October 17, 2022

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

Re: Notice of Exempt Modification New Cingular Wireless PCS LLC ("AT&T") Site CT2901
227 Whitewood Road, Waterbury, CT 06708 (the "Property")
Latitude: 41.5781410 N Longitude: 73.0817310 W

Dear Ms. Bachman:

AT&T currently maintains (9) antennas at the 105' level on the existing 80' Eversource transmission tower #11229 ("Tower") located at 227 Whitewood Road, Waterbury, CT. The Property is owned by Blessed 1 LLC, and the Tower is owned by Connecticut Light & Power ("Eversource"). AT&T intends to modify its facility by removing all (9) antennas and adding (3) AIR6449 B77D at the 104'2" level, (3) QD8616-7 & (3) DMB65R-BU8DA antennas at the 105' level & (3) AIR6419 B77G antennas at the 107'8" level of the tower. The AIR6649 B77D & AIR6419 B77G antennas are stacked one on top of the other. The height of AT&Ts existing antennas is 105'and proposed antennas is 104'2", 105' & 107'8" on the Tower. AT&T also intends on removing (6) RRUs from the 105' level at the tower and replace them with (3) 4478 B4, (3) 4449 B5/B12, & (3) 2012 B29 RRUs at ground level.

This modification may include B2, B5, B17, B14, B29, B30, B66 & n77 hardware that is 4G(LTE) and/or 5GNR capable through remote software configuration and either or both services may be turned on or off at various times.

The AT&T facility received CT Siting Council ("Council") approval in Petition 1103 on June 12, 2014, with minor project changes approved on August 24, 2018. The approvals contained no conditions that could feasibly be violated by this modification, including facility height or mounting restrictions. AT&Ts modification complies with the above-mentioned approval.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies ("R.C.S.A") §16-50j-73 for construction that constitutes an exempt modification pursuant to R.C.S.A §16-50j-72(b)(2). In accordance with to R.C.S.A §16-50j-73, a copy of this letter is being sent to the Honorable Neil M. O'Leary, Mayor, City of Waterbury, as elected official, Mr. Robert Nerney, City Planner, City of Waterbury, Blessed 1 LLC, the property owner and Eversource, the tower owner.

The planned modification of the facility falls squarely within those activities explicitly provided for in R.C.S.A §16-50j-72(b)(2). Specifically:

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require an extension of the site boundary.

3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the modified facility will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and foundation can support the proposed loading.

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

Sincerely,

*Hollis M. Redding*

Hollis M. Redding
SAI Communications, LLC
12 Industrial Way
Salem, NH 03079
Mobile: 860-834-6964
hredding@saigrp.com

Enclosures

Cc: Honorable Neil M. O'Leary, Mayor, City of Waterbury
Mr. Robert Nerney, City Planner, City of Waterbury
Blessed 1 LLC, the property owner
Connecticut Light & Power (''Eversource"), the tower owner

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

# Calculated Radio Frequency Emissions Report

CT2901

227 Whitewood Road, Waterbury, CT 06708

October 14, 2022

# Table of Contents



# List of Figures



# List of Tables

## 1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of AT&T antenna arrays to be mounted at 105' AGL on an existing monopole tower located at 227 Whitewood Road in Waterbury, CT. The coordinates of the tower are 41° 34' 41.31" N, 73° 04' 54.23" W.

AT&T is proposing the following:

1) Install nine (9) multi-band antennas (three per sector) to support its commercial LTE network and the FirstNet National Public Safety Broadband Network ("NPSBN").

This report considers the planned antenna configuration for AT&T[1] to derive the resulting % MPE of its proposed installation.

## 2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter ($mW/cm^2$). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment C of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment C contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

[1] As referenced to AT&T's Radio Frequency Design Sheet updated 02/21/2022.

## 3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{EIRP}{\pi \times R^2}\right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{\left(H^2 + V^2\right)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor of 2.0

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final installations.

## 4. Antenna Inventory

Table 1 below outlines AT&T's proposed antenna configuration for the site. The associated data sheets and antenna patterns for these specific antenna models are included in Attachments C.

| Operator | Sector / Call Sign | TX Freq (MHz) | Power at Antenna (Watts) | Ant Gain (dBi) | Power EIRP (Watts) | Antenna Model | Beam Width | Mech. Tilt | Length (ft) | Antenna Centerline Height (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| AT&T | Alpha / 40° | 739 | 160 | 15.1 | 5177 | DMP65R-BU8D | 75 | 0 | 8.0 | 105 |
| | | 850 | 160 | 16.0 | 6370 | | 64 | | | |
| | | 2300 | 160 | 18.1 | 10330 | | 54 | | | |
| | | 763 | 160 | 15.2 | 5298 | QD8616-7 | 67 | 0 | 8.0 | 105 |
| | | 1900 | 160 | 17.2 | 8397 | | 62 | | | |
| | | 2100 | 240 | 17.5 | 13496 | | 62 | | | |
| | Beta / 150° | 739 | 160 | 15.1 | 5177 | DMP65R-BU8D | 75 | 0 | 8.0 | 105 |
| | | 850 | 160 | 16.0 | 6370 | | 64 | | | |
| | | 2300 | 160 | 18.1 | 10330 | | 54 | | | |
| | | 763 | 160 | 15.2 | 5298 | QD8616-7 | 67 | 0 | 8.0 | 105 |
| | | 1900 | 160 | 17.2 | 8397 | | 62 | | | |
| | | 2100 | 240 | 17.5 | 13496 | | 62 | | | |
| | Gamma / 270° | 739 | 160 | 15.1 | 5177 | DMP65R-BU8D | 75 | 0 | 8.0 | 105 |
| | | 850 | 160 | 16.0 | 6370 | | 64 | | | |
| | | 2300 | 160 | 18.1 | 10330 | | 54 | | | |
| | | 763 | 160 | 15.2 | 5298 | QD8616-7 | 67 | 0 | 8.0 | 105 |
| | | 1900 | 160 | 17.2 | 8397 | | 62 | | | |
| | | 2100 | 240 | 17.5 | 13496 | | 62 | | | |

Table 1: Proposed Antenna Inventory[2] [3]

[2] Antenna heights are in reference to the Hudson Design Group LLC. Construction Drawings, dated 04/29/2022.

[3] Transmit power assumes 0 dB of cable loss.

## 5. Calculation Results

The calculated power density results are shown in Figure 1 below. For completeness, the calculations for this analysis range from 0 feet horizontal distance (directly below the antennas) to a value of 3,000 feet horizontal distance from the site. In addition to the other worst-case scenario considerations that were previously mentioned, the power density calculations to each horizontal distance point away from the antennas was completed using a local maximum off beam antenna gain (within ± 5 degrees of the true mathematical angle) to incorporate a realistic worst-case scenario.

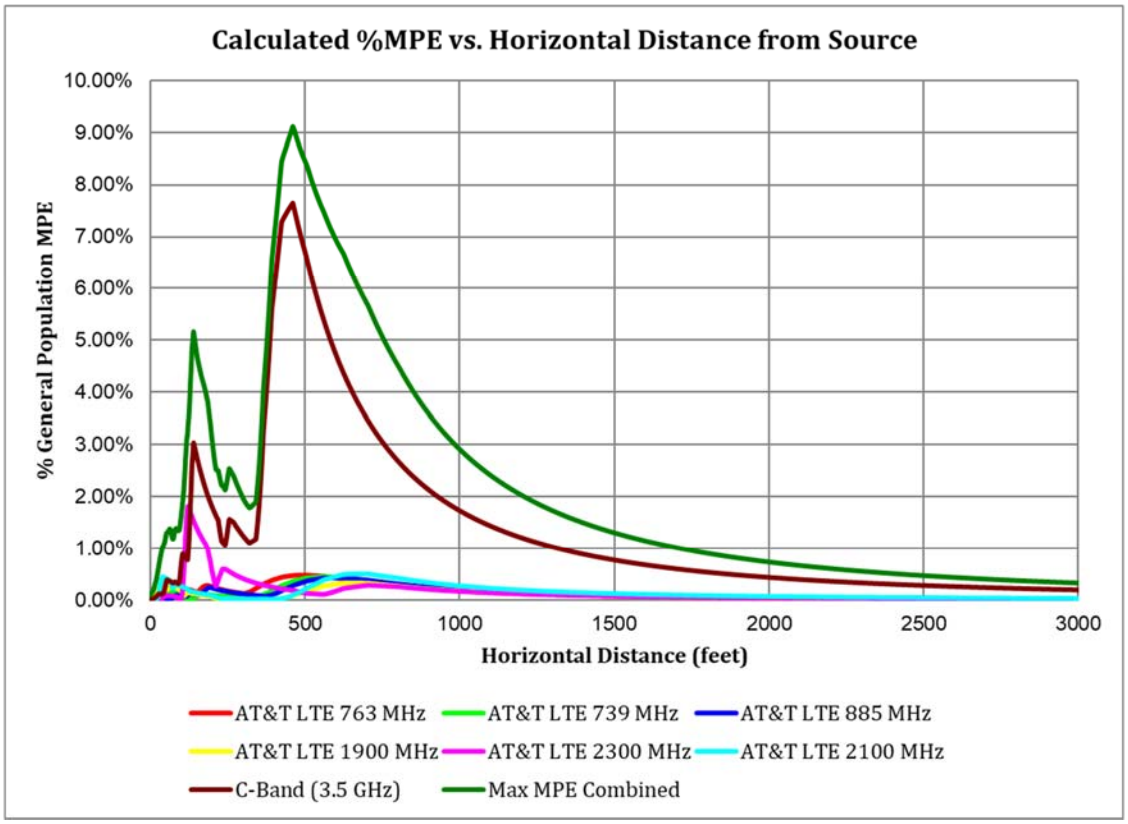



**Figure 1: Graph of General Population % MPE vs. Distance**

The highest percent of MPE (9.11**%** of the General Population limit) is calculated to occur at a horizontal distance of 60 feet from antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1500 feet and beyond, one would now be in the main beam of the antenna pattern and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists percent of MPE values as well as the associated parameters that were included in the calculations. The highest percent of MPE value was calculated to occur at a horizontal distance of 460 feet from the site (reference Figure 1).

As stated in Section 3, all calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. In addition, a six-foot height offset was considered in this analysis to account for average human height. As a result, the predicted signal levels are significantly higher than the actual signal levels will be from the final configuration. The results presented in Figure 1 and Table 2 assume level ground elevation from the base of the tower out to the horizontal distances calculated.

| Carrier | Number of Transmitters | Power out of Base Station Per Transmitter (Watts) | Antenna Height (Feet) | Distance to the Base of Antennas (Feet) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) | % MPE |
|---|---|---|---|---|---|---|---|
| AT&T LTE 1900 MHz | 1 | 160.0 | 105.0 | 461 | 0.000836 | 1.000 | 0.08% |
| AT&T LTE 2100 MHz | 1 | 240.0 | 105.0 | 461 | 0.000925 | 1.000 | 0.09% |
| AT&T LTE 2300 MHz | 1 | 160.0 | 105.0 | 461 | 0.001858 | 1.000 | 0.19% |
| AT&T LTE 739 MHz | 1 | 160.0 | 105.0 | 461 | 0.001760 | 0.493 | 0.36% |
| AT&T LTE 763 MHz | 1 | 160.0 | 105.0 | 461 | 0.002395 | 0.509 | 0.47% |
| AT&T LTE 885 MHz | 1 | 160.0 | 105.0 | 461 | 0.001621 | 0.590 | 0.27% |
| C-Band (3.5 GHz) | 2 | 108.5 | 104.0 | 461 | 0.076500 | 1.000 | 7.65% |
| | | | | | | **Total** | **9.11%** |

**Table 2: Maximum Percent of General Population Exposure Values**

## 6. Conclusion

The above analysis verifies that RF exposure levels from the site with AT&T's proposed antenna configuration will be well below the maximum permissible levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods and parameters detailed above, the maximum cumulative percent of MPE in consideration of all transmitters is calculated to be **9.11% of the FCC limit (General Population/Uncontrolled)**. This maximum cumulative percent of MPE value is calculated to occur 461 feet away from the site.

## 7. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

Report Prepared By: Ram Acharya
RF Engineer 1
C Squared Systems, LLC

October 13, 2022
Date

Reviewed/Approved By: Martin J. Lavin
Senior RF Engineer
C Squared Systems, LLC

October 14, 2022
Date

## Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

## Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

### (A) Limits for Occupational/Controlled Exposure[4]

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (E) (A/m) | Power Density (S) (mW/cm$^2$) | Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes) |
|---|---|---|---|---|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842/f | 4.89/f | (900/f$^2$)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | - | - | f/300 | 6 |
| 1500-100,000 | - | - | 5 | 6 |

### (B) Limits for General Population/Uncontrolled Exposure[5]

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (E) (A/m) | Power Density (S) (mW/cm$^2$) | Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes) |
|---|---|---|---|---|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f$^2$)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | - | - | f/1500 | 30 |
| 1500-100,000 | - | - | 1.0 | 30 |

f = frequency in MHz * Plane-wave equivalent power density

**Table 3: FCC Limits for Maximum Permissible Exposure**

[4] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

[5] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

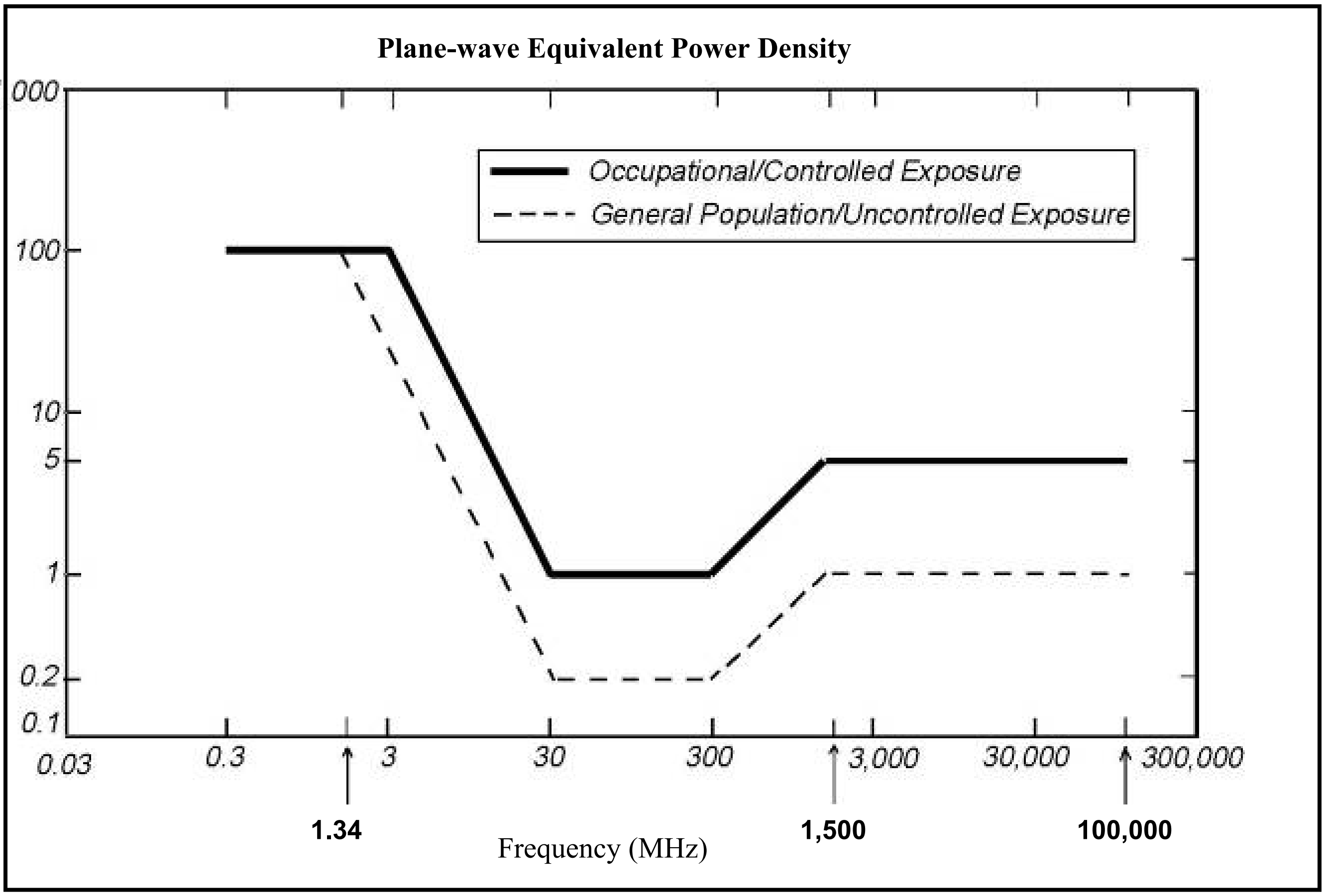
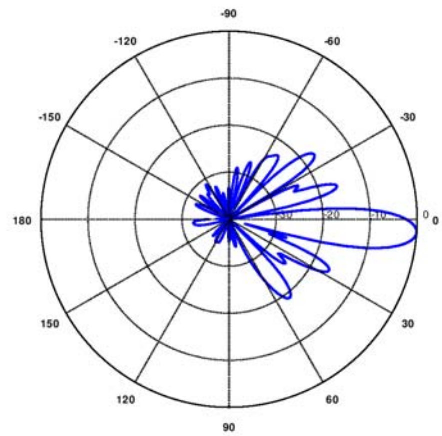



**Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)**

## Attachment C: AT&T Mobility Antenna Model Data Sheets and Electrical Patterns

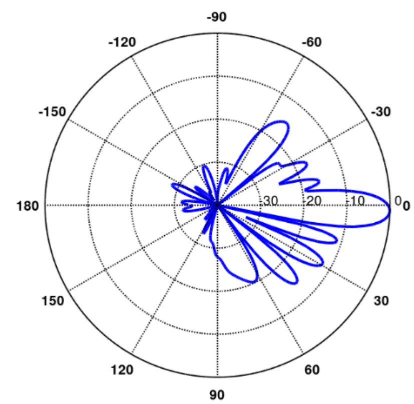
### 739 MHz

| | |
|---|---|
| Manufacturer: | CCI |
| Model #: | DMP65R-BU8DA |
| Frequency Band: | 698-798 MHz |
| Gain: | 15.1 dBi |
| Vertical Beamwidth: | 9.5° |
| Horizontal Beamwidth: | 75° |
| Polarization: | ±45° |
| Dimensions (L x W x D): | 96.0" x 20.7" x 7.7" |



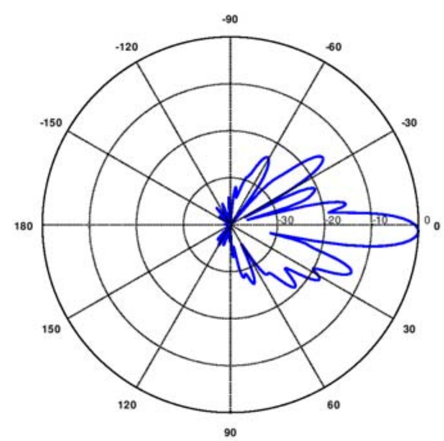

### 763 MHz

| | |
|---|---|
| Manufacturer: | Quintel |
| Model #: | QD8616-7 |
| Frequency Band: | 758 – 798 MHz |
| Gain: | 15.2 dBi |
| Vertical Beamwidth: | 9.1° |
| Horizontal Beamwidth: | 67° |
| Polarization: | ±45° |
| Dimensions (L x W x D): | 96.0" x 22", 9.6" |



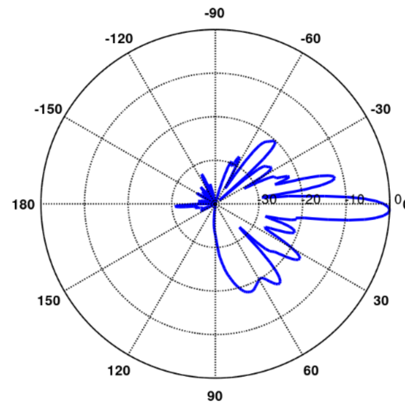

### 885 MHz

| | |
|---|---|
| Manufacturer: | CCI |
| Model #: | DMP65R-BU8D |
| Frequency Band: | 824-896 MHz |
| Gain: | 16.0 dBi |
| Vertical Beamwidth: | 8.0° |
| Horizontal Beamwidth: | 64° |
| Polarization: | ±45° |
| Dimensions (L x W x D): | 96.0" x 20.7" x 7.7" |



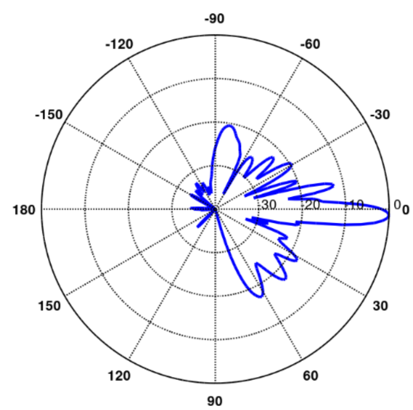
## 1900 MHz

| | |
|---|---|
| Manufacturer: | Quintel |
| Model #: | QD8616-7 |
| Frequency Band: | 1850 – 1990 MHz |
| Gain: | 17.2 dBi |
| Vertical Beamwidth: | 6.2° |
| Horizontal Beamwidth: | 62° |
| Polarization: | ±45° |
| Dimensions (L x W x D): | 96.0” x 22” x 9.6” |



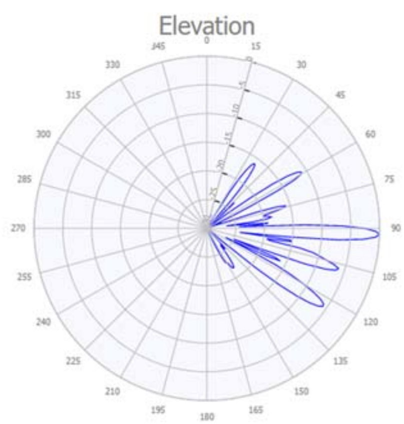

## 2100 MHz

| | |
|---|---|
| Manufacturer: | Quintel |
| Model #: | QD8616-7 |
| Frequency Band: | 2110 – 2180 MHz |
| Gain: | 17.5 dBi |
| Vertical Beamwidth: | 5.5° |
| Horizontal Beamwidth: | 62° |
| Polarization: | ±45° |
| Dimensions (L x W x D): | 96.0” x 22” x 9.6” |




## 2300 MHz

| | |
|---|---|
| Manufacturer: | CCI |
| Model #: | DMP65R-BU8D |
| Frequency Band: | 2300-2400 MHz |
| Gain: | 18.1 dBi |
| Vertical Beamwidth: | 4.1° |
| Horizontal Beamwidth: | 54° |
| Polarization: | ±45° |
| Dimensions (L x W x D): | 96.0” x 20.7” x 7.7” |



## PROJECT INFORMATION

SCOPE OF WORK:

ITEMS TO BE MOUNTED ON THE EXISTING TRANSMISSION TOWER
- NEW AT&T ANTENNAS: AIR6419 B77G (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- NEW AT&T ANTENNAS: AIR6449 B77D (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- NEW AT&T ANTENNAS: DMP65R-BU8DA (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- NEW AT&T ANTENNAS: QD8616-7 (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- NEW AT&T TMAS: TMA2124F03V5-2D (TYP. OF 2 PER SECTOR, TOTAL OF 6).
- NEW AT&T DC & FIBER SURGE ARRESTOR DC6-48-60-18-8C (TOTAL OF 1)
- ADD (2) #6 AWG DC POWER CABLES & (1) 18 PAIR FIBER CABLE.

ITEMS TO BE MOUNTED AT EQUIPMENT LOCATION:
- ADD (1) 6648 + XCEDE CABLE
- ADD (4) RECTIFIERS
- NEW AT&T RRUS: 4478 B14 (700) (TYP. OF 1 PER SECTOR, TOTAL OF 3)
- NEW AT&T RRUS: 4449 B5/B12 (850/700) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- NEW AT&T RRUS: 2012 B29 (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- NEW LOCATION OF EXISTING AT&T RRUS: 4426-B66 (AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3) (RELOCATED TO POS. 4).
- NEW AT&T PENTAPLEXERS: 5PX-0726 (TYP. OF 4 PER SECTOR, TOTAL OF 12).
- ADD (6) 782-11055 SBT + (6) BIAS-TS
- NEW ICE BRIDGE & H-FRAME EXTENSION TO SUPPORT ADDITIONAL GROUND EQUIPMENT (APPROX. 5'-0"±)

ITEMS TO BE REMOVED:
- EXISTING AT&T ANTENNAS: HPA-65R-BUU-H8 (TYP. OF 2 PER SECTOR, TOTAL OF 6).
- EXISTING AT&T ANTENNAS: OPA-65R-LCUU-H8 (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- EXISTING AT&T RRUS: 11 B12 (700) (TYP. OF 1 PER SECTOR, TOTAL OF 3)
- EXISTING AT&T RRUS: 4478-B5 (850) (TYP. OF 1 PER SECTOR, TOTAL OF 3)
- EXISTING AT&T TMA'S: TMABPDB7823VG12A (TYP. OF 4 PER SECTOR, TOTAL OF 12).
- EXISTING AT&T DIPLEXERS: DBC2055F1V1-2 (TYP. OF 4 PER SECTOR, TOTAL OF 12).
- EXISTING (6) COAX CABLES.

ITEMS TO REMAIN:
- (9)(G) RRU'S, (30) COAX CABLES ,(6) TMA'S. (6) DIPLEXERS

| | |
|---|---|
| SITE ADDRESS: | 227 WHITEWOOD ROAD<br>WATERBURY, CT 06708 |
| LATITUDE: | 41.5781410° N, 41° 34' 41.31" N |
| LONGITUDE: | 73.0817310° W, 73° 4' 54.23" W |
| TYPE OF SITE: | TRANSMISSION TOWER / INDOOR EQUIPMENT |
| STRUCTURE HEIGHT: | 80'-0"± |
| RAD CENTER: | 105'-0"± (LTE), 107'-8"± (3.45GHz), 104'-0" (C-band) |
| CURRENT USE: | TELECOMMUNICATIONS FACILITY |
| PROPOSED USE: | TELECOMMUNICATIONS FACILITY |

## DRAWING INDEX

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| A-3 | DETAILS | 1 |
| A-4 | DETAILS | 1 |
| G-1 | GROUNDING DETAILS | 1 |
| RF-1 | RF PLUMBING DIAGRAM | 1 |

at&t

# SITE NUMBER: CTL02901

# SITE NAME: WATERBURY WHITEWOOD ROAD

# FA CODE: 10549309

# EVERSOURCE STRUCTURE: 11229

# PACE ID: MRCTB054260, MRCTB054782, MRCTB055479, MRCTB054388, MRCTB056540, MRCTB053320, MRCTB053310, MRCTB056326, MRCTB062571

# PROJECT: 5G NR 1SR CBAND_SITE OVERLAY. LTE. 7TH CARRIER_4TXRX ANTENNA RETROFIT_BBU RECONFIGURATION_SITE OVERLAY. LTE. 6TH CARRIERUPGRADE

## VICINITY MAP

**DIRECTIONS TO SITE:**

HEAD NORTHEAST ON ENTERPRISE DRIVE TOWARD CAPITAL BLVD.TURN LEFT ONTO CAPITOL BLVD.TURN LEFT ONTO WEST ST.TURN LEFT TO MERGE ONTO I-91 S TOWARD NEW HAVEN.MERGE ONTO I-91 S.TAKE EXIT 18 TO MERGE ONTO I-691 W TOWARD MERIDEN/WATERBURY.TAKE EXIT 1 ON THE LEFT FOR I-84 W TOWARD WATERBURY/DANBURY.MERGE ONTO I-84.TAKE EXIT 20 TO MERGE ONTO CT-8 N TOWARD TORRINGTON.TAKE EXIT 35 ON THE LEFT FOR CT-73 TOWARD OAKVILLE/WATERTOWN.MERGE ONTO RUDY AVE.CONTINUE ONTO WATERTOWN AVE.TURN LEFT ONTO IRVINGTON AVE.CONTINUE ONTO BUNKER HILL AVE.TURN RIGHT ONTO OAKVILLE AVE.TAKE THE 3RD LEFT ONTO WHITEWOOD RD.TAKE THE 1ST LEFT TO STAY ON WHITEWOOD AND THE DESTINATION WILL BE ON THE RIGHT


## GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T MOBILITY REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
4. CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN.

**72 HOURS**

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SITE NUMBER: CTL02901
SITE NAME: WATERBURY WHITEWOOD ROAD

227 WHITEWOOD ROAD
WATERBURY, CT 06708
NEW HAVEN COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

| NO. | DATE | REVISIONS | BY | CHK | APP'D |
|---|---|---|---|---|---|
| 1 | 11/04/22 | ISSUED FOR CONSTRUCTION | YH | HC | DPH |
| 0 | 10/19/22 | ISSUED FOR CONSTRUCTION | YH | HC | DPH |
| A | 04/29/22 | ISSUED FOR REVIEW | JP | HC | DPH |

SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

STATE OF CONNECTICUT DANIEL P. HAMM No. 24178 LICENSED PROFESSIONAL ENGINEER

AT&T

TITLE SHEET
5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | T-1 | 1 |

## GROUNDING NOTES

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81 STANDARDS) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS AND #2 AWG STRANDED COPPER FOR OUTDOOR BTS.
6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO GROUND BAR.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
11. METAL CONDUIT SHALL BE MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

## GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR – SAI
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T MOBILITY

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.
7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
16. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T SITES."
17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.
20. **APPLICABLE BUILDING CODES:**
   SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

   **BUILDING CODE: IBC 2021 WITH 2022 CT STATE BUILDING CODE AMENDMENTS**
   **ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE (NFPA 70-2017)**

   SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

   **AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;**

   **AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) MANUAL OF STEEL CONSTRUCTION, ASD, FOURTEENTH EDITION;**

   **TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-H, STRUCTURAL STANDARDS FOR STEEL**

   FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

## ABBREVIATIONS

| | | | | | |
|---|---|---|---|---|---|
| AGL | ABOVE GRADE LEVEL | EQ | EQUAL | REQ | REQUIRED |
| AWG | AMERICAN WIRE GAUGE | GC | GENERAL CONTRACTOR | RF | RADIO FREQUENCY |
| BBU | BATTERY BACKUP UNIT | GRC | GALVANIZED RIGID CONDUIT | TBD | TO BE DETERMINED |
| BTCW | BARE TINNED SOLID COPPER WIRE | MGB | MASTER GROUND BAR | TBR | TO BE REMOVED |
| BGR | BURIED GROUND RING | MIN | MINIMUM | TBRR | TO BE REMOVED AND REPLACED |
| BTS | BASE TRANSCEIVER STATION | P | PROPOSED | TYP | TYPICAL |
| E | EXISTING | NTS | NOT TO SCALE | UG | UNDER GROUND |
| EGB | EQUIPMENT GROUND BAR | RAD | RADIATION CENTER LINE (ANTENNA) | VIF | VERIFY IN FIELD |
| EGR | EQUIPMENT GROUND RING | REF | REFERENCE | | |

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SITE NUMBER: CTL02901
SITE NAME: WATERBURY WHITEWOOD ROAD

227 WHITEWOOD ROAD
WATERBURY, CT 06708
NEW HAVEN COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

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| A | 04/29/22 | ISSUED FOR REVIEW | JP | HC | DPH |

SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED
PROFESSIONAL ENGINEER

AT&T

GENERAL NOTES

5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

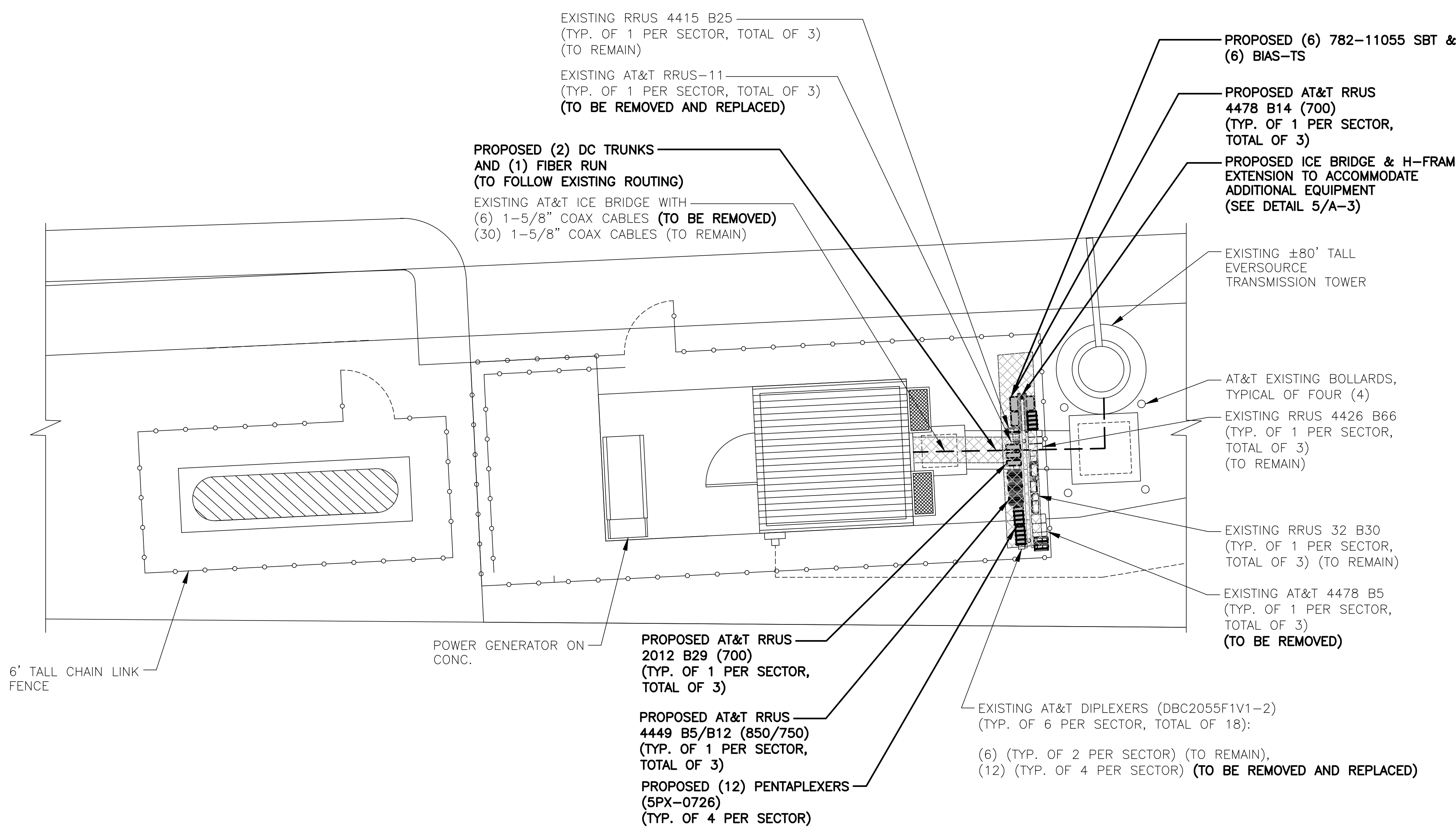
| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | GN-1 | 1 |

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

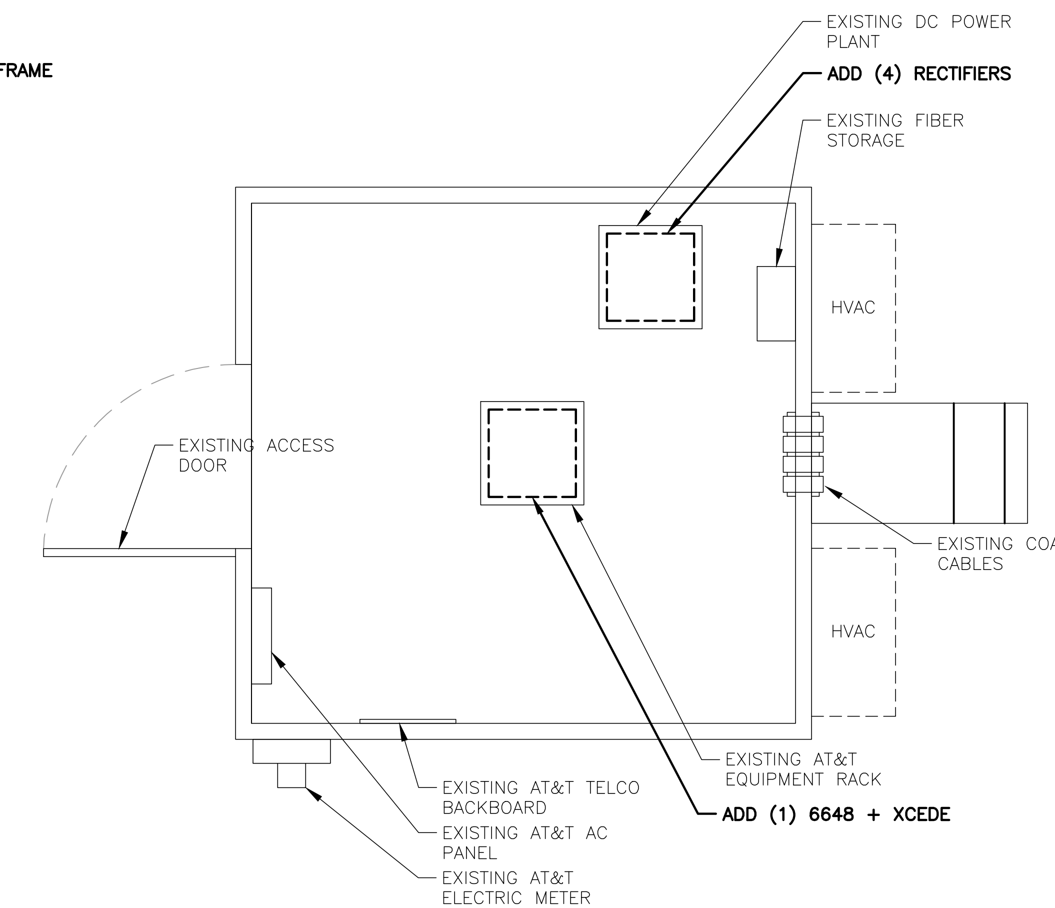
NOTE:

REFER TO STRUCTURAL ANALYSIS BY: CENTEK ENGINEERING, DATED: SEPTEMBER 12, 2022,(REV.2) FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT.




MAGNETIC NORTH 13°12' TRUE NORTH

**COMPOUND PLAN** (1 / A-1)
22x34 SCALE: 3/16"=1'-0"
11x17 SCALE: 3/32"=1'-0"
0 2'-8" 5'-4" 10'-8" 16'-0"




MAGNETIC NORTH 13°12' TRUE NORTH

**EQUIPMENT PLAN** (2 / A-1)
22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"
0 1'-0" 2'-0" 4'-0" 6'-0"

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| A | 04/29/22 | ISSUED FOR REVIEW | JP | HC | DPH |

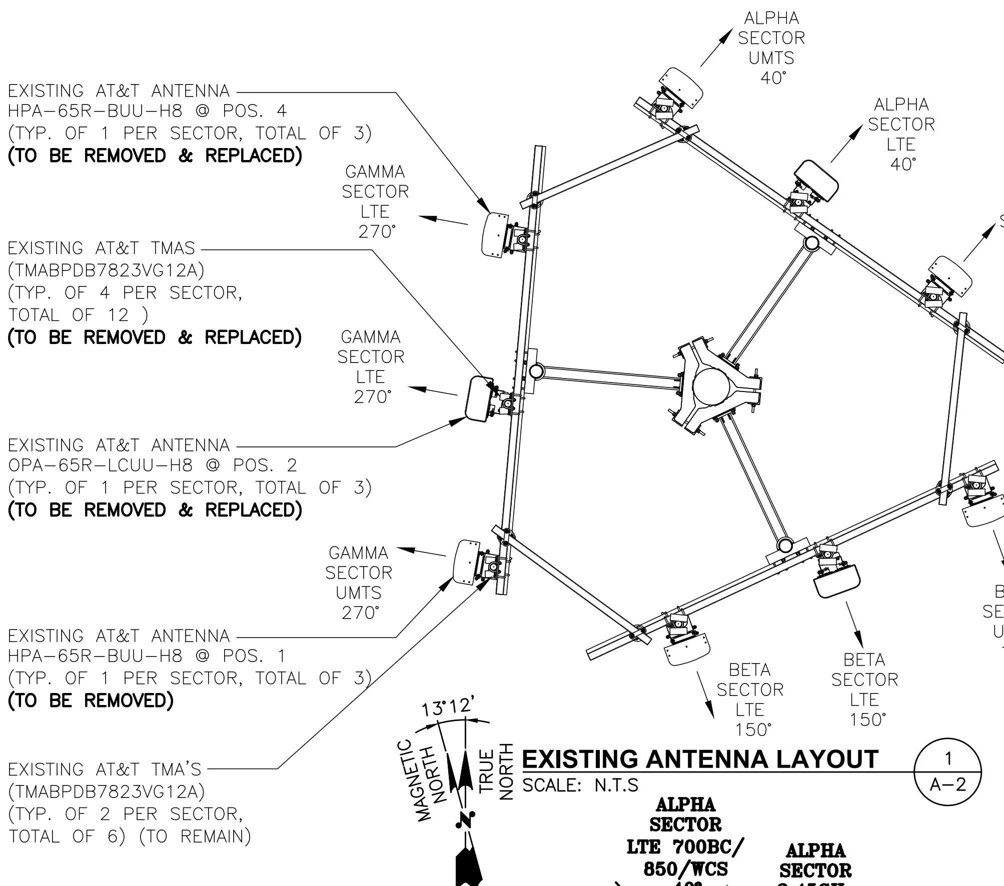
SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

STATE OF CONNECTICUT DANIEL P. HAMM No. 24178 LICENSED PROFESSIONAL ENGINEER

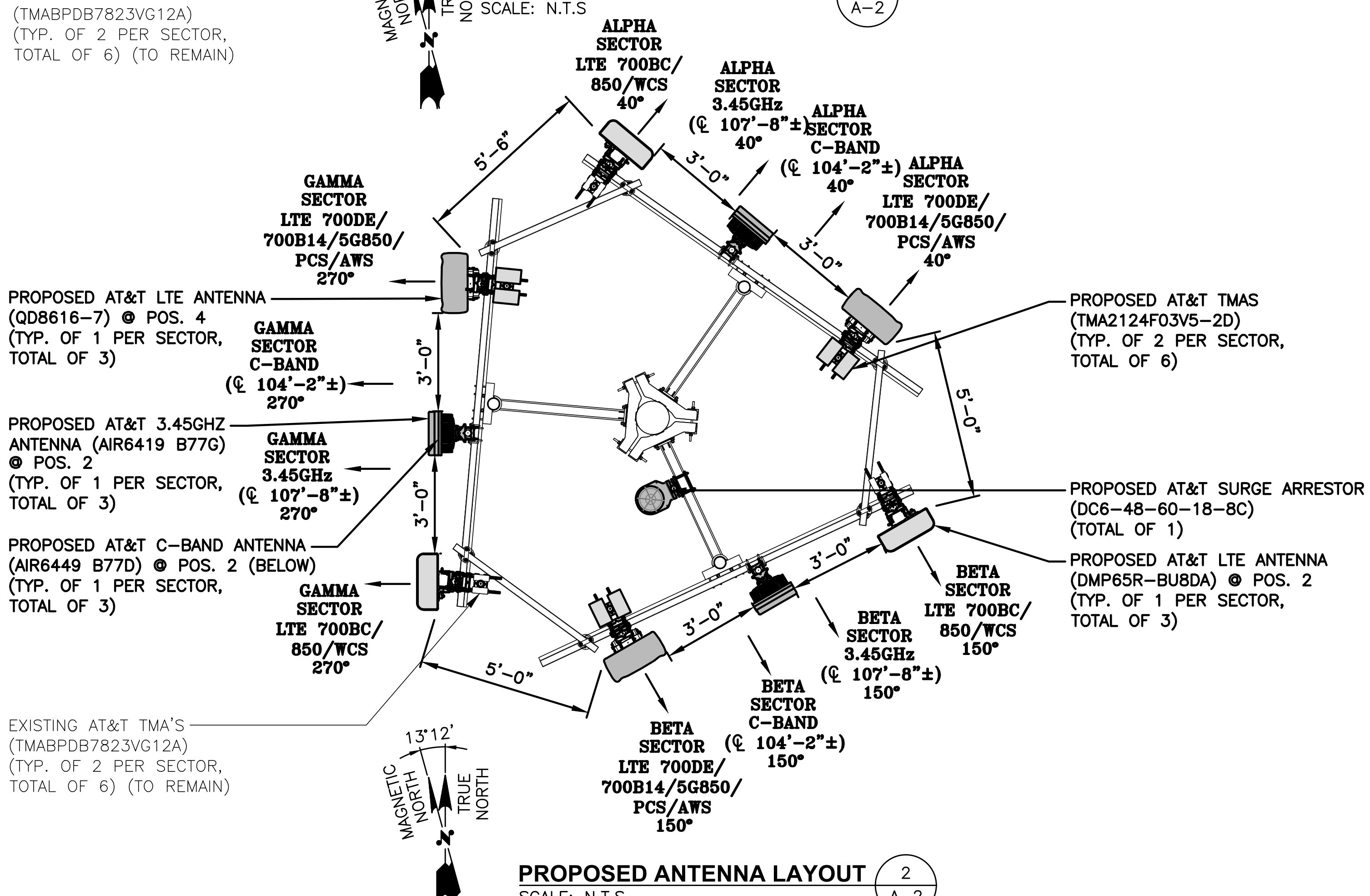
AT&T

COMPOUND & EQUIPMENT PLANS
5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

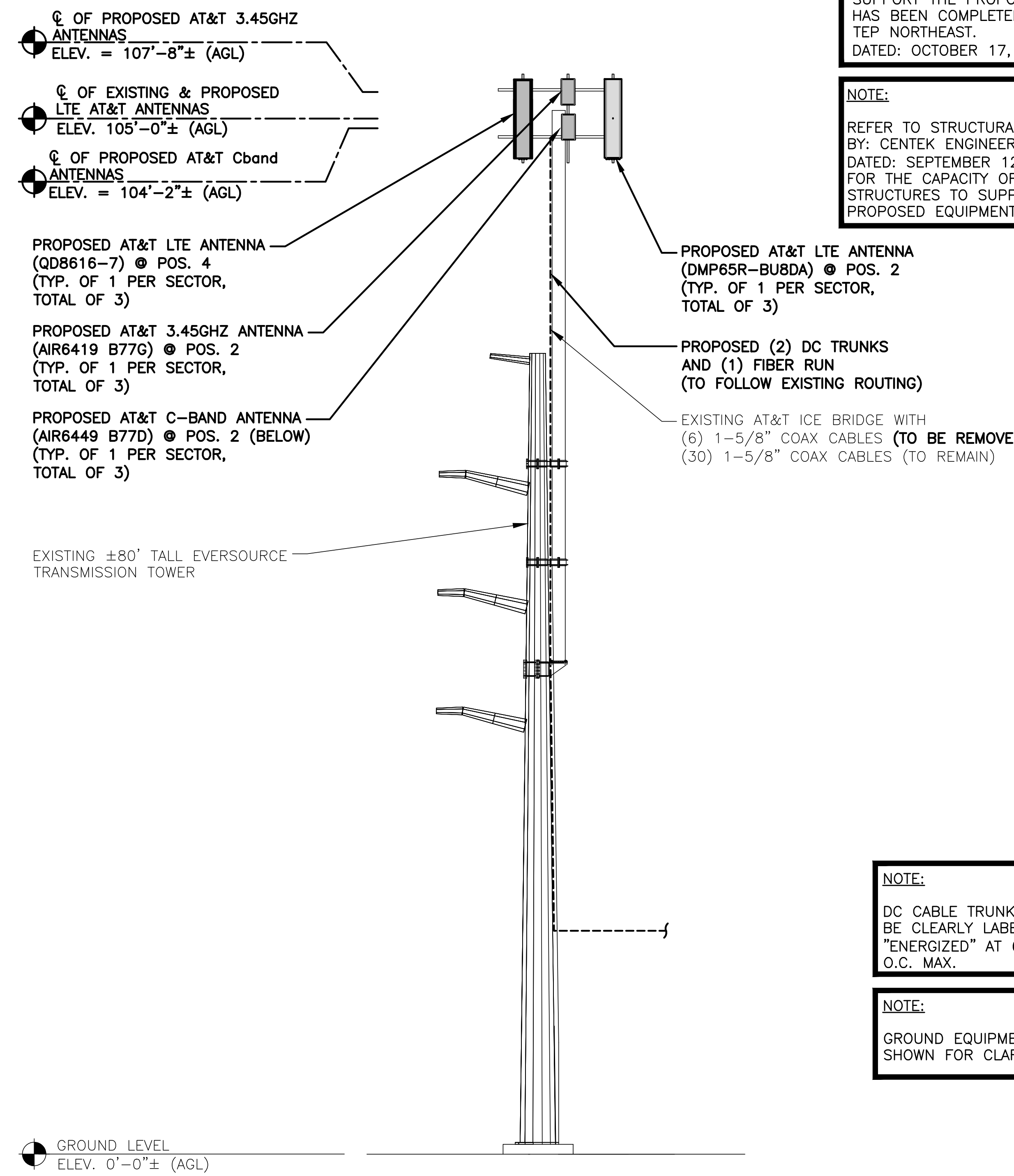
| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | A-1 | 1 |




## EXISTING ANTENNA LAYOUT
1 / A-2
SCALE: N.T.S




## PROPOSED ANTENNA LAYOUT
2 / A-2
SCALE: N.T.S




## ELEVATION
3 / A-2
22x34 SCALE: 1/8"=1'-0"
11x17 SCALE: 1/16"=1'-0"
0 4'-0" 8'-0" 16'-0" 24'-0"

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING ANTENNA MOUNT TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY: TEP NORTHEAST. DATED: OCTOBER 17, 2022 (REV.1)

NOTE:
REFER TO STRUCTURAL ANALYSIS BY: CENTEK ENGINEERING, DATED: SEPTEMBER 12, 2022,(REV.2) FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT.

NOTE:
DC CABLE TRUNKS TO BE CLEARLY LABELED "ENERGIZED" AT 6'-0" O.C. MAX.

NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY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SITE NUMBER: CTL02901
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227 WHITEWOOD ROAD WATERBURY, CT 06708 NEW HAVEN COUNTY


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SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

STATE OF CONNECTICUT DANIEL P. HAMM No. 24178 LICENSED PROFESSIONAL ENGINEER

AT&T
ANTENNA LAYOUTS & ELEVATION
5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | A-2 | 1 |

## ANTENNA SCHEDULE

| SECTOR | EXISTING/ PROPOSED | BAND | ANTENNA | SIZE (INCHES) (L x W x D) | ANTENNA ℄ HEIGHT | ANTENNA TIP HEIGHT | AZIMUTH | TMA/ DIPLEXER | RRU | SIZE (INCHES) (L x W x D) | FEEDER | RAYCAP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | – | – | – | – | – | – | – | – | – | – | (E) (10)1-5/8 | (P) (1) RAYCAP DC6-48-60-18-8C |
| A2 | PROPOSED | LTE 700 BC/850/WCS | DMP65R-BU8DA | 96X20.7X7.7 | 105'-0"± | 109'-0"± | 40° | (2)(E) TMABPDB7823VG12A<br>(2)(E) DBC2055F1V1 | (G)(P)(1) 4449 B5/B12 (850/700)<br>(G)(E)(1) RRUS-32 B30 (WCS) | 17.9X13.2X10.4<br>– | (P)(2) DC POWER & (1) FIBER | |
| A3 | PROPOSED | 3.45GHZ + CBAND | AIR6419 B77G<br>AIR6449 B77D<br>(STACKED) | 31.1X16.1X7.3<br>30.4X15.9X8.1 | 107'-8"±<br>104'-2"± | 109'-0"±<br>105'-5"± | 40° | – | – | – | – | |
| A4 | PROPOSED | LTE 700 DE/700 B14/5G 850/PCS/AWS | QD8616-7 | 96X22X9.6 | 105'-0"± | 109'-0"± | 40° | (4)(P) 5PX-0726<br>(2)(P) TMA2124F03V5-2D | (G)(P)(1) 4478 B14 (700)<br>(G)(E)(1) 4426 B66 (AWS)<br>(G)(E)(1) 4415 B25 (PCS)<br>(G)(P)(1) 2012 B29 | 18.1X13.4X8.3<br>–<br>–<br>20.4X18.5X7.5 | – | |
| B1 | – | – | – | – | – | – | – | – | – | – | (E) (10) 1-5/8 | |
| B2 | PROPOSED | LTE 700 BC/850/WCS | DMP65R-BU8DA | 96X20.7X7.7 | 105'-0"± | 109'-0"± | 150° | (2)(E) TMABPDB7823VG12A<br>(2)(E) DBC2055F1V1 | (G)(P)(1) 4449 B5/B12 (850/700)<br>(G)(E)(1) RRUS-32 B30 (WCS) | 17.9X13.2X10.4<br>– | – | |
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| B4 | PROPOSED | LTE 700 DE/700 B14/5G 850/PCS/AWS | QD8616-7 | 96X22X9.6 | 105'-0"± | 109'-0"± | 150° | (4)(P) 5PX-0726<br>(2)(P) TMA2124F03V5-2D | (G)(P)(1) 4478 B14 (700)<br>(G)(E)(1) 4426 B66 (AWS)<br>(G)(E)(1) 4415 B25 (PCS)<br>(G)(P)(1) 2012 B29 | 18.1X13.4X8.3<br>–<br>–<br>20.4X18.5X7.5 | – | |
| C1 | – | – | – | – | – | – | – | – | – | – | (E) (10) 1-5/8 | |
| C2 | PROPOSED | LTE 700 BC/850/WCS | DMP65R-BU8DA | 96X20.7X7.7 | 105'-0"± | 109'-0"± | 270° | (2)(E) TMABPDB7823VG12A<br>(2)(E) DBC2055F1V1 | (G)(P)(1) 4449 B5/B12 (850/700)<br>(G)(E)(1) RRUS-32 B30 (WCS) | 17.9X13.2X10.4<br>– | – | |
| C3 | PROPOSED | 3.45GHZ + CBAND | AIR6419 B77G<br>AIR6449 B77D<br>(STACKED) | 31.1X16.1X7.3<br>30.4X15.9X8.1 | 107'-8"±<br>104'-2"± | 109'-0"±<br>105'-5"± | 270° | – | – | – | – | I |
| C4 | PROPOSED | LTE 700 DE/700 B14/5G 850/PCS/AWS | QD8616-7 | 96X22X9.6 | 105'-0"± | 109'-0"± | 270° | (4)(P) 5PX-0726<br>(2)(P) TMA2124F03V5-2D | (G)(P)(1) 4478 B14 (700)<br>(G)(E)(1) 4426 B66 (AWS)<br>(G)(E)(1) 4415 B25 (PCS)<br>(G)(P)(1) 2012 B29 | 18.1X13.4X8.3<br>–<br>–<br>20.4X18.5X7.5 | – | |

**FINAL ANTENNA SCHEDULE** (1 / A-3)
SCALE: N.T.S

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING **ANTENNA MOUNT** TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:
TEP NORTHEAST.
DATED: OCTOBER 17, 2022 (REV.1)

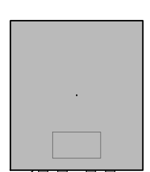
NOTE:
REFER TO STRUCTURAL ANALYSIS
BY: CENTEK ENGINEERING,
DATED: SEPTEMBER 12, 2022,(REV.2)
FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT.

## RRU CHART

| QUANTITY | MODEL | SIZE (L x W x D) |
|---|---|---|
| P(3) | 4449 (850/700) | 17.9"x13.2"x10.4" |
| P(3) | 4478 B14 (700) | 18.1"x13.4"x8.3" |
| E(3) | 4415 | 16.5"x13.4"x5.9" |
| E(3) | 4426 | 14.9"x13.2"x5.8" |
| E(3) | RRUS-32 (WCS) | 27.2"x12.1"x7.0" |
| P(3) | RRUS-2012 B29 | 20.4"x18.5"x7.5" |

**NOTE:**
MOUNT PER MANUFACTURER'S SPECIFICATIONS

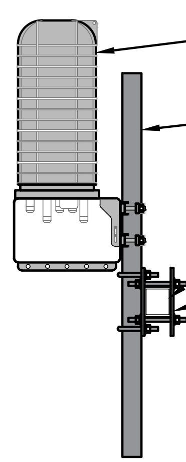
NOTE:
SEE RFDS FOR RRH FREQUENCY AND MODEL NUMBER



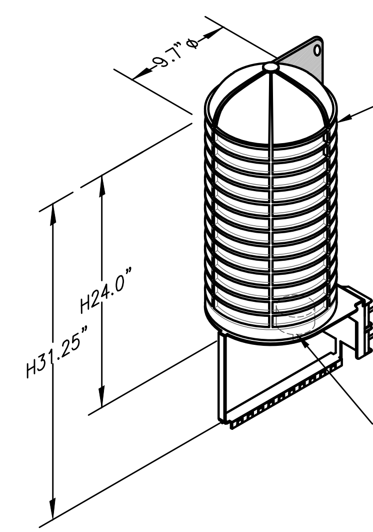
PROPOSED RRU REFER TO THE FINAL RFDS AND CHART FOR QUANTITY, MODEL AND DIMENSIONS

NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

**PROPOSED RRUS DETAIL** (2 / A-3)
SCALE: N.T.S

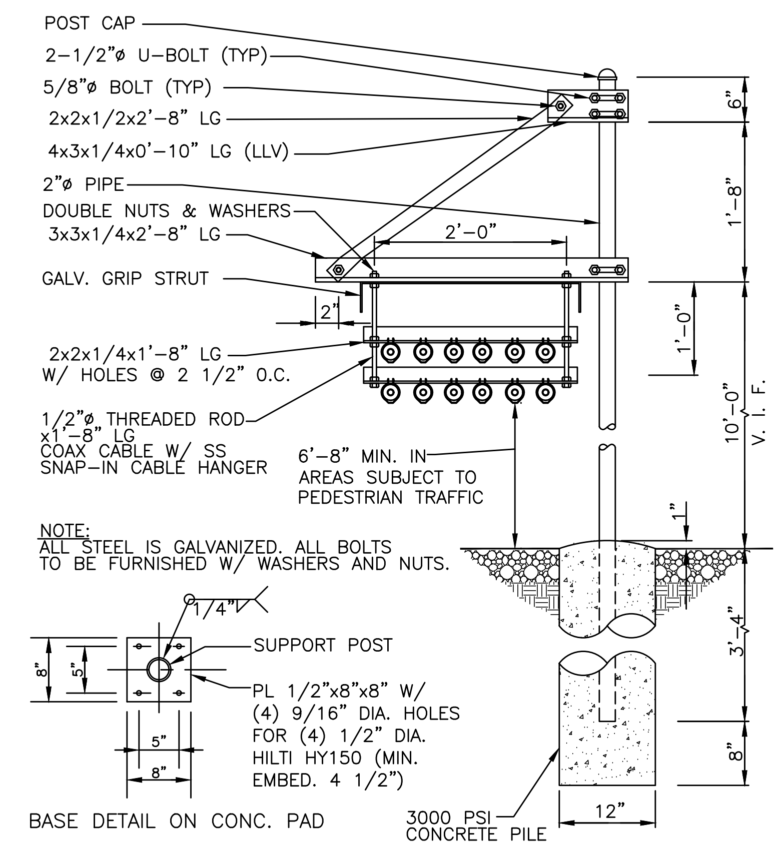



**PROPOSED SURGE MOUNTING DETAIL** (3 / A-3)
SCALE: N.T.S




NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

**DC SURGE SUPPRESSOR DETAIL** (4 / A-3)
SCALE: N.T.S




**CABLE BRIDGE DETAIL** (5 / A-3)
SCALE: N.T.S

HDG HUDSON Design Group LLC
45 BEECHWOOD DRIVE NORTH ANDOVER, MA 01845 TEL: (978) 557-5553 FAX: (978) 336-5586

SAI
12 INDUSTRIAL WAY SALEM, NH 03079

SITE NUMBER: CTL02901
SITE NAME: WATERBURY WHITEWOOD ROAD
227 WHITEWOOD ROAD
WATERBURY, CT 06708
NEW HAVEN COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

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| 1 | 11/04/22 | ISSUED FOR CONSTRUCTION | YH | HC | DPH |
| 0 | 10/19/22 | ISSUED FOR CONSTRUCTION | YH | HC | DPH |
| A | 04/29/22 | ISSUED FOR REVIEW | JP | HC | DPH |

SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

STATE OF CONNECTICUT DANIEL P. HAMM No. 24178 LICENSED PROFESSIONAL ENGINEER

AT&T
DETAILS
5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | A-3 | 1 |

NOTE:

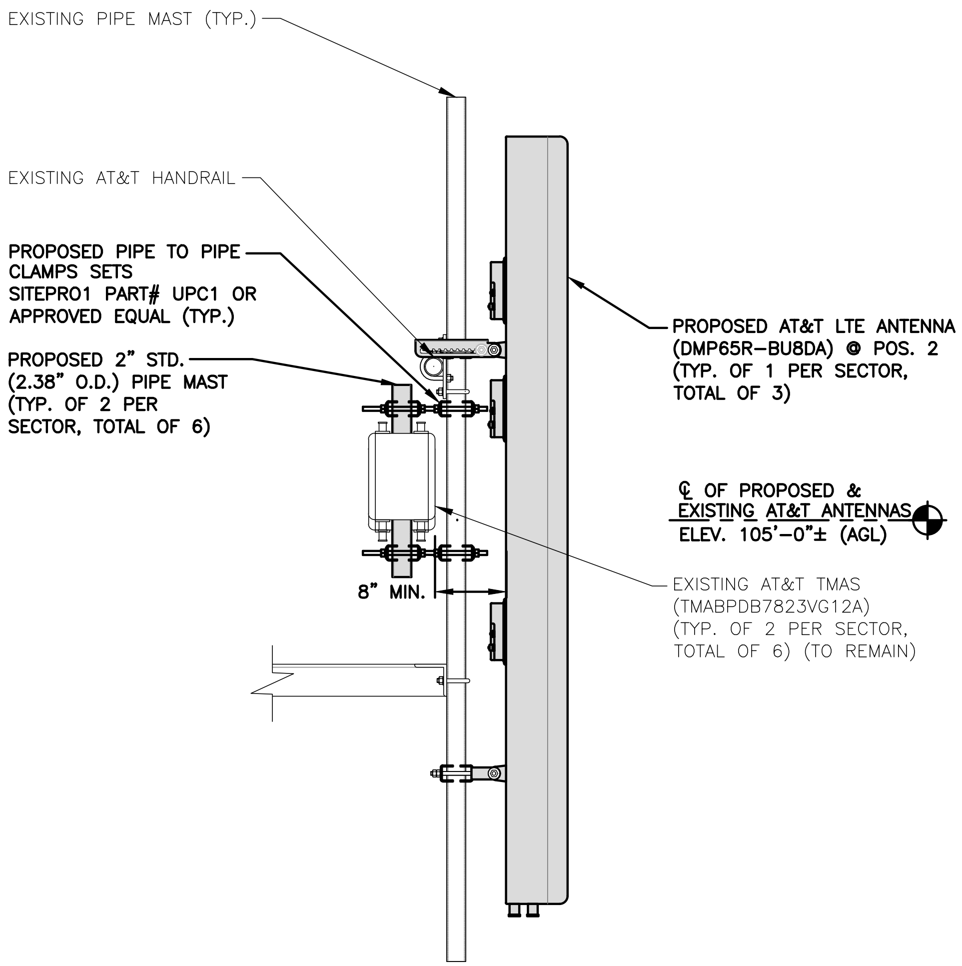
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:

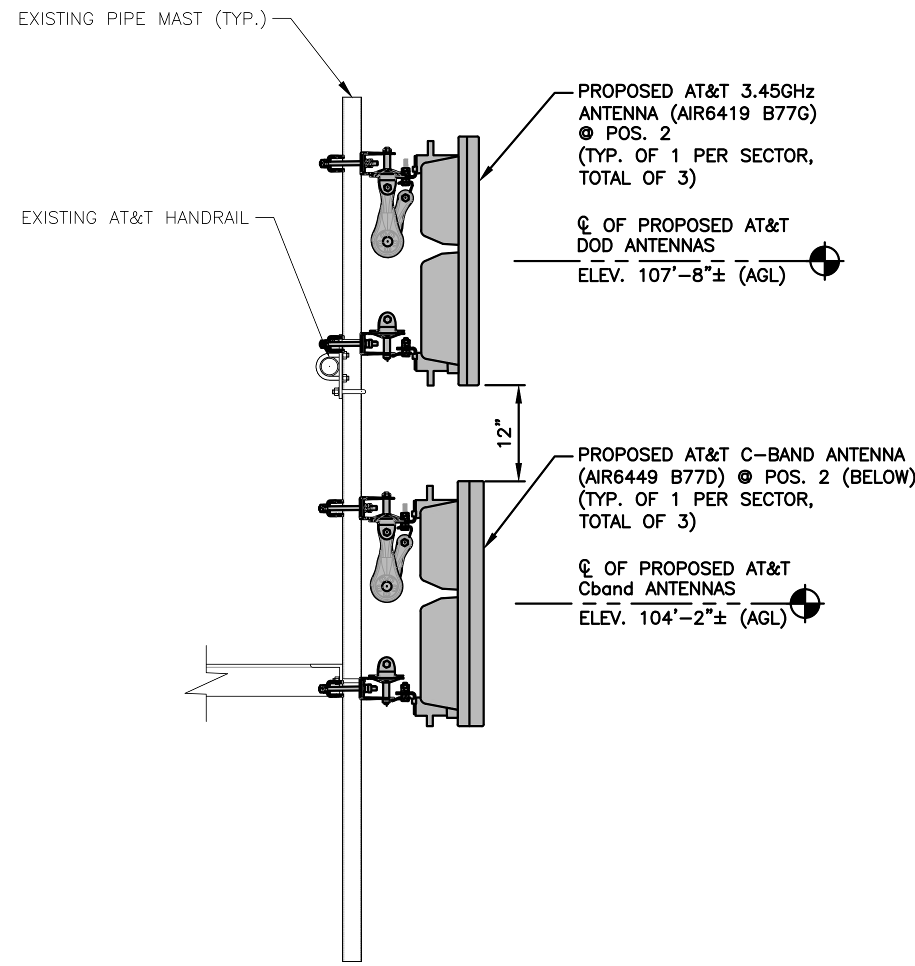
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING **ANTENNA MOUNT** TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:
TEP NORTHEAST.
DATED: OCTOBER 17, 2022 (REV.1)

NOTE:

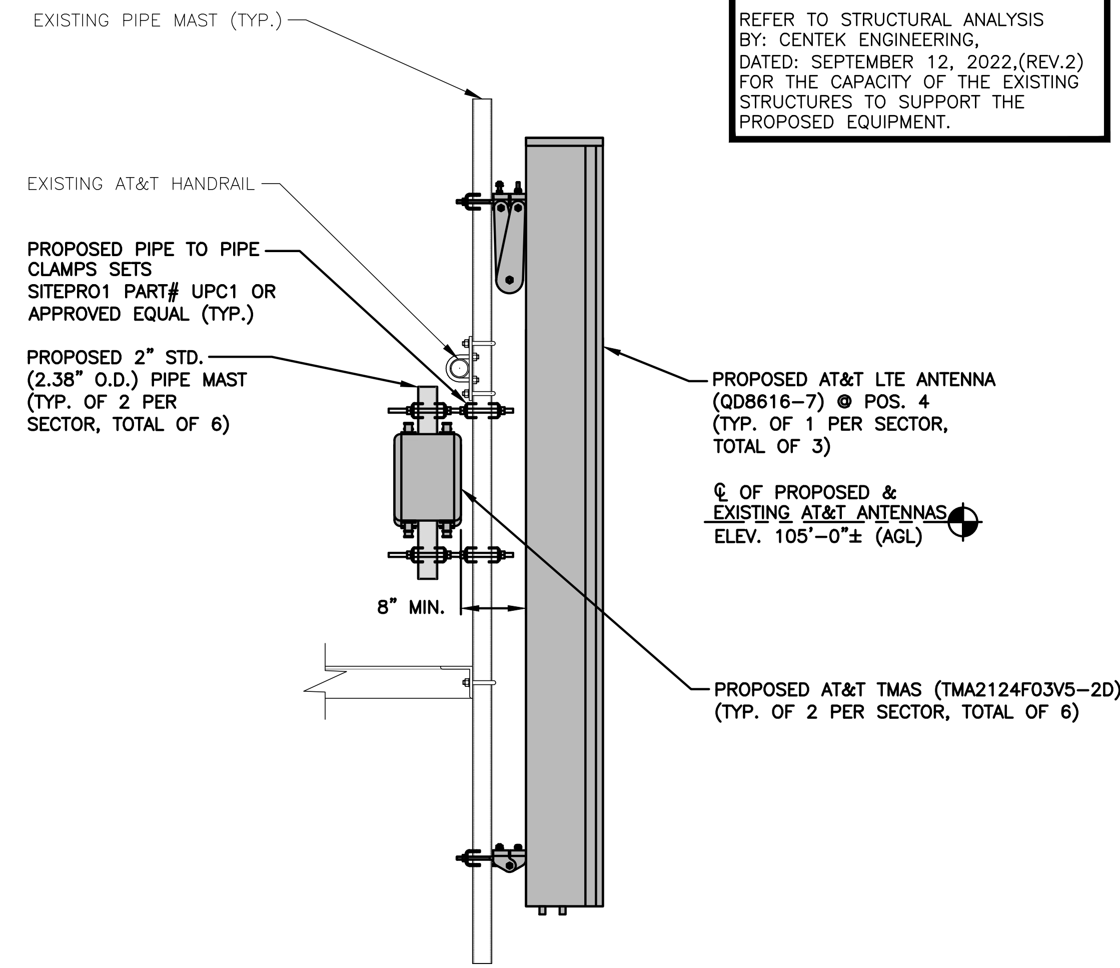
REFER TO STRUCTURAL ANALYSIS BY: CENTEK ENGINEERING, DATED: SEPTEMBER 12, 2022,(REV.2) FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT.




**PROPOSED LTE ANTENNA MOUNTING DETAIL**
22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"
1 / A-4
0 0'-6" 1'-0" 2'-0" 3'-0"




**PROPOSED C-BAND ANTENNA MOUNTING DETAIL**
22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"
2 / A-4
0 0'-6" 1'-0" 2'-0" 3'-0"




**PROPOSED LTE ANTENNA MOUNTING DETAIL**
22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"
3 / A-4
0 0'-6" 1'-0" 2'-0" 3'-0"


HUDSON Design Group LLC
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227 WHITEWOOD ROAD
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NEW HAVEN COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

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| A | 04/29/22 | ISSUED FOR REVIEW | | HC | DPH |

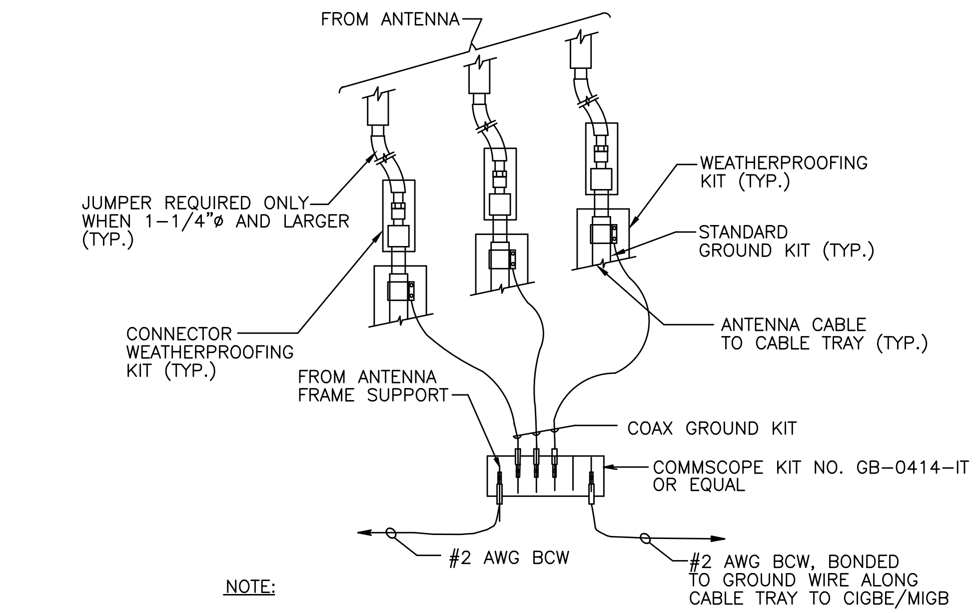
SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

AT&T

DETAILS

5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | A-4 | 1 |

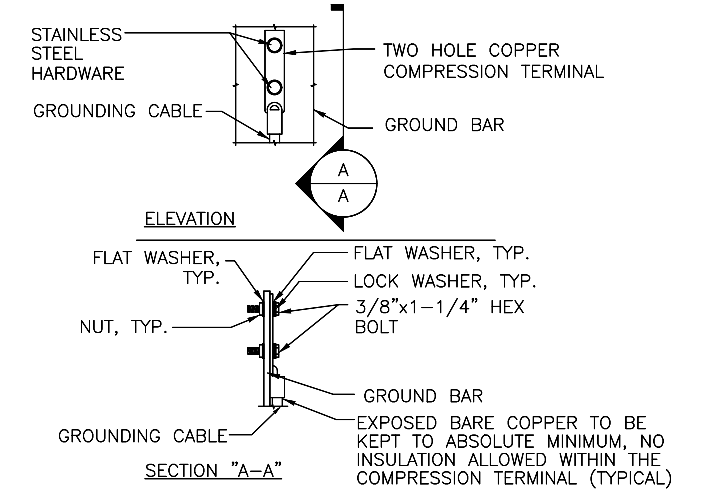



NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

## GROUND WIRE TO GROUND BAR CONNECTION DETAIL (1 / G-1)

SCALE: N.T.S

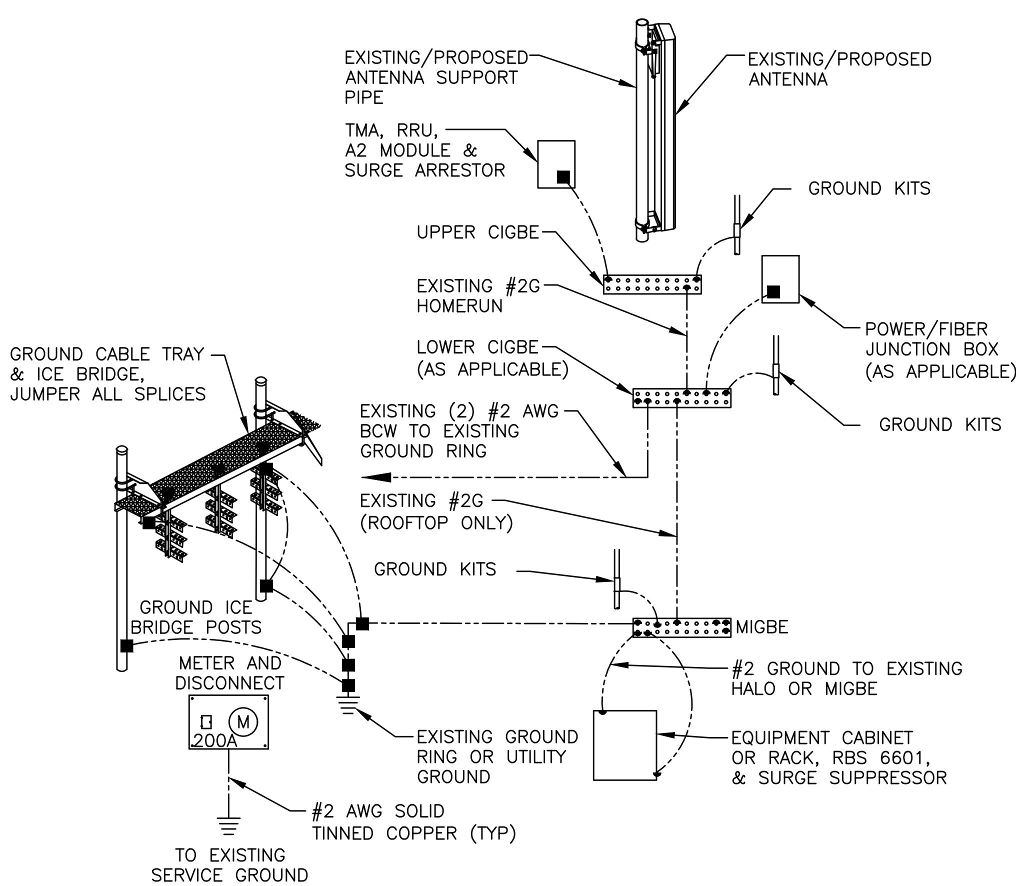



NOTES:

1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATION.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB

## TYPICAL GROUND BAR CONNECTION DETAIL (3 / G-1)

SCALE: N.T.S




## GROUNDING RISER DIAGRAM (2 / G-1)

SCALE: N.T.S

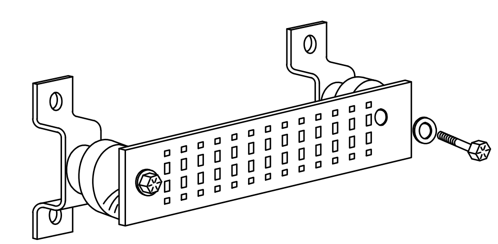
EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

SECTION "P" – SURGE PRODUCERS

CABLE ENTRY PORTS (HATCH PLATES) (#2 AWG)
GENERATOR FRAMEWORK (IF AVAILABLE) (#2 AWG)
TELCO GROUND BAR
COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2 AWG)
+24V POWER SUPPLY RETURN BAR (#2 AWG)
–48V POWER SUPPLY RETURN BAR (#2 AWG)
RECTIFIER FRAMES.

SECTION "A" – SURGE ABSORBERS

INTERIOR GROUND RING (#2 AWG)
EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2 AWG)
METALLIC COLD WATER PIPE (IF AVAILABLE) (#2 AWG)
BUILDING STEEL (IF AVAILABLE) (#2 AWG)



## GROUND BAR - DETAIL (AS REQUIRED) (4 / G-1)

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
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SAI
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| A | 04/29/22 | ISSUED FOR REVIEW | JP | HC | DPH |

SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

STATE OF CONNECTICUT · DANIEL P. HAMM · No. 24178 · LICENSED PROFESSIONAL ENGINEER

AT&T

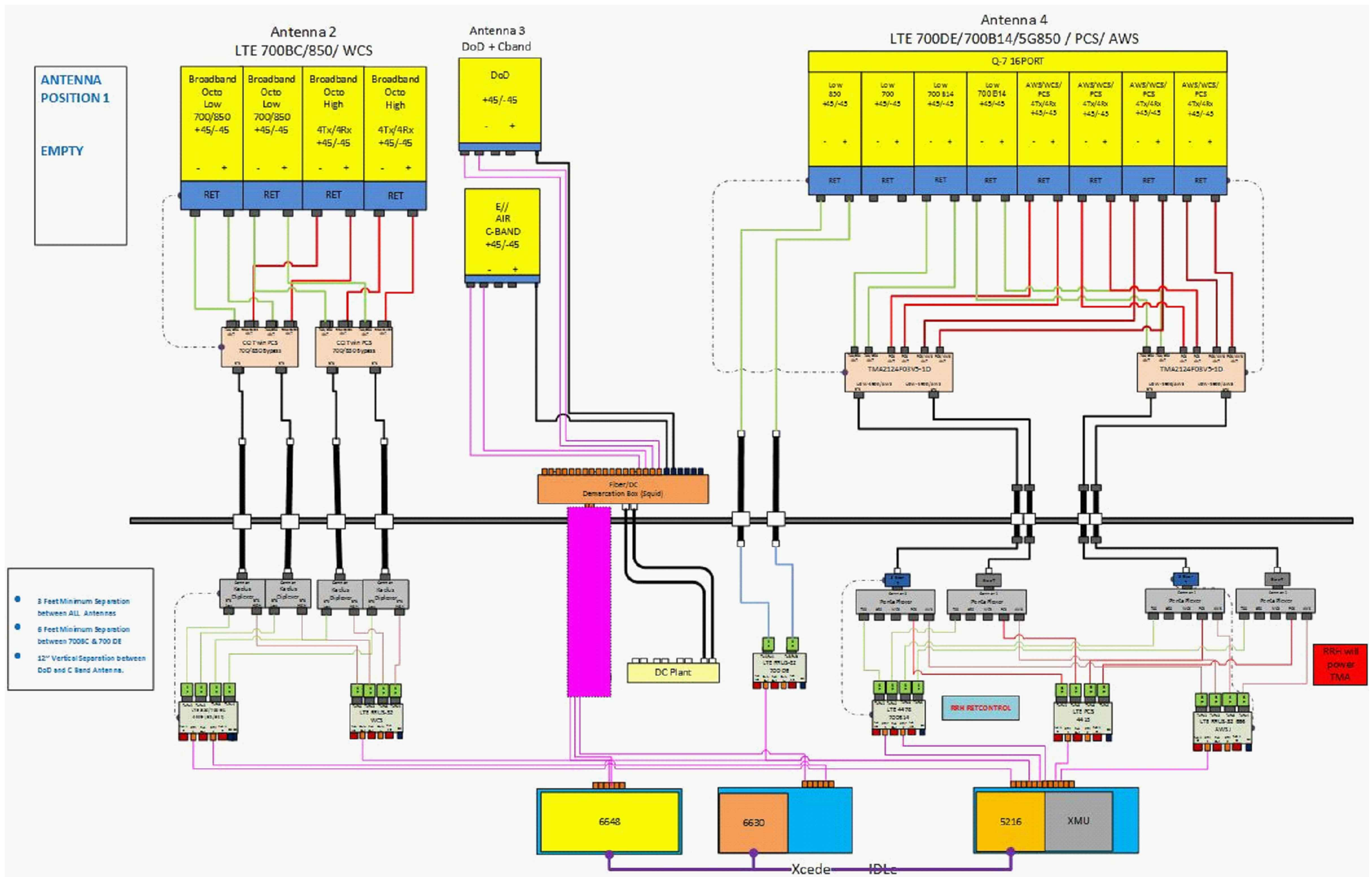
GROUNDING DETAILS

5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | G-1 | 1 |

**NOTE:**

REV: 1
DATED: 02/21/2022
RFDS ID: 4893429




**RF PLUMBING DIAGRAM**
SCALE: N.T.S
1
RF–1

**NOTE:**
1. CONTRACTOR TO CONFIRM ALL PARTS.
2. INSTALL ALL EQUIPMENT TO MANUFACTURER'S RECOMMENDATIONS.
3. RFDS USED FOR REFERENCE.

**NOTE:**

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.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| 0 | 10/19/22 | ISSUED FOR CONSTRUCTION | YH | HC | DPH |
| A | 04/29/22 | ISSUED FOR REVIEW | JP | HC | DPH |

SCALE: AS SHOWN | DESIGNED BY: HC | DRAWN BY: JP

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RF PLUMBING DIAGRAM
5G NR 1SR CBAND_SITE OVERLAY, LTE, 7TH CARRIER_4TXRX ANTENNA RETROFIT_SITE OVERLAY, LTE, 6TH CARRIER UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CTL02901 | RF–1 | 1 |

CENTEK engineering

Centered on Solutions℠

# Structural Analysis of Antenna Mast and Pole

*AT&T Site Ref: CT2901*

*Eversource Structure No. 11229*
*80' Electric Transmission Pole*

*227 Whitewood Road*
*Waterbury, CT*

*CENTEK Project No. 22021.06*

~~*Date: June 10, 2022*~~
*Rev 2: September 12, 2022*

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

**Prepared for:**
*AT&T Mobility*
*500 Enterprise Drive, Suite 3A*
*Rocky Hill, CT 06067*

# ***Table of Contents***

## *Introduction*

The purpose of this report is to analyze the existing mast and 80' utility pole located at 227 Whitewood Road in Waterbury, CT for the proposed AT&T Mobility antenna installation.

The existing/proposed loads consist of the following:

- AT&T MOBILITY (Existing to Remain):
  Antennas: Six (6) CCI TMABPDB7823VG12A TMAs mounted on a custom T-Arm Frame with a RAD center elevation of 105-ft above grade.
  Coax Cables: Thirty (30) 1-5/8" ∅ coax cables running on the exterior of the pole/mast as indicated in section 4 of this report.

- **AT&T MOBILITY (Existing to Remove):**
  **Antennas: Six (6) CCI HPA-65R-BUU-H8 panel antennas, three (3) CCI OPA-65R-LCUU-H8 panel antennas and twelve (12) CCI TMABPDB7823VG12A TMAs mounted on a custom T-Arms (refer to CDs for details) with a RAD center elevation of 105-ft above grade.**
  **Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the exterior of the pole/mast as indicated in section 4 of this report.**

- **AT&T MOBILITY (Proposed):**
  **Antennas: Three (3) Quintel QD8616-7 panel antennas, three (3) CCI DMP65R-BU8D panel antennas, three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson AIR6419 panel antennas, six (6) Kaelus TMA2124F03V5-2D TMAs and one (1) Raycap DC6 surge arrestor mounted on a custom T-Arms (refer to CDs for details) with a RAD center elevation of 105-ft above grade.**
  **Cables: One (1) fiber cable and two (2) DC cables running on the exterior of the pole/mast as indicated in section 4 of this report.**

## *Primary assumptions used in the analysis*

- ASCE Manual No. 48-11, "Design of Steel Transmission Pole Structures", defines steel stresses for evaluation of the utility pole.
- All utility tower members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- All coaxial cable will be installed within the antenna mast unless specified otherwise.
- Antenna mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Antenna mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.
- For NESC analysis, total wind area of each antenna grouping was calculated per TIA-G, Section 2.6.9.2.

## Analysis

Structural analysis of the existing antenna mast was independently completed using the current version of RISA-3D computer program licensed to CENTEK Engineering, Inc.

The antenna mast consisting of a HSS16x0.5 x 25-ft long pipe flange connected to a HSS18x0.5 x 32-ft long pipe conforming to ASTM A500 Gr. B (Fy = 42 ksi) connected at three points to the existing tower was analyzed for its ability to resist loads prescribed by the TIA standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA-222-G loading and for NESC/EVERSOURCE loading are listed in report Sections 6 and 8, respectively.

An envelope solution was first made to determine maximum and minimum forces, stresses, and deflections to confirm the selected section as adequate. Additional analyses were then made to determine the NESC forces to be applied to the pole structure.

The RISA-3D program contains a library of all AISC shapes and corresponding section properties are computed and applied directly within the program. The program's Steel Code Check option was also utilized. The forces calculated in RISA-3D using NESC guidelines were then applied to the pole using PLS-Pole. Maximum usage for the pole was calculated considering the additional forces from the mast and associated appurtenances.

## Design Basis

Our analysis was performed in accordance with ASCE 48-11, "Design of Steel Transmission Pole Structures", NESC C2-2017 and Eversource Design Criteria.

- UTILITY POLE ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility structure to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the EVERSOURCE Design Criteria Table, NESC C2-2017 ~ Construction Grade B, and ASCE Manual No. 48-11, "Design Of Steel Transmission Pole Structures".

  Load cases considered:

  Load Case 1: NESC Heavy
  Wind Pressure.……………………………. 4.0 psf
  Radial Ice Thickness………………………. 0.5"
  Vertical Overload Capacity Factor…………. 1.50
  Wind Overload Capacity Factor……………. 2.50
  Wire Tension Overload Capacity Factor…… 1.65

  Load Case 2: NESC Extreme
  Wind Speed.………………………………. 110 mph (1)
  Radial Ice Thickness……………………….. 0"

  *Note 1: NESC C2-2017, Section25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)*

  Load Case 3: NESC Extreme Ice w/ Wind
  Wind Pressure.……………………………. 4.0 psf
  Radial Ice Thickness………………………. 1.0"
  Vertical Overload Capacity Factor…………. 1.00
  Wind Overload Capacity Factor……………. 1.00

- MAST ASSEMBLY ANALYSIS

  Mast, appurtenances and connections to the utility tower were analyzed and designed in accordance with TIA-222-G and AISC standards.

  Load cases considered:

  Load Case 1:
  Wind Speed……………………………….... 97 mph (2018 CSBC Appendix-N)
  Radial Ice Thickness……………………….. 0"

  Load Case 2:
  Wind Pressure.……………………………. 50 mph wind pressure
  Radial Ice Thickness……………………….. 0.75"

## *Results*

- MAST ASSEMBLY

  The existing mast was determined to be structurally **adequate**.

| Member | Stress Ratio (% of capacity) | Result |
|---|---|---|
| HSS16x0.5 | 85.6% | **PASS** |
| HSS18x0.5 | 82.2% | **PASS** |
| 3/4" ∅ ASTM A325 Bolt (Bot Bracket)[1] | 61.4% | **PASS** |

Note 1 – Critical connection component.

- UTILITY POLE

  This analysis finds that the subject utility pole is adequate to support the proposed antenna mast and related appurtenances. The pole stresses meet the requirements set forth by the ASCE Manual No. 48-11, "Design of Steel Transmission Pole Structures Second Edition", for the applied NESC Heavy and Hi-Wind load cases. The detailed analysis results are provided in Section 9 of this report. The analysis results are summarized as follows:

  A maximum usage of **93.40%** occurs in the utility pole under the **NESC Extreme** loading condition.

  POLE SECTION:

  The utility pole was found to be within allowable limits.

| Tower Section | Elevation | Stress Ratio (% of capacity) | Result |
|---|---|---|---|
| Tube Number 1 | 28.25-80.00' (AGL) | 93.40% | **PASS** |

BASE PLATE:

The base plate was found to be within allowable limits.

| Tower Component | Design Limit | Stress Ratio (percentage of capacity) | Result |
|---|---|---|---|
| Base Plate | Bending | 55.00% | **PASS** |

- FOUNDATION AND ANCHORS

The existing foundation consists of a 7.0-ft ∅ x 20-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (12) 2.25"∅, ASTM A615 Gr. 75 anchor bolts embedded approximately 9-ft-6-in into the concrete foundation structure. Foundation information was obtained from the original Forth Worth Tower design calculations.

BASE REACTIONS:

From PLS-Pole analysis of pole based on NESC/Eversource prescribed loads.

| Load Case | Shear | Axial | Moment |
|---|---|---|---|
| NESC Heavy Wind | 24.53 kips | 57.94 kips | 1650.75 ft-kips |
| NESC Extreme Wind | 38.85 kips | 29.97 kips | 2575.38 ft-kips |
| NESC Extreme Ice w/ Wind | 15.24 kips | 52.42 kips | 1076.04 ft-kips |

Note 1 – 10% increase to be applied to tower base reactions for foundation verification per OTRM 051

ANCHOR BOLTS:

The anchor bolts were found to be within allowable limits.

| Tower Component | Design Limit | Stress Ratio (% of capacity) | Result |
|---|---|---|---|
| Anchor Bolts | Tension | 89.1% | **PASS** |

FOUNDATION:

The foundation with the proposed modifications was found to be within allowable limits.

| Foundation | Design Limit | Proposed Loading (1) | Result |
|---|---|---|---|
| Reinforced Concrete Caisson | Moment Capacity | 38% | **PASS** |
| | Shear Capacity | 78% | **PASS** |
| | Lateral Deflection | 1.70 in. | **PASS** |

Note 1: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.

## *Conclusion*

This analysis shows that the subject utility pole **is adequate** to support the proposed AT&T equipment upgrade.

The analysis is based, in part on the information provided to this office by Eversource and AT&T. If the existing conditions are different than the information in this report, CENTEK engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

## STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES

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

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.

- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.

- It is the responsibility of the client to ensure that the information provided to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.

- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222.

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

## *G E N E R A L   D E S C R I P T I O N   O F   S T R U C T U R A L   A N A L Y S I S   P R O G R A M ~ R I S A - 3 D*

RISA-3D Structural Analysis Program is an integrated structural analysis and design software package for buildings, bridges, tower structures, etc.

Modeling Features:

- Comprehensive CAD-like drawing/editing environment: draw, generate, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, trim, extend, etc.
- Versatile drawing grids (orthogonal, radial, skewed, DXF underlay)
- Universal snaps and object snaps allow drawing without grids
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet based, save/recall selections with locking
- True spreadsheet editing with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and graphics
- Open multiple spreadsheets simultaneously
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability, automatic timed backup
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, geodesic domes, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection custom shape libraries
- Light Gage Shapes: AISI, SSMA, Dale/Incor, Dietrich, Marino\WARE
- Import DXF, RISA-2D, STAAD and CIS/2 files
- Export DXF, SDNF and CIS/2 files
- Robust two-way link with Autodesk Revit 2022 & 2021
- Link with Tekla Structures 2021 & 2020

Design Codes:

- Steel Design Codes: AISC 360-16/10/05: ASD & LRFD, AISC 2nd & 3rd: LRFD, AISC 9th: ASD, CSA S16-14/09/05/01/CSA-S16.1-94, BS 5950-1: 2000, EN 1993-1-1:2014/2005, ENV 1993-1-1:1992, IS 800: 2007/1998, AS 4100-1998, NZS 3404: 1997
- Seismic design per AISC 341-16/10/05, including 358 prequalified connections
- Concrete Design Codes: ACI 318-19/14/11/08/05/02/99, CSA A23.3-14/04/94, NTC-DF 2004, BS 8110-1: 1997, BS EN 1992-1-1: 2004+A1: 2014/2004, EN 1992-1-1:1992, IS 456: 2000, AS 3600-2001, NZS 3101: 1995, SBC 304-2007
- Cold Formed Steel Design Codes: AISI S100-16/12/10/07: ASD & LRFD, AISI NAS-04/01: ASD & LRFD, AISI 1999: ASD & LRFD, AISI 400-15 & AISI S240-15 (Walls), CSA S136-16/12/10/07/04/01: LSD, CANACERO 16: ASD, CANACERO 12/10/07/04/01: ASD & LRFD
- Aluminum Design Codes: AA ADM1-15/10: ASD & LRFD, AA ADM1-05: ASD
- Wood Design Codes: AWC NDS-18/15/12: ASD, AF&PA NDS-08/05/01/97/91: ASD, CSA 086-14/09 Ultimate, Structural Composite Lumber, multi-ply, full sawn, Glulam, shear walls
- Masonry Design Codes: TMS 402-16: ASD & Strength, ACI 530-13/11/08/05/02: ASD & Strength, ACI 530-99: ASD, UBC 1997: ASD & Strength
- Stainless Steel Design Code: AISC 360-10: ASD & LRFD
- Wind loads are generated automatically (ASCE 7-16/10/05/02/98/95, NBC 15/10/05, NTC 2004, & IS 875: 1987) for building-type structures, including partial wind cases
- Seismic loads are generated automatically (ASCE 7-16/10/05/02, CBC 2001, IBC 2000, UBC 1997, NBC 15/10/05, NTC 2004, & IS 1893: 2002) for building-type structures, including accidental torsion

Analysis Features:

- Analysis of 1D members (beams, columns, braces, etc.) using Finite Element Method
- Analysis of 2D elements (plates, walls) using Finite Element Method
- Analysis of 3D elements (solids) using Finite Element Method
- Partial fixity member end releases using rotational spring constants
- Simpson Strong-Tie Yield Link as member end releases
- Orthotropic Plate Material
- Time History Analysis
- Accelerated true sparse solver for static analysis
- Accelerated Sparse Lanczos dynamics solver, very fast and robust
- Flexible modeling of P-Delta effects
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS with automatic calc of scaling factors
- Automatic inclusion of mass offset (5% or user defined) for dynamics when integrated with RISAFloor
- Ritz vector dynamic solver
- True physical member modeling (members are aware of interior joints)
- Plate/shell elements with plane stress only option
- 8 node solid elements
- High end mesh generation — draw a polygon with any number of sides to create a mesh of well formed quadrilateral (NO triangular) elements
- Automatic rigid diaphragm modeling with detachable joints
- Area loads with one-way or two-way distributions with optional “blow through” distribution for loading open structures
- Plate thermal loads
- Simultaneous moving loads, AASHTO/custom for bridges, cranes…
- Torsional warping calculations for stiffness, stress and design of hot rolled steel
- Member end releases, rigid end offsets, analysis offsets
- Enforced joint displacements
- One Way members, for tension only bracing, slipping, etc.
- One Way springs, for modeling soils and other effects
- Euler members: Compression up to buckling load, then disable
- Stress calculations on any arbitrary shape
- Inactivate members, plates, solids and diaphragms without deleting them
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members, plates and solids

Graphics Features:

- Unlimited simultaneous model view windows
- “True to scale” rendering with translucency, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamically zoom, pan, rotate, scroll, snap views
- Font and color control
- Saved views to quickly restore frequent or desired views
- Rendered or wire-frame animations of deflected model and mode shapes
- Animation of moving loads with speed control
- Distance tool for measuring between points
- Force/moment summation about any arbitrary cut line
- High quality customizable graphics printing

Design Features:

- Designs/optimizes concrete, hot rolled & cold formed steel, masonry, wood and aluminum
- Program selected or user-defined rebar layouts for flexure and shear
- Concrete beam detailing (Rectangular, T and L).
- Concrete column interaction diagrams
- Concrete wall design including in-plane, out-of-plane & bearing loads
- Automatic spectra generation for ASCE 7, NBC, IS 1893, NTC
- Extensive user controlled generation of load combinations
- Intelligent unbraced length calculations for physical members
- Tapered wide flange design per AISC Design Guide 25
- Masonry wall design for in-plane and out-of-plane
- Wood Shapes: Complete NDS species/grade and Glulam database
- Complete wood wall design for bearing & shear walls: Segmented, Perforated & Force Transfer Around Openings design methods
- Strap and Hold Down design for Wood Shear Walls
- Seismic design of concrete walls using ACI 318-14 Chapter 18
- Concrete seismic coupling beams for multi-story walls with diaphragms
- Capacity-Limited Seismic Design for Special Concentrated Braced Frames (SCBF)
- Buckling Restrained Brace (BRB) seismic checks using CoreBrace elements

Results Features:

- Graphic presentation of color-coded results and plotted designs
- Color contours on plates, solid stresses/forces with smoothing and animation
- Spreadsheet results with sorting and filtering of: deflections, forces, stresses, optimized sizes for strength or deflection, code designs, concrete reinforcing, material takeoffs, etc.
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams

## *G E N E R A L  D E S C R I P T I O N  O F  S T R U C T U R A L  A N A L Y S I S  P R O G R A M ~ P L S - P O L E*

PLS-POLE provides all of the capabilities a structural engineer requires to design transmission, substation or communications structures. It does so using a simple easy to use graphical interface that rests upon our time tested finite element engine. Regardless of whether you want to model a simple wood pole or a guyed steel X-Frame; PLS-POLE can handle the job simply, reliably and efficiently.

Modeling Features:

- Structures are made of standard reusable components that are available in libraries. You can easily create your own libraries or get them from a manufacturer
- Structure models are built interactively using interactive menus and graphical commands
- Automatic generation of underlying finite element model of structure
- Steel poles can have circular, 4, 6, 8, 12, 16, or 18-sided, regular, elliptical or user input cross sections (flat-to-flat or tip-to-tip orientations)
- Steel and concrete poles can be selected from standard sizes available from manufacturers
- Automatic pole class selection
- Cross brace position optimizer
- Capability to specify pole ground line rotations
- Capability to model foundation displacements
- Can optionally model foundation stiffness
- Guys are easily handled (modeled as exact cable elements in nonlinear analysis)
- Powerful graphics module (members color-coded by stress usage)
- Graphical selection of joints and components allows graphical editing and checking
- Poles can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces

Analysis Features:

- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Design checks for ASCE, ANSI/TIA/EIA 222 (Revisions F and G) or other requirements
- Automatic calculation of dead and wind loads
- Automated loading on structure (wind, ice and drag coefficients) according to:
    - ASCE 74-1991, 2009
    - NESC 2002, 2007, 2012, 2017
    - IEC 60826:2003
    - IS 802 : 1995, 2015
    - EN50341-1:2001 and 2012 (CENELEC)
    - EN50341-3-2:2001 (Belgium NNA)
    - EN50341-3-9:2001, EN50341-2-9:2015, 2017 (UK NNA)
    - EN50341-3-17:2001 (Portugal NNA)
    - AS/NZS 7000:2010
    - ESAA C(b)1-2003 (Austalia)
    - TPNZ (New Zealand)
    - REE (Spain)
    - Russian 7th
    - ISEC-NCR-83
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Detects buckling by nonlinear analysis

Results Features:

- Detects buckling by nonlinear analysis
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Automatic tracking of part numbers and costs

## *G E N E R A L D E S C R I P T I O N O F S T R U C T U R A L A N A L Y S I S P R O G R A M ~ L P I L E P L U S*

LPILE Plus is a special purpose program based on rational procedures for analyzing a pile under lateral loading. The program computes deflection, shear, bending moment, and soil response with respect to depth in nonlinear soils. Components of the stiffness matrix at the pile head may be computed internally by the program to help the users in their super-structure analysis. Several pile lengths may be automatically checked by the program in order to help the user produce a design with an optimum pile penetration.

Soil behavior is modeled with p-y curves internally generated by the computer program following published recommendations for various types of soils; alternatively, the user can manually introduce other p-y curves. Special procedures are programmed for developing p-y curves for layered soils and for rocks.

Several types of pile-head boundary conditions may be selected, and the properties of the pile can also vary as a function of depth. LPILE Plus has capabilities to compute the ultimate-moment capacity of a pile's section and can provide design information for rebar arrangement. The user may optionally ask the program to generate and take into account nonlinear values of flexural stiffness (EI) which are generated internally based on specified pile dimensions, material properties, and cracked/uncracked concrete behavior.
A single, user-friendly interface written for the Microsoft Windows© environment is provided for the preparation of input, analytical run, and for the graphical observation of data contained in the output file. The program has been written in 32-bit programming codes for compatibility with the latest versions of the Microsoft Windows operating system. The program produces plain-text input and output files that may be observed and/or edited for their inclusion in project reports

# Criteria for Design of PCS Facilities On or Extending Above Metal Electric Transmission Towers & Analysis of Transmission Towers Supporting PCS Masts [(1)]

## Introduction

This criteria is the result from an evaluation of the methods and loadings specified by the separate standards, which are used in designing telecommunications towers and electric transmission towers. That evaluation is detailed elsewhere, but in summary; the methods and loadings are significantly different. This criteria specifies the manner in which the appropriate standard is used to design PCS facilities including masts and brackets (hereafter referred to as “masts”), and to evaluate the electric transmission towers to support PCS masts. The intent is to achieve an equivalent level of safety and security under the extreme design conditions expected in Connecticut and Massachusetts.

ANSI Standard TIA-222 covering the design of telecommunications structures specifies LRFD design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed code defined percentage of failure strength.

ANSI Standard C2-2017 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

Each standard defines the details of how loads are to be calculated differently. Most of the NU effort in “unifying” both codes was to establish what level of strength each approach would provide, and then increasing the appropriate elements of each to achieve a similar level of security under extreme weather loadings.

Two extreme weather conditions are considered. The first is an extreme wind condition (hurricane) based upon a 50-year recurrence (2% annual probability). The second is a winter condition combining wind and ice loadings.

The following sections describe the design criteria for any PCS mast extending above the top of an electric transmission tower, and the analysis criteria for evaluating the loads on the transmission tower from such a mast from the lower portions of such a mast, and loads on the pre-existing electric lower portions of such a mast, and loads on the pre-existing electric transmission tower and the conductors it supports.

*Note 1: Prepared from documentation provide from Eversource.*

## *P C S  M a s t*

The PCS facility (mast, external cable/trays, including the initial and any planned future support platforms, antennas, etc. extending the full height above the top level of the electric transmission structure) shall be designed in accordance with the provisions of TIA 222-G:

## *E L E C T R I C  T R A N S M I S S I O N  T O W E R*

The electric transmission tower shall be analyzed using yield stress theory in accordance with the attached table titled “Eversource Design Criteria”. This specifies uniform loadings (different from the TIA loadings) on the each of the following components of the installed facility:

- PCS mast for its total height above ground level, including the initial and planned future support platforms, antennas, etc. above the top of an electric transmission structure.
- Conductors are related devices and hardware.
- Electric transmission structure. The loads from the PCS facility and from the electric conductors shall be applied to the structure at conductor and PCS mast attachment points, where those load transfer to the tower.

The uniform loadings and factors specified for the above components in the table are based upon the National Electrical Safety Code 2017 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to TIA and its loads and factors with the exceptions noted above. (Note that the NESC does not require the projected wind surfaces of structures and equipment to be increased by the ice covering.)

In the event that the electric transmission tower is not sufficient to support the additional loadings of the PCS mast, reinforcement will be necessary to upgrade the strength of the overstressed members.

### Attachment A
### Eversource Design Criteria

| Condition | Standard | Attachment A ES Design Criteria | Basic Wind Speed | Pressure | Height Factor | Gust Factor | Load or Stress Factor | Force Coef. - Shape Factor |
|---|---|---|---|---|---|---|---|---|
| | | | V (MPH) | Q (PSF) | Kz | Gh | | |
| Ice Condition | TIA/EIA | Antenna Mount | TIA | TIA (0.75Wi) | TIA | TIA | TIA, Section 3.1.1.1 disallowed for connection design | TIA |
| Ice Condition | NESC Heavy | Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress) | ----- | 4 | 1 | 1 | 2.5 | 1.6 Flat Surfaces<br>1.3 Round Surfaces |
| Ice Condition | NESC Heavy | Tower/Pole Analysis with antennas below top of Tower/Pole (on two faces) | ----- | 4 | 1 | 1 | 2.5 | 1.6 Flat Surfaces<br>1.3 Round Surfaces |
| Ice Condition | NESC Heavy | Conductors: | Conductor Loads Provided by ES | | | | | |
| High Wind Condition | TIA/EIA | Antenna Mount | 85 | TIA | TIA | TIA | TIA, Section 3.1.1.1 disallowed for connection design | TIA |
| High Wind Condition | NESC Extreme Wind | Tower/Pole Analysis with antennas extending above top of Tower/Pole | For wind speed use OTRM 060 Map 1,<br>Rule 250C: Extreme Wind Loading<br>Apply a 1.25 x Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure | | | | | 1.6 Flat Surfaces<br>1.3 Round Surfaces |
| High Wind Condition | NESC Extreme Wind | Tower/Pole Analysis with antennas below top of Tower/Pole | For wind speed use OTRM 060 Map 1,<br>Rule 250C: Extreme Wind Loading<br>Height above ground is based on overall height to top of tower/pole | | | | | 1.6 Flat Surfaces<br>1.3 Round Surfaces |
| High Wind Condition | NESC Extreme Wind | Conductors: | Conductor Loads Provided by ES | | | | | |
| NESC Extreme Ice with Wind Condition* | | Tower/Pole Analysis with antennas extending above top of Tower/Pole | For wind speed use OTRM 060 Map 1,<br>Rule 250D: Extreme Ice with Wind Loading<br>4 PSF Wind Load 1.25 x Gust Response Factor<br>Apply a 1.25 x Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure | | | | | 1.6 Flat Surfaces<br>1.3 Round Surfaces |
| NESC Extreme Ice with Wind Condition* | | Tower/Pole Analysis with antennas below top of Tower/Pole | For wind speed use OTRM 060 Map 1,<br>Rule 250D: Extreme Ice with Wind Loading<br>4 PSF Wind Load<br>Height above ground is based on overall height to top of tower/pole | | | | | 1.6 Flat Surfaces<br>1.3 Round Surfaces |
| NESC Extreme Ice with Wind Condition* | | Conductors: | Conductor Loads Provided by ES | | | | | |

*Only for structures installed after 2007 determined from NESC applied loading conditions (not TIA Loads) on the structure and mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

The strength reduction factor obtained from the field investigation shall be applied to the members or connections that are showing signs of deterioration from their original condition With the written approval of Eversource Transmission Line Engineering on a case by case the existing structures may be analyzed initially using the current NESC code, then it is permitted to use the original design code with the original conductor load should the existing tower fail the current NESC code.

The structure shall be analyzed using yield stress theory in accordance with Attachment A, "Eversource Design Criteria." This specifies uniform loadings (different from the TIA loadings) on each of the following components of the installed facility:

a) Wireless communication mast for its total height above ground level, including the initial and any planned future equipment (Support Platforms, Antennas, TMA's etc.) above the top of an electric transmission structure.

b) Conductors and related devices and hardware (wire loads will be provided by Eversource).

c) Electric Transmission Structure

i) The loads from the wireless communication equipment components based on NESC and Eversource Criteria in Attachment A, and from the electric conductors shall be applied to the structure at conductor and wireless communication mast attachment points, where those loads transfer to the tower. ii)

ii) Shape Factor Multiplier:

| NESC Structure Shape | Cd |
|---|---|
| Polyround (for polygonal steel poles) | 1.3 |
| Flat | 1.6 |
| Open Lattice | 3.2 |
| Pole with Coaxial Cable | See Below Table |

iii) When Coaxial Cables are mounted alongside the pole structure, the shape multiplier shall be:

| Mount Type | Cable Cd | Pole Cd |
|---|---|---|
| Coaxial Cables on outside periphery (One layer) | 1.45 | 1.45 |
| Coaxial Cables mounted on stand offs | 1.6 | 1.6 |

d) The uniform loadings and factors specified for the above components in Attachment A, "Eversource Design Criteria" are based upon the National Electric Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to the TIA and its loads and factors with the exceptions noted above.

PLS-CADD Version 12.30    9:32:51 AM Monday, March 18, 2013
Northeast Utilities System
Project Name: 'c:\cps\pls-cadd\1990_20120109\xyz files\1990 rebuild_20130313.DON'
Line Title: 'Oxford Airport Glide Path Mitigation'

Criteria Notes:
NUSCO Criteria File nusco_green.cri
This criteria file is based on the 2007 edition of the National Electric Safety Code
This criteria file is to be applied to new transmission line designs in Central CT.
For a detailed map on the NUSCO design wind zones, please consult OTRM 060
Rule 250C Wind speed assumed to be 110 MPH
Rule 250D Assumed 15 deg F, 4 psf wind and 1 inch of radial ice

PLS-Pole models entered into the model from FWT on 5/10/2012

ADSS Line into Shaws Hill Entered 2/20/2013

Realignment at Municipal Rd and Quarry in Waterbury. 2/21/2013

Added Relocation of Distribution Circuits 13F61 & 13F62. 2/27/2013

Weather Cases

| WC # | Description | Air Density Factor (psf/mph^2) | Wind Vel. (mph) | Wind Pres. (psf) | Wire Ice Thick (in) | Wire Ice Density (lbs/ft^3) | Wire Ice Load (lbs/ft) | Wire Temp (deg F) | Ambient Temp (deg F) | Weather Load Factor | NESC Constant (lbs/ft) | Wire Wind Height Adjust Model | Wire Gust Response Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | NESC Rule 250B | 0.00256 | 40 | 4.0 | 0.50 | 57.000 | 0.00 | 0 | 0 | 1.00 | 0.30 | None | 1 |
| 2 | NESC Rule 250C | 0.00256 | 110 | 31.0 | 0.00 | 0.000 | 0.00 | 60 | 60 | 1.00 | 0.00 | NESC 2007 | NESC 2007 |
| 3 | NESC Rule 250D | 0.00256 | 40 | 4.1 | 1.00 | 57.000 | 0.00 | 15 | 15 | 1.00 | 0.00 | None | 1 |
| 4 | Uplift | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | -20 | -20 | 1.00 | 0.00 | None | 1 |
| 5 | Maximum Operating | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 356 | 285 | 1.00 | 0.00 | None | 1 |
| 6 | NESC Blowout 6PSF | 0.00256 | 48 | 6.0 | 0.00 | 0.000 | 0.00 | 60 | 60 | 1.00 | 0.00 | None | 1 |
| 7 | GALLOPING (SWING) | 0.00256 | 28 | 2.0 | 0.50 | 57.000 | 0.00 | 32 | 32 | 1.00 | 0.00 | None | 1 |
| 8 | GALLOPING (SAG) | 0.00256 | 0 | 0.0 | 0.50 | 57.000 | 0.00 | 32 | 32 | 1.00 | 0.00 | None | 1 |
| 9 | 0 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 0 | 0 | 1.00 | 0.00 | None | 1 |
| 10 | 30 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 30 | 30 | 1.00 | 0.00 | None | 1 |
| 11 | 32 Deg F | 0.00256 | 0 | 0.0 | 0.50 | 57.000 | 0.00 | 32 | 32 | 1.00 | 0.00 | None | 1 |
| 12 | 60 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 60 | 60 | 1.00 | 0.00 | None | 1 |
| 13 | 90 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 90 | 90 | 1.00 | 0.00 | None | 1 |
| 14 | 120 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 120 | 120 | 1.00 | 0.00 | None | 1 |
| 15 | 167 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 167 | 167 | 1.00 | 0.00 | None | 1 |
| 16 | 212 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 212 | 212 | 1.00 | 0.00 | None | 1 |
| 17 | 356 Deg F | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 356 | 285 | 1.00 | 0.00 | None | 1 |
| 18 | NU Blowout | 0.00256 | 59 | 9.0 | 0.00 | 0.000 | 0.00 | 60 | 60 | 1.00 | 0.00 | None | 1 |
| 19 | NU Swing Cw | 0.00256 | 0 | 0.0 | 0.00 | 0.000 | 0.00 | 60 | 60 | 1.00 | 0.00 | None | 1 |
| 20 | NU Swing Cl | 0.00256 | 35 | 3.1 | 0.00 | 0.000 | 0.00 | 45 | 45 | 1.00 | 0.00 | None | 1 |
| 21 | NU Swing Cs | 0.00256 | 48 | 6.0 | 0.00 | 0.000 | 0.00 | 60 | 60 | 1.00 | 0.00 | None | 1 |
| 22 | NU Swing Ch | 0.00256 | 60 | 9.2 | 0.00 | 0.000 | 0.00 | 60 | 60 | 1.00 | 0.00 | None | 1 |

Structure Loads Criteria

| LC # | WC # | Load Case Description | Cable Condition | Wind Dir. | Bisect Wind Angle | Wire Vert. Load Factor | Wire + Struct. Wind Load Factor | Wire Tension Load Factor | Struct Weight Load Factor | Struct Wind Area Factor | Struct. Wind Load Model | Struct. Ice Thick (in) | Struct. Ice Density (lbs/ft^3) | Pole Tip Deflection Check | Pole Tip Deflect Limit % or (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | RULE 250B NA+ | Creep RS | NA+ | | 1.50 | 2.50 | 1.65 | 1.50 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 2 | 1 | RULE 250B NA- | Creep RS | NA- | | 1.50 | 2.50 | 1.65 | 1.50 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 3 | 2 | RULE 250C NA+ | Creep RS | NA+ | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | Pre V7 NESC 2002 | 0.00 | 0.000 | No Limit | 0.00 |
| 4 | 2 | RULE 250C NA- | Creep RS | NA- | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | Pre V7 NESC 2002 | 0.00 | 0.000 | No Limit | 0.00 |
| 5 | 3 | RULE 250D NA+ | Creep RS | NA+ | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 6 | 3 | RULE 250D NA- | Creep RS | NA- | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 7 | 1 | 250B No OLF NA+ | Creep RS | NA+ | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 8 | 1 | 250B No OLF NA- | Creep RS | NA- | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 9 | 12 | Deflection | Creep RS | NA+ | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 10 | 1 | BROKEN SIDE NA+ | Creep RS | NA+ | | 1.50 | 2.50 | 1.65 | 1.50 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 11 | 1 | BROKEN SIDE NA- | Creep RS | NA- | | 1.50 | 2.50 | 1.65 | 1.50 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 12 | 1 | BROKEN WIRE NA+ | Creep RS | NA+ | | 1.50 | 2.50 | 1.65 | 1.50 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |
| 13 | 1 | BROKEN WIRE NA- | Creep RS | NA- | | 1.50 | 2.50 | 1.65 | 1.50 | 1.00 | Pre V7 Standard | 0.00 | 0.000 | No Limit | 0.00 |

Cable Load Adjustments for each Load Case

| LC # | WC # | Load Case Description | Struct Groups On Which To Apply | Command 1 Wire(s) Set: Phase: Side: | Command 1 | Command 1 Value (lbs) (deg) (%) | Command 2 Wire(s) Set: Phase: Side: | Command 2 | Command 2 Value (lbs) (deg) (%) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | RULE 250B NA+ | 'All' | | | | | | |
| 2 | 1 | RULE 250B NA- | 'All' | | | | | | |
| 3 | 2 | RULE 250C NA+ | 'All' | | | | | | |
| 4 | 2 | RULE 250C NA- | 'All' | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 | 3 | RULE 250D NA+ | 'All' | | | | | |
| 6 | 3 | RULE 250D NA- | 'All' | | | | | |
| 7 | 1 | 250B No OLF NA+ | 'All' | | | | | |
| 8 | 1 | 250B No OLF NA- | 'All' | | | | | |
| 9 | 12 | Deflection | 'All' | | | | | |
| 10 | 1 | BROKEN SIDE NA+ | 'PLS-POLE has DE' | Ahead Spans # Broken Subconductors | 1.0 | | | |
| 11 | 1 | BROKEN SIDE NA- | 'PLS-POLE has DE' | Ahead Spans # Broken Subconductors | 1.0 | | | |
| 12 | 1 | BROKEN WIRE NA+ | 'Angle' | 1:1:Ahead # Broken Subconductors | 1.0 | 2:1:Ahead # Broken Subconductors | 1.0 | |
| 13 | 1 | BROKEN WIRE NA- | 'Angle' | 1:1:Ahead # Broken Subconductors | 1.0 | 2:1:Ahead # Broken Subconductors | 1.0 | |

Span and Wire Summary For Structure Range

Span azimuth is measured clockwise from structure transverse axis (0=transverse, 90=back, 270=ahead)
Azimuth of structure transverse axis is 140.8940 (deg) measured clockwise from North.

| Str. No. | Str. Name | LC # | WC # | Load Case Description | Set No. | Phase No. | Attach. Joint Labels | Back span Cable Name | Len. (ft) | Azi. (deg) | Horiz. Load (lbs/ft) | Vert. Load (lbs/ft) | Horiz. Tension (lbs) | Ahead span Cable Name | Len. (ft) | Azi. (deg) | Horiz. Load (lbs/ft) | Vert. Load (lbs/ft) | Horiz. Tension (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | type_c-80ft.pol | 1 | 1 | RULE 250B NA+ | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 1 | 1 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 1 | 1 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 1 | 1 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 1.37 | 1.66 | 8728 | afl_hexacor_dno-7757.wir | 481 | 265 | 1.37 | 1.66 | 8724 |
| 11229 | type_c-80ft.pol | 2 | 1 | RULE 250B NA- | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 2 | 1 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 2 | 1 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 2 | 1 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 1.37 | 1.66 | 8728 | afl_hexacor_dno-7757.wir | 481 | 265 | 1.37 | 1.66 | 8724 |
| 11229 | type_c-80ft.pol | 3 | 2 | RULE 250C NA+ | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 3.39 | 2.04 | 10306 | falcon_acss.wir | 481 | 265 | 3.46 | 2.04 | 10284 |
| 11229 | type_c-80ft.pol | 3 | 2 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 3.30 | 2.04 | 10306 | falcon_acss.wir | 481 | 265 | 3.36 | 2.04 | 10285 |
| 11229 | type_c-80ft.pol | 3 | 2 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 3.18 | 2.04 | 10306 | falcon_acss.wir | 481 | 265 | 3.24 | 2.04 | 10285 |
| 11229 | type_c-80ft.pol | 3 | 2 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 1.46 | 0.40 | 4747 | afl_hexacor_dno-7757.wir | 481 | 265 | 1.49 | 0.40 | 4735 |
| 11229 | type_c-80ft.pol | 4 | 2 | RULE 250C NA- | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 3.39 | 2.04 | 10306 | falcon_acss.wir | 481 | 265 | 3.46 | 2.04 | 10284 |
| 11229 | type_c-80ft.pol | 4 | 2 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 3.30 | 2.04 | 10306 | falcon_acss.wir | 481 | 265 | 3.36 | 2.04 | 10285 |
| 11229 | type_c-80ft.pol | 4 | 2 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 3.18 | 2.04 | 10306 | falcon_acss.wir | 481 | 265 | 3.24 | 2.04 | 10285 |
| 11229 | type_c-80ft.pol | 4 | 2 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 1.46 | 0.40 | 4747 | afl_hexacor_dno-7757.wir | 481 | 265 | 1.49 | 0.40 | 4735 |
| 11229 | type_c-80ft.pol | 5 | 3 | RULE 250D NA+ | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 1.21 | 5.21 | 13569 | falcon_acss.wir | 481 | 265 | 1.21 | 5.21 | 13567 |
| 11229 | type_c-80ft.pol | 5 | 3 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 1.21 | 5.21 | 13569 | falcon_acss.wir | 481 | 265 | 1.21 | 5.21 | 13567 |
| 11229 | type_c-80ft.pol | 5 | 3 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 1.21 | 5.21 | 13569 | falcon_acss.wir | 481 | 265 | 1.21 | 5.21 | 13567 |
| 11229 | type_c-80ft.pol | 5 | 3 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 0.90 | 2.44 | 7134 | afl_hexacor_dno-7757.wir | 481 | 265 | 0.90 | 2.44 | 7131 |
| 11229 | type_c-80ft.pol | 6 | 3 | RULE 250D NA- | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 1.21 | 5.21 | 13569 | falcon_acss.wir | 481 | 265 | 1.21 | 5.21 | 13567 |
| 11229 | type_c-80ft.pol | 6 | 3 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 1.21 | 5.21 | 13569 | falcon_acss.wir | 481 | 265 | 1.21 | 5.21 | 13567 |
| 11229 | type_c-80ft.pol | 6 | 3 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 1.21 | 5.21 | 13569 | falcon_acss.wir | 481 | 265 | 1.21 | 5.21 | 13567 |
| 11229 | type_c-80ft.pol | 6 | 3 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 0.90 | 2.44 | 7134 | afl_hexacor_dno-7757.wir | 481 | 265 | 0.90 | 2.44 | 7131 |
| 11229 | type_c-80ft.pol | 7 | 1 | 250B No OLF NA+ | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 0.85 | 3.31 | 10770 | falcon_acss.wir | 481 | 265 | 0.85 | 3.31 | 10768 |
| 11229 | type_c-80ft.pol | 7 | 1 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 0.85 | 3.31 | 10770 | falcon_acss.wir | 481 | 265 | 0.85 | 3.31 | 10768 |
| 11229 | type_c-80ft.pol | 7 | 1 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 0.85 | 3.31 | 10770 | falcon_acss.wir | 481 | 265 | 0.85 | 3.31 | 10768 |
| 11229 | type_c-80ft.pol | 7 | 1 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 0.55 | 1.11 | 5290 | afl_hexacor_dno-7757.wir | 481 | 265 | 0.55 | 1.11 | 5287 |
| 11229 | type_c-80ft.pol | 8 | 1 | 250B No OLF NA- | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 0.85 | 3.31 | 10770 | falcon_acss.wir | 481 | 265 | 0.85 | 3.31 | 10768 |
| 11229 | type_c-80ft.pol | 8 | 1 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 0.85 | 3.31 | 10770 | falcon_acss.wir | 481 | 265 | 0.85 | 3.31 | 10768 |
| 11229 | type_c-80ft.pol | 8 | 1 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 0.85 | 3.31 | 10770 | falcon_acss.wir | 481 | 265 | 0.85 | 3.31 | 10768 |
| 11229 | type_c-80ft.pol | 8 | 1 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 0.55 | 1.11 | 5290 | afl_hexacor_dno-7757.wir | 481 | 265 | 0.55 | 1.11 | 5287 |
| 11229 | type_c-80ft.pol | 9 | 12 | Deflection | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 0.00 | 2.04 | 6127 | falcon_acss.wir | 481 | 265 | 0.00 | 2.04 | 6127 |
| 11229 | type_c-80ft.pol | 9 | 12 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 0.00 | 2.04 | 6127 | falcon_acss.wir | 481 | 265 | 0.00 | 2.04 | 6127 |
| 11229 | type_c-80ft.pol | 9 | 12 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 0.00 | 2.04 | 6127 | falcon_acss.wir | 481 | 265 | 0.00 | 2.04 | 6127 |
| 11229 | type_c-80ft.pol | 9 | 12 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 0.00 | 0.40 | 1778 | afl_hexacor_dno-7757.wir | 481 | 265 | 0.00 | 0.40 | 1778 |
| 11229 | type_c-80ft.pol | 12 | 1 | BROKEN WIRE NA+ | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 0 |
| 11229 | type_c-80ft.pol | 12 | 1 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 12 | 1 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 12 | 1 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 1.37 | 1.66 | 8728 | afl_hexacor_dno-7757.wir | 481 | 265 | 1.37 | 1.66 | 0 |
| 11229 | type_c-80ft.pol | 13 | 1 | BROKEN WIRE NA- | 1 | 1 | C1 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 0 |
| 11229 | type_c-80ft.pol | 13 | 1 | | 1 | 2 | C2 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 13 | 1 | | 1 | 3 | C3 | falcon_acss.wir | 606 | 95 | 2.12 | 4.97 | 17770 | falcon_acss.wir | 481 | 265 | 2.12 | 4.97 | 17767 |
| 11229 | type_c-80ft.pol | 13 | 1 | | 2 | 1 | SW:T | afl_hexacor_dno-7757.wir | 606 | 95 | 1.37 | 1.66 | 8728 | afl_hexacor_dno-7757.wir | 481 | 265 | 1.37 | 1.66 | 0 |

Wire Loads In Span Coordinate System For Structure Range

Wire loads expressed in span coordinate system (Longitudinal axis is line connecting attach. points)
Note: Loads in this report do not include load from counter weights, insulator weight or insulator wind area.

| Str. No. | Str. Name | LC # | WC # | Load Case Description | Set No. | Phase No. | Attach. Joint Labels | Loads from back span Vert. (lbs) | Trans. (lbs) | Long. (lbs) | Loads from ahead span Vert. (lbs) | Trans. (lbs) | Long. (lbs) | Warnings |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | type_c-80ft.pol | 1 | 1 | RULE 250B NA+ | 1 | 1 | C1 | 897 | 643 | 17770 | 2487 | 513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 1 | 1 | | 1 | 2 | C2 | 897 | 643 | 17770 | 2487 | 513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 1 | 1 | | 1 | 3 | C3 | 897 | 643 | 17770 | 2487 | 513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 1 | 1 | | 2 | 1 | SW:T | 237 | 416 | 8728 | 946 | 332 | 8724 | |
| 11229 | type_c-80ft.pol | 2 | 1 | RULE 250B NA- | 1 | 1 | C1 | 897 | -643 | 17770 | 2487 | -513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 2 | 1 | | 1 | 2 | C2 | 897 | -643 | 17770 | 2487 | -513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 2 | 1 | | 1 | 3 | C3 | 897 | -643 | 17770 | 2487 | -513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 2 | 1 | | 2 | 1 | SW:T | 237 | -416 | 8728 | 946 | -332 | 8724 | |
| 11229 | type_c-80ft.pol | 3 | 2 | RULE 250C NA+ | 1 | 1 | C1 | 197 | 1030 | 10306 | 1383 | 837 | 10284 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 3 | 2 | | 1 | 2 | C2 | 197 | 1000 | 10306 | 1383 | 813 | 10285 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 3 | 2 | | 1 | 3 | C3 | 197 | 966 | 10306 | 1383 | 784 | 10285 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 3 | 2 | | 2 | 1 | SW:T | -79 | 442 | 4747 | 499 | 359 | 4735 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | type_c-80ft.pol | 4 | 2 | RULE 250C NA- | 1 | 1 | C1 | 197 | -1030 | 10306 | 1383 | -837 | 10284 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 4 | 2 | | 1 | 2 | C2 | 197 | -1000 | 10306 | 1383 | -813 | 10285 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 4 | 2 | | 1 | 3 | C3 | 197 | -966 | 10306 | 1383 | -784 | 10285 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 4 | 2 | | 2 | 1 | SW:T | -79 | -442 | 4747 | 499 | -359 | 4735 | |
| 11229 | type_c-80ft.pol | 5 | 3 | RULE 250D NA+ | 1 | 1 | C1 | 1022 | 367 | 13569 | 2434 | 293 | 13567 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 5 | 3 | | 1 | 2 | C2 | 1022 | 367 | 13569 | 2434 | 293 | 13567 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 5 | 3 | | 1 | 3 | C3 | 1022 | 367 | 13569 | 2434 | 293 | 13567 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 5 | 3 | | 2 | 1 | SW:T | 442 | 274 | 7134 | 1199 | 219 | 7131 | |
| 11229 | type_c-80ft.pol | 6 | 3 | RULE 250D NA- | 1 | 1 | C1 | 1022 | -367 | 13569 | 2434 | -293 | 13567 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 6 | 3 | | 1 | 2 | C2 | 1022 | -367 | 13569 | 2434 | -293 | 13567 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 6 | 3 | | 1 | 3 | C3 | 1022 | -367 | 13569 | 2434 | -293 | 13567 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 6 | 3 | | 2 | 1 | SW:T | 442 | -274 | 7134 | 1199 | -219 | 7131 | |
| 11229 | type_c-80ft.pol | 7 | 1 | 250B No OLF NA+ | 1 | 1 | C1 | 598 | 257 | 10770 | 1658 | 205 | 10768 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 7 | 1 | | 1 | 2 | C2 | 598 | 257 | 10770 | 1658 | 205 | 10768 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 7 | 1 | | 1 | 3 | C3 | 598 | 257 | 10770 | 1658 | 205 | 10768 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 7 | 1 | | 2 | 1 | SW:T | 158 | 166 | 5290 | 631 | 133 | 5287 | |
| 11229 | type_c-80ft.pol | 8 | 1 | 250B No OLF NA- | 1 | 1 | C1 | 598 | -257 | 10770 | 1658 | -205 | 10768 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 8 | 1 | | 1 | 2 | C2 | 598 | -257 | 10770 | 1658 | -205 | 10768 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 8 | 1 | | 1 | 3 | C3 | 598 | -257 | 10770 | 1658 | -205 | 10768 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 8 | 1 | | 2 | 1 | SW:T | 158 | -166 | 5290 | 631 | -133 | 5287 | |
| 11229 | type_c-80ft.pol | 9 | 12 | Deflection | 1 | 1 | C1 | 368 | 0 | 6127 | 1024 | 0 | 6127 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 9 | 12 | | 1 | 2 | C2 | 368 | 0 | 6127 | 1024 | 0 | 6127 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 9 | 12 | | 1 | 3 | C3 | 368 | 0 | 6127 | 1024 | 0 | 6127 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 9 | 12 | | 2 | 1 | SW:T | 46 | 0 | 1778 | 247 | 0 | 1778 | |
| 11229 | type_c-80ft.pol | 12 | 1 | BROKEN WIRE NA+ | 1 | 1 | C1 | 897 | 643 | 17770 | 0 | 0 | 0 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 12 | 1 | | 1 | 2 | C2 | 897 | 643 | 17770 | 2487 | 513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 12 | 1 | | 1 | 3 | C3 | 897 | 643 | 17770 | 2487 | 513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 12 | 1 | | 2 | 1 | SW:T | 237 | 416 | 8728 | 0 | 0 | 0 | |
| 11229 | type_c-80ft.pol | 13 | 1 | BROKEN WIRE NA- | 1 | 1 | C1 | 897 | -643 | 17770 | 0 | -0 | 0 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 13 | 1 | | 1 | 2 | C2 | 897 | -643 | 17770 | 2487 | -513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 13 | 1 | | 1 | 3 | C3 | 897 | -643 | 17770 | 2487 | -513 | 17767 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 13 | 1 | | 2 | 1 | SW:T | 237 | -416 | 8728 | 0 | -0 | 0 | |

Wire Loads In Structure Coordinate System For Structure Range

Note: Loads in this report include load from counter weights, insulator weight and insulator wind area.

| Str. No. | Str. Name | LC # | WC # | Load Case Description | Set No. | Phase No. | Attach. Joint Labels | Structure Loads Vert. (lbs) | Structure Loads Trans. (lbs) | Structure Loads Long. (lbs) | Loads from back span Vert. (lbs) | Loads from back span Trans. (lbs) | Loads from back span Long. (lbs) | Loads from ahead span Vert. (lbs) | Loads from ahead span Trans. (lbs) | Loads from ahead span Long. (lbs) | Warnings |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | type_c-80ft.pol | 1 | 1 | RULE 250B NA+ | 1 | 1 | C1 | 3984 | -2136 | 15 | 1197 | -1005 | 17750 | 2787 | -1132 | -17735 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 1 | 1 | | 1 | 2 | C2 | 3984 | -2134 | 15 | 1197 | -1004 | 17750 | 2787 | -1130 | -17735 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 1 | 1 | | 1 | 3 | C3 | 3984 | -2132 | 15 | 1197 | -1003 | 17750 | 2787 | -1129 | -17735 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 1 | 1 | | 2 | 1 | SW:T | 1183 | -927 | 13 | 237 | -422 | 8728 | 946 | -505 | -8715 | |
| 11229 | type_c-80ft.pol | 2 | 1 | RULE 250B NA- | 1 | 1 | C1 | 3984 | -4665 | -9 | 1197 | -2398 | 17627 | 2787 | -2267 | -17637 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 2 | 1 | | 1 | 2 | C2 | 3984 | -4662 | -10 | 1197 | -2397 | 17627 | 2787 | -2265 | -17637 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 2 | 1 | | 1 | 3 | C3 | 3984 | -4660 | -10 | 1197 | -2396 | 17627 | 2787 | -2264 | -17637 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 2 | 1 | | 2 | 1 | SW:T | 1183 | -2417 | -3 | 237 | -1251 | 8648 | 946 | -1166 | -8652 | |
| 11229 | type_c-80ft.pol | 3 | 2 | RULE 250C NA+ | 1 | 1 | C1 | 1980 | 282 | 40 | 397 | 235 | 10357 | 1583 | 47 | -10317 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 3 | 2 | | 1 | 2 | C2 | 1980 | 229 | 40 | 397 | 206 | 10355 | 1583 | 23 | -10315 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 3 | 2 | | 1 | 3 | C3 | 1980 | 167 | 39 | 397 | 173 | 10352 | 1583 | -5 | -10313 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 3 | 2 | | 2 | 1 | SW:T | 420 | -111 | 20 | -79 | -15 | 4768 | 499 | -96 | -4748 | |
| 11229 | type_c-80ft.pol | 4 | 2 | RULE 250C NA- | 1 | 1 | C1 | 1980 | -4222 | 3 | 397 | -2209 | 10160 | 1583 | -2014 | -10157 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 4 | 2 | | 1 | 2 | C2 | 1980 | -4167 | 3 | 397 | -2179 | 10163 | 1583 | -1989 | -10160 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 4 | 2 | | 1 | 3 | C3 | 1980 | -4103 | 4 | 397 | -2144 | 10167 | 1583 | -1959 | -10163 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 4 | 2 | | 2 | 1 | SW:T | 420 | -1706 | 4 | -79 | -895 | 4683 | 499 | -811 | -4679 | |
| 11229 | type_c-80ft.pol | 5 | 3 | RULE 250D NA+ | 1 | 1 | C1 | 3856 | -1893 | 9 | 1222 | -911 | 13542 | 2634 | -983 | -13533 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 5 | 3 | | 1 | 2 | C2 | 3856 | -1891 | 9 | 1222 | -910 | 13542 | 2634 | -982 | -13533 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 5 | 3 | | 1 | 3 | C3 | 3856 | -1890 | 9 | 1222 | -909 | 13542 | 2634 | -981 | -13533 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 5 | 3 | | 2 | 1 | SW:T | 1642 | -876 | 8 | 442 | -411 | 7127 | 1199 | -465 | -7120 | |
| 11229 | type_c-80ft.pol | 6 | 3 | RULE 250D NA- | 1 | 1 | C1 | 3856 | -3300 | -5 | 1222 | -1687 | 13471 | 2634 | -1612 | -13477 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 6 | 3 | | 1 | 2 | C2 | 3856 | -3298 | -5 | 1222 | -1687 | 13472 | 2634 | -1611 | -13477 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 6 | 3 | | 1 | 3 | C3 | 3856 | -3296 | -5 | 1222 | -1686 | 13472 | 2634 | -1610 | -13477 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 6 | 3 | | 2 | 1 | SW:T | 1642 | -1857 | -3 | 442 | -957 | 7075 | 1199 | -901 | -7078 | |
| 11229 | type_c-80ft.pol | 7 | 1 | 250B No OLF NA+ | 1 | 1 | C1 | 2656 | -1555 | 7 | 798 | -752 | 10745 | 1858 | -803 | -10738 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 7 | 1 | | 1 | 2 | C2 | 2656 | -1554 | 7 | 798 | -752 | 10745 | 1858 | -802 | -10738 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 7 | 1 | | 1 | 3 | C3 | 2656 | -1552 | 7 | 798 | -751 | 10745 | 1858 | -801 | -10738 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 7 | 1 | | 2 | 1 | SW:T | 789 | -715 | 6 | 158 | -341 | 5281 | 631 | -374 | -5275 | |
| 11229 | type_c-80ft.pol | 8 | 1 | 250B No OLF NA- | 1 | 1 | C1 | 2656 | -2567 | -3 | 798 | -1310 | 10696 | 1858 | -1257 | -10699 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 8 | 1 | | 1 | 2 | C2 | 2656 | -2565 | -3 | 798 | -1309 | 10696 | 1858 | -1256 | -10699 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 8 | 1 | | 1 | 3 | C3 | 2656 | -2564 | -3 | 798 | -1308 | 10696 | 1858 | -1255 | -10699 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 8 | 1 | | 2 | 1 | SW:T | 789 | -1311 | -0 | 158 | -673 | 5250 | 631 | -639 | -5250 | |
| 11229 | type_c-80ft.pol | 9 | 12 | Deflection | 1 | 1 | C1 | 1792 | -1172 | -0 | 568 | -587 | 6098 | 1224 | -586 | -6098 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 9 | 12 | | 1 | 2 | C2 | 1792 | -1172 | -0 | 568 | -586 | 6098 | 1224 | -585 | -6098 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 9 | 12 | | 1 | 3 | C3 | 1792 | -1171 | -0 | 568 | -586 | 6098 | 1224 | -585 | -6099 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 9 | 12 | | 2 | 1 | SW:T | 293 | -341 | -0 | 46 | -170 | 1770 | 247 | -170 | -1770 | |
| 11229 | type_c-80ft.pol | 12 | 1 | BROKEN WIRE NA+ | 1 | 1 | C1 | 1197 | -1005 | 17750 | 1197 | -1005 | 17750 | 0 | 0 | 0 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 12 | 1 | | 1 | 2 | C2 | 3984 | -2134 | 15 | 1197 | -1004 | 17750 | 2787 | -1130 | -17735 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 12 | 1 | | 1 | 3 | C3 | 3984 | -2132 | 15 | 1197 | -1003 | 17750 | 2787 | -1129 | -17735 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 12 | 1 | | 2 | 1 | SW:T | 237 | -422 | 8728 | 237 | -422 | 8728 | 0 | 0 | 0 | |
| 11229 | type_c-80ft.pol | 13 | 1 | BROKEN WIRE NA- | 1 | 1 | C1 | 1197 | -2398 | 17627 | 1197 | -2398 | 17627 | 0 | 0 | 0 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 13 | 1 | | 1 | 2 | C2 | 3984 | -4662 | -10 | 1197 | -2397 | 17627 | 2787 | -2265 | -17637 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 13 | 1 | | 1 | 3 | C3 | 3984 | -4660 | -10 | 1197 | -2396 | 17627 | 2787 | -2264 | -17637 | Multiple spans sharing same strain insulator ?? |
| 11229 | type_c-80ft.pol | 13 | 1 | | 2 | 1 | SW:T | 237 | -1251 | 8648 | 237 | -1251 | 8648 | 0 | 0 | 0 | |

Wire Load Induced Ground Line Moments For Single Pole Centered At Structure Origin For Structure Range

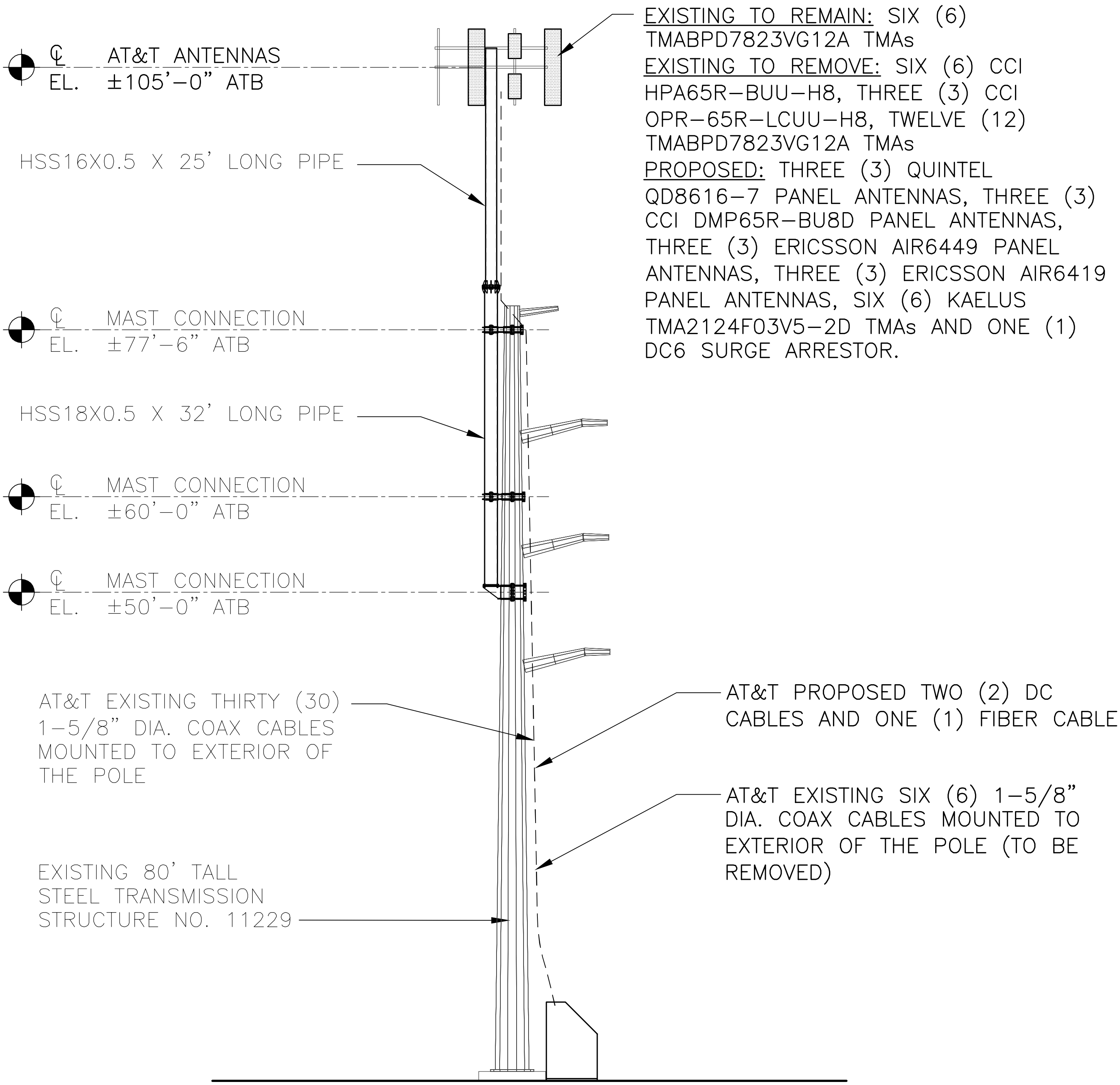
Note: not applicable to guyed structures or frames. These approximate values do not include nonlinear (P-delta) effects or wind on pole. ??

| Str. No. | Str. Name | LC # | WC # | Load Case Description | Vert. Load (kips) | Trans. Shear (kips) | Long. Shear (kips) | Resultant Shear (kips) | Trans. Moment (ft-k) | Long. Moment (ft-k) | Resultant Moment (ft-k) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | type_c-80ft.pol | 1 | 1 | RULE 250B NA+ | 13.135 | -7.329 | 0.059 | 7.330 | -557.531 | 3.589 | 557.542 |
| 11229 | type_c-80ft.pol | 2 | 1 | RULE 250B NA- | 13.135 | -16.403 | -0.032 | 16.403 | -1099.151 | -1.863 | 1099.152 |
| 11229 | type_c-80ft.pol | 3 | 2 | RULE 250C NA+ | 6.360 | 0.568 | 0.139 | 0.585 | -31.716 | 8.234 | 32.767 |
| 11229 | type_c-80ft.pol | 4 | 2 | RULE 250C NA- | 6.360 | -14.199 | 0.014 | 14.199 | -896.083 | 0.902 | 896.083 |
| 11229 | type_c-80ft.pol | 5 | 3 | RULE 250D NA+ | 13.210 | -6.550 | 0.034 | 6.550 | -511.168 | 2.103 | 511.173 |
| 11229 | type_c-80ft.pol | 6 | 3 | RULE 250D NA- | 13.210 | -11.752 | -0.019 | 11.752 | -824.702 | -1.117 | 824.703 |
| 11229 | type_c-80ft.pol | 7 | 1 | 250B No OLF NA+ | 8.757 | -5.377 | 0.026 | 5.377 | -401.374 | 1.613 | 401.378 |
| 11229 | type_c-80ft.pol | 8 | 1 | 250B No OLF NA- | 8.757 | -9.006 | -0.010 | 9.006 | -618.022 | -0.568 | 618.023 |
| 11229 | type_c-80ft.pol | 9 | 12 | Deflection | 5.668 | -3.856 | -0.000 | 3.856 | -278.934 | -0.012 | 278.934 |
| 11229 | type_c-80ft.pol | 12 | 1 | BROKEN WIRE NA+ | 9.402 | -5.693 | 26.509 | 27.113 | -408.286 | 1900.163 | 1943.532 |
| 11229 | type_c-80ft.pol | 13 | 1 | BROKEN WIRE NA- | 9.402 | -12.970 | 26.256 | 29.285 | -820.270 | 1882.988 | 2053.895 |

Basic factored design wind pressure on structure For Structure Range

| Str. No. | Str. Name | LC # | WC # | Load Case Description | Trans. Wind Press. (psf) | Long. Wind Press. (psf) | Notes |
|---|---|---|---|---|---|---|---|
| 11229 | type_c-80ft.pol | 1 | 1 | RULE 250B NA+ | 10.0 | 0.0 | |
| 11229 | type_c-80ft.pol | 2 | 1 | RULE 250B NA- | -10.0 | -0.0 | |
| 11229 | type_c-80ft.pol | 3 | 2 | RULE 250C NA+ | 30.5 | 0.0 | Wind adjusted for terrain category 'C' and hgt. 53.33 (ft) (larger of hgt*2/3 and 6.67m) |
| 11229 | type_c-80ft.pol | 4 | 2 | RULE 250C NA- | -30.5 | -0.0 | Wind adjusted for terrain category 'C' and hgt. 53.33 (ft) (larger of hgt*2/3 and 6.67m) |
| 11229 | type_c-80ft.pol | 5 | 3 | RULE 250D NA+ | 4.1 | 0.0 | |
| 11229 | type_c-80ft.pol | 6 | 3 | RULE 250D NA- | -4.1 | -0.0 | |
| 11229 | type_c-80ft.pol | 7 | 1 | 250B No OLF NA+ | 4.0 | 0.0 | |
| 11229 | type_c-80ft.pol | 8 | 1 | 250B No OLF NA- | -4.0 | -0.0 | |
| 11229 | type_c-80ft.pol | 9 | 12 | Deflection | 0.0 | 0.0 | |
| 11229 | type_c-80ft.pol | 12 | 1 | BROKEN WIRE NA+ | 10.0 | 0.0 | |
| 11229 | type_c-80ft.pol | 13 | 1 | BROKEN WIRE NA- | -10.0 | -0.0 | |

Structure loads written to the following LCA files:
c:\pls\temp\11229.lca




1 / EL–1 **TOWER & MAST ELEVATION**

SCALE: NOT TO SCALE

| REVISIONS | | |
|---|---|---|
| 00 | 6/10/22 | CONSTRUCTION |
| 01 | 8/18/22 | CONSTRUCTION |
| | | |
| | | |
| | | |

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| | |
|---|---|
| PROJECT NO: | 22021.06 |
| DRAWN BY: | TJL |
| CHECKED BY: | CFC |
| SCALE: | AS NOTED |
| DATE: | 6/10/22 |

TOWER AND MAST ELEVATION

EL-1

DWG. 1 OF 1

## Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-G

### Wind Speeds

| | | | |
|---|---|---|---|
| Basic Wind Speed | $V := 97$ | mph | (User Input - 2018 CSBC Appendix N) |
| Basic Wind Speed with Ice | $V_i := 50$ | mph | (User Input per Annex B of TIA-222-G) |
| Basic Wind Speed Service Loads | $V_{Ser} := 60$ | mph | (User Input - TIA-222-G Section 2.8.3) |

### Input

| | | | |
|---|---|---|---|
| Structure Type = | Structure_Type := Pole | | (User Input) |
| Structure Category = | SC := III | | (User Input) |
| Exposure Category = | Exp := C | | (User Input) |
| Structure Height = | $h := 80$ | ft | (User Input) |
| Height to Center of Antennas = | $z_{ant} := 105$ | ft | (User Input) |
| Height to Center of Mast 1 = | $z_{Mast1} := 94.5$ | ft | (User Input) |
| Height to Center of Mast 2 = | $z_{Mast2} := 66$ | ft | (User Input) |
| Radial Ice Thickness = | $t_i := 0.75$ | in | (User Input per Annex B of TIA-222-G) |
| Radial Ice Density = | $Id := 56.00$ | pcf | (User Input) |
| Topograpic Factor = | $K_{zt} := 1.0$ | | (User Input) |
| | $K_a := 0.8$ | | (User Input) |
| Gust Response Factor = | $G_H := 1.35$ | | (User Input) |

### Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if Structure\_Type = Pole} \\ 0.85 & \text{if Structure\_Type = Lattice} \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-G)

Importance Factors =

$$I_{Wind} := \begin{cases} 0.87 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.15 & \text{if SC = 3} \end{cases} = 1.15$$

(Per Table 2-3 of TIA-222-G)

$$I_{Wind\_w\_Ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.00 & \text{if SC = 3} \end{cases} = 1$$

$$I_{ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.25 & \text{if SC = 3} \end{cases} = 1.25$$

Wind Direction Probability Factor (Service) = $K_{dSer} := 0.85$ (Per Section 2.8.3 of TIA-222-G)

Importance Factor (Service) = $I_{Ser} := 1$ (Per Section 2.8.3 of TIA-222-G)

$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.123$ $t_{izant} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.105$

Velocity Pressure Coefficient Antennas = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.279$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V^2 \cdot I_{Wind} = 33.649$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.774$

Velocity Pressure Service = $qz_{ant.Ser} := 0.00256 \cdot K_{dSer} \cdot Kz_{ant} \cdot V_{Ser}^2 \cdot I_{Ser} = 10.017$

$K_{izMast1} := \left(\frac{z_{Mast1}}{33}\right)^{0.1} = 1.111$ $t_{izMast1} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{izMast1} \cdot K_{zt}^{0.35} = 2.083$

Velocity Pressure Coefficient Mast = $Kz_{Mast1} := 2.01\left(\left(\frac{z_{Mast1}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.251$

Velocity Pressure w/o Ice Mast= $qz_{Mast1} := 0.00256 \cdot K_d \cdot Kz_{Mast1} \cdot V^2 \cdot I_{Wind} = 32.911$

Velocity Pressure with Ice Mast = $qz_{ice.Mast1} := 0.00256 \cdot K_d \cdot Kz_{Mast1} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.604$

Velocity Pressure Service = $qz_{Mast1.Ser} := 0.00256 \cdot K_{dSer} \cdot Kz_{Mast1} \cdot V_{Ser}^2 \cdot I_{Ser} = 9.797$

$K_{izMast2} := \left(\frac{z_{Mast2}}{33}\right)^{0.1} = 1.072$ $t_{izMast2} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{izMast2} \cdot K_{zt}^{0.35} = 2.01$

Velocity Pressure Coefficient Mast = $Kz_{Mast2} := 2.01\left(\left(\frac{z_{Mast2}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.16$

Velocity Pressure w/o Ice Mast= $qz_{Mast2} := 0.00256 \cdot K_d \cdot Kz_{Mast2} \cdot V^2 \cdot I_{Wind} = 30.515$

Velocity Pressure with Ice Mast = $qz_{ice.Mast2} := 0.00256 \cdot K_d \cdot Kz_{Mast2} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.05$

Velocity Pressure Service = $qz_{Mast2.Ser} := 0.00256 \cdot K_{dSer} \cdot Kz_{Mast2} \cdot V_{Ser}^2 \cdot I_{Ser} = 9.084$

**Development of Wind & Ice Load on Mast**

| | | | |
|---|---|---|---|
| **Mast Data:** | (HSS16x0.5) | | (User Input) |
| Mast Shape = | Round | | (User Input) |
| Mast Diameter = | $D_{mast} := 16$ | in | (User Input) |
| Mast Length = | $L_{mast} := 25$ | ft | (User Input) |
| Mast Thickness = | $t_{mast} := 0.5$ | in | (User Input) |

Mast Aspect Ratio = $Ar_{mast} := \frac{12 L_{mast}}{D_{mast}} = 18.8$

Mast Force Coefficient = $Ca_{mast} = 1.06$

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Mast Projected Surface Area = | $A_{mast} := \frac{D_{mast}}{12} = 1.333$ | sf/ft | |
| Total Mast Wind Force = | $qz_{Mast1} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 63$ | plf | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Mast Projected Surface Area w/ Ice = | $AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{izMast1})}{12} = 1.681$ | sf/ft | |
| Total Mast Wind Force w/ Ice = | $qz_{ice.Mast1} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 18$ | plf | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Mast Wind Force Service Loads = | $qz_{Mast1.Ser} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 19$ | plf | **BLC 6** |

**Gravity Loads (without ice)**

| | | | | |
|---|---|---|---|---|
| Weight of the mast = | Self Weight | **(Computed internally by Risa-3D)** | plf | **BLC 1** |

**Gravity Loads (ice only)**

| | | | |
|---|---|---|---|
| Ice Area per Linear Foot = | $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast1} \cdot 2\right)^2 - D_{mast}^{\,2}\right] = 118.3$ | sq in | |
| Weight of Ice on Mast = | $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 46$ | plf | **BLC 3** |

**Development of Wind & Ice Load on Mast**

| | | | |
|---|---|---|---|
| **Mast Data:** | (HSS18x0.5) | | (User Input) |
| Mast Shape = | Round | | (User Input) |
| Mast Diameter = | $D_{mast} := 18$ | in | (User Input) |
| Mast Length = | $L_{mast} := 32$ | ft | (User Input) |
| Mast Thickness = | $t_{mast} := 0.5$ | in | (User Input) |
| Mast Aspect Ratio = | $Ar_{mast} := \frac{12 L_{mast}}{D_{mast}} = 21.3$ | | |
| Mast Force Coefficient = | $Ca_{mast} = 1.12$ | | |

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Mast Projected Surface Area = | $A_{mast} := \frac{D_{mast}}{12} = 1.5$ | sf/ft | |
| Total Mast Wind Force = | $qz_{Mast2} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 69$ | plf | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Mast Projected Surface Area w/ Ice = | $AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{izMast2})}{12} = 1.835$ | sf/ft | |
| Total Mast Wind Force w/ Ice = | $qz_{ice.Mast2} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 20$ | plf | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Mast Wind Force Service Loads = | $qz_{Mast2.Ser} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 21$ | plf | **BLC 6** |

**Gravity Loads (without ice)**

| | | | | |
|---|---|---|---|---|
| Weight of the mast = | Self Weight | **(Computed internally by Risa-3D)** | plf | **BLC 1** |

**Gravity Loads (ice only)**

| | | | |
|---|---|---|---|
| Ice Area per Linear Foot = | $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast2} \cdot 2\right)^2 - D_{mast}^2\right] = 126.3$ | sq in | |
| Weight of Ice on Mast = | $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 49$ | plf | **BLC 3** |

**Development of Wind & Ice Load on Antennas**

**Antenna Data:**

Antenna Model = CCI DMP65R-BU8D

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 96$ in (User Input)

Antenna Width = $W_{ant} := 20.7$ in (User Input)

Antenna Thickness = $T_{ant} := 7.7$ in (User Input)

Antenna Weight = $WT_{ant} := 115$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.6$

Antenna Force Coefficient = $Ca_{ant} = 1.3$

**Wind Load (without ice)**

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 13.8$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 41.4$ sf

Total Antenna Wind Force = $F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 1948$ lbs **BLC 5**

**Wind Load (with ice)**

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izant}) \cdot (W_{ant} + 2 \cdot t_{izant})}{144} = 17.3$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 52$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 565$ lbs **BLC 4**

**Wind Load (Service)**

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 580$ lbs **BLC 6**

**Gravity Load (without ice)**

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 345$ lbs **BLC 2**

**Gravity Loads (ice only)**

cu in

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{izant})(W_{ant} + 2 \cdot t_{izant}) \cdot (T_{ant} + 2 \cdot t_{izant}) - V_{ant} = 1 \times 10^4$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 468$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 1403$ lbs **BLC 3**

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

Antenna Model = Quintel QD8616-7

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 96$ in (User Input)

Antenna Width = $W_{ant} := 22$ in (User Input)

Antenna Thickness = $T_{ant} := 9.6$ in (User Input)

Antenna Weight = $WT_{ant} := 132$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.4$

Antenna Force Coefficient = $Ca_{ant} = 1.28$

**Wind Load (without ice)**

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 14.7$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 44$ sf

Total Antenna Wind Force = $F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 2051$ lbs **BLC 5**

**Wind Load (with ice)**

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izant}) \cdot (W_{ant} + 2 \cdot t_{izant})}{144} = 18.2$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 54.7$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 589$ lbs **BLC 4**

**Wind Load (Service)**

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 611$ lbs **BLC 6**

**Gravity Load (without ice)**

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 396$ lbs **BLC 2**

**Gravity Loads (ice only)**

cu in

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{izant})(W_{ant} + 2 \cdot t_{izant}) \cdot (T_{ant} + 2 \cdot t_{izant}) - V_{ant} = 2 \times 10^4$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 518$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 1555$ lbs **BLC 3**

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | Ericsson AIR6419 | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 31.1$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 16.1$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 7.3$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 56$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 3$ | | (User Input) |
| Antenna Aspect Ratio = | $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.9$ | | |
| Antenna Force Coefficient = | $Ca_{ant} = 1.2$ | | |

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna = | $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.5$ | sf | |
| Antenna Projected Surface Area = | $A_{ant} := SA_{ant} \cdot N_{ant} = 10.4$ | sf | |
| Total Antenna Wind Force = | $F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 455$ | lbs | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna w/ Ice = | $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izant}) \cdot (W_{ant} + 2 \cdot t_{izant})}{144} = 5$ | sf | |
| Antenna Projected Surface Area w/ Ice = | $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 14.9$ | sf | |
| Total Antenna Wind Force w/ Ice = | $Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 151$ | lbs | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Antenna Wind Force Service Loads = | $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 135$ | lbs | **BLC 6** |

**Gravity Load (without ice)**

| | | | |
|---|---|---|---|
| Weight of All Antennas = | $WT_{ant} \cdot N_{ant} = 168$ | lbs | **BLC 2** |

**Gravity Loads (ice only)**

cu in

| | | | |
|---|---|---|---|
| Volume of Each Antenna = | $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3655$ | cu in | |
| Volume of Ice on Each Antenna = | $V_{ice} := (L_{ant} + 2 \cdot t_{izant})(W_{ant} + 2 \cdot t_{izant}) \cdot (T_{ant} + 2 \cdot t_{izant}) - V_{ant} = 4599$ | | |
| Weight of Ice on Each Antenna = | $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 149$ | lbs | |
| Weight of Ice on All Antennas = | $W_{ICEant} \cdot N_{ant} = 447$ | lbs | **BLC 3** |

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | Ericsson AIR6449 | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 30.6$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 15.9$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 10.6$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 96$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 3$ | | (User Input) |
| Antenna Aspect Ratio = | $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.9$ | | |
| Antenna Force Coefficient = | $Ca_{ant} = 1.2$ | | |

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna = | $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.4$ | sf | |
| Antenna Projected Surface Area = | $A_{ant} := SA_{ant} \cdot N_{ant} = 10.1$ | sf | |
| Total Antenna Wind Force = | $F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 442$ | lbs | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna w/ Ice = | $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izant}) \cdot (W_{ant} + 2 \cdot t_{izant})}{144} = 4.9$ | sf | |
| Antenna Projected Surface Area w/ Ice = | $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 14.6$ | sf | |
| Total Antenna Wind Force w/ Ice = | $Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 147$ | lbs | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Antenna Wind Force Service Loads = | $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 132$ | lbs | **BLC 6** |

**Gravity Load (without ice)**

| | | | |
|---|---|---|---|
| Weight of All Antennas = | $WT_{ant} \cdot N_{ant} = 288$ | lbs | **BLC 2** |

**Gravity Loads (ice only)** cu in

| | | | |
|---|---|---|---|
| Volume of Each Antenna = | $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5157$ | cu in | |
| Volume of Ice on Each Antenna = | $V_{ice} := (L_{ant} + 2 \cdot t_{izant})(W_{ant} + 2 \cdot t_{izant}) \cdot (T_{ant} + 2 \cdot t_{izant}) - V_{ant} = 5210$ | | |
| Weight of Ice on Each Antenna = | $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 169$ | lbs | |
| Weight of Ice on All Antennas = | $W_{ICEant} \cdot N_{ant} = 507$ | lbs | **BLC 3** |

**Development of Wind & Ice Load on Antennas**

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | Kaelus TMA2124F03V5-2D | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 9.7$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 10.4$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 8.3$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 36$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 6$ | | (User Input) |
| Antenna Aspect Ratio = | $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 0.9$ | | |
| Antenna Force Coefficient = | $Ca_{ant} = 1.2$ | | |

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna = | $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.7$ | sf | |
| Antenna Projected Surface Area = | $A_{ant} := SA_{ant} \cdot N_{ant} = 4.2$ | sf | |
| Total Antenna Wind Force = | $F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 183$ | lbs | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna w/ Ice = | $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izant}) \cdot (W_{ant} + 2 \cdot t_{izant})}{144} = 1.4$ | sf | |
| Antenna Projected Surface Area w/ Ice = | $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 8.5$ | sf | |
| Total Antenna Wind Force w/ Ice = | $Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 85$ | lbs | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Antenna Wind Force Service Loads = | $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 55$ | lbs | **BLC 6** |

**Gravity Load (without ice)**

| | | | |
|---|---|---|---|
| Weight of All Antennas = | $WT_{ant} \cdot N_{ant} = 216$ | lbs | **BLC 2** |

**Gravity Loads (ice only)** cu in

| | | | |
|---|---|---|---|
| Volume of Each Antenna = | $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 837$ | cu in | |
| Volume of Ice on Each Antenna = | $V_{ice} := (L_{ant} + 2 \cdot t_{izant})(W_{ant} + 2 \cdot t_{izant}) \cdot (T_{ant} + 2 \cdot t_{izant}) - V_{ant} = 1705$ | | |
| Weight of Ice on Each Antenna = | $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 55$ | lbs | |
| Weight of Ice on All Antennas = | $W_{ICEant} \cdot N_{ant} = 332$ | lbs | **BLC 3** |

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | CCI TMABPD7823VG12A | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 14.25$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 11.024$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 4.11$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 22$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 6$ | | (User Input) |
| Antenna Aspect Ratio = | $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.3$ | | |
| Antenna Force Coefficient = | $Ca_{ant} = 1.2$ | | |

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna = | $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 1.1$ | sf | |
| Antenna Projected Surface Area = | $A_{ant} := SA_{ant} \cdot N_{ant} = 6.5$ | sf | |
| Total Antenna Wind Force = | $F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 285$ | lbs | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna w/ Ice = | $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izant}) \cdot (W_{ant} + 2 \cdot t_{izant})}{144} = 2$ | sf | |
| Antenna Projected Surface Area w/ Ice = | $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 11.7$ | sf | |
| Total Antenna Wind Force w/ Ice = | $Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 118$ | lbs | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Antenna Wind Force Service Loads = | $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 85$ | lbs | **BLC 6** |

**Gravity Load (without ice)**

| | | | |
|---|---|---|---|
| Weight of All Antennas = | $WT_{ant} \cdot N_{ant} = 132$ | lbs | **BLC 2** |

**Gravity Loads (ice only)**

cu in

| | | | |
|---|---|---|---|
| Volume of Each Antenna = | $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 646$ | cu in | |
| Volume of Ice on Each Antenna = | $V_{ice} := (L_{ant} + 2 \cdot t_{izant})(W_{ant} + 2 \cdot t_{izant}) \cdot (T_{ant} + 2 \cdot t_{izant}) - V_{ant} = 1694$ | | |
| Weight of Ice on Each Antenna = | $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 55$ | lbs | |
| Weight of Ice on All Antennas = | $W_{ICEant} \cdot N_{ant} = 329$ | lbs | **BLC 3** |

**Development of Wind & Ice Load on Antennas**

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | Raycap DC6-48-60-18-8C | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 31.4$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 18.28$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 10.24$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 26$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 1$ | | (User Input) |
| Antenna Aspect Ratio = | $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.7$ | | |
| Antenna Force Coefficient = | $Ca_{ant} = 1.2$ | | |

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna = | $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4$ | sf | |
| Antenna Projected Surface Area = | $A_{ant} := SA_{ant} \cdot N_{ant} = 4$ | sf | |
| Total Antenna Wind Force = | $F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 174$ | lbs | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Surface Area for One Antenna w/ Ice = | $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izant}) \cdot (W_{ant} + 2 \cdot t_{izant})}{144} = 5.6$ | sf | |
| Antenna Projected Surface Area w/ Ice = | $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 5.6$ | sf | |
| Total Antenna Wind Force w/ Ice = | $Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 56$ | lbs | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Antenna Wind Force Service Loads = | $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 52$ | lbs | **BLC 6** |

**Gravity Load (without ice)**

| | | | |
|---|---|---|---|
| Weight of All Antennas = | $WT_{ant} \cdot N_{ant} = 26$ | lbs | **BLC 2** |

**Gravity Loads (ice only)** cu in

| | | | |
|---|---|---|---|
| Volume of Each Antenna = | $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5878$ | cu in | |
| Volume of Ice on Each Antenna = | $V_{ice} := (L_{ant} + 2 \cdot t_{izant})(W_{ant} + 2 \cdot t_{izant}) \cdot (T_{ant} + 2 \cdot t_{izant}) - V_{ant} = 5695$ | | |
| Weight of Ice on Each Antenna = | $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 185$ | lbs | |
| Weight of Ice on All Antennas = | $W_{ICEant} \cdot N_{ant} = 185$ | lbs | **BLC 3** |

## Development of Wind & Ice Load on Antenna Mounts

**Mount Data:**

| | | | |
|---|---|---|---|
| Mount Type: | Custom T-Arm Mount w/ Square Horz. and Handrail | | |
| Platform Shape = | Flat | | (User Input) |
| Platform Area = | $A_{plt} := 25$ | sq ft | (User Input) |
| Platform Area w/ Ice = | $A_{ICE.plt} := 32$ | sq ft | (User Input) |
| Platform Weight = | $WT_{plt} := 1675$ | lbs | (User Input) |
| Platform Weight w/ Ice = | $WT_{ICE.plt} := 2200$ | lbs | (User Input) |

**Wind Load (without ice)**

| | | | |
|---|---|---|---|
| Total Platform Wind Force = | $F_{plt} := qz_{ant} \cdot G_H \cdot A_{plt} = 1136$ | lbs | **BLC 5** |

**Wind Load (with ice)**

| | | | |
|---|---|---|---|
| Total Platform Wind Force w/ Ice = | $Fi_{plt} := qz_{ice.ant} \cdot G_H \cdot A_{ICE.plt} = 336$ | lbs | **BLC 4** |

**Wind Load (Service)**

| | | | |
|---|---|---|---|
| Total Platform Wind Force Service Loads = | $F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot A_{plt} = 338$ | lbs | **BLC 6** |

**Gravity Load (without ice)**

| | | | |
|---|---|---|---|
| Weight of Platform = | $WT_{plt} = 1675$ | lbs | **BLC 2** |

**Gravity Loads (ice only)**

| | | | |
|---|---|---|---|
| Weight of Ice on Platform = | $WT_{ICE.plt} - WT_{plt} = 525$ | lbs | **BLC 3** |

## Development of Wind & Ice Load on Coax Cables

**Cable Data:**

Type = 1-5/8"

Shape = Round (User Input)

Coax Outside Diameter = $D_{coax} := 1.98$ in (User Input)

Coax Cable Length = $L_{coax} := 25$ ft (User Input)

Weight of Coax per foot = $Wt_{coax} := 1.04$ plf (User Input)

Total Number of Coax = $N_{coax} := 33$ (User Input - 30 Coax & 1 Hybrid & 2 DC)

No. of Coax Projecting Outside Face of PCS Mast = $NP_{coax} := 8$ (User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 151.5$

Coax Cable Force Factor Coefficient = $Ca_{coax} = 1.2$

### Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 1.3$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{Mast1} \cdot G_H \cdot A_{coax} = 70$ plf **BLC 5**

### Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot t_{izMast1})}{12} = 1.7$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.Mast1} \cdot G_H \cdot AICE_{coax} = 21$ plf **BLC 4**

### Wind Load (Service )

Total Coax Wind Force Service Loads = $F_{coax} := Ca_{coax} \cdot qz_{Mast1.Ser} \cdot G_H \cdot A_{coax} = 21$ plf **BLC 6**

### Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 34$ plf **BLC 2**

### Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot t_{izMast1})^2 - D_{coax}^{\ 2}\right] = 26.6$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 341$ plf **BLC 3**

## (Global) Model Settings

| | |
|---|---|
| Display Sections for Member Calcs | 5 |
| Max Internal Sections for Member Calcs | 97 |
| Include Shear Deformation? | Yes |
| Increase Nailing Capacity for Wind? | Yes |
| Include Warping? | Yes |
| Trans Load Btwn Intersecting Wood Wall? | Yes |
| Area Load Mesh (in^2) | 144 |
| Merge Tolerance (in) | .12 |
| P-Delta Analysis Tolerance | 0.50% |
| Include P-Delta for Walls? | Yes |
| Automatically Iterate Stiffness for Walls? | No |
| Max Iterations for Wall Stiffness | 3 |
| Gravity Acceleration (ft/sec^2) | 32.2 |
| Wall Mesh Size (in) | 12 |
| Eigensolution Convergence Tol. (1.E-) | 4 |
| Vertical Axis | Y |
| Global Member Orientation Plane | XZ |
| Static Solver | Sparse Accelerated |
| Dynamic Solver | Accelerated Solver |

| | |
|---|---|
| Hot Rolled Steel Code | AISC 14th(360-10): LRFD |
| Adjust Stiffness? | Yes(Iterative) |
| RISAConnection Code | AISC 14th(360-10): ASD |
| Cold Formed Steel Code | AISI 1999: ASD |
| Wood Code | AF&PA NDS-91/97: ASD |
| Wood Temperature | < 100F |
| Concrete Code | ACI 318-02 |
| Masonry Code | ACI 530-05: ASD |
| Aluminum Code | AA ADM1-05: ASD - Building |
| Stainless Steel Code | AISC 14th(360-10): ASD |
| Adjust Stiffness? | Yes(Iterative) |

| | |
|---|---|
| Number of Shear Regions | 4 |
| Region Spacing Increment (in) | 4 |
| Biaxial Column Method | PCA Load Contour |
| Parme Beta Factor (PCA) | .65 |
| Concrete Stress Block | Rectangular |
| Use Cracked Sections? | Yes |
| Use Cracked Sections Slab? | Yes |
| Bad Framing Warnings? | No |
| Unused Force Warnings? | Yes |
| Min 1 Bar Diam. Spacing? | No |
| Concrete Rebar Set | REBAR_SET_ASTMA615 |
| Min % Steel for Column | 1 |
| Max % Steel for Column | 8 |

## (Global) Model Settings, Continued

| | |
|---|---|
| Seismic Code | UBC 1997 |
| Seismic Base Elevation (ft) | Not Entered |
| Add Base Weight? | No |
| Ct X | .035 |
| Ct Z | .035 |
| T X (sec) | Not Entered |
| T Z (sec) | Not Entered |
| R X | 8.5 |
| R Z | 8.5 |
| Ca | .36 |
| Cv | .54 |
| Nv | 1 |
| Occupancy Category | 4 |
| Seismic Zone | 3 |
| Om Z | 1 |
| Om X | 1 |
| Rho Z | 1 |
| Rho X | 1 |
| | |
| Footing Overturning Safety Factor | 1.5 |
| Optimize for OTM/Sliding | No |
| Check Concrete Bearing | No |
| Footing Concrete Weight (k/ft^3) | 0 |
| Footing Concrete f'c (ksi) | 3 |
| Footing Concrete Ec (ksi) | 4000 |
| Lambda | 1 |
| Footing Steel fy (ksi) | 60 |
| Minimum Steel | 0.0018 |
| Maximum Steel | 0.0075 |
| Footing Top Bar | #3 |
| Footing Top Bar Cover (in) | 3.5 |
| Footing Bottom Bar | #3 |
| Footing Bottom Bar Cover (in) | 3.5 |
| Pedestal Bar | #3 |
| Pedestal Bar Cover (in) | 1.5 |
| Pedestal Ties | #3 |

## Hot Rolled Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (\... | Density[k/ft^3] | Yield[ksi] | Ry | Fu[ksi] | Rt |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A36 Gr.36 | 29000 | 11154 | .3 | .65 | .49 | 36 | 1.5 | 58 | 1.2 |
| 2 | A572 Gr.50 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 58 | 1.2 |
| 3 | A992 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 58 | 1.2 |
| 4 | A500 Gr.42 | 29000 | 11154 | .3 | .65 | .49 | 42 | 1.3 | 58 | 1.1 |
| 5 | A500 Gr.46 | 29000 | 11154 | .3 | .65 | .49 | 46 | 1.2 | 58 | 1.1 |
| 6 | A53 Gr. B | 29000 | 11154 | .3 | .65 | .49 | 35 | 1.5 | 58 | 1.2 |

## Hot Rolled Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design Ru... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mast | HSS18x0.500 | Beam | Pipe | A500 Gr.42 | Typical | 25.6 | 985 | 985 | 1970 |
| 2 | Mast 2 | HSS16x0.500 | Beam | Pipe | A500 Gr.42 | Typical | 22.7 | 685 | 685 | 1370 |

## Hot Rolled Steel Design Parameters

| | Label | Shape | Length[ft] | Lbyy[ft] | Lbzz[ft] | Lcomp top[... | Lcomp bot[... | L-torq... | Kyy | Kzz | Cb | Functi... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | Mast | 32 | | | Lbyy | | | | | | Lateral |
| 2 | M2 | Mast 2 | 25 | | | Lbyy | | | | | | Lateral |

## Member Primary Data

| | Label | I Joint | J Joint | K Joint | Rotate(... | Section/Shape | Type | Design List | Material | Design ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | BOTC... | FLANGE | | | Mast | Beam | Pipe | A500 Gr.42 | Typical |
| 2 | M2 | FLANGE | TOPM... | | | Mast 2 | Beam | Pipe | A500 Gr.42 | Typical |

## Joint Coordinates and Temperatures

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 1 | BOTCONNECTION | 0 | 0 | 0 | 0 | |
| 2 | CONN | 0 | 10 | 0 | 0 | |
| 3 | TOPCONNECTION | 0 | 27.5 | 0 | 0 | |
| 4 | TOPMAST | 0 | 57 | 0 | 0 | |
| 5 | ANTCL | 0 | 55 | 0 | 0 | |
| 6 | FLANGE | 0 | 32 | 0 | 0 | |

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Z [k/in] | X Rot.[k-ft/rad] | Y Rot.[k-ft/rad] | Z Rot.[k-ft/rad] |
|---|---|---|---|---|---|---|---|
| 1 | BOTCONNECTION | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 2 | TOPCONNECTION | Reaction | | Reaction | | | |
| 3 | CONN | Reaction | | Reaction | | | |

## Member Point Loads

| Member Label | Direction | Magnitude[k,k-ft] | Location[ft,%] |
|---|---|---|---|
| No Data to Print ... | | | |

## Joint Loads and Enforced Displacements (BLC 2 : Weight of Appurtenances)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | Y | -.345 |
| 2 | ANTCL | L | Y | -.396 |
| 3 | ANTCL | L | Y | -.168 |
| 4 | ANTCL | L | Y | -.288 |
| 5 | ANTCL | L | Y | -.216 |
| 6 | ANTCL | L | Y | -.132 |
| 7 | ANTCL | L | Y | -.026 |
| 8 | ANTCL | L | Y | -1.675 |

## Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | Y | -1.403 |
| 2 | ANTCL | L | Y | -1.555 |
| 3 | ANTCL | L | Y | -.447 |
| 4 | ANTCL | L | Y | -.507 |
| 5 | ANTCL | L | Y | -.332 |
| 6 | ANTCL | L | Y | -.329 |
| 7 | ANTCL | L | Y | -.185 |
| 8 | ANTCL | L | Y | -.525 |

## Joint Loads and Enforced Displacements (BLC 4 : (x) TIA Wind with Ice)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | X | .565 |
| 2 | ANTCL | L | X | .589 |
| 3 | ANTCL | L | X | .151 |
| 4 | ANTCL | L | X | .147 |
| 5 | ANTCL | L | X | .085 |
| 6 | ANTCL | L | X | .118 |
| 7 | ANTCL | L | X | .056 |
| 8 | ANTCL | L | X | .336 |

## Joint Loads and Enforced Displacements (BLC 5 : (x) TIA Wind)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | X | 1.948 |
| 2 | ANTCL | L | X | 2.051 |
| 3 | ANTCL | L | X | .455 |
| 4 | ANTCL | L | X | .442 |
| 5 | ANTCL | L | X | .183 |
| 6 | ANTCL | L | X | .285 |
| 7 | ANTCL | L | X | .174 |
| 8 | ANTCL | L | X | 1.136 |

## Joint Loads and Enforced Displacements (BLC 6 : (x) TIA Wind Service)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | X | .58 |
| 2 | ANTCL | L | X | .611 |
| 3 | ANTCL | L | X | .135 |
| 4 | ANTCL | L | X | .132 |
| 5 | ANTCL | L | X | .055 |
| 6 | ANTCL | L | X | .085 |
| 7 | ANTCL | L | X | .052 |
| 8 | ANTCL | L | X | .338 |

## Member Distributed Loads (BLC 2 : Weight of Appurtenances)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft.. | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M2 | Y | -.034 | -.034 | 0 | 18 |

## Member Distributed Loads (BLC 3 : Weight of Ice Only)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft.. | End Location[ft,... |
|---|---|---|---|---|---|---|

## *Member Distributed Loads (BLC 3 : Weight of Ice Only) (Continued)*

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | Y | -.049 | -.049 | 0 | 0 |
| 2 | M2 | Y | -.046 | -.046 | 0 | 0 |
| 3 | M2 | Y | -.341 | -.341 | 0 | 18 |

## *Member Distributed Loads (BLC 4 : (x) TIA Wind with Ice)*

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | X | .02 | .02 | 0 | 0 |
| 2 | M2 | X | .018 | .018 | 0 | 0 |
| 3 | M2 | X | .021 | .021 | 0 | 18 |

## *Member Distributed Loads (BLC 5 : (x) TIA Wind)*

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | X | .069 | .069 | 0 | 0 |
| 2 | M2 | X | .063 | .063 | 0 | 0 |
| 3 | M2 | X | .07 | .07 | 0 | 18 |

## *Member Distributed Loads (BLC 6 : (x) TIA Wind Service)*

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | X | .021 | .021 | 0 | 0 |
| 2 | M2 | X | .019 | .019 | 0 | 0 |
| 3 | M2 | X | .021 | .021 | 0 | 18 |

## *Basic Load Cases*

| | BLC Description | Category | X Gra... | Y Gra... | Z Gra... | Joint | Point | Distrib... | Area(... | Surfa... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Self Weight | None | | -1 | | | | | | |
| 2 | Weight of Appurtenances | None | | | | 8 | | 1 | | |
| 3 | Weight of Ice Only | None | | | | 8 | | 3 | | |
| 4 | (x) TIA Wind with Ice | None | | | | 8 | | 3 | | |
| 5 | (x) TIA Wind | None | | | | 8 | | 3 | | |
| 6 | (x) TIA Wind Service | None | | | | 8 | | 3 | | |

## *Load Combinations*

| | Description | So... | P... | S... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.2D + 1.6W (X... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 5 | 1.6 | | | | | | | | | | | | | | |
| 2 | 0.9D + 1.6W (X... | Yes | Y | | 1 | .9 | 2 | .9 | 5 | 1.6 | | | | | | | | | | | | | | |
| 3 | 1.2D + 1.0Di + ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 3 | 1 | 4 | 1 | | | | | | | | | | | | |
| 4 | 1.0D+1.0Ws (X... | Yes | Y | | 1 | 1 | 2 | 1 | 6 | 1 | | | | | | | | | | | | | | |

## *Envelope Joint Reactions*

| | Joint | | X [k] | LC | Y [k] | LC | Z [k] | LC | MX [k-ft] | LC | MY [k-ft] | LC | MZ [k-ft] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BOTCONNEC... | max | -3.366 | 4 | 24.431 | 3 | 0 | 4 | 0 | 4 | 0 | 4 | 55.7 | 1 |
| 2 | | min | -18.087 | 1 | 7.719 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 10.363 | 4 |
| 3 | TOPCONNEC... | max | -8.331 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 |
| 4 | | min | -44.69 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 5 | CONN | max | 44.029 | 1 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 |
| 6 | | min | 8.184 | 4 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |

## Envelope Joint Reactions (Continued)

| | Joint | | X [k] | LC | Y [k] | LC | Z [k] | LC | MX [k-ft] | LC | MY [k-ft] | LC | MZ [k-ft] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Totals: | max | -3.513 | 4 | 24.431 | 3 | 0 | 4 | | | | | | |
| 8 | | min | -18.747 | 1 | 7.719 | 2 | 0 | 1 | | | | | | |

## Envelope Joint Displacements

| | Joint | | X [in] | LC | Y [in] | LC | Z [in] | LC | X Rotation [rad] | LC | Y Rotation [rad] | LC | Z Rotation [rad] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BOTCONN... | max | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 |
| 2 | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 3 | CONN | max | 0 | 4 | -.001 | 2 | 0 | 4 | 0 | 4 | 0 | 4 | 2.073e-03 | 1 |
| 4 | | min | 0 | 1 | -.005 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | 3.855e-04 | 4 |
| 5 | TOPCONN... | max | 0 | 4 | -.004 | 2 | 0 | 4 | 0 | 4 | 0 | 4 | -2.13e-03 | 4 |
| 6 | | min | 0 | 1 | -.012 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | -1.145e-02 | 1 |
| 7 | TOPMAST | max | 13.419 | 1 | -.006 | 2 | 0 | 4 | 0 | 4 | 0 | 4 | -9.381e-03 | 4 |
| 8 | | min | 2.495 | 4 | -.021 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | -5.046e-02 | 1 |
| 9 | ANTCL | max | 12.208 | 1 | -.006 | 2 | 0 | 4 | 0 | 4 | 0 | 4 | -9.381e-03 | 4 |
| 10 | | min | 2.27 | 4 | -.021 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | -5.046e-02 | 1 |
| 11 | FLANGE | max | .89 | 1 | -.004 | 2 | 0 | 4 | 0 | 4 | 0 | 4 | -3.899e-03 | 4 |
| 12 | | min | .166 | 4 | -.014 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | -2.096e-02 | 1 |

## Envelope AISC 14th(360-10): LRFD Steel Code Checks

| | Memb... | Shape | Code Check | L... | LC | Sh... | L... | Dir | ... | phi*P... | phi*Pn... | phi*Mn y-y [k-ft] | phi*... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | HSS18x0.500 | .822 | 2... | 1 | .100 | 2... | | 1 | 764.7... | 967.68 | 450.45 | 450... | 2.... | H1... |
| 2 | M2 | HSS16x0.500 | .856 | 0 | 1 | .060 | 0 | | 1 | 714.4... | 858.06 | 352.8 | 352.8 | 1.... | H1... |

## *Joint Reactions (By Combination)*

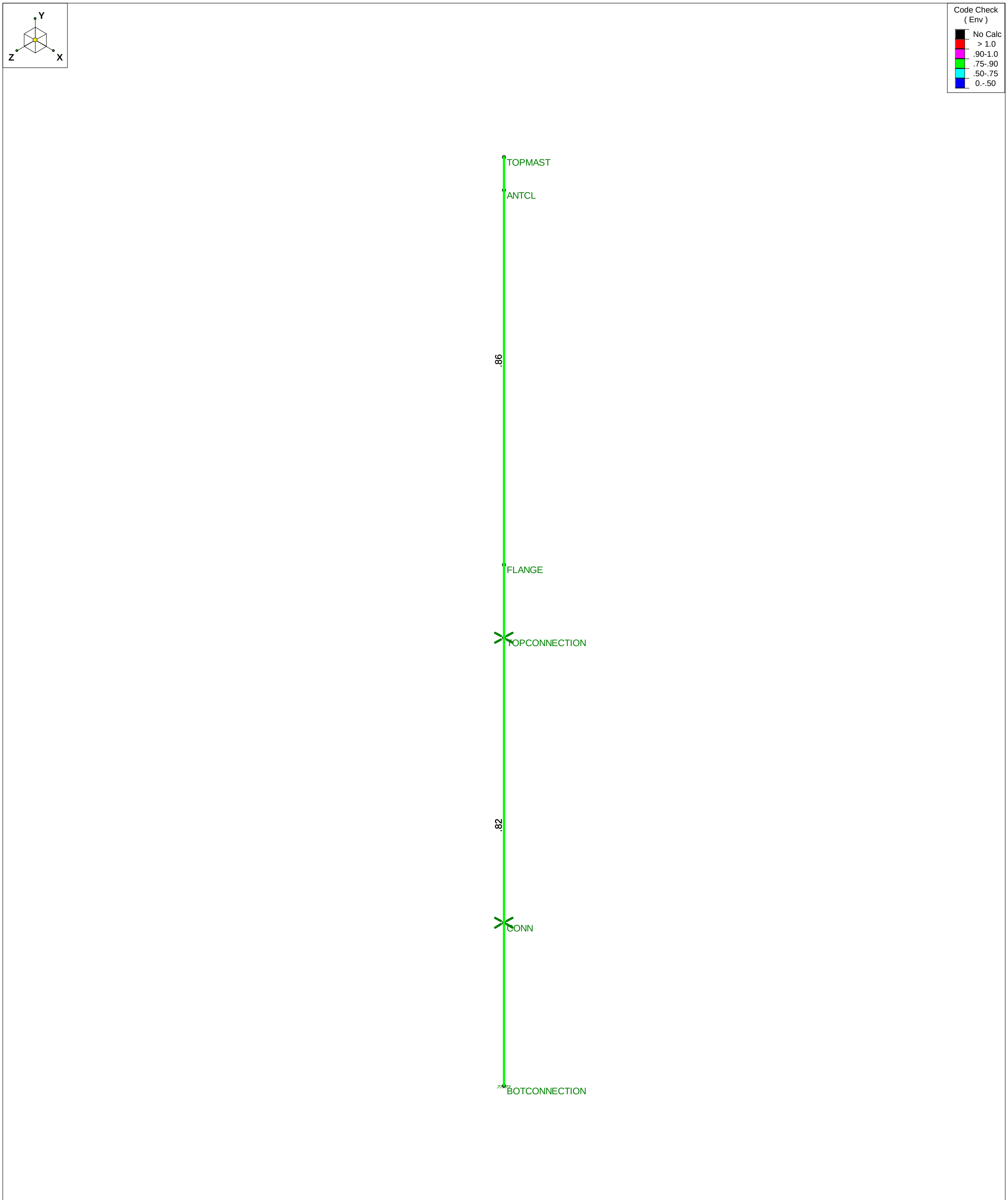
| | LC | Joint Label | X [k] | Y [k] | Z [k] | MX [k-ft] | MY [k-ft] | MZ [k-ft] |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | BOTCONNECTION | -18.087 | 10.292 | 0 | 0 | 0 | 55.7 |
| 2 | 1 | TOPCONNECTION | -44.69 | 0 | 0 | 0 | 0 | 0 |
| 3 | 1 | CONN | 44.029 | 0 | 0 | 0 | 0 | 0 |
| 4 | 1 | Totals: | -18.747 | 10.292 | 0 | | | |
| 5 | 1 | COG (ft): | X: 0 | Y: 38.961 | Z: 0 | | | |

## *Joint Reactions (By Combination)*

| | LC | Joint Label | X [k] | Y [k] | Z [k] | MX [k-ft] | MY [k-ft] | MZ [k-ft] |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | BOTCONNECTION | -18.017 | 7.719 | 0 | 0 | 0 | 55.481 |
| 2 | 2 | TOPCONNECTION | -44.579 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2 | CONN | 43.848 | 0 | 0 | 0 | 0 | 0 |
| 4 | 2 | Totals: | -18.747 | 7.719 | 0 | | | |
| 5 | 2 | COG (ft): | X: 0 | Y: 38.961 | Z: 0 | | | |

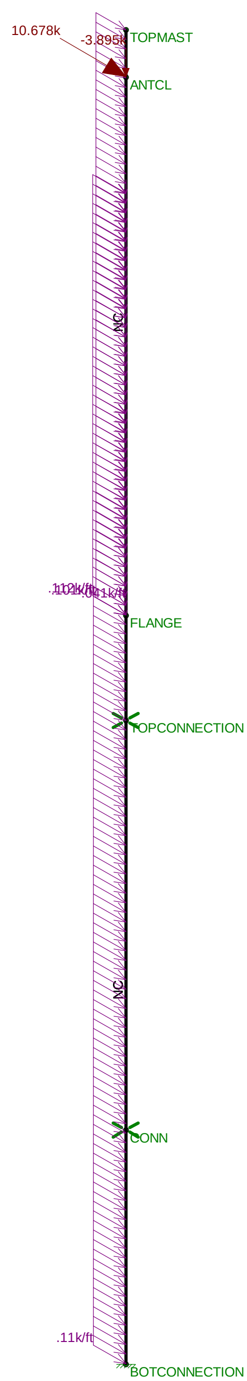
## *Joint Reactions (By Combination)*

| | LC | Joint Label | X [k] | Y [k] | Z [k] | MX [k-ft] | MY [k-ft] | MZ [k-ft] |
|---|---|---|---|---|---|---|---|---|
| 1 | 3 | BOTCONNECTION | -3.521 | 24.431 | 0 | 0 | 0 | 10.854 |
| 2 | 3 | TOPCONNECTION | -8.601 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3 | CONN | 8.607 | 0 | 0 | 0 | 0 | 0 |
| 4 | 3 | Totals: | -3.515 | 24.431 | 0 | | | |
| 5 | 3 | COG (ft): | X: 0 | Y: 41.729 | Z: 0 | | | |



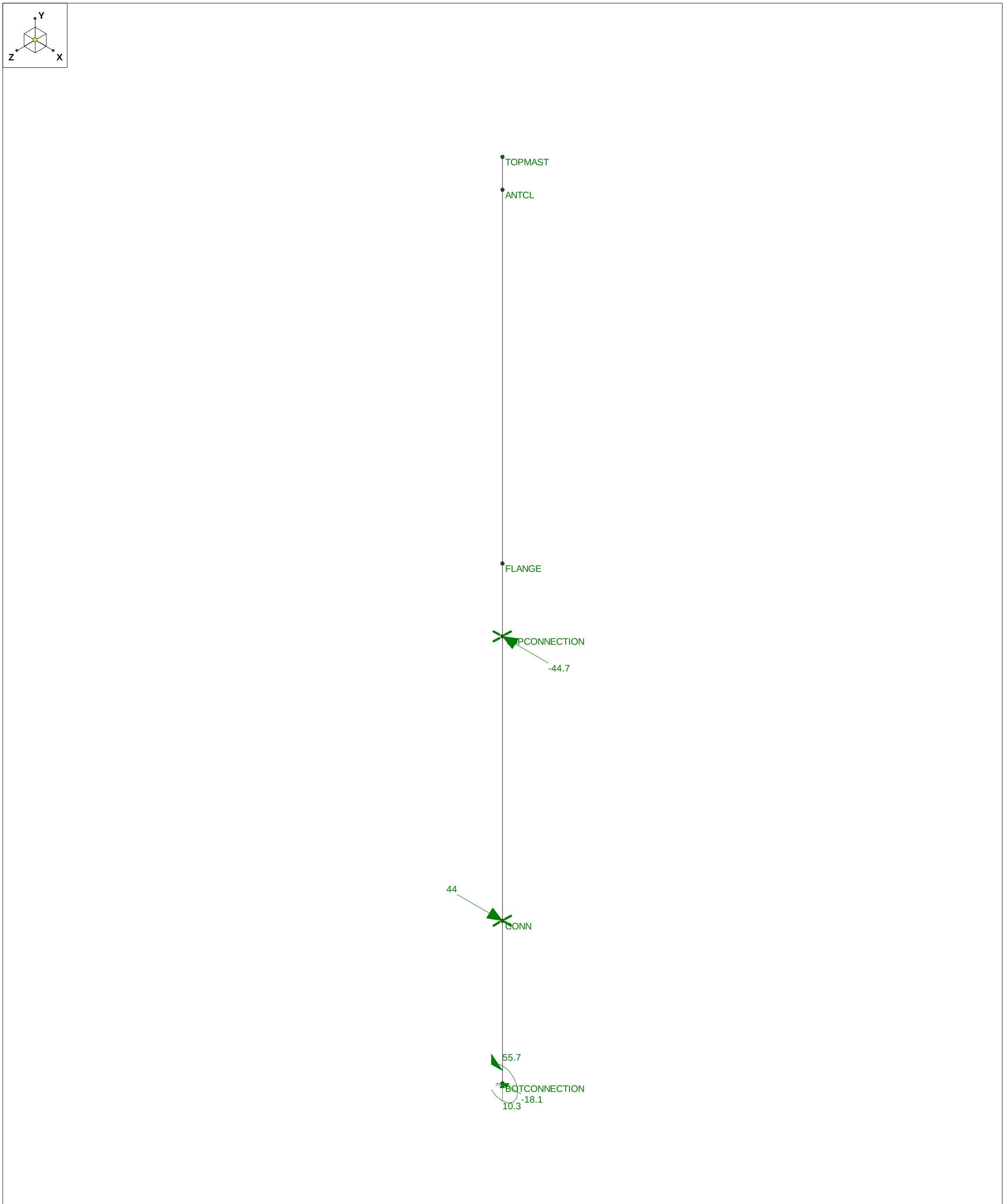

Member Code Checks Displayed (Enveloped)
Envelope Only Solution

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | June 10, 2022 at 9:47 AM |
| 22021.06 / AT&T CT2901 | Unity Check | TIA Loads.r3d |



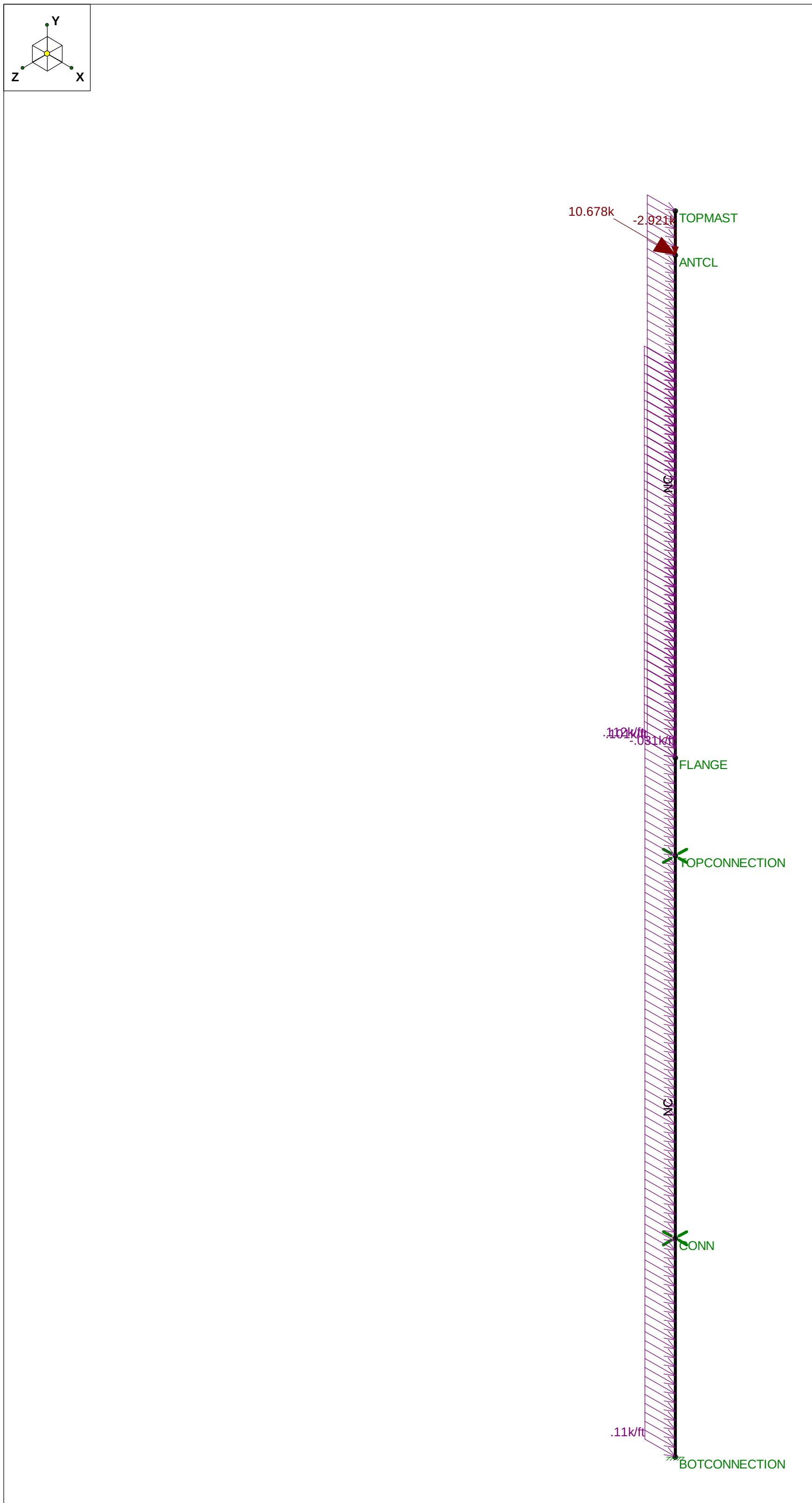

Member Code Checks Displayed
Loads: LC 1, 1.2D + 1.6W (X-direction)

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | June 10, 2022 at 9:46 AM |
| 22021.06 / AT&T CT2901 | LC #1 Loads | TIA Loads.r3d |



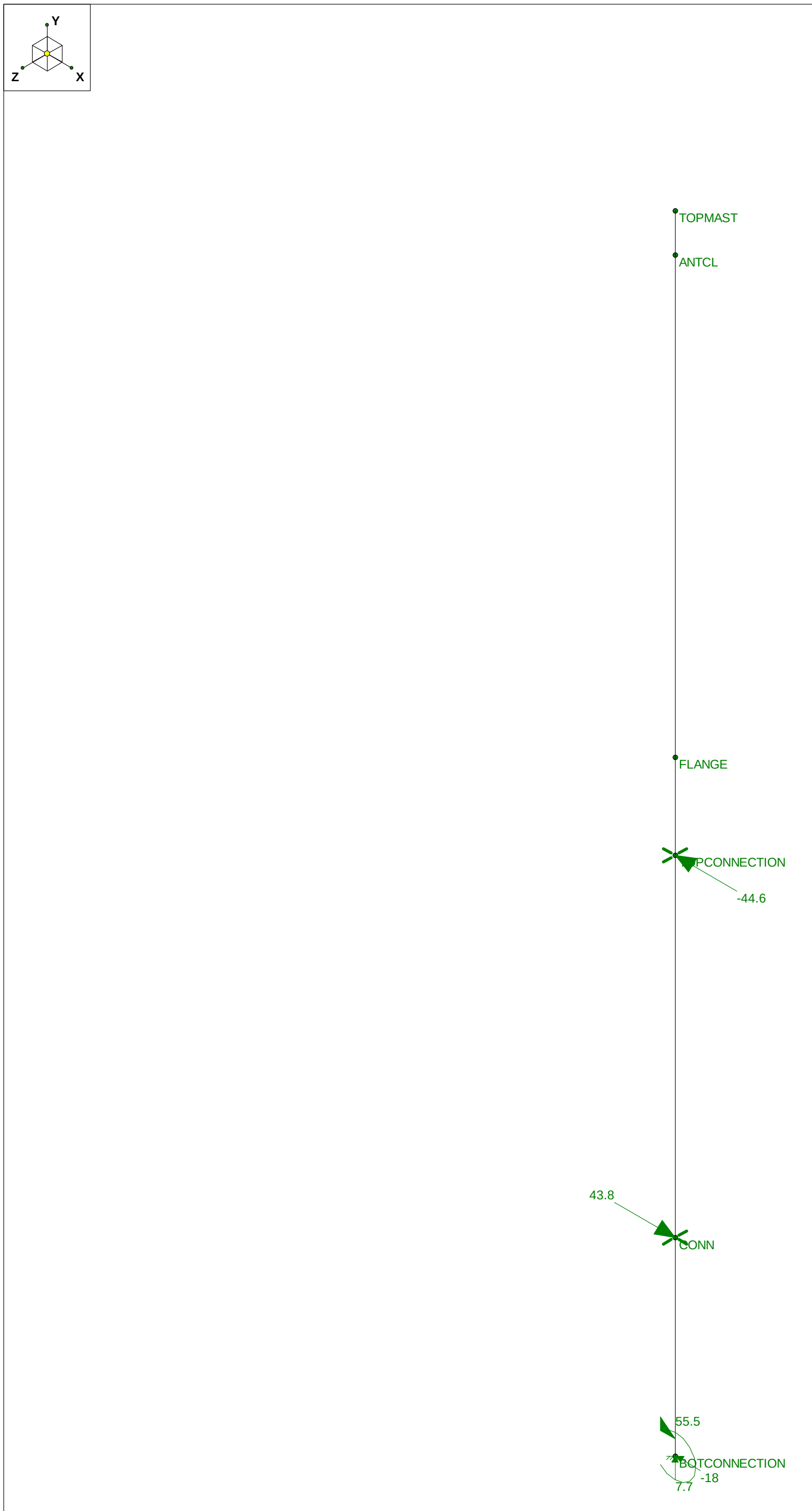

Reaction and Moment Units are k and k-ft

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | June 10, 2022 at 9:48 AM |
| 22021.06 / AT&T CT2901 | LC #1 Reactions | TIA Loads.r3d |



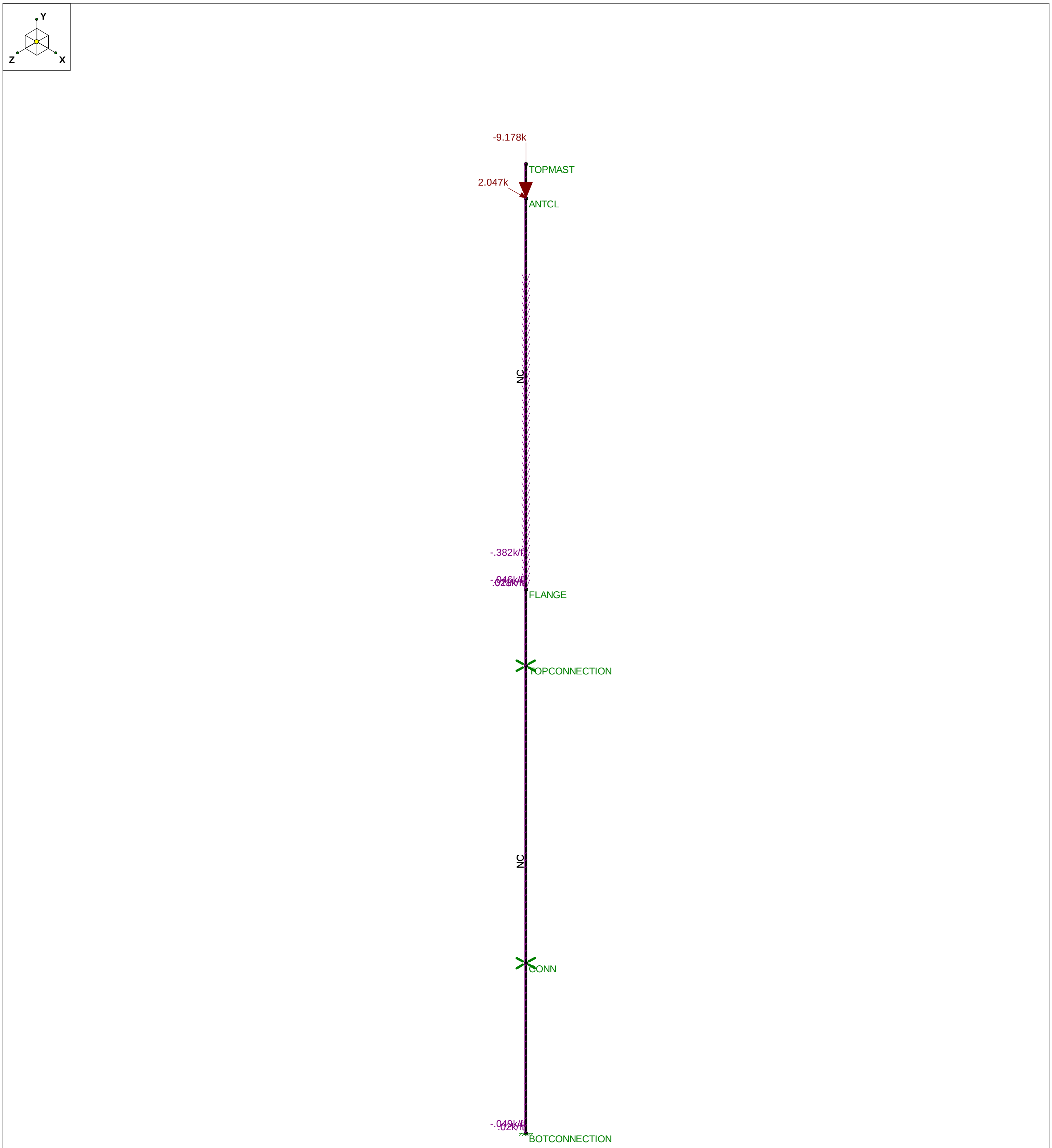

Member Code Checks Displayed
Loads: LC 2, 0.9D + 1.6W (X-direction)

| | | |
|---|---|---|
| CENTEK Engineering, INC. | Pole # 11229 - Mast | |
| TJL | | June 10, 2022 at 9:47 AM |
| 22021.06 / AT&T CT2901 | LC #2 Loads | TIA Loads.r3d |



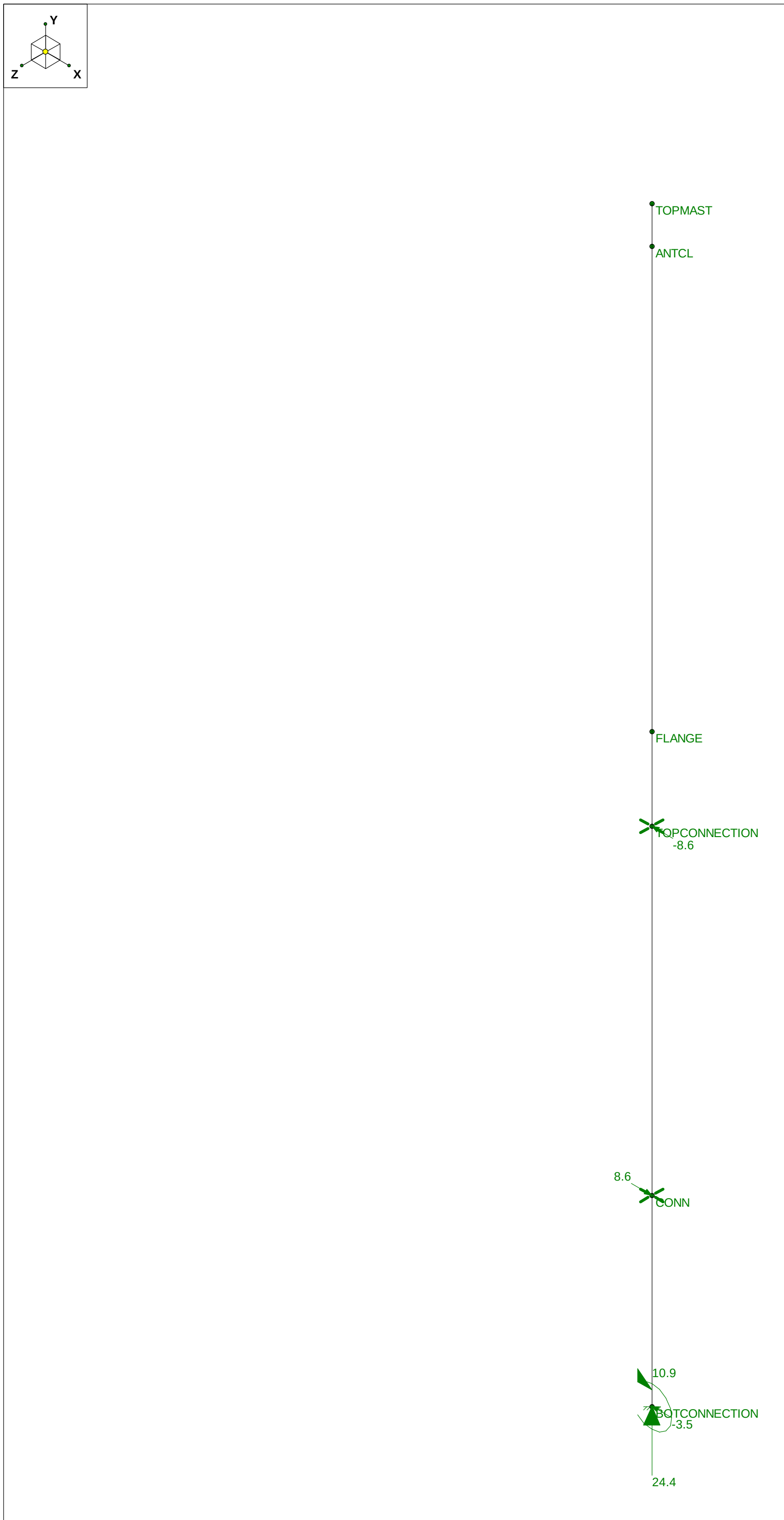

Reaction and Moment Units are k and k-ft

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | June 10, 2022 at 9:49 AM |
| 22021.06 / AT&T CT2901 | LC #2 Reactions | TIA Loads.r3d |



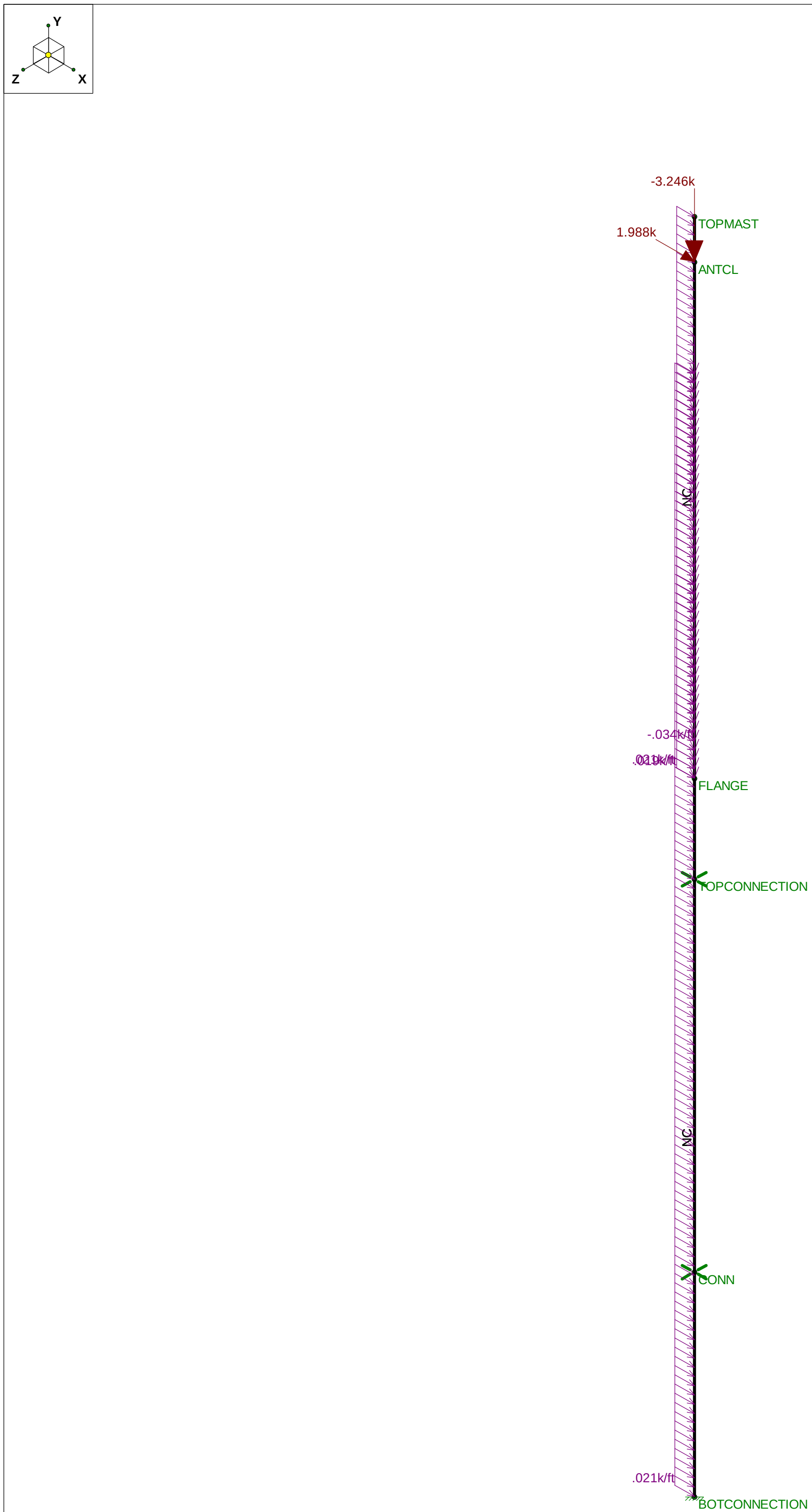

Member Code Checks Displayed
Loads: LC 3, 1.2D + 1.0Di + 1.0Wi (X-direction)

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | June 10, 2022 at 9:47 AM |
| 22021.06 / AT&T CT2901 | LC #3 Loads | TIA Loads.r3d |




Reaction and Moment Units are k and k-ft

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | June 10, 2022 at 9:49 AM |
| 22021.06 / AT&T CT2901 | LC #3 Reactions | TIA Loads.r3d |

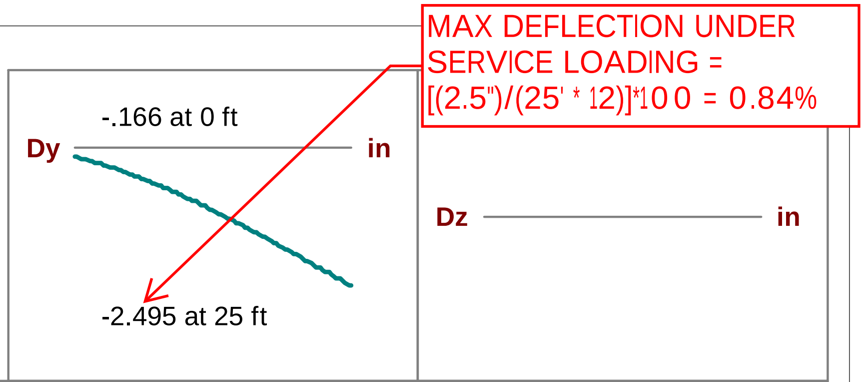


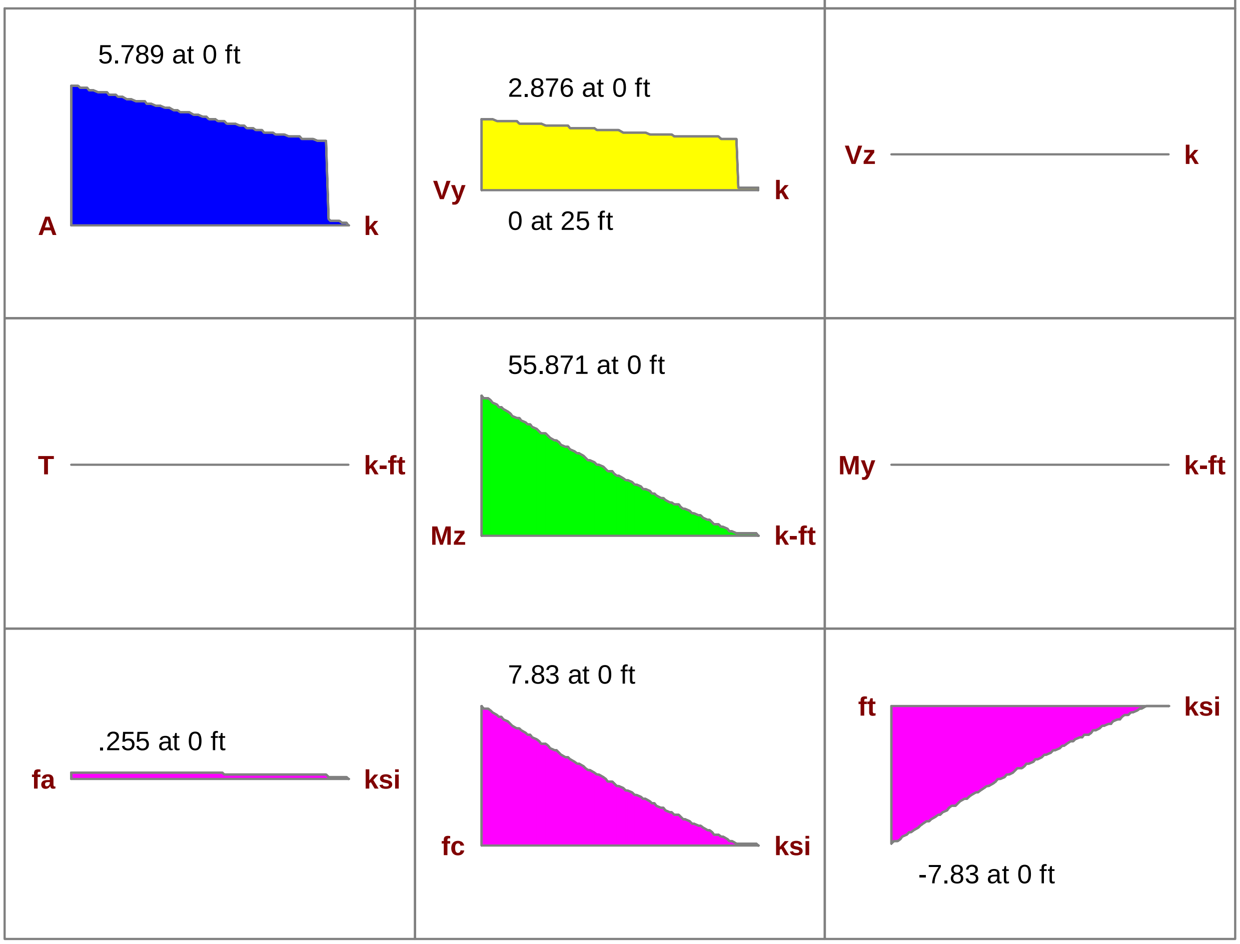

Member Code Checks Displayed
Loads: LC 4, 1.0D+1.0Ws (X-direction)

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | June 10, 2022 at 9:47 AM |
| 22021.06 / AT&T CT2901 | LC #4 Loads | TIA Loads.r3d |

Beam: ***M2***

Shape: **HSS16x0.500**
Material: **A500 Gr.42**
Length: **25 ft**
I Joint: **FLANGE**
J Joint: **TOPMAST**
**LC 4: 1.0D+1.0Ws (X-direction)**
Code Check: **0.162 (bending)**
Report Based On 97 Sections




## *AISC 14th(360-10): LRFD Code Check*

**Direct Analysis Method**

| | | | | | |
|---|---|---|---|---|---|
| Max Bending Check | **0.162** | Max Shear Check | **0.011 (s)** | Max Defl Ratio | **L/517** |
| Location | **0 ft** | Location | **0 ft** | Location | **25 ft** |
| Equation | **H1-1b** | | | Span | **1** |

Bending **Compact** Compression **Non-Slender**

| | | | | |
|---|---|---|---|---|
| Fy | **42 ksi** | | y-y | z-z |
| phi*Pnc | **714.437 k** | Lb | **25 ft** | **25 ft** |
| phi*Pnt | **858.06 k** | KL/r | **54.612** | **54.612** |
| phi*Mny | **352.8 k-ft** | L Comp Flange | **25 ft** | |
| phi*Mnz | **352.8 k-ft** | L-torque | **25 ft** | |
| phi*Vny | **257.418 k** | Tau_b | **1** | |
| phi*Vnz | **257.418 k** | | | |
| phi*Tn | **333.163 k-ft** | | | |
| Cb | **1.863** | | | |

## Mast Top Connection:

### Maximum Design Reactions at Brace:

| | | |
|---|---|---|
| Vertical = | $Vert := 0 \cdot kips$ | (User Input) |
| Horizontal = | $Horz := 44.7 \cdot kips$ | (User Input) |
| Moment = | $Moment := 0$ | (User Input) |

### Bolt Data:

| | | |
|---|---|---|
| Bolt Grade = | A325 | (User Input) |
| Number of Bolts = | $n_b := 6$ | (User Input) |
| Bolt Diameter = | $d_b := 0.75in$ | (User Input) |
| Nomianl Tensile Strength = | $F_{nt} := 90 \cdot ksi$ | (User Input) |
| Nomianl Shear Strength = | $F_{nv} := 54 \cdot ksi$ | (User Input) |
| Resistance Factor = | $\phi := 0.75$ | (User Input) |
| Bolt Eccentricity from C.L. Mast = | $e := 26.5 \cdot in$ | (User Input) |
| Vetical Spacing Between Top and Bottom Bolts = | $S_{vert} := 9 \cdot in$ | (User Input) |
| Horizontal Spacing Between Bolts = | $S_{horz} := 24.5 \cdot in$ | (User Input) |

Bolt Area = $a_b := \frac{1}{4} \cdot \pi \cdot d_b^{\,2} = 0.442 \cdot in^2$

**Check Bolt Stresses:**

**Wind Acting Parallel to Stiffiner Plate:**

Shear Stress per Bolt = $f_v := \dfrac{Vert}{n_b \cdot a_b} = 0 \cdot ksi$

$Condition1 := if(f_v < \phi \cdot F_{nv}, \text{"OK"}, \text{"Overstressed"})$

$Condition1 = \text{"OK"}$

$\dfrac{f_v}{(\phi \cdot F_{nv})} = 0 \cdot \%$

Tensile Stress Adjusted for Shear = $F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \dfrac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v\right) & \text{if } 1.3 \cdot F_{nt} - \dfrac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \le F_{nt} \\ F_{nt} & \text{otherwise} \end{cases} = 90 \cdot ksi$

Tension Force Each Bolt = $F_{tension.bolt} := \dfrac{Horz}{n_b} + \dfrac{Vert \cdot e}{S_{vert} \cdot 2} = 7.45 \cdot kips$

Tension Stress Each Bolt = $f_t := \dfrac{F_{tension.bolt}}{a_b} = 16.9 \cdot ksi$

$Condition2 := if(f_t < \phi \cdot F'_{nt}, \text{"OK"}, \text{"Overstressed"})$

$Condition2 = \text{"OK"}$

$\dfrac{f_t}{(\phi \cdot F'_{nt})} = 25 \cdot \%$

**Wind Acting Perpendicular to Stiffiner Plate:**

Shear Stress per Bolt = $f_v := \dfrac{\sqrt{Vert^2 + Horz^2}}{n_b \cdot a_b} = 16.863 \cdot ksi$

$Condition3 := if(f_v < \phi \cdot F_{nv}, \text{"OK"}, \text{"Overstressed"})$

$Condition3 = \text{"OK"}$

$\dfrac{f_v}{(\phi \cdot F_{nv})} = 41.6 \cdot \%$

Tensile Stress Adjusted for Shear = $F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \dfrac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v\right) & \text{if } 1.3 \cdot F_{nt} - \dfrac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \le F_{nt} \\ F_{nt} & \text{otherwise} \end{cases} = 79.53 \cdot ksi$

Tension Force per Bolt = $F_{tension.conn} := \dfrac{Horz \cdot e}{S_{horz} \cdot \dfrac{n_b}{2}} + \dfrac{Vert \cdot e}{S_{vert} \cdot 2} = 16.116 \cdot kips$

Tension Stress Each Bolt = $f_t := \dfrac{F_{tension.conn}}{a_b} = 36.48 \cdot ksi$

$Condition4 := if(f_t < \phi \cdot F'_{nt}, \text{"OK"}, \text{"Overstressed"})$

$Condition4 = \text{"OK"}$

$\dfrac{f_t}{(\phi \cdot F'_{nt})} = 61.2 \cdot \%$

## Mast Middle Connection:

### Maximum Design Reactions at Brace:

| | | |
|---|---|---|
| Vertical = | $Vert := 0 \cdot kips$ | (User Input) |
| Horizontal = | $Horz := 44.1 \cdot kips$ | (User Input) |
| Moment = | $Moment := 0$ | (User Input) |

### Bolt Data:

| | | |
|---|---|---|
| Bolt Grade = | A325 | (User Input) |
| Number of Bolts = | $n_b := 6$ | (User Input) |
| Bolt Diameter = | $d_b := 0.75in$ | (User Input) |
| Nomianl Tensile Strength = | $F_{nt} := 90 \cdot ksi$ | (User Input) |
| Nomianl Shear Strength = | $F_{nv} := 54 \cdot ksi$ | (User Input) |
| Resistance Factor = | $\phi := 0.75$ | (User Input) |
| Bolt Eccentricity from C.L. Mast = | $e := 26.5 \cdot in$ | (User Input) |
| Vetical Spacing Between Top and Bottom Bolts = | $S_{vert} := 9 \cdot in$ | (User Input) |
| Horizontal Spacing Between Bolts = | $S_{horz} := 29 \cdot in$ | (User Input) |

Bolt Area = $a_b := \frac{1}{4} \cdot \pi \cdot d_b^{\,2} = 0.442 \cdot in^2$

**Check Bolt Stresses:**

**Wind Acting Parallel to Stiffiner Plate:**

Shear Stress per Bolt = $f_v := \frac{Vert}{n_b \cdot a_b} = 0 \cdot ksi$

$Condition1 := if(f_v < \phi \cdot F_{nv}, "OK", "Overstressed")$

$Condition1 = "OK"$

$\frac{f_v}{(\phi \cdot F_{nv})} = 0 \cdot \%$

Tensile Stress Adjusted for Shear = $F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v\right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \le F_{nt} \\ F_{nt} & \text{otherwise} \end{cases} = 90 \cdot ksi$

Tension Force Each Bolt = $F_{tension.bolt} := \frac{Horz}{n_b} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 7.35 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.bolt}}{a_b} = 16.6 \cdot ksi$

$Condition2 := if(f_t < \phi \cdot F'_{nt}, "OK", "Overstressed")$

$Condition2 = "OK"$

$\frac{f_t}{(\phi \cdot F'_{nt})} = 24.6 \cdot \%$

**Wind Acting Perpendicular to Stiffiner Plate:**

Shear Stress per Bolt = $f_v := \frac{\sqrt{Vert^2 + Horz^2}}{n_b \cdot a_b} = 16.637 \cdot ksi$

$Condition3 := if(f_v < \phi \cdot F_{nv}, "OK", "Overstressed")$

$Condition3 = "OK"$

$\frac{f_v}{(\phi \cdot F_{nv})} = 41.1 \cdot \%$

Tensile Stress Adjusted for Shear = $F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v\right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \le F_{nt} \\ F_{nt} & \text{otherwise} \end{cases} = 80.03 \cdot ksi$

Tension Force per Bolt = $F_{tension.conn} := \frac{Horz \cdot e}{S_{horz} \cdot \frac{n_b}{2}} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 13.433 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.conn}}{a_b} = 30.406 \cdot ksi$

$Condition4 := if(f_t < \phi \cdot F'_{nt}, "OK", "Overstressed")$

$Condition4 = "OK"$

$\frac{f_t}{(\phi \cdot F'_{nt})} = 50.7 \cdot \%$

## Mast Connection to Bottom Bracket:

**Design Reactions at Brace:**

| | | |
|---|---|---|
| Axial = | $Axial := 10.3 \cdot kips$ | (User Input) |
| Shear = | $Shear := 18.1 \cdot kips$ | (User Input) |
| Moment = | $Moment := 55.7 \cdot kips \cdot ft$ | (User Input) |

**Anchor Bolt Data:**

| | | |
|---|---|---|
| Bolt Grade = | A325 | (User Input) |
| Design Shear Stress = | $F_v := 40.5 \cdot ksi$ | (User Input) |
| Design Tension Stress = | $F_T := 67.5 \cdot ksi$ | (User Input) |
| Total Number of Bolts = | $n_b := 4$ | (User Input) |
| Number of Bolts Tension Side Parallel = | $n_{b.par} := 2$ | (User Input) |
| Number of Bolts Tension Side Diagonal = | $n_{b.diag} := 1$ | (User Input) |
| Bolt Diameter = | $d_b := 1.0in$ | (User Input) |
| Bolt Spacing X Direction = | $S_x := 16 \cdot in$ | (User Input) |
| Bolt Spacing Z Direction = | $S_z := 16 \cdot in$ | (User Input) |

**Base Plate Data:**

| | | |
|---|---|---|
| Base Plate Steel = | A36 | (User Input) |
| Allowable Yield Stress = | $F_y := 36 \cdot ksi$ | (User Input) |
| Base Plate Width = | $Pl_w := 20 \cdot in$ | (User Input) |
| Base Plate Thickness = | $Pl_t := 1.5 \cdot in$ | (User Input) |
| Bolt Edge Distance = | $B_E := 2 \cdot in$ | (User Input) |
| Pole Diameter = | $D_p := 18 \cdot in$ | (User Input) |

**Base Plate Data:**

| | | |
|---|---|---|
| Weld Grade | E70XX | (User Input) |
| Weld Yield Stress = | $F_{yw} := 70 \cdot ksi$ | (User Input) |
| Weld Size = | $sw := 0.5 \cdot in$ | (User Input) |

**Anchor Bolt Check:**

BoltArea = $a_b := \frac{1}{4}\cdot\pi\cdot d_b^{\,2} = 0.785\cdot in^2$

Bolt Spacing Diag. Direction = $S_{diag} := \sqrt{S_x^{\,2} + S_z^{\,2}} = 22.63\cdot in$

Tension Load per Bolt Parallel = $T_{par} := \frac{Moment}{S_x\cdot n_{b.par}} - \frac{Axial}{n_b} = 18.31\cdot kips$

Tension Load per Bolt Diagonal = $T_{diag} := \frac{Moment}{S_{diag}\cdot n_{b.diag}} - \frac{Axial}{n_b} = 26.96\cdot kips$

Tension per bolt = $T := if\left(T_{par} > T_{diag}, T_{par}, T_{diag}\right) = 26.964\cdot kips$

Actual Tensile Stress = $f_t := \frac{T}{a_b} = 34.33\cdot ksi$

Condition2 := if$\left(f_t < F_T, \text{"OK"}, \text{"Overstressed"}\right)$

Condition2 = "OK"

**Base Plate Check:**

Design Bending Stress = $F_b := 0.9\cdot F_y = 32.4\cdot ksi$

Plate Bending Width = $Z := \left(Pl_w\cdot\sqrt{2} - D_p\right) = 10.28\cdot in$

MomentArm = $K := \frac{\left(S_{diag} - D_p\right)}{2} = 2.31\cdot in$

Moment in Base Plate = $M := K\cdot T = 62.39\cdot kips\cdot in$

Section Modulus = $S_Z := \frac{1}{6}\cdot Z\cdot Pl_t^{\,2} = 3.86\cdot in^3$

Bending Stress = $f_b := \frac{M}{S_Z} = 16.18\cdot ksi$

Condition3 := if$\left(f_b < F_b, \text{"OK"}, \text{"Overstressed"}\right)$

Condition3 = "OK"

**Base Plate to PCS Mast Weld Check:**

Design Weld Stress = $F_w := 0.45 \cdot F_{yw} = 31.5 \cdot ksi$

Weld Area = $A_w := \frac{\pi}{4} \cdot \left[\left(D_p + 2sw \cdot 0.707\right)^2 - D_p^{\ 2}\right] = 20.38 \cdot in^2$

Weld Moment of Inertia = $I_w := \frac{\pi}{64} \cdot \left[\left(D_p + 2sw \cdot 0.707\right)^4 - D_p^{\ 4}\right] = 858.55 \cdot in^4$

$c := \frac{D_p}{2} + sw \cdot 0.707 = 9.35 \cdot in$

Section Modulus of Weld = $S_w := \frac{I_w}{c} = 91.79 \cdot in^3$

Weld Stress = $f_w := \frac{Moment}{S_w} + \frac{Shear}{A_w} = 8.17 \cdot ksi$

Condition4 := if($f_w < F_w$, "OK" , "Overstressed")

Condition4 = "OK"

## Mast Bottom Connection:

### Maximum Design Reactions at Brace:

Vertical = $Vert := 10.3 \cdot kips$ (User Input)

Horizontal = $Horz := 18.1 \cdot kips$ (User Input)

Moment = $Moment := 55.7 \cdot ft \cdot kips$ (User Input)

### Bolt Data:

Bolt Grade = A325 (User Input)

Number of Bolts = $n_b := 12$ (User Input)

Bolt Diameter = $d_b := 0.75in$ (User Input)

Nomianl Tensile Strength = $F_{nt} := 90 \cdot ksi$ (User Input)

Nomianl Shear Strength = $F_{nv} := 54 \cdot ksi$ (User Input)

Resistance Factor = $\phi := 0.75$ (User Input)

Bolt Eccentricity from C.L. Mast = $e := 26.5 \cdot in$ (User Input)

Horizontal Spacing Between Bolts = $S_{horz} := 32 \cdot in$ (User Input)

Vetical Spacing From Plate CL to Bolt 1 = $S_{vert1} := 2 \cdot in$ (User Input)

Vetical Spacing From Plate CL to Bolt 2 = $S_{vert2} := 6 \cdot in$ (User Input)

Vetical Spacing From Plate CL to Bolt 3 = $S_{vert3} := 10 \cdot in$ (User Input)

Bolt Polar Moment of Inertia = $I_p := 2 \cdot S_{vert1}^2 + 2 \cdot S_{vert2}^2 + 2 \cdot S_{vert3}^2 = 280 \cdot in^2$

Bolt Area = $a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.442 \cdot in^2$

**Check Bolt Stresses:**

**Wind Acting Parallel to Stiffiner Plate:**

Shear Stress per Bolt = $f_v := \frac{Vert}{n_b \cdot a_b} = 1.943 \cdot ksi$

Condition1 := if($f_v < \phi \cdot F_{nv}$, "OK", "Overstressed")

Condition1 = "OK"

$\frac{f_v}{(\phi \cdot F_{nv})} = 4.8 \cdot \%$

Tensile Stress Adjusted for Shear = $F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v\right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \le F_{nt} \\ F_{nt} & \text{otherwise} \end{cases} = 90 \cdot ksi$

Tension Force Each Bolt = $F_{tension.bolt} := \frac{Horz}{n_b} + \frac{(Vert \cdot e + Moment) \cdot S_{vert3}}{2 \cdot I_p} = 18.318 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.bolt}}{a_b} = 41.5 \cdot ksi$

Condition2 := if($f_t < \phi \cdot F'_{nt}$, "OK", "Overstressed")

Condition2 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 61.4 \cdot \%$

**Wind Acting Perpendicular to Stiffiner Plate:**

Shear Stress per Bolt = $f_v := \sqrt{\left(\frac{Vert}{n_b \cdot a_b} + \frac{Moment \cdot 2}{S_{horz} \cdot n_b \cdot a_b}\right)^2 + \left(\frac{Horz}{n_b \cdot a_b}\right)^2} = 10.399 \cdot ksi$

Condition3 := if($f_v < \phi \cdot F_{nv}$, "OK", "Overstressed")

Condition3 = "OK"

$\frac{f_v}{(\phi \cdot F_{nv})} = 25.7 \cdot \%$

Tensile Stress Adjusted for Shear = $F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v\right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \le F_{nt} \\ F_{nt} & \text{otherwise} \end{cases} = 90 \cdot ksi$

Tension Force per Bolt = $F_{tension.conn} := \frac{Horz \cdot e}{S_{horz} \cdot \frac{n_b}{2}} + \frac{Vert \cdot e \cdot S_{vert3}}{2 \cdot I_p} = 7.372 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.conn}}{a_b} = 16.687 \cdot ksi$

Condition4 := if($f_t < \phi \cdot F'_{nt}$, "OK", "Overstressed")

Condition4 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 24.7 \cdot \%$

## Flange Bolt and Flange Plate Analysis:

### Input Data:

Tower Reactions:

| | | |
|---|---|---|
| Overturning Moment = | $OM := 301 \cdot ft \cdot kips$ | (Input From Risa3D) |
| Shear Force = | $Shear := 15.5 \cdot kips$ | (Input From Risa3D) |
| Axial Force = | $Axial := 5.3 \cdot kips$ | (Input From Risa3D) |

Flange Bolt Data:

Use ASTM A325

| | | |
|---|---|---|
| Number of Flange Bolts = | $N := 16$ | (User Input) |
| Diameter of Bolt Circle = | $D_{bc} := 21 \cdot in$ | (User Input) |
| Bolt Ultimate Strength = | $F_u := 120 \cdot ksi$ | (User Input) |
| Bolt Yield Strength = | $F_y := 92 \cdot ksi$ | (User Input) |
| Bolt Modulus = | $E := 29000 \cdot ksi$ | (User Input) |
| Diameter of Flange Bolts = | $D := 1.0 \cdot in$ | (User Input) |
| Threads per Inch = | $n := 8$ | (User Input) |

Flange Plate Data:

Use ASTM A36

| | | |
|---|---|---|
| Plate Yield Strength = | $Fy_{bp} := 36 \cdot ksi$ | (User Input) |
| Flange Plate Thickness = | $t_{bp} := 1.75 \cdot in$ | (User Input) |
| Flange Plate Diameter = | $D_{bp} := 24 \cdot in$ | (User Input) |
| Outer Pole Diameter = | $D_{pole} := 16 \cdot in$ | (User Input) |

**Weld Plate Data:**

| | | |
|---|---|---|
| Weld Grade | E70XX | (User Input) |
| Weld Yield Stress = | $F_{yw} := 70 \cdot ksi$ | (User Input) |
| Weld Size = | $sw := 0.5 \cdot in$ | (User Input) |

## Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 10.5 \cdot in$

Distance to Bolts = $i := 1..N$

$$d_i := \begin{vmatrix} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{vmatrix}$$

$d_1 = 4.02 \cdot in$ $d_7 = 4.02 \cdot in$

$d_2 = 7.42 \cdot in$ $d_8 = 0.00 \cdot in$

$d_3 = 9.70 \cdot in$ $d_9 = -4.02 \cdot in$

$d_4 = 10.50 \cdot in$ $d_{10} = -7.42 \cdot in$

$d_5 = 9.70 \cdot in$ $d_{11} = -9.70 \cdot in$

$d_6 = 7.42 \cdot in$ $d_{12} = -10.50 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 8 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := \mathrm{if}\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 1.70 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 2.50 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 1.70 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ $MA_{12} = 0.00 \cdot in$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 14.3 \cdot in$

## Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i (d_i)^2 = 882 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 42.7 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 0.75 \cdot (0.75 \cdot A_g \cdot F_u) = 53 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 80.5 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Gross}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

**Flange Plate Analysis:**

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 16.8 \cdot kips$ $C_7 = 16.8 \cdot kips$

$C_2 = 30.7 \cdot kips$ $C_8 = 0.3 \cdot kips$

$C_3 = 40.1 \cdot kips$ $C_9 = -16.1 \cdot kips$

$C_4 = 43.3 \cdot kips$ $C_{10} = -30.1 \cdot kips$

$C_5 = 40.1 \cdot kips$ $C_{11} = -39.4 \cdot kips$

$C_6 = 30.7 \cdot kips$ $C_{12} = -42.7 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{4 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^{\ 2}\right)} = 22.3 \cdot ksi$$

Allowable Bending Stress in Plate = $F_{bp} := 0.9 \cdot Fy_{bp} = 32.4 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 68.9 \cdot \%$

Condition3 = $Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition2 = "Ok"

**Plate to PCS Mast Weld Check:**

Design Weld Stress = $F_w := 0.45 \cdot F_{yw} = 31.5 \cdot ksi$

Weld Area = $A_w := 35.2 \cdot in^2$ (User Input - Calculated in AutoCAD see below)

Weld Moment of Inertia = $I_w := 1482 \cdot in^4$ (User Input - Calculated in AutoCAD see below)

$c := 11.375 \cdot in$ (User Input - Calculated in AutoCAD see below)

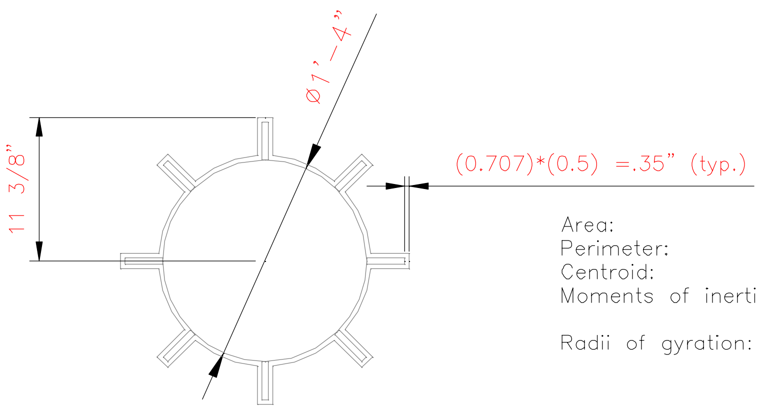
Section Modulus of Weld = $S_w := \frac{I_w}{c} = 130.29 \cdot in^3$

Weld Stress = $f_w := \frac{OM}{S_w} + \frac{Shear}{A_w} = 28.16 \cdot ksi$

Weld Stress % of Capacity = $\frac{f_w}{F_w} = 89.4 \cdot \%$

Condition3 := if($f_w < F_w$, "OK" , "Overstressed")

Condition3 = "OK"



**Basic Components**

| | | | |
|---|---|---|---|
| Heavy Wind Pressure = | $p := 4.00$ | psf | (User Input NESC 2017 Figure 250-1 & Table 250-1) |
| Basic Windspeed = | $V := 110$ | mph | (User Input NESC 2017 Figure 250-2(e) ) |
| Radial Ice Thickness = | $Ir := 0.50$ | in | (User Input) |
| Radial Ice Density = | $Id := 56.0$ | pcf | (User Input) |

**Factors for Extreme Wind Calculation**

| | | | |
|---|---|---|---|
| Elevation of Top of Mast Above Grade = | $TME := 107$ | ft | (User Input) |
| Multiplier Gust Response Factor = | $m := 1.25$ | | (User Input - Only for NESC Extreme wind case) |
| NESC Factor = | $kv := 1.43$ | | (User Input from NESC 2017 Table 250-3 equation) |
| Importance Factor = | $I := 1.0$ | | (User Input from NESC 2017 Section 250.C.2) |

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.284$ (NESC 2017 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.31$ (NESC 2017 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.846$ (NESC 2017 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.865$ (NESC 2017 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 34.4$ psf (NESC 2017 Section 250.C.2)

**NESC Extreme Ice w/ Wind Components**

| | | | |
|---|---|---|---|
| Heavy Wind Pressure = | $p_{ex} := 4.0$ | psf | (User Input NESC 2007 Figure 250-3 & Table 250-4) |
| Radial Ice Thickness = | $Ir_{ex} := 1.0$ | in | (User Input NESC 2007 Figure 250-3) |

**Shape Factors**

| | | |
|---|---|---|
| Shape Factor for Round Members = | $Cd_R := 1.3$ | (User Input) |
| Shape Factor for Flat Members = | $Cd_F := 1.6$ | (User Input) |
| Shape Factor for Open Lattice = | $Cd_{OL} := 3.2$ | (User Input) |
| Shape Factor for Coax Cables Attached to Outside of Pole = | $Cd_{coax} := 1.6$ | (User Input) |

**Overload Factors** NU Design Criteria Table

**Overload Factors for Wind Loads:**

| | | | |
|---|---|---|---|
| **NESC Heavy Wind Loading =** | **2.5** | (User Input) | Apply in Risa-3D Analysis |
| **NESC Extreme Wind Loading =** | **1.0** | (User Input) | Apply in Risa-3D Analysis |
| **NESC Extreme Ice w/ Wind Loading =** | **1.0** | (User Input) | Apply in Risa-3D Analysis |

**Overload Factors for Vertical Loads:**

| | | | |
|---|---|---|---|
| **NESC Heavy Wind Loading =** | **1.5** | (User Input) | Apply in Risa-3D Analysis |
| **NESC Extreme Wind Loading =** | **1.0** | (User Input) | Apply in Risa-3D Analysis |
| **NESC Extreme Ice w/ Wind Loading =** | **1.0** | (User Input) | Apply in Risa-3D Analysis |

**Development of Wind & Ice Load on Mast**

**Mast Data:** (HSS16x0.5)

| | | | |
|---|---|---|---|
| Mast Shape = | Round | | (User Input) |
| Mast Diameter = | $D_{mast} := 16$ | in | (User Input) |
| Mast Length = | $L_{mast} := 25$ | ft | (User Input) |
| Mast Thickness = | $t_{mast} := 0.5$ | in | (User Input) |

**Gravity Loads (without ice)**

Weight of the mast = Self Weight **(Computed internally by Risa-3D)** plf **BLC 1**

**Gravity Loads (ice only)**

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + Ir \cdot 2\right)^2 - D_{mast}{}^2\right] = 25.9$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 10$ plf **BLC 3**

**Gravity Loads (Extreme ice only)**

Extreme Ice Area per Linear Foot = $Ai_{ex.mast} := \frac{\pi}{4}\left[\left(D_{mast} + Ir_{ex} \cdot 2\right)^2 - D_{mast}{}^2\right] = 53.4$ sq in

Weight of Extreme Ice on Mast = $W_{ICE.exmast} := Id \cdot \frac{Ai_{ex.mast}}{144} = 21$ plf **BLC 4**

**Wind Load (NESC Heavy)**

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot Ir\right)}{12} = 1.417$ sf/ft

Total Mast Wind Force w/ Ice = $Fi_{mast} := p \cdot Cd_F \cdot AICE_{mast} = 9$ plf **BLC 5**

**Wind Load (NESC Extreme)**

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.333$ sf/ft

Total Mast Wind Force (Above NU Structure) = $F_{mast} := qz \cdot Cd_F \cdot A_{mast} \cdot m = 92$ plf **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Mast Projected Surface Area w/ Extreme Ice = $AICE_{ex.mast} := \frac{\left(D_{mast} + 2 \cdot Ir_{ex}\right)}{12} = 1.5$ sf/ft

Total Mast Wind Force w/ Extreme Ice = $Fi_{ex.mast} := p_{ex} \cdot Cd_F \cdot AICE_{ex.mast} = 10$ plf **BLC 7**

## Development of Wind & Ice Load on Mast

**Mast Data:** (HSS18x0.5)

| | | | |
|---|---|---|---|
| Mast Shape = | Round | | (User Input) |
| Mast Diameter = | $D_{mast} := 18$ | in | (User Input) |
| Mast Length = | $L_{mast} := 32$ | ft | (User Input) |
| Mast Thickness = | $t_{mast} := 0.5$ | in | (User Input) |

### Gravity Loads (without ice)

Weight of the mast = Self Weight **(Computed internally by Risa-3D)** plf **BLC 1**

### Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + Ir \cdot 2\right)^2 - D_{mast}{}^2\right] = 29.1$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 11$ plf **BLC 3**

### Gravity Loads (Extreme ice only)

Extreme Ice Area per Linear Foot = $Ai_{ex.mast} := \frac{\pi}{4}\left[\left(D_{mast} + Ir_{ex} \cdot 2\right)^2 - D_{mast}{}^2\right] = 59.7$ sq in

Weight of Extreme Ice on Mast = $W_{ICE.exmast} := Id \cdot \frac{Ai_{ex.mast}}{144} = 23$ plf **BLC 4**

### Wind Load (NESC Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot Ir\right)}{12} = 1.583$ sf/ft

Total Mast Wind Force w/ Ice = $Fi_{mast} := p \cdot Cd_R \cdot AICE_{mast} = 8$ plf **BLC 5**

### Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.5$ sf/ft

Total Mast Wind Force (Below NU Structure) = $F_{mast} := qz \cdot Cd_R \cdot A_{mast} = 67$ plf **BLC 6**

### Wind Load (NESC Extreme Ice w/ Wind)

Mast Projected Surface Area w/ Extreme Ice = $AICE_{ex.mast} := \frac{\left(D_{mast} + 2 \cdot Ir_{ex}\right)}{12} = 1.667$ sf/ft

Total Mast Wind Force w/ Extreme Ice = $Fi_{ex.mast} := p_{ex} \cdot Cd_R \cdot AICE_{ex.mast} = 9$ plf **BLC 7**

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | CCI DMP65R-BU8D | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 96$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 20.7$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 7.7$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 115$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 3$ | | (User Input) |

**Gravity Load (without ice)**

Weight of All Antennas = $Wt_{ant} := WT_{ant} \cdot N_{ant} = 345$ lbs **BLC 2**

**Gravity Load (ice only)**

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 3011$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 98$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant} := W_{ICEant} \cdot N_{ant} = 293$ lbs **BLC 3**

**Gravity Load (Extreme ice only)**

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 6277$ cu

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 203$ lbs

Weight of Extreme Ice on All Antennas = $W_{ICE.exant} \cdot N_{ant} = 610$ lbs **BLC 4**

**Wind Load (NESC Heavy)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 14.62$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir)}{144} = 5.86$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 14.62$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 8.05$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 8.05$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 30.717$

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot EPA_{tot} = 197$ lbs **BLC 5**

**Wind Load (NESC Extreme)**

Effective Projected Area for One Antenna = $EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 13.8$ $EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 5.13$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 13.8$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 7.3$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 7.3$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 28.4$

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 1954$ lbs **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 15.45$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex})}{144} = 6.6$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 15.45$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 8.81$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 8.81$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 33.075$

Total Antenna Wind Force = $Fi_{ex.ant} := p_{ex} \cdot Cd_F \cdot EPA_{tot} = 212$ lbs **BLC 7**

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | Qunitel QD8616-7 | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 96$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 22$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 9.6$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 132$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 3$ | | (User Input) |

**Gravity Load (without ice)**

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 396$ lbs **BLC 2**

**Gravity Load (ice only)**

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 3373$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 109$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 328$ lbs **BLC 3**

**Gravity Load (Extreme ice only)**

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 7008$ cu

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 227$ lbs

Weight of Extreme Ice on All Antennas = $W_{ICE.exant} \cdot N_{ant} = 681$ lbs **BLC 4**

**Wind Load (NESC Heavy)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 15.49$ $\quad EPA_T := \frac{(L_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir)}{144} = 7.14$

Antenna Projected Surface Area =

$$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 15.49$$

$$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 9.23$$

$$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 9.23$$

$$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 33.95$$

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot EPA_{tot} = 217$ lbs **BLC 5**

**Wind Load (NESC Extreme)**

Effective Projected Area for One Antenna = $EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 14.67$ $EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 6.4$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 14.67$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 8.47$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 8.47$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 31.6$

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 2174$ lbs **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 16.33$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex})}{144} = 7.89$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 16.33$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 10$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 10$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 36.342$

Total Antenna Wind Force = $Fi_{ex.ant} := p_{ex} \cdot Cd_F \cdot EPA_{tot} = 233$ lbs **BLC 7**

## Development of Wind & Ice Load on Antennas

### Antenna Data:

Antenna Model = Ericsson AIR6419

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 31.1$ in (User Input)

Antenna Width = $W_{ant} := 16.1$ in (User Input)

Antenna Thickness = $T_{ant} := 7.3$ in (User Input)

Antenna Weight = $WT_{ant} := 56$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

### Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 168$ lbs **BLC 2**

### Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3655$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 901$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 29$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 88$ lbs **BLC 3**

### Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 1917$ cu

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 62$ lbs

Weight of Extreme Ice on All Antennas = $W_{ICE.exant} \cdot N_{ant} = 186$ lbs **BLC 4**

### Wind Load (NESC Heavy)

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 3.81$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir)}{144} = 1.85$

Antenna Projected Surface Area =

$$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 3.81$$

$$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 2.34$$

$$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 2.34$$

$$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 8.493$$

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot EPA_{tot} = 54$ lbs **BLC 5**

**Wind Load (NESC Extreme)**

Effective Projected Area for One Antenna = $EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 3.48$ $\quad EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 1.58$

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 3.48$

Antenna Projected Surface Area = $EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 2.05$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 2.05$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 7.581$

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 522$ lbs **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 4.16$ $\quad EPA_T := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex})}{144} = 2.14$

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 4.16$

Antenna Projected Surface Area = $EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 2.64$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 2.64$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 9.447$

Total Antenna Wind Force = $Fi_{ex.ant} := p_{ex} \cdot Cd_F \cdot EPA_{tot} = 60$ lbs **BLC 7**

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

Antenna Model = Ericsson AIR6449

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 30.6$ in (User Input)

Antenna Width = $W_{ant} := 15.9$ in (User Input)

Antenna Thickness = $T_{ant} := 10.6$ in (User Input)

Antenna Weight = $WT_{ant} := 96$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

**Gravity Load (without ice)**

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 288$ lbs **BLC 2**

**Gravity Load (ice only)**

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5157$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 1038$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 34$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 101$ lbs **BLC 3**

**Gravity Load (Extreme ice only)**

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 2195$ cu

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 71$ lbs

Weight of Extreme Ice on All Antennas = $W_{ICE.exant} \cdot N_{ant} = 213$ lbs **BLC 4**

**Wind Load (NESC Heavy)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 3.71$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir)}{144} = 2.55$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 3.71$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 2.84$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 2.84$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 9.381$

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot EPA_{tot} = 60$ lbs **BLC 5**

**Wind Load (NESC Extreme)**

Effective Projected Area for One Antenna = $EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 3.38$ $EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 2.25$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 3.38$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 2.53$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 2.53$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 8.447$

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 581$ lbs **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 4.05$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex})}{144} = 2.85$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 4.05$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 3.15$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 3.15$

$EPA_{tot} := EPA_{A1} + EPA_{A2} + EPA_{A3} = 10.357$

Total Antenna Wind Force = $Fi_{ex.ant} := p_{ex} \cdot Cd_F \cdot EPA_{tot} = 66$ lbs **BLC 7**

| | | |
|---|---|---|
| CENTEK engineering<br>Centered on Solutions™ www.centekeng.com<br>63-2 North Branford Road P: (203) 488-0580<br>Branford, CT 06405 F: (203) 488-8587 | Subject:<br><br>Location:<br><br>Rev. 1: 8/18/22 | Load Analysis of AT&T Equipment on Structure #11229<br><br>Waterbury, CT<br><br>Prepared by: T.J.L Checked by: C.F.C.<br>Job No. 22021.06 |

**Development of Wind & Ice Load on Antennas**

**Antenna Data:**

Antenna Model = Kaelus TMA2124F03V5-2D

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 9.7$ in (User Input)

Antenna Width = $W_{ant} := 10.4$ in (User Input)

Antenna Thickness = $T_{ant} := 8.3$ in (User Input)

Antenna Weight = $WT_{ant} := 36$ lbs (User Input)

Number of Antennas = $N_{ant} := 6$ (User Input)

**Gravity Load (without ice)**

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 216$ lbs **BLC 2**

**Gravity Load (ice only)**

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 837$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 297$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 10$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 58$ lbs **BLC 3**

**Gravity Load (Extreme ice only)**

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 657$ cu

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 21$ lbs

Weight of Extreme Ice on All Antennas = $W_{ICE.exant} \cdot N_{ant} = 128$ lbs **BLC 4**

**Wind Load (NESC Heavy)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 0.85$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir)}{144} = 0.69$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 0.85$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 0.73$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 0.73$

$EPA_{tot} := EPA_{A1} \cdot 2 + EPA_{A2} \cdot 2 + EPA_{A3} \cdot 2 = 4.614$

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot EPA_{tot} = 30$ lbs **BLC 5**

## Wind Load (NESC Extreme)

Effective Projected Area for One Antenna =

$$EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 0.7 \qquad EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 0.56$$

Antenna Projected Surface Area =

$$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 0.7$$

$$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 0.59$$

$$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 0.59$$

$$EPA_{tot} := EPA_{A1} \cdot 2 + EPA_{A2} \cdot 2 + EPA_{A3} \cdot 2 = 3.779$$

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 260$ lbs **BLC 6**

## Wind Load (NESC Extreme Ice w/ Wind)

Effective Projected Area for One Antenna =

$$EPA_N := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 1.01 \qquad EPA_T := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex})}{144} = 0.84$$

Antenna Projected Surface Area =

$$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 1.01$$

$$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 0.88$$

$$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 0.88$$

$$EPA_{tot} := EPA_{A1} \cdot 2 + EPA_{A2} \cdot 2 + EPA_{A3} \cdot 2 = 5.533$$

Total Antenna Wind Force = $Fi_{ex.ant} := p_{ex} \cdot Cd_F \cdot EPA_{tot} = 35$ lbs **BLC 7**

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

Antenna Model = CCI TMABPD7823VG12A

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 14.25$ in (User Input)

Antenna Width = $W_{ant} := 11.024$ in (User Input)

Antenna Thickness = $T_{ant} := 4.11$ in (User Input)

Antenna Weight = $WT_{ant} := 22$ lbs (User Input)

Number of Antennas = $N_{ant} := 6$ (User Input)

**Gravity Load (without ice)**

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 132$ lbs **BLC 2**

**Gravity Load (ice only)**

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 646$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 291$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 9$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 57$ lbs **BLC 3**

**Gravity Load (Extreme ice only)**

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 647$ cu

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 21$ lbs

Weight of Extreme Ice on All Antennas = $W_{ICE.exant} \cdot N_{ant} = 126$ lbs **BLC 4**

**Wind Load (NESC Heavy)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 1.27$ $EPA_T := \frac{(L_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir)}{144} = 0.54$

Antenna Projected Surface Area =

$$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 1.27$$

$$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 0.72$$

$$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 0.72$$

$$EPA_{tot} := EPA_{A1} \cdot 2 + EPA_{A2} \cdot 2 + EPA_{A3} \cdot 2 = 5.444$$

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot EPA_{tot} = 35$ lbs **BLC 5**

**Wind Load (NESC Extreme)**

Effective Projected Area for One Antenna = $EPA_N := \frac{L_{ant} \cdot W_{ant}}{144} = 1.09$ $\quad EPA_T := \frac{L_{ant} \cdot T_{ant}}{144} = 0.41$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 1.09$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 0.58$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 0.58$

$EPA_{tot} := EPA_{A1} \cdot 2 + EPA_{A2} \cdot 2 + EPA_{A3} \cdot 2 = 4.493$

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot EPA_{tot} \cdot m = 309$ lbs **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Effective Projected Area for One Antenna = $EPA_N := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 1.47$ $\quad EPA_T := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex})}{144} = 0.69$

Antenna Projected Surface Area =

$EPA_{A1} := EPA_N \cdot \cos(\phi)^2 + EPA_T \cdot \sin(\phi)^2 = 1.47$

$EPA_{A2} := EPA_N \cdot \cos(120 \cdot deg - \phi)^2 + EPA_T \cdot \sin(120 \cdot deg - \phi)^2 = 0.88$

$EPA_{A3} := EPA_N \cdot \cos(240 \cdot deg - \phi)^2 + EPA_T \cdot \sin(240 \cdot deg - \phi)^2 = 0.88$

$EPA_{tot} := EPA_{A1} \cdot 2 + EPA_{A2} \cdot 2 + EPA_{A3} \cdot 2 = 6.478$

Total Antenna Wind Force = $Fi_{ex.ant} := p_{ex} \cdot Cd_F \cdot EPA_{tot} = 41$ lbs **BLC 7**

## Development of Wind & Ice Load on Antennas

**Antenna Data:**

| | | | |
|---|---|---|---|
| Antenna Model = | Raycap DC6-48-60-18-8C | | |
| Antenna Shape = | Flat | | (User Input) |
| Antenna Height = | $L_{ant} := 31.4$ | in | (User Input) |
| Antenna Width = | $W_{ant} := 18.28$ | in | (User Input) |
| Antenna Thickness = | $T_{ant} := 10.24$ | in | (User Input) |
| Antenna Weight = | $WT_{ant} := 26$ | lbs | (User Input) |
| Number of Antennas = | $N_{ant} := 1$ | | (User Input) |

**Gravity Load (without ice)**

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 26$ lbs **BLC 2**

**Gravity Load (ice only)**

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5878$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 1144$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 37$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 37$ lbs **BLC 3**

**Gravity Load (Extreme ice only)**

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 2413$ cu

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 78$ lbs

Weight of Extreme Ice on All Antennas = $W_{ICE.exant} \cdot N_{ant} = 78$ lbs **BLC 4**

**Wind Load (NESC Heavy)**

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 4.3$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 4.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 28$ lbs **BLC 5**

**Wind Load (NESC Extreme)**

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 4$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 274$ lbs **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Surface Area for One Antenna w/ Extreme Ice = $SA_{ICE.exant} := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 4.7$ sf

Antenna Projected Surface Area w/ Extreme Ice = $A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 4.7$ sf

Total Antenna Wind Force w/ Extreme Ice = $Fi_{ex.ant} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} = 30$ lbs **BLC 7**

## Development of Wind & Ice Load on Antenna Mounts

**Mount Data:**

| | | | |
|---|---|---|---|
| Mount Type: | Custom T-Arm Mount w/ Square Horz | | |
| Mount Shape = | Flat | | |
| Mount Projected Surface Area = | $CdAa := 25$ | sf | (User Input) |
| Mount Projected Surface Area w/ Ice = | $CdAa_{ice} := 32$ | sf | (User Input) |
| Mount Projected Surface Area w/ Extreme Ice = | $CdAa_{ice.ex} := 36$ | sf | (User Input) |
| Mount Weight = | $WT_{mnt} := 1675$ | lbs | (User Input) |
| Mount Weight w/ Ice = | $WT_{mnt.ice} := 2200$ | lbs | (User Input) |
| Mount Weight w/ Extreme Ice = | $WT_{mnt.ice.ex} := 2500$ | lbs | (User Input) |

**Gravity Loads (without ice)**

Weight of All Mounts = $Wt_{mnt1} := WT_{mnt} = 1675$ lbs **BLC 2**

**Gravity Load (ice only)**

Weight of Ice on All Mounts = $Wt_{ice.mnt1} := \left(WT_{mnt.ice} - WT_{mnt}\right) = 525$ lbs **BLC 3**

**Gravity Load (extreme ice only)**

Weight of Ice on All Mounts = $Wt_{ice.ex.mnt1} := \left(WT_{mnt.ice.ex} - WT_{mnt}\right) = 825$ lbs **BLC 4**

**Wind Load (NESC Heavy)**

Total Mount Wind Force w/ Ice = $Fi_{mnt1} := p \cdot CdAa_{ice} = 128$ lbs **BLC 5**

**Wind Load (NESC Extreme)**

Total Mount Wind Force = $F_{mnt1} := qz \cdot CdAa \cdot m = 1075$ lbs **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Total Mount Wind Force w/ Extreme Ice = $Fi_{ex.mnt1} := p_{ex} \cdot CdAa_{ice.ex} = 144$ lbs **BLC 7**

**Development of Wind & Ice Load on Coax Cables**

**Coax Cable Data:**

Coax Type = 1-5/8"

Shape = Round (User Input)

Coax Outside Diameter = $D_{coax} := 1.98$ in (User Input)

Coax Cable Length = $L_{coax} := 25$ ft (User Input)

Weight of Coax per foot = $Wt_{coax} := 1.04$ plf (User Input)

Total Number of Coax = $N_{coax} := 33$ (User Input - 30 Coax & 1 Hybrid & 2 DC)

No. of Coax Projecting Outside Face of Member = $NP_{coax} := 8$ (User Input)

**Gravity Loads (without ice)**

Weight of all cables w/o ice = $WT_{coax} := Wt_{coax} \cdot N_{coax} = 34$ plf **BLC 2**

**Gravity Load (ice only)**

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot Ir\right)^2 - D_{coax}^{\,2}\right] = 3.9$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 50$ plf **BLC 3**

**Gravity Loads (Extreme ice only)**

Extreme Ice Area per Linear Foot = $Ai_{ex.coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot Ir_{ex}\right)^2 - D_{coax}^{\,2}\right] = 9.4$ sq in

Extreme Ice Weight All Coax per foot = $W_{ICE.excoax} := N_{coax} \cdot Id \cdot \frac{Ai_{ex.coax}}{144} = 120$ plf **BLC 4**

**Wind Load (NESC Heavy)**

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{NP_{coax} \cdot \left(D_{coax} + 2 \cdot Ir\right)}{12} = 2$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 13$ plf **BLC 5**

**Wind Load (NESC Extreme)**

Coax projected surface area = $A_{coax} := \frac{\left(NP_{coax} D_{coax}\right)}{12} = 1.3$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 91$ plf **BLC 6**

**Wind Load (NESC Extreme Ice w/ Wind)**

Coax Projected Surface Area w/ Extreme Ice = $AICE_{ex.coax} := \frac{NP_{coax} \cdot \left(D_{coax} + 2 \cdot Ir_{ex}\right)}{12} = 2.653$ sf/ft

Total Coax Wind Force w/ Extreme Ice = $Fi_{ex.coax} := p_{ex} \cdot Cd_{coax} \cdot AICE_{ex.coax} = 17$ plf **BLC 7**

## *(Global) Model Settings*

| | |
|---|---|
| Display Sections for Member Calcs | 5 |
| Max Internal Sections for Member Calcs | 97 |
| Include Shear Deformation? | Yes |
| Increase Nailing Capacity for Wind? | Yes |
| Include Warping? | Yes |
| Trans Load Btwn Intersecting Wood Wall? | Yes |
| Area Load Mesh (in^2) | 144 |
| Merge Tolerance (in) | .12 |
| P-Delta Analysis Tolerance | 0.50% |
| Include P-Delta for Walls? | Yes |
| Automatically Iterate Stiffness for Walls? | No |
| Max Iterations for Wall Stiffness | 3 |
| Gravity Acceleration (ft/sec^2) | 32.2 |
| Wall Mesh Size (in) | 12 |
| Eigensolution Convergence Tol. (1.E-) | 4 |
| Vertical Axis | Y |
| Global Member Orientation Plane | XZ |
| Static Solver | Sparse Accelerated |
| Dynamic Solver | Accelerated Solver |

| | |
|---|---|
| Hot Rolled Steel Code | AISC 14th(360-10): LRFD |
| Adjust Stiffness? | Yes(Iterative) |
| RISAConnection Code | AISC 14th(360-10): ASD |
| Cold Formed Steel Code | AISI 1999: ASD |
| Wood Code | AF&PA NDS-91/97: ASD |
| Wood Temperature | < 100F |
| Concrete Code | ACI 318-02 |
| Masonry Code | ACI 530-05: ASD |
| Aluminum Code | AA ADM1-05: ASD - Building |
| Stainless Steel Code | AISC 14th(360-10): ASD |
| Adjust Stiffness? | Yes(Iterative) |

| | |
|---|---|
| Number of Shear Regions | 4 |
| Region Spacing Increment (in) | 4 |
| Biaxial Column Method | PCA Load Contour |
| Parme Beta Factor (PCA) | .65 |
| Concrete Stress Block | Rectangular |
| Use Cracked Sections? | Yes |
| Use Cracked Sections Slab? | Yes |
| Bad Framing Warnings? | No |
| Unused Force Warnings? | Yes |
| Min 1 Bar Diam. Spacing? | No |
| Concrete Rebar Set | REBAR_SET_ASTMA615 |
| Min % Steel for Column | 1 |
| Max % Steel for Column | 8 |

## *(Global) Model Settings, Continued*

| | |
|---|---|
| Seismic Code | UBC 1997 |
| Seismic Base Elevation (ft) | Not Entered |
| Add Base Weight? | No |
| Ct X | .035 |
| Ct Z | .035 |
| T X (sec) | Not Entered |
| T Z (sec) | Not Entered |
| R X | 8.5 |
| R Z | 8.5 |
| Ca | .36 |
| Cv | .54 |
| Nv | 1 |
| Occupancy Category | 4 |
| Seismic Zone | 3 |
| Om Z | 1 |
| Om X | 1 |
| Rho Z | 1 |
| Rho X | 1 |
| | |
| Footing Overturning Safety Factor | 1.5 |
| Optimize for OTM/Sliding | No |
| Check Concrete Bearing | No |
| Footing Concrete Weight (k/ft^3) | 0 |
| Footing Concrete f'c (ksi) | 3 |
| Footing Concrete Ec (ksi) | 4000 |
| Lambda | 1 |
| Footing Steel fy (ksi) | 60 |
| Minimum Steel | 0.0018 |
| Maximum Steel | 0.0075 |
| Footing Top Bar | #3 |
| Footing Top Bar Cover (in) | 3.5 |
| Footing Bottom Bar | #3 |
| Footing Bottom Bar Cover (in) | 3.5 |
| Pedestal Bar | #3 |
| Pedestal Bar Cover (in) | 1.5 |
| Pedestal Ties | #3 |

## *Hot Rolled Steel Properties*

| | Label | E [ksi] | G [ksi] | Nu | Therm (\... | Density[k/ft^3] | Yield[ksi] | Ry | Fu[ksi] | Rt |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A36 Gr.36 | 29000 | 11154 | .3 | .65 | .49 | 36 | 1.5 | 58 | 1.2 |
| 2 | A572 Gr.50 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 58 | 1.2 |
| 3 | A992 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 58 | 1.2 |
| 4 | A500 Gr.42 | 29000 | 11154 | .3 | .65 | .49 | 42 | 1.3 | 58 | 1.1 |
| 5 | A500 Gr.46 | 29000 | 11154 | .3 | .65 | .49 | 46 | 1.2 | 58 | 1.1 |
| 6 | A53 Gr. B | 29000 | 11154 | .3 | .65 | .49 | 35 | 1.5 | 58 | 1.2 |

## Hot Rolled Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design Ru... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mast | HSS18x0.500 | Column | Wide Flange | A500 Gr.42 | Typical | 25.6 | 985 | 985 | 1970 |
| 2 | Mast 2 | HSS16x0.500 | Column | Wide Flange | A500 Gr.42 | Typical | 22.7 | 685 | 685 | 1370 |

## Hot Rolled Steel Design Parameters

| | Label | Shape | Length[ft] | Lbyy[ft] | Lbzz[ft] | Lcomp top[... | Lcomp bot[... | L-torq... | Kyy | Kzz | Cb | Functi... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | Mast | 32 | | | Lbyy | | | | | | Lateral |
| 2 | M2 | Mast 2 | 25 | | | Lbyy | | | | | | Lateral |

## Member Primary Data

| | Label | I Joint | J Joint | K Joint | Rotate(... | Section/Shape | Type | Design List | Material | Design ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | BOTC... | FLANGE | | | Mast | Column | Wide Flan... | A500 Gr.42 | Typical |
| 2 | M2 | FLANGE | TOPM... | | | Mast 2 | Column | Wide Flan... | A500 Gr.42 | Typical |

## Joint Coordinates and Temperatures

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 1 | BOTCONNECTION | 0 | 0 | 0 | 0 | |
| 2 | CONN | 0 | 10 | 0 | 0 | |
| 3 | TOPCONNECTION | 0 | 27.5 | 0 | 0 | |
| 4 | TOPMAST | 0 | 57 | 0 | 0 | |
| 5 | ANTCL | 0 | 55 | 0 | 0 | |
| 6 | FLANGE | 0 | 32 | 0 | 0 | |

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Z [k/in] | X Rot.[k-ft/rad] | Y Rot.[k-ft/rad] | Z Rot.[k-ft/rad] |
|---|---|---|---|---|---|---|---|
| 1 | BOTCONNECTION | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 2 | TOPCONNECTION | Reaction | | Reaction | | | |
| 3 | CONN | Reaction | | Reaction | | | |

## Member Point Loads

| Member Label | Direction | Magnitude[k,k-ft] | Location[ft,%] |
|---|---|---|---|
| No Data to Print ... | | | |

## Joint Loads and Enforced Displacements (BLC 2 : Weight of Appurtenances)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | Y | -.345 |
| 2 | ANTCL | L | Y | -.396 |
| 3 | ANTCL | L | Y | -.168 |
| 4 | ANTCL | L | Y | -.288 |
| 5 | ANTCL | L | Y | -.216 |
| 6 | ANTCL | L | Y | -.132 |
| 7 | ANTCL | L | Y | -.026 |
| 8 | ANTCL | L | Y | -1.675 |

## Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only on Struct)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | Y | -.293 |
| 2 | ANTCL | L | Y | -.328 |
| 3 | ANTCL | L | Y | -.088 |
| 4 | ANTCL | L | Y | -.101 |
| 5 | ANTCL | L | Y | -.058 |
| 6 | ANTCL | L | Y | -.057 |
| 7 | ANTCL | L | Y | -.037 |
| 8 | ANTCL | L | Y | -.525 |

## Joint Loads and Enforced Displacements (BLC 4 : Weight of Extreme Ice Only)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | Y | -.61 |
| 2 | ANTCL | L | Y | -.681 |
| 3 | ANTCL | L | Y | -.186 |
| 4 | ANTCL | L | Y | -.213 |
| 5 | ANTCL | L | Y | -.128 |
| 6 | ANTCL | L | Y | -.126 |
| 7 | ANTCL | L | Y | -.078 |
| 8 | ANTCL | L | Y | -.825 |

## Joint Loads and Enforced Displacements (BLC 5 : NESC Heavy Wind on Structure)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | X | .197 |
| 2 | ANTCL | L | X | .217 |
| 3 | ANTCL | L | X | .054 |
| 4 | ANTCL | L | X | .06 |
| 5 | ANTCL | L | X | .03 |
| 6 | ANTCL | L | X | .035 |
| 7 | ANTCL | L | X | .028 |
| 8 | ANTCL | L | X | .128 |

## Joint Loads and Enforced Displacements (BLC 6 : NESC Extreme Wind on Structure)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | X | 1.954 |
| 2 | ANTCL | L | X | 2.174 |
| 3 | ANTCL | L | X | .522 |
| 4 | ANTCL | L | X | .581 |
| 5 | ANTCL | L | X | .26 |
| 6 | ANTCL | L | X | .309 |
| 7 | ANTCL | L | X | .274 |
| 8 | ANTCL | L | X | 1.075 |

## Joint Loads and Enforced Displacements (BLC 7 : NESC Extreme Ice w/ Wind on Stru)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 1 | ANTCL | L | X | .212 |
| 2 | ANTCL | L | X | .233 |
| 3 | ANTCL | L | X | .06 |
| 4 | ANTCL | L | X | .066 |
| 5 | ANTCL | L | X | .035 |
| 6 | ANTCL | L | X | .041 |

## Joint Loads and Enforced Displacements (BLC 7 : NESC Extreme Ice w/ Wind on Stru) (Continued)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (k*s^2/f... |
|---|---|---|---|---|
| 7 | ANTCL | L | X | .03 |
| 8 | ANTCL | L | X | .144 |

## Member Distributed Loads (BLC 2 : Weight of Appurtenances)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M2 | Y | -.034 | -.034 | 0 | 18 |

## Member Distributed Loads (BLC 3 : Weight of Ice Only on Struct)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | Y | -.011 | -.011 | 0 | 0 |
| 2 | M2 | Y | -.01 | -.01 | 0 | 0 |
| 3 | M2 | Y | -.05 | -.05 | 0 | 18 |

## Member Distributed Loads (BLC 4 : Weight of Extreme Ice Only)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | Y | -.023 | -.023 | 0 | 0 |
| 2 | M2 | Y | -.021 | -.021 | 0 | 0 |
| 3 | M2 | Y | -.12 | -.12 | 0 | 18 |

## Member Distributed Loads (BLC 5 : NESC Heavy Wind on Structure)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | X | .008 | .008 | 0 | 0 |
| 2 | M2 | X | .009 | .009 | 0 | 0 |
| 3 | M2 | X | .013 | .013 | 0 | 18 |

## Member Distributed Loads (BLC 6 : NESC Extreme Wind on Structure)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | X | .067 | .067 | 0 | 0 |
| 2 | M2 | X | .092 | .092 | 0 | 0 |
| 3 | M2 | X | .091 | .091 | 0 | 18 |

## Member Distributed Loads (BLC 7 : NESC Extreme Ice w/ Wind on Stru)

| | Member Label | Direction | Start Magnitude[k/ft,F,ksf] | End Magnitude[k/ft,F,k... | Start Location[ft... | End Location[ft,... |
|---|---|---|---|---|---|---|
| 1 | M1 | X | .009 | .009 | 0 | 0 |
| 2 | M2 | X | .01 | .01 | 0 | 0 |
| 3 | M2 | X | .017 | .017 | 0 | 18 |

## Basic Load Cases

| | BLC Description | Category | X Gra... | Y Gra... | Z Gra... | Joint | Point | Distrib... | Area(... | Surfa... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Self Weight (Mast) | None | | -1 | | | | | | |
| 2 | Weight of Appurtenances | None | | | | 8 | | 1 | | |
| 3 | Weight of Ice Only on Struct | None | | | | 8 | | 3 | | |
| 4 | Weight of Extreme Ice Only | None | | | | 8 | | 3 | | |
| 5 | NESC Heavy Wind on Structure | None | | | | 8 | | 3 | | |
| 6 | NESC Extreme Wind on Structure | None | | | | 8 | | 3 | | |
| 7 | NESC Extreme Ice w/ Wind on Stru | None | | | | 8 | | 3 | | |

### *Load Combinations*

| | Description | So... | P... | S... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... | BLC | Fac... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | NESC Heavy W... | Yes | Y | | 1 | 1.5 | 2 | 1.5 | 3 | 1.5 | 5 | 2.5 | | | | | | | | | | | | |
| 2 | NESC Extreme ... | Yes | Y | | 1 | 1 | 2 | 1 | 6 | 1 | | | | | | | | | | | | | | |
| 3 | NESC Extreme ... | Yes | Y | | 1 | 1 | 2 | 1 | 4 | 1 | 7 | 1 | | | | | | | | | | | | |

## *Joint Reactions (By Combination)*

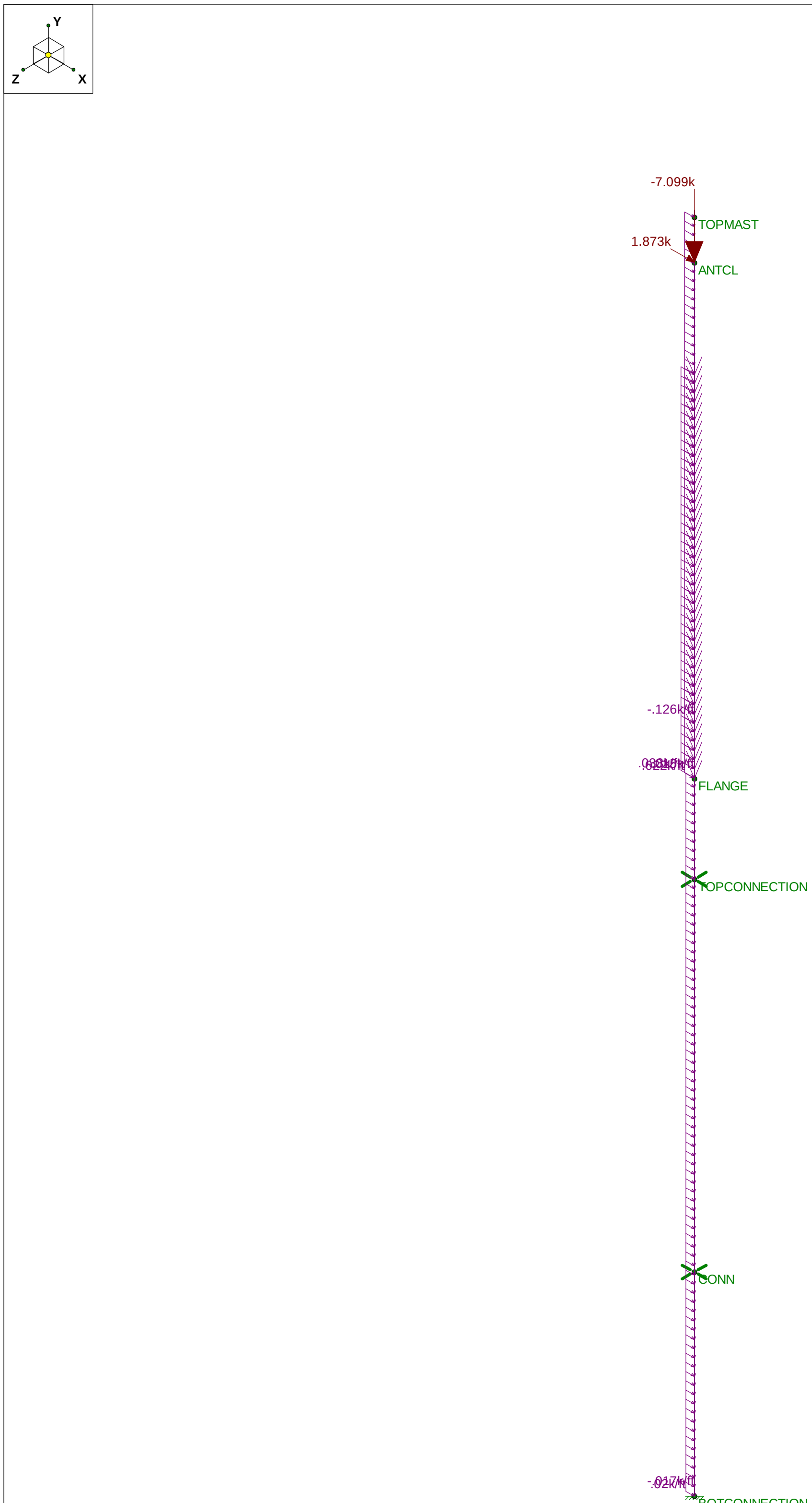
| | LC | Joint Label | X [k] | Y [k] | Z [k] | MX [k-ft] | MY [k-ft] | MZ [k-ft] |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | BOTCONNECTION | -3.469 | 17.348 | 0 | 0 | 0 | 10.692 |
| 2 | 1 | TOPCONNECTION | -8.664 | 0 | 0 | 0 | 0 | 0 |
| 3 | 1 | CONN | 8.473 | 0 | 0 | 0 | 0 | 0 |
| 4 | 1 | Totals: | -3.66 | 17.348 | 0 | | | |
| 5 | 1 | COG (ft): | X: 0 | Y: 40.603 | Z: 0 | | | |

## *Joint Reactions (By Combination)*

| | LC | Joint Label | X [k] | Y [k] | Z [k] | MX [k-ft] | MY [k-ft] | MZ [k-ft] |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | BOTCONNECTION | -12.757 | 8.577 | 0 | 0 | 0 | 39.366 |
| 2 | 2 | TOPCONNECTION | -31.786 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2 | CONN | 31.312 | 0 | 0 | 0 | 0 | 0 |
| 4 | 2 | Totals: | -13.231 | 8.577 | 0 | | | |
| 5 | 2 | COG (ft): | X: 0 | Y: 38.961 | Z: 0 | | | |

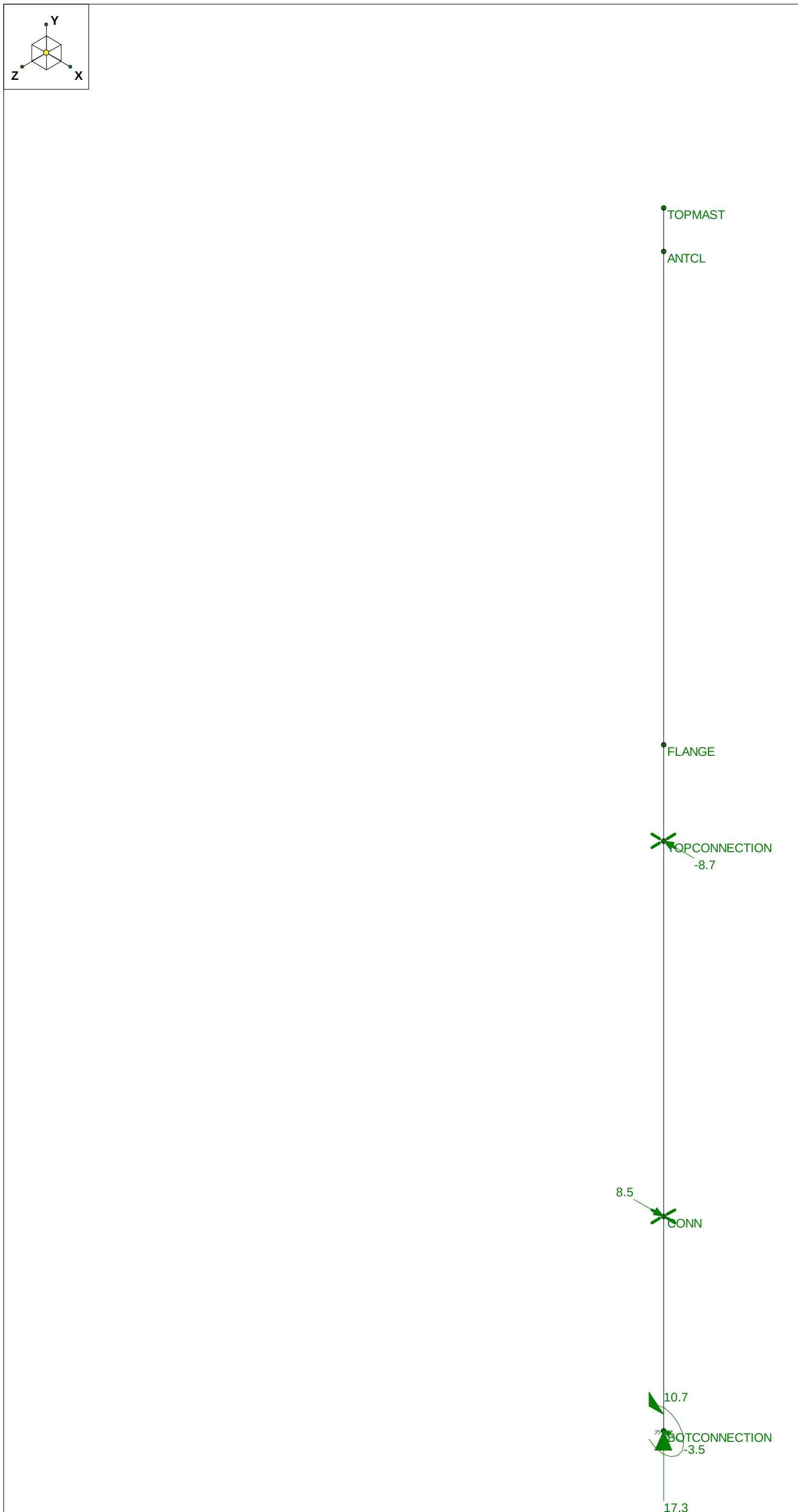
## *Joint Reactions (By Combination)*

| | LC | Joint Label | X [k] | Y [k] | Z [k] | MX [k-ft] | MY [k-ft] | MZ [k-ft] |
|---|---|---|---|---|---|---|---|---|
| 1 | 3 | BOTCONNECTION | -1.552 | 14.845 | 0 | 0 | 0 | 4.784 |
| 2 | 3 | TOPCONNECTION | -3.903 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3 | CONN | 3.79 | 0 | 0 | 0 | 0 | 0 |
| 4 | 3 | Totals: | -1.665 | 14.845 | 0 | | | |
| 5 | 3 | COG (ft): | X: 0 | Y: 41.391 | Z: 0 | | | |



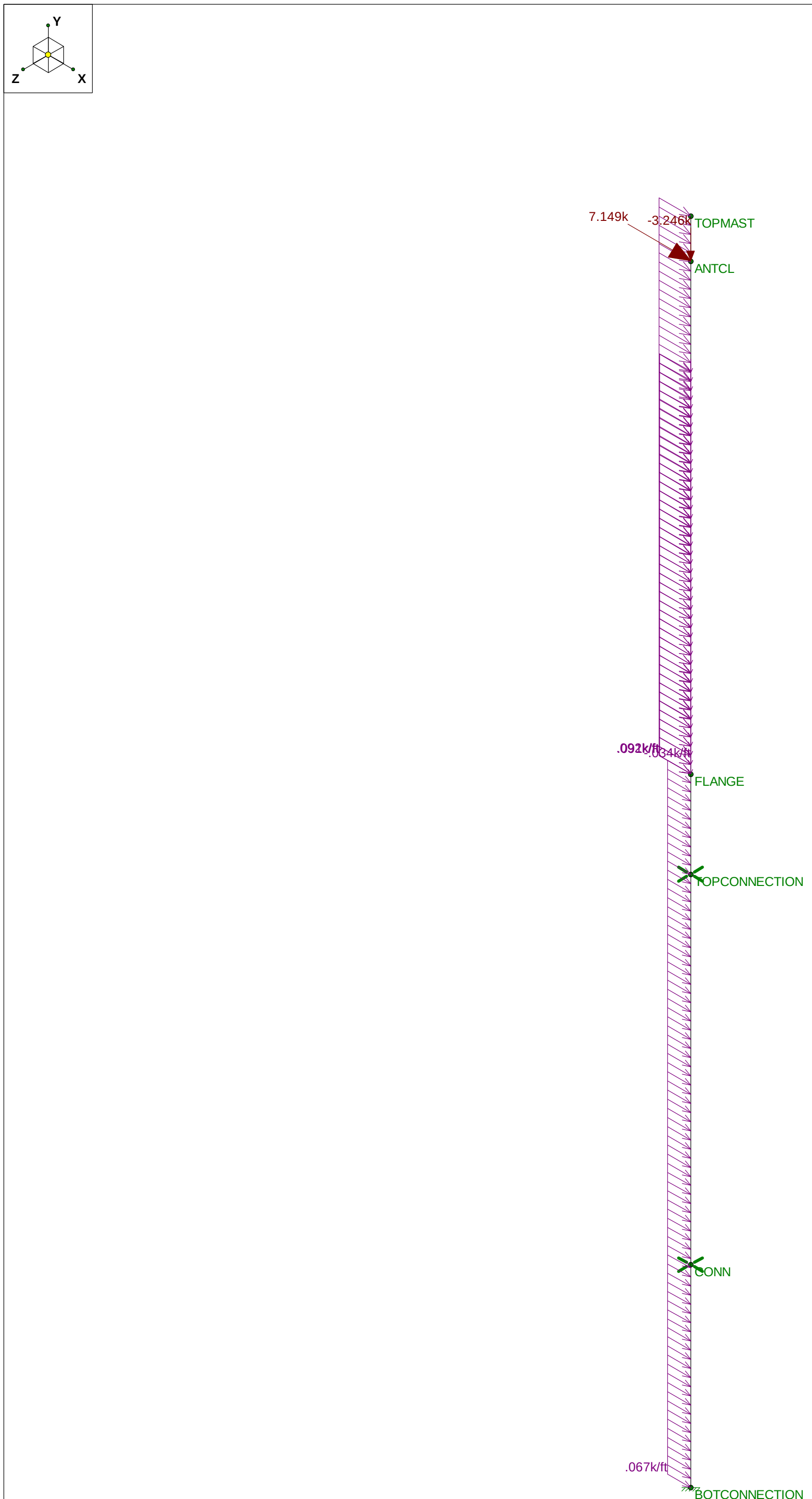

Loads: LC 1, NESC Heavy Wind on PCS Structure

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | Aug 18, 2022 at 8:48 AM |
| 22021.06/ AT&T CT2901 | LC #1 Loads | NESC Loads.r3d |



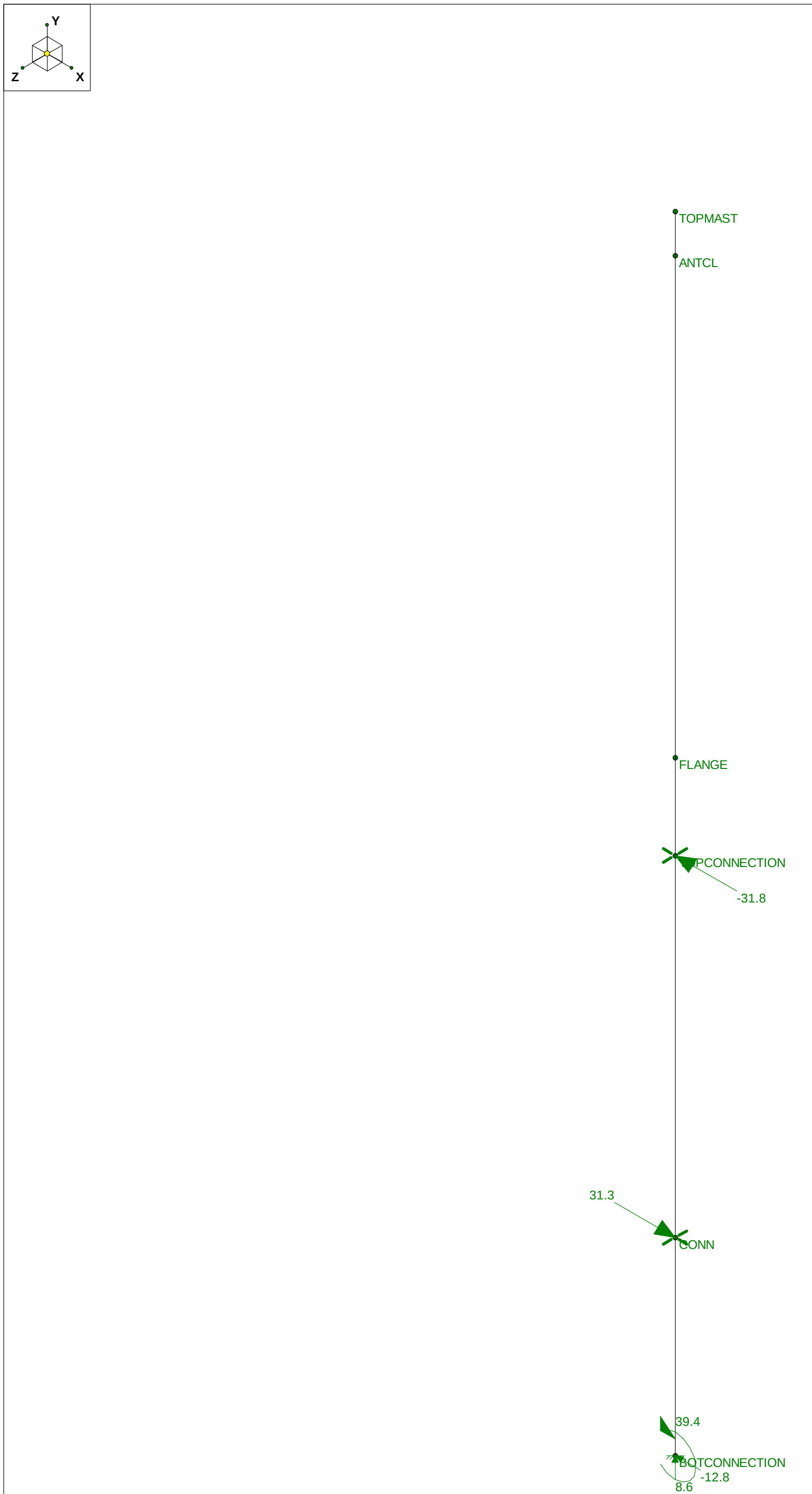

Results for LC 1, NESC Heavy Wind on PCS Structure
Reaction and Moment Units are k and k-ft

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | Aug 18, 2022 at 8:49 AM |
| 22021.06/ AT&T CT2901 | LC #1 Reactions | NESC Loads.r3d |



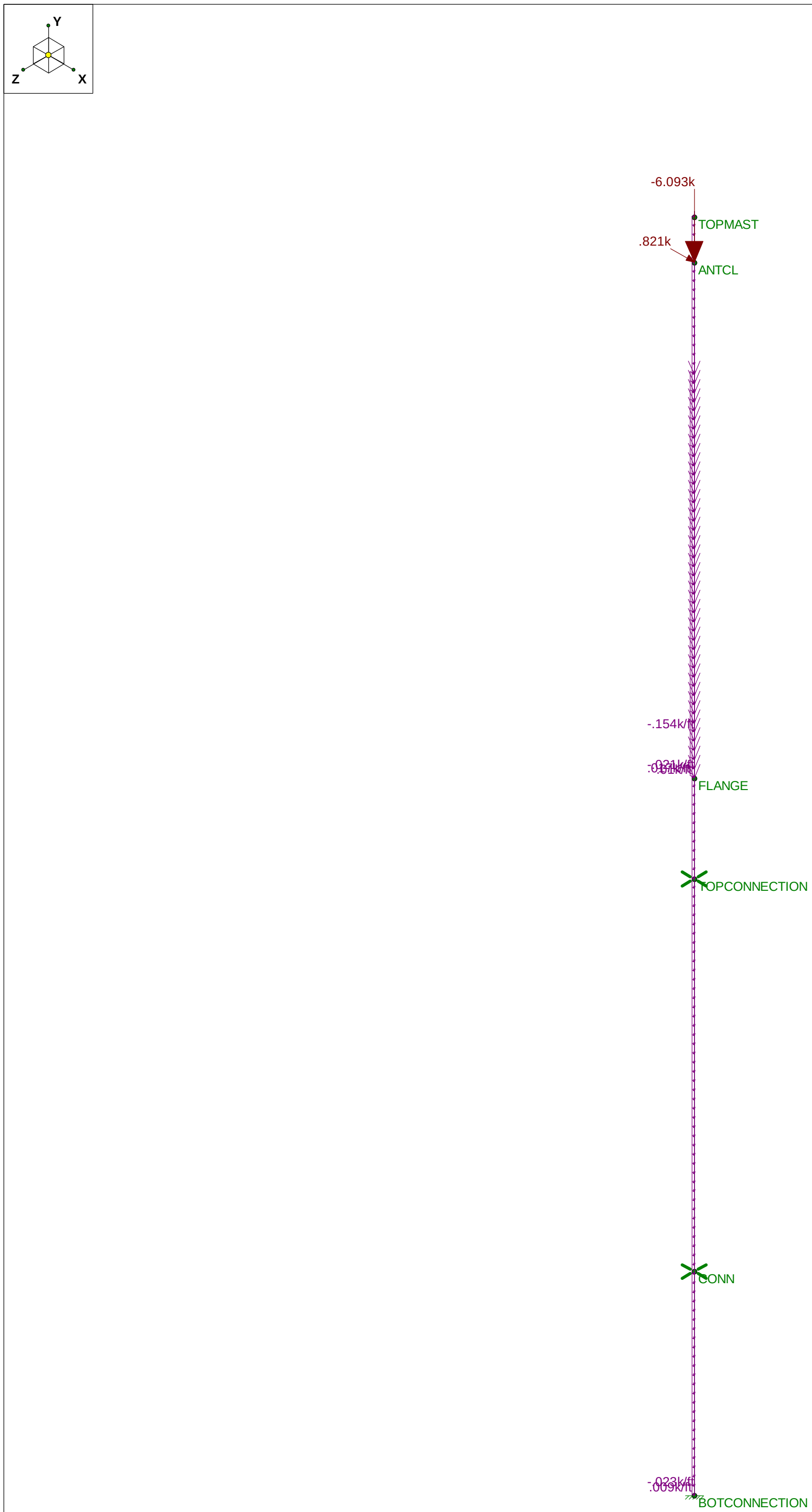

Loads: LC 2, NESC Extreme Wind on PCS Structure

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | Aug 18, 2022 at 8:49 AM |
| 22021.06/ AT&T CT2901 | LC #2 Loads | NESC Loads.r3d |



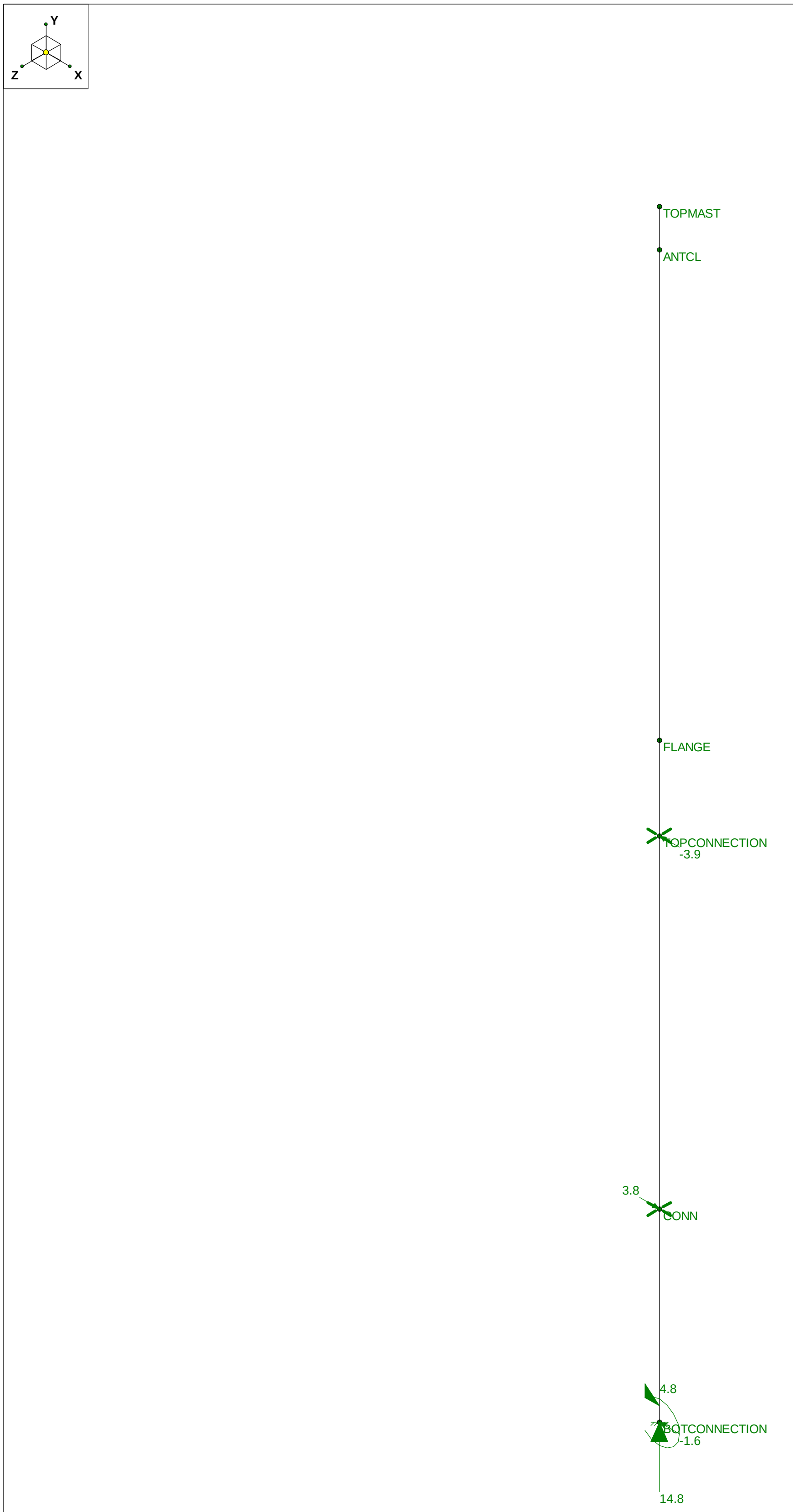

Results for LC 2, NESC Extreme Wind on PCS Structure
Reaction and Moment Units are k and k-ft

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | Aug 18, 2022 at 8:50 AM |
| 22021.06/ AT&T CT2901 | LC #2 Reactions | NESC Loads.r3d |




Loads: LC 3, NESC Extreme Ice w/ Wind on PCS Structure

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | Aug 18, 2022 at 8:49 AM |
| 22021.06/ AT&T CT2901 | LC #3 Loads | NESC Loads.r3d |




Results for LC 3, NESC Extreme Ice w/ Wind on PCS Structure
Reaction and Moment Units are k and k-ft

| | | |
|---|---|---|
| CENTEK Engineering, INC. | | |
| TJL | Pole # 11229 - Mast | Aug 18, 2022 at 8:50 AM |
| 22021.06/ AT&T CT2901 | LC #3 Reactions | NESC Loads.r3d |

## Coax Cable on Pole

Coaxial Cable Span — $Coax_{Span} := 10ft$ *(User Input)*

Heavy Wind Pressure = $p := 4 \cdot psf$ *(User Input)*

Radial Ice Thickness = $Ir := 0.5 \cdot in$ *(User Input)*

Extreme Ice w/ Wind Pressure = $p_{ex} := 4 \cdot psf$ *(User Input)*

Extreme Radial Ice Thickness = $Ir_{ex} := 1.0 \cdot in$ *(User Input)*

Radial Ice Density = $Id := 56 \cdot pcf$ *(User Input)*

Basic Windspeed = $V := 110$ mph (User Input NESC 2017 Figure 250-2(e) )

Height to Top of Coax (on utility pole) Above Grade = $TC := 80$ ft (User Input)

NESC Factor = $kv := 1.43$ (User Input from NESC 2017 Table 250-3 equation)

Importance Factor = $I := 1.0$ (User Input from NESC 2017 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{0.67TC}{900}\right)^{\frac{2}{9.5}} = 1.11$ (NESC 2017 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)}\right]^{\frac{1}{7}} = 0.323$ (NESC 2017 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220}\right)} = 0.88$ (NESC 2017 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.889$ (NESC 2017 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 30.6$ psf (NESC 2017 Section 250.C.2)

Shape Factor = $Cd_{coax} := 1.6$ *(User Input)*

Overload Factor for NESC Heavy Wind Transverse Load = $OF_{HWT} := 2.5$ *(User Input)*

Overload Factor for NESC Heavy Wind Vertical Load = $OF_{HWV} := 1.5$ *(User Input)*

Overload Factor for NESC Extreme Wind Transverse Load = $OF_{EWT} := 1.0$ *(User Input)*

Overload Factor for NESC Extreme Wind Vertical Load = $OF_{EWV} := 1.0$ *(User Input)*

Overload Factor for NESC Extreme Ice w/ Wind Transverse Load = $OF_{EIT} := 1.0$ *(User Input)*

Overload Factor for NESC Extreme Ice w/ Wind Vertical Load = $OF_{EIV} := 1.0$ *(User Input)*

Diameter of Coax Cable = $D_{coax} := 1.98 \cdot in$ *(User Input)*

Weight of Coax Cable = $W_{coax} := 1.04 \cdot plf$ *(User Input)*

Number of Coax Cables = $N_{coax} := 33$ *(User Input)*

Number of Projected Coax Cables = $NP_{coax} := 8$ *(User Input)*

Project Width without Ice = $A := \left(NP_{coax} \cdot D_{coax}\right) = 15.84 \cdot in$

Project Width with Ice = $A_{ice} := \left(NP_{coax} \cdot D_{coax} + 2 \cdot Ir\right) = 16.84 \cdot in$

Project Width with Extreme Ice = $A_{ice.ex} := \left(NP_{coax} \cdot D_{coax} + 2 \cdot Ir_{ex}\right) = 17.84 \cdot in$

Ice Area per Liner Ft = $Ai_{coax} := \frac{\pi}{4} \cdot \left[\left(D_{coax} + 2 \cdot Ir\right)^2 - D_{coax}^{\ 2}\right] = 0.027 \, ft^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax} \cdot Id \cdot N_{coax} = 49.993 \cdot plf$

Extreme Ice Area per Liner Ft = $Ai_{coax.ex} := \frac{\pi}{4} \cdot \left[\left(D_{coax} + 2 \cdot Ir_{ex}\right)^2 - D_{coax}^{\ 2}\right] = 0.065 \, ft^2$

Weight of Extreme Ice on All Coax Cables = $W_{ice.ex} := Ai_{coax.ex} \cdot Id \cdot N_{coax} = 120.145 \cdot plf$

Heavy Wind Vertical Load =

$Heavy\_WInd_{Vert} := \overrightarrow{\left[\left(N_{coax} \cdot W_{coax} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HWV}\right]}$

Heavy Wind Transverse Load =

$Heavy\_Wind_{Trans} := \overrightarrow{\left(p \cdot A_{ice} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{HWT}\right)}$

$Heavy\_WInd_{Vert} = 1265 \, lb$ $Heavy\_Wind_{Trans} = 225 \, lb$

Extreme Wind Vertical Load =

$Extreme\_Wind_{Vert} := \overrightarrow{\left(N_{coax} \cdot W_{coax} \cdot Coax_{Span} \cdot OF_{EWV}\right)}$

Extreme Wind Transverse Load =

$Extreme\_Wind_{Trans} := \overrightarrow{\left[\left(qz \cdot psf \cdot A \cdot Cd_{coax}\right) \cdot Coax_{Span} \cdot OF_{EWT}\right]}$

$Extreme\_Wind_{Vert} = 343 \, lb$ $Extreme\_Wind_{Trans} = 645 \, lb$

Extreme Ice w/ Wind Vertical Load =

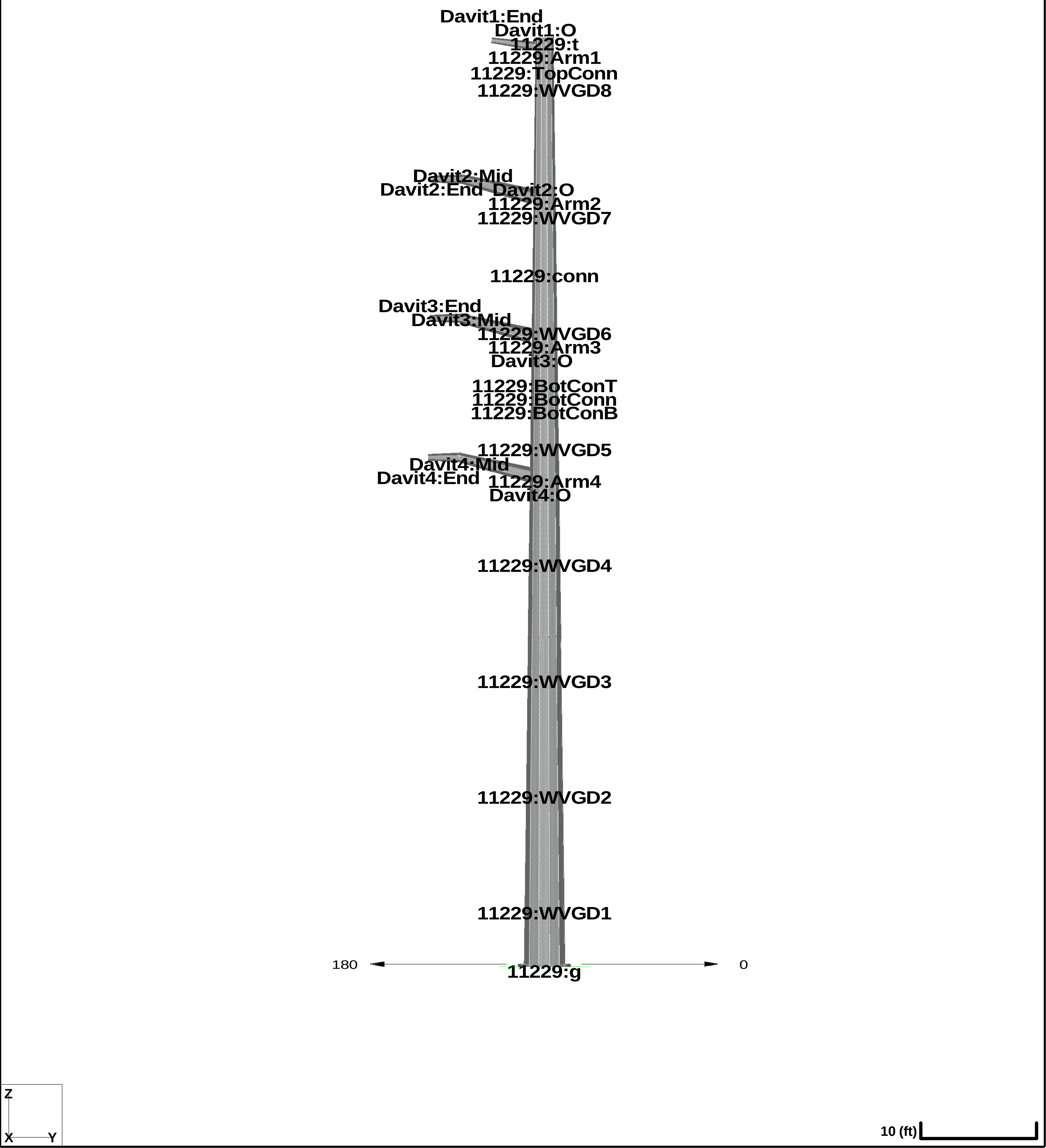
$Extreme\_Ice_{Vert} := \overrightarrow{\left[\left(N_{coax} \cdot W_{coax} + W_{ice.ex}\right) \cdot Coax_{Span} \cdot OF_{EIV}\right]}$

Extreme Ice w/ Wind Transverse Load =

$Extreme\_Ice_{Trans} := \overrightarrow{\left(p_{ex} \cdot A_{ice.ex} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{EIT}\right)}$

$Extreme\_Ice_{Vert} = 1545 \, lb$ $Extreme\_Ice_{Trans} = 95 \, lb$

Centek Engineering Inc,  Project: "cl&p structure # 11229"
PLS-POLE Version 16.81,  9:15:33 AM Friday, June 10, 2022
Undeformed geometry displayed



Project Name : 22021.06 - Waterbury, CT
Project Notes: Structure # 11229/ AT&T CT2901
Project File : J:\Jobs\2202100.WI\06_CT2901\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS Pole\cl&p structure # 11229.pol
Date run : 7:55:56 AM Thursday, August 18, 2022
by : PLS-POLE Version 16.81
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: J:\Jobs\2202100.WI\06_CT2901\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS Pole\cl&p #11229.lca

*** Analysis Results:

Maximum element usage is 93.40% for Steel Pole "11229" in load case "NESC Extreme"
Maximum insulator usage is 39.37% for Clamp "Clamp 14" in load case "NESC Extreme"

**Foundation Design Forces For All Load Cases:**

**Note: loads are factored.**

| Load Case | Foundation Description | Axial Force (kips) | Shear Force (kips) | Bending Moment (ft-k) | Foundation Usage % |
|---|---|---|---|---|---|
| NESC Heavy | 11229:g | 57.94 | 24.53 | 1650.75 | 0.00 |
| NESC Extreme | 11229:g | 29.97 | 38.85 | 2575.38 | 0.00 |
| NESC Extreme Ice w/ Wind | 11229:g | 52.42 | 15.24 | 1076.04 | 0.00 |

**Summary of Joint Support Reactions For All Load Cases:**

| Load Case | Joint Label | Long. Force (kips) | Tran. Force (kips) | Vert. Force (kips) | Shear Force (kips) | Tran. Moment (ft-k) | Long. Moment (ft-k) | Bending Moment (ft-k) | Vert. Moment (ft-k) | Found. Usage % |
|---|---|---|---|---|---|---|---|---|---|---|
| NESC Heavy | 11229:g | -0.04 | 24.53 | -57.94 | 24.53 | -1650.72 | 10.52 | 1650.75 | 0.35 | 0.00 |
| NESC Extreme | 11229:g | -0.04 | 38.85 | -29.97 | 38.85 | -2575.09 | 38.55 | 2575.38 | -0.02 | 0.00 |
| NESC Extreme Ice w/ Wind | 11229:g | -0.01 | 15.24 | -52.42 | 15.24 | -1076.03 | 5.08 | 1076.04 | 0.18 | 0.00 |

**Summary of Tip Deflections For All Load Cases:**

**Note: positive tip load results in positive deflection**

| Load Case | Joint Label | Long. Defl. (in) | Tran. Defl. (in) | Vert. Defl. (in) | Resultant Defl. (in) | Long. Rot. (deg) | Tran. Rot. (deg) | Twist (deg) |
|---|---|---|---|---|---|---|---|---|
| NESC Heavy | 11229:t | -0.29 | -30.17 | -0.66 | 30.18 | -0.03 | 3.22 | -0.00 |
| NESC Extreme | 11229:t | -1.05 | -50.01 | -1.80 | 50.05 | -0.10 | 5.70 | 0.00 |
| NESC Extreme Ice w/ Wind | 11229:t | -0.14 | -19.93 | -0.30 | 19.94 | -0.01 | 2.12 | -0.00 |

**Tubes Summary:**

| Pole Label | Tube Num. | Weight (lbs) | Load Case | Maximum Usage % | Resultant Moment (ft-k) |
|---|---|---|---|---|---|
| 11229 | 1 | 4692 | NESC Extreme | 93.40 | 1367.39 |

| | | | | | |
|---|---|---|---|---|---|
| 11229 | 2 | 5027 | NESC Extreme | 88.94 | 2575.38 |

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

**Summary of Steel Pole Usages:**

| Steel Pole Label | Maximum Usage % | Load Case | Height AGL (ft) | Segment Number | Weight (lbs) |
|---|---|---|---|---|---|
| 11229 | 93.40 | NESC Extreme | 30.6 | 18 | 11163.8 |

**Summary of Tubular Davit Usages:**

| Tubular Davit Label | Maximum Usage % | Load Case | Height AGL (ft) | Segment Number | Weight (lbs) |
|---|---|---|---|---|---|
| Davit1 | 14.27 | NESC Extreme Ice w/ Wind | 79.5 | 1 | 52.8 |
| Davit2 | 20.20 | NESC Heavy | 66.6 | 1 | 256.6 |
| Davit3 | 20.34 | NESC Heavy | 54.6 | 1 | 256.6 |
| Davit4 | 20.51 | NESC Heavy | 42.6 | 1 | 256.6 |

*** Maximum Stress Summary for Each Load Case

**Summary of Maximum Usages by Load Case:**

| Load Case | Maximum Usage % | Element Label | Element Type |
|---|---|---|---|
| NESC Heavy | 59.74 | 11229 | Steel Pole |
| NESC Extreme | 93.40 | 11229 | Steel Pole |
| NESC Extreme Ice w/ Wind | 40.61 | 11229 | Steel Pole |

**Summary of Steel Pole Usages by Load Case:**

| Load Case | Maximum Usage % | Steel Pole Label | Height AGL (ft) | Segment Number |
|---|---|---|---|---|
| NESC Heavy | 59.74 | 11229 | 30.6 | 18 |
| NESC Extreme | 93.40 | 11229 | 30.6 | 18 |
| NESC Extreme Ice w/ Wind | 40.61 | 11229 | 30.6 | 18 |

**Summary of Base Plate Usages by Load Case:**

| Load Case | Pole Label | Bend Line # | Length (in) | Vertical Load (kips) | X Moment (ft-k) | Y Moment (ft-k) | Bending Stress (ksi) | Bolt Moment Sum (ft-k) | # Bolts Acting On Bend Line | Max Bolt Load For Bend Line (kips) | Minimum Plate Thickness (in) | Usage % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NESC Heavy | 11229 | 6 | 27.000 | 56.498 | -1650.717 | 10.525 | 18.033 | 34.235 | 1 | 141.907 | 1.351 | 36.07 |
| NESC Extreme | 11229 | 6 | 27.000 | 28.524 | -2575.088 | 38.551 | 27.500 | 52.208 | 1 | 216.405 | 1.669 | 55.00 |
| NESC Extreme Ice w/ Wind | 11229 | 6 | 27.000 | 50.981 | -1076.032 | 5.076 | 11.905 | 22.601 | 1 | 93.683 | 1.098 | 23.81 |

**Summary of Tubular Davit Usages by Load Case:**

| Load Case | Maximum Usage % | Tubular Davit Label | Height AGL (ft) | Segment Number |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| NESC Heavy | 20.51 | Davit4 | 42.6 | 1 |
| NESC Extreme | 11.25 | Davit4 | 42.6 | 1 |
| NESC Extreme Ice w/ Wind | 18.93 | Davit4 | 42.6 | 1 |

**Summary of Insulator Usages:**

| Insulator Label | Insulator Type | Maximum Usage % | Load Case | Weight (lbs) |
|---|---|---|---|---|
| Clamp 1 | Clamp | 2.69 | NESC Heavy | 0.0 |
| Clamp 2 | Clamp | 6.13 | NESC Heavy | 0.0 |
| Clamp 3 | Clamp | 6.13 | NESC Heavy | 0.0 |
| Clamp 4 | Clamp | 6.13 | NESC Heavy | 0.0 |
| Clamp 5 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 6 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 7 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 8 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 9 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 10 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 11 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 12 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 13 | Clamp | 31.79 | NESC Extreme | 0.0 |
| Clamp 14 | Clamp | 39.37 | NESC Extreme | 0.0 |
| Clamp 15 | Clamp | 17.69 | NESC Heavy | 0.0 |
| Clamp 16 | Clamp | 39.37 | NESC Extreme | 0.0 |
| Clamp 17 | Clamp | 31.31 | NESC Extreme | 0.0 |

*** Weight of structure (lbs):

| | |
|---|---|
| Weight of Tubular Davit Arms: | 822.7 |
| Weight of Steel Poles: | 11163.8 |
| Total: | 11986.5 |

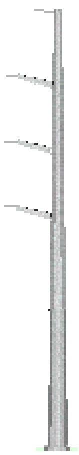
*** End of Report

```
***************************************************************************
*                                                                         *
*                               PLS-POLE                                  *
*                    POLE AND FRAME ANALYSIS AND DESIGN                   *
*               Copyright Power Line Systems 1999-2021                    *
*                                                                         *
***************************************************************************
```

Project Name : 22021.06 - Waterbury, CT
Project Notes: Structure # 11229/ AT&T CT2901
Project File : J:\Jobs\2202100.WI\06_CT2901\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS Pole\cl&p structure # 11229.pol
Date run     : 7:55:55 AM Thursday, August 18, 2022
by           : PLS-POLE Version 16.81
Licensed to  : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.



Modeling options:
  Offset Arms from Pole/Mast:   Yes
  Offset Braces from Pole/Mast: Yes
  Offset Guys from Pole/Mast:   Yes
  Offset Posts from Pole/Mast:  Yes
  Offset Strains from Pole/Mast:  Yes
  Use Alternate Convergence Process: No
  Steel poles and tubular arms checked with ASCE/SEI 48-05

Default Modulus of Elasticity for Steel = 29000.00 (ksi)
Default Weight Density for Steel = 490.00 (lbs/ft^3)

**Steel Pole Properties:**

| **Steel Pole Property** | **Stock Number** | **Length** | **Default Embedded** | **Base Plate** | **Shape** | **Tip Diameter** | **Base Diameter** | **Taper** | **Default Drag** | **Tubes** | **Modulus of Elasticity** | **Weight Density** | **Shape At** | **Strength Check** | **Distance From** | **Ultimate Trans.** | **Ultimate** | **Texture** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Label | | (ft) | Length (ft) | | | (in) | (in) | (in/ft) | Coef. | | Override (ksi) | Override (lbs/ft^3) | Base | Type | Tip (ft) | Load (kips) | Long. Load (kips) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CL&P11229 | 11229 | 80.00 | 0 | Yes | 12F | 19.06 | 42.46 | 0 | 1.3 | 2 tubes | 0 | 0 | | Calculated | 0.000 | 0.0000 | 0.0000 | Galvanized Steel |

**Steel Tubes Properties:**

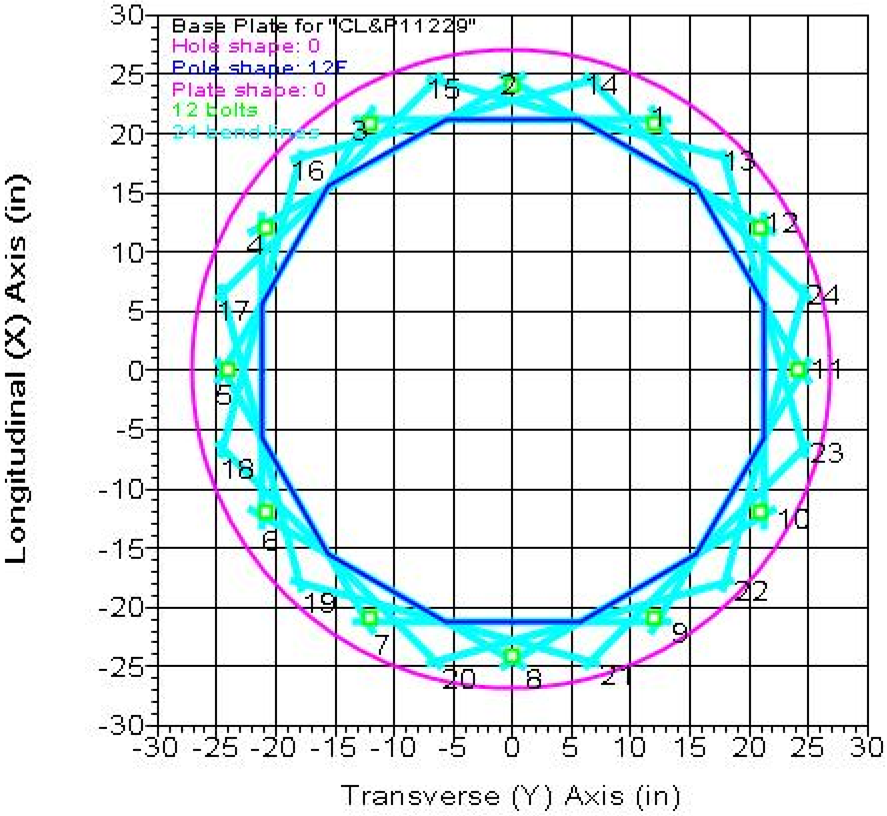
| Pole Property | Tube No. | Length (ft) | Thickness (in) | Lap Length (ft) | Lap Factor | Lap Gap or Butt Offset (in) | Yield Stress (ksi) | Moment Cap. Override (ft-k) | Tube Weight (lbs) | Center of Gravity (ft) | Calculated Taper (in/ft) | Tube Top Diameter (in) | Tube Bot. Diameter (in) | 1.5x Diam. Lap Length (ft) | Actual Overlap (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CL&P11229 | 1 | 51.75 | 0.3125 | 4.750 | 0.000 | 0.000 | 65.000 | 0.000 | 4692 | 28.40 | 0.30031 | 19.06 | 34.60 | 4.247 | 4.750 |
| CL&P11229 | 2 | 33 | 0.375 | 0.000 | 0.000 | 0.000 | 65.000 | 0.000 | 5027 | 17.23 | 0.30031 | 32.55 | 42.46 | 0.000 | 0.000 |

**Base Plate Properties:**

| Pole Property | Plate Diam. (in) | Plate Shape | Plate Thick. (in) | Plate Weight (lbs) | Bend Line Length Override (in) | Hole Diam. (in) | Hole Shape | Steel Density (lbs/ft^3) | Steel Yield Stress (ksi) | Bolt Diam. (in) | Bolt Pattern Diam. (in) | Num. Of Bolts | Bolt Cage X Inertia (in^4) | Bolt Cage Y Inertia (in^4) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CL&P11229 | 54.250 | 0 | 2.250 | 1444 | 27.000 | 0.000 | 0 | 490.00 | 50.000 | 2.250 | 48.250 | 12 | 13849.21 | 13849.21 |

**Base Plate Bolt Coordinates for Property "CL&P11229":**

| Bolt X Coord. | Bolt Y Coord. | Bolt Angle (deg) |
|---|---|---|
| 0 | 1 | 0 |
| 0.4974 | 0.8653 | 0 |
| 0.8653 | 0.4974 | 0 |
| 1 | 0 | 0 |



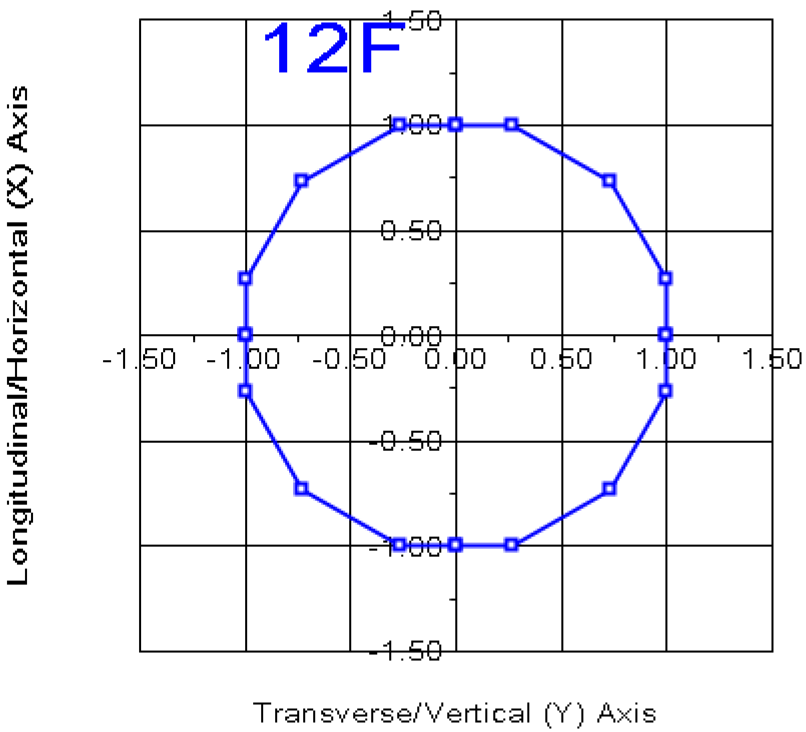

**Steel Pole Connectivity:**

| Pole Label | Tip Joint | Base Joint | X of Base (ft) | Y of Base (ft) | Z of Base (ft) | Inclin. About X (deg) | Inclin. About Y (deg) | Property Set | Attach. Labels | Base Connect | Embed % Override | Embed C. Override (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | | | 0 | 0 | 0 | 0 | 0 | CL&P11229 | 17 labels | | 0.00 | 0 |

**Relative Attachment Labels for Steel Pole "11229":**

| Joint Label | Distance From Origin/Top Joint (ft) | Global Z of Attach (ft) |
|---|---|---|
| 11229:Arm1 | 0.00 | 79.25 |
| 11229:Arm2 | 0.00 | 66.25 |
| 11229:Arm3 | 0.00 | 54.25 |
| 11229:Arm4 | 0.00 | 42.25 |
| 11229:WVGD1 | 0.00 | 5.00 |

| | | |
|---|---|---|
| 11229:WVGD2 | 0.00 | 15.00 |
| 11229:WVGD3 | 0.00 | 25.00 |
| 11229:WVGD4 | 0.00 | 35.00 |
| 11229:WVGD5 | 0.00 | 45.00 |
| 11229:WVGD6 | 0.00 | 55.00 |
| 11229:WVGD7 | 0.00 | 65.00 |
| 11229:WVGD8 | 0.00 | 76.00 |
| 11229:TopConn | 0.00 | 77.50 |
| 11229:BotConT | 0.00 | 50.50 |
| 11229:BotConn | 0.00 | 50.00 |
| 11229:BotConB | 0.00 | 49.50 |
| 11229:conn | 0.00 | 60.00 |




**Pole Steel Properties:**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Outer Diam. (in) | Area (in^2) | T-Moment Inertia (in^4) | L-Moment Inertia (in^4) | D/t | W/t Max. | Fy (ksi) | Fa Min. (ksi) | T-Moment Capacity (ft-k) | L-Moment Capacity (ft-k) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:t | 11229:t Ori | 0.00 | 19.06 | 18.84 | 847.64 | 847.64 | 0.00 | 13.7 | 65.00 | 65.00 | 481.78 | 481.78 |
| 11229 | 11229:Arm1 | 11229:Arm1 End | 0.75 | 19.29 | 19.06 | 878.56 | 878.56 | 0.00 | 13.9 | 65.00 | 65.00 | 493.52 | 493.52 |
| 11229 | 11229:Arm1 | 11229:Arm1 Ori | 0.75 | 19.29 | 19.06 | 878.56 | 878.56 | 0.00 | 13.9 | 65.00 | 65.00 | 493.52 | 493.52 |
| 11229 | 11229:TopConn | 11229:TopConn End | 2.50 | 19.81 | 19.59 | 953.59 | 953.59 | 0.00 | 14.3 | 65.00 | 65.00 | 521.46 | 521.46 |
| 11229 | 11229:TopConn | 11229:TopConn Ori | 2.50 | 19.81 | 19.59 | 953.59 | 953.59 | 0.00 | 14.3 | 65.00 | 65.00 | 521.46 | 521.46 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:WVGD8 | 11229:WVGD8 | End | 4.00 | 20.26 | 20.04 | 1021.21 | 1021.21 | 0.00 | 14.7 | 65.00 | 65.00 | 546.02 | 546.02 |
| 11229 | 11229:WVGD8 | 11229:WVGD8 | Ori | 4.00 | 20.26 | 20.04 | 1021.21 | 1021.21 | 0.00 | 14.7 | 65.00 | 65.00 | 546.02 | 546.02 |
| 11229 | #11229:0 | Tube 1 | End | 8.88 | 21.73 | 21.52 | 1262.91 | 1262.91 | 0.00 | 15.9 | 65.00 | 65.00 | 629.75 | 629.75 |
| 11229 | #11229:0 | Tube 1 | Ori | 8.88 | 21.73 | 21.52 | 1262.91 | 1262.91 | 0.00 | 15.9 | 65.00 | 65.00 | 629.75 | 629.75 |
| 11229 | 11229:Arm2 | 11229:Arm2 | End | 13.75 | 23.19 | 22.99 | 1540.03 | 1540.03 | 0.00 | 17.2 | 65.00 | 65.00 | 719.45 | 719.45 |
| 11229 | 11229:Arm2 | 11229:Arm2 | Ori | 13.75 | 23.19 | 22.99 | 1540.03 | 1540.03 | 0.00 | 17.2 | 65.00 | 65.00 | 719.45 | 719.45 |
| 11229 | 11229:WVGD7 | 11229:WVGD7 | End | 15.00 | 23.56 | 23.36 | 1617.08 | 1617.08 | 0.00 | 17.5 | 65.00 | 65.00 | 743.42 | 743.42 |
| 11229 | 11229:WVGD7 | 11229:WVGD7 | Ori | 15.00 | 23.56 | 23.36 | 1617.09 | 1617.09 | 0.00 | 17.5 | 65.00 | 65.00 | 743.42 | 743.42 |
| 11229 | 11229:conn | 11229:conn | End | 20.00 | 25.07 | 24.87 | 1950.99 | 1950.99 | 0.00 | 18.8 | 65.00 | 65.00 | 843.19 | 843.19 |
| 11229 | 11229:conn | 11229:conn | Ori | 20.00 | 25.07 | 24.87 | 1950.99 | 1950.99 | 0.00 | 18.8 | 65.00 | 65.00 | 843.19 | 843.19 |
| 11229 | 11229:WVGD6 | 11229:WVGD6 | End | 25.00 | 26.57 | 26.38 | 2327.97 | 2327.97 | 0.00 | 20.1 | 65.00 | 65.00 | 949.25 | 949.25 |
| 11229 | 11229:WVGD6 | 11229:WVGD6 | Ori | 25.00 | 26.57 | 26.38 | 2327.97 | 2327.97 | 0.00 | 20.1 | 65.00 | 65.00 | 949.25 | 949.25 |
| 11229 | 11229:Arm3 | 11229:Arm3 | End | 25.75 | 26.79 | 26.61 | 2388.39 | 2388.39 | 0.00 | 20.3 | 65.00 | 65.00 | 965.70 | 965.70 |
| 11229 | 11229:Arm3 | 11229:Arm3 | Ori | 25.75 | 26.79 | 26.61 | 2388.39 | 2388.39 | 0.00 | 20.3 | 65.00 | 65.00 | 965.70 | 965.70 |
| 11229 | 11229:BotConT | 11229:BotConT | End | 29.50 | 27.92 | 27.74 | 2706.22 | 2706.22 | 0.00 | 21.3 | 65.00 | 65.00 | 1050.08 | 1050.08 |
| 11229 | 11229:BotConT | 11229:BotConT | Ori | 29.50 | 27.92 | 27.74 | 2706.22 | 2706.22 | 0.00 | 21.3 | 65.00 | 65.00 | 1050.08 | 1050.08 |
| 11229 | 11229:BotConn | 11229:BotConn | End | 30.00 | 28.07 | 27.89 | 2750.62 | 2750.62 | 0.00 | 21.4 | 65.00 | 65.00 | 1061.60 | 1061.60 |
| 11229 | 11229:BotConn | 11229:BotConn | Ori | 30.00 | 28.07 | 27.89 | 2750.62 | 2750.62 | 0.00 | 21.4 | 65.00 | 65.00 | 1061.60 | 1061.60 |
| 11229 | 11229:BotConB | 11229:BotConB | End | 30.50 | 28.22 | 28.04 | 2795.50 | 2795.50 | 0.00 | 21.5 | 65.00 | 65.00 | 1073.18 | 1073.18 |
| 11229 | 11229:BotConB | 11229:BotConB | Ori | 30.50 | 28.22 | 28.04 | 2795.50 | 2795.50 | 0.00 | 21.5 | 65.00 | 65.00 | 1073.18 | 1073.18 |
| 11229 | 11229:WVGD5 | 11229:WVGD5 | End | 35.00 | 29.57 | 29.40 | 3221.56 | 3221.56 | 0.00 | 22.7 | 65.00 | 65.00 | 1180.22 | 1180.22 |
| 11229 | 11229:WVGD5 | 11229:WVGD5 | Ori | 35.00 | 29.57 | 29.40 | 3221.56 | 3221.56 | 0.00 | 22.7 | 65.00 | 65.00 | 1180.22 | 1180.22 |
| 11229 | 11229:Arm4 | 11229:Arm4 | End | 37.75 | 30.40 | 30.23 | 3502.11 | 3502.11 | 0.00 | 23.4 | 65.00 | 65.00 | 1248.14 | 1248.14 |
| 11229 | 11229:Arm4 | 11229:Arm4 | Ori | 37.75 | 30.40 | 30.23 | 3502.11 | 3502.11 | 0.00 | 23.4 | 65.00 | 65.00 | 1248.14 | 1248.14 |
| 11229 | #11229:1 | Tube 1 | End | 41.38 | 31.49 | 31.32 | 3896.19 | 3896.19 | 0.00 | 24.3 | 65.00 | 65.00 | 1340.58 | 1340.58 |
| 11229 | #11229:1 | Tube 1 | Ori | 41.38 | 31.49 | 31.32 | 3896.19 | 3896.19 | 0.00 | 24.3 | 65.00 | 65.00 | 1340.58 | 1340.58 |
| 11229 | 11229:WVGD4 | 11229:WVGD4 | End | 45.00 | 32.57 | 32.42 | 4318.78 | 4318.78 | 0.00 | 25.3 | 65.00 | 65.00 | 1436.32 | 1436.32 |
| 11229 | 11229:WVGD4 | 11229:WVGD4 | Ori | 45.00 | 32.57 | 32.42 | 4318.78 | 4318.78 | 0.00 | 25.3 | 65.00 | 65.00 | 1436.32 | 1436.32 |
| 11229 | #11229:2 | SpliceT | End | 47.00 | 33.17 | 33.02 | 4564.49 | 4564.49 | 0.00 | 25.8 | 65.00 | 65.00 | 1490.55 | 1490.55 |
| 11229 | #11229:2 | SpliceT | Ori | 47.00 | 33.17 | 33.02 | 4564.50 | 4564.50 | 0.00 | 25.8 | 65.00 | 65.00 | 1490.55 | 1490.55 |
| 11229 | #11229:3 | SpliceB | End | 51.75 | 33.98 | 40.52 | 5855.48 | 5855.48 | 0.00 | 21.6 | 65.00 | 65.00 | 1867.02 | 1867.02 |
| 11229 | #11229:3 | SpliceB | Ori | 51.75 | 33.98 | 40.52 | 5855.48 | 5855.48 | 0.00 | 21.6 | 65.00 | 65.00 | 1867.02 | 1867.02 |
| 11229 | 11229:WVGD3 | 11229:WVGD3 | End | 55.00 | 34.95 | 41.69 | 6380.65 | 6380.65 | 0.00 | 22.3 | 65.00 | 65.00 | 1977.66 | 1977.66 |
| 11229 | 11229:WVGD3 | 11229:WVGD3 | Ori | 55.00 | 34.95 | 41.69 | 6380.65 | 6380.65 | 0.00 | 22.3 | 65.00 | 65.00 | 1977.66 | 1977.66 |
| 11229 | #11229:4 | Tube 2 | End | 60.00 | 36.45 | 43.50 | 7248.47 | 7248.47 | 0.00 | 23.4 | 65.00 | 65.00 | 2154.10 | 2154.10 |
| 11229 | #11229:4 | Tube 2 | Ori | 60.00 | 36.45 | 43.50 | 7248.47 | 7248.47 | 0.00 | 23.4 | 65.00 | 65.00 | 2154.10 | 2154.10 |
| 11229 | 11229:WVGD2 | 11229:WVGD2 | End | 65.00 | 37.96 | 45.31 | 8191.62 | 8191.62 | 0.00 | 24.4 | 65.00 | 65.00 | 2338.08 | 2338.08 |
| 11229 | 11229:WVGD2 | 11229:WVGD2 | Ori | 65.00 | 37.96 | 45.31 | 8191.62 | 8191.62 | 0.00 | 24.4 | 65.00 | 65.00 | 2338.08 | 2338.08 |
| 11229 | #11229:5 | Tube 2 | End | 70.00 | 39.46 | 47.12 | 9213.22 | 9213.22 | 0.00 | 25.5 | 65.00 | 65.00 | 2529.59 | 2529.59 |
| 11229 | #11229:5 | Tube 2 | Ori | 70.00 | 39.46 | 47.12 | 9213.22 | 9213.22 | 0.00 | 25.5 | 65.00 | 65.00 | 2529.59 | 2529.59 |
| 11229 | 11229:WVGD1 | 11229:WVGD1 | End | 75.00 | 40.96 | 48.93 | 10316.42 | 10316.42 | 0.00 | 26.6 | 65.00 | 65.00 | 2728.64 | 2728.64 |
| 11229 | 11229:WVGD1 | 11229:WVGD1 | Ori | 75.00 | 40.96 | 48.93 | 10316.42 | 10316.42 | 0.00 | 26.6 | 65.00 | 65.00 | 2728.64 | 2728.64 |
| 11229 | 11229:g | 11229:g | End | 80.00 | 42.46 | 50.74 | 11504.34 | 11504.34 | 0.00 | 27.7 | 65.00 | 65.00 | 2935.24 | 2935.24 |

**Tubular Davit Properties:**

| Davit Property Label | Stock Number | Steel Shape | Thickness (in) | Base Diameter or Depth (in) | Tip Diameter or Depth (in) | Taper (in/ft) | Drag Coef. | Modulus of Elasticity (ksi) | Geometry | Strength Check Type | Vertical Capacity (lbs) | Tension Capacity (lbs) | Compres. Capacity (lbs) | Long. Capacity (lbs) | Yield Stress (ksi) | Weight Density (lbs/ft^3) | Steel Shape Override | Texture At End |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARM-09 | J120328001 | 6T | 0.1875 | 8 | 5 | 0 | 1.3 | 29000 | 1 point | Calculated | 0 | 0 | 0 | 0 | 65 | 0 | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARM-10 | J120328001 | 6T | 0.25 | 14 | 6 | 0 | 1.3 | 29000 | 2 points | Calculated | 0 | 0 | 0 | 0 | 65 |

0

**Intermediate Joints for Davit Property "ARM-09":**

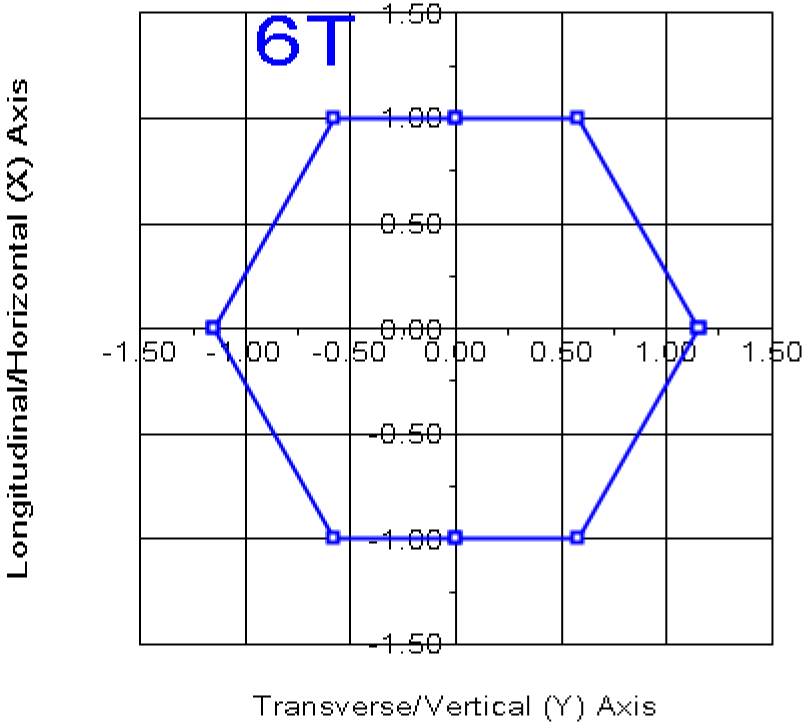
| Joint Label | Horz. Offset (ft) | Vert. Offset (ft) |
|---|---|---|
| End | 3.75 | -0.5 |

**Intermediate Joints for Davit Property "ARM-10":**

| Joint Label | Horz. Offset (ft) | Vert. Offset (ft) |
|---|---|---|
| Mid | 6.08 | -1.5 |
| End | 8.75 | -1.5 |

**Tubular Davit Arm Connectivity:**

| Davit Label | Attach Label | Davit Property Set | Azimuth (deg) |
|---|---|---|---|
| Davit1 | 11229:Arm1 | ARM-09 | 180 |
| Davit2 | 11229:Arm2 | ARM-10 | 180 |
| Davit3 | 11229:Arm3 | ARM-10 | 180 |
| Davit4 | 11229:Arm4 | ARM-10 | 180 |




**Tubular Davit Arm Steel Properties:**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Outer Diam. (in) | Area (in^2) | V-Moment Inertia (in^4) | H-Moment Inertia (in^4) | D/t | W/t Max. | Fy (ksi) | Fa Min. (ksi) | V-Moment Capacity (ft-k) | H-Moment Capacity (ft-k) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit1 | Davit1:O | Origin | 0.00 | 8.00 | 5.07 | 43.04 | 43.04 | 0.00 | 18.9 | 65.00 | 65.00 | 50.47 | 58.28 |
| Davit1 | Davit1:End | End | 3.78 | 5.00 | 3.13 | 10.07 | 10.07 | 0.00 | 9.6 | 65.00 | 65.00 | 18.89 | 21.82 |
| Davit2 | Davit2:O | Origin | 0.00 | 14.00 | 11.91 | 312.77 | 312.77 | 0.00 | 26.6 | 65.00 | 65.00 | 209.60 | 242.03 |
| Davit2 | #Davit2:0 | End | 3.13 | 11.20 | 9.48 | 157.81 | 157.81 | 0.00 | 20.1 | 65.00 | 65.00 | 132.24 | 152.70 |
| Davit2 | #Davit2:0 | Origin | 3.13 | 11.20 | 9.48 | 157.81 | 157.81 | 0.00 | 20.1 | 65.00 | 65.00 | 132.24 | 152.70 |
| Davit2 | Davit2:Mid | End | 6.26 | 8.39 | 7.05 | 64.96 | 64.96 | 0.00 | 13.6 | 65.00 | 65.00 | 72.63 | 83.87 |
| Davit2 | Davit2:Mid | Origin | 6.26 | 8.39 | 7.05 | 64.96 | 64.96 | 0.00 | 13.6 | 65.00 | 65.00 | 72.63 | 83.87 |
| Davit2 | Davit2:End | End | 8.93 | 6.00 | 4.98 | 22.91 | 22.91 | 0.00 | 8.1 | 65.00 | 65.00 | 35.82 | 41.36 |
| Davit3 | Davit3:O | Origin | 0.00 | 14.00 | 11.91 | 312.77 | 312.77 | 0.00 | 26.6 | 65.00 | 65.00 | 209.60 | 242.03 |
| Davit3 | #Davit3:0 | End | 3.13 | 11.20 | 9.48 | 157.81 | 157.81 | 0.00 | 20.1 | 65.00 | 65.00 | 132.24 | 152.70 |
| Davit3 | #Davit3:0 | Origin | 3.13 | 11.20 | 9.48 | 157.81 | 157.81 | 0.00 | 20.1 | 65.00 | 65.00 | 132.24 | 152.70 |
| Davit3 | Davit3:Mid | End | 6.26 | 8.39 | 7.05 | 64.96 | 64.96 | 0.00 | 13.6 | 65.00 | 65.00 | 72.63 | 83.87 |
| Davit3 | Davit3:Mid | Origin | 6.26 | 8.39 | 7.05 | 64.96 | 64.96 | 0.00 | 13.6 | 65.00 | 65.00 | 72.63 | 83.87 |
| Davit3 | Davit3:End | End | 8.93 | 6.00 | 4.98 | 22.91 | 22.91 | 0.00 | 8.1 | 65.00 | 65.00 | 35.82 | 41.36 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit4 | Davit4:O | Origin | 0.00 | 14.00 | 11.91 | 312.77 | 312.77 | 0.00 | 26.6 | 65.00 | 65.00 | 209.60 | 242.03 |
| Davit4 | #Davit4:0 | End | 3.13 | 11.20 | 9.48 | 157.81 | 157.81 | 0.00 | 20.1 | 65.00 | 65.00 | 132.24 | 152.70 |
| Davit4 | #Davit4:0 | Origin | 3.13 | 11.20 | 9.48 | 157.81 | 157.81 | 0.00 | 20.1 | 65.00 | 65.00 | 132.24 | 152.70 |
| Davit4 | Davit4:Mid | End | 6.26 | 8.39 | 7.05 | 64.96 | 64.96 | 0.00 | 13.6 | 65.00 | 65.00 | 72.63 | 83.87 |
| Davit4 | Davit4:Mid | Origin | 6.26 | 8.39 | 7.05 | 64.96 | 64.96 | 0.00 | 13.6 | 65.00 | 65.00 | 72.63 | 83.87 |
| Davit4 | Davit4:End | End | 8.93 | 6.00 | 4.98 | 22.91 | 22.91 | 0.00 | 8.1 | 65.00 | 65.00 | 35.82 | 41.36 |

*** Insulator Data

**Clamp Properties:**

| Label | Stock Number | Holding Capacity (lbs) | Hardware Capacity (lbs) | Notes |
|---|---|---|---|---|
| clamp2 | clamp2 | 1e+05 | 0 | |

**Clamp Insulator Connectivity:**

| Clamp Label | Structure And Tip Attach | Property Set | Min. Required Vertical Load (uplift) (lbs) |
|---|---|---|---|
| Clamp 1 | Davit1:End | clamp2 | No Limit |
| Clamp 2 | Davit2:End | clamp2 | No Limit |
| Clamp 3 | Davit3:End | clamp2 | No Limit |
| Clamp 4 | Davit4:End | clamp2 | No Limit |
| Clamp 5 | 11229:WVGD1 | clamp2 | No Limit |
| Clamp 6 | 11229:WVGD2 | clamp2 | No Limit |
| Clamp 7 | 11229:WVGD3 | clamp2 | No Limit |
| Clamp 8 | 11229:WVGD4 | clamp2 | No Limit |
| Clamp 9 | 11229:WVGD5 | clamp2 | No Limit |
| Clamp 10 | 11229:WVGD6 | clamp2 | No Limit |
| Clamp 11 | 11229:WVGD7 | clamp2 | No Limit |
| Clamp 12 | 11229:WVGD8 | clamp2 | No Limit |
| Clamp 13 | 11229:TopConn | clamp2 | No Limit |
| Clamp 14 | 11229:BotConT | clamp2 | No Limit |
| Clamp 15 | 11229:BotConn | clamp2 | No Limit |
| Clamp 16 | 11229:BotConB | clamp2 | No Limit |
| Clamp 17 | 11229:conn | clamp2 | No Limit |

Material List Options:
Show Parts: YES
Decompose Assemblies: NO
Show Assemblies: YES

**Material List**

| Stock Number | Item Description | Quantity | Unit of Measure |
|---|---|---|---|
| J120328001 | Tubular Davit property: ARM-09 | 4.00 | Each |
| clamp2 | Clamp property: clamp2 | 17.00 | Each |
| 11229 | Steel Pole property: CL&P11229 | 1.00 | Each |

*** Loads Data

Loads from file: J:\Jobs\2202100.WI\06_CT2901\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS Pole\cl&p #11229.lca

Insulator dead and wind loads are already included in the point loads printed below.

Loading Method Parameters:

Structure Height Summary (used for calculating wind/ice adjust with height):
  Z of ground for wind height adjust      0.00 (ft) and structure Z coordinate that will be put on the centerline ground profile in PLS-CADD.
  Ground elevation shift                  0.00 (ft)
  Z of ground with shift                  0.00 (ft)
  Z of structure top (highest joint)     80.00 (ft)
  Structure height                       80.00 (ft)
  Structure height above ground          80.00 (ft)

**Vector Load Cases:**

| Load Case Description | Dead Load Factor | Wind Area Factor | SF for Steel Poles Tubular Arms and Towers | SF for Wood Poles | SF for Conc. Poles Ult. | SF for Conc. First Crack | SF for Conc. Zero Tens. | SF for Guys and Cables | SF for Non Tubular Arms | SF for Braces | SF for Insuls. | SF for Hardware | SF For Found. | Point Loads | Wind/Ice Model | Trans. Wind Pressure (psf) | Longit. Wind Pressure (psf) | Ice Thick. (in) | Ice Density (lbs/ft^3) | Temperature (deg F) | Pole Deflection Check | Pole Deflection Limit % or (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NESC Heavy | 1.5000 | 2.5000 | 1.00000 | 0.6500 | 0.0000 | 1.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 | 17 loads | Wind on All | -4 | 0 | 0.000 | 0.000 | 0.0 | No Limit | 0 |
| NESC Extreme | 1.0000 | 1.0000 | 1.00000 | 0.6500 | 0.0000 | 1.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 | 17 loads | NESC 2017 | -31 | 0 | 0.000 | 0.000 | 0.0 | No Limit | 0 |
| NESC Extreme Ice w/ Wind | 1.0000 | 1.0000 | 1.00000 | 0.6500 | 0.0000 | 1.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 | 17 loads | Wind on All | -4 | 0 | 0.000 | 0.000 | 0.0 | No Limit | 0 |

**Point Loads for Load Case "NESC Heavy":**

| Joint Label | Vertical Load (lbs) | Transverse Load (lbs) | Longitudinal Load (lbs) | Load Comment |
|---|---|---|---|---|
| Davit1:End | 1183 | -2417 | -3 | Shield Wire |
| Davit2:End | 3984 | -4665 | -9 | Conductor |
| Davit3:End | 3984 | -4662 | -10 | Conductor |
| Davit4:End | 3984 | -4660 | -10 | Conductor |
| 11229:WVGD1 | 1265 | -225 | 0 | Coax Cables |
| 11229:WVGD2 | 1265 | -225 | 0 | Coax Cables |
| 11229:WVGD3 | 1265 | -225 | 0 | Coax Cables |
| 11229:WVGD4 | 1265 | -225 | 0 | Coax Cables |
| 11229:WVGD5 | 1265 | -225 | 0 | Coax Cables |
| 11229:WVGD6 | 1265 | -225 | 0 | Coax Cables |
| 11229:WVGD7 | 1265 | -225 | 0 | Coax Cables |
| 11229:WVGD8 | 1265 | -225 | 0 | Coax Cables |
| 11229:TopConn | 0 | -8664 | 0 | Top Connection |
| 11229:conn | 0 | 8473 | 0 | Mid Connection |

| | | | | |
|---|---|---|---|---|
| 11229:BotConT | 0 | 0 | -10692 | Bottom Connection |
| 11229:BotConn | 17348 | -3469 | 0 | Bottom Connection |
| 11229:BotConB | 0 | 0 | 10692 | Bottom Connection |

**Point Loads for Load Case "NESC Extreme":**

| Joint Label | Vertical Load (lbs) | Transverse Load (lbs) | Longitudinal Load (lbs) | Load Comment |
|---|---|---|---|---|
| Davit1:End | 420 | -1706 | 4 | Shield Wire |
| Davit2:End | 1980 | -4222 | 3 | Conductor |
| Davit3:End | 1980 | -4167 | 3 | Conductor |
| Davit4:End | 1980 | -4103 | 4 | Conductor |
| 11229:WVGD1 | 343 | -645 | 0 | Coax Cables |
| 11229:WVGD2 | 343 | -645 | 0 | Coax Cables |
| 11229:WVGD3 | 343 | -645 | 0 | Coax Cables |
| 11229:WVGD4 | 343 | -645 | 0 | Coax Cables |
| 11229:WVGD5 | 343 | -645 | 0 | Coax Cables |
| 11229:WVGD6 | 343 | -645 | 0 | Coax Cables |
| 11229:WVGD7 | 343 | -645 | 0 | Coax Cables |
| 11229:WVGD8 | 343 | -645 | 0 | Coax Cables |
| 11229:TopConn | 0 | -31786 | 0 | Top Connection |
| 11229:conn | 0 | 31312 | 0 | Mid Connection |
| 11229:BotConT | 0 | 0 | -39366 | Bottom Connection |
| 11229:BotConn | 8577 | -12757 | 0 | Bottom Connection |
| 11229:BotConB | 0 | 0 | 39366 | Bottom Connection |

**Detailed Pole Loading Data for Load Case "NESC Extreme":**

**Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.**
**Wind load is calculated for the undeformed shape of a pole.**

| Pole Label | Top Joint | Bottom Joint | Section Top Z (ft) | Section Bottom Z (ft) | Section Average Elevation (ft) | Outer Diameter (in) | Reynolds Number | Drag Coef. | Adjusted Wind Pressure (psf) | Adjusted Ice Thickness (in) | Pole Vert. Load (lbs) | Pole Wind Load (lbs) | Pole Ice Vertical Load (lbs) | Pole Ice Wind Load (lbs) | Tran. Wind Load (lbs) | Long. Wind Load (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:t | 11229:Arm1 | 80.00 | 79.25 | 79.63 | 19.173 | 1.59e+06 | 1.000 | 30.56 | 0.00 | 48.36 | 36.62 | 0.00 | 0.00 | -36.62 | 0.00 |
| 11229 | 11229:Arm1 | 11229:TopConn | 79.25 | 77.50 | 78.38 | 19.548 | 1.62e+06 | 1.000 | 30.56 | 0.00 | 115.10 | 87.11 | 0.00 | 0.00 | -87.11 | 0.00 |
| 11229 | 11229:TopConn | 11229:WVGD8 | 77.50 | 76.00 | 76.75 | 20.036 | 1.66e+06 | 1.000 | 30.56 | 0.00 | 101.16 | 76.53 | 0.00 | 0.00 | -76.53 | 0.00 |
| 11229 | 11229:WVGD8 | | 76.00 | 71.13 | 73.56 | 20.993 | 1.74e+06 | 1.000 | 30.56 | 0.00 | 344.71 | 260.60 | 0.00 | 0.00 | -260.60 | 0.00 |
| 11229 | | 11229:Arm2 | 71.13 | 66.25 | 68.69 | 22.457 | 1.86e+06 | 1.000 | 30.56 | 0.00 | 369.12 | 278.77 | 0.00 | 0.00 | -278.77 | 0.00 |
| 11229 | 11229:Arm2 | 11229:WVGD7 | 66.25 | 65.00 | 65.63 | 23.377 | 1.93e+06 | 1.000 | 30.56 | 0.00 | 98.58 | 74.41 | 0.00 | 0.00 | -74.41 | 0.00 |
| 11229 | 11229:WVGD7 | 11229:conn | 65.00 | 60.00 | 62.50 | 24.315 | 2.01e+06 | 1.000 | 30.56 | 0.00 | 410.35 | 309.58 | 0.00 | 0.00 | -309.58 | 0.00 |
| 11229 | 11229:conn | 11229:WVGD6 | 60.00 | 55.00 | 57.50 | 25.817 | 2.14e+06 | 1.000 | 30.56 | 0.00 | 436.02 | 328.69 | 0.00 | 0.00 | -328.69 | 0.00 |
| 11229 | 11229:WVGD6 | 11229:Arm3 | 55.00 | 54.25 | 54.63 | 26.680 | 2.21e+06 | 1.000 | 30.56 | 0.00 | 67.62 | 50.95 | 0.00 | 0.00 | -50.95 | 0.00 |
| 11229 | 11229:Arm3 | 11229:BotConT | 54.25 | 50.50 | 52.38 | 27.356 | 2.26e+06 | 1.000 | 30.56 | 0.00 | 346.75 | 261.22 | 0.00 | 0.00 | -261.22 | 0.00 |
| 11229 | 11229:BotConT | 11229:BotConn | 50.50 | 50.00 | 50.25 | 27.994 | 2.32e+06 | 1.000 | 30.56 | 0.00 | 47.32 | 35.64 | 0.00 | 0.00 | -35.64 | 0.00 |
| 11229 | 11229:BotConn | 11229:BotConB | 50.00 | 49.50 | 49.75 | 28.144 | 2.33e+06 | 1.000 | 30.56 | 0.00 | 47.58 | 35.83 | 0.00 | 0.00 | -35.83 | 0.00 |
| 11229 | 11229:BotConB | 11229:WVGD5 | 49.50 | 45.00 | 47.25 | 28.895 | 2.39e+06 | 1.000 | 30.56 | 0.00 | 439.78 | 331.10 | 0.00 | 0.00 | -331.10 | 0.00 |
| 11229 | 11229:WVGD5 | 11229:Arm4 | 45.00 | 42.25 | 43.63 | 29.984 | 2.48e+06 | 1.000 | 30.56 | 0.00 | 278.99 | 209.96 | 0.00 | 0.00 | -209.96 | 0.00 |
| 11229 | 11229:Arm4 | | 42.25 | 38.63 | 40.44 | 30.941 | 2.56e+06 | 1.000 | 30.56 | 0.00 | 379.62 | 285.60 | 0.00 | 0.00 | -285.60 | 0.00 |
| 11229 | | 11229:WVGD4 | 38.63 | 35.00 | 36.81 | 32.030 | 2.65e+06 | 1.000 | 30.56 | 0.00 | 393.12 | 295.65 | 0.00 | 0.00 | -295.65 | 0.00 |
| 11229 | 11229:WVGD4 | | 35.00 | 33.00 | 34.00 | 32.874 | 2.72e+06 | 1.000 | 30.56 | 0.00 | 222.67 | 167.42 | 0.00 | 0.00 | -167.42 | 0.00 |
| 11229 | | | 33.00 | 28.25 | 30.62 | 33.575 | 2.78e+06 | 1.000 | 30.56 | 0.00 | 1186.25 | 406.10 | 0.00 | 0.00 | -406.10 | 0.00 |
| 11229 | | 11229:WVGD3 | 28.25 | 25.00 | 26.63 | 34.464 | 2.85e+06 | 1.000 | 30.56 | 0.00 | 454.57 | 285.21 | 0.00 | 0.00 | -285.21 | 0.00 |
| 11229 | 11229:WVGD3 | | 25.00 | 20.00 | 22.50 | 35.703 | 2.95e+06 | 1.000 | 30.56 | 0.00 | 724.75 | 454.56 | 0.00 | 0.00 | -454.56 | 0.00 |
| 11229 | | 11229:WVGD2 | 20.00 | 15.00 | 17.50 | 37.205 | 3.08e+06 | 1.000 | 30.56 | 0.00 | 755.55 | 473.68 | 0.00 | 0.00 | -473.68 | 0.00 |

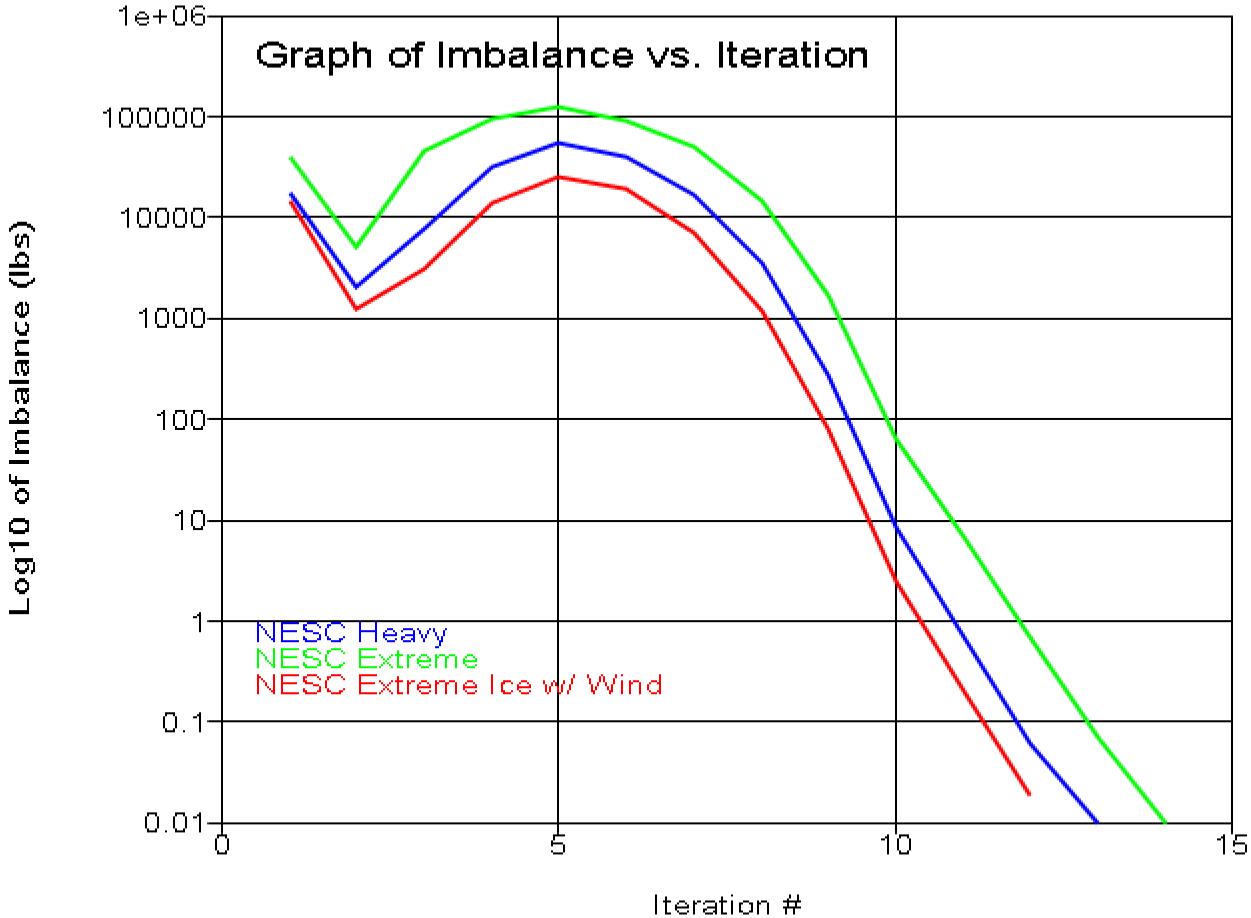
| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:WVGD2 | | 15.00 | 10.00 | 12.50 | 38.706 | 3.2e+06 | 1.000 | 30.56 | 0.00 | 786.36 | 492.79 | 0.00 | 0.00 | -492.79 | 0.00 |
| 11229 | | 11229:WVGD1 | 10.00 | 5.00 | 7.50 | 40.208 | 3.33e+06 | 1.000 | 30.56 | 0.00 | 817.16 | 511.91 | 0.00 | 0.00 | -511.91 | 0.00 |
| 11229 | 11229:WVGD1 | 11229:g | 5.00 | 0.00 | 2.50 | 41.709 | 3.45e+06 | 1.000 | 30.56 | 0.00 | 847.97 | 531.03 | 0.00 | 0.00 | -531.03 | 0.00 |

**Point Loads for Load Case "NESC Extreme Ice w/ Wind":**

| Joint Label | Vertical Load (lbs) | Transverse Load (lbs) | Longitudinal Load (lbs) | Load Comment |
|---|---|---|---|---|
| Davit1:End | 1642 | -1857 | -3 | Shield Wire |
| Davit2:End | 3856 | -3300 | -5 | Conductor |
| Davit3:End | 3856 | -3298 | -5 | Conductor |
| Davit4:End | 3856 | -3296 | -5 | Conductor |
| 11229:WVGD1 | 1545 | -95 | 0 | Coax Cables |
| 11229:WVGD2 | 1545 | -95 | 0 | Coax Cables |
| 11229:WVGD3 | 1545 | -95 | 0 | Coax Cables |
| 11229:WVGD4 | 1545 | -95 | 0 | Coax Cables |
| 11229:WVGD5 | 1545 | -95 | 0 | Coax Cables |
| 11229:WVGD6 | 1545 | -95 | 0 | Coax Cables |
| 11229:WVGD7 | 1545 | -95 | 0 | Coax Cables |
| 11229:WVGD8 | 1545 | -95 | 0 | Coax Cables |
| 11229:TopConn | 0 | -3903 | 0 | Top Connection |
| 11229:conn | 0 | 3790 | 0 | Mid Connection |
| 11229:BotConT | 0 | 0 | -4784 | Bottom Connection |
| 11229:BotConn | 14845 | -1552 | 0 | Bottom Connection |
| 11229:BotConB | 0 | 0 | 4784 | Bottom Connection |

*** Analysis Results:

Maximum element usage is 93.40% for Steel Pole "11229" in load case "NESC Extreme"
Maximum insulator usage is 39.37% for Clamp "Clamp 14" in load case "NESC Extreme"




*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 13

**Equilibrium Joint Positions and Rotations for Load Case "NESC Heavy":**

| Joint Label | X-Displ (ft) | Y-Displ (ft) | Z-Displ (ft) | X-Rot (deg) | Y-Rot (deg) | Z-Rot (deg) | X-Pos (ft) | Y-Pos (ft) | Z-Pos (ft) |
|---|---|---|---|---|---|---|---|---|---|
| 11229:g | 0 | 0 | 0 | 0.0000 | 0.0000 | 0.0000 | 0 | 0 | 0 |
| 11229:t | -0.02456 | -2.514 | -0.05475 | 3.2172 | -0.0287 | -0.0014 | -0.02456 | -2.514 | 79.95 |
| 11229:Arm1 | -0.02418 | -2.472 | -0.05357 | 3.2172 | -0.0287 | -0.0014 | -0.02418 | -2.472 | 79.2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11229:TopConn | -0.0233 | -2.374 | -0.05081 | 3.2126 | -0.0287 | -0.0014 | -0.0233 | -2.374 | 77.45 |
| 11229:WVGD8 | -0.02255 | -2.29 | -0.04845 | 3.2044 | -0.0287 | -0.0014 | -0.02255 | -2.29 | 75.95 |
| 11229:Arm2 | -0.01765 | -1.757 | -0.03382 | 3.0252 | -0.0287 | -0.0014 | -0.01765 | -1.757 | 66.22 |
| 11229:WVGD7 | -0.01702 | -1.691 | -0.03209 | 2.9808 | -0.0287 | -0.0014 | -0.01702 | -1.691 | 64.97 |
| 11229:conn | -0.0145 | -1.439 | -0.02566 | 2.7813 | -0.0287 | -0.0014 | -0.0145 | -1.439 | 59.97 |
| 11229:WVGD6 | -0.01199 | -1.205 | -0.02012 | 2.5719 | -0.0286 | -0.0014 | -0.01199 | -1.205 | 54.98 |
| 11229:Arm3 | -0.01162 | -1.172 | -0.01936 | 2.5411 | -0.0286 | -0.0014 | -0.01162 | -1.172 | 54.23 |
| 11229:BotConT | -0.009739 | -1.011 | -0.01583 | 2.3668 | -0.0286 | -0.0013 | -0.009739 | -1.011 | 50.48 |
| 11229:BotConn | -0.009472 | -0.9902 | -0.0154 | 2.3436 | -0.0284 | -0.0013 | -0.009472 | -0.9902 | 49.98 |
| 11229:BotConB | -0.009207 | -0.9698 | -0.01496 | 2.3203 | -0.0280 | -0.0013 | -0.009207 | -0.9698 | 49.49 |
| 11229:WVGD5 | -0.007183 | -0.7955 | -0.01139 | 2.1076 | -0.0234 | -0.0011 | -0.007183 | -0.7955 | 44.99 |
| 11229:Arm4 | -0.006118 | -0.6973 | -0.009526 | 1.9758 | -0.0209 | -0.0010 | -0.006118 | -0.6973 | 42.24 |
| 11229:WVGD4 | -0.003852 | -0.4708 | -0.005644 | 1.5933 | -0.0150 | -0.0007 | -0.003852 | -0.4708 | 34.99 |
| 11229:WVGD3 | -0.001777 | -0.2362 | -0.002449 | 1.0977 | -0.0091 | -0.0004 | -0.001777 | -0.2362 | 25 |
| 11229:WVGD2 | -0.0005841 | -0.08386 | -0.000882 | 0.6410 | -0.0047 | -0.0002 | -0.0005841 | -0.08386 | 15 |
| 11229:WVGD1 | -5.99e-05 | -0.009379 | -0.0002019 | 0.2072 | -0.0014 | -0.0001 | -5.99e-05 | -0.009379 | 5 |
| Davit1:O | -0.02418 | -2.471 | -0.09867 | 3.2172 | -0.0287 | -0.0014 | -0.02418 | -3.274 | 79.15 |
| Davit1:End | -0.02443 | -2.493 | -0.3147 | 3.3246 | -0.0288 | -0.0016 | -0.02443 | -7.047 | 79.44 |
| Davit2:O | -0.01764 | -1.755 | -0.08482 | 3.0252 | -0.0287 | -0.0014 | -0.01764 | -2.722 | 66.17 |
| Davit2:Mid | -0.01841 | -1.829 | -0.4229 | 3.2931 | -0.0287 | -0.0020 | -0.01841 | -8.875 | 67.33 |
| Davit2:End | -0.01843 | -1.824 | -0.5791 | 3.3796 | -0.0287 | -0.0022 | -0.01843 | -11.54 | 67.17 |
| Davit3:O | -0.01162 | -1.171 | -0.06886 | 2.5411 | -0.0286 | -0.0014 | -0.01162 | -2.287 | 54.18 |
| Davit3:Mid | -0.01241 | -1.234 | -0.3551 | 2.8113 | -0.0287 | -0.0020 | -0.01241 | -8.431 | 55.39 |
| Davit3:End | -0.01244 | -1.231 | -0.4889 | 2.8987 | -0.0287 | -0.0022 | -0.01244 | -11.1 | 55.26 |
| Davit4:O | -0.006124 | -0.6966 | -0.05319 | 1.9758 | -0.0209 | -0.0010 | -0.006124 | -1.963 | 42.2 |
| Davit4:Mid | -0.006726 | -0.748 | -0.279 | 2.2486 | -0.0209 | -0.0016 | -0.006726 | -8.094 | 43.47 |
| Davit4:End | -0.006768 | -0.7459 | -0.3866 | 2.3371 | -0.0209 | -0.0018 | -0.006768 | -10.76 | 43.36 |

**Joint Support Reactions for Load Case "NESC Heavy":**

| Joint Label | X Force (kips) | X Usage % | Y Force (kips) | Y Usage % | H-Shear Usage % | Z Force (kips) | Comp. Usage % | Uplift Usage % | Result. Force (kips) | Result. Usage % | X Moment (ft-k) | X-M. Usage % | Y Moment (ft-k) | Y-M. Usage % | H-Bend-M Usage % | Z Moment (ft-k) | Z-M. Usage % | Max. Usage % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229:g | -0.04 | 0.0 | 24.53 | 0.0 | 0.0 | -57.94 | 0.0 | 0.0 | 62.92 | 0.0 | -1650.72 | 0.0 | 10.5 | 0.0 | 0.0 | 0.35 | 0.0 | 0.0 |

**Detailed Steel Pole Usages for Load Case "NESC Heavy":**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Trans. Defl. (in) | Long. Defl. (in) | Vert. Defl. (in) | Trans. Mom. (Local Mx) (ft-k) | Long. Mom. (Local My) (ft-k) | Tors. Mom. (ft-k) | Axial Force (kips) | Tran. Shear (kips) | Long. Shear (kips) | P/A (ksi) | M/S. (ksi) | V/Q. (ksi) | T/R. (ksi) | Res. (ksi) | Max. Usage % | At Pt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:t | Origin | 0.00 | -30.17 | -0.29 | -0.66 | 0.00 | 0.00 | 0.0 | -0.04 | -0.01 | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 5 |
| 11229 | 11229:Arm1 | End | 0.75 | -29.66 | -0.29 | -0.64 | -0.01 | -0.00 | 0.0 | -0.04 | -0.01 | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 3 |
| 11229 | 11229:Arm1 | Origin | 0.75 | -29.66 | -0.29 | -0.64 | -6.21 | 0.00 | -0.0 | -1.28 | -2.53 | 0.00 | -0.07 | 0.82 | 0.07 | 0.00 | 0.89 | 1.4 | 2 |
| 11229 | 11229:TopConn | End | 2.50 | -28.48 | -0.28 | -0.61 | -10.63 | 0.01 | -0.0 | -1.28 | -2.53 | 0.00 | -0.07 | 1.33 | 0.07 | 0.00 | 1.40 | 2.1 | 2 |
| 11229 | 11229:TopConn | Origin | 2.50 | -28.48 | -0.28 | -0.61 | -10.63 | 0.01 | -0.0 | -0.96 | -11.22 | 0.00 | -0.05 | 0.00 | 1.17 | 0.00 | 2.02 | 3.1 | 5 |
| 11229 | 11229:WVGD8 | End | 4.00 | -27.48 | -0.27 | -0.58 | -27.46 | 0.01 | -0.0 | -0.96 | -11.22 | 0.00 | -0.05 | 3.27 | 0.30 | 0.00 | 3.36 | 5.2 | 2 |
| 11229 | 11229:WVGD8 | Origin | 4.00 | -27.48 | -0.27 | -0.58 | -27.46 | 0.01 | -0.0 | -2.55 | -11.61 | 0.00 | -0.13 | 3.27 | 0.31 | 0.00 | 3.44 | 5.3 | 2 |
| 11229 | Tube 1 | End | 8.88 | -24.23 | -0.24 | -0.49 | -84.04 | 0.01 | -0.0 | -2.55 | -11.61 | 0.00 | -0.12 | 8.67 | 0.29 | 0.00 | 8.81 | 13.5 | 2 |
| 11229 | Tube 1 | Origin | 8.88 | -24.23 | -0.24 | -0.49 | -84.04 | 0.01 | -0.0 | -3.10 | -11.74 | -0.00 | -0.14 | 8.67 | 0.29 | 0.00 | 8.83 | 13.6 | 2 |
| 11229 | 11229:Arm2 | End | 13.75 | -21.08 | -0.21 | -0.41 | -141.29 | 0.00 | -0.0 | -3.10 | -11.74 | -0.00 | -0.14 | 12.77 | 0.27 | 0.00 | 12.91 | 19.9 | 2 |
| 11229 | 11229:Arm2 | Origin | 13.75 | -21.08 | -0.21 | -0.41 | -186.59 | 0.02 | -0.1 | -7.59 | -16.72 | 0.01 | -0.33 | 16.86 | 0.39 | 0.01 | 17.20 | 26.5 | 2 |
| 11229 | 11229:WVGD7 | End | 15.00 | -20.29 | -0.20 | -0.39 | -207.50 | 0.03 | -0.1 | -7.59 | -16.72 | 0.01 | -0.32 | 18.14 | 0.38 | 0.01 | 18.48 | 28.4 | 2 |
| 11229 | 11229:WVGD7 | Origin | 15.00 | -20.29 | -0.20 | -0.39 | -207.50 | 0.03 | -0.1 | -9.26 | -17.10 | 0.01 | -0.40 | 18.14 | 0.39 | 0.01 | 18.55 | 28.5 | 2 |
| 11229 | 11229:conn | End | 20.00 | -17.27 | -0.17 | -0.31 | -292.97 | 0.05 | -0.1 | -9.26 | -17.10 | 0.01 | -0.37 | 22.59 | 0.36 | 0.00 | 22.97 | 35.3 | 2 |
| 11229 | 11229:conn | Origin | 20.00 | -17.27 | -0.17 | -0.31 | -292.97 | 0.05 | -0.1 | -10.35 | -8.76 | 0.00 | -0.42 | 22.59 | 0.19 | 0.00 | 23.00 | 35.4 | 2 |
| 11229 | 11229:WVGD6 | End | 25.00 | -14.46 | -0.14 | -0.24 | -336.79 | 0.06 | -0.1 | -10.35 | -8.76 | 0.00 | -0.39 | 23.06 | 0.18 | 0.00 | 23.46 | 36.1 | 2 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:WVGD6 | Origin | 25.00 | -14.46 | -0.14 | -0.24 | -336.79 | 0.06 | -0.1 | -12.00 | -9.12 | 0.00 | -0.45 | 23.06 | 0.18 | 0.00 | 23.52 | 36.2 | 2 |
| 11229 | 11229:Arm3 | End | 25.75 | -14.06 | -0.14 | -0.23 | -343.63 | 0.07 | -0.1 | -12.00 | -9.12 | 0.00 | -0.45 | 23.13 | 0.18 | 0.00 | 23.58 | 36.3 | 2 |
| 11229 | 11229:Arm3 | Origin | 25.75 | -14.06 | -0.14 | -0.23 | -389.90 | 0.08 | -0.2 | -16.50 | -14.02 | 0.01 | -0.62 | 26.24 | 0.28 | 0.01 | 26.87 | 41.3 | 2 |
| 11229 | 11229:BotConT | End | 29.50 | -12.13 | -0.12 | -0.19 | -442.49 | 0.13 | -0.2 | -16.50 | -14.02 | 0.01 | -0.59 | 27.39 | 0.27 | 0.01 | 27.99 | 43.1 | 2 |
| 11229 | 11229:BotConT | Origin | 29.50 | -12.13 | -0.12 | -0.19 | -442.49 | 0.12 | -0.3 | -16.81 | -14.07 | 10.70 | -0.61 | 27.39 | 0.81 | 0.01 | 28.03 | 43.1 | 2 |
| 11229 | 11229:BotConn | End | 30.00 | -11.88 | -0.11 | -0.18 | -449.52 | 5.48 | -0.3 | -16.81 | -14.07 | 10.70 | -0.60 | 27.61 | 0.80 | 0.01 | 28.25 | 43.5 | 2 |
| 11229 | 11229:BotConn | Origin | 30.00 | -11.88 | -0.11 | -0.18 | -449.52 | 5.48 | -0.3 | -34.08 | -18.25 | 10.71 | -1.22 | 27.61 | 0.83 | 0.01 | 28.87 | 44.4 | 2 |
| 11229 | 11229:BotConB | End | 30.50 | -11.64 | -0.11 | -0.18 | -458.65 | 10.83 | -0.3 | -34.08 | -18.25 | 10.71 | -1.22 | 27.96 | 0.83 | 0.01 | 29.21 | 44.9 | 2 |
| 11229 | 11229:BotConB | Origin | 30.50 | -11.64 | -0.11 | -0.18 | -458.65 | 10.83 | -0.2 | -34.49 | -18.28 | 0.01 | -1.23 | 27.96 | 0.34 | 0.01 | 29.19 | 44.9 | 2 |
| 11229 | 11229:WVGD5 | End | 35.00 | -9.55 | -0.09 | -0.14 | -540.90 | 10.90 | -0.2 | -34.49 | -18.28 | 0.01 | -1.17 | 29.95 | 0.33 | 0.01 | 31.13 | 47.9 | 2 |
| 11229 | 11229:WVGD5 | Origin | 35.00 | -9.55 | -0.09 | -0.14 | -540.90 | 10.89 | -0.2 | -36.34 | -18.58 | 0.01 | -1.24 | 29.95 | 0.33 | 0.01 | 31.19 | 48.0 | 2 |
| 11229 | 11229:Arm4 | End | 37.75 | -8.37 | -0.07 | -0.11 | -591.98 | 10.92 | -0.2 | -36.34 | -18.58 | 0.01 | -1.20 | 30.98 | 0.32 | 0.01 | 32.19 | 49.5 | 2 |
| 11229 | 11229:Arm4 | Origin | 37.75 | -8.37 | -0.07 | -0.11 | -639.30 | 10.94 | -0.3 | -41.10 | -23.40 | 0.02 | -1.36 | 33.45 | 0.41 | 0.01 | 34.81 | 53.6 | 2 |
| 11229 | Tube 1 | End | 41.38 | -6.94 | -0.06 | -0.09 | -724.12 | 11.00 | -0.3 | -41.10 | -23.40 | 0.02 | -1.31 | 35.25 | 0.39 | 0.01 | 36.57 | 56.3 | 2 |
| 11229 | Tube 1 | Origin | 41.38 | -6.94 | -0.06 | -0.09 | -724.12 | 11.00 | -0.3 | -41.76 | -23.40 | 0.01 | -1.33 | 35.25 | 0.39 | 0.01 | 36.59 | 56.3 | 2 |
| 11229 | 11229:WVGD4 | End | 45.00 | -5.65 | -0.05 | -0.07 | -808.95 | 11.04 | -0.3 | -41.76 | -23.40 | 0.01 | -1.29 | 36.74 | 0.38 | 0.01 | 38.04 | 58.5 | 2 |
| 11229 | 11229:WVGD4 | Origin | 45.00 | -5.65 | -0.05 | -0.07 | -808.95 | 11.04 | -0.3 | -43.54 | -23.66 | 0.01 | -1.34 | 36.74 | 0.39 | 0.01 | 38.09 | 58.6 | 2 |
| 11229 | SpliceT | End | 47.00 | -5.00 | -0.04 | -0.06 | -856.27 | 11.05 | -0.3 | -43.54 | -23.66 | 0.01 | -1.32 | 37.47 | 0.38 | 0.01 | 38.79 | 59.7 | 2 |
| 11229 | SpliceT | Origin | 47.00 | -5.00 | -0.04 | -0.06 | -856.27 | 11.05 | -0.3 | -44.66 | -23.68 | 0.00 | -1.35 | 37.47 | 0.38 | 0.01 | 38.83 | 59.7 | 2 |
| 11229 | SpliceB | End | 51.75 | -3.64 | -0.03 | -0.04 | -968.75 | 11.07 | -0.3 | -44.66 | -23.68 | 0.00 | -1.10 | 33.83 | 0.31 | 0.01 | 34.94 | 53.7 | 2 |
| 11229 | SpliceB | Origin | 51.75 | -3.64 | -0.03 | -0.04 | -968.75 | 11.07 | -0.3 | -45.98 | -23.70 | -0.00 | -1.13 | 33.83 | 0.31 | 0.01 | 34.97 | 53.8 | 2 |
| 11229 | 11229:WVGD3 | End | 55.00 | -2.83 | -0.02 | -0.03 | -1045.77 | 11.06 | -0.3 | -45.98 | -23.70 | -0.00 | -1.10 | 34.47 | 0.30 | 0.01 | 35.58 | 54.7 | 2 |
| 11229 | 11229:WVGD3 | Origin | 55.00 | -2.83 | -0.02 | -0.03 | -1045.77 | 11.06 | -0.3 | -48.20 | -23.97 | -0.01 | -1.16 | 34.47 | 0.30 | 0.01 | 35.63 | 54.8 | 2 |
| 11229 | Tube 2 | End | 60.00 | -1.80 | -0.01 | -0.02 | -1165.60 | 11.02 | -0.3 | -48.20 | -23.97 | -0.01 | -1.11 | 35.26 | 0.29 | 0.01 | 36.37 | 56.0 | 2 |
| 11229 | Tube 2 | Origin | 60.00 | -1.80 | -0.01 | -0.02 | -1165.60 | 11.02 | -0.3 | -49.41 | -23.99 | -0.01 | -1.14 | 35.26 | 0.29 | 0.01 | 36.40 | 56.0 | 2 |
| 11229 | 11229:WVGD2 | End | 65.00 | -1.01 | -0.01 | -0.01 | -1285.52 | 10.95 | -0.3 | -49.41 | -23.99 | -0.01 | -1.09 | 35.82 | 0.28 | 0.01 | 36.91 | 56.8 | 2 |
| 11229 | 11229:WVGD2 | Origin | 65.00 | -1.01 | -0.01 | -0.01 | -1285.52 | 10.95 | -0.3 | -51.92 | -24.25 | -0.02 | -1.15 | 35.82 | 0.28 | 0.01 | 36.97 | 56.9 | 2 |
| 11229 | Tube 2 | End | 70.00 | -0.45 | -0.00 | -0.01 | -1406.75 | 10.84 | -0.3 | -51.92 | -24.25 | -0.02 | -1.10 | 36.22 | 0.27 | 0.00 | 37.33 | 57.4 | 2 |
| 11229 | Tube 2 | Origin | 70.00 | -0.45 | -0.00 | -0.01 | -1406.75 | 10.84 | -0.3 | -53.21 | -24.27 | -0.03 | -1.13 | 36.22 | 0.27 | 0.00 | 37.35 | 57.5 | 2 |
| 11229 | 11229:WVGD1 | End | 75.00 | -0.11 | -0.00 | -0.00 | -1528.09 | 10.70 | -0.3 | -53.21 | -24.27 | -0.03 | -1.09 | 36.47 | 0.26 | 0.00 | 37.56 | 57.8 | 2 |
| 11229 | 11229:WVGD1 | Origin | 75.00 | -0.11 | -0.00 | -0.00 | -1528.09 | 10.70 | -0.3 | -55.82 | -24.53 | -0.04 | -1.14 | 36.47 | 0.26 | 0.00 | 37.61 | 57.9 | 2 |
| 11229 | 11229:g | End | 80.00 | 0.00 | 0.00 | 0.00 | -1650.72 | 10.52 | -0.3 | -55.82 | -24.53 | -0.04 | -1.10 | 36.62 | 0.26 | 0.00 | 37.72 | 58.0 | 2 |

**Detailed Tubular Davit Arm Usages for Load Case "NESC Heavy":**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Trans. Defl. (in) | Long. Defl. (in) | Vert. Defl. (in) | Vert. Mom. (ft-k) | Horz. Mom. (ft-k) | Tors. Mom. (ft-k) | Axial Force (kips) | Vert. Shear (kips) | Horz. Shear (kips) | P/A (ksi) | M/S. (ksi) | V/Q. (ksi) | T/R. (ksi) | Res. (ksi) | Max. Usage % | At Pt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit1 | Davit1:O | Origin | 0.00 | -29.65 | -0.29 | -1.18 | -5.30 | -0.01 | 0.0 | 2.32 | 1.40 | 0.00 | 0.46 | 6.82 | 0.00 | 0.00 | 7.28 | 11.2 | 1 |
| Davit1 | Davit1:End | End | 3.78 | -29.92 | -0.29 | -3.78 | 0.00 | 0.00 | 0.0 | 2.32 | 1.40 | 0.00 | 0.74 | 0.00 | 0.96 | 0.00 | 1.82 | 2.8 | 3 |
| Davit2 | Davit2:O | Origin | 0.00 | -21.06 | -0.21 | -1.02 | -41.32 | -0.09 | -0.0 | 3.78 | 5.08 | 0.01 | 0.32 | 12.81 | 0.00 | 0.00 | 13.13 | 20.2 | 1 |
| Davit2 | #Davit2:0 | End | 3.13 | -21.50 | -0.22 | -3.00 | -25.41 | -0.06 | -0.0 | 3.78 | 5.08 | 0.01 | 0.40 | 12.49 | 0.00 | 0.00 | 12.89 | 19.8 | 1 |
| Davit2 | #Davit2:0 | Origin | 3.13 | -21.50 | -0.22 | -3.00 | -25.41 | -0.06 | -0.0 | 3.82 | 4.92 | 0.01 | 0.40 | 12.49 | 0.00 | 0.00 | 12.89 | 19.8 | 1 |
| Davit2 | Davit2:Mid | End | 6.26 | -21.95 | -0.22 | -5.07 | -10.00 | -0.03 | -0.0 | 3.82 | 4.92 | 0.01 | 0.54 | 8.95 | 0.00 | 0.00 | 9.49 | 14.6 | 1 |
| Davit2 | Davit2:Mid | Origin | 6.26 | -21.95 | -0.22 | -5.07 | -10.00 | -0.03 | 0.0 | 4.89 | 3.75 | 0.01 | 0.69 | 8.95 | 0.00 | 0.00 | 9.64 | 14.8 | 1 |
| Davit2 | Davit2:End | End | 8.93 | -21.89 | -0.22 | -6.95 | 0.00 | 0.00 | 0.0 | 4.89 | 3.75 | 0.01 | 0.98 | 0.00 | 1.61 | 0.00 | 2.96 | 4.5 | 3 |
| Davit3 | Davit3:O | Origin | 0.00 | -14.05 | -0.14 | -0.83 | -41.63 | -0.10 | -0.0 | 3.74 | 5.11 | 0.01 | 0.31 | 12.91 | 0.00 | 0.00 | 13.22 | 20.3 | 1 |
| Davit3 | #Davit3:0 | End | 3.13 | -14.42 | -0.14 | -2.50 | -25.62 | -0.07 | -0.0 | 3.74 | 5.11 | 0.01 | 0.39 | 12.59 | 0.00 | 0.00 | 12.99 | 20.0 | 1 |
| Davit3 | #Davit3:0 | Origin | 3.13 | -14.42 | -0.14 | -2.50 | -25.62 | -0.07 | -0.0 | 3.78 | 4.95 | 0.01 | 0.40 | 12.59 | 0.00 | 0.00 | 12.99 | 20.0 | 1 |
| Davit3 | Davit3:Mid | End | 6.26 | -14.81 | -0.15 | -4.26 | -10.11 | -0.03 | -0.0 | 3.78 | 4.95 | 0.01 | 0.54 | 9.05 | 0.00 | 0.00 | 9.58 | 14.7 | 1 |
| Davit3 | Davit3:Mid | Origin | 6.26 | -14.81 | -0.15 | -4.26 | -10.11 | -0.03 | 0.0 | 4.86 | 3.79 | 0.01 | 0.69 | 9.05 | 0.00 | 0.00 | 9.74 | 15.0 | 1 |
| Davit3 | Davit3:End | End | 8.93 | -14.77 | -0.15 | -5.87 | 0.00 | 0.00 | 0.0 | 4.86 | 3.79 | 0.01 | 0.98 | 0.00 | 1.63 | 0.00 | 2.98 | 4.6 | 3 |
| Davit4 | Davit4:O | Origin | 0.00 | -8.36 | -0.07 | -0.64 | -41.98 | -0.10 | -0.0 | 3.68 | 5.15 | 0.01 | 0.31 | 13.02 | 0.00 | 0.00 | 13.33 | 20.5 | 1 |
| Davit4 | #Davit4:0 | End | 3.13 | -8.66 | -0.08 | -1.95 | -25.86 | -0.06 | -0.0 | 3.68 | 5.15 | 0.01 | 0.39 | 12.71 | 0.00 | 0.00 | 13.10 | 20.2 | 1 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit4 | #Davit4:0 | Origin | 3.13 | -8.66 | -0.08 | -1.95 | -25.86 | -0.06 | -0.0 | 3.73 | 4.99 | 0.01 | 0.39 | 12.71 | 0.00 | 0.00 | 13.10 | 20.2 | 1 |
| Davit4 | Davit4:Mid | End | 6.26 | -8.98 | -0.08 | -3.35 | -10.24 | -0.03 | -0.0 | 3.73 | 4.99 | 0.01 | 0.53 | 9.16 | 0.00 | 0.00 | 9.69 | 14.9 | 1 |
| Davit4 | Davit4:Mid | Origin | 6.26 | -8.98 | -0.08 | -3.35 | -10.24 | -0.03 | 0.0 | 4.82 | 3.83 | 0.01 | 0.68 | 9.16 | 0.00 | 0.00 | 9.84 | 15.1 | 1 |
| Davit4 | Davit4:End | End | 8.93 | -8.95 | -0.08 | -4.64 | -0.00 | 0.00 | 0.0 | 4.82 | 3.83 | 0.01 | 0.97 | 0.00 | 1.65 | 0.00 | 3.01 | 4.6 | 3 |

**Summary of Clamp Capacities and Usages for Load Case "NESC Heavy":**

| Clamp Label | Force (kips) | Input Holding Capacity (kips) | Factored Holding Capacity (kips) | Holding Usage % | Input Hardware Capacity (kips) | Factored Hardware Capacity (kips) | Hardware Usage % | Max. Usage % |
|---|---|---|---|---|---|---|---|---|
| Clamp 1 | 2.691 | 100.00 | 100.00 | 2.69 | 0.00 | 0.00 | 0.00 | 2.69 |
| Clamp 2 | 6.135 | 100.00 | 100.00 | 6.13 | 0.00 | 0.00 | 0.00 | 6.13 |
| Clamp 3 | 6.132 | 100.00 | 100.00 | 6.13 | 0.00 | 0.00 | 0.00 | 6.13 |
| Clamp 4 | 6.131 | 100.00 | 100.00 | 6.13 | 0.00 | 0.00 | 0.00 | 6.13 |
| Clamp 5 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 6 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 7 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 8 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 9 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 10 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 11 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 12 | 1.285 | 100.00 | 100.00 | 1.28 | 0.00 | 0.00 | 0.00 | 1.28 |
| Clamp 13 | 8.664 | 100.00 | 100.00 | 8.66 | 0.00 | 0.00 | 0.00 | 8.66 |
| Clamp 14 | 10.692 | 100.00 | 100.00 | 10.69 | 0.00 | 0.00 | 0.00 | 10.69 |
| Clamp 15 | 17.691 | 100.00 | 100.00 | 17.69 | 0.00 | 0.00 | 0.00 | 17.69 |
| Clamp 16 | 10.692 | 100.00 | 100.00 | 10.69 | 0.00 | 0.00 | 0.00 | 10.69 |
| Clamp 17 | 8.473 | 100.00 | 100.00 | 8.47 | 0.00 | 0.00 | 0.00 | 8.47 |

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 14

**Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme":**

| Joint Label | X-Displ (ft) | Y-Displ (ft) | Z-Displ (ft) | X-Rot (deg) | Y-Rot (deg) | Z-Rot (deg) | X-Pos (ft) | Y-Pos (ft) | Z-Pos (ft) |
|---|---|---|---|---|---|---|---|---|---|
| 11229:g | 0 | 0 | 0 | 0.0000 | 0.0000 | 0.0000 | 0 | 0 | 0 |
| 11229:t | -0.08727 | -4.168 | -0.1498 | 5.7006 | -0.1020 | 0.0023 | -0.08727 | -4.168 | 79.85 |
| 11229:Arm1 | -0.08594 | -4.093 | -0.1461 | 5.7006 | -0.1020 | 0.0023 | -0.08594 | -4.093 | 79.1 |
| 11229:TopConn | -0.08283 | -3.919 | -0.1374 | 5.6985 | -0.1020 | 0.0023 | -0.08283 | -3.919 | 77.36 |
| 11229:WVGD8 | -0.08017 | -3.77 | -0.13 | 5.6853 | -0.1020 | 0.0022 | -0.08017 | -3.77 | 75.87 |
| 11229:Arm2 | -0.06283 | -2.835 | -0.08499 | 5.2108 | -0.1021 | 0.0013 | -0.06283 | -2.835 | 66.17 |
| 11229:WVGD7 | -0.06061 | -2.722 | -0.0799 | 5.1115 | -0.1021 | 0.0011 | -0.06061 | -2.722 | 64.92 |
| 11229:conn | -0.0517 | -2.294 | -0.06155 | 4.6604 | -0.1022 | 0.0003 | -0.0517 | -2.294 | 59.94 |
| 11229:WVGD6 | -0.04278 | -1.908 | -0.04653 | 4.2019 | -0.1022 | -0.0005 | -0.04278 | -1.908 | 54.95 |
| 11229:Arm3 | -0.04144 | -1.853 | -0.04454 | 4.1370 | -0.1022 | -0.0006 | -0.04144 | -1.853 | 54.21 |
| 11229:BotConT | -0.03475 | -1.593 | -0.03546 | 3.8135 | -0.1022 | -0.0012 | -0.03475 | -1.593 | 50.46 |
| 11229:BotConn | -0.0338 | -1.56 | -0.03435 | 3.7716 | -0.1017 | -0.0012 | -0.0338 | -1.56 | 49.97 |
| 11229:BotConB | -0.03285 | -1.527 | -0.03327 | 3.7298 | -0.1002 | -0.0012 | -0.03285 | -1.527 | 49.47 |
| 11229:WVGD5 | -0.02563 | -1.248 | -0.02454 | 3.3533 | -0.0835 | -0.0008 | -0.02563 | -1.248 | 44.98 |
| 11229:Arm4 | -0.02184 | -1.093 | -0.02008 | 3.1232 | -0.0744 | -0.0006 | -0.02184 | -1.093 | 42.23 |
| 11229:WVGD4 | -0.01378 | -0.7358 | -0.01111 | 2.5020 | -0.0536 | -0.0002 | -0.01378 | -0.7358 | 34.99 |
| 11229:WVGD3 | -0.006389 | -0.3685 | -0.004092 | 1.7152 | -0.0324 | -0.0001 | -0.006389 | -0.3685 | 25 |
| 11229:WVGD2 | -0.002115 | -0.1308 | -0.001027 | 0.9997 | -0.0171 | -0.0000 | -0.002115 | -0.1308 | 15 |
| 11229:WVGD1 | -0.0002193 | -0.01463 | -0.0001182 | 0.3231 | -0.0050 | 0.0000 | -0.0002193 | -0.01463 | 5 |
| Davit1:O | -0.08577 | -4.089 | -0.2259 | 5.7006 | -0.1020 | 0.0023 | -0.08577 | -4.893 | 79.02 |
| Davit1:End | -0.08583 | -4.12 | -0.6026 | 5.7390 | -0.1020 | 0.0026 | -0.08583 | -8.674 | 79.15 |
| Davit2:O | -0.06265 | -2.831 | -0.1727 | 5.2108 | -0.1021 | 0.0013 | -0.06265 | -3.797 | 66.08 |
| Davit2:Mid | -0.06417 | -2.943 | -0.7388 | 5.3432 | -0.1021 | 0.0015 | -0.06417 | -9.989 | 67.01 |
| Davit2:End | -0.06365 | -2.931 | -0.9886 | 5.3802 | -0.1021 | 0.0016 | -0.06365 | -12.65 | 66.76 |
| Davit3:O | -0.04131 | -1.85 | -0.1251 | 4.1370 | -0.1022 | -0.0006 | -0.04131 | -2.967 | 54.12 |
| Davit3:Mid | -0.04325 | -1.944 | -0.5755 | 4.2740 | -0.1022 | -0.0004 | -0.04325 | -9.14 | 55.17 |
| Davit3:End | -0.0429 | -1.937 | -0.7758 | 4.3130 | -0.1022 | -0.0004 | -0.0429 | -11.8 | 54.97 |
| Davit4:O | -0.02176 | -1.091 | -0.08908 | 3.1232 | -0.0744 | -0.0006 | -0.02176 | -2.357 | 42.16 |
| Davit4:Mid | -0.02332 | -1.165 | -0.4306 | 3.2643 | -0.0744 | -0.0003 | -0.02332 | -8.512 | 43.32 |
| Davit4:End | -0.02313 | -1.161 | -0.584 | 3.3052 | -0.0744 | -0.0002 | -0.02313 | -11.18 | 43.17 |

**Joint Support Reactions for Load Case "NESC Extreme":**

| Joint Label | X Force (kips) | X Usage % | Y Force (kips) | Y Usage % | H-Shear Usage % | Z Force (kips) | Comp. Usage % | Uplift Usage % | Result. Force (kips) | Result. Usage % | X Moment (ft-k) | X-M. Usage % | Y Moment (ft-k) | Y-M. Usage % | H-Bend-M Usage % | Z Moment (ft-k) | Z-M. Usage % | Max. Usage % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229:g | -0.04 | 0.0 | 38.85 | 0.0 | 0.0 | -29.97 | 0.0 | 0.0 | 49.06 | 0.0 | -2575.09 | 0.0 | 38.6 | 0.0 | 0.0 | -0.02 | 0.0 | 0.0 |

**Detailed Steel Pole Usages for Load Case "NESC Extreme":**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Trans. Defl. (in) | Long. Defl. (in) | Vert. Defl. (in) | Trans. Mom. (Local Mx) (ft-k) | Long. Mom. (Local My) (ft-k) | Tors. Mom. (ft-k) | Axial Force (kips) | Tran. Shear (kips) | Long. Shear (kips) | P/A (ksi) | M/S. (ksi) | V/Q. (ksi) | T/R. (ksi) | Res. (ksi) | Max. Usage % | At Pt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:t | Origin | 0.00 | -50.01 | -1.05 | -1.80 | 0.00 | 0.00 | 0.0 | -0.02 | -0.02 | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 5 |
| 11229 | 11229:Arm1 | End | 0.75 | -49.12 | -1.03 | -1.75 | -0.02 | -0.00 | 0.0 | -0.02 | -0.02 | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 4 |
| 11229 | 11229:Arm1 | Origin | 0.75 | -49.12 | -1.03 | -1.75 | -2.16 | -0.00 | 0.0 | -0.41 | -1.83 | -0.00 | -0.02 | 0.08 | 0.19 | 0.00 | 0.34 | 0.5 | 4 |
| 11229 | 11229:TopConn | End | 2.50 | -47.03 | -0.99 | -1.65 | -5.37 | -0.01 | 0.0 | -0.41 | -1.83 | -0.00 | -0.02 | 0.67 | 0.05 | 0.00 | 0.70 | 1.1 | 2 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:TopConn | Origin | 2.50 | -47.03 | -0.99 | -1.65 | -5.37 | -0.01 | 0.0 | 2.64 | -33.55 | -0.00 | 0.13 | 0.00 | 3.49 | 0.00 | 6.05 | 9.3 | 5 |
| 11229 | 11229:WVGD8 | End | 4.00 | -45.24 | -0.96 | -1.56 | -55.70 | -0.01 | 0.0 | 2.64 | -33.55 | -0.00 | 0.13 | 6.63 | 0.89 | 0.00 | 6.94 | 10.7 | 2 |
| 11229 | 11229:WVGD8 | Origin | 4.00 | -45.24 | -0.96 | -1.56 | -55.70 | -0.01 | 0.0 | 2.10 | -34.42 | -0.00 | 0.10 | 6.63 | 0.91 | 0.00 | 6.92 | 10.6 | 2 |
| 11229 | Tube 1 | End | 8.88 | -39.51 | -0.86 | -1.28 | -223.51 | -0.02 | 0.0 | 2.10 | -34.42 | -0.00 | 0.10 | 23.07 | 0.85 | 0.00 | 23.21 | 35.7 | 2 |
| 11229 | Tube 1 | Origin | 8.88 | -39.51 | -0.86 | -1.28 | -223.51 | -0.02 | 0.0 | 1.60 | -34.73 | -0.00 | 0.07 | 23.07 | 0.86 | 0.00 | 23.19 | 35.7 | 2 |
| 11229 | 11229:Arm2 | End | 13.75 | -34.02 | -0.75 | -1.02 | -392.83 | -0.03 | 0.0 | 1.60 | -34.73 | -0.00 | 0.07 | 35.49 | 0.80 | 0.00 | 35.59 | 54.8 | 2 |
| 11229 | 11229:Arm2 | Origin | 13.75 | -34.02 | -0.75 | -1.02 | -416.03 | -0.03 | 0.0 | -0.62 | -39.34 | -0.00 | -0.03 | 37.59 | 0.91 | 0.00 | 37.65 | 57.9 | 2 |
| 11229 | 11229:WVGD7 | End | 15.00 | -32.67 | -0.73 | -0.96 | -465.21 | -0.03 | 0.0 | -0.62 | -39.34 | -0.00 | -0.03 | 40.68 | 0.89 | 0.00 | 40.73 | 62.7 | 2 |
| 11229 | 11229:WVGD7 | Origin | 15.00 | -32.67 | -0.73 | -0.96 | -465.21 | -0.04 | 0.0 | -1.34 | -40.22 | -0.00 | -0.06 | 40.68 | 0.91 | 0.00 | 40.76 | 62.7 | 2 |
| 11229 | 11229:conn | End | 20.00 | -27.53 | -0.62 | -0.74 | -666.32 | -0.05 | 0.0 | -1.34 | -40.22 | -0.00 | -0.05 | 51.37 | 0.86 | 0.00 | 51.44 | 79.1 | 2 |
| 11229 | 11229:conn | Origin | 20.00 | -27.53 | -0.62 | -0.74 | -666.32 | -0.05 | 0.0 | -4.51 | -9.34 | -0.00 | -0.18 | 51.37 | 0.20 | 0.00 | 51.55 | 79.3 | 2 |
| 11229 | 11229:WVGD6 | End | 25.00 | -22.89 | -0.51 | -0.56 | -713.03 | -0.07 | 0.0 | -4.51 | -9.34 | -0.00 | -0.17 | 48.83 | 0.19 | 0.00 | 49.00 | 75.4 | 2 |
| 11229 | 11229:WVGD6 | Origin | 25.00 | -22.89 | -0.51 | -0.56 | -713.03 | -0.07 | 0.0 | -5.10 | -10.20 | -0.00 | -0.19 | 48.83 | 0.20 | 0.00 | 49.02 | 75.4 | 2 |
| 11229 | 11229:Arm3 | End | 25.75 | -22.24 | -0.50 | -0.53 | -720.68 | -0.07 | 0.0 | -5.10 | -10.20 | -0.00 | -0.19 | 48.51 | 0.20 | 0.00 | 48.70 | 74.9 | 2 |
| 11229 | 11229:Arm3 | Origin | 25.75 | -22.24 | -0.50 | -0.53 | -744.88 | -0.08 | -0.0 | -7.29 | -14.66 | -0.00 | -0.27 | 50.14 | 0.29 | 0.00 | 50.41 | 77.6 | 2 |
| 11229 | 11229:BotConT | End | 29.50 | -19.11 | -0.42 | -0.43 | -799.87 | -0.08 | -0.0 | -7.29 | -14.66 | -0.00 | -0.26 | 49.51 | 0.28 | 0.00 | 49.78 | 76.6 | 2 |
| 11229 | 11229:BotConT | Origin | 29.50 | -19.11 | -0.42 | -0.43 | -799.87 | -0.09 | -0.1 | -7.46 | -14.80 | 39.37 | -0.27 | 49.51 | 2.89 | 0.00 | 50.03 | 77.0 | 1 |
| 11229 | 11229:BotConn | End | 30.00 | -18.72 | -0.41 | -0.41 | -807.27 | 19.59 | -0.1 | -7.46 | -14.80 | 39.37 | -0.27 | 49.75 | 2.79 | 0.00 | 50.25 | 77.3 | 2 |
| 11229 | 11229:BotConn | Origin | 30.00 | -18.72 | -0.41 | -0.41 | -807.27 | 19.59 | -0.1 | -15.24 | -28.12 | 39.38 | -0.55 | 49.75 | 2.83 | 0.00 | 50.53 | 77.7 | 2 |
| 11229 | 11229:BotConB | End | 30.50 | -18.32 | -0.39 | -0.40 | -821.33 | 39.28 | -0.1 | -15.24 | -28.12 | 39.38 | -0.54 | 50.38 | 2.81 | 0.00 | 51.16 | 78.7 | 2 |
| 11229 | 11229:BotConB | Origin | 30.50 | -18.32 | -0.39 | -0.40 | -821.33 | 39.28 | -0.0 | -15.66 | -28.27 | 0.01 | -0.56 | 50.38 | 0.53 | 0.00 | 50.95 | 78.4 | 2 |
| 11229 | 11229:WVGD5 | End | 35.00 | -14.98 | -0.31 | -0.29 | -948.53 | 39.32 | -0.0 | -15.66 | -28.27 | 0.01 | -0.53 | 52.82 | 0.51 | 0.00 | 53.36 | 82.1 | 2 |
| 11229 | 11229:WVGD5 | Origin | 35.00 | -14.98 | -0.31 | -0.29 | -948.53 | 39.32 | 0.0 | -16.48 | -29.14 | 0.01 | -0.56 | 52.82 | 0.52 | 0.00 | 53.39 | 82.1 | 2 |
| 11229 | 11229:Arm4 | End | 37.75 | -13.11 | -0.26 | -0.24 | -1028.65 | 39.33 | 0.0 | -16.48 | -29.14 | 0.01 | -0.55 | 54.12 | 0.51 | 0.00 | 54.67 | 84.1 | 2 |
| 11229 | 11229:Arm4 | Origin | 37.75 | -13.11 | -0.26 | -0.24 | -1053.81 | 39.33 | 0.0 | -18.97 | -33.54 | 0.00 | -0.63 | 55.43 | 0.59 | 0.00 | 56.07 | 86.3 | 2 |
| 11229 | Tube 1 | End | 41.38 | -10.85 | -0.21 | -0.18 | -1175.38 | 39.33 | 0.0 | -18.97 | -33.54 | 0.00 | -0.61 | 57.50 | 0.57 | 0.00 | 58.12 | 89.4 | 2 |
| 11229 | Tube 1 | Origin | 41.38 | -10.85 | -0.21 | -0.18 | -1175.38 | 39.32 | 0.0 | -19.54 | -33.74 | -0.00 | -0.62 | 57.50 | 0.57 | 0.00 | 58.13 | 89.4 | 2 |
| 11229 | 11229:WVGD4 | End | 45.00 | -8.83 | -0.17 | -0.13 | -1297.70 | 39.31 | 0.0 | -19.54 | -33.74 | -0.00 | -0.60 | 59.20 | 0.55 | 0.00 | 59.81 | 92.0 | 2 |
| 11229 | 11229:WVGD4 | Origin | 45.00 | -8.83 | -0.17 | -0.13 | -1297.70 | 39.31 | 0.0 | -20.31 | -34.56 | -0.01 | -0.63 | 59.20 | 0.56 | 0.00 | 59.84 | 92.1 | 2 |
| 11229 | SpliceT | End | 47.00 | -7.82 | -0.14 | -0.11 | -1366.82 | 39.30 | 0.0 | -20.31 | -34.56 | -0.01 | -0.61 | 60.06 | 0.55 | 0.00 | 60.69 | 93.4 | 2 |
| 11229 | SpliceT | Origin | 47.00 | -7.82 | -0.14 | -0.11 | -1366.82 | 39.29 | 0.0 | -21.17 | -34.78 | -0.01 | -0.64 | 60.06 | 0.56 | 0.00 | 60.71 | 93.4 | 2 |
| 11229 | SpliceB | End | 51.75 | -5.68 | -0.10 | -0.07 | -1532.02 | 39.25 | 0.0 | -21.17 | -34.78 | -0.01 | -0.52 | 53.70 | 0.45 | 0.00 | 54.23 | 83.4 | 2 |
| 11229 | SpliceB | Origin | 51.75 | -5.68 | -0.10 | -0.07 | -1532.02 | 39.24 | 0.0 | -22.18 | -35.04 | -0.01 | -0.55 | 53.70 | 0.46 | 0.00 | 54.26 | 83.5 | 2 |
| 11229 | 11229:WVGD3 | End | 55.00 | -4.42 | -0.08 | -0.05 | -1645.88 | 39.20 | 0.0 | -22.18 | -35.04 | -0.01 | -0.53 | 54.44 | 0.44 | 0.00 | 54.98 | 84.6 | 2 |
| 11229 | 11229:WVGD3 | Origin | 55.00 | -4.42 | -0.08 | -0.05 | -1645.88 | 39.20 | 0.0 | -23.28 | -35.96 | -0.02 | -0.56 | 54.44 | 0.46 | 0.00 | 55.00 | 84.6 | 2 |
| 11229 | Tube 2 | End | 60.00 | -2.81 | -0.05 | -0.03 | -1825.67 | 39.11 | 0.0 | -23.28 | -35.96 | -0.02 | -0.54 | 55.41 | 0.44 | 0.00 | 55.95 | 86.1 | 2 |
| 11229 | Tube 2 | Origin | 60.00 | -2.81 | -0.05 | -0.03 | -1825.67 | 39.11 | 0.0 | -24.25 | -36.29 | -0.02 | -0.56 | 55.41 | 0.44 | 0.00 | 55.97 | 86.1 | 2 |
| 11229 | 11229:WVGD2 | End | 65.00 | -1.57 | -0.03 | -0.01 | -2007.13 | 39.00 | 0.0 | -24.25 | -36.29 | -0.02 | -0.54 | 56.09 | 0.42 | 0.00 | 56.63 | 87.1 | 2 |
| 11229 | 11229:WVGD2 | Origin | 65.00 | -1.57 | -0.03 | -0.01 | -2007.13 | 39.00 | 0.0 | -25.57 | -37.29 | -0.03 | -0.56 | 56.09 | 0.43 | 0.00 | 56.66 | 87.2 | 2 |
| 11229 | Tube 2 | End | 70.00 | -0.70 | -0.01 | -0.00 | -2193.56 | 38.87 | 0.0 | -25.57 | -37.29 | -0.03 | -0.54 | 56.63 | 0.42 | 0.00 | 57.18 | 88.0 | 2 |
| 11229 | Tube 2 | Origin | 70.00 | -0.70 | -0.01 | -0.00 | -2193.56 | 38.87 | 0.0 | -26.60 | -37.64 | -0.03 | -0.56 | 56.63 | 0.42 | 0.00 | 57.20 | 88.0 | 2 |
| 11229 | 11229:WVGD1 | End | 75.00 | -0.18 | -0.00 | -0.00 | -2381.78 | 38.72 | 0.0 | -26.60 | -37.64 | -0.03 | -0.54 | 56.98 | 0.41 | 0.00 | 57.53 | 88.5 | 2 |
| 11229 | 11229:WVGD1 | Origin | 75.00 | -0.18 | -0.00 | -0.00 | -2381.78 | 38.72 | 0.0 | -27.99 | -38.66 | -0.03 | -0.57 | 56.98 | 0.42 | 0.00 | 57.56 | 88.6 | 2 |
| 11229 | 11229:g | End | 80.00 | 0.00 | 0.00 | 0.00 | -2575.09 | 38.55 | 0.0 | -27.99 | -38.66 | -0.03 | -0.55 | 57.25 | 0.40 | 0.00 | 57.81 | 88.9 | 2 |

**Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme":**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Trans. Defl. (in) | Long. Defl. (in) | Vert. Defl. (in) | Vert. Mom. (ft-k) | Horz. Mom. (ft-k) | Tors. Mom. (ft-k) | Axial Force (kips) | Vert. Shear (kips) | Horz. Shear (kips) | P/A (ksi) | M/S. (ksi) | V/Q. (ksi) | T/R. (ksi) | Res. (ksi) | Max. Usage % | At Pt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit1 | Davit1:O | Origin | 0.00 | -49.07 | -1.03 | -2.71 | -1.90 | 0.01 | 0.0 | 1.69 | 0.50 | -0.00 | 0.33 | 2.44 | 0.00 | 0.00 | 2.78 | 4.3 | 1 |
| Davit1 | Davit1:End | End | 3.78 | -49.44 | -1.03 | -7.23 | 0.00 | 0.00 | 0.0 | 1.69 | 0.50 | -0.00 | 0.54 | 0.00 | 0.34 | 0.00 | 0.80 | 1.2 | 3 |
| Davit2 | Davit2:O | Origin | 0.00 | -33.97 | -0.75 | -2.07 | -21.42 | -0.00 | -0.0 | 3.85 | 2.79 | 0.00 | 0.32 | 6.64 | 0.00 | 0.00 | 6.97 | 10.7 | 1 |
| Davit2 | #Davit2:0 | End | 3.13 | -34.64 | -0.76 | -5.45 | -12.68 | -0.00 | -0.0 | 3.85 | 2.79 | 0.00 | 0.41 | 6.23 | 0.00 | 0.00 | 6.64 | 10.2 | 1 |
| Davit2 | #Davit2:0 | Origin | 3.13 | -34.64 | -0.76 | -5.45 | -12.68 | -0.00 | -0.0 | 3.87 | 2.68 | 0.00 | 0.41 | 6.23 | 0.00 | 0.00 | 6.64 | 10.2 | 1 |
| Davit2 | Davit2:Mid | End | 6.26 | -35.32 | -0.77 | -8.87 | -4.28 | -0.00 | -0.0 | 3.87 | 2.68 | 0.00 | 0.55 | 3.83 | 0.00 | 0.00 | 4.38 | 6.7 | 1 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit2 | Davit2:Mid | Origin | 6.26 | -35.32 | -0.77 | -8.87 | -4.28 | -0.00 | 0.0 | 4.39 | 1.60 | 0.00 | 0.62 | 3.83 | 0.00 | 0.00 | 4.45 | 6.9 | 1 |
| Davit2 | Davit2:End | End | 8.93 | -35.18 | -0.76 | -11.86 | 0.00 | 0.00 | 0.0 | 4.39 | 1.60 | 0.00 | 0.88 | 0.00 | 0.69 | 0.00 | 1.48 | 2.3 | 3 |
| Davit3 | Davit3:O | Origin | 0.00 | -22.20 | -0.50 | -1.50 | -22.05 | -0.00 | -0.0 | 3.74 | 2.85 | 0.00 | 0.31 | 6.84 | 0.00 | 0.00 | 7.15 | 11.0 | 1 |
| Davit3 | #Davit3:0 | End | 3.13 | -22.76 | -0.51 | -4.18 | -13.11 | -0.00 | -0.0 | 3.74 | 2.85 | 0.00 | 0.39 | 6.44 | 0.00 | 0.00 | 6.84 | 10.5 | 1 |
| Davit3 | #Davit3:0 | Origin | 3.13 | -22.76 | -0.51 | -4.18 | -13.11 | -0.00 | -0.0 | 3.76 | 2.75 | 0.00 | 0.40 | 6.44 | 0.00 | 0.00 | 6.84 | 10.5 | 1 |
| Davit3 | Davit3:Mid | End | 6.26 | -23.33 | -0.52 | -6.91 | -4.51 | -0.00 | -0.0 | 3.76 | 2.75 | 0.00 | 0.53 | 4.04 | 0.00 | 0.00 | 4.57 | 7.0 | 1 |
| Davit3 | Davit3:Mid | Origin | 6.26 | -23.33 | -0.52 | -6.91 | -4.51 | -0.00 | 0.0 | 4.31 | 1.69 | 0.00 | 0.61 | 4.04 | 0.00 | 0.00 | 4.65 | 7.1 | 1 |
| Davit3 | Davit3:End | End | 8.93 | -23.24 | -0.51 | -9.31 | 0.00 | 0.00 | 0.0 | 4.31 | 1.69 | 0.00 | 0.86 | 0.00 | 0.73 | 0.00 | 1.53 | 2.3 | 3 |
| Davit4 | Davit4:O | Origin | 0.00 | -13.09 | -0.26 | -1.07 | -22.60 | 0.01 | 0.0 | 3.63 | 2.91 | -0.00 | 0.30 | 7.01 | 0.00 | 0.00 | 7.31 | 11.3 | 1 |
| Davit4 | #Davit4:0 | End | 3.13 | -13.53 | -0.27 | -3.09 | -13.49 | 0.01 | 0.0 | 3.63 | 2.91 | -0.00 | 0.38 | 6.63 | 0.00 | 0.00 | 7.01 | 10.8 | 1 |
| Davit4 | #Davit4:0 | Origin | 3.13 | -13.53 | -0.27 | -3.09 | -13.49 | 0.01 | 0.0 | 3.65 | 2.80 | -0.00 | 0.39 | 6.63 | 0.00 | 0.00 | 7.02 | 10.8 | 1 |
| Davit4 | Davit4:Mid | End | 6.26 | -13.98 | -0.28 | -5.17 | -4.72 | 0.00 | 0.0 | 3.65 | 2.80 | -0.00 | 0.52 | 4.23 | 0.00 | 0.00 | 4.74 | 7.3 | 1 |
| Davit4 | Davit4:Mid | Origin | 6.26 | -13.98 | -0.28 | -5.17 | -4.72 | 0.00 | 0.0 | 4.21 | 1.77 | -0.00 | 0.60 | 4.23 | 0.00 | 0.00 | 4.82 | 7.4 | 1 |
| Davit4 | Davit4:End | End | 8.93 | -13.93 | -0.28 | -7.01 | 0.00 | 0.00 | 0.0 | 4.21 | 1.77 | -0.00 | 0.85 | 0.00 | 0.76 | 0.00 | 1.57 | 2.4 | 3 |

**Summary of Clamp Capacities and Usages for Load Case "NESC Extreme":**

| Clamp Label | Force (kips) | Input Holding Capacity (kips) | Factored Holding Capacity (kips) | Holding Usage % | Input Hardware Capacity (kips) | Factored Hardware Capacity (kips) | Hardware Usage % | Max. Usage % |
|---|---|---|---|---|---|---|---|---|
| Clamp 1 | 1.757 | 100.00 | 100.00 | 1.76 | 0.00 | 0.00 | 0.00 | 1.76 |
| Clamp 2 | 4.663 | 100.00 | 100.00 | 4.66 | 0.00 | 0.00 | 0.00 | 4.66 |
| Clamp 3 | 4.613 | 100.00 | 100.00 | 4.61 | 0.00 | 0.00 | 0.00 | 4.61 |
| Clamp 4 | 4.556 | 100.00 | 100.00 | 4.56 | 0.00 | 0.00 | 0.00 | 4.56 |
| Clamp 5 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 6 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 7 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 8 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 9 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 10 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 11 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 12 | 0.731 | 100.00 | 100.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.73 |
| Clamp 13 | 31.786 | 100.00 | 100.00 | 31.79 | 0.00 | 0.00 | 0.00 | 31.79 |
| Clamp 14 | 39.366 | 100.00 | 100.00 | 39.37 | 0.00 | 0.00 | 0.00 | 39.37 |
| Clamp 15 | 15.372 | 100.00 | 100.00 | 15.37 | 0.00 | 0.00 | 0.00 | 15.37 |
| Clamp 16 | 39.366 | 100.00 | 100.00 | 39.37 | 0.00 | 0.00 | 0.00 | 39.37 |
| Clamp 17 | 31.312 | 100.00 | 100.00 | 31.31 | 0.00 | 0.00 | 0.00 | 31.31 |

*** Analysis Results for Load Case No. 3 "NESC Extreme Ice w/ Wind" - Number of iterations in SAPS 12

**Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme Ice w/ Wind":**

| Joint Label | X-Displ (ft) | Y-Displ (ft) | Z-Displ (ft) | X-Rot (deg) | Y-Rot (deg) | Z-Rot (deg) | X-Pos (ft) | Y-Pos (ft) | Z-Pos (ft) |
|---|---|---|---|---|---|---|---|---|---|
| 11229:g | 0 | 0 | 0 | 0.0000 | 0.0000 | 0.0000 | 0 | 0 | 0 |
| 11229:t | -0.01149 | -1.661 | -0.02506 | 2.1165 | -0.0135 | -0.0008 | -0.01149 | -1.661 | 79.97 |
| 11229:Arm1 | -0.01131 | -1.633 | -0.02455 | 2.1165 | -0.0135 | -0.0008 | -0.01131 | -1.633 | 79.23 |
| 11229:TopConn | -0.0109 | -1.569 | -0.02336 | 2.1111 | -0.0135 | -0.0008 | -0.0109 | -1.569 | 77.48 |
| 11229:WVGD8 | -0.01055 | -1.514 | -0.02233 | 2.1042 | -0.0135 | -0.0008 | -0.01055 | -1.514 | 75.98 |
| 11229:Arm2 | -0.008249 | -1.163 | -0.01597 | 1.9975 | -0.0134 | -0.0008 | -0.008249 | -1.163 | 66.23 |
| 11229:WVGD7 | -0.007955 | -1.12 | -0.01521 | 1.9686 | -0.0134 | -0.0008 | -0.007955 | -1.12 | 64.98 |
| 11229:conn | -0.006781 | -0.953 | -0.01236 | 1.8422 | -0.0134 | -0.0007 | -0.006781 | -0.953 | 59.99 |
| 11229:WVGD6 | -0.005612 | -0.7978 | -0.009876 | 1.7106 | -0.0133 | -0.0007 | -0.005612 | -0.7978 | 54.99 |
| 11229:Arm3 | -0.005437 | -0.7755 | -0.009533 | 1.6911 | -0.0133 | -0.0007 | -0.005437 | -0.7755 | 54.24 |
| 11229:BotConT | -0.004565 | -0.6685 | -0.007927 | 1.5742 | -0.0133 | -0.0007 | -0.004565 | -0.6685 | 50.49 |
| 11229:BotConn | -0.004441 | -0.6548 | -0.007729 | 1.5586 | -0.0132 | -0.0006 | -0.004441 | -0.6548 | 49.99 |
| 11229:BotConB | -0.004319 | -0.6412 | -0.007526 | 1.5430 | -0.0130 | -0.0006 | -0.004319 | -0.6412 | 49.49 |
| 11229:WVGD5 | -0.003378 | -0.5253 | -0.005861 | 1.4010 | -0.0109 | -0.0005 | -0.003378 | -0.5253 | 44.99 |
| 11229:Arm4 | -0.002882 | -0.4601 | -0.004979 | 1.3136 | -0.0097 | -0.0005 | -0.002882 | -0.4601 | 42.25 |
| 11229:WVGD4 | -0.001822 | -0.3098 | -0.003111 | 1.0544 | -0.0071 | -0.0003 | -0.001822 | -0.3098 | 35 |
| 11229:WVGD3 | -0.0008457 | -0.1549 | -0.001517 | 0.7227 | -0.0043 | -0.0002 | -0.0008457 | -0.1549 | 25 |
| 11229:WVGD2 | -0.0002796 | -0.05485 | -0.0006542 | 0.4202 | -0.0023 | -0.0001 | -0.0002796 | -0.05485 | 15 |
| 11229:WVGD1 | -2.889e-05 | -0.006114 | -0.0001786 | 0.1353 | -0.0007 | -0.0000 | -2.889e-05 | -0.006114 | 5 |
| Davit1:O | -0.01132 | -1.633 | -0.05423 | 2.1165 | -0.0135 | -0.0008 | -0.01132 | -2.436 | 79.2 |
| Davit1:End | -0.01147 | -1.649 | -0.1994 | 2.2573 | -0.0135 | -0.0011 | -0.01147 | -6.203 | 79.55 |
| Davit2:O | -0.008254 | -1.162 | -0.04965 | 1.9975 | -0.0134 | -0.0008 | -0.008254 | -2.129 | 66.2 |
| Davit2:Mid | -0.008656 | -1.214 | -0.2767 | 2.2536 | -0.0135 | -0.0011 | -0.008656 | -8.26 | 67.47 |
| Davit2:End | -0.008685 | -1.212 | -0.3845 | 2.3401 | -0.0135 | -0.0012 | -0.008685 | -10.93 | 67.37 |
| Davit3:O | -0.005443 | -0.775 | -0.04248 | 1.6911 | -0.0133 | -0.0007 | -0.005443 | -1.891 | 54.21 |
| Davit3:Mid | -0.005838 | -0.8198 | -0.2368 | 1.9481 | -0.0133 | -0.0010 | -0.005838 | -8.016 | 55.51 |
| Davit3:End | -0.005867 | -0.8182 | -0.3304 | 2.0350 | -0.0133 | -0.0011 | -0.005867 | -10.68 | 55.42 |
| Davit4:O | -0.002888 | -0.4597 | -0.03401 | 1.3136 | -0.0097 | -0.0005 | -0.002888 | -1.726 | 42.22 |
| Davit4:Mid | -0.003186 | -0.4957 | -0.1881 | 1.5718 | -0.0098 | -0.0008 | -0.003186 | -7.842 | 43.56 |
| Davit4:End | -0.003213 | -0.4947 | -0.2642 | 1.6592 | -0.0098 | -0.0009 | -0.003213 | -10.51 | 43.49 |

**Joint Support Reactions for Load Case "NESC Extreme Ice w/ Wind":**

| Joint Label | X Force (kips) | X Usage % | Y Force (kips) | Y Usage % | H-Shear Usage % | Z Force (kips) | Comp. Usage % | Uplift Usage % | Result. Force (kips) | Result. Usage % | X Moment (ft-k) | X-M. Usage % | Y Moment (ft-k) | Y-M. Usage % | H-Bend-M Usage % | Z Moment (ft-k) | Z-M. Usage % | Max. Usage % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229:g | -0.01 | 0.0 | 15.24 | 0.0 | 0.0 | -52.42 | 0.0 | 0.0 | 54.60 | 0.0 | -1076.03 | 0.0 | 5.1 | 0.0 | 0.0 | 0.18 | 0.0 | 0.0 |

**Detailed Steel Pole Usages for Load Case "NESC Extreme Ice w/ Wind":**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Trans. Defl. (in) | Long. Defl. (in) | Vert. Defl. (in) | Trans. Mom. (Local Mx) (ft-k) | Long. Mom. (Local My) (ft-k) | Tors. Mom. (ft-k) | Axial Force (kips) | Tran. Shear (kips) | Long. Shear (kips) | P/A (ksi) | M/S. (ksi) | V/Q. (ksi) | T/R. (ksi) | Res. (ksi) | Max. Usage % | At Pt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:t | Origin | 0.00 | -19.93 | -0.14 | -0.30 | 0.00 | 0.00 | 0.0 | -0.02 | -0.00 | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 5 |
| 11229 | 11229:Arm1 | End | 0.75 | -19.60 | -0.14 | -0.29 | -0.00 | -0.00 | 0.0 | -0.02 | -0.00 | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 2 |
| 11229 | 11229:Arm1 | Origin | 0.75 | -19.60 | -0.14 | -0.29 | -8.25 | 0.00 | -0.0 | -1.73 | -1.94 | 0.00 | -0.09 | 1.09 | 0.05 | 0.00 | 1.18 | 1.8 | 2 |
| 11229 | 11229:TopConn | End | 2.50 | -18.83 | -0.13 | -0.28 | -11.64 | 0.01 | -0.0 | -1.73 | -1.94 | 0.00 | -0.09 | 1.45 | 0.05 | 0.00 | 1.54 | 2.4 | 2 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | 11229:TopConn | Origin | 2.50 | -18.83 | -0.13 | -0.28 | -11.64 | 0.01 | -0.0 | -1.70 | -5.85 | 0.00 | -0.09 | 1.45 | 0.16 | 0.00 | 1.56 | 2.4 | 2 |
| 11229 | 11229:WVGD8 | End | 4.00 | -18.16 | -0.13 | -0.27 | -20.42 | 0.01 | -0.0 | -1.70 | -5.85 | 0.00 | -0.08 | 2.43 | 0.16 | 0.00 | 2.53 | 3.9 | 2 |
| 11229 | 11229:WVGD8 | Origin | 4.00 | -18.16 | -0.13 | -0.27 | -20.42 | 0.01 | -0.0 | -3.46 | -6.04 | 0.00 | -0.17 | 2.43 | 0.16 | 0.00 | 2.62 | 4.0 | 2 |
| 11229 | Tube 1 | End | 8.88 | -16.03 | -0.11 | -0.23 | -49.87 | 0.02 | -0.0 | -3.46 | -6.04 | 0.00 | -0.16 | 5.15 | 0.15 | 0.00 | 5.32 | 8.2 | 2 |
| 11229 | Tube 1 | Origin | 8.88 | -16.03 | -0.11 | -0.23 | -49.87 | 0.02 | -0.0 | -3.82 | -6.10 | 0.00 | -0.18 | 5.15 | 0.15 | 0.00 | 5.33 | 8.2 | 2 |
| 11229 | 11229:Arm2 | End | 13.75 | -13.96 | -0.10 | -0.19 | -79.59 | 0.03 | -0.0 | -3.82 | -6.10 | 0.00 | -0.17 | 7.19 | 0.14 | 0.00 | 7.36 | 11.3 | 2 |
| 11229 | 11229:Arm2 | Origin | 13.75 | -13.96 | -0.10 | -0.19 | -122.22 | 0.04 | -0.1 | -8.06 | -9.57 | 0.01 | -0.35 | 11.04 | 0.22 | 0.00 | 11.40 | 17.5 | 2 |
| 11229 | 11229:WVGD7 | End | 15.00 | -13.44 | -0.10 | -0.18 | -134.18 | 0.04 | -0.1 | -8.06 | -9.57 | 0.01 | -0.34 | 11.73 | 0.22 | 0.00 | 12.08 | 18.6 | 2 |
| 11229 | 11229:WVGD7 | Origin | 15.00 | -13.44 | -0.10 | -0.18 | -134.18 | 0.04 | -0.1 | -9.87 | -9.75 | 0.01 | -0.42 | 11.73 | 0.22 | 0.00 | 12.16 | 18.7 | 2 |
| 11229 | 11229:conn | End | 20.00 | -11.44 | -0.08 | -0.15 | -182.93 | 0.07 | -0.1 | -9.87 | -9.75 | 0.01 | -0.40 | 14.10 | 0.21 | 0.00 | 14.50 | 22.3 | 2 |
| 11229 | 11229:conn | Origin | 20.00 | -11.44 | -0.08 | -0.15 | -182.93 | 0.07 | -0.1 | -10.43 | -6.01 | 0.00 | -0.42 | 14.10 | 0.13 | 0.00 | 14.52 | 22.3 | 2 |
| 11229 | 11229:WVGD6 | End | 25.00 | -9.57 | -0.07 | -0.12 | -212.96 | 0.10 | -0.1 | -10.43 | -6.01 | 0.00 | -0.40 | 14.58 | 0.12 | 0.00 | 14.98 | 23.0 | 2 |
| 11229 | 11229:WVGD6 | Origin | 25.00 | -9.57 | -0.07 | -0.12 | -212.96 | 0.10 | -0.1 | -12.23 | -6.17 | 0.00 | -0.46 | 14.58 | 0.12 | 0.00 | 15.05 | 23.2 | 2 |
| 11229 | 11229:Arm3 | End | 25.75 | -9.31 | -0.07 | -0.11 | -217.59 | 0.10 | -0.1 | -12.23 | -6.17 | 0.00 | -0.46 | 14.65 | 0.12 | 0.00 | 15.11 | 23.2 | 2 |
| 11229 | 11229:Arm3 | Origin | 25.75 | -9.31 | -0.07 | -0.11 | -260.96 | 0.11 | -0.1 | -16.46 | -9.60 | 0.01 | -0.62 | 17.57 | 0.19 | 0.00 | 18.19 | 28.0 | 2 |
| 11229 | 11229:BotConT | End | 29.50 | -8.02 | -0.05 | -0.10 | -296.98 | 0.14 | -0.1 | -16.46 | -9.60 | 0.01 | -0.59 | 18.39 | 0.18 | 0.00 | 18.98 | 29.2 | 2 |
| 11229 | 11229:BotConT | Origin | 29.50 | -8.02 | -0.05 | -0.10 | -296.98 | 0.14 | -0.1 | -16.67 | -9.62 | 4.79 | -0.60 | 18.39 | 0.39 | 0.00 | 19.00 | 29.2 | 2 |
| 11229 | 11229:BotConn | End | 30.00 | -7.86 | -0.05 | -0.09 | -301.79 | 2.54 | -0.1 | -16.67 | -9.62 | 4.79 | -0.60 | 18.52 | 0.38 | 0.00 | 19.13 | 29.4 | 2 |
| 11229 | 11229:BotConn | Origin | 30.00 | -7.86 | -0.05 | -0.09 | -301.79 | 2.54 | -0.1 | -31.52 | -11.57 | 4.80 | -1.13 | 18.52 | 0.40 | 0.00 | 19.66 | 30.3 | 2 |
| 11229 | 11229:BotConB | End | 30.50 | -7.69 | -0.05 | -0.09 | -307.58 | 4.94 | -0.1 | -31.52 | -11.57 | 4.80 | -1.12 | 18.71 | 0.40 | 0.00 | 19.85 | 30.5 | 2 |
| 11229 | 11229:BotConB | Origin | 30.50 | -7.69 | -0.05 | -0.09 | -307.58 | 4.94 | -0.1 | -31.78 | -11.57 | 0.01 | -1.13 | 18.71 | 0.22 | 0.00 | 19.85 | 30.5 | 2 |
| 11229 | 11229:WVGD5 | End | 35.00 | -6.30 | -0.04 | -0.07 | -359.63 | 4.98 | -0.1 | -31.78 | -11.57 | 0.01 | -1.08 | 19.88 | 0.21 | 0.00 | 20.96 | 32.3 | 2 |
| 11229 | 11229:WVGD5 | Origin | 35.00 | -6.30 | -0.04 | -0.07 | -359.63 | 4.98 | -0.1 | -33.70 | -11.69 | 0.01 | -1.15 | 19.88 | 0.21 | 0.00 | 21.03 | 32.4 | 2 |
| 11229 | 11229:Arm4 | End | 37.75 | -5.52 | -0.03 | -0.06 | -391.77 | 5.01 | -0.1 | -33.70 | -11.69 | 0.01 | -1.11 | 20.47 | 0.20 | 0.00 | 21.59 | 33.2 | 2 |
| 11229 | 11229:Arm4 | Origin | 37.75 | -5.52 | -0.03 | -0.06 | -435.94 | 5.01 | -0.2 | -38.10 | -15.06 | 0.01 | -1.26 | 22.77 | 0.26 | 0.00 | 24.04 | 37.0 | 2 |
| 11229 | Tube 1 | End | 41.38 | -4.57 | -0.03 | -0.05 | -490.53 | 5.06 | -0.2 | -38.10 | -15.06 | 0.01 | -1.22 | 23.85 | 0.25 | 0.00 | 25.07 | 38.6 | 2 |
| 11229 | Tube 1 | Origin | 41.38 | -4.57 | -0.03 | -0.05 | -490.53 | 5.06 | -0.2 | -38.52 | -15.03 | 0.01 | -1.23 | 23.85 | 0.25 | 0.00 | 25.08 | 38.6 | 2 |
| 11229 | 11229:WVGD4 | End | 45.00 | -3.72 | -0.02 | -0.04 | -545.02 | 5.09 | -0.2 | -38.52 | -15.03 | 0.01 | -1.19 | 24.73 | 0.25 | 0.00 | 25.92 | 39.9 | 2 |
| 11229 | 11229:WVGD4 | Origin | 45.00 | -3.72 | -0.02 | -0.04 | -545.02 | 5.09 | -0.2 | -40.39 | -15.13 | 0.01 | -1.25 | 24.73 | 0.25 | 0.00 | 25.98 | 40.0 | 2 |
| 11229 | SpliceT | End | 47.00 | -3.29 | -0.02 | -0.03 | -575.28 | 5.11 | -0.2 | -40.39 | -15.13 | 0.01 | -1.22 | 25.15 | 0.24 | 0.00 | 26.37 | 40.6 | 2 |
| 11229 | SpliceT | Origin | 47.00 | -3.29 | -0.02 | -0.03 | -575.28 | 5.11 | -0.2 | -41.13 | -15.11 | 0.01 | -1.25 | 25.15 | 0.24 | 0.00 | 26.40 | 40.6 | 2 |
| 11229 | SpliceB | End | 51.75 | -2.39 | -0.01 | -0.02 | -647.06 | 5.14 | -0.2 | -41.13 | -15.11 | 0.01 | -1.02 | 22.58 | 0.20 | 0.00 | 23.59 | 36.3 | 2 |
| 11229 | SpliceB | Origin | 51.75 | -2.39 | -0.01 | -0.02 | -647.06 | 5.14 | -0.2 | -41.98 | -15.09 | 0.00 | -1.04 | 22.58 | 0.20 | 0.00 | 23.61 | 36.3 | 2 |
| 11229 | 11229:WVGD3 | End | 55.00 | -1.86 | -0.01 | -0.02 | -696.08 | 5.16 | -0.2 | -41.98 | -15.09 | 0.00 | -1.01 | 22.92 | 0.19 | 0.00 | 23.93 | 36.8 | 2 |
| 11229 | 11229:WVGD3 | Origin | 55.00 | -1.86 | -0.01 | -0.02 | -696.08 | 5.16 | -0.2 | -44.15 | -15.18 | 0.00 | -1.06 | 22.92 | 0.19 | 0.00 | 23.99 | 36.9 | 2 |
| 11229 | Tube 2 | End | 60.00 | -1.18 | -0.01 | -0.01 | -771.96 | 5.17 | -0.2 | -44.15 | -15.18 | 0.00 | -1.01 | 23.34 | 0.18 | 0.00 | 24.35 | 37.5 | 2 |
| 11229 | Tube 2 | Origin | 60.00 | -1.18 | -0.01 | -0.01 | -771.96 | 5.17 | -0.2 | -44.93 | -15.14 | -0.00 | -1.03 | 23.34 | 0.18 | 0.00 | 24.37 | 37.5 | 2 |
| 11229 | 11229:WVGD2 | End | 65.00 | -0.66 | -0.00 | -0.01 | -847.68 | 5.17 | -0.2 | -44.93 | -15.14 | -0.00 | -0.99 | 23.60 | 0.18 | 0.00 | 24.60 | 37.8 | 2 |
| 11229 | 11229:WVGD2 | Origin | 65.00 | -0.66 | -0.00 | -0.01 | -847.68 | 5.17 | -0.2 | -47.28 | -15.22 | -0.00 | -1.04 | 23.60 | 0.18 | 0.00 | 24.65 | 37.9 | 2 |
| 11229 | Tube 2 | End | 70.00 | -0.29 | -0.00 | -0.00 | -923.78 | 5.15 | -0.2 | -47.28 | -15.22 | -0.00 | -1.00 | 23.77 | 0.17 | 0.00 | 24.78 | 38.1 | 2 |
| 11229 | Tube 2 | Origin | 70.00 | -0.29 | -0.00 | -0.00 | -923.78 | 5.15 | -0.2 | -48.12 | -15.19 | -0.01 | -1.02 | 23.77 | 0.17 | 0.00 | 24.80 | 38.1 | 2 |
| 11229 | 11229:WVGD1 | End | 75.00 | -0.07 | -0.00 | -0.00 | -999.73 | 5.12 | -0.2 | -48.12 | -15.19 | -0.01 | -0.98 | 23.85 | 0.16 | 0.00 | 24.83 | 38.2 | 2 |
| 11229 | 11229:WVGD1 | Origin | 75.00 | -0.07 | -0.00 | -0.00 | -999.73 | 5.12 | -0.2 | -50.54 | -15.26 | -0.01 | -1.03 | 23.85 | 0.16 | 0.00 | 24.88 | 38.3 | 2 |
| 11229 | 11229:g | End | 80.00 | 0.00 | 0.00 | 0.00 | -1076.03 | 5.08 | -0.2 | -50.54 | -15.26 | -0.01 | -1.00 | 23.86 | 0.16 | 0.00 | 24.86 | 38.2 | 2 |

**Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme Ice w/ Wind":**

| Element Label | Joint Label | Joint Position | Rel. Dist. (ft) | Trans. Defl. (in) | Long. Defl. (in) | Vert. Defl. (in) | Vert. Mom. (ft-k) | Horz. Mom. (ft-k) | Tors. Mom. (ft-k) | Axial Force (kips) | Vert. Shear (kips) | Horz. Shear (kips) | P/A (ksi) | M/S. (ksi) | V/Q. (ksi) | T/R. (ksi) | Res. (ksi) | Max. Usage % | At Pt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit1 | Davit1:O | Origin | 0.00 | -19.59 | -0.14 | -0.65 | -6.94 | -0.01 | 0.0 | 1.69 | 1.84 | 0.00 | 0.33 | 8.94 | 0.00 | 0.00 | 9.28 | 14.3 | 1 |
| Davit1 | Davit1:End | End | 3.78 | -19.79 | -0.14 | -2.39 | 0.00 | 0.00 | 0.0 | 1.69 | 1.84 | 0.00 | 0.54 | 0.00 | 1.25 | 0.00 | 2.24 | 3.4 | 3 |
| Davit2 | Davit2:O | Origin | 0.00 | -13.95 | -0.10 | -0.60 | -38.77 | -0.05 | -0.0 | 2.40 | 4.65 | 0.01 | 0.20 | 12.02 | 0.00 | 0.00 | 12.22 | 18.8 | 1 |
| Davit2 | #Davit2:0 | End | 3.13 | -14.25 | -0.10 | -1.92 | -24.22 | -0.03 | -0.0 | 2.40 | 4.65 | 0.01 | 0.25 | 11.91 | 0.00 | 0.00 | 12.16 | 18.7 | 1 |
| Davit2 | #Davit2:0 | Origin | 3.13 | -14.25 | -0.10 | -1.92 | -24.22 | -0.03 | -0.0 | 2.43 | 4.54 | 0.01 | 0.26 | 11.91 | 0.00 | 0.00 | 12.16 | 18.7 | 1 |
| Davit2 | Davit2:Mid | End | 6.26 | -14.57 | -0.10 | -3.32 | -10.00 | -0.01 | -0.0 | 2.43 | 4.54 | 0.01 | 0.35 | 8.95 | 0.00 | 0.00 | 9.30 | 14.3 | 1 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davit2 | Davit2:Mid | Origin | 6.26 | -14.57 | -0.10 | -3.32 | -10.00 | -0.02 | 0.0 | 3.45 | 3.75 | 0.01 | 0.49 | 8.95 | 0.00 | 0.00 | 9.44 | 14.5 | 1 |
| Davit2 | Davit2:End | End | 8.93 | -14.54 | -0.10 | -4.61 | 0.00 | 0.00 | 0.0 | 3.45 | 3.75 | 0.01 | 0.69 | 0.00 | 1.61 | 0.00 | 2.88 | 4.4 | 3 |
| Davit3 | Davit3:O | Origin | 0.00 | -9.30 | -0.07 | -0.51 | -38.89 | -0.05 | -0.0 | 2.37 | 4.66 | 0.01 | 0.20 | 12.06 | 0.00 | 0.00 | 12.26 | 18.9 | 1 |
| Davit3 | #Davit3:0 | End | 3.13 | -9.56 | -0.07 | -1.63 | -24.31 | -0.03 | -0.0 | 2.37 | 4.66 | 0.01 | 0.25 | 11.95 | 0.00 | 0.00 | 12.20 | 18.8 | 1 |
| Davit3 | #Davit3:0 | Origin | 3.13 | -9.56 | -0.07 | -1.63 | -24.31 | -0.03 | -0.0 | 2.41 | 4.55 | 0.01 | 0.25 | 11.95 | 0.00 | 0.00 | 12.20 | 18.8 | 1 |
| Davit3 | Davit3:Mid | End | 6.26 | -9.84 | -0.07 | -2.84 | -10.05 | -0.01 | -0.0 | 2.41 | 4.55 | 0.01 | 0.34 | 9.00 | 0.00 | 0.00 | 9.34 | 14.4 | 1 |
| Davit3 | Davit3:Mid | Origin | 6.26 | -9.84 | -0.07 | -2.84 | -10.05 | -0.02 | 0.0 | 3.43 | 3.77 | 0.01 | 0.49 | 9.00 | 0.00 | 0.00 | 9.48 | 14.6 | 1 |
| Davit3 | Davit3:End | End | 8.93 | -9.82 | -0.07 | -3.97 | 0.00 | 0.00 | 0.0 | 3.43 | 3.77 | 0.01 | 0.69 | 0.00 | 1.62 | 0.00 | 2.89 | 4.4 | 3 |
| Davit4 | Davit4:O | Origin | 0.00 | -5.52 | -0.03 | -0.41 | -39.05 | -0.05 | -0.0 | 2.34 | 4.67 | 0.01 | 0.20 | 12.11 | 0.00 | 0.00 | 12.31 | 18.9 | 1 |
| Davit4 | #Davit4:0 | End | 3.13 | -5.72 | -0.04 | -1.29 | -24.42 | -0.03 | -0.0 | 2.34 | 4.67 | 0.01 | 0.25 | 12.00 | 0.00 | 0.00 | 12.25 | 18.8 | 1 |
| Davit4 | #Davit4:0 | Origin | 3.13 | -5.72 | -0.04 | -1.29 | -24.42 | -0.03 | -0.0 | 2.37 | 4.57 | 0.01 | 0.25 | 12.00 | 0.00 | 0.00 | 12.25 | 18.8 | 1 |
| Davit4 | Davit4:Mid | End | 6.26 | -5.95 | -0.04 | -2.26 | -10.11 | -0.01 | -0.0 | 2.37 | 4.57 | 0.01 | 0.34 | 9.05 | 0.00 | 0.00 | 9.39 | 14.4 | 1 |
| Davit4 | Davit4:Mid | Origin | 6.26 | -5.95 | -0.04 | -2.26 | -10.11 | -0.01 | 0.0 | 3.41 | 3.79 | 0.01 | 0.48 | 9.05 | 0.00 | 0.00 | 9.53 | 14.7 | 1 |
| Davit4 | Davit4:End | End | 8.93 | -5.94 | -0.04 | -3.17 | 0.00 | 0.00 | 0.0 | 3.41 | 3.79 | 0.01 | 0.68 | 0.00 | 1.63 | 0.00 | 2.90 | 4.5 | 3 |

**Summary of Clamp Capacities and Usages for Load Case "NESC Extreme Ice w/ Wind":**

| Clamp Label | Force (kips) | Input Holding Capacity (kips) | Factored Holding Capacity (kips) | Holding Usage % | Input Hardware Capacity (kips) | Factored Hardware Capacity (kips) | Hardware Usage % | Max. Usage % |
|---|---|---|---|---|---|---|---|---|
| Clamp 1 | 2.479 | 100.00 | 100.00 | 2.48 | 0.00 | 0.00 | 0.00 | 2.48 |
| Clamp 2 | 5.075 | 100.00 | 100.00 | 5.08 | 0.00 | 0.00 | 0.00 | 5.08 |
| Clamp 3 | 5.074 | 100.00 | 100.00 | 5.07 | 0.00 | 0.00 | 0.00 | 5.07 |
| Clamp 4 | 5.073 | 100.00 | 100.00 | 5.07 | 0.00 | 0.00 | 0.00 | 5.07 |
| Clamp 5 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 6 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 7 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 8 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 9 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 10 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 11 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 12 | 1.548 | 100.00 | 100.00 | 1.55 | 0.00 | 0.00 | 0.00 | 1.55 |
| Clamp 13 | 3.903 | 100.00 | 100.00 | 3.90 | 0.00 | 0.00 | 0.00 | 3.90 |
| Clamp 14 | 4.784 | 100.00 | 100.00 | 4.78 | 0.00 | 0.00 | 0.00 | 4.78 |
| Clamp 15 | 14.926 | 100.00 | 100.00 | 14.93 | 0.00 | 0.00 | 0.00 | 14.93 |
| Clamp 16 | 4.784 | 100.00 | 100.00 | 4.78 | 0.00 | 0.00 | 0.00 | 4.78 |
| Clamp 17 | 3.790 | 100.00 | 100.00 | 3.79 | 0.00 | 0.00 | 0.00 | 3.79 |

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

**Summary of Steel Pole Usages:**

| Steel Pole Label | Maximum Usage % | Load Case | Height AGL (ft) | Segment Number | Weight (lbs) |
|---|---|---|---|---|---|
| 11229 | 93.40 | NESC Extreme | 30.6 | 18 | 11163.8 |

**Base Plate Results by Bend Line:**

| Pole Label | Load Case | Bend Line # | Start X (ft) | Start Y (ft) | End X (ft) | End Y (ft) | Length (in) | Bending Stress (ksi) | Bolt Mom. Sum (ft-k) | # Bolts Acting | Bolt Max Load (kips) | Min Plate Thickness (in) | Actual Thickness (in) | Usage % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | NESC Heavy | 1 | 1.859 | 0.970 | -0.090 | 2.095 | 27.000 | 14.201 | 26.960 | 1 | -113.575 | 1.199 | 2.250 | 28.40 |
| 11229 | NESC Heavy | 2 | 2.095 | -0.090 | 0.970 | 1.859 | 27.000 | 7.850 | 14.902 | 1 | -62.778 | 0.891 | 2.250 | 15.70 |
| 11229 | NESC Heavy | 3 | 1.769 | -1.125 | 1.769 | 1.125 | 27.000 | 0.709 | 1.347 | 1 | 5.583 | 0.268 | 2.250 | 1.42 |
| 11229 | NESC Heavy | 4 | 0.970 | -1.859 | 2.095 | 0.090 | 27.000 | 9.216 | 17.496 | 1 | 73.708 | 0.966 | 2.250 | 18.43 |
| 11229 | NESC Heavy | 5 | -0.090 | -2.095 | 1.859 | -0.970 | 27.000 | 15.487 | 29.402 | 1 | 123.862 | 1.252 | 2.250 | 30.97 |
| 11229 | NESC Heavy | 6 | -1.125 | -1.769 | 1.125 | -1.769 | 27.000 | 18.033 | 34.235 | 1 | 141.907 | 1.351 | 2.250 | 36.07 |
| 11229 | NESC Heavy | 7 | -1.859 | -0.970 | 0.090 | -2.095 | 27.000 | 15.378 | 29.195 | 1 | 122.991 | 1.248 | 2.250 | 30.76 |
| 11229 | NESC Heavy | 8 | -2.095 | 0.090 | -0.970 | -1.859 | 27.000 | 9.027 | 17.137 | 1 | 72.194 | 0.956 | 2.250 | 18.05 |
| 11229 | NESC Heavy | 9 | -1.769 | 1.125 | -1.769 | -1.125 | 27.000 | 0.487 | 0.925 | 1 | 3.833 | 0.222 | 2.250 | 0.97 |
| 11229 | NESC Heavy | 10 | -0.970 | 1.859 | -2.095 | -0.090 | 27.000 | 8.039 | 15.261 | 1 | -64.292 | 0.902 | 2.250 | 16.08 |
| 11229 | NESC Heavy | 11 | 0.090 | 2.095 | -1.859 | 0.970 | 27.000 | 14.310 | 27.166 | 1 | -114.445 | 1.204 | 2.250 | 28.62 |
| 11229 | NESC Heavy | 12 | 1.125 | 1.769 | -1.125 | 1.769 | 27.000 | 16.837 | 31.963 | 1 | -132.491 | 1.306 | 2.250 | 33.67 |
| 11229 | NESC Heavy | 13 | 1.561 | 1.478 | -0.613 | 2.060 | 27.000 | 14.136 | 26.836 | 2 | -132.491 | 1.196 | 2.250 | 28.27 |
| 11229 | NESC Heavy | 14 | 2.091 | 0.500 | 0.500 | 2.091 | 27.000 | 9.811 | 18.625 | 2 | -113.575 | 0.997 | 2.250 | 19.62 |
| 11229 | NESC Heavy | 15 | 2.060 | -0.613 | 1.478 | 1.561 | 27.000 | 3.882 | 7.369 | 2 | -62.778 | 0.627 | 2.250 | 7.76 |
| 11229 | NESC Heavy | 16 | 1.478 | -1.561 | 2.060 | 0.613 | 27.000 | 4.501 | 8.545 | 2 | 73.708 | 0.675 | 2.250 | 9.00 |
| 11229 | NESC Heavy | 17 | 0.500 | -2.091 | 2.091 | -0.500 | 27.000 | 10.991 | 20.866 | 2 | 123.862 | 1.055 | 2.250 | 21.98 |
| 11229 | NESC Heavy | 18 | -0.613 | -2.060 | 1.561 | -1.478 | 27.000 | 15.266 | 28.982 | 2 | 141.907 | 1.243 | 2.250 | 30.53 |
| 11229 | NESC Heavy | 19 | -1.561 | -1.478 | 0.613 | -2.060 | 27.000 | 15.217 | 28.888 | 2 | 141.907 | 1.241 | 2.250 | 30.43 |
| 11229 | NESC Heavy | 20 | -2.091 | -0.500 | -0.500 | -2.091 | 27.000 | 10.858 | 20.614 | 2 | 122.991 | 1.049 | 2.250 | 21.72 |
| 11229 | NESC Heavy | 21 | -2.060 | 0.613 | -1.478 | -1.561 | 27.000 | 4.314 | 8.189 | 2 | 72.194 | 0.661 | 2.250 | 8.63 |
| 11229 | NESC Heavy | 22 | -1.478 | 1.561 | -2.060 | -0.613 | 27.000 | 3.866 | 7.339 | 2 | -64.292 | 0.626 | 2.250 | 7.73 |
| 11229 | NESC Heavy | 23 | -0.500 | 2.091 | -2.091 | 0.500 | 27.000 | 9.943 | 18.877 | 2 | -114.445 | 1.003 | 2.250 | 19.89 |
| 11229 | NESC Heavy | 24 | 0.613 | 2.060 | -1.561 | 1.478 | 27.000 | 14.185 | 26.930 | 2 | -132.491 | 1.198 | 2.250 | 28.37 |
| 11229 | NESC Extreme | 1 | 1.859 | 0.970 | -0.090 | 2.095 | 27.000 | 22.660 | 43.019 | 1 | -181.228 | 1.515 | 2.250 | 45.32 |
| 11229 | NESC Extreme | 2 | 2.095 | -0.090 | 0.970 | 1.859 | 27.000 | 12.667 | 24.048 | 1 | -101.308 | 1.132 | 2.250 | 25.33 |
| 11229 | NESC Extreme | 3 | 1.769 | -1.125 | 1.769 | 1.125 | 27.000 | 0.709 | 1.346 | 1 | 5.581 | 0.268 | 2.250 | 1.42 |
| 11229 | NESC Extreme | 4 | 0.970 | -1.859 | 2.095 | 0.090 | 27.000 | 13.955 | 26.493 | 1 | 111.607 | 1.189 | 2.250 | 27.91 |
| 11229 | NESC Extreme | 5 | -0.090 | -2.095 | 1.859 | -0.970 | 27.000 | 23.653 | 44.904 | 1 | 189.169 | 1.548 | 2.250 | 47.31 |
| 11229 | NESC Extreme | 6 | -1.125 | -1.769 | 1.125 | -1.769 | 27.000 | 27.500 | 52.208 | 1 | 216.405 | 1.669 | 2.250 | 55.00 |
| 11229 | NESC Extreme | 7 | -1.859 | -0.970 | 0.090 | -2.095 | 27.000 | 23.255 | 44.147 | 1 | 185.982 | 1.534 | 2.250 | 46.51 |
| 11229 | NESC Extreme | 8 | -2.095 | 0.090 | -0.970 | -1.859 | 27.000 | 13.262 | 25.176 | 1 | 106.062 | 1.159 | 2.250 | 26.52 |
| 11229 | NESC Extreme | 9 | -1.769 | 1.125 | -1.769 | -1.125 | 27.000 | 0.105 | 0.200 | 1 | -0.827 | 0.103 | 2.250 | 0.21 |
| 11229 | NESC Extreme | 10 | -0.970 | 1.859 | -2.095 | -0.090 | 27.000 | 13.361 | 25.364 | 1 | -106.853 | 1.163 | 2.250 | 26.72 |
| 11229 | NESC Extreme | 11 | 0.090 | 2.095 | -1.859 | 0.970 | 27.000 | 23.059 | 43.775 | 1 | -184.415 | 1.528 | 2.250 | 46.12 |
| 11229 | NESC Extreme | 12 | 1.125 | 1.769 | -1.125 | 1.769 | 27.000 | 26.896 | 51.061 | 1 | -211.651 | 1.650 | 2.250 | 53.79 |
| 11229 | NESC Extreme | 13 | 1.561 | 1.478 | -0.613 | 2.060 | 27.000 | 22.570 | 42.849 | 2 | -211.651 | 1.512 | 2.250 | 45.14 |
| 11229 | NESC Extreme | 14 | 2.091 | 0.500 | 0.500 | 2.091 | 27.000 | 15.718 | 29.839 | 2 | -181.228 | 1.262 | 2.250 | 31.44 |
| 11229 | NESC Extreme | 15 | 2.060 | -0.613 | 1.478 | 1.561 | 27.000 | 6.065 | 11.514 | 2 | -101.308 | 0.784 | 2.250 | 12.13 |
| 11229 | NESC Extreme | 16 | 1.478 | -1.561 | 2.060 | 0.613 | 27.000 | 6.649 | 12.622 | 2 | 111.607 | 0.820 | 2.250 | 13.30 |
| 11229 | NESC Extreme | 17 | 0.500 | -2.091 | 2.091 | -0.500 | 27.000 | 16.733 | 31.766 | 2 | 189.169 | 1.302 | 2.250 | 33.47 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11229 | NESC Extreme | 18 | -0.613 | -2.060 | 1.561 | -1.478 | 27.000 | 23.297 | 44.227 | 2 | 216.405 | 1.536 | 2.250 | 46.59 |
| 11229 | NESC Extreme | 19 | -1.561 | -1.478 | 0.613 | -2.060 | 27.000 | 23.116 | 43.884 | 2 | 216.405 | 1.530 | 2.250 | 46.23 |
| 11229 | NESC Extreme | 20 | -2.091 | -0.500 | -0.500 | -2.091 | 27.000 | 16.247 | 30.843 | 2 | 185.982 | 1.283 | 2.250 | 32.49 |
| 11229 | NESC Extreme | 21 | -2.060 | 0.613 | -1.478 | -1.561 | 27.000 | 6.058 | 11.501 | 2 | 106.062 | 0.783 | 2.250 | 12.12 |
| 11229 | NESC Extreme | 22 | -1.478 | 1.561 | -2.060 | -0.613 | 27.000 | 6.103 | 11.586 | 2 | -106.853 | 0.786 | 2.250 | 12.21 |
| 11229 | NESC Extreme | 23 | -0.500 | 2.091 | -2.091 | 0.500 | 27.000 | 16.204 | 30.761 | 2 | -184.415 | 1.281 | 2.250 | 32.41 |
| 11229 | NESC Extreme | 24 | 0.613 | 2.060 | -1.561 | 1.478 | 27.000 | 22.751 | 43.191 | 2 | -211.651 | 1.518 | 2.250 | 45.50 |
| 11229 | NESC Extreme Ice w/ Wind | 1 | 1.859 | 0.970 | -0.090 | 2.095 | 27.000 | 9.119 | 17.312 | 1 | -72.929 | 0.961 | 2.250 | 18.24 |
| 11229 | NESC Extreme Ice w/ Wind | 2 | 2.095 | -0.090 | 0.970 | 1.859 | 27.000 | 4.985 | 9.464 | 1 | -39.871 | 0.710 | 2.250 | 9.97 |
| 11229 | NESC Extreme Ice w/ Wind | 3 | 1.769 | -1.125 | 1.769 | 1.125 | 27.000 | 0.593 | 1.127 | 1 | 4.670 | 0.245 | 2.250 | 1.19 |
| 11229 | NESC Extreme Ice w/ Wind | 4 | 0.970 | -1.859 | 2.095 | 0.090 | 27.000 | 6.139 | 11.655 | 1 | 49.098 | 0.788 | 2.250 | 12.28 |
| 11229 | NESC Extreme Ice w/ Wind | 5 | -0.090 | -2.095 | 1.859 | -0.970 | 27.000 | 10.234 | 19.428 | 1 | 81.846 | 1.018 | 2.250 | 20.47 |
| 11229 | NESC Extreme Ice w/ Wind | 6 | -1.125 | -1.769 | 1.125 | -1.769 | 27.000 | 11.905 | 22.601 | 1 | 93.683 | 1.098 | 2.250 | 23.81 |
| 11229 | NESC Extreme Ice w/ Wind | 7 | -1.859 | -0.970 | 0.090 | -2.095 | 27.000 | 10.181 | 19.328 | 1 | 81.426 | 1.015 | 2.250 | 20.36 |
| 11229 | NESC Extreme Ice w/ Wind | 8 | -2.095 | 0.090 | -0.970 | -1.859 | 27.000 | 6.048 | 11.481 | 1 | 48.368 | 0.783 | 2.250 | 12.10 |
| 11229 | NESC Extreme Ice w/ Wind | 9 | -1.769 | 1.125 | -1.769 | -1.125 | 27.000 | 0.486 | 0.923 | 1 | 3.826 | 0.222 | 2.250 | 0.97 |
| 11229 | NESC Extreme Ice w/ Wind | 10 | -0.970 | 1.859 | -2.095 | -0.090 | 27.000 | 5.077 | 9.638 | 1 | -40.601 | 0.717 | 2.250 | 10.15 |
| 11229 | NESC Extreme Ice w/ Wind | 11 | 0.090 | 2.095 | -1.859 | 0.970 | 27.000 | 9.171 | 17.411 | 1 | -73.349 | 0.964 | 2.250 | 18.34 |
| 11229 | NESC Extreme Ice w/ Wind | 12 | 1.125 | 1.769 | -1.125 | 1.769 | 27.000 | 10.825 | 20.551 | 1 | -85.186 | 1.047 | 2.250 | 21.65 |
| 11229 | NESC Extreme Ice w/ Wind | 13 | 1.561 | 1.478 | -0.613 | 2.060 | 27.000 | 9.084 | 17.245 | 2 | -85.186 | 0.959 | 2.250 | 18.17 |
| 11229 | NESC Extreme Ice w/ Wind | 14 | 2.091 | 0.500 | 0.500 | 2.091 | 27.000 | 6.275 | 11.913 | 2 | -72.929 | 0.797 | 2.250 | 12.55 |
| 11229 | NESC Extreme Ice w/ Wind | 15 | 2.060 | -0.613 | 1.478 | 1.561 | 27.000 | 2.531 | 4.804 | 2 | -39.871 | 0.506 | 2.250 | 5.06 |
| 11229 | NESC Extreme Ice w/ Wind | 16 | 1.478 | -1.561 | 2.060 | 0.613 | 27.000 | 3.054 | 5.797 | 2 | 49.098 | 0.556 | 2.250 | 6.11 |
| 11229 | NESC Extreme Ice w/ Wind | 17 | 0.500 | -2.091 | 2.091 | -0.500 | 27.000 | 7.285 | 13.829 | 2 | 81.846 | 0.859 | 2.250 | 14.57 |
| 11229 | NESC Extreme Ice w/ Wind | 18 | -0.613 | -2.060 | 1.561 | -1.478 | 27.000 | 10.083 | 19.141 | 2 | 93.683 | 1.010 | 2.250 | 20.17 |
| 11229 | NESC Extreme Ice w/ Wind | 19 | -1.561 | -1.478 | 0.613 | -2.060 | 27.000 | 10.059 | 19.096 | 2 | 93.683 | 1.009 | 2.250 | 20.12 |
| 11229 | NESC Extreme Ice w/ Wind | 20 | -2.091 | -0.500 | -0.500 | -2.091 | 27.000 | 7.221 | 13.708 | 2 | 81.426 | 0.855 | 2.250 | 14.44 |
| 11229 | NESC Extreme Ice w/ Wind | 21 | -2.060 | 0.613 | -1.478 | -1.561 | 27.000 | 2.963 | 5.625 | 2 | 48.368 | 0.548 | 2.250 | 5.93 |
| 11229 | NESC Extreme Ice w/ Wind | 22 | -1.478 | 1.561 | -2.060 | -0.613 | 27.000 | 2.523 | 4.790 | 2 | -40.601 | 0.505 | 2.250 | 5.05 |
| 11229 | NESC Extreme Ice w/ Wind | 23 | -0.500 | 2.091 | -2.091 | 0.500 | 27.000 | 6.339 | 12.035 | 2 | -73.349 | 0.801 | 2.250 | 12.68 |
| 11229 | NESC Extreme Ice w/ Wind | 24 | 0.613 | 2.060 | -1.561 | 1.478 | 27.000 | 9.107 | 17.290 | 2 | -85.186 | 0.960 | 2.250 | 18.21 |

**Summary of Tubular Davit Usages:**

| Tubular Davit Label | Maximum Usage % | Load Case | Height AGL (ft) | Segment Number | Weight (lbs) |
|---|---|---|---|---|---|
| Davit1 | 14.27 | NESC Extreme Ice w/ Wind | 79.5 | 1 | 52.8 |
| Davit2 | 20.20 | NESC Heavy | 66.6 | 1 | 256.6 |
| Davit3 | 20.34 | NESC Heavy | 54.6 | 1 | 256.6 |
| Davit4 | 20.51 | NESC Heavy | 42.6 | 1 | 256.6 |

*** Maximum Stress Summary for Each Load Case

**Summary of Maximum Usages by Load Case:**

| Load Case | Maximum Usage % | Element Label | Element Type |
|---|---|---|---|
| NESC Heavy | 59.74 | 11229 | Steel Pole |
| NESC Extreme | 93.40 | 11229 | Steel Pole |
| NESC Extreme Ice w/ Wind | 40.61 | 11229 | Steel Pole |

**Summary of Steel Pole Usages by Load Case:**

| Load Case | Maximum | Steel Pole | Height | Segment |
|---|---|---|---|---|

| Load Case | Usage % | Label | Height AGL (ft) | Segment Number |
|---|---|---|---|---|
| NESC Heavy | 59.74 | 11229 | 30.6 | 18 |
| NESC Extreme | 93.40 | 11229 | 30.6 | 18 |
| NESC Extreme Ice w/ Wind | 40.61 | 11229 | 30.6 | 18 |

**Summary of Base Plate Usages by Load Case:**

| Load Case | Pole Label | Bend Line # | Length (in) | Vertical Load (kips) | X Moment (ft-k) | Y Moment (ft-k) | Bending Stress (ksi) | Bolt Moment Sum (ft-k) | # Bolts Acting On Bend Line | Max Bolt Load For Bend Line (kips) | Minimum Plate Thickness (in) | Usage % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NESC Heavy | 11229 | 6 | 27.000 | 56.498 | -1650.717 | 10.525 | 18.033 | 34.235 | 1 | 141.907 | 1.351 | 36.07 |
| NESC Extreme | 11229 | 6 | 27.000 | 28.524 | -2575.088 | 38.551 | 27.500 | 52.208 | 1 | 216.405 | 1.669 | 55.00 |
| NESC Extreme Ice w/ Wind | 11229 | 6 | 27.000 | 50.981 | -1076.032 | 5.076 | 11.905 | 22.601 | 1 | 93.683 | 1.098 | 23.81 |

**Summary of Tubular Davit Usages by Load Case:**

| Load Case | Maximum Usage % | Tubular Davit Label | Height AGL (ft) | Segment Number |
|---|---|---|---|---|
| NESC Heavy | 20.51 | Davit4 | 42.6 | 1 |
| NESC Extreme | 11.25 | Davit4 | 42.6 | 1 |
| NESC Extreme Ice w/ Wind | 18.93 | Davit4 | 42.6 | 1 |

**Summary of Insulator Usages:**

| Insulator Label | Insulator Type | Maximum Usage % | Load Case | Weight (lbs) |
|---|---|---|---|---|
| Clamp 1 | Clamp | 2.69 | NESC Heavy | 0.0 |
| Clamp 2 | Clamp | 6.13 | NESC Heavy | 0.0 |
| Clamp 3 | Clamp | 6.13 | NESC Heavy | 0.0 |
| Clamp 4 | Clamp | 6.13 | NESC Heavy | 0.0 |
| Clamp 5 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 6 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 7 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 8 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 9 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 10 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 11 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 12 | Clamp | 1.55 | NESC Extreme Ice w/ Wind | 0.0 |
| Clamp 13 | Clamp | 31.79 | NESC Extreme | 0.0 |
| Clamp 14 | Clamp | 39.37 | NESC Extreme | 0.0 |
| Clamp 15 | Clamp | 17.69 | NESC Heavy | 0.0 |
| Clamp 16 | Clamp | 39.37 | NESC Extreme | 0.0 |
| Clamp 17 | Clamp | 31.31 | NESC Extreme | 0.0 |

**Loads At Insulator Attachments For All Load Cases:**

| Load Case | Insulator Label | Insulator Type | Structure Attach Label | Structure Attach Load X (kips) | Structure Attach Load Y (kips) | Structure Attach Load Z (kips) | Structure Attach Load Res. (kips) |
|---|---|---|---|---|---|---|---|
| NESC Heavy | Clamp 1 | Clamp | Davit1:End | -0.003 | -2.417 | 1.183 | 2.691 |
| NESC Heavy | Clamp 2 | Clamp | Davit2:End | -0.009 | -4.665 | 3.984 | 6.135 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NESC Heavy | Clamp 3 | Clamp | Davit3:End | -0.010 | -4.662 | 3.984 | 6.132 |
| NESC Heavy | Clamp 4 | Clamp | Davit4:End | -0.010 | -4.660 | 3.984 | 6.131 |
| NESC Heavy | Clamp 5 | Clamp | 11229:WVGD1 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 6 | Clamp | 11229:WVGD2 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 7 | Clamp | 11229:WVGD3 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 8 | Clamp | 11229:WVGD4 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 9 | Clamp | 11229:WVGD5 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 10 | Clamp | 11229:WVGD6 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 11 | Clamp | 11229:WVGD7 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 12 | Clamp | 11229:WVGD8 | 0.000 | -0.225 | 1.265 | 1.285 |
| NESC Heavy | Clamp 13 | Clamp | 11229:TopConn | 0.000 | -8.664 | 0.000 | 8.664 |
| NESC Heavy | Clamp 14 | Clamp | 11229:BotConT | -10.692 | 0.000 | 0.000 | 10.692 |
| NESC Heavy | Clamp 15 | Clamp | 11229:BotConn | 0.000 | -3.469 | 17.348 | 17.691 |
| NESC Heavy | Clamp 16 | Clamp | 11229:BotConB | 10.692 | 0.000 | 0.000 | 10.692 |
| NESC Heavy | Clamp 17 | Clamp | 11229:conn | 0.000 | 8.473 | 0.000 | 8.473 |
| NESC Extreme | Clamp 1 | Clamp | Davit1:End | 0.004 | -1.706 | 0.420 | 1.757 |
| NESC Extreme | Clamp 2 | Clamp | Davit2:End | 0.003 | -4.222 | 1.980 | 4.663 |
| NESC Extreme | Clamp 3 | Clamp | Davit3:End | 0.003 | -4.167 | 1.980 | 4.613 |
| NESC Extreme | Clamp 4 | Clamp | Davit4:End | 0.004 | -4.103 | 1.980 | 4.556 |
| NESC Extreme | Clamp 5 | Clamp | 11229:WVGD1 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 6 | Clamp | 11229:WVGD2 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 7 | Clamp | 11229:WVGD3 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 8 | Clamp | 11229:WVGD4 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 9 | Clamp | 11229:WVGD5 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 10 | Clamp | 11229:WVGD6 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 11 | Clamp | 11229:WVGD7 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 12 | Clamp | 11229:WVGD8 | 0.000 | -0.645 | 0.343 | 0.731 |
| NESC Extreme | Clamp 13 | Clamp | 11229:TopConn | 0.000 | -31.786 | 0.000 | 31.786 |
| NESC Extreme | Clamp 14 | Clamp | 11229:BotConT | -39.366 | 0.000 | 0.000 | 39.366 |
| NESC Extreme | Clamp 15 | Clamp | 11229:BotConn | 0.000 | -12.757 | 8.577 | 15.372 |
| NESC Extreme | Clamp 16 | Clamp | 11229:BotConB | 39.366 | 0.000 | 0.000 | 39.366 |
| NESC Extreme | Clamp 17 | Clamp | 11229:conn | 0.000 | 31.312 | 0.000 | 31.312 |
| NESC Extreme Ice w/ Wind | Clamp 1 | Clamp | Davit1:End | -0.003 | -1.857 | 1.642 | 2.479 |
| NESC Extreme Ice w/ Wind | Clamp 2 | Clamp | Davit2:End | -0.005 | -3.300 | 3.856 | 5.075 |
| NESC Extreme Ice w/ Wind | Clamp 3 | Clamp | Davit3:End | -0.005 | -3.298 | 3.856 | 5.074 |
| NESC Extreme Ice w/ Wind | Clamp 4 | Clamp | Davit4:End | -0.005 | -3.296 | 3.856 | 5.073 |
| NESC Extreme Ice w/ Wind | Clamp 5 | Clamp | 11229:WVGD1 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 6 | Clamp | 11229:WVGD2 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 7 | Clamp | 11229:WVGD3 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 8 | Clamp | 11229:WVGD4 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 9 | Clamp | 11229:WVGD5 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 10 | Clamp | 11229:WVGD6 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 11 | Clamp | 11229:WVGD7 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 12 | Clamp | 11229:WVGD8 | 0.000 | -0.095 | 1.545 | 1.548 |
| NESC Extreme Ice w/ Wind | Clamp 13 | Clamp | 11229:TopConn | 0.000 | -3.903 | 0.000 | 3.903 |
| NESC Extreme Ice w/ Wind | Clamp 14 | Clamp | 11229:BotConT | -4.784 | 0.000 | 0.000 | 4.784 |
| NESC Extreme Ice w/ Wind | Clamp 15 | Clamp | 11229:BotConn | 0.000 | -1.552 | 14.845 | 14.926 |
| NESC Extreme Ice w/ Wind | Clamp 16 | Clamp | 11229:BotConB | 4.784 | 0.000 | 0.000 | 4.784 |
| NESC Extreme Ice w/ Wind | Clamp 17 | Clamp | 11229:conn | 0.000 | 3.790 | 0.000 | 3.790 |

**Overturning Moments For User Input Concentrated Loads:**

**Moments are static equivalents based on central axis of 0,0 (i.e. a single pole).**

| Load Case | Total Tran. Load (kips) | Total Long. Load (kips) | Total Vert. Load (kips) | Transverse Overturning Moment (ft-k) | Longitudinal Overturning Moment (ft-k) | Torsional Moment (ft-k) |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| NESC Heavy | -21.864 | -0.032 | 40.603 | -1504.656 | 12.536 | 0.300 |
| NESC Extreme | -32.589 | 0.014 | 17.681 | -2324.019 | 38.502 | -0.117 |
| NESC Extreme Ice w/ Wind | -14.176 | -0.018 | 40.415 | -1004.523 | 5.860 | 0.162 |

*** Weight of structure (lbs):

| | |
|---|---|
| Weight of Tubular Davit Arms: | 822.7 |
| Weight of Steel Poles: | 11163.8 |
| Total: | 11986.5 |

*** End of Report

## Anchor Bolt Analysis:

### Input Data:

Bolt Force:

| | | |
|---|---|---|
| Maximum Tensile Force = | $T_{Max} := 217 \cdot kips$ | (User Input from PLS-Pole) |
| Maximum Shear Force at Base = | $V_{base} := 39 \cdot kips$ | (User Input from PLS-Pole) |

Anchor Bolt Data:

Use ASTM A615 Grade 75

| | | |
|---|---|---|
| Number of Anchor Bolts = | $N := 12$ | (User Input) |
| Bolt "Column" Distance = | $l := 3.0 \cdot in$ | (User Input) |
| Bolt Ultimate Strength = | $F_u := 100 \cdot ksi$ | (User Input) |
| Bolt Yield Strength = | $F_y := 75 \cdot ksi$ | (User Input) |
| Bolt Modulus = | $E := 29000 \cdot ksi$ | (User Input) |
| Diameter of Anchor Bolts = | $D := 2.25 \cdot in$ | (User Input) |
| Threads per Inch = | $n := 4.5$ | (User Input) |

## Anchor Bolt Analysis:

Stress Area of Bolt = $A_s := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Maximum Shear Force per Bolt = $V_{Max} := \frac{V_{base}}{N} = 3.3 \cdot kips$

Shear Stress per Bolt = $f_v := \frac{V_{Max}}{A_s} = 1 \times 10^3 psi$

Tensile Stress Permitted = $F_t := 0.75 \cdot F_u = 75 \cdot ksi$

Shear Stress Permitted = $F_v := 0.35 F_u = 35 \cdot ksi$

Permitted Axial Tensile Stress in Conjuction with Shear = $F_{tv} := F_t \cdot \sqrt{1 - \left(\frac{f_v}{F_v}\right)^2} = 74.97 \cdot ksi$

Bolt Tension % of Capacity = $\frac{T_{Max}}{F_{tv} \cdot A_s} = 89.13 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{F_{tv} \cdot A_s} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

## Caisson Foundation:

Input Data:

| | | |
|---|---|---|
| Shear Force = | $S := 38.9k \cdot 1.1 = 42.8 \cdot kips$ | USER INPUT-FROM PLS-Pole |
| Overturning Moment = | $M := 2575.4ft \cdot k \cdot 1.1 = 2833 \cdot ft \cdot k$ | USER INPUT-FROM PLS-Pole |
| Applied Axial Load = | $A1 := 30k \cdot 1.1 = 33 \cdot kips$ | USER INPUT-FROM PLS-Pole |
| Bending Moment = | $M_u := 3221ft \cdot k$ | USER INPUT--FROM LPILE |
| Moment Capacity = | $M_n := 9367ft \cdot k$ | USER INPUT--FROM LPILE |
| Max Shear = | $V_u := 1518654 \cdot lb$ | USER INPUT--FROM LPILE |
| Foundation Diameter = | $d := 7.0ft$ | USER INPUT |
| Overall Length of Caisson = | $L_c := 20ft$ | USER INPUT |
| Depth From Top of Caisson to Grade = | $L_{pag} := 0.5ft$ | USER INPUT |
| Number of Rebar = | $n := 36$ | USER INPUT |
| Area of Rebar = | $Ar := 1.56in^2$ | USER INPUT |
| Rebar Yield Strength = | $fy := 60ksi$ | USER INPUT |
| Concrete Comp Strength = | $f'c := 3000$ psi | USER INPUT |
| Area of Shear Reinforcement = | $A_v := 0.62in^2$ | USER INPUT = (2)*(Area of #5) per 11.4.7.3 |
| Spacing of Shear Reinforcement = | $s := 6in$ | |

Check Moment Capacity:

Bending Strength Reduction Factor = $\phi := 0.9$

$$\frac{M_u}{\phi \cdot M_n} = 38.2 \cdot \%$$

$BendingCheck := if(\phi \cdot M_n \geq M_u, "OK", "NO GOOD")$

$BendingCheck = "OK"$

Check Shear Capacity:

Shear Strength Reduction Factor = $\phi := 0.75$

Area of Concrete Pier = $A_c := \frac{1}{4} \cdot \pi \cdot d^2 = 5542 \cdot in^2$

Nominal Shear Strength by Concrete = $V_c := 2 \cdot \sqrt{f'c} \cdot psi \cdot A_c = 607 \cdot kips$

Nominal Shear Strength by Steel = $V_s := \frac{(A_v \cdot fy \cdot 0.8 \cdot d)}{s} = 417 \cdot kips$

Long Rein Area Resisting Shear Friction = $A_{vf} := \frac{1}{3} \cdot Ar \cdot n = 18.7 \cdot in^2$

Per original design "Since shear force is very high and the depth of the pier as beam is relatively high, consider 1/3 no. of pier reinforcing bars in middle 60 degree zone will resist shear force by shear friction"

Coefficient of Friction = $\mu := 1.4$

Nominal Shear Strength by Vert Steel Bars = $V_f := (A_{vf} \cdot fy \cdot \mu) = 1572 \cdot kips$

Nominal Shear Strength = $\phi V_n := \phi \cdot (V_c + V_s + V_f) = 1947 \cdot kips$

$ShearCheck := if(\phi V_n \geq V_u, "OK", "NO GOOD")$

ShearCheck = "OK"

$\frac{V_u}{\phi V_n} = 78 \cdot \%$

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.47)

               Analysis of Individual Piles and Drilled Shafts
              Subjected to Lateral Loading Using the p-y Method

                       (c) 1985-2010 by Ensoft, Inc.
                            All Rights Reserved

================================================================================

This program is licensed to:

TJL
Centek Engineering

--------------------------------------------------------------------------------
                            Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      J:\Jobs\2202100.WI\06_CT2901\05_Structural\Backup
Documentation\Rev (1)\Calcs\MathCAD\Foundation\
Name of input data file:     Structure 11229.lpd
Name of output file:         Structure 11229.lpo
Name of plot output file:    Structure 11229.lpp
Name of runtime file:        Structure 11229.lpr


------------------------------------------------------------------------------
                          Time and Date of Analysis
------------------------------------------------------------------------------

               Date:  August 18, 2022     Time:   8:00:54


------------------------------------------------------------------------------
                                Problem Title
------------------------------------------------------------------------------

AT&T - CT2901 / Pole - 11229


------------------------------------------------------------------------------
                               Program Options
------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:
```

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis includes automatic computation of pile-top deflection vs. pile embedment length
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 1000
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

---

## Pile Structural Properties and Geometry

---

Pile Length = 240.00 in

Depth of ground surface below top of pile = 6.00 in

Slope angle of ground surface = 8.50 deg.

Structural properties of pile defined using 2 points

| Point No. | Point Depth in | Pile Diameter in | Moment of Inertia in**4 | Pile Area Sq.in | Modulus of Elasticity lbs/Sq.in |
|---|---|---|---|---|---|
| 1 | 0.0000 | 84.00000000 | 2443920. | 5541.8000 | 3122019. |
| 2 | 240.0000 | 84.00000000 | 2443920. | 5541.8000 | 3122019. |

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

## Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 6.000 in
Distance from top of pile to bottom of layer = 300.000 in
p-y subgrade modulus k for top of soil layer = 125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 125.000 lbs/in**3

(Depth of lowest layer extends 60.00 in below pile tip)

## Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

| Point No. | Depth X in | Eff. Unit Weight lbs/in**3 |
|---|---|---|
| 1 | 6.00 | 0.07523 |
| 2 | 300.00 | 0.07523 |

## Shear Strength of Soils

Shear strength parameters with depth defined using 2 points

| Point No. | Depth X in | Cohesion c lbs/in**2 | Angle of Friction Deg. | E50 or k_rm | RQD % |
|---|---|---|---|---|---|
| 1 | 6.000 | 0.00000 | 36.00 | ------ | ------ |
| 2 | 300.000 | 0.00000 | 36.00 | ------ | ------ |

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

## p-y Modification Factors

Distribution of p-y multipliers with depth defined using 2 points

| Point No. | Depth X in | p-mult | y-mult |
|---|---|---|---|
| 1 | 6.000 | 0.0100 | 1.0000 |
| 2 | 54.000 | 0.0100 | 1.0000 |

## Loading Type

Static loading criteria was used for computation of p-y curves.

## Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 42800.000 lbs
Bending moment at pile head = 33996000.000 in-lbs
Axial load at pile head = 33000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

## Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 84.0000 in

Material Properties:

| | | | |
|---|---|---|---|
| Compressive Strength of Concrete | = | 3.000 | kip/in**2 |
| Yield Stress of Reinforcement | = | 60. | kip/in**2 |
| Modulus of Elasticity of Reinforcement | = | 29000. | kip/in**2 |
| Number of Reinforcing Bars | = | 36 | |
| Area of Single Bar | = | 1.56000 | in**2 |
| Number of Rows of Reinforcing Bars | = | 19 | |
| Area of Steel | = | 56.160 | in**2 |
| Area of Shaft | = | 5541.769 | in**2 |
| Percentage of Steel Reinforcement | = | 1.013 | percent |
| Cover Thickness (edge to bar center) | = | 4.330 | in |

Unfactored Axial Squash Load Capacity = 17357.90 kip

Distribution and Area of Steel Reinforcement

| Row Number | Area of Reinforcement in**2 | Distance to Centroidal Axis in |
|---|---|---|
| 1 | 1.560 | 37.670 |
| 2 | 3.120 | 37.098 |
| 3 | 3.120 | 35.398 |
| 4 | 3.120 | 32.623 |
| 5 | 3.120 | 28.857 |
| 6 | 3.120 | 24.214 |
| 7 | 3.120 | 18.835 |
| 8 | 3.120 | 12.884 |
| 9 | 3.120 | 6.541 |
| 10 | 3.120 | 0.000 |
| 11 | 3.120 | -6.541 |
| 12 | 3.120 | -12.884 |
| 13 | 3.120 | -18.835 |
| 14 | 3.120 | -24.214 |
| 15 | 3.120 | -28.857 |
| 16 | 3.120 | -32.623 |
| 17 | 3.120 | -35.398 |
| 18 | 3.120 | -37.098 |
| 19 | 1.560 | -37.670 |

Axial Thrust Force = 33000.00 lbs

| Bending Moment in-lbs | Bending Stiffness lb-in2 | Bending Curvature rad/in | Maximum Strain in/in | Neutral Axis Position inches | Max. Concrete Stress psi | Max. Steel Stress psi |
|---|---|---|---|---|---|---|
| 5517988. | 8.828781E+12 | 6.250000E-07 | 0.00002808 | 44.92739636 | 86.31321302 | 735.82781 |
| 10983489. | 8.786791E+12 | 0.00000125 | 0.00005442 | 43.53981453 | 165.86138 | 1421.35578 |
| 16396637. | 8.744873E+12 | 0.00000188 | 0.00008081 | 43.09602267 | 244.20936 | 2107.90248 |
| 21755817. | 8.702327E+12 | 0.00000250 | 0.00010715 | 42.85995251 | 321.14407 | 2793.42156 |
| 27061840. | 8.659789E+12 | 0.00000313 | 0.00013349 | 42.71822029 | 396.77259 | 3478.93246 |
| 27061840. | 7.216491E+12 | 0.00000375 | 0.00008965 | 23.90718645 | 266.71823 | 6064.20597 |
| 27061840. | 6.185563E+12 | 0.00000438 | 0.00010385 | 23.73621958 | 307.53067 | 7096.59839 |
| 27061840. | 5.412368E+12 | 0.00000500 | 0.00011787 | 23.57350892 | 347.47041 | 8133.99121 |
| 27061840. | 4.810994E+12 | 0.00000563 | 0.00013191 | 23.45043451 | 387.10802 | 9170.81662 |
| 27061840. | 4.329894E+12 | 0.00000625 | 0.00014597 | 23.35513026 | 426.44239 | 10207.07014 |
| 27061840. | 3.936268E+12 | 0.00000688 | 0.00016005 | 23.28004593 | 465.47242 | 11242.74709 |
| 27061840. | 3.608245E+12 | 0.00000750 | 0.00017415 | 23.22014219 | 504.19685 | 12277.84407 |
| 27061840. | 3.330688E+12 | 0.00000813 | 0.00018827 | 23.17193681 | 542.61457 | 13312.35614 |
| 27061840. | 3.092782E+12 | 0.00000875 | 0.00020241 | 23.13294142 | 580.72441 | 14346.27861 |
| 27061840. | 2.886596E+12 | 0.00000938 | 0.00021657 | 23.10132855 | 618.52512 | 15379.60755 |
| 27061840. | 2.706184E+12 | 0.00001000 | 0.00023076 | 23.07573134 | 656.01553 | 16412.33791 |
| 27061840. | 2.546997E+12 | 0.00001063 | 0.00024496 | 23.05510587 | 693.19450 | 17444.46426 |
| 27061840. | 2.405497E+12 | 0.00001125 | 0.00025918 | 23.03863102 | 730.06057 | 18475.98413 |
| 27153816. | 2.286637E+12 | 0.00001188 | 0.00027343 | 23.02567345 | 766.61275 | 19506.88996 |
| 28529560. | 2.282365E+12 | 0.00001250 | 0.00028770 | 23.01571244 | 802.84955 | 20537.17924 |
| 29903417. | 2.278356E+12 | 0.00001313 | 0.00030198 | 23.00833744 | 838.76987 | 21566.84531 |
| 31275370. | 2.274572E+12 | 0.00001375 | 0.00031629 | 23.00320548 | 874.37229 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | 22595.88432 |
| 32645410. | 2.270985E+12 | 0.00001438 | 0.00033063 | 23.00003868 | 909.65560 | 23624.29012 |
| 34013518. | 2.267568E+12 | 0.00001500 | 0.00034498 | 22.99859923 | 944.61833 | 24652.05933 |
| 35379691. | 2.264300E+12 | 0.00001563 | 0.00035935 | 22.99869686 | 979.25935 | 25679.18423 |
| 36743908. | 2.261164E+12 | 0.00001625 | 0.00037375 | 23.00016135 | 1013.57714 | 26705.66146 |
| 38106158. | 2.258143E+12 | 0.00001688 | 0.00038817 | 23.00285250 | 1047.57035 | 27731.48531 |
| 39466427. | 2.255224E+12 | 0.00001750 | 0.00040262 | 23.00665015 | 1081.23762 | 28756.65005 |
| 40824705. | 2.252398E+12 | 0.00001813 | 0.00041708 | 23.01145166 | 1114.57760 | 29781.14947 |
| 42180974. | 2.249652E+12 | 0.00001875 | 0.00043157 | 23.01716441 | 1147.58874 | 30804.97935 |
| 43535224. | 2.246979E+12 | 0.00001938 | 0.00044608 | 23.02371329 | 1180.26975 | 31828.13234 |
| 44887437. | 2.244372E+12 | 0.00002000 | 0.00046062 | 23.03102821 | 1212.61907 | 32850.60364 |
| 46237601. | 2.241823E+12 | 0.00002063 | 0.00047518 | 23.03904909 | 1244.63523 | 33872.38751 |
| 47585699. | 2.239327E+12 | 0.00002125 | 0.00048976 | 23.04772335 | 1276.31674 | 34893.47798 |
| 48931719. | 2.236879E+12 | 0.00002188 | 0.00050437 | 23.05700594 | 1307.66213 | 35913.86811 |
| 50275645. | 2.234473E+12 | 0.00002250 | 0.00051900 | 23.06685430 | 1338.66981 | 36933.55257 |
| 51617458. | 2.232106E+12 | 0.00002313 | 0.00053366 | 23.07723087 | 1369.33819 | 37952.52580 |
| 52957149. | 2.229775E+12 | 0.00002375 | 0.00054834 | 23.08810562 | 1399.66581 | 38970.77975 |
| 54294705. | 2.227475E+12 | 0.00002438 | 0.00056305 | 23.09945101 | 1429.65115 | 39988.30682 |
| 56963320. | 2.222959E+12 | 0.00002563 | 0.00059254 | 23.12343854 | 1488.58786 | 42021.16349 |
| 59623184. | 2.218537E+12 | 0.00002688 | 0.00062213 | 23.14902073 | 1546.13539 | 44051.03822 |
| 62274161. | 2.214192E+12 | 0.00002813 | 0.00065183 | 23.17605239 | 1602.28016 | 46077.87602 |
| 64916106. | 2.209910E+12 | 0.00002938 | 0.00068163 | 23.20441335 | 1657.00812 | 48101.62162 |
| 67548886. | 2.205678E+12 | 0.00003063 | 0.00071154 | 23.23401099 | 1710.30514 | 50122.21274 |
| 70172348. | 2.201485E+12 | 0.00003188 | 0.00074156 | 23.26476520 | 1762.15645 | 52139.58892 |
| 72786342. | 2.197324E+12 | 0.00003313 | 0.00077170 | 23.29661089 | 1812.54689 | 54153.68691 |
| 75390716. | 2.193184E+12 | 0.00003438 | 0.00080195 | 23.32949799 | 1861.46104 | 56164.43794 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 77985291. | 2.189061E+12 | 0.00003563 | 0.00083232 | 23.36337644 | 1908.88247 | 58171.78047 |
| 80554550. | 2.184530E+12 | 0.00003688 | 0.00086275 | 23.39653891 | 1954.70082 | 60000.00000 |
| 82677895. | 2.168601E+12 | 0.00003813 | 0.00089151 | 23.38393682 | 1996.38466 | 60000.00000 |
| 84420293. | 2.144007E+12 | 0.00003938 | 0.00091880 | 23.33460242 | 2034.46505 | 60000.00000 |
| 86025703. | 2.117556E+12 | 0.00004063 | 0.00094560 | 23.27621824 | 2070.51840 | 60000.00000 |
| 87382621. | 2.086749E+12 | 0.00004188 | 0.00097137 | 23.19698077 | 2103.92346 | 60000.00000 |
| 88734502. | 2.057612E+12 | 0.00004313 | 0.00099723 | 23.12406188 | 2136.21687 | 60000.00000 |
| 89838189. | 2.024523E+12 | 0.00004438 | 0.00102195 | 23.02986413 | 2165.92131 | 60000.00000 |
| 90888861. | 1.992085E+12 | 0.00004563 | 0.00104650 | 22.93696564 | 2194.31222 | 60000.00000 |
| 91935412. | 1.961289E+12 | 0.00004688 | 0.00107111 | 22.85041326 | 2221.68686 | 60000.00000 |
| 92883570. | 1.930048E+12 | 0.00004813 | 0.00109527 | 22.75890416 | 2247.47219 | 60000.00000 |
| 93671165. | 1.897138E+12 | 0.00004938 | 0.00111862 | 22.65566164 | 2271.36247 | 60000.00000 |
| 94455398. | 1.865786E+12 | 0.00005063 | 0.00114203 | 22.55864757 | 2294.32731 | 60000.00000 |
| 95236227. | 1.835879E+12 | 0.00005188 | 0.00116550 | 22.46742386 | 2316.35980 | 60000.00000 |
| 95856705. | 1.804361E+12 | 0.00005313 | 0.00119000 | 22.39999992 | 2338.34106 | 60000.00000 |
| 96730418. | 1.778950E+12 | 0.00005438 | 0.00121506 | 22.34600919 | 2359.72029 | 60000.00000 |
| 97289098. | 1.749017E+12 | 0.00005563 | 0.00123694 | 22.23707646 | 2377.35642 | 60000.00000 |
| 97845173. | 1.720355E+12 | 0.00005688 | 0.00125886 | 22.13384396 | 2394.17540 | 60000.00000 |
| 98398625. | 1.692880E+12 | 0.00005813 | 0.00128084 | 22.03595620 | 2410.17139 | 60000.00000 |
| 98949421. | 1.666517E+12 | 0.00005938 | 0.00130287 | 21.94308525 | 2425.33832 | 60000.00000 |
| 99497531. | 1.641196E+12 | 0.00006063 | 0.00132496 | 21.85493070 | 2439.67002 | 60000.00000 |
| 1.000429E+08 | 1.616856E+12 | 0.00006188 | 0.00134709 | 21.77121967 | 2453.16033 | 60000.00000 |
| 1.004944E+08 | 1.591990E+12 | 0.00006313 | 0.00136852 | 21.67959291 | 2465.36497 | 60000.00000 |
| 1.008738E+08 | 1.566971E+12 | 0.00006438 | 0.00138942 | 21.58320719 | 2476.46180 | 60000.00000 |
| 1.012510E+08 | 1.542872E+12 | 0.00006563 | 0.00141036 | 21.49121743 | 2486.80273 | 60000.00000 |
| 1.016260E+08 | 1.519641E+12 | 0.00006688 | 0.00143135 | 21.40338331 | 2496.38237 | |

60000.00000

| | | | | | | |
|---|---|---|---|---|---|---|
| 1.019988E+08 | 1.497230E+12 | 0.00006813 | 0.00145239 | 21.31948453 | 2505.19534 | 60000.00000 |
| 1.023694E+08 | 1.475595E+12 | 0.00006938 | 0.00147348 | 21.23931831 | 2513.23620 | 60000.00000 |
| 1.027377E+08 | 1.454693E+12 | 0.00007063 | 0.00149461 | 21.16268939 | 2520.49921 | 60000.00000 |
| 1.031037E+08 | 1.434487E+12 | 0.00007188 | 0.00151580 | 21.08942503 | 2526.97879 | 60000.00000 |
| 1.034674E+08 | 1.414939E+12 | 0.00007313 | 0.00153704 | 21.01935500 | 2532.66902 | 60000.00000 |
| 1.037433E+08 | 1.394867E+12 | 0.00007438 | 0.00156187 | 20.99999875 | 2538.33164 | 60000.00000 |
| 1.044204E+08 | 1.358314E+12 | 0.00007688 | 0.00160381 | 20.86257988 | 2545.32254 | 60000.00000 |
| 1.048818E+08 | 1.321346E+12 | 0.00007938 | 0.00164308 | 20.70016962 | 2549.01423 | 60000.00000 |
| 1.053354E+08 | 1.286539E+12 | 0.00008188 | 0.00168252 | 20.54991585 | 2548.97259 | 60000.00000 |
| 1.057786E+08 | 1.253672E+12 | 0.00008438 | 0.00172216 | 20.41078967 | 2544.62012 | 60000.00000 |
| 1.062169E+08 | 1.222641E+12 | 0.00008688 | 0.00176199 | 20.28187484 | 2548.45945 | 60000.00000 |
| 1.066504E+08 | 1.193291E+12 | 0.00008938 | 0.00180201 | 20.16237026 | 2549.97547 | 60000.00000 |
| 1.070766E+08 | 1.165460E+12 | 0.00009188 | 0.00184230 | 20.05226344 | 2544.73610 | 60000.00000 |
| 1.074694E+08 | 1.138749E+12 | 0.00009438 | 0.00188232 | 19.94506806 | 2545.58907 | 60000.00000 |
| 1.077322E+08 | 1.112074E+12 | 0.00009688 | 0.00192048 | 19.82427925 | 2548.60038 | 60000.00000 |
| 1.079921E+08 | 1.086713E+12 | 0.00009938 | 0.00195879 | 19.71108824 | 2549.93184 | 60000.00000 |
| 1.082471E+08 | 1.062548E+12 | 0.00010188 | 0.00199732 | 19.60562271 | 2546.24528 | 60000.00000 |
| 1.085724E+08 | 1.040215E+12 | 0.00010438 | 0.00204564 | 19.59897619 | 2542.94979 | 60000.00000 |
| 1.088119E+08 | 1.018123E+12 | 0.00010688 | 0.00208325 | 19.49238664 | 2546.52352 | 60000.00000 |
| 1.090495E+08 | 9.970242E+11 | 0.00010938 | 0.00212098 | 19.39180273 | 2548.85517 | 60000.00000 |
| 1.092852E+08 | 9.768512E+11 | 0.00011188 | 0.00215883 | 19.29684395 | 2549.92635 | 60000.00000 |
| 1.095175E+08 | 9.575296E+11 | 0.00011438 | 0.00219690 | 19.20783824 | 2546.99976 | 60000.00000 |
| 1.097475E+08 | 9.390161E+11 | 0.00011688 | 0.00223510 | 19.12385184 | 2542.44731 | 60000.00000 |
| 1.099763E+08 | 9.212672E+11 | 0.00011938 | 0.00227340 | 19.04419881 | 2540.65804 | 60000.00000 |
| 1.102037E+08 | 9.042358E+11 | 0.00012188 | 0.00231180 | 18.96862632 | 2544.47682 | 60000.00000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1.104299E+08 | 8.878783E+11 | 0.00012438 | 0.00235030 | 18.89690155 | 2547.30816 | 60000.00000 |
| 1.105771E+08 | 8.715440E+11 | 0.00012688 | 0.00238683 | 18.81247205 | 2549.01462 | 60000.00000 |
| 1.107063E+08 | 8.557010E+11 | 0.00012938 | 0.00242299 | 18.72840804 | 2549.87306 | 60000.00000 |
| 1.108339E+08 | 8.404463E+11 | 0.00013188 | 0.00245928 | 18.64857727 | 2548.40133 | 60000.00000 |
| 1.109598E+08 | 8.257475E+11 | 0.00013438 | 0.00249571 | 18.57270187 | 2544.77467 | 60000.00000 |
| 1.110853E+08 | 8.115821E+11 | 0.00013688 | 0.00253219 | 18.50002581 | 2541.13775 | 60000.00000 |
| 1.112103E+08 | 7.979214E+11 | 0.00013938 | 0.00256873 | 18.43038136 | 2537.49045 | 60000.00000 |
| 1.113348E+08 | 7.847387E+11 | 0.00014188 | 0.00260534 | 18.36361080 | 2538.98011 | 60000.00000 |
| 1.114588E+08 | 7.720092E+11 | 0.00014438 | 0.00264200 | 18.29957145 | 2542.29046 | 60000.00000 |
| 1.115823E+08 | 7.597094E+11 | 0.00014688 | 0.00267872 | 18.23812312 | 2545.01948 | 60000.00000 |
| 1.115823E+08 | 7.469946E+11 | 0.00014938 | 0.00271862 | 18.19999892 | 2547.47908 | 60000.00000 |
| 1.115823E+08 | 7.346984E+11 | 0.00015188 | 0.00276412 | 18.19999892 | 2549.40842 | 60000.00000 |
| 1.119951E+08 | 7.254741E+11 | 0.00015438 | 0.00280962 | 18.19999892 | 2549.72237 | 60000.00000 |
| 1.120910E+08 | 7.145244E+11 | 0.00015688 | 0.00284695 | 18.14790577 | 2546.55138 | 60000.00000 |
| 1.121689E+08 | 7.038048E+11 | 0.00015938 | 0.00288543 | 18.10466963 | 2543.17849 | 60000.00000 |
| 1.122464E+08 | 6.934139E+11 | 0.00016188 | 0.00292397 | 18.06314582 | 2539.79489 | 60000.00000 |
| 1.123234E+08 | 6.833365E+11 | 0.00016438 | 0.00296257 | 18.02325922 | 2536.40051 | 60000.00000 |
| 1.124001E+08 | 6.735587E+11 | 0.00016688 | 0.00300124 | 17.98494476 | 2532.99509 | 60000.00000 |
| 1.124764E+08 | 6.640671E+11 | 0.00016938 | 0.00303997 | 17.94813985 | 2535.83328 | 60000.00000 |
| 1.125522E+08 | 6.548491E+11 | 0.00017188 | 0.00307876 | 17.91278189 | 2539.34904 | 60000.00000 |
| 1.126276E+08 | 6.458930E+11 | 0.00017438 | 0.00311762 | 17.87881583 | 2542.37558 | 60000.00000 |
| 1.127771E+08 | 6.287225E+11 | 0.00017938 | 0.00319554 | 17.81485158 | 2546.93667 | 60000.00000 |
| 1.128914E+08 | 6.122926E+11 | 0.00018438 | 0.00327162 | 17.74436349 | 2549.36531 | 60000.00000 |
| 1.129295E+08 | 5.963275E+11 | 0.00018938 | 0.00334682 | 17.67296416 | 2549.27197 | 60000.00000 |
| 1.129527E+08 | 5.811074E+11 | 0.00019438 | 0.00342390 | 17.61490792 | 2543.73260 | 60000.00000 |
| 1.129753E+08 | 5.666472E+11 | 0.00019938 | 0.00350115 | 17.56061679 | 2538.16339 | |

```
  60000.00000
  1.129971E+08  5.528910E+11    0.00020438    0.00357857   17.50983793    2532.56350
  60000.00000
  1.130182E+08  5.397884E+11    0.00020938    0.00365618   17.46234101    2526.93215
  60000.00000
  1.130385E+08  5.272934E+11    0.00021438    0.00373397   17.41791826    2531.92802
  60000.00000
  1.130581E+08  5.153645E+11    0.00021938    0.00381194   17.37638694    2538.05196
  60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 =  112397.64871
in-kip




-------------------------------------------------------------------------------
             Computed Values of Load Distribution and Deflection
                 for Lateral Loading for Load Case Number  1
-------------------------------------------------------------------------------

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head  =       42800.000 lbs
Specified moment at pile head       =    33996000.000 in-lbs
Specified axial load at pile head   =       33000.000 lbs

  Depth   Deflect.  Moment     Shear     Slope     Total   Flx. Rig. Soil Res.
Es*h
    X        y        M          V         S       Stress      EI        p
F/L
    in       in      lbs-in      lbs       Rad.  lbs/in**2 lbs-in**2  lbs/in
-------- --------- --------- --------- --------- --------- --------- ---------
---------
   0.000     1.700  3.40E+07    42800. -0.010696   590.193  2.27E+12     0.000
0.000
   2.400     1.675  3.41E+07    42800. -0.010660   591.973  2.27E+12     0.000
0.000
   4.800     1.649  3.42E+07    42800. -0.010624   593.753  2.27E+12     0.000
0.000
   7.200     1.624  3.43E+07    42799. -0.010587   595.532  2.27E+12 -0.461536
0.682265
   9.600     1.598  3.44E+07    42797. -0.010551   597.312  2.27E+12    -1.398
2.100
  12.000     1.573  3.45E+07    42793. -0.010515   599.092  2.27E+12    -2.351
3.588
  14.400     1.548  3.46E+07    42786. -0.010478   600.871  2.27E+12    -3.320
5.148
  16.800     1.523  3.47E+07    42777. -0.010441   602.649  2.27E+12    -4.303
6.782
  19.200     1.498  3.48E+07    42765. -0.010404   604.428  2.27E+12    -5.298
8.490
```

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21.600 | 1.473 | 3.49E+07 | 42751. | -0.010367 | 606.206 | 2.27E+12 | -6.304 | 10.273 |
| 24.000 | 1.448 | 3.50E+07 | 42735. | -0.010330 | 607.983 | 2.27E+12 | -7.320 | 12.133 |
| 26.400 | 1.423 | 3.51E+07 | 42716. | -0.010293 | 609.759 | 2.26E+12 | -8.344 | 14.071 |
| 28.800 | 1.398 | 3.52E+07 | 42695. | -0.010256 | 611.534 | 2.26E+12 | -9.375 | 16.089 |
| 31.200 | 1.374 | 3.53E+07 | 42671. | -0.010219 | 613.309 | 2.26E+12 | -10.411 | 18.187 |
| 33.600 | 1.349 | 3.54E+07 | 42645. | -0.010181 | 615.082 | 2.26E+12 | -11.451 | 20.366 |
| 36.000 | 1.325 | 3.55E+07 | 42616. | -0.010143 | 616.854 | 2.26E+12 | -12.492 | 22.628 |
| 38.400 | 1.301 | 3.57E+07 | 42585. | -0.010106 | 618.625 | 2.26E+12 | -13.534 | 24.972 |
| 40.800 | 1.276 | 3.58E+07 | 42551. | -0.010068 | 620.395 | 2.26E+12 | -14.574 | 27.402 |
| 43.200 | 1.252 | 3.59E+07 | 42515. | -0.010030 | 622.163 | 2.26E+12 | -15.612 | 29.918 |
| 45.600 | 1.228 | 3.60E+07 | 42476. | -0.009992 | 623.929 | 2.26E+12 | -16.645 | 32.521 |
| 48.000 | 1.204 | 3.61E+07 | 42435. | -0.009954 | 625.694 | 2.26E+12 | -17.671 | 35.214 |
| 50.400 | 1.181 | 3.62E+07 | 42391. | -0.009915 | 627.457 | 2.26E+12 | -18.706 | 38.028 |
| 52.800 | 1.157 | 3.63E+07 | 42345. | -0.009877 | 629.218 | 2.26E+12 | -19.734 | 40.942 |
| 55.200 | 1.133 | 3.64E+07 | 39831. | -0.009838 | 630.977 | 2.26E+12 | -2075.459 | 4395.839 |
| 57.600 | 1.110 | 3.65E+07 | 34729. | -0.009800 | 632.530 | 2.26E+12 | -2176.592 | 4707.951 |
| 60.000 | 1.086 | 3.65E+07 | 29385. | -0.009761 | 633.868 | 2.26E+12 | -2276.675 | 5030.855 |
| 62.400 | 1.063 | 3.66E+07 | 23802. | -0.009722 | 634.981 | 2.26E+12 | -2375.569 | 5364.871 |
| 64.800 | 1.039 | 3.67E+07 | 17984. | -0.009683 | 635.858 | 2.26E+12 | -2473.136 | 5710.338 |
| 67.200 | 1.016 | 3.67E+07 | 11933. | -0.009644 | 636.490 | 2.26E+12 | -2569.240 | 6067.625 |
| 69.600 | 0.993142 | 3.67E+07 | 5653.179 | -0.009605 | 636.868 | 2.26E+12 | -2663.742 | 6437.124 |
| 72.000 | 0.970136 | 3.67E+07 | -851.117 | -0.009566 | 636.983 | 2.26E+12 | -2756.505 | 6819.261 |
| 74.400 | 0.947223 | 3.67E+07 | -7575.790 | -0.009527 | 636.824 | 2.26E+12 | -2847.390 | 7214.493 |
| 76.800 | 0.924404 | 3.67E+07 | -14516. | -0.009489 | 636.384 | 2.26E+12 | -2936.260 | 7623.314 |
| 79.200 | 0.901678 | 3.66E+07 | -21667. | -0.009450 | 635.653 | 2.26E+12 | -3022.974 | 8046.259 |
| 81.600 | 0.879046 | 3.66E+07 | -29024. | -0.009411 | 634.622 | 2.26E+12 | -3107.395 | |

```
8483.911
  84.000  0.856507  3.65E+07   -36580. -0.009372   633.284  2.26E+12 -3189.382
8936.900
  86.400  0.834061  3.64E+07   -44330. -0.009333   631.630  2.26E+12 -3268.793
9405.915
  88.800  0.811707  3.63E+07   -52267. -0.009295   629.653  2.26E+12 -3345.487
9891.708
  91.200  0.789446  3.62E+07   -60386. -0.009256   627.344  2.26E+12 -3420.813
10400.
  93.600  0.767277  3.60E+07   -68685. -0.009218   624.697  2.26E+12 -3494.806
10932.
  96.000  0.745199  3.58E+07   -77158. -0.009180   621.703  2.26E+12 -3565.888
11484.
  98.400  0.723213  3.56E+07   -85798. -0.009142   618.357  2.26E+12 -3633.917
12059.
 100.800  0.701318  3.54E+07   -94597. -0.009104   614.651  2.26E+12 -3698.747
12658.
 103.200  0.679512  3.52E+07 -1.04E+05 -0.009067   610.578  2.26E+12 -3760.228
13281.
 105.600  0.657796  3.49E+07 -1.13E+05 -0.009030   606.134  2.27E+12 -3818.209
13931.
 108.000  0.636169  3.46E+07 -1.22E+05 -0.008993   601.311  2.27E+12 -3872.532
14609.
 110.400  0.614630  3.43E+07 -1.31E+05 -0.008956   596.105  2.27E+12 -3923.039
15319.
 112.800  0.593178  3.40E+07 -1.41E+05 -0.008920   590.511  2.27E+12 -3969.563
16061.
 115.200  0.571812  3.37E+07 -1.50E+05 -0.008884   584.523  2.27E+12 -4011.934
16839.
 117.600  0.550532  3.33E+07 -1.60E+05 -0.008849   578.139  2.27E+12 -4049.973
17656.
 120.000  0.529337  3.29E+07 -1.70E+05 -0.008814   571.353  2.27E+12 -4083.495
18514.
 122.400  0.508225  3.25E+07 -1.80E+05 -0.008780   564.163  2.27E+12 -4112.305
19420.
 124.800  0.487195  3.20E+07 -1.89E+05 -0.008745   556.566  2.27E+12 -4136.199
20376.
 127.200  0.466247  3.16E+07 -1.99E+05 -0.008712   548.560  2.27E+12 -4154.959
21388.
 129.600  0.445378  3.11E+07 -2.09E+05 -0.008679   540.142  2.28E+12 -4168.353
22462.
 132.000  0.424589  3.06E+07 -2.19E+05 -0.008646   531.312  2.28E+12 -4176.133
23606.
 134.400  0.403876  3.00E+07 -2.29E+05 -0.008614   522.068  2.28E+12 -4187.420
24883.
 136.800  0.383240  2.95E+07 -2.39E+05 -0.008583   512.410  2.28E+12 -4192.758
26257.
 139.200  0.362678  2.89E+07 -2.50E+05 -0.008552   502.336  2.28E+12 -4191.788
27739.
 141.600  0.342189  2.83E+07 -2.60E+05 -0.008522   491.848  2.28E+12 -4184.117
29346.
```

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 144.000 | 0.321771 | 2.76E+07 | -2.70E+05 | -0.008493 | 480.945 | 2.29E+12 | -4169.297 | 31098. |
| 146.400 | 0.301423 | 2.70E+07 | -2.80E+05 | -0.008475 | 469.630 | 8.66E+12 | -4146.823 | 33018. |
| 148.800 | 0.281093 | 2.63E+07 | -2.90E+05 | -0.008467 | 457.904 | 8.66E+12 | -4115.884 | 35142. |
| 151.200 | 0.260780 | 2.56E+07 | -2.99E+05 | -0.008460 | 445.770 | 8.67E+12 | -4075.759 | 37510. |
| 153.600 | 0.240484 | 2.49E+07 | -3.09E+05 | -0.008453 | 433.233 | 8.68E+12 | -4025.596 | 40175. |
| 156.000 | 0.220205 | 2.41E+07 | -3.19E+05 | -0.008446 | 420.298 | 8.68E+12 | -3964.368 | 43207. |
| 158.400 | 0.199942 | 2.33E+07 | -3.28E+05 | -0.008440 | 406.970 | 8.69E+12 | -3808.896 | 45720. |
| 160.800 | 0.179694 | 2.25E+07 | -3.37E+05 | -0.008433 | 393.266 | 8.69E+12 | -3477.086 | 46440. |
| 163.200 | 0.159462 | 2.17E+07 | -3.45E+05 | -0.008427 | 379.217 | 8.70E+12 | -3133.421 | 47160. |
| 165.600 | 0.139243 | 2.09E+07 | -3.52E+05 | -0.008421 | 364.857 | 8.71E+12 | -2777.903 | 47880. |
| 168.000 | 0.119039 | 2.00E+07 | -3.58E+05 | -0.008416 | 350.223 | 8.71E+12 | -2410.534 | 48600. |
| 170.400 | 0.098847 | 1.92E+07 | -3.63E+05 | -0.008410 | 335.350 | 8.72E+12 | -2031.314 | 49320. |
| 172.800 | 0.078669 | 1.83E+07 | -3.68E+05 | -0.008405 | 320.277 | 8.73E+12 | -1640.243 | 50040. |
| 175.200 | 0.058502 | 1.74E+07 | -3.71E+05 | -0.008400 | 305.040 | 8.73E+12 | -1237.321 | 50760. |
| 177.600 | 0.038347 | 1.65E+07 | -3.74E+05 | -0.008396 | 289.682 | 8.74E+12 | -822.545 | 51480. |
| 180.000 | 0.018203 | 1.56E+07 | -3.75E+05 | -0.008391 | 274.241 | 8.75E+12 | -395.912 | 52200. |
| 182.400 | -0.001931 | 1.47E+07 | -3.76E+05 | -0.008387 | 258.762 | 8.75E+12 | 42.581 | 52920. |
| 184.800 | -0.022055 | 1.38E+07 | -3.75E+05 | -0.008383 | 243.287 | 8.76E+12 | 492.938 | 53640. |
| 187.200 | -0.042171 | 1.29E+07 | -3.73E+05 | -0.008380 | 227.861 | 8.77E+12 | 955.164 | 54360. |
| 189.600 | -0.062277 | 1.20E+07 | -3.70E+05 | -0.008376 | 212.529 | 8.78E+12 | 1429.264 | 55080. |
| 192.000 | -0.082376 | 1.11E+07 | -3.66E+05 | -0.008373 | 197.338 | 8.79E+12 | 1915.244 | 55800. |
| 194.400 | -0.102468 | 1.03E+07 | -3.61E+05 | -0.008370 | 182.338 | 8.79E+12 | 2413.112 | 56520. |
| 196.800 | -0.122552 | 9.40E+06 | -3.55E+05 | -0.008367 | 167.576 | 8.79E+12 | 2922.875 | 57240. |
| 199.200 | -0.142631 | 8.56E+06 | -3.47E+05 | -0.008365 | 153.103 | 8.80E+12 | 3444.540 | 57960. |
| 201.600 | -0.162704 | 7.74E+06 | -3.38E+05 | -0.008363 | 138.972 | 8.80E+12 | 3978.115 | 58680. |
| 204.000 | -0.182772 | 6.94E+06 | -3.28E+05 | -0.008361 | 125.234 | 8.81E+12 | 4523.608 | |

```
59400.
 206.400 -0.202835  6.17E+06 -3.16E+05 -0.008359   111.944  8.82E+12  5081.028
60120.
 208.800 -0.222895  5.42E+06 -3.04E+05 -0.008357    99.157  8.83E+12  5650.385
60840.
 211.200 -0.242951  4.71E+06 -2.89E+05 -0.008356    86.929  8.83E+12  6231.686
61560.
 213.600 -0.263004  4.04E+06 -2.74E+05 -0.008355    75.318  8.83E+12  6824.941
62280.
 216.000 -0.283054  3.40E+06 -2.56E+05 -0.008354    64.383  8.83E+12  7430.159
63000.
 218.400 -0.303102  2.81E+06 -2.38E+05 -0.008353    54.183  8.83E+12  8047.347
63720.
 220.800 -0.323148  2.26E+06 -2.18E+05 -0.008352    44.780  8.83E+12  8676.516
64440.
 223.200 -0.343192  1.76E+06 -1.96E+05 -0.008352    36.236  8.83E+12  9317.672
65160.
 225.600 -0.363236  1.32E+06 -1.73E+05 -0.008351    28.614  8.83E+12  9970.823
65880.
 228.000 -0.383278  9.32E+05 -1.48E+05 -0.008351    21.979  8.83E+12    10636.
66600.
 230.400 -0.403320  6.08E+05 -1.22E+05 -0.008351    16.396  8.83E+12    11313.
67320.
 232.800 -0.423362  3.48E+05   -94062. -0.008351    11.934  8.83E+12    12002.
68040.
 235.200 -0.443403  1.57E+05   -64415. -0.008351     8.660  8.83E+12    12704.
68760.
 237.600 -0.463445    40067.   -33070. -0.008351     6.643  8.83E+12    13417.
69480.
 240.000 -0.483486     0.000     0.000 -0.008351     5.955  8.83E+12    14142.
35100.
```

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No.  1:

```
Pile-head deflection             =     1.70016191 in
Computed slope at pile head      =    -0.01069591
Maximum bending moment           =      36718629. lbs-in
Maximum shear force              =  -375526.44105 lbs
Depth of maximum bending moment  =    72.00000000 in
Depth of maximum shear force     =      182.40000 in
```

Number of iterations = 71
Number of zero deflection points = 1

---

## Summary of Pile Response(s)

---

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

| Load Type | Pile-Head Condition 1 | Pile-Head Condition 2 | Axial Load lbs | Pile-Head Deflection in | Maximum Moment in-lbs | Maximum Shear lbs |
|---|---|---|---|---|---|---|
| 1 | V= 42800. | M= 3.40E+07 | 33000.0000 | 1.7002 | 3.6719E+07 | -375526. |

---

## Pile-head Deflection vs. Pile Length

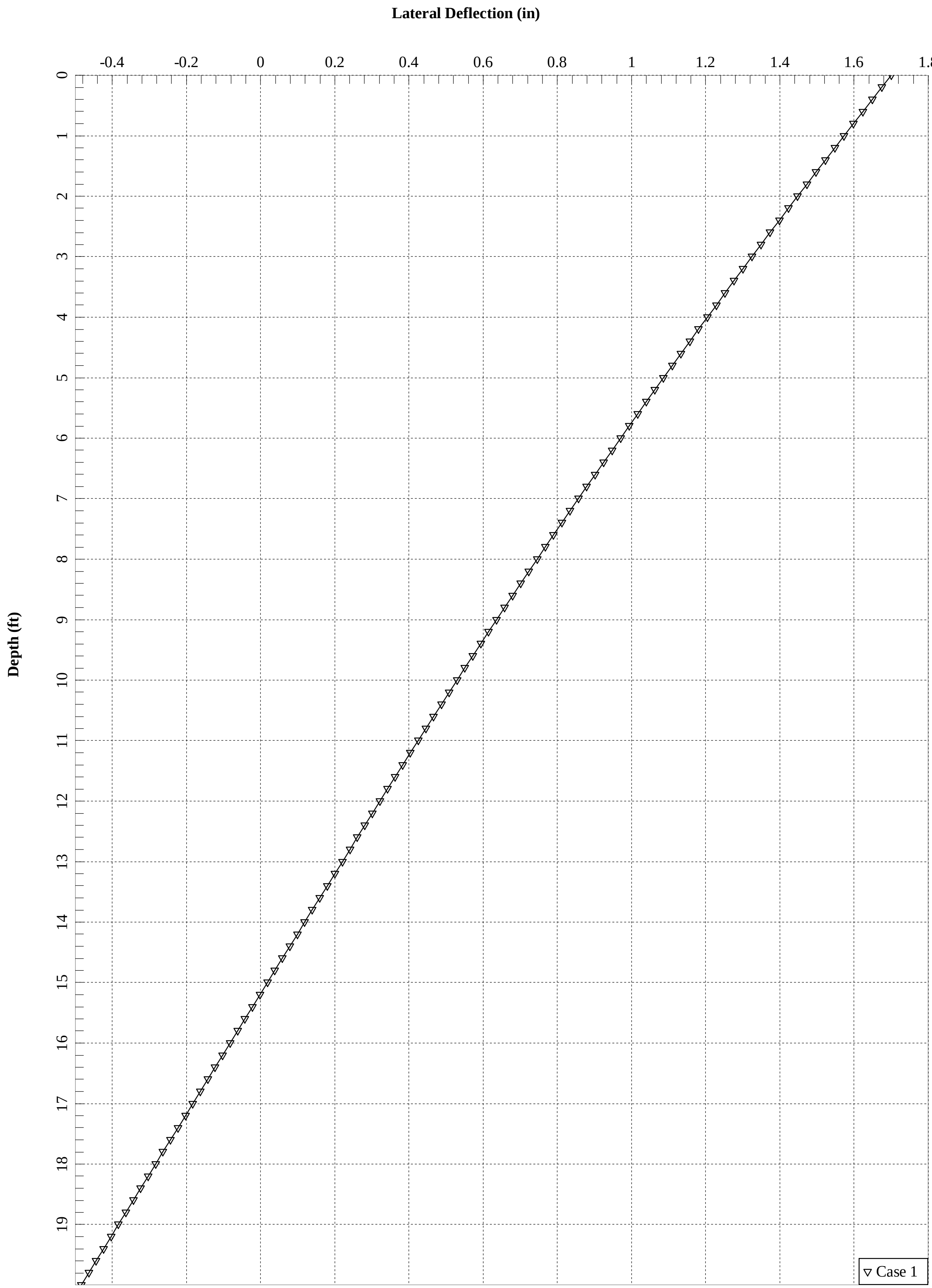
---

Boundary Condition Type 1, Shear and Moment

Shear = 42800. lbs
Moment = 33996000. in-lbs
Axial Load = 33000. lbs

| Pile Length in | Pile Head Deflection in | Maximum Moment in-lbs | Maximum Shear lbs |
|---|---|---|---|
| 240.000 | 1.70016191 | 36718629. | -375526.44105 |
| 228.000 | 2.37315561 | 36676937. | -408277.32860 |
| 216.000 | 3.70878259 | 36699119. | -451016.37938 |
| 204.000 | 5.98163146 | 36658753. | -492609.60889 |
| 192.000 | 19.97876267 | 36878171. | -597996.43976 |

The analysis ended normally.



Lateral Deflection (in)
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
Case 1

```
================================================================================

                 LPILE Plus for Windows, Version 5.0 (5.0.47)

                Analysis of Individual Piles and Drilled Shafts
               Subjected to Lateral Loading Using the p-y Method

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                             All Rights Reserved

================================================================================

This program is licensed to:

TJL
Centek Engineering

--------------------------------------------------------------------------------
                            Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      J:\Jobs\2202100.WI\06_CT2901\05_Structural\Backup
Documentation\Rev (2)\Calcs\MathCAD\Foundation\Weak Rock\
Name of input data file:     Structure 11229.lpd
Name of output file:         Structure 11229.lpo
Name of plot output file:    Structure 11229.lpp
Name of runtime file:        Structure 11229.lpr


-------------------------------------------------------------------------------
                          Time and Date of Analysis
-------------------------------------------------------------------------------

               Date:  September 12, 2022     Time:  11:13:41


-------------------------------------------------------------------------------
                                Problem Title
-------------------------------------------------------------------------------

W.O. #40357101 - 1990 Line Foundations - Structure No. 11229


-------------------------------------------------------------------------------
                                Program Options
-------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:
```

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis includes automatic computation of pile-top deflection vs. pile embedment length
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

---

## Pile Structural Properties and Geometry

---

Pile Length = 240.00 in

Depth of ground surface below top of pile = 6.00 in

Slope angle of ground surface = 8.50 deg.

Structural properties of pile defined using 2 points

| Point No. | Point Depth in | Pile Diameter in | Moment of Inertia in**4 | Pile Area Sq.in | Modulus of Elasticity lbs/Sq.in |
|---|---|---|---|---|---|
| 1 | 0.0000 | 84.00000000 | 2443920. | 5541.8000 | 3122019. |
| 2 | 240.0000 | 84.00000000 | 2443920. | 5541.8000 | 3122019. |

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

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## Soil and Rock Layering Information

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The soil profile is modelled using 2 layers

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Layer  1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer    =        6.000 in
Distance from top of pile to bottom of layer =      120.000 in
p-y subgrade modulus k for top of soil layer =      125.000 lbs/in**3
p-y subgrade modulus k for bottom of layer   =      125.000 lbs/in**3

Layer  2 is weak rock, p-y criteria by Reese, 1997
Distance from top of pile to top of layer    =      120.000 in
Distance from top of pile to bottom of layer =      300.000 in
Initial modulus of rock at top of layer      =   4.0000E+06 lbs/in**2
Initial modulus of rock at bottom of layer   =   4.0000E+06 lbs/in**2
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(Depth of lowest layer extends 60.00 in below pile tip)

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## Effective Unit Weight of Soil vs. Depth

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Effective unit weight of soil with depth defined using 4 points

| Point No. | Depth X in | Eff. Unit Weight lbs/in**3 |
|---|---|---|
| 1 | 6.00 | 0.07523 |
| 2 | 120.00 | 0.07523 |
| 3 | 120.00 | 0.09259 |
| 4 | 300.00 | 0.09259 |

**** WARNING - POSSIBLE INPUT DATA ERROR ****

Values entered for effective unit weights of soil were outside the limits of 0.011574 pci (20 pcf) or 0.0810019 pci (140 pcf) This data may be erroneous. Please check your data.

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## Shear Strength of Soils

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Shear strength parameters with depth defined using 4 points

| Point No. | Depth X in | Cohesion c lbs/in**2 | Angle of Friction Deg. | E50 or k_rm | RQD % |
|---|---|---|---|---|---|
| 1 | 6.000 | 0.00000 | 36.00 | ------ | ------ |
| 2 | 120.000 | 0.00000 | 36.00 | ------ | ------ |
| 3 | 120.000 | 10000.00000 | 0.00 | 0.00050 | 25.0 |
| 4 | 300.000 | 10000.00000 | 0.00 | 0.00050 | 25.0 |

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

## p-y Modification Factors

Distribution of p-y multipliers with depth defined using 2 points

| Point No. | Depth X in | p-mult | y-mult |
|---|---|---|---|
| 1 | 6.000 | 0.0100 | 1.0000 |
| 2 | 54.000 | 0.0100 | 1.0000 |

## Loading Type

Static loading criteria was used for computation of p-y curves.

## Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Shear force at pile head    =       43000.000 lbs
Bending moment at pile head =    34000000.000 in-lbs
Axial load at pile head     =       33000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

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## Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 84.0000 in

Material Properties:

| | | | |
|---|---|---|---|
| Compressive Strength of Concrete | = | 3.000 | kip/in**2 |
| Yield Stress of Reinforcement | = | 60. | kip/in**2 |
| Modulus of Elasticity of Reinforcement | = | 29000. | kip/in**2 |
| Number of Reinforcing Bars | = | 36 | |
| Area of Single Bar | = | 1.56000 | in**2 |
| Number of Rows of Reinforcing Bars | = | 19 | |
| Area of Steel | = | 56.160 | in**2 |
| Area of Shaft | = | 5541.769 | in**2 |
| Percentage of Steel Reinforcement | = | 1.013 | percent |
| Cover Thickness (edge to bar center) | = | 4.330 | in |

Unfactored Axial Squash Load Capacity = 17357.90 kip

Distribution and Area of Steel Reinforcement

| Row Number | Area of Reinforcement in**2 | Distance to Centroidal Axis in |
|---|---|---|
| 1 | 1.560 | 37.670 |
| 2 | 3.120 | 37.098 |
| 3 | 3.120 | 35.398 |
| 4 | 3.120 | 32.623 |
| 5 | 3.120 | 28.857 |
| 6 | 3.120 | 24.214 |

| | | |
|---|---|---|
| 7 | 3.120 | 18.835 |
| 8 | 3.120 | 12.884 |
| 9 | 3.120 | 6.541 |
| 10 | 3.120 | 0.000 |
| 11 | 3.120 | -6.541 |
| 12 | 3.120 | -12.884 |
| 13 | 3.120 | -18.835 |
| 14 | 3.120 | -24.214 |
| 15 | 3.120 | -28.857 |
| 16 | 3.120 | -32.623 |
| 17 | 3.120 | -35.398 |
| 18 | 3.120 | -37.098 |
| 19 | 1.560 | -37.670 |

Axial Thrust Force = 33000.00 lbs

| Bending Moment in-lbs | Bending Stiffness lb-in2 | Bending Curvature rad/in | Maximum Strain in/in | Neutral Axis Position inches | Max. Concrete Stress psi | Max. Steel Stress psi |
|---|---|---|---|---|---|---|
| 5517988. | 8.828781E+12 | 6.250000E-07 | 0.00002808 | 44.92739636 | 86.31321302 | 735.82781 |
| 10983489. | 8.786791E+12 | 0.00000125 | 0.00005442 | 43.53981453 | 165.86138 | 1421.35578 |
| 16396637. | 8.744873E+12 | 0.00000188 | 0.00008081 | 43.09602267 | 244.20936 | 2107.90248 |
| 21755817. | 8.702327E+12 | 0.00000250 | 0.00010715 | 42.85995251 | 321.14407 | 2793.42156 |
| 27061840. | 8.659789E+12 | 0.00000313 | 0.00013349 | 42.71822029 | 396.77259 | 3478.93246 |
| 27061840. | 7.216491E+12 | 0.00000375 | 0.00008965 | 23.90718645 | 266.71823 | 6064.20597 |
| 27061840. | 6.185563E+12 | 0.00000438 | 0.00010385 | 23.73621958 | 307.53067 | 7096.59839 |
| 27061840. | 5.412368E+12 | 0.00000500 | 0.00011787 | 23.57350892 | 347.47041 | 8133.99121 |
| 27061840. | 4.810994E+12 | 0.00000563 | 0.00013191 | 23.45043451 | 387.10802 | 9170.81662 |
| 27061840. | 4.329894E+12 | 0.00000625 | 0.00014597 | 23.35513026 | 426.44239 | 10207.07014 |
| 27061840. | 3.936268E+12 | 0.00000688 | 0.00016005 | 23.28004593 | 465.47242 | 11242.74709 |
| 27061840. | 3.608245E+12 | 0.00000750 | 0.00017415 | 23.22014219 | 504.19685 | 12277.84407 |
| 27061840. | 3.330688E+12 | 0.00000813 | 0.00018827 | 23.17193681 | 542.61457 | 13312.35614 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 27061840. | 3.092782E+12 | 0.00000875 | 0.00020241 | 23.13294142 | 580.72441 | 14346.27861 |
| 27061840. | 2.886596E+12 | 0.00000938 | 0.00021657 | 23.10132855 | 618.52512 | 15379.60755 |
| 27061840. | 2.706184E+12 | 0.00001000 | 0.00023076 | 23.07573134 | 656.01553 | 16412.33791 |
| 27061840. | 2.546997E+12 | 0.00001063 | 0.00024496 | 23.05510587 | 693.19450 | 17444.46426 |
| 27061840. | 2.405497E+12 | 0.00001125 | 0.00025918 | 23.03863102 | 730.06057 | 18475.98413 |
| 27153816. | 2.286637E+12 | 0.00001188 | 0.00027343 | 23.02567345 | 766.61275 | 19506.88996 |
| 28529560. | 2.282365E+12 | 0.00001250 | 0.00028770 | 23.01571244 | 802.84955 | 20537.17924 |
| 29903417. | 2.278356E+12 | 0.00001313 | 0.00030198 | 23.00833744 | 838.76987 | 21566.84531 |
| 31275370. | 2.274572E+12 | 0.00001375 | 0.00031629 | 23.00320548 | 874.37229 | 22595.88432 |
| 32645410. | 2.270985E+12 | 0.00001438 | 0.00033063 | 23.00003868 | 909.65560 | 23624.29012 |
| 34013518. | 2.267568E+12 | 0.00001500 | 0.00034498 | 22.99859923 | 944.61833 | 24652.05933 |
| 35379691. | 2.264300E+12 | 0.00001563 | 0.00035935 | 22.99869686 | 979.25935 | 25679.18423 |
| 36743908. | 2.261164E+12 | 0.00001625 | 0.00037375 | 23.00016135 | 1013.57714 | 26705.66146 |
| 38106158. | 2.258143E+12 | 0.00001688 | 0.00038817 | 23.00285250 | 1047.57035 | 27731.48531 |
| 39466427. | 2.255224E+12 | 0.00001750 | 0.00040262 | 23.00665015 | 1081.23762 | 28756.65005 |
| 40824705. | 2.252398E+12 | 0.00001813 | 0.00041708 | 23.01145166 | 1114.57760 | 29781.14947 |
| 42180974. | 2.249652E+12 | 0.00001875 | 0.00043157 | 23.01716441 | 1147.58874 | 30804.97935 |
| 43535224. | 2.246979E+12 | 0.00001938 | 0.00044608 | 23.02371329 | 1180.26975 | 31828.13234 |
| 44887437. | 2.244372E+12 | 0.00002000 | 0.00046062 | 23.03102821 | 1212.61907 | 32850.60364 |
| 46237601. | 2.241823E+12 | 0.00002063 | 0.00047518 | 23.03904909 | 1244.63523 | 33872.38751 |
| 47585699. | 2.239327E+12 | 0.00002125 | 0.00048976 | 23.04772335 | 1276.31674 | 34893.47798 |
| 48931719. | 2.236879E+12 | 0.00002188 | 0.00050437 | 23.05700594 | 1307.66213 | 35913.86811 |
| 50275645. | 2.234473E+12 | 0.00002250 | 0.00051900 | 23.06685430 | 1338.66981 | 36933.55257 |
| 51617458. | 2.232106E+12 | 0.00002313 | 0.00053366 | 23.07723087 | 1369.33819 | 37952.52580 |
| 52957149. | 2.229775E+12 | 0.00002375 | 0.00054834 | 23.08810562 | 1399.66581 | 38970.77975 |
| 54294705. | 2.227475E+12 | 0.00002438 | 0.00056305 | 23.09945101 | 1429.65115 | |

| | | | | | |
|---|---|---|---|---|---|
| 39988.30682 | | | | | |
| 56963320. | 2.222959E+12 | 0.00002563 | 0.00059254 | 23.12343854 | 1488.58786 |
| 42021.16349 | | | | | |
| 59623184. | 2.218537E+12 | 0.00002688 | 0.00062213 | 23.14902073 | 1546.13539 |
| 44051.03822 | | | | | |
| 62274161. | 2.214192E+12 | 0.00002813 | 0.00065183 | 23.17605239 | 1602.28016 |
| 46077.87602 | | | | | |
| 64916106. | 2.209910E+12 | 0.00002938 | 0.00068163 | 23.20441335 | 1657.00812 |
| 48101.62162 | | | | | |
| 67548886. | 2.205678E+12 | 0.00003063 | 0.00071154 | 23.23401099 | 1710.30514 |
| 50122.21274 | | | | | |
| 70172348. | 2.201485E+12 | 0.00003188 | 0.00074156 | 23.26476520 | 1762.15645 |
| 52139.58892 | | | | | |
| 72786342. | 2.197324E+12 | 0.00003313 | 0.00077170 | 23.29661089 | 1812.54689 |
| 54153.68691 | | | | | |
| 75390716. | 2.193184E+12 | 0.00003438 | 0.00080195 | 23.32949799 | 1861.46104 |
| 56164.43794 | | | | | |
| 77985291. | 2.189061E+12 | 0.00003563 | 0.00083232 | 23.36337644 | 1908.88247 |
| 58171.78047 | | | | | |
| 80554550. | 2.184530E+12 | 0.00003688 | 0.00086275 | 23.39653891 | 1954.70082 |
| 60000.00000 | | | | | |
| 82677895. | 2.168601E+12 | 0.00003813 | 0.00089151 | 23.38393682 | 1996.38466 |
| 60000.00000 | | | | | |
| 84420293. | 2.144007E+12 | 0.00003938 | 0.00091880 | 23.33460242 | 2034.46505 |
| 60000.00000 | | | | | |
| 86025703. | 2.117556E+12 | 0.00004063 | 0.00094560 | 23.27621824 | 2070.51840 |
| 60000.00000 | | | | | |
| 87382621. | 2.086749E+12 | 0.00004188 | 0.00097137 | 23.19698077 | 2103.92346 |
| 60000.00000 | | | | | |
| 88734502. | 2.057612E+12 | 0.00004313 | 0.00099723 | 23.12406188 | 2136.21687 |
| 60000.00000 | | | | | |
| 89838189. | 2.024523E+12 | 0.00004438 | 0.00102195 | 23.02986413 | 2165.92131 |
| 60000.00000 | | | | | |
| 90888861. | 1.992085E+12 | 0.00004563 | 0.00104650 | 22.93696564 | 2194.31222 |
| 60000.00000 | | | | | |
| 91935412. | 1.961289E+12 | 0.00004688 | 0.00107111 | 22.85041326 | 2221.68686 |
| 60000.00000 | | | | | |
| 92883570. | 1.930048E+12 | 0.00004813 | 0.00109527 | 22.75890416 | 2247.47219 |
| 60000.00000 | | | | | |
| 93671165. | 1.897138E+12 | 0.00004938 | 0.00111862 | 22.65566164 | 2271.36247 |
| 60000.00000 | | | | | |
| 94455398. | 1.865786E+12 | 0.00005063 | 0.00114203 | 22.55864757 | 2294.32731 |
| 60000.00000 | | | | | |
| 95236227. | 1.835879E+12 | 0.00005188 | 0.00116550 | 22.46742386 | 2316.35980 |
| 60000.00000 | | | | | |
| 95856705. | 1.804361E+12 | 0.00005313 | 0.00119000 | 22.39999992 | 2338.34106 |
| 60000.00000 | | | | | |
| 96730418. | 1.778950E+12 | 0.00005438 | 0.00121506 | 22.34600919 | 2359.72029 |
| 60000.00000 | | | | | |
| 97289098. | 1.749017E+12 | 0.00005563 | 0.00123694 | 22.23707646 | 2377.35642 |
| 60000.00000 | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 97845173. | 1.720355E+12 | 0.00005688 | 0.00125886 | 22.13384396 | 2394.17540 | 60000.00000 |
| 98398625. | 1.692880E+12 | 0.00005813 | 0.00128084 | 22.03595620 | 2410.17139 | 60000.00000 |
| 98949421. | 1.666517E+12 | 0.00005938 | 0.00130287 | 21.94308525 | 2425.33832 | 60000.00000 |
| 99497531. | 1.641196E+12 | 0.00006063 | 0.00132496 | 21.85493070 | 2439.67002 | 60000.00000 |
| 1.000429E+08 | 1.616856E+12 | 0.00006188 | 0.00134709 | 21.77121967 | 2453.16033 | 60000.00000 |
| 1.004944E+08 | 1.591990E+12 | 0.00006313 | 0.00136852 | 21.67959291 | 2465.36497 | 60000.00000 |
| 1.008738E+08 | 1.566971E+12 | 0.00006438 | 0.00138942 | 21.58320719 | 2476.46180 | 60000.00000 |
| 1.012510E+08 | 1.542872E+12 | 0.00006563 | 0.00141036 | 21.49121743 | 2486.80273 | 60000.00000 |
| 1.016260E+08 | 1.519641E+12 | 0.00006688 | 0.00143135 | 21.40338331 | 2496.38237 | 60000.00000 |
| 1.019988E+08 | 1.497230E+12 | 0.00006813 | 0.00145239 | 21.31948453 | 2505.19534 | 60000.00000 |
| 1.023694E+08 | 1.475595E+12 | 0.00006938 | 0.00147348 | 21.23931831 | 2513.23620 | 60000.00000 |
| 1.027377E+08 | 1.454693E+12 | 0.00007063 | 0.00149461 | 21.16268939 | 2520.49921 | 60000.00000 |
| 1.031037E+08 | 1.434487E+12 | 0.00007188 | 0.00151580 | 21.08942503 | 2526.97879 | 60000.00000 |
| 1.034674E+08 | 1.414939E+12 | 0.00007313 | 0.00153704 | 21.01935500 | 2532.66902 | 60000.00000 |
| 1.037433E+08 | 1.394867E+12 | 0.00007438 | 0.00156187 | 20.99999875 | 2538.33164 | 60000.00000 |
| 1.044204E+08 | 1.358314E+12 | 0.00007688 | 0.00160381 | 20.86257988 | 2545.32254 | 60000.00000 |
| 1.048818E+08 | 1.321346E+12 | 0.00007938 | 0.00164308 | 20.70016962 | 2549.01423 | 60000.00000 |
| 1.053354E+08 | 1.286539E+12 | 0.00008188 | 0.00168252 | 20.54991585 | 2548.97259 | 60000.00000 |
| 1.057786E+08 | 1.253672E+12 | 0.00008438 | 0.00172216 | 20.41078967 | 2544.62012 | 60000.00000 |
| 1.062169E+08 | 1.222641E+12 | 0.00008688 | 0.00176199 | 20.28187484 | 2548.45945 | 60000.00000 |
| 1.066504E+08 | 1.193291E+12 | 0.00008938 | 0.00180201 | 20.16237026 | 2549.97547 | 60000.00000 |
| 1.070766E+08 | 1.165460E+12 | 0.00009188 | 0.00184230 | 20.05226344 | 2544.73610 | 60000.00000 |
| 1.074694E+08 | 1.138749E+12 | 0.00009438 | 0.00188232 | 19.94506806 | 2545.58907 | 60000.00000 |
| 1.077322E+08 | 1.112074E+12 | 0.00009688 | 0.00192048 | 19.82427925 | 2548.60038 | 60000.00000 |
| 1.079921E+08 | 1.086713E+12 | 0.00009938 | 0.00195879 | 19.71108824 | 2549.93184 | 60000.00000 |
| 1.082471E+08 | 1.062548E+12 | 0.00010188 | 0.00199732 | 19.60562271 | 2546.24528 | |

| | | | | | |
|---|---|---|---|---|---|
| 60000.00000 | | | | | |
| 1.085724E+08 | 1.040215E+12 | 0.00010438 | 0.00204564 | 19.59897619 | 2542.94979 |
| 60000.00000 | | | | | |
| 1.088119E+08 | 1.018123E+12 | 0.00010688 | 0.00208325 | 19.49238664 | 2546.52352 |
| 60000.00000 | | | | | |
| 1.090495E+08 | 9.970242E+11 | 0.00010938 | 0.00212098 | 19.39180273 | 2548.85517 |
| 60000.00000 | | | | | |
| 1.092852E+08 | 9.768512E+11 | 0.00011188 | 0.00215883 | 19.29684395 | 2549.92635 |
| 60000.00000 | | | | | |
| 1.095175E+08 | 9.575296E+11 | 0.00011438 | 0.00219690 | 19.20783824 | 2546.99976 |
| 60000.00000 | | | | | |
| 1.097475E+08 | 9.390161E+11 | 0.00011688 | 0.00223510 | 19.12385184 | 2542.44731 |
| 60000.00000 | | | | | |
| 1.099763E+08 | 9.212672E+11 | 0.00011938 | 0.00227340 | 19.04419881 | 2540.65804 |
| 60000.00000 | | | | | |
| 1.102037E+08 | 9.042358E+11 | 0.00012188 | 0.00231180 | 18.96862632 | 2544.47682 |
| 60000.00000 | | | | | |
| 1.104299E+08 | 8.878783E+11 | 0.00012438 | 0.00235030 | 18.89690155 | 2547.30816 |
| 60000.00000 | | | | | |
| 1.105771E+08 | 8.715440E+11 | 0.00012688 | 0.00238683 | 18.81247205 | 2549.01462 |
| 60000.00000 | | | | | |
| 1.107063E+08 | 8.557010E+11 | 0.00012938 | 0.00242299 | 18.72840804 | 2549.87306 |
| 60000.00000 | | | | | |
| 1.108339E+08 | 8.404463E+11 | 0.00013188 | 0.00245928 | 18.64857727 | 2548.40133 |
| 60000.00000 | | | | | |
| 1.109598E+08 | 8.257475E+11 | 0.00013438 | 0.00249571 | 18.57270187 | 2544.77467 |
| 60000.00000 | | | | | |
| 1.110853E+08 | 8.115821E+11 | 0.00013688 | 0.00253219 | 18.50002581 | 2541.13775 |
| 60000.00000 | | | | | |
| 1.112103E+08 | 7.979214E+11 | 0.00013938 | 0.00256873 | 18.43038136 | 2537.49045 |
| 60000.00000 | | | | | |
| 1.113348E+08 | 7.847387E+11 | 0.00014188 | 0.00260534 | 18.36361080 | 2538.98011 |
| 60000.00000 | | | | | |
| 1.114588E+08 | 7.720092E+11 | 0.00014438 | 0.00264200 | 18.29957145 | 2542.29046 |
| 60000.00000 | | | | | |
| 1.115823E+08 | 7.597094E+11 | 0.00014688 | 0.00267872 | 18.23812312 | 2545.01948 |
| 60000.00000 | | | | | |
| 1.115823E+08 | 7.469946E+11 | 0.00014938 | 0.00271862 | 18.19999892 | 2547.47908 |
| 60000.00000 | | | | | |
| 1.115823E+08 | 7.346984E+11 | 0.00015188 | 0.00276412 | 18.19999892 | 2549.40842 |
| 60000.00000 | | | | | |
| 1.119951E+08 | 7.254741E+11 | 0.00015438 | 0.00280962 | 18.19999892 | 2549.72237 |
| 60000.00000 | | | | | |
| 1.120910E+08 | 7.145244E+11 | 0.00015688 | 0.00284695 | 18.14790577 | 2546.55138 |
| 60000.00000 | | | | | |
| 1.121689E+08 | 7.038048E+11 | 0.00015938 | 0.00288543 | 18.10466963 | 2543.17849 |
| 60000.00000 | | | | | |
| 1.122464E+08 | 6.934139E+11 | 0.00016188 | 0.00292397 | 18.06314582 | 2539.79489 |
| 60000.00000 | | | | | |
| 1.123234E+08 | 6.833365E+11 | 0.00016438 | 0.00296257 | 18.02325922 | 2536.40051 |
| 60000.00000 | | | | | |

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  1.124001E+08  6.735587E+11    0.00016688    0.00300124   17.98494476    2532.99509
  60000.00000
  1.124764E+08  6.640671E+11    0.00016938    0.00303997   17.94813985    2535.83328
  60000.00000
  1.125522E+08  6.548491E+11    0.00017188    0.00307876   17.91278189    2539.34904
  60000.00000
  1.126276E+08  6.458930E+11    0.00017438    0.00311762   17.87881583    2542.37558
  60000.00000
  1.127771E+08  6.287225E+11    0.00017938    0.00319554   17.81485158    2546.93667
  60000.00000
  1.128914E+08  6.122926E+11    0.00018438    0.00327162   17.74436349    2549.36531
  60000.00000
  1.129295E+08  5.963275E+11    0.00018938    0.00334682   17.67296416    2549.27197
  60000.00000
  1.129527E+08  5.811074E+11    0.00019438    0.00342390   17.61490792    2543.73260
  60000.00000
  1.129753E+08  5.666472E+11    0.00019938    0.00350115   17.56061679    2538.16339
  60000.00000
  1.129971E+08  5.528910E+11    0.00020438    0.00357857   17.50983793    2532.56350
  60000.00000
  1.130182E+08  5.397884E+11    0.00020938    0.00365618   17.46234101    2526.93215
  60000.00000
  1.130385E+08  5.272934E+11    0.00021438    0.00373397   17.41791826    2531.92802
  60000.00000
  1.130581E+08  5.153645E+11    0.00021938    0.00381194   17.37638694    2538.05196
  60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 =  112397.64871
in-kip


Iteration  91, Y(top) =   1.4639E-01, dYmax =   1.4361E-05
Iteration  92, Y(top) =   1.4641E-01, dYmax =   1.3749E-05
Iteration  93, Y(top) =   1.4642E-01, dYmax =   1.2785E-05
Iteration  94, Y(top) =   1.4643E-01, dYmax =   1.1828E-05
Iteration  95, Y(top) =   1.4644E-01, dYmax =   1.0920E-05
Iteration  96, Y(top) =   1.4645E-01, dYmax =   1.0071E-05
Iteration  97, Y(top) =   1.4646E-01, dYmax =   9.2817E-06


------------------------------------------------------------------------------
             Computed Values of Load Distribution and Deflection
                 for Lateral Loading for Load Case Number  1
------------------------------------------------------------------------------

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head  =       43000.000 lbs
Specified moment at pile head       =    34000000.000 in-lbs
Specified axial load at pile head   =       33000.000 lbs

  Depth   Deflect.  Moment     Shear     Slope     Total   Flx. Rig. Soil Res.
```

Es*h

| X | y | M | V | S | Stress | EI | p | F/L |
|---|---|---|---|---|---|---|---|---|
| in | in | lbs-in | lbs | Rad. | lbs/in**2 | lbs-in**2 | lbs/in | |
| 0.000 | 0.146462 | 3.40E+07 | 43000. | -0.002154 | 590.262 | 2.27E+12 | 0.000 | 0.000 |
| 2.400 | 0.141336 | 3.41E+07 | 43000. | -0.002118 | 592.038 | 2.27E+12 | 0.000 | 0.000 |
| 4.800 | 0.136296 | 3.42E+07 | 43000. | -0.002082 | 593.815 | 2.27E+12 | 0.000 | 0.000 |
| 7.200 | 0.131343 | 3.43E+07 | 43000. | -0.002046 | 595.591 | 2.27E+12 | -0.197015 | 3.600 |
| 9.600 | 0.126478 | 3.44E+07 | 42999. | -0.002009 | 597.367 | 2.27E+12 | -0.569149 | 10.800 |
| 12.000 | 0.121699 | 3.45E+07 | 42997. | -0.001973 | 599.144 | 2.27E+12 | -0.912745 | 18.000 |
| 14.400 | 0.117009 | 3.46E+07 | 42994. | -0.001936 | 600.920 | 2.27E+12 | -1.229 | 25.200 |
| 16.800 | 0.112406 | 3.47E+07 | 42991. | -0.001899 | 602.695 | 2.27E+12 | -1.517 | 32.400 |
| 19.200 | 0.107892 | 3.48E+07 | 42987. | -0.001862 | 604.471 | 2.27E+12 | -1.780 | 39.600 |
| 21.600 | 0.103466 | 3.49E+07 | 42983. | -0.001826 | 606.247 | 2.27E+12 | -2.018 | 46.800 |
| 24.000 | 0.099130 | 3.50E+07 | 42978. | -0.001788 | 608.022 | 2.27E+12 | -2.230 | 54.000 |
| 26.400 | 0.094882 | 3.51E+07 | 42972. | -0.001751 | 609.797 | 2.26E+12 | -2.419 | 61.200 |
| 28.800 | 0.090723 | 3.52E+07 | 42966. | -0.001714 | 611.571 | 2.26E+12 | -2.586 | 68.400 |
| 31.200 | 0.086655 | 3.53E+07 | 42960. | -0.001677 | 613.346 | 2.26E+12 | -2.730 | 75.600 |
| 33.600 | 0.082676 | 3.54E+07 | 42953. | -0.001639 | 615.120 | 2.26E+12 | -2.852 | 82.800 |
| 36.000 | 0.078787 | 3.55E+07 | 42946. | -0.001601 | 616.893 | 2.26E+12 | -2.955 | 90.000 |
| 38.400 | 0.074989 | 3.57E+07 | 42939. | -0.001564 | 618.667 | 2.26E+12 | -3.037 | 97.200 |
| 40.800 | 0.071281 | 3.58E+07 | 42931. | -0.001526 | 620.440 | 2.26E+12 | -3.101 | 104.400 |
| 43.200 | 0.067665 | 3.59E+07 | 42924. | -0.001488 | 622.212 | 2.26E+12 | -3.146 | 111.600 |
| 45.600 | 0.064139 | 3.60E+07 | 42916. | -0.001450 | 623.984 | 2.26E+12 | -3.175 | 118.800 |
| 48.000 | 0.060706 | 3.61E+07 | 42909. | -0.001412 | 625.756 | 2.26E+12 | -3.187 | 126.000 |
| 50.400 | 0.057364 | 3.62E+07 | 42901. | -0.001373 | 627.528 | 2.26E+12 | -3.184 | 133.200 |
| 52.800 | 0.054114 | 3.63E+07 | 42893. | -0.001335 | 629.299 | 2.26E+12 | -3.166 | |

140.400

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 55.200 | 0.050956 | 3.64E+07 | 42514. | -0.001296 | 631.070 | 2.26E+12 | -313.381 | 14760. |
| 57.600 | 0.047891 | 3.65E+07 | 41767. | -0.001258 | 632.809 | 2.26E+12 | -308.900 | 15480. |
| 60.000 | 0.044919 | 3.66E+07 | 41032. | -0.001219 | 634.519 | 2.26E+12 | -303.206 | 16200. |
| 62.400 | 0.042041 | 3.67E+07 | 40313. | -0.001180 | 636.198 | 2.26E+12 | -296.386 | 16920. |
| 64.800 | 0.039255 | 3.68E+07 | 39611. | -0.001141 | 637.847 | 2.26E+12 | -288.526 | 17640. |
| 67.200 | 0.036563 | 3.69E+07 | 38929. | -0.001102 | 639.468 | 2.26E+12 | -279.710 | 18360. |
| 69.600 | 0.033966 | 3.70E+07 | 38269. | -0.001063 | 641.061 | 2.26E+12 | -270.027 | 19080. |
| 72.000 | 0.031462 | 3.70E+07 | 37634. | -0.001024 | 642.628 | 2.26E+12 | -259.561 | 19800. |
| 74.400 | 0.029053 | 3.71E+07 | 37024. | -0.000984 | 644.169 | 2.26E+12 | -248.400 | 20520. |
| 76.800 | 0.026738 | 3.72E+07 | 36442. | -0.000945 | 645.685 | 2.26E+12 | -236.632 | 21240. |
| 79.200 | 0.024518 | 3.73E+07 | 35889. | -0.000905 | 647.177 | 2.26E+12 | -224.342 | 21960. |
| 81.600 | 0.022394 | 3.74E+07 | 35366. | -0.000865 | 648.648 | 2.26E+12 | -211.620 | 22680. |
| 84.000 | 0.020364 | 3.75E+07 | 34874. | -0.000826 | 650.097 | 2.26E+12 | -198.552 | 23400. |
| 86.400 | 0.018431 | 3.76E+07 | 34413. | -0.000786 | 651.527 | 2.26E+12 | -185.227 | 24120. |
| 88.800 | 0.016592 | 3.76E+07 | 33985. | -0.000746 | 652.938 | 2.26E+12 | -171.732 | 24840. |
| 91.200 | 0.014850 | 3.77E+07 | 33589. | -0.000706 | 654.332 | 2.26E+12 | -158.157 | 25560. |
| 93.600 | 0.013205 | 3.78E+07 | 33226. | -0.000666 | 655.711 | 2.26E+12 | -144.591 | 26280. |
| 96.000 | 0.011655 | 3.79E+07 | 32895. | -0.000625 | 657.075 | 2.26E+12 | -131.121 | 27000. |
| 98.400 | 0.010202 | 3.80E+07 | 32596. | -0.000585 | 658.426 | 2.26E+12 | -117.838 | 27720. |
| 100.800 | 0.008846 | 3.80E+07 | 32329. | -0.000545 | 659.765 | 2.26E+12 | -104.831 | 28440. |
| 103.200 | 0.007588 | 3.81E+07 | 32092. | -0.000504 | 661.094 | 2.26E+12 | -92.189 | 29160. |
| 105.600 | 0.006426 | 3.82E+07 | 31886. | -0.000464 | 662.414 | 2.26E+12 | -80.002 | 29880. |
| 108.000 | 0.005362 | 3.83E+07 | 31708. | -0.000423 | 663.726 | 2.26E+12 | -68.361 | 30600. |
| 110.400 | 0.004395 | 3.84E+07 | 31557. | -0.000382 | 665.031 | 2.26E+12 | -57.355 | 31320. |
| 112.800 | 0.003526 | 3.84E+07 | 31432. | -0.000342 | 666.330 | 2.26E+12 | -47.076 | 32040. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 115.200 | 0.002756 | 3.85E+07 | 31330. | -0.000301 | 667.624 | 2.26E+12 | -37.614 | 32760. |
| 117.600 | 0.002083 | 3.86E+07 | 31250. | -0.000260 | 668.915 | 2.26E+12 | -29.060 | 33480. |
| 120.000 | 0.001509 | 3.87E+07 | -1.52E+05 | -0.000219 | 670.203 | 2.26E+12 | -1.52E+05 | 2.42E+08 |
| 122.400 | 0.001034 | 3.78E+07 | -5.08E+05 | -0.000178 | 656.400 | 2.26E+12 | -1.44E+05 | 3.35E+08 |
| 124.800 | 0.000655 | 3.62E+07 | -8.41E+05 | -0.000139 | 628.320 | 2.26E+12 | -1.34E+05 | 4.90E+08 |
| 127.200 | 0.000368 | 3.38E+07 | -1.15E+06 | -0.000102 | 587.010 | 2.27E+12 | -1.20E+05 | 7.82E+08 |
| 129.600 | 0.000168 | 3.07E+07 | -1.38E+06 | -6.75E-05 | 533.818 | 2.28E+12 | -77226. | 1.11E+09 |
| 132.000 | 4.45E-05 | 2.72E+07 | -1.50E+06 | -3.74E-05 | 472.982 | 2.36E+12 | -21188. | 1.14E+09 |
| 134.400 | -1.22E-05 | 2.35E+07 | -1.52E+06 | -2.04E-05 | 410.049 | 8.69E+12 | 5981.509 | 1.18E+09 |
| 136.800 | -5.32E-05 | 1.99E+07 | -1.48E+06 | -1.44E-05 | 347.708 | 8.71E+12 | 26978. | 1.22E+09 |
| 139.200 | -8.12E-05 | 1.64E+07 | -1.40E+06 | -9.39E-06 | 288.038 | 8.74E+12 | 42366. | 1.25E+09 |
| 141.600 | -9.83E-05 | 1.32E+07 | -1.28E+06 | -5.33E-06 | 232.561 | 8.77E+12 | 52798. | 1.29E+09 |
| 144.000 | -0.000107 | 1.03E+07 | -1.15E+06 | -2.12E-06 | 182.310 | 8.79E+12 | 58966. | 1.33E+09 |
| 146.400 | -0.000108 | 7.68E+06 | -1.00E+06 | 3.26E-07 | 137.897 | 8.80E+12 | 61574. | 1.36E+09 |
| 148.800 | -0.000105 | 5.45E+06 | -8.55E+05 | 2.11E-06 | 99.578 | 8.83E+12 | 61307. | 1.40E+09 |
| 151.200 | -9.83E-05 | 3.57E+06 | -7.11E+05 | 3.34E-06 | 67.328 | 8.83E+12 | 58814. | 1.44E+09 |
| 153.600 | -8.92E-05 | 2.03E+06 | -5.75E+05 | 4.10E-06 | 40.900 | 8.83E+12 | 54684. | 1.47E+09 |
| 156.000 | -7.87E-05 | 8.11E+05 | -4.50E+05 | 4.49E-06 | 19.886 | 8.83E+12 | 49440. | 1.51E+09 |
| 158.400 | -6.76E-05 | -1.27E+05 | -3.39E+05 | 4.58E-06 | 8.145 | 8.83E+12 | 43535. | 1.55E+09 |
| 160.800 | -5.67E-05 | -8.15E+05 | -2.42E+05 | 4.45E-06 | 19.956 | 8.83E+12 | 37349. | 1.58E+09 |
| 163.200 | -4.63E-05 | -1.29E+06 | -1.59E+05 | 4.17E-06 | 28.070 | 8.83E+12 | 31188. | 1.62E+09 |
| 165.600 | -3.67E-05 | -1.58E+06 | -91538. | 3.78E-06 | 33.098 | 8.83E+12 | 25287. | 1.65E+09 |
| 168.000 | -2.81E-05 | -1.73E+06 | -37406. | 3.33E-06 | 35.621 | 8.83E+12 | 19822. | 1.69E+09 |
| 170.400 | -2.07E-05 | -1.76E+06 | 4267.276 | 2.85E-06 | 36.183 | 8.83E+12 | 14906. | 1.73E+09 |
| 172.800 | -1.44E-05 | -1.71E+06 | 34885. | 2.38E-06 | 35.269 | 8.83E+12 | 10609. | 1.76E+09 |
| 175.200 | -9.27E-06 | -1.59E+06 | 55961. | 1.93E-06 | 33.306 | 8.83E+12 | 6954.612 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.80E+09 | | | | | | | |
| 177.600 | -5.14E-06 | -1.44E+06 | 69033. | 1.52E-06 | 30.653 | 8.83E+12 | 3938.461 |
| 1.84E+09 | | | | | | | |
| 180.000 | -1.96E-06 | -1.26E+06 | 75593. | 1.16E-06 | 27.611 | 8.83E+12 | 1528.885 |
| 1.87E+09 | | | | | | | |
| 182.400 | 4.06E-07 | -1.07E+06 | 77040. | 8.39E-07 | 24.417 | 8.83E+12 | -323.205 |
| 1.91E+09 | | | | | | | |
| 184.800 | 2.07E-06 | -8.90E+05 | 74638. | 5.72E-07 | 21.256 | 8.83E+12 | -1678.601 |
| 1.95E+09 | | | | | | | |
| 187.200 | 3.15E-06 | -7.16E+05 | 69498. | 3.53E-07 | 18.261 | 8.83E+12 | -2604.479 |
| 1.98E+09 | | | | | | | |
| 189.600 | 3.77E-06 | -5.57E+05 | 62569. | 1.80E-07 | 15.523 | 8.83E+12 | -3170.021 |
| 2.02E+09 | | | | | | | |
| 192.000 | 4.02E-06 | -4.16E+05 | 54633. | 4.83E-08 | 13.099 | 8.83E+12 | -3442.949 |
| 2.06E+09 | | | | | | | |
| 194.400 | 4.00E-06 | -2.95E+05 | 46317. | -4.83E-08 | 11.016 | 8.83E+12 | -3486.929 |
| 2.09E+09 | | | | | | | |
| 196.800 | 3.79E-06 | -1.93E+05 | 38101. | -1.15E-07 | 9.278 | 8.83E+12 | -3359.750 |
| 2.13E+09 | | | | | | | |
| 199.200 | 3.45E-06 | -1.12E+05 | 30335. | -1.56E-07 | 7.873 | 8.83E+12 | -3112.193 |
| 2.17E+09 | | | | | | | |
| 201.600 | 3.04E-06 | -47795. | 23256. | -1.78E-07 | 6.776 | 8.83E+12 | -2787.464 |
| 2.20E+09 | | | | | | | |
| 204.000 | 2.59E-06 | -9.507 | 17005. | -1.84E-07 | 5.955 | 8.83E+12 | -2421.110 |
| 2.24E+09 | | | | | | | |
| 206.400 | 2.15E-06 | 33830. | 11650. | -1.80E-07 | 6.536 | 8.83E+12 | -2041.276 |
| 2.28E+09 | | | | | | | |
| 208.800 | 1.73E-06 | 55912. | 7197.788 | -1.67E-07 | 6.916 | 8.83E+12 | -1669.241 |
| 2.31E+09 | | | | | | | |
| 211.200 | 1.35E-06 | 68380. | 3610.555 | -1.51E-07 | 7.130 | 8.83E+12 | -1320.119 |
| 2.35E+09 | | | | | | | |
| 213.600 | 1.01E-06 | 73243. | 822.014 | -1.31E-07 | 7.213 | 8.83E+12 | -1003.665 |
| 2.39E+09 | | | | | | | |
| 216.000 | 7.18E-07 | 72325. | -1252.529 | -1.11E-07 | 7.198 | 8.83E+12 | -725.121 |
| 2.42E+09 | | | | | | | |
| 218.400 | 4.74E-07 | 67231. | -2705.945 | -9.25E-08 | 7.110 | 8.83E+12 | -486.059 |
| 2.46E+09 | | | | | | | |
| 220.800 | 2.74E-07 | 59337. | -3631.428 | -7.53E-08 | 6.974 | 8.83E+12 | -285.177 |
| 2.50E+09 | | | | | | | |
| 223.200 | 1.13E-07 | 49800. | -4116.499 | -6.05E-08 | 6.811 | 8.83E+12 | -119.048 |
| 2.53E+09 | | | | | | | |
| 225.600 | -1.61E-08 | 39578. | -4238.694 | -4.83E-08 | 6.635 | 8.83E+12 | 17.219 |
| 2.57E+09 | | | | | | | |
| 228.000 | -1.19E-07 | 29454. | -4062.774 | -3.89E-08 | 6.461 | 8.83E+12 | 129.381 |
| 2.61E+09 | | | | | | | |
| 230.400 | -2.03E-07 | 20076. | -3639.283 | -3.22E-08 | 6.300 | 8.83E+12 | 223.528 |
| 2.64E+09 | | | | | | | |
| 232.800 | -2.74E-07 | 11986. | -3004.316 | -2.79E-08 | 6.161 | 8.83E+12 | 305.611 |
| 2.68E+09 | | | | | | | |
| 235.200 | -3.37E-07 | 5655.728 | -2180.380 | -2.55E-08 | 6.052 | 8.83E+12 | 381.003 |
| 2.72E+09 | | | | | | | |

```
 237.600 -3.96E-07  1520.107 -1178.277 -2.45E-08     5.981  8.83E+12   454.082
2.75E+09
 240.000 -4.54E-07     0.000     0.000 -2.43E-08     5.955  8.83E+12   527.815
1.39E+09
```

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.14646218 in
Computed slope at pile head      =    -0.00215399
Maximum bending moment           =      38651656. lbs-in
Maximum shear force              =      -1518654. lbs
Depth of maximum bending moment  =      120.00000 in
Depth of maximum shear force     =      134.40000 in
Number of iterations             =             97
Number of zero deflection points =              3
```

--------------------------------------------------------------------------------

Summary of Pile Response(s)

--------------------------------------------------------------------------------

Definition of Symbols for Pile-Head Loading Conditions:

```
Type 1 = Shear and Moment,          y = pile-head displacment in
Type 2 = Shear and Slope,           M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness,  V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment,     S = Pile-head Slope, radians
Type 5 = Deflection and Slope,      R = Rot. Stiffness of Pile-head in-lbs/rad
```

| Load Type | Pile-Head Condition 1 | Pile-Head Condition 2 | Axial Load lbs | Pile-Head Deflection in | Maximum Moment in-lbs | Maximum Shear lbs |
|---|---|---|---|---|---|---|
| 1 | V= 43000. | M= 3.40E+07 | 33000.0000 | 0.1464622 | 3.8652E+07 | -1518654. |

--------------------------------------------------------------------------------

## Pile-head Deflection vs. Pile Length

---

Boundary Condition Type 1, Shear and Moment

Shear = 43000. lbs
Moment = 34000000. in-lbs
Axial Load = 33000. lbs

| Pile Length in | Pile Head Deflection in | Maximum Moment in-lbs | Maximum Shear lbs |
|---|---|---|---|
| 240.000 | 0.14646218 | 38651656. | -1518654. |
| 228.000 | 0.14781767 | 38658079. | -1513413. |
| 216.000 | 0.14765315 | 38694759. | -1504675. |
| 204.000 | 0.14647553 | 38663863. | -1509364. |
| 192.000 | 0.14827535 | 38682368. | -1512342. |
| 180.000 | 0.14728789 | 38682504. | -1507085. |
| 168.000 | 0.14852393 | 38677885. | -1509867. |
| 156.000 | 0.14672401 | 38648863. | -1667605. |
| 144.000 | 0.26168680 | 37765609. | -2786382. |
| 132.000 | 18.31788675 | 36894743. | -3996744. |

The analysis ended normally.

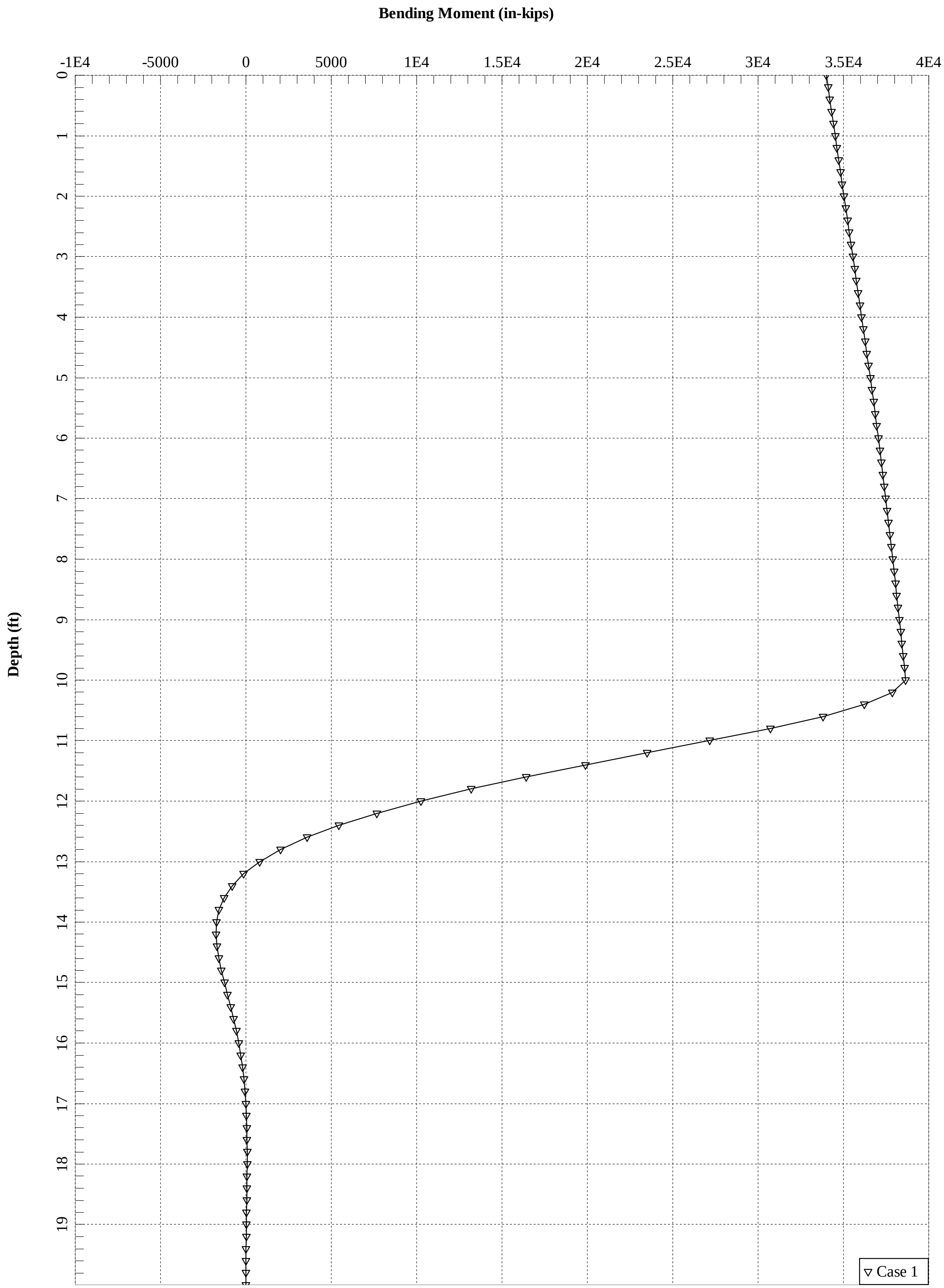
---

## Summary of Warning Messages

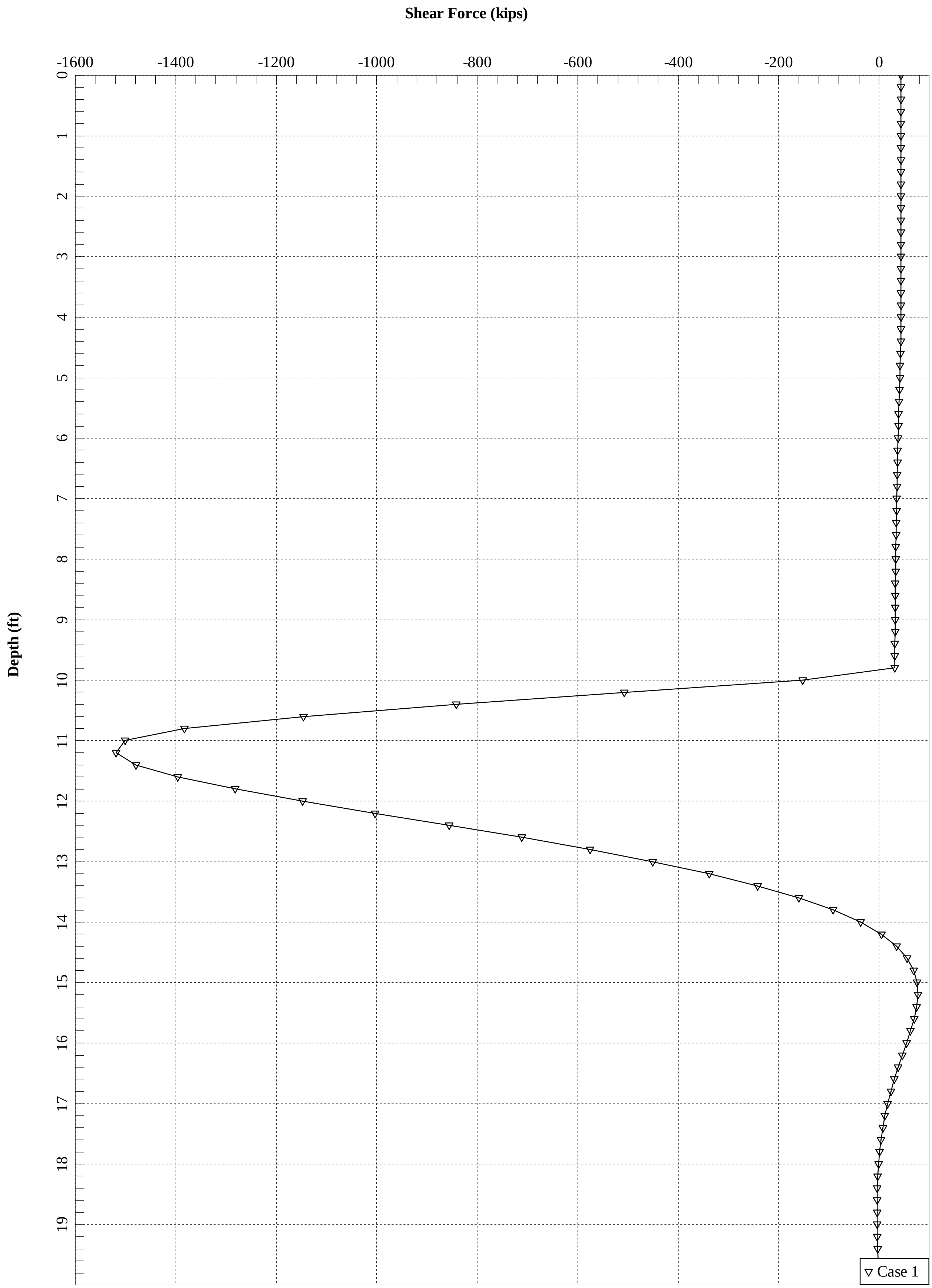
---

**** WARNING ****

An unreasonable input value for unconfined compressive strength has been specified for a soil defined using the weak rock criteria. The input value is greater than 1000 psi. You should check your input data for correctness.



Bending Moment (in-kips)
-1E4
-5000
0
5000
1E4
1.5E4
2E4
2.5E4
3E4
3.5E4
4E4
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
Case 1


Shear Force (kips)
-1600
-1400
-1200
-1000
-800
-600
-400
-200
0
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
Case 1

## Section 1 - RFDS GENERAL INFORMATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RFDS NAME: | CTL02901 | DATE: | 2/8/2019 | RF DESIGN ENG: | Mateen Mohammed | RF PERF ENG: | |
| ISSUE: | Bronze Standard | Approved? (Y/N): | Yes | RF DESIGN PHONE: | 5107767382 | RF PERF PHONE: | |
| REVISION: | Preliminary | RF MANAGER: | Benedetto, John | RF DESIGN EMAIL: | mm093q@att.com | RF PERF EMAIL: | |

| | | | | | |
|---|---|---|---|---|---|
| RFDS PROGRAM TYPE: | 2022 5G NR Radio | | | | |
| RFDS TECHNOLOGY: | 5G NR 1SR CBAND | | | | |
| STATE/STATUS: | Preliminary/Approved | | | | |
| ADDITIONAL WORKFLOW NOTIFICATIONS: | | RFDS ID: | 4893429 | | |
| RFDS VERSION | 1.00 | Created By: | mm093q | Updated By: | mm093q |
| UMTS FREQUENCY: | | Created: | 12/4/2021 | Updated: | 2/14/2022 |
| LTE FREQUENCY: | 700,1900,AWS,WCS | Estimated SQIN: | 17,434 | Expiration: | |
| 5G FREQUENCY: | 850,1900,AWS,CBAND,DoD | RER Initiative: | | Calculation ID: | 202202141913179774 |

INITIATIVE PROJECT: CBAND + DoD

| | | | |
|---|---|---|---|
| IPLAN JOB # 1: | ER_-RCTB-21-02661 | PRD \|\| SUB GRP #1 | LTE Next Carrier \|\| LTE 7C |
| IPLAN JOB # 2: | ER_-RCTB-21-02848 | PRD \|\| SUB GRP #2 | LTE Next Carrier \|\| LTE 6C |
| IPLAN JOB # 3: | ER_-RCTB-21-04262 | PRD \|\| SUB GRP #3 | Antenna Modifications \|\| 4TXRX Antenna Retrofit |
| IPLAN JOB # 4: | ER_-RCTB-21-03323 | PRD \|\| SUB GRP #4 | 5G NR Radio \|\| 5G NR 1SR CBand |
| IPLAN JOB # 5: | ER_-RCTB-21-04775 | PRD \|\| SUB GRP #5 | Cell Site RF Modifications \|\| BBU reconfiguration with new IDs |
| IPLAN JOB # 6: | ER_-RCTB-21-05391 | PRD \|\| SUB GRP #6 | 5G NR Software Radio \|\| 5G NR Activation |
| IPLAN JOB # 7: | ER_-RCTB-21-05389 | PRD \|\| SUB GRP #7 | 5G NR Software Radio \|\| 5G NR Activation |
| IPLAN JOB # 8: | ER_-RCTB-21-05330 | PRD \|\| SUB GRP #8 | 5G NR Radio \|\| 5G NR 1SR CBand |
| IPLAN JOB # 9: | ER_-RCTB-22-01001 | PRD \|\| SUB GRP #9 | Antenna Modifications \|\| 4TX4RX Software Retrofit |
| IPLAN JOB #10: | | PRD \|\| SUB GRP #10 | |
| IPLAN JOB # 11: | | PRD \|\| SUB GRP #11 | |
| IPLAN JOB # 12: | | PRD \|\| SUB GRP #12 | |
| IPLAN JOB # 13: | | PRD \|\| SUB GRP #13 | |
| IPLAN JOB # 14: | | PRD \|\| SUB GRP #14 | |
| IPLAN JOB # 15: | | PRD \|\| SUB GRP #15 | |
| IPLAN JOB # 16: | | PRD \|\| SUB GRP #16 | |

## Section 2 - LOCATION INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| USID: | **143463** | FA LOCATION CODE: | **10549309** | LOCATION NAME: | WATERBURY WHITEWOOD ROAD |
| REGION: | NORTHEAST | MARKET CLUSTER: | NEW ENGLAND | MARKET: | CONNECTICUT |
| ADDRESS: | 227 WHITEWOOD ROAD | CITY: | WATERBURY | STATE: | CT |
| ZIP CODE: | 06708 | COUNTY: | NEW HAVEN | LONG (DEC. DEG.): | -73.0817310 |
| LATITUDE (D-M-S): | 41d 34m41.31s | LONGITUDE (D-M-S): | -73d -4m-54.23s | LAT (DEC. DEG.): | 41.5781410 |

DIRECTIONS, ACCESS AND EQUIPMENT LOCATION: CL&P TOWER WITH SEPARATE GROUND LEASE.

| | | | | | |
|---|---|---|---|---|---|
| ORACLE PRJT # 1: | 2051A11PDP | PACE JOB #1: | MRCTB054260 | | |
| ORACLE PRJT # 2: | 2051A11PK6 | PACE JOB #2: | MRCTB054782 | | |
| ORACLE PRJT # 3: | 2051A11LFR | PACE JOB #3: | MRCTB055479 | | |
| ORACLE PRJT # 4: | 2051A11KTY | PACE JOB #4: | MRCTB054388 | | |
| ORACLE PRJT # 5: | 2051A11MAG | PACE JOB #5: | MRCTB056540 | | |
| ORACLE PRJT # 6: | | PACE JOB #6: | MRCTB053320 | | |
| ORACLE PRJT # 7: | | PACE JOB #7: | MRCTB053310 | | |
| ORACLE PRJT # 8: | 2051A11LTZ | PACE JOB #8: | MRCTB056326 | | |
| ORACLE PRJT # 9: | 2051A149JR | PACE JOB #9: | MRCTB062571 | | |
| ORACLE PRJT # 10: | | PACE JOB #10: | | | |
| ORACLE PRJT # 11: | | PACE JOB #11: | | | |
| ORACLE PRJT # 12: | | PACE JOB #12: | | | |
| ORACLE PRJT # 13: | | PACE JOB #13: | | | |
| ORACLE PRJT # 14: | | PACE JOB #14: | | | |
| ORACLE PRJT # 15: | | PACE JOB #15: | | | |
| ORACLE PRJT # 16: | | PACE JOB #16: | | | |
| BORDER CELL WITH CONTOUR COORD: | | SEARCH RING NAME: | WATERBURY NORTH | | |
| AM STUDY REQ'D (Y/N): | No | SEARCH RING ID: | 2901 | | |
| FREQ COORD: | | BTA: | | MSA / RSA: | |
| | | | | | |
| | | LAC(UMTS): | | | |
| RF DISTRICT: | TBD | | | | |
| RF ZONE: | TBD | RNC(UMTS): | | | |
| | | MME POOL ID(LTE): | FF01 | | |
| PARENT NAME(UMTS): | | | | | |

## Section 3 - LICENSE COVERAGE/FILING INFORMATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CGSA - NO FILING TRIGGERED (Yes/No): | No | CGSA LOSS: | | PCS REDUCED - UPS ZIP: | | CGSA CALL SIGNS: | |
| CGSA - MINOR FILING NEEDED (Yes/No): | No | CGSA EXT AGMT NEEDED: | | PCS POPS REDUCED: | | | |
| CGSA - MAJOR FILING NEEDED (Yes/No): | Yes | CGSA SCORECARD UPDATED: | | | | | |

## Section 4 - TOWER/REGULATORY INFORMATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| STRUCTURE AT&T OWNED?: | No | GROUND ELEVATION (ft): | | STRUCTURE TYPE: | | MARKET LOCATION 700 MHz Band: | |
| ADDITIONAL REGULATORY?: | No | HEIGHT OVERALL (ft): | 0.00 | FCC ASR NUMBER: | | MARKET LOCATION 850 MHz Band: | |
| SUB-LEASE RIGHTS?: | No | STRUCTURE HEIGHT (ft): | 0.00 | | | MARKET LOCATION 1900 MHz Band: | |
| LIGHTING TYPE: | | | | | | MARKET LOCATION AWS Band: | |
| | | | | | | MARKET LOCATION WCS Band: | |
| | | | | | | MARKET LOCATION Future Band: | |

## Section 5 - E-911 INFORMATION - existing

| | PSAP NAME: | PSAP ID: | E911 PHASE: | MPC SVC PROVIDER: | LMU REQUIRED: | ESRN: | DATE LIVE PH1: | DATE LIVE PH2: |
|---|---|---|---|---|---|---|---|---|
| SECTOR A E-911 | | | | INTRADO | | 0 | | |
| SECTOR B | | | | INTRADO | | 0 | | |
| SECTOR C | | | | INTRADO | | 0 | | |
| SECTOR D | | | | | | | | |
| SECTOR E | | | | | | | | |
| SECTOR F | | | | | | | | |
| OMNI | | | | | | | | |

## Section 5 - E-911 INFORMATION - final

| | PSAP NAME: | PSAP ID: | E911 PHASE: | MPC SVC PROVIDER: | LMU REQUIRED: | ESRN: | DATE LIVE PH1: | DATE LIVE PH2: |
|---|---|---|---|---|---|---|---|---|
| SECTOR A E-911 | | | | INTRADO | | 0 | | |
| SECTOR B | | | | INTRADO | | 0 | | |
| SECTOR C | | | | INTRADO | | 0 | | |
| SECTOR D | | | | | | | | |
| SECTOR E | | | | | | | | |
| SECTOR F | | | | | | | | |
| OMNI | | | | | | | | |

## Section 6/7 - BBU INFORMATION - existing

| | BBU 1 | BBU 2 |
|---|---|---|
| BBU ID: | 576012 | 734450 |
| TECHNOLOGY: | LTE | 5G |
| BBU NAME: | CTL02901 | CTCN002901 |
| BBU USID: | 143463 | 143463 |
| CELL ID / BCF: | CTL02901 | CTCN002901 |
| BTA/TID: | 318L | 318N |
| 4-9 DIGIT SITE ID: | 2901 | 2901 |
| COW OR TOY?: | No | No |
| CELL SITE TYPE: | SECTORIZED | SECTORIZED |
| SITE TYPE: | MACRO-CONVENTIONAL | MACRO-CONVENTIONAL |
| BTS LOCATION ID: | ROOF | ROOF |
| BASE STATION TYPE: | BASE | BASE |
| EQUIPMENT NAME: | WATERBURY NORTH | WATERBURY NORTH |
| DISASTER PRIORITY: | 0 | 0 |
| EQUIPMENT VENDOR: | ERICSSON | ERICSSON |
| EQUIPMENT TYPE (Model): | 6601 INDOOR MU | BASEBAND 6630 |
| BASEBAND CONFIGURATION : | | xxxxx / 1x6630 / xxxxx |
| MARKET STATE CODE: | CT | CTC |
| NODE B NUMBER: | 2901 | 2901 |
| SIDEHAUL SWITCH VENDOR: | | |
| SIDEHAUL SWITCH MODEL: | | |
| SIDEHAUL SWITCH NAME: | | |
| CSS - CTS COMMON ID: | CTL02901 | CTCN002901 |
| CSS - SECONDARY FUNCTION ID: | | |

## Section 6/7 - BBU INFORMATION - final

| | BBU 1 | BBU 2 | BBU 3 |
|---|---|---|---|
| BBU ID: | 576012 | 0 | 734450 |
| TECHNOLOGY: | LTE | 5G | LTE,5G |
| BBU NAME: | CTL02901 | CTCN032901 | CTL03901R,CTCN002901 |
| BBU USID: | 143463 | 143463 | 143463 |
| CELL ID / BCF: | CTL02901 | CTCN032901 | CTCN002901 |
| BTA/TID: | 318L | | 318N |
| 4-9 DIGIT SITE ID: | 2901 | 14032901 | 2901 |
| COW OR TOY?: | No | No | No |
| CELL SITE TYPE: | SECTORIZED | SECTORIZED | SECTORIZED |
| SITE TYPE: | MACRO-CONVENTIONAL | MACRO-CONVENTIONAL | MACRO-CONVENTIONAL |
| BTS LOCATION ID: | ROOF | INTERNAL | ROOF |
| BASE STATION TYPE: | BASE | OVERLAY | BASE |
| EQUIPMENT NAME: | WATERBURY NORTH | CTCN032901 | WATERBURY NORTH |
| DISASTER PRIORITY: | 0 | 0 | 0 |
| EQUIPMENT VENDOR: | ERICSSON | ERICSSON | ERICSSON |
| EQUIPMENT TYPE (Model): | 6601 RADIONODE 5216 | BASEBAND 6648 | BASEBAND 6630 |
| BASEBAND CONFIGURATION : | 1x6601 / 1x5216 / 1xXMU03 | xxxxx / 1x6648 / xxxxx + IDLe | xxxxx / 1x6630 Mixed-Mode / xxxxx + I |
| MARKET STATE CODE: | CT | CTC | CT,CTC |
| NODE B NUMBER: | 2901 | 32901 | 3901,2901 |
| SIDEHAUL SWITCH VENDOR: | | | |
| SIDEHAUL SWITCH MODEL: | | | |
| SIDEHAUL SWITCH NAME: | | | |
| CSS - CTS COMMON ID: | CTL02901 | | CTCN002901 |
| CSS - SECONDARY FUNCTION ID: | | | |

## Section 7b - Radio INFORMATION - existing

## Section 7b - Radio INFORMATION - final

## Section 8 - RBS/SECTOR ASSOCIATION - existing

| | BBU 1 | BBU 2 |
|---|---|---|
| CTS Common ID | CTL02901 | CTCN002901 |
| Soft Sector IDs | CTL02901_2A_1 | CTCN002901_N005A_1 |
| | CTL02901_2A_2 | CTCN002901_N005B_1 |
| | CTL02901_2B_1 | CTCN002901_N005C_1 |
| | CTL02901_2B_2 | |
| | CTL02901_2C_1 | |
| | CTL02901_2C_2 | |
| | CTL02901_3A_1 | |
| | CTL02901_3B_1 | |
| | CTL02901_3C_1 | |
| | CTL02901_7A_1 | |
| | CTL02901_7B_1 | |
| | CTL02901_7C_1 | |
| | CTL02901_8A_1 | |
| | CTL02901_8B_1 | |
| | CTL02901_8C_1 | |
| | CTL02901_9A_1 | |
| | CTL02901_9A_2 | |
| | CTL02901_9B_1 | |
| | CTL02901_9B_2 | |
| | CTL02901_9C_1 | |
| | CTL02901_9C_2 | |

## Section 8 - RBS/SECTOR ASSOCIATION - final

| | BBU 1 | BBU 2 | BBU 3 |
|---|---|---|---|
| CTS Common ID | CTL02901 | CTCN032901 | CTL03901R,CTCN002901 |
| Soft Sector IDs | CTL02901_3A_1 | CTCN032901_N077A_1 | CTCN002901_N002A_1 |
| | CTL02901_3B_1 | CTCN032901_N077A_2 | CTCN002901_N002B_1 |
| | CTL02901_3C_1 | CTCN032901_N077B_1 | CTCN002901_N002C_1 |
| | CTL02901_7A_1 | CTCN032901_N077B_2 | CTCN002901_N005A_1 |
| | CTL02901_7A_2_E | CTCN032901_N077C_1 | CTCN002901_N005B_1 |
| | CTL02901_7A_3_F | CTCN032901_N077C_2 | CTCN002901_N005C_1 |
| | CTL02901_7B_1 | | CTCN002901_N066A_1 |
| | CTL02901_7B_2_E | | CTCN002901_N066B_1 |
| | CTL02901_7B_3_F | | CTCN002901_N066C_1 |
| | CTL02901_7C_1 | | CTL03901_2A_2 |
| | CTL02901_7C_2_E | | CTL03901_2B_2 |
| | CTL02901_7C_3_F | | CTL03901_2C_2 |
| | | | CTL03901_9A_1 |
| | | | CTL03901_9B_1 |
| | | | CTL03901_9C_1 |

## Section 9 - SOFT SECTOR ID - existing

| | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS | LTE 2ND 1900 | LTE 2ND AWS | LTE 4TH 700 | LTE 4TH AWS | LTE 5TH 700 | 5G 1ST 850 | 5G 1ST 1900 | 5G 1ST AWS | 5G 1ST CBAND | 5G 2ND CBAND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| USEID (excluding Hard Sector) | | | | | | | | | | | | | | | |
| SECTOR A SOFT SECTOR ID | CTL02901_7A_1 | CTL02901_8A_1 | CTL02901_9A_1 | CTL02901_2A_1 | CTL02901_3A_1 | CTL02901_9A_2 | CTL02901_2A_2 | | | | CTCN002901_N005A_1 | | | | |
| SECTOR B | CTL02901_7B_1 | CTL02901_8B_1 | CTL02901_9B_1 | CTL02901_2B_1 | CTL02901_3B_1 | CTL02901_9B_2 | CTL02901_2B_2 | | | | CTCN002901_N005B_1 | | | | |
| SECTOR C | CTL02901_7C_1 | CTL02901_8C_1 | CTL02901_9C_1 | CTL02901_2C_1 | CTL02901_3C_1 | CTL02901_9C_2 | CTL02901_2C_2 | | | | CTCN002901_N005C_1 | | | | |
| SECTOR D | | | | | | | | | | | | | | | |
| SECTOR E | | | | | | | | | | | | | | | |
| SECTOR F | | | | | | | | | | | | | | | |
| OMNI | | | | | | | | | | | | | | | |

## Section 9 - SOFT SECTOR ID - final

| | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS | LTE 2ND 1900 | LTE 2ND AWS | LTE 4TH 700 | LTE 4TH AWS | LTE 5TH 700 | 5G 1ST 850 | 5G 1ST 1900 | 5G 1ST AWS | 5G 1ST CBAND | 5G 2ND CBAND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| USEID (excluding Hard Sector) | | | | | | | | | | | | | | | |
| SECTOR A SOFT SECTOR ID | CTL02901_7A_1 | | CTL03901_9A_1 | | CTL02901_3A_1 | | | CTL02901_7A_2_E | CTL03901_2A_2 | CTL02901_7A_3_F | CTCN002901_N005 | CTCN002901_N002 | CTCN002901_N066 | CTCN032901_N077A_1 | CTCN032901_N077A_2 |
| SECTOR B | CTL02901_7B_1 | | CTL03901_9B_1 | | CTL02901_3B_1 | | | CTL02901_7B_2_E | CTL03901_2B_2 | CTL02901_7B_3_F | CTCN002901_N005 | CTCN002901_N002 | CTCN002901_N066 | CTCN032901_N077B_1 | CTCN032901_N077B_2 |
| SECTOR C | CTL02901_7C_1 | | CTL03901_9C_1 | | CTL02901_3C_1 | | | CTL02901_7C_2_E | CTL03901_2C_2 | CTL02901_7C_3_F | CTCN002901_N005 | CTCN002901_N002 | CTCN002901_N066 | CTCN032901_N077C_1 | CTCN032901_N077C_2 |
| SECTOR D | | | | | | | | | | | | | | | |
| SECTOR E | | | | | | | | | | | | | | | |
| SECTOR F | | | | | | | | | | | | | | | |
| OMNI | | | | | | | | | | | | | | | |

## Section 9 - Cell Number - existing

| | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS | LTE 2ND 1900 | LTE 2ND AWS | LTE 4TH 700 | LTE 4TH AWS | LTE 5TH 700 | 5G 1ST 850 | 5G 1ST 1900 | 5G 1ST AWS | 5G 1ST CBAND | 5G 2ND CBAND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| USEID (excluding Hard Sector) | | | | | | | | | | | | | | | |
| SECTOR A CELL NUMBER | 15 | 1 | 8 | 22 | 149 | 178 | 192 | | | | 25 | | | | |
| SECTOR B | 16 | 2 | 9 | 23 | 150 | 179 | 193 | | | | 49 | | | | |
| SECTOR C | 17 | 3 | 10 | 24 | 151 | 180 | 194 | | | | 73 | | | | |
| SECTOR D | | | | | | | | | | | | | | | |
| SECTOR E | | | | | | | | | | | | | | | |
| SECTOR F | | | | | | | | | | | | | | | |
| OMNI | | | | | | | | | | | | | | | |

## Section 9 - Cell Number - final

| | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS | LTE 2ND 1900 | LTE 2ND AWS | LTE 4TH 700 | LTE 4TH AWS | LTE 5TH 700 | 5G 1ST 850 | 5G 1ST 1900 | 5G 1ST AWS | 5G 1ST CBAND | 5G 2ND CBAND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| USEID (excluding Hard Sector) | | | | | | | | | | | | | | | |
| SECTOR A CELL NUMBER | 15 | | 8 | | 149 | | | 185 | 192 | 171 | 25 | 26 | 27 | 36 | 37 |
| SECTOR B | 16 | | 9 | | 150 | | | 186 | 193 | 172 | 49 | 50 | 51 | 60 | 61 |
| SECTOR C | 17 | | 10 | | 151 | | | 187 | 194 | 173 | 73 | 74 | 75 | 84 | 85 |
| SECTOR D | | | | | | | | | | | | | | | |
| SECTOR E | | | | | | | | | | | | | | | |
| SECTOR F | | | | | | | | | | | | | | | |
| OMNI | | | | | | | | | | | | | | | |

## Section 10 - CID/SAC - existing

| | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS | LTE 2ND 1900 | LTE 2ND AWS | LTE 4TH 700 | LTE 4TH AWS | LTE 5TH 700 | 5G 1ST 850 | 5G 1ST 1900 | 5G 1ST AWS | 5G 1ST CBAND | 5G 2ND CBAND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SECTOR A CID/SAC | | | | | | | | | | | | | | | |
| SECTOR B | | | | | | | | | | | | | | | |
| SECTOR C | | | | | | | | | | | | | | | |
| SECTOR D | | | | | | | | | | | | | | | |
| SECTOR E | | | | | | | | | | | | | | | |
| SECTOR F | | | | | | | | | | | | | | | |
| OMNI | | | | | | | | | | | | | | | |

## Section 10 - CID/SAC - final

| | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS | LTE 2ND 1900 | LTE 2ND AWS | LTE 4TH 700 | LTE 4TH AWS | LTE 5TH 700 | 5G 1ST 850 | 5G 1ST 1900 | 5G 1ST AWS | 5G 1ST CBAND | 5G 2ND CBAND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SECTOR A CID/SAC | | | | | | | | | | | | | | | |
| SECTOR B | | | | | | | | | | | | | | | |
| SECTOR C | | | | | | | | | | | | | | | |
| SECTOR D | | | | | | | | | | | | | | | |
| SECTOR E | | | | | | | | | | | | | | | |
| SECTOR F | | | | | | | | | | | | | | | |
| OMNI | | | | | | | | | | | | | | | |

## Section 11 - CURRENT RADIO COUNTS existing

| | UMTS 1ST 850 | UMTS 2ND 850 | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS |
|---|---|---|---|---|---|---|---|
| SECTOR A RADIO COUNTS | | | 1 | 1 | 1 | 1 | 1 |
| SECTOR B | | | 1 | 1 | 1 | 1 | 1 |
| SECTOR C | | | 1 | 1 | 1 | 1 | 1 |
| SECTOR D | | | | | | | |
| SECTOR E | | | | | | | |
| SECTOR F | | | | | | | |
| OMNI | | | | | | | |

## Section 12 - CURRENT T1 COUNTS existing

| | LTE 1ST Cabinet |
|---|---|
| # T1s | 1 |
| LINK PROFILE | |
| RF COMBINING | |
| FIBER or ETHERNET? | ETHERNET |
| Tx Board Model | |
| Tx Board QTY | |
| RAX/ECU Board Model | |
| RAX/ECU Board QTY | |
| BBU Board Model | |
| BBU Board QTY | |
| RRU - location | Top |
| FIBER JUMPER | FIBER |
| DC CABLE | DC |
| DC/Fiber Dem. Box | RAYCAP |
| Bundled Fiber Cable | YES |
| Bundled DC Cable | YES |

## Section 13 - NEW/PROPOSED RADIO COUNTS

| | UMTS 1ST 850 | UMTS 2ND 850 | LTE 1ST 700 | LTE 1ST 850 | LTE 1ST 1900 | LTE 1ST AWS | LTE 1ST WCS |
|---|---|---|---|---|---|---|---|
| SECTOR A RADIO COUNTS | | | 1 | 1 | 1 | 1 | 1 |
| SECTOR B | | | 1 | 1 | 1 | 1 | 1 |
| SECTOR C | | | 1 | 1 | 1 | 1 | 1 |
| SECTOR D | | | | | | | |
| SECTOR E | | | | | | | |
| SECTOR F | | | | | | | |
| OMNI | | | | | | | |

## Section 14 - NEW/PROPOSED T1 COUNTS

| | LTE 1ST Cabinet |
|---|---|
| # T1s | 1 |
| LINK PROFILE | |
| RF COMBINING | |
| FIBER or ETHERNET? | ETHERNET |
| Tx Board Model | |
| Tx Board QTY | |
| RAX/ECU Board Model | |
| RAX/ECU Board QTY | |
| BBU Board Model | |
| BBU Board QTY | |
| RRU - location | Top |
| FIBER JUMPER | FIBER |
| DC CABLE | DC |
| DC/Fiber Dem. Box | RAYCAP |
| Bundled Fiber Cable | YES |
| Bundled DC Cable | YES |

## Section 15A - CURRENT TOWER CONFIGURATION - SECTOR A (OR OMNI)

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANTENNA MAKE - MODEL** | HPA-65R-BUU-H8 | | OPA-65R-LCUU-H8 | | | | HPA-65R-BUU-H8 | | | | | | | |
| **ANTENNA VENDOR** | CCI Products | | CCI Products | | | | CCI Products | | | | | | | |
| **ANTENNA SIZE (H x W x D)** | 92.4X14.8X7.4 | | 92.7X14.4X7 | | | | 92.4X14.8X7.4 | | | | | | | |
| **ANTENNA WEIGHT** | 68 | | 88 | | | | 68 | | | | | | | |
| **AZIMUTH** | 40 | | 40 | | | | 40 | | | | | | | |
| **MAGNETIC DECLINATION** | | | | | | | | | | | | | | |
| **RADIATION CENTER (feet)** | 105 | | 105 | | | | 105 | | | | | | | |
| **ANTENNA TIP HEIGHT** | 109 | | 109 | | | | 109 | | | | | | | |
| **MECHANICAL DOWNTILT** | 0 | | 0 | | | | 0 | | | | | | | |
| **FEEDER AMOUNT** | 4 | | 4 | | | | 4 | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)** | | | | | | | | | | | | | | |
| **Antenna RET Motor (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SURGE ARRESTOR (QTY/MODEL)** | 4 | TSXDC-4310FM | 8 | BDFDM-DB (4) + TSXDC-4310FM | | | 6 | BDFDM-DB (2) + TSXDC-4310FM | | | | | | |
| **DIPLEXER (QTY/MODEL)** | 2 | Kaelus DBC2055F1V1-2 | 2 | Kaelus DBC2055F1V1-2 | | | 2 | Kaelus DBC2055F1V1-2 | | | | | | |
| **DUPLEXER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Antenna RET CONTROL UNIT (QTY/MODEL)** | | LTE RRH | | LTE RRH | | | | LTE RRH | | | | | | |
| **DC BLOCK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **TMA/LNA (QTY/MODEL)** | 2 | TMABPDB7823V G12A (Twin-LBP) | 2 | TMABPDB7823V G12A (Twin-LBP) | | | 2 | TMABPDB7823V G12A (Twin-LBP) | | | | | | |
| **CURRENT INJECTORS FOR TMA (QTY/MODEL)** | | | | | | | | | | | | | | |
| **PDU FOR TMAS (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FILTER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SQUID (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FIBER TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **DC TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **REPEATER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - 700 band (QTY/MODEL)** | | | | | | | 1 | RRUS-11 B12 | | | | | | |
| **RRH - 850 band (QTY/MODEL)** | | | 1 | 4478 B5 | | | | | | | | | | |
| **RRH - 1900 band (QTY/MODEL)** | | | | | | | 1 | 4415 B25 | | | | | | |
| **RRH - AWS band (QTY/MODEL)** | 1 | 4426 B66 | | | | | | | | | | | | |
| **RRH - WCS band (QTY/MODEL)** | | | 1 | RRUS-32 B30 | | | | | | | | | | |
| **Additional RRH #1 - any band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional RRH #2 - any band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_1 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 1 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Local Market Note 1** | | | | | | | | | | | | | | |
| **Local Market Note 2** | | | | | | | | | | | | | | |
| **Local Market Note 3** | | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANTENNA POSITION 1** | **PORT 3** | | 143463.A.AWS.4G.4 | CTL02901_2A_2 | CTL02901_2A_2 | | LTE AWS | H8_2133MHz_02DT | 17.4 | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 5070.2572 | | 2 | |
| **ANTENNA POSITION 2** | **PORT 1** | | 143463.A.850.4G.1 | CTL02901_8A_1 | CTL02901_8A_1 | | LTE 850 | H8_849MHz_02DT | 15.4 | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1000 | | 3 | |
| | **PORT 3** | | 143463.A.WCS.4G.1 | CTL02901_3A_1 | CTL02901_3A_1 | | LTE WCS | H8_2350MHz_03DT | 17.2 | 40 | 3 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1285.2866 | | 4 | |
| | **PORT 5** | | 143463.A.850.5G.1 | CTCN002901_N005A_1 | CTCN002901_N005A_1 | | 5G 850 | H8_849MHz_02DT | 15.4 | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1000 | | 3 | |
| **ANTENNA POSITION 4** | **PORT 1** | | 143463.A.700.4G.1 | CTL02901_7A_1 | CTL02901_7A_1 | | LTE 700 | H8_719MHz_02DT | 15.3 | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1475.7065 | | 7 | |
| | **PORT 3** | | 143463.A.1900.4G.1 | CTL02901_9A_1 | CTL02901_9A_1 | | LTE 1900 | H8_1930MHz_02DT | 16.9 | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 4842.058 | | 8 | |
| | **PORT 4** | | 143463.A.1900.4G.4 | CTL02901_9A_2 | CTL02901_9A_2 | | LTE 1900 | H8_1930MHz_02DT | 16.9 | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 4842.058 | | 8 | |

# Section 15B - CURRENT TOWER CONFIGURATION - SECTOR B

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA MAKE - MODEL | HPA-65R-BUU-H8 | | OPA-65R-LCUU-H8 | | | | HPA-65R-BUU-H8 | | | | | | | |
| ANTENNA VENDOR | CCI Products | | CCI Products | | | | CCI Products | | | | | | | |
| ANTENNA SIZE (H x W x D) | 92.4X14.8X7.4 | | 92.7X14.4X7 | | | | 92.4X14.8X7.4 | | | | | | | |
| ANTENNA WEIGHT | 68 | | 88 | | | | 68 | | | | | | | |
| AZIMUTH | 150 | | 150 | | | | 150 | | | | | | | |
| MAGNETIC DECLINATION | | | | | | | | | | | | | | |
| RADIATION CENTER (feet) | 105 | | 105 | | | | 105 | | | | | | | |
| ANTENNA TIP HEIGHT | 109 | | 109 | | | | 109 | | | | | | | |
| MECHANICAL DOWNTILT | 0 | | 0 | | | | 0 | | | | | | | |
| FEEDER AMOUNT | 4 | | 4 | | | | 4 | | | | | | | |
| VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP) | | | | | | | | | | | | | | |
| VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches) | | | | | | | | | | | | | | |
| Antenna RET Motor (QTY/MODEL) | | | | | | | | | | | | | | |
| SURGE ARRESTOR (QTY/MODEL) | 4 | TSXDC-4310FM | 8 | BDFDM-DB (4) + TSXDC-4310FM | | | 6 | BDFDM-DB (2) + TSXDC-4310FM | | | | | | |
| DIPLEXER (QTY/MODEL) | 2 | Kaelus DBC2055F1V1-2 | 2 | Kaelus DBC2055F1V1-2 | | | 2 | Kaelus DBC2055F1V1-2 | | | | | | |
| DUPLEXER (QTY/MODEL) | | | | | | | | | | | | | | |
| Antenna RET CONTROL UNIT (QTY/MODEL) | | LTE RRH | | LTE RRH | | | | LTE RRH | | | | | | |
| DC BLOCK (QTY/MODEL) | | | | | | | | | | | | | | |
| TMA/LNA (QTY/MODEL) | 2 | TMABPDB7823V G12A (Twin-LBP) | 2 | TMABPDB7823V G12A (Twin-LBP) | | | 2 | TMABPDB7823V G12A (Twin-LBP) | | | | | | |
| CURRENT INJECTORS FOR TMA (QTY/MODEL) | | | | | | | | | | | | | | |
| PDU FOR TMAS (QTY/MODEL) | | | | | | | | | | | | | | |
| FILTER (QTY/MODEL) | | | | | | | | | | | | | | |
| SQUID (QTY/MODEL) | | | | | | | | | | | | | | |
| FIBER TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| DC TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| REPEATER (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH - 700 band (QTY/MODEL) | | | | | | | 1 | RRUS-11 B12 | | | | | | |
| RRH - 850 band (QTY/MODEL) | | | 1 | 4478 B5 | | | | | | | | | | |
| RRH - 1900 band (QTY/MODEL) | | | | | | | 1 | 4415 B25 | | | | | | |
| RRH - AWS band (QTY/MODEL) | 1 | 4426 B66 | | | | | | | | | | | | |
| RRH - WCS band (QTY/MODEL) | | | 1 | RRUS-32 B30 | | | | | | | | | | |
| Additional RRH #1 - any band (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional RRH #2 - any band (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_1 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_2 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_3 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 1 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 2 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 3 (QTY/MODEL) | | | | | | | | | | | | | | |
| Local Market Note 1 | | | | | | | | | | | | | | |
| Local Market Note 2 | | | | | | | | | | | | | | |
| Local Market Note 3 | | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA POSITION 1 | PORT 3 | | 143463.B.AWS.4G.4 | CTL02901_2B_2 | CTL02901_2B_2 | | LTE AWS | H8_2133MHz_02DT | 17.4 | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 5070.2572 | | 10 | |
| ANTENNA POSITION 2 | PORT 1 | | 143463.B.850.4G.1 | CTL02901_8B_1 | CTL02901_8B_1 | | LTE 850 | H8_849MHz_02DT | 15.4 | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1000 | | 11 | |
| | PORT 3 | | 143463.B.WCS.4G.1 | CTL02901_3B_1 | CTL02901_3B_1 | | LTE WCS | H8_2350MHz_03DT | 17.2 | 150 | 3 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1285.2866 | | 12 | |
| | PORT 5 | | 143463.B.850.5G.1 | CTCN002901_N005B_1 | CTCN002901_N005B_1 | | 5G 850 | H8_849MHz_02DT | 15.4 | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1000 | | 11 | |
| ANTENNA POSITION 4 | PORT 1 | | 143463.B.700.4G.1 | CTL02901_7B_1 | CTL02901_7B_1 | | LTE 700 | H8_719MHz_02DT | 15.3 | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1475.7065 | | 15 | |
| | PORT 3 | | 143463.B.1900.4G.1 | CTL02901_9B_1 | CTL02901_9B_1 | | LTE 1900 | H8_1930MHz_02DT | 16.9 | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 4842.058 | | 16 | |
| | PORT 4 | | 143463.B.1900.4G.4 | CTL02901_9B_2 | CTL02901_9B_2 | | LTE 1900 | H8_1930MHz_02DT | 16.9 | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 4842.058 | | 16 | |

# Section 15C - CURRENT TOWER CONFIGURATION - SECTOR C

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA MAKE - MODEL | HPA-65R-BUU-H8 | | OPA-65R-LCUU-H8 | | | | HPA-65R-BUU-H8 | | | | | | | |
| ANTENNA VENDOR | CCI Products | | CCI Products | | | | CCI Products | | | | | | | |
| ANTENNA SIZE (H x W x D) | 92.4X14.8X7.4 | | 92.7X14.4X7 | | | | 92.4X14.8X7.4 | | | | | | | |
| ANTENNA WEIGHT | 68 | | 88 | | | | 68 | | | | | | | |
| AZIMUTH | 270 | | 270 | | | | 270 | | | | | | | |
| MAGNETIC DECLINATION | | | | | | | | | | | | | | |
| RADIATION CENTER (feet) | 105 | | 105 | | | | 105 | | | | | | | |
| ANTENNA TIP HEIGHT | 109 | | 109 | | | | 109 | | | | | | | |
| MECHANICAL DOWNTILT | 0 | | 0 | | | | 0 | | | | | | | |
| FEEDER AMOUNT | 4 | | 4 | | | | 4 | | | | | | | |
| VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP) | | | | | | | | | | | | | | |
| VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches) | | | | | | | | | | | | | | |
| Antenna RET Motor (QTY/MODEL) | | | | | | | | | | | | | | |
| SURGE ARRESTOR (QTY/MODEL) | 4 | TSXDC-4310FM | 8 | BDFDM-DB (4) + TSXDC-4310FM | | | 6 | BDFDM-DB (2) + TSXDC-4310FM | | | | | | |
| DIPLEXER (QTY/MODEL) | 2 | Kaelus DBC2055F1V1-2 | 2 | Kaelus DBC2055F1V1-2 | | | 2 | Kaelus DBC2055F1V1-2 | | | | | | |
| DUPLEXER (QTY/MODEL) | | | | | | | | | | | | | | |
| Antenna RET CONTROL UNIT (QTY/MODEL) | | LTE RRH | | LTE RRH | | | | LTE RRH | | | | | | |
| DC BLOCK (QTY/MODEL) | | | | | | | | | | | | | | |
| TMA/LNA (QTY/MODEL) | 2 | TMABPDB7823VG12A (Twin-LBP) | 2 | TMABPDB7823VG12A (Twin-LBP) | | | 2 | TMABPDB7823VG12A (Twin-LBP) | | | | | | |
| CURRENT INJECTORS FOR TMA (QTY/MODEL) | | | | | | | | | | | | | | |
| PDU FOR TMAS (QTY/MODEL) | | | | | | | | | | | | | | |
| FILTER (QTY/MODEL) | | | | | | | | | | | | | | |
| SQUID (QTY/MODEL) | | | | | | | | | | | | | | |
| FIBER TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| DC TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| REPEATER (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH - 700 band (QTY/MODEL) | | | | | | | 1 | RRUS-11 B12 | | | | | | |
| RRH - 850 band (QTY/MODEL) | | | 1 | 4478 B5 | | | | | | | | | | |
| RRH - 1900 band (QTY/MODEL) | | | | | | | 1 | 4415 B25 | | | | | | |
| RRH - AWS band (QTY/MODEL) | 1 | 4426 B66 | | | | | | | | | | | | |
| RRH - WCS band (QTY/MODEL) | | | 1 | RRUS-32 B30 | | | | | | | | | | |
| Additional RRH #1 - any band (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional RRH #2 - any band (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_1 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_2 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_3 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 1 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 2 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 3 (QTY/MODEL) | | | | | | | | | | | | | | |
| Local Market Note 1 | | | | | | | | | | | | | | |
| Local Market Note 2 | | | | | | | | | | | | | | |
| Local Market Note 3 | | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA POSITION 1 | PORT 3 | | 143463.C.AWS.4G.4 | CTL02901_2C_2 | CTL02901_2C_2 | | LTE AWS | H8_2133MHz_02DT | 17.4 | 270 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 5070.2572 | | 18 | |
| ANTENNA POSITION 2 | PORT 1 | | 143463.C.850.4G.1 | CTL02901_8C_1 | CTL02901_8C_1 | | LTE 850 | H8_849MHz_02DT | 15.4 | 270 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1000 | | 19 | |
| | PORT 3 | | 143463.C.WCS.4G.1 | CTL02901_3C_1 | CTL02901_3C_1 | | LTE WCS | H8_2350MHz_03DT | 17.2 | 270 | 3 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1285.2866 | | 20 | |
| | PORT 5 | | 143463.C.850.5G.1 | CTCN002901_N005C_1 | CTCN002901_N005C_1 | | 5G 850 | H8_849MHz_02DT | 15.4 | 270 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1000 | | 19 | |
| ANTENNA POSITION 4 | PORT 1 | | 143463.C.700.4G.1 | CTL02901_7C_1 | CTL02901_7C_1 | | LTE 700 | H8_719MHz_02DT | 15.3 | 270 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 1475.7065 | | 23 | |
| | PORT 3 | | 143463.C.1900.4G.1 | CTL02901_9C_1 | CTL02901_9C_1 | | LTE 1900 | H8_1930MHz_02DT | 16.9 | 270 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 4842.058 | | 24 | |
| | PORT 4 | | 143463.C.1900.4G.4 | CTL02901_9C_2 | CTL02901_9C_2 | | LTE 1900 | H8_1930MHz_02DT | 16.9 | 270 | 2 | BOTTOM | 1-5/8" COAX | 140 | 0 | | | No | | 4842.058 | | 24 | |

## Section 16A - PLANNED/PROPOSED TOWER CONFIGURATION - SECTOR A (OR OMNI)

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Existing Antenna?** | | | | | | | | | | | | | | |
| **ANTENNA MAKE - MODEL** | | | DMP65R-BU8DA | | AIR6449 B77D+AIR6419 B77G STACKED | | QD8616-7 | | | | | | | |
| **ANTENNA VENDOR** | | | CCI | | Ericsson | | Quintel | | | | | | | |
| **ANTENNA SIZE (H x W x D)** | | | 96X20.7X7.7 | | 30.4X15.9X8.1 | | 96X22X9.6 | | | | | | | |
| **ANTENNA WEIGHT** | | | 95.7 | | 81.6 | | 68.2 | | | | | | | |
| **AZIMUTH** | | | 40 | | 40 | | 40 | | | | | | | |
| **MAGNETIC DECLINATION** | | | | | | | | | | | | | | |
| **RADIATION CENTER (feet)** | | | 105 | | 105 | | 105 | | | | | | | |
| **ANTENNA TIP HEIGHT** | | | 109 | | 109 | | 109 | | | | | | | |
| **MECHANICAL DOWNTILT** | | | 0 | | 0 | | 0 | | | | | | | |
| **FEEDER AMOUNT** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)** | | | | | | | | | | | | | | |
| **Antenna RET Motor (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SURGE ARRESTOR (QTY/MODEL)** | | | 8 | TSXDC-4310FM | | | 8 | TSXDC-4310FM | | | | | | |
| **DIPLEXER (QTY/MODEL)** | | | | | | | 4 | 5PX-0726 | | | | | | |
| **DUPLEXER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Antenna RET CONTROL UNIT (QTY/MODEL)** | | | | RRH CONTROLLED | | | | RRH CONTROLLED | | | | | | |
| **DC BLOCK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **TMA/LNA (QTY/MODEL)** | | | | | | | 2 | TMA2124F03V5-2D | | | | | | |
| **CURRENT INJECTORS FOR TMA (QTY/MODEL)** | | | | | | | | | | | | | | |
| **PDU FOR TMAS (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FILTER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SQUID (QTY/MODEL)** | | | | | 1 | DC6-48-60-18-8F | | | | | | | | |
| **FIBER TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **DC TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **REPEATER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - 700 band (QTY/MODEL)** | | | 1 | 4449 B5/B12 | | | 1 | 4478 B14 | | | | | | |
| **RRH - 850 band (QTY/MODEL)** | | | | with another band | | | | | | | | | | |
| **RRH - 1900 band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - AWS band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - WCS band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional RRH #1 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6449 B77D | 1 | 2012 B29 | | | | | | |
| **Additional RRH #2 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6419 B77G | | | | | | | | |
| **RRH_7B_1 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 1 (QTY/MODEL)** | | | | | | | 2 | K SBT 782-11055 | | | | | | |
| **Additional Component 2 (QTY/MODEL)** | | | | | 1 | IDLe Xcede | | | | | | | | |
| **Additional Component 3 (QTY/MODEL)** | | | | | 1 | 6648 | | | | | | | | |
| **Local Market Note 1** | - Follow Antenna/RRHs positions as per PDs.<br>-Replace antennas. | | | | | | | | | | | | | |
| **Local Market Note 2** | | | | | | | | | | | | | | |
| **Local Market Note 3** | 1x6601 / 1x5216 / 1xXMU03 \|\| xxxxx / 1x6630 Mixed-Mode / xxxxx + IDLe//1x6648+IDLe Xcede | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANTENNA POSITION 2** | **PORT 1** | | | CTL02901_7A_1 | CTL02901_7A_1 | | LTE 700 | BU8DA_719MHz_08DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | | | CTCN002901_N005A_1 | CTCN002901_N005A_1 | | 5G 850 | BU8DA_849MHz_04DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | | | CTL02901_3A_1 | CTL02901_3A_1 | | LTE WCS | BU8DA_2355MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| **ANTENNA POSITION 3** | **PORT 1** | | | CTCN032901_N077A_1 | CTCN032901_N077A_1 | | 5G CBAND | B77D+AIR6419 B77G STACKED | | 40 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | **PORT 3** | | | CTCN032901_N077A_2 | CTCN032901_N077A_2 | | 5G DoD | B77D+AIR6419 B77G STACKED | | 40 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| **ANTENNA POSITION 4** | **PORT 1** | | | CTL02901_7A_2_E | CTL02901_7A_2_E | | LTE 700 | 7_719MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | | | CTL02901_7A_3_F | CTL02901_7A_3_F | | LTE 700 | 7_719MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | | | CTL03901_9A_1 | CTL03901_9A_1 | | LTE 1900 | 7_1930MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 7** | | | CTL03901_2A_2 | CTL03901_2A_2 | | LTE AWS | 7_2170MHz_05DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 11** | | | CTCN002901_N002A_1 | CTCN002901_N002A_1 | | 5G 1900 | 7_1930MHz_05DT | | 40 | 3 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 12** | | | CTCN002901_N066A_1 | CTCN002901_N066A_1 | | 5G AWS | 7_2170MHz_05DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |

## Section 16B - PLANNED/PROPOSED TOWER CONFIGURATION - SECTOR B

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Existing Antenna?** | | | | | | | | | | | | | | |
| **ANTENNA MAKE - MODEL** | | | DMP65R-BU8DA | | AIR6449 B77D+AIR6419 B77G STACKED | | QD8616-7 | | | | | | | |
| **ANTENNA VENDOR** | | | CCI | | Ericsson | | Quintel | | | | | | | |
| **ANTENNA SIZE (H x W x D)** | | | 96X20.7X7.7 | | 30.4X15.9X8.1 | | 96X22X9.6 | | | | | | | |
| **ANTENNA WEIGHT** | | | 95.7 | | 81.6 | | 68.2 | | | | | | | |
| **AZIMUTH** | | | 150 | | 150 | | 150 | | | | | | | |
| **MAGNETIC DECLINATION** | | | | | | | | | | | | | | |
| **RADIATION CENTER (feet)** | | | 105 | | 105 | | 105 | | | | | | | |
| **ANTENNA TIP HEIGHT** | | | 109 | | 109 | | 109 | | | | | | | |
| **MECHANICAL DOWNTILT** | | | 0 | | 0 | | 0 | | | | | | | |
| **FEEDER AMOUNT** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)** | | | | | | | | | | | | | | |
| **Antenna RET Motor (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SURGE ARRESTOR (QTY/MODEL)** | | | 8 | TSXDC-4310FM | | | 8 | TSXDC-4310FM | | | | | | |
| **DIPLEXER (QTY/MODEL)** | | | | | | | 4 | 5PX-0726 | | | | | | |
| **DUPLEXER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Antenna RET CONTROL UNIT (QTY/MODEL)** | | | | RRH CONTROLLED | | | | RRH CONTROLLED | | | | | | |
| **DC BLOCK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **TMA/LNA (QTY/MODEL)** | | | | | | | 2 | TMA2124F03V5-2D | | | | | | |
| **CURRENT INJECTORS FOR TMA (QTY/MODEL)** | | | | | | | | | | | | | | |
| **PDU FOR TMAS (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FILTER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SQUID (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FIBER TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **DC TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **REPEATER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - 700 band (QTY/MODEL)** | | | 1 | 4449 B5/B12 | | | 1 | 4478 B14 | | | | | | |
| **RRH - 850 band (QTY/MODEL)** | | | | with another band | | | | | | | | | | |
| **RRH - 1900 band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - AWS band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - WCS band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional RRH #1 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6449 B77D | 1 | 2012 B29 | | | | | | |
| **Additional RRH #2 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6419 B77G | | | | | | | | |
| **RRH_7B_1 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 1 (QTY/MODEL)** | | | | | | | 2 | K SBT 782-11055 | | | | | | |
| **Additional Component 2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Local Market Note 1** | - Follow Antenna/RRHs positions as per PDs.<br>-Replace antennas. | | | | | | | | | | | | | |
| **Local Market Note 2** | | | | | | | | | | | | | | |
| **Local Market Note 3** | 1x6601 / 1x5216 / 1xXMU03 \|\| xxxxx / 1x6630 Mixed-Mode / xxxxx + IDLe//1x6648+IDLe Xcede | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANTENNA POSITION 2** | **PORT 1** | | | CTL02901_7B_1 | CTL02901_7B_1 | | LTE 700 | BU8DA_719MHz_08DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | | | CTCN002901_N005B_1 | CTCN002901_N005B_1 | | 5G 850 | BU8DA_849MHz_04DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | | | CTL02901_3B_1 | CTL02901_3B_1 | | LTE WCS | BU8DA_2355MHz_03DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| **ANTENNA POSITION 3** | **PORT 1** | | | CTCN032901_N077B_1 | CTCN032901_N077B_1 | | 5G CBAND | B77D+AIR6419 B77G STACKED | | 150 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | **PORT 3** | | | CTCN032901_N077B_2 | CTCN032901_N077B_2 | | 5G DoD | B77D+AIR6419 B77G STACKED | | 150 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| **ANTENNA POSITION 4** | **PORT 1** | | | CTL02901_7B_2_E | CTL02901_7B_2_E | | LTE 700 | 7_719MHz_03DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | | | CTL02901_7B_3_F | CTL02901_7B_3_F | | LTE 700 | 7_719MHz_03DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | | | CTL03901_9B_1 | CTL03901_9B_1 | | LTE 1900 | 7_1930MHz_03DT | | 150 | 3 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 7** | | | CTL03901_2B_2 | CTL03901_2B_2 | | LTE AWS | 7_2170MHz_05DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 11** | | | CTCN002901_N002B_1 | CTCN002901_N002B_1 | | 5G 1900 | 7_1930MHz_05DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 12** | | | CTCN002901_N066B_1 | CTCN002901_N066B_1 | | 5G AWS | 7_2170MHz_05DT | | 150 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |

# Section 16C - PLANNED/PROPOSED TOWER CONFIGURATION - SECTOR C

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Existing Antenna?** | | | | | | | | | | | | | | |
| **ANTENNA MAKE - MODEL** | | | DMP65R-BU8DA | | AIR6449 B77D+AIR6419 B77G STACKED | | QD8616-7 | | | | | | | |
| **ANTENNA VENDOR** | | | CCI | | Ericsson | | Quintel | | | | | | | |
| **ANTENNA SIZE (H x W x D)** | | | 96X20.7X7.7 | | 30.4X15.9X8.1 | | 96X22X9.6 | | | | | | | |
| **ANTENNA WEIGHT** | | | 95.7 | | 81.6 | | 68.2 | | | | | | | |
| **AZIMUTH** | | | 270 | | 270 | | 270 | | | | | | | |
| **MAGNETIC DECLINATION** | | | | | | | | | | | | | | |
| **RADIATION CENTER (feet)** | | | 105 | | 105 | | 105 | | | | | | | |
| **ANTENNA TIP HEIGHT** | | | 109 | | 109 | | 109 | | | | | | | |
| **MECHANICAL DOWNTILT** | | | 0 | | 0 | | 0 | | | | | | | |
| **FEEDER AMOUNT** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)** | | | | | | | | | | | | | | |
| **Antenna RET Motor (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SURGE ARRESTOR (QTY/MODEL)** | | | 8 | TSXDC-4310FM | | | 8 | TSXDC-4310FM | | | | | | |
| **DIPLEXER (QTY/MODEL)** | | | | | | | 4 | 5PX-0726 | | | | | | |
| **DUPLEXER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Antenna RET CONTROL UNIT (QTY/MODEL)** | | | | RRH CONTROLLED | | | | RRH CONTROLLED | | | | | | |
| **DC BLOCK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **TMA/LNA (QTY/MODEL)** | | | | | | | 2 | TMA2124F03V5-2D | | | | | | |
| **CURRENT INJECTORS FOR TMA (QTY/MODEL)** | | | | | | | | | | | | | | |
| **PDU FOR TMAS (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FILTER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SQUID (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FIBER TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **DC TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **REPEATER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - 700 band (QTY/MODEL)** | | | 1 | 4449 B5/B12 | | | 1 | 4478 B14 | | | | | | |
| **RRH - 850 band (QTY/MODEL)** | | | | with another band | | | | | | | | | | |
| **RRH - 1900 band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - AWS band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - WCS band (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional RRH #1 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6449 B77D | 1 | 2012 B29 | | | | | | |
| **Additional RRH #2 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6419 B77G | | | | | | | | |
| **RRH_7B_1 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 1 (QTY/MODEL)** | | | | | | | 2 | K SBT 782-11055 | | | | | | |
| **Additional Component 2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Local Market Note 1** | D 3 Antenna solution, | | | | | | | | | | | | | |
| **Local Market Note 2** | | | | | | | | | | | | | | |
| **Local Market Note 3** | / 1xXMU03 \|\| xxxxx / 1x6630 Mixed- | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANTENNA POSITION 2** | **PORT 1** | | | CTL02901_7C_1 | CTL02901_7C_1 | | LTE 700 | BU8DA_719MHz_08DT | | 150 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | | | CTCN002901_N005C_1 | CTCN002901_N005C_1 | | 5G 850 | BU8DA_849MHz_04DT | | 150 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | | | CTL02901_3C_1 | CTL02901_3C_1 | | LTE WCS | BU8DA_2355MHz_03DT | | 150 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| **ANTENNA POSITION 3** | **PORT 1** | | | CTCN032901_N077C_1 | CTCN032901_N077C_1 | | 5G CBAND | B77D+AIR6419 B77G STACKED | | 270 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | **PORT 3** | | | CTCN032901_N077C_2 | CTCN032901_N077C_2 | | 5G DoD | B77D+AIR6419 B77G STACKED | | 270 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| **ANTENNA POSITION 4** | **PORT 1** | | | CTL02901_7C_2_E | CTL02901_7C_2_E | | LTE 700 | 7_719MHz_03DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | | | CTL02901_7C_3_F | CTL02901_7C_3_F | | LTE 700 | 7_719MHz_03DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | | | CTL03901_9C_1 | CTL03901_9C_1 | | LTE 1900 | 7_1930MHz_03DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 7** | | | CTL03901_2C_2 | CTL03901_2C_2 | | LTE AWS | 7_2170MHz_05DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 11** | | | CTCN002901_N002C_1 | CTCN002901_N002C_1 | | 5G 1900 | 7_1930MHz_05DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 12** | | | CTCN002901_N066C_1 | CTCN002901_N066C_1 | | 5G AWS | 7_2170MHz_05DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |

## Section 16.5A - SCOPING TOWER CONFIGURATION - SECTOR A (OR OMNI)

## Section 17A - FINAL TOWER CONFIGURATION - SECTOR A (OR OMNI)

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA MAKE - MODEL | | | DMP65R-BU8DA | | AIR6449 B77D+AIR6419 B77G STACKED | | QD8616-7 | | | | | | | |
| ANTENNA VENDOR | | | CCI | | Ericsson | | Quintel | | | | | | | |
| ANTENNA SIZE (H x W x D) | | | 96X20.7X7.7 | | 30.4X15.9X8.1 | | 96X22X9.6 | | | | | | | |
| ANTENNA WEIGHT | | | 95.7 | | 81.6 | | 68.2 | | | | | | | |
| AZIMUTH | | | 40 | | 40 | | 40 | | | | | | | |
| MAGNETIC DECLINATION | | | | | | | | | | | | | | |
| RADIATION CENTER (feet) | | | 105 | | 105 | | 105 | | | | | | | |
| ANTENNA TIP HEIGHT | | | 109 | | 109 | | 109 | | | | | | | |
| MECHANICAL DOWNTILT | | | 0 | | 0 | | 0 | | | | | | | |
| FEEDER AMOUNT | | | 4 | | | | 6 | | | | | | | |
| VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP) | | | | | | | | | | | | | | |
| VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches) | | | | | | | | | | | | | | |
| Antenna RET Motor (QTY/MODEL) | | | | | | | | | | | | | | |
| SURGE ARRESTOR (QTY/MODEL) | | | 8 | TSXDC-4310FM | | | 14 | TSXDC-4310FM | | | | | | |
| DIPLEXER (QTY/MODEL) | | | 2 | DBC2055F1V1-2 | | | 4 | 5PX-0726 | | | | | | |
| DUPLEXER (QTY/MODEL) | | | | | | | | | | | | | | |
| Antenna RET CONTROL UNIT (QTY/MODEL) | | | | RRH CONTROLLED | | | | RRH CONTROLLED | | | | | | |
| DC BLOCK (QTY/MODEL) | | | | | | | | | | | | | | |
| TMA/LNA (QTY/MODEL) | | | 2 | TMABPD7823VG 12A | | | 2 | TMA2124F03V5-2D | | | | | | |
| CURRENT INJECTORS FOR TMA (QTY/MODEL) | | | | | | | 2 | APTDC-BDFDM-DB | | | | | | |
| PDU FOR TMAS (QTY/MODEL) | | | | | | | | | | | | | | |
| FILTER (QTY/MODEL) | | | | | | | | | | | | | | |
| SQUID (QTY/MODEL) | | | | | 1 | DC6-48-60-18-8F | | | | | | | | |
| FIBER TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| DC TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| REPEATER (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH - 700 band (QTY/MODEL) | | | 1 | 4449 B5/B12 | | | 1 | 4478 B14 | | | | | | |
| RRH - 850 band (QTY/MODEL) | | | | with another band | | | | | | | | | | |
| RRH - 1900 band (QTY/MODEL) | | | | | | | 1 | 4415 B25 | | | | | | |
| RRH - AWS band (QTY/MODEL) | | | | | | | 1 | 4426 B66 | | | | | | |
| RRH - WCS band (QTY/MODEL) | | | 1 | RRUS-32 B30 | | | | | | | | | | |
| Additional RRH #1 - any band (QTY/MODEL) | | | | | 1 | integrated within: AIR6449 B77D | 1 | 2012 B29 | | | | | | |
| Additional RRH #2 - any band (QTY/MODEL) | | | | | 1 | integrated within: AIR6419 B77G | | | | | | | | |
| RRH_7B_1 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_2 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_3 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 1 (QTY/MODEL) | | | | | | | 2 | K SBT 782-11055 | | | | | | |
| Additional Component 2 (QTY/MODEL) | | | | | 1 | IDLe Xcede | | | | | | | | |
| Additional Component 3 (QTY/MODEL) | | | | | 1 | 6648 | | | | | | | | |
| Local Market Note 1 | - Follow Antenna/RRHs positions as per PDs.<br>-Replace antennas. | | | | | | | | | | | | | |
| Local Market Note 2 | | | | | | | | | | | | | | |
| Local Market Note 3 | 1x6601 / 1x5216 / 1xXMU03 \|\| xxxxx / 1x6630 Mixed-Mode / xxxxx + IDLe//1x6648+IDLe Xcede | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA POSITION 2 | PORT 1 | 143463.A.700.4G.1 | | CTL02901_7A_1 | CTL02901_7A_1 | | LTE 700 | BU8DA_719MHz_08DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 2 | 143463.A.850.5G.1 | | CTCN002901_N005A_1 | CTCN002901_N005A_1 | | 5G 850 | BU8DA_849MHz_04DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 3 | 143463.A.WCS.4G.1 | | CTL02901_3A_1 | CTL02901_3A_1 | | LTE WCS | BU8DA_2355MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| ANTENNA POSITION 3 | PORT 1 | 143463.A.CBAND.5G.tmp1 | | CTCN032901_N077A_1 | CTCN032901_N077A_1 | | 5G CBAND | B77D+AIR6419 B77G STACKED | | 40 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | PORT 3 | 143463.A.CBAND.5G.tmp2 | | CTCN032901_N077A_2 | CTCN032901_N077A_2 | | 5G DoD | B77D+AIR6419 B77G STACKED | | 40 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| ANTENNA POSITION 4 | PORT 1 | 143463.A.700.4G.tmp4 | | CTL02901_7A_2_E | CTL02901_7A_2_E | | LTE 700 | 7_719MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 2 | 143463.A.700.4G.tmp5 | | CTL02901_7A_3_F | CTL02901_7A_3_F | | LTE 700 | 7_719MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 3 | 143463.A.1900.4G.tmp1 | | CTL03901_9A_1 | CTL03901_9A_1 | | LTE 1900 | 7_1930MHz_03DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 7 | 143463.A.AWS.4G.tmp4 | | CTL03901_2A_2 | CTL03901_2A_2 | | LTE AWS | 7_2170MHz_05DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 11 | 143463.A.1900.5G.tmp1 | | CTCN002901_N002A_1 | CTCN002901_N002A_1 | | 5G 1900 | 7_1930MHz_05DT | | 40 | 3 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 12 | 143463.A.AWS.5G.tmp1 | | CTCN002901_N066A_1 | CTCN002901_N066A_1 | | 5G AWS | 7_2170MHz_05DT | | 40 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |

## Section 17B - FINAL TOWER CONFIGURATION - SECTOR B

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANTENNA MAKE - MODEL** | | | DMP65R-BU8DA | | AIR6449 B77D+AIR6419 B77G STACKED | | QD8616-7 | | | | | | | |
| **ANTENNA VENDOR** | | | CCI | | Ericsson | | Quintel | | | | | | | |
| **ANTENNA SIZE (H x W x D)** | | | 96X20.7X7.7 | | 30.4X15.9X8.1 | | 96X22X9.6 | | | | | | | |
| **ANTENNA WEIGHT** | | | 95.7 | | 81.6 | | 68.2 | | | | | | | |
| **AZIMUTH** | | | 150 | | 150 | | 150 | | | | | | | |
| **MAGNETIC DECLINATION** | | | | | | | | | | | | | | |
| **RADIATION CENTER (feet)** | | | 105 | | 105 | | 105 | | | | | | | |
| **ANTENNA TIP HEIGHT** | | | 109 | | 109 | | 109 | | | | | | | |
| **MECHANICAL DOWNTILT** | | | 0 | | 0 | | 0 | | | | | | | |
| **FEEDER AMOUNT** | | | 4 | | | | 6 | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)** | | | | | | | | | | | | | | |
| **VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)** | | | | | | | | | | | | | | |
| **HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)** | | | | | | | | | | | | | | |
| **Antenna RET Motor (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SURGE ARRESTOR (QTY/MODEL)** | | | 8 | TSXDC-4310FM | | | 14 | TSXDC-4310FM | | | | | | |
| **DIPLEXER (QTY/MODEL)** | | | 2 | DBC2055F1V1-2 | | | 4 | 5PX-0726 | | | | | | |
| **DUPLEXER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Antenna RET CONTROL UNIT (QTY/MODEL)** | | | | RRH CONTROLLED | | | | RRH CONTROLLED | | | | | | |
| **DC BLOCK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **TMA/LNA (QTY/MODEL)** | | | 2 | TMABPD7823VG12A | | | 2 | TMA2124F03V5-2D | | | | | | |
| **CURRENT INJECTORS FOR TMA (QTY/MODEL)** | | | | | | | 2 | APTDC-BDFDM-DB | | | | | | |
| **PDU FOR TMAS (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FILTER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **SQUID (QTY/MODEL)** | | | | | | | | | | | | | | |
| **FIBER TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **DC TRUNK (QTY/MODEL)** | | | | | | | | | | | | | | |
| **REPEATER (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH - 700 band (QTY/MODEL)** | | | 1 | 4449 B5/B12 | | | 1 | 4478 B14 | | | | | | |
| **RRH - 850 band (QTY/MODEL)** | | | | with another band | | | | | | | | | | |
| **RRH - 1900 band (QTY/MODEL)** | | | | | | | 1 | 4415 B25 | | | | | | |
| **RRH - AWS band (QTY/MODEL)** | | | | | | | 1 | 4426 B66 | | | | | | |
| **RRH - WCS band (QTY/MODEL)** | | | 1 | RRUS-32 B30 | | | | | | | | | | |
| **Additional RRH #1 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6449 B77D | 1 | 2012 B29 | | | | | | |
| **Additional RRH #2 - any band (QTY/MODEL)** | | | | | 1 | integrated within: AIR6419 B77G | | | | | | | | |
| **RRH_7B_1 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **RRH_7B_3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 1 (QTY/MODEL)** | | | | | | | 2 | K SBT 782-11055 | | | | | | |
| **Additional Component 2 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Additional Component 3 (QTY/MODEL)** | | | | | | | | | | | | | | |
| **Local Market Note 1** | - Follow Antenna/RRHs positions as per PDs.<br>-Replace antennas. | | | | | | | | | | | | | |
| **Local Market Note 2** | | | | | | | | | | | | | | |
| **Local Market Note 3** | 1x6601 / 1x5216 / 1xXMU03 \|\| xxxxx / 1x6630 Mixed-Mode / xxxxx + IDLe//1x6648+IDLe Xcede | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANTENNA POSITION 2** | **PORT 1** | 143463.B.700.4G.1 | | CTL02901_7B_1 | CTL02901_7B_1 | | LTE 700 | BU8DA_719MHz_08DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | 143463.B.850.5G.1 | | CTCN002901_N005B_1 | CTCN002901_N005B_1 | | 5G 850 | BU8DA_849MHz_04DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | 143463.B.WCS.4G.1 | | CTL02901_3B_1 | CTL02901_3B_1 | | LTE WCS | BU8DA_2355MHz_03DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| **ANTENNA POSITION 3** | **PORT 1** | 143463.B.CBAND.5G.tmp1 | | CTCN032901_N077B_1 | CTCN032901_N077B_1 | | 5G CBAND | B77D+AIR6419 B77G STACKED | | 150 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | **PORT 3** | 143463.B.CBAND.5G.tmp2 | | CTCN032901_N077B_2 | CTCN032901_N077B_2 | | 5G DoD | B77D+AIR6419 B77G STACKED | | 150 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| **ANTENNA POSITION 4** | **PORT 1** | 143463.B.700.4G.tmp4 | | CTL02901_7B_2_E | CTL02901_7B_2_E | | LTE 700 | 7_719MHz_03DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 2** | 143463.B.700.4G.tmp5 | | CTL02901_7B_3_F | CTL02901_7B_3_F | | LTE 700 | 7_719MHz_03DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 3** | 143463.B.1900.4G.tmp1 | | CTL03901_9B_1 | CTL03901_9B_1 | | LTE 1900 | 7_1930MHz_03DT | | 150 | 3 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 7** | 143463.B.AWS.4G.tmp4 | | CTL03901_2B_2 | CTL03901_2B_2 | | LTE AWS | 7_2170MHz_05DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 11** | 143463.B.1900.5G.tmp1 | | CTCN002901_N002B_1 | CTCN002901_N002B_1 | | 5G 1900 | 7_1930MHz_05DT | | 150 | 2 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | **PORT 12** | 143463.B.AWS.5G.tmp1 | | CTCN002901_N066B_1 | CTCN002901_N066B_1 | | 5G AWS | 7_2170MHz_05DT | | 150 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |

## Section 17C - FINAL TOWER CONFIGURATION - SECTOR C

| ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA (unless otherwise specified) | ANTENNA POSITION 1 | | ANTENNA POSITION 2 | | ANTENNA POSITION 3 | | ANTENNA POSITION 4 | | ANTENNA POSITION 5 | | ANTENNA POSITION 6 | | ANTENNA POSITION 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA MAKE - MODEL | | | DMP65R-BU8DA | | AIR6449 B77D+AIR6419 B77G STACKED | | QD8616-7 | | | | | | | |
| ANTENNA VENDOR | | | CCI | | Ericsson | | Quintel | | | | | | | |
| ANTENNA SIZE (H x W x D) | | | 96X20.7X7.7 | | 30.4X15.9X8.1 | | 96X22X9.6 | | | | | | | |
| ANTENNA WEIGHT | | | 95.7 | | 81.6 | | 68.2 | | | | | | | |
| AZIMUTH | | | 270 | | 270 | | 270 | | | | | | | |
| MAGNETIC DECLINATION | | | | | | | | | | | | | | |
| RADIATION CENTER (feet) | | | 105 | | 105 | | 105 | | | | | | | |
| ANTENNA TIP HEIGHT | | | 109 | | 109 | | 109 | | | | | | | |
| MECHANICAL DOWNTILT | | | 0 | | 0 | | 0 | | | | | | | |
| FEEDER AMOUNT | | | 4 | | | | 6 | | | | | | | |
| VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP) | | | | | | | | | | | | | | |
| VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE) | | | | | | | | | | | | | | |
| HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches) | | | | | | | | | | | | | | |
| Antenna RET Motor (QTY/MODEL) | | | | | | | | | | | | | | |
| SURGE ARRESTOR (QTY/MODEL) | | | 8 | TSXDC-4310FM | | | 14 | TSXDC-4310FM | | | | | | |
| DIPLEXER (QTY/MODEL) | | | 2 | DBC2055F1V1-2 | | | 4 | 5PX-0726 | | | | | | |
| DUPLEXER (QTY/MODEL) | | | | | | | | | | | | | | |
| Antenna RET CONTROL UNIT (QTY/MODEL) | | | | RRH CONTROLLED | | | | RRH CONTROLLED | | | | | | |
| DC BLOCK (QTY/MODEL) | | | | | | | | | | | | | | |
| TMA/LNA (QTY/MODEL) | | | 2 | TMABPD7823VG12A | | | 2 | TMA2124F03V5-2D | | | | | | |
| CURRENT INJECTORS FOR TMA (QTY/MODEL) | | | | | | | 2 | APTDC-BDFDM-DB | | | | | | |
| PDU FOR TMAS (QTY/MODEL) | | | | | | | | | | | | | | |
| FILTER (QTY/MODEL) | | | | | | | | | | | | | | |
| SQUID (QTY/MODEL) | | | | | | | | | | | | | | |
| FIBER TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| DC TRUNK (QTY/MODEL) | | | | | | | | | | | | | | |
| REPEATER (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH - 700 band (QTY/MODEL) | | | 1 | 4449 B5/B12 | | | 1 | 4478 B14 | | | | | | |
| RRH - 850 band (QTY/MODEL) | | | | with another band | | | | | | | | | | |
| RRH - 1900 band (QTY/MODEL) | | | | | | | 1 | 4415 B25 | | | | | | |
| RRH - AWS band (QTY/MODEL) | | | | | | | 1 | 4426 B66 | | | | | | |
| RRH - WCS band (QTY/MODEL) | | | 1 | RRUS-32 B30 | | | | | | | | | | |
| Additional RRH #1 - any band (QTY/MODEL) | | | | | 1 | integrated within: AIR6449 B77D | 1 | 2012 B29 | | | | | | |
| Additional RRH #2 - any band (QTY/MODEL) | | | | | 1 | integrated within: AIR6419 B77G | | | | | | | | |
| RRH_7B_1 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_2 (QTY/MODEL) | | | | | | | | | | | | | | |
| RRH_7B_3 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 1 (QTY/MODEL) | | | | | | | 2 | K SBT 782-11055 | | | | | | |
| Additional Component 2 (QTY/MODEL) | | | | | | | | | | | | | | |
| Additional Component 3 (QTY/MODEL) | | | | | | | | | | | | | | |
| Local Market Note 1 | - Follow Antenna/RRHs positions as per PDs.<br>-Replace antennas. | | | | | | | | | | | | | |
| Local Market Note 2 | | | | | | | | | | | | | | |
| Local Market Note 3 | 1x6601 / 1x5216 / 1xXMU03 \|\| xxxxx / 1x6630 Mixed-Mode / xxxxx + IDLe//1x6648+IDLe Xcede | | | | | | | | | | | | | |

| PORT SPECIFIC FIELDS | PORT NUMBER | USEID (CSSng) | USEID (Atoll) | ATOLL TXID | ATOLL CELL ID | TX/RX? | TECHNOLOGY / FREQUENCY | ANTENNA ATOLL | ANTENNA GAIN | ELECTRICAL AZIMUTH | ELECTRICAL TILT | RRH LOCATION (Top/Bottom/ Integrated/None) | FEEDERS TYPE | FEEDER LENGTH (feet) | RXAIT KIT MODULE? | TRIPLEXER or LLC (QTY) | TRIPLEXER or LLC (MODEL) | SCPA/MCPA MODULE? | HATCHPLATE POWER (Watts) | ERP (Watts) | Antenna RET Name | CABLE NUMBER | CABLE ID(cssng) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANTENNA POSITION 2 | PORT 1 | 143463.C.700.4G.1 | | CTL02901_7C_1 | CTL02901_7C_1 | | LTE 700 | BU8DA_719MHz_08DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 2 | 143463.C.850.5G.1 | | CTCN002901_N005C_1 | CTCN002901_N005C_1 | | 5G 850 | BU8DA_849MHz_04DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 3 | 143463.C.WCS.4G.1 | | CTL02901_3C_1 | CTL02901_3C_1 | | LTE WCS | BU8DA_2355MHz_03DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| ANTENNA POSITION 3 | PORT 1 | 143463.C.CBAND.5G.tmp1 | | CTCN032901_N077C_1 | CTCN032901_N077C_1 | | 5G CBAND | B77D+AIR6419 B77G STACKED | | 270 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | PORT 3 | 143463.C.CBAND.5G.tmp2 | | CTCN032901_N077C_2 | CTCN032901_N077C_2 | | 5G DoD | B77D+AIR6419 B77G STACKED | | 270 | 0 | TOP | FIBER | 0 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| ANTENNA POSITION 4 | PORT 1 | 143463.C.700.4G.tmp4 | | CTL02901_7C_2_E | CTL02901_7C_2_E | | LTE 700 | 7_719MHz_03DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 2 | 143463.C.700.4G.tmp5 | | CTL02901_7C_3_F | CTL02901_7C_3_F | | LTE 700 | 7_719MHz_03DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 3 | 143463.C.1900.4G.tmp1 | | CTL03901_9C_1 | CTL03901_9C_1 | | LTE 1900 | 7_1930MHz_03DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 7 | 143463.C.AWS.4G.tmp4 | | CTL03901_2C_2 | CTL03901_2C_2 | | LTE AWS | 7_2170MHz_05DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 11 | 143463.C.1900.5G.tmp1 | | CTCN002901_N002C_1 | CTCN002901_N002C_1 | | 5G 1900 | 7_1930MHz_05DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |
| | PORT 12 | 143463.C.AWS.5G.tmp1 | | CTCN002901_N066C_1 | CTCN002901_N066C_1 | | 5G AWS | 7_2170MHz_05DT | | 270 | 0 | BOTTOM | 1-5/8" COAX | 140 | | | | | | | | | |

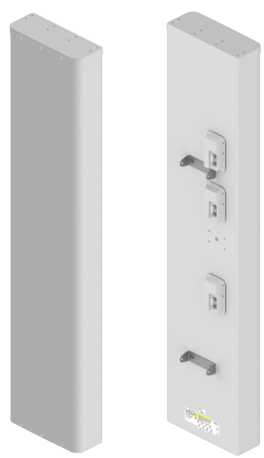
Antennas

MultiPort Series

DATA SHEET

# Diplexed Multi-Band Antenna

DMP65R-BU8D



- Eight foot (2.4 m) internally multiplexed MultiBand antenna, including eight external RF ports (12 RF ports internal), with a 65° azimuth beamwidth covering 698-896 MHz and 1695-2400 MHz frequencies
- Four wide high band ports covering 1695-2400 MHz and four wide low band ports covering 698-896 MHz in a single antenna enclosure
- Innovative Multiplexed/RET Control configuration, supporting Dual Band Radio Configurations (B12/B5 and B29/B5). The antenna provides Dual 4T4R (4x4 MIMO) capability, while providing independent RET control, an Industry First
- Innovative Low and High Band Array configuration allows for 4T4R (4x4 MIMO) on Low Band and 4T4R (4x4 MIMO) High Band Arrays, using full length arrays (non stacked), all in a 20.7" (525 mm) width enclosure, an Industry First
- Industry leading antenna topology and RET shielding techniques drastically mitigate PIM propagation from B12/B14/B29 operations, allowing for superior Network performance
- Full Spectrum Compliance for PCS, AWS-3 and WCS frequencies and 700/850 MHz Dual Band Radio Configurations
- 
- LTE Optimized FBR and SPR performance, providing for an efficient use of valuable radio capacity
- LTE Optimized Boresight and Sector XPD and USL performance, essential for LTE Performance
- Exceeds minimum PIM performance requirements
- Equipped with new 4.3-10 connector, which is 40% smaller than traditional 7/16 DIN connector
- Ordering options for External RET Controllers (Type 1) or Internally Integrated RET Controllers (Type 17)

## Overview

The CCI internally multiplexed MultiBand array is an eight port (12 RF ports internal) antenna, with four wide band ports covering 1695-2400 MHz and four low band ports covering 698-896 MHz. The antenna provides the capability to deploy 4T4R (4x4 MIMO) in the high band, with separate RET control. The antenna also provides the capability to provide independent RET control for 700/850 MHz Dual Band Radio Configurations, while maintaining 4T4R (4x4 MIMO) across the low band ports.

CCI antennas are designed and produced to ISO 9001 certification standards for reliability and quality in our state-of-the-art manufacturing facilities.

## Applications

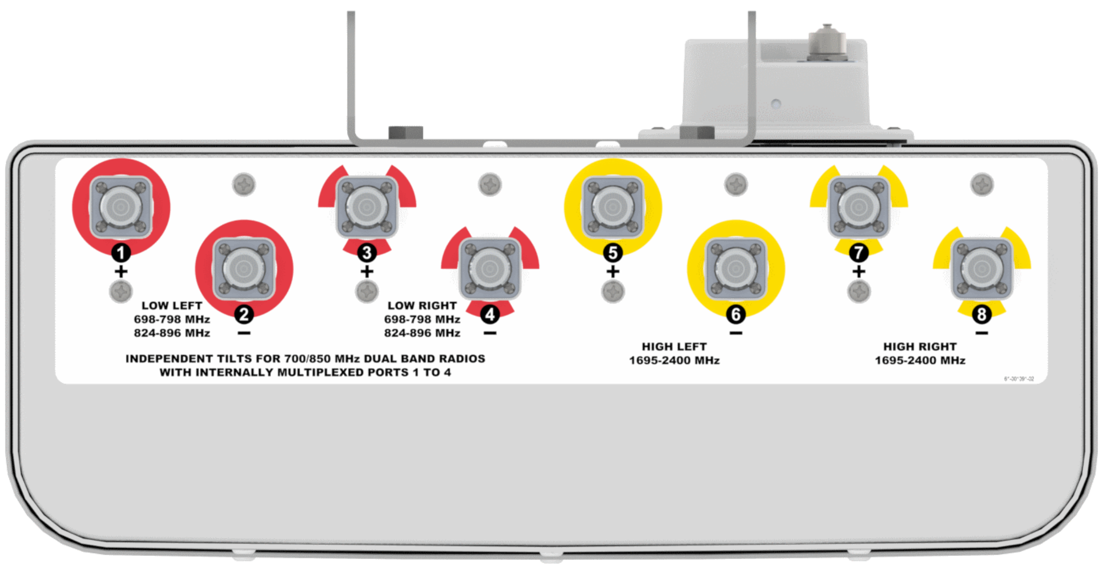
- 4x4 MIMO for the High Band and 4X4 MIMO Low Band ports
- Ready for Network Standardization on 4.3-10 DIN connectors
- With CCI's multiband antennas, wireless providers can connect multiple platforms to a single antenna, reducing tower load, lease expense, deployment time and installation costs

## Mechanical

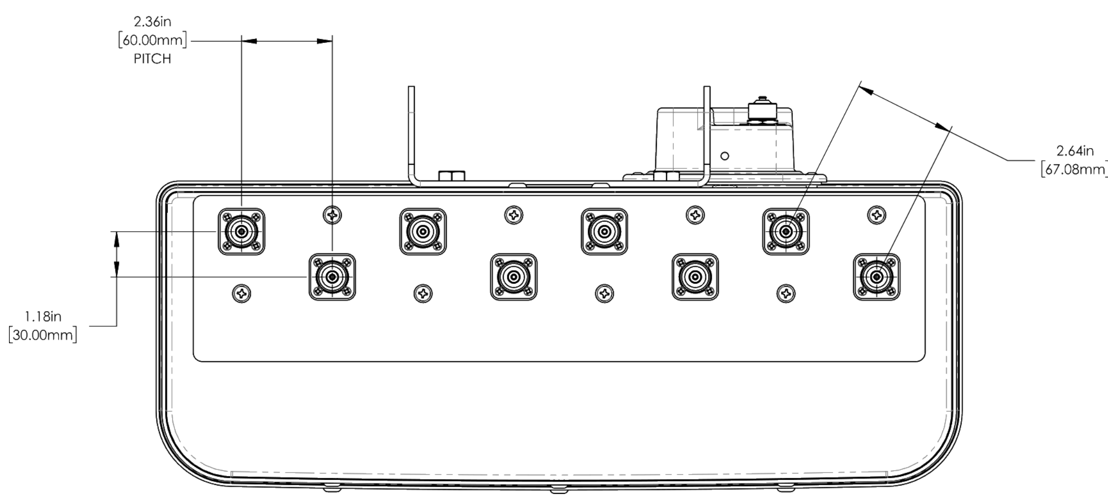
| | |
|---|---|
| Dimensions (L×W×D) | 96.0×20.7×7.7 in (2438×525×197 mm) |
| Survival Wind Speed | > 150 mph (> 241 kph) |
| Front Wind Load | 457 lbs (2033 N) @ 100 mph (161 kph) |
| Side Wind Load | 209 lbs (929 N) @ 100 mph (161 kph) |
| Equivalent Flat Plate Area | 17.9 ft$^2$ (1.7 m$^2$) |
| Weight * | 95.7 lbs (43.4 kg) |
| Connector | 8 x 4.3-10 female |
| Mounting Pole | 2 to 5 in (5 to 12 cm) |

** Weight excludes mounting*

*Bottom View*




*Connector Spacing*



# QD8616-7

## 8ft 65° MultiServ™ 16-Port Antenna

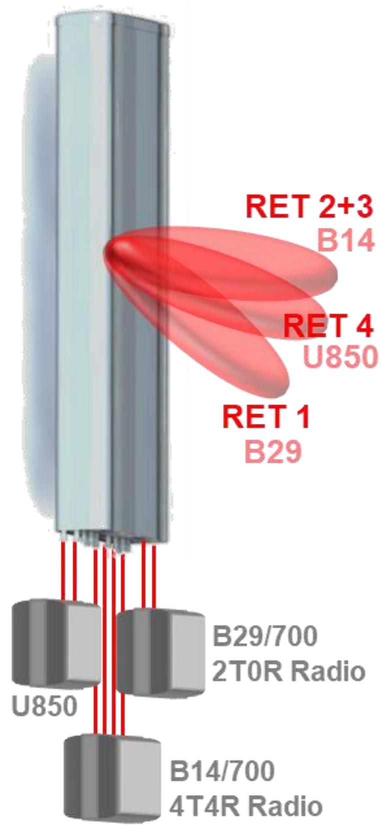
**2x698-728MHz / 4x758-798MHz / 2x824-894MHz / 8x1695-2400MHz**

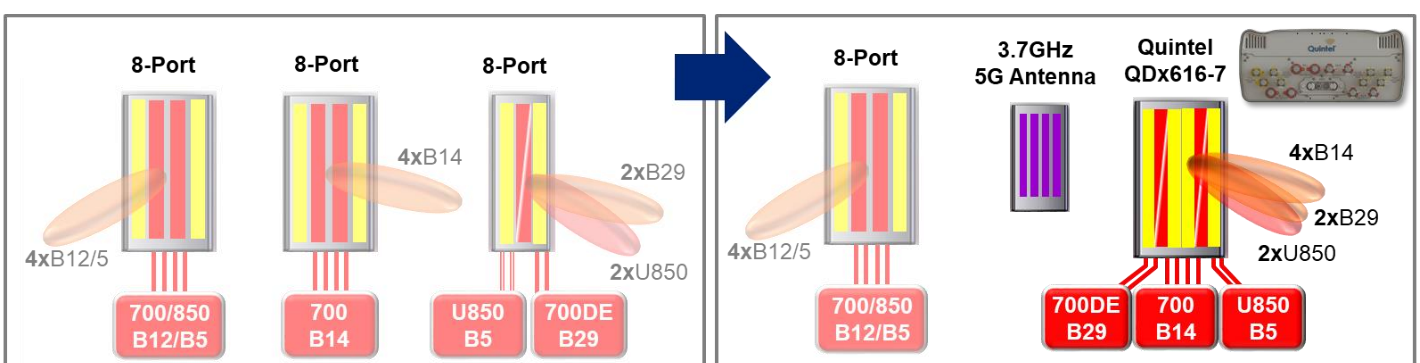
- Allows B29 and B5 services to share same antenna with B14
- Frees up an Antenna position at sites for 3.7GHz Antenna
- B29/B14 Cross-Band Internal PIM > 159dBc

- Full length Low & High-band Arrays for optimal VBW and Gain
- Best in class Quality, Internal and External PIM performance

| Electrical Characteristics | Ports 1 2 | Ports 3 4 5 6 | Ports 7 8 | Ports 9 - 16 | | | |
|---|---|---|---|---|---|---|---|
| Polarization | ±45° | 2x ±45° | ±45° | 4x ±45° | | | |
| Operating Frequency (MHz) | 698-728 | 758-798 | 824-894 | 1695-2400 | | | |
| | 698-728 | 758-798 | 824-894 | 1695-1880 | 1850-1990 | 2110-2180 | 2300-2400 |
| Gain (dBi) | 14.9 | 15.2 | 15.3 | 17.0 | 17.2 | 17.5 | 18.4 |
| Azimuth beamwidth[1] | 72±4.0° | 67±6.1° | 65±5.2° | 63±5.8° | 62±5.9° | 62±4.3° | 58±5.6° |
| Electrical down-tilt range | 2°-12° | 2x 2°-12° | 2°-12° | 2x 0°–9° | | | |
| Elevation beamwidth[1] | 9.7±0.5° | 9.1±0.3° | 8.5±0.4° | 6.8±0.6° | 6.2±0.4° | 5.5±0.3° | 5.1±0.3° |
| BASTA Gain (dBi) | 14.8±0.2 | 15.0±0.4 | 15.0±0.5 | 16.5±0.6 | 16.9±0.4 | 17.1±0.5 | 18.0±0.8 |
| Min Tilt | 14.7 | 14.9 | 14.9 | 16.6 | 17.0 | 17.1 | 17.9 |
| Mid Tilt | 14.8 | 15.0 | 15.1 | 16.6 | 17.0 | 17.2 | 18.1 |
| Max Tilt | 14.6 | 14.9 | 14.8 | 16.4 | 16.7 | 16.9 | 17.8 |
| USLS 20°>mainbeam (dB) | 11.7 | 13.5 | 12.6 | 11.8 | 12.3 | 13.8 | 15.0 |
| FTB at 180°±30° (dB)[1] | 19.3 | 33.9 | 27.3 | 32.1 | 26.4 | 32.0 | 27.1 |
| Isolation Port to Port (dB) | 36 | 35 | 32 | 35 | 35 | 36 | 36 |
| Return loss/VSWR (dB) | 14/1.5 | 14/1.5 | 14/1.5 | 14/1.5 | 14/1.5 | 14/1.5 | 14/1.5 |
| X Polar at 0° (dB)[1] | 15.1 | 15.0 | 15.5 | 19.2 | 17.8 | 19.3 | 20.3 |
| Max Power handling (port) | 75 Watts | 100 Watts | 200 Watts | 250 Watts | | | |
| Max Power (all ports) | 900 Watts | | | | | | |
| PIM (dBc: 2x43dBm) | >153 (>159 X-Band B29/B14) | | | >153 | | | |

[1] *BASTA*




**Application Example: Allows 3.7GHz deployment maintaining 3x Antenna Positions with all services**

# Quintel®
New Dimensions in Wireless™

# QD8616-7
MultiServ

## 8ft 65° MultiServ™ 16-Port Antenna

2x698-728MHz / 4x758-798MHz / 2x824-894MHz /8x1695-2400MHz

## Mechanical Characteristics

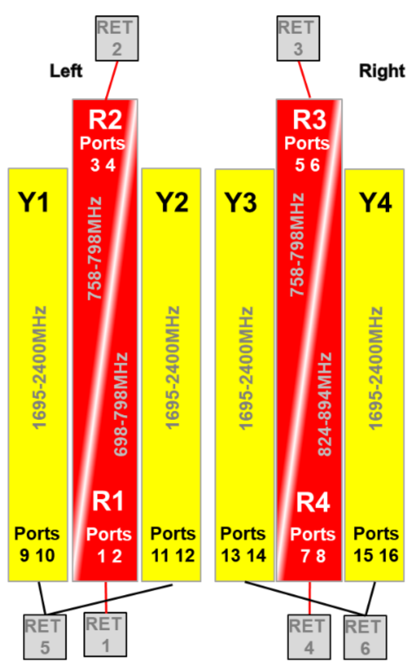
| | |
|---|---|
| Dimensions | L 96"(2438mm) x W 22"(558mm) x D 9.6"(245mm) |
| Weight (excl mounting brackets) | 132lbs (60.0kg) |
| No. of Connectors | 16x 4.3-10.0 DIN Female Long Neck |
| Max Wind Speed | 150mph (67m/s) |
| Equivalent Projected Area[2] | Front: 13.3ft$^2$ (1.24m$^2$) Side: 4.2ft$^2$ (0.39m$^2$) |
| Wind Load[2] @161km/h (45m/s) | Front: 339lbs (1508N), Side: 107lbs (476N) |
| Operating Temperature | -40°C to +65°C |

*[2] Equivalent Projected Area and Wind Load derived from simulation measurements.*
*Equivalent Projected Area assumed $C_d$=1*

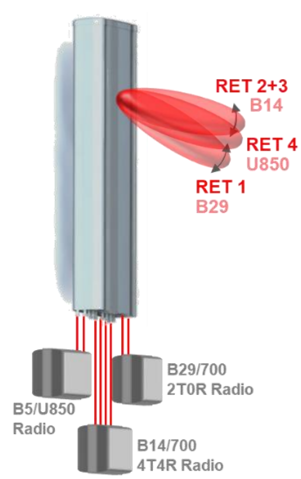
## Fully Integrated RET Characteristics

| | |
|---|---|
| Protocol | V 1.1/2.0/3GPP (SRET Type 1) |
| Surge immunity | IEC 61000-4-5:2005 4KV(AISG PIN) |
| AISG Data rate | 9.6 kbps |
| RET Connectors | 1x 8-Pin DIN Female & 1x 8-Pin DIN Male |

## Port Layout, Array Configuration and RET ID




| RET ID | Ports | | | | Arrays | | | | Freq Range |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | | | R1 | | | | 698-728MHz |
| 2 | 3 | 4 | | | R2 | | | | 758-798MHz |
| 3 | | | 5 | 6 | | | R3 | | 758-798MHz |
| 4 | | | 7 | 8 | | | R4 | | 824-894MHz |
| 5 | 9 | 10 | 11 | 12 | Y1 | Y2 | | | 1695-2400MHz |
| 6 | 13 | 14 | 15 | 16 | | | Y3 | Y4 | 1695-2400MHz |



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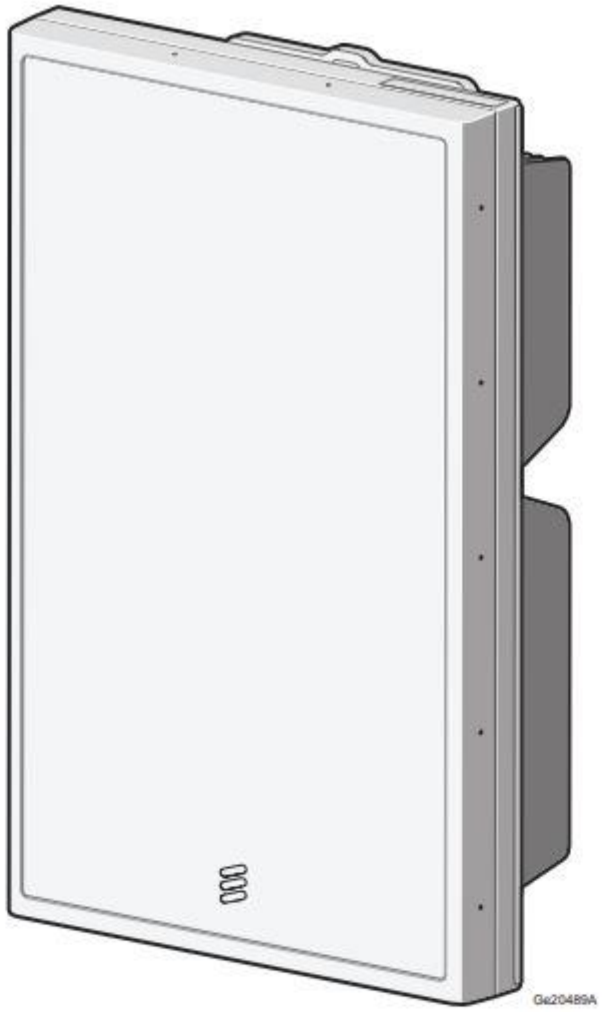
www.quintelsolutions.com

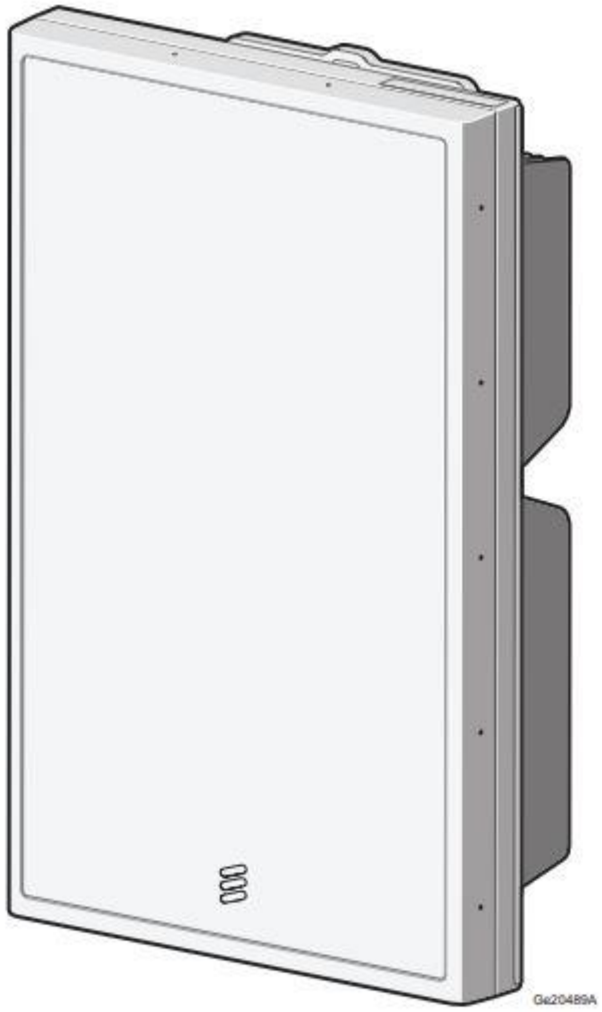
# ERICSSON AIR 6419 B77G

- ERICSSON AIR 6419 has a total of 2 ECPRI connections @ 25.8 Gbps, 1 DC Power cable connection
- Operates over B77G DOD band (3.4-3.6 GHz)
- Breaker size = 45A DC, DC Power Consumption = 1280W (for dimensioning)
- Dimensions
  - Height: 31.1” (790 mm)
  - Width: 16.1” (408 mm)
  - Depth: 7.3” (186 mm)
- Weight, excl. mounting hardware = 44 lbs (20 kg)
- Weight with Mounting Hardware = 55.4 lbs (25.2 kg)
- Max Frontal Wind Load @ 42m/s = 454 N
- Horizontal Separation Required between AIR 6419 = 100mm
- Minimum Vertical Space Required below/above AIR 6419 = 300mm
- Minimum Height Above Users = 5m
- Outdoor Installation locations to avoid:
  - Hot microclimates caused by, for example, heat radiated or reflected from dark or metallic walls or floors
  - Chimney mouths or ventilation system outlets
  - In front of Large glass surfaces or concrete surfaces
- Avoid radio interference by keeping the area directly in front of the antenna clear of metal surfaces such as railing, ladders or chains or equipment generating electromagnetic fields, for example, electric motors in air conditioners or diesel generators in front of antenna
- Do not use metallic paint to cover the AIR 6419 If painting is required. Do not paint underside of AIR 6419.



# ERICSSON AIR 6449 B77

- ERICSSON AIR 6449 has a total of 4 ECPRI connections @ 25 Gbps
- Operates over B77 band (3.3-4.2 GHz)
- Breaker size = 50A DC, DC Power Consumption = 1280W (for dimensioning)
- Dimensions
  - Height: 30.6” (778 mm)
  - Width: 15.9” (403 mm)
  - Depth: 10.6” (268 mm)
- Weight, excl. mounting hardware = 82.5 lbs (37.5 kg)
- Weight with Mounting Hardware = 95.5 lbs (43.4 kg)
- Max Frontal Wind Load @ 42m/s = 478 N
- Horizontal Separation Required between AIR 6449 = 100mm
- Minimum Vertical Space Required below AIR 6449 = 300mm
- Minimum Height Above Users = 5m
- Outdoor Installation locations to avoid:
  - Hot microclimates caused by, for example, heat radiated or reflected from dark or metallic walls or floors
  - Chimney mouths or ventilation system outlets
  - In front of Large glass surfaces or concrete surfaces
- Avoid radio interference by keeping the area directly in front of the antenna clear of metal surfaces such as railing, ladders or chains or equipment generating electromagnetic fields, for example, electric motors in air conditioners or diesel generators in front of antenna
- Do not use metallic paint to cover the AIR 6449 If painting is required. Do not paint underside of AIR 6449.

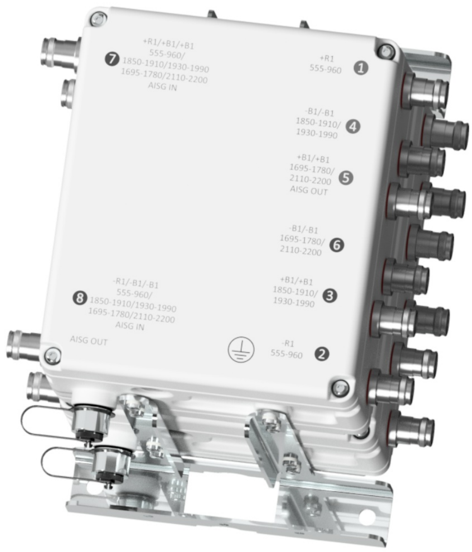


# TMA2124F03V5-2D

## DUAL TWIN TMA 1900/AWS/LOWPASS 555-960MHZ 6 ANT

NON-DIPLEXED 1900/AWS ANTENNA PORTS

Designed to be deployed in co-located AWS & 1900 networks, the Kaelus TMA2124 provides gain in 1900 and AWS uplink, using independent LNAs per band and per channel. Low loss bypass 555-960MHz signal to low band antennas is also provided.



## FEATURES

- Improved base station sensitivity through excellent noise figure performance and linearity
- AISG 2.0 compatible, full software upgradable using AISG “personality” upload
- DC/AISG passthrough to AWS antenna (port 5)
- AISG OUT connector disabled when AISG device (SBT equipped antenna) present on Port 3 +R1/+R1
- One AISG subunit per LNA, 4 in total. All fixed gain
- 555-960 bypass to low band antenna

## TECHNICAL SPECIFICATIONS

| BAND NAME | 1900 | AWS |
|---|---|---|
| **DOWNLINK** | | |
| **Passband** | 1930 - 1990MHz | 2110 - 2200MHz |
| **Insertion loss** | 0.4dB typical | 0.3dB typical |
| **Return loss** | 22dB typical | |
| **Maximum input power** | 160W (average) / 2kW (PEP) | 160W (average) / 2kW (PEP) |
| **Intermodulation products** | -155dBc maximum, at antenna port in RX band with 2 x 20W carriers | -163dBc maximum, at antenna port in RX band with 2 x 20W carriers |
| **UPLINK** | | |
| **Passband** | 1850 - 1910MHz | 1695 - 1780MHz |
| **Gain** | 13dB | |
| **Gain variation** | ±1dB maximum | |
| **Return loss** | 22dB typical | |
| **Bypass return loss** | 14dB typical | |
| **Bypass loss** | 3dB typical | |
| **Noise figure** | 1.2dB typical @ 13dB gain | 1.0dB typical @ 13dB gain |
| **Output IP3** | +28dBm typical | |
| **Maximum input power with no damage** | +12dBm | |
| **555-960 LOWPASS FILTER** | | |
| **Passband** | 555 - 960MHz | |
| **Insertion loss** | 0.2dB typical | |
| **Return loss** | 21dB typical | |
| **Maximum input power** | 250W (average) / 2.5kW (PEP) | |
| **Intermodulation products** | -155dBc maximum, at antenna port with 2 x 20W carriers | |
| **ELECTRICAL** | | |
| **Impedance** | 50Ohms | |

| POWER SUPPLY AND ALARM (CURRENT WINDOW ALARM MODE, DEFAULT) | |
|---|---|
| Current window alarm mode (CWA) is the default operating mode and can be configured to specific customer requirements. The TMA2124F03V4 is configured so that both channels are independently powered and monitored via their respective BTS port, 7 or 8. The BTS port sinks additional current to indicate an alarm state in its uplink path. Normal operating and alarm current values are configured independently via a field-loadable personality file. Please contact Kaelus for more information. | |
| **DC supply voltage** | +8.5 to +18V DC, case is DC ground |
| **DC supply** | Each BTS port powered individually |
| **DC supply current, normal mode** | 200mA per port typical (both ports are powered) |
| **DC supply current, alarm mode** | 300mA per port typical (both ports are powered) |

| AISG MODE OF OPERATION (AUTO SELECTED ON VALID AISG 2.0 FRAMES) | |
|---|---|
| AISG signals can be applied to port 7 or port 8. The TMA unit switches to AISG mode when valid frames are detected on either port 7 or 8. All LNAs take DC power from the port with the AISG frames or, if DC is present on both ports, power will be supplied equally between the ports. Each LNA is controlled uniquely by its sub-unit number. | |
| **DC supply voltage** | +7.5V to +30V DC |
| **AISG version** | 2.0 (1.1 optional) |
| **Supply current, AISG mode** | 500mA @ 7.5V, 135mA @ 30V typical |
| **AISG connector, current rating** | IEC60130-9, 8-pin female, < 4A peak, 2A continuous, pin 6 |
| **Field firmware upgradable** | Yes (R951022ATA2.0 Rev 2.9.12) |
| **AISG pass through to antenna port** | Yes |

| ANTENNA AISG OOK + DC | | | | |
|---|---|---|---|---|
| When DC is applied it is quickly switched through to port 5. If an over-current condition is detected, DC & AISG are disconnected from port 5. If DC remains connected to the load at port 5, DC and AISG are disconnected from the AISG OUT 8 pin connector. If DC is disconnected from port 5, DC and AISG are enabled at the AISG OUT 8 pin connector. If a short circuit is detected at the AISG OUT 8 pin connector, DC and AISG are disabled. | | | | |
| **Mode of Operation** | Voltage at Port 5 | Assumption | "Autosense + Protection" Switch Status | Comment |
| **AISG or CWA** | High | Device present or open circuit | Close | DC & AISG OOK will be supplied to port 5. DC & AISG is removed from the AISG OUT 8 pin port |
| **AISG or CWA** | Low | DC short circuit or low DC resistance | Open | DC & AISG OOK will not be supplied to port 5. DC & AISG are supplied to the AISG OUT 8 pin port |

| ENVIRONMENTAL | |
|---|---|
| For further details of environmental compliance, please contact Kaelus. | |
| **Temperature range** | -40°C to +65°C \| -40°F to +149°F |
| **Ingress protection** | IP67 |
| **Altitude** | 3,000m \| 10,000ft |
| **Lightning protection** | IEC61312-1, RF: ±5kA maximum (8/20us), AISG: ±2kA maximum (8/20us) |
| **MTBF** | >1,000,000 hours |
| **Compliance** | FCC Part 15 subpart B |

| MECHANICAL | |
|---|---|
| **Dimensions H x D x W (single unit)** | 245 x 263 x 210mm \| 9.7 x 10.4 x 8.3in excluding brackets and connectors |
| **Weight** | 16.2kg \| 35.71lbs |
| **Finish** | Painted, light grey (RAL 7035) |
| **Connectors** | 4.3-10 (F) x 16 long neck, AISG (F) x 2 |
| **Wind Load** | Front 390N, Side 147N (Single)<br>Front 251N, Side 409N (Twin)<br>At 74m/s (AS/NZS 1170-2-2011 Structural design - Wind actions - Cyclone areas) |
| **Mounting** | Pole/wall bracket supplied with two metal clamps 45-178mm diameter poles |

## ORDERING INFORMATION

| PART NUMBER | CONFIGURATION | OPTIONAL FEATURES | CONNECTORS |
|---|---|---|---|
| **TMA2124F03V5-1D** | TWIN 2 in / 6 out | STANDARD | 4.3-10 (F) |
| **TMA2124F03V5-2D** | QUAD 4 in / 12 out | STANDARD | 4.3-10 (F) |
| **TMA2124F03V5-1S** | TWIN 2 in / 6 out | STANDARD | 4.3-10 (F) |
| **TMA2124F03V5-2S** | QUAD 4 in / 12 out | STANDARD | 4.3-10 (F) |




Contact Us: +1 303 768 8080 | +61 (0) 7 3907 1200 | www.kaelus.com

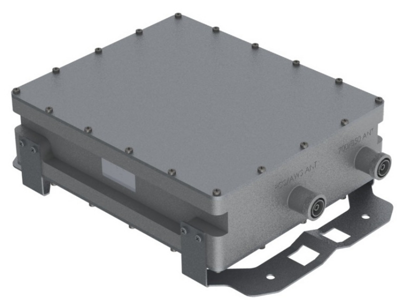
# Triple Band (AWS/PCS/WCS) Twin TMA with 700/850 Bypass

CCI EXTENDING WIRELESS PERFORMANCE

Tel: 201-342-3338 Fax: 201-342-3339 www.cciproducts.com

## General Information

**ModelTMABPDB7823VG12A**



CCI's Triple Band TMA with 700/850 bypass contains two triple band TMA's in a single housing. The TMA's are fully duplexed and share a single LNA for all three bands. The bypass path provides excellent isolation to the TMA path. Separate antenna ports for the bypass path and TMA path are combined onto a single BTS port. Low noise high linearity amplifiers improve the uplink sensitivity and the receive performance of base stations. The TMA is fully compliant with the latest AISG 2.0 specification. The TMA supports CDMA, EDGE/GSM, UMTS and LTE BTS equipment. The TMA is ideally suited for sites upgraded to quad-band using the existing infrastructure. The TMA allows the sharing of feeder lines for both AWS and PCS bands thus reducing tower loading, leasing, and installation costs. The input and output connectors are located inline for ease of installation in space constrained areas such as uni-pole structures and stealth antennas.

### Contents:



### Features:

- Small lightweight unit
- Triple Band (AWS/PCS/WCS) Twin TMA with 700/850 Bypass
- Independent Gain Control
- High linearity
- Lightning protected
- Fail-safe bypass mode
- High reliability

## Technical Description

The TMA system is an outdoor quad band tower mount unit which provides low noise amplification of PCS, AWS, and WCS uplink signals combined with 700/850 bypassed signals from separate antenna ports to a common BTS port. The tower mount unit consists of 14 band-pass filters, two redundant low noise amplifiers (LNA) with bypass failure circuitry, two bias tees, AISG control circuitry, and lightning protection circuitry all housed in an IP68 enclosure suited to long life masthead mounting. The AWS, PCS and WCS paths are dual duplexed to separate the low power uplink signals from the high power down link signals at the BTS and antenna ports. The AWS, PCS, and WCS uplink signals are amplified with a dedicated ultra-low noise PHEMT LNA with adjustable gain control. The unit provides protection against lightning strikes via a multistage surge protection circuit. DC power and AISG 2.0 control is provided via the BTS feeder cable. The unit operates in current window alarm (CWA) mode until a valid AISG message is detected, at which point it automatically switches to AISG mode. Once in AISG mode, the unit can only switch back to CWA mode with the receipt of an AISG CCI vendor defined command. In CWA mode, the unit requires 12VDC at each BTS port and follows typical current window convention. In AISG mode, the unit will accept 10-30 VDC from either BTS port. In AISG mode, the unit does not require an AISG 2.0 compatible site control unit (SCU) and may also be powered by a standard power distribution unit (PDU).

An optional Site Control Unit (SCU) is available to power up to 32 AISG modules per sector and to provide the monitoring and alarm functions for the system. The SCU is housed in a single (1U) 1.75" x 19" rack and contains dual redundant power supplies capable of being "hot swapped" that provide a regulated DC supply voltage on the RF coax for the tower mount amplifiers.

# CCI Triple Band (AWS/PCS/WCS) Twin TMA with 700/850 Bypass Typical Specifications

| Description | Typical Specifications | | | |
|---|---|---|---|---|
| **Electrical Specifications** | **700/850** | **PCS** | **AWS** | **WCS** |
| Receive Frequency Range | - | 1850 – 1910 MHz | 1710 – 1755 MHz | 2305 – 2320 MHz |
| Transmit Frequency Range | - | 1930 – 1990 MHz | 2110 – 2155 MHz | 2345 – 2360 MHz |
| Bypass Frequency Range | 698 - 894 MHz | - | - | - |
| Amplifier Gain | - | 6 to 12 dB Adjustable in 0.25 dB steps via AISG | 6 to 12 dB Adjustable in 0.25 dB steps via AISG | 6 to 12 dB Adjustable in 0.25 dB steps via AISG |
| Gain Variation | - | ±1.0 dB | ±1.0 dB | ±1.0 dB |
| System Noise Figure | - | 1.4 dB Typ. | 1.3 dB Typ. | 1.3 dB Typ. |
| Input Third Order Intercept Point | - | +12 dBm Min at Max. Gain | | |
| Input / Output Return Loss | 18 dB Min all ports, 12 dB Min. Bypass Mode | | | |
| Insertion Loss | 0.25 dB Typ. | | | |
| Transmit Passband | - | 0.5 dB Typical | 0.4 dB Typical | 0.4 dB Typical |
| Bypass Mode, (PCS/AWS/WCS) Rx Passband | - | 2.5 dB Typ. | 2.5 dB Typ. | 2.5 dB Typ. |
| Filter Characteristics | | | | |
| Continuous Average Power | 200 Watts max | | | |
| Peak Envelope Power | 2 KW max | | | |
| Intermodulation Performance | | | | |
| IMD at ANT port in Rx Band | < -112 dBm (-155 dBc) [2 tones at +43 dBm] | | | |
| Operating Voltage | +10V to +30V DC provided via coax or AISG | | | |
| Power Consumption | <2.0 Watts | | | |
| **Mechanical Specifications** | | | | |
| Connectors | DIN 7-16 female x 2; AISG x 1 | | | |
| Dimensions (Body Only) | 10.63” (H) x 11.024” (W) x 3.72” (D); (290.60 (H) x 280.00 (W) x 95.0 (D) mm) | | | |
| Dimensions (with Conn. & Bracket) | 14.25” (H) x 11.024” (W) x 4.11” (D); (362.00 (H) x 280.00 (W) x 104.40 (D) mm) | | | |
| Weight | 23.1 Lbs. (10.5 Kg) - with Brackets; 22 Lbs. (10 Kg) - without brackets | | | |
| Mounting | Pole/Wall Mounting Bracket | | | |
| **Environmental Specifications** | | | | |
| Operating Temperature | -40˚ C to +65˚C | | | |
| Lightning Protection | 8/20us, ±2KA max, 10 strikes each, IEC61000-4-5 | | | |
| Enclosure | IP68 | | | |
| MTBF | >500,000 hours | | | |

All specifications are subject to change. The latest specifications are available at www.cciproducts.com

**DATA SHEET**

# DC Surge Protection Solutions
## DC6-48-60-18-8C-EV
**Overvoltage Protection and Fiber Distribution/Cable Management Solution**

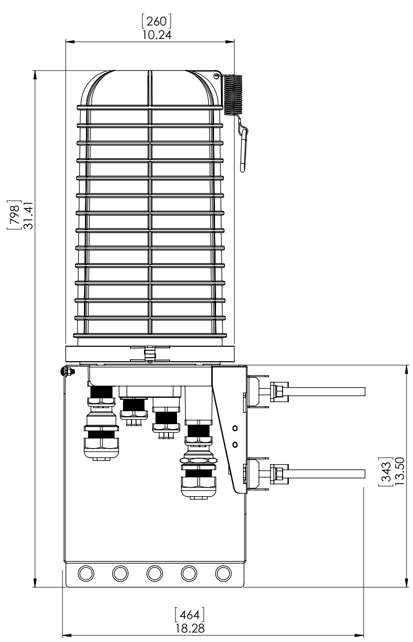
### Rooftop / Towertop

*powered by* **Strikesorb**®

The DC6-48-60-18-8C-EV is designed to provide the ultimate coordination between the SPD and the RRH/RRU by offering industry-leading low-clamping voltage of 160V and extremely robust protection for use in a high DC voltage environment. Capable of providing 12.5kA (10/350 μs) max per circuit surge capacity for up to 6 -48V DC circuits.

### Features

- Provides discrete protection for six individual -48V DC circuits
- Surge protection of 90kA 8/20 μs
- Maximum impulse current 12.5kA 10/350 μs
- Fiber connections for up to 18 fiber pair
- Simplifies inter-connectivity and cable management for DC conductors
- UL 1449 4th Edition Type 2 protective device
- IEC 61643-11 Class I protection for DC applications
- Form C relay contacts included, allowing remote monitoring of suppressor status
- Copper-coated lid to reduce power line interference
- Patented design
- Patented Strikesorb technology ensures lowest let-through voltage available in the industry, providing enhanced coordination with the RRH/RRU
- Raycap recommends that DC protection system be installed within 5 meters of the radio




### Benefits

- Strikesorb modules are fully recognized to UL 1449 4th Edition, and IEC 61643-11 Safety Standards, meeting all intermediate and high current fault requirements to facilitate use in original equipment manufacturers (OEM) applications
- Strikesorb offers unique maintenance-free protection against direct lightning currents
- Design provides maximum flexibility for installation
- NEMA 4X enclosure allows for indoor or outdoor installation



G02-01-203 180122


**Raycap**

**SPECIFICATIONS**

powered by
**Strikesorb®**

DC Surge Protection Solutions

# DC6-48-60-18-8C-EV

## Overvoltage Protection and Fiber Distribution/Cable Management Solution

| Electrical | | |
|---|---|---|
| Model Number | | DC6-48-60-18-8C-EV |
| CEQ / ANT Number | | CEQ.18537 |
| Number of Circuits Protected | | 6 |
| Surge Protective Device (SPD) Type per UL 1449 4th Edition | | Type 2 |
| Surge Protection Class as per IEC 61643-11 | | Class I |
| Nominal Operating DC Voltage [$U_n$] | | 48 V |
| Nominal Discharge Current [$I_n$] per UL 1449 4th Edition | | 20 kA 8/20 μs |
| Maximum Surge Current [$I_{max}$] per IEC 61643-11 | | 90 kA 8/20 μs |
| Maximum Impulse (Lightning) Current [$I_{imp}$] per IEC 61643-11 | | 12.5 kA 10/350 μs |
| Maximum Continuous Operating DC Voltage [$U_c$] (MCOV) | | 60 VDC |
| Voltage Protection Level [$U_p$] per IEC 61643-11 | | 160 V |
| Voltage Protection Rating (VPR) per UL 1449 4th Edition | | 330 V |
| Suppression Technology | | MOV |
| Strikesorb Module Type 2CA (UL 1449 4th edition) | | 30-V1-EV |
| Protection Modes: | Normal Mode | -48V to Return |
| | Common Mode | Return to Ground |
| **Mechanical** | | |
| Connection Terminal (Alarm) Method | | Form C Hardwired, #22 to #12 AWG [0.34 to 4 mm²] |
| Connection Terminal (Suppression) Method (for all power cables) | | Compression lug 2 hole, #10, 5/8 pitch, #12 – #4 AWG [3.3 – 21.15 mm²] |
| Connection Terminal (Terminal Block) Method | Copper | #12 to #4 AWG [3.3 – 21.15 mm²] |
| Fiber Connection Method | | LC-LC Single Mode |
| Environmental Ingress Protection (IP) Rating | | IP 68 |
| Operating Temperature (°C) | | -40° C to +100° C |
| Storage Temperature (°C) | | -70° C to +80° C |
| Cold Temperature Cycling IEC 61300-2-22 | | -30° C to +60° C 200 hrs @5 PSI |
| Resistance to Aggressive Materials CEI IEC 61073-2 | | Including Acids and Bases |
| UV Protection ISO 4892-2 Method A | | Xenon-Arc 2160 hrs |
| Enclosure Type | | Outdoor NEMA 4X |
| Enclosure Dimensions (L x W x H) | | 18.28" × 10.24" × 31.4" [464 × 260 × 797 mm] |
| Weight* | | System: 16.0 lbs [7.25 kg] Mount: 10.2 lbs [4.62 kg] Total: 26.2 lbs [11.87 kg] |
| Combined Wind Loading | Sustained | 150 mph Sustained: 105.7 lbs [470 N] |
| | Gust | 195 mph Gust: 213.6 lbs [950 N] |

**Standards Compliance & Certifications**

NEBS certified to: GR-63-CORE Issue 4, GR-1089-CORE Issue 6, GR-3108-CORE Issue 3, GR-487-CORE Issue 4, ATT-TP-76200 Issue 18

Strikesorb modules are compliant to the following Surge Protection Device Standards:

Standards: UL 1449 4th Edition: 2011, IEC 61643-11: 2011, EN 61643-11: 2012, IEEE C62.11: 2005, IEEE C62.41: 2002, IEEE C62.45: 2002, NEMA-LS-1

Certifications: UL, VDE, CE

AWG=American Wire Gauge

March 28, 2022
**October 17, 2022 (Rev.1)**

SAI Communications
12 Industrial Way
Salem NH, 03079

| | | |
|---|---|---|
| RE: | Site Number: | CT2901 |
| | FA Number: | 10549309 |
| | PACE Number: | MRCTB054388 |
| | PT Number: | 2051A11KTY |
| | Site Name: | WATERBURY WHITEWOOD ROAD |
| | Site Address: | 227 Whitewood Road<br>Waterbury, CT 06708 |

To Whom It May Concern:

TEP Northeast (TEP NE) has been authorized by SAI Communications to perform a mount analysis on the existing AT&T antenna/RRH mounts to determine their capability of supporting the following additional loading:

- (6) TMABPD7823VG12A TMA's (10.7"x11.1"x3.8" – Wt. = 25 lbs. /each)
- **(3) DMP65R-BU8DA Antennas (96.0"x20.7"x7.7" – Wt. = 119 lbs. /each)**
- **(3) AIR6419 N77G Antennas (31.1"x16.1"x7.3" – Wt. = 66 lbs. each)**
- **(3) AIR6449 N77D Antennas (30.6"x15.9"x10.6" – Wt. = 82 lbs. /each)**
- **(3) QD8616-7 Antennas (96.0"x22.0"x9.6" – Wt. = 150 lbs. /each)**
- **(6) TMA2124F03V5-2D TMA's (9.7"x10.4"x8.3" – Wt. = 36 lbs. /each)**
- **(1) DC6-48-60-18-8C-EV Surge Arrestor (24.0"x9.7"Ø – Wt. = 33 lbs.)**

**Proposed equipment shown in bold.*

Construction drawings prepared by Centek Engineering, dated September 28, 2018, were used to perform this analysis. TEP NE conducted a ground audit of the existing mounts on November 18, 2021.

Mount Analysis Methods:

- This analysis was conducted in accordance with EIA/TIA-222-H, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, the International Building Code 2015 with 2018 Connecticut State Building Code, and AT&T Mount Technical Directive – R22.
- TEP NE considers this mount to be asymmetrical and has applied wind loads in 30 degree increments all around the mount. Per TIA-222-H and Appendix N of the Connecticut State Building Code, the max basic wind speed for this site is equal to 125 mph with a max basic wind speed with ice of 50 mph and a max ice thickness of 1.0 in. An escalated ice thickness of 1.12 in was used for this analysis.
- TEP NE considers this site to be exposure category B; tower is located in an urban/suburban or wooded area with numerous closely spaced obstructions.
- TEP NE considers this site to be topographic category 1; tower is located on flat terrain or the bottom of a hill or ridge.
- TEP NE considers this site to have a spectral response acceleration parameter at short periods, $S_S$, of 0.189 and a spectral response acceleration parameter at a period of 1 second, $S_1$, of 0.064.
- The mount has been analyzed with load combinations consisting of 500 lbs live load using a service wind speed of 30 mph wind on the worst case antenna. Analysis performed on each antenna pipe to determine worst case location; worst case location was antenna position 2.
- The mount has been analyzed with load combinations consisting of a 250 lbs live load in a worst case location on the mount.
- The existing mounts are secured to the existing monopole with ring mounts and threaded rods. TEP NE considers the threaded rods to be the governing connection member.

Based on our evaluation, we have determined that the existing mounts **ARE CAPABLE** of supporting the proposed installation.

| | Component | Controlling Load Case | Stress Ratio | Pass/Fail |
|---|---|---|---|---|
| **Existing Mount Rating** | Weld | LC10 | 75% | **Pass** |

This determination was based on the following limitations and assumptions:

1. TEP NE is not responsible for any modifications completed prior to and hereafter which TEP NE was not directly involved.
2. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.
3. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.
4. The existing mount has been adequately secured to the tower structure per the mount manufacturer's specifications.
5. All components pertaining to AT&T's mounts must be tightened and re-plumbed prior to the installation of new appurtenances.
6. TEP NE performed a localized analysis on the mount itself and not on the supporting tower structure.

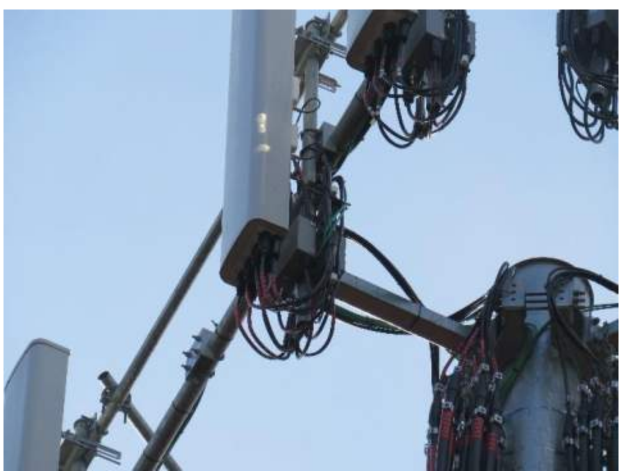
Please feel free to contact our office should you have any questions.

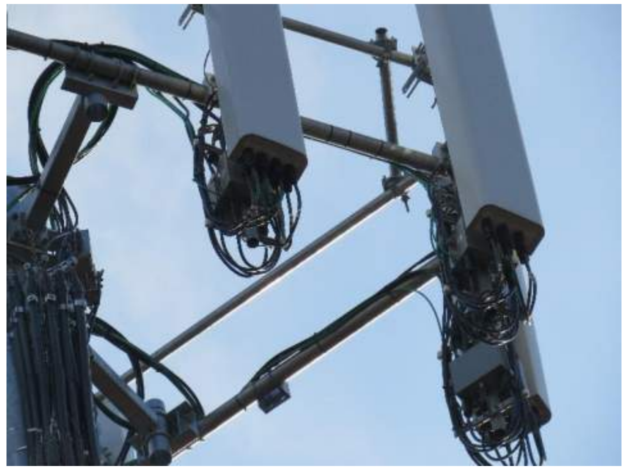
Respectfully Submitted,
TEP Northeast

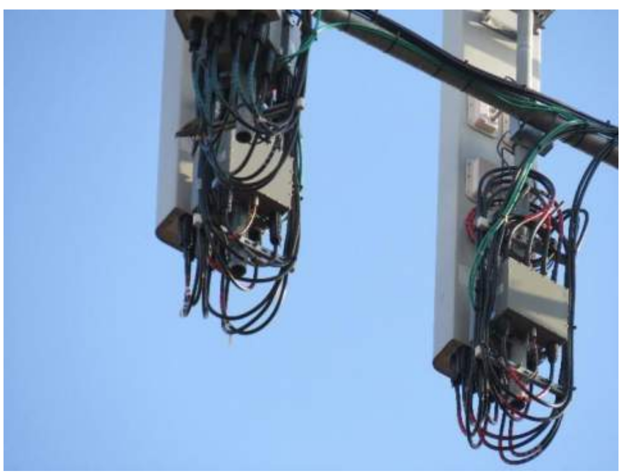
Michael Cabral
Director

Daniel P. Hamm, PE
Vice President

**FIELD PHOTOS:**




# Wind & Ice Calculations

## ANSI/TIA-222H - WIND, ICE & SEISMIC LOAD CALCULATIONS

| | | | | Reference |
|---|---|---|---|---|
| Site Code/Name | | CT2901 - Waterbury Whitewood Road | | |
| State | | Connecticut | | |
| County | | New Haven | | *Reference* |
| Structure Class | | II | | *Table 2-1* |
| Exposure Category | | B | | *Section 2.6.5.1.2* |
| Topographic Category | | 1 - Kzt = 1 | | *Section 2.6.6.2.1* |
| Mean Elevation of base of structure | $z_s$ | 544.49 | ft | *ASCE7-10 Hazards* |
| Height Above Ground | z | 105 | ft | |

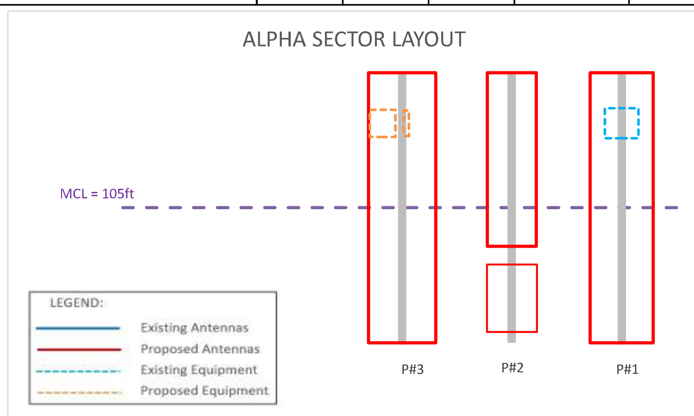
| Wind Parameters | | | | |
|---|---|---|---|---|
| Basic wind speed | V | 125 | mph | *Appendix N of Connecticut Building Code* |
| Wind direction probability factor | $K_d$ | 0.95 | | *Section 16.6* |
| Gust effect factor | $G_h$ | 1 | | *Section 16.6* |
| Velocity Pressure (Ka = 0.9) | | 33.60 | psf | *Section 2.6.11.6* |

| Wind & Ice Parameters | | | | |
|---|---|---|---|---|
| Base windspeed in conjunction with ice, V | | 50 | mph | *ASCE7-10 Hazards Tool* |
| Base Ice thickness | $t_i$ | 1.00 | in | *ASCE7-10 Hazards Tool* |
| Ice Velocity Pressure (Ka = 0.9) | $q_{ice}$ | 5.38 | psf | *Section 2.6.11.6* |
| Design Ice Thickness | $t_{iz}$ | 1.12 | in | *Section 2.6.10* |

| Seismic Parameters | | | | |
|---|---|---|---|---|
| Site Soil Class | | D - Default | | *Table 2-10* |
| Seismic Design Category | | B | | *ASCE7-10 Hazards Tool* |
| Spectral Response at Short Periods | $S_s$ | 0.189 | | *Appendix N of Connecticut Building Code* |
| Spectral Response at 1sec | $S_1$ | 0.064 | | *Appendix N of Connecticut Building Code* |
| Long Period Transition Period | $T_L$ | 6 | | *ASCE7-10 Hazards Tool* |
| Seismic Importance Factor | $I_s$ | 1 | | *Table 2-3* |
| Response modification coefficient | R | 2 | | *Section 16.7* |
| Short-Period Site Coefficient | $F_a$ | 1.6 | | *Table 2-11* |
| Design Spectral Response at Short Periods | $S_{DS}$ | 0.202 | | *Section 2.7.5* |
| Seismic Response Coefficient | $C_s$ | 0.101 | | *Section 2.7.7.1* |

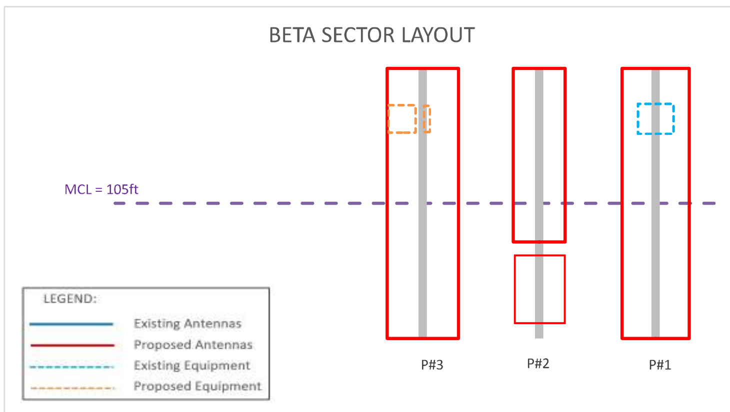
## ALPHA SECTOR

| Position | Appurtenance properties | | | | | | Wind | | Ice | Seismic |
|---|---|---|---|---|---|---|---|---|---|---|
| | Manufacturer | Model | L [in] | W [in] | D [in] | Weight [lbs] | $0^o$ [lbs] | $90^o$ [lbs] | IceWeight [lbs] | $E_H$ [lbs] |
| 1 | CCI | DMP65R-BU8DA | 96.0 | 20.7 | 7.7 | 95.7 | 600.5 | 272.9 | 257.6 | 9.6 |
| 2 | Ericsson | AIR6449 B77D + AIR6419 B77G | 61.7 | 16.1 | 10.6 | 148.0 | 291.9 | 205.7 | 146.5 | 14.9 |
| 3 | Quintel | QD8616-7 | 96.0 | 22.0 | 9.6 | 68.2 | 632.2 | 322.6 | 278.9 | 6.9 |
| 3 | CCI | 5PX-0726 | 9.2 | 19.0 | 1.7 | 12.5 | 4.9 | 49.1 | 23.9 | 1.3 |
| 3 | Kaelus | TMA2124F03V5-2D | 9.7 | 10.4 | 8.3 | 35.7 | 22.5 | 28.2 | 17.8 | 3.6 |
| 1 | CCI | TMABPDB7823VG12A | 10.6 | 11.0 | 3.7 | 22.0 | 32.8 | 11.2 | 17.1 | 2.2 |
| - | Raycap | DC6-48-60-18-8C | 24.0 | 9.7 | 9.7 | 33.0 | 65.2 | 65.2 | 42.6 | 3.3 |



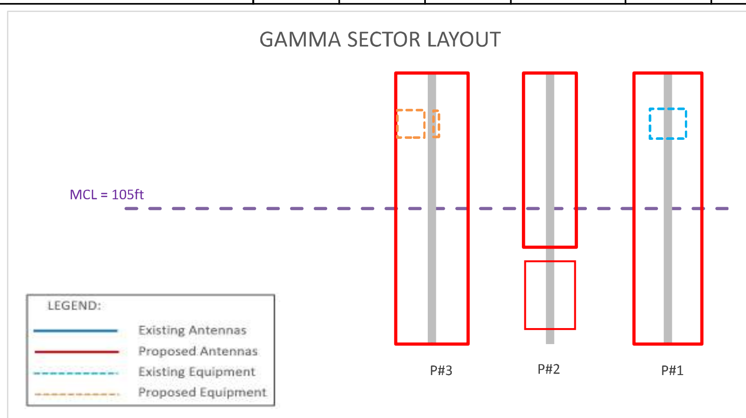
## BETA SECTOR

| Position | Appurtenance properties | | | | | | Wind | | Ice | Seismic |
|---|---|---|---|---|---|---|---|---|---|---|
| | Manufacturer | Model | L [in] | W [in] | D [in] | Weight [lbs] | $0^o$ [lbs] | $90^o$ [lbs] | IceWeight [lbs] | $E_H$ [lbs] |
| 1 | CCI | DMP65R-BU8DA | 96.0 | 20.7 | 7.7 | 95.7 | 354.8 | 518.6 | 257.6 | 9.6 |
| 2 | Ericsson | AIR6449 B77D + AIR6419 B77G | 61.7 | 16.1 | 10.6 | 148.0 | 227.2 | 270.3 | 146.5 | 14.9 |
| 3 | Quintel | QD8616-7 | 96.0 | 22.0 | 9.6 | 68.2 | 400.0 | 554.8 | 278.9 | 6.9 |
| 3 | CCI | 5PX-0726 | 9.2 | 19.0 | 1.7 | 12.5 | 38.0 | 16.0 | 23.9 | 1.3 |
| 3 | Kaelus | TMA2124F03V5-2D | 9.7 | 10.4 | 8.3 | 35.7 | 26.8 | 24.0 | 17.8 | 3.6 |
| 1 | CCI | TMABPDB7823VG12A | 10.6 | 11.0 | 3.7 | 22.0 | 16.6 | 27.4 | 17.1 | 2.2 |



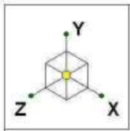
GAMMA SECTOR

| Position | Appurtenance properties | | | | | | Wind | | Ice | Seismic |
|---|---|---|---|---|---|---|---|---|---|---|
| | Manufacturer | Model | L [in] | W [in] | D [in] | Weight [lbs] | $0^o$ [lbs] | $90^o$ [lbs] | IceWeight [lbs] | $E_H$ [lbs] |
| 1 | CCI | DMP65R-BU8DA | 96.0 | 20.7 | 7.7 | 95.7 | 354.8 | 518.6 | 257.6 | 9.6 |
| 2 | Ericsson | AIR6449 B77D + AIR6419 B77G | 61.7 | 16.1 | 10.6 | 148.0 | 227.2 | 270.3 | 146.5 | 14.9 |
| 3 | Quintel | QD8616-7 | 96.0 | 22.0 | 9.6 | 68.2 | 400.0 | 554.8 | 278.9 | 6.9 |
| 3 | CCI | 5PX-0726 | 9.2 | 19.0 | 1.7 | 12.5 | 38.0 | 16.0 | 23.9 | 1.3 |
| 3 | Kaelus | TMA2124F03V5-2D | 9.7 | 10.4 | 8.3 | 35.7 | 26.8 | 24.0 | 17.8 | 3.6 |
| 1 | CCI | TMABPDB7823VG12A | 10.6 | 11.0 | 3.7 | 22.0 | 16.6 | 27.4 | 17.1 | 2.2 |



NORTHEAST

# Mount Calculations
# (Existing Conditions)




| | | |
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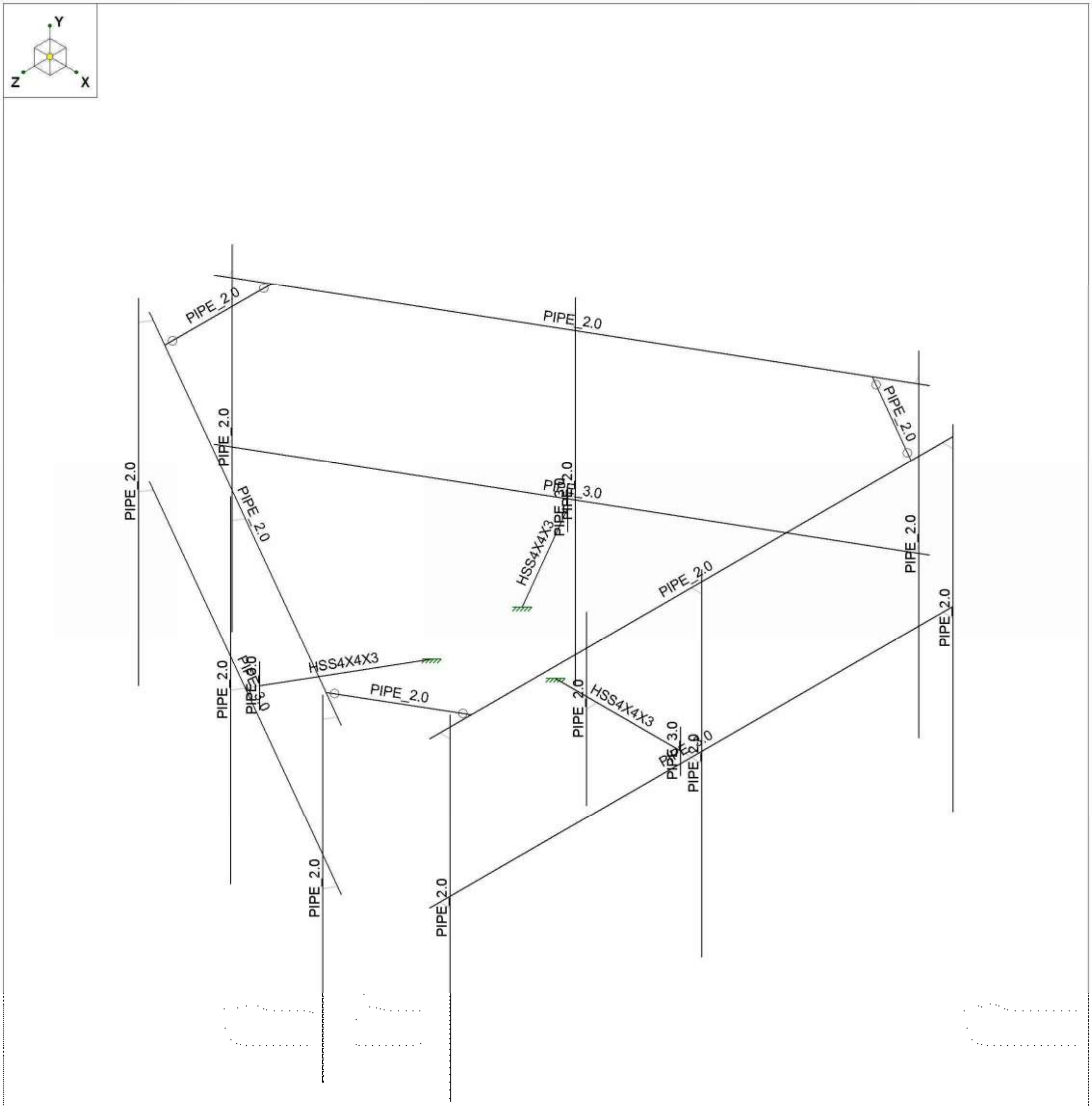
| CT2901 | | CT2901.r3d |




| | | |
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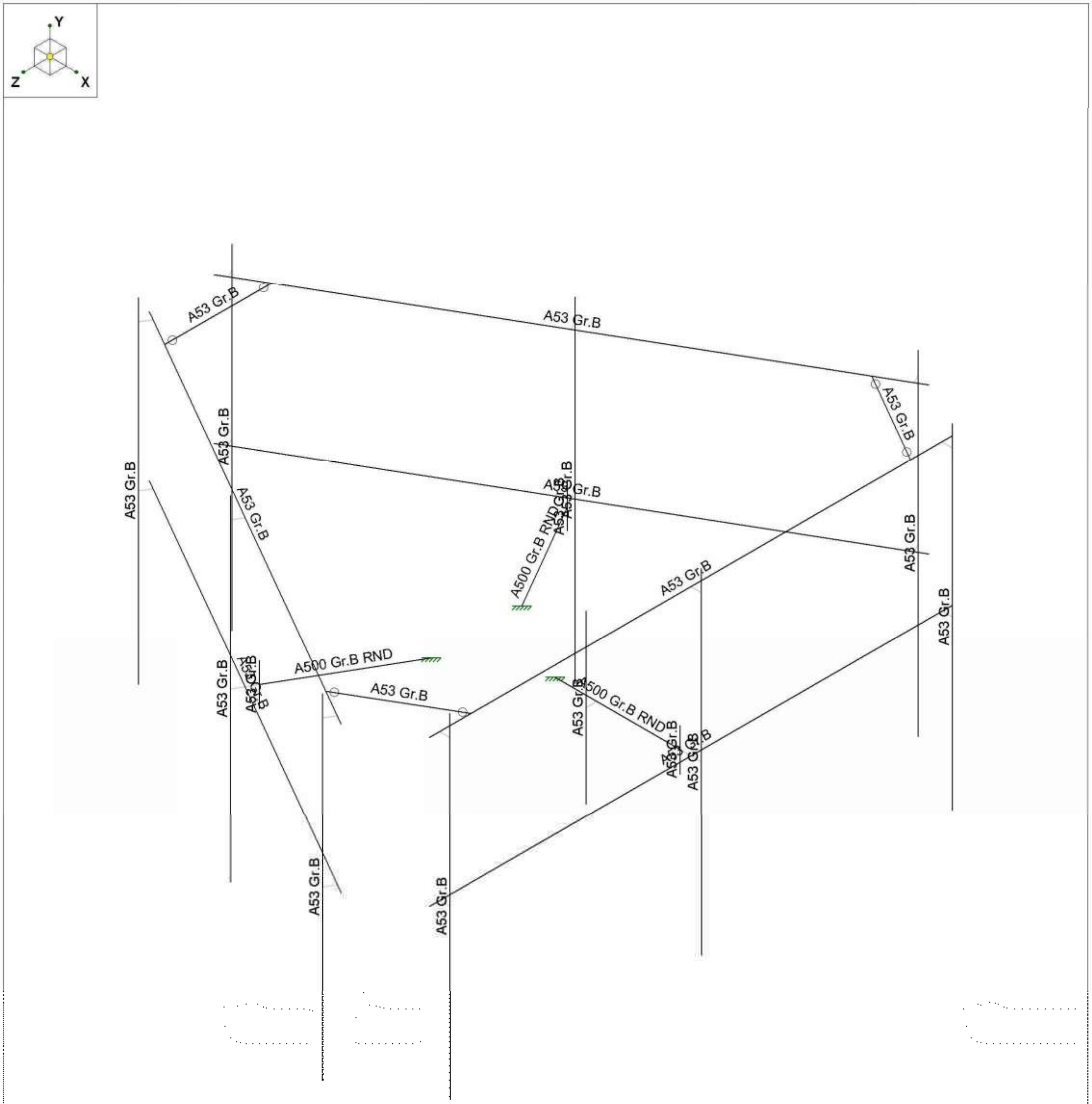


| | | |
|---|---|---|
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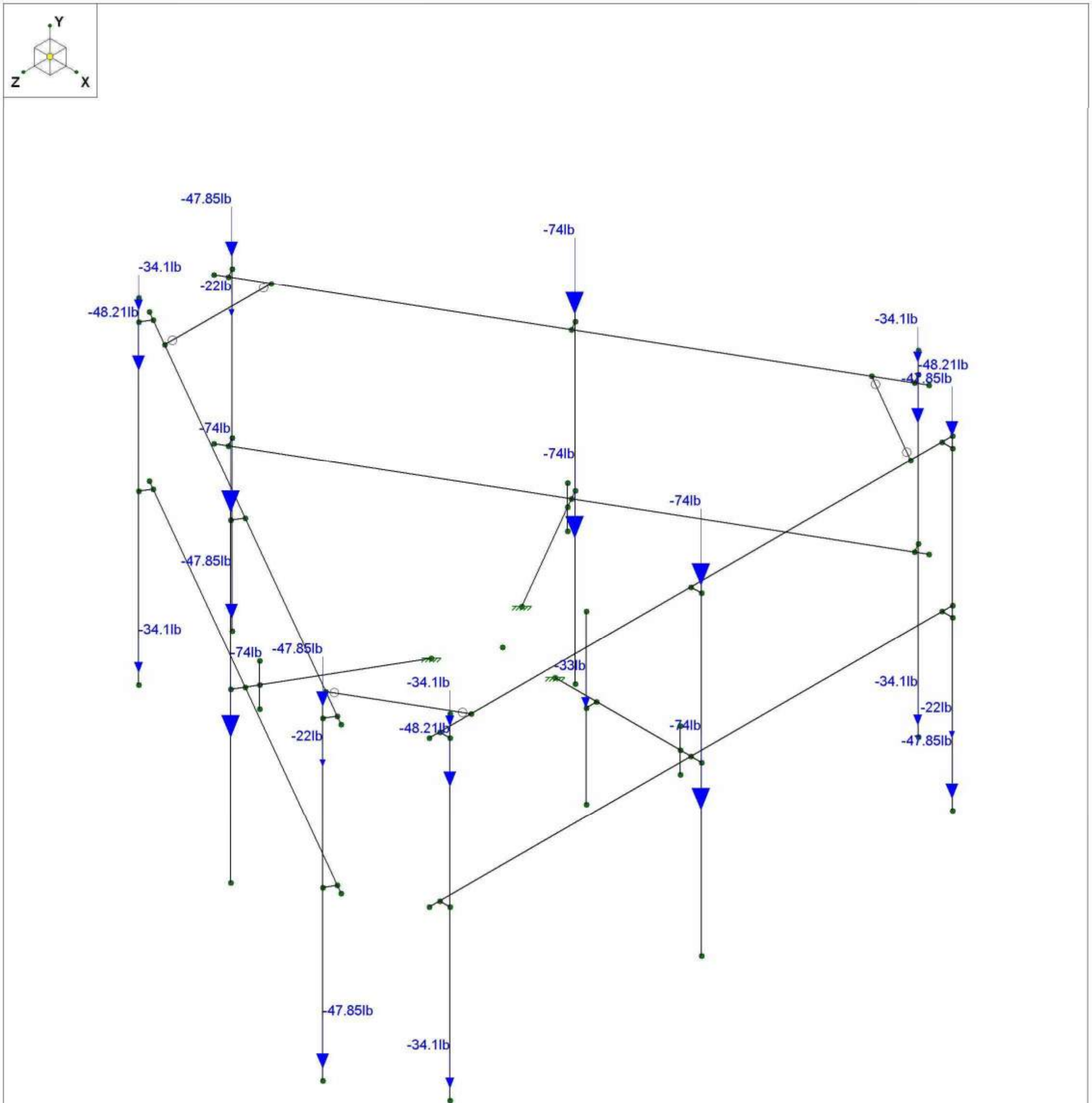


Loads: BLC 2, We

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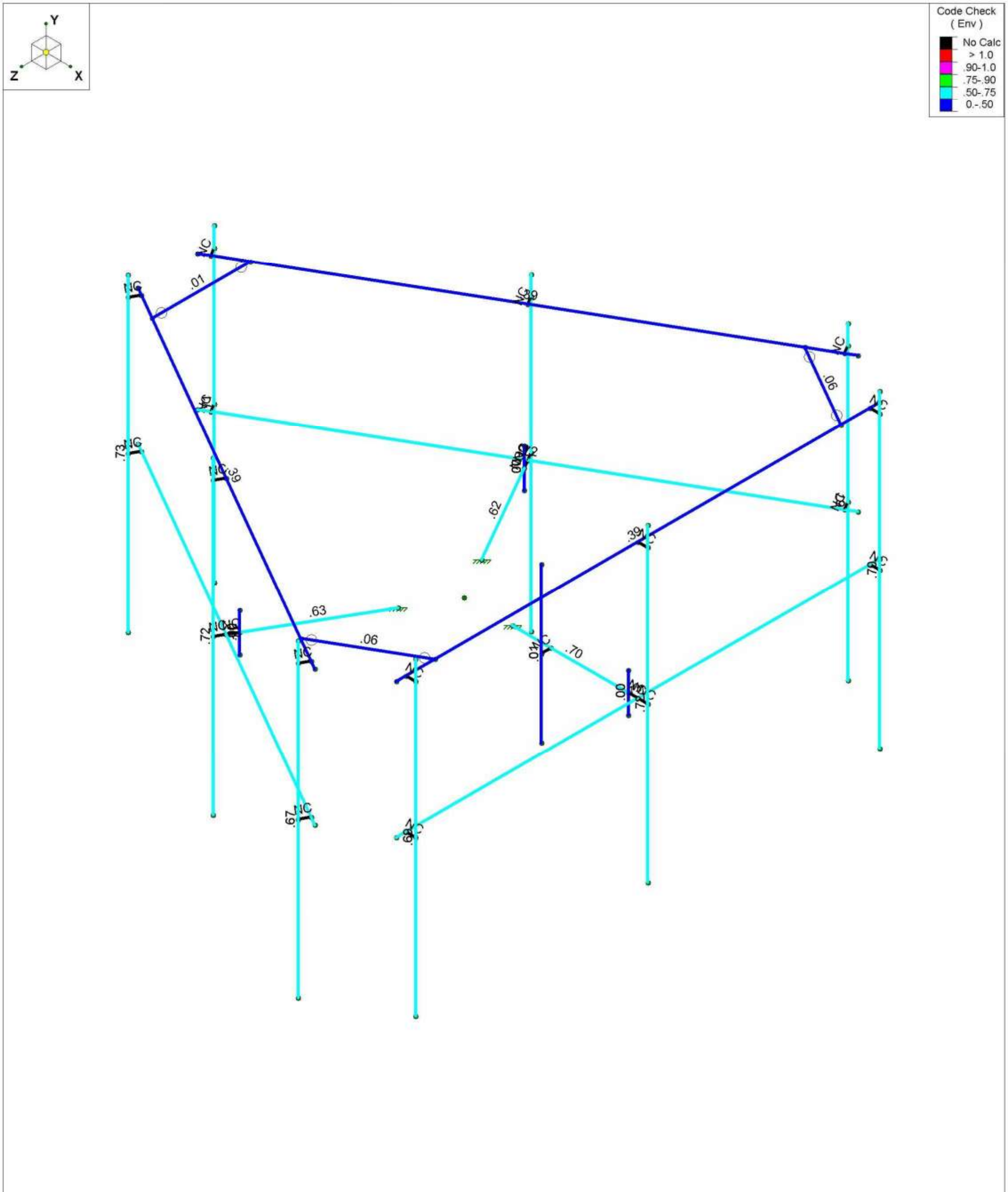


Member Code Checks Displayed (Enveloped)
Envelope Only Solution

| | | |
|---|---|---|
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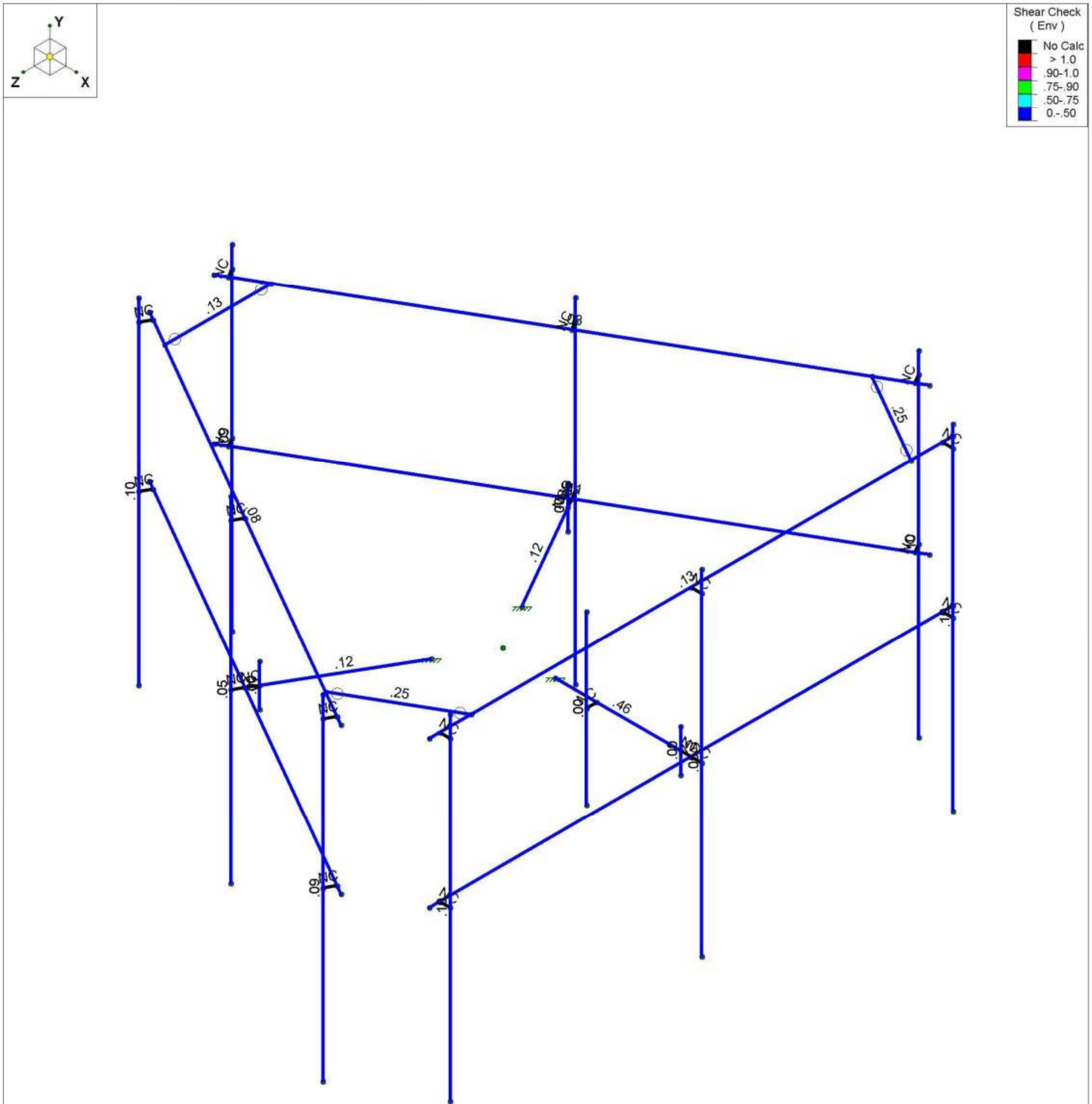
| CT2901 | | CT2901.r3d |




Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

| | | |
|---|---|---|
| Hudson Design Group | Waterbury Whitewood Road | SK - 6 |
| AV | | Mar 28, 2022 at 5:43 PM |
| CT2901 | | CT2901.r3d |

## (Global) Model Settings

| | |
|---|---|
| Display Sections for Member Calcs | 5 |
| Max Internal Sections for Member Calcs | 97 |
| Include Shear Deformation? | Yes |
| Increase Nailing Capacity for Wind? | Yes |
| Include Warping? | Yes |
| Trans Load Btwn Intersecting Wood Wall? | Yes |
| Area Load Mesh (in^2) | 144 |
| Merge Tolerance (in) | .12 |
| P-Delta Analysis Tolerance | 0.50% |
| Include P-Delta for Walls? | Yes |
| Automatically Iterate Stiffness for Walls? | Yes |
| Max Iterations for Wall Stiffness | 3 |
| Gravity Acceleration (in/sec^2) | 386.4 |
| Wall Mesh Size (in) | 12 |
| Eigensolution Convergence Tol. (1.E-) | 4 |
| Vertical Axis | Y |
| Global Member Orientation Plane | XZ |
| Static Solver | Sparse Accelerated |
| Dynamic Solver | Accelerated Solver |

| | |
|---|---|
| Hot Rolled Steel Code | AISC 15th(360-16): LRFD |
| Adjust Stiffness? | Yes(Iterative) |
| RISAConnection Code | AISC 15th(360-16): LRFD |
| Cold Formed Steel Code | AISI S100-16: LRFD |
| Wood Code | None |
| Wood Temperature | < 100F |
| Concrete Code | None |
| Masonry Code | None |
| Aluminum Code | None - Building |
| Stainless Steel Code | None |

| | |
|---|---|
| Number of Shear Regions | 4 |
| Region Spacing Increment (in) | 4 |
| Biaxial Column Method | Exact Integration |
| Parme Beta Factor (PCA) | .65 |
| Concrete Stress Block | Rectangular |
| Use Cracked Sections? | Yes |
| Use Cracked Sections Slab? | Yes |
| Bad Framing Warnings? | No |
| Unused Force Warnings? | Yes |
| Min 1 Bar Diam. Spacing? | No |
| Concrete Rebar Set | REBAR_SET_ASTMA615 |
| Min % Steel for Column | 1 |
| Max % Steel for Column | 8 |

## (Global) Model Settings, Continued

| | |
|---|---|
| Seismic Code | ASCE 7-16 |
| Seismic Base Elevation (in) | Not Entered |
| Add Base Weight? | Yes |
| Ct X | .02 |
| Ct Z | .02 |
| T X (sec) | Not Entered |
| T Z (sec) | Not Entered |
| R X | 3 |
| R Z | 3 |
| Ct Exp. X | .75 |
| Ct Exp. Z | .75 |
| SD1 | 1 |
| SDS | 1 |
| S1 | 1 |
| TL (sec) | 5 |
| Risk Cat | I or II |
| Drift Cat | Other |
| Om Z | 1 |
| Om X | 1 |
| Cd Z | 1 |
| Cd X | 1 |
| Rho Z | 1 |
| Rho X | 1 |
| | |

## Hot Rolled Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (/1... | Density[k/ft... | Yield[ksi] | Ry | Fu[ksi] | Rt |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A992 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 65 | 1.1 |
| 2 | A36 Gr.36 | 29000 | 11154 | .3 | .65 | .49 | 36 | 1.5 | 58 | 1.2 |
| 3 | A572 Gr.50 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 65 | 1.1 |
| 4 | A500 Gr.B RND | 29000 | 11154 | .3 | .65 | .527 | 42 | 1.4 | 58 | 1.3 |
| 5 | A500 Gr.B RECT | 29000 | 11154 | .3 | .65 | .527 | 46 | 1.4 | 58 | 1.3 |
| 6 | A500 Gr.C RND | 29000 | 11154 | .3 | .65 | .527 | 46 | 1.4 | 62 | 1.3 |
| 7 | A500 Gr.C RECT | 29000 | 11154 | .3 | .65 | .527 | 50 | 1.4 | 62 | 1.3 |
| 8 | A53 Gr.B | 29000 | 11154 | .3 | .65 | .49 | 35 | 1.6 | 60 | 1.2 |
| 9 | A1085 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.4 | 65 | 1.3 |
| 10 | A913 Gr.65 | 29000 | 11154 | .3 | .65 | .49 | 65 | 1.1 | 80 | 1.1 |

## Hot Rolled Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design Ru... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PIPE_2.5 | PIPE_2.5 | None | None | A53 Gr.B | Typical | 1.61 | 1.45 | 1.45 | 2.89 |
| 2 | HSS4X4X3 | HSS4X4X3 | None | None | A500 Gr.B... | Typical | 2.58 | 6.21 | 6.21 | 10 |
| 3 | PIPE_3.0 | PIPE_3.0 | None | None | A53 Gr.B | Typical | 2.07 | 2.85 | 2.85 | 5.69 |
| 4 | PIPE_2.0 | PIPE_2.0 | None | None | A53 Gr.B | Typical | 1.02 | .627 | .627 | 1.25 |

## Hot Rolled Steel Design Parameters

| | Label | Shape | Length[in] | Lbyy[in] | Lbzz[in] | Lcomp top[in] | Lcomp bot[in] | L-torqu... | Kyy | Kzz | Cb | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | PIPE_2.0 | 150 | | | Lbyy | | | | | | Lateral |
| 2 | M5 | PIPE_3.0 | 12 | | | Lbyy | | | | | | Lateral |
| 3 | M6 | HSS4X4X3 | 36 | | | Lbyy | | | | | | Lateral |
| 4 | M7 | PIPE_3.0 | 150 | | | Lbyy | | | | | | Lateral |
| 5 | M9 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 6 | M10 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 7 | M12 | PIPE_2.0 | 150 | | | Lbyy | | | | | | Lateral |

## Hot Rolled Steel Design Parameters (Continued)

| | Label | Shape | Length[in] | Lbyy[in] | Lbzz[in] | Lcomp top[in] | Lcomp bot[in] | L-torqu... | Kyy | Kzz | Cb | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | M16 | PIPE_3.0 | 12 | | | Lbyy | | | | | | Lateral |
| 9 | M17 | HSS4X4X3 | 36 | | | Lbyy | | | | | | Lateral |
| 10 | M18 | PIPE_3.0 | 150 | | | Lbyy | | | | | | Lateral |
| 11 | M20 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 12 | M21 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 13 | M23 | PIPE_2.0 | 150 | | | Lbyy | | | | | | Lateral |
| 14 | M27 | PIPE_3.0 | 12 | | | Lbyy | | | | | | Lateral |
| 15 | M28 | HSS4X4X3 | 36 | | | Lbyy | | | | | | Lateral |
| 16 | M29 | PIPE_3.0 | 150 | | | Lbyy | | | | | | Lateral |
| 17 | M31 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 18 | M32 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 19 | M34 | PIPE_2.0 | 30.531 | | | Lbyy | | | | | | Lateral |
| 20 | M35 | PIPE_2.0 | 30.531 | | | Lbyy | | | | | | Lateral |
| 21 | M36 | PIPE_2.0 | 30.531 | | | Lbyy | | | | | | Lateral |
| 22 | M37 | PIPE_2.0 | 48 | | | | | | | | | Lateral |
| 23 | M41 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 24 | M44 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |
| 25 | M47 | PIPE_2.0 | 96 | | | Lbyy | | | | | | Lateral |

## Material Takeoff

| | Material | Size | Pieces | Length[in] | Weight[K] |
|---|---|---|---|---|---|
| 1 | General | | | | |
| 2 | RIGID | | 22 | 66 | 0 |
| 3 | Total General | | 22 | 66 | 0 |
| 4 | | | | | |
| 5 | Hot Rolled Steel | | | | |
| 6 | A500 Gr.B RND | HSS4X4X3 | 3 | 108 | .085 |
| 7 | A53 Gr.B | PIPE_2.0 | 16 | 1453.6 | .42 |
| 8 | A53 Gr.B | PIPE_3.0 | 6 | 486 | .285 |
| 9 | Total HR Steel | | 25 | 2047.6 | .791 |

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Z [k/in] | X Rot.[k-ft/rad] | Y Rot.[k-ft/rad] | Z Rot.[k-ft/rad] |
|---|---|---|---|---|---|---|---|
| 1 | N32 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 2 | N64 | | | | | | |
| 3 | N11 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 4 | N53 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |

## Member Primary Data

| | Label | I Joint | J Joint | K Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | N1 | N2 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 2 | M2 | N3 | N4 | | | RIGID | None | None | RIGID | Typical |
| 3 | M3 | N5 | N6 | | | RIGID | None | None | RIGID | Typical |
| 4 | M4 | N10 | N7 | | | RIGID | None | None | RIGID | Typical |
| 5 | M5 | N8 | N9 | | | PIPE_3.0 | None | None | A53 Gr.B | Typical |
| 6 | M6 | N10 | N11 | | | HSS4X4X3 | None | None | A500 Gr.B... | Typical |
| 7 | M7 | N12 | N13 | | | PIPE_3.0 | None | None | A53 Gr.B | Typical |
| 8 | M8 | N14 | N15 | | | RIGID | None | None | RIGID | Typical |
| 9 | M9 | N17 | N16 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 10 | M10 | N18 | N19 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 11 | M11 | N20 | N21 | | | RIGID | None | None | RIGID | Typical |
| 12 | M12 | N22 | N23 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |

## Member Primary Data (Continued)

| | Label | I Joint | J Joint | K Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 | M13 | N24 | N25 | | | RIGID | None | None | RIGID | Typical |
| 14 | M14 | N26 | N27 | | | RIGID | None | None | RIGID | Typical |
| 15 | M15 | N31 | N28 | | | RIGID | None | None | RIGID | Typical |
| 16 | M16 | N29 | N30 | | | PIPE_3.0 | None | None | A53 Gr.B | Typical |
| 17 | M17 | N31 | N32 | | | HSS4X4X3 | None | None | A500 Gr.B... | Typical |
| 18 | M18 | N33 | N34 | | | PIPE_3.0 | None | None | A53 Gr.B | Typical |
| 19 | M19 | N35 | N36 | | | RIGID | None | None | RIGID | Typical |
| 20 | M20 | N38 | N37 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 21 | M21 | N40 | N39 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 22 | M22 | N41 | N42 | | | RIGID | None | None | RIGID | Typical |
| 23 | M23 | N43 | N44 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 24 | M24 | N45 | N46 | | | RIGID | None | None | RIGID | Typical |
| 25 | M25 | N47 | N48 | | | RIGID | None | None | RIGID | Typical |
| 26 | M26 | N52 | N49 | | | RIGID | None | None | RIGID | Typical |
| 27 | M27 | N50 | N51 | | | PIPE_3.0 | None | None | A53 Gr.B | Typical |
| 28 | M28 | N52 | N53 | | | HSS4X4X3 | None | None | A500 Gr.B... | Typical |
| 29 | M29 | N54 | N55 | | | PIPE_3.0 | None | None | A53 Gr.B | Typical |
| 30 | M30 | N56 | N57 | | | RIGID | None | None | RIGID | Typical |
| 31 | M31 | N59 | N58 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 32 | M32 | N61 | N60 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 33 | M33 | N62 | N63 | | | RIGID | None | None | RIGID | Typical |
| 34 | M34 | N64 | N65 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 35 | M35 | N66 | N67 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 36 | M36 | N68 | N69 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 37 | M37 | N71 | N70 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 38 | M38 | N73 | N72 | | | RIGID | None | None | RIGID | Typical |
| 39 | M39 | N74 | N75 | | | RIGID | None | None | RIGID | Typical |
| 40 | M40 | N7 | N76 | | | RIGID | None | None | RIGID | Typical |
| 41 | M41 | N78 | N77 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 42 | M42 | N80 | N81 | | | RIGID | None | None | RIGID | Typical |
| 43 | M43 | N28 | N82 | | | RIGID | None | None | RIGID | Typical |
| 44 | M44 | N84 | N83 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |
| 45 | M45 | N85 | N86 | | | RIGID | None | None | RIGID | Typical |
| 46 | M46 | N49 | N87 | | | RIGID | None | None | RIGID | Typical |
| 47 | M47 | N89 | N88 | | | PIPE_2.0 | None | None | A53 Gr.B | Typical |

## Member Advanced Data

| | Label | I Release | J Release | I Offset[in] | J Offset[in] | T/C Only | Physical | Defl Rat... | Analysis ... | Inactive | Seismic... |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | | | | | | Yes | ** NA ** | | | None |
| 2 | M2 | | | | | | Yes | ** NA ** | | | None |
| 3 | M3 | | | | | | Yes | ** NA ** | | | None |
| 4 | M4 | | | | | | Yes | ** NA ** | | | None |
| 5 | M5 | | | | | | Yes | ** NA ** | | | None |
| 6 | M6 | | | | | | Yes | ** NA ** | | | None |
| 7 | M7 | | | | | | Yes | ** NA ** | | | None |
| 8 | M8 | | | | | | Yes | ** NA ** | | | None |
| 9 | M9 | | | | | | Yes | ** NA ** | | | None |
| 10 | M10 | | | | | | Yes | ** NA ** | | | None |
| 11 | M11 | | | | | | Yes | ** NA ** | | | None |
| 12 | M12 | | | | | | Yes | ** NA ** | | | None |
| 13 | M13 | | | | | | Yes | ** NA ** | | | None |
| 14 | M14 | | | | | | Yes | ** NA ** | | | None |
| 15 | M15 | | | | | | Yes | ** NA ** | | | None |
| 16 | M16 | | | | | | Yes | ** NA ** | | | None |
| 17 | M17 | | | | | | Yes | ** NA ** | | | None |

## Member Advanced Data (Continued)

| | Label | I Release | J Release | I Offset[in] | J Offset[in] | T/C Only | Physical | Defl Rat... | Analysis ... | Inactive | Seismic... |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | M18 | | | | | | Yes | ** NA ** | | | None |
| 19 | M19 | | | | | | Yes | ** NA ** | | | None |
| 20 | M20 | | | | | | Yes | ** NA ** | | | None |
| 21 | M21 | | | | | | Yes | ** NA ** | | | None |
| 22 | M22 | | | | | | Yes | ** NA ** | | | None |
| 23 | M23 | | | | | | Yes | ** NA ** | | | None |
| 24 | M24 | | | | | | Yes | ** NA ** | | | None |
| 25 | M25 | | | | | | Yes | ** NA ** | | | None |
| 26 | M26 | | | | | | Yes | ** NA ** | | | None |
| 27 | M27 | | | | | | Yes | ** NA ** | | | None |
| 28 | M28 | | | | | | Yes | ** NA ** | | | None |
| 29 | M29 | | | | | | Yes | ** NA ** | | | None |
| 30 | M30 | | | | | | Yes | ** NA ** | | | None |
| 31 | M31 | | | | | | Yes | ** NA ** | | | None |
| 32 | M32 | | | | | | Yes | ** NA ** | | | None |
| 33 | M33 | | | | | | Yes | ** NA ** | | | None |
| 34 | M34 | BenPIN | BenPIN | | | | Yes | ** NA ** | | | None |
| 35 | M35 | BenPIN | BenPIN | | | | Yes | ** NA ** | | | None |
| 36 | M36 | BenPIN | BenPIN | | | | Yes | ** NA ** | | | None |
| 37 | M37 | | | | | | Yes | ** NA ** | | | None |
| 38 | M38 | | | | | | Yes | ** NA ** | | | None |
| 39 | M39 | | | | | | Yes | ** NA ** | | | None |
| 40 | M40 | | | | | | Yes | ** NA ** | | | None |
| 41 | M41 | | | | | | Yes | ** NA ** | | | None |
| 42 | M42 | | | | | | Yes | ** NA ** | | | None |
| 43 | M43 | | | | | | Yes | ** NA ** | | | None |
| 44 | M44 | | | | | | Yes | ** NA ** | | | None |
| 45 | M45 | | | | | | Yes | ** NA ** | | | None |
| 46 | M46 | | | | | | Yes | ** NA ** | | | None |
| 47 | M47 | | | | | | Yes | ** NA ** | | | None |

## Basic Load Cases

| | BLC Description | Category | X Gravity | Y Gravity | Z Gravity | Joint | Point | Distributed | Area(Me... | Surface(P... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Self We | DL | | -1.1 | | | | | | |
| 2 | We | DL | | | | | 28 | | | |
| 3 | Ice We | DL | | | | | 28 | 25 | | |
| 4 | W0 | WL | | | | | 28 | 25 | | |
| 5 | W30 | WL | | | | | 56 | 50 | | |
| 6 | W60 | WL | | | | | 56 | 50 | | |
| 7 | W90 | WL | | | | | 28 | 25 | | |
| 8 | W120 | WL | | | | | 56 | 50 | | |
| 9 | W150 | WL | | | | | 56 | 50 | | |
| 10 | W0 + Ice | WL | | | | | 28 | 25 | | |
| 11 | W30 + Ice | WL | | | | | 56 | 50 | | |
| 12 | W60 + Ice | WL | | | | | 56 | 50 | | |
| 13 | W90 + Ice | WL | | | | | 28 | 25 | | |
| 14 | W120 + Ice | WL | | | | | 56 | 50 | | |
| 15 | W150 + Ice | WL | | | | | 56 | 50 | | |
| 16 | 500lbs LM 1 | LL | | | | 1 | | | | |
| 17 | 500lbs LM 2 | LL | | | | 1 | | | | |
| 18 | 500lbs LM 3 | LL | | | | 1 | | | | |
| 19 | 500lbs LM 4 | LL | | | | | | | | |
| 20 | 250lbs LV 5 | LL | | | | 1 | | | | |
| 21 | 250lbs LV 6 | LL | | | | 1 | | | | |
| 22 | E0 | EL | -.1 | | | | 28 | | | |

## Basic Load Cases (Continued)

| | BLC Description | Category | X Gravity | Y Gravity | Z Gravity | Joint | Point | Distributed | Area(Me... | Surface(P... |
|---|---|---|---|---|---|---|---|---|---|---|
| 23 | E90 | EL | | | .1 | | 28 | | | |

## Load Combinations

| | Description | So... | P... | S... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Dead | Yes | Y | | 1 | 1.4 | 2 | 1.4 | 0 | | 0 | | | | | | | | | | | | | |
| 2 | Dead + Wind 0 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 4 | 1 | 0 | | | | | | | | | | | | | |
| 3 | Dead + Wind 30 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 5 | 1 | 0 | | | | | | | | | | | | | |
| 4 | Dead + Wind 60 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 6 | 1 | 0 | | | | | | | | | | | | | |
| 5 | Dead + Wind 90 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 7 | 1 | 0 | | | | | | | | | | | | | |
| 6 | Dead + Wind 120 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 8 | 1 | 0 | | | | | | | | | | | | | |
| 7 | Dead + Wind 150 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 9 | 1 | 0 | | | | | | | | | | | | | |
| 8 | Dead + Wind 180 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 4 | -1 | 0 | | | | | | | | | | | | | |
| 9 | Dead + Wind 210 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 5 | -1 | 0 | | | | | | | | | | | | | |
| 10 | Dead + Wind 240 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 6 | -1 | 0 | | | | | | | | | | | | | |
| 11 | Dead + Wind 270 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 7 | -1 | 0 | | | | | | | | | | | | | |
| 12 | Dead + Wind 300 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 8 | -1 | 0 | | | | | | | | | | | | | |
| 13 | Dead + Wind 330 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 9 | -1 | 0 | | | | | | | | | | | | | |
| 14 | Dead + Ice + Wind Ice 0 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 10 | 1 | 3 | 1 | | | | | | | | | | | | |
| 15 | Dead + Ice + Wind Ice 30 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 11 | 1 | 3 | 1 | | | | | | | | | | | | |
| 16 | Dead + Ice + Wind Ice 60 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 12 | 1 | 3 | 1 | | | | | | | | | | | | |
| 17 | Dead + Ice + Wind Ice 90 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 13 | 1 | 3 | 1 | | | | | | | | | | | | |
| 18 | Dead + Ice + Wind Ice 120 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 14 | 1 | 3 | 1 | | | | | | | | | | | | |
| 19 | Dead + Ice + Wind Ice 150 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 15 | 1 | 3 | 1 | | | | | | | | | | | | |
| 20 | Dead + Ice + Wind Ice 180 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 10 | -1 | 3 | 1 | | | | | | | | | | | | |
| 21 | Dead + Ice + Wind Ice 210 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 11 | -1 | 3 | 1 | | | | | | | | | | | | |
| 22 | Dead + Ice + Wind Ice 240 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 12 | -1 | 3 | 1 | | | | | | | | | | | | |
| 23 | Dead + Ice + Wind Ice 270 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 13 | -1 | 3 | 1 | | | | | | | | | | | | |
| 24 | Dead + Ice + Wind Ice 300 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 14 | -1 | 3 | 1 | | | | | | | | | | | | |
| 25 | Dead + Ice + Wind Ice 330 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 15 | -1 | 3 | 1 | | | | | | | | | | | | |
| 26 | Dead + LM5001 + Wred 0 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 4 | .058 | | | | | | | | | | | | |
| 27 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 5 | .058 | | | | | | | | | | | | |
| 28 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 6 | .058 | | | | | | | | | | | | |
| 29 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 7 | .058 | | | | | | | | | | | | |
| 30 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 8 | .058 | | | | | | | | | | | | |
| 31 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 9 | .058 | | | | | | | | | | | | |
| 32 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 4 | -.058 | | | | | | | | | | | | |
| 33 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 5 | -.058 | | | | | | | | | | | | |
| 34 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 6 | -.058 | | | | | | | | | | | | |
| 35 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 7 | -.058 | | | | | | | | | | | | |
| 36 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 8 | -.058 | | | | | | | | | | | | |
| 37 | Dead + LM5001 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 16 | 1.5 | 9 | -.058 | | | | | | | | | | | | |
| 38 | Dead + LM5002 + Wred 0 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 4 | .058 | | | | | | | | | | | | |
| 39 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 5 | .058 | | | | | | | | | | | | |
| 40 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 6 | .058 | | | | | | | | | | | | |
| 41 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 7 | .058 | | | | | | | | | | | | |
| 42 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 8 | .058 | | | | | | | | | | | | |
| 43 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 9 | .058 | | | | | | | | | | | | |
| 44 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 4 | -.058 | | | | | | | | | | | | |
| 45 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 5 | -.058 | | | | | | | | | | | | |
| 46 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 6 | -.058 | | | | | | | | | | | | |
| 47 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 7 | -.058 | | | | | | | | | | | | |
| 48 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 8 | -.058 | | | | | | | | | | | | |
| 49 | Dead + LM5002 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 17 | 1.5 | 9 | -.058 | | | | | | | | | | | | |
| 50 | Dead + LM5003 + Wred 0 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 4 | .058 | | | | | | | | | | | | |
| 51 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 5 | .058 | | | | | | | | | | | | |

## Load Combinations (Continued)

| | Description | So... | P... | S... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... | BLC | Fa... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 6 | .058 | | | | | | | | | | | | |
| 53 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 7 | .058 | | | | | | | | | | | | |
| 54 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 8 | .058 | | | | | | | | | | | | |
| 55 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 9 | .058 | | | | | | | | | | | | |
| 56 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 4 | -.058 | | | | | | | | | | | | |
| 57 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 5 | -.058 | | | | | | | | | | | | |
| 58 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 6 | -.058 | | | | | | | | | | | | |
| 59 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 7 | -.058 | | | | | | | | | | | | |
| 60 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 8 | -.058 | | | | | | | | | | | | |
| 61 | Dead + LM5003 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 18 | 1.5 | 9 | -.058 | | | | | | | | | | | | |
| 62 | Dead + LM5004 + Wred 0 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 4 | .058 | | | | | | | | | | | | |
| 63 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 5 | .058 | | | | | | | | | | | | |
| 64 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 6 | .058 | | | | | | | | | | | | |
| 65 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 7 | .058 | | | | | | | | | | | | |
| 66 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 8 | .058 | | | | | | | | | | | | |
| 67 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 9 | .058 | | | | | | | | | | | | |
| 68 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 4 | -.058 | | | | | | | | | | | | |
| 69 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 5 | -.058 | | | | | | | | | | | | |
| 70 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 6 | -.058 | | | | | | | | | | | | |
| 71 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 7 | -.058 | | | | | | | | | | | | |
| 72 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 8 | -.058 | | | | | | | | | | | | |
| 73 | Dead + LM5004 + Wred ... | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 19 | 1.5 | 9 | -.058 | | | | | | | | | | | | |
| 74 | Dead + LV2505 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 20 | 1.5 | 0 | | | | | | | | | | | | | |
| 75 | Dead + LV2506 | Yes | Y | | 1 | 1.2 | 2 | 1.2 | 21 | 1.5 | 0 | | | | | | | | | | | | | |
| 76 | Service 60mph Wind 0 | Yes | Y | | 1 | 1 | 2 | 1 | 4 | .23 | 0 | | | | | | | | | | | | | |
| 77 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | 1 | 23 | | | | | | | | | | | | | |
| 78 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | .866 | 23 | .5 | | | | | | | | | | | | |
| 79 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | .5 | 23 | .866 | | | | | | | | | | | | |
| 80 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | | 23 | 1 | | | | | | | | | | | | |
| 81 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | -.5 | 23 | .866 | | | | | | | | | | | | |
| 82 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | -.866 | 23 | .5 | | | | | | | | | | | | |
| 83 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | -1 | 23 | | | | | | | | | | | | | |
| 84 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | -.866 | 23 | -.5 | | | | | | | | | | | | |
| 85 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | -.5 | 23 | -.866 | | | | | | | | | | | | |
| 86 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | | 23 | -1 | | | | | | | | | | | | |
| 87 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | .5 | 23 | -.866 | | | | | | | | | | | | |
| 88 | (1.2 + 0.2SDS)Dead + 1.... | Yes | Y | | 1 | 1.24 | 2 | 1.24 | 22 | .866 | 23 | -.5 | | | | | | | | | | | | |

## Joint Loads and Enforced Displacements (BLC 16 : 500lbs LM 1)

| | Joint Label | L,D,M | Direction | Magnitude[(lb,k-in), (in,rad), (lb*s^2... |
|---|---|---|---|---|
| 1 | N6 | L | Y | -500 |

## Joint Loads and Enforced Displacements (BLC 17 : 500lbs LM 2)

| | Joint Label | L,D,M | Direction | Magnitude[(lb,k-in), (in,rad), (lb*s^2... |
|---|---|---|---|---|
| 1 | N75 | L | Y | -500 |

## Joint Loads and Enforced Displacements (BLC 18 : 500lbs LM 3)

| | Joint Label | L,D,M | Direction | Magnitude[(lb,k-in), (in,rad), (lb*s^2... |
|---|---|---|---|---|
| 1 | N4 | L | Y | -500 |

## Joint Loads and Enforced Displacements (BLC 20 : 250lbs LV 5)

| | Joint Label | L,D,M | Direction | Magnitude[(lb,k-in), (in,rad), (lb*s^2... |
|---|---|---|---|---|
| 1 | N7 | L | Y | -250 |

## Joint Loads and Enforced Displacements (BLC 21 : 250lbs LV 6)

| | Joint Label | L,D,M | Direction | Magnitude[(lb,k-in), (in,rad), (lb*s^2... |
|---|---|---|---|---|
| 1 | N13 | L | Y | -250 |

## Member Distributed Loads (BLC 3 : Ice We)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | Y | -.4 | -.4 | 0 | 0 |
| 2 | M41 | Y | -.4 | -.4 | 0 | 0 |
| 3 | M9 | Y | -.4 | -.4 | 0 | 0 |
| 4 | M7 | Y | -.528 | -.528 | 0 | 0 |
| 5 | M1 | Y | -.4 | -.4 | 0 | 0 |
| 6 | M36 | Y | -.4 | -.4 | 0 | 0 |
| 7 | M6 | Y | -.775 | -.775 | 0 | 0 |
| 8 | M5 | Y | -.528 | -.528 | 0 | 0 |
| 9 | M37 | Y | -.4 | -.4 | 0 | 0 |
| 10 | M32 | Y | -.4 | -.4 | 0 | 0 |
| 11 | M47 | Y | -.4 | -.4 | 0 | 0 |
| 12 | M31 | Y | -.4 | -.4 | 0 | 0 |
| 13 | M29 | Y | -.528 | -.528 | 0 | 0 |
| 14 | M23 | Y | -.4 | -.4 | 0 | 0 |
| 15 | M35 | Y | -.4 | -.4 | 0 | 0 |
| 16 | M28 | Y | -.775 | -.775 | 0 | 0 |
| 17 | M27 | Y | -.528 | -.528 | 0 | 0 |
| 18 | M21 | Y | -.4 | -.4 | 0 | 0 |
| 19 | M44 | Y | -.4 | -.4 | 0 | 0 |
| 20 | M20 | Y | -.4 | -.4 | 0 | 0 |
| 21 | M18 | Y | -.528 | -.528 | 0 | 0 |
| 22 | M12 | Y | -.4 | -.4 | 0 | 0 |
| 23 | M34 | Y | -.4 | -.4 | 0 | 0 |
| 24 | M17 | Y | -.775 | -.775 | 0 | 0 |
| 25 | M16 | Y | -.4 | -.4 | 0 | 0 |

## Member Distributed Loads (BLC 4 : W0)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | -.665 | -.665 | 0 | 0 |
| 2 | M41 | X | -.665 | -.665 | 0 | 0 |
| 3 | M9 | X | -.665 | -.665 | 0 | 0 |
| 4 | M7 | X | -.98 | -.98 | 0 | 0 |
| 5 | M1 | X | -.665 | -.665 | 0 | 0 |
| 6 | M36 | X | -.515 | -.515 | 0 | 0 |
| 7 | M6 | X | 0 | 0 | 0 | 0 |
| 8 | M5 | X | -.589 | -.589 | 0 | 0 |
| 9 | M37 | X | -.606 | -.606 | 0 | 0 |
| 10 | M32 | X | -.665 | -.665 | 0 | 0 |
| 11 | M47 | X | -.665 | -.665 | 0 | 0 |
| 12 | M31 | X | -.665 | -.665 | 0 | 0 |
| 13 | M29 | X | -.98 | -.98 | 0 | 0 |
| 14 | M23 | X | -.166 | -.166 | 0 | 0 |
| 15 | M35 | X | -.129 | -.129 | 0 | 0 |
| 16 | M28 | X | -.737 | -.737 | 0 | 0 |
| 17 | M27 | X | -.589 | -.589 | 0 | 0 |
| 18 | M21 | X | -.665 | -.665 | 0 | 0 |
| 19 | M44 | X | -.665 | -.665 | 0 | 0 |
| 20 | M20 | X | -.665 | -.665 | 0 | 0 |
| 21 | M18 | X | -.98 | -.98 | 0 | 0 |
| 22 | M12 | X | -.166 | -.166 | 0 | 0 |
| 23 | M34 | X | -.129 | -.129 | 0 | 0 |

## Member Distributed Loads (BLC 4 : W0) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 24 | M17 | X | -.737 | -.737 | 0 | 0 |
| 25 | M16 | X | -.419 | -.419 | 0 | 0 |

## Member Distributed Loads (BLC 5 : W30)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | -.576 | -.576 | 0 | 0 |
| 2 | M41 | X | -.576 | -.576 | 0 | 0 |
| 3 | M9 | X | -.576 | -.576 | 0 | 0 |
| 4 | M7 | X | -.849 | -.849 | 0 | 0 |
| 5 | M1 | X | -.432 | -.432 | 0 | 0 |
| 6 | M36 | X | -.335 | -.335 | 0 | 0 |
| 7 | M6 | X | -.213 | -.213 | 0 | 0 |
| 8 | M5 | X | -.51 | -.51 | 0 | 0 |
| 9 | M37 | X | -.525 | -.525 | 0 | 0 |
| 10 | M32 | X | -.576 | -.576 | 0 | 0 |
| 11 | M47 | X | -.576 | -.576 | 0 | 0 |
| 12 | M31 | X | -.576 | -.576 | 0 | 0 |
| 13 | M29 | X | -.849 | -.849 | 0 | 0 |
| 14 | M23 | X | -.432 | -.432 | 0 | 0 |
| 15 | M35 | X | -.335 | -.335 | 0 | 0 |
| 16 | M28 | X | -.213 | -.213 | 0 | 0 |
| 17 | M27 | X | -.51 | -.51 | 0 | 0 |
| 18 | M21 | X | -.576 | -.576 | 0 | 0 |
| 19 | M44 | X | -.576 | -.576 | 0 | 0 |
| 20 | M20 | X | -.576 | -.576 | 0 | 0 |
| 21 | M18 | X | -.849 | -.849 | 0 | 0 |
| 22 | M12 | X | 0 | 0 | 0 | 0 |
| 23 | M34 | X | 0 | 0 | 0 | 0 |
| 24 | M17 | X | -.852 | -.852 | 0 | 0 |
| 25 | M16 | X | -.363 | -.363 | 0 | 0 |
| 26 | M10 | Z | .333 | .333 | 0 | 0 |
| 27 | M41 | Z | .333 | .333 | 0 | 0 |
| 28 | M9 | Z | .333 | .333 | 0 | 0 |
| 29 | M7 | Z | .49 | .49 | 0 | 0 |
| 30 | M1 | Z | .249 | .249 | 0 | 0 |
| 31 | M36 | Z | .193 | .193 | 0 | 0 |
| 32 | M6 | Z | .123 | .123 | 0 | 0 |
| 33 | M5 | Z | .294 | .294 | 0 | 0 |
| 34 | M37 | Z | .303 | .303 | 0 | 0 |
| 35 | M32 | Z | .333 | .333 | 0 | 0 |
| 36 | M47 | Z | .333 | .333 | 0 | 0 |
| 37 | M31 | Z | .333 | .333 | 0 | 0 |
| 38 | M29 | Z | .49 | .49 | 0 | 0 |
| 39 | M23 | Z | .249 | .249 | 0 | 0 |
| 40 | M35 | Z | .193 | .193 | 0 | 0 |
| 41 | M28 | Z | .123 | .123 | 0 | 0 |
| 42 | M27 | Z | .294 | .294 | 0 | 0 |
| 43 | M21 | Z | .333 | .333 | 0 | 0 |
| 44 | M44 | Z | .333 | .333 | 0 | 0 |
| 45 | M20 | Z | .333 | .333 | 0 | 0 |
| 46 | M18 | Z | .49 | .49 | 0 | 0 |
| 47 | M12 | Z | 0 | 0 | 0 | 0 |
| 48 | M34 | Z | 0 | 0 | 0 | 0 |
| 49 | M17 | Z | .492 | .492 | 0 | 0 |
| 50 | M16 | Z | .21 | .21 | 0 | 0 |

## Member Distributed Loads (BLC 6 : W60)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | -.333 | -.333 | 0 | 0 |
| 2 | M41 | X | -.333 | -.333 | 0 | 0 |
| 3 | M9 | X | -.333 | -.333 | 0 | 0 |
| 4 | M7 | X | -.49 | -.49 | 0 | 0 |
| 5 | M1 | X | -.083 | -.083 | 0 | 0 |
| 6 | M36 | X | -.064 | -.064 | 0 | 0 |
| 7 | M6 | X | -.369 | -.369 | 0 | 0 |
| 8 | M5 | X | -.294 | -.294 | 0 | 0 |
| 9 | M37 | X | -.303 | -.303 | 0 | 0 |
| 10 | M32 | X | -.333 | -.333 | 0 | 0 |
| 11 | M47 | X | -.333 | -.333 | 0 | 0 |
| 12 | M31 | X | -.333 | -.333 | 0 | 0 |
| 13 | M29 | X | -.49 | -.49 | 0 | 0 |
| 14 | M23 | X | -.333 | -.333 | 0 | 0 |
| 15 | M35 | X | -.258 | -.258 | 0 | 0 |
| 16 | M28 | X | 0 | 0 | 0 | 0 |
| 17 | M27 | X | -.294 | -.294 | 0 | 0 |
| 18 | M21 | X | -.333 | -.333 | 0 | 0 |
| 19 | M44 | X | -.333 | -.333 | 0 | 0 |
| 20 | M20 | X | -.333 | -.333 | 0 | 0 |
| 21 | M18 | X | -.49 | -.49 | 0 | 0 |
| 22 | M12 | X | -.083 | -.083 | 0 | 0 |
| 23 | M34 | X | -.064 | -.064 | 0 | 0 |
| 24 | M17 | X | -.369 | -.369 | 0 | 0 |
| 25 | M16 | X | -.21 | -.21 | 0 | 0 |
| 26 | M10 | Z | .576 | .576 | 0 | 0 |
| 27 | M41 | Z | .576 | .576 | 0 | 0 |
| 28 | M9 | Z | .576 | .576 | 0 | 0 |
| 29 | M7 | Z | .849 | .849 | 0 | 0 |
| 30 | M1 | Z | .144 | .144 | 0 | 0 |
| 31 | M36 | Z | .112 | .112 | 0 | 0 |
| 32 | M6 | Z | .639 | .639 | 0 | 0 |
| 33 | M5 | Z | .51 | .51 | 0 | 0 |
| 34 | M37 | Z | .525 | .525 | 0 | 0 |
| 35 | M32 | Z | .576 | .576 | 0 | 0 |
| 36 | M47 | Z | .576 | .576 | 0 | 0 |
| 37 | M31 | Z | .576 | .576 | 0 | 0 |
| 38 | M29 | Z | .849 | .849 | 0 | 0 |
| 39 | M23 | Z | .576 | .576 | 0 | 0 |
| 40 | M35 | Z | .446 | .446 | 0 | 0 |
| 41 | M28 | Z | 0 | 0 | 0 | 0 |
| 42 | M27 | Z | .51 | .51 | 0 | 0 |
| 43 | M21 | Z | .576 | .576 | 0 | 0 |
| 44 | M44 | Z | .576 | .576 | 0 | 0 |
| 45 | M20 | Z | .576 | .576 | 0 | 0 |
| 46 | M18 | Z | .849 | .849 | 0 | 0 |
| 47 | M12 | Z | .144 | .144 | 0 | 0 |
| 48 | M34 | Z | .112 | .112 | 0 | 0 |
| 49 | M17 | Z | .639 | .639 | 0 | 0 |
| 50 | M16 | Z | .363 | .363 | 0 | 0 |

## Member Distributed Loads (BLC 7 : W90)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | Z | .665 | .665 | 0 | 0 |
| 2 | M41 | Z | .665 | .665 | 0 | 0 |
| 3 | M9 | Z | .665 | .665 | 0 | 0 |

## Member Distributed Loads (BLC 7 : W90) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 4 | M7 | Z | .98 | .98 | 0 | 0 |
| 5 | M1 | Z | 0 | 0 | 0 | 0 |
| 6 | M36 | Z | 0 | 0 | 0 | 0 |
| 7 | M6 | Z | .983 | .983 | 0 | 0 |
| 8 | M5 | Z | .589 | .589 | 0 | 0 |
| 9 | M37 | Z | .606 | .606 | 0 | 0 |
| 10 | M32 | Z | .665 | .665 | 0 | 0 |
| 11 | M47 | Z | .665 | .665 | 0 | 0 |
| 12 | M31 | Z | .665 | .665 | 0 | 0 |
| 13 | M29 | Z | .98 | .98 | 0 | 0 |
| 14 | M23 | Z | .499 | .499 | 0 | 0 |
| 15 | M35 | Z | .387 | .387 | 0 | 0 |
| 16 | M28 | Z | .246 | .246 | 0 | 0 |
| 17 | M27 | Z | .589 | .589 | 0 | 0 |
| 18 | M21 | Z | .665 | .665 | 0 | 0 |
| 19 | M44 | Z | .665 | .665 | 0 | 0 |
| 20 | M20 | Z | .665 | .665 | 0 | 0 |
| 21 | M18 | Z | .98 | .98 | 0 | 0 |
| 22 | M12 | Z | .499 | .499 | 0 | 0 |
| 23 | M34 | Z | .387 | .387 | 0 | 0 |
| 24 | M17 | Z | .246 | .246 | 0 | 0 |
| 25 | M16 | Z | .419 | .419 | 0 | 0 |

## Member Distributed Loads (BLC 8 : W120)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | .333 | .333 | 0 | 0 |
| 2 | M41 | X | .333 | .333 | 0 | 0 |
| 3 | M9 | X | .333 | .333 | 0 | 0 |
| 4 | M7 | X | .49 | .49 | 0 | 0 |
| 5 | M1 | X | .083 | .083 | 0 | 0 |
| 6 | M36 | X | .064 | .064 | 0 | 0 |
| 7 | M6 | X | .369 | .369 | 0 | 0 |
| 8 | M5 | X | .294 | .294 | 0 | 0 |
| 9 | M37 | X | .303 | .303 | 0 | 0 |
| 10 | M32 | X | .333 | .333 | 0 | 0 |
| 11 | M47 | X | .333 | .333 | 0 | 0 |
| 12 | M31 | X | .333 | .333 | 0 | 0 |
| 13 | M29 | X | .49 | .49 | 0 | 0 |
| 14 | M23 | X | .083 | .083 | 0 | 0 |
| 15 | M35 | X | .064 | .064 | 0 | 0 |
| 16 | M28 | X | .369 | .369 | 0 | 0 |
| 17 | M27 | X | .294 | .294 | 0 | 0 |
| 18 | M21 | X | .333 | .333 | 0 | 0 |
| 19 | M44 | X | .333 | .333 | 0 | 0 |
| 20 | M20 | X | .333 | .333 | 0 | 0 |
| 21 | M18 | X | .49 | .49 | 0 | 0 |
| 22 | M12 | X | .333 | .333 | 0 | 0 |
| 23 | M34 | X | .258 | .258 | 0 | 0 |
| 24 | M17 | X | 0 | 0 | 0 | 0 |
| 25 | M16 | X | .21 | .21 | 0 | 0 |
| 26 | M10 | Z | .576 | .576 | 0 | 0 |
| 27 | M41 | Z | .576 | .576 | 0 | 0 |
| 28 | M9 | Z | .576 | .576 | 0 | 0 |
| 29 | M7 | Z | .849 | .849 | 0 | 0 |
| 30 | M1 | Z | .144 | .144 | 0 | 0 |
| 31 | M36 | Z | .112 | .112 | 0 | 0 |

## Member Distributed Loads (BLC 8 : W120) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 32 | M6 | Z | .639 | .639 | 0 | 0 |
| 33 | M5 | Z | .51 | .51 | 0 | 0 |
| 34 | M37 | Z | .525 | .525 | 0 | 0 |
| 35 | M32 | Z | .576 | .576 | 0 | 0 |
| 36 | M47 | Z | .576 | .576 | 0 | 0 |
| 37 | M31 | Z | .576 | .576 | 0 | 0 |
| 38 | M29 | Z | .849 | .849 | 0 | 0 |
| 39 | M23 | Z | .144 | .144 | 0 | 0 |
| 40 | M35 | Z | .112 | .112 | 0 | 0 |
| 41 | M28 | Z | .639 | .639 | 0 | 0 |
| 42 | M27 | Z | .51 | .51 | 0 | 0 |
| 43 | M21 | Z | .576 | .576 | 0 | 0 |
| 44 | M44 | Z | .576 | .576 | 0 | 0 |
| 45 | M20 | Z | .576 | .576 | 0 | 0 |
| 46 | M18 | Z | .849 | .849 | 0 | 0 |
| 47 | M12 | Z | .576 | .576 | 0 | 0 |
| 48 | M34 | Z | .446 | .446 | 0 | 0 |
| 49 | M17 | Z | 0 | 0 | 0 | 0 |
| 50 | M16 | Z | .363 | .363 | 0 | 0 |

## Member Distributed Loads (BLC 9 : W150)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | .576 | .576 | 0 | 0 |
| 2 | M41 | X | .576 | .576 | 0 | 0 |
| 3 | M9 | X | .576 | .576 | 0 | 0 |
| 4 | M7 | X | .849 | .849 | 0 | 0 |
| 5 | M1 | X | .432 | .432 | 0 | 0 |
| 6 | M36 | X | .335 | .335 | 0 | 0 |
| 7 | M6 | X | .213 | .213 | 0 | 0 |
| 8 | M5 | X | .51 | .51 | 0 | 0 |
| 9 | M37 | X | .525 | .525 | 0 | 0 |
| 10 | M32 | X | .576 | .576 | 0 | 0 |
| 11 | M47 | X | .576 | .576 | 0 | 0 |
| 12 | M31 | X | .576 | .576 | 0 | 0 |
| 13 | M29 | X | .849 | .849 | 0 | 0 |
| 14 | M23 | X | 0 | 0 | 0 | 0 |
| 15 | M35 | X | 0 | 0 | 0 | 0 |
| 16 | M28 | X | .852 | .852 | 0 | 0 |
| 17 | M27 | X | .51 | .51 | 0 | 0 |
| 18 | M21 | X | .576 | .576 | 0 | 0 |
| 19 | M44 | X | .576 | .576 | 0 | 0 |
| 20 | M20 | X | .576 | .576 | 0 | 0 |
| 21 | M18 | X | .849 | .849 | 0 | 0 |
| 22 | M12 | X | .432 | .432 | 0 | 0 |
| 23 | M34 | X | .335 | .335 | 0 | 0 |
| 24 | M17 | X | .213 | .213 | 0 | 0 |
| 25 | M16 | X | .363 | .363 | 0 | 0 |
| 26 | M10 | Z | .333 | .333 | 0 | 0 |
| 27 | M41 | Z | .333 | .333 | 0 | 0 |
| 28 | M9 | Z | .333 | .333 | 0 | 0 |
| 29 | M7 | Z | .49 | .49 | 0 | 0 |
| 30 | M1 | Z | .249 | .249 | 0 | 0 |
| 31 | M36 | Z | .193 | .193 | 0 | 0 |
| 32 | M6 | Z | .123 | .123 | 0 | 0 |
| 33 | M5 | Z | .294 | .294 | 0 | 0 |
| 34 | M37 | Z | .303 | .303 | 0 | 0 |

## Member Distributed Loads (BLC 9 : W150) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 35 | M32 | Z | .333 | .333 | 0 | 0 |
| 36 | M47 | Z | .333 | .333 | 0 | 0 |
| 37 | M31 | Z | .333 | .333 | 0 | 0 |
| 38 | M29 | Z | .49 | .49 | 0 | 0 |
| 39 | M23 | Z | 0 | 0 | 0 | 0 |
| 40 | M35 | Z | 0 | 0 | 0 | 0 |
| 41 | M28 | Z | .492 | .492 | 0 | 0 |
| 42 | M27 | Z | .294 | .294 | 0 | 0 |
| 43 | M21 | Z | .333 | .333 | 0 | 0 |
| 44 | M44 | Z | .333 | .333 | 0 | 0 |
| 45 | M20 | Z | .333 | .333 | 0 | 0 |
| 46 | M18 | Z | .49 | .49 | 0 | 0 |
| 47 | M12 | Z | .249 | .249 | 0 | 0 |
| 48 | M34 | Z | .193 | .193 | 0 | 0 |
| 49 | M17 | Z | .123 | .123 | 0 | 0 |
| 50 | M16 | Z | .21 | .21 | 0 | 0 |

## Member Distributed Loads (BLC 10 : W0 + Ice)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | -.193 | -.193 | 0 | 0 |
| 2 | M41 | X | -.193 | -.193 | 0 | 0 |
| 3 | M9 | X | -.193 | -.193 | 0 | 0 |
| 4 | M7 | X | -.257 | -.257 | 0 | 0 |
| 5 | M1 | X | -.207 | -.207 | 0 | 0 |
| 6 | M36 | X | -.138 | -.138 | 0 | 0 |
| 7 | M6 | X | -.013 | -.013 | 0 | 0 |
| 8 | M5 | X | -.15 | -.15 | 0 | 0 |
| 9 | M37 | X | -.153 | -.153 | 0 | 0 |
| 10 | M32 | X | -.193 | -.193 | 0 | 0 |
| 11 | M47 | X | -.193 | -.193 | 0 | 0 |
| 12 | M31 | X | -.193 | -.193 | 0 | 0 |
| 13 | M29 | X | -.257 | -.257 | 0 | 0 |
| 14 | M23 | X | -.053 | -.053 | 0 | 0 |
| 15 | M35 | X | -.041 | -.041 | 0 | 0 |
| 16 | M28 | X | -.177 | -.177 | 0 | 0 |
| 17 | M27 | X | -.15 | -.15 | 0 | 0 |
| 18 | M21 | X | -.193 | -.193 | 0 | 0 |
| 19 | M44 | X | -.193 | -.193 | 0 | 0 |
| 20 | M20 | X | -.193 | -.193 | 0 | 0 |
| 21 | M18 | X | -.257 | -.257 | 0 | 0 |
| 22 | M12 | X | -.053 | -.053 | 0 | 0 |
| 23 | M34 | X | -.041 | -.041 | 0 | 0 |
| 24 | M17 | X | -.177 | -.177 | 0 | 0 |
| 25 | M16 | X | -.123 | -.123 | 0 | 0 |

## Member Distributed Loads (BLC 11 : W30 + Ice)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | -.167 | -.167 | 0 | 0 |
| 2 | M41 | X | -.167 | -.167 | 0 | 0 |
| 3 | M9 | X | -.167 | -.167 | 0 | 0 |
| 4 | M7 | X | -.223 | -.223 | 0 | 0 |
| 5 | M1 | X | -.135 | -.135 | 0 | 0 |
| 6 | M36 | X | -.092 | -.092 | 0 | 0 |
| 7 | M6 | X | -.058 | -.058 | 0 | 0 |
| 8 | M5 | X | -.13 | -.13 | 0 | 0 |
| 9 | M37 | X | -.132 | -.132 | 0 | 0 |

## Member Distributed Loads (BLC 11 : W30 + Ice) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 10 | M32 | X | -.167 | -.167 | 0 | 0 |
| 11 | M47 | X | -.167 | -.167 | 0 | 0 |
| 12 | M31 | X | -.167 | -.167 | 0 | 0 |
| 13 | M29 | X | -.223 | -.223 | 0 | 0 |
| 14 | M23 | X | -.135 | -.135 | 0 | 0 |
| 15 | M35 | X | -.092 | -.092 | 0 | 0 |
| 16 | M28 | X | -.058 | -.058 | 0 | 0 |
| 17 | M27 | X | -.13 | -.13 | 0 | 0 |
| 18 | M21 | X | -.167 | -.167 | 0 | 0 |
| 19 | M44 | X | -.167 | -.167 | 0 | 0 |
| 20 | M20 | X | -.167 | -.167 | 0 | 0 |
| 21 | M18 | X | -.223 | -.223 | 0 | 0 |
| 22 | M12 | X | -.002 | -.002 | 0 | 0 |
| 23 | M34 | X | -.007 | -.007 | 0 | 0 |
| 24 | M17 | X | -.2 | -.2 | 0 | 0 |
| 25 | M16 | X | -.107 | -.107 | 0 | 0 |
| 26 | M10 | Z | .096 | .096 | 0 | 0 |
| 27 | M41 | Z | .096 | .096 | 0 | 0 |
| 28 | M9 | Z | .096 | .096 | 0 | 0 |
| 29 | M7 | Z | .129 | .129 | 0 | 0 |
| 30 | M1 | Z | .078 | .078 | 0 | 0 |
| 31 | M36 | Z | .053 | .053 | 0 | 0 |
| 32 | M6 | Z | .034 | .034 | 0 | 0 |
| 33 | M5 | Z | .075 | .075 | 0 | 0 |
| 34 | M37 | Z | .076 | .076 | 0 | 0 |
| 35 | M32 | Z | .096 | .096 | 0 | 0 |
| 36 | M47 | Z | .096 | .096 | 0 | 0 |
| 37 | M31 | Z | .096 | .096 | 0 | 0 |
| 38 | M29 | Z | .129 | .129 | 0 | 0 |
| 39 | M23 | Z | .078 | .078 | 0 | 0 |
| 40 | M35 | Z | .053 | .053 | 0 | 0 |
| 41 | M28 | Z | .034 | .034 | 0 | 0 |
| 42 | M27 | Z | .075 | .075 | 0 | 0 |
| 43 | M21 | Z | .096 | .096 | 0 | 0 |
| 44 | M44 | Z | .096 | .096 | 0 | 0 |
| 45 | M20 | Z | .096 | .096 | 0 | 0 |
| 46 | M18 | Z | .129 | .129 | 0 | 0 |
| 47 | M12 | Z | .000891 | .000891 | 0 | 0 |
| 48 | M34 | Z | .004 | .004 | 0 | 0 |
| 49 | M17 | Z | .116 | .116 | 0 | 0 |
| 50 | M16 | Z | .061 | .061 | 0 | 0 |

## Member Distributed Loads (BLC 12 : W60 + Ice)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | -.096 | -.096 | 0 | 0 |
| 2 | M41 | X | -.096 | -.096 | 0 | 0 |
| 3 | M9 | X | -.096 | -.096 | 0 | 0 |
| 4 | M7 | X | -.129 | -.129 | 0 | 0 |
| 5 | M1 | X | -.027 | -.027 | 0 | 0 |
| 6 | M36 | X | -.02 | -.02 | 0 | 0 |
| 7 | M6 | X | -.088 | -.088 | 0 | 0 |
| 8 | M5 | X | -.075 | -.075 | 0 | 0 |
| 9 | M37 | X | -.076 | -.076 | 0 | 0 |
| 10 | M32 | X | -.096 | -.096 | 0 | 0 |
| 11 | M47 | X | -.096 | -.096 | 0 | 0 |
| 12 | M31 | X | -.096 | -.096 | 0 | 0 |

## Member Distributed Loads (BLC 12 : W60 + Ice) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 13 | M29 | X | -.129 | -.129 | 0 | 0 |
| 14 | M23 | X | -.104 | -.104 | 0 | 0 |
| 15 | M35 | X | -.069 | -.069 | 0 | 0 |
| 16 | M28 | X | -.006 | -.006 | 0 | 0 |
| 17 | M27 | X | -.075 | -.075 | 0 | 0 |
| 18 | M21 | X | -.096 | -.096 | 0 | 0 |
| 19 | M44 | X | -.096 | -.096 | 0 | 0 |
| 20 | M20 | X | -.096 | -.096 | 0 | 0 |
| 21 | M18 | X | -.129 | -.129 | 0 | 0 |
| 22 | M12 | X | -.027 | -.027 | 0 | 0 |
| 23 | M34 | X | -.02 | -.02 | 0 | 0 |
| 24 | M17 | X | -.088 | -.088 | 0 | 0 |
| 25 | M16 | X | -.061 | -.061 | 0 | 0 |
| 26 | M10 | Z | .167 | .167 | 0 | 0 |
| 27 | M41 | Z | .167 | .167 | 0 | 0 |
| 28 | M9 | Z | .167 | .167 | 0 | 0 |
| 29 | M7 | Z | .223 | .223 | 0 | 0 |
| 30 | M1 | Z | .046 | .046 | 0 | 0 |
| 31 | M36 | Z | .035 | .035 | 0 | 0 |
| 32 | M6 | Z | .153 | .153 | 0 | 0 |
| 33 | M5 | Z | .13 | .13 | 0 | 0 |
| 34 | M37 | Z | .132 | .132 | 0 | 0 |
| 35 | M32 | Z | .167 | .167 | 0 | 0 |
| 36 | M47 | Z | .167 | .167 | 0 | 0 |
| 37 | M31 | Z | .167 | .167 | 0 | 0 |
| 38 | M29 | Z | .223 | .223 | 0 | 0 |
| 39 | M23 | Z | .179 | .179 | 0 | 0 |
| 40 | M35 | Z | .12 | .12 | 0 | 0 |
| 41 | M28 | Z | .011 | .011 | 0 | 0 |
| 42 | M27 | Z | .13 | .13 | 0 | 0 |
| 43 | M21 | Z | .167 | .167 | 0 | 0 |
| 44 | M44 | Z | .167 | .167 | 0 | 0 |
| 45 | M20 | Z | .167 | .167 | 0 | 0 |
| 46 | M18 | Z | .223 | .223 | 0 | 0 |
| 47 | M12 | Z | .046 | .046 | 0 | 0 |
| 48 | M34 | Z | .035 | .035 | 0 | 0 |
| 49 | M17 | Z | .153 | .153 | 0 | 0 |
| 50 | M16 | Z | .107 | .107 | 0 | 0 |

## Member Distributed Loads (BLC 13 : W90 + Ice)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | Z | .193 | .193 | 0 | 0 |
| 2 | M41 | Z | .193 | .193 | 0 | 0 |
| 3 | M9 | Z | .193 | .193 | 0 | 0 |
| 4 | M7 | Z | .257 | .257 | 0 | 0 |
| 5 | M1 | Z | .002 | .002 | 0 | 0 |
| 6 | M36 | Z | .008 | .008 | 0 | 0 |
| 7 | M6 | Z | .231 | .231 | 0 | 0 |
| 8 | M5 | Z | .15 | .15 | 0 | 0 |
| 9 | M37 | Z | .153 | .153 | 0 | 0 |
| 10 | M32 | Z | .193 | .193 | 0 | 0 |
| 11 | M47 | Z | .193 | .193 | 0 | 0 |
| 12 | M31 | Z | .193 | .193 | 0 | 0 |
| 13 | M29 | Z | .257 | .257 | 0 | 0 |
| 14 | M23 | Z | .156 | .156 | 0 | 0 |
| 15 | M35 | Z | .106 | .106 | 0 | 0 |

## Member Distributed Loads (BLC 13 : W90 + Ice) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 16 | M28 | Z | .067 | .067 | 0 | 0 |
| 17 | M27 | Z | .15 | .15 | 0 | 0 |
| 18 | M21 | Z | .193 | .193 | 0 | 0 |
| 19 | M44 | Z | .193 | .193 | 0 | 0 |
| 20 | M20 | Z | .193 | .193 | 0 | 0 |
| 21 | M18 | Z | .257 | .257 | 0 | 0 |
| 22 | M12 | Z | .156 | .156 | 0 | 0 |
| 23 | M34 | Z | .106 | .106 | 0 | 0 |
| 24 | M17 | Z | .067 | .067 | 0 | 0 |
| 25 | M16 | Z | .123 | .123 | 0 | 0 |

## Member Distributed Loads (BLC 14 : W120 + Ice)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | .096 | .096 | 0 | 0 |
| 2 | M41 | X | .096 | .096 | 0 | 0 |
| 3 | M9 | X | .096 | .096 | 0 | 0 |
| 4 | M7 | X | .129 | .129 | 0 | 0 |
| 5 | M1 | X | .027 | .027 | 0 | 0 |
| 6 | M36 | X | .02 | .02 | 0 | 0 |
| 7 | M6 | X | .088 | .088 | 0 | 0 |
| 8 | M5 | X | .075 | .075 | 0 | 0 |
| 9 | M37 | X | .076 | .076 | 0 | 0 |
| 10 | M32 | X | .096 | .096 | 0 | 0 |
| 11 | M47 | X | .096 | .096 | 0 | 0 |
| 12 | M31 | X | .096 | .096 | 0 | 0 |
| 13 | M29 | X | .129 | .129 | 0 | 0 |
| 14 | M23 | X | .027 | .027 | 0 | 0 |
| 15 | M35 | X | .02 | .02 | 0 | 0 |
| 16 | M28 | X | .088 | .088 | 0 | 0 |
| 17 | M27 | X | .075 | .075 | 0 | 0 |
| 18 | M21 | X | .096 | .096 | 0 | 0 |
| 19 | M44 | X | .096 | .096 | 0 | 0 |
| 20 | M20 | X | .096 | .096 | 0 | 0 |
| 21 | M18 | X | .129 | .129 | 0 | 0 |
| 22 | M12 | X | .104 | .104 | 0 | 0 |
| 23 | M34 | X | .069 | .069 | 0 | 0 |
| 24 | M17 | X | .006 | .006 | 0 | 0 |
| 25 | M16 | X | .061 | .061 | 0 | 0 |
| 26 | M10 | Z | .167 | .167 | 0 | 0 |
| 27 | M41 | Z | .167 | .167 | 0 | 0 |
| 28 | M9 | Z | .167 | .167 | 0 | 0 |
| 29 | M7 | Z | .223 | .223 | 0 | 0 |
| 30 | M1 | Z | .046 | .046 | 0 | 0 |
| 31 | M36 | Z | .035 | .035 | 0 | 0 |
| 32 | M6 | Z | .153 | .153 | 0 | 0 |
| 33 | M5 | Z | .13 | .13 | 0 | 0 |
| 34 | M37 | Z | .132 | .132 | 0 | 0 |
| 35 | M32 | Z | .167 | .167 | 0 | 0 |
| 36 | M47 | Z | .167 | .167 | 0 | 0 |
| 37 | M31 | Z | .167 | .167 | 0 | 0 |
| 38 | M29 | Z | .223 | .223 | 0 | 0 |
| 39 | M23 | Z | .046 | .046 | 0 | 0 |
| 40 | M35 | Z | .035 | .035 | 0 | 0 |
| 41 | M28 | Z | .153 | .153 | 0 | 0 |
| 42 | M27 | Z | .13 | .13 | 0 | 0 |
| 43 | M21 | Z | .167 | .167 | 0 | 0 |

## Member Distributed Loads (BLC 14 : W120 + Ice) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 44 | M44 | Z | .167 | .167 | 0 | 0 |
| 45 | M20 | Z | .167 | .167 | 0 | 0 |
| 46 | M18 | Z | .223 | .223 | 0 | 0 |
| 47 | M12 | Z | .179 | .179 | 0 | 0 |
| 48 | M34 | Z | .12 | .12 | 0 | 0 |
| 49 | M17 | Z | .011 | .011 | 0 | 0 |
| 50 | M16 | Z | .107 | .107 | 0 | 0 |

## Member Distributed Loads (BLC 15 : W150 + Ice)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 1 | M10 | X | .167 | .167 | 0 | 0 |
| 2 | M41 | X | .167 | .167 | 0 | 0 |
| 3 | M9 | X | .167 | .167 | 0 | 0 |
| 4 | M7 | X | .223 | .223 | 0 | 0 |
| 5 | M1 | X | .135 | .135 | 0 | 0 |
| 6 | M36 | X | .092 | .092 | 0 | 0 |
| 7 | M6 | X | .058 | .058 | 0 | 0 |
| 8 | M5 | X | .13 | .13 | 0 | 0 |
| 9 | M37 | X | .132 | .132 | 0 | 0 |
| 10 | M32 | X | .167 | .167 | 0 | 0 |
| 11 | M47 | X | .167 | .167 | 0 | 0 |
| 12 | M31 | X | .167 | .167 | 0 | 0 |
| 13 | M29 | X | .223 | .223 | 0 | 0 |
| 14 | M23 | X | .002 | .002 | 0 | 0 |
| 15 | M35 | X | .007 | .007 | 0 | 0 |
| 16 | M28 | X | .2 | .2 | 0 | 0 |
| 17 | M27 | X | .13 | .13 | 0 | 0 |
| 18 | M21 | X | .167 | .167 | 0 | 0 |
| 19 | M44 | X | .167 | .167 | 0 | 0 |
| 20 | M20 | X | .167 | .167 | 0 | 0 |
| 21 | M18 | X | .223 | .223 | 0 | 0 |
| 22 | M12 | X | .135 | .135 | 0 | 0 |
| 23 | M34 | X | .092 | .092 | 0 | 0 |
| 24 | M17 | X | .058 | .058 | 0 | 0 |
| 25 | M16 | X | .107 | .107 | 0 | 0 |
| 26 | M10 | Z | .096 | .096 | 0 | 0 |
| 27 | M41 | Z | .096 | .096 | 0 | 0 |
| 28 | M9 | Z | .096 | .096 | 0 | 0 |
| 29 | M7 | Z | .129 | .129 | 0 | 0 |
| 30 | M1 | Z | .078 | .078 | 0 | 0 |
| 31 | M36 | Z | .053 | .053 | 0 | 0 |
| 32 | M6 | Z | .034 | .034 | 0 | 0 |
| 33 | M5 | Z | .075 | .075 | 0 | 0 |
| 34 | M37 | Z | .076 | .076 | 0 | 0 |
| 35 | M32 | Z | .096 | .096 | 0 | 0 |
| 36 | M47 | Z | .096 | .096 | 0 | 0 |
| 37 | M31 | Z | .096 | .096 | 0 | 0 |
| 38 | M29 | Z | .129 | .129 | 0 | 0 |
| 39 | M23 | Z | .000891 | .000891 | 0 | 0 |
| 40 | M35 | Z | .004 | .004 | 0 | 0 |
| 41 | M28 | Z | .116 | .116 | 0 | 0 |
| 42 | M27 | Z | .075 | .075 | 0 | 0 |
| 43 | M21 | Z | .096 | .096 | 0 | 0 |
| 44 | M44 | Z | .096 | .096 | 0 | 0 |
| 45 | M20 | Z | .096 | .096 | 0 | 0 |
| 46 | M18 | Z | .129 | .129 | 0 | 0 |

## Member Distributed Loads (BLC 15 : W150 + Ice) (Continued)

| | Member Label | Direction | Start Magnitude[lb/in,... | End Magnitude[lb/in,... | Start Location[in,%] | End Location[in,%] |
|---|---|---|---|---|---|---|
| 47 | M12 | Z | .078 | .078 | 0 | 0 |
| 48 | M34 | Z | .053 | .053 | 0 | 0 |
| 49 | M17 | Z | .034 | .034 | 0 | 0 |
| 50 | M16 | Z | .061 | .061 | 0 | 0 |

## Envelope Joint Reactions

| | Joint | | X [lb] | LC | Y [lb] | LC | Z [lb] | LC | MX [k-in] | LC | MY [k-in] | LC | MZ [k-in] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N32 | max | 1519.312 | 13 | 1841.83 | 24 | 1773.737 | 11 | 59.472 | 22 | 52.172 | 8 | -4.524 | 8 |
| 2 | | min | -1624.245 | 7 | 667.008 | 76 | -1953.043 | 5 | 13.825 | 4 | -52.3 | 2 | -32.441 | 14 |
| 3 | N11 | max | 2165.446 | 2 | 1963.121 | 20 | 1368.957 | 11 | 45.907 | 35 | 53.916 | 4 | 67.789 | 19 |
| 4 | | min | -1958.051 | 8 | 715.095 | 76 | -1368.854 | 5 | -46.079 | 53 | -54.086 | 10 | 21.92 | 12 |
| 5 | N53 | max | 1560.519 | 3 | 1843.366 | 16 | 1924.38 | 11 | -15.08 | 12 | 52.856 | 12 | -3.17 | 8 |
| 6 | | min | -1667.443 | 9 | 666.964 | 76 | -1745.159 | 5 | -56.99 | 17 | -53.025 | 6 | -36.74 | 14 |
| 7 | Totals: | max | 5067.519 | 2 | 5647.388 | 16 | 5067.074 | 11 | | | | | | |
| 8 | | min | -5067.526 | 8 | 2049.067 | 76 | -5067.056 | 5 | | | | | | |

## Envelope AISC 15th(360-16): LRFD Steel Code Checks

| | Member | Shape | Code ... | Loc[in] | LC | Shear ... | Loc[in] | Dir | LC | phi*Pnc [... | phi*Pnt [lb] | phi*Mn y... | phi*Mn z... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M31 | PIPE_2.0 | .730 | 48 | 10 | .096 | 48 | | 4 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 2 | M7 | PIPE_3.0 | .726 | 75 | 2 | .118 | 75 | | 8 | 28250.554 | 65205 | 68.985 | 68.985 | 1... | H1-1b |
| 3 | M47 | PIPE_2.0 | .721 | 48 | 10 | .051 | 48 | | 10 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 4 | M44 | PIPE_2.0 | .720 | 48 | 6 | .052 | 48 | | 6 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 5 | M29 | PIPE_3.0 | .717 | 75 | 10 | .114 | 75 | | 4 | 28250.554 | 65205 | 68.985 | 68.985 | 1... | H1-1b |
| 6 | M41 | PIPE_2.0 | .716 | 48 | 2 | .052 | 48 | | 13 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 7 | M18 | PIPE_3.0 | .716 | 75 | 6 | .115 | 75 | | 12 | 28250.554 | 65205 | 68.985 | 68.985 | 1... | H1-1b |
| 8 | M21 | PIPE_2.0 | .708 | 48 | 6 | .091 | 48 | | 12 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 9 | M10 | PIPE_2.0 | .702 | 48 | 2 | .104 | 48 | | 8 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 10 | M6 | HSS4X4X3 | .700 | 36 | 58 | .458 | 36 | y | 53 | 94351.639 | 97524 | 138.726 | 138.726 | 1... | H3-6 |
| 11 | M9 | PIPE_2.0 | .695 | 48 | 2 | .096 | 48 | | 8 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 12 | M20 | PIPE_2.0 | .669 | 48 | 6 | .097 | 48 | | 12 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 13 | M32 | PIPE_2.0 | .668 | 48 | 10 | .091 | 48 | | 4 | 14916.096 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 14 | M28 | HSS4X4X3 | .630 | 36 | 6 | .122 | 36 | z | 7 | 94351.639 | 97524 | 138.726 | 138.726 | 1... | H1-1b |
| 15 | M17 | HSS4X4X3 | .622 | 36 | 2 | .121 | 36 | z | 3 | 94351.639 | 97524 | 138.726 | 138.726 | 1... | H1-1b |
| 16 | M12 | PIPE_2.0 | .393 | 75 | 6 | .078 | 3.125 | | 32 | 6295.422 | 32130 | 22.459 | 22.459 | 2... | H1-1b |
| 17 | M23 | PIPE_2.0 | .393 | 75 | 10 | .078 | 146.8.. | | 56 | 6295.422 | 32130 | 22.459 | 22.459 | 2... | H1-1b |
| 18 | M1 | PIPE_2.0 | .389 | 75 | 2 | .127 | 139.0.. | | 30 | 6295.422 | 32130 | 22.459 | 22.459 | 2... | H1-1b |
| 19 | M35 | PIPE_2.0 | .059 | 14.311 | 31 | .251 | 30.531 | | 31 | 29730.659 | 32130 | 22.459 | 22.459 | 1... | H3-6 |
| 20 | M34 | PIPE_2.0 | .058 | 14.311 | 57 | .250 | 30.531 | | 57 | 29730.659 | 32130 | 22.459 | 22.459 | 1... | H3-6 |
| 21 | M37 | PIPE_2.0 | .008 | 24 | 7 | .002 | 24 | | 7 | 26521.424 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 22 | M36 | PIPE_2.0 | .006 | 15.265 | 20 | .133 | 0 | | 11 | 29730.659 | 32130 | 22.459 | 22.459 | 1... | H1-1b |
| 23 | M27 | PIPE_3.0 | .000 | 6 | 3 | .000 | 6 | | 3 | 64856.883 | 65205 | 68.985 | 68.985 | 1... | H1-1b |
| 24 | M5 | PIPE_3.0 | .000 | 6 | 7 | .000 | 6 | | 7 | 64856.883 | 65205 | 68.985 | 68.985 | 1... | H1-1b |
| 25 | M16 | PIPE_3.0 | .000 | 6 | 11 | .000 | 6 | | 11 | 64856.883 | 65205 | 68.985 | 68.985 | 1... | H1-1b |

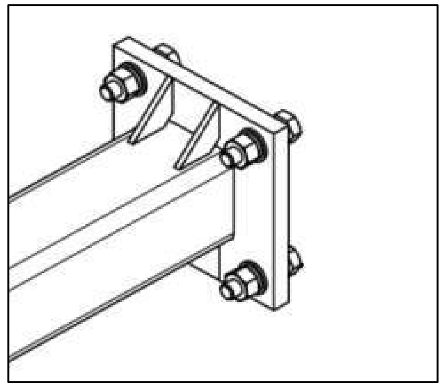
# Connection Check

## SITE DETAILS

| | |
|---|---|
| Site Name/Code | CT2901 - Waterbury Whitewood Road |
| Date | 03/28/2022 |
| Engineer | AV |

## CONNECTION PARAMETERS

| | | | |
|---|---|---|---|
| Number of bolts | | **4** | |
| b - width of member | | **4** | *in* |
| d - height of member | | **4** | *in* |
| B - horizontal bolt spacing | | **6** | *in* |
| D - vertical bolt spacing | | **6** | *in* |
| Bolt Diameter | d | **5/8** | *in* |
| Section Shape | | **HSS** | |
| Weld Thickness | | **1/4** | *in* |
| Tensile Area | $A_b$ | 0.31 | *in²* |
| Tensile Area | $A_n$ | 0.23 | *in²* |
| Grade | | **A325** | |
| Bolt Ultimate Strength | $F_{ub}$ | 120 | *ksi* |
| Connection length reduction factor | Rb | 1 | |



*Connection Sketch/Photo*

## FLANGE LOADS

| | | | |
|---|---|---|---|
| Loadcase # | | **10** | |
| Bending Moment | Mzz | **34.15** | *kips-in* |
| Bending Moment | Myy | **54.09** | *kips-in* |
| Torsional Moment | Mxx | **7.16** | *kips-in* |
| Shear Force | Vy | **0.86** | *kips* |
| Shear Force | Vz | **1.33** | *kips* |
| Axial Force | Px | **0.76** | *kips* |

## BOLT CHECK

**Bolt Tension Capacity**

$\phi R_{nt} = 0.75 * F_{ub} * A_n$

$\phi R_{nt} =$ **20.3** *kips*

**Bolt Shear Capacity**

$\phi R_{nv} = 0.75*0.625*0.8*Fub*Ab*Rb$

$\phi R_{nv} =$ **13.8** *kips*

**Maximum Bolt Tension**

$T_{ub} = F_{Mxx} + F_{Mzz} + T_y/4$

$T_{ub} =$ **7.54** *kips*

**Maximum Bolt Shear**

$V_{ub} = \text{sqrt}((V_x/4)^2 + (V_y/4)^2) + F_{Myy}$

$V_{ub} =$ **0.82** *kips*

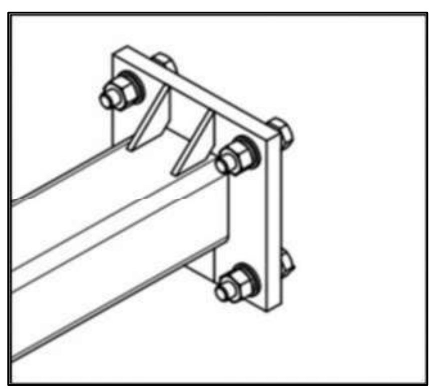
| | | | | | |
|---|---|---|---|---|---|
| **Tension Ratio:** | **37.1%** | % | **Shear Ratio:** | **5.9%** | % |
| | PASS | | | PASS | |
| **$(T_{ub} / \phi R_{nt})^2 + (V_{ub} / \phi R_{nv})^2 < 1.0$** | **OK** | | Ratio | **14.1%** | PASS |

## WELD CHECK

| | | |
|---|---|---|
| Filler Metal $F_{EXX}$ | **70** | ksi |
| Weld Thk. | **0.25** | in |
| Base metal $F_u$ | **58** | ksi |
| Type of section | **HSS** | |
| Length of Section [b] | **4.0** | in |
| Length of Section [d] | **4.0** | in |
| $l_{total}$ | **16.00** | in |
| $I_p$ | **85.33** | in³ |
| $S_z$ | **21.33** | in² |
| $S_y$ | **21.33** | in² |
| $R_{ux}$ | 4.18 | kips/in |
| $R_{uy}$ | 0.22 | kips/in |
| $R_{uz}$ | 0.25 | kips/in |
| $R_u$ | 4.20 | kips/in |
| Allowable Weld Stress | **5.57** | kips/in |

**75.4%** PASS

Are stiffners present? **No**



*Connection Sketch*

# Waterburv

**Unique ID:** 012408470021 **Card No:** 1 Of 1

| **Location:** | 227 WHITEWOOD RD | **Map Id:** | 0124-0847-0021 | **Zone:** | RM | **Date Printed:** | 8/23/2022 |
|---|---|---|---|---|---|---|---|
| | | **Neighborhood:** | 77500-Watertown Ave/Bunker Hill | | | **Last Update:** | 8/23/2022 |

| Owner Of Record | Volume/Page | Date | Sales Type | Valid | Sale Price |
|---|---|---|---|---|---|
| BLESSED 1 LLC | 8325/0049 | 8/16/2021 | Warranty Sale | Yes | 650,000 |
| 28 MOUNTAIN RD , SEYMOUR, CT 06483 | | | Exempt | | |

**Prior Owner History**

| | | | | | |
|---|---|---|---|---|---|
| DUBLESKI CUSTOM HOMES LLC | 6427/0208 | 9/12/2008 | Warranty Sale | No | 0 |
| DCH AND ASSOCIATES LLC | 6297/0029 | 1/11/2008 | Warrantv Sale | Yes | 725.000 |
| HAL-LOR ENTERPRISES LLC | 5159/0118 | 11/19/2007 | Probate | No | 0 |
| LUARASI LORAND & HALIM DEMIRAJ (TC) | 5159/0118 | 11/1/2004 | Warrantv Sale | Yes | 660.000 |
| JAMES SEERAM | 4589/0288 | 3/7/2003 | Warrantv Sale | Yes | 600.000 |

| Permit Number | Date | Permit Description |
|---|---|---|
| 2019.1322 | 6/4/2019 | set 1000 gallon tank on pad and run gas line to generator |
| 2018.3342 | 11/21/2018 | Install cell site shelter building with 200a. 120/240v. service and 30kw generator with ATS - crs#31 |
| 2016.1389 | 5/16/2016 | WIRE 2 FLOOD LIGHTS TP ILLUMINATE SIGN |
| 2014.2342 | 9/4/2014 | INSTALL MULTI GANG METER CENTER CELL- SITE |
| 2013.0108 | 1/25/2013 | TENANT FIT OIT LAUNDROMAT |
| 1261E | 11/3/2009 | FIT OUT CHINESE REST |

**Supplemental Data**

| | |
|---|---|
| **Census/Tract** | |
| **Dev Map ID** | PARCEL "C" |
| **Utilities** | |

**Appraised Value**

| | |
|---|---|
| **Total Land Value** | 253,150 |
| **Total Building Value** | 367,141 |
| **Total Outbldg Value** | 14,400 |
| **Total Market Value** | 634,691 |

**Acres**

| Land Type | Acres | 490 | Total Value |
|---|---|---|---|
| Commercial Rear | 1.01 | 0.00 | 15.150 |
| Primarv Site | 0.50 | 0.00 | 238.000 |
| **Total** | 1.5100 | 0.00 | 253,150 |

**State Item Codes**

| Code | Quantity | Value |
|---|---|---|
| 22-Com Buildinq | 1.00 | 257.000 |
| 21-Com Land | 1.51 | 177.200 |
| 25-Com Outbuildinq | 1.00 | 10.080 |

**Assessment History (Prior Years as of Oct 1)**

| | 2022 | 2021 | 2020 | 2019 | 2018 |
|---|---|---|---|---|---|
| **Land** | 177,200 | 177,200 | 177,200 | 177,200 | 177,200 |
| **Building** | 257,000 | 257,000 | 257,000 | 257,000 | 257,000 |
| **Outbuilding** | 10,080 | 10,080 | 10,080 | 10,080 | 10,080 |
| **Total** | **444,280** | **444,280** | **444,280** | **444,280** | **444,280** |

**490 Appraised Totals**

| Type | Acres | Value | Type | Acres | Value |
|---|---|---|---|---|---|
| | | | **Totals** | **0.00** | **0** |

**Application Date:** **Expiration Date:**

**Comments**

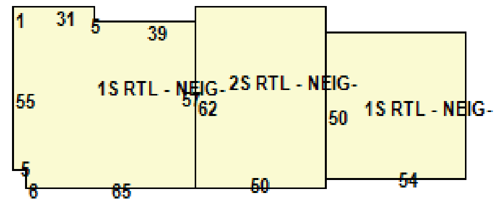
**Information may be deemed reliable, but not guaranteed.**

**Revaluation Date:** 10/1/2017

**Unique ID:** 012408470021

Waterburv

| **Location:** | 227 WHITEWOOD RD | **Unit** |
|---|---|---|




| Commercial Building Description | |
|---|---|
| Building Use | Retail |
| Class | |
| Overall Condition | Fair |
| Construction Quality | Averaqe |
| Stories | 2.00 |
| Year Built | 1975 |
| Remodel | |
| Percent Complete | 100 |
| GLA | **13015** |

| Basement | |
|---|---|
| Basement Area | 0 |

| HVAC | |
|---|---|
| Heating Type | Complete HVAC |
| Fuel Type | Gas |
| Cooling Type | |

| Interior | |
|---|---|
| Floors | |
| Walls | |
| Wall Height | |

| Exterior | |
|---|---|
| Exterior Walls | Brick/Block Back-up |
| Roof Type | Composite Built Up |
| Roof Cover | |

**Special Features**

| Description | Area/Qty |
|---|---|
| Base Value | 13015 |

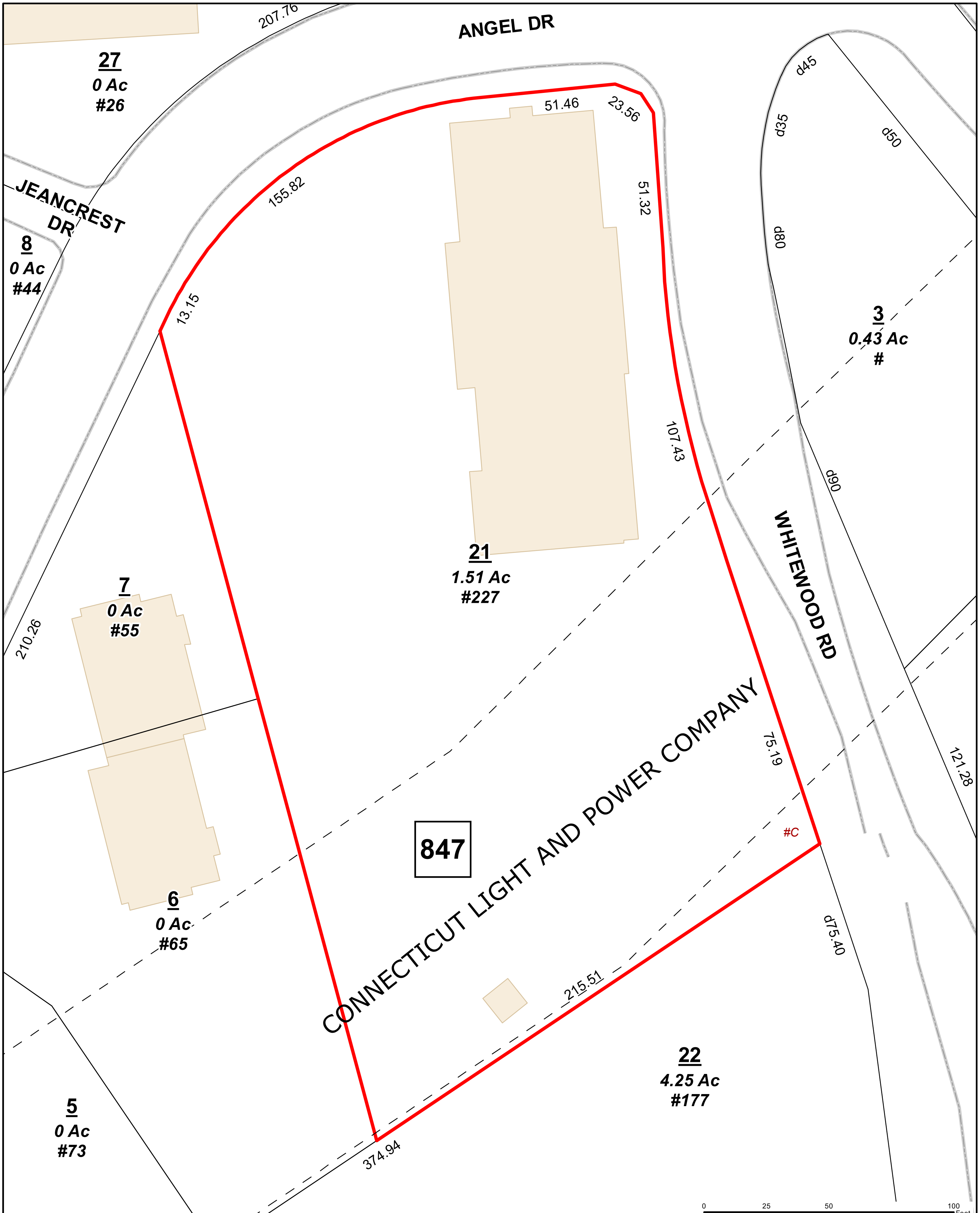
**Attached Component Computations**

| Type | Yr Blt | Area/Qty |
|---|---|---|
| Enclosed Porch | 1975 | 35 |

012408470021 04/11/2016

**Detached Component Computations**

| Type | Year | Condition | Area/Qty | Type | Year | Condition | Area/Qty |
|---|---|---|---|---|---|---|---|
| Asphalt Pavinq | 1975 | Averaqe | 18000 | | | | |




City of Waterbury
Public Works Department

MBL: 0124-0847-0021
ADDRESS: 227 WHITEWOOD RD

*This map is for informational purposes only and has not been prepared for, or suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to verify the usability of the information. The City of Waterbury makes no warranties, express or implied, as to the use of the information obtained herein.*

N

# 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


**CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

June 13, 2014

Lucia Chiocchio, Esq.
Cuddy & Feder LLP
445 Hamilton Avenue, 14th Floor
White Plains, New York 10601

RE: **PETITION NO. 1103 -** New Cingular Wireless PCS, LLC petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed installation of a telecommunications facility at an existing Connecticut Light and Power Company transmission structure located at 227 Whitewood Road, Waterbury, Connecticut.

Dear Attorney Chiocchio:

At a public meeting held on June 12, 2014, the Connecticut Siting Council (Council) considered and ruled that the above-referenced proposal would not have a substantial adverse environmental effect, and pursuant to Connecticut General Statutes § 16-50k, would not require a Certificate of Environmental Compatibility and Public Need with the following conditions:

- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed; and

- Any nonfunctioning antenna and associated antenna mounting equipment on this facility shall be removed within 60 days of the date the antenna ceased to function.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition dated May 9, 2014.

Enclosed for your information is a copy of the staff report on this project.

Very truly yours,

Robert Stein MAB

Robert Stein
Chairman

RS/CDM/jb

Enclosure: Staff Report dated June 12, 2014

c: The Honorable Neil M. O'Leary, Mayor, City of Waterbury
James A. Sequin, AICP, City Planner, City of Waterbury
The Honorable Raymond F. Primini, Chairman, Town of Watertown
Charles Frigon, Town Manager, Town of Watertown
Ruth Mulcahy, Land Use Administrator, Town of Watertown
Robert D. Gray, Program Administrator, Northeast Utilities Service Company

# 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


Petition No. 1103
AT&T
Waterbury, Connecticut
Staff Report
June 12, 2014

On May 12, 2014, the Connecticut Siting Council (Council) received a petition from New Cingular Wireless PCS, LLC (AT&T) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for a proposed installation of a wireless telecommunications facility on an existing CL&P structure located at 227 Whitewood Road in Waterbury, Connecticut. Council member Michael Caron and staff member David Martin visited the site on June 5, 2014 to review the proposal. Lucia Chiocchio of Cuddy & Feder, Harry Rocheville of Centek Engineering and Matthew Bandle of AT&T Mobility represented AT&T at the field review.

CL&P's transmission structure #11229 is an 80-foot monopole tower (one of the replacement towers on CL&P's 1990 line that was the subject of Petition 1058). AT&T proposes to add a 25-foot extension to the tower in order to install 12 panel antennas—three antennas (one per sector) for UMTS and nine antennas (three per sector) for LTE— at a centerline height of 105 feet above ground level. AT&T's equipment compound would be located near the base of the tower. The compound would include a 12-foot by 16-foot equipment shelter. Backup power would be provided by a 50 kW propane-fueled generator that would be located adjacent to the equipment shelter. The compound would be enclosed by a 6-foot chain link fence. A 1000-gallon propane storage tank would be located on a concrete pad within its own fenced enclosure adjacent to the equipment compound. Included with the petition materials was a noise study recommending that a noise barrier/sound absorber composite be installed on the inside of the fence extending six feet beyond the generator in the easterly and westerly directions. The engineer confirmed that the noise absorber would be installed on the compound fence. Access to the compound would be over an easement on an adjacent property as the grade at the rear of the property on which the compound would be located is too steep to allow vehicular access. Utility service would be brought underground from a utility pole on Whitewood Road.

A professional engineer performed a structural analysis of the existing transmission tower and proposed extension and concluded that the transmission tower is structurally capable of supporting the extension.

An AT&T RF engineer calculated that the power density of the proposed antennas would be approximately 23.8% of the FCC's maximum permissible exposure.

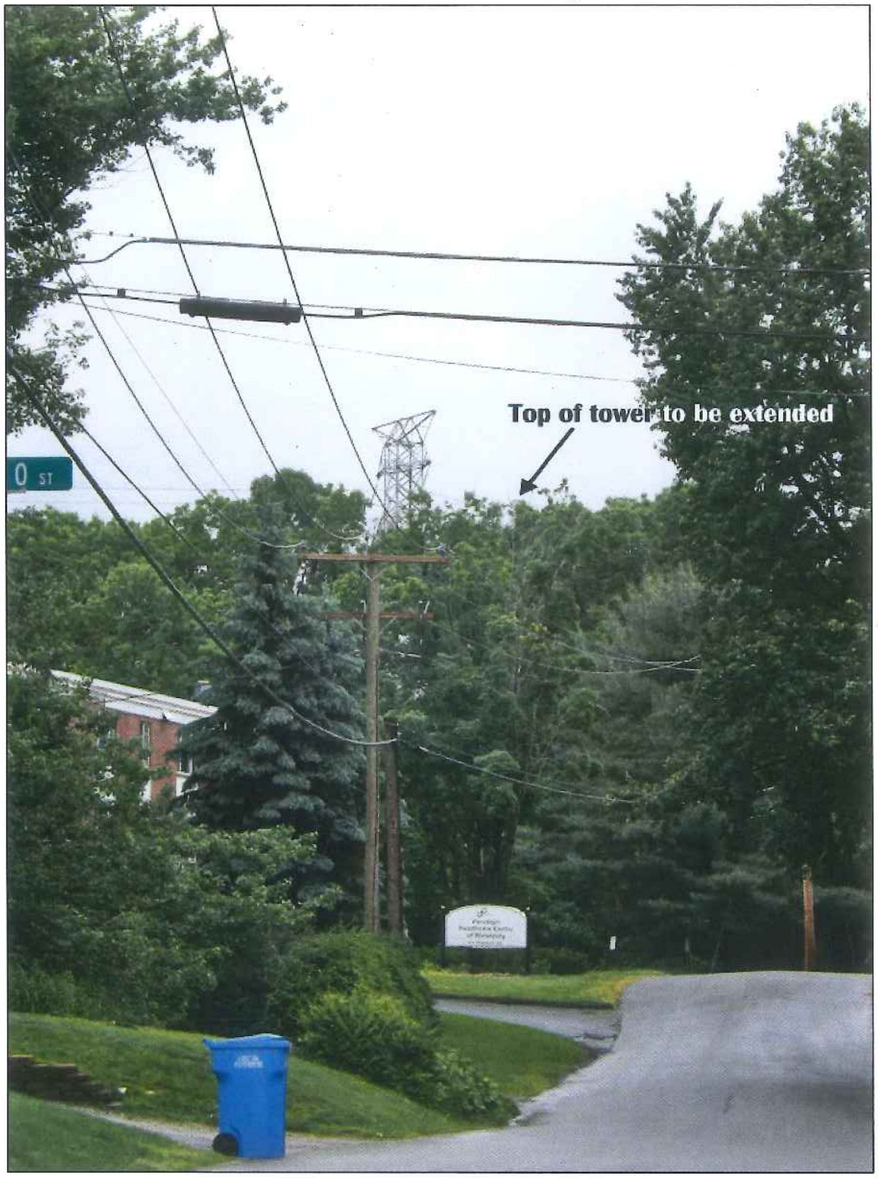
Land uses surrounding the proposed facility are apartments, condominiums, and moderate density single family residences. The tower to be extended is next to a taller lattice structure. The proposed extension with antennas would be very similar in height and mass to the existing lattice structure. Visibility of the tower will be somewhat limited by mature deciduous trees, especially for the residential properties to the south of the tower.

For this petition, AT&T notified the City and abutting property owners. No comments have been received.

AT&T's proposed tower extension and antenna installation should not create any significantly adverse environmental impacts.

CSC
CONNECTICUT SITING COUNCIL

**View of transmission towers from the south, on Whitewood Road**



**View of the transmission towers from west, from access location**

**Site of equipment compound**

EVERSOURCE ENERGY

56 Prospect Street,
Hartford, CT 06103

P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000

November 15, 2022

Mr. Tim Burks
SAI Communications
12 Industrial Way
Salem, NH 03079

RE: AT&T Antenna Site CT2901, Whitewood Rd, Waterbury CT, Eversource Structure 11229

Dear Mr. Burks:

Based on our reviews of the site drawings, the structural analysis and foundation review provided by Centek Engineering, along with third-party review performed by Paul J. Ford and Company, we accept the proposed modification.

Please work with Christopher Gelinas of Eversource Real Estate to process the site lease amendment. Please do not hesitate to contact us with questions or concerns. Christopher can be contacted at 860-665-2008, and I can be contacted at (203) 623-0409.

Sincerely,

Richard Badon

Richard Badon
Transmission Line Engineering

Ref: 2022-0912 - CT2901 Structural Analysis Rev2 (22021.06)
CT2901_C-BAND_CD Rev1_11.04.22
CT2901 Mount Structural Analysis Rev.1 10172022

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SAI GROUP
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SALEM NH 03079-2837

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**C035**

HON NEIL M O'LEARY, MAYOR
WATERBURY CITY HALL
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235 GRAND ST
WATERBURY CT 06702-1915

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**C083**

ROBERT NERNEY, CITY PLANNER
CITY OF WATERBURY
# 5
185 S MAIN ST
WATERBURY CT 06706

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SALEM NH 03079-2837

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Ref#: CT2901
**0000**

**C020**

BLESSED 1 LLC
28 MOUNTAIN RD
SEYMOUR CT 06478-1954

**USPS TRACKING #**

**9405 5036 9930 0396 8967 81**

Electronic Rate Approved #038555749

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SALEM NH 03079-2837

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Ref#: CT2901
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**C015**

CHRIS GELINAS
EVERSOURCE
107 SELDEN ST
BERLIN CT 06037-1616

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SAI GROUP
12 INDUSTRIAL WAY
SALEM NH 03079-2837

Expected Delivery Date: 11/19/22
Ref#: CT2901
**0000**

**C006**

MELANIE BACHMAN EXECUTIVE DIRECTOR
CT SITING COUNCIL
10 FRANKLIN SQ
NEW BRITAIN CT 06051-2655

**USPS TRACKING #**

**9405 5036 9930 0396 8968 11**

Electronic Rate Approved #038555749

*Cut on dotted line.*

**From:** auto-reply@usps.com
**Sent:** Thursday, November 17, 2022 11:02 PM
**To:** Hollis Redding
**Subject:** USPS® Arrived at USPS Regional Facility 9405503699300396896736

UNITED S

Hello **HOLLIS M REDDING**,

Your item arrived at our USPS facility in SPRINGFIELD MA NETWORK DISTRIBUTION CENTER on November 17, 2022 at 10:46 pm. The item is currently in transit to the destination.

Tracking Number: **9405503699300396896736**

Tracking & Delivery Op

**My Account**

**From:** auto-reply@usps.com
**To:** Hollis Redding
**Subject:** USPS® Expected Delivery by Friday, November 18, 2022 arriving by 9:00pm 9405503699300396896750
**Date:** Thursday, November 17, 2022 9:21:46 AM

City Planner Copy

Hello **HOLLIS M REDDING**,

USPS is now in possession of your item as of 8:52 am on November 17, 2022 in MERIDEN, CT 06450.

Tracking Number:
**9405503699300396896750**

**Expected Delivery By**

**18**
**Nov**

**By 9:00pm**

By 9:00pm

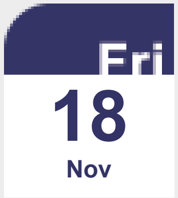
**From:** auto-reply@usps.com
**Sent:** Thursday, November 17, 2022 9:23 AM
**To:** Hollis Redding
**Subject:** USPS® Expected Delivery by Friday, November 18, 2022 arriving by 9:00pm 9405503699300396896804

Hello **HOLLIS M REDDING**,

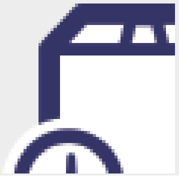
USPS is now in possession of your item as of 8:52 am on November 17, 2022 in MERIDEN, CT 06450.

Tracking Number: **9405503699300396896804**

**Expected Delivery By**




**By 9:00pm**



**From:** auto-reply@usps.com
**Sent:** Thursday, November 17, 2022 9:23 AM
**To:** Hollis Redding
**Subject:** USPS® Expected Delivery by Friday, November 18, 2022 arriving by 9:00pm 9405503699300396896781

Hello **HOLLIS M REDDING**,

USPS is now in possession of your item as of 8:52 am on November 17, 2022 in MERIDEN, CT 06450.

Tracking Number: **9405503699300396896781**

**Expected Delivery By**

Fri
18
Nov

**By 9:00pm**