CENTEK engineering

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Structural Analysis of Antenna Mast and Pole

T-Mobile Site Ref: CTNH461A

Eversource Structure No. 10184
150' Electric Transmission Pole

18 Hilltop View Lane
New Milford, CT

CENTEK Project No. 21005.39

~~*Date: February 10, 2022*~~
Rev 2: November 8, 2022

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

Prepared for:
Transcend Wireless
10 Industrial Ave, Suite 3
Mahwah, NJ 07430

Table of Contents

Introduction

The purpose of this report is to analyze the existing mast and 150' utility pole located at 18 Hilltop View Lane in New Milford, CT for the proposed antenna and equipment upgrade by T-Mobile.

The existing/proposed loads consist of the following:

- **SPRINT (Existing to Remove)**
Antennas: Three (3) RFS APXVSPP18-C panel antennas flush mounted to the existing 12-in Sch. 80 pipe mast with RAD center elevation of 155-ft 6-in above grade.
Coax Cables: Eighteen (18) 1-5/8" ∅ coax cables running on the exterior of the pole and antenna mast.
- **T-MOBILE (Proposed):**
Antennas: Three (3) RFS APXVAALL24_43 panel antennas and three (3) ATSBT-FM-4G Bias Tees flush mounted to the existing 12-in Sch. 80 pipe mast with RAD center elevation of 165-ft above grade.
Coax Cables: Twenty-four (24) 1-5/8" ∅ coax cables running on the exterior of the pole and antenna mast.

Primary assumptions used in the analysis

- ASCE 48-11, "Design of Steel Transmission Pole Structures", defines steel stresses for evaluation of the utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- Pipe 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.
- Pipe 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.

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 existing mast consisting of a 12-in x 36-ft long SCH. 80 pipe (O.D. = 12.75") connected at two points to the existing tower was analyzed for its ability to resist loads prescribed by the TIA-222 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 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 TIA-222, ASCE 48-11, "Design of Steel Transmission Pole Structures", NESC C2-2017 and Northeast Utilities Design Criteria.

- UTILITY POLE ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility pole 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 48-11.

  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.………………………………… 100 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)

- MAST ASSEMBLY ANALYSIS

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

  Load cases considered:

  Load Case 1:
  Wind Speed……………………………….. 125 mph (2022 CSBC Appendix-P)
  Radial Ice Thickness………………………. 0”

  Load Case 2:
  Wind Pressure.……………………………. 50 mph wind pressure
  Radial Ice Thickness……………………….. 1.0”

Results

- MAST ASSEMBLY

  The existing pipe mast was determined to be structurally adequate.

Component	Stress Ratio (percentage of capacity)	Result
12” Sch. 80 Pipe	67.3%	**PASS**
Flange Connection	76.3%	**PASS**
Connection to Tower	36.5%	**PASS**

Horizontal Displacement (% of Cantilever Height)	Serviceability Allowable	Result
0.42 %	1.5 %	**PASS**

- 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 48-11, “Design of Steel Transmission Pole Structures” for the applied NESC Heavy and Extreme 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 **87.23%** 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 5	0.00’ -40.0’ (AGL)	87.23%	**PASS**

BASE PLATE:

The base plate was found to be within allowable limits from the PLS output based on 24 bend lines.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Base Plate	Bending	82.1%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 10-ft square x 9.0-ft long reinforced concrete pier with sixteen (16) rock anchors embedded 24-ft into rock. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615 Gr. 75 anchor bolts embedded approximately 8-ft-9-in into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01143-600001 Sheet 1.

BASE REACTIONS:

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

Load Case	Shear	Axial	Moment
NESC Heavy Wind	59.66 kips	156.27 kips	6675.22 ft-kips
NESC Extreme Wind	67.32 kips	83.82 kips	7009.96 ft-kips

Note 1 – 10% increase to be applied to above 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	78.85%	**PASS**

FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Allowable Limit	Proposed Loading	Result
Reinf. Conc. Pier w/ Rock Anchors	OTM (1)	1.0 FS (2)	2.65 FS (2)	**PASS**
	Bearing Pressure	50 ksf	24.1 ksf	**PASS**
	Rock Anchor Tension	100%	66%	**PASS**

Note 1: OTM denote overturning moment.
Note 2: FS denotes Factor of Safety.

C o n c l u s i o n

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part on the information provided to this office by Eversource and T-Mobile. 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

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA-3D

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 graphic drawing/editing capabilities that let you draw, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, etc.
- Versatile drawing grids (orthogonal, radial, skewed)
- Universal snaps and object snaps allow drawing without grids
- Versatile general truss generator
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet selection, with locking
- Saved selections to quickly recall desired selections
- Modification tools that modify single items or entire selections
- Real spreadsheets with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and views so you can edit or view any data in the plotted views or in the spreadsheets
- Simultaneous view of multiple spreadsheets
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection libraries
- Import DXF, RISA-2D, STAAD and ProSteel 3D files
- Export DXF, SDNF and ProSteel 3D files

Analysis Features:

- Static analysis and P-Delta effects
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS mode combinations
- Automatic inclusion of mass offset (5% or user defined) for dynamic analysis
- Physical member modeling that does not require members to be broken up at intermediate joints
- State of the art 3 or 4 node plate/shell elements
- High-end automatic mesh generation — draw a polygon with any number of sides to create a mesh of well-formed quadrilateral (NOT triangular) elements.
- Accurate analysis of tapered wide flanges - web, top and bottom flanges may all taper independently
- Automatic rigid diaphragm modeling
- Area loads with one-way or two-way distributions
- Multiple simultaneous moving loads with standard AASHTO loads and custom moving loads for bridges, cranes, etc.
- Torsional warping calculations for stiffness, stress and design
- Automatic Top of Member offset modeling
- Member end releases & rigid end offsets
- Joint master-slave assignments
- Joints detachable from diaphragms
- Enforced joint displacements
- 1-Way members, for tension only bracing, slipping, etc.

- 1-Way springs, for modeling soils and other effects
- Euler members that take compression up to their buckling load, then turn off.
- Stress calculations on any arbitrary shape
- Inactive members, plates, and diaphragms allows you to quickly remove parts of structures from consideration
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members and plates
- Automatic subgrade soil spring generator

Graphics Features:

- Unlimited simultaneous model view windows
- Extraordinary “true to scale” rendering, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamic scrolling stops right where you want
- Plot & print virtually everything with color coding & labeling
- Rotate, zoom, pan, scroll and snap views
- Saved views to quickly restore frequent or desired views
- Full render or wire-frame animations of deflected model and dynamic mode shapes with frame and speed control
- Animation of moving loads with speed control
- High quality customizable graphics printing

Design Features:

- Designs concrete, hot rolled steel, cold formed steel and wood
- ACI 1999/2002, BS 8110-97, CSA A23.3-94, IS456:2000,EC 2-1992 with consistent bar sizes through adjacent spans
- Exact integration of concrete stress distributions using parabolic or rectangular stress blocks
- Concrete beam detailing (Rectangular, T and L)
- Concrete column interaction diagrams
- Steel Design Codes: AISC ASD 9th, LRFD 2nd & 3rd, HSS Specification, CAN/CSA-S16.1-1994 & 2004, BS 5950-1-2000, IS 800-1984, Euro 3-1993 including local shape databases
- AISI 1999 cold formed steel design
- NDS 1991/1997/2001 wood design, including Structural Composite Lumber, multi-ply, full sawn
- Automatic spectra generation for UBC 1997, IBC 2000/2003
- Generation of load combinations: ASCE, UBC, IBC, BOCA, SBC, ACI
- Unbraced lengths for physical members that recognize connecting elements and full lengths of members
- Automatic approximation of K factors
- Tapered wide flange design with either ASD or LRFD codes
- Optimization of member sizes for all materials and all design codes, controlled by standard or user-defined lists of available sizes and criteria such as maximum depths
- Automatic calculation of custom shape properties
- Steel Shapes: AISC, HSS, CAN, ARBED, British, Euro, Indian, Chilean
- Light Gage Shapes: AISI, SSMA, Dale / Incor, Dietrich, Marino\WARE
- Wood Shapes: Complete NDS species/grade database
- Full seamless integration with RISAFoot (Ver 2 or better) for advanced footing design and detailing
- Plate force summation tool

Results Features:

- Graphic presentation of color-coded results and plotted designs
- Color contours of plate stresses and forces with quadratic smoothing, the contours may also be animated
- Spreadsheet results with sorting and filtering of: reactions, member & joint deflections, beam & plate forces/stresses, optimized sizes, code designs, concrete reinforcing, material takeoffs, frequencies and mode shapes
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams that display magnitudes at any dialed location
- Saved solutions quickly restore analysis and design results.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-POLE

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
    - NESC 2002
    - NESC 2007
    - IEC 60826:2003
    - EN50341-1:2001 (CENELEC)
    - EN50341-3-9:2001 (UK NNA)
    - EN50341-3-17:2001 (Portugal NNA)
    - ESAA C(b)1-2003 (Australia)
    - TPNZ (New Zealand)
    - REE (Spain)
    - EIA/TIA 222-F
    - ANSI/TIA 222-G
    - CSA S37-01
- 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

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 Northeast Utilities.

PCS Mast

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:

ELECTRIC TRANSMISSION TOWER

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	Category	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 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 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, Rule 250C: Extreme Wind Loading 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 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, Rule 250C: Extreme Wind Loading Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 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, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load 1.25 x Gust Response Factor 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 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, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 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.

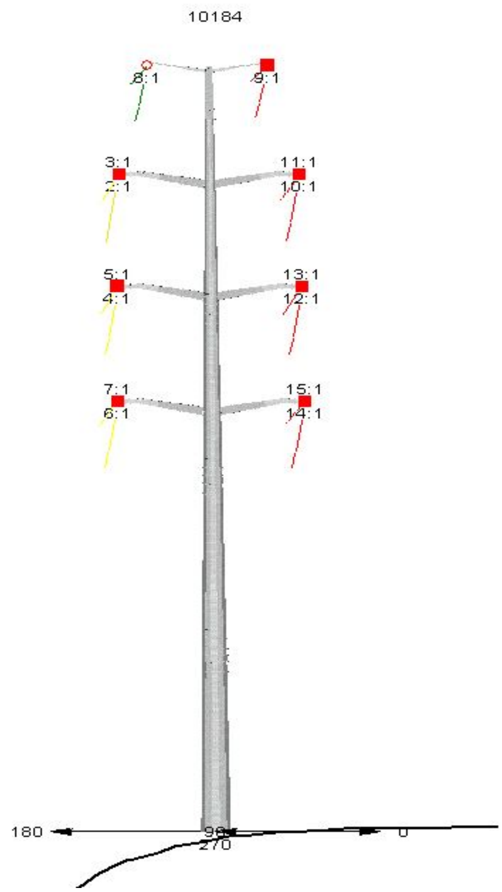
Project: 321/1887 Lines, Structure 10184
Date: 10/12/18
Engineer: JS
Purpose: Recalculate wire loads for Sprint site.

Shield Wires:
321: AFL DNO-4963 0.457" OPGW, sagged to 4200# NESC 250B Final
1618: 7#8 Alumoweld, sagged in PLS-CADD

Conductors:
Bundled 1272 "Bittern" ACSR, sagged in PLS-CADD

NESC 250B

321 Line			**1618 Line**	
Shield Wire				
V:	1626		**V:**	1626
T:	-1927		**T:**	-1896
L:	0		**L:**	-753
Top Phase				
V:	10631		**V:**	10734
T:	-7054		**T:**	-7350
L:	-1946		**L:**	-708
Mid Phase				
V:	10639		**V:**	10640
T:	-7128		**T:**	-7212
L:	-1713		**L:**	-1784
Bot Phase				
V:	10634		**V:**	10655
T:	-7310		**T:**	-7653
L:	1430		**L:**	5287



Looking south. OPGW attached on top left arm. Alumoweld attached on top right arm.
Positive transverse loads are in the 0 degree direction.
Positive longitudinal loads are to the north (90 degree direction)

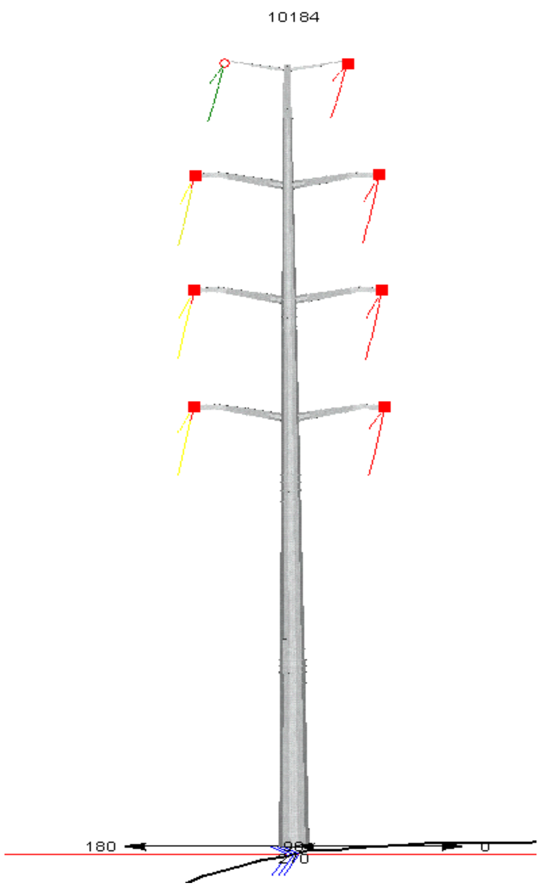
Project: 321/1887 Lines, Structure 10184
Date: 10/12/18
Engineer: JS
Purpose: Recalculate wire loads for Sprint site.

Shield Wires:
321: AFL DNO-4963 0.457" OPGW, sagged to 4200# NESC 250B Final
1618: 7#8 Alumoweld, sagged in PLS-CADD

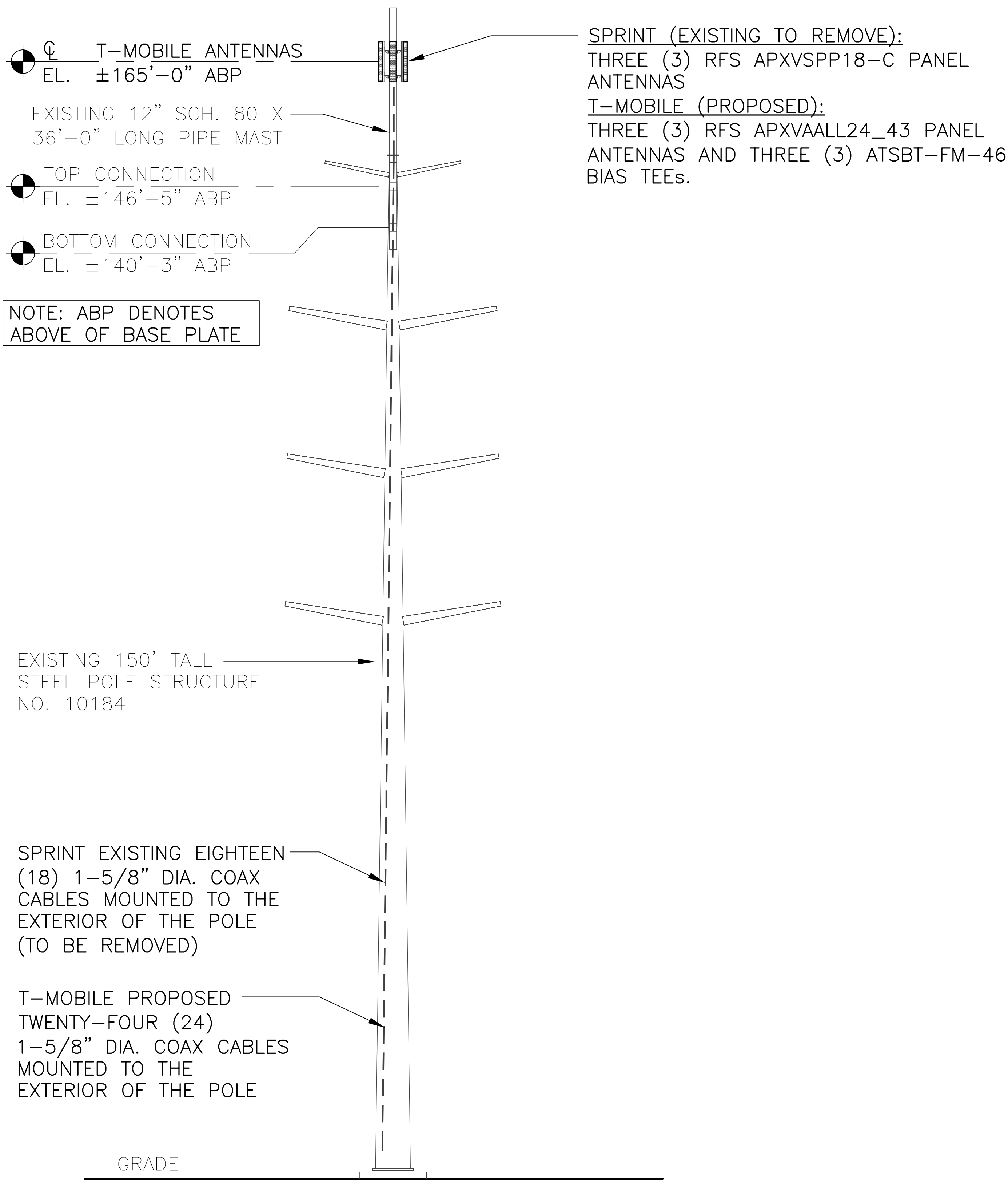
Conductors:
Bundled 1272 "Bittern" ACSR, sagged in PLS-CADD

NESC 250C

		321 Line		1618 Line
OPGW			**Alumoweld**	
	V:	512	**V:**	-523
	T:	-1202	**T:**	-1045
	L:	0	**L:**	-211
Top Phase				
	V:	4906	**V:**	4964
	T:	-6753	**T:**	-6902
	L:	-1294	**L:**	-795
Mid Phase				
	V:	4874	**V:**	4871
	T:	-6589	**T:**	-6640
	L:	-1169	**L:**	-1193
Bot Phase				
	V:	4831	**V:**	4838
	T:	-6427	**T:**	-6588
	L:	213	**L:**	1835



Looking south. OPGW attached on top left arm. Alumoweld attached on top right arm.
Positive transverse loads are in the 0 degree direction.
Positive longitudinal loads are to the north (90 degree direction)



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TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

REVISIONS		
00	2/1/22	ISSUED FOR REVIEW

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CTNH461A
EVERSOURCE 10184

18 HILLTOP VIEW LANE
NEW MILFORD, CT 06776

PROJECT NO:	2105.39
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	2/1/22

TOWER AND MAST ELEVATION

EL-1

DWG. 1 OF 1

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

Wind Speeds

Basic Wind Speed $V := 125$ mph (User Input - 2022 CSBC Appendix P)

Basic Wind Speed with Ice $V_i := 50$ mph (User Input per Annex B of TIA-222-H)

Basic Wind Speed Service Loads $V_{Ser} := 60$ mph (User Input - TIA-222-H 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 = $h := 150$ ft (User Input)

Height to Center of Antennas = $z_{T\_Mo} := 165$ ft (User Input)

Height to Center of Mast = $z_{Mast1} := 166$ ft (User Input)

Height to Center of Mast = $z_{Mast2} := 148$ ft (User Input)

Radial Ice Thickness = $t_i := 1.0$ in (User Input per Annex B of TIA-222-H)

Radial Ice Density = $Id := 56.00$ pcf (User Input)

Topograpic Factor = $K_{zt} := 1.0$ (User Input)

Shielding Factor for Appurtenances = $K_a := 1.0$ (User Input)

Ground Elevation Factor = $K_e = 0.996$ (User Input)

Gust Response Factor = $G_H := 1.35$ (User Input - Section 2.6.9.4 of TIA-222-H)

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-H)

Importance Factors =

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \\ 1.25 & \text{if } SC = 4 \end{cases} = 1.15$$

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

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

$$K_{iz} := \left(\frac{z_{T\_Mo}}{33}\right)^{0.1} = 1.175 \qquad t_{izT\_Mo} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.351$$

Velocity Pressure Coefficient Antennas = $Kz_{T\_Mo} := 2.01\left(\left(\frac{z_{T\_Mo}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.406$

Velocity Pressure w/o Ice Antennas = $qz_{T\_Mo} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{T\_Mo} \cdot V^2 = 53.205$

Velocity Pressure with Ice Antennas = $qz_{ice.T\_Mo} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{T\_Mo} \cdot V_i^2 = 8.513$

Velocity Pressure Service = $qz_{T\_Mo.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{T\_Mo} \cdot V_{Ser}^2 = 10.968$

$$K_{izMast1} := \left(\frac{z_{Mast1}}{33}\right)^{0.1} = 1.175 \qquad t_{izMast1} := t_i \cdot I_{ice} \cdot K_{izMast1} \cdot K_{zt}^{0.35} = 1.352$$

Velocity Pressure Coefficient Mast = $Kz_{Mast1} := 2.01\left(\left(\frac{z_{Mast1}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.408$

Velocity Pressure w/o Ice Mast= $qz_{Mast1} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast1} \cdot V^2 = 53.273$

Velocity Pressure with Ice Mast = $qz_{ice.Mast1} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast1} \cdot V_i^2 = 8.524$

Velocity Pressure Service = $qz_{Mast1.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{Mast1} \cdot V_{Ser}^2 = 10.982$

$$K_{izMast2} := \left(\frac{z_{Mast2}}{33}\right)^{0.1} = 1.162 \qquad t_{izMast2} := t_i \cdot I_{ice} \cdot K_{izMast2} \cdot K_{zt}^{0.35} = 1.336$$

Velocity Pressure Coefficient Mast = $Kz_{Mast2} := 2.01\left(\left(\frac{z_{Mast2}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.375$

Velocity Pressure w/o Ice Mast= $qz_{Mast2} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast2} \cdot V^2 = 52.001$

Velocity Pressure with Ice Mast = $qz_{ice.Mast2} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast2} \cdot V_i^2 = 8.32$

Velocity Pressure Service = $qz_{Mast2.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{Mast2} \cdot V_{Ser}^2 = 10.72$

Development of Wind & Ice Load on Mast

Mast Data: (12 Sch. 80) (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 12.75$ in (User Input)

Mast Length = $L_{mast} := 36$ ft (User Input)

Mast Thickness = $t_{mast} := 0.5$ in (User Input)

Mast Aspect Ratio = $Ar_{mast} := \frac{12L_{mast}}{D_{mast}} = 33.9$

Mast Force Coefficient = $Ca_{mast} = 1.2$

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 = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast1} \cdot 2\right)^2 - D_{mast}^2\right] = 59.9$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 23$ plf **BLC 3**

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast2} \cdot 2\right)^2 - D_{mast}^2\right] = 59.1$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 23$ plf **BLC 3**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot t_{izMast1}\right)}{12} = 1.288$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.Mast1} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 18$ plf **BLC 4**

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot t_{izMast2}\right)}{12} = 1.285$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.Mast2} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 17$ plf **BLC 4**

Wind Load (without ice)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.063$ sf/ft

Total Mast Wind Force = $qz_{Mast1} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 92$ plf **BLC 5**

Total Mast Wind Force = $qz_{Mast2} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 90$ plf **BLC 5**

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**

Total Mast Wind Force Service Loads = $qz_{Mast2.Ser} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 18$ plf **BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model =	RFSAPXVAALL24_43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 24$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 150$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.0$

Antenna Force Coefficient = $Ca_{ant} = 1.27$

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 450$ 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 = $V_{ice} := (L_{ant} + 2 \cdot t_{izT\_Mo})(W_{ant} + 2 \cdot t_{izT\_Mo}) \cdot (T_{ant} + 2 \cdot t_{izT\_Mo}) - V_{ant} = 9928$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 322$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 965$ lbs **BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izT\_Mo}) \cdot (W_{ant} + 2 \cdot t_{izT\_Mo})}{144} = 18.3$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 54.9$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 798$ lbs **BLC 4**

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 48$ sf

Total Antenna Wind Force = $F_{ant} := qz_{T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 4362$ lbs **BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{T\_Mo.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 899$ lbs **BLC 6**

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Subject: Loads on AT&T Mast - Structure 10184

Location: New Milford, CT

Rev. 2: 11/8/22

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 21005.39

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model =	AT SBT-TOP-F M4G Bias Tee		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 5.63$	in	(User Input)
Antenna Width =	$W_{ant} := 3.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 2$	in	(User Input)
Antenna Weight =	$WT_{ant} := 2$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 6$ lbs **BLC 2**

Gravity Loads (ice only) cu in

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 42$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot t_{izT\_Mo}\right)\left(W_{ant} + 2 \cdot t_{izT\_Mo}\right) \cdot \left(T_{ant} + 2 \cdot t_{izT\_Mo}\right) - V_{ant} = 209$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 7$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 20$ lbs **BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{izT\_Mo}\right) \cdot \left(W_{ant} + 2 \cdot t_{izT\_Mo}\right)}{144} = 0.4$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 1.1$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 15$ lbs **BLC 4**

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 0.4$ sf

Total Antenna Wind Force = $F_{ant} := qz_{T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 37$ lbs **BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{T\_Mo.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 8$ lbs **BLC 6**

Development of Wind & Ice Load on Antennas

Mount Data:

Mount Type: Tri-Sector Chain Mount

Platform Weight = $WT_{mnt} := 160$ lbs (User Input)

Platform Weight w/ Ice = $WT_{ICE.mnt} := 200$ lbs (User Input)

Gravity Loads (without ice)

Weight of All Mounts = $WT_{mnt} = 160$ lbs **BLC 2**

Gravity Loads (ice only)

Weight of Ice on All Mounts = $WT_{ICE.mnt} - WT_{mnt} = 40$ lbs **BLC 3**

Wind Load (with ice)

Total Mount Wind Force = $Fi_{mnt} := 0$ lbs **BLC 4**

Wind Load (without ice)

Total Mount Wind Force = $F_{mnt} := 0$ lbs **BLC 5**

Wind Load (Service)

Total Mount Wind Force = $Fi_{mnt} := 0$ lbs **BLC 6**

Development of Wind & Ice Load on Coax Cables

Cable Data: T-Mobile Cables

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 = $N_{coax} := 24$ (User Input

No. of Coax Projecting Outside Face of PCS Mast = $NP_{coax} := 6$ (User Input)

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

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

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 25$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot t_{izMast1})^2 - D_{coax}^{\ 2}\right] = 14.1$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 132$ plf **BLC 3**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot t_{izMast1})}{12} = 1.2$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.Mast1} \cdot G_H \cdot AICE_{coax} = 17$ plf **BLC 4**

Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 1$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{Mast1} \cdot G_H \cdot A_{coax} = 85$ plf **BLC 5**

Wind Load (Service)

Total Coax Wind Force Service Loads = $F_{coax} := Ca_{coax} \cdot qz_{Mast1.Ser} \cdot G_H \cdot A_{coax} = 18$ plf **BLC 6**

(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	Standard 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 Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE_12.0X	Column	Pipe	A53 Gr. B	Typical	17.5	339	339	678

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	14			Lbyy						Lateral
2	M2	Mast	22			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N1	N4			Mast	Column	Pipe	A53 Gr. B	Typical
2	M2	N4	N5			Mast	Column	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3.25	0	0	
3	N3	0	9.417	0	0	
4	N4	0	14	0	0	
5	N5	0	36	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	N1						
2	N2	Reaction	Reaction	Reaction		Reaction	
3	N3	Reaction	Reaction	Reaction		Reaction	
4	N4						

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.45	14
2	M2	Y	-.006	14
3	M2	Y	-.16	14

Member Point Loads (BLC 3 : Weight of Ice Only)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.965	14
2	M2	Y	-.02	14
3	M2	Y	-.04	14

Member Point Loads (BLC 4 : TIA Wind with Ice)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.798	14
2	M2	X	.015	14

Member Point Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	4.362	14
2	M2	X	.037	14

Member Point Loads (BLC 6 : TIA Service)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.899	14
2	M2	X	.008	14

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	M1	Y	-.025	-.025	0	0
2	M2	Y	-.025	-.025	0	10

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,...
1	M1	Y	-.023	-.023	0	0
2	M2	Y	-.023	-.023	0	0
3	M1	Y	-.132	-.132	0	0
4	M2	Y	-.132	-.132	0	10

Member Distributed Loads (BLC 4 : 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	.017	.017	0	0
2	M2	X	.018	.018	0	0
3	M1	X	.017	.017	0	0
4	M2	X	.017	.017	0	10

Member Distributed Loads (BLC 5 : 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	.09	.09	0	0
2	M2	X	.092	.092	0	0
3	M1	X	.085	.085	0	0
4	M2	X	.085	.085	0	10

Member Distributed Loads (BLC 6 : TIA 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	.018	.018	0	0
2	M2	X	.019	.019	0	0
3	M1	X	.018	.018	0	0
4	M2	X	.018	.018	0	10

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					3	2		
3	Weight of Ice Only	None					3	4		

Basic Load Cases (Continued)

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
4	TIA Wind with Ice	None					2	4		
5	TIA Wind	None					2	4		
6	TIA Service	None					2	4		

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	1.2D + 1.0...	Yes	Y		1	1.2	2	1.2	5	1														
2	0.9D + 1.0...	Yes	Y		1	.9	2	.9	5	1														
3	1.2D +1.0...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.0D + 1.0...	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	N2	max	18.856	1	1.624	3	0	4	0	4	0	4	0	4
2		min	3.578	3	.482	2	0	1	0	1	0	1	0	1
3	N3	max	-5.433	3	7.428	3	0	4	0	4	0	4	0	4
4		min	-28.579	1	2.542	2	0	1	0	1	0	1	0	1
5	Totals:	max	-1.855	3	9.053	3	0	4						
6		min	-9.723	1	3.024	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	N1	max	.084	1	0	2	0	4	0	4	0	4	2.164e-03	1
2		min	.016	3	0	3	0	1	0	1	0	1	4.113e-04	3
3	N2	max	0	4	0	4	0	4	0	4	0	4	2.145e-03	1
4		min	0	1	0	1	0	1	0	1	0	1	4.077e-04	3
5	N3	max	0	4	0	4	0	4	0	4	0	4	-9.211e-04	3
6		min	0	1	0	1	0	1	0	1	0	1	-4.847e-03	1
7	N4	max	.529	1	0	2	0	4	0	4	0	4	-2.612e-03	3
8		min	.101	3	0	3	0	1	0	1	0	1	-1.375e-02	1
9	N5	max	6.487	1	0	2	0	4	0	4	0	4	-4.759e-03	3
10		min	1.233	3	-.002	3	0	1	0	1	0	1	-2.502e-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	PIPE_12.0X	.673	9...	1	.124	9...		1	511.6...	551.25	184.275	184...	1....	H1...
2	M2	PIPE_12.0X	.484	0	1	.044	0		1	458.5...	551.25	184.275	184...	2....	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	N2	18.856	.643	0	0	0	0
2	1	N3	-28.579	3.389	0	0	0	0
3	1	Totals:	-9.723	4.032	0			
4	1	COG (ft):	X: 0	Y: 18.762	Z: 0			

Joint Reactions (By Combination)

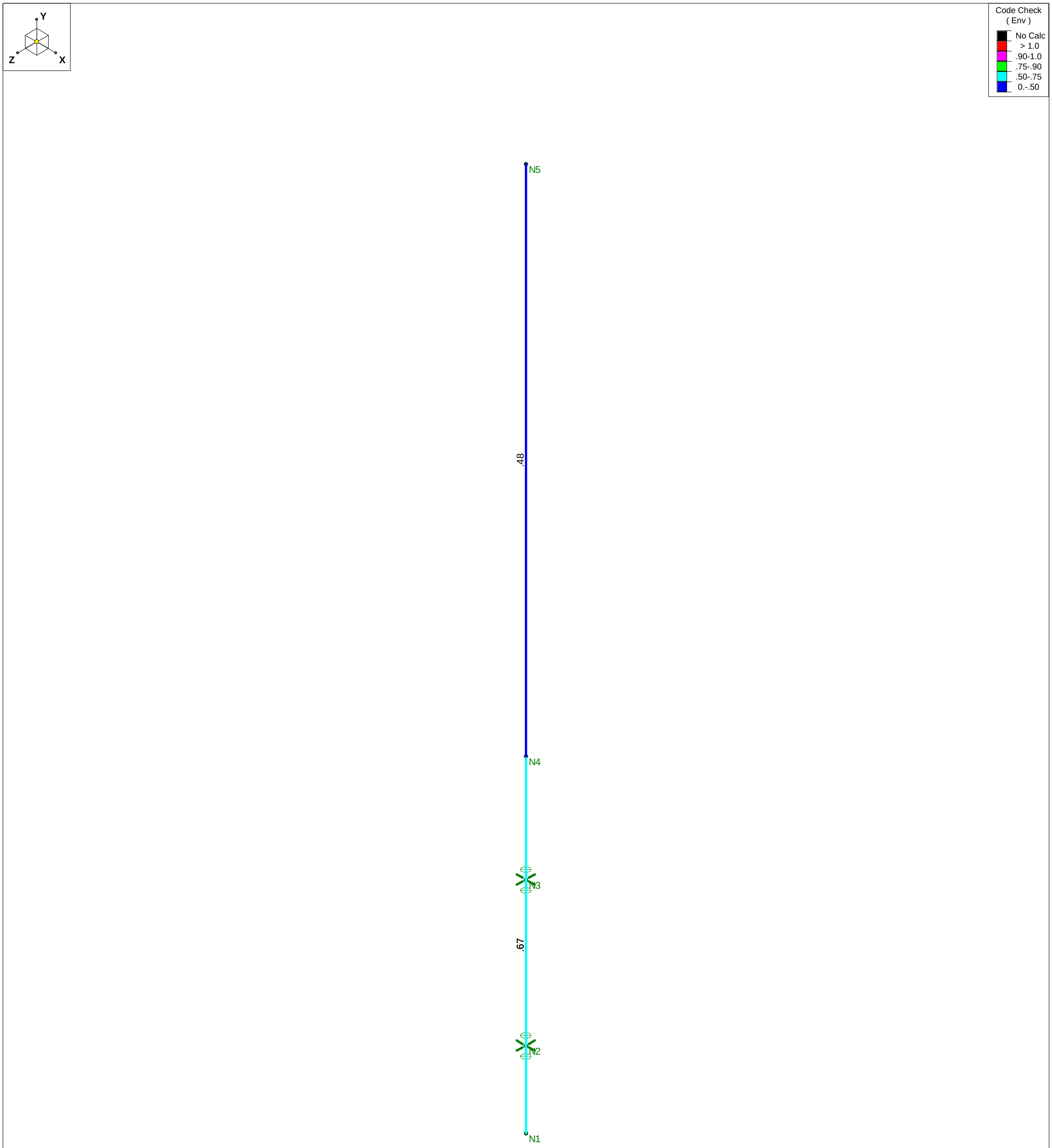
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	18.824	.482	0	0	0	0
2	2	N3	-28.547	2.542	0	0	0	0
3	2	Totals:	-9.723	3.024	0			
4	2	COG (ft):	X: 0	Y: 18.762	Z: 0			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	N2	3.578	1.624	0	0	0	0
2	3	N3	-5.433	7.428	0	0	0	0
3	3	Totals:	-1.855	9.053	0			
4	3	COG (ft):	X: 0	Y: 17.372	Z: 0			

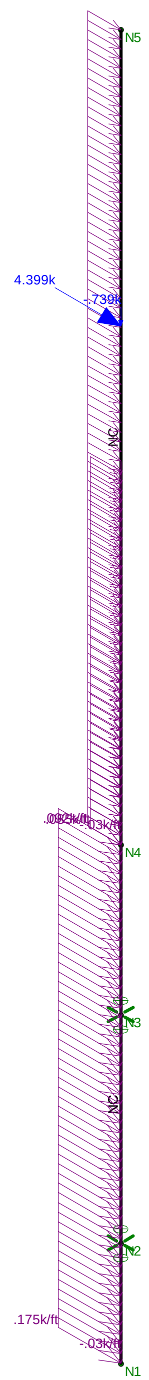
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	N2	3.893	.535	0	0	0	0
2	4	N3	-5.902	2.824	0	0	0	0
3	4	Totals:	-2.009	3.36	0			
4	4	COG (ft):	X: 0	Y: 18.762	Z: 0			



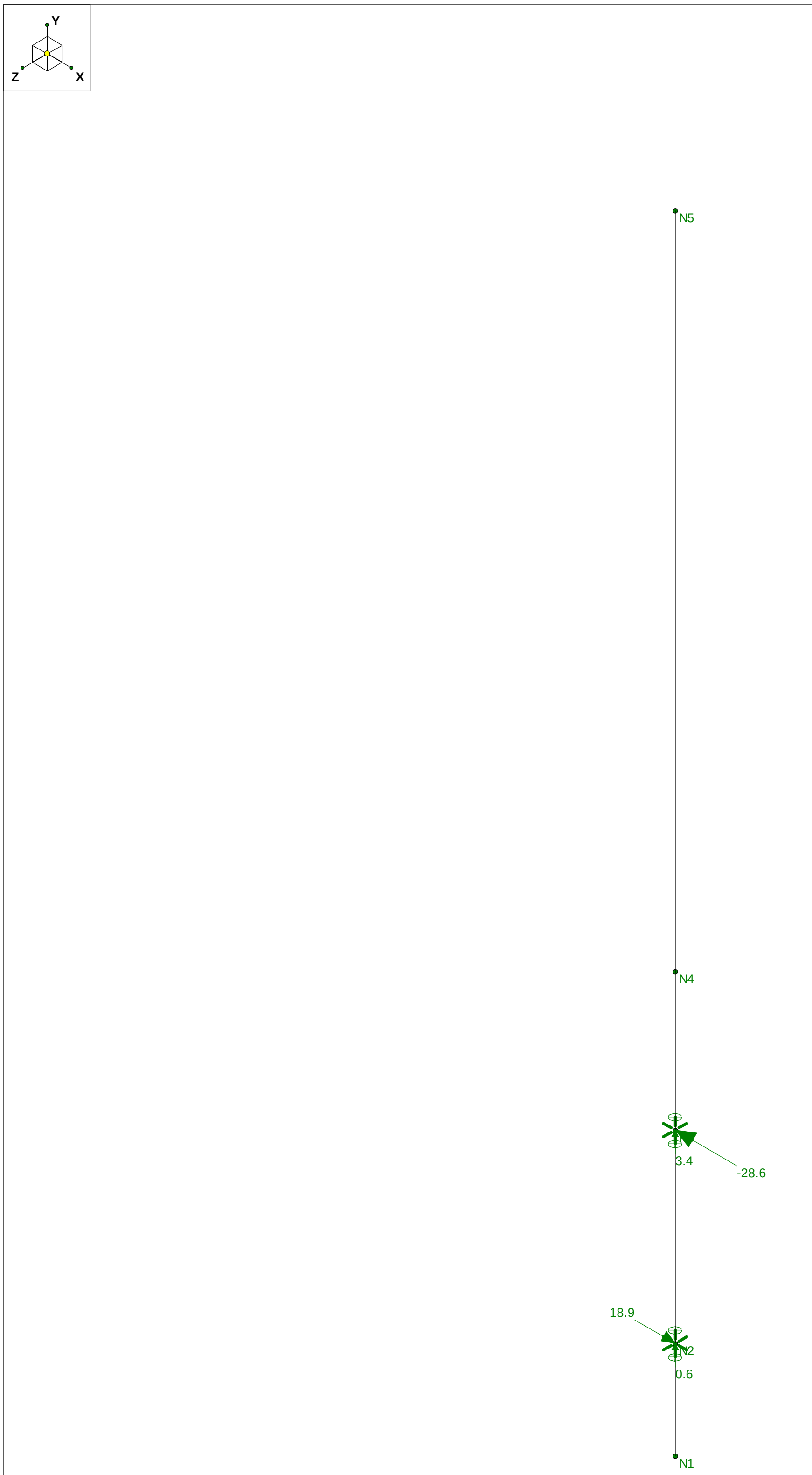
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:34 PM
21005.39 / T-Mobile - CTN...	Unity Check	TIA.r3d



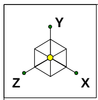
Member Code Checks Displayed
Loads: LC 1, 1.2D + 1.0W

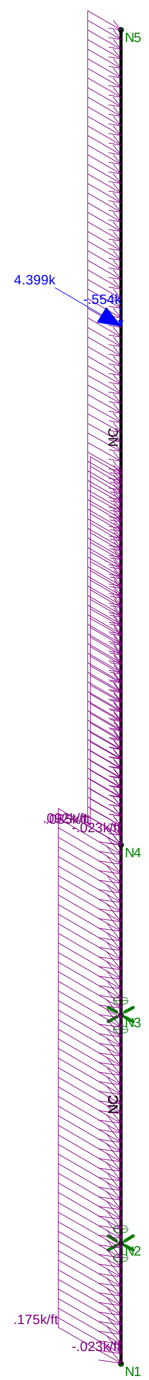
CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:34 PM
21005.39 / T-Mobile - CTN...	LC #1 Loads	TIA.r3d



Reaction and Moment Units are k and k-ft

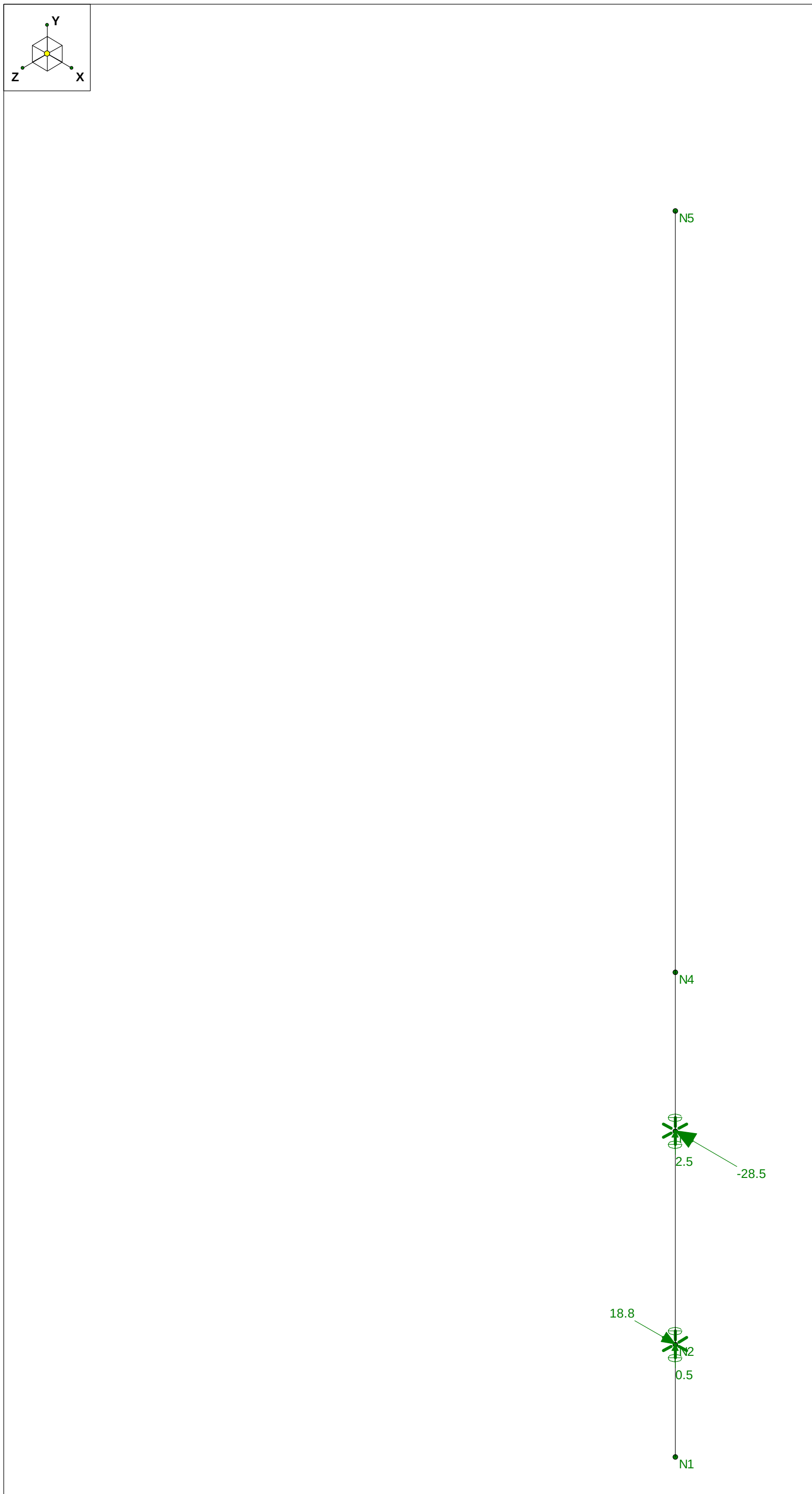
CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:35 PM
21005.39 / T-Mobile - CTN...	LC #1 Reactions	TIA.r3d





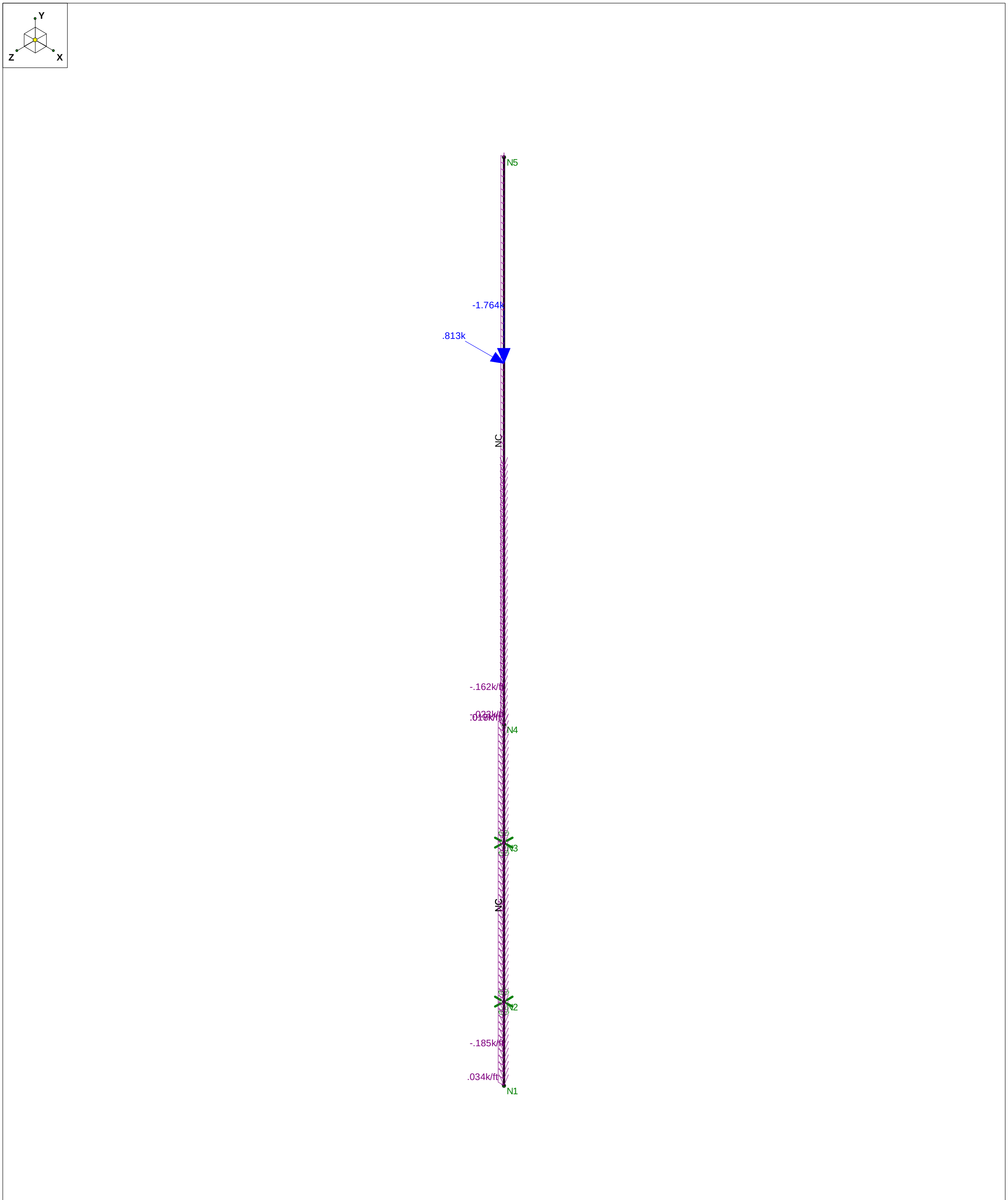
Member Code Checks Displayed
Loads: LC 2, 0.9D + 1.0W

CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:34 PM
21005.39 / T-Mobile - CTN...	LC #2 Loads	TIA.r3d



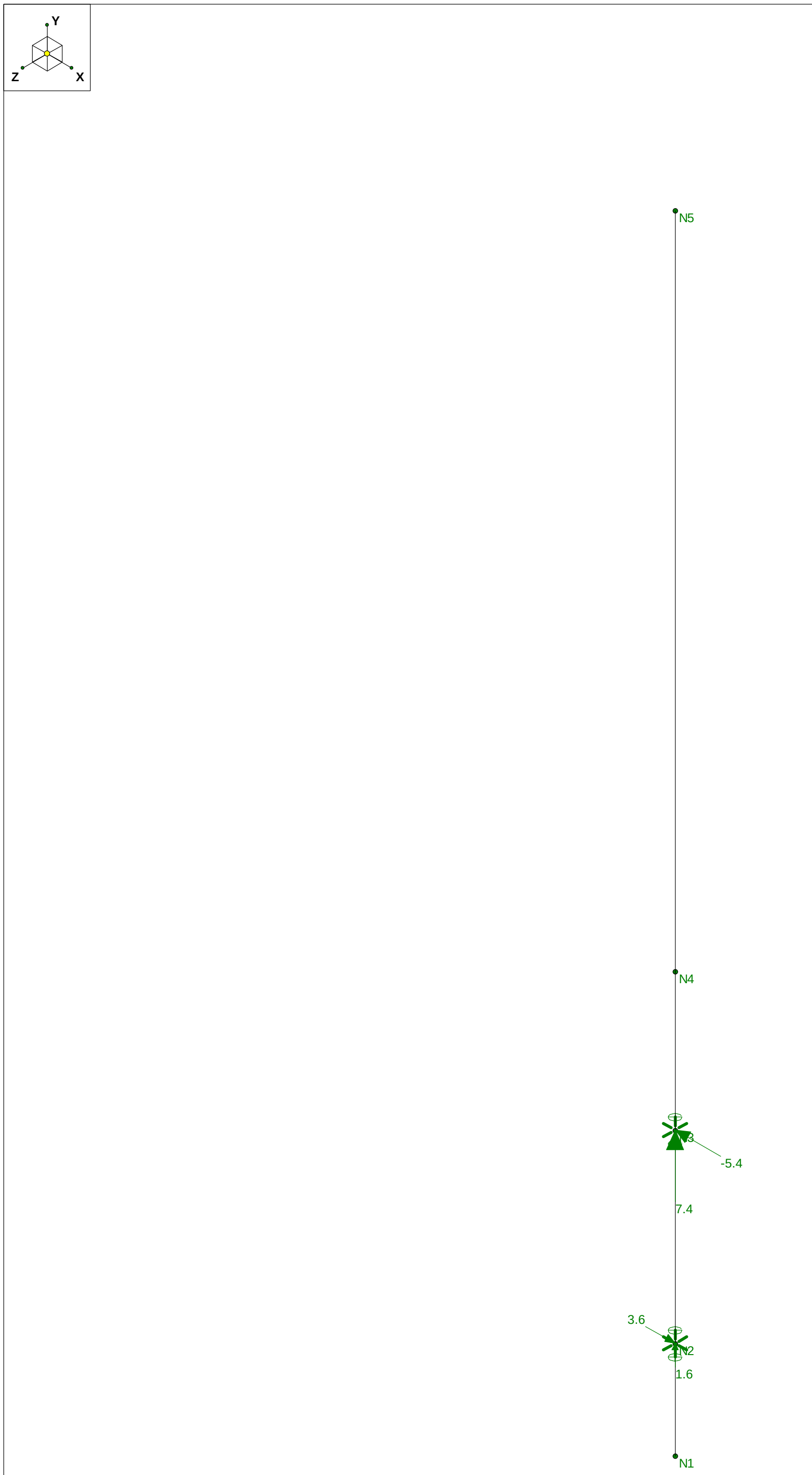
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:36 PM
21005.39 / T-Mobile - CTN...	LC #2 Reactions	TIA.r3d



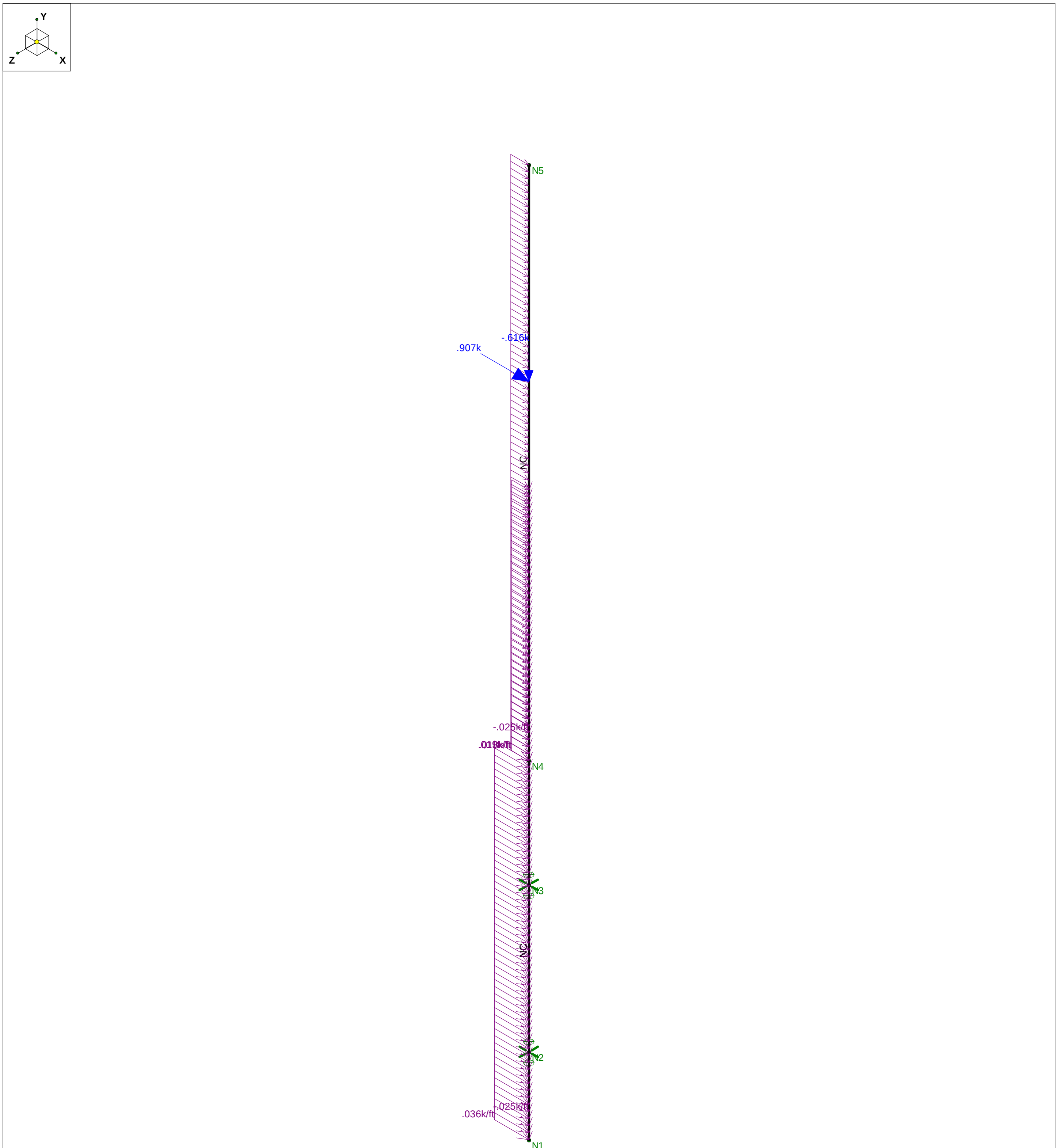
Member Code Checks Displayed
Loads: LC 3, 1.2D +1.0Di + 1.0Wi

CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:35 PM
21005.39 / T-Mobile - CTN...	LC #3 Loads	TIA.r3d



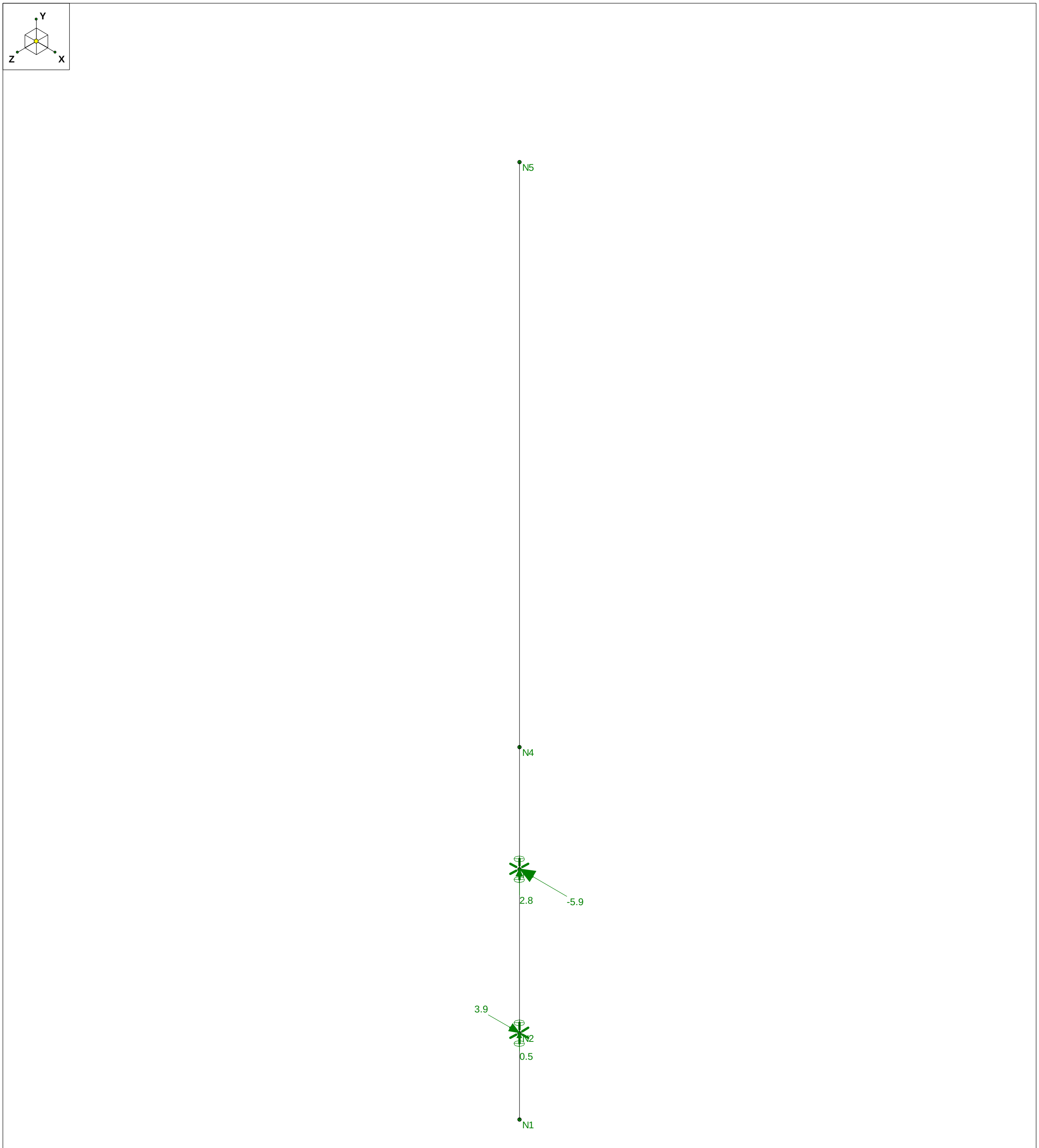
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:36 PM
21005.39 / T-Mobile - CTN...	LC #3 Reactions	TIA.r3d



Member Code Checks Displayed
Loads: LC 4, 1.0D + 1.0WService

CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:35 PM
21005.39 / T-Mobile - CTN...	LC #4 Loads	TIA.r3d



Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Structure # 10184 - Mast	Nov 8, 2022 at 4:37 PM
21005.39 / T-Mobile - CTN...	LC #4 Reactions	TIA.r3d

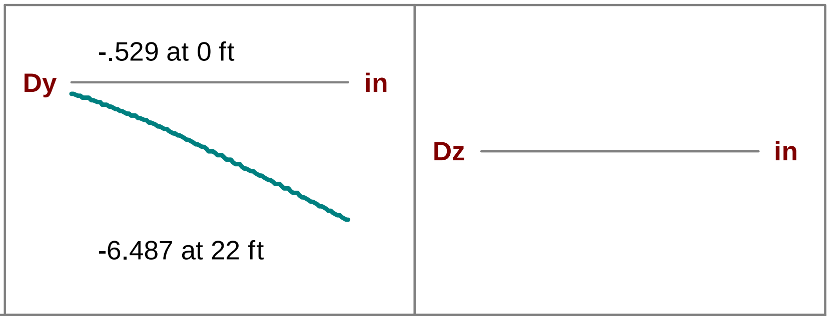
Column: ***M2***

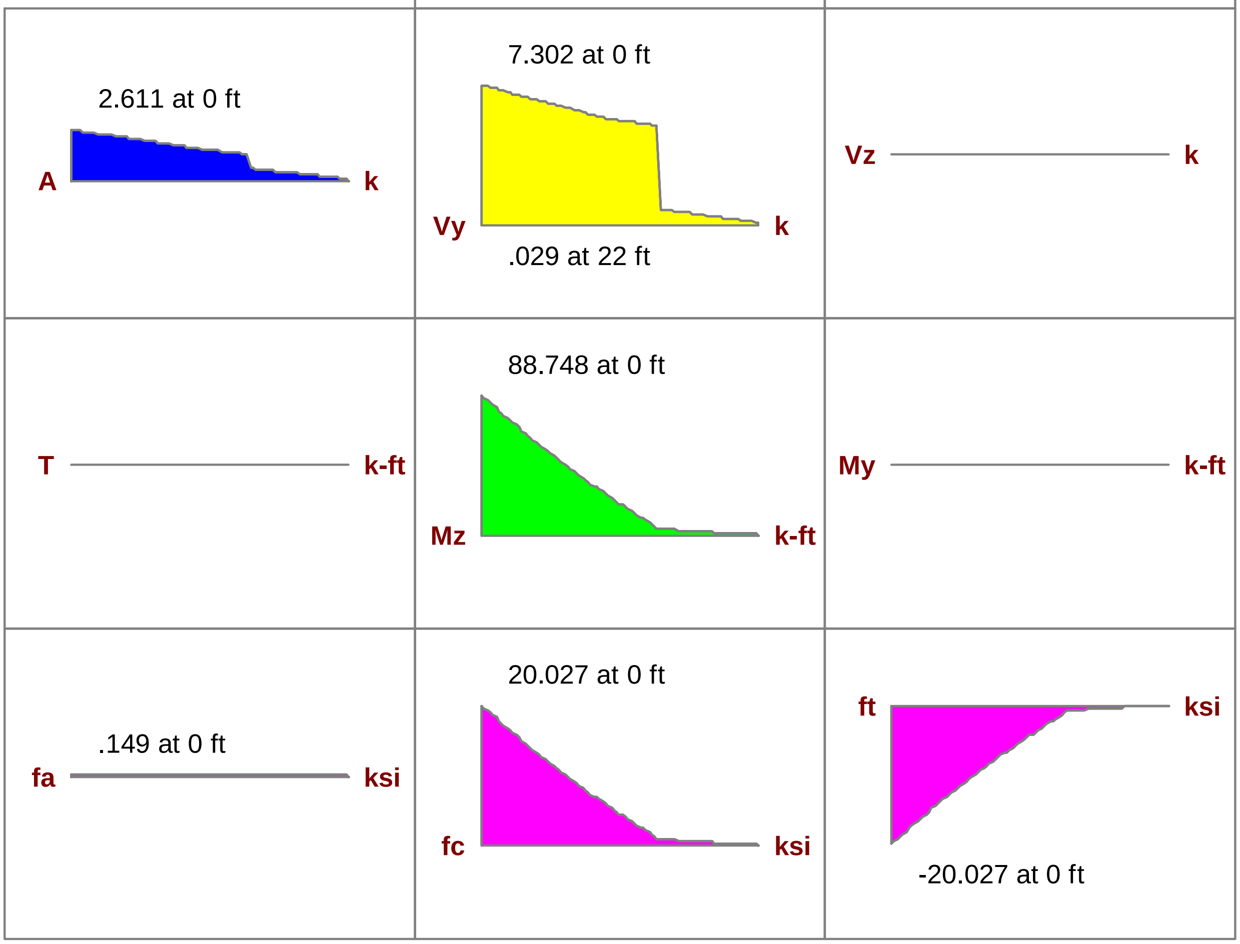
Shape:	**PIPE_12.0X**
Material:	**A53 Gr. B**
Length:	**22 ft**
I Joint:	**N4**
J Joint:	**N5**

LC 1: 1.2D + 1.0W

Code Check: **0.484 (bending)**

Report Based On 97 Sections





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

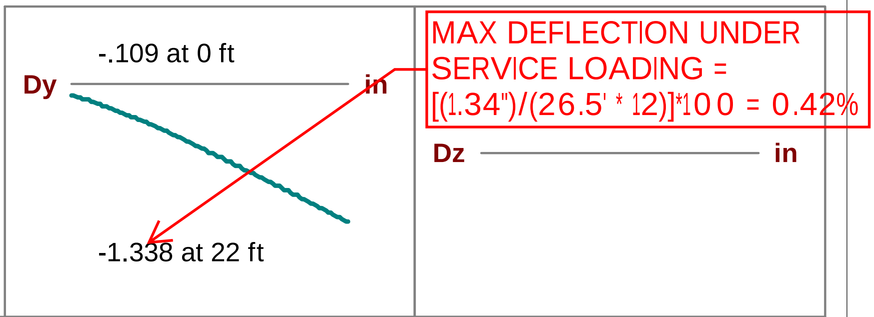
Direct Analysis Method

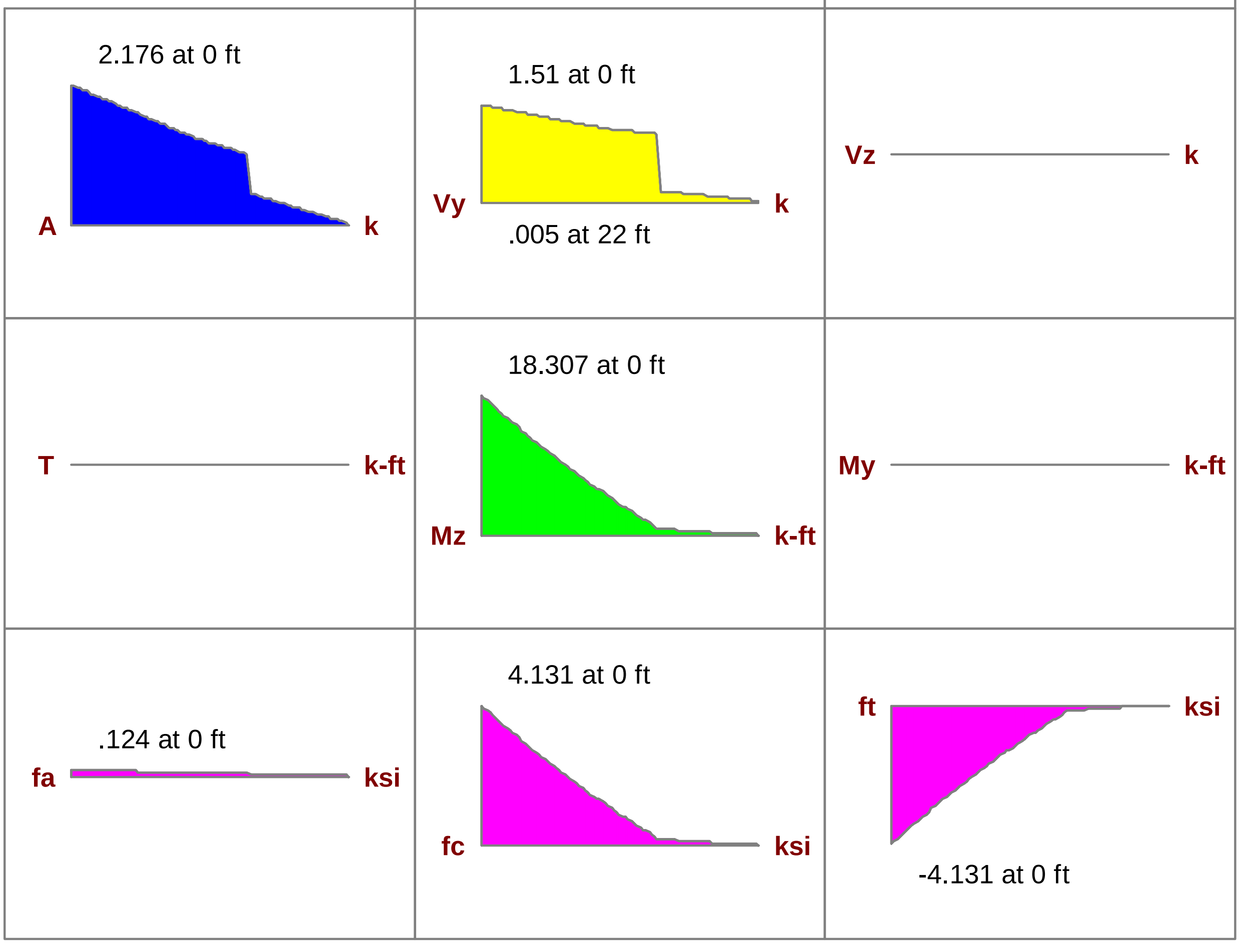
Max Bending Check	**0.484**	Max Shear Check	**0.044 (s)**
Location	**0 ft**	Location	**0 ft**
Equation	**H1-1b**	Max Defl Ratio	**L/44**
Bending	**Compact**	Compression	**Non-Slender**

			y-y	z-z
Fy	**35 ksi**	Lb	**22 ft**	**22 ft**
phi*Pnc	**458.537 k**	KL/r	**59.982**	**59.982**
phi*Pnt	**551.25 k**			
phi*Mny	**184.275 k-ft**	L Comp Flange	**22 ft**	
phi*Mnz	**184.275 k-ft**	L-torque	**22 ft**	
phi*Vny	**165.375 k**	Tau_b	**1**	
phi*Vnz	**165.375 k**			
phi*Tn	**173.622 k-ft**			
Cb	**2.429**			

Column: ***M2***

Shape: **PIPE_12.0X**
Material: **A53 Gr. B**
Length: **22 ft**
I Joint: **N4**
J Joint: **N5**
LC 4: 1.0D + 1.0WService
Code Check: **0.102 (bending)**
Report Based On 97 Sections





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

Direct Analysis Method

Max Bending Check	**0.102**	Max Shear Check	**0.009 (s)**
Location	**0 ft**	Location	**0 ft**
Equation	**H1-1b**	Max Defl Ratio	**L/214**

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

			y-y	z-z
Fy	**35 ksi**	Lb	**22 ft**	**22 ft**
phi*Pnc	**458.537 k**	KL/r	**59.982**	**59.982**
phi*Pnt	**551.25 k**			
phi*Mny	**184.275 k-ft**	L Comp Flange	**22 ft**	
phi*Mnz	**184.275 k-ft**	L-torque	**22 ft**	
phi*Vny	**165.375 k**	Tau_b	**1**	
phi*Vnz	**165.375 k**			
phi*Tn	**173.622 k-ft**			
Cb	**2.432**			

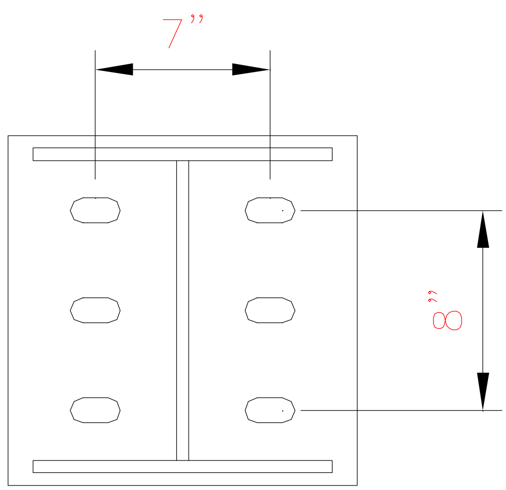
Mast Connection:

Maximum Design Reactions at Brace:

Vertical =	$Vert := 4 \cdot kips$	(User Input)
Horizontal =	$Horz := 28.6 \cdot kips$	(User Input)
Moment =	$Moment := 0$	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 6$	(User Input)
Bolt Diameter =	$d_b := 1.0in$	(User Input)
Nominal Tensile Strength =	$F_{nt} := 90 \cdot ksi$	(User Input)
Nominal Shear Strength =	$F_{nv} := 54 \cdot ksi$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 12 \cdot in$	(User Input)
Vetical Spacing Between Top and Bottom Bolts =	$S_{vert} := 8 \cdot in$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 7 \cdot in$	(User Input)
Bolt Area =	$a_b := \frac{1}{4} \cdot \pi \cdot d_b^{\,2} = 0.785 \cdot in^2$	



Check Bolt Stresses:

Wind Acting Parallel to Stiffiner Plate:

Shear Stress per Bolt = $f_v := \frac{Vert}{n_b \cdot a_b} = 0.849 \cdot ksi$

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

Condition1 = "OK"

$\frac{f_v}{(\phi \cdot F_{nv})} = 2.1 \cdot \%$

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

Tension Force Each Bolt = $F_{tension.bolt} := \frac{Horz}{n_b} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 7.767 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.bolt}}{a_b} = 9.9 \cdot ksi$

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

Condition2 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 14.7 \cdot \%$

Wind Acting Perpendicular to Stiffiner Plate:

Shear Stress per Bolt = $f_v := \frac{\sqrt{Vert^2 + Horz^2}}{n_b \cdot a_b} = 6.128 \cdot ksi$

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

Condition3 = "OK"

$\frac{f_v}{(\phi \cdot F_{nv})} = 15.1 \cdot \%$

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

Tension Force per Bolt = $F_{tension.conn} := \frac{Horz \cdot e}{S_{horz} \cdot \frac{n_b}{2}} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 19.343 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.conn}}{a_b} = 24.628 \cdot ksi$

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

Condition4 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 36.5 \cdot \%$

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 88.8 \cdot ft \cdot kips$	(Input From Risa LC #1 & 2)
Shear Force =	$Shear := 7.3 \cdot kips$	(Input From Risa LC #1 & 2)
Axial Force (Max) =	$Axial_{max} := 2.6 \cdot kips$	(Input From Risa LC #1)
Axial Force (Min) =	$Axial_{min} := 1.9 \cdot kips$	(Input From Risa LC #2)

Flange Bolt Data:

ASTM A325

Number of Flange Bolts =	$N := 8$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 17 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 120 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Flange Bolts =	$D := 1 \cdot in$	(User Input)
Threads per Inch =	$n := 8$	(User Input)

Flange Plate Data:

Use ASTM A572 Grade 50

Plate Yield Strength =	$F_{yf} := 50 \cdot ksi$	(User Input)
Flange Plate Thickness =	$t_{TP} := 1 \cdot in$	(User Input)
Flange Plate Diameter =	$D_{OD} := 20 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 12.75 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.5 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 35 \cdot ksi$	(User Input)

Geometric Layout Data:

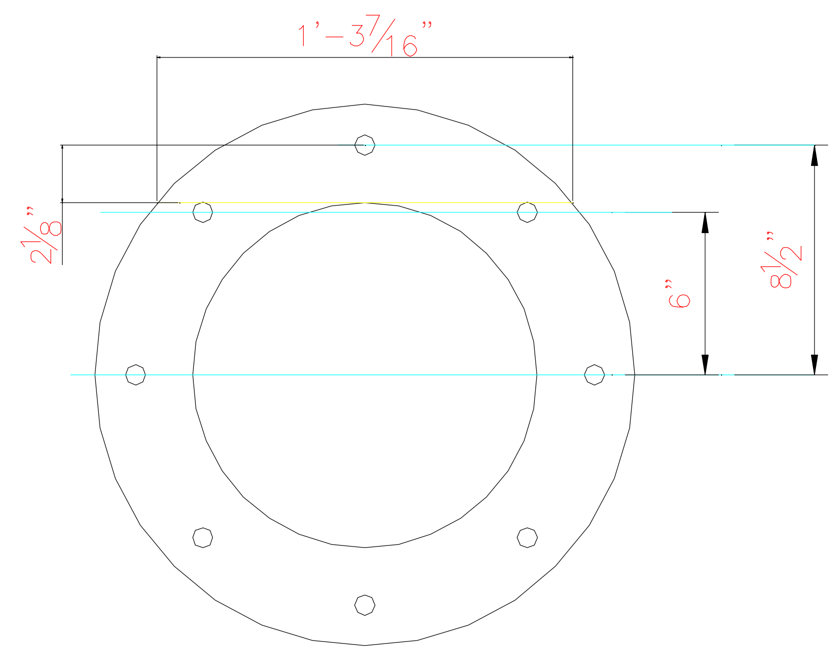
Distance from Bolts to Centroid of Pole:

$d_1 := 8.5in$ $d_2 := 6in$ (User Input)

Critical Distances For Bending in Plate: (User Input)

$ma_1 := 2.125in$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{OD}}{2}\right)^2 - \left(\frac{D_T}{2}\right)^2} = 12.3 \cdot in$



Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 2 + (d_2)^2 \cdot 4\right] = 288.5 \cdot in^2$

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

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

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial_{min}}{N} = 31.2 \cdot kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N} = 0.9 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := \left(0.75 \cdot F_u \cdot A_n\right) = 54.5 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{\Phi R_{nt}} = 57.15 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed"\right)$

$Condition1 = "OK"$

Design Shear Strength = $\Phi R_{nv} := \left(0.75 \cdot 0.45 \cdot F_u \cdot A_g\right) = 31.8 \cdot kips$

Bolt Shear % of Capacity = $\frac{V_{Max}}{\Phi R_{nv}} = 2.87 \cdot \%$

Condition2 = $Condition2 := if\left[\left(\frac{V_{Max}}{\Phi R_{nv}}\right)^2 + \left(\frac{T_{Max}}{\Phi R_{nt}}\right)^2 \le 1.00, "OK", "Overstressed"\right]$

$Condition2 = "OK"$

Flange Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_1}{I_p} + \frac{Axial_{max}}{N} = 31.72 \cdot kips$

Applied Bending Stress in Plate = $f_{bp} := \frac{4 \cdot \left(C_1 \cdot ma_1\right)}{B_{eff} \cdot t_{TP}^{\;2}} = 21.87 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 0.9 \cdot F_{yf} = 45 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 48.6 \cdot \%$

Condition1== $Condition1 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

$Condition1 = "Ok"$

Flange Plate Analysis (Prying Check):

Per TIA-222-G Addemdum 3

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.5 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 13.25 \cdot in$

Effective Flange Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le (D_{BC} + 6 \cdot t_{TP}) \\ (D_{BC} + 6 \cdot t_{TP}) & \text{otherwise} \end{cases} = 20 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Flange Rods = $\theta_1 := \frac{\pi}{N} = 0.393$

Angle Defining Limiting Effective Flange Plate Width Based on Plate Thickness = $\theta_2 := asin\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.784$

Angle Defining Limiting Effective Flange Plate Width Based on Distance Between Flange Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := acos\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.474$

Governing Angle Defining Effective Flange Plate Width Resisting Bending = $\theta := min(\theta_1, \theta_2, \theta_3) = 0.393$

Effective Moment Arm of Flange Rod Force = $x := 0.5 \cdot (D_{BC} - D_e) = 1.875 \cdot in$

Effective Flange Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot sin(\theta) = 6.506 \cdot in$

Effective Flange Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := (D_{oe} - D_e) \cdot sin(\theta) = 2.583 \cdot in$

Total Effective Flange Plate Width Resisting Bending = $B_{eff} := min[(B_{et} + B_{er}), 12 \cdot t_{TP}] = 9.089 \cdot in$

Required Flange Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot C_1 \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 0.763 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 76.3 \cdot \%$

Condition1 = Condition1 := if$\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition1 = "Ok"

Required Flange Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.525 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 52.5 \cdot \%$

Condition2 = Condition2 := if$\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition2 = "Ok"

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

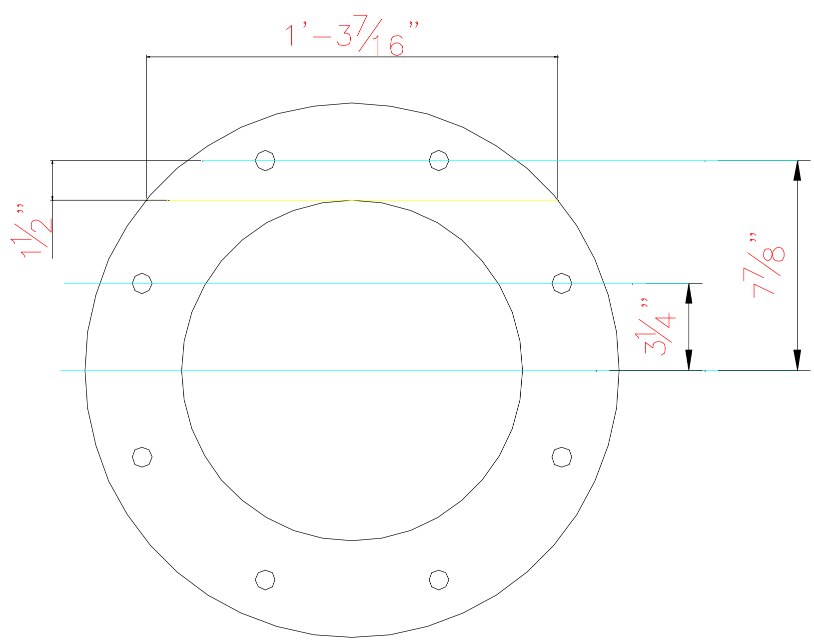
$d_1 := 7.875\text{in}$ $\quad d_2 := 3.25\text{in}$ (User Input)

Critical Distances For Bending in Plate:

(User Input)

$ma_1 := 1.5\text{in}$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{OD}}{2}\right)^2 - \left(\frac{D_T}{2}\right)^2} = 12.3 \cdot \text{in}$



Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4\right] = 290.3 \cdot \text{in}^2$

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

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

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial_{min}}{N} = 28.7 \cdot kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N} = 0.9 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := \left(0.75 \cdot F_u \cdot A_n\right) = 54.5 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{\Phi R_{nt}} = 52.59 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{\Phi R_{nt}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := \left(0.75 \cdot 0.45 \cdot F_u \cdot A_g\right) = 31.8 \cdot kips$

Bolt Shear % of Capacity = $\frac{V_{Max}}{\Phi R_{nv}} = 2.87 \cdot \%$

Condition2 = $Condition2 := if\left[\left(\frac{V_{Max}}{\Phi R_{nv}}\right)^2 + \left(\frac{T_{Max}}{\Phi R_{nt}}\right)^2 \le 1.00, \text{"OK"}, \text{"Overstressed"}\right]$

Condition2 = "OK"

Flange Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_1}{I_p} + \frac{Axial_{max}}{N} = 29.23 \cdot kips$

Applied Bending Stress in Plate = $f_{bp} := \frac{4 \cdot \left(2 \cdot C_1 \cdot ma_1\right)}{B_{eff} \cdot t_{TP}^{2}} = 28.45 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 0.9 \cdot F_{yf} = 45 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 63.2 \cdot \%$

Condition1= = $Condition1 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition1 = "Ok"

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2017 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 100$	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 =	$TME := 173$	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 = $$Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.42$$ (NESC 2017 Table 250-2)

Exposure Factor = $$Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.289$$ (NESC 2017 Table 250-3)

Response Term = $$Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.772$$ (NESC 2017 Table 250-3)

Gust Response Factor = $$Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.825$$ (NESC 2017 Table 250-3)

Wind Pressure = $$qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 30$$ psf (NESC 2017 Section 250.C.2)

Shape Factors

Eversource Design Criteria

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 Coax Cables Attached to Outside of Pole =	$Cd_{coax} := 1.6$	(User Input)

Overload Factors

Overload Factors for Wind Loads:

NESC Heavy Loading =	**2.5**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis

Overload Factors for Vertical Loads:

NESC Heavy Loading =	**1.5**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis

Development of Wind & Ice Load on PCS Mast

Mast Data: (Pipe 12" Sch. 80)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 12.75$ in (User Input)

Mast Length = $L_{mast} := 36$ ft (User Input)

Mast Thickness = $t_{mast} := 0.5$ in (User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.063$ sf/ft

Total Mast Wind Force (Above Tower) = $qz \cdot Cd_R \cdot A_{mast} \cdot m = 52$ plf **BLC 5**

Total Mast Wind Force (Above Tower) = $qz \cdot Cd_{coax} \cdot A_{mast} \cdot m = 64$ (Coax on Mast) plf **BLC 5**

Total Mast Wind Force (Below Tower) = $qz \cdot Cd_{coax} \cdot A_{mast} = 51$ (Coax on Mast) plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 1.146$ sf/ft

Total Mast Wind Force w/ Ice = $p \cdot Cd_{coax} \cdot AICE_{mast} = 7$ plf **BLC 4**

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 = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^{\,2}\right] = 20.8$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 8$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAALL24_43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 24$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 150$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 48$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 2875$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 16.8$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 50.5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 323$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 450$ 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 = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 3450$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 112$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 335$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	AT SBT-TOP-FM4G Bias Tee		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 5.63$	in	(User Input)
Antenna Width =	$W_{ant} := 3.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 2.0$	in	(User Input)
Antenna Weight =	$WT_{ant} := 2$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 0.4$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 26$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 0.2$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 0.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 4$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 6$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 42$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 52$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 2$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 5$ lbs **BLC 3**

Development of Wind & Ice Load on Mounts

Mount Data:

Mount Type = Tri-Sector Chain Mount

Mount Weight = $WT_{mnt} := 160$ lbs (User Input)

Mount Weight w/ Ice = $WT_{ICEmnt} := 200$ lbs (User Input)

Wind Load (NESC Extreme)

Total Platform Wind Force = $F_{mnt} := 0$ lbs **BLC 5**

Wind Load (NESC Heavy)

Total Platform Wind Force w/ Ice = $Fi_{mnt} := 0$ lbs **BLC 4**

Gravity Load (without ice)

Weight of Platform = $WT_{mnt} = 160$ lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Platform = $WT_{ICEmnt} - WT_{mnt} = 40$ lbs **BLC 3**

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Subject: Equipment Loads on Structure #10184

Location: New Milford, CT

Rev. 1: 6/28/22

Prepared by: T.J.L Checked by: C.F.C.
Job No. 21005.39

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type = HELIAX 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 = $N_{coax} := 24$ (User Input)

No. of Coax Projecting Outside Face of Mast = $NP_{coax} := 6$ (User Input)

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 1$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 59$ plf **BLC 5**

Total Coax Wind Force (Below NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 47$ plf **BLC 5**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{NP_{coax} \cdot (D_{coax} + 2 \cdot Ir)}{12} = 1.5$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 10$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 25$ plf **BLC 2**

Gravity Load (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot Ir)^2 - D_{coax}^{\ 2}\right] = 3.9$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 36$ 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	Standard Solver

Hot Rolled Steel Code	AISC 9th: ASD
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	PIPE_12.0X	Column	Pipe	A53 Gr. B	Typical	17.5	339	339	678

Hot Rolled Steel Design Parameters

	Label	Shape	Lengt...	Lbyy[ft]	Lbzz[ft]	Lcomp to...	Lcomp b...	Kyy	Kzz	Cm-yy	Cm-zz	Cb	y sway	z sway	Function
1	M1	Mast	14			Lbyy									Lateral
2	M2	Mast	22			Lbyy									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N1	N4			Mast	Column	Pipe	A53 Gr. B	Typical
2	M2	N4	N5			Mast	Column	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3.25	0	0	
3	N3	0	9.417	0	0	
4	N4	0	14	0	0	
5	N5	0	36	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	N1						
2	N2	Reaction	Reaction	Reaction		Reaction	
3	N3	Reaction	Reaction	Reaction		Reaction	

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.45	14
2	M2	Y	-.006	14
3	M2	Y	-.16	14

Member Point Loads (BLC 3 : Weight of Ice Only)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.335	14
2	M2	Y	-.005	14
3	M2	Y	-.04	14

Member Point Loads (BLC 4 : NESC Heavy Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.323	14
2	M2	X	.004	14

Member Point Loads (BLC 5 : NESC Extreme Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	2.875	14
2	M2	X	.026	14

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	M1	Y	-.025	-.025	0	0
2	M2	Y	-.025	-.025	0	10

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,...
1	M1	Y	-.008	-.008	0	0
2	M2	Y	-.008	-.008	0	0
3	M1	Y	-.036	-.036	0	0
4	M2	Y	-.036	-.036	0	10

Member Distributed Loads (BLC 4 : NESC Heavy 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	.007	.007	0	0
2	M2	X	.007	.007	0	0
3	M1	X	.01	.01	0	0
4	M2	X	.01	.01	0	10

Member Distributed Loads (BLC 5 : NESC Extreme 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	.051	.051	0	0
2	M2	X	.064	.064	0	10
3	M2	X	.052	.052	10	0
4	M1	X	.047	.047	0	0
5	M2	X	.059	.059	0	10

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					3	2		
3	Weight of Ice Only	None					3	4		
4	NESC Heavy Wind	None					2	4		
5	NESC Extreme Wind	None					2	5		

Load Combinations

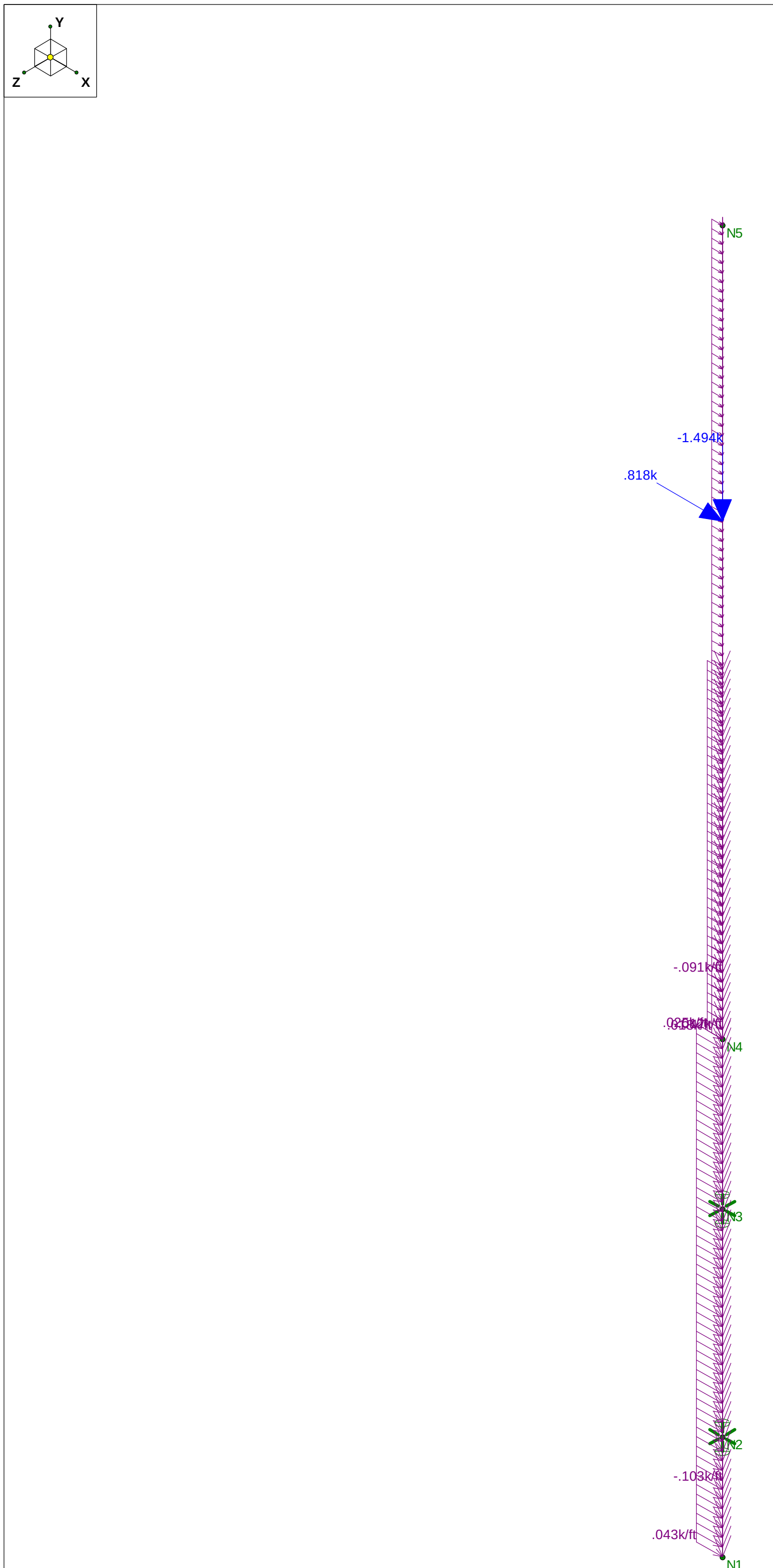
	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	NESC Heavy W...	Yes	Y		1	1.5	2	1.5	3	1.5	4	2.5												
2	NESC Extreme ...	Yes	Y		1	1	2	1	5	1														

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	3.626	1.221	0	0	0	0
2	1	N3	-5.674	6.116	0	0	0	0
3	1	Totals:	-2.048	7.338	0			
4	1	COG (ft):	X: 0	Y: 18.24	Z: 0			

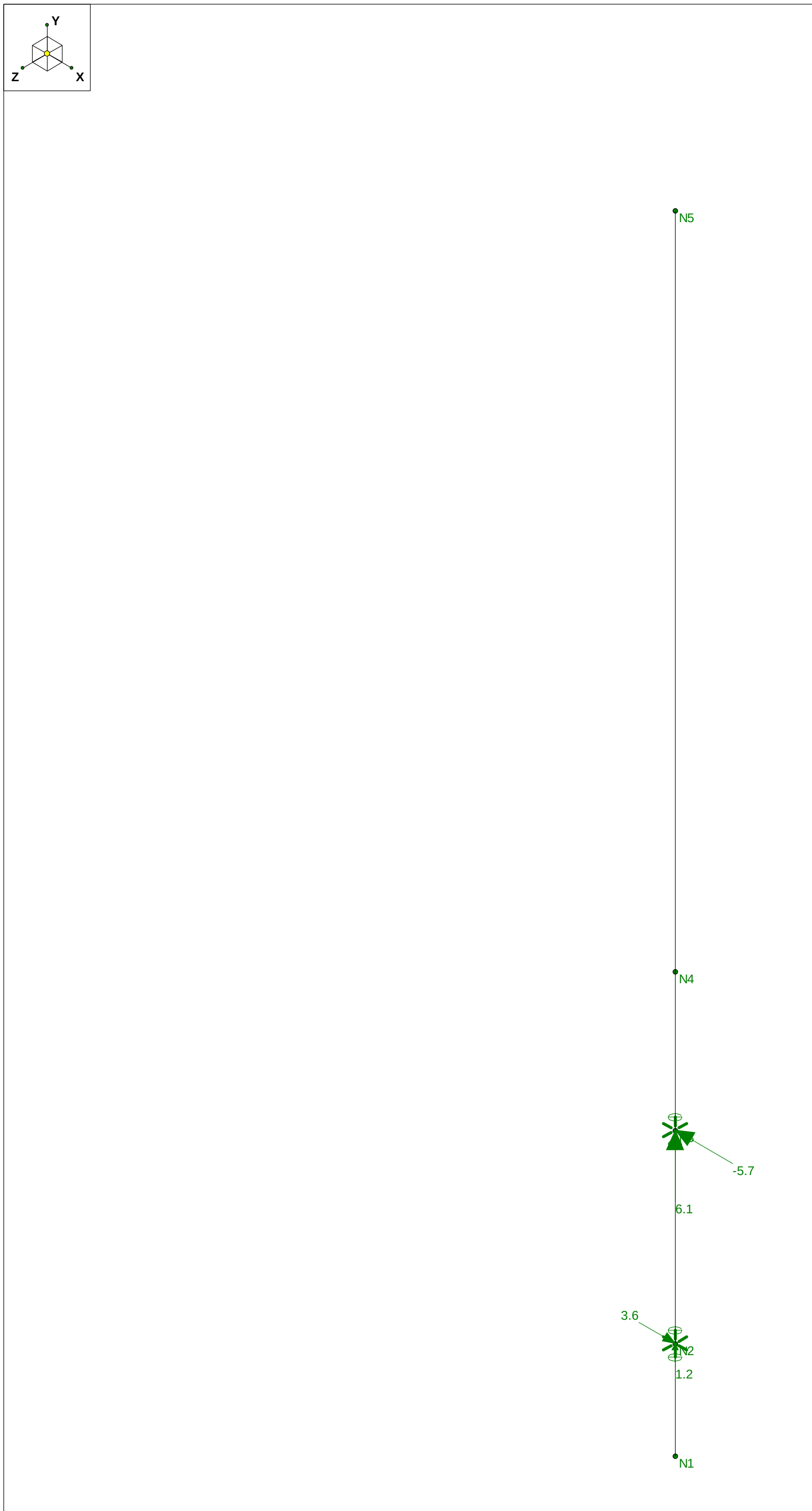
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	12.252	.535	0	0	0	0
2	2	N3	-18.379	2.824	0	0	0	0
3	2	Totals:	-6.127	3.36	0			
4	2	COG (ft):	X: 0	Y: 18.762	Z: 0			



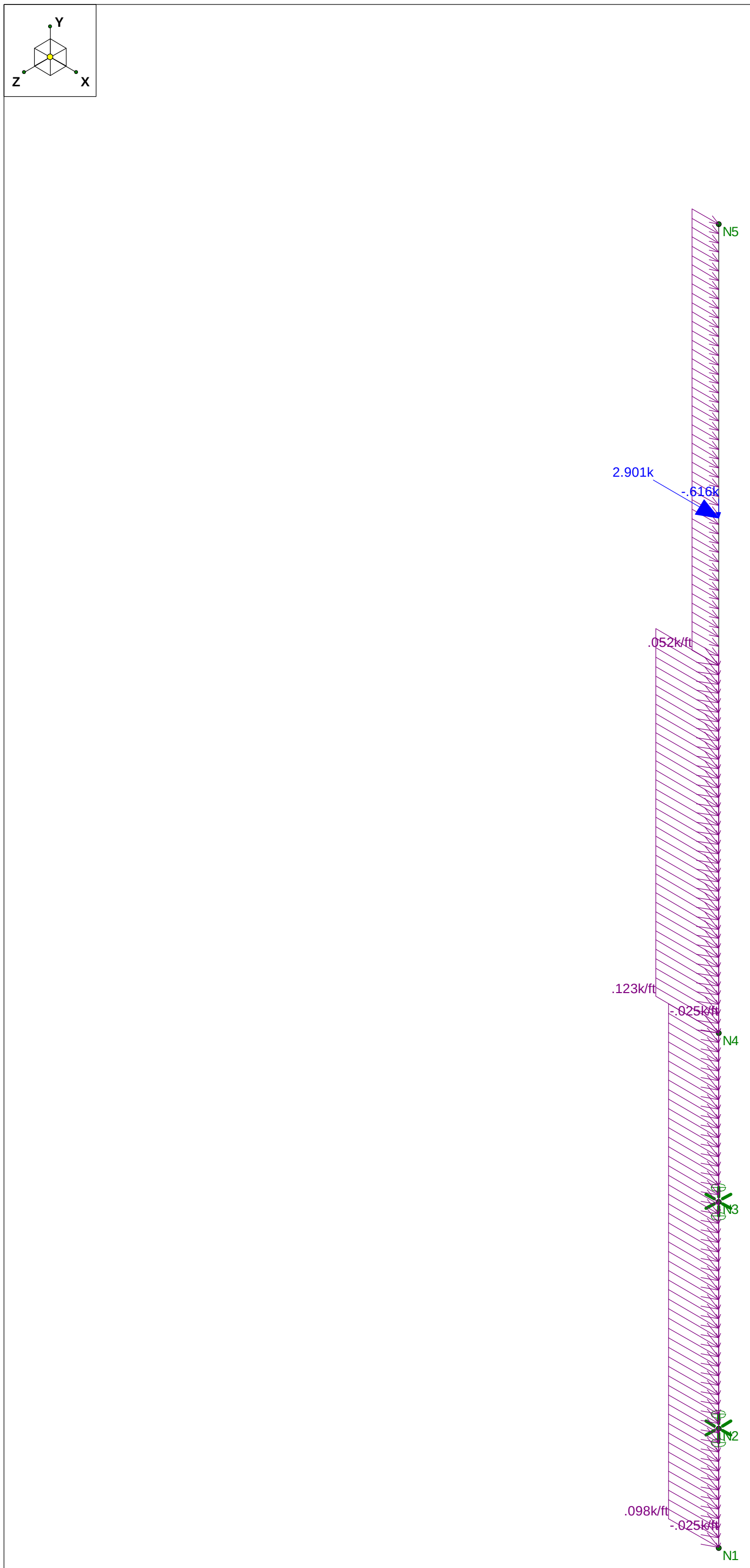
Loads: LC 1, NESC Heavy Wind on PCS Structure

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10184 - Mast	June 28, 2022 at 10:36 AM
21005.39 - CTNH461A	LC #1 Loads	NESC.r3d



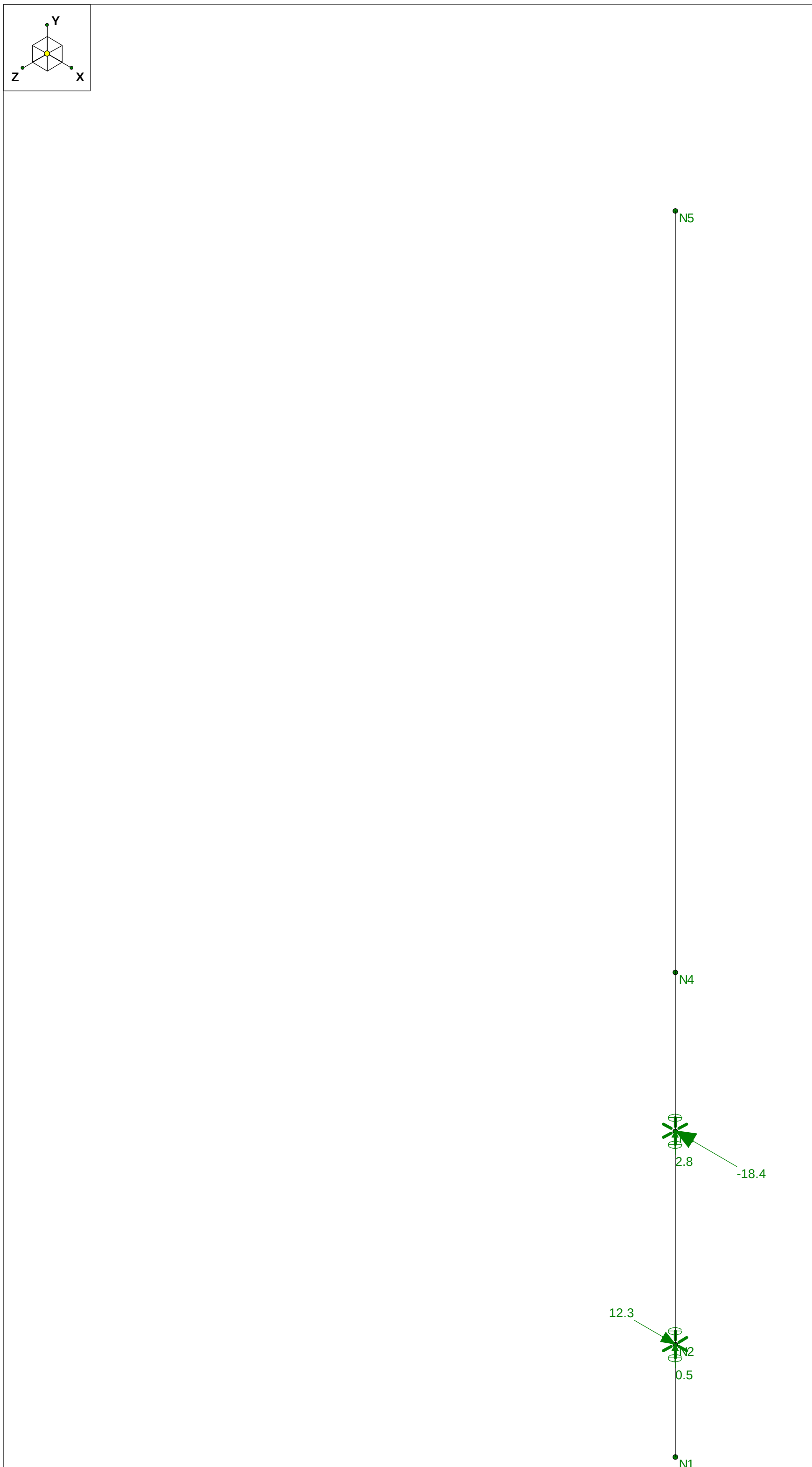
Results for LC 1, NESC Heavy Wind on PCS Structure
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10184 - Mast	June 28, 2022 at 10:37 AM
21005.39 - CTNH461A	LC #1 Reactions	NESC.r3d



Loads: LC 2, NESC Extreme Wind on PCS Structure

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10184 - Mast	June 28, 2022 at 10:36 AM
21005.39 - CTNH461A	LC #2 Loads	NESC.r3d



Results for LC 2, NESC Extreme Wind on PCS Structure
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10184 - Mast	June 28, 2022 at 10:37 AM
21005.39 - CTNH461A	LC #2 Reactions	NESC.r3d

Coax Cable on CL&P 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)*
Radial Ice Density =	$Id := 56 \cdot pcf$		*(User Input)*
Basic Windspeed =	$V := 100$	mph	(User Input NESC 2017 Figure 250-2(e))
Height to Top of Coax (on utility pole) Above Grade =	$TC := 140$	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 = $Kz := 2.01 \cdot \left(\frac{0.67TC}{900}\right)^{\frac{2}{9.5}} = 1.249$ (NESC 2017 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)}\right]^{\frac{1}{7}} = 0.298$ (NESC 2017 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220}\right)} = 0.807$ (NESC 2017 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.843$ (NESC 2017 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 26.9$ psf (NESC 2017 Section 250.C.2)

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 = $N_{coax} := 24$ *(User Input)*

Number of Projected Coax Cables = $NP_{coax} := 6$ *(User Input)*

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)*

Wind Area without Ice = $A := \left(NP_{coax} \cdot D_{coax}\right) = 11.88 \cdot in$

Wind Area with Ice = $A_{ice} := \left(NP_{coax} \cdot D_{coax} + 2 \cdot Ir\right) = 12.88 \cdot in$

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 = $W_{ice} := Ai_{coax} \cdot Id \cdot N_{coax} = 36.359 \cdot plf$

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 =

$$Heavy\_Wind_{Trans} := \overrightarrow{\left(p \cdot A_{ice} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{HWT}\right)}$$

$Heavy\_WInd_{Vert} = 920lb$ $Heavy\_Wind_{Trans} = 172lb$

Extreme Wind Vertical Load =

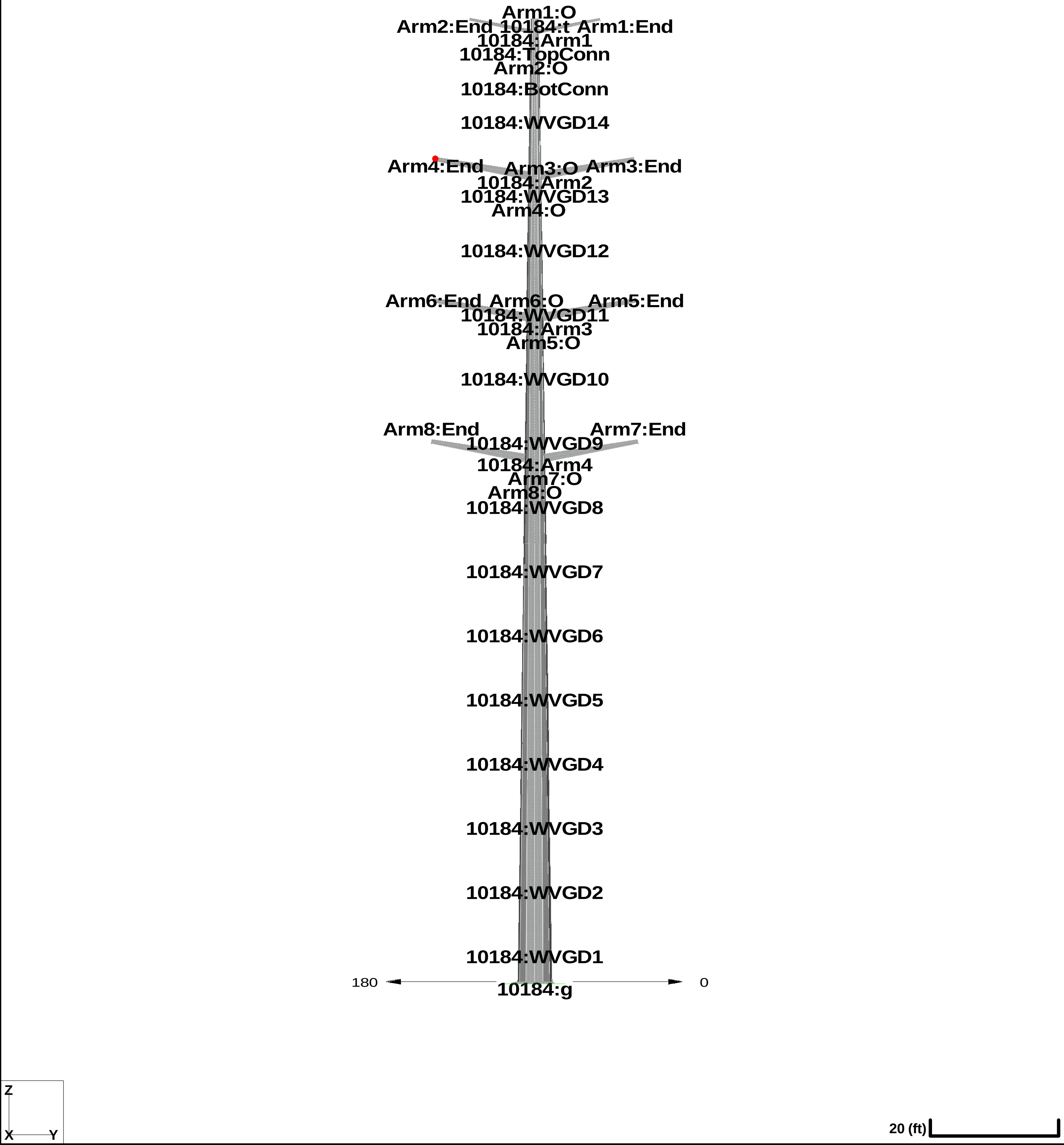
$$Extreme\_Wind_{Vert} := \overrightarrow{\left(N_{coax} \cdot W_{coax} \cdot Coax_{Span} \cdot OF_{EWV}\right)}$$

Extreme Wind Transverse Load =

$$Extreme\_Wind_{Trans} := \overrightarrow{\left[\left(qz \cdot psf \cdot A \cdot Cd_{coax}\right) \cdot Coax_{Span} \cdot OF_{EWT}\right]}$$

$Extreme\_Wind_{Vert} = 250lb$ $Extreme\_Wind_{Trans} = 427lb$

Centek Engineering Inc, Project: "cl&p structure # 10184"
PLS-POLE Version 16.81, 9:27:15 AM Tuesday, February 01, 2022
Undeformed geometry displayed



Project Name : 21005.39 - New Milford, CT
Project Notes: Structure # 10184/ T-Mobile CTNH461A
Project File : J:\Jobs\2100500.WI\39_CTNH461A_CT33XC095\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS-Pole\cl&p structure # 10184.pol
Date run : 10:41:55 AM Tuesday, June 28, 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\2100500.WI\39_CTNH461A_CT33XC095\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS-Pole\cl&p #10184.lca

*** Analysis Results:

Maximum element usage is 87.23% for Steel Pole "10184" in load case "NESC Extreme"
Maximum insulator usage is 23.24% for Clamp "9" 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	10184:g	156.27	59.66	6675.22	0.00
NESC Extreme	10184:g	83.82	67.32	7009.96	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	10184:g	-0.02	-59.66	-156.27	59.66	6668.97	288.95	6675.22	72.01	0.00
NESC Extreme	10184:g	2.61	-67.26	-83.82	67.32	6998.73	396.63	7009.96	31.33	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	10184:t	-8.74	102.23	-4.04	102.69	-0.63	-6.21	-0.03
NESC Extreme	10184:t	-7.29	107.90	-4.48	108.24	-0.44	-6.78	-0.04

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
10184	1	257	NESC Extreme	47.63	96.61
10184	2	4527	NESC Extreme	58.36	839.94
10184	3	7896	NESC Extreme	72.12	2388.80
10184	4	10996	NESC Extreme	83.38	4417.59

10184	5	13516	NESC Extreme	87.23	4730.62

*** 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)
10184	87.23	NESC Extreme	34.3	34	41645.5

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
Arm1	34.96	NESC Heavy	148.6	1	156.1
Arm2	14.95	NESC Heavy	148.6	1	156.1
Arm3	31.73	NESC Heavy	126.1	1	873.6
Arm4	27.95	NESC Heavy	126.1	1	873.6
Arm5	34.26	NESC Heavy	104.1	1	873.6
Arm6	27.70	NESC Heavy	104.1	1	873.6
Arm7	42.97	NESC Heavy	82.1	1	873.6
Arm8	26.99	NESC Heavy	82.1	1	873.6

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	85.91	10184	Steel Pole
NESC Extreme	87.23	10184	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Height AGL (ft)	Segment Number
NESC Heavy	85.91	10184	34.3	34
NESC Extreme	87.23	10184	34.3	34

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	10184	2	34.600	151.823	6668.972	288.837	47.418	205.081	6	185.044	2.667	79.03
NESC Extreme	10184	2	34.600	79.365	6998.738	396.582	49.252	213.015	6	191.789	2.718	82.09

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Height AGL (ft)	Segment Number

NESC Heavy	42.97	Arm7	82.1	1
NESC Extreme	19.47	Arm7	82.1	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
1	Clamp	3.26	NESC Heavy	0.0
2	Clamp	3.15	NESC Heavy	0.0
3	Clamp	16.29	NESC Heavy	0.0
4	Clamp	16.13	NESC Heavy	0.0
5	Clamp	16.22	NESC Heavy	0.0
6	Clamp	16.15	NESC Heavy	0.0
7	Clamp	17.68	NESC Heavy	0.0
8	Clamp	16.23	NESC Heavy	0.0
9	Clamp	23.24	NESC Extreme	0.0
10	Clamp	15.33	NESC Extreme	0.0
11	Clamp	1.17	NESC Heavy	0.0
12	Clamp	1.17	NESC Heavy	0.0
13	Clamp	1.17	NESC Heavy	0.0
14	Clamp	1.17	NESC Heavy	0.0
15	Clamp	1.17	NESC Heavy	0.0
16	Clamp	1.17	NESC Heavy	0.0
17	Clamp	1.17	NESC Heavy	0.0
18	Clamp	1.17	NESC Heavy	0.0
19	Clamp	1.17	NESC Heavy	0.0
20	Clamp	1.17	NESC Heavy	0.0
21	Clamp	1.17	NESC Heavy	0.0
22	Clamp	1.17	NESC Heavy	0.0
23	Clamp	1.17	NESC Heavy	0.0
24	Clamp	1.17	NESC Heavy	0.0

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	5553.7
Weight of Steel Poles:	41645.5
Total:	47199.2

*** End of Report

```
**************************************************************************
*                                                                        *
*                                PLS-POLE                                *
*                  POLE AND FRAME ANALYSIS AND DESIGN                    *
*               Copyright Power Line Systems 1999-2021                   *
*                                                                        *
**************************************************************************
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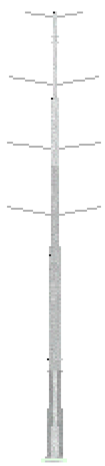
Project Name : 21005.39 - New Milford, CT
Project Notes: Structure # 10184/ T-Mobile CTNH461A
Project File : J:\Jobs\2100500.WI\39_CTNH461A_CT33XC095\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS-Pole\cl&p structure # 10184.pol
Date run   : 10:41:54 AM Tuesday, June 28, 2022
by   : PLS-POLE Version 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)	
10184	10184	150.00	0	Yes	12T	14	62.25	0	1.6	5 tubes	0	0		Calculated	0.000	0.0000	0.0000	Galvanized Steel

Steel Tubes Properties:

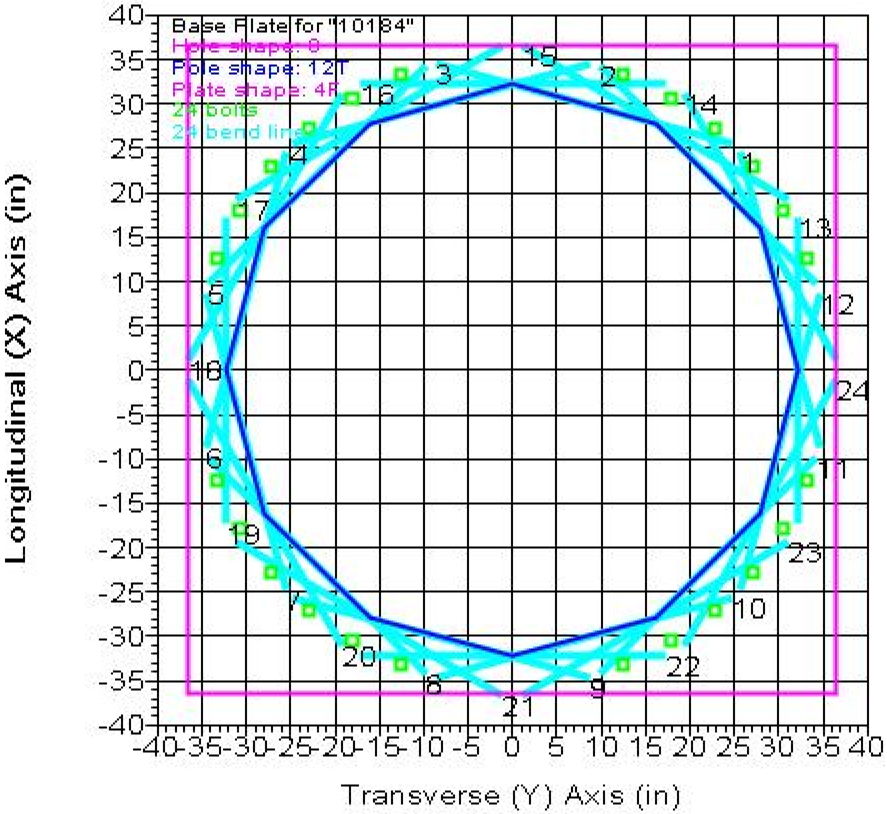
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap or Butt Offset (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)	Actual Overlap (ft)
10184	1	8.25	0.1875	0.000	0.000	0.000	60.000	0.000	257	4.25	0.33917	14.00	16.80	2.053	0.000
10184	2	40	0.4375	3.833	0.000	0.000	60.000	0.000	4527	21.91	0.33917	17.30	30.86	3.749	3.833
10184	3	37.25	0.5625	5.167	0.000	0.000	60.000	0.000	7896	19.76	0.33917	28.69	41.32	5.025	5.167
10184	4	40	0.5625	6.500	0.000	0.000	60.000	0.000	10996	21.01	0.33917	38.45	52.01	6.361	6.500
10184	5	40	0.5625	0.000	0.000	0.000	60.000	0.000	13516	20.82	0.33917	48.68	62.25	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)
10184	73.000	4F	3.000	4452	34.600	0.000	0	490.00	60.000	2.250	71.000	24	60162.19	60162.19

Base Plate Bolt Coordinates for Property "10184":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0.3521	0.9366	0
0.507	0.8627	0
0.6444	0.7641	0
0.7641	0.6444	0
0.8627	0.507	0
0.9366	0.3521	0



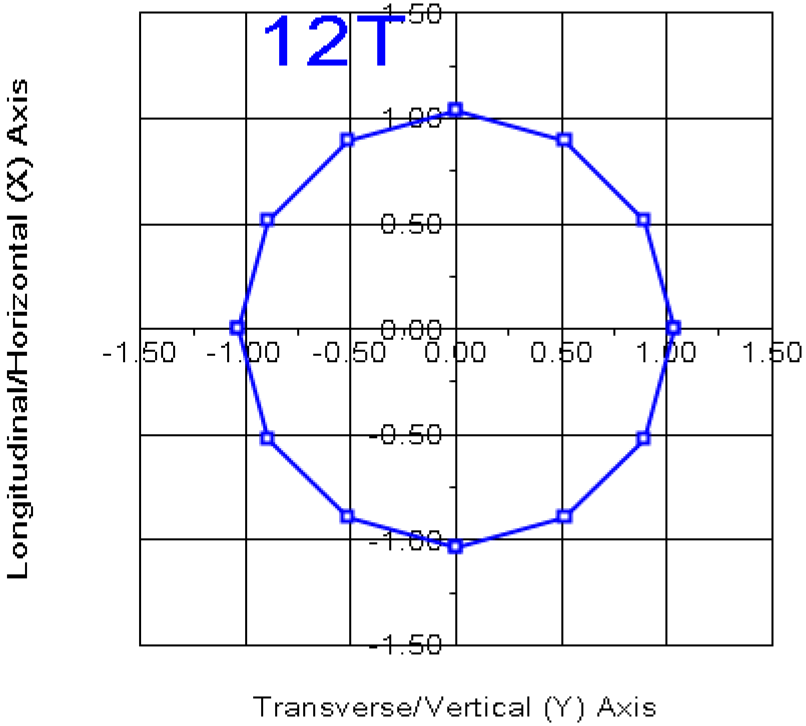
Steel Pole Connectivity:

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)
10184			0	0	0	0	0	10184	20 labels		0.00	0

Relative Attachment Labels for Steel Pole "10184":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
10184:Arm1	0.00	148.08
10184:Arm2	0.00	125.66
10184:Arm3	0.00	103.66
10184:Arm4	0.00	81.66
10184:WVGD1	0.00	5.00

10184:WVGD2	0.00	15.00
10184:WVGD3	0.00	25.00
10184:WVGD4	0.00	35.00
10184:WVGD5	0.00	45.00
10184:WVGD6	0.00	55.00
10184:WVGD7	0.00	65.00
10184:WVGD8	0.00	75.00
10184:WVGD9	0.00	85.00
10184:WVGD10	0.00	95.00
10184:WVGD11	0.00	105.00
10184:WVGD12	0.00	115.00
10184:WVGD13	0.00	125.00
10184:TopConn	3.58	0.00
10184:BotConn	9.75	0.00
10184:WVGD14	0.00	135.00



Pole Steel Properties:

Warning: Capacities and usages printed in splices are listed for the inner tube except at the splice top which uses the outer tube. ??

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)

10184	10184:t	10184:t	Ori	0.00	14.00	8.33	203.38	203.38	0.00	17.3	60.00	60.00	140.32	140.32
10184	10184:Arm1	10184:Arm1	End	1.92	14.65	8.72	233.46	233.46	0.00	18.3	60.00	60.00	153.93	153.93
10184	10184:Arm1	10184:Arm1	Ori	1.92	14.65	8.72	233.46	233.46	0.00	18.3	60.00	60.00	153.93	153.93
10184	10184:TopConn	10184:TopConn	End	3.58	15.22	9.06	261.91	261.91	0.00	19.1	60.00	60.00	166.27	166.27
10184	10184:TopConn	10184:TopConn	Ori	3.58	15.22	9.06	261.91	261.91	0.00	19.1	60.00	60.00	166.27	166.27
10184	#10184:0	SpliceT	End	8.25	16.80	10.01	353.69	353.69	0.00	21.3	60.00	60.00	203.38	203.38
10184	#10184:0	SpliceT	Ori	8.25	17.30	23.72	863.50	863.50	0.00	7.9	60.00	60.00	482.18	482.18
10184	10184:BotConn	10184:BotConn	End	9.75	17.81	24.43	944.02	944.02	0.00	8.2	60.00	60.00	512.08	512.08
10184	10184:BotConn	10184:BotConn	Ori	9.75	17.81	24.43	944.02	944.02	0.00	8.2	60.00	60.00	512.08	512.08
10184	#10184:1	Tube 2	End	12.38	18.70	25.69	1096.70	1096.70	0.00	8.8	60.00	60.00	566.57	566.57
10184	#10184:1	Tube 2	Ori	12.38	18.70	25.69	1096.70	1096.70	0.00	8.8	60.00	60.00	566.57	566.57
10184	10184:WVGD14	10184:WVGD14	End	15.00	19.59	26.94	1265.02	1265.02	0.00	9.3	60.00	60.00	623.82	623.82
10184	10184:WVGD14	10184:WVGD14	Ori	15.00	19.59	26.94	1265.02	1265.02	0.00	9.3	60.00	60.00	623.82	623.82
10184	#10184:2	Tube 2	End	19.67	21.17	29.17	1605.63	1605.63	0.00	10.3	60.00	60.00	732.53	732.53
10184	#10184:2	Tube 2	Ori	19.67	21.17	29.17	1605.63	1605.63	0.00	10.3	60.00	60.00	732.53	732.53
10184	10184:Arm2	10184:Arm2	End	24.34	22.76	31.40	2002.49	2002.49	0.00	11.3	60.00	60.00	849.97	849.97
10184	10184:Arm2	10184:Arm2	Ori	24.34	22.76	31.40	2002.49	2002.49	0.00	11.3	60.00	60.00	849.97	849.97
10184	10184:WVGD13	10184:WVGD13	End	25.00	22.98	31.71	2062.98	2062.98	0.00	11.4	60.00	60.00	867.17	867.17
10184	10184:WVGD13	10184:WVGD13	Ori	25.00	22.98	31.71	2062.99	2062.99	0.00	11.4	60.00	60.00	867.17	867.17
10184	#10184:3	Tube 2	End	30.00	24.67	34.10	2564.38	2564.38	0.00	12.4	60.00	60.00	1003.85	1003.85
10184	#10184:3	Tube 2	Ori	30.00	24.68	34.10	2564.38	2564.38	0.00	12.4	60.00	60.00	1003.85	1003.85
10184	10184:WVGD12	10184:WVGD12	End	35.00	26.37	36.48	3141.08	3141.08	0.00	13.5	60.00	60.00	1150.53	1150.53
10184	10184:WVGD12	10184:WVGD12	Ori	35.00	26.37	36.48	3141.08	3141.08	0.00	13.5	60.00	60.00	1150.53	1150.53
10184	#10184:4	Tube 2	End	39.71	27.97	38.73	3757.72	3757.72	0.00	14.4	60.00	60.00	1297.80	1297.80
10184	#10184:4	Tube 2	Ori	39.71	27.97	38.73	3757.72	3757.72	0.00	14.4	60.00	60.00	1297.80	1297.80
10184	#10184:5	SpliceT	End	44.42	29.56	40.97	4450.21	4450.21	0.00	15.4	60.00	60.00	1453.94	1453.94
10184	#10184:5	SpliceT	Ori	44.42	29.56	40.97	4450.21	4450.21	0.00	15.4	60.00	60.00	1453.94	1453.94
10184	10184:WVGD11	10184:WVGD11	End	45.00	28.89	51.23	5262.58	5262.58	0.00	11.1	60.00	60.00	1759.67	1759.67
10184	10184:WVGD11	10184:WVGD11	Ori	45.00	28.89	51.23	5262.58	5262.58	0.00	11.1	60.00	60.00	1759.67	1759.67
10184	10184:Arm3	10184:Arm3	End	46.34	29.34	52.05	5520.66	5520.66	0.00	11.3	60.00	60.00	1817.29	1817.29
10184	10184:Arm3	10184:Arm3	Ori	46.34	29.34	52.05	5520.66	5520.66	0.00	11.3	60.00	60.00	1817.29	1817.29
10184	#10184:6	SpliceB	End	48.25	29.99	53.22	5901.05	5901.05	0.00	11.6	60.00	60.00	1900.63	1900.63
10184	#10184:6	SpliceB	Ori	48.25	29.99	53.22	5901.05	5901.05	0.00	11.6	60.00	60.00	1900.63	1900.63
10184	#10184:7	Tube 3	End	51.63	31.13	55.29	6616.66	6616.66	0.00	12.2	60.00	60.00	2052.76	2052.76
10184	#10184:7	Tube 3	Ori	51.63	31.13	55.29	6616.66	6616.66	0.00	12.2	60.00	60.00	2052.76	2052.76
10184	10184:WVGD10	10184:WVGD10	End	55.00	32.28	57.36	7387.92	7387.92	0.00	12.7	60.00	60.00	2210.76	2210.76
10184	10184:WVGD10	10184:WVGD10	Ori	55.00	32.28	57.36	7387.92	7387.92	0.00	12.7	60.00	60.00	2210.76	2210.76
10184	#10184:8	Tube 3	End	60.00	33.97	60.43	8637.23	8637.23	0.00	13.5	60.00	60.00	2455.60	2455.60
10184	#10184:8	Tube 3	Ori	60.00	33.98	60.43	8637.24	8637.24	0.00	13.5	60.00	60.00	2455.60	2455.60
10184	10184:WVGD9	10184:WVGD9	End	65.00	35.67	63.50	10020.02	10020.02	0.00	14.3	60.00	60.00	2713.29	2713.29
10184	10184:WVGD9	10184:WVGD9	Ori	65.00	35.67	63.50	10020.02	10020.02	0.00	14.3	60.00	60.00	2713.29	2713.29
10184	10184:Arm4	10184:Arm4	End	68.34	36.80	65.55	11022.58	11022.58	0.00	14.9	60.00	60.00	2892.80	2892.80
10184	10184:Arm4	10184:Arm4	Ori	68.34	36.80	65.55	11022.59	11022.59	0.00	14.9	60.00	60.00	2892.80	2892.80
10184	#10184:9	Tube 3	End	71.67	37.93	67.59	12084.75	12084.75	0.00	15.4	60.00	60.00	3077.19	3077.19
10184	#10184:9	Tube 3	Ori	71.67	37.93	67.59	12084.76	12084.76	0.00	15.4	60.00	60.00	3077.19	3077.19
10184	10184:WVGD8	10184:WVGD8	End	75.00	39.06	69.63	13213.06	13213.06	0.00	15.9	60.00	60.00	3267.27	3267.27
10184	10184:WVGD8	10184:WVGD8	Ori	75.00	39.06	69.63	13213.06	13213.06	0.00	15.9	60.00	60.00	3267.27	3267.27
10184	#10184:10	SpliceT	End	76.50	39.57	70.55	13743.75	13743.75	0.00	16.2	60.00	60.00	3354.80	3354.80
10184	#10184:10	SpliceT	Ori	76.50	39.57	70.55	13743.75	13743.75	0.00	16.2	60.00	60.00	3354.80	3354.80
10184	#10184:11	Splice	End	79.08	39.32	70.10	13482.52	13482.52	0.00	16.1	60.00	60.00	3311.86	3311.86
10184	#10184:11	Splice	Ori	79.08	39.32	70.10	13482.52	13482.52	0.00	16.1	60.00	60.00	3311.86	3311.86
10184	#10184:12	SpliceB	End	81.67	40.20	71.69	14417.62	14417.62	0.00	16.5	60.00	60.00	3464.36	3464.36
10184	#10184:12	SpliceB	Ori	81.67	40.20	71.69	14417.62	14417.62	0.00	16.5	60.00	60.00	3464.36	3464.36
10184	10184:WVGD7	10184:WVGD7	End	85.00	41.33	73.73	15686.57	15686.57	0.00	17.0	60.00	60.00	3666.17	3666.17
10184	10184:WVGD7	10184:WVGD7	Ori	85.00	41.33	73.73	15686.57	15686.57	0.00	17.0	60.00	60.00	3666.17	3666.17
10184	#10184:13	Tube 4	End	90.00	43.02	76.80	17726.51	17726.51	0.00	17.8	60.00	60.00	3979.64	3979.64
10184	#10184:13	Tube 4	Ori	90.00	43.03	76.80	17726.52	17726.52	0.00	17.8	60.00	60.00	3979.64	3979.64
10184	10184:WVGD6	10184:WVGD6	End	95.00	44.72	79.87	19936.07	19936.07	0.00	18.6	60.00	60.00	4305.97	4305.97
10184	10184:WVGD6	10184:WVGD6	Ori	95.00	44.72	79.87	19936.07	19936.07	0.00	18.6	60.00	60.00	4305.97	4305.97

10184	#10184:14	Tube 4	End	100.00	46.42	82.93	22322.01	22322.01	0.00	19.4	60.00	60.00	4645.16	4645.16
10184	#10184:14	Tube 4	Ori	100.00	46.42	82.93	22322.01	22322.01	0.00	19.4	60.00	60.00	4645.16	4645.16
10184	10184:WVGD5	10184:WVGD5	End	105.00	48.11	86.00	24891.11	24891.11	0.00	20.2	60.00	60.00	4997.21	4997.21
10184	10184:WVGD5	10184:WVGD5	Ori	105.00	48.11	86.00	24891.12	24891.12	0.00	20.2	60.00	60.00	4997.21	4997.21
10184	#10184:15	SpliceT	End	110.00	49.81	89.07	27650.15	27650.15	0.00	21.0	60.00	60.00	5362.13	5362.13
10184	#10184:15	SpliceT	Ori	110.00	49.81	89.07	27650.16	27650.16	0.00	21.0	60.00	60.00	5362.13	5362.13
10184	10184:WVGD4	10184:WVGD4	End	115.00	50.38	90.10	28622.78	28622.78	0.00	21.3	60.00	60.00	5487.85	5487.85
10184	10184:WVGD4	10184:WVGD4	Ori	115.00	50.38	90.10	28622.79	28622.79	0.00	21.3	60.00	60.00	5487.85	5487.85
10184	#10184:16	SpliceB	End	116.50	50.89	91.02	29508.63	29508.63	0.00	21.6	60.00	60.00	5601.13	5601.13
10184	#10184:16	SpliceB	Ori	116.50	50.89	91.02	29508.63	29508.63	0.00	21.6	60.00	60.00	5601.13	5601.13
10184	#10184:17	Tube 5	End	120.75	52.33	93.63	32117.37	32117.37	0.00	22.2	60.00	60.00	5928.38	5928.38
10184	#10184:17	Tube 5	Ori	120.75	52.33	93.63	32117.38	32117.38	0.00	22.2	60.00	60.00	5928.38	5928.38
10184	10184:WVGD3	10184:WVGD3	End	125.00	53.77	96.24	34875.51	34875.51	0.00	22.9	60.00	60.00	6264.92	6264.92
10184	10184:WVGD3	10184:WVGD3	Ori	125.00	53.77	96.24	34875.52	34875.52	0.00	22.9	60.00	60.00	6264.92	6264.92
10184	#10184:18	Tube 5	End	130.00	55.47	99.30	38317.30	38317.30	0.00	23.7	60.00	60.00	6672.74	6672.74
10184	#10184:18	Tube 5	Ori	130.00	55.47	99.30	38317.30	38317.30	0.00	23.7	60.00	60.00	6672.74	6672.74
10184	10184:WVGD2	10184:WVGD2	End	135.00	57.16	102.37	41978.39	41978.39	0.00	24.6	60.00	60.00	7093.43	7093.43
10184	10184:WVGD2	10184:WVGD2	Ori	135.00	57.16	102.37	41978.39	41978.39	0.00	24.6	60.00	60.00	7093.43	7093.43
10184	#10184:19	Tube 5	End	140.00	58.86	105.44	45865.56	45865.56	0.00	25.4	60.00	60.00	7526.97	7526.97
10184	#10184:19	Tube 5	Ori	140.00	58.86	105.44	45865.57	45865.57	0.00	25.4	60.00	60.00	7526.97	7526.97
10184	10184:WVGD1	10184:WVGD1	End	145.00	60.55	108.50	49985.60	49985.60	0.00	26.2	60.00	60.00	7973.38	7973.38
10184	10184:WVGD1	10184:WVGD1	Ori	145.00	60.55	108.50	49985.60	49985.60	0.00	26.2	60.00	60.00	7973.38	7973.38
10184	10184:g	10184:g	End	150.00	62.25	111.57	54345.27	54345.27	0.00	27.0	60.00	60.00	8432.65	8432.65

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 Override (lbs/ft^3)	Steel Texture Shape At End
ARM D		4F	0.1875	8	5	0	1.6	29000	1 point	Calculated	0	0	0	0	60	0	
ARM E		4F	0.375	16	8	0	1.6	29000	1 point	Calculated	0	0	0	0	60	0	

Intermediate Joints for Davit Property "ARM D":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	9.5	-1.917

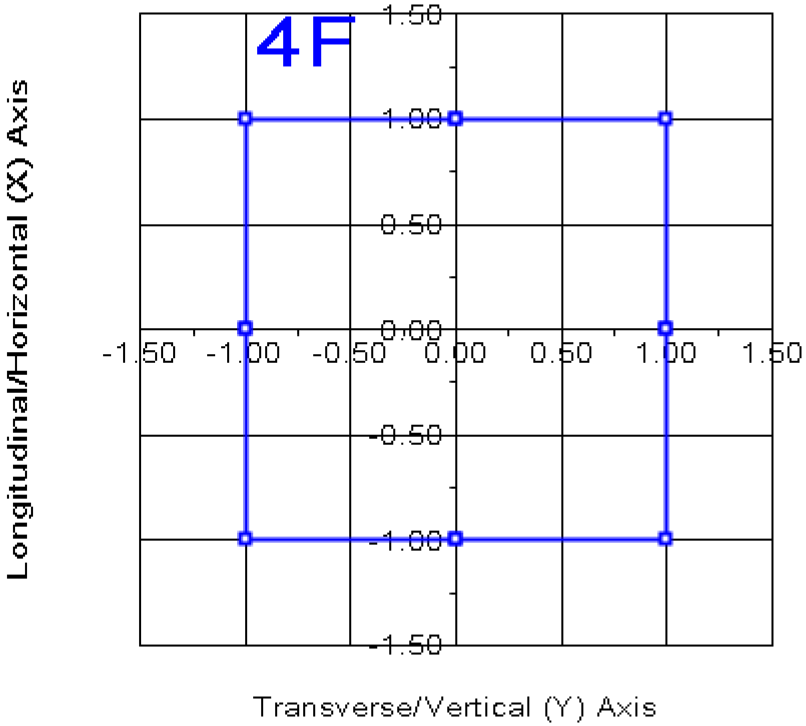
Intermediate Joints for Davit Property "ARM E":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	14.5	-2.55

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property	Azimuth

		Set	(deg)
Arm1	10184:Arm1	ARM D	0
Arm2	10184:Arm1	ARM D	180
Arm3	10184:Arm2	ARM E	0
Arm4	10184:Arm2	ARM E	180
Arm5	10184:Arm3	ARM E	0
Arm6	10184:Arm3	ARM E	180
Arm7	10184:Arm4	ARM E	0
Arm8	10184:Arm4	ARM E	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)
Arm1	Arm1:O	Origin	0.00	8.00	5.86	59.64	59.64	0.00	32.7	60.00	60.00	74.55	74.55
Arm1	#Arm1:0	End	4.85	6.50	4.73	31.47	31.47	0.00	24.7	60.00	60.00	48.42	48.42
Arm1	#Arm1:0	Origin	4.85	6.50	4.73	31.47	31.47	0.00	24.7	60.00	60.00	48.42	48.42
Arm1	Arm1:End	End	9.69	5.00	3.61	13.95	13.95	0.00	16.7	60.00	60.00	27.91	27.91
Arm2	Arm2:O	Origin	0.00	8.00	5.86	59.64	59.64	0.00	32.7	60.00	60.00	74.55	74.55
Arm2	#Arm2:0	End	4.85	6.50	4.73	31.47	31.47	0.00	24.7	60.00	60.00	48.42	48.42

Arm2	#Arm2:0	Origin	4.85	6.50	4.73	31.47	31.47	0.00	24.7	60.00	60.00	48.42	48.42
Arm2	Arm2:End	End	9.69	5.00	3.61	13.95	13.95	0.00	16.7	60.00	60.00	27.91	27.91
Arm3	Arm3:O	Origin	0.00	16.00	23.44	954.22	954.22	0.00	32.7	60.00	60.00	596.39	596.39
Arm3	#Arm3:0	End	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm3	#Arm3:0	Origin	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm3	#Arm3:1	End	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm3	#Arm3:1	Origin	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm3	Arm3:End	End	14.72	8.00	11.44	111.10	111.10	0.00	11.3	60.00	60.00	138.87	138.87
Arm4	Arm4:O	Origin	0.00	16.00	23.44	954.22	954.22	0.00	32.7	60.00	60.00	596.39	596.39
Arm4	#Arm4:0	End	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm4	#Arm4:0	Origin	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm4	#Arm4:1	End	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm4	#Arm4:1	Origin	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm4	Arm4:End	End	14.72	8.00	11.44	111.10	111.10	0.00	11.3	60.00	60.00	138.87	138.87
Arm5	Arm5:O	Origin	0.00	16.00	23.44	954.22	954.22	0.00	32.7	60.00	60.00	596.39	596.39
Arm5	#Arm5:0	End	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm5	#Arm5:0	Origin	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm5	#Arm5:1	End	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm5	#Arm5:1	Origin	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm5	Arm5:End	End	14.72	8.00	11.44	111.10	111.10	0.00	11.3	60.00	60.00	138.87	138.87
Arm6	Arm6:O	Origin	0.00	16.00	23.44	954.22	954.22	0.00	32.7	60.00	60.00	596.39	596.39
Arm6	#Arm6:0	End	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm6	#Arm6:0	Origin	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm6	#Arm6:1	End	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm6	#Arm6:1	Origin	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm6	Arm6:End	End	14.72	8.00	11.44	111.10	111.10	0.00	11.3	60.00	60.00	138.87	138.87
Arm7	Arm7:O	Origin	0.00	16.00	23.44	954.22	954.22	0.00	32.7	60.00	60.00	596.39	596.39
Arm7	#Arm7:0	End	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm7	#Arm7:0	Origin	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm7	#Arm7:1	End	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm7	#Arm7:1	Origin	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm7	Arm7:End	End	14.72	8.00	11.44	111.10	111.10	0.00	11.3	60.00	60.00	138.87	138.87
Arm8	Arm8:O	Origin	0.00	16.00	23.44	954.22	954.22	0.00	32.7	60.00	60.00	596.39	596.39
Arm8	#Arm8:0	End	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm8	#Arm8:0	Origin	5.00	13.28	19.36	538.13	538.13	0.00	25.4	60.00	60.00	405.13	405.13
Arm8	#Arm8:1	End	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm8	#Arm8:1	Origin	9.86	10.64	15.40	270.89	270.89	0.00	18.4	60.00	60.00	254.56	254.56
Arm8	Arm8:End	End	14.72	8.00	11.44	111.10	111.10	0.00	11.3	60.00	60.00	138.87	138.87

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)	Hardware Capacity (lbs)	Notes
clamp1	clamp1	8e+04	0	

Clamp Insulator Connectivity:

Clamp Label	Structure And Tip	Property Set	Min. Required Vertical Load

	Attach		(uplift) (lbs)
1	Arm1:End	clamp1	No Limit
2	Arm2:End	clamp1	No Limit
3	Arm3:End	clamp1	No Limit
4	Arm4:End	clamp1	No Limit
5	Arm5:End	clamp1	No Limit
6	Arm6:End	clamp1	No Limit
7	Arm7:End	clamp1	No Limit
8	Arm8:End	clamp1	No Limit
9	10184:TopConn	clamp1	No Limit
10	10184:BotConn	clamp1	No Limit
11	10184:WVGD1	clamp1	No Limit
12	10184:WVGD2	clamp1	No Limit
13	10184:WVGD3	clamp1	No Limit
14	10184:WVGD4	clamp1	No Limit
15	10184:WVGD5	clamp1	No Limit
16	10184:WVGD6	clamp1	No Limit
17	10184:WVGD7	clamp1	No Limit
18	10184:WVGD8	clamp1	No Limit
19	10184:WVGD9	clamp1	No Limit
20	10184:WVGD10	clamp1	No Limit
21	10184:WVGD11	clamp1	No Limit
22	10184:WVGD12	clamp1	No Limit
23	10184:WVGD13	clamp1	No Limit
24	10184:WVGD14	clamp1	No Limit

Material List Options:
- Show Parts: YES
- Decompose Assemblies: NO
- Show Assemblies: YES

Material List

Stock Number	Item Description	Quantity	Unit of Measure
clamp1	Clamp property: clamp	24.00	Each
10184	Steel Pole property: 10184	1.00	Each

*** Loads Data

Loads from file: J:\Jobs\2100500.WI\39_CTNH461A_CT33XC095\05_Structural\Backup Documentation\Rev (1)\Calcs\PLS-Pole\cl&p #10184.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)	150.00 (ft)	
Structure height	150.00 (ft)	
Structure height above ground	150.00 (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. Poles 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	24 loads	Wind on All	4	0	0.000	56.000	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	24 loads	NESC 2017	25.6	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
Arm1:End	1626	1896	-753	Shield Wire
Arm2:End	1626	1927	0	Shield Wire
Arm3:End	10734	7350	-708	Conductor
Arm4:End	10631	7054	-1946	Conductor
Arm5:End	10640	7212	-1784	Conductor
Arm6:End	10639	7128	-1713	Conductor
Arm7:End	10655	7653	5287	Conductor
Arm8:End	10634	7310	1430	Conductor
10184:TopConn	6116	5674	0	Mast Connection
10184:BotConn	1221	-3626	0	Mast Connection
10184:WVGD14	920	172	0	Coax Cable
10184:WVGD13	920	172	0	Coax Cable
10184:WVGD12	920	172	0	Coax Cable
10184:WVGD11	920	172	0	Coax Cable
10184:WVGD10	920	172	0	Coax Cable
10184:WVGD9	920	172	0	Coax Cable

10184:WVGD8	920	172	0	Coax Cable
10184:WVGD7	920	172	0	Coax Cable
10184:WVGD6	920	172	0	Coax Cable
10184:WVGD5	920	172	0	Coax Cable
10184:WVGD4	920	172	0	Coax Cable
10184:WVGD3	920	172	0	Coax Cable
10184:WVGD2	920	172	0	Coax Cable
10184:WVGD1	920	172	0	Coax Cable

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Arm1:End	-523	1045	-211	Shield Wire
Arm2:End	512	1202	0	Shield Wire
Arm3:End	4964	6902	-795	Conductor
Arm4:End	4906	6753	-1294	Conductor
Arm5:End	4871	6640	-1193	Conductor
Arm6:End	4874	6589	-1169	Conductor
Arm7:End	4838	6588	1835	Conductor
Arm8:End	4831	6427	213	Conductor
10184:TopConn	2824	18379	0	Mast Connection
10184:BotConn	535	-12252	0	Mast Connection
10184:WVGD14	250	427	0	Coax Cable
10184:WVGD13	250	427	0	Coax Cable
10184:WVGD12	250	427	0	Coax Cable
10184:WVGD11	250	427	0	Coax Cable
10184:WVGD10	250	427	0	Coax Cable
10184:WVGD9	250	427	0	Coax Cable
10184:WVGD8	250	427	0	Coax Cable
10184:WVGD7	250	427	0	Coax Cable
10184:WVGD6	250	427	0	Coax Cable
10184:WVGD5	250	427	0	Coax Cable
10184:WVGD4	250	427	0	Coax Cable
10184:WVGD3	250	427	0	Coax Cable
10184:WVGD2	250	427	0	Coax Cable
10184:WVGD1	250	427	0	Coax Cable

Detailed Pole Loading Data for Load Case "NESC Extreme":

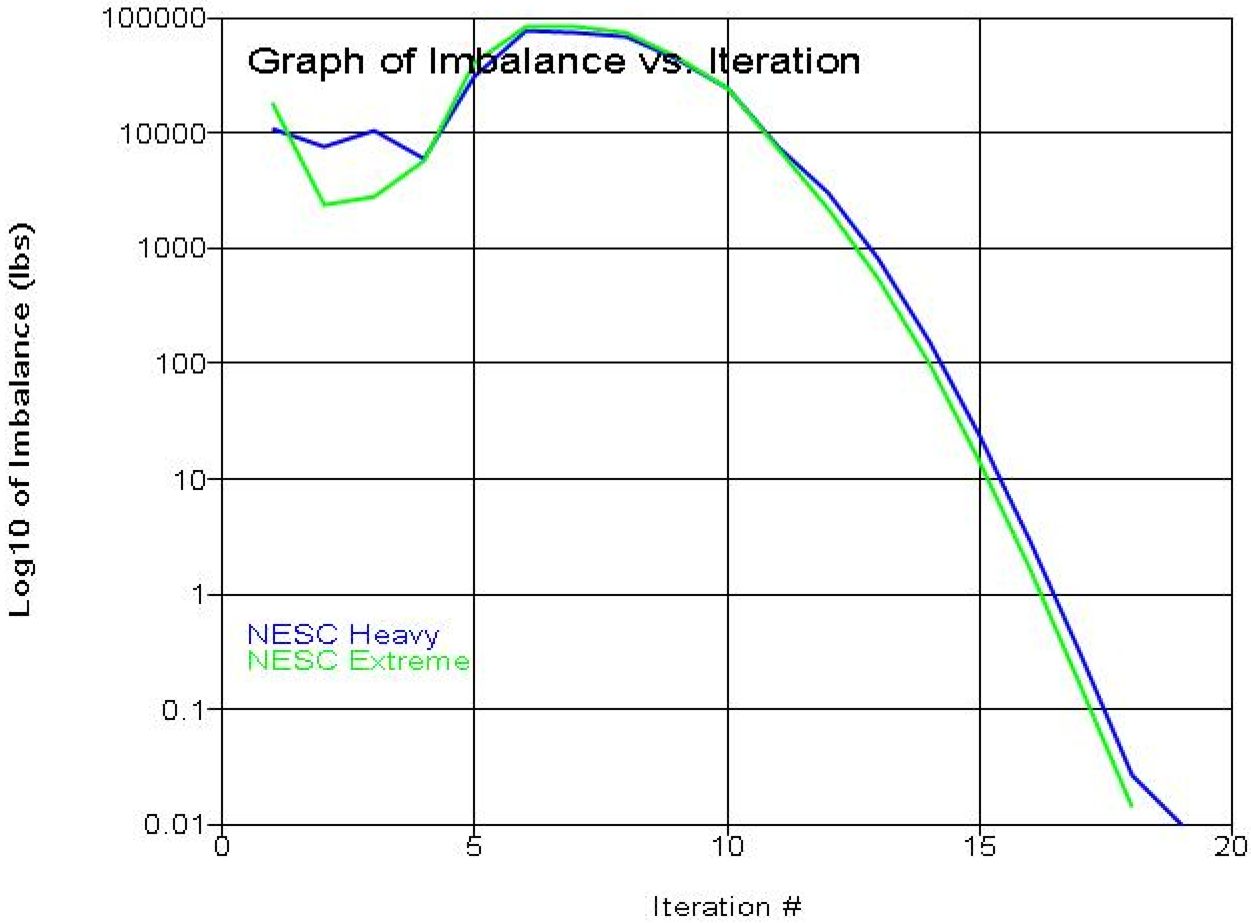
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

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)
10184	10184:t	10184:Arm1	150.00	148.08	149.04	14.325	1.12e+06	1.000	27.11	0.00	55.59	62.04	0.00	0.00	62.04	0.00
10184	10184:Arm1	10184:TopConn	148.08	146.42	147.25	14.933	1.16e+06	1.000	27.11	0.00	50.40	56.22	0.00	0.00	56.22	0.00
10184	10184:TopConn		146.42	141.75	144.08	16.007	1.25e+06	1.000	27.11	0.00	151.49	168.79	0.00	0.00	168.79	0.00
10184		10184:BotConn	141.75	140.25	141.00	17.553	1.37e+06	1.000	27.11	0.00	122.89	59.49	0.00	0.00	59.49	0.00
10184	10184:BotConn		140.25	137.63	138.94	18.252	1.42e+06	1.000	27.11	0.00	223.85	108.26	0.00	0.00	108.26	0.00
10184		10184:WVGD14	137.63	135.00	136.31	19.142	1.49e+06	1.000	27.11	0.00	235.03	113.54	0.00	0.00	113.54	0.00
10184	10184:WVGD14		135.00	130.33	132.66	20.380	1.59e+06	1.000	27.11	0.00	445.98	215.13	0.00	0.00	215.13	0.00
10184		10184:Arm2	130.33	125.66	127.99	21.964	1.71e+06	1.000	27.11	0.00	481.41	231.86	0.00	0.00	231.86	0.00
10184	10184:Arm2	10184:WVGD13	125.66	125.00	125.33	22.868	1.78e+06	1.000	27.11	0.00	70.46	33.91	0.00	0.00	33.91	0.00

10184	10184:WVGD13		125.00	120.00	122.50	23.827	1.86e+06	1.000	27.11	0.00	559.81	269.19	0.00	0.00	269.19	0.00
10184		10184:WVGD12	120.00	115.00	117.50	25.523	1.99e+06	1.000	27.11	0.00	600.39	288.35	0.00	0.00	288.35	0.00
10184	10184:WVGD12		115.00	110.29	112.65	27.169	2.12e+06	1.000	27.11	0.00	602.50	289.05	0.00	0.00	289.05	0.00
10184			110.29	105.58	107.94	28.766	2.24e+06	1.000	27.11	0.00	638.49	306.04	0.00	0.00	306.04	0.00
10184		10184:WVGD11	105.58	105.00	105.29	29.226	2.28e+06	1.000	27.11	0.00	182.84	38.50	0.00	0.00	38.50	0.00
10184	10184:WVGD11	10184:Arm3	105.00	103.66	104.33	29.115	2.27e+06	1.000	27.11	0.00	426.23	88.40	0.00	0.00	88.40	0.00
10184	10184:Arm3		103.66	101.75	102.70	29.667	2.31e+06	1.000	27.11	0.00	616.14	127.78	0.00	0.00	127.78	0.00
10184			101.75	98.37	100.06	30.562	2.38e+06	1.000	27.11	0.00	623.13	233.06	0.00	0.00	233.06	0.00
10184		10184:WVGD10	98.37	95.00	96.69	31.707	2.47e+06	1.000	27.11	0.00	646.91	241.79	0.00	0.00	241.79	0.00
10184	10184:WVGD10		95.00	90.00	92.50	33.127	2.58e+06	1.000	27.11	0.00	1002.09	374.26	0.00	0.00	374.26	0.00
10184		10184:WVGD9	90.00	85.00	87.50	34.823	2.71e+06	1.000	27.11	0.00	1054.27	393.42	0.00	0.00	393.42	0.00
10184	10184:WVGD9	10184:Arm4	85.00	81.66	83.33	36.238	2.83e+06	1.000	27.11	0.00	734.16	273.79	0.00	0.00	273.79	0.00
10184	10184:Arm4		81.66	78.33	79.99	37.369	2.91e+06	1.000	27.11	0.00	753.91	281.02	0.00	0.00	281.02	0.00
10184		10184:WVGD8	78.33	75.00	76.66	38.498	3e+06	1.000	27.11	0.00	777.03	289.51	0.00	0.00	289.51	0.00
10184	10184:WVGD8		75.00	73.50	74.25	39.317	3.07e+06	1.000	27.11	0.00	357.77	133.26	0.00	0.00	133.26	0.00
10184			73.50	70.92	72.21	39.447	3.08e+06	1.000	27.11	0.00	1236.52	230.27	0.00	0.00	230.27	0.00
10184			70.92	68.33	69.62	39.761	3.1e+06	1.000	27.11	0.00	1263.94	232.10	0.00	0.00	232.10	0.00
10184		10184:WVGD7	68.33	65.00	66.67	40.764	3.18e+06	1.000	27.11	0.00	824.87	306.99	0.00	0.00	306.99	0.00
10184	10184:WVGD7		65.00	60.00	62.50	42.177	3.29e+06	1.000	27.11	0.00	1280.57	476.50	0.00	0.00	476.50	0.00
10184		10184:WVGD6	60.00	55.00	57.50	43.873	3.42e+06	1.000	27.11	0.00	1332.76	495.66	0.00	0.00	495.66	0.00
10184	10184:WVGD6		55.00	50.00	52.50	45.569	3.55e+06	1.000	27.11	0.00	1384.94	514.82	0.00	0.00	514.82	0.00
10184		10184:WVGD5	50.00	45.00	47.50	47.265	3.68e+06	1.000	27.11	0.00	1437.13	533.98	0.00	0.00	533.98	0.00
10184	10184:WVGD5		45.00	40.00	42.50	48.960	3.82e+06	1.000	27.11	0.00	1489.31	553.14	0.00	0.00	553.14	0.00
10184		10184:WVGD4	40.00	35.00	37.50	50.094	3.91e+06	1.000	27.11	0.00	3048.38	565.94	0.00	0.00	565.94	0.00
10184	10184:WVGD4		35.00	33.50	34.25	50.634	3.95e+06	1.000	27.11	0.00	934.41	171.61	0.00	0.00	171.61	0.00
10184			33.50	29.25	31.37	51.609	4.02e+06	1.000	27.11	0.00	1335.41	495.60	0.00	0.00	495.60	0.00
10184		10184:WVGD3	29.25	25.00	27.12	53.050	4.14e+06	1.000	27.11	0.00	1372.89	509.44	0.00	0.00	509.44	0.00
10184	10184:WVGD3		25.00	20.00	22.50	54.619	4.26e+06	1.000	27.11	0.00	1663.43	617.06	0.00	0.00	617.06	0.00
10184		10184:WVGD2	20.00	15.00	17.50	56.315	4.39e+06	1.000	27.11	0.00	1715.62	636.22	0.00	0.00	636.22	0.00
10184	10184:WVGD2		15.00	10.00	12.50	58.010	4.52e+06	1.000	27.11	0.00	1767.80	655.38	0.00	0.00	655.38	0.00
10184		10184:WVGD1	10.00	5.00	7.50	59.706	4.65e+06	1.000	27.11	0.00	1819.99	674.54	0.00	0.00	674.54	0.00
10184	10184:WVGD1	10184:g	5.00	0.00	2.50	61.402	4.79e+06	1.000	27.11	0.00	1872.17	693.70	0.00	0.00	693.70	0.00

*** Analysis Results:

Maximum element usage is 87.23% for Steel Pole "10184" in load case "NESC Extreme"
Maximum insulator usage is 23.24% for Clamp "9" in load case "NESC Extreme"



*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 19

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)
10184:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10184:t	-0.7283	8.519	-0.3363	-6.2073	-0.6300	-0.0287	-0.7283	8.519	149.7
10184:Arm1	-0.7073	8.312	-0.325	-6.2073	-0.6300	-0.0287	-0.7073	8.312	147.8

10184:TopConn	-0.6864	8.132	-0.3151	-6.1855	-0.6259	-0.0479	-0.6864	8.132	146.1
10184:BotConn	-0.6147	7.478	-0.2797	-5.9796	-0.6015	-0.0955	-0.6147	7.478	140
10184:WVGD14	-0.5595	6.937	-0.2514	-5.8443	-0.5875	-0.1090	-0.5595	6.937	134.7
10184:Arm2	-0.4659	6.006	-0.2042	-5.5888	-0.5601	-0.1254	-0.4659	6.006	125.5
10184:WVGD13	-0.4598	5.942	-0.2011	-5.5665	-0.5574	-0.1241	-0.4598	5.942	124.8
10184:WVGD12	-0.3703	5.005	-0.1562	-5.1548	-0.5037	-0.1081	-0.3703	5.005	114.8
10184:WVGD11	-0.2903	4.145	-0.1185	-4.6882	-0.4396	-0.0983	-0.2903	4.145	104.9
10184:Arm3	-0.2803	4.036	-0.114	-4.6333	-0.4319	-0.0974	-0.2803	4.036	103.5
10184:WVGD10	-0.2207	3.365	-0.08734	-4.2450	-0.3742	-0.0937	-0.2207	3.365	94.91
10184:WVGD9	-0.1628	2.664	-0.06212	-3.7821	-0.3023	-0.0914	-0.1628	2.664	84.94
10184:Arm4	-0.1462	2.447	-0.05494	-3.6288	-0.2780	-0.0909	-0.1462	2.447	81.6
10184:WVGD8	-0.1176	2.044	-0.04226	-3.3150	-0.2365	-0.0773	-0.1176	2.044	74.96
10184:WVGD7	-0.08236	1.508	-0.02728	-2.8131	-0.1821	-0.0594	-0.08236	1.508	64.97
10184:WVGD6	-0.05527	1.059	-0.01666	-2.3172	-0.1380	-0.0449	-0.05527	1.059	54.98
10184:WVGD5	-0.03481	0.6952	-0.009505	-1.8475	-0.1024	-0.0333	-0.03481	0.6952	44.99
10184:WVGD4	-0.0198	0.4111	-0.004955	-1.3993	-0.0728	-0.0236	-0.0198	0.4111	35
10184:WVGD3	-0.009511	0.2048	-0.002314	-0.9607	-0.0471	-0.0153	-0.009511	0.2048	25
10184:WVGD2	-0.003236	0.07227	-0.0009364	-0.5543	-0.0258	-0.0084	-0.003236	0.07227	15
10184:WVGD1	-0.0003432	0.00806	-0.000242	-0.1778	-0.0079	-0.0026	-0.0003432	0.00806	5
Arm1:O	-0.7063	8.308	-0.3933	-6.2073	-0.6300	-0.0287	-0.7063	8.94	147.7
Arm1:End	-0.7385	8.466	-1.501	-6.8864	-0.6551	0.2439	-0.7385	18.6	148.5
Arm2:O	-0.7084	8.316	-0.2566	-6.2073	-0.6300	-0.0287	-0.7084	7.684	147.8
Arm2:End	-0.7454	8.567	0.7212	-5.8227	-0.6323	-0.0313	-0.7454	-1.565	150.7
Arm3:O	-0.4628	6.001	-0.2998	-5.5888	-0.5601	-0.1254	-0.4628	6.983	125.4
Arm3:End	-0.4473	6.189	-1.833	-6.3478	-0.5625	-0.0785	-0.4473	21.67	126.4
Arm4:O	-0.469	6.011	-0.1086	-5.5888	-0.5601	-0.1254	-0.469	5.029	125.5
Arm4:End	-0.5571	6.306	1.211	-5.0135	-0.5981	-0.2521	-0.5571	-9.175	129.4
Arm5:O	-0.2773	4.032	-0.2193	-4.6333	-0.4319	-0.0974	-0.2773	5.335	103.4
Arm5:End	-0.2787	4.2	-1.508	-5.3925	-0.4420	0.0194	-0.2787	20	104.7
Arm6:O	-0.2833	4.04	-0.008701	-4.6333	-0.4319	-0.0974	-0.2833	2.737	103.6
Arm6:End	-0.3517	4.273	1.072	-4.0480	-0.4632	-0.2091	-0.3517	-11.53	107.3
Arm7:O	-0.1432	2.444	-0.1554	-3.6288	-0.2780	-0.0909	-0.1432	4.032	81.5
Arm7:End	-0.07781	2.588	-1.188	-4.3989	-0.2390	-0.4343	-0.07781	18.68	83.02
Arm8:O	-0.1492	2.451	0.04555	-3.6288	-0.2780	-0.0909	-0.1492	0.8629	81.7
Arm8:End	-0.1751	2.622	0.875	-3.0354	-0.2576	0.0001	-0.1751	-13.47	85.08

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 %
10184:g	-0.02	0.0	-59.66	0.0	0.0	-156.27	0.0	0.0	167.28	0.0	6668.97	0.0	289.0	0.0	0.0	72.01	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.
10184	10184:t	Origin	0.00	102.23	-8.74	-4.04	0.00	0.00	0.0	-0.04	0.02	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	4
10184	10184:Arm1	End	1.92	99.75	-8.49	-3.90	0.04	-0.00	0.0	-0.04	0.02	-0.00	-0.00	0.02	0.00	0.00	0.02	0.0	1
10184	10184:Arm1	Origin	1.92	99.75	-8.49	-3.90	7.81	1.51	7.6	-3.39	4.27	0.80	-0.39	2.93	0.53	1.48	4.81	8.0	

2	10184	10184:TopConn	End	3.58	97.59	-8.24	-3.78	14.92	2.85	7.6	-3.39	4.27	0.80	-0.37	5.18	0.51	1.37	6.43	10.7
2	10184	10184:TopConn	Origin	3.58	97.59	-8.24	-3.78	14.93	2.84	7.6	-9.02	10.64	0.88	-1.00	5.18	1.21	1.37	7.62	12.7
2	10184	SpliceT	End	8.25	91.62	-7.57	-3.46	64.57	6.98	7.6	-9.02	10.64	0.88	-0.90	19.05	0.18	1.12	20.08	33.5
1	10184	SpliceT	Origin	8.25	91.62	-7.57	-3.46	64.58	6.96	7.5	-9.25	10.71	0.88	-0.39	8.04	0.08	0.47	8.48	14.1
1	10184	10184:BotConn	End	9.75	89.74	-7.38	-3.36	80.64	8.28	7.5	-9.25	10.71	0.88	-0.38	9.45	0.07	0.44	9.87	16.4
1	10184	10184:BotConn	Origin	9.75	89.74	-7.38	-3.36	80.64	8.27	7.5	-11.11	7.29	0.88	-0.45	9.45	0.07	0.44	9.94	16.6
1	10184	Tube 2	End	12.38	86.48	-7.04	-3.18	99.79	10.61	7.5	-11.11	7.29	0.88	-0.43	10.57	0.07	0.40	11.03	18.4
1	10184	Tube 2	Origin	12.38	86.48	-7.04	-3.18	99.79	10.60	7.5	-11.46	7.38	0.88	-0.45	10.57	0.07	0.40	11.04	18.4
1	10184	10184:WVGD14	End	15.00	83.25	-6.71	-3.02	119.16	12.93	7.5	-11.46	7.38	0.88	-0.43	11.46	0.07	0.36	11.91	19.9
1	10184	10184:WVGD14	Origin	15.00	83.25	-6.71	-3.02	119.17	12.92	7.5	-12.88	7.77	0.90	-0.48	11.46	0.07	0.36	11.96	19.9
1	10184	Tube 2	End	19.67	77.60	-6.14	-2.73	155.48	17.12	7.5	-12.88	7.77	0.90	-0.44	12.74	0.06	0.31	13.19	22.0
1	10184	Tube 2	Origin	19.67	77.60	-6.14	-2.73	155.48	17.10	7.5	-13.59	7.94	0.90	-0.47	12.74	0.06	0.31	13.22	22.0
1	10184	10184:Arm2	End	24.34	72.07	-5.59	-2.45	192.59	21.31	7.5	-13.59	7.94	0.90	-0.43	13.60	0.06	0.26	14.04	23.4
1	10184	10184:Arm2	Origin	24.34	72.07	-5.59	-2.45	234.67	28.72	-11.9	-36.44	24.71	3.81	-1.16	16.57	0.25	0.42	17.76	29.6
1	10184	10184:WVGD13	End	25.00	71.30	-5.52	-2.41	250.88	31.21	-11.9	-36.44	24.71	3.81	-1.15	17.36	0.24	0.41	18.54	30.9
1	10184	10184:WVGD13	Origin	25.00	71.30	-5.52	-2.41	250.88	31.23	-11.9	-37.86	25.04	3.81	-1.19	17.36	0.24	0.41	18.59	31.0
1	10184	Tube 2	End	30.00	65.57	-4.97	-2.13	376.07	50.21	-11.9	-37.86	25.04	3.81	-1.11	22.48	0.23	0.36	23.61	39.3
1	10184	Tube 2	Origin	30.00	65.57	-4.97	-2.13	376.06	50.24	-11.9	-38.81	25.14	3.79	-1.14	22.48	0.23	0.36	23.64	39.4
1	10184	10184:WVGD12	End	35.00	60.06	-4.44	-1.87	501.78	69.13	-11.9	-38.81	25.14	3.79	-1.06	26.17	0.21	0.31	27.25	45.4
1	10184	10184:WVGD12	Origin	35.00	60.06	-4.44	-1.87	501.78	69.16	-11.9	-40.71	25.49	3.78	-1.12	26.17	0.21	0.31	27.30	45.5
1	10184	Tube 2	End	39.71	55.08	-3.98	-1.65	621.83	86.90	-11.9	-40.71	25.49	3.78	-1.05	28.75	0.20	0.27	29.81	49.7
1	10184	Tube 2	Origin	39.71	55.08	-3.98	-1.65	621.82	86.93	-11.9	-41.74	25.59	3.76	-1.08	28.75	0.20	0.27	29.84	49.7
1	10184	SpliceT	End	44.42	50.32	-3.54	-1.45	742.32	104.57	-11.9	-41.74	25.59	3.76	-1.02	30.63	0.19	0.24	31.66	52.8
1	10184	SpliceT	Origin	44.42	50.32	-3.54	-1.45	742.32	104.58	-11.8	-42.41	25.65	3.75	-1.04	30.63	0.19	0.24	31.68	52.8
1	10184	10184:WVGD11	End	45.00	49.74	-3.48	-1.42	757.27	106.76	-11.8	-42.41	25.65	3.75	-0.83	25.82	0.15	0.20	26.66	44.4
1	10184	10184:WVGD11	Origin	45.00	49.74	-3.48	-1.42	757.27	106.76	-11.8	-43.79	25.94	3.75	-0.85	25.82	0.15	0.20	26.68	44.5
1	10184	10184:Arm3	End	46.34	48.43	-3.36	-1.37	792.13	111.79	-11.8	-43.79	25.94	3.75	-0.84	26.15	0.15	0.20	27.00	45.0
1	10184	10184:Arm3	Origin	46.34	48.43	-3.36	-1.37	831.72	121.20	-11.0	-67.23	42.22	7.45	-1.29	27.46	0.29	0.18	28.76	47.9
1	10184	SpliceB	End	48.25	46.60	-3.20	-1.29	912.20	135.38	-11.0	-67.23	42.22	7.45	-1.26	28.80	0.29	0.17	30.07	50.1

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	10184	SpliceB	Origin	48.25	46.60	-3.20	-1.29	912.20	135.38	-10.9	-68.25	42.26	7.43	-1.28	28.80	0.28	0.17	30.09	50.1
1	10184	Tube 3	End	51.63	43.44	-2.92	-1.17	1054.83	160.42	-10.9	-68.25	42.26	7.43	-1.23	30.83	0.27	0.16	32.07	53.5
1	10184	Tube 3	Origin	51.63	43.44	-2.92	-1.17	1054.83	160.43	-10.9	-69.31	42.29	7.40	-1.25	30.83	0.27	0.16	32.09	53.5
1	10184	10184:WVGD10	End	55.00	40.38	-2.65	-1.05	1197.56	185.38	-10.9	-69.31	42.29	7.40	-1.21	32.50	0.26	0.15	33.72	56.2
1	10184	10184:WVGD10	Origin	55.00	40.38	-2.65	-1.05	1197.56	185.39	-10.9	-71.60	42.57	7.38	-1.25	32.50	0.26	0.15	33.76	56.3
1	10184	Tube 3	End	60.00	36.05	-2.28	-0.89	1410.40	222.20	-10.9	-71.60	42.57	7.38	-1.18	34.46	0.25	0.13	35.65	59.4
1	10184	Tube 3	Origin	60.00	36.05	-2.28	-0.89	1410.39	222.21	-10.9	-73.31	42.61	7.33	-1.21	34.46	0.25	0.13	35.68	59.5
1	10184	10184:WVGD9	End	65.00	31.97	-1.95	-0.75	1623.43	258.81	-10.9	-73.31	42.61	7.33	-1.15	35.90	0.24	0.12	37.06	61.8
1	10184	10184:WVGD9	Origin	65.00	31.97	-1.95	-0.75	1623.43	258.82	-10.9	-75.71	42.87	7.30	-1.19	35.90	0.23	0.12	37.10	61.8
1	10184	10184:Arm4	End	68.34	29.37	-1.75	-0.66	1766.79	283.18	-10.9	-75.71	42.87	7.30	-1.15	36.65	0.23	0.11	37.80	63.0
1	10184	10184:Arm4	Origin	68.34	29.37	-1.75	-0.66	1807.37	266.49	-72.6	-99.89	59.34	0.67	-1.52	37.49	0.02	0.75	39.03	65.1
1	10184	Tube 3	End	71.67	26.89	-1.58	-0.58	2004.88	268.46	-72.6	-99.89	59.34	0.67	-1.48	39.09	0.02	0.71	40.59	67.6
1	10184	Tube 3	Origin	71.67	26.89	-1.58	-0.58	2004.85	268.64	-72.5	-101.20	59.30	0.63	-1.50	39.09	0.02	0.71	40.61	67.7
1	10184	10184:WVGD8	End	75.00	24.52	-1.41	-0.51	2202.23	270.47	-72.5	-101.20	59.30	0.63	-1.45	40.44	0.02	0.67	41.91	69.9
1	10184	10184:WVGD8	Origin	75.00	24.52	-1.41	-0.51	2202.21	270.60	-72.5	-103.08	59.49	0.61	-1.48	40.44	0.02	0.67	41.94	69.9
1	10184	SpliceT	End	76.50	23.49	-1.34	-0.48	2291.46	271.39	-72.5	-103.08	59.49	0.61	-1.46	40.98	0.02	0.65	42.46	70.8
1	10184	SpliceT	Origin	76.50	23.49	-1.34	-0.48	2291.44	271.50	-72.5	-104.38	59.49	0.58	-1.48	40.98	0.02	0.65	42.48	70.8
1	10184	Splice	End	79.08	21.77	-1.23	-0.43	2445.14	272.79	-72.5	-104.38	59.49	0.58	-1.49	44.30	0.02	0.66	45.80	76.3
1	10184	Splice	Origin	79.08	21.77	-1.23	-0.43	2445.13	272.93	-72.5	-106.39	59.48	0.56	-1.52	44.30	0.02	0.66	45.83	76.4
1	10184	SpliceB	End	81.67	20.12	-1.12	-0.38	2598.82	274.14	-72.5	-106.39	59.48	0.56	-1.48	45.01	0.02	0.63	46.51	77.5
1	10184	SpliceB	Origin	81.67	20.12	-1.12	-0.38	2598.80	274.31	-72.4	-108.11	59.44	0.52	-1.51	45.01	0.01	0.63	46.53	77.6
1	10184	10184:WVGD7	End	85.00	18.09	-0.99	-0.33	2796.94	275.77	-72.4	-108.11	59.44	0.52	-1.47	45.77	0.01	0.59	47.25	78.8
1	10184	10184:WVGD7	Origin	85.00	18.09	-0.99	-0.33	2796.92	276.00	-72.3	-110.81	59.57	0.48	-1.50	45.77	0.01	0.59	47.29	78.8
1	10184	Tube 4	End	90.00	15.27	-0.81	-0.26	3094.77	277.98	-72.3	-110.81	59.57	0.48	-1.44	46.66	0.01	0.55	48.11	80.2
1	10184	Tube 4	Origin	90.00	15.27	-0.81	-0.26	3094.74	278.26	-72.3	-113.03	59.45	0.43	-1.47	46.66	0.01	0.54	48.14	80.2
1	10184	10184:WVGD6	End	95.00	12.71	-0.66	-0.20	3392.03	279.99	-72.3	-113.03	59.45	0.43	-1.42	47.27	0.01	0.50	48.69	81.1
1	10184	10184:WVGD6	Origin	95.00	12.71	-0.66	-0.20	3392.01	280.26	-72.2	-116.23	59.56	0.38	-1.46	47.26	0.01	0.50	48.73	81.2
1	10184	Tube 4	End	100.00	10.40	-0.53	-0.15	3689.82	281.77	-72.2	-116.23	59.56	0.38	-1.40	47.66	0.01	0.47	49.07	81.8
1	10184	Tube 4	Origin	100.00	10.40	-0.53	-0.15	3689.80	282.03	-72.2	-118.59	59.46	0.34	-1.43	47.66	0.01	0.47	49.10	81.8
1	10184	10184:WVGD5	End	105.00	8.34	-0.42	-0.11	3987.13	283.33	-72.2	-118.59	59.46	0.34	-1.38	47.87	0.01	0.43	49.26	82.1

1																		
10184	10184:WVGD5	Origin	105.00	8.34	-0.42	-0.11	3987.12	283.59	-72.1	-121.93	59.58	0.30	-1.42	47.87	0.01	0.43	49.30	82.2
1																		
10184	SpliceT	End	110.00	6.52	-0.32	-0.08	4285.02	284.69	-72.1	-121.93	59.58	0.30	-1.37	47.95	0.01	0.40	49.32	82.2
1																		
10184	SpliceT	Origin	110.00	6.52	-0.32	-0.08	4285.00	284.94	-72.1	-125.57	59.52	0.26	-1.41	47.95	0.01	0.40	49.36	82.3
1																		
10184	10184:WVGD4	End	115.00	4.93	-0.24	-0.06	4582.61	285.84	-72.1	-125.57	59.52	0.26	-1.39	50.10	0.01	0.39	51.50	85.8
1																		
10184	10184:WVGD4	Origin	115.00	4.93	-0.24	-0.06	4582.60	286.01	-72.1	-129.62	59.68	0.23	-1.44	50.10	0.01	0.39	51.55	85.9
1																		
10184	SpliceB	End	116.50	4.50	-0.22	-0.05	4672.12	286.24	-72.1	-129.62	59.68	0.23	-1.42	50.05	0.01	0.39	51.48	85.8
1																		
10184	SpliceB	Origin	116.50	4.50	-0.22	-0.05	4672.12	286.39	-72.1	-131.46	59.63	0.21	-1.44	50.05	0.00	0.39	51.50	85.8
1																		
10184	Tube 5	End	120.75	3.40	-0.16	-0.04	4925.53	286.96	-72.1	-131.46	59.63	0.21	-1.40	49.85	0.00	0.36	51.26	85.4
1																		
10184	Tube 5	Origin	120.75	3.40	-0.16	-0.04	4925.52	287.18	-72.1	-133.68	59.53	0.17	-1.43	49.85	0.00	0.36	51.28	85.5
1																		
10184	10184:WVGD3	End	125.00	2.46	-0.11	-0.03	5178.54	287.61	-72.1	-133.68	59.53	0.17	-1.39	49.60	0.00	0.35	50.99	85.0
1																		
10184	10184:WVGD3	Origin	125.00	2.46	-0.11	-0.03	5178.53	287.84	-72.0	-137.08	59.63	0.14	-1.42	49.60	0.00	0.34	51.02	85.0
1																		
10184	Tube 5	End	130.00	1.56	-0.07	-0.02	5476.69	288.19	-72.0	-137.08	59.63	0.14	-1.38	49.25	0.00	0.32	50.63	84.4
1																		
10184	Tube 5	Origin	130.00	1.56	-0.07	-0.02	5476.67	288.43	-72.0	-139.82	59.54	0.10	-1.41	49.25	0.00	0.32	50.66	84.4
1																		
10184	10184:WVGD2	End	135.00	0.87	-0.04	-0.01	5774.39	288.61	-72.0	-139.82	59.54	0.10	-1.37	48.84	0.00	0.30	50.21	83.7
1																		
10184	10184:WVGD2	Origin	135.00	0.87	-0.04	-0.01	5774.38	288.84	-72.0	-143.56	59.65	0.07	-1.40	48.84	0.00	0.30	50.25	83.7
1																		
10184	Tube 5	End	140.00	0.38	-0.02	-0.01	6072.61	288.85	-72.0	-143.56	59.65	0.07	-1.36	48.41	0.00	0.29	49.77	83.0
1																		
10184	Tube 5	Origin	140.00	0.38	-0.02	-0.01	6072.60	289.08	-72.0	-146.44	59.58	0.03	-1.39	48.41	0.00	0.29	49.80	83.0
1																		
10184	10184:WVGD1	End	145.00	0.10	-0.00	-0.00	6370.50	288.93	-72.0	-146.44	59.58	0.03	-1.35	47.94	0.00	0.27	49.29	82.2
1																		
10184	10184:WVGD1	Origin	145.00	0.10	-0.00	-0.00	6370.49	289.15	-72.0	-150.32	59.70	-0.00	-1.39	47.94	0.00	0.27	49.33	82.2
1																		
10184	10184:g	End	150.00	0.00	0.00	0.00	6668.97	288.84	-72.0	-150.32	59.70	-0.00	-1.35	47.45	0.00	0.26	48.80	81.3
1																		

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.
Arm1	Arm1:O	Origin	0.00	99.70	-8.48	-4.72	-18.22	7.44	0.0	1.73	1.94	-0.77	0.30	20.66	0.55	0.00	20.97	35.0	2
Arm1	#Arm1:0	End	4.85	100.63	-8.60	-11.19	-8.80	3.71	0.0	1.73	1.94	-0.77	0.37	15.50	0.68	0.00	15.91	26.5	2
Arm1	#Arm1:0	Origin	4.85	100.63	-8.60	-11.19	-8.80	3.71	-0.0	1.76	1.82	-0.77	0.37	15.50	0.64	0.00	15.91	26.5	2
Arm1	Arm1:End	End	9.69	101.59	-8.86	-18.02	0.00	-0.00	-0.0	1.76	1.82	-0.77	0.49	0.00	1.16	0.00	2.07	3.4	3
Arm2	Arm2:O	Origin	0.00	99.79	-8.50	-3.08	-10.44	-0.18	-0.0	-2.38	1.13	0.02	-0.41	8.55	0.30	0.00	8.97	14.9	2
Arm2	#Arm2:0	End	4.85	101.33	-8.72	2.89	-4.98	-0.09	-0.0	-2.38	1.13	0.02	-0.50	6.28	0.37	0.00	6.81	11.4	2
Arm2	#Arm2:0	Origin	4.85	101.33	-8.72	2.89	-4.98	-0.09	-0.0	-2.34	1.03	0.02	-0.49	6.28	0.34	0.00	6.80	11.3	2
Arm2	Arm2:End	End	9.69	102.81	-8.94	8.65	-0.00	-0.00	-0.0	-2.34	1.03	0.02	-0.65	0.00	0.66	0.00	1.31	2.2	3

Arm3	Arm3:O	Origin	0.00	72.01	-5.55	-3.60	-173.66	12.32	0.0	6.46	12.28	-0.84	0.28	18.71	0.81	0.00	19.04	31.7	2
Arm3	#Arm3:0	End	5.00	72.76	-5.48	-9.56	-112.28	8.10	0.0	6.46	12.28	-0.84	0.33	17.83	0.98	0.00	18.24	30.4	2
Arm3	#Arm3:0	Origin	5.00	72.76	-5.48	-9.56	-112.29	8.09	0.0	6.55	11.75	-0.84	0.34	17.83	0.94	0.00	18.24	30.4	2
Arm3	#Arm3:1	End	9.86	73.50	-5.41	-15.64	-55.14	4.03	0.0	6.55	11.75	-0.84	0.43	13.95	1.19	0.00	14.52	24.2	2
Arm3	#Arm3:1	Origin	9.86	73.50	-5.41	-15.64	-55.14	4.03	-0.0	6.63	11.34	-0.83	0.43	13.95	1.15	0.00	14.51	24.2	2
Arm3	Arm3:End	End	14.72	74.26	-5.37	-21.99	0.00	-0.00	-0.0	6.63	11.34	-0.83	0.58	0.00	2.30	0.00	4.02	6.7	3
Arm4	Arm4:O	Origin	0.00	72.13	-5.63	-1.30	-131.75	-30.42	-0.0	-9.90	9.34	2.06	-0.42	16.32	0.63	0.00	16.77	28.0	2
Arm4	#Arm4:0	End	5.00	73.39	-5.94	4.28	-85.05	-20.12	-0.0	-9.90	9.34	2.06	-0.51	15.57	0.76	0.00	16.14	26.9	2
Arm4	#Arm4:0	Origin	5.00	73.39	-5.94	4.28	-85.05	-20.09	-0.0	-9.73	8.91	2.06	-0.50	15.57	0.73	0.00	16.12	26.9	2
Arm4	#Arm4:1	End	9.86	74.56	-6.29	9.50	-41.72	-10.06	-0.0	-9.73	8.91	2.06	-0.63	12.20	0.92	0.00	12.94	21.6	2
Arm4	#Arm4:1	Origin	9.86	74.56	-6.29	9.50	-41.72	-10.05	-0.0	-9.60	8.58	2.07	-0.62	12.20	0.89	0.00	12.92	21.5	2
Arm4	Arm4:End	End	14.72	75.67	-6.69	14.53	-0.00	-0.00	-0.0	-9.60	8.58	2.07	-0.84	0.00	1.74	0.00	3.13	5.2	3
Arm5	Arm5:O	Origin	0.00	48.38	-3.33	-2.63	-173.60	27.62	0.0	6.12	12.27	-1.88	0.26	20.24	0.81	0.00	20.55	34.3	2
Arm5	#Arm5:0	End	5.00	49.04	-3.29	-7.59	-112.25	18.20	0.0	6.12	12.27	-1.88	0.32	19.32	0.99	0.00	19.71	32.9	2
Arm5	#Arm5:0	Origin	5.00	49.04	-3.29	-7.59	-112.26	18.18	0.0	6.23	11.75	-1.87	0.32	19.32	0.95	0.00	19.71	32.8	2
Arm5	#Arm5:1	End	9.86	49.71	-3.30	-12.71	-55.13	9.07	0.0	6.23	11.75	-1.87	0.40	15.13	1.20	0.00	15.68	26.1	2
Arm5	#Arm5:1	Origin	9.86	49.71	-3.30	-12.71	-55.13	9.07	-0.0	6.31	11.34	-1.87	0.41	15.13	1.16	0.00	15.67	26.1	2
Arm5	Arm5:End	End	14.72	50.40	-3.34	-18.09	0.00	-0.00	-0.0	6.31	11.34	-1.87	0.55	0.00	2.30	0.00	4.02	6.7	3
Arm6	Arm6:O	Origin	0.00	48.48	-3.40	-0.10	-134.06	-26.61	-0.0	-9.82	9.50	1.80	-0.42	16.16	0.63	0.00	16.62	27.7	2
Arm6	#Arm6:0	End	5.00	49.49	-3.64	4.52	-86.56	-17.59	-0.0	-9.82	9.50	1.80	-0.51	15.43	0.77	0.00	15.99	26.6	2
Arm6	#Arm6:0	Origin	5.00	49.49	-3.64	4.52	-86.57	-17.57	-0.0	-9.66	9.07	1.81	-0.50	15.42	0.74	0.00	15.97	26.6	2
Arm6	#Arm6:1	End	9.86	50.41	-3.91	8.79	-42.47	-8.80	-0.0	-9.66	9.07	1.81	-0.63	12.09	0.93	0.00	12.81	21.4	2
Arm6	#Arm6:1	Origin	9.86	50.41	-3.91	8.79	-42.48	-8.79	-0.0	-9.53	8.74	1.81	-0.62	12.08	0.90	0.00	12.80	21.3	2
Arm6	Arm6:End	End	14.72	51.28	-4.22	12.87	-0.00	-0.00	-0.0	-9.53	8.74	1.81	-0.83	0.00	1.77	0.00	3.18	5.3	3
Arm7	Arm7:O	Origin	0.00	29.33	-1.72	-1.87	-176.72	-76.40	0.0	6.36	12.48	5.20	0.27	25.47	0.89	0.00	25.78	43.0	2
Arm7	#Arm7:0	End	5.00	29.89	-1.59	-5.78	-114.31	-50.40	0.0	6.36	12.48	5.20	0.33	24.39	1.08	0.00	24.79	41.3	2
Arm7	#Arm7:0	Origin	5.00	29.89	-1.59	-5.78	-114.35	-50.31	0.0	6.48	11.97	5.18	0.33	24.39	1.04	0.00	24.79	41.3	2
Arm7	#Arm7:1	End	9.86	30.46	-1.32	-9.89	-56.17	-25.12	0.0	6.48	11.97	5.18	0.42	19.16	1.31	0.00	19.72	32.9	2
Arm7	#Arm7:1	Origin	9.86	30.46	-1.32	-9.89	-56.19	-25.08	0.0	6.59	11.56	5.16	0.43	19.16	1.28	0.00	19.71	32.8	2
Arm7	Arm7:End	End	14.72	31.06	-0.93	-14.26	0.00	-0.00	0.0	6.59	11.56	5.16	0.58	0.00	2.34	0.00	4.10	6.8	3
Arm8	Arm8:O	Origin	0.00	29.41	-1.79	0.55	-136.09	20.33	-0.0	-9.83	9.64	-1.37	-0.42	15.74	0.64	0.00	16.19	27.0	2
Arm8	#Arm8:0	End	5.00	30.16	-1.93	4.15	-87.89	13.46	-0.0	-9.83	9.64	-1.37	-0.51	15.01	0.78	0.00	15.58	26.0	2
Arm8	#Arm8:0	Origin	5.00	30.16	-1.93	4.15	-87.89	13.44	-0.0	-9.68	9.21	-1.38	-0.50	15.01	0.74	0.00	15.56	25.9	2
Arm8	#Arm8:1	End	9.86	30.83	-2.03	7.42	-43.13	6.74	-0.0	-9.68	9.21	-1.38	-0.63	11.75	0.94	0.00	12.49	20.8	2
Arm8	#Arm8:1	Origin	9.86	30.83	-2.03	7.42	-43.14	6.73	0.0	-9.56	8.87	-1.38	-0.62	11.75	0.91	0.00	12.47	20.8	2
Arm8	Arm8:End	End	14.72	31.46	-2.10	10.50	-0.00	-0.00	0.0	-9.56	8.87	-1.38	-0.84	0.00	1.80	0.00	3.22	5.4	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 %
1	2.609	80.00	80.00	3.26	0.00	0.00	0.00	3.26
2	2.521	80.00	80.00	3.15	0.00	0.00	0.00	3.15
3	13.029	80.00	80.00	16.29	0.00	0.00	0.00	16.29
4	12.906	80.00	80.00	16.13	0.00	0.00	0.00	16.13
5	12.977	80.00	80.00	16.22	0.00	0.00	0.00	16.22
6	12.920	80.00	80.00	16.15	0.00	0.00	0.00	16.15
7	14.144	80.00	80.00	17.68	0.00	0.00	0.00	17.68
8	12.983	80.00	80.00	16.23	0.00	0.00	0.00	16.23
9	8.343	80.00	80.00	10.43	0.00	0.00	0.00	10.43

10	3.826	80.00	80.00	4.78	0.00	0.00	0.00	4.78
11	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
12	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
13	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
14	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
15	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
16	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
17	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
18	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
19	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
20	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
21	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
22	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
23	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17
24	0.936	80.00	80.00	1.17	0.00	0.00	0.00	1.17

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 18

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)
10184:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10184:t	-0.6079	8.992	-0.3736	-6.7844	-0.4415	-0.0391	-0.6079	8.992	149.6
10184:Arm1	-0.5933	8.765	-0.3602	-6.7843	-0.4415	-0.0391	-0.5933	8.765	147.7
10184:TopConn	-0.5798	8.569	-0.3484	-6.7915	-0.4404	-0.0444	-0.5798	8.569	146.1
10184:BotConn	-0.5316	7.85	-0.3062	-6.5340	-0.4338	-0.0560	-0.5316	7.85	139.9
10184:WVGD14	-0.4921	7.261	-0.2729	-6.3270	-0.4299	-0.0585	-0.4921	7.261	134.7
10184:Arm2	-0.4231	6.261	-0.2189	-5.9594	-0.4224	-0.0609	-0.4231	6.261	125.4
10184:WVGD13	-0.4184	6.193	-0.2153	-5.9302	-0.4212	-0.0601	-0.4184	6.193	124.8
10184:WVGD12	-0.3487	5.2	-0.1655	-5.4313	-0.3942	-0.0507	-0.3487	5.2	114.8
10184:WVGD11	-0.2842	4.299	-0.1244	-4.8982	-0.3578	-0.0448	-0.2842	4.299	104.9
10184:Arm3	-0.276	4.185	-0.1195	-4.8363	-0.3533	-0.0443	-0.276	4.185	103.5
10184:WVGD10	-0.2258	3.486	-0.09093	-4.4119	-0.3183	-0.0419	-0.2258	3.486	94.91
10184:WVGD9	-0.1747	2.758	-0.0641	-3.9173	-0.2734	-0.0402	-0.1747	2.758	84.94
10184:Arm4	-0.1593	2.535	-0.05649	-3.7548	-0.2582	-0.0398	-0.1593	2.535	81.6
10184:WVGD8	-0.1315	2.117	-0.04316	-3.4263	-0.2297	-0.0338	-0.1315	2.117	74.96
10184:WVGD7	-0.09551	1.563	-0.02747	-2.9068	-0.1885	-0.0259	-0.09551	1.563	64.97
10184:WVGD6	-0.06622	1.1	-0.01642	-2.3967	-0.1510	-0.0196	-0.06622	1.1	54.98
10184:WVGD5	-0.04297	0.723	-0.009033	-1.9141	-0.1177	-0.0145	-0.04297	0.723	44.99
10184:WVGD4	-0.02514	0.4283	-0.004415	-1.4531	-0.0875	-0.0103	-0.02514	0.4283	35
10184:WVGD3	-0.0124	0.2139	-0.001838	-1.0004	-0.0591	-0.0067	-0.0124	0.2139	25
10184:WVGD2	-0.004335	0.07565	-0.0006163	-0.5789	-0.0336	-0.0036	-0.004335	0.07565	15
10184:WVGD1	-0.0004771	0.008467	-0.0001299	-0.1863	-0.0106	-0.0011	-0.0004771	0.008467	5
Arm1:O	-0.5923	8.761	-0.4348	-6.7843	-0.4415	-0.0391	-0.5923	9.393	147.6
Arm1:End	-0.5997	8.92	-1.556	-6.6431	-0.4477	0.0377	-0.5997	19.05	148.4
Arm2:O	-0.5943	8.77	-0.2855	-6.7843	-0.4415	-0.0391	-0.5943	8.138	147.8
Arm2:End	-0.6242	9.061	0.8175	-6.7283	-0.4421	-0.0405	-0.6242	-1.071	150.8
Arm3:O	-0.4213	6.255	-0.3208	-5.9594	-0.4224	-0.0609	-0.4213	7.237	125.3
Arm3:End	-0.4204	6.446	-1.893	-6.3296	-0.4258	-0.0087	-0.4204	21.93	126.3
Arm4:O	-0.4249	6.266	-0.117	-5.9594	-0.4224	-0.0609	-0.4249	5.284	125.5
Arm4:End	-0.4823	6.601	1.346	-5.7562	-0.4469	-0.1448	-0.4823	-8.88	129.6
Arm5:O	-0.2743	4.18	-0.2294	-4.8363	-0.3533	-0.0443	-0.2743	5.484	103.4
Arm5:End	-0.282	4.348	-1.514	-5.2074	-0.3602	0.0336	-0.282	20.15	104.7
Arm6:O	-0.2777	4.189	-0.009621	-4.8363	-0.3533	-0.0443	-0.2777	2.886	103.6
Arm6:End	-0.3231	4.448	1.174	-4.6222	-0.3739	-0.1202	-0.3231	-11.36	107.4
Arm7:O	-0.1577	2.531	-0.1605	-3.7548	-0.2582	-0.0398	-0.1577	4.119	81.5
Arm7:End	-0.1373	2.673	-1.169	-4.1309	-0.2451	-0.1592	-0.1373	18.76	83.04
Arm8:O	-0.1609	2.538	0.04748	-3.7548	-0.2582	-0.0398	-0.1609	0.9503	81.7
Arm8:End	-0.1846	2.729	0.96	-3.5312	-0.2554	-0.0268	-0.1846	-13.36	85.17

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 %
10184:g	2.61	0.0	-67.26	0.0	0.0	-83.82	0.0	0.0	107.50	0.0	6998.73	0.0	396.6	0.0	0.0	31.33	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.
10184	10184:t	Origin	0.00	107.90	-7.29	-4.48	0.00	-0.00	0.0	-0.03	0.03	0.00	-0.00	0.00	0.01	0.00	0.01	0.0	4
10184	10184:Arm1	End	1.92	105.19	-7.12	-4.32	0.06	0.00	0.0	-0.03	0.03	0.00	-0.00	0.03	0.00	0.00	0.03	0.0	1
10184	10184:Arm1	Origin	1.92	105.19	-7.12	-4.32	-5.74	0.41	2.0	-0.09	2.37	0.22	-0.01	2.24	0.05	0.40	2.38	4.0	1
10184	10184:TopConn	End	3.58	102.82	-6.96	-4.18	-1.79	0.77	2.0	-0.09	2.37	0.22	-0.01	0.28	0.53	0.37	1.59	2.6	4
10184	10184:TopConn	Origin	3.58	102.82	-6.96	-4.18	-1.79	0.77	2.0	-0.84	21.08	0.25	-0.09	0.28	4.73	0.37	8.84	14.7	4
10184	SpliceT	End	8.25	96.25	-6.52	-3.79	96.57	1.96	2.0	-0.84	21.08	0.25	-0.08	28.49	0.05	0.30	28.58	47.6	1
10184	SpliceT	Origin	8.25	96.25	-6.52	-3.79	96.57	1.96	2.0	-1.04	21.20	0.26	-0.04	12.02	0.02	0.13	12.06	20.1	1
10184	10184:BotConn	End	9.75	94.20	-6.38	-3.67	128.37	2.35	2.0	-1.04	21.20	0.26	-0.04	15.04	0.02	0.12	15.09	25.1	1
10184	10184:BotConn	Origin	9.75	94.20	-6.38	-3.67	128.37	2.34	2.0	-3.16	9.19	0.25	-0.13	15.04	0.02	0.12	15.17	25.3	1
10184	Tube 2	End	12.38	90.64	-6.14	-3.47	152.49	3.01	2.0	-3.16	9.19	0.25	-0.12	16.15	0.02	0.11	16.27	27.1	1
10184	Tube 2	Origin	12.38	90.64	-6.14	-3.47	152.49	3.00	2.0	-3.40	9.32	0.25	-0.13	16.15	0.02	0.11	16.28	27.1	1
10184	10184:WVGD14	End	15.00	87.14	-5.91	-3.28	176.95	3.67	2.0	-3.40	9.32	0.25	-0.13	17.02	0.02	0.10	17.15	28.6	1
10184	10184:WVGD14	Origin	15.00	87.14	-5.91	-3.28	176.95	3.66	2.0	-3.97	9.96	0.26	-0.15	17.02	0.02	0.10	17.17	28.6	1
10184	Tube 2	End	19.67	81.04	-5.49	-2.94	223.49	4.88	2.0	-3.97	9.96	0.26	-0.14	18.31	0.02	0.08	18.44	30.7	1
10184	Tube 2	Origin	19.67	81.04	-5.49	-2.94	223.49	4.87	2.0	-4.46	10.22	0.26	-0.15	18.31	0.02	0.08	18.46	30.8	1
10184	10184:Arm2	End	24.34	75.13	-5.08	-2.63	271.22	6.10	2.0	-4.46	10.22	0.26	-0.14	19.15	0.02	0.07	19.29	32.1	1
10184	10184:Arm2	Origin	24.34	75.13	-5.08	-2.63	309.18	11.66	-5.9	-14.84	25.16	2.45	-0.47	21.83	0.16	0.21	22.31	37.2	1
10184	10184:WVGD13	End	25.00	74.31	-5.02	-2.58	325.69	13.27	-5.9	-14.84	25.16	2.45	-0.47	22.53	0.16	0.20	23.01	38.4	1
10184	10184:WVGD13	Origin	25.00	74.31	-5.02	-2.58	325.69	13.28	-5.9	-15.41	25.76	2.45	-0.49	22.53	0.16	0.20	23.03	38.4	1
10184	Tube 2	End	30.00	68.23	-4.60	-2.27	454.48	25.51	-5.9	-15.41	25.76	2.45	-0.45	27.16	0.15	0.18	27.62	46.0	1
10184	Tube 2	Origin	30.00	68.23	-4.60	-2.27	454.48	25.52	-5.9	-16.10	26.02	2.45	-0.47	27.16	0.15	0.18	27.64	46.1	1
10184	10184:WVGD12	End	35.00	62.40	-4.18	-1.99	584.60	37.75	-5.9	-16.10	26.02	2.45	-0.44	30.49	0.14	0.15	30.93	51.6	1
10184	10184:WVGD12	Origin	35.00	62.40	-4.18	-1.99	584.60	37.76	-5.9	-17.03	26.74	2.45	-0.47	30.49	0.14	0.15	30.96	51.6	1
10184	Tube 2	End	39.71	57.17	-3.81	-1.74	710.52	49.27	-5.9	-17.03	26.74	2.45	-0.44	32.85	0.13	0.14	33.29	55.5	1
10184	Tube 2	Origin	39.71	57.17	-3.81	-1.74	710.51	49.27	-5.9	-17.76	27.02	2.45	-0.46	32.85	0.13	0.14	33.31	55.5	1
10184	SpliceT	End	44.42	52.19	-3.45	-1.52	837.72	60.77	-5.9	-17.76	27.02	2.45	-0.43	34.57	0.12	0.12	35.01	58.3	1
10184	SpliceT	Origin	44.42	52.19	-3.45	-1.52	837.72	60.77	-5.8	-18.24	27.18	2.45	-0.45	34.57	0.12	0.12	35.02	58.4	1
10184	10184:WVGD11	End	45.00	51.59	-3.41	-1.49	853.57	62.20	-5.8	-18.24	27.18	2.45	-0.36	29.10	0.10	0.10	29.46	49.1	1
10184	10184:WVGD11	Origin	45.00	51.59	-3.41	-1.49	853.57	62.20	-5.8	-18.78	27.70	2.45	-0.37	29.10	0.10	0.10	29.47	49.1	1
10184	10184:Arm3	End	46.34	50.22	-3.31	-1.43	890.79	65.48	-5.8	-18.78	27.70	2.45	-0.36	29.41	0.10	0.10	29.77	49.6	1
10184	10184:Arm3	Origin	46.34	50.22	-3.31	-1.43	926.33	71.70	-5.6	-29.63	41.97	4.89	-0.57	30.58	0.19	0.09	31.16	51.9	1
10184	SpliceB	End	48.25	48.30	-3.17	-1.35	1006.34	81.01	-5.6	-29.63	41.97	4.89	-0.56	31.77	0.19	0.09	32.33	53.9	1
10184	SpliceB	Origin	48.25	48.30	-3.17	-1.35	1006.34	81.01	-5.6	-30.34	42.14	4.89	-0.57	31.77	0.19	0.09	32.34	53.9	1
10184	Tube 3	End	51.63	45.01	-2.94	-1.22	1148.56	97.50	-5.6	-30.34	42.14	4.89	-0.55	33.57	0.18	0.08	34.12	56.9	1
10184	Tube 3	Origin	51.63	45.01	-2.94	-1.22	1148.56	97.50	-5.6	-31.10	42.33	4.89	-0.56	33.57	0.18	0.08	34.14	56.9	1
10184	10184:WVGD10	End	55.00	41.83	-2.71	-1.09	1291.43	113.96	-5.6	-31.10	42.33	4.89	-0.54	35.05	0.17	0.08	35.59	59.3	1
10184	10184:WVGD10	Origin	55.00	41.83	-2.71	-1.09	1291.43	113.96	-5.6	-32.30	43.03	4.88	-0.56	35.05	0.17	0.08	35.62	59.4	1
10184	Tube 3	End	60.00	37.34	-2.39	-0.92	1506.61	138.33	-5.6	-32.30	43.03	4.88	-0.53	36.81	0.16	0.07	37.35	62.2	1
10184	Tube 3	Origin	60.00	37.34	-2.39	-0.92	1506.61	138.32	-5.6	-33.51	43.35	4.87	-0.55	36.81	0.16	0.07	37.37	62.3	1
10184	10184:WVGD9	End	65.00	33.10	-2.10	-0.77	1723.35	162.65	-5.6	-33.51	43.35	4.87	-0.53	38.11	0.16	0.06	38.64	64.4	1
10184	10184:WVGD9	Origin	65.00	33.10	-2.10	-0.77	1723.35	162.64	-5.6	-34.78	44.06	4.87	-0.55	38.11	0.16	0.06	38.66	64.4	1
10184	10184:Arm4	End	68.34	30.41	-1.91	-0.68	1870.69	178.89	-5.6	-34.78	44.06	4.87	-0.53	38.80	0.15	0.06	39.33	65.6	1
10184	10184:Arm4	Origin	68.34	30.41	-1.91	-0.68	1905.39	173.85	-31.6	-46.19	58.02	2.87	-0.70	39.52	0.09	0.33	40.23	67.1	1
10184	Tube 3	End	71.67	27.85	-1.74	-0.59	2098.49	183.27	-31.6	-46.19	58.02	2.87	-0.68	40.92	0.09	0.31	41.61	69.3	1
10184	Tube 3	Origin	71.67	27.85	-1.74	-0.59	2098.49	183.34	-31.6	-47.12	58.22	2.86	-0.70	40.92	0.09	0.31	41.62	69.4	1
10184	10184:WVGD8	End	75.00	25.40	-1.58	-0.52	2292.25	192.72	-31.6	-47.12	58.22	2.86	-0.68	42.09	0.08	0.29	42.78	71.3	1
10184	10184:WVGD8	Origin	75.00	25.40	-1.58	-0.52	2292.24	192.77	-31.6	-48.03	58.80	2.85	-0.69	42.09	0.08	0.29	42.79	71.3	1
10184	SpliceT	End	76.50	24.34	-1.51	-0.49	2380.45	196.99	-31.6	-48.03	58.80	2.85	-0.68	42.57	0.08	0.28	43.26	72.1	1
10184	SpliceT	Origin	76.50	24.34	-1.51	-0.49	2380.45	197.03	-31.6	-48.93	58.94	2.84	-0.69	42.57	0.08	0.28	43.27	72.1	1
10184	Splice	End	79.08	22.56	-1.39	-0.43	2532.73	204.28	-31.6	-48.93	58.94	2.84	-0.70	45.88	0.08	0.29	46.59	77.6	1
10184	Splice	Origin	79.08	22.56	-1.39	-0.43	2532.73	204.33	-31.5	-50.32	59.13	2.84	-0.72	45.88	0.08	0.29	46.61	77.7	1
10184	SpliceB	End	81.67	20.85	-1.28	-0.39	2685.49	211.55	-31.5	-50.32	59.13	2.84	-0.70	46.51	0.08	0.27	47.22	78.7	1
10184	SpliceB	Origin	81.67	20.85	-1.28	-0.39	2685.49	211.61	-31.5	-51.53	59.31	2.83	-0.72	46.51	0.08	0.27	47.23	78.7	1
10184	10184:WVGD7	End	85.00	18.76	-1.15	-0.33	2883.19	220.90	-31.5	-51.53	59.31	2.83	-0.70	47.19	0.08	0.26	47.89	79.8	1
10184	10184:WVGD7	Origin	85.00	18.76	-1.15	-0.33	2883.18	220.99	-31.5	-53.03	60.00	2.81	-0.72	47.19	0.08	0.26	47.91	79.8	1

10184	Tube 4	End	90.00	15.84	-0.96	-0.26	3183.19	234.86	-31.5	-53.03	60.00	2.81	-0.69	47.99	0.07	0.24	48.69	81.1	1
10184	Tube 4	Origin	90.00	15.84	-0.96	-0.26	3183.18	234.96	-31.5	-54.61	60.31	2.80	-0.71	47.99	0.07	0.24	48.71	81.2	1
10184	10184:WVGD6	End	95.00	13.20	-0.79	-0.20	3484.72	248.74	-31.5	-54.61	60.31	2.80	-0.68	48.56	0.07	0.22	49.24	82.1	1
10184	10184:WVGD6	Origin	95.00	13.20	-0.79	-0.20	3484.71	248.84	-31.4	-56.46	61.06	2.78	-0.71	48.56	0.07	0.22	49.27	82.1	1
10184	Tube 4	End	100.00	10.81	-0.65	-0.15	3790.04	262.55	-31.4	-56.46	61.06	2.78	-0.68	48.95	0.07	0.20	49.64	82.7	1
10184	Tube 4	Origin	100.00	10.81	-0.65	-0.15	3790.03	262.65	-31.4	-58.13	61.40	2.76	-0.70	48.95	0.07	0.20	49.66	82.8	1
10184	10184:WVGD5	End	105.00	8.68	-0.52	-0.11	4097.03	276.29	-31.4	-58.13	61.40	2.76	-0.68	49.19	0.07	0.19	49.87	83.1	1
10184	10184:WVGD5	Origin	105.00	8.68	-0.52	-0.11	4097.02	276.38	-31.4	-60.08	62.18	2.75	-0.70	49.19	0.06	0.19	49.89	83.2	1
10184	SpliceT	End	110.00	6.79	-0.40	-0.08	4407.95	289.95	-31.4	-60.08	62.18	2.75	-0.67	49.32	0.06	0.18	50.00	83.3	1
10184	SpliceT	Origin	110.00	6.79	-0.40	-0.08	4407.94	290.04	-31.4	-62.60	62.56	2.73	-0.70	49.32	0.06	0.18	50.03	83.4	1
10184	10184:WVGD4	End	115.00	5.14	-0.30	-0.05	4720.77	303.53	-31.4	-62.60	62.56	2.73	-0.69	51.61	0.06	0.17	52.31	87.2	1
10184	10184:WVGD4	Origin	115.00	5.14	-0.30	-0.05	4720.76	303.60	-31.4	-65.00	63.25	2.72	-0.72	51.61	0.06	0.17	52.34	87.2	1
10184	SpliceB	End	116.50	4.69	-0.27	-0.05	4815.64	307.63	-31.4	-65.00	63.25	2.72	-0.71	51.59	0.06	0.17	52.30	87.2	1
10184	SpliceB	Origin	116.50	4.69	-0.27	-0.05	4815.64	307.69	-31.4	-66.28	63.46	2.71	-0.73	51.59	0.06	0.17	52.32	87.2	1
10184	Tube 5	End	120.75	3.54	-0.21	-0.03	5085.34	319.08	-31.4	-66.28	63.46	2.71	-0.71	51.47	0.06	0.16	52.18	87.0	1
10184	Tube 5	Origin	120.75	3.54	-0.21	-0.03	5085.33	319.16	-31.4	-67.84	63.77	2.70	-0.72	51.47	0.06	0.16	52.19	87.0	1
10184	10184:WVGD3	End	125.00	2.57	-0.15	-0.02	5356.34	330.50	-31.4	-67.84	63.77	2.70	-0.70	51.30	0.06	0.15	52.00	86.7	1
10184	10184:WVGD3	Origin	125.00	2.57	-0.15	-0.02	5356.33	330.59	-31.4	-69.83	64.54	2.69	-0.73	51.30	0.06	0.15	52.03	86.7	1
10184	Tube 5	End	130.00	1.63	-0.09	-0.01	5679.06	343.86	-31.4	-69.83	64.54	2.69	-0.70	51.06	0.05	0.14	51.77	86.3	1
10184	Tube 5	Origin	130.00	1.63	-0.09	-0.01	5679.05	343.96	-31.3	-71.76	64.93	2.67	-0.72	51.06	0.05	0.14	51.79	86.3	1
10184	10184:WVGD2	End	135.00	0.91	-0.05	-0.01	6003.72	357.15	-31.3	-71.76	64.93	2.67	-0.70	50.78	0.05	0.13	51.48	85.8	1
10184	10184:WVGD2	Origin	135.00	0.91	-0.05	-0.01	6003.71	357.25	-31.3	-73.98	65.77	2.65	-0.72	50.78	0.05	0.13	51.51	85.8	1
10184	Tube 5	End	140.00	0.40	-0.02	-0.00	6332.56	370.37	-31.3	-73.98	65.77	2.65	-0.70	50.48	0.05	0.12	51.18	85.3	1
10184	Tube 5	Origin	140.00	0.40	-0.02	-0.00	6332.55	370.47	-31.3	-76.00	66.19	2.64	-0.72	50.48	0.05	0.12	51.20	85.3	1
10184	10184:WVGD1	End	145.00	0.10	-0.01	-0.00	6663.49	383.51	-31.3	-76.00	66.19	2.64	-0.70	50.14	0.05	0.12	50.84	84.7	1
10184	10184:WVGD1	Origin	145.00	0.10	-0.01	-0.00	6663.48	383.61	-31.3	-78.31	67.05	2.62	-0.72	50.14	0.05	0.12	50.87	84.8	1
10184	10184:g	End	150.00	0.00	0.00	0.00	6998.74	396.58	-31.3	-78.31	67.05	2.62	-0.70	49.80	0.05	0.11	50.50	84.2	1

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.
Arm1	Arm1:O	Origin	0.00	105.13	-7.11	-5.22	3.52	2.01	0.0	1.08	-0.32	-0.21	0.18	4.45	0.10	0.00	4.64	7.7	2
Arm1	#Arm1:0	End	4.85	106.09	-7.13	-11.99	1.95	1.00	0.0	1.08	-0.32	-0.21	0.23	3.65	0.13	0.00	3.89	6.5	2
Arm1	#Arm1:0	Origin	4.85	106.09	-7.13	-11.99	1.95	1.00	-0.0	1.08	-0.40	-0.21	0.23	3.65	0.15	0.00	3.89	6.5	2
Arm1	Arm1:End	End	9.69	107.04	-7.20	-18.68	0.00	-0.00	-0.0	1.08	-0.40	-0.21	0.30	0.00	0.26	0.00	0.54	0.9	3
Arm2	Arm2:O	Origin	0.00	105.24	-7.13	-3.43	-1.66	-0.05	-0.0	-1.34	0.20	0.01	-0.23	1.38	0.05	0.00	1.61	2.7	2
Arm2	#Arm2:0	End	4.85	106.99	-7.31	3.21	-0.68	-0.02	-0.0	-1.34	0.20	0.01	-0.28	0.87	0.07	0.00	1.16	1.9	2
Arm2	#Arm2:0	Origin	4.85	106.99	-7.31	3.21	-0.68	-0.02	-0.0	-1.31	0.14	0.00	-0.28	0.87	0.05	0.00	1.15	1.9	2
Arm2	Arm2:End	End	9.69	108.73	-7.49	9.81	-0.00	-0.00	-0.0	-1.31	0.14	0.00	-0.36	0.00	0.09	0.00	0.40	0.7	3
Arm3	Arm3:O	Origin	0.00	75.06	-5.06	-3.85	-85.36	12.36	0.0	6.50	6.11	-0.84	0.28	9.83	0.40	0.00	10.13	16.9	2
Arm3	#Arm3:0	End	5.00	75.83	-5.03	-10.12	-54.80	8.14	0.0	6.50	6.11	-0.84	0.34	9.32	0.49	0.00	9.69	16.2	2
Arm3	#Arm3:0	Origin	5.00	75.83	-5.03	-10.12	-54.80	8.13	0.0	6.53	5.77	-0.84	0.34	9.32	0.46	0.00	9.69	16.2	2
Arm3	#Arm3:1	End	9.86	76.58	-5.03	-16.35	-26.74	4.06	0.0	6.53	5.77	-0.84	0.42	7.26	0.59	0.00	7.75	12.9	2
Arm3	#Arm3:1	Origin	9.86	76.58	-5.03	-16.35	-26.74	4.06	-0.0	6.56	5.50	-0.83	0.43	7.26	0.56	0.00	7.75	12.9	2
Arm3	Arm3:End	End	14.72	77.35	-5.04	-22.72	0.00	-0.00	-0.0	6.56	5.50	-0.83	0.57	0.00	1.11	0.00	2.01	3.4	3
Arm4	Arm4:O	Origin	0.00	75.19	-5.10	-1.40	-47.52	-19.78	-0.0	-8.02	3.49	1.34	-0.34	6.77	0.24	0.00	7.13	11.9	2
Arm4	#Arm4:0	End	5.00	76.58	-5.30	4.63	-30.08	-13.07	-0.0	-8.02	3.49	1.34	-0.41	6.39	0.30	0.00	6.82	11.4	2
Arm4	#Arm4:0	Origin	5.00	76.58	-5.30	4.63	-30.08	-13.07	-0.0	-7.93	3.20	1.34	-0.41	6.39	0.28	0.00	6.82	11.4	2
Arm4	#Arm4:1	End	9.86	77.91	-5.53	10.43	-14.50	-6.54	-0.0	-7.93	3.20	1.34	-0.51	4.96	0.35	0.00	5.51	9.2	2
Arm4	#Arm4:1	Origin	9.86	77.91	-5.53	10.43	-14.50	-6.54	-0.0	-7.86	2.98	1.34	-0.51	4.96	0.33	0.00	5.50	9.2	2
Arm4	Arm4:End	End	14.72	79.22	-5.79	16.15	-0.00	-0.00	-0.0	-7.86	2.98	1.34	-0.69	0.00	0.60	0.00	1.25	2.1	3

Arm5	Arm5:O	Origin	0.00	50.16	-3.29	-2.75	-85.52	18.05	0.0	6.12	6.12	-1.23	0.26	10.42	0.41	0.00	10.70	17.8	2
Arm5	#Arm5:0	End	5.00	50.83	-3.29	-7.85	-54.91	11.89	0.0	6.12	6.12	-1.23	0.32	9.89	0.50	0.00	10.25	17.1	2
Arm5	#Arm5:0	Origin	5.00	50.83	-3.29	-7.85	-54.91	11.89	0.0	6.17	5.78	-1.23	0.32	9.89	0.47	0.00	10.24	17.1	2
Arm5	#Arm5:1	End	9.86	51.50	-3.33	-12.95	-26.80	5.94	0.0	6.17	5.78	-1.23	0.40	7.72	0.60	0.00	8.18	13.6	2
Arm5	#Arm5:1	Origin	9.86	51.50	-3.33	-12.95	-26.80	5.94	-0.0	6.20	5.51	-1.22	0.40	7.72	0.57	0.00	8.18	13.6	2
Arm5	Arm5:End	End	14.72	52.18	-3.38	-18.17	0.00	-0.00	-0.0	6.20	5.51	-1.22	0.54	0.00	1.12	0.00	2.01	3.3	3
Arm6	Arm6:O	Origin	0.00	50.27	-3.33	-0.12	-50.04	-17.81	-0.0	-7.79	3.66	1.21	-0.33	6.83	0.25	0.00	7.17	12.0	2
Arm6	#Arm6:0	End	5.00	51.35	-3.49	4.79	-31.72	-11.77	-0.0	-7.79	3.66	1.21	-0.40	6.44	0.31	0.00	6.86	11.4	2
Arm6	#Arm6:0	Origin	5.00	51.35	-3.49	4.79	-31.72	-11.76	-0.0	-7.70	3.38	1.21	-0.40	6.44	0.29	0.00	6.86	11.4	2
Arm6	#Arm6:1	End	9.86	52.37	-3.67	9.47	-15.32	-5.89	-0.0	-7.70	3.38	1.21	-0.50	5.00	0.36	0.00	5.53	9.2	2
Arm6	#Arm6:1	Origin	9.86	52.37	-3.67	9.47	-15.32	-5.88	-0.0	-7.63	3.15	1.21	-0.50	5.00	0.34	0.00	5.52	9.2	2
Arm6	Arm6:End	End	14.72	53.38	-3.88	14.08	-0.00	-0.00	-0.0	-7.63	3.15	1.21	-0.67	0.00	0.64	0.00	1.29	2.2	3
Arm7	Arm7:O	Origin	0.00	30.37	-1.89	-1.93	-86.91	-26.48	0.0	5.96	6.22	1.80	0.25	11.41	0.42	0.00	11.68	19.5	2
Arm7	#Arm7:0	End	5.00	30.94	-1.86	-5.89	-55.82	-17.47	0.0	5.96	6.22	1.80	0.31	10.85	0.52	0.00	11.20	18.7	2
Arm7	#Arm7:0	Origin	5.00	30.94	-1.86	-5.89	-55.82	-17.45	0.0	6.01	5.88	1.80	0.31	10.85	0.49	0.00	11.20	18.7	2
Arm7	#Arm7:1	End	9.86	31.50	-1.77	-9.90	-27.26	-8.72	0.0	6.01	5.88	1.80	0.39	8.48	0.62	0.00	8.94	14.9	2
Arm7	#Arm7:1	Origin	9.86	31.50	-1.77	-9.90	-27.26	-8.71	0.0	6.05	5.61	1.79	0.39	8.48	0.59	0.00	8.93	14.9	2
Arm7	Arm7:End	End	14.72	32.07	-1.65	-14.03	0.00	-0.00	0.0	6.05	5.61	1.79	0.53	0.00	1.14	0.00	2.04	3.4	3
Arm8	Arm8:O	Origin	0.00	30.46	-1.93	0.57	-52.26	2.77	-0.0	-7.55	3.82	-0.19	-0.32	5.54	0.25	0.00	5.87	9.8	2
Arm8	#Arm8:0	End	5.00	31.25	-2.03	4.37	-33.17	1.84	-0.0	-7.55	3.82	-0.19	-0.39	5.19	0.30	0.00	5.60	9.3	2
Arm8	#Arm8:0	Origin	5.00	31.25	-2.03	4.37	-33.17	1.84	-0.0	-7.47	3.53	-0.19	-0.39	5.18	0.28	0.00	5.59	9.3	2
Arm8	#Arm8:1	End	9.86	32.01	-2.13	7.98	-16.03	0.92	-0.0	-7.47	3.53	-0.19	-0.49	4.00	0.36	0.00	4.52	7.5	2
Arm8	#Arm8:1	Origin	9.86	32.01	-2.13	7.98	-16.03	0.92	0.0	-7.40	3.30	-0.19	-0.48	4.00	0.33	0.00	4.51	7.5	2
Arm8	Arm8:End	End	14.72	32.74	-2.21	11.52	-0.00	-0.00	0.0	-7.40	3.30	-0.19	-0.65	0.00	0.67	0.00	1.33	2.2	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 %
1	1.187	80.00	80.00	1.48	0.00	0.00	0.00	1.48
2	1.307	80.00	80.00	1.63	0.00	0.00	0.00	1.63
3	8.539	80.00	80.00	10.67	0.00	0.00	0.00	10.67
4	8.447	80.00	80.00	10.56	0.00	0.00	0.00	10.56
5	8.321	80.00	80.00	10.40	0.00	0.00	0.00	10.40
6	8.279	80.00	80.00	10.35	0.00	0.00	0.00	10.35
7	8.377	80.00	80.00	10.47	0.00	0.00	0.00	10.47
8	8.043	80.00	80.00	10.05	0.00	0.00	0.00	10.05
9	18.595	80.00	80.00	23.24	0.00	0.00	0.00	23.24
10	12.264	80.00	80.00	15.33	0.00	0.00	0.00	15.33
11	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
12	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
13	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
14	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
15	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
16	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
17	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
18	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
19	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
20	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
21	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
22	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62
23	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62

24	0.495	80.00	80.00	0.62	0.00	0.00	0.00	0.62

*** 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)
10184	87.23	NESC Extreme	34.3	34	41645.5

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 %
10184	NESC Heavy	1	2.064	2.132	-0.721	2.879	34.600	28.400	122.831	3	185.044	2.064	3.000	47.33
10184	NESC Heavy	2	2.853	0.815	0.815	2.853	34.600	47.418	205.081	6	185.044	2.667	3.000	79.03
10184	NESC Heavy	3	2.879	-0.721	2.132	2.064	34.600	15.601	67.474	3	133.531	1.530	3.000	26.00
10184	NESC Heavy	4	2.132	-2.064	2.879	0.721	34.600	11.246	48.641	3	-108.452	1.299	3.000	18.74
10184	NESC Heavy	5	0.815	-2.853	2.853	-0.815	34.600	39.409	170.443	6	-166.665	2.431	3.000	65.68
10184	NESC Heavy	6	-0.721	-2.879	2.064	-2.132	34.600	25.204	109.009	3	-166.665	1.944	3.000	42.01
10184	NESC Heavy	7	-2.064	-2.132	0.721	-2.879	34.600	26.367	114.038	3	-172.392	1.989	3.000	43.95
10184	NESC Heavy	8	-2.853	-0.815	-0.815	-2.853	34.600	43.169	186.707	6	-172.392	2.545	3.000	71.95
10184	NESC Heavy	9	-2.879	0.721	-2.132	-2.064	34.600	13.568	58.682	3	-120.879	1.427	3.000	22.61
10184	NESC Heavy	10	-2.132	2.064	-2.879	-0.721	34.600	13.279	57.433	3	121.104	1.411	3.000	22.13
10184	NESC Heavy	11	-0.815	2.853	-2.853	0.815	34.600	43.657	188.817	6	179.317	2.559	3.000	72.76
10184	NESC Heavy	12	0.721	2.879	-2.064	2.132	34.600	27.237	117.802	3	179.317	2.021	3.000	45.40
10184	NESC Heavy	13	1.442	2.685	-1.442	2.685	34.600	7.204	31.159	2	185.044	1.040	3.000	12.01
10184	NESC Heavy	14	2.591	1.605	0.094	3.046	34.600	32.069	138.697	4	185.044	2.193	3.000	53.45
10184	NESC Heavy	15	3.046	0.094	1.605	2.591	34.600	21.655	93.657	4	155.032	1.802	3.000	36.09
10184	NESC Heavy	16	2.685	-1.442	2.685	1.442	34.600	2.614	11.307	2	80.052	0.626	3.000	4.36
10184	NESC Heavy	17	1.605	-2.591	3.046	-0.094	34.600	16.622	71.888	4	-131.900	1.579	3.000	27.70
10184	NESC Heavy	18	0.094	-3.046	2.591	-1.605	34.600	27.978	121.006	4	-166.665	2.049	3.000	46.63
10184	NESC Heavy	19	-1.442	-2.685	1.442	-2.685	34.600	6.704	28.995	2	-172.392	1.003	3.000	11.17
10184	NESC Heavy	20	-2.591	-1.605	-0.094	-3.046	34.600	29.636	128.176	4	-172.392	2.108	3.000	49.39
10184	NESC Heavy	21	-3.046	-0.094	-1.605	-2.591	34.600	19.222	83.136	4	-142.381	1.698	3.000	32.04
10184	NESC Heavy	22	-2.685	1.442	-2.685	-1.442	34.600	2.614	11.307	2	-67.400	0.626	3.000	4.36
10184	NESC Heavy	23	-1.605	2.591	-3.046	0.094	34.600	19.054	82.409	4	144.552	1.691	3.000	31.76
10184	NESC Heavy	24	-0.094	3.046	-2.591	1.605	34.600	30.411	131.527	4	179.317	2.136	3.000	50.68
10184	NESC Extreme	1	2.064	2.132	-0.721	2.879	34.600	29.457	127.403	3	191.789	2.102	3.000	49.10
10184	NESC Extreme	2	2.853	0.815	0.815	2.853	34.600	49.252	213.015	6	191.789	2.718	3.000	82.09
10184	NESC Extreme	3	2.879	-0.721	2.132	2.064	34.600	16.213	70.120	3	138.813	1.559	3.000	27.02
10184	NESC Extreme	4	2.132	-2.064	2.879	0.721	34.600	11.962	51.737	3	-115.136	1.340	3.000	19.94
10184	NESC Extreme	5	0.815	-2.853	2.853	-0.815	34.600	41.868	181.078	6	-177.312	2.506	3.000	69.78
10184	NESC Extreme	6	-0.721	-2.879	2.064	-2.132	34.600	26.798	115.901	3	-177.312	2.005	3.000	44.66
10184	NESC Extreme	7	-2.064	-2.132	0.721	-2.879	34.600	28.395	122.806	3	-185.175	2.064	3.000	47.32
10184	NESC Extreme	8	-2.853	-0.815	-0.815	-2.853	34.600	47.031	203.410	6	-185.175	2.656	3.000	78.39
10184	NESC Extreme	9	-2.879	0.721	-2.132	-2.064	34.600	15.150	65.524	3	-132.199	1.507	3.000	25.25
10184	NESC Extreme	10	-2.132	2.064	-2.879	-0.721	34.600	13.025	56.333	3	121.750	1.398	3.000	21.71
10184	NESC Extreme	11	-0.815	2.853	-2.853	0.815	34.600	44.089	190.683	6	183.926	2.572	3.000	73.48
10184	NESC Extreme	12	0.721	2.879	-2.064	2.132	34.600	27.861	120.498	3	183.926	2.044	3.000	46.43
10184	NESC Extreme	13	1.442	2.685	-1.442	2.685	34.600	7.429	32.130	2	191.789	1.056	3.000	12.38
10184	NESC Extreme	14	2.591	1.605	0.094	3.046	34.600	33.282	143.945	4	191.789	2.234	3.000	55.47
10184	NESC Extreme	15	3.046	0.094	1.605	2.591	34.600	22.506	97.337	4	161.062	1.837	3.000	37.51
10184	NESC Extreme	16	2.685	-1.442	2.685	1.442	34.600	2.744	11.866	2	83.143	0.642	3.000	4.57
10184	NESC Extreme	17	1.605	-2.591	3.046	-0.094	34.600	17.663	76.394	4	-140.059	1.628	3.000	29.44

10184	NESC Extreme	18	0.094	-3.046	2.591	-1.605	34.600	29.734	128.600	4	-177.312	2.112	3.000	49.56
10184	NESC Extreme	19	-1.442	-2.685	1.442	-2.685	34.600	7.167	30.999	2	-185.175	1.037	3.000	11.95
10184	NESC Extreme	20	-2.591	-1.605	-0.094	-3.046	34.600	32.010	138.445	4	-185.175	2.191	3.000	53.35
10184	NESC Extreme	21	-3.046	-0.094	-1.605	-2.591	34.600	21.234	91.837	4	-154.449	1.785	3.000	35.39
10184	NESC Extreme	22	-2.685	1.442	-2.685	-1.442	34.600	2.744	11.866	2	-76.529	0.642	3.000	4.57
10184	NESC Extreme	23	-1.605	2.591	-3.046	0.094	34.600	18.935	81.893	4	146.672	1.685	3.000	31.56
10184	NESC Extreme	24	-0.094	3.046	-2.591	1.605	34.600	31.006	134.100	4	183.926	2.157	3.000	51.68

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
Arm1	34.96	NESC Heavy	148.6	1	156.1
Arm2	14.95	NESC Heavy	148.6	1	156.1
Arm3	31.73	NESC Heavy	126.1	1	873.6
Arm4	27.95	NESC Heavy	126.1	1	873.6
Arm5	34.26	NESC Heavy	104.1	1	873.6
Arm6	27.70	NESC Heavy	104.1	1	873.6
Arm7	42.97	NESC Heavy	82.1	1	873.6
Arm8	26.99	NESC Heavy	82.1	1	873.6

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	85.91	10184	Steel Pole
NESC Extreme	87.23	10184	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Height AGL (ft)	Segment Number
NESC Heavy	85.91	10184	34.3	34
NESC Extreme	87.23	10184	34.3	34

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	10184	2	34.600	151.823	6668.972	288.837	47.418	205.081	6	185.044	2.667	79.03
NESC Extreme	10184	2	34.600	79.365	6998.738	396.582	49.252	213.015	6	191.789	2.718	82.09

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Height AGL (ft)	Segment Number
NESC Heavy	42.97	Arm7	82.1	1
NESC Extreme	19.47	Arm7	82.1	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
1	Clamp	3.26	NESC Heavy	0.0
2	Clamp	3.15	NESC Heavy	0.0
3	Clamp	16.29	NESC Heavy	0.0
4	Clamp	16.13	NESC Heavy	0.0
5	Clamp	16.22	NESC Heavy	0.0
6	Clamp	16.15	NESC Heavy	0.0
7	Clamp	17.68	NESC Heavy	0.0
8	Clamp	16.23	NESC Heavy	0.0
9	Clamp	23.24	NESC Extreme	0.0
10	Clamp	15.33	NESC Extreme	0.0
11	Clamp	1.17	NESC Heavy	0.0
12	Clamp	1.17	NESC Heavy	0.0
13	Clamp	1.17	NESC Heavy	0.0
14	Clamp	1.17	NESC Heavy	0.0
15	Clamp	1.17	NESC Heavy	0.0
16	Clamp	1.17	NESC Heavy	0.0
17	Clamp	1.17	NESC Heavy	0.0
18	Clamp	1.17	NESC Heavy	0.0
19	Clamp	1.17	NESC Heavy	0.0
20	Clamp	1.17	NESC Heavy	0.0
21	Clamp	1.17	NESC Heavy	0.0
22	Clamp	1.17	NESC Heavy	0.0
23	Clamp	1.17	NESC Heavy	0.0
24	Clamp	1.17	NESC Heavy	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	1	Clamp	Arm1:End	-0.753	1.896	1.626	2.609
NESC Heavy	2	Clamp	Arm2:End	0.000	1.927	1.626	2.521
NESC Heavy	3	Clamp	Arm3:End	-0.708	7.350	10.734	13.029
NESC Heavy	4	Clamp	Arm4:End	-1.946	7.054	10.631	12.906
NESC Heavy	5	Clamp	Arm5:End	-1.784	7.212	10.640	12.977
NESC Heavy	6	Clamp	Arm6:End	-1.713	7.128	10.639	12.920
NESC Heavy	7	Clamp	Arm7:End	5.287	7.653	10.655	14.144
NESC Heavy	8	Clamp	Arm8:End	1.430	7.310	10.634	12.983
NESC Heavy	9	Clamp	10184:TopConn	0.000	5.674	6.116	8.343
NESC Heavy	10	Clamp	10184:BotConn	0.000	-3.626	1.221	3.826
NESC Heavy	11	Clamp	10184:WVGD1	0.000	0.172	0.920	0.936
NESC Heavy	12	Clamp	10184:WVGD2	0.000	0.172	0.920	0.936
NESC Heavy	13	Clamp	10184:WVGD3	0.000	0.172	0.920	0.936
NESC Heavy	14	Clamp	10184:WVGD4	0.000	0.172	0.920	0.936
NESC Heavy	15	Clamp	10184:WVGD5	0.000	0.172	0.920	0.936
NESC Heavy	16	Clamp	10184:WVGD6	0.000	0.172	0.920	0.936
NESC Heavy	17	Clamp	10184:WVGD7	0.000	0.172	0.920	0.936
NESC Heavy	18	Clamp	10184:WVGD8	0.000	0.172	0.920	0.936
NESC Heavy	19	Clamp	10184:WVGD9	0.000	0.172	0.920	0.936
NESC Heavy	20	Clamp	10184:WVGD10	0.000	0.172	0.920	0.936

NESC Heavy	21	Clamp	10184:WVGD11	0.000	0.172	0.920	0.936
NESC Heavy	22	Clamp	10184:WVGD12	0.000	0.172	0.920	0.936
NESC Heavy	23	Clamp	10184:WVGD13	0.000	0.172	0.920	0.936
NESC Heavy	24	Clamp	10184:WVGD14	0.000	0.172	0.920	0.936
NESC Extreme	1	Clamp	Arm1:End	-0.211	1.045	-0.523	1.187
NESC Extreme	2	Clamp	Arm2:End	0.000	1.202	0.512	1.307
NESC Extreme	3	Clamp	Arm3:End	-0.795	6.902	4.964	8.539
NESC Extreme	4	Clamp	Arm4:End	-1.294	6.753	4.906	8.447
NESC Extreme	5	Clamp	Arm5:End	-1.193	6.640	4.871	8.321
NESC Extreme	6	Clamp	Arm6:End	-1.169	6.589	4.874	8.279
NESC Extreme	7	Clamp	Arm7:End	1.835	6.588	4.838	8.377
NESC Extreme	8	Clamp	Arm8:End	0.213	6.427	4.831	8.043
NESC Extreme	9	Clamp	10184:TopConn	0.000	18.379	2.824	18.595
NESC Extreme	10	Clamp	10184:BotConn	0.000	-12.252	0.535	12.264
NESC Extreme	11	Clamp	10184:WVGD1	0.000	0.427	0.250	0.495
NESC Extreme	12	Clamp	10184:WVGD2	0.000	0.427	0.250	0.495
NESC Extreme	13	Clamp	10184:WVGD3	0.000	0.427	0.250	0.495
NESC Extreme	14	Clamp	10184:WVGD4	0.000	0.427	0.250	0.495
NESC Extreme	15	Clamp	10184:WVGD5	0.000	0.427	0.250	0.495
NESC Extreme	16	Clamp	10184:WVGD6	0.000	0.427	0.250	0.495
NESC Extreme	17	Clamp	10184:WVGD7	0.000	0.427	0.250	0.495
NESC Extreme	18	Clamp	10184:WVGD8	0.000	0.427	0.250	0.495
NESC Extreme	19	Clamp	10184:WVGD9	0.000	0.427	0.250	0.495
NESC Extreme	20	Clamp	10184:WVGD10	0.000	0.427	0.250	0.495
NESC Extreme	21	Clamp	10184:WVGD11	0.000	0.427	0.250	0.495
NESC Extreme	22	Clamp	10184:WVGD12	0.000	0.427	0.250	0.495
NESC Extreme	23	Clamp	10184:WVGD13	0.000	0.427	0.250	0.495
NESC Extreme	24	Clamp	10184:WVGD14	0.000	0.427	0.250	0.495

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	51.986	-0.187	87.402	5695.842	258.999	72.465
NESC Extreme	54.251	-2.614	36.132	5970.245	377.878	31.302

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 5553.7
Weight of Steel Poles: 41645.5
Total: 47199.2

*** End of Report

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force = $T_{Max} := 192 \cdot kips$ (User Input from PLS-Pole)

Maximum Shear Force at Base = $V_{base} := 68 \cdot kips$ (User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = $N := 24$ (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 = $V_{Max} := \frac{V_{base}}{N} = 2.8 \cdot kips$

Shear Stress per Bolt = $f_v := \frac{V_{Max}}{A_s} = 872.4\,psi$

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 = $F_{tv} := F_t \cdot \sqrt{1 - \left(\frac{f_v}{F_v}\right)^2} = 74.98 \cdot ksi$

Bolt Tension % of Capacity = $\frac{T_{Max}}{F_{tv} \cdot A_s} = 78.85 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{F_{tv} \cdot A_s} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 7010 \cdot 1.1 \cdot ft \cdot kips = 7711 \cdot ft \cdot kips$	(User Input from PLS-Pole)	
Shear Force =	$Shear := 67.3 \cdot kip \cdot 1.1 = 74.03 \cdot kips$	(User Input from PLS-Pole)	
Axial Force =	$Axial := 83.8 \cdot kip \cdot 1.1 = 92.18 \cdot kips$	(User Input from PLS-Pole)	
Tower Height =	$H_t := 150 \cdot ft$	(User Input)	

Footing Data:

Depth to Bottom of Footing =	$D_f := 6 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 9 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 3 \cdot ft$	(User Input)	
Width of Pier =	$W_p := 10 \cdot ft$	(User Input)	
Depth of Soil =	$D_{soil} := 6 \cdot ft$	(User Input)	
Depth of Rock =	$D_{rock} := 24 \cdot ft$	(User Input)	

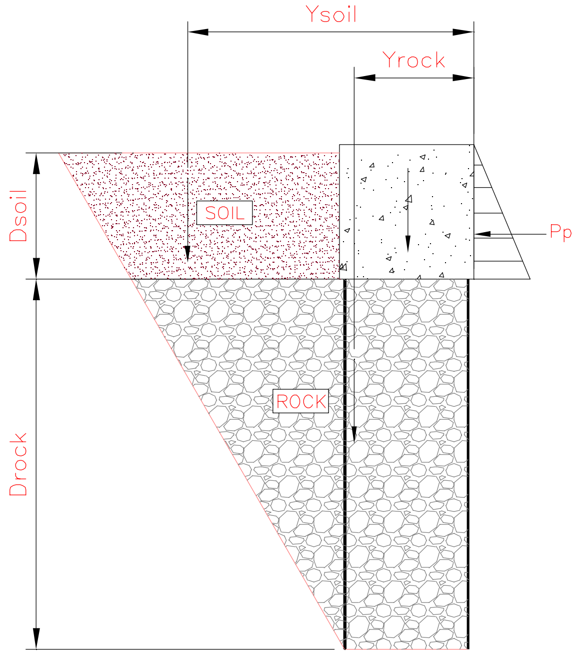
Material Properties:

Concrete Compressive Strength =	$f_c := 3500 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Internal Friction Angle of Rock =	$\Phi_r := 30 \cdot deg$	(User Input)	
Soil Bearing Capacity =	$q_s := 9000 \cdot psf$	(User Input)	
Rock Bearing Capacity =	$q_{rock} := 50000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Unit Weight of Rock =	$\gamma_{rock} := 160 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 4 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Rock Anchor Properties:

ASTM A615 Grade 60

Bolt Ultimate Strength =	$F_u := 90 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 60 \cdot ksi$	(User Input)
Bar Diameter =	$d_{ra} := 1.27 \cdot in$	(User Input)
Number of Bars per Hole =	$n_{ra} := 3$	(User Input)
Gross Area of Bolt Group =	$A_g := \frac{\pi}{4} \cdot d_{ra}^2 \cdot n_{ra} = 3.8 \cdot in^2$	(3 # 10 Bars)
Hole Diameter =	$d_{Hole} := 4 \cdot in$	(User Input)
Grout Strength =	$\tau := 120 \cdot psi$	(User Input)
Total Number of Rock Bolts =	$N_{atot} := 16$	(User Input)
Rock Anchor Out to Out Spacing =	$S_a := 112 \cdot in$	(User Input)
Distance to Rock Anchor Group 1 =	$D_{a1} := 28 \cdot in$	(User Input)
Distance to Rock Anchor Group 2 =	$D_{a2} := 56 \cdot in$	(User Input)
Number of Rock Anchors in Group 1 =	$N_{a1} := 4$	(User Input)
Number of Rock Anchors in Group 2 =	$N_{a2} := 10$	(User Input)



Effective Depth of Soil Used = $D_{soil.eff} := if(D_{soil} - n \ge 0, D_{soil} - n, 0) = 2ft$

Volume 1 = $V1 := \left[\frac{1}{2}\cdot\tan(\Phi_s)\cdot D_{soil}^2\cdot(S_a + 2\cdot\tan(\Phi_s)\cdot D_{rock}) + \frac{D_{soil}}{3}\cdot(\tan(\Phi_s)\cdot D_{soil})^2\cdot 2\right] = 432.995\cdot ft^3$

Volume 2 = $V2 := (S_a + \tan(\Phi_s)\cdot D_{rock})\cdot(S_a + 2\cdot\tan(\Phi_s)\cdot D_{rock})\cdot D_{soil} + \frac{1}{2}\cdot\tan(\Phi_s)\cdot D_{soil}^2\cdot 2\cdot(S_a + \tan(\Phi_s)\cdot D_{rock}) - W_p^2\cdot D_{soil} = 5037\cdot ft^3$

Distance to Centroid 1 = $Y1 := S_a + \tan(\Phi_s)\cdot D_{rock} + \frac{1}{3}\cdot\tan(\Phi_s)\cdot D_{soil} = 24.344ft$

Distance to Centroid 2 = $Y2 := \frac{1}{2}\cdot(S_a + \tan(\Phi_s)\cdot D_{rock}) = 11.595ft$

Distance from Toe to Centroid of Soil = $Y_{soil} := if\left(V1 + V2 > 0, \frac{V1\cdot Y1 + V2\cdot Y2}{V1 + V2}, 0\right) = 12.6ft$

Volume 3 = $V3 := \left[\frac{1}{2}\cdot\tan(\Phi_s)\cdot D_{rock}^2\cdot S_a + \frac{D_{rock}}{3}\cdot(\tan(\Phi_s)\cdot D_{rock})^2\cdot 2\right] = 4623.918\cdot ft^3$

Volume 4 = $V4 := \left(S_a\cdot D_{rock} + \frac{1}{2}\cdot\tan(\Phi_s)\cdot D_{rock}^2\cdot 2\right)\cdot S_a = 5194.502\cdot ft^3$

Distance to Centroid 3 = $Y3 := S_a + \frac{1}{3}\cdot\tan(\Phi_s)\cdot D_{rock} = 13.952ft$

Distance to Centroid 4 = $Y4 := \frac{S_a}{2} = 4.667ft$

Distance from Toe to Centroid of Rock = $Y_{rock} := \frac{(V3\cdot Y3 + V4\cdot Y4)}{(V3 + V4)} = 9.04ft$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}\left(\text{Bouyancy} = 1, \gamma_{conc} - 62.4\text{pcf}, \gamma_{conc}\right) = 150\cdot\text{pcf}$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}\left(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}\right) = 100\cdot\text{pcf}$

Coefficient of Lateral Soil Pressure = $K_p := \dfrac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Passive Pressure = $P_{top} := 0 = 0\cdot\text{ksf}$

$P_{bot} := K_p\cdot\gamma_s\cdot D_{soil.eff} + c\cdot 2\cdot\sqrt{K_p} = 0.6\cdot\text{ksf}$

$P_{ave} := \dfrac{P_{top} + P_{bot}}{2} = 0.3\cdot\text{ksf}$

$A_p := W_p\cdot\left(L_p - L_{pag} - n\right) = 20\text{ft}^2$

Ultimate Shear = $S_u := P_{ave}\cdot A_p = 6\cdot\text{kip}$

Passive Pressure Resistance to Overturning = $PP_R := \min\left[\text{Shear}, \left(S_u\right)\right] = 6\cdot\text{kip}$

Weight of Concrete Pad = $WT_c := \left(W_p^{\,2}\cdot L_p\right)\cdot\gamma_c = 135\cdot\text{kip}$

Total Weight of Soil = $WT_{Stot} := (V1 + V2)\cdot\gamma_s = 547\cdot\text{kips}$

Total Weight of Rock = $WT_{Rtot} := (V3 + V4)\cdot\gamma_{rock} = 1570.9\cdot\text{kips}$

Resisting Moment = $M_r := \left(WT_c + \text{Axial}\right)\cdot\dfrac{W_p}{2} + PP_R\cdot\dfrac{\left(L_p - L_{pag} - n\right)}{3} + WT_{Stot}\cdot Y_{soil} + WT_{Rtot}\cdot Y_{rock} = 22235\cdot\text{kip}\cdot\text{ft}$

Overturning Moment = $M_{ot.z} := OM + \text{Shear}\cdot L_p = 8377\cdot\text{kip}\cdot\text{ft}$

Factor of Safety Actual = $FS := \dfrac{M_r}{M_{ot.z}} = 2.65$

Factor of Safety Required = $FS_{req} := 1.0$

OverTurning_Moment_Check := if$\left(FS \geq FS_{req}\right.$, "Okay", "No Good"$\left.\right)$

OverTurning_Moment_Check = "Okay"

Rock Anchor Check

Overturning Moment = $M_{ot} := OM + Shear \cdot L_p = 8377 \cdot kip \cdot ft$

Polar Moment of Inertia = $I_p := \left(D_{a1}^{\ 2} \cdot N_{a1} + D_{a2}^{\ 2} \cdot N_{a2}\right) = 34496 \cdot in^2$

Maximum Tension Force = $T_{Max} := \dfrac{\left[M_{ot} - PP_R \cdot \dfrac{\left(L_p - L_{pag} - n\right)}{3}\right] \cdot D_{a2}}{I_p} - \dfrac{Axial + WT_c}{N_{atot}} = 148.9 \cdot kips$

Design Tension = $T_{des} := A_g \cdot F_y = 228 \cdot kips$

Condition1 := if($T_{Max} < T_{des}$, "OK" , "NG") $\dfrac{T_{Max}}{T_{des}} = 65.3 \cdot \%$

Condition1 = "OK"

Check Bond Strength:

Bond Strength = Bond_Strength := $d_{Hole} \cdot \pi \cdot D_{rock} \cdot \tau = 434 \cdot kips$

Condition2 := if(T_{Max} < Bond_Strength, "OK" , "NG") $\dfrac{T_{Max}}{Bond\_Strength} = 34.3 \cdot \%$

Condition2 = "OK"

Bearing Pressure Caused by Footing:

Force @ Rock Anchor Group 1 = $F_1 := \dfrac{\left[M_{ot} - PP_R \cdot \dfrac{\left(L_p - L_{pag} - n\right)}{3}\right] \cdot D_{a1}}{I_p} \cdot \dfrac{N_{a1}}{2} = 163.1 \cdot kips$

Force @ Rock Anchor Group 2 = $F_2 := \dfrac{\left[M_{ot} - PP_R \cdot \dfrac{\left(L_p - L_{pag} - n\right)}{3}\right] \cdot D_{a2}}{I_p} \cdot \dfrac{N_{a2}}{2} = 815.6 \cdot kips$

Total Resultance Force = $P_{tot} := WT_c + Axial + F_1 + F_2 = 1206 \cdot kips$

Maximum Bearing Pressure = $P_{max} := \dfrac{P_{tot}}{\left(\dfrac{W_p}{2}\right) \cdot W_p} = 24.117 \cdot ksf$

Max_Pressure_Check := if($P_{max} < q_{rock}$, "Okay" , "No Good")

Max_Pressure_Check = "Okay"

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP (Not Preferred)

CTNH461A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 1 - Site Information

Site ID: CTNH461A
Status: Draft
Version: 1
Project Type: Sprint Retain
Approved: Not Approved
Approved By: Not Approved
Last Modified: 12/6/2021 3:20:34 PM
Last Modified By: Michael.Low1@T-Mobile.com

Site Name: CT33XC095
Site Class: Utility Lattice Tower
Site Type: Structure Non Building
Plan Year: 2021
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.53814400
Longitude: -73.42585800
Address: 18 Hilltop View Lane
City, State: New Milford, CT
Region: NORTHEAST

RAN Template: 67E998E 6160		AL Template: 67E998E_1OP (Not Preferred)		
Sector Count: 3	Antenna Count: 3	Coax Line Count: 24	TMA Count: 3	RRU Count: 6

Section 2 - Existing Template Images

----- This section is intentionally blank. -----

Section 3 - Proposed Template Images

----- This section is intentionally blank. -----

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template: 67E998E 6160	**A&L Template:** 67E998E_1OP (Not Preferred)

CTNH461A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 5 - RAN Equipment

Existing RAN Equipment

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Proposed RAN Equipment

Template: 67E998E 6160

Enclosure	**1**	**2**	**3**
Enclosure Type	Enclosure 6160 AC V1	B160	RBS 6601
Baseband	BB 6648 L2100 L1900 L700 L600 N600		DUG20 G1900
Transport System	CSR IXRe V2 (Gen2)		
Functionality Groups	Ericsson Hybrid Trunk 6/24 4AWG *Select Length* **(x 2)**		

RAN Scope of Work:

CT33XC095
200A existing.

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP (Not Preferred)

CTNH461A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 67E998E_1OP (Not Preferred)

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro			
Antenna	1			
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)			
Azimuth	20			
M. Tilt	0			
Height	165			
Ports	**P1**	**P2**	**P3**	**P4**
Active Tech.	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners				
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)	Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment				

Unconnected Equipment:

Scope of Work:

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template: 67E998E 6160	A&L Template: 67E998E_1OP (Not Preferred)

CTNH461A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Sector 2 (Proposed) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1			
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)			
Azimuth	150			
M. Tilt	0			
Height	165			
Ports	P1	P2	P3	P4
Active Tech.	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners				
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)	Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment				

Unconnected Equipment:

Scope of Work:

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template: 67E998E 6160	A&L Template: 67E998E_1OP (Not Preferred)

CTNH461A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro			
Antenna	1			
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)			
Azimuth	270			
M. Tilt	0			
Height	165			
Ports	P1	P2	P3	P4
Active Tech.	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**	1-5/8" Coax **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners				
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)	Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment				

Unconnected Equipment:

Scope of Work:

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template: 67E998E 6160	**A&L Template:** 67E998E_1OP (Not Preferred)

CTNH461A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

----- This section is intentionally blank. -----

	Proposed Power Systems Equipment
Enclosure	**1**
Enclosure Type	Enclosure 6160 AC V1

RADIO FREQUENCY SYSTEMS

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-894/617-894/1695-2690/1695-2690MHz, 65deg, 16.2/16.1/18.9/18.7dBi, 2.4m (8ft), VET, RET, 2-12°/2-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600, 700, 800, AWS, PCS & BRS applications.

- 24 Inch Width For Easier Zoning
- Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality
- Superior elevation pattern performance across the entire electrical down tilt range
- Includes three AISG RET motors - Includes 0.5m AISG jumper for optional daisy chain of two high band RET motors for one single AISG point of high band tilt control.
- Low band arrays driven by a single RET motor

Technical Features

LOW BAND LEFT ARRAY (617-894 MHZ) [R1]

Frequency Band	MHz	617-698	698-806	806-894
Gain Typical	dBi	15.5	16.1	16.2
Gain Over All Tilts	dBi	15.2 +/- .3	15.6 +/- .5	15.8 +/- .4
Horizontal Beamwidth @3dB	Deg	65 +/-3	64 +/-2	62 +/-3
Vertical Beamwidth @3dB	Deg	9.9 +/- .7	8.6 +/- .7	7.6 +/-.4
Electrical Downtilt Range	Deg	2 to 12		
Upper Side Lobe Suppression Peak to +20	dB	15	14	14
Front-to-Back, at +/-30°, Copolar	dB	25	25	29
Cross Polar Discrimination (XPD) @ Boresight	dB	18	18	17
Cross Polar Discrimination (XPD) @ +/-60	dB	5	5	6
3rd Order PIM 2 x 43dBm	dBc	-153		
VSWR	-	1.5:1		
Cross Polar Isolation	dB	25		
Maximum Effective Power per Port	Watt	400		

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-894/617-894/1695-2690/1695-2690MHz, 65deg, 16.2/16.1/18.9/18.7dBi, 2.4m (8ft), VET, RET, 2-12°/2-12°/2-12°/2-12°

HIGH BAND RIGHT ARRAY (1695-2690 MHZ) [Y2]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200	2200-2490	2490-2690
Gain Typical	dBi	17.7	18.1	18.7	18.5	18.0
Gain Over All Tilts	dBi	17.1 +/- .6	17.6 +/- .5	18 +/- .7	17.9 +/- .6	17.4 +/- .6
Horizontal Beamwidth @3dB	Deg	67 +/- 5	64 +/- 5	65 +/- 5	62 +/- 7	60 +/- 9
Vertical Beamwidth @3dB	Deg	5.7 +/- .5	5.2 +/- .3	4.7 +/- .6	4.2 +/- .3	4.2 +/- .3
Electrical Downtilt Range	Deg	2 to 12				
Upper Side Lobe Suppression Peak to +20	dB	15	15	14	14	13
Front-to-Back, at +/-30°, Copolar	dB	27	28	26	23	21
Cross Polar Discrimination (XPD) @ Boresight	dB	21	17	14	16	18
Cross Polar Discrimination (XPD) @ +/-60	dB	10	8	7	4	1
3rd Order PIM 2 x 43dBm	dBc	-153				
VSWR	-	1.5:1				
Cross Polar Isolation	dB	25				
Maximum Effective Power per Port	Watt	300				

ELECTRICAL SPECIFICATIONS

Impedance	Ohm	50.0
Polarization	Deg	±45°

MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 215 (95.9 x 24 x 8.5)
Weight (Antenna Only)	kg (lb)	55.7 (122.8)
Weight (Mounting Hardware only)	kg (lb)	12.3 (27.1)
Packing size- HxWxD	mm (in)	2565 x 735 x 390 (101 x 28.9 x 15.4)
Shipping Weight	kg (lb)	77.9 (171.7)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Grounding type		DC Grounded
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	240 (150)
Wind Load @Rated Wind Front	N	1428.0
Wind Load @Rated Wind Side	N	434.0
Wind Load @Rated Wind Rear	N	1544.0
Environmental		ETSI 300-019-2-4 Class 4.1E

Product Specifications

COMMSCOPE®

POWERED BY ANDREW

ATSBT-TOP-FM-4G

Teletilt® Top Smart Bias Tee

- Injects AISG power and control signals onto a coaxial cable line
- Reduces cable and site lease costs by eliminating the need for AISG home run cables
- AISG 1.1 and 2.0 compliant
- Operates at 10-30 Vdc
- Weatherproof AISG connectors
- Intuitive schematics simplify and ensure proper installation
- Enhanced lightning protection plus grounding stud for additional surge protection
- 7-16 DIN female connector (BTS)
- 7-16 DIN male connector (ANT)

General Specifications

Smart Bias Tee Type	10–30 V Top
Brand	Teletilt®
Operating Frequency Band	694 – 2690 MHz

Electrical Specifications

EU Certification	CE
Protocol	AISG 1.1 | AISG 2.0
Antenna Interface Signal	dc Blocked | RF
BTS Interface Signal	AISG data | dc | RF
Interface Protocol Signal	Data | dc
Voltage Range	10–30 Vdc
VSWR | Return Loss	1.17:1 | 22 dB, typical
Power Consumption, maximum	0.6 W
RF Power, maximum	250 W @ 1850 MHz 500 W @ 850 MHz
Impedance	50 ohm
Insertion Loss, typical	0.1 dB
3rd Order IMD	-158.0 dBc (relative to carrier)
3rd Order IMD Test Method	Two +43 dBm carriers
Electromagnetic Compatibility (EMC)	CFR 47 Part 15, Subpart B, Class B | EN 55022, Class B | ICES-003 Issue 4 CAN/CSA-CEI/IEC CISPR 22:02

Mechanical Specifications

Antenna Interface	7-16 DIN Male
BTS Interface	7-16 DIN Female
AISG Input Connector	8-pin DIN Female
Color	Silver
Grounding Lug Thread Size	M8
Material Type	Aluminum
Lightning Surge Capability	5 times @ -3 kA 5 times @ 3 kA

Product Specifications

ATSBT-TOP-FM-4G

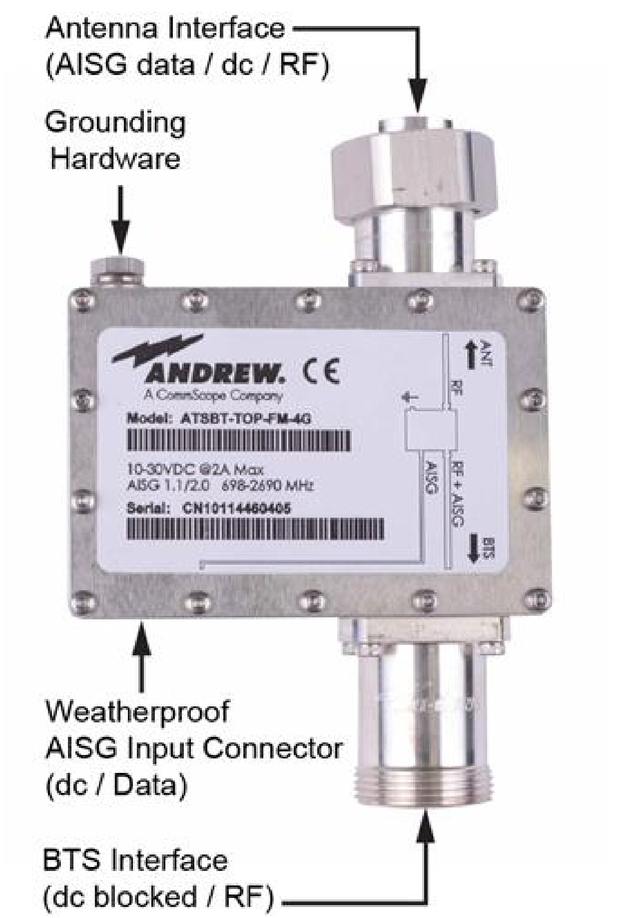
POWERED BY ANDREW

Lightning Surge Capability Test Method	IEC 61000-4-5, Level X
Lightning Surge Capability Waveform	1.2/50 voltage and 8/20 current combination waveform

Environmental Specifications

Ingress Protection Test Method	IEC 60529:2001, IP66
Operating Temperature	-40 °C to +70 °C (-40 °F to +158 °F)

Interface Port Drawing



Dimensions

Width	94.0 mm | 3.7 in
Depth	50.0 mm | 2.0 in
Height	143.00 mm | 5.63 in
Net Weight	0.8 kg | 1.8 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption