | 67 | 129005.79 | -386.84 | -236.15 |
| | Max. $H_x$ | 50 | 46945.73 | 1283.79 | 37.86 |
| | Max. $H_z$ | 6 | 44660.38 | 3.99 | 1306.23 |
| | Max. $M_x$ | 1 | 0.00 | 2.83 | 8.29 |
| | Max. $M_z$ | 1 | 0.00 | 2.83 | 8.29 |
| | Max. Torsion | 37 | 326.73 | 562.43 | -1042.42 |
| | Min. Vert | 1 | 40030.74 | 2.83 | 8.29 |
| | Min. $H_x$ | 20 | 46969.04 | -1274.87 | 37.59 |
| | Min. $H_z$ | 35 | 46976.75 | 5.41 | -1296.43 |
| | Min. $M_x$ | 1 | 0.00 | 2.83 | 8.29 |
| | Min. $M_z$ | 1 | 0.00 | 2.83 | 8.29 |
| | Min. Torsion | 7 | -366.31 | -628.98 | 1021.11 |
| Guy C @ 140 ft Elev 0 ft Azimuth 240 deg | Max. Vert | 42 | -1417.02 | -1682.15 | 978.18 |
| | Max. $H_x$ | 42 | -1417.02 | -1682.15 | 978.18 |
| | Max. $H_z$ | 65 | -19482.56 | -23146.52 | 13359.25 |
| | Min. Vert | 12 | -19656.49 | -19515.08 | 11254.57 |
| | Min. $H_x$ | 65 | -19482.56 | -23146.52 | 13359.25 |
| | Min. $H_z$ | 42 | -1417.02 | -1682.15 | 978.18 |
| Guy B @ 140 ft Elev 0 ft Azimuth 120 deg | Max. Vert | 22 | -1415.41 | 1683.64 | 974.22 |
| | Max. $H_x$ | 73 | -19360.18 | 23083.36 | 13325.99 |
| | Max. $H_z$ | 73 | -19360.18 | 23083.36 | 13325.99 |
| | Min. Vert | 52 | -19639.29 | 19500.81 | 11254.44 |
| | Min. $H_x$ | 22 | -1415.41 | 1683.64 | 974.22 |
| | Min. $H_z$ | 22 | -1415.41 | 1683.64 | 974.22 |
| Guy A @ 140 ft Elev 0 ft Azimuth 0 deg | Max. Vert | 2 | -1413.12 | 4.09 | -1937.01 |
| | Max. $H_x$ | 72 | -15295.87 | 675.27 | -21687.44 |
| | Max. $H_z$ | 2 | -1413.12 | 4.09 | -1937.01 |
| | Min. Vert | 32 | -19672.17 | -7.23 | -22534.79 |
| | Min. $H_x$ | 66 | -15315.42 | -675.95 | -21702.02 |
| | Min. $H_z$ | 69 | -19491.85 | -3.19 | -26712.55 |

# Tower Mast Reaction Summary

| Load Combination | Vertical | $Shear_x$ | $Shear_z$ | Overturning Moment, $M_x$ | Overturning Moment, $M_z$ | Torque |
|---|---|---|---|---|---|---|
| | lb | lb | lb | lb-ft | lb-ft | lb-ft |
| Dead Only | 40030.74 | -2.83 | -8.29 | 0.00 | 0.00 | 14.71 |
| 1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy | 47709.68 | -3.82 | -1178.89 | 0.00 | 0.00 | 254.59 |
| 1.2D+1.6W (pattern 1) 0 deg - No Ice+1.0 Guy | 47782.69 | -3.68 | -794.63 | 0.00 | 0.00 | 251.53 |
| 1.2D+1.6W (pattern 2) 0 deg - No Ice+1.0 Guy | 47464.90 | -3.53 | -1194.08 | 0.00 | 0.00 | 247.11 |
| 1.2D+1.6W (pattern 3) 0 deg - No Ice+1.0 Guy | 46268.16 | -3.67 | -1291.55 | 0.00 | 0.00 | 220.50 |
| 1.2D+1.6W (pattern 4) 0 deg - No Ice+1.0 Guy | 44660.38 | -3.99 | -1306.23 | 0.00 | 0.00 | 252.58 |
| 1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy | 47921.57 | 628.98 | -1021.11 | 0.00 | 0.00 | 366.31 |
| 1.2D+1.6W (pattern 1) 30 deg - No Ice+1.0 Guy | 47920.94 | 439.44 | -687.39 | 0.00 | 0.00 | 359.01 |
| 1.2D+1.6W (pattern 2) 30 deg - No Ice+1.0 Guy | 47701.18 | 631.62 | -1029.05 | 0.00 | 0.00 | 353.98 |
| 1.2D+1.6W (pattern 3) 30 deg - No Ice+1.0 Guy | 46917.40 | 658.86 | -1107.27 | 0.00 | 0.00 | 325.45 |
| 1.2D+1.6W (pattern 4) 30 deg - No Ice+1.0 Guy | 45912.64 | 640.88 | -1112.01 | 0.00 | 0.00 | 350.75 |
| 1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy | 47447.11 | 1068.64 | -631.84 | 0.00 | 0.00 | 347.85 |
| 1.2D+1.6W (pattern 1) 60 deg - No Ice+1.0 Guy | 47397.66 | 737.97 | -440.91 | 0.00 | 0.00 | 343.91 |
| 1.2D+1.6W (pattern 2) 60 deg - No Ice+1.0 Guy | 47281.50 | 1072.37 | -633.72 | 0.00 | 0.00 | 338.84 |
| 1.2D+1.6W (pattern 3) 60 deg - No Ice+1.0 Guy | 46973.50 | 1127.07 | -665.04 | 0.00 | 0.00 | 310.19 |
| 1.2D+1.6W (pattern 4) 60 deg - No Ice+1.0 Guy | 46557.40 | 1104.48 | -652.06 | 0.00 | 0.00 | 313.64 |
| 1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy | 47982.15 | 1184.90 | -55.58 | 0.00 | 0.00 | 225.11 |
| 1.2D+1.6W (pattern 1) 90 deg - No Ice+1.0 Guy | 47983.92 | 800.94 | -57.96 | 0.00 | 0.00 | 223.16 |
| 1.2D+1.6W (pattern 2) 90 deg - No Ice+1.0 Guy | 47763.40 | 1192.98 | -53.13 | 0.00 | 0.00 | 219.17 |
| 1.2D+1.6W (pattern 3) 90 deg - No Ice+1.0 Guy | 46969.04 | 1274.87 | -37.59 | 0.00 | 0.00 | 201.83 |
| 1.2D+1.6W (pattern 4) 90 deg - No Ice+1.0 Guy | 45930.86 | 1270.62 | -20.10 | 0.00 | 0.00 | 185.86 |
| 1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy | 47793.66 | 1005.29 | 572.91 | 0.00 | 0.00 | 88.09 |
| 1.2D+1.6W (pattern 1) 120 deg - No Ice+1.0 Guy | 47867.96 | 672.71 | 380.91 | 0.00 | 0.00 | 86.70 |
| 1.2D+1.6W (pattern 2) 120 deg - No Ice+1.0 Guy | 47548.98 | 1018.67 | 580.78 | 0.00 | 0.00 | 86.55 |
| 1.2D+1.6W (pattern 3) 120 deg - No Ice+1.0 Guy | 46344.33 | 1103.25 | 629.54 | 0.00 | 0.00 | 87.23 |
| 1.2D+1.6W (pattern 4) 120 deg - No Ice+1.0 Guy | 44693.24 | 1116.74 | 637.13 | 0.00 | 0.00 | 60.05 |
| 1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy | 47973.69 | 551.14 | 1042.26 | 0.00 | 0.00 | -58.72 |
| 1.2D+1.6W (pattern 1) 150 deg - No Ice+1.0 Guy | 47976.25 | 357.15 | 711.02 | 0.00 | 0.00 | -59.80 |
| 1.2D+1.6W (pattern 2) 150 deg - No Ice+1.0 Guy | 47755.93 | 557.21 | 1048.23 | 0.00 | 0.00 | -56.25 |
| 1.2D+1.6W (pattern 3) 150 deg | 46963.12 | 611.68 | 1111.29 | 0.00 | 0.00 | -37.08 |

| Load Combination | Vertical lb | $Shear_x$ lb | $Shear_z$ lb | Overturning Moment, $M_x$ lb-ft | Overturning Moment, $M_z$ lb-ft | Torque lb-ft |
|---|---|---|---|---|---|---|
| 1.2D+1.6W (pattern 4) 150 deg - No Ice+1.0 Guy | 45927.71 | 624.76 | 1098.73 | 0.00 | 0.00 | -71.57 |
| 1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy | 47450.00 | -5.76 | 1229.15 | 0.00 | 0.00 | -232.28 |
| 1.2D+1.6W (pattern 1) 180 deg - No Ice+1.0 Guy | 47401.09 | -5.64 | 847.37 | 0.00 | 0.00 | -229.70 |
| 1.2D+1.6W (pattern 2) 180 deg - No Ice+1.0 Guy | 47285.01 | -5.57 | 1233.39 | 0.00 | 0.00 | -224.81 |
| 1.2D+1.6W (pattern 3) 180 deg - No Ice+1.0 Guy | 46976.75 | -5.41 | 1296.43 | 0.00 | 0.00 | -195.44 |
| 1.2D+1.6W (pattern 4) 180 deg - No Ice+1.0 Guy | 46560.36 | -5.63 | 1270.45 | 0.00 | 0.00 | -229.79 |
| 1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy | 47960.10 | -562.43 | 1042.42 | 0.00 | 0.00 | -326.73 |
| 1.2D+1.6W (pattern 1) 210 deg - No Ice+1.0 Guy | 47960.27 | -368.11 | 711.55 | 0.00 | 0.00 | -319.46 |
| 1.2D+1.6W (pattern 2) 210 deg - No Ice+1.0 Guy | 47739.89 | -568.05 | 1048.76 | 0.00 | 0.00 | -314.65 |
| 1.2D+1.6W (pattern 3) 210 deg - No Ice+1.0 Guy | 46950.20 | -622.28 | 1111.50 | 0.00 | 0.00 | -286.71 |
| 1.2D+1.6W (pattern 4) 210 deg - No Ice+1.0 Guy | 45930.53 | -635.69 | 1098.47 | 0.00 | 0.00 | -312.95 |
| 1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy | 47768.05 | -1015.21 | 572.99 | 0.00 | 0.00 | -283.97 |
| 1.2D+1.6W (pattern 1) 240 deg - No Ice+1.0 Guy | 47838.55 | -682.30 | 381.28 | 0.00 | 0.00 | -279.38 |
| 1.2D+1.6W (pattern 2) 240 deg - No Ice+1.0 Guy | 47519.68 | -1028.22 | 581.01 | 0.00 | 0.00 | -275.06 |
| 1.2D+1.6W (pattern 3) 240 deg - No Ice+1.0 Guy | 46319.00 | -1112.73 | 629.56 | 0.00 | 0.00 | -250.63 |
| 1.2D+1.6W (pattern 4) 240 deg - No Ice+1.0 Guy | 44686.92 | -1126.27 | 636.81 | 0.00 | 0.00 | -257.76 |
| 1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy | 47954.65 | -1193.97 | -55.77 | 0.00 | 0.00 | -185.94 |
| 1.2D+1.6W (pattern 1) 270 deg - No Ice+1.0 Guy | 47955.69 | -809.96 | -58.01 | 0.00 | 0.00 | -183.90 |
| 1.2D+1.6W (pattern 2) 270 deg - No Ice+1.0 Guy | 47735.69 | -1201.99 | -53.35 | 0.00 | 0.00 | -180.05 |
| 1.2D+1.6W (pattern 3) 270 deg - No Ice+1.0 Guy | 46945.73 | -1283.79 | -37.86 | 0.00 | 0.00 | -163.36 |
| 1.2D+1.6W (pattern 4) 270 deg - No Ice+1.0 Guy | 45917.07 | -1279.41 | -20.42 | 0.00 | 0.00 | -148.39 |
| 1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy | 47426.35 | -1077.18 | -631.21 | 0.00 | 0.00 | -57.29 |
| 1.2D+1.6W (pattern 1) 300 deg - No Ice+1.0 Guy | 47377.22 | -746.58 | -440.23 | 0.00 | 0.00 | -56.01 |
| 1.2D+1.6W (pattern 2) 300 deg - No Ice+1.0 Guy | 47260.59 | -1080.88 | -633.26 | 0.00 | 0.00 | -55.89 |
| 1.2D+1.6W (pattern 3) 300 deg - No Ice+1.0 Guy | 46957.53 | -1135.49 | -664.75 | 0.00 | 0.00 | -57.01 |
| 1.2D+1.6W (pattern 4) 300 deg - No Ice+1.0 Guy | 46542.08 | -1112.99 | -651.54 | 0.00 | 0.00 | -26.78 |
| 1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy | 47908.96 | -637.34 | -1019.86 | 0.00 | 0.00 | 97.91 |
| 1.2D+1.6W (pattern 1) 330 deg - No Ice+1.0 Guy | 47909.82 | -447.61 | -686.13 | 0.00 | 0.00 | 98.99 |
| 1.2D+1.6W (pattern 2) 330 deg - No Ice+1.0 Guy | 47690.84 | -639.54 | -1028.00 | 0.00 | 0.00 | 95.38 |
| 1.2D+1.6W (pattern 3) 330 deg - No Ice+1.0 Guy | 46907.99 | -666.89 | -1106.47 | 0.00 | 0.00 | 75.56 |

| Load Combination | Vertical lb | Shear$_x$ lb | Shear$_z$ lb | Overturning Moment, $M_x$ lb-ft | Overturning Moment, $M_z$ lb-ft | Torque lb-ft |
|---|---|---|---|---|---|---|
| 1.2D+1.6W (pattern 4) 330 deg - No Ice+1.0 Guy | 45897.37 | -649.50 | -1110.90 | 0.00 | 0.00 | 108.96 |
| 1.2 Dead+1.0 Ice+1.0 Temp+Guy | 127536.90 | -47.28 | -13.72 | 0.00 | 0.00 | 48.87 |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128934.85 | -51.17 | -526.08 | 0.00 | 0.00 | 179.22 |
| 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128485.46 | 192.35 | -460.53 | 0.00 | 0.00 | 225.81 |
| 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128084.62 | 378.97 | -266.97 | 0.00 | 0.00 | 184.13 |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128527.50 | 452.37 | -8.33 | 0.00 | 0.00 | 106.82 |
| 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy | 129005.79 | 386.84 | 236.15 | 0.00 | 0.00 | 54.73 |
| 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128529.62 | 207.88 | 415.05 | 0.00 | 0.00 | 0.89 |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128089.85 | -52.85 | 480.55 | 0.00 | 0.00 | -80.65 |
| 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128495.10 | -313.68 | 415.41 | 0.00 | 0.00 | -127.27 |
| 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128945.82 | -492.00 | 237.03 | 0.00 | 0.00 | -85.67 |
| 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128467.71 | -556.31 | -7.26 | 0.00 | 0.00 | -7.91 |
| 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128038.68 | -481.70 | -266.12 | 0.00 | 0.00 | 45.53 |
| 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy | 128460.63 | -294.89 | -459.83 | 0.00 | 0.00 | 97.20 |
| Dead+Wind 0 deg - Service+Guy | 40200.93 | -3.32 | -318.49 | 0.00 | 0.00 | 71.08 |
| Dead+Wind 30 deg - Service+Guy | 40165.23 | 150.18 | -276.62 | 0.00 | 0.00 | 91.46 |
| Dead+Wind 60 deg - Service+Guy | 40134.95 | 263.36 | -162.54 | 0.00 | 0.00 | 86.56 |
| Dead+Wind 90 deg - Service+Guy | 40164.84 | 305.49 | -7.44 | 0.00 | 0.00 | 63.18 |
| Dead+Wind 120 deg - Service+Guy | 40200.76 | 264.95 | 146.46 | 0.00 | 0.00 | 32.80 |
| Dead+Wind 150 deg - Service+Guy | 40164.76 | 151.92 | 258.47 | 0.00 | 0.00 | -2.49 |
| Dead+Wind 180 deg - Service+Guy | 40134.91 | -3.53 | 299.42 | 0.00 | 0.00 | -37.56 |
| Dead+Wind 210 deg - Service+Guy | 40165.40 | -158.86 | 258.36 | 0.00 | 0.00 | -57.93 |
| Dead+Wind 240 deg - Service+Guy | 40201.31 | -271.85 | 146.30 | 0.00 | 0.00 | -53.38 |
| Dead+Wind 270 deg - Service+Guy | 40164.71 | -312.33 | -7.60 | 0.00 | 0.00 | -29.85 |
| Dead+Wind 300 deg - Service+Guy | 40134.16 | -270.08 | -162.68 | 0.00 | 0.00 | 0.88 |
| Dead+Wind 330 deg - Service+Guy | 40164.44 | -156.91 | -276.72 | 0.00 | 0.00 | 36.04 |

## Solution Summary

| | Sum of Applied Forces | | | Sum of Reactions | | | |
|---|---|---|---|---|---|---|---|
| Load Comb. | PX lb | PY lb | PZ lb | PX lb | PY lb | PZ lb | % Error |
| 1 | 0.00 | -13546.89 | 0.00 | 3.31 | 13535.65 | 7.25 | 0.102% |
| 2 | 0.00 | -16077.64 | -17296.11 | -0.01 | 16077.35 | 17287.98 | 0.034% |
| 3 | 0.00 | -16077.64 | -16452.37 | -0.01 | 16077.37 | 16444.91 | 0.032% |
| 4 | 0.00 | -16077.64 | -16464.77 | -0.01 | 16077.36 | 16456.99 | 0.034% |
| 5 | 0.00 | -16077.64 | -16082.31 | -0.01 | 16077.37 | 16073.83 | 0.037% |
| 6 | 0.00 | -16077.64 | -15420.85 | -0.03 | 16077.42 | 15409.28 | 0.052% |
| 7 | 8634.72 | -15952.17 | -14955.78 | -8635.57 | 15951.93 | 14947.71 | 0.035% |
| 8 | 8212.86 | -15952.17 | -14225.08 | -8213.71 | 15951.92 | 14216.87 | 0.036% |
| 9 | 8221.83 | -15952.17 | -14240.63 | -8222.68 | 15951.93 | 14232.60 | 0.035% |
| 10 | 8027.83 | -15952.17 | -13904.61 | -8028.89 | 15951.94 | 13895.55 | 0.040% |
| 11 | 7699.24 | -15952.17 | -13335.48 | -7700.46 | 15951.96 | 13322.74 | 0.058% |
| 12 | 14953.60 | -15826.70 | -8633.46 | -14938.77 | 15826.39 | 8626.00 | 0.071% |
| 13 | 14222.90 | -15826.70 | -8211.59 | -14208.82 | 15826.39 | 8204.55 | 0.069% |
| 14 | 14240.05 | -15826.70 | -8221.50 | -14226.07 | 15826.41 | 8214.49 | 0.069% |
| 15 | 13902.42 | -15826.70 | -8026.57 | -13884.92 | 15826.38 | 8017.39 | 0.088% |
| 16 | 13334.53 | -15826.70 | -7698.70 | -13316.28 | 15826.41 | 7688.70 | 0.094% |
| 17 | 17269.45 | -15952.17 | 0.00 | -17262.61 | 15951.92 | 4.89 | 0.036% |
| 18 | 16425.71 | -15952.17 | 0.00 | -16418.76 | 15951.91 | 4.97 | 0.037% |
| 19 | 16443.67 | -15952.17 | 0.00 | -16436.86 | 15951.92 | 4.89 | 0.037% |
| 20 | 16055.66 | -15952.17 | 0.00 | -16047.96 | 15951.92 | 5.65 | 0.042% |
| 21 | 15398.49 | -15952.17 | 0.00 | -15388.80 | 15951.97 | 6.90 | 0.054% |
| 22 | 14978.87 | -16077.64 | 8648.05 | -14972.38 | 16077.37 | -8644.31 | 0.032% |
| 23 | 14248.17 | -16077.64 | 8226.19 | -14241.53 | 16077.36 | -8222.36 | 0.033% |
| 24 | 14258.91 | -16077.64 | 8232.39 | -14251.96 | 16077.36 | -8228.38 | 0.035% |
| 25 | 13927.69 | -16077.64 | 8041.16 | -13920.80 | 16077.38 | -8037.19 | 0.035% |
| 26 | 13354.85 | -16077.64 | 7710.43 | -13345.34 | 16077.42 | -7704.95 | 0.049% |
| 27 | 8634.72 | -15952.17 | 14955.78 | -8627.06 | 15951.92 | -14952.32 | 0.036% |
| 28 | 8212.86 | -15952.17 | 14225.08 | -8205.05 | 15951.91 | -14221.56 | 0.037% |
| 29 | 8221.83 | -15952.17 | 14240.63 | -8214.18 | 15951.92 | -14237.19 | 0.037% |
| 30 | 8027.83 | -15952.17 | 13904.61 | -8019.08 | 15951.92 | -13900.80 | 0.042% |
| 31 | 7699.24 | -15952.17 | 13335.48 | -7687.12 | 15951.95 | -13329.90 | 0.060% |
| 32 | -0.00 | -15826.70 | 17266.93 | 0.40 | 15826.39 | -17250.33 | 0.071% |
| 33 | -0.00 | -15826.70 | 16423.19 | 0.39 | 15826.39 | -16407.45 | 0.069% |
| 34 | -0.00 | -15826.70 | 16443.00 | 0.39 | 15826.41 | -16427.36 | 0.069% |
| 35 | -0.00 | -15826.70 | 16053.13 | 0.34 | 15826.38 | -16033.36 | 0.088% |
| 36 | -0.00 | -15826.70 | 15397.39 | 0.21 | 15826.41 | -15376.56 | 0.094% |
| 37 | -8634.72 | -15952.17 | 14955.78 | 8627.16 | 15951.93 | -14952.40 | 0.035% |
| 38 | -8212.86 | -15952.17 | 14225.08 | 8205.16 | 15951.91 | -14221.64 | 0.037% |
| 39 | -8221.83 | -15952.17 | 14240.63 | 8214.30 | 15951.93 | -14237.27 | 0.036% |
| 40 | -8027.83 | -15952.17 | 13904.61 | 8019.24 | 15951.93 | -13900.89 | 0.041% |
| 41 | -7699.24 | -15952.17 | 13335.48 | 7687.32 | 15951.96 | -13330.04 | 0.059% |
| 42 | -14978.87 | -16077.64 | 8648.05 | 14972.45 | 16077.38 | -8644.36 | 0.031% |
| 43 | -14248.17 | -16077.64 | 8226.19 | 14241.61 | 16077.36 | -8222.41 | 0.033% |
| 44 | -14258.91 | -16077.64 | 8232.39 | 14252.06 | 16077.36 | -8228.44 | 0.034% |
| 45 | -13927.69 | -16077.64 | 8041.16 | 13920.94 | 16077.39 | -8037.27 | 0.034% |
| 46 | -13354.85 | -16077.64 | 7710.43 | 13344.41 | 16077.40 | -7704.44 | 0.054% |
| 47 | -17269.45 | -15952.17 | -0.00 | 17262.72 | 15951.93 | 4.83 | 0.035% |
| 48 | -16425.71 | -15952.17 | -0.00 | 16418.86 | 15951.91 | 4.91 | 0.037% |
| 49 | -16443.67 | -15952.17 | -0.00 | 16436.97 | 15951.93 | 4.82 | 0.036% |
| 50 | -16055.66 | -15952.17 | -0.00 | 16048.11 | 15951.93 | 5.56 | 0.041% |
| 51 | -15398.49 | -15952.17 | -0.00 | 15387.73 | 15951.95 | 7.57 | 0.059% |
| 52 | -14953.60 | -15826.70 | -8633.46 | 14939.02 | 15826.40 | 8625.67 | 0.071% |
| 53 | -14222.90 | -15826.70 | -8211.59 | 14209.06 | 15826.40 | 8204.24 | 0.069% |
| 54 | -14240.05 | -15826.70 | -8221.50 | 14224.10 | 15826.37 | 8212.95 | 0.079% |
| 55 | -13902.42 | -15826.70 | -8026.57 | 13885.14 | 15826.38 | 8017.12 | 0.087% |
| 56 | -13334.53 | -15826.70 | -7698.70 | 13316.43 | 15826.41 | 7688.55 | 0.094% |
| 57 | -8634.72 | -15952.17 | -14955.78 | 8635.54 | 15951.93 | 14947.69 | 0.035% |
| 58 | -8212.86 | -15952.17 | -14225.08 | 8213.68 | 15951.92 | 14216.85 | 0.036% |
| 59 | -8221.83 | -15952.17 | -14240.63 | 8222.66 | 15951.93 | 14232.58 | 0.035% |
| 60 | -8027.83 | -15952.17 | -13904.61 | 8028.87 | 15951.94 | 13895.52 | 0.040% |
| 61 | -7699.24 | -15952.17 | -13335.48 | 7700.40 | 15951.96 | 13322.71 | 0.058% |

| Load Comb. | Sum of Applied Forces PX lb | PY lb | PZ lb | Sum of Reactions PX lb | PY lb | PZ lb | % Error |
|---|---|---|---|---|---|---|---|
| 62 | -0.00 | -82677.65 | 0.00 | 4.27 | 82677.63 | 1.21 | 0.005% |
| 63 | -0.00 | -82855.84 | -9206.19 | -0.11 | 82855.74 | 9192.01 | 0.017% |
| 64 | 4598.22 | -82677.65 | -7964.35 | -4595.21 | 82677.55 | 7948.86 | 0.019% |
| 65 | 7969.75 | -82499.46 | -4601.34 | -7955.28 | 82499.35 | 4593.91 | 0.020% |
| 66 | 9196.41 | -82677.65 | 0.00 | -9183.76 | 82677.56 | 4.94 | 0.016% |
| 67 | 7972.79 | -82855.84 | 4603.10 | -7962.32 | 82855.74 | -4597.08 | 0.014% |
| 68 | 4598.22 | -82677.65 | 7964.35 | -4587.57 | 82677.56 | -7955.92 | 0.016% |
| 69 | -0.00 | -82499.46 | 9202.68 | 0.80 | 82499.35 | -9186.50 | 0.020% |
| 70 | -4598.22 | -82677.65 | 7964.35 | 4587.44 | 82677.56 | -7955.22 | 0.017% |
| 71 | -7972.79 | -82855.84 | 4603.10 | 7960.40 | 82855.74 | -4596.08 | 0.017% |
| 72 | -9196.41 | -82677.65 | -0.00 | 9182.82 | 82677.56 | 4.74 | 0.017% |
| 73 | -7969.75 | -82499.46 | -4601.34 | 7953.76 | 82499.34 | 4592.12 | 0.022% |
| 74 | -4598.22 | -82677.65 | -7964.35 | 4595.54 | 82677.56 | 7950.26 | 0.017% |
| 75 | -0.00 | -13576.89 | -4136.07 | 0.01 | 13576.87 | 4106.79 | 0.206% |
| 76 | 2064.85 | -13546.89 | -3576.42 | -2049.31 | 13546.86 | 3551.34 | 0.208% |
| 77 | 3575.89 | -13516.89 | -2064.54 | -3552.74 | 13516.84 | 2051.25 | 0.189% |
| 78 | 4129.69 | -13546.89 | 0.00 | -4100.11 | 13546.86 | -0.80 | 0.209% |
| 79 | 3581.94 | -13576.89 | 2068.03 | -3556.47 | 13576.87 | -2053.29 | 0.207% |
| 80 | 2064.85 | -13546.89 | 3576.42 | -2050.78 | 13546.86 | -3550.34 | 0.209% |
| 81 | 0.00 | -13516.89 | 4129.09 | 0.03 | 13516.84 | -4102.32 | 0.189% |
| 82 | -2064.85 | -13546.89 | 3576.42 | 2050.84 | 13546.86 | -3550.34 | 0.209% |
| 83 | -3581.94 | -13576.89 | 2068.03 | 3556.53 | 13576.87 | -2053.28 | 0.207% |
| 84 | -4129.69 | -13546.89 | -0.00 | 4100.16 | 13546.86 | -0.79 | 0.209% |
| 85 | -3575.89 | -13516.89 | -2064.54 | 3552.78 | 13516.85 | 2051.26 | 0.189% |
| 86 | -2064.85 | -13546.89 | -3576.42 | 2049.34 | 13546.86 | 3551.34 | 0.208% |

## Non-Linear Convergence Results

| Load Combination | Converged? | Number of Cycles | Displacement Tolerance | Force Tolerance |
|---|---|---|---|---|
| 1 | Yes | 75 | 0.00000001 | 0.00000000 |
| 2 | Yes | 201 | 0.00000001 | 0.00008193 |
| 3 | Yes | 202 | 0.00000001 | 0.00007843 |
| 4 | Yes | 200 | 0.00000001 | 0.00007950 |
| 5 | Yes | 193 | 0.00000001 | 0.00008488 |
| 6 | Yes | 176 | 0.00000001 | 0.00007588 |
| 7 | Yes | 195 | 0.00000001 | 0.00007329 |
| 8 | Yes | 195 | 0.00000001 | 0.00007763 |
| 9 | Yes | 194 | 0.00000001 | 0.00007457 |
| 10 | Yes | 188 | 0.00000001 | 0.00007793 |
| 11 | Yes | 176 | 0.00000001 | 0.00006813 |
| 12 | Yes | 166 | 0.00000001 | 0.00006500 |
| 13 | Yes | 166 | 0.00000001 | 0.00007135 |
| 14 | Yes | 166 | 0.00000001 | 0.00006446 |
| 15 | Yes | 164 | 0.00000001 | 0.00006973 |
| 16 | Yes | 163 | 0.00000001 | 0.00007410 |
| 17 | Yes | 195 | 0.00000001 | 0.00007602 |
| 18 | Yes | 195 | 0.00000001 | 0.00008047 |
| 19 | Yes | 194 | 0.00000001 | 0.00007745 |
| 20 | Yes | 188 | 0.00000001 | 0.00008185 |
| 21 | Yes | 177 | 0.00000001 | 0.00006748 |
| 22 | Yes | 202 | 0.00000001 | 0.00007632 |
| 23 | Yes | 202 | 0.00000001 | 0.00008034 |
| 24 | Yes | 200 | 0.00000001 | 0.00008162 |
| 25 | Yes | 194 | 0.00000001 | 0.00008031 |
| 26 | Yes | 177 | 0.00000001 | 0.00007597 |

| | | | | |
|---|---|---|---|---|
| 27 | Yes | 195 | 0.00000001 | 0.00007610 |
| 28 | Yes | 195 | 0.00000001 | 0.00008057 |
| 29 | Yes | 194 | 0.00000001 | 0.00007753 |
| 30 | Yes | 188 | 0.00000001 | 0.00008181 |
| 31 | Yes | 176 | 0.00000001 | 0.00007362 |
| 32 | Yes | 166 | 0.00000001 | 0.00006499 |
| 33 | Yes | 166 | 0.00000001 | 0.00007147 |
| 34 | Yes | 166 | 0.00000001 | 0.00006447 |
| 35 | Yes | 164 | 0.00000001 | 0.00006966 |
| 36 | Yes | 163 | 0.00000001 | 0.00007379 |
| 37 | Yes | 195 | 0.00000001 | 0.00007470 |
| 38 | Yes | 195 | 0.00000001 | 0.00007917 |
| 39 | Yes | 194 | 0.00000001 | 0.00007607 |
| 40 | Yes | 188 | 0.00000001 | 0.00007998 |
| 41 | Yes | 176 | 0.00000001 | 0.00007082 |
| 42 | Yes | 202 | 0.00000001 | 0.00007534 |
| 43 | Yes | 202 | 0.00000001 | 0.00007932 |
| 44 | Yes | 200 | 0.00000001 | 0.00008051 |
| 45 | Yes | 194 | 0.00000001 | 0.00007880 |
| 46 | Yes | 176 | 0.00000001 | 0.00007961 |
| 47 | Yes | 195 | 0.00000001 | 0.00007490 |
| 48 | Yes | 195 | 0.00000001 | 0.00007932 |
| 49 | Yes | 194 | 0.00000001 | 0.00007631 |
| 50 | Yes | 188 | 0.00000001 | 0.00008032 |
| 51 | Yes | 176 | 0.00000001 | 0.00007189 |
| 52 | Yes | 166 | 0.00000001 | 0.00006434 |
| 53 | Yes | 166 | 0.00000001 | 0.00007065 |
| 54 | Yes | 165 | 0.00000001 | 0.00007224 |
| 55 | Yes | 164 | 0.00000001 | 0.00006921 |
| 56 | Yes | 163 | 0.00000001 | 0.00007387 |
| 57 | Yes | 195 | 0.00000001 | 0.00007354 |
| 58 | Yes | 195 | 0.00000001 | 0.00007797 |
| 59 | Yes | 194 | 0.00000001 | 0.00007492 |
| 60 | Yes | 188 | 0.00000001 | 0.00007833 |
| 61 | Yes | 176 | 0.00000001 | 0.00006916 |
| 62 | Yes | 137 | 0.00000001 | 0.00005669 |
| 63 | Yes | 185 | 0.00000001 | 0.00001807 |
| 64 | Yes | 181 | 0.00000001 | 0.00001821 |
| 65 | Yes | 177 | 0.00000001 | 0.00002194 |
| 66 | Yes | 183 | 0.00000001 | 0.00002228 |
| 67 | Yes | 187 | 0.00000001 | 0.00002119 |
| 68 | Yes | 183 | 0.00000001 | 0.00002160 |
| 69 | Yes | 177 | 0.00000001 | 0.00002089 |
| 70 | Yes | 182 | 0.00000001 | 0.00001712 |
| 71 | Yes | 185 | 0.00000001 | 0.00001909 |
| 72 | Yes | 182 | 0.00000001 | 0.00001906 |
| 73 | Yes | 176 | 0.00000001 | 0.00002354 |
| 74 | Yes | 182 | 0.00000001 | 0.00001801 |
| 75 | Yes | 146 | 0.00000001 | 0.00009902 |
| 76 | Yes | 146 | 0.00000001 | 0.00009933 |
| 77 | Yes | 147 | 0.00000001 | 0.00009068 |
| 78 | Yes | 146 | 0.00000001 | 0.00009861 |
| 79 | Yes | 146 | 0.00000001 | 0.00009765 |
| 80 | Yes | 146 | 0.00000001 | 0.00009820 |
| 81 | Yes | 147 | 0.00000001 | 0.00009033 |
| 82 | Yes | 146 | 0.00000001 | 0.00009861 |
| 83 | Yes | 146 | 0.00000001 | 0.00009837 |
| 84 | Yes | 146 | 0.00000001 | 0.00009943 |
| 85 | Yes | 147 | 0.00000001 | 0.00009134 |
| 86 | Yes | 146 | 0.00000001 | 0.00009989 |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| T1 | 180 - 160 | 1.400 | 81 | 0.0877 | 0.1974 |
| T2 | 160 - 140 | 1.045 | 81 | 0.0700 | 0.1771 |
| T3 | 140 - 120 | 0.785 | 81 | 0.0604 | 0.1539 |
| T4 | 120 - 100 | 0.550 | 85 | 0.0463 | 0.1212 |
| T5 | 100 - 80 | 0.404 | 85 | 0.0249 | 0.0767 |
| T6 | 80 - 60 | 0.336 | 85 | 0.0043 | 0.0383 |
| T7 | 60 - 40 | 0.364 | 85 | 0.0019 | 0.0387 |
| T8 | 40 - 20 | 0.344 | 85 | 0.0181 | 0.0360 |
| T9 | 20 - 5 | 0.213 | 85 | 0.0422 | 0.0306 |
| T10 | 5 - 0 | 0.055 | 85 | 0.0505 | 0.0162 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 180.00 | Lightning Rod 5/8x4' | 81 | 1.400 | 0.0877 | 0.1974 | 123900 |
| 179.00 | Decibel DB809 | 81 | 1.381 | 0.0867 | 0.1964 | 123900 |
| 177.00 | Decibel DB809 | 81 | 1.343 | 0.0847 | 0.1944 | 123900 |
| 171.00 | 12 ft Boom / Frame | 81 | 1.231 | 0.0789 | 0.1884 | 68833 |
| 163.00 | Celwave PD201 | 81 | 1.092 | 0.0721 | 0.1802 | 36703 |
| 162.75 | Guy | 81 | 1.088 | 0.0719 | 0.1800 | 36277 |
| 150.00 | 12 ft Boom / Frame | 81 | 0.908 | 0.0648 | 0.1663 | 85709 |
| 127.00 | Decibel DB420 | 77 | 0.626 | 0.0522 | 0.1341 | 65520 |
| 119.67 | Guy | 85 | 0.547 | 0.0460 | 0.1205 | 38011 |
| 83.00 | Celwave PD201 | 85 | 0.339 | 0.0066 | 0.0416 | 35392 |
| 82.75 | Guy | 85 | 0.338 | 0.0064 | 0.0413 | 35163 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| T1 | 180 - 160 | 8.590 | 23 | 0.5616 | 0.8268 |
| T2 | 160 - 140 | 6.340 | 23 | 0.4929 | 0.7429 |
| T3 | 140 - 120 | 4.487 | 23 | 0.4351 | 0.6506 |
| T4 | 120 - 100 | 2.887 | 17 | 0.3324 | 0.5186 |
| T5 | 100 - 80 | 2.037 | 56 | 0.1994 | 0.3390 |
| T6 | 80 - 60 | 1.708 | 56 | 0.0873 | 0.1874 |
| T7 | 60 - 40 | 1.773 | 56 | 0.0355 | 0.1762 |
| T8 | 40 - 20 | 1.620 | 56 | 0.0945 | 0.1513 |
| T9 | 20 - 5 | 0.986 | 56 | 0.1987 | 0.1147 |
| T10 | 5 - 0 | 0.252 | 56 | 0.2339 | 0.0669 |

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 180.00 | Lightning Rod 5/8x4' | 23 | 8.590 | 0.5616 | 0.8268 | 29277 |
| 179.00 | Decibel DB809 | 23 | 8.472 | 0.5579 | 0.8226 | 29277 |
| 177.00 | Decibel DB809 | 23 | 8.237 | 0.5505 | 0.8142 | 29277 |
| 171.00 | 12 ft Boom / Frame | 23 | 7.540 | 0.5286 | 0.7891 | 16265 |
| 163.00 | Celwave PD201 | 23 | 6.653 | 0.5018 | 0.7555 | 8661 |
| 162.75 | Guy | 23 | 6.626 | 0.5011 | 0.7545 | 8555 |
| 150.00 | 12 ft Boom / Frame | 23 | 5.380 | 0.4662 | 0.6995 | 11863 |
| 127.00 | Decibel DB420 | 18 | 3.361 | 0.3717 | 0.5712 | 8445 |
| 119.67 | Guy | 17 | 2.867 | 0.3304 | 0.5159 | 5858 |
| 83.00 | Celwave PD201 | 56 | 1.729 | 0.1013 | 0.2010 | 6861 |
| 82.75 | Guy | 56 | 1.727 | 0.1001 | 0.1997 | 6831 |

## Bolt Design Data

| Section No. | Elevation ft | Component Type | Bolt Grade | Bolt Size in | Number Of Bolts | Maximum Load per Bolt lb | Allowable Load lb | Ratio Load / Allowable | Allowable Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 | Leg | A325N | 0.7500 | 4 | 13.50 | 29820.60 | 0.000 ✓ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 2157.42 | 5904.86 | 0.365 ✓ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 16.47 | 5904.86 | 0.003 ✓ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 357.03 | 4802.40 | 0.074 ✓ | 1 | Member Bearing |
| T2 | 160 | Leg | A325N | 0.7500 | 4 | 1403.13 | 29820.60 | 0.047 ✓ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 1029.07 | 5904.86 | 0.174 ✓ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 429.87 | 5904.86 | 0.073 ✓ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 205.30 | 4802.40 | 0.043 ✓ | 1 | Member Bearing |
| T3 | 140 | Leg | A325N | 0.7500 | 4 | 1489.79 | 29820.60 | 0.050 ✓ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 1663.75 | 6681.60 | 0.249 ✓ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 219.50 | 5904.86 | 0.037 ✓ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 397.90 | 4802.40 | 0.083 ✓ | 1 | Member Bearing |
| T4 | 120 | Leg | A325N | 0.7500 | 4 | 2061.02 | 29820.60 | 0.069 ✓ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 939.43 | 6681.60 | 0.141 ✓ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 311.91 | 4802.40 | 0.065 ✓ | 1 | Member Bearing |
| T5 | 100 | Leg | A325N | 0.7500 | 4 | 2553.52 | 29820.60 | 0.086 ✓ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 1765.76 | 6681.60 | 0.264 ✓ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 257.49 | 5904.86 | 0.044 ✓ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 658.48 | 4802.40 | 0.137 ✓ | 1 | Member Bearing |
| | | Torque Arm Top@82.75 | A325N | 0.7500 | 2 | 2135.89 | 16912.80 | 0.126 ✓ | 1 | Member Bearing |
| T6 | 80 | Leg | A325N | 0.7500 | 4 | 3455.53 | 29820.60 | 0.116 ✓ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 2102.61 | 5904.86 | 0.356 ✓ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 874.67 | 5904.86 | 0.148 ✓ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 438.75 | 4802.40 | 0.091 ✓ | 1 | Member Bearing |
| T7 | 60 | Leg | A325N | 0.7500 | 4 | 3388.91 | 29820.60 | 0.114 ✓ | 1 | Bolt Tension |

| Section No. | Elevation ft | Component Type | Bolt Grade | Bolt Size in | Number Of Bolts | Maximum Load per Bolt lb | Allowable Load lb | Ratio Load / Allowable | Allowable Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Diagonal | A325N | 0.5000 | 1 | 1206.29 | 5904.86 | 0.204 ✔ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 415.00 | 5904.86 | 0.070 ✔ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 187.59 | 4802.40 | 0.039 ✔ | 1 | Member Bearing |
| T8 | 40 | Leg | A325N | 0.7500 | 4 | 3776.31 | 29820.60 | 0.127 ✔ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 668.95 | 6681.60 | 0.100 ✔ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 170.47 | 5904.86 | 0.029 ✔ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 236.08 | 4802.40 | 0.049 ✔ | 1 | Member Bearing |
| T9 | 20 | Leg | A325N | 0.7500 | 4 | 3825.02 | 29820.60 | 0.128 ✔ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 1118.53 | 5904.86 | 0.189 ✔ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 295.48 | 5904.86 | 0.050 ✔ | 1 | Member Bearing |
| | | Bottom Girt | A325N | 0.5000 | 1 | 3710.08 | 4802.40 | 0.773 ✔ | 1 | Member Bearing |
| T10 | 5 | Leg | A325N | 0.7500 | 4 | 3606.66 | 29820.60 | 0.121 ✔ | 1 | Bolt Tension |
| | | Diagonal | A325N | 0.5000 | 1 | 1665.54 | 5904.86 | 0.282 ✔ | 1 | Member Bearing |
| | | Top Girt | A325N | 0.5000 | 1 | 4041.00 | 5904.86 | 0.684 ✔ | 1 | Member Bearing |

## Guy Design Data

| Section No. | Elevation ft | Size | Initial Tension lb | Breaking Load lb | Actual $T_u$ lb | Allowable $\phi T_n$ lb | Required S.F. | Actual S.F. |
|---|---|---|---|---|---|---|---|---|
| T1 | 162.75 (A) (462) | 3/4 EHS | 5830.00 | 58299.92 | 14887.10 | 34980.00 | 1.000 | 2.350 ✔ |
| | 162.75 (B) (461) | 3/4 EHS | 5830.00 | 58299.92 | 14827.70 | 34980.00 | 1.000 | 2.359 ✔ |
| | 162.75 (C) (460) | 3/4 EHS | 5830.00 | 58299.92 | 14853.40 | 34980.00 | 1.000 | 2.355 ✔ |
| T4 | 119.67 (A) (465) | 1/2 EHS | 2690.00 | 26900.04 | 7981.66 | 16140.00 | 1.000 | 2.022 ✔ |
| | 119.67 (B) (464) | 1/2 EHS | 2690.00 | 26900.04 | 8000.99 | 16140.00 | 1.000 | 2.017 ✔ |
| | 119.67 (C) (463) | 1/2 EHS | 2690.00 | 26900.04 | 8006.90 | 16140.00 | 1.000 | 2.016 ✔ |
| T5 | 82.75 (A) (453) | 1/2 EHS | 2690.00 | 26900.04 | 7466.30 | 16140.00 | 1.000 | 2.162 ✔ |
| | 82.75 (A) (454) | 1/2 EHS | 2690.00 | 26900.04 | 7381.74 | 16140.00 | 1.000 | 2.186 ✔ |
| | 82.75 (B) (449) | 1/2 EHS | 2690.00 | 26900.04 | 7498.40 | 16140.00 | 1.000 | 2.152 ✔ |
| | 82.75 (B) (450) | 1/2 EHS | 2690.00 | 26900.04 | 7468.33 | 16140.00 | 1.000 | 2.161 ✔ |
| | 82.75 (C) (442) | 1/2 EHS | 2690.00 | 26900.04 | 7392.66 | 16140.00 | 1.000 | 2.183 ✔ |
| | 82.75 (C) (443) | 1/2 EHS | 2690.00 | 26900.04 | 7491.77 | 16140.00 | 1.000 | 2.154 ✔ |

# Compression Checks

## Leg Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | Mast Stability Index | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | P2x.218 | 20.00 | 2.42 | 37.8 K=1.00 | 1.4773 | 1.00 | -16824.80 | 59870.70 | 0.281 [1] ✓ |
| T2 | 160 - 140 | P2x.218 | 20.00 | 2.42 | 37.8 K=1.00 | 1.4773 | 1.00 | -17864.70 | 59870.70 | 0.298 [1] ✓ |
| T3 | 140 - 120 | P2x.218 | 20.00 | 2.42 | 37.8 K=1.00 | 1.4773 | 1.00 | -24719.20 | 59870.70 | 0.413 [1] ✓ |
| T4 | 120 - 100 | P2x.218 | 20.00 | 2.42 | 37.8 K=1.00 | 1.4773 | 1.00 | -30628.00 | 59870.70 | 0.512 [1] ✓ |
| T5 | 100 - 80 | P2.5x.276 | 20.00 | 2.42 | 31.4 K=1.00 | 2.2535 | 1.00 | -41452.10 | 94363.10 | 0.439 [1] ✓ |
| T6 | 80 - 60 | P2.5x.276 | 20.00 | 2.42 | 62.8 K=2.00 | 2.2535 | 1.00 | -41466.40 | 76028.20 | 0.545 [1] ✓ |
| T7 | 60 - 40 | P2.5x.203 | 20.00 | 2.42 | 61.2 K=2.00 | 1.7040 | 1.00 | -45303.30 | 58302.40 | 0.777 [1] ✓ |
| T8 | 40 - 20 | P2.5x.203 | 20.00 | 2.42 | 61.2 K=2.00 | 1.7040 | 1.00 | -46193.60 | 58302.40 | 0.792 [1] ✓ |
| T9 | 20 - 5 | P2.5x.276 | 15.00 | 2.39 | 62.0 K=2.00 | 2.2535 | 1.00 | -45900.30 | 76530.40 | 0.600 [1] ✓ |
| T10 | 5 - 0 | P2.5x.276 | 5.38 | 1.06 | 13.7 K=1.00 | 2.2535 | 0.78 | -47632.00 | 78051.80 | 0.610 [1] ✓ |

[1] $P_u$ / $\phi P_n$ controls

## Diagonal Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 K=1.00 | 0.2627 | -2070.21 | 6038.67 | 0.343 [1] ✓ |
| T2 | 160 - 140 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 K=1.00 | 0.2627 | -1159.62 | 6038.67 | 0.192 [1] ✓ |
| T3 | 140 - 120 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 K=1.00 | 0.2627 | -1663.75 | 6038.67 | 0.276 [1] ✓ |
| T4 | 120 - 100 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 K=1.00 | 0.2627 | -939.43 | 6038.67 | 0.156 [1] ✓ |
| T5 | 100 - 80 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 K=1.00 | 0.2627 | -1765.76 | 6127.23 | 0.288 [1] ✓ |
| T6 | 80 - 60 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 K=1.00 | 0.2627 | -2212.25 | 6127.23 | 0.361 [1] ✓ |
| T7 | 60 - 40 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 K=1.00 | 0.2627 | -1330.75 | 6127.23 | 0.217 [1] ✓ |
| T8 | 40 - 20 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 | 0.2627 | -668.95 | 6127.23 | 0.109 [1] |

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T9 | 20 - 5 | ROHN TS1.5x16 ga | 4.17 | 3.88 | 91.2 K=1.00 | 0.2627 | -1108.66 | 6153.03 | 0.180 [1] ✓ |
| T10 | 5 - 0 | ROHN TS1.5x16 ga | 1.42 | 0.78 | 18.4 K=1.00 | 0.2627 | -958.03 | 10407.00 | 0.092 [1] ✓ |

[1] $P_u$ / $\phi P_n$ controls

## Top Girt Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 K=1.00 | 0.2627 | -18.15 | 7292.66 | 0.002 [1] ✓ |
| T2 | 160 - 140 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 K=1.00 | 0.2627 | -215.82 | 7292.66 | 0.030 [1] ✓ |
| T6 | 80 - 60 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -577.37 | 7363.82 | 0.078 [1] ✓ |
| T7 | 60 - 40 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -317.45 | 7363.82 | 0.043 [1] ✓ |
| T8 | 40 - 20 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -73.19 | 7363.82 | 0.010 [1] ✓ |
| T9 | 20 - 5 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -193.68 | 7363.82 | 0.026 [1] ✓ |

[1] $P_u$ / $\phi P_n$ controls

## Bottom Girt Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T2 | 160 - 140 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 K=1.00 | 0.2627 | -19.55 | 7292.66 | 0.003 [1] ✓ |
| T3 | 140 - 120 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 K=1.00 | 0.2627 | -241.21 | 7292.66 | 0.033 [1] ✓ |
| T4 | 120 - 100 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 K=1.00 | 0.2627 | -7.65 | 7292.66 | 0.001 [1] ✓ |
| T5 | 100 - 80 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -131.98 | 7363.82 | 0.018 [1] ✓ |
| T6 | 80 - 60 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -375.83 | 7363.82 | 0.051 [1] ✓ |
| T7 | 60 - 40 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -106.18 | 7363.82 | 0.014 [1] ✓ |
| T8 | 40 - 20 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 K=1.00 | 0.2627 | -157.25 | 7363.82 | 0.021 [1] |

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|

[1] $P_u$ / $\phi P_n$ controls

## Top Guy Pull-Off Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 | L1 1/2x1 1/2x3/16 | 3.42 | 3.18 | 130.1 K=1.00 | 0.5273 | -1906.43 | 7008.98 | 0.272 [1] |

[1] $P_u$ / $\phi P_n$ controls

## Top Guy Pull-Off Bending Design Data

| Section No. | Elevation ft | Size | $M_{ux}$ lb-ft | $\phi M_{nx}$ lb-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$ lb-ft | $\phi M_{ny}$ lb-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 | L1 1/2x1 1/2x3/16 | 0.00 | 711.05 | 0.000 | 0.00 | 368.03 | 0.000 |

## Top Guy Pull-Off Interaction Design Data

| Section No. | Elevation ft | Size | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 | L1 1/2x1 1/2x3/16 | 0.272 | 0.000 | 0.000 | 0.272 [1] | 1.000 | 4.9-3 |

[1] $P_u$ / $\phi P_n$ controls

## Torque-Arm Top Design Data

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 (444) | C10x15.3 | 3.50 | 3.38 | 56.9 K=1.00 | 4.4900 | -516.71 | 122682.00 | 0.004 |
| T5 | 100 - 80 (445) | C10x15.3 | 3.50 | 3.38 | 56.9 K=1.00 | 4.4900 | -548.03 | 122682.00 | 0.004 |
| T5 | 100 - 80 (451) | C10x15.3 | 3.50 | 3.38 | 56.9 K=1.00 | 4.4900 | -752.12 | 122682.00 | 0.006 |

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 (452) | C10x15.3 | 3.50 | 3.38 | 56.9 K=1.00 | 4.4900 | -894.47 | 122682.00 | 0.007 |
| T5 | 100 - 80 (455) | C10x15.3 | 3.50 | 3.38 | 56.9 K=1.00 | 4.4900 | -669.83 | 122682.00 | 0.005 |
| T5 | 100 - 80 (456) | C10x15.3 | 3.50 | 3.38 | 56.9 K=1.00 | 4.4900 | -854.62 | 122682.00 | 0.007 |

## Torque-Arm Top Bending Design Data

| Section No. | Elevation ft | Size | $M_{ux}$ lb-ft | $\phi M_{nx}$ lb-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$ lb-ft | $\phi M_{ny}$ lb-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 (444) | C10x15.3 | -8871.00 | 36450.00 | 0.243 | 0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (445) | C10x15.3 | -8820.75 | 36450.00 | 0.242 | -0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (451) | C10x15.3 | -8817.00 | 36450.00 | 0.242 | -0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (452) | C10x15.3 | -8745.00 | 36450.00 | 0.240 | 0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (455) | C10x15.3 | -8808.33 | 36450.00 | 0.242 | -0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (456) | C10x15.3 | -8779.08 | 36450.00 | 0.241 | -0.00 | 6345.00 | 0.000 |

## Torque-Arm Top Interaction Design Data

| Section No. | Elevation ft | Size | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 (444) | C10x15.3 | 0.004 | 0.243 | 0.000 | 0.245 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (445) | C10x15.3 | 0.004 | 0.242 | 0.000 | 0.244 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (451) | C10x15.3 | 0.006 | 0.242 | 0.000 | 0.245 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (452) | C10x15.3 | 0.007 | 0.240 | 0.000 | 0.244 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (455) | C10x15.3 | 0.005 | 0.242 | 0.000 | 0.244 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (456) | C10x15.3 | 0.007 | 0.241 | 0.000 | 0.244 ✔ | 1.000 | 4.9-4 ✔ |

## Tension Checks

## Leg Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | P2x.218 | 20.00 | 2.42 | 37.8 | 1.4773 | 11395.60 | 66476.60 | 0.171 [1] |
| T2 | 160 - 140 | P2x.218 | 20.00 | 2.42 | 37.8 | 1.4773 | 1170.22 | 66476.60 | 0.018 [1] |
| T3 | 140 - 120 | P2x.218 | 20.00 | 2.42 | 37.8 | 1.4773 | 1540.33 | 66476.60 | 0.023 [1] |
| T4 | 120 - 100 | P2x.218 | 20.00 | 2.42 | 37.8 | 1.4773 | 1539.67 | 66476.60 | 0.023 [1] |
| T5 | 100 - 80 | P2.5x.276 | 20.00 | 2.42 | 31.4 | 2.2535 | 2819.21 | 101409.00 | 0.028 [1] |

[1] $P_u$ / $\phi P_n$ controls

## Diagonal Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 | 0.2627 | 2157.42 | 10641.40 | 0.203 [1] |
| T2 | 160 - 140 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 | 0.2627 | 1029.07 | 10641.40 | 0.097 [1] |
| T3 | 140 - 120 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 | 0.2627 | 1386.80 | 10641.40 | 0.130 [1] |
| T4 | 120 - 100 | ROHN TS1.5x16 ga | 4.19 | 3.95 | 92.8 | 0.2627 | 791.41 | 10641.40 | 0.074 [1] |
| T5 | 100 - 80 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 | 0.2627 | 1147.57 | 10641.40 | 0.108 [1] |
| T6 | 80 - 60 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 | 0.2627 | 2102.61 | 10641.40 | 0.198 [1] |
| T7 | 60 - 40 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 | 0.2627 | 1206.29 | 10641.40 | 0.113 [1] |
| T8 | 40 - 20 | ROHN TS1.5x16 ga | 4.19 | 3.89 | 91.6 | 0.2627 | 555.89 | 10641.40 | 0.052 [1] |
| T9 | 20 - 5 | ROHN TS1.5x16 ga | 4.17 | 3.88 | 91.2 | 0.2627 | 1118.53 | 10641.40 | 0.105 [1] |
| T10 | 5 - 0 | ROHN TS1.5x16 ga | 3.19 | 1.61 | 37.8 | 0.2627 | 1665.54 | 10641.40 | 0.157 [1] |

[1] $P_u$ / $\phi P_n$ controls

## Top Girt Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 | 0.2627 | 16.47 | 10641.40 | 0.002 [1] |

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T2 | 160 - 140 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 | 0.2627 | 429.87 | 10641.40 | 0.040 [1] |
| T3 | 140 - 120 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 | 0.2627 | 219.50 | 10641.40 | 0.021 [1] |
| T5 | 100 - 80 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 257.49 | 10641.40 | 0.024 [1] |
| T6 | 80 - 60 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 874.67 | 10641.40 | 0.082 [1] |
| T7 | 60 - 40 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 415.00 | 10641.40 | 0.039 [1] |
| T8 | 40 - 20 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 170.47 | 10641.40 | 0.016 [1] |
| T9 | 20 - 5 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 295.48 | 10641.40 | 0.028 [1] |
| T10 | 5 - 0 | ROHN TS1.5x16 ga | 3.36 | 3.12 | 73.5 | 0.2627 | 4041.00 | 10641.40 | 0.380 [1] |

[1] $P_u$ / $\phi P_n$ controls

## Bottom Girt Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 | 0.2627 | 357.03 | 10641.40 | 0.034 [1] |
| T2 | 160 - 140 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 | 0.2627 | 205.30 | 10641.40 | 0.019 [1] |
| T3 | 140 - 120 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 | 0.2627 | 397.90 | 10641.40 | 0.037 [1] |
| T4 | 120 - 100 | ROHN TS1.5x16 ga | 3.42 | 3.22 | 75.8 | 0.2627 | 311.91 | 10641.40 | 0.029 [1] |
| T5 | 100 - 80 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 658.48 | 10641.40 | 0.062 [1] |
| T6 | 80 - 60 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 438.75 | 10641.40 | 0.041 [1] |
| T7 | 60 - 40 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 187.59 | 10641.40 | 0.018 [1] |
| T8 | 40 - 20 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 236.08 | 10641.40 | 0.022 [1] |
| T9 | 20 - 5 | ROHN TS1.5x16 ga | 3.42 | 3.18 | 74.8 | 0.2627 | 3710.08 | 10641.40 | 0.349 [1] |

[1] $P_u$ / $\phi P_n$ controls

## Top Guy Pull-Off Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | 3x1/2 | 3.42 | 3.22 | 267.9 | 1.5000 | 4665.36 | 48600.00 | 0.096 [1] |
| T4 | 120 - 100 | 3x1/2 | 3.42 | 3.22 | 267.9 | 1.5000 | 3454.26 | 48600.00 | 0.071 [1] |
| T5 | 100 - 80 | L1 1/2x1 1/2x3/16 | 3.42 | 3.18 | 83.6 | 0.5273 | 2773.17 | 17085.90 | 0.162 [1] |

[1] $P_u$ / $\phi P_n$ controls

## Top Guy Pull-Off Bending Design Data

| Section No. | Elevation ft | Size | $M_{ux}$ lb-ft | $\phi M_{nx}$ lb-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$ lb-ft | $\phi M_{ny}$ lb-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | 3x1/2 | 0.00 | 3037.50 | 0.000 | 0.00 | 506.25 | 0.000 |
| T4 | 120 - 100 | 3x1/2 | 0.00 | 3037.50 | 0.000 | 0.00 | 506.25 | 0.000 |
| T5 | 100 - 80 | L1 1/2x1 1/2x3/16 | 0.00 | 711.05 | 0.000 | 0.00 | 368.03 | 0.000 |

## Top Guy Pull-Off Interaction Design Data

| Section No. | Elevation ft | Size | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | 3x1/2 | 0.096 | 0.000 | 0.000 | 0.096 [1] ✔ | 1.000 | 4.9-4 ✔ |
| T4 | 120 - 100 | 3x1/2 | 0.071 | 0.000 | 0.000 | 0.071 [1] ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 | L1 1/2x1 1/2x3/16 | 0.162 | 0.000 | 0.000 | 0.162 [1] ✔ | 1.000 | 4.9-4 ✔ |

[1] $P_u$ / $\phi P_n$ controls

## Torque-Arm Top Design Data

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 (444) | C10x15.3 | 3.50 | 3.38 | 56.9 | 4.4900 | 2386.63 | 145476.00 | 0.016 |
| T5 | 100 - 80 (445) | C10x15.3 | 3.50 | 3.38 | 56.9 | 4.4900 | 2388.26 | 145476.00 | 0.016 |
| T5 | 100 - 80 (451) | C10x15.3 | 3.50 | 3.38 | 56.9 | 4.4900 | 2351.02 | 145476.00 | 0.016 |
| T5 | 100 - 80 (452) | C10x15.3 | 3.50 | 3.38 | 56.9 | 4.4900 | 2308.68 | 145476.00 | 0.016 |
| T5 | 100 - 80 (455) | C10x15.3 | 3.50 | 3.38 | 56.9 | 4.4900 | 2373.80 | 145476.00 | 0.016 |
| T5 | 100 - 80 (456) | C10x15.3 | 3.50 | 3.38 | 56.9 | 4.4900 | 2307.90 | 145476.00 | 0.016 |

## Torque-Arm Top Bending Design Data

| Section No. | Elevation ft | Size | $M_{ux}$ lb-ft | $\phi M_{nx}$ lb-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$ lb-ft | $\phi M_{ny}$ lb-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 (444) | C10x15.3 | -14909.83 | 36450.00 | 0.409 | 0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (445) | C10x15.3 | -14821.83 | 36450.00 | 0.407 | -0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (451) | C10x15.3 | -14952.00 | 36450.00 | 0.410 | 0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (452) | C10x15.3 | -14825.42 | 36450.00 | 0.407 | 0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (455) | C10x15.3 | -14920.50 | 36450.00 | 0.409 | -0.00 | 6345.00 | 0.000 |
| T5 | 100 - 80 (456) | C10x15.3 | -14835.58 | 36450.00 | 0.407 | -0.00 | 6345.00 | 0.000 |

## Torque-Arm Top Interaction Design Data

| Section No. | Elevation ft | Size | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|
| T5 | 100 - 80 (444) | C10x15.3 | 0.016 | 0.409 | 0.000 | 0.417 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (445) | C10x15.3 | 0.016 | 0.407 | 0.000 | 0.415 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (451) | C10x15.3 | 0.016 | 0.410 | 0.000 | 0.418 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (452) | C10x15.3 | 0.016 | 0.407 | 0.000 | 0.415 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (455) | C10x15.3 | 0.016 | 0.409 | 0.000 | 0.417 ✔ | 1.000 | 4.9-4 ✔ |
| T5 | 100 - 80 (456) | C10x15.3 | 0.016 | 0.407 | 0.000 | 0.415 ✔ | 1.000 | 4.9-4 ✔ |

## Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| T1 | 180 - 160 | Leg | P2x.218 | 2 | -16824.80 | 59870.70 | 28.1 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 29 | -2070.21 | 6038.67 | 34.3<br>36.5 (b) | Pass |
| | | Top Girt | ROHN TS1.5x16 ga | 5 | -18.15 | 7292.66 | 0.4 | Pass |
| | | Bottom Girt | ROHN TS1.5x16 ga | 7 | 357.03 | 10641.40 | 3.4<br>7.4 (b) | Pass |
| | | Guy A@162.75 | 3/4 | 462 | 14887.10 | 34980.00 | 42.6 | Pass |
| | | Guy B@162.75 | 3/4 | 461 | 14827.70 | 34980.00 | 42.4 | Pass |
| | | Guy C@162.75 | 3/4 | 460 | 14853.40 | 34980.00 | 42.5 | Pass |
| | | Top Guy Pull-Off@162.75 | 3x1/2 | 459 | 4665.36 | 48600.00 | 9.6 | Pass |
| T2 | 160 - 140 | Leg | P2x.218 | 59 | -17864.70 | 59870.70 | 29.8 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 113 | -1159.62 | 6038.67 | 19.2 | Pass |
| | | Top Girt | ROHN TS1.5x16 ga | 61 | 429.87 | 10641.40 | 4.0<br>7.3 (b) | Pass |
| | | Bottom Girt | ROHN TS1.5x16 ga | 66 | 205.30 | 10641.40 | 1.9<br>4.3 (b) | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| T3 | 140 - 120 | Leg | P2x.218 | 116 | -24719.20 | 59870.70 | 41.3 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 124 | -1663.75 | 6038.67 | 27.6 | Pass |
| | | Top Girt | ROHN TS1.5x16 ga | 118 | 219.50 | 10641.40 | 2.1 | Pass |
| | | | | | | | 3.7 (b) | |
| | | Bottom Girt | ROHN TS1.5x16 ga | 123 | 397.90 | 10641.40 | 3.7 | Pass |
| | | | | | | | 8.3 (b) | |
| T4 | 120 - 100 | Leg | P2x.218 | 173 | -30628.00 | 59870.70 | 51.2 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 181 | -939.43 | 6038.67 | 15.6 | Pass |
| | | Bottom Girt | ROHN TS1.5x16 ga | 180 | 311.91 | 10641.40 | 2.9 | Pass |
| | | | | | | | 6.5 (b) | |
| | | Guy A@119.667 | 1/2 | 465 | 7981.66 | 16140.00 | 49.5 | Pass |
| | | Guy B@119.667 | 1/2 | 464 | 8000.99 | 16140.00 | 49.6 | Pass |
| | | Guy C@119.667 | 1/2 | 463 | 8006.90 | 16140.00 | 49.6 | Pass |
| | | Top Guy Pull-Off@119.667 | 3x1/2 | 175 | 3454.26 | 48600.00 | 7.1 | Pass |
| T5 | 100 - 80 | Leg | P2.5x.276 | 230 | -41452.10 | 94363.10 | 43.9 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 242 | -1765.76 | 6127.23 | 28.8 | Pass |
| | | Top Girt | ROHN TS1.5x16 ga | 232 | 257.49 | 10641.40 | 2.4 | Pass |
| | | | | | | | 4.4 (b) | |
| | | Bottom Girt | ROHN TS1.5x16 ga | 237 | 658.48 | 10641.40 | 6.2 | Pass |
| | | | | | | | 13.7 (b) | |
| | | Guy A@82.75 | 1/2 | 453 | 7466.30 | 16140.00 | 46.3 | Pass |
| | | Guy B@82.75 | 1/2 | 449 | 7498.40 | 16140.00 | 46.5 | Pass |
| | | Guy C@82.75 | 1/2 | 443 | 7491.77 | 16140.00 | 46.4 | Pass |
| | | Top Guy Pull-Off@82.75 | L1 1/2x1 1/2x3/16 | 446 | -1906.43 | 7008.98 | 27.2 | Pass |
| | | Torque Arm Top@82.75 | C10x15.3 | 451 | 2351.02 | 145476.00 | 41.8 | Pass |
| T6 | 80 - 60 | Leg | P2.5x.276 | 287 | -41466.40 | 76028.20 | 54.5 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 317 | -2212.25 | 6127.23 | 36.1 | Pass |
| | | Top Girt | ROHN TS1.5x16 ga | 290 | 874.67 | 10641.40 | 8.2 | Pass |
| | | | | | | | 14.8 (b) | |
| | | Bottom Girt | ROHN TS1.5x16 ga | 293 | -375.83 | 7363.82 | 5.1 | Pass |
| | | | | | | | 9.1 (b) | |
| T7 | 60 - 40 | Leg | P2.5x.203 | 320 | -45303.30 | 58302.40 | 77.7 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 351 | -1330.75 | 6127.23 | 21.7 | Pass |
| | | Top Girt | ROHN TS1.5x16 ga | 324 | -317.45 | 7363.82 | 4.3 | Pass |
| | | | | | | | 7.0 (b) | |
| | | Bottom Girt | ROHN TS1.5x16 ga | 327 | 187.59 | 10641.40 | 1.8 | Pass |
| | | | | | | | 3.9 (b) | |
| T8 | 40 - 20 | Leg | P2.5x.203 | 353 | -46193.60 | 58302.40 | 79.2 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 361 | -668.95 | 6127.23 | 10.9 | Pass |
| | | Top Girt | ROHN TS1.5x16 ga | 357 | 170.47 | 10641.40 | 1.6 | Pass |
| | | | | | | | 2.9 (b) | |
| | | Bottom Girt | ROHN TS1.5x16 ga | 358 | 236.08 | 10641.40 | 2.2 | Pass |
| | | | | | | | 4.9 (b) | |
| T9 | 20 - 5 | Leg | P2.5x.276 | 386 | -45900.30 | 76530.40 | 60.0 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 394 | -1108.66 | 6153.03 | 18.0 | Pass |
| | | | | | | | 18.9 (b) | |
| | | Top Girt | ROHN TS1.5x16 ga | 388 | 295.48 | 10641.40 | 2.8 | Pass |
| | | | | | | | 5.0 (b) | |
| | | Bottom Girt | ROHN TS1.5x16 ga | 391 | 3710.08 | 10641.40 | 34.9 | Pass |
| | | | | | | | 77.3 (b) | |
| T10 | 5 - 0 | Leg | P2.5x.276 | 413 | -47632.00 | 78051.80 | 61.0 | Pass |
| | | Diagonal | ROHN TS1.5x16 ga | 437 | 1665.54 | 10641.40 | 15.7 | Pass |
| | | | | | | | 28.2 (b) | |
| | | Top Girt | ROHN TS1.5x16 ga | 416 | 4041.00 | 10641.40 | 38.0 | Pass |
| | | | | | | | 68.4 (b) | |
| | | | | | | | Summary | |
| | | | | | | Leg (T8) | 79.2 | Pass |
| | | | | | | Diagonal | 36.5 | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| | | | | | | (T1) | | |
| | | | | | | Top Girt (T10) | 68.4 | Pass |
| | | | | | | Bottom Girt (T9) | 77.3 | Pass |
| | | | | | | Guy A (T4) | 49.5 | Pass |
| | | | | | | Guy B (T4) | 49.6 | Pass |
| | | | | | | Guy C (T4) | 49.6 | Pass |
| | | | | | | Top Guy Pull-Off (T5) | 27.2 | Pass |
| | | | | | | Torque Arm Top (T5) | 41.8 | Pass |
| | | | | | | Bolt Checks | 77.3 | Pass |
| | | | | | | **RATING =** | **79.2** | **Pass** |

| | |
|---|---|
| Site Name: | Hampden Road |
| Client: | CDT |
| Job Number: | 117-23243.1 |
| Date: | 1/14/2018 |

**Design Base Loads (Factored) per TIA-222-G**

| | | |
|---|---|---|
| Moment ($M_u$): | 0.0 | k-ft |
| Shear/Leg ($V_u$): | 1.3 | k |
| Compression/Leg ($P_u$): | 129.0 | k |
| Uplift/Leg ($T_u$): | 0.0 | k |
| Diameter of Prismatic Portion of Pier (d): | 1.0 | ft |
| Depth to Base of Foundation: | 4.0 | ft |
| Pier Height Above Ground (h): | 1.7 | ft |
| Length / Width of Pad (w): | 5.0 | ft |
| Thickness of Pad (t): | 4.0 | ft |
| Depth Below Ground Surface to Water Table (w): | 20.0 | ft |
| Unit Weight of Concrete: | 150.0 | pcf |
| Unit Weight of Water: | 62.4 | pcf |
| Unit Weight of Soil Above Water Table: | 120.0 | pcf |
| Unit Weight of Soil Below Water Table: | 65.0 | pcf |
| Friction Angle of Uplift from Top of Pad: | 30 | Degrees |
| Friction Angle of Uplift from Base of Pad: | 30 | Degrees |
| Uplift Angle Started at Top or Base of Pad (T/B): | T | |
| Ultimate Skin Friction: | 0 | psf |
| Ultimate Compressive Bearing Pressure: | 10000 | psf |
| Capacity Increase (Due to Transient Loads): | 1.00 | |
| Bearing Strength Reduction Factor ($\phi_s$): | 0.60 | |
| Uplift Strength Reduction Factor ($\phi_s$): | 0.75 | |

**Axial Capacities**

| | | |
|---|---|---|
| Nominal Uplift Capacity per Leg ($\phi_s T_n$): | 11.4 | k |
| Nominal Compressive Capacity per Leg ($\phi_s P_n$): | 150.0 | k |
| $P_u$: | 132.8 | k |
| $T_u/\phi_s T_n$: | 0.00 | Result: OK |
| $P_u/\phi_s P_n$: | 0.89 | Result: OK |

## PROJECT INFORMATION:

### TOWER INFORMATION

LAT: 41.99959167°

LONG: -72.355614°

SITE TYPE: 180' GUYED TOWER

COUNTY: TOLLAND

### APPLICANT

SPRINT
1 INTERNATIONAL BLVD., SUITE 800
MAHWAH, NJ 07495
CONTACT: TBD
PHONE: TBD
EMAIL: TBD

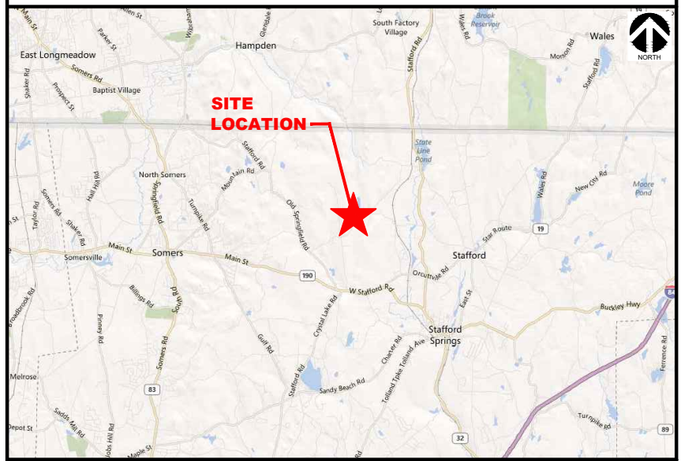
### LANDLORD

CORDLESS DATA TRANSFER, INC.
PO BOX 363
MORLBOROUGH, CT 06647

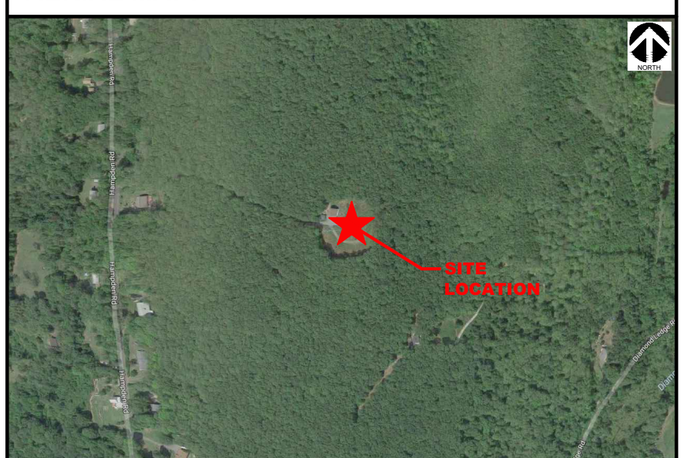
### A&E FIRM

RAMAKER & ASSOCIATES, INC.
CONTACT: KEITH BOHNSACK
PROJECT MANAGER
PHONE: (608) 643-4100
EMAIL: kbohnsack@ramaker.com

## VICINITY MAP:




## AERIAL MAP:




## SHEET INDEX:

| SHEET # | SHEET DESCRIPTION | REVISION |
|---|---|---|
| T-1 | COVER SHEET & SITE PLAN | - |
| A-1 | ANTENNA LAYOUTS & EQUIPMENT LAYOUT | - |
| A-2 | TOWER ELEVATION | - |
| A-3 | ANTENNA DETAILS | - |
| A-4 | ANTENNA SCHEDULE & DETAILS | - |
| A-5 | FIBER PLUMBING DIAGRAM | - |
| A-6 | CABLE COLOR CODING | - |
| E-1 | DC POWER & FIBER DISTRIBUTION DETAIL | - |

## CODE COMPLIANCE:

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.

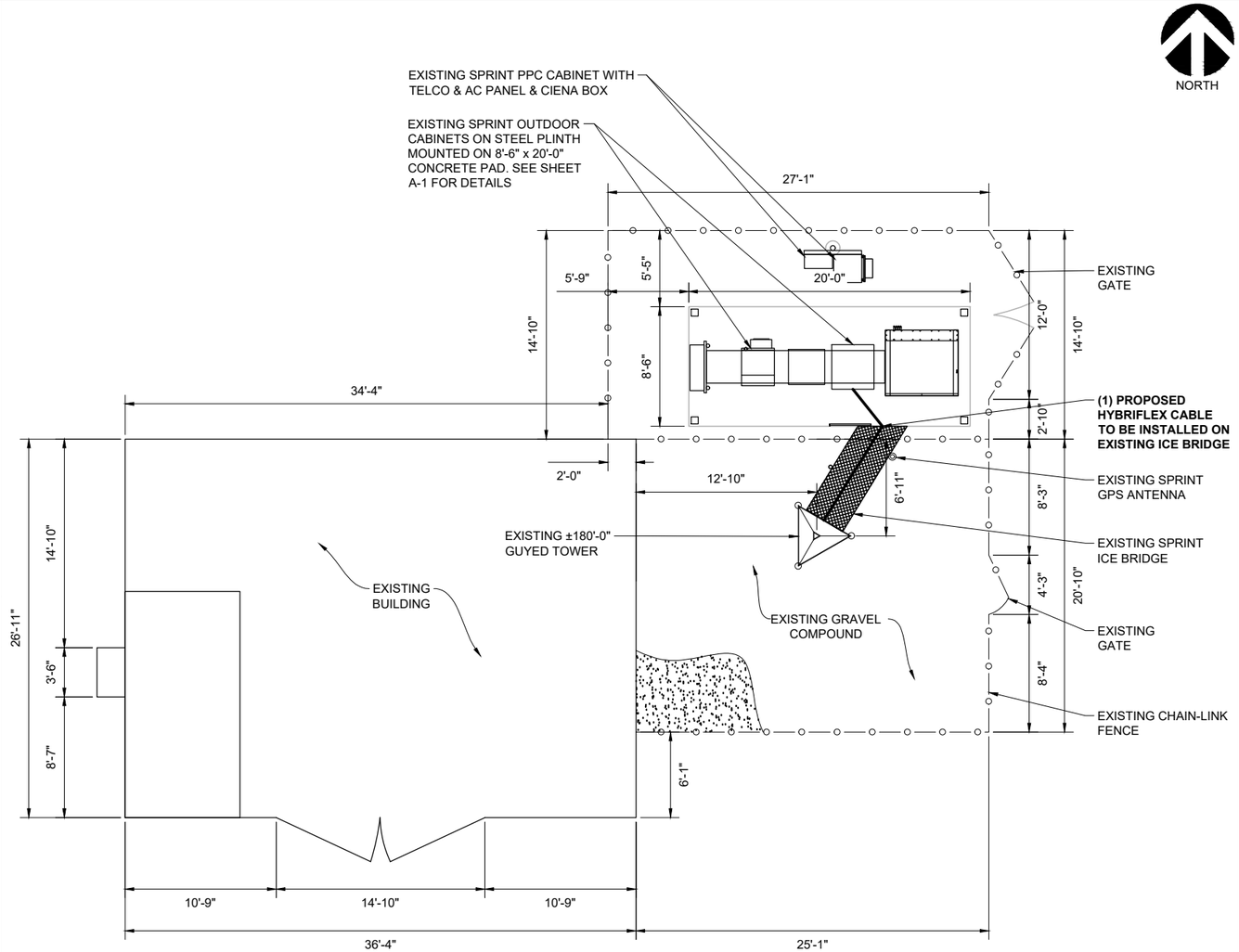
1. INTERNATIONAL BUILDING CODE
2. ANSI/TIA-222 STRUCTURAL STANDARD FOR ANTENNA STRUCTURES
3. NFPA 780 - LIGHTNING PROTECTION CODE
4. NATIONAL ELECTRIC CODE

811 Know what's below. Call before you dig. www.call811.com

# DO MACRO UPGRADE

## SITE CASCADE:

## CT33XC553




OVERALL SITE PLAN (1)
SCALE: 1" = 10'

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495

RAMAKER & ASSOCIATES, INC.
700-76 BROADWAY, SUITE 182
WESTWOOD, NJ 07675
www.Ramaker.com

Charles Cherundolo Consulting, Inc.
713 Clover Lane, Moscow, PA 18444
Phone: 570-840-5084 Fax: 570-842-5592

Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: 10/17/2017 Date:

| MARK | DATE | DESCRIPTION |
|---|---|---|
| | | |

ISSUE PHASE: FINAL
DATE ISSUED: 10/17/2017

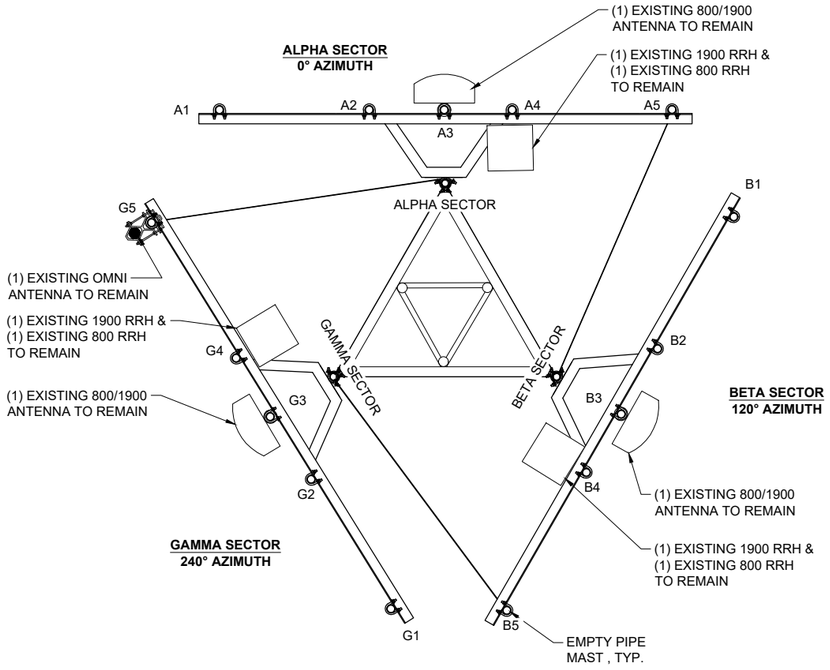
PROJECT TITLE:
CT33XC553

PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

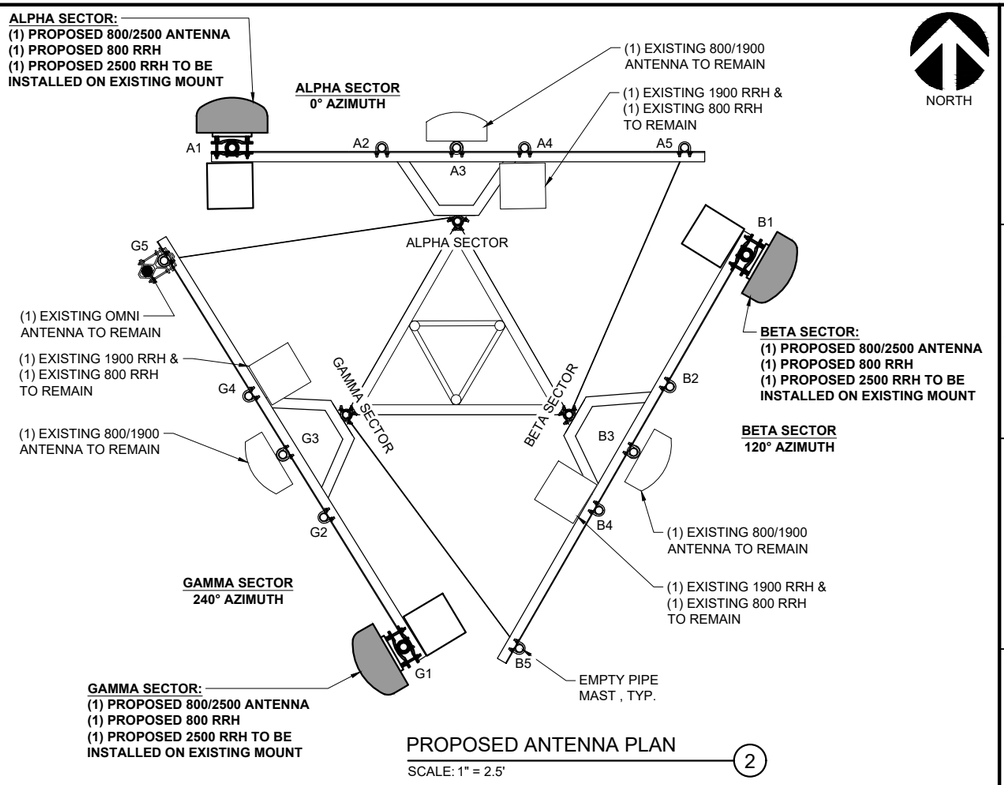
SHEET TITLE:
COVER SHEET & SITE PLAN

0 5' 10' 20'
11" x 17" - 1" = 10'
22" x 34" - 1" = 5'

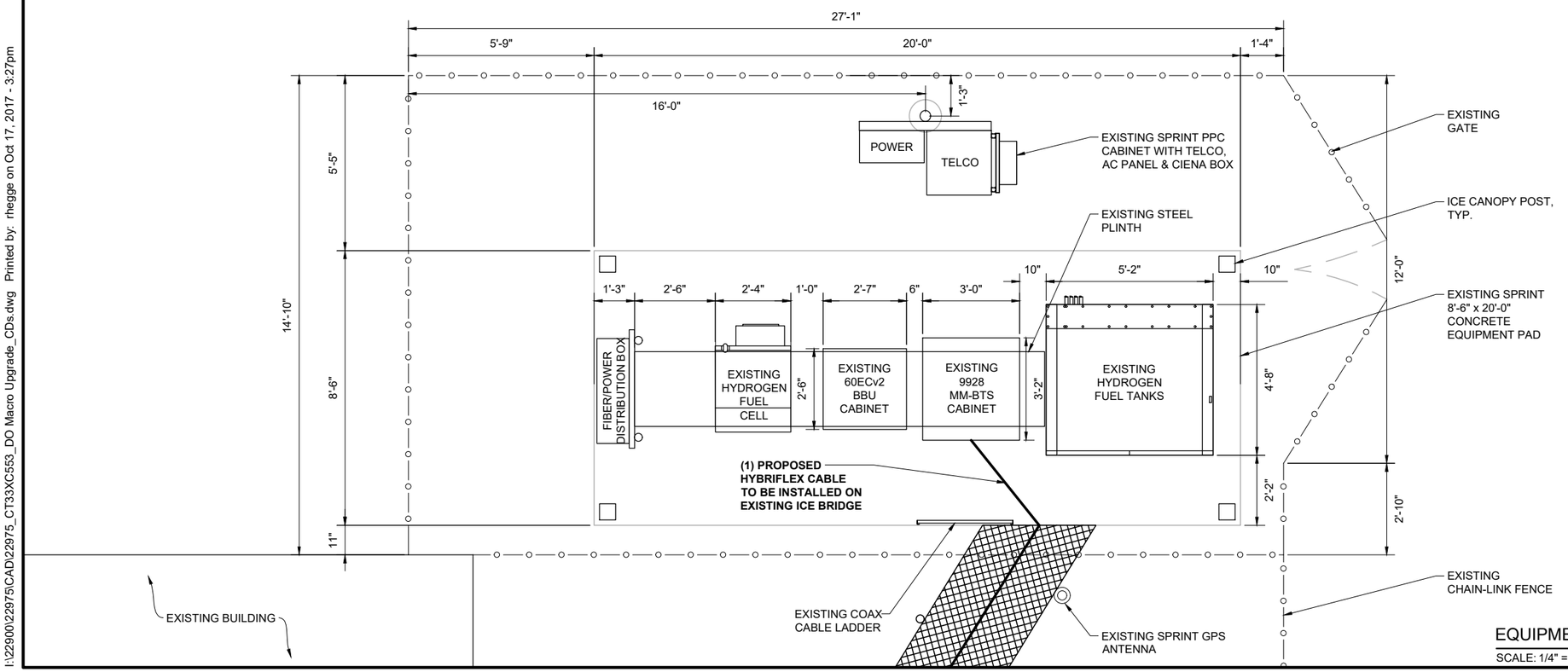
PROJECT NUMBER: 22975
SHEET NUMBER: T-1




EXISTING ANTENNA PLAN (1)
SCALE: 1" = 2.5'




PROPOSED ANTENNA PLAN (2)
SCALE: 1" = 2.5'




EQUIPMENT PLAN (3)
SCALE: 1/4" = 1'-0"

Sprint

1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495

RAMAKER & ASSOCIATES, INC.

700-76 BROADWAY, SUITE 182
WESTWOOD, NJ 07675
www.Ramaker.com

Charles Cherundolo Consulting, Inc.

713 Clover Lane, Moscow, PA 18444
Phone: 570-840-5084 Fax: 570-842-5592

Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED PROFESSIONAL ENGINEER

Signature: 10/17/2017 Date:

| MARK | DATE | DESCRIPTION |
|---|---|---|
| | | |

ISSUE PHASE: FINAL
DATE ISSUED: 10/17/2017

PROJECT TITLE:

# CT33XC553

PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

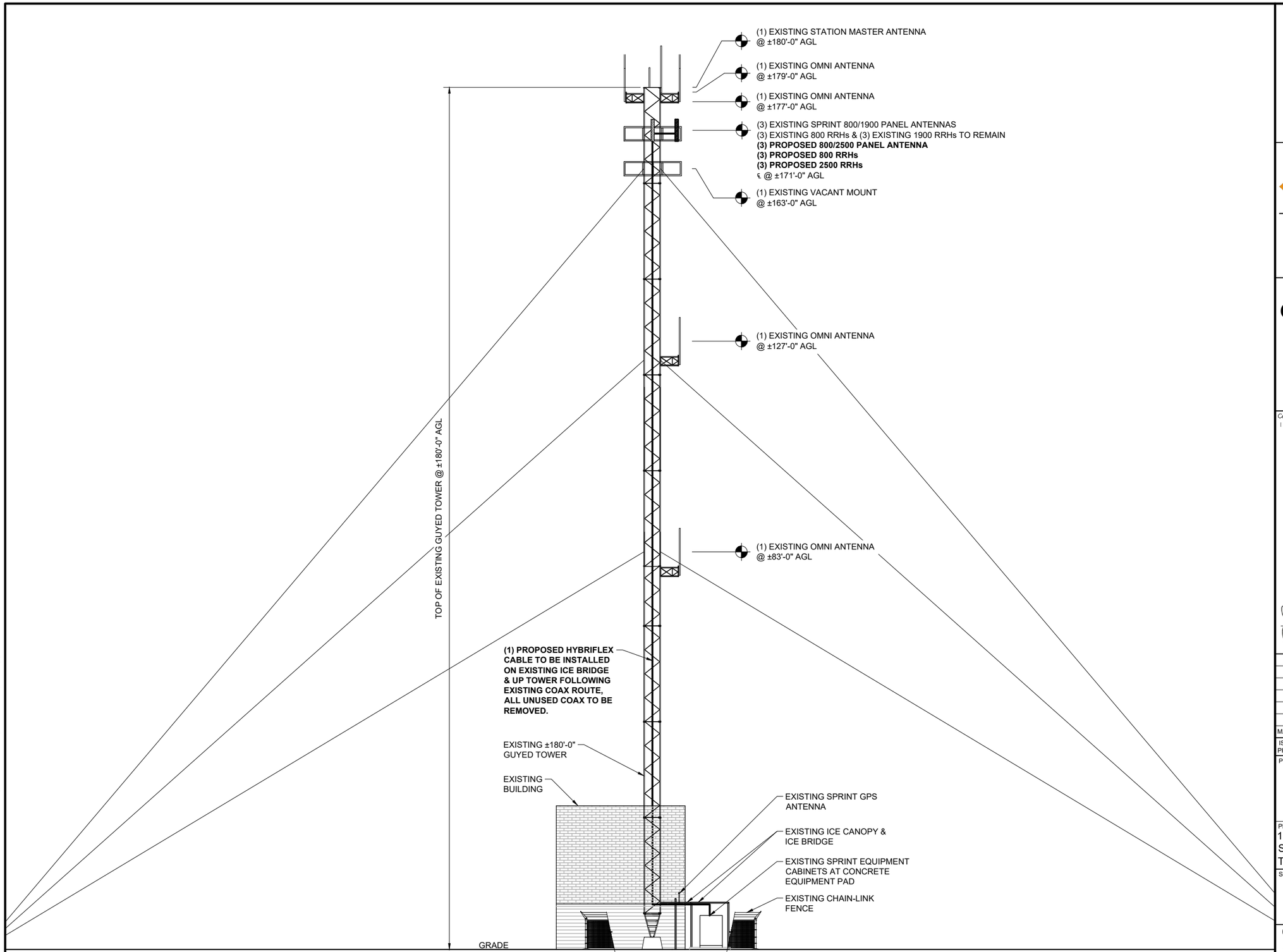
SHEET TITLE:

## ANTENNA LAYOUTS & EQUIPMENT LAYOUT

0 2' 4' 8'

11" x 17" - 1/4" = 1'
22" x 34" - 1/2" = 1'

PROJECT NUMBER: 22975
SHEET NUMBER: A-1




TOWER ELEVATION (EAST) 1

SCALE: 1" = 20'

Sprint

1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495

RAMAKER & ASSOCIATES, INC.

700-76 BROADWAY, SUITE 182
WESTWOOD, NJ 07675
www.Ramaker.com

Charles Cherundolo Consulting, Inc.

713 Clover Lane, Moscow, PA 18444
Phone: 570-840-5084 Fax: 570-842-5592

Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Connecticut.

STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: 10/17/2017 Date:

| MARK | DATE | DESCRIPTION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

ISSUE PHASE: FINAL
DATE ISSUED: 10/17/2017

PROJECT TITLE:

CT33XC553

PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

SHEET TITLE:

TOWER ELEVATION

0 10' 20' 40'

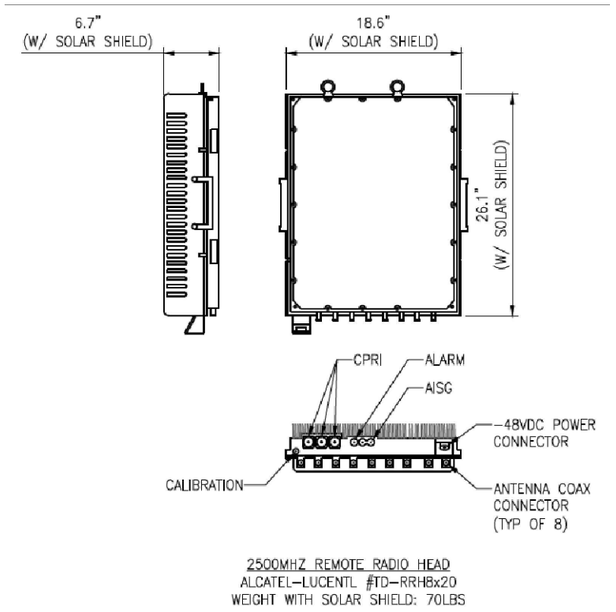
11" x 17" - 1" = 20'
22" x 34" - 1" = 10'

PROJECT NUMBER: 22975

SHEET NUMBER: A-2


| MECHANICAL | |
|---|---|
| DIMENSION (HxWxD) | 71.9" x 13.8" x 8.2" |
| WEIGHT | 58 lbs |

COMMSCOPE ANTENNA MODEL # DT465B-2XR - ANTENNA SPECS




2500MHZ REMOTE RADIO HEAD
ALCATEL-LUCENTL #TD-RRH8x20
WEIGHT WITH SOLAR SHIELD: 70LBS

| MECHANICAL | |
|---|---|
| DIMENSION (HxWxD) | 26.1"x18.6"x6.7" |
| WEIGHT | 70 lbs |

ALU- TD-RRH8X20-25 - RADIO SPECS

## 800MHz 2X50W Remote Radio Head (RRH)

Simultaneous CDMA & LTE Multi technology RRH 862-869 MHz
- Any combination of CDMA and LTE carriers supported by 100W RF Power

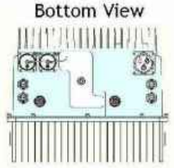
2 CPRI-like Optical Connections for daisy chaining
Software Switchable External Filter for use before Public Safety is cleared

| Dimensions: | w/o Filter | w/ Filter |
|---|---|---|
| Height: | 480 mm (19") | 480 mm (19") |
| Width: | 330 mm (13") | 330 mm (13") |
| Depth: | 218 mm (8.6") | 310 (12.2") |
| Weight: | 24 kg (53 lbs) | 29 kg (64 lbs) |
| | 49 liters, <29kg | |

Power Supply: -48 VDC
Power Consumption: <400W Typical
Operating Temp range -40°C to +55°C
Option to mount on Ground at tower base

Front/Top View


Bottom View



Alcatel-Lucent's 800 RRH satisfies Sprint's requirements.

| MECHANICAL | |
|---|---|
| DIMENSION (HxWxD) | 19" x 13" x 12.2" |
| WEIGHT | 64 lbs |

ALU- 800 MHz 2x50W - RADIO SPECS

Sprint
1 INTERNATIONAL BLVD, SUITE 800
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Charles Cherundolo Consulting, Inc.
713 Clover Lane, Moscow, PA 18444
Phone: 570-840-5084 Fax: 570-842-5592

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STATE OF CONNECTICUT
JAMES R. SKOWRONSKI
26266
LICENSED PROFESSIONAL ENGINEER

Signature: 10/17/2017 Date:

| MARK | DATE | DESCRIPTION |
|---|---|---|
| | | |

ISSUE PHASE: FINAL
DATE ISSUED: 10/17/2017

PROJECT TITLE:
CT33XC553

PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

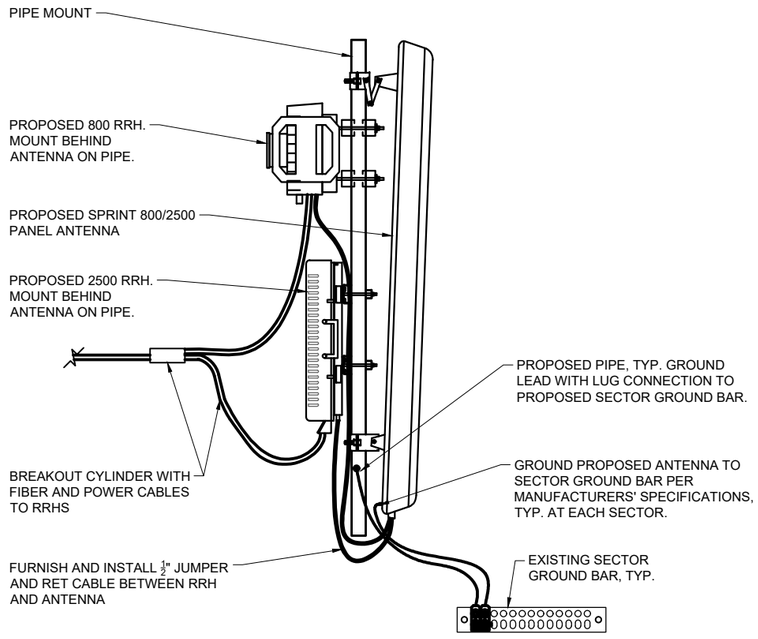
SHEET TITLE:
ANTENNA DETAILS

SCALE: NONE

PROJECT NUMBER: 22975
SHEET NUMBER: A-3

| 800/1900/2500 EQUIPMENT SCHEDULE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SECTOR | POSITION | ANTENNA MAKE/MODEL | AZIMUTH | CENTERLINE | RRH | CABLE TYPE | CABLE LENGTH | JUMPER TYPE |
| ALPHA | 1 | PROPOSED 800/2500 (COMMSCOPE DT465B-2XR) | 0° | 171'-0" | (1) PROPOSED RRH 800 MHz 2x50W<br>(1) PROPOSED 2500 (TD-RRH8x20-25) | (1) PROPOSED HYBRIFLEX | 200' | 8' HYBRID |
| | 2 | VACANT | - | - | - | - | - | - |
| | 3 | EXISTING 800/1900 ANTENNA | 0° | 171'-0" | (1) EXISTING RRH 1900 4X45 65 MHz | - | - | EXISTING |
| | 4 | - | - | 171'-0" | (1) EXISTING RRH 1900 4X45 65 MHz<br>(1) EXISTING RRH 800 MHz 2x50W | EXISTING HYBRIFLEX | 200' | - |
| | 5 | VACANT | - | - | - | - | - | - |
| BETA | 1 | PROPOSED 800/2500 (COMMSCOPE DT465B-2XR) | 120° | 171'-0" | (1) PROPOSED RRH 800 MHz 2x50W<br>(1) PROPOSED 2500 (TD-RRH8x20-25) | SHARED W/ ALPHA | 200' | 8' HYBRID |
| | 2 | VACANT | - | - | - | - | - | - |
| | 3 | EXISTING 800/1900 ANTENNA | 120° | 171'-0" | (1) EXISTING RRH 1900 4X45 65 MHz | - | - | EXISTING |
| | 4 | - | - | 171'-0" | (1) EXISTING RRH 1900 4X45 65 MHz<br>(1) EXISTING RRH 800 MHz 2x50W | EXISTING HYBRIFLEX | 200' | - |
| | 5 | VACANT | - | - | - | - | - | - |
| GAMMA | 1 | PROPOSED 800/2500 (COMMSCOPE DT465B-2XR) | 240° | 171'-0" | (1) PROPOSED RRH 800 MHz 2x50W<br>(1) PROPOSED 2500 (TD-RRH8x20-25) | SHARED W/ ALPHA | 200' | 8' HYBRID |
| | 2 | VACANT | - | - | - | - | - | - |
| | 3 | EXISTING 800/1900 ANTENNA | 240° | 171'-0" | (1) EXISTING RRH 1900 4X45 65 MHz | - | - | EXISTING |
| | 4 | - | - | 171'-0" | (1) EXISTING RRH 1900 4X45 65 MHz<br>(1) EXISTING RRH 800 MHz 2x50W | EXISTING HYBRIFLEX | 200' | - |
| | 5 | VACANT | - | - | - | - | - | - |

EQUIPMENT & CABLE SCHEDULE (1)
SCALE: NTS




ANTENNA & RRH MOUNTING DETAIL (2)
SCALE: NTS

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STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

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| MARK | DATE | DESCRIPTION |
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ISSUE PHASE: FINAL
DATE ISSUED: 10/17/2017

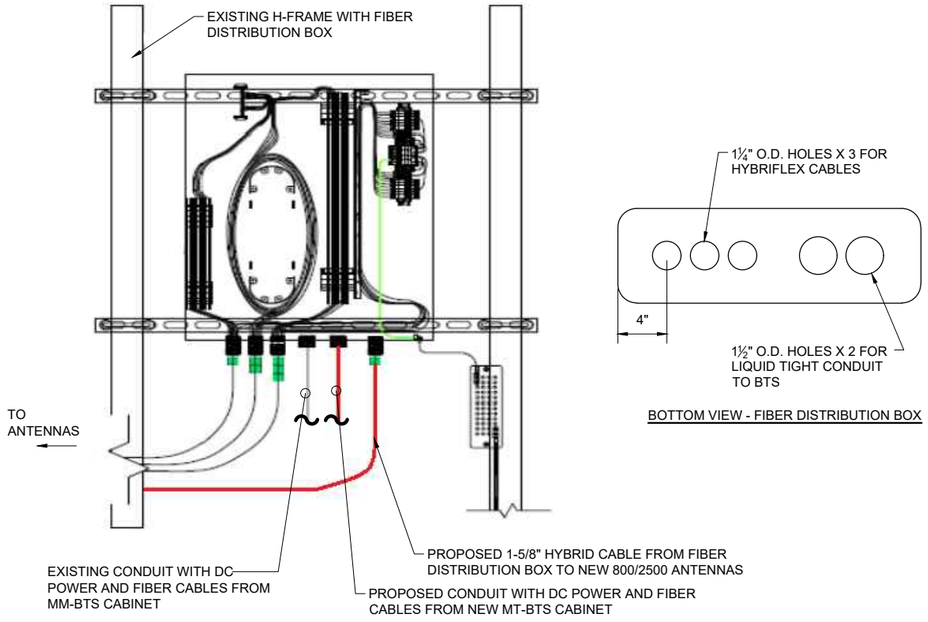
PROJECT TITLE:
CT33XC553

PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

SHEET TITLE:
ANTENNA SCHEDULE & DETAIL

SCALE: NONE

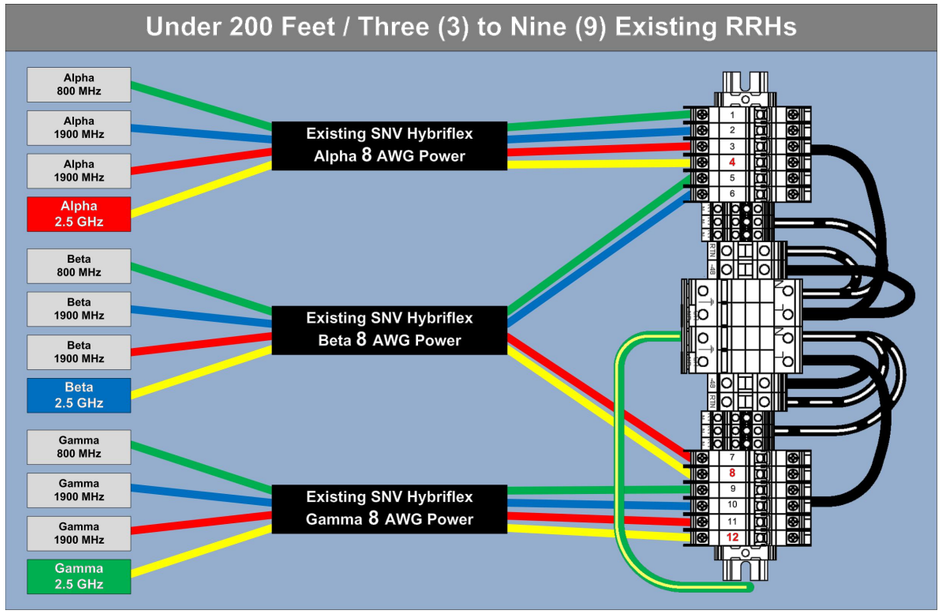
PROJECT NUMBER: 22975
SHEET NUMBER: A-4



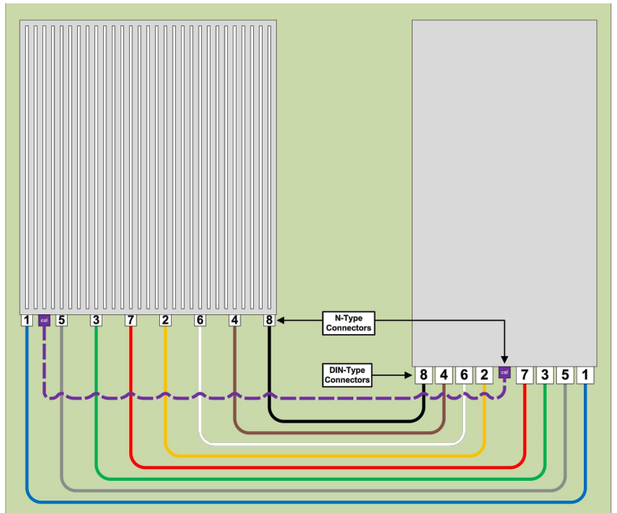

TYPICAL FIBER DISTRIBUTION BOX DETAIL (1)
SCALE: NTS




BOTTOM VIEW - FIBER DISTRIBUTION BOX

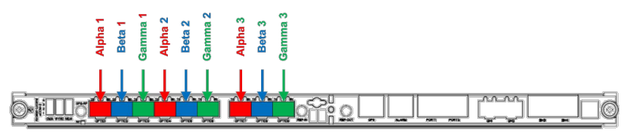



RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL (2)
SCALE: NTS

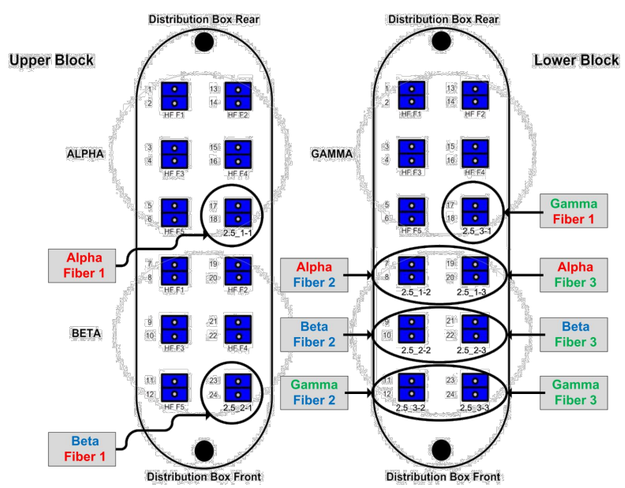



8T8R DETAIL (3)
SCALE: NTS

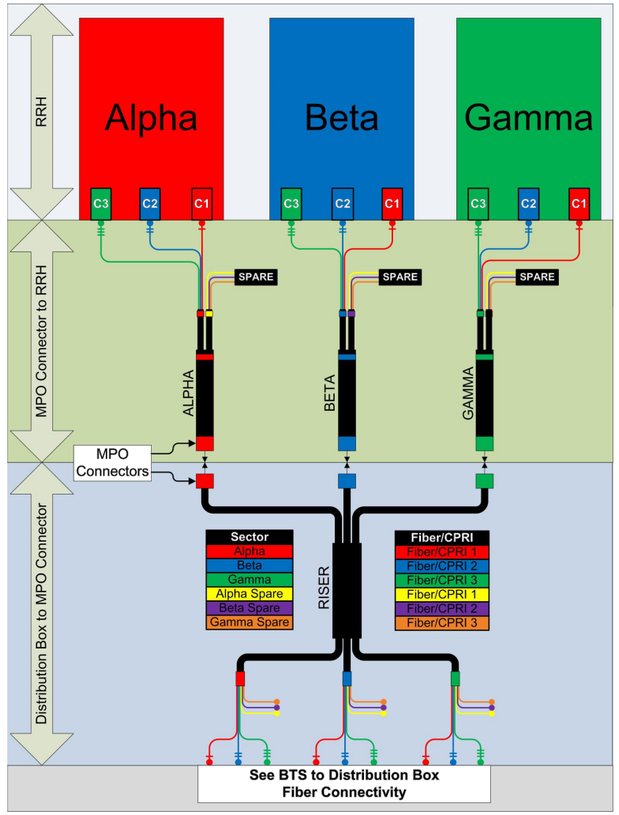
## eCCM2-HR




## Distribution Box Fiber Panel




BTS TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL (4)
SCALE: NTS




RRH TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL (5)
SCALE: NTS

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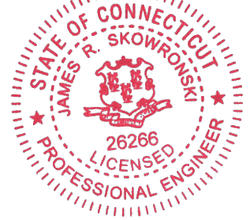



Signature: 10/17/2017 Date:

| MARK | DATE | DESCRIPTION |
|---|---|---|
| | | |

ISSUE PHASE: FINAL
DATE ISSUED: 10/17/2017

PROJECT TITLE:
CT33XC553

PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

SHEET TITLE:
FIBER PLUMBING DIAGRAM

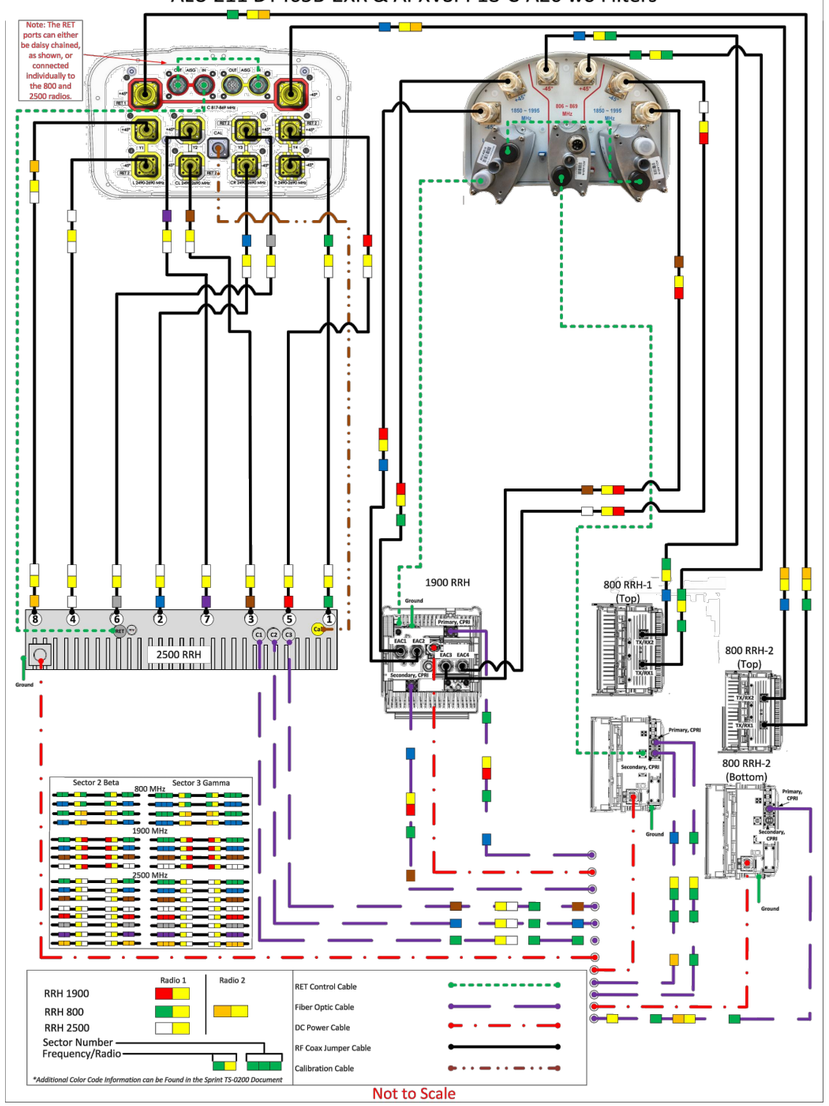
SCALE: NONE

PROJECT NUMBER: 22975
SHEET NUMBER: A-5

| Prepared By | Revision Date | Revision Number |
|---|---|---|
| Mark Elliott | August 23, 2017 | R4 |
| **Approved By** | **Approval Date** | |
| RAN Hardware & Antenna Teams | DRAFT-Macro Generated | |

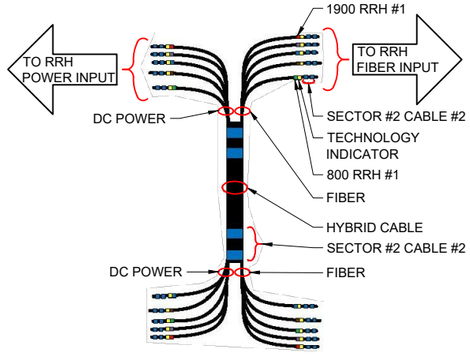
Sprint

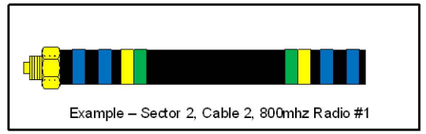
## ALU 211 DT465B-2XR & APXVSPP18-C-A20 wo Filters

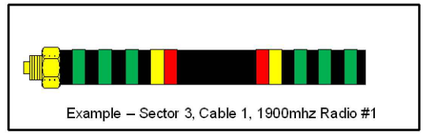


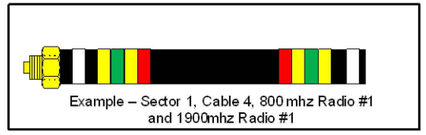

Not to Scale

| Sector | Cable | First Ring | Second Ring | Third Ring |
|---|---|---|---|---|
| 1 Alpha | 1 | Green | No Tape | No Tape |
| 1 | 2 | Blue | No Tape | No Tape |
| 1 | 3 | Brown | No Tape | No Tape |
| 1 | 4 | White | No Tape | No Tape |
| 1 | 5 | Red | No Tape | No Tape |
| 1 | 6 | Grey | No Tape | No Tape |
| 1 | 7 | Purple | No Tape | No Tape |
| 1 | 8 | Orange | No Tape | No Tape |
| 2 Beta | 1 | Green | Green | No Tape |
| 2 | 2 | Blue | Blue | No Tape |
| 2 | 3 | Brown | Brown | No Tape |
| 2 | 4 | White | White | No Tape |
| 2 | 5 | Red | Red | No Tape |
| 2 | 6 | Grey | Grey | No Tape |
| 2 | 7 | Purple | Purple | No Tape |
| 2 | 8 | Orange | Orange | No Tape |
| 3 Gamma | 1 | Green | Green | Green |
| 3 | 2 | Blue | Blue | Blue |
| 3 | 3 | Brown | Brown | Brown |
| 3 | 4 | White | White | White |
| 3 | 5 | Red | Red | Red |
| 3 | 6 | Grey | Grey | Grey |
| 3 | 7 | Purple | Purple | Purple |
| 3 | 8 | Orange | Orange | Orange |





Example – Sector 2, Cable 2, 800mhz Radio #1


Example – Sector 3, Cable 1, 1900mhz Radio #1


Example – Sector 1, Cable 4, 800 mhz Radio #1 and 1900mhz Radio #1

COLOR CODING CHARTS (1)
SCALE: NTS

| 2.5 FREQUENCY | INDICATOR | | ID |
|---|---|---|---|
| 2500 -1 | YEL | WHT | GRN |
| 2500 -2 | YEL | WHT | RED |
| 2500 -3 | YEL | WHT | BRN |
| 2500 -4 | YEL | WHT | BLU |
| 2500 -5 | YEL | WHT | SLT |
| 2500 -6 | YEL | WHT | ORG |
| 2500 -7 | YEL | WHT | WHT |
| 2500 -8 | YEL | WHT | PPL |

| NV FREQUENCY | INDICATOR | ID |
|---|---|---|
| 800-1 | YEL | GRN |
| 1900-1 | YEL | RED |
| 1900-2 | YEL | BRN |
| 1900-3 | YEL | BLU |
| 1900-4 | YEL | SLT |
| 800-1 | YEL | ORG |
| RESERVED | YEL | WHT |
| RESERVED | YEL | PPL |

## CABLE MARKING NOTES

1. ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
2. THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAKOUT UNIT. THERE SHALL BE 1" SPACE BETWEEN EACH RING.
3. A 2" GAP SHALL SEPARATE THE CABLE COLOR CODE FROM THE FREQUENCY COLOR CODE. THE 2" COLOR RINGS FOR THE FREQUENCY CODE SHALL BE PLACED NEXT TO EACH OTHER WITH NO SPACES.
4. THE 2" COLORED TAPE(S) SHALL BE WRAPPED A MINIMUM OF 3 TIMES AROUND THE INDIVIDUAL CABLES, AND THE TAPE SHALL BE KEPT IN THE SAME LOCATION AS MUCH AS POSSIBLE.
5. SITES WITH MORE THAN FOUR (4) SECTORS WILL REQUIRE ADDITIONAL RINGS FOR EACH SECTOR, FOLLOWING THE PATTERN. HIGH CAPACITY SITES WILL USE THE SECOND CABLE IDENTIFIED BY BLUE BANDS OF TAPE
6. HYBRID FIBER CABLE SHALL BE SECTOR IDENTIFIED INSIDE THE CABINET ON FREQUENCY BUNDLES, ON THE SEALTITE, ON THE MAIN LINE UPON EXIT OF SEALTITE, AND BEFORE AND AFTER THE BREAKOUT UNIT (MEDUSA), AS WELL AS BEFORE AND AFTER ANY ENTRANCE OR EXIT.
7. HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.
8. INDIVIDUAL POWER PAIRS AND FIBER BUNDLES SHALL BE LABELED WITH BOTH THE CABLE AND FREQUENCY.

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ISSUE PHASE: FINAL — DATE ISSUED: 10/17/2017

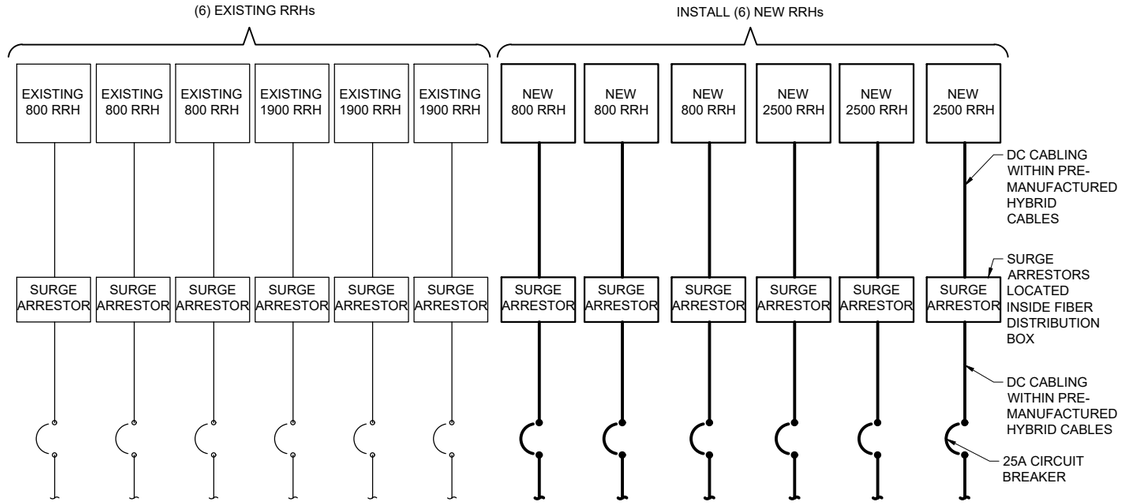
PROJECT TITLE:
CT33XC553

PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

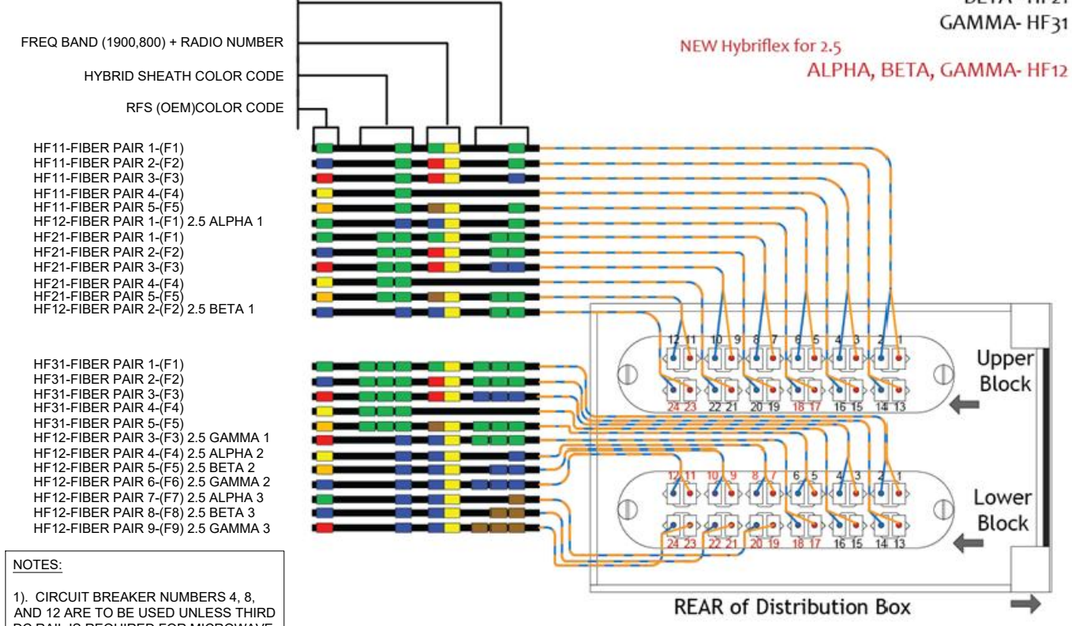
SHEET TITLE:
CABLE COLOR CODING

SCALE: NONE

PROJECT NUMBER: 22975
SHEET NUMBER: A-6




DC ONE-LINE DIAGRAM (1)
SCALE: NTS




Each sector has separate Hybriflex cable .
Hybriflex cable naming as follows:

ALPHA – HF11
BETA - HF21
GAMMA- HF31

NEW Hybriflex for 2.5
ALPHA, BETA, GAMMA- HF12

NOTES:

1). CIRCUIT BREAKER NUMBERS 4, 8, AND 12 ARE TO BE USED UNLESS THIRD DC RAIL IS REQUIRED FOR MICROWAVE.
2). USE DC POWER LOOP.
3). ALL UNUSED DC FEEDERS TO BE TERMINATED WITH WIRE NUTS AND TAPED.
4). REMOVE ALL DEBRIS FROM INTERIOR OF FIBER DISTRIBUTION BOX WHEN COMPLETE.

TYPICAL FIBER DISTRIBUTION (2)
SCALE: NTS

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PROJECT TITLE:
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PROJECT INFORMATION:
169 HAMPDEN ROAD
STAFFORD SPRINGS, CT 06076
TOLLAND COUNTY

SHEET TITLE:
DC POWER & FIBER DISTRIBUTION DETAIL

SCALE: NONE

PROJECT NUMBER: 22975
SHEET NUMBER: E-1