Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

August 1, 2017

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
8 Sky Edge Lane, Bethel, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains six (6) wireless telecommunications antennas attached to an existing 150-foot electric transmission line tower (Structure No. 10255 – Bethel) at 8 Sky Edge Lane in Bethel, Connecticut (the "Property"). The transmission line tower and underlying property are owned by Eversource. The Council approved Cellco's use of this structure in 2007 (Petition No. 796). Cellco now intends to replace six (6) of its existing antennas with three (3) model HBX-6516DS, 700/2100 MHz antennas and three (3) model LNX-6513DS, 850/1900 MHz antennas, all at the same 167.5-foot level on the tower. Included in Attachment 1 are specifications for Cellco's replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Matthew S. Knickerbocker, Bethel's First Selectman; Beth Cavagna, Bethel's Town Planner; and Eversource, the tower and Property owner.

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

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's replacement antennas will be attached at the same 167.5-foot level on the transmission line tower.

16606000-v1

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

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

4. The installation of new antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The transmission line tower can support Cellco's proposed antenna modifications. (*See* Structural Analysis Report included in Attachment 3).

A copy of the parcel map and property owner information is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 5.

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Matthew S. Knickerbocker, Bethel's First Selectman
Beth Cavagna, Bethel's Town Planner
Eversource
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

HBX-6516DS-VTM | HBX-6516DS-A1M

Andrew® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry to minimize any sector overlap
- Rugged, reliable design with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain, dBi	17.4	17.6	17.8
Beamwidth, Horizontal, degrees	66	64	66
Beamwidth, Vertical, degrees	7.4	6.9	6.4
Beam Tilt, degrees	0–10	0–10	0–10
USLS (First Lobe), dB	19	19	19
Front-to-Back Ratio at 180°, dB	35	35	35
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	17.1	17.4	17.4
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.3	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 17.0 5 ° | 17.2 10 ° | 16.9	0 ° | 17.3 5 ° | 17.5 10 ° | 17.0	0 ° | 17.4 5 ° | 17.3 10 ° | 17.1
Beamwidth, Horizontal Tolerance, degrees	±3.8	±2.4	±5.2
Beamwidth, Vertical Tolerance, degrees	±0.4	±0.4	±0.6
USLS, beampeak to 20° above beampeak, dB	18	18	17
Front-to-Back Total Power at 180° ± 30°, dB	26	27	26
CPR at Boresight, dB	17	19	20
CPR at Sector, dB	9	7	7

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol®
Operating Frequency Band	1710 – 2180 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, frontal	257.0 N @ 150 km/h 57.8 lbf @ 150 km/h
Wind Loading, lateral	67.0 N @ 150 km/h 15.1 lbf @ 150 km/h
Wind Loading, rear	310.0 N @ 150 km/h 69.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	83.0 mm | 3.3 in
Length	1306.0 mm | 51.4 in
Width	166.0 mm | 6.5 in
Net Weight, without mounting kit	4.7 kg | 10.4 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBX-6516DS-A1M

Packed Dimensions

Depth	188.0 mm | 7.4 in
Length	1442.0 mm | 56.8 in
Width	277.0 mm | 10.9 in
Shipping Weight	11.5 kg | 25.4 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB390 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Use for narrow panel antennas. Includes two pipe mounts.

DB5098E — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Product Specifications

COMMSCOPE®

LNX-6513DS-A1M

Single Band Antenna, 698–896 MHz, 65° horizontal beamwidth, with factory attached AISG 2.0 actuator

- Extended tilt range offers better coverage
- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	14.6	15.1
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Vertical, degrees	16.0	14.5
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	20	20
Front-to-Back Ratio at 180°, dB	30	30
CPR at Boresight, dB	12	12
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Beamwidth, Horizontal Tolerance, degrees	±3	±3

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Operating Frequency Band	698 – 896 MHz
Antenna Type	Sector
Band	Single band
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	2
RF Connector Quantity, low band	2
RF Connector Interface	7-16 DIN Female
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant

Product Specifications

LNX-6513DS-A1M

RF Connector Location	Bottom
Wind Loading, frontal	438.0 N @ 150 km/h 98.5 lbf @ 150 km/h
Wind Loading, lateral	143.0 N @ 150 km/h 32.1 lbf @ 150 km/h
Wind Loading, rear	514.0 N @ 150 km/h 115.6 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1390.0 mm | 54.7 in
Length, with installed actuator	1553.0 mm | 61.1 in
Width	301.0 mm | 11.9 in
Depth	181.0 mm | 7.1 in
Net Weight, without mounting kit	14.8 kg | 32.6 lb

Packed Dimensions

Length	1706.0 mm | 67.2 in
Width	411.0 mm | 16.2 in
Depth	284.0 mm | 11.2 in
Shipping Weight	30.9 kg | 68.1 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ATTACHMENT 2

	General	Power	Density					
Site Name: Bethel N								
Tower Height: 150Ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint	5	693	157.5	1900	0.0543	1.0000	0.54%	
*Sprint	1	390	157.5	850	0.0061	0.5667	0.11%	
Verizon	**1**	**3883**	**167.5**	**0.0498**	**1970**	**1.0000**	**4.98%**	
Verizon	**9**	**381**	**167.5**	**0.0439**	**869**	**0.5793**	**7.59%**	
Verizon	**1**	**4458**	**167.5**	**0.0571**	**2145**	**1.0000**	**5.71%**	
Verizon	**1**	**2133**	**167.5**	**0.0273**	**746**	**0.4973**	**5.50%**	
								24.42%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Antenna Mast and Pole

Verizon Site Ref: Bethel North

Eversource Structure No. 10255
150' Electric Transmission Pole

Sky Edge Lane
Bethel, CT

CENTEK Project No. 17032.01

~~Date: March 21, 2017~~
Rev 1: May 8, 2017

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

Prepared for:
McPhee Electric
505 Main Street
Farmington, CT 06032

Table of Contents

SECTION 1 - REPORT

- INTRODUCTION
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS
- ANALYSIS
- DESIGN BASIS
- RESULTS
- CONCLUSION

SECTION 2 - CONDITIONS & SOFTWARE

- STANDARD ENGINEERING CONDITIONS
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAMS
  - RISA 3-D
  - PLS POLE

SECTION 3 - DESIGN CRITERIA

- CRITERIA FOR DESIGN OF PCS FACILITIES ON OR EXTENDING ABOVE METAL ELECTRIC TRANSMISSON TOWERS
- NU DESIGN CRITERIA TABLE
- PCS SHAPE FACTOR CRITERIA
- WIRE LOADS SHEET

SECTION 4 - DRAWINGS

- TOWER AND MAST ELEVATION DRAWING

SECTION 5 - TIA-222-G LOAD CALCULATIONS FOR MAST ANALYSIS

- MAST WIND & ICE LOAD

SECTION 6 - MAST ANALYSIS PER TIA-222G

- LOAD CASES AND COMBINATIONS
- RISA 3-D ANALYSIS REPORT
- MAST CONNECTION TO TOWER ANALYSIS

SECTION 7 - NECS/NU LOAD CALCULATIONS

- MAST WIND LOAD

SECTION 8 - MAST ANALYSIS PER NESC/NU

- LOAD CASES AND COMBINATIONS
- RISA 3-D ANALYSIS REPORT

SECTION 9 - PLS POLE ANALYSIS

- COAX CABLE LOAD ON TOWER CALCULATION
- PLS REPORT
- ANCHOR BOLT ANALYSIS
- FOUNDATION ANALYSIS

SECTION 10 - REFERENCE MATERIAL

- RFDS SHEET
- EQUIPMENT CUT SHEETS

Introduction

The purpose of this report is to analyze the existing mast and 150' utility pole located on Sky Edge Lane in Bethel, CT for the proposed antenna and equipment upgrade by Verizon.

The existing/proposed loads consist of the following:

- SPRINT (Existing):
  Antennas: Three (3) RFS APXVSPP18-C panel antennas mounted on an existing 13-ft low profile platform with RAD center elevation of 157-ft 6-in above grade.
  Coax Cables: Eighteen (18) 1-5/8" ∅ coax cables running on the outside of the existing tower as indicated in section 4 of this report.
- VERIZON (EXISTING TO REMAIN):
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the outside of the tower as indicated in section 4 of this report.
- VERIZON (EXISTING TO REMOVE):
  Antennas: Three (3) Antel BXA-70063/6CF panel antennas and three (3) Antel WWX063X13G00 panel antennas mounted on three (3) dual standoff mounts with RAD center elevation of 167-ft 6-in above grade.
- **VERIZON (PROPOSED):**
  Antennas: Three (3) Andrew HBX-6516DS panel antennas, three (3) Andrew LNX-6513DS panel antennas and three (3) Bias Tees mounted on three (3) dual standoff mounts with RAD center elevation of 167-ft 6-in above grade.

Primary assumptions used in the analysis

- ASCE 48-05, "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 33-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-222G standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA-222-G loading and for NESC/NU 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-G, ASCE 48-05, "Design of Steel Transmission Pole Structures", NESC C2-2007 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 NU Design Criteria Table, NESC C2-2007 ~ Construction Grade B, and ASCE 48-05.

  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 C2-2007, 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 the NU Design Criteria Table, TIA-222-G and AISC standards.

Load cases considered:

Load Case 1:
Wind Speed.. 93 mph (2016 CSBC Appendix-N)
Radial Ice Thickness............................. 0"

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

Results

- MAST ASSEMBLY

The existing pipe mast was determined to be structurally adequate.

Component	Stress Ratio (percentage of capacity)	Result
12" Sch. 80 Pipe	68.6%	**PASS**
Connection to Tower	39.7%	**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 48-05, "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 **96.84%** occurs in the utility pole base plate 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 3	0.00' -51.17' (AGL)	95.01%	**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	96.84%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 8-ft ∅ x 20.5-ft long reinforced concrete caisson with a 24-ft square by 4-ft thick reinforced concrete mat installed at the periphery of the caisson. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 8-ft into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01143-60001.

BASE REACTIONS:

From PLS-Pole analysis of CL&P pole based on NESC/EVERSOURCE prescribed loads.

Load Case	Shear	Axial	Moment
NESC Heavy Wind	33.68 kips	126.22 kips	4165.11 ft-kips
NESC Extreme Wind	53.27 kips	63.62 kips	5995.33 ft-kips

Note 1 – 10% increase will be applied to tower base reactions 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	57.48%	PASS

FOUNDATION:

The foundation was found to be structurally adequate.

Foundation	Design Limit	Allowable Limit	Proposed Loading (2)	Result
Reinforced Conc. Caisson with Mat	Overturning	1.0 FS (1)	1.56 FS (1)	PASS

Note 1: FS denotes Factor of Safety
Note 2: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.

Conclusion

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 Verizon. 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-TOWER

PLS-TOWER is a Microsoft Windows program for the analysis and design of steel latticed towers used in electric power lines or communication facilities. Both self-supporting and guyed towers can be modeled. The program performs design checks of structures under user specified loads. For electric power structures it can also calculate maximum allowable wind and weight spans and interaction diagrams between different ratios of allowable wind and weight spans.

Modeling Features:

- Powerful graphics module (stress usages shown in different colors)
- Graphical selection of joints and members allows graphical editing and checking
- Towers can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces
- Can extract geometry and connectivity information from a DXF CAD drawing
- CAD design drawings, title blocks, drawing borders or photos can be tied to structure model
- XML based post processor interface
- Steel Detailing Neutral File (SDNF) export to link with detailing packages
- Can link directly to line design program PLS-CADD
- Automatic generation of structure files for PLS-CADD
- Databases of steel angles, rounds, bolts, guys, etc.
- Automatic generation of joints and members by symmetries and interpolations
- Automated mast generation (quickly builds model for towers that have regular repeating sections) via graphical copy/paste
- Steel angles and rounds modeled either as truss, beam or tension-only elements
- Guys are easily handled (can be modeled as exact cable elements)

Analysis Features:

- Automatic handling of tension-only members
- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Automatic calculation of tower dead, ice, and wind loads as well as 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
- Minimization of problems caused by unstable joints and mechanisms
- Automatic bandwidth minimization and ability to solve large problems
- Design checks according to (other standards can be added easily):
    - ASCE Standard 10-90

- AS 3995 (Australian Standard 3995)
- BS 8100 (British Standard 8100)
- EN50341-1 (CENELEC, both empirical and analytical methods are available)
- ECCS 1985
- NGT-ECCS
- PN-90/B-03200
- EIA/TIA 222-F
- ANSI/TIA 222-G
- CSA S37-01
- EDF/RTE Resal
- IS 802 (India Standard 802)

<u>Results Features:</u>

- Design summaries printed for each group of members
- 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
- Capability to batch run multiple tower configurations and consolidate the results
- Automated optimum angle member size selection and bolt quantity determination

Tool for interactive angle member sizing and bolt quantity determination.

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 a working strength/allowable stress design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed some defined percentage of failure strength (allowable stress).

ANSI Standard C2-2007 (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 "NU 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 2007 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

NU Design Criteria

Condition	Standard	Item	Basic Wind Speed V (MPH)	Pressure Q (PSF)	Height Factor Kz	Gust Factor Gh	Load or Stress Factor	Force Coef - Shape Factor
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (.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	1.00	1.00	2.50	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	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
Ice Condition	NESC Heavy	Conductors:	Conductor loads provided by NU					
High Wind Condtion	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
High Wind Condtion	NESC Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
High Wind Condtion	NESC Extreme Wind	Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
High Wind Condtion	NESC Extreme Wind	Conductors:	Conductor loads provided by NU					
NESC Extreme Ice with Wind Conditon*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
NESC Extreme Ice with Wind Conditon*		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
NESC Extreme Ice with Wind Conditon*		Conductors:	Conductor loads provided by NU					

* Only for Structures Installed after 2007

Shape Factor Criteria shall be per TIA Shape Factors.

2) STEP 2 - The electric transmission structure analysis and evaluation shall be performed in accordance with NESC requirements and shall include the mast and antenna loads determined from NESC applied loading conditions (not TIA/EIA Loads) on the structure and mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

The structure shall be analyzed using yield stress theory in accordance with Attachment A, "NU 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 NU).
c) Electric Transmission Structure
   i) The loads from the wireless communication equipment components based on NESC and NU 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) Shape Factor Multiplier:

NESC Structure Shape	Cd
Polyround (for polygonal steel poles)	1.3
Flat	1.6
Open Lattice	3.2

   iii) When Coaxial Cables are mounted along side 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	1.3

d) The uniform loadings and factors specified for the above components in Attachment A, "NU 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.

   Note: The NESC does not require ice load be included in the supporting structure. (Ice on conductors and shield wire only, and NU will provide these loads).

e) Mast reaction loads shall be evaluated for local effects on the transmission structure members at the attachment points.

INPUT DATA

TOWER ID: 10255

Structure Height (ft) : 150

Wind Zone : Central CT (green) **Wind Speed :** 90.5711047 mph

Tower Type : (•) Suspension ( ) Strain **Extreme Wind Model :** PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*3/8 AW*	*3/8 AW*
DESCRIPTION =	3/8	3/8
STRANDING =	7 #8 Al Weld	7 #8 Al Weld
DIAMETER =	0.385 in	0.385 in
WEIGHT =	0.262 lb/ft	0.262 lb/ft

Conductor Properties:

	BACK	AHEAD
NAME =	*BITTERN*	*BITTERN*
	1272.000	1272.000
	45/7 ACSR	45/7 ACSR
DIAMETER =	1.345 in	1.345 in
WEIGHT =	1.432 lb/ft	1.432 lb/ft
Number of Conductors per phase	2	2

Insulator Weight = 0 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	4,200	10,000	4,200	10,000
EXTREME WIND =	3,440	10,733	3,440	10,733
LONG. WIND =	na	na	na	na
250D COMBINED =	na	na	na	na
NESC W/O OLF =	na	na	na	na
60 DEG F NO WIND =	1,239	4,616	1,239	4,616

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	0	AHEAD:	0	**0**
WIND SPAN (ft) =	BACK:	441	AHEAD:	493	**934**
WEIGHT SPAN (ft) =	BACK:	544	AHEAD:	386	**931**

WIRE LOADING AT ATTACHMENTS

TOWER ID: 10255

Wind Span =	934	ft
Weight Span =	931	ft
Total Angle =	0	degrees

Broken Wire Span =	AHEAD SPAN
Type of Insulator Attachment =	SUSPENSION

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	1,078 lb	0 lb	1,134 lb	509 lb	6,930 lb	663 lb
Conductor =	3,651 lb	0 lb	7,201 lb	1,724 lb	33,000 lb	4,212 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	715 lb	0 lb	280 lb
Conductor =	4,999 lb	0 lb	3,065 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	280 lb
Conductor =	#VALUE!	#VALUE!	3,065 lb

4. NESC RULE 250D Extreme Ice & Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,846 lb
Conductor =	#VALUE!	#VALUE!	8,093 lb

5. NESC RULE 250B w/o OLF's

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	756 lb
Conductor =	#VALUE!	#VALUE!	4,800 lb

6. 60 Deg. F. No Wind

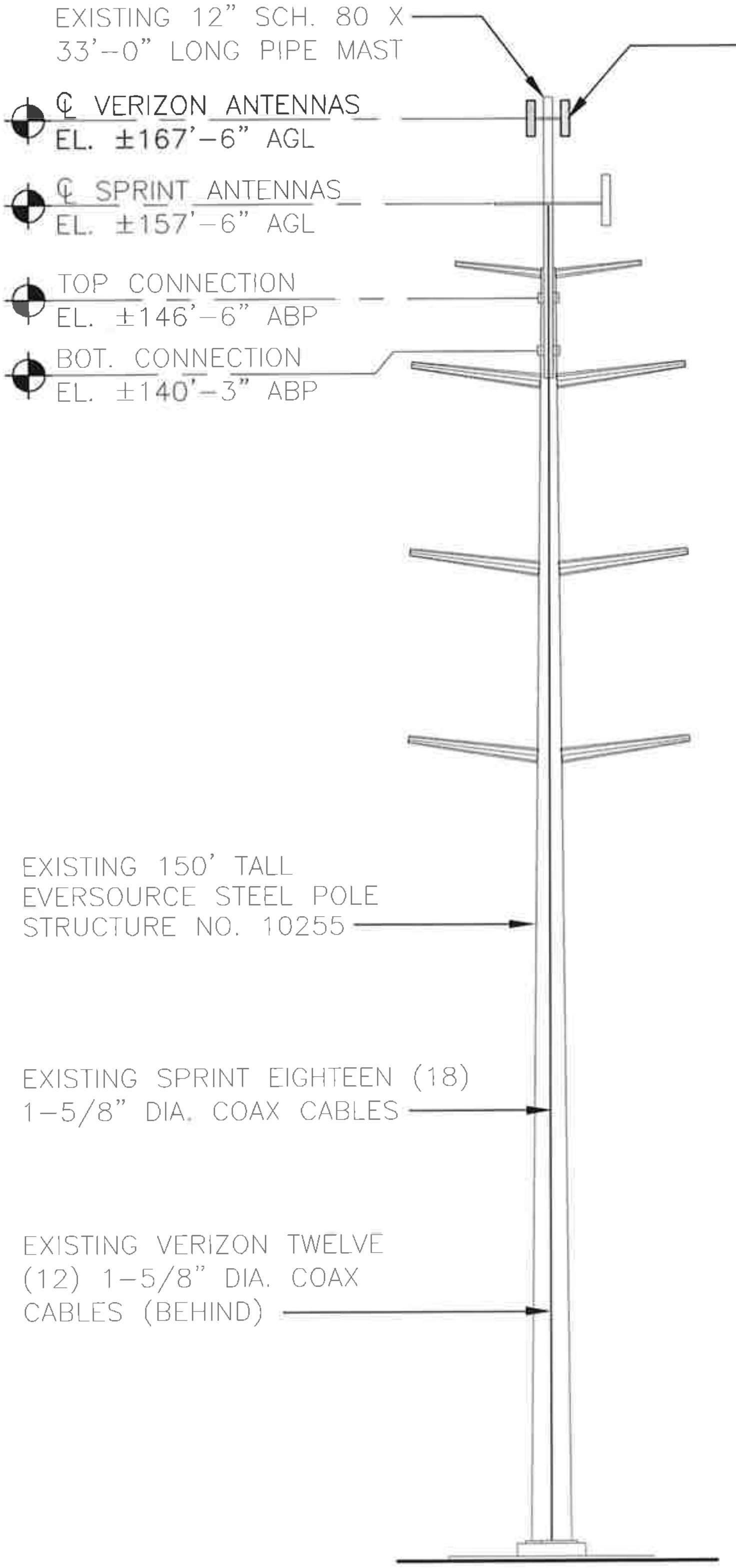
	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	244 lb
Conductor =	0 lb	0 lb	2,665 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	365 lb
Conductor =	0 lb	0 lb	3,998 lb

NOTE: All loads include required overload factors (OLF's).

LC 1		HORIZONTAL	LONGITUDINAL	VERTICAL
NESC Heavy	shield - back	509.2529583	6930	663.0142153
	shield - ahead	569.0041667	-6930	470.5537229
	SHIELD - SUM	**1078.257125**	**0**	**1133.567938**
	conductor - back	1724.473917	33000	4211.530273
	conductor - ahead	1926.808333	-33000	2989.002654
	CONDUCTOR - SUM	**3651.28225**	**0**	**7200.532927**
LC 2		**HORIZONTAL**	**LONGITUDINAL**	**VERTICAL**
Extreme Wind	shield - back	337.8929873	3956	163.872401
	shield - ahead	377.5383423	-3956	116.303341
	SHIELD - SUM	**715.4313296**	**0**	**280.175742**
	conductor - back	2360.862691	24685.9	1792.70648
	conductor - ahead	2637.8653	-24685.9	1272.31768
	CONDUCTOR - SUM	**4998.727991**	**0**	**3065.02416**
LC 3		**HORIZONTAL**	**LONGITUDINAL**	**VERTICAL**
Long. Wind	shield - back	#VALUE!	#VALUE!	163.872401
	shield - ahead	#VALUE!	#VALUE!	116.303341
	SHIELD - SUM	**#VALUE!**	**#VALUE!**	**280.175742**
	conductor - back	#VALUE!	#VALUE!	1792.70648
	conductor - ahead	#VALUE!	#VALUE!	1272.31768
	CONDUCTOR - SUM	**#VALUE!**	**#VALUE!**	**3065.02416**
LC 4		**HORIZONTAL**	**LONGITUDINAL**	**VERTICAL**
RULE 250D	shield - back	#VALUE!	#VALUE!	1079.952555
	shield - ahead	#VALUE!	#VALUE!	766.4627447
	SHIELD - SUM	**#VALUE!**	**#VALUE!**	**1846.4153**
	conductor - back	#VALUE!	#VALUE!	4733.36118
	conductor - ahead	#VALUE!	#VALUE!	3359.355913
	CONDUCTOR - SUM	**#VALUE!**	**#VALUE!**	**8092.717093**
LC 5		**HORIZONTAL**	**LONGITUDINAL**	**VERTICAL**
NESC w/o OLF's	shield - back	#VALUE!	#VALUE!	442.0094769
	shield - ahead	#VALUE!	#VALUE!	313.7024819
	SHIELD - SUM	**#VALUE!**	**#VALUE!**	**755.7119588**
	conductor - back	#VALUE!	#VALUE!	2807.686849
	conductor - ahead	#VALUE!	#VALUE!	1992.668436
	CONDUCTOR - SUM	**#VALUE!**	**#VALUE!**	**4800.355285**
LC 6		**HORIZONTAL**	**LONGITUDINAL**	**VERTICAL**
Raking	shield - back	0	1239	142.49774
	shield - ahead	0	-1239	101.13334
	SHIELD - SUM	**0**	**0**	**243.63108**
	conductor - back	0	9232	1558.8752
	conductor - ahead	0	-9232	1106.3632
	CONDUCTOR - SUM	**0**	**0**	**2665.2384**
LC 6		**HORIZONTAL**	**LONGITUDINAL**	**VERTICAL**
60 DEG F NO WIND	shield - back	0	1858.5	213.74661
	shield - ahead	0	-1858.5	151.70001
	SHIELD - SUM	**0**	**0**	**365.44662**
	conductor - back	0	13848	2338.3128
	conductor - ahead	0	-13848	1659.5448
	CONDUCTOR - SUM	**0**	**0**	**3997.8576**



VERIZON (EXISTING TO REMOVE):
THREE (3) ANTEL BXA-70063/6CF PANEL ANTENNAS AND THREE (3) ANTEL WWX063X13G00 PANEL ANTENNAS MOUNTED ON THREE (3) DUAL STANDOFF MOUNTS

VERIZON (PROPOSED):
THREE (3) ANDREW HBX-6516DS PANEL ANTENNAS, THREE (3) ANDREW LNX-6513DS PANEL ANTENNAS AND THREE (3) BIAS TEEs MOUNTED ON THREE (3) DUAL STANDOFF MOUNTS

1 / EL-1 TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

REVISIONS		
00	3/21/17	ISSUED FOR NU REVIEW

CENTEK engineering
Centered on Solutions℠
www.CentekEng.com
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road, Branford, CT 06405

BETHEL NORTH
10255

SKY EDGE LANE
BETHEL, CT 06801

PROJECT NO:	17032.01
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	3/21/17

TOWER AND MAST ELEVATION

EL-1

DWG. 1 OF 1

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

Wind Speeds

Basic Wind Speed $V := 93$ mph (User Input - 2016 CSBC Appendix N)

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

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 = $z_{ant} := 167.5$ ft (User Input)

Radial Ice Thickness = $t_i := 0.75$ in (User Input per Annex B of TIA-222-G)

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

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

$K_a := 1.0$ (User Input)

Gust Response Factor = $G_H := 1.35$ (User Input)

Output

Wind Direction Probability Factor = $K_d := \begin{cases} 0.95 \text{ if Structure\_Type = Pole} \\ 0.85 \text{ if Structure\_Type = Lattice} \end{cases} = 0.95$ (Per Table 2-2 of TIA-222-G)

Importance Factors = $I_{Wind} := \begin{cases} 0.87 \text{ if } SC = 1 \\ 1.00 \text{ if } SC = 2 \\ 1.15 \text{ if } SC = 3 \end{cases} = 1.15$ (Per Table 2-3 of TIA-222-G)

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

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

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.176$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.206$$

Velocity Pressure Coefficient = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.411$

Velocity Pressure w/o Ice = $qz_{ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot K_{zt} \cdot V^2 \cdot I_{Wind} = 34.126$

Velocity Pressure with Ice = $qz_{ice.ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot K_{zt} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 8.578$

Development of Wind & Ice Load on Mast

Mast Data: (Pipe 12" SCH. 80) (User Input)

Mast Shape = Round (User Input)

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

Mast Length = $L_{mast} := 30$ ft (User Input)

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

Mast Aspect Ratio = $Ar_{mast} := \frac{12L_{mast}}{D_{mast}} = 28.2$

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

Wind Load (without ice)

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

Total Mast Wind Force = $qz_{ant} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 59$ plf **BLC 5**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{iz})}{12} = 1.43$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.ant} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 20$ 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 = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + t_{iz} \cdot 2)^2 - D_{mast}^2\right] = 103.6$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 40$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:	(Verizon)		
Antenna Model =	Andrew LNX-6513DS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 54.7$	in	(User Input)
Antenna Width =	$W_{ant} := 11.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.1$	in	(User Input)
Antenna Weight =	$WT_{ant} := 31.1$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.6$		
Antenna Force Coefficient =	$Ca_{ant} = 1.29$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.5$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 13.6$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 808$	lbs	BLC 5

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.7$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 20.1$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 301$	lbs	BLC 4

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 93$	lbs	BLC 2

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4622$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 6478$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 210$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 630$	lbs	BLC 3

Development of Wind & Ice Load on Antennas

Antenna Data: (Verizon)

Antenna Model =	Andrew HBX-6516DS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 51.4$	in	(User Input)
Antenna Width =	$W_{ant} := 6.5$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 11$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 7.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.43$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.3$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 7$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 459$	lbs	BLC 5

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 4.2$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 12.7$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 210$	lbs	BLC 4

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 33$	lbs	BLC 2

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1103$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 3594$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 116$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 349$	lbs	BLC 3

Development of Wind & Ice Load on Antennas

Antenna Data: (Verizon)

Antenna Model =	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)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 0.4$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 24$	lbs	**BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 0.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 1.7$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 24$	lbs	**BLC 4**

Gravity Load (without ice)

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

Gravity Loads (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 =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 481$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 16$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 47$	lbs	**BLC 3**

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject:	Equipmnet Loads on Structure #10255
Location:	Bethel, CT
Rev. 1: 5/8/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 17032.01

Development of Wind & Ice Load on Antenna Mounts

Mount Data: (Verizon)

Mount Type: Dual Standoff Mount
B1827 w/ 6 Pipe Mounts

Platform Shape =	Flat		(User Input)	
Platform Area =	$A_{plt} := 7$	sq ft	(User Input)	(Force Coefficient Included)
Platform Area w/ Ice =	$A_{ICE.plt} := 10$	sq ft	(User Input)	(Force Coefficient Included)
Platform Weight =	$WT_{plt} := 575$	lbs	(User Input)	
Platform Weight w/ Ice =	$WT_{ICE.plt} := 800$	lbs	(User Input)	

Wind Load (without ice)

Total Platform Wind Force =	$F_{plt} := qz_{ant} \cdot G_H \cdot A_{plt} = 322$	lbs	BLC 5

Wind Load (with ice)

Total Platform Wind Force w/ Ice =	$Fi_{plt} := qz_{ice.ant} \cdot G_H \cdot A_{ICE.plt} = 116$	lbs	BLC 4

Gravity Load (without ice)

Weight of Platform =	$WT_{plt} = 575$	lbs	BLC 2

Gravity Loads (ice only)

Weight of Ice on Platform =	$WT_{ICE.plt} - WT_{plt} = 225$	lbs	BLC 3

Development of Wind & Ice Load on Antennas

Antenna Data:	(Sprint)		
Antenna Model =	ARFS APXVSPP18-C		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 11.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 57$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 6.1$		
Antenna Force Coefficient =	$Ca_{ant} = 1.36$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.9$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 17.7$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 1109$	lbs	BLC 5

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 8.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 25.8$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 406$	lbs	BLC 4

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 171$	lbs	BLC 2

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5947$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 8189$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 265$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 796$	lbs	BLC 3

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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: Equipmnet Loads on Structure #10255

Location: Bethel, CT

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 17032.01

Rev. 1: 5/8/17

Development of Wind & Ice Load on Antenna Mounts

Mount Data:	(Sprint)			
Mount Type:	13-ft Low Profile Platform			
Platform Shape =	Flat		(User Input)	
Platform Area =	$A_{plt} := 20$	sq ft	(User Input)	(Force Coefficient Included)
Platform Area w/ Ice =	$A_{ICE.plt} := 25$	sq ft	(User Input)	(Force Coefficient Included)
Platform Weight =	$WT_{plt} := 1500$	lbs	(User Input)	
Platform Weight w/ Ice =	$WT_{ICE.plt} := 2000$	lbs	(User Input)	

Wind Load (without ice)

Total Platform Wind Force =	$F_{plt} := qz_{ant} \cdot G_H \cdot A_{plt} = 921$	lbs	BLC 5

Wind Load (with ice)

Total Platform Wind Force w/ Ice =	$Fi_{plt} := qz_{ice.ant} \cdot G_H \cdot A_{ICE.plt} = 289$	lbs	BLC 4

Gravity Load (without ice)

Weight of Platform =	$WT_{plt} = 1500$	lbs	BLC 2

Gravity Loads (ice only)

Weight of Ice on Platform =	$WT_{ICE.plt} - WT_{plt} = 500$	lbs	BLC 3

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (Bottom Mast to Sprint Antennas)

Coax Type =	HELIAX 1-5/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)
Coax Cable Length =	$L_{coax} := 31$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 30$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 4$		(User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 187.9$

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

Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.7$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{ant} \cdot G_H \cdot A_{coax} = 36$ plf **BLC 5**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot t_{iz})}{12} = 1$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.ant} \cdot G_H \cdot AICE_{coax} = 14$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 31$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot t_{iz})^2 - D_{coax}^2\right] = 29$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 338$ plf **BLC 3**

CENTEK engineering Centered on Solutions™ www.centekeng.com 63-2 North Branford Road P: (203) 488-0580 Branford, CT 06405 F: (203) 488-8587	Subject:	Equipmnet Loads on Structure #10255
	Location:	Bethel, CT
	Rev. 1: 5/8/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 17032.01

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (Above Sprint Antennas)

Coax Type = HELIAX 1-5/8"

Shape = Round (User Input)

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

Coax Cable Length = $L_{coax} := 31$ ft (User Input)

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

Total Number of Coax = $N_{coax} := 12$ (User Input)

No. of Coax Projecting Outside Face of PCS Mast = $NP_{coax} := 2$ (User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 187.9$

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

Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.3$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{ant} \cdot G_H \cdot A_{coax} = 18$ plf **BLC 5**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot t_{iz})}{12} = 0.7$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.ant} \cdot G_H \cdot AICE_{coax} = 10$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 12$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot t_{iz})^2 - D_{coax}{}^2\right] = 29$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 135$ plf **BLC 3**

CENTEK engineering, INC. Consulting Engineers 63-2 North Branford Road Branford, CT 06405 Ph. 203-488-0580 / Fax. 203-488-8587	Subject: **Analysis of TIA-222G Wind and Ice Loads for Analysis of Mast Only** **Tabulated Load Cases** Location: **Bethel, CT** Date: 3/20/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 17032.01

Load Case	Description
1	Self Weight (Mast)
2	Weight of Appurtenances
3	Weight of Ice Only
4	TIA Wind with Ice
5	TIA Wind

Footnotes:

CENTEK engineering, INC.
Consulting Engineers
63-2 North Branford Road
Branford, CT 06405
Ph. 203-488-0580 / Fax. 203-488-8587

Subject: **Analysis of TIA-222G Wind and Ice Loads for Analysis of Mast Only**
Load Combinations Table

Location: **Bethel, CT**
Date: 3/20/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 17032.01

Load Combination	Description	Envelope Soultion	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.2D + 1.6W		1	Y	1	1.2	2	1.2	5	1.6				
2	0.9D + 1.6W		1	Y	1	0.9	2	0.9	5	1.6				
3	1.2D + 1.0Di + 1.0Wi		1	Y	1	1.2	2	1.2	3	1.0	4	1.0		

Footnotes:
BLC = Basic Load Case
D = Dead Load
Di = Dead Load of Ice
W = Wind Load
W = Wind Load w/ Ice

(Global) Model Settings

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

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

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 (\1E...	Density[k/ft...	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	Beam	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[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Mast	14			Lbyy						Lateral
2	M2	Mast	19			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	BOTMAST	FLANGE			Mast	Beam	Pipe	A53 Gr. B	Typical
2	M2	FLANGE	TOPMAST			Mast	Beam	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	BOTMAST	0	0	0	0	
2	BOTCONNECTION	0	3.25	0	0	
3	TOPCONNECTION	0	9.42	0	0	
4	FLANGE	0	14	0	0	
5	TOPMAST	0	33	0	0	

Joint Boundary Conditions

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

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.093	16.5
2	M2	Y	-.033	16.5
3	M2	Y	-.006	16.5
4	M2	Y	-.575	16.5
5	M2	Y	-.171	6.5
6	M2	Y	-1.5	6.5

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.63	16.5
2	M2	Y	-.349	16.5
3	M2	Y	-.047	16.5
4	M2	Y	-.225	16.5
5	M2	Y	-.796	6.5
6	M2	Y	-.5	6.5

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.301	16.5
2	M2	X	.21	16.5
3	M2	X	.024	16.5
4	M2	X	.116	16.5
5	M2	X	.406	6.5
6	M2	X	.289	6.5

Member Point Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.808	16.5
2	M2	X	.459	16.5
3	M2	X	.024	16.5
4	M2	X	.322	16.5
5	M2	X	1.109	6.5
6	M2	X	.921	6.5

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.031	-.031	0	0
2	M2	Y	-.031	-.031	0	6.5
3	M2	Y	-.012	-.012	6.5	16.5

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

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.04	-.04	0	0
2	M2	Y	-.04	-.04	0	0
3	M1	Y	-.338	-.338	0	0
4	M2	Y	-.338	-.338	0	6.5
5	M2	Y	-.135	-.135	6.5	16.5

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

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.02	.02	0	0
2	M2	X	.02	.02	0	0
3	M1	X	.014	.014	0	0
4	M2	X	.014	.014	0	6.5
5	M2	X	.01	.01	6.5	16.5

Member Distributed Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.059	.059	0	0
2	M2	X	.059	.059	0	0
3	M1	X	.036	.036	0	0
4	M2	X	.036	.036	0	6.5
5	M2	X	.018	.018	6.5	16.5

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Self Weight	None		-1						
2	Weight of Appurtenan...	None					6	3		
3	Weight of Ice Only	None					6	5		
4	TIA Wind with Ice	None					6	5		
5	TIA Wind	None					6	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	1.2D + 1.6W	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D +1.0Di + 1.0Wi	Yes	Y		1	1.2	2	1.2	3	1	4	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	BOTCONNECT...	max	19.321	1	3.083	3	0	1	0	1	0	1	0	1
2		min	4.642	3	.516	2	0	1	0	1	0	1	0	1
3	TOPCONNECT...	max	-7.035	3	15.181	3	0	1	0	1	0	1	0	1
4		min	-29.734	1	4.072	2	0	1	0	1	0	1	0	1
5	Totals:	max	-2.393	3	18.264	3	0	1						
6		min	-10.413	2	4.589	2	0	1						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	BOTMAST	max	.086	1	0	2	0	1	0	1	0	1	2.195e-03	1
2		min	.02	3	0	3	0	1	0	1	0	1	5.25e-04	3
3	BOTCONNECT...	max	0	3	0	2	0	1	0	1	0	1	2.179e-03	1
4		min	0	1	0	3	0	1	0	1	0	1	5.215e-04	3
5	TOPCONNECT...	max	0	1	0	2	0	1	0	1	0	1	-1.179e-03	3
6		min	0	3	0	3	0	1	0	1	0	1	-4.926e-03	1
7	FLANGE	max	.534	1	0	2	0	1	0	1	0	1	-3.314e-03	3
8		min	.128	3	-.002	3	0	1	0	1	0	1	-1.38e-02	1
9	TOPMAST	max	5.425	1	-.001	2	0	1	0	1	0	1	-5.863e-03	3
10		min	1.315	3	-.005	3	0	1	0	1	0	1	-2.405e-02	1

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

	Member	Shape	Code Check	Loc[ft]	LC	Shear...	Loc[ft]	Dir	LC	phi*Pnc...	phi*Pnt...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M1	PIPE_12.0X	.686	9.479	1	.125	9.333		1	511.638	551.25	184.275	184.275	1...	H1-1b
2	M2	PIPE_12.0X	.473	0	1	.050	0		1	480.506	551.25	184.275	184.275	2...	H1-1b

Joint Reactions

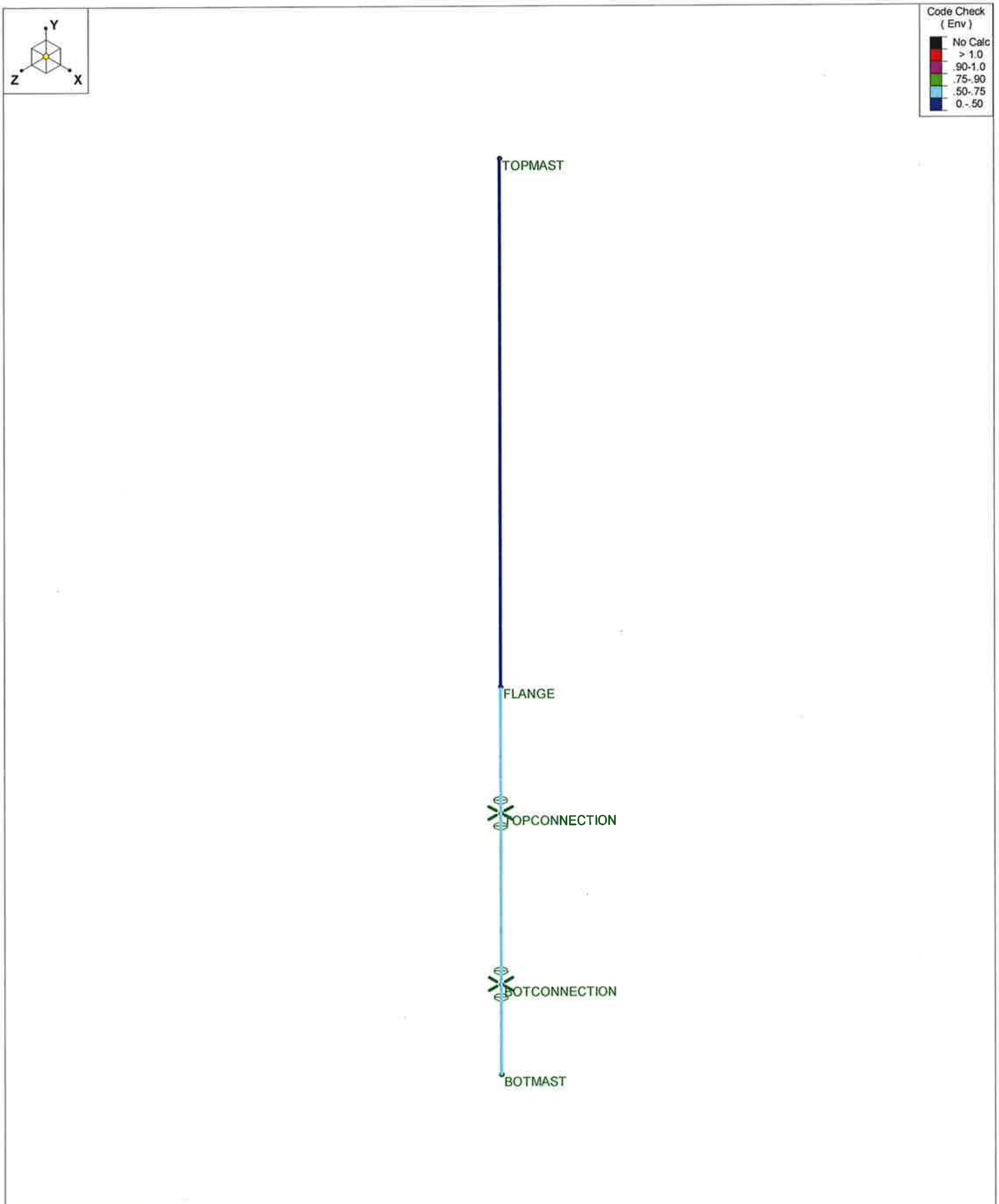
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTCONNECTION	19.321	.688	0	0	0	0
2	1	TOPCONNECTION	-29.734	5.43	0	0	0	0
3	1	Totals:	-10.413	6.118	0			
4	1	COG (ft):	X: 0	Y: 19.185	Z: 0			

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTCONNECTION	19.274	.516	0	0	0	0
2	2	TOPCONNECTION	-29.687	4.072	0	0	0	0
3	2	Totals:	-10.413	4.589	0			
4	2	COG (ft):	X: 0	Y: 19.185	Z: 0			

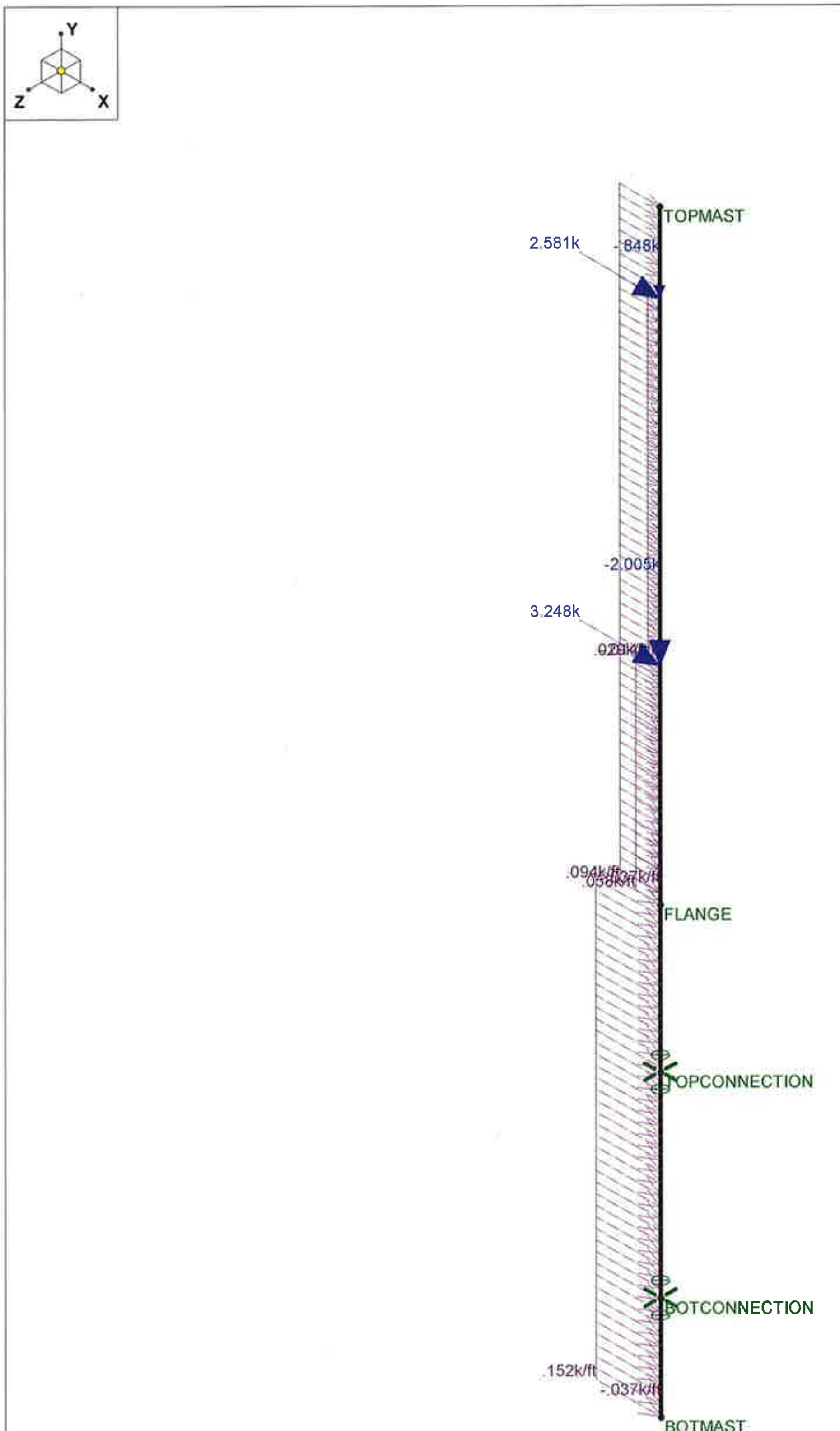
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	BOTCONNECTION	4.642	3.083	0	0	0	0
2	3	TOPCONNECTION	-7.035	15.181	0	0	0	0
3	3	Totals:	-2.393	18.264	0			
4	3	COG (ft):	X: 0	Y: 16.936	Z: 0			



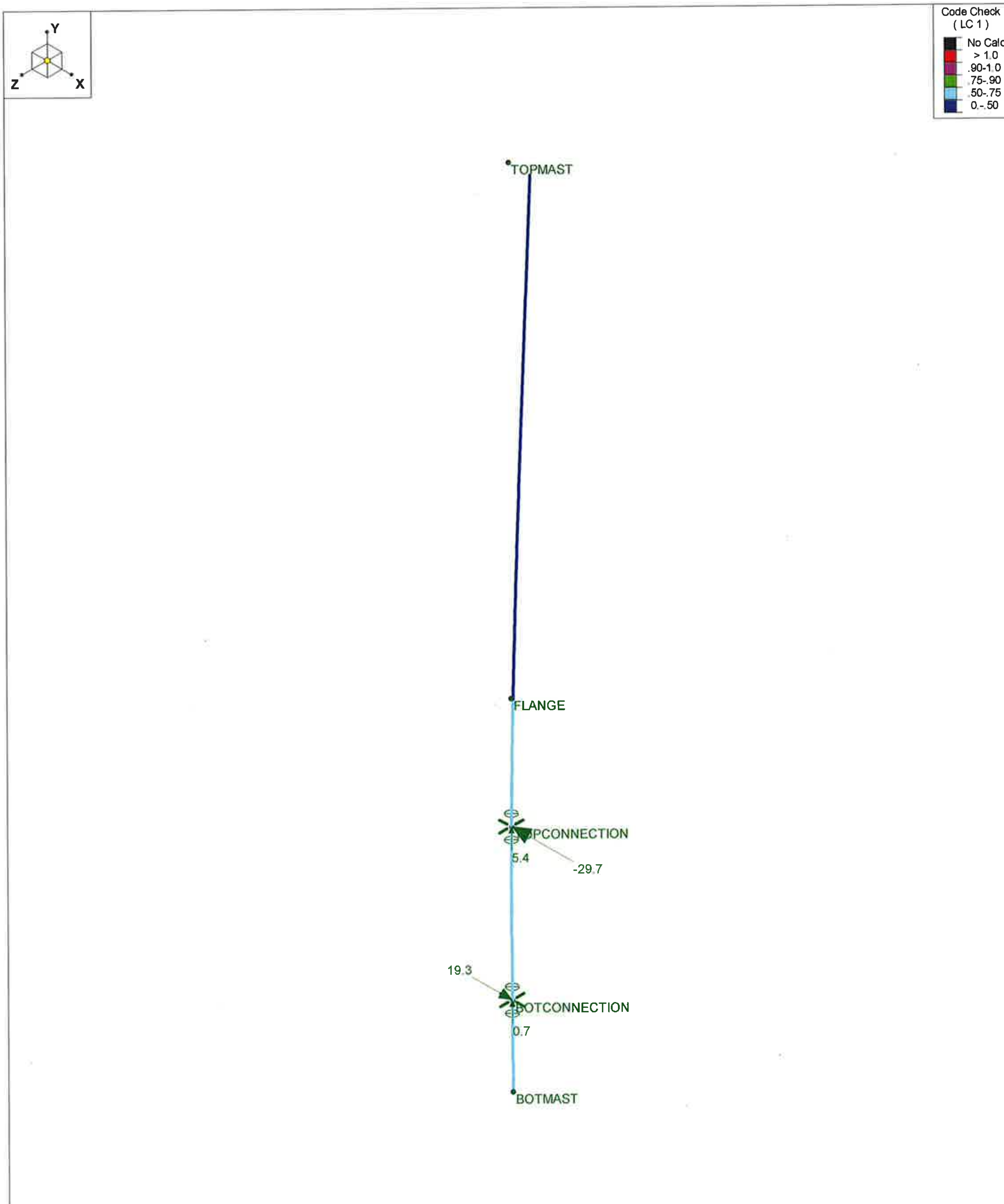
Envelope Only Solution

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10255 - Mast	May 8, 2017 at 1:03 PM
17032.01 / Verizon Bethel ...	Unity Check	TIA.r3d



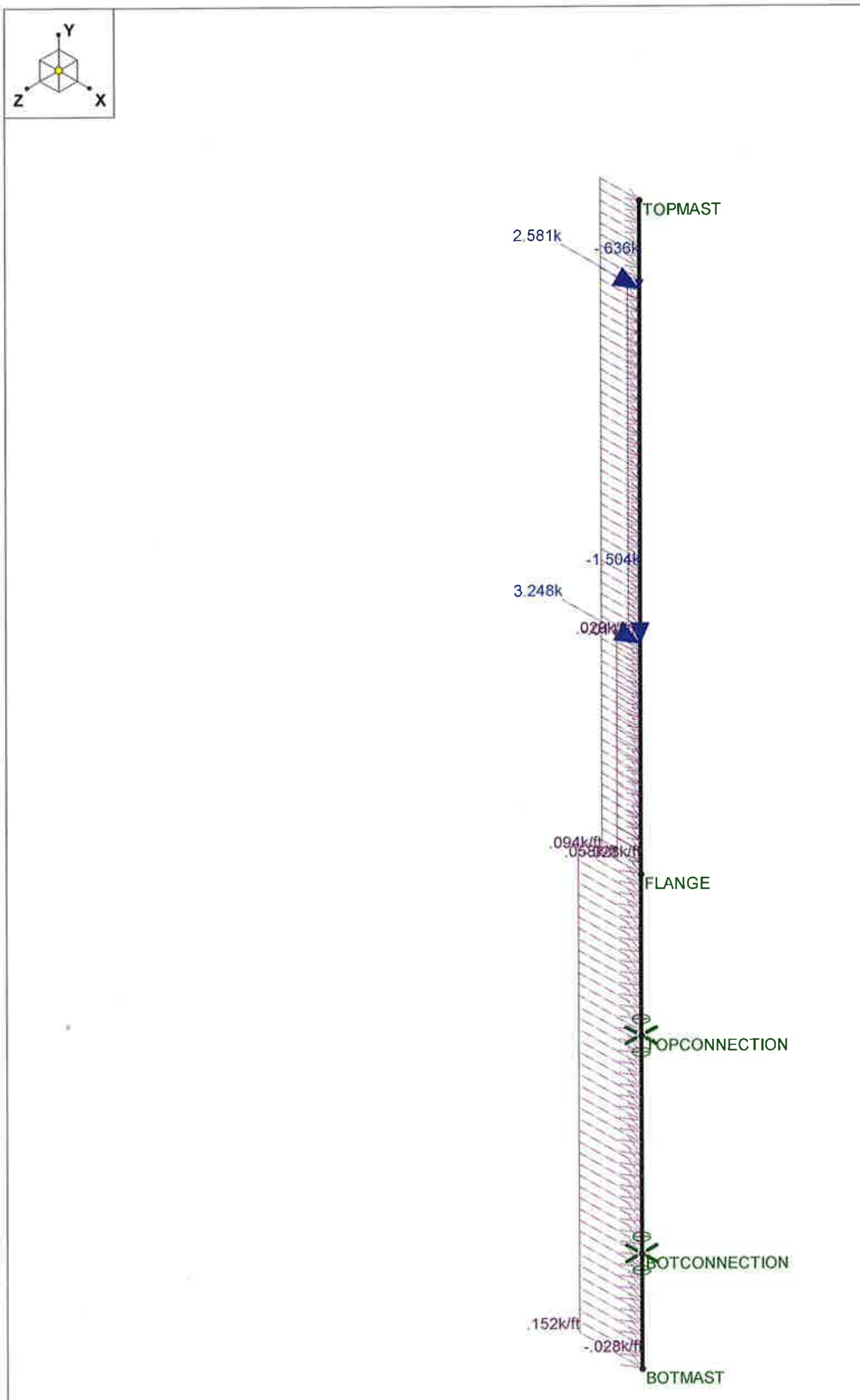
Loads: LC 1, 1.2D + 1.6W

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10255 - Mast	May 8, 2017 at 1:03 PM
17032.01 / Verizon Bethel ...	LC #1 Loads	TIA.r3d



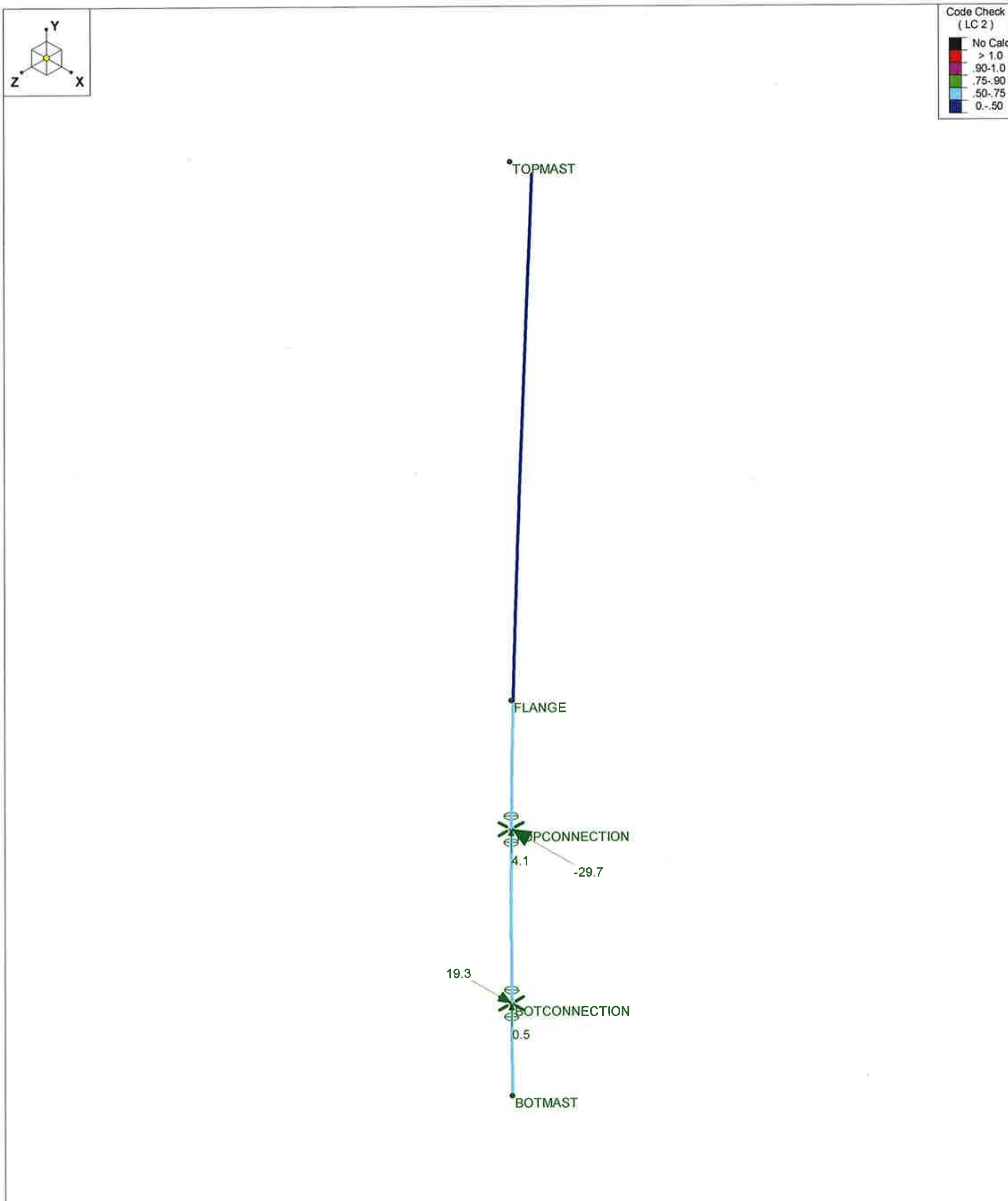
Results for LC 1, 1.2D + 1.6W
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.	Strcuture #10255 - Mast	
tjl, cfc		May 8, 2017 at 1:05 PM
17032.01 / Verizon Bethel ...	LC #1 Reactions and Deflected Shape	TIA.r3d



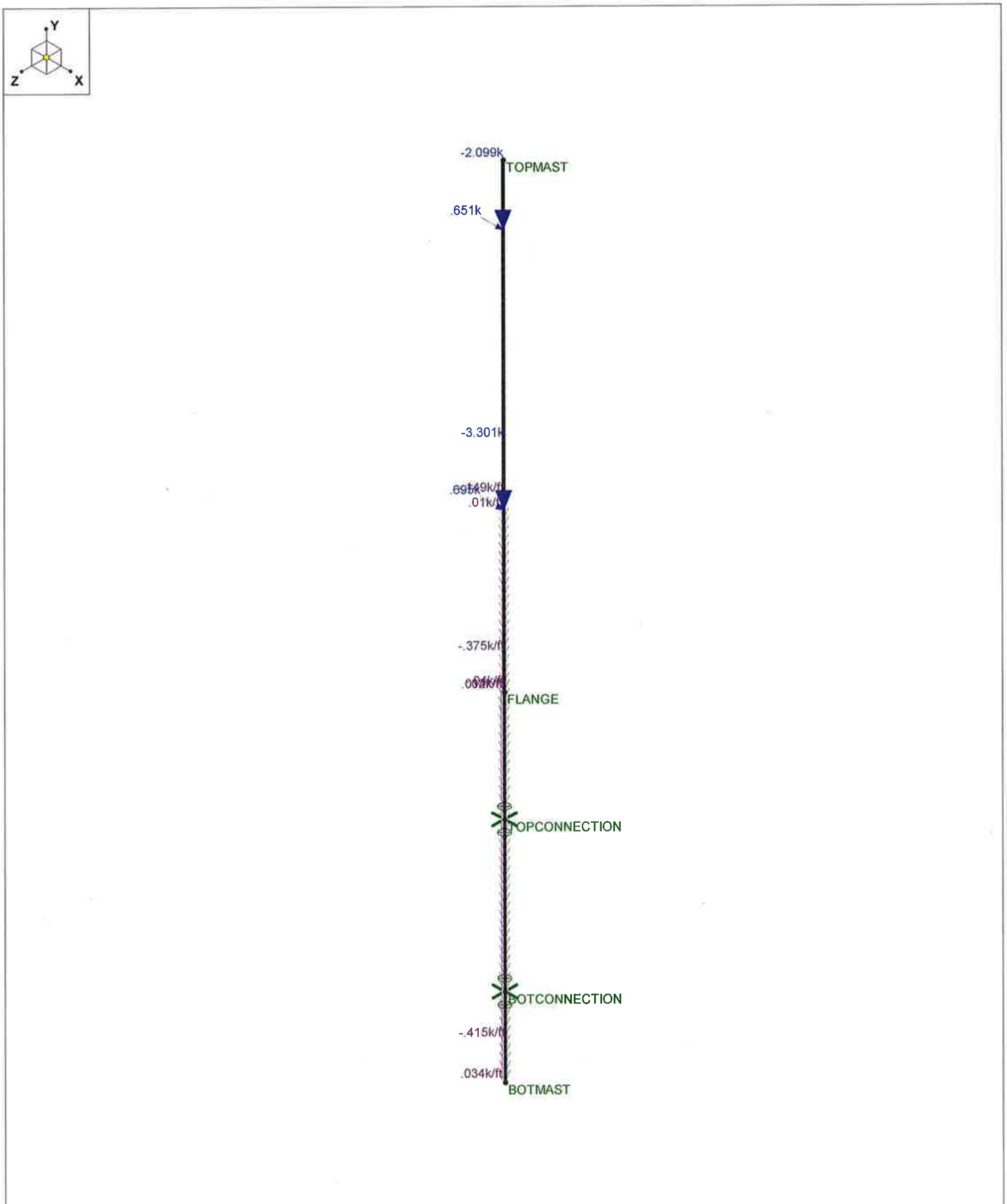
Loads: LC 2, 0.9D + 1.6W

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10255 - Mast	May 8, 2017 at 1:04 PM
17032.01 / Verizon Bethel ...	LC #2 Loads	TIA.r3d



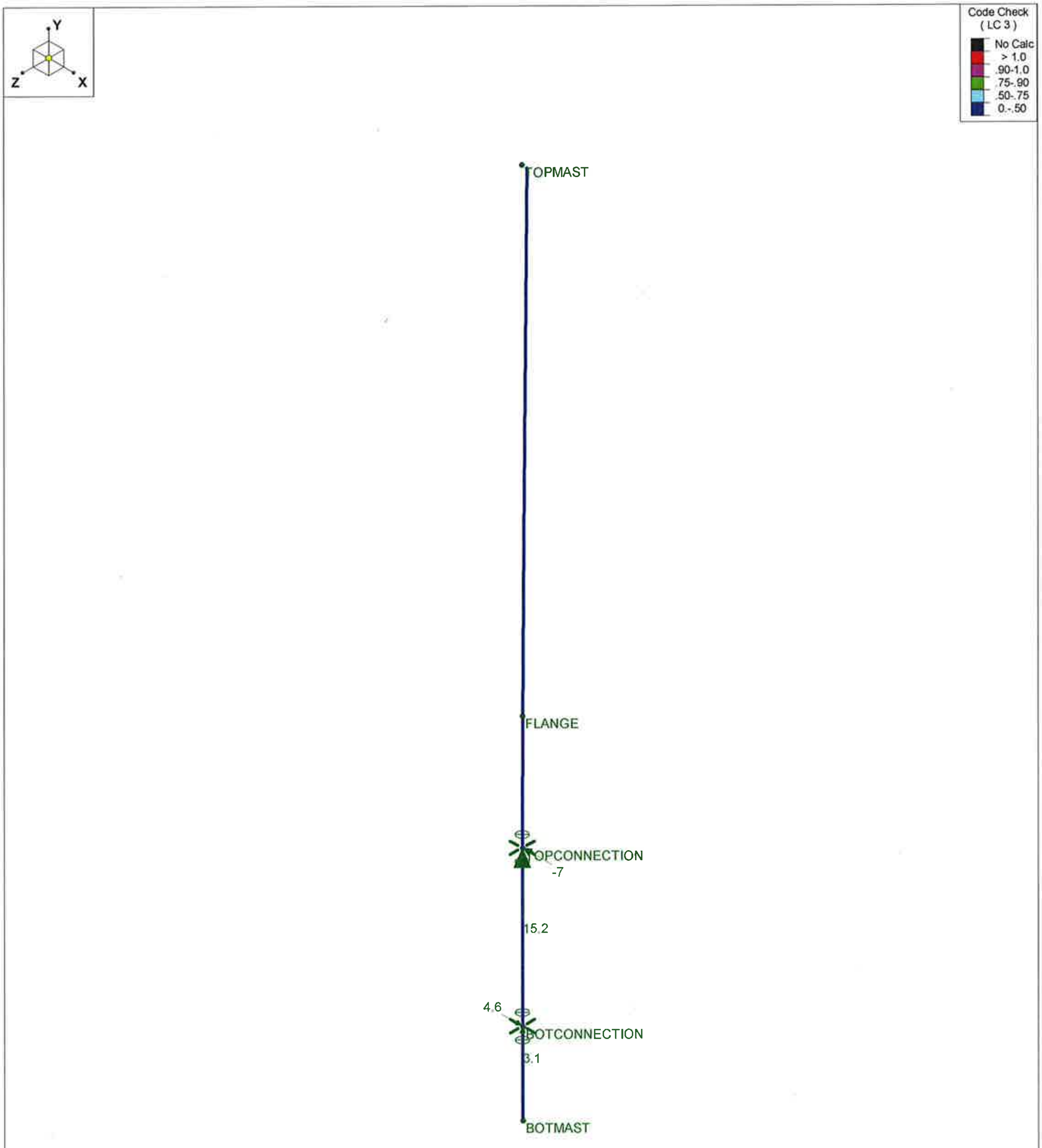
Results for LC 2, 0.9D + 1.6W
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10255 - Mast	May 8, 2017 at 1:05 PM
17032.01 / Verizon Bethel ...	LC #2 Reactions and Deflected Shape	TIA.r3d



Loads: LC 3, 1.2D +1.0Di + 1.0Wi

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10255 - Mast	May 8, 2017 at 1:04 PM
17032.01 / Verizon Bethel ...	LC #3 Loads	TIA.r3d

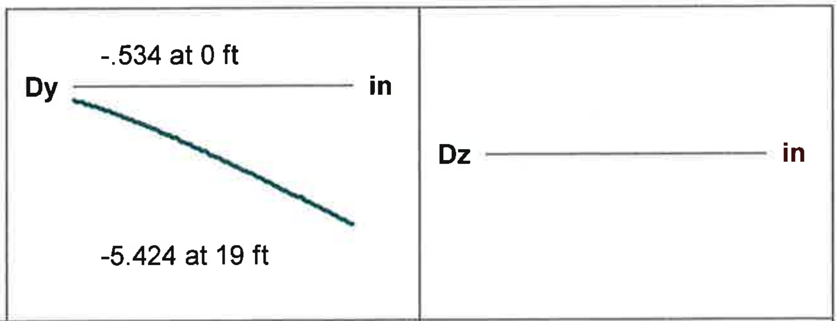


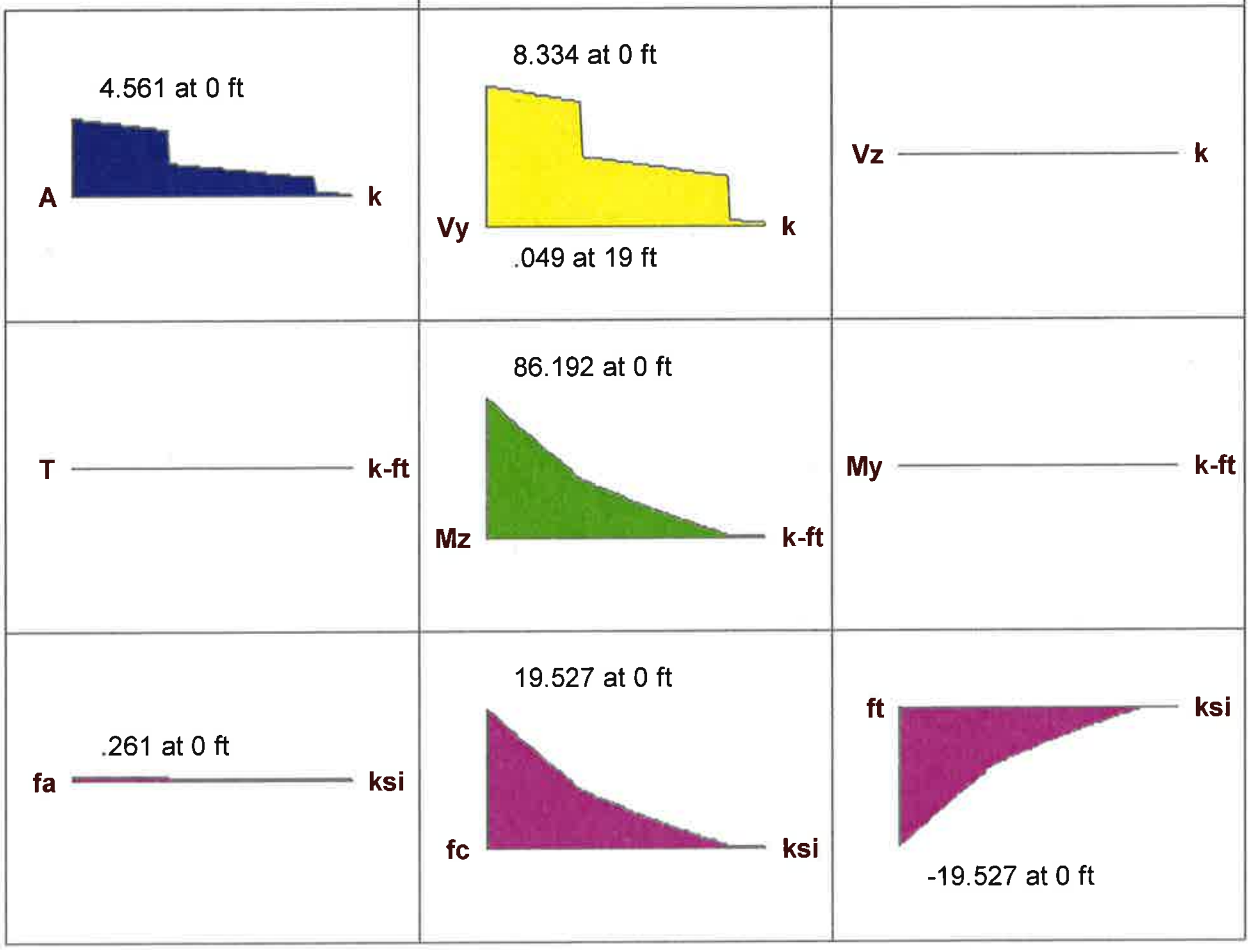
Results for LC 3, 1.2D +1.0Di + 1.0Wi
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Strcuture #10255 - Mast	May 8, 2017 at 1:06 PM
17032.01 / Verizon Bethel ...	LC #3 Reactions and Deflected Shape	TIA.r3d

Beam: ***M2***

Shape: **PIPE_12.0X**
Material: **A53 Gr. B**
Length: **19 ft**
I Joint: **FLANGE**
J Joint: **TOPMAST**
LC 1: 1.2D + 1.6W
Code Check: **0.472 (bending)**
Report Based On 97 Sections





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

Direct Analysis Method

Max Bending Check	**0.472**	Max Shear Check	**0.050 (s)**
Location	**0 ft**	Location	**0 ft**
Equation	**H1-1b**	Max Defl Ratio	**L/47**
Bending	**Compact**	Compression	**Non-Slender**

			y-y	z-z
Fy	**35 ksi**	Lb	**19 ft**	**19 ft**
phi*Pnc	**480.506 k**	KL/r	**51.803**	**51.803**
phi*Pnt	**551.25 k**			
phi*Mny	**184.275 k-ft**	L Comp Flange	**19 ft**	
phi*Mnz	**184.275 k-ft**	L-torque	**19 ft**	
phi*Vny	**165.375 k**	Tau_b	**1**	
phi*Vnz	**165.375 k**			
phi*Tn	**175.038 k-ft**			
Cb	**2.264**			

CENTEK engineering
Centered on Solutions™ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: Mast Connection to Pole # 10255

Location: Bethel, CT

Rev. 0: 3/21/17

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 17032.01

Mast Connection:

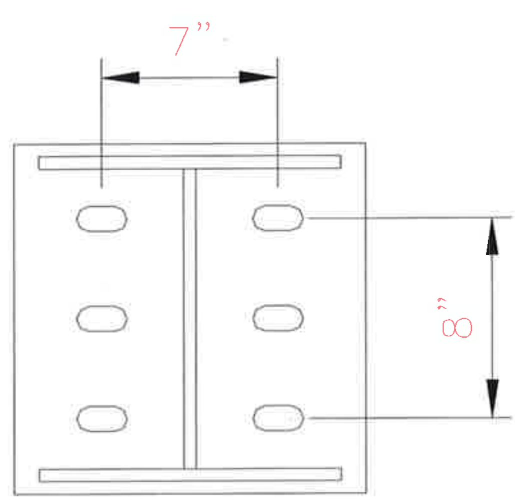
Maximum Design Reactions at Brace:

Vertical =	$Vert := 5.4 \cdot kips$	(User Input)
Horizontal =	$Horz := 29.7 \cdot kips$	(User Input)
Moment =	$Moment := 0$	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 6$	(User Input)
Bolt Diameter =	$d_b := 1.0in$	(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 = $f_v := \frac{Vert}{n_b \cdot a_b} = 1.146 \cdot ksi$

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

$Condition1 = \text{"OK"}$

$\frac{f_v}{(\phi \cdot F_{nv})} = 2.8 \cdot \%$

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

Tension Force Each Bolt = $F_{tension.bolt} := \frac{Horz}{n_b} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 9 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.bolt}}{a_b} = 11.5 \cdot ksi$

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

$Condition2 = \text{"OK"}$

$\frac{f_t}{(\phi \cdot F'_{nt})} = 17 \cdot \%$

Wind Acting Perpendicular to Stiffiner Plate:

Shear Stress per Bolt = $f_v := \frac{\sqrt{Vert^2 + Horz^2}}{n_b \cdot a_b} = 6.406 \cdot ksi$

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

$Condition3 = \text{"OK"}$

$\frac{f_v}{(\phi \cdot F_{nv})} = 15.8 \cdot \%$

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

Tension Force per Bolt = $F_{tension.conn} := \frac{Horz \cdot e}{S_{horz} \cdot \frac{n_b}{2}} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 21.021 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.conn}}{a_b} = 26.765 \cdot ksi$

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

$Condition4 = \text{"OK"}$

$\frac{f_t}{(\phi \cdot F'_{nt})} = 39.7 \cdot \%$

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment = $OM := 86.2 \cdot ft \cdot kips$ (Input From Risa3D)

Shear Force = $Shear := 8.3 \cdot kips$ (Input From Risa3D)

Axial Force = $Axial := 4.6 \cdot kips$ (Input From Risa3D)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts = $N := 8$ (User Input)

Diameter of Bolt Circle = $D_{bc} := 17 \cdot in$ (User Input)

Bolt Minimum Tensile Strength = $F_{ub} := 120 \cdot ksi$ (User Input)

Bolt Modulus = $E := 29000 \cdot ksi$ (User Input)

Diameter of Flange Bolts = $D := 1.00 \cdot in$ (User Input)

Threads per Inch = $n := 8$ (User Input)

Flange Plate Data:

Use ASTM A36

Plate Yield Strength = $Fy_{bp} := 36 \cdot ksi$ (User Input)

Flange Plate Thickness = $t_{bp} := 1.0 \cdot in$ (User Input)

Flange Plate Diameter = $D_{bp} := 20 \cdot in$ (User Input)

Outer Pole Diameter = $D_{pole} := 12.8 \cdot in$ (User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 8.5 \cdot in$

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

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

$d_1 = 6.01 \cdot in$	$d_7 = -6.01 \cdot in$
$d_2 = 8.50 \cdot in$	$d_8 = -0.00 \cdot in$
$d_3 = 6.01 \cdot in$	$d_9 = \blacksquare \cdot in$
$d_4 = 0.00 \cdot in$	$d_{10} = \blacksquare \cdot in$
$d_5 = -6.01 \cdot in$	$d_{11} = \blacksquare \cdot in$
$d_6 = -8.50 \cdot in$	$d_{12} = \blacksquare \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 6.4 \cdot in$

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

$MA_1 = 0.00 \cdot in$	$MA_7 = 0.00 \cdot in$
$MA_2 = 2.10 \cdot in$	$MA_8 = 0.00 \cdot in$
$MA_3 = 0.00 \cdot in$	$MA_9 = \blacksquare \cdot in$
$MA_4 = 0.00 \cdot in$	$MA_{10} = \blacksquare \cdot in$
$MA_5 = 0.00 \cdot in$	$MA_{11} = \blacksquare \cdot in$
$MA_6 = 0.00 \cdot in$	$MA_{12} = \blacksquare \cdot in$

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

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i (d_i)^2 = 289 \cdot in^2$

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

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

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

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

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

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 29.8 \cdot kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N} = 1 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := \left(0.75 \cdot F_{ub} \cdot 0.75 \cdot A_g\right) = 53 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{\Phi R_{nt}} = 56.30 \cdot \%$

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

Condition1 = "OK"

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

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

$C_1 = 22.1 \cdot kips$

$C_2 = 31.0 \cdot kips$

$C_3 = 22.1 \cdot kips$

$C_4 = 0.6 \cdot kips$

$C_5 = -20.9 \cdot kips$

$C_6 = -29.8 \cdot kips$

$C_7 = -20.9 \cdot kips$

$C_8 = 0.6 \cdot kips$

$C_9 = \blacksquare \cdot kips$

$C_{10} = \blacksquare \cdot kips$

$C_{11} = \blacksquare \cdot kips$

$C_{12} = \blacksquare \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{4 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 21.2 \cdot ksi$$

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

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 65.4 \cdot \%$

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

$Condition3 = \text{"Ok"}$

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 100$	mph	(User Input NESC 2007 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 =	$TME := 170$	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 2007 Table 250-3 equation)
Importance Factor =	$I := 1.0$		(User Input from NESC 2007 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.415$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346\left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.29$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.775$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.826$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 29.9$ psf (NESC 2007 Section 250.C.2)

Shape Factors

NUS Design Criteria Issued April 12, 2007

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 =	$Cd_{coax} := 1.45$	(User Input)

Overload Factors

NU Design Criteria Table

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 =	$L_{mast} := 33$	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 NU Structure) = $qz \cdot Cd_R \cdot A_{mast} \cdot m = 52$ plf **BLC 5**

Total Mast Wind Force (Below NU Structure) = $qz \cdot Cd_R \cdot A_{mast} = 41$ 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 = $p \cdot Cd_R \cdot AICE_{mast} = 6$ 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:	(Verizon)		
Antenna Model =	Andrew LNX-6513DS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 54.7$	in	(User Input)
Antenna Width =	$W_{ant} := 11.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.1$	in	(User Input)
Antenna Weight =	$WT_{ant} := 31.1$	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 = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.5$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 13.6$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 812$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 5$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 15$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 96$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 93$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4622$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1198$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 39$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 117$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:	(Verizon)		
Antenna Model =	Andrew HBX-6516DS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 51.4$	in	(User Input)
Antenna Width =	$W_{ant} := 6.5$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 11$	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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.3$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 7$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 417$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 2.7$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 8.2$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 52$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 33$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1103$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 587$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 19$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 57$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (Verizon)

Antenna Model =	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:	(Verizon)			
Mount Type =	Dual Standoff Mount B1827 w/ 6 Pipe Mounts			
Platform Shape =	Flat		(User Input)	
Platform Area =	$A_{plt} := 7$	sq ft	(User Input)	(Shape Factor Included)
Platform Area w/ Ice =	$A_{ICEplt} := 10$	sq ft	(User Input)	(Shape Factor Included)
Platform Weight =	$WT_{plt} := 575$	lbs	(User Input)	
Platform Weight w/ Ice =	$WT_{ICEplt} := 800$	lbs	(User Input)	

Wind Load (NESC Extreme)

Total Platform Wind Force = $F_{plt} := qz \cdot A_{plt} \cdot m = 262$ lbs **BLC 5**

Wind Load (NESC Heavy)

Total Platform Wind Force w/ Ice = $Fi_{plt} := p \cdot A_{ICEplt} = 40$ lbs **BLC 4**

Gravity Load (without ice)

Weight of Platform = $WT_{plt} = 575$ lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Platform = $WT_{ICEplt} - WT_{plt} = 225$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (Sprint)

Antenna Model =	RFS APXVSPP18-C		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 11.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 57$	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 = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.9$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 17.7$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1059$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.5$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 19.5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 125$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 171$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5947$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1528$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 50$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 149$ lbs **BLC 3**

Development of Wind & Ice Load on Mounts

Mount Data: (Sprint)

Mount Type =	13-ft Low Profile Platform			
Platform Shape =	Flat		(User Input)	
Platform Area =	$A_{plt} := 20$	sq ft	(User Input)	(Shape Factor Included)
Platform Area w/ Ice =	$A_{ICEplt} := 25$	sq ft	(User Input)	(Shape Factor Included)
Platform Weight =	$WT_{plt} := 1500$	lbs	(User Input)	
Platform Weight w/ Ice =	$WT_{ICEplt} := 2000$	lbs	(User Input)	

Wind Load (NESC Extreme)

Total Platform Wind Force = $F_{plt} := qz \cdot Cd_F \cdot A_{plt} \cdot m = 1197$ lbs **BLC 5**

Wind Load (NESC Heavy)

Total Platform Wind Force w/ Ice = $Fi_{plt} := p \cdot Cd_F \cdot A_{ICEplt} = 160$ lbs **BLC 4**

Gravity Load (without ice)

Weight of Platform = $WT_{plt} = 1500$ lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Platform = $WT_{ICEplt} - WT_{plt} = 500$ lbs **BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (Bottom Mast to Sprint Antennas)

Coax Type = HELIAX 1-5/8"

Shape = Round (User Input)

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

Coax Cable Length = $L_{coax} := 31$ ft (User Input)

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

Total Number of Coax = $N_{coax} := 30$ (User Input)

No. of Coax Projecting Outside Face of PCS Mast = $NP_{coax} := 4$ (User Input)

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.7$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 29$ plf **BLC 5**

Total Coax Wind Force (Below NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 36$ plf **BLC 5**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{NP_{coax} \cdot (D_{coax} + 2 \cdot Ir)}{12} = 1$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 6$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 31$ 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 = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 45$ plf **BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (Above Sprint Antennas)

Coax Type =	HELIAX 1-5/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)
Coax Cable Length =	$L_{coax} := 31$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 12$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 2$		(User Input)

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.3$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 18$ plf **BLC 5**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{NP_{coax} \cdot (D_{coax} + 2 \cdot Ir)}{12} = 0.5$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 3$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 12$ 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 = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 18$ plf **BLC 3**

CENTEK engineering, INC.
Consulting Engineers
63-2 North Branford Road
Branford, CT 06405
Ph. 203-488-0580 / Fax. 203-488-8587

Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining Reactions Applied to Utility Pole Tabulated Load Cases**

Location: **Bethel, CT**

Date:3/20/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 17032.01

Load Case	Description
1	Self Weight (Mast)
2	Weight of Appurtenances
3	Weight of Ice Only
4	NESC Heavy Wind
5	NESC Extreme Wind

Footnotes:

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Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining Reactions Applied to Utility Pole Load Combinations Table**
Location: **Bethel, CT**
Date: 3/20/17 Prepared by: T.J.L. Checked by: C.F.C. Job No. 17032.01

Load Combination	Description	Envelope Soultion	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	NESC Heavy Wind		1		1	1.5	2	1.5	3	1.5	4	2.5		
2	NESC Extreme Wind		1		1	1	2	1	5	1				

Footnotes:
(1) BLC = Basic Load Case

(Global) Model Settings

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

Hot Rolled Steel Code	AISC 14th(360-10): ASD
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

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 (\1E..	Density[k/ft...	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	Beam	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[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Mast	14			Lbyy						Lateral
2	M2	Mast	19			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	BOTMAST	FLANGE			Mast	Beam	Pipe	A53 Gr. B	Typical
2	M2	FLANGE	TOPMAST			Mast	Beam	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	BOTMAST	0	0	0	0	
2	BOTCONNECTION	0	3.25	0	0	
3	TOPCONNECTION	0	9.42	0	0	
4	FLANGE	0	14	0	0	
5	TOPMAST	0	33	0	0	

Joint Boundary Conditions

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

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.093	16.5
2	M2	Y	-.033	16.5
3	M2	Y	-.006	16.5
4	M2	Y	-.575	16.5
5	M2	Y	-.171	6.5
6	M2	Y	-1.5	6.5

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.117	16.5
2	M2	Y	-.057	16.5
3	M2	Y	-.005	16.5
4	M2	Y	-.225	16.5
5	M2	Y	-.149	6.5
6	M2	Y	-.5	6.5

Member Point Loads (BLC 4 : NESC Heavy Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.096	16.5
2	M2	X	.052	16.5
3	M2	X	.004	16.5
4	M2	X	.04	16.5
5	M2	X	.125	6.5
6	M2	X	.16	6.5

Member Point Loads (BLC 5 : NESC Extreme Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.812	16.5
2	M2	X	.417	16.5
3	M2	X	.026	16.5
4	M2	X	.262	16.5
5	M2	X	1.059	6.5
6	M2	X	1.197	6.5

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.031	-.031	0	0
2	M2	Y	-.031	-.031	0	6.5
3	M2	Y	-.012	-.012	6.5	16.5

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

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.008	-.008	0	0
2	M2	Y	-.008	-.008	0	0
3	M1	Y	-.045	-.045	0	0
4	M2	Y	-.045	-.045	0	6.5
5	M2	Y	-.018	-.018	6.5	16.5

Member Distributed Loads (BLC 4 : NESC Heavy Wind)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.006	.006	0	0
2	M2	X	.006	.006	0	0
3	M1	X	.006	.006	0	0
4	M2	X	.006	.006	0	6.5
5	M2	X	.003	.003	6.5	16.5

Member Distributed Loads (BLC 5 : NESC Extreme Wind)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.041	.041	0	0
2	M2	X	.041	.041	0	6.5
3	M2	X	.052	.052	6.5	19
4	M1	X	.036	.036	0	0
5	M2	X	.036	.036	0	6.5
6	M2	X	.018	.018	6.5	16.5

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Self Weight	None		-1						
2	Weight of Appurtenan...	None					6	3		
3	Weight of Ice Only	None					6	5		
4	NESC Heavy Wind	None					6	5		
5	NESC Extreme Wind	None					6	6		

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	NESC He...	Yes			1	1.5	2	1.5	3	1.5	4	2.5												
2	NESC Ext...	Yes			1	1	2	1	5	1														
3	Self Weight				1	1																		

Envelope Joint Reactions

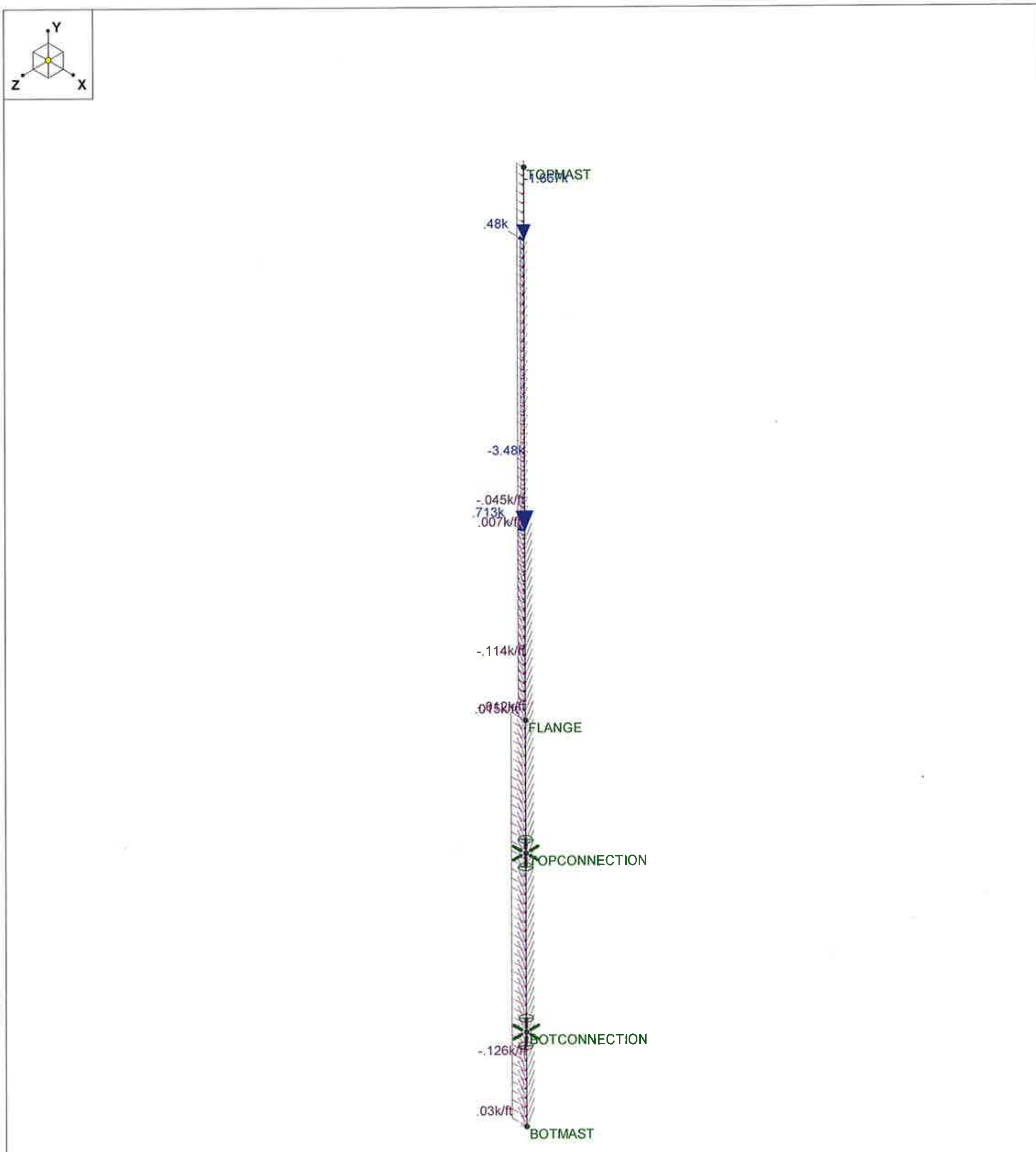
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	BOTCONNECT...	max	11.741	2	1.364	1	0	1	0	1	0	1	0	1
2		min	3.724	1	.574	2	0	1	0	1	0	1	0	1
3	TOPCONNECT...	max	-5.794	1	9.913	1	0	1	0	1	0	1	0	1
4		min	-17.923	2	4.525	2	0	1	0	1	0	1	0	1
5	Totals:	max	-2.07	1	11.277	1	0	1						
6		min	-6.181	2	5.099	2	0	1						

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTCONNECTION	3.724	1.364	0	0	0	0
2	1	TOPCONNECTION	-5.794	9.913	0	0	0	0
3	1	Totals:	-2.07	11.277	0			
4	1	COG (ft):	X: 0	Y: 18.867	Z: 0			

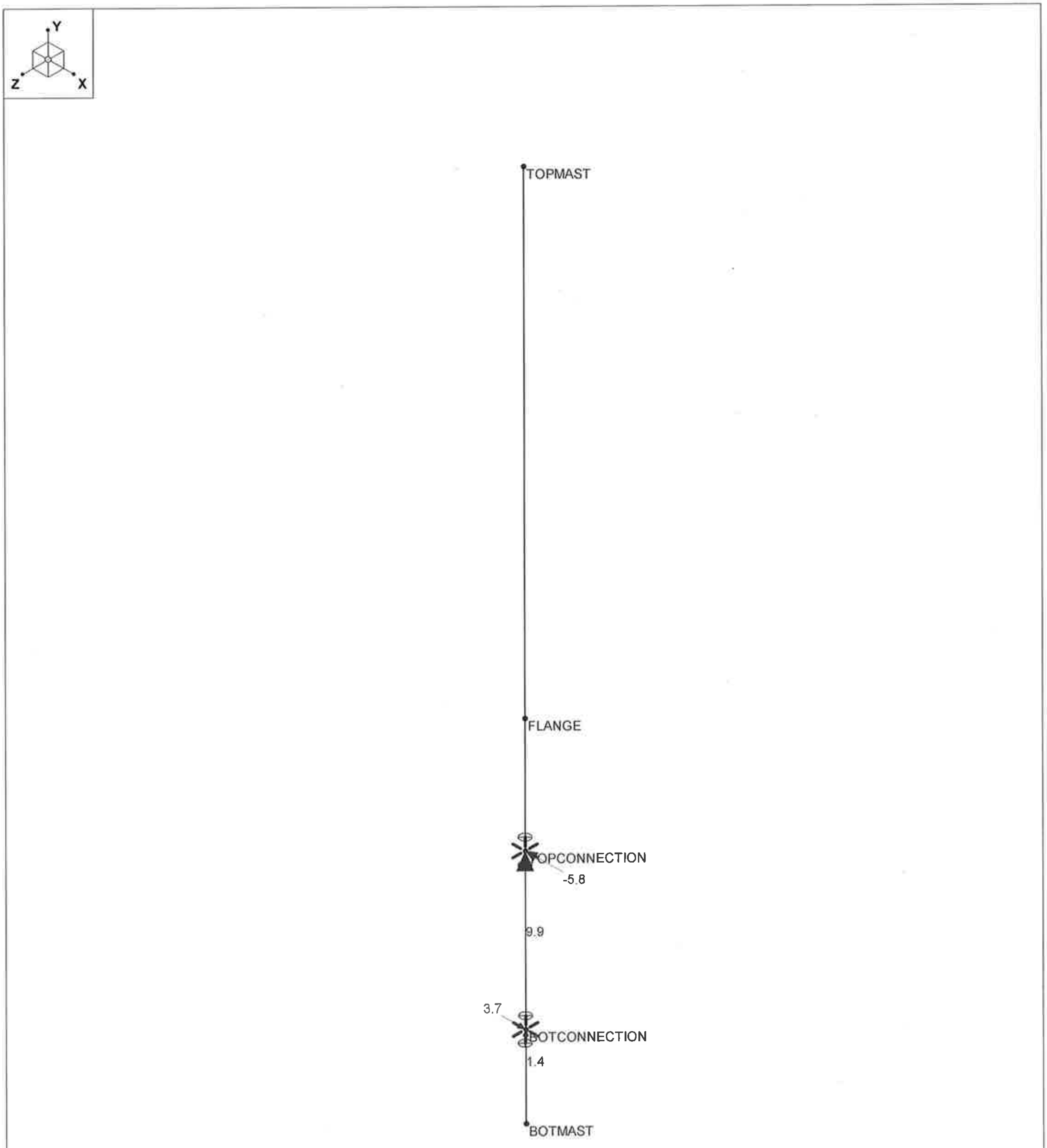
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTCONNECTION	11.741	.574	0	0	0	0
2	2	TOPCONNECTION	-17.923	4.525	0	0	0	0
3	2	Totals:	-6.181	5.099	0			
4	2	COG (ft):	X: 0	Y: 19.185	Z: 0			



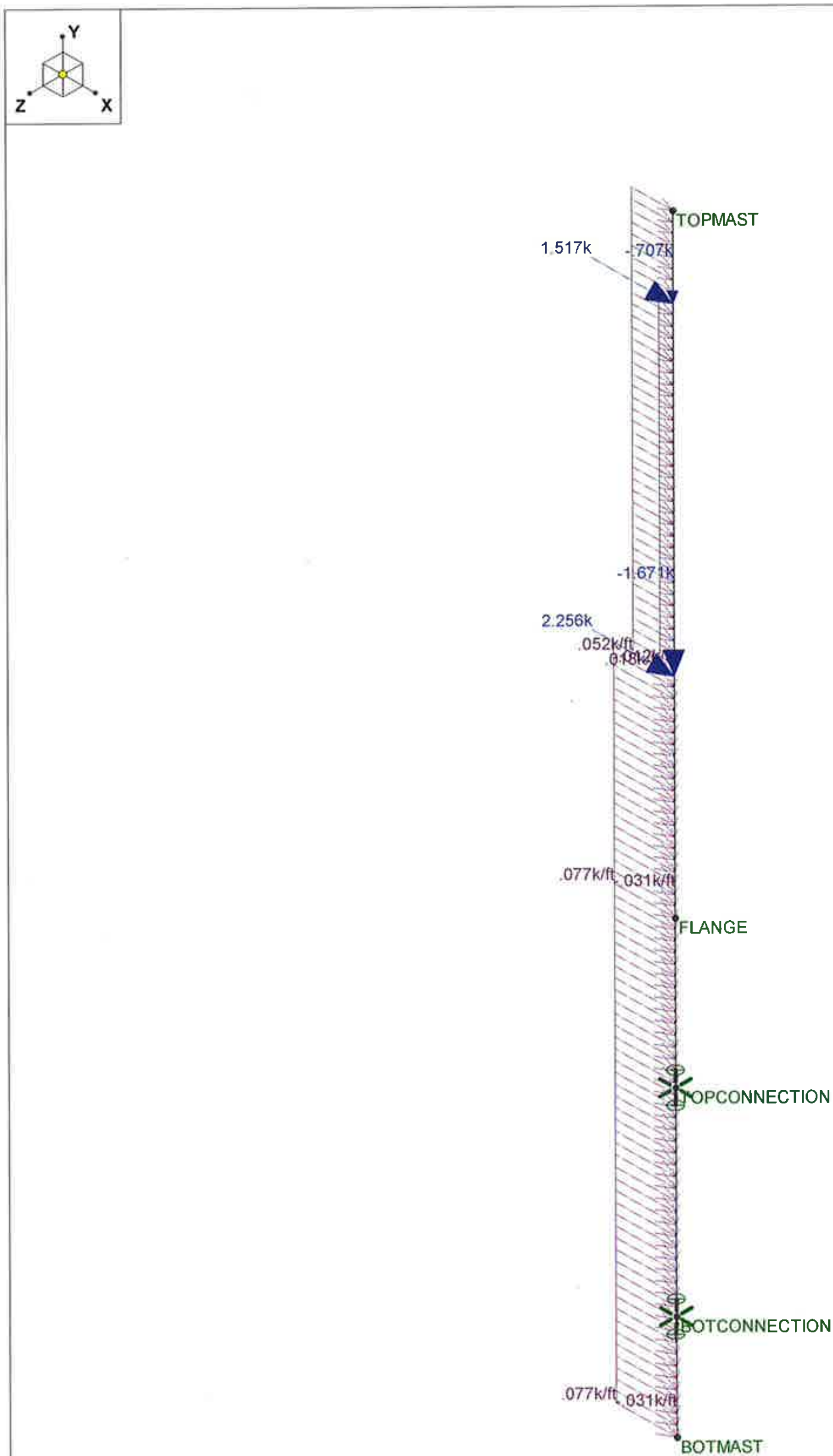
Loads: LC 1, NESC Heavy Wind

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10255 - Mast	Mar 20, 2017 at 5:04 PM
17032.01 /Verizon Bethel ...	LC #1 Loads	NESC.r3d



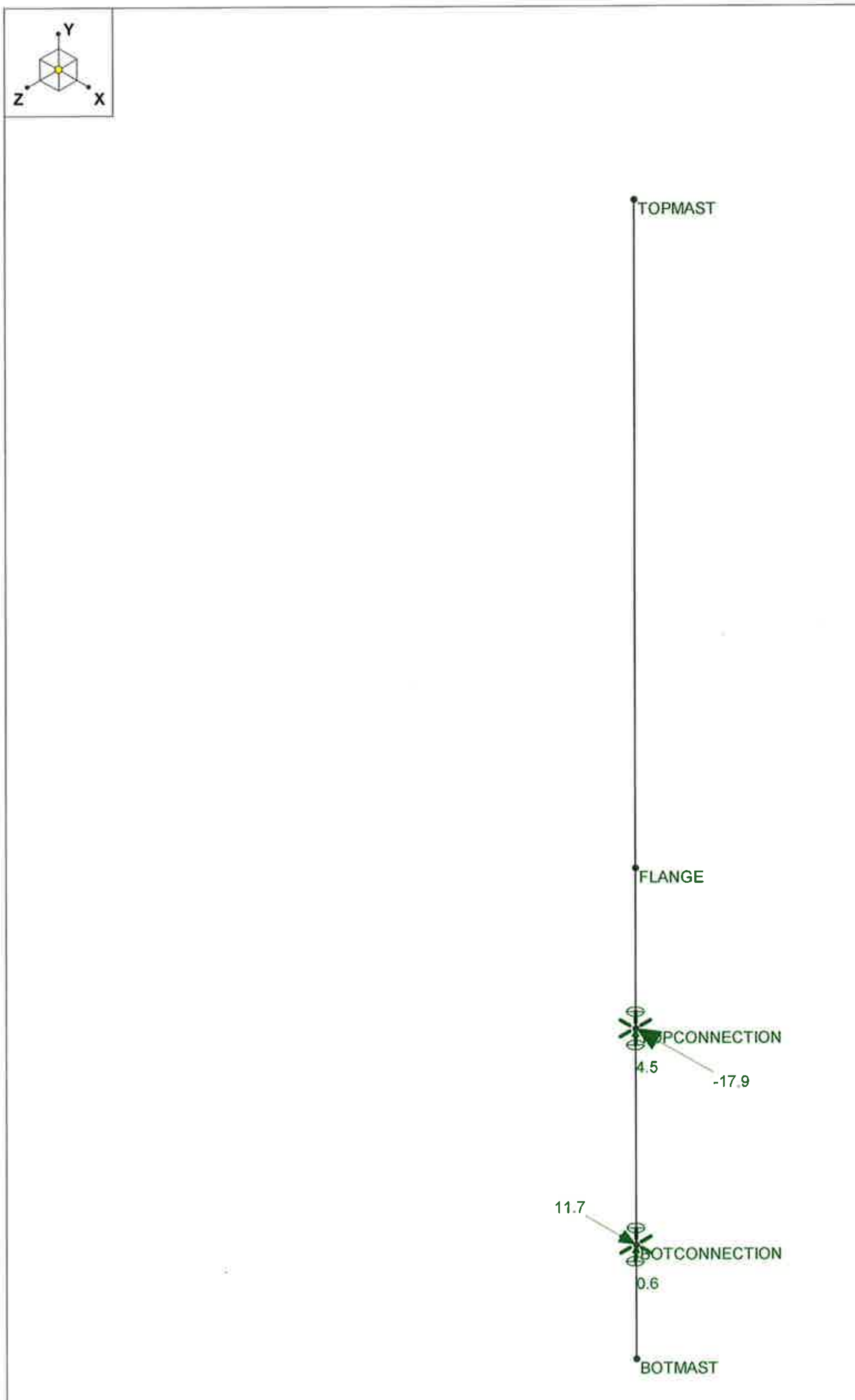
Results for LC 1, NESC Heavy Wind
Reaction and Moment Units are k and k-ft

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10255 - Mast	Mar 20, 2017 at 5:06 PM
17032.01 /Verizon Bethel ...	LC #1 Reactions	NESC.r3d



Loads: LC 2, NESC Extreme Wind

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10255 - Mast	Mar 20, 2017 at 5:05 PM
17032.01 /Verizon Bethel ...	LC #2 Loads	NESC.r3d



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

CENTEK Engineering, Inc.		
tjl, cfc	Structure # 10255 - Mast	Mar 20, 2017 at 5:06 PM
17032.01 /Verizon Bethel ...	LC #2 Reactions	NESC.r3d

Coax Cable on CL&P Pole

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 2007 Figure 250-2(e))
Height to Top of Coax Above Grade =	$TC := 167.5$ ft	(User Input)
NESC Factor =	$kv := 1.43$	(User Input from NESC 2007 Table 250-3 equation)
Importance Factor =	$I := 1.0$	(User Input from NESC 2007 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{0.67TC}{900}\right)^{\frac{2}{9.5}} = 1.297$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)}\right]^{\frac{1}{7}} = 0.29$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220}\right)} = 0.778$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.827$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 27.5$ psf (NESC 2007 Section 250.C.2)

Distance Between Coax Cable Attach Points =

Coaxial Cable Span $Coax_{Span} := \begin{pmatrix} 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \end{pmatrix} \cdot ft$ (User Input)

Diameter of Coax Cable =	$D_{coax} := 1.98 \cdot in$	(User Input)
Weight of Coax Cable =	$W_{coax} := 1.04 \cdot plf$	(User Input)
Number of Coax Cables =	$N_{coax} := 30$	(User Input)
Number of Projected Coax Cables =	$NP_{coax} := 3$	(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 = $A := \left(NP_{coax} \cdot D_{coax}\right) = 5.94 \cdot in$

Wind Area with Ice = $A_{ice} := \left(NP_{coax} \cdot D_{coax} + 2 \cdot Ir\right) = 6.94 \cdot in$

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 = $W_{ice} := Ai_{coax} \cdot Id \cdot N_{coax} = 45.448 \cdot plf$

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 =

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

$Heavy\_Wind_{Vert} = \begin{pmatrix} 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \end{pmatrix} lb$ $Heavy\_Wind_{Trans} = \begin{pmatrix} 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \\ 93 \end{pmatrix} lb$

Extreme Wind Vertical Load =

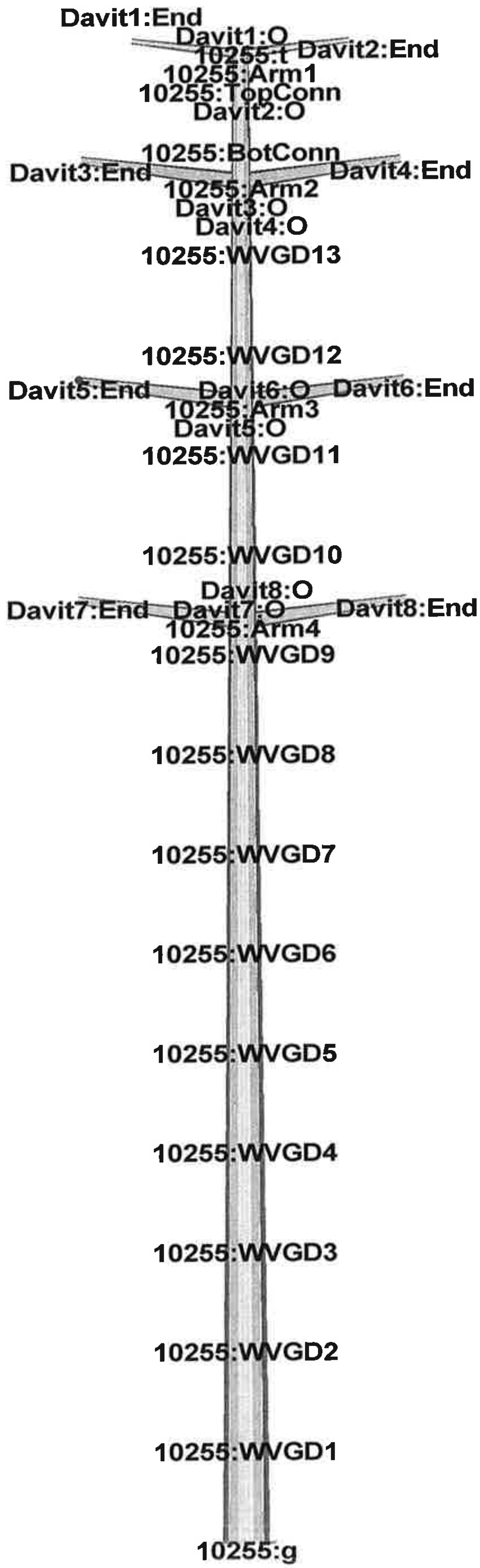
$Extreme\_Wind_{Vert} := \overrightarrow{\left(N_{coax} \cdot W_{coax} \cdot Coax_{Span} \cdot OF_{EWV}\right)}$

Extreme Wind Transverse Load =

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

$Extreme\_Wind_{Vert} = \begin{pmatrix} 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \end{pmatrix} lb$ $Extreme\_Wind_{Trans} = \begin{pmatrix} 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \\ 218 \end{pmatrix} ft^2$

.S-POLE Version 12.50, 4:40:36 PM Monday, March 20, 2017
ıdeformed geometry displayed



Project Name : 17032.01 - Bethel, CT
Project Notes: Str # 10255/ Verizon Bethel North
Project File : J:\Jobs\1703200.WI\01_Bethel North\04_Structural\Backup Documentation\Calcs\PLS-Pole\cl&p structure # 10255.pol
Date run : 10:04:10 AM Tuesday, March 21, 2017
by : PLS-POLE Version 12.50
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: j:\jobs\1703200.wi\01_bethel north\04_structural\backup documentation\calcs\pls-pole\cl&p #10255.lca

*** Analysis Results:

Maximum element usage is 96.84% for Base Plate "10255" in load case "NESC Extreme"
Maximum insulator usage is 23.11% for Clamp "Clamp9" in load case "NESC Extreme"

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	10255:g	-0.17	-33.68	-126.22	33.68	4165.10	-12.11	4165.11	-0.02	0.00
NESC Extreme	10255:g	-0.05	-53.27	-63.62	53.27	5995.33	-3.68	5995.33	-0.01	0.00

Summary of Tip Deflections For All Load Cases:

Note: postive 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	10255:t	0.22	100.47	-3.88	100.55	0.01	-5.95	0.00
NESC Extreme	10255:t	0.06	141.28	-7.55	141.48	0.00	-8.46	0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
10255	1	5022	NESC Extreme	81.92	1169.17
10255	2	10058	NESC Extreme	92.77	3381.91
10255	3	12901	NESC Extreme	95.01	5729.83

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
10255	95.01	NESC Extreme	37	30952.3

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	11.06	NESC Heavy	1	182.3
Davit2	14.05	NESC Heavy	1	182.3
Davit3	28.23	NESC Heavy	1	575.0
Davit4	32.72	NESC Heavy	1	575.0
Davit5	28.51	NESC Heavy	1	575.0
Davit6	32.90	NESC Heavy	1	575.0
Davit7	28.91	NESC Heavy	1	575.0
Davit8	33.14	NESC Heavy	1	575.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	69.63	10255	Base Plate
NESC Extreme	96.84	10255	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	68.34	10255	27
NESC Extreme	95.01	10255	37

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	10255	12	36.011	123.245	4165.095	-12.106	41.776	188.049	5	100.387	2.503	69.63
NESC Extreme	10255	12	36.011	60.648	5995.326	-3.682	58.104	261.550	5	139.401	2.952	96.84

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	33.14	Davit8	1
NESC Extreme	15.16	Davit8	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	1.96	NESC Heavy	0.0
Clamp2	Clamp	1.96	NESC Heavy	0.0
Clamp3	Clamp	10.09	NESC Heavy	0.0

Clamp4	Clamp	10.09	NESC Heavy	0.0
Clamp5	Clamp	10.09	NESC Heavy	0.0
Clamp6	Clamp	10.09	NESC Heavy	0.0
Clamp7	Clamp	10.09	NESC Heavy	0.0
Clamp8	Clamp	10.09	NESC Heavy	0.0
Clamp9	Clamp	23.11	NESC Extreme	0.0
Clamp10	Clamp	14.69	NESC Extreme	0.0
Clamp11	Clamp	1.44	NESC Heavy	0.0
Clamp12	Clamp	1.44	NESC Heavy	0.0
Clamp13	Clamp	1.44	NESC Heavy	0.0
Clamp14	Clamp	1.44	NESC Heavy	0.0
Clamp15	Clamp	1.44	NESC Heavy	0.0
Clamp16	Clamp	1.44	NESC Heavy	0.0
Clamp17	Clamp	1.44	NESC Heavy	0.0
Clamp18	Clamp	1.44	NESC Heavy	0.0
Clamp19	Clamp	1.44	NESC Heavy	0.0
Clamp20	Clamp	1.44	NESC Heavy	0.0
Clamp21	Clamp	1.44	NESC Heavy	0.0
Clamp22	Clamp	1.44	NESC Heavy	0.0
Clamp23	Clamp	1.44	NESC Heavy	0.0

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	3814.7
Weight of Steel Poles:	30952.3
Total:	34767.0

*** End of Report

```
*************************************************************************
*                                                                       *
*                               PLS-POLE                                *
*                  POLE AND FRAME ANALYSIS AND DESIGN                   *
*             Copyright Power Line Systems, Inc. 1999-2011              *
*                                                                       *
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Project Name : 17032.01 - Bethel, CT
Project Notes: Str # 10255/ Verizon Bethel North
Project File : J:\Jobs\1703200.WI\01_Bethel North\04_Structural\Backup Documentation\Calcs\PLS-Pole\cl&p structure # 10255.pol
Date run : 10:04:10 AM Tuesday, March 21, 2017
by : PLS-POLE Version 12.50
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 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	Ultimate

Label		(ft)	Length (ft)			(in)	(in)	(in/ft)	Coef.		Override (ksi)	Override (lbs/ft^3)	Base	Type	Tip (ft)	Trans. Load (kips)	Long. Load (kips)
CL&P10255	10255	150.00	0	Yes	12F	20.18	55.99	0	1.3	3 tubes	0	0		Calculated	0.000	0.0000	0.0000

Steel Tubes Properties:

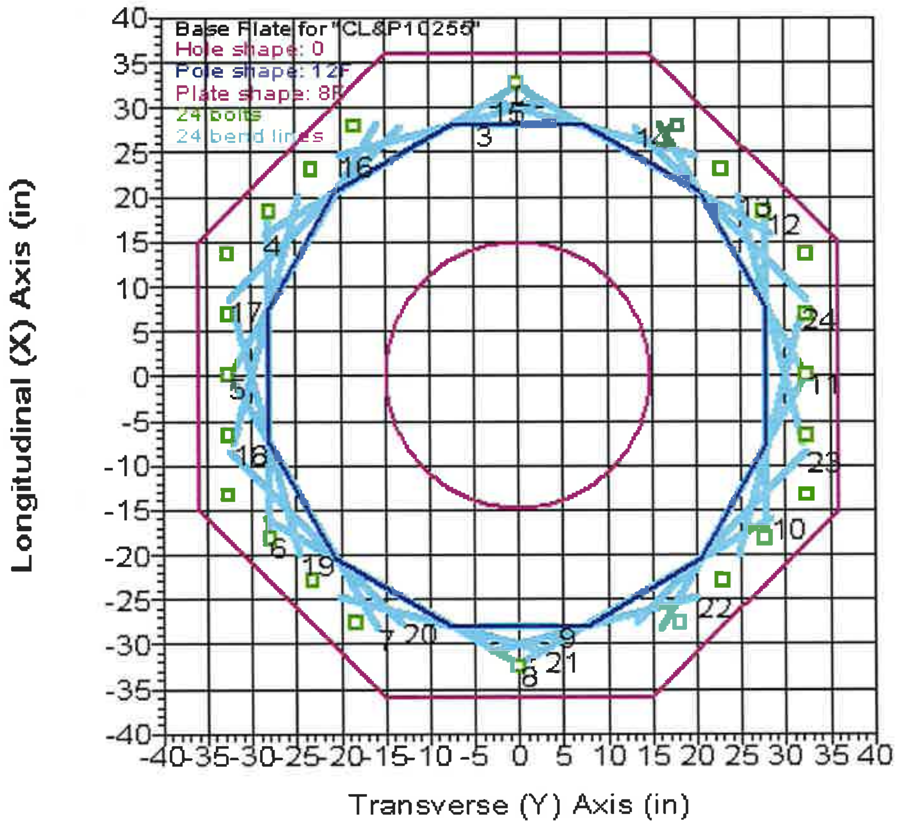
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)	Actual Overlap (ft)
CL&P10255	1	55	0.3125	4.670	0.000	0.000	65.000	0.000	5022	29.85	0.24873	20.18	33.86	4.154	4.670
CL&P10255	2	54.67	0.4375	6.170	0.000	0.000	65.000	0.000	10058	28.95	0.24873	32.07	45.67	5.600	6.170
CL&P10255	3	51.17	0.46875	0.000	0.000	0.000	65.000	0.000	12901	26.69	0.24873	43.26	55.99	0.000	0.000

Base Plate Properties:

Pole Property	Plate Diam. (in)	Plate Shape	Plate Thick. (in)	Plate Weight (lbs)	Bend Line Length Override (in)	Hole Diam. (in)	Hole Shape	Steel Density (lbs/ft^3)	Steel Yield Stress (ksi)	Bolt Diam. (in)	Bolt Pattern Diam. (in)	Num. Of Bolts	Bolt Cage X Inertia (in^4)	Bolt Cage Y Inertia (in^4)
CL&P10255	72.000	8F	3.000	2971	0.000	30.000	0	490.00	60.000	2.250	65.000	24	67953.29	37978.89

Base Plate Bolt Coordinates for Property "CL&P10255":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0	1	0
0.8538	0.5615	0
0.7077	0.7077	0
0.5615	0.8538	0
0.4154	1	0
0.2077	1	0
1	0	0



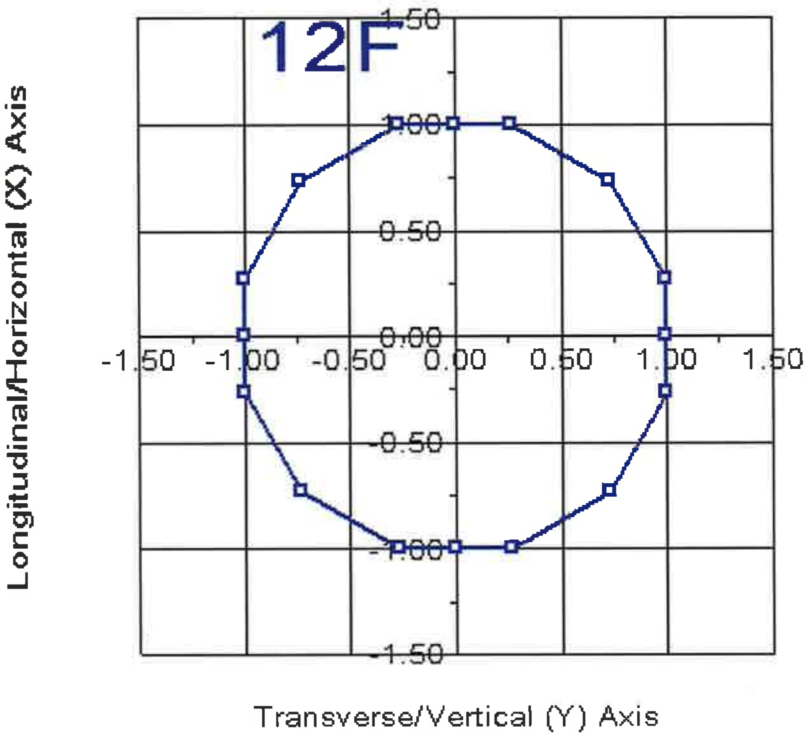
Steel Pole Connectivity:

Pole Label	Tip Joint	Base Joint	X of Base (ft)	Y of Base (ft)	Z of Base (ft)	Inclin. About X (deg)	Inclin. About Y (deg)	Property Set	Attach. Labels	Base Connect	Embed % Override	Embed C. Override (ft)
10255			0	0	0	0	0	CL&P10255	19 labels		0.00	0

Relative Attachment Labels for Steel Pole "10255":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
10255:Arm1	0.00	149.30
10255:Arm2	0.00	136.63
10255:Arm3	0.00	114.63
10255:Arm4	0.00	92.63
10255:TopConn	0.00	146.42

10255:BotConn	0.00	140.25
10255:WVGD1	0.00	10.00
10255:WVGD2	0.00	20.00
10255:WVGD3	0.00	30.00
10255:WVGD4	0.00	40.00
10255:WVGD5	0.00	50.00
10255:WVGD6	0.00	60.00
10255:WVGD7	0.00	70.00
10255:WVGD8	0.00	80.00
10255:WVGD9	0.00	90.00
10255:WVGD10	0.00	100.00
10255:WVGD11	0.00	110.00
10255:WVGD12	0.00	120.00
10255:WVGD13	0.00	130.00



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)
10255	10255:t	10255:t Ori	0.00	20.18	19.96	1008.79	1008.79	0.00	14.6	65.00	65.00	541.55	541.55

10255	10255:Arm1	10255:Arm1	End	0.70	20.35	20.14	1035.54	1035.54	0.00	14.8	65.00	65.00	551.16	551.16
10255	10255:Arm1	10255:Arm1	Ori	0.70	20.35	20.14	1035.54	1035.54	0.00	14.8	65.00	65.00	551.16	551.16
10255	10255:TopConn	10255:TopConn	End	3.58	21.07	20.86	1150.58	1150.58	0.00	15.4	65.00	65.00	591.56	591.56
10255	10255:TopConn	10255:TopConn	Ori	3.58	21.07	20.86	1150.58	1150.58	0.00	15.4	65.00	65.00	591.56	591.56
10255	#10255:0	Tube 1	End	6.67	21.84	21.63	1282.93	1282.93	0.00	16.0	65.00	65.00	636.44	636.44
10255	#10255:0	Tube 1	Ori	6.67	21.84	21.63	1282.93	1282.93	0.00	16.0	65.00	65.00	636.44	636.44
10255	10255:BotConn	10255:BotConn	End	9.75	22.61	22.40	1425.06	1425.06	0.00	16.7	65.00	65.00	682.95	682.95
10255	10255:BotConn	10255:BotConn	Ori	9.75	22.61	22.40	1425.06	1425.06	0.00	16.7	65.00	65.00	682.95	682.95
10255	10255:Arm2	10255:Arm2	End	13.38	23.51	23.31	1605.04	1605.04	0.00	17.5	65.00	65.00	739.70	739.70
10255	10255:Arm2	10255:Arm2	Ori	13.38	23.51	23.31	1605.04	1605.04	0.00	17.5	65.00	65.00	739.70	739.70
10255	#10255:1	Tube 1	End	16.69	24.33	24.13	1782.21	1782.21	0.00	18.2	65.00	65.00	793.54	793.54
10255	#10255:1	Tube 1	Ori	16.69	24.33	24.13	1782.21	1782.21	0.00	18.2	65.00	65.00	793.54	793.54
10255	10255:WVGD13	10255:WVGD13	End	20.00	25.15	24.96	1971.97	1971.97	0.00	18.9	65.00	65.00	849.26	849.26
10255	10255:WVGD13	10255:WVGD13	Ori	20.00	25.15	24.96	1971.97	1971.97	0.00	18.9	65.00	65.00	849.27	849.27
10255	#10255:2	Tube 1	End	25.00	26.40	26.21	2283.18	2283.18	0.00	20.0	65.00	65.00	936.97	936.97
10255	#10255:2	Tube 1	Ori	25.00	26.40	26.21	2283.18	2283.18	0.00	20.0	65.00	65.00	936.97	936.97
10255	10255:WVGD12	10255:WVGD12	End	30.00	27.64	27.46	2625.52	2625.52	0.00	21.0	65.00	65.00	1028.98	1028.98
10255	10255:WVGD12	10255:WVGD12	Ori	30.00	27.64	27.46	2625.52	2625.52	0.00	21.0	65.00	65.00	1028.98	1028.98
10255	#10255:3	Tube 1	End	32.69	28.31	28.13	2822.91	2822.91	0.00	21.6	65.00	65.00	1080.22	1080.22
10255	#10255:3	Tube 1	Ori	32.69	28.31	28.13	2822.91	2822.91	0.00	21.6	65.00	65.00	1080.22	1080.22
10255	10255:Arm3	10255:Arm3	End	35.38	28.98	28.80	3029.96	3029.96	0.00	22.2	65.00	65.00	1132.70	1132.70
10255	10255:Arm3	10255:Arm3	Ori	35.38	28.98	28.80	3029.96	3029.96	0.00	22.2	65.00	65.00	1132.70	1132.70
10255	10255:WVGD11	10255:WVGD11	End	40.00	30.13	29.96	3409.54	3409.54	0.00	23.2	65.00	65.00	1225.94	1225.94
10255	10255:WVGD11	10255:WVGD11	Ori	40.00	30.13	29.96	3409.54	3409.54	0.00	23.2	65.00	65.00	1225.94	1225.94
10255	#10255:4	Tube 1	End	45.00	31.37	31.21	3854.19	3854.19	0.00	24.2	65.00	65.00	1330.88	1330.88
10255	#10255:4	Tube 1	Ori	45.00	31.37	31.21	3854.19	3854.19	0.00	24.2	65.00	65.00	1330.88	1330.88
10255	10255:WVGD10	10255:WVGD10	End	50.00	32.62	32.46	4335.91	4335.91	0.00	25.3	65.00	65.00	1440.13	1440.13
10255	10255:WVGD10	10255:WVGD10	Ori	50.00	32.62	32.46	4335.91	4335.91	0.00	25.3	65.00	65.00	1440.13	1440.13
10255	#10255:5	SpliceT	End	50.33	32.70	32.54	4369.04	4369.04	0.00	25.4	65.00	65.00	1447.49	1447.49
10255	#10255:5	SpliceT	Ori	50.33	32.70	32.54	4369.04	4369.04	0.00	25.4	65.00	65.00	1447.49	1447.49
10255	#10255:6	SpliceB	End	55.00	33.24	46.14	6353.36	6353.36	0.00	17.7	65.00	65.00	2070.93	2070.93
10255	#10255:6	SpliceB	Ori	55.00	33.24	46.14	6353.36	6353.36	0.00	17.7	65.00	65.00	2070.93	2070.93
10255	10255:Arm4	10255:Arm4	End	57.38	33.83	46.97	6702.85	6702.85	0.00	18.0	65.00	65.00	2146.69	2146.69
10255	10255:Arm4	10255:Arm4	Ori	57.38	33.83	46.97	6702.85	6702.85	0.00	18.0	65.00	65.00	2146.69	2146.69
10255	10255:WVGD9	10255:WVGD9	End	60.00	34.48	47.89	7103.77	7103.77	0.00	18.4	65.00	65.00	2232.01	2232.01
10255	10255:WVGD9	10255:WVGD9	Ori	60.00	34.48	47.89	7103.77	7103.77	0.00	18.4	65.00	65.00	2232.01	2232.01
10255	#10255:7	Tube 2	End	65.00	35.72	49.64	7911.06	7911.06	0.00	19.2	65.00	65.00	2399.12	2399.12
10255	#10255:7	Tube 2	Ori	65.00	35.72	49.64	7911.06	7911.06	0.00	19.2	65.00	65.00	2399.12	2399.12
10255	10255:WVGD8	10255:WVGD8	End	70.00	36.97	51.39	8777.30	8777.30	0.00	20.0	65.00	65.00	2572.27	2572.27
10255	10255:WVGD8	10255:WVGD8	Ori	70.00	36.97	51.39	8777.31	8777.31	0.00	20.0	65.00	65.00	2572.27	2572.27
10255	#10255:8	Tube 2	End	75.00	38.21	53.14	9704.59	9704.59	0.00	20.7	65.00	65.00	2751.45	2751.45
10255	#10255:8	Tube 2	Ori	75.00	38.21	53.14	9704.59	9704.59	0.00	20.7	65.00	65.00	2751.45	2751.45
10255	10255:WVGD7	10255:WVGD7	End	80.00	39.45	54.89	10694.98	10694.98	0.00	21.5	65.00	65.00	2936.66	2936.66
10255	10255:WVGD7	10255:WVGD7	Ori	80.00	39.45	54.89	10694.98	10694.98	0.00	21.5	65.00	65.00	2936.66	2936.66
10255	#10255:9	Tube 2	End	85.00	40.70	56.63	11750.57	11750.57	0.00	22.2	65.00	65.00	3127.91	3127.91
10255	#10255:9	Tube 2	Ori	85.00	40.70	56.63	11750.57	11750.57	0.00	22.2	65.00	65.00	3127.91	3127.91
10255	10255:WVGD6	10255:WVGD6	End	90.00	41.94	58.38	12873.43	12873.43	0.00	23.0	65.00	65.00	3325.19	3325.19
10255	10255:WVGD6	10255:WVGD6	Ori	90.00	41.94	58.38	12873.43	12873.43	0.00	23.0	65.00	65.00	3325.19	3325.19
10255	#10255:10	Tube 2	End	94.42	43.04	59.93	13922.50	13922.50	0.00	23.7	65.00	65.00	3504.41	3504.41
10255	#10255:10	Tube 2	Ori	94.42	43.04	59.93	13922.50	13922.50	0.00	23.7	65.00	65.00	3504.41	3504.41
10255	#10255:11	SpliceT	End	98.83	44.14	61.47	15027.07	15027.07	0.00	24.4	65.00	65.00	3688.33	3688.33
10255	#10255:11	SpliceT	Ori	98.83	44.14	61.47	15027.07	15027.07	0.00	24.4	65.00	65.00	3688.33	3688.33
10255	10255:WVGD5	10255:WVGD5	End	100.00	43.55	64.94	15430.22	15430.22	0.00	22.2	65.00	65.00	3838.06	3838.06
10255	10255:WVGD5	10255:WVGD5	Ori	100.00	43.55	64.94	15430.22	15430.22	0.00	22.2	65.00	65.00	3838.06	3838.06
10255	#10255:12	SpliceB	End	105.00	44.80	66.81	16805.27	16805.27	0.00	22.9	65.00	65.00	4064.04	4064.04
10255	#10255:12	SpliceB	Ori	105.00	44.80	66.81	16805.27	16805.27	0.00	22.9	65.00	65.00	4064.04	4064.04
10255	10255:WVGD4	10255:WVGD4	End	110.00	46.04	68.69	18259.67	18259.67	0.00	23.6	65.00	65.00	4296.48	4296.48
10255	10255:WVGD4	10255:WVGD4	Ori	110.00	46.04	68.69	18259.67	18259.67	0.00	23.6	65.00	65.00	4296.48	4296.48
10255	#10255:13	Tube 3	End	115.00	47.28	70.56	19795.66	19795.66	0.00	24.3	65.00	65.00	4535.39	4535.39

10255	#10255:13	Tube 3	Ori	115.00	47.28	70.56	19795.66	19795.66	0.00	24.3	65.00	65.00	4535.39	4535.39
10255	10255:WVGD3	10255:WVGD3	End	120.00	48.53	72.44	21415.47	21415.47	0.00	25.1	65.00	65.00	4780.76	4780.76
10255	10255:WVGD3	10255:WVGD3	Ori	120.00	48.53	72.44	21415.47	21415.47	0.00	25.1	65.00	65.00	4780.76	4780.76
10255	#10255:14	Tube 3	End	125.00	49.77	74.31	23121.31	23121.31	0.00	25.8	65.00	65.00	5032.59	5032.59
10255	#10255:14	Tube 3	Ori	125.00	49.77	74.31	23121.31	23121.31	0.00	25.8	65.00	65.00	5032.59	5032.59
10255	10255:WVGD2	10255:WVGD2	End	130.00	51.02	76.18	24915.41	24915.41	0.00	26.5	65.00	65.00	5290.89	5290.89
10255	10255:WVGD2	10255:WVGD2	Ori	130.00	51.02	76.18	24915.42	24915.42	0.00	26.5	65.00	65.00	5290.89	5290.89
10255	#10255:15	Tube 3	End	135.00	52.26	78.06	26800.01	26800.01	0.00	27.2	65.00	65.00	5555.66	5555.66
10255	#10255:15	Tube 3	Ori	135.00	52.26	78.06	26800.01	26800.01	0.00	27.2	65.00	65.00	5555.66	5555.66
10255	10255:WVGD1	10255:WVGD1	End	140.00	53.50	79.93	28777.33	28777.33	0.00	27.9	65.00	65.00	5826.89	5826.89
10255	10255:WVGD1	10255:WVGD1	Ori	140.00	53.50	79.93	28777.33	28777.33	0.00	27.9	65.00	65.00	5826.89	5826.89
10255	#10255:16	Tube 3	End	145.00	54.75	81.81	30849.59	30849.59	0.00	28.6	65.00	65.00	6104.58	6104.58
10255	#10255:16	Tube 3	Ori	145.00	54.75	81.81	30849.59	30849.59	0.00	28.6	65.00	65.00	6104.58	6104.58
10255	10255:g	10255:g	End	150.00	55.99	83.68	33019.02	33019.02	0.00	29.3	65.00	65.00	6388.74	6388.74

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)	Steel Shape At End 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)
ARM1	601420	6T	0.1875	10.75	6	0	1	29000	1 point	Calculated	0	0	0	0	65	0
ARM2	601515	8T	0.25	18.46	9	0	1	29000	1 point	Calculated	0	0	0	0	65	0

Intermediate Joints for Davit Property "ARM1":

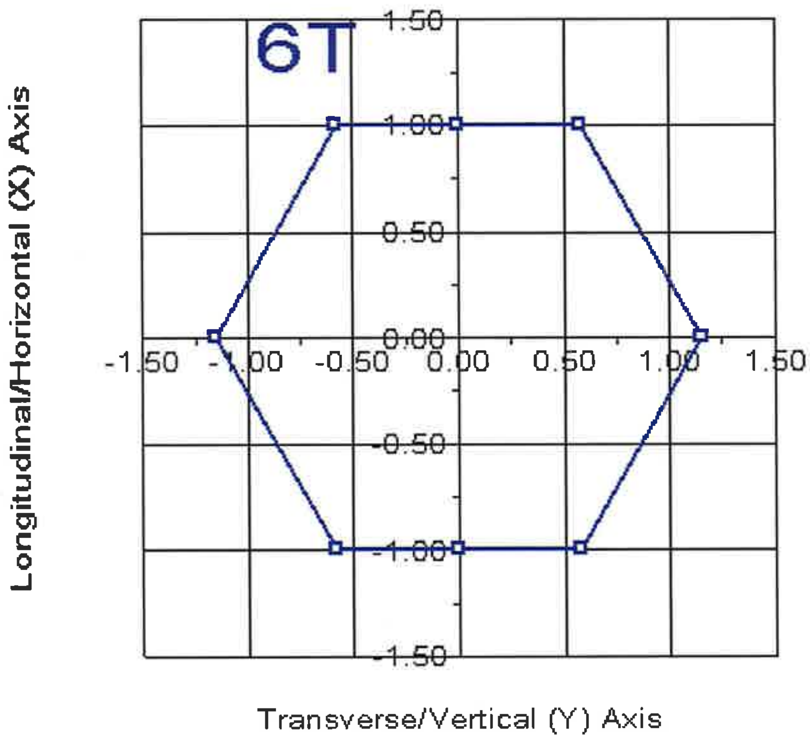
Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	10	-1.2

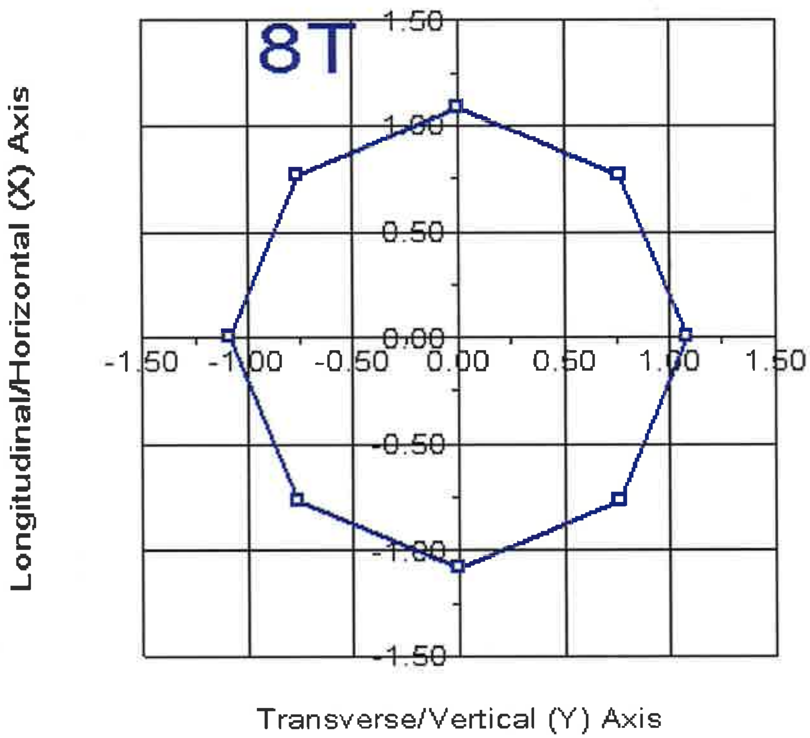
Intermediate Joints for Davit Property "ARM2":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	15	-2

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property Set	Azimuth (deg)
Davit1	10255:Arm1	ARM1	180
Davit2	10255:Arm1	ARM1	0
Davit3	10255:Arm2	ARM2	180
Davit4	10255:Arm2	ARM2	0
Davit5	10255:Arm3	ARM2	180
Davit6	10255:Arm3	ARM2	0
Davit7	10255:Arm4	ARM2	180


6T
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-1.50 -1.00 -0.50 0.00 0.50 1.00 1.50
Longitudinal/Horizontal (X) Axis
Transverse/Vertical (Y) Axis



Tubular Davit Arm Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	V-Moment Inertia (in^4)	H-Moment Inertia (in^4)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	V-Moment Capacity (ft-k)	H-Moment Capacity (ft-k)
Davit1	Davit1:O	Origin	0.00	10.75	6.86	106.34	106.34	0.00	27.3	65.00	65.00	92.80	107.16
Davit1	#Davit1:0	End	5.00	8.39	5.33	49.84	49.84	0.00	20.1	65.00	65.00	55.72	64.34
Davit1	#Davit1:0	Origin	5.00	8.39	5.33	49.84	49.84	0.00	20.1	65.00	65.00	55.72	64.34
Davit1	#Davit1:1	End	7.54	7.20	4.55	31.08	31.08	0.00	16.4	65.00	65.00	40.52	46.78
Davit1	#Davit1:1	Origin	7.54	7.20	4.55	31.08	31.08	0.00	16.4	65.00	65.00	40.52	46.78
Davit1	Davit1:End	End	10.07	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
Davit2	Davit2:O	Origin	0.00	10.75	6.86	106.34	106.34	0.00	27.3	65.00	65.00	92.80	107.16
Davit2	#Davit2:0	End	5.00	8.39	5.33	49.84	49.84	0.00	20.1	65.00	65.00	55.72	64.34
Davit2	#Davit2:0	Origin	5.00	8.39	5.33	49.84	49.84	0.00	20.1	65.00	65.00	55.72	64.34
Davit2	#Davit2:1	End	7.54	7.20	4.55	31.08	31.08	0.00	16.4	65.00	65.00	40.52	46.78
Davit2	#Davit2:1	Origin	7.54	7.20	4.55	31.08	31.08	0.00	16.4	65.00	65.00	40.52	46.78
Davit2	Davit2:End	End	10.07	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
Davit3	Davit3:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit3	#Davit3:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit3	#Davit3:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32

Davit3	#Davit3:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit3	#Davit3:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit3	#Davit3:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit3	#Davit3:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit3	Davit3:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit4	Davit4:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit4	#Davit4:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit4	#Davit4:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit4	#Davit4:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit4	#Davit4:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit4	#Davit4:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit4	#Davit4:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit4	Davit4:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit5	Davit5:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit5	#Davit5:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit5	#Davit5:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit5	#Davit5:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit5	#Davit5:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit5	#Davit5:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit5	#Davit5:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit5	Davit5:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit6	Davit6:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit6	#Davit6:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit6	#Davit6:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit6	#Davit6:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit6	#Davit6:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit6	#Davit6:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit6	#Davit6:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit6	Davit6:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit7	Davit7:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit7	#Davit7:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit7	#Davit7:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit7	#Davit7:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit7	#Davit7:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit7	#Davit7:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit7	#Davit7:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit7	Davit7:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63
Davit8	Davit8:O	Origin	0.00	18.46	15.09	661.20	661.20	0.00	26.4	65.00	65.00	358.49	358.49
Davit8	#Davit8:0	End	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit8	#Davit8:0	Origin	5.00	15.33	12.50	375.85	375.85	0.00	21.3	65.00	65.00	245.32	245.32
Davit8	#Davit8:1	End	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit8	#Davit8:1	Origin	10.00	12.21	9.91	187.31	187.31	0.00	16.1	65.00	65.00	153.55	153.55
Davit8	#Davit8:2	End	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit8	#Davit8:2	Origin	12.57	10.60	8.58	121.60	121.60	0.00	13.4	65.00	65.00	114.77	114.77
Davit8	Davit8:End	End	15.13	9.00	7.25	73.40	73.40	0.00	10.8	65.00	65.00	81.63	81.63

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)

clamp clamp1 8e+004

Clamp Insulator Connectivity:

Clamp Label	Structure And Tip Attach	Property Set	Min. Required Vertical Load (uplift) (lbs)
Clamp1	Davit1:End	clamp	No Limit
Clamp2	Davit2:End	clamp	No Limit
Clamp3	Davit3:End	clamp	No Limit
Clamp4	Davit4:End	clamp	No Limit
Clamp5	Davit5:End	clamp	No Limit
Clamp6	Davit6:End	clamp	No Limit
Clamp7	Davit7:End	clamp	No Limit
Clamp8	Davit8:End	clamp	No Limit
Clamp9	10255:TopConn	clamp	No Limit
Clamp10	10255:BotConn	clamp	No Limit
Clamp11	10255:WVGD1	clamp	No Limit
Clamp12	10255:WVGD2	clamp	No Limit
Clamp13	10255:WVGD3	clamp	No Limit
Clamp14	10255:WVGD4	clamp	No Limit
Clamp15	10255:WVGD5	clamp	No Limit
Clamp16	10255:WVGD6	clamp	No Limit
Clamp17	10255:WVGD7	clamp	No Limit
Clamp18	10255:WVGD8	clamp	No Limit
Clamp19	10255:WVGD9	clamp	No Limit
Clamp20	10255:WVGD10	clamp	No Limit
Clamp21	10255:WVGD11	clamp	No Limit
Clamp22	10255:WVGD12	clamp	No Limit
Clamp23	10255:WVGD13	clamp	No Limit

*** Loads Data

Loads from file: j:\jobs\1703200.wi\01_bethel north\04_structural\backup documentation\calcs\pls-pole\cl&p #10255.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)	150.50 (ft)	
Structure height	150.50 (ft)	
Structure height above ground	150.50 (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 Pole Conc. Ult.	SF for Conc. First Crack	SF for Conc. Zero Tens.	SF for Guys and Cables	SF for Non Tubular Arms	SF for Braces	SF for Insuls.	SF For 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	1.0000	23 loads	Wind on All	4	0	0.500	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	1.0000	23 loads	NESC 2007	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
Davit1:End	1134	1078	0	Shield Wire
Davit2:End	1134	1078	0	Shield Wire
Davit3:End	7201	3651	0	Conductor
Davit4:End	7201	3651	0	Conductor
Davit5:End	7201	3651	0	Conductor
Davit6:End	7201	3651	0	Conductor
Davit7:End	7201	3651	0	Conductor
Davit8:End	7201	3651	0	Conductor
10255:TopConn	9913	5794	0	Top Connection
10255:BotConn	1364	-3724	0	Bottom Connection
10255:WVGD1	1150	93	0	Coax Cables
10255:WVGD2	1150	93	0	Coax Cables
10255:WVGD3	1150	93	0	Coax Cables
10255:WVGD4	1150	93	0	Coax Cables
10255:WVGD5	1150	93	0	Coax Cables
10255:WVGD6	1150	93	0	Coax Cables

10255:WVGD7	1150	93	0	Coax Cables
10255:WVGD8	1150	93	0	Coax Cables
10255:WVGD9	1150	93	0	Coax Cables
10255:WVGD10	1150	93	0	Coax Cables
10255:WVGD11	1150	93	0	Coax Cables
10255:WVGD12	1150	93	0	Coax Cables
10255:WVGD13	1150	93	0	Coax Cables

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

**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)
10255	10255:t	10255:Arm1	150.00	149.30	149.65	20.267	9.6e+005	1.300	10.00	0.50	71.64	15.37	8.87	0.76	16.13	0.00
10255	10255:Arm1	10255:TopConn	149.30	146.42	147.86	20.712	9.81e+005	1.300	10.00	0.50	301.32	64.63	37.29	3.12	67.75	0.00
10255	10255:TopConn		146.42	143.34	144.88	21.454	1.02e+006	1.300	10.00	0.50	334.50	71.71	41.38	3.34	75.05	0.00
10255		10255:BotConn	143.34	140.25	141.79	22.221	1.05e+006	1.300	10.00	0.50	346.65	74.27	42.86	3.34	77.61	0.00
10255	10255:BotConn	10255:Arm2	140.25	136.63	138.44	23.056	1.09e+006	1.300	10.00	0.50	422.84	90.55	52.25	3.93	94.47	0.00
10255	10255:Arm2		136.63	133.31	134.97	23.919	1.13e+006	1.300	10.00	0.50	401.04	85.84	49.54	3.59	89.43	0.00
10255		10255:WVGD13	133.31	130.00	131.66	24.743	1.17e+006	1.300	10.00	0.50	415.04	88.79	51.24	3.59	92.38	0.00
10255	10255:WVGD13		130.00	125.00	127.50	25.777	1.22e+006	1.300	10.00	0.50	652.99	139.63	80.58	5.42	145.05	0.00
10255		10255:WVGD12	125.00	120.00	122.50	27.020	1.28e+006	1.300	10.00	0.50	684.88	146.37	84.47	5.42	151.78	0.00
10255	10255:WVGD12		120.00	117.31	118.66	27.976	1.32e+006	1.300	10.00	0.50	381.30	81.46	47.01	2.91	84.37	0.00
10255		10255:Arm3	117.31	114.63	115.97	28.645	1.36e+006	1.300	10.00	0.50	390.51	83.40	48.13	2.91	86.31	0.00
10255	10255:Arm3	10255:WVGD11	114.63	110.00	112.31	29.554	1.4e+006	1.300	10.00	0.50	693.62	148.09	85.46	5.01	153.10	0.00
10255	10255:WVGD11		110.00	105.00	107.50	30.751	1.46e+006	1.300	10.00	0.50	780.56	166.58	96.13	5.42	171.99	0.00
10255		10255:WVGD10	105.00	100.00	102.50	31.995	1.51e+006	1.300	10.00	0.50	812.45	173.31	100.02	5.42	178.73	0.00
10255	10255:WVGD10		100.00	99.67	99.84	32.658	1.55e+006	1.300	10.00	0.50	54.74	11.68	6.74	0.36	12.03	0.00
10255			99.67	95.00	97.34	32.967	1.56e+006	1.300	10.00	0.50	1869.88	166.79	96.26	5.06	171.85	0.00
10255		10255:Arm4	95.00	92.63	93.81	33.531	1.59e+006	1.300	10.00	0.50	564.48	86.28	49.79	2.57	88.85	0.00
10255	10255:Arm4	10255:WVGD9	92.63	90.00	91.31	34.153	1.62e+006	1.300	10.00	0.50	635.46	97.13	56.05	2.84	99.97	0.00
10255	10255:WVGD9		90.00	85.00	87.50	35.101	1.66e+006	1.300	10.00	0.50	1244.45	190.14	109.73	5.42	195.56	0.00
10255		10255:WVGD8	85.00	80.00	82.50	36.345	1.72e+006	1.300	10.00	0.50	1289.10	196.88	113.62	5.42	202.29	0.00
10255	10255:WVGD8		80.00	75.00	77.50	37.588	1.78e+006	1.300	10.00	0.50	1333.75	203.61	117.50	5.42	209.03	0.00
10255		10255:WVGD7	75.00	70.00	72.50	38.832	1.84e+006	1.300	10.00	0.50	1378.39	210.35	121.39	5.42	215.77	0.00
10255	10255:WVGD7		70.00	65.00	67.50	40.076	1.9e+006	1.300	10.00	0.50	1423.04	217.09	125.28	5.42	222.50	0.00
10255		10255:WVGD6	65.00	60.00	62.50	41.319	1.96e+006	1.300	10.00	0.50	1467.69	223.82	129.17	5.42	229.24	0.00
10255	10255:WVGD6		60.00	55.59	57.79	42.490	2.01e+006	1.300	10.00	0.50	1333.09	203.24	117.29	4.78	208.02	0.00
10255			55.59	51.17	53.38	43.588	2.06e+006	1.300	10.00	0.50	1367.90	208.49	120.32	4.78	213.27	0.00
10255		10255:WVGD5	51.17	50.00	50.59	43.845	2.08e+006	1.300	10.00	0.50	754.83	55.58	32.07	1.27	56.84	0.00
10255	10255:WVGD5		50.00	45.00	47.50	44.175	2.09e+006	1.300	10.00	0.50	3282.82	239.29	138.09	5.42	244.71	0.00
10255		10255:WVGD4	45.00	40.00	42.50	45.419	2.15e+006	1.300	10.00	0.50	1729.02	246.03	141.98	5.42	251.45	0.00
10255	10255:WVGD4		40.00	35.00	37.50	46.662	2.21e+006	1.300	10.00	0.50	1776.86	252.77	145.87	5.42	258.19	0.00
10255		10255:WVGD3	35.00	30.00	32.50	47.906	2.27e+006	1.300	10.00	0.50	1824.70	259.51	149.76	5.42	264.92	0.00
10255	10255:WVGD3		30.00	25.00	27.50	49.150	2.33e+006	1.300	10.00	0.50	1872.54	266.24	153.65	5.42	271.66	0.00
10255		10255:WVGD2	25.00	20.00	22.50	50.394	2.39e+006	1.300	10.00	0.50	1920.37	272.98	157.53	5.42	278.40	0.00
10255	10255:WVGD2		20.00	15.00	17.50	51.637	2.44e+006	1.300	10.00	0.50	1968.21	279.72	161.42	5.42	285.13	0.00
10255		10255:WVGD1	15.00	10.00	12.50	52.881	2.5e+006	1.300	10.00	0.50	2016.05	286.45	165.31	5.42	291.87	0.00
10255	10255:WVGD1		10.00	5.00	7.50	54.125	2.56e+006	1.300	10.00	0.50	2063.89	293.19	169.20	5.42	298.61	0.00
10255		10255:g	5.00	0.00	2.50	55.368	2.62e+006	1.300	10.00	0.50	2111.73	299.93	173.08	5.42	305.34	0.00

Point Loads for Load Case "NESC Extreme":

Joint Vertical Transverse Longitudinal Load

Label	Load (lbs)	Load (lbs)	Load (lbs)	Comment
Davit1:End	280	715	0	Shield Wire
Davit2:End	280	715	0	Shield Wire
Davit3:End	3065	4999	0	Conductor
Davit4:End	3065	4999	0	Conductor
Davit5:End	3065	4999	0	Conductor
Davit6:End	3065	4999	0	Conductor
Davit7:End	3065	4999	0	Conductor
Davit8:End	3065	4999	0	Conductor
10255:TopConn	4525	17923	0	Top Connection
10255:BotConn	574	-11741	0	Bottom Connection
10255:WVGD1	312	218	0	Coax Cables
10255:WVGD2	312	218	0	Coax Cables
10255:WVGD3	312	218	0	Coax Cables
10255:WVGD4	312	218	0	Coax Cables
10255:WVGD5	312	218	0	Coax Cables
10255:WVGD6	312	218	0	Coax Cables
10255:WVGD7	312	218	0	Coax Cables
10255:WVGD8	312	218	0	Coax Cables
10255:WVGD9	312	218	0	Coax Cables
10255:WVGD10	312	218	0	Coax Cables
10255:WVGD11	312	218	0	Coax Cables
10255:WVGD12	312	218	0	Coax Cables
10255:WVGD13	312	218	0	Coax Cables

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

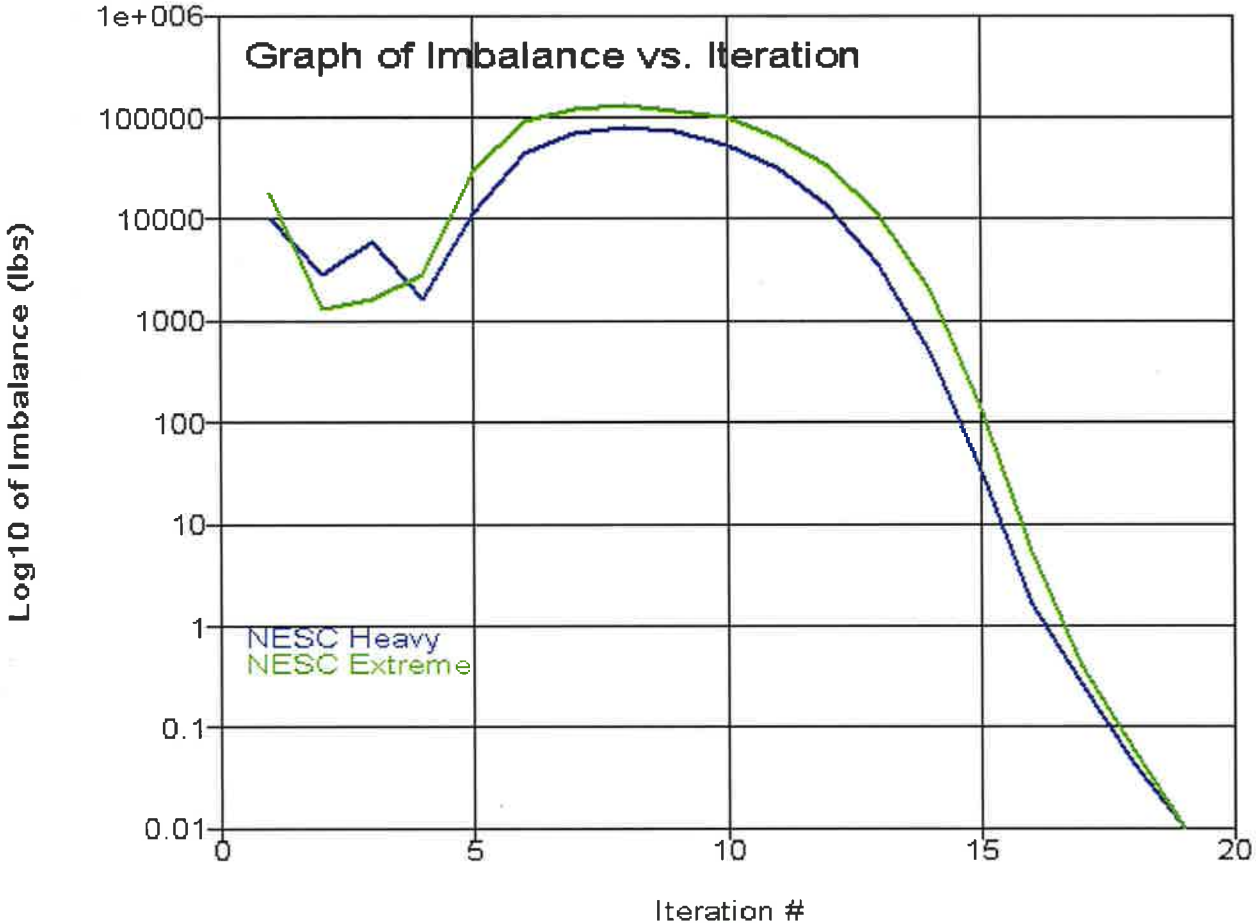
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

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)
10255	10255:t	10255:Arm1	150.00	149.30	149.65	20.267	1.58e+006	1.000	27.12	0.00	47.76	32.07	0.00	0.00	32.07	0.00
10255	10255:Arm1	10255:TopConn	149.30	146.42	147.86	20.712	1.62e+006	1.000	27.12	0.00	200.88	134.83	0.00	0.00	134.83	0.00
10255	10255:TopConn		146.42	143.34	144.88	21.454	1.67e+006	1.000	27.12	0.00	223.00	149.61	0.00	0.00	149.61	0.00
10255		10255:BotConn	143.34	140.25	141.79	22.221	1.73e+006	1.000	27.12	0.00	231.10	154.96	0.00	0.00	154.96	0.00
10255	10255:BotConn	10255:Arm2	140.25	136.63	138.44	23.056	1.8e+006	1.000	27.12	0.00	281.89	188.92	0.00	0.00	188.92	0.00
10255	10255:Arm2		136.63	133.31	134.97	23.919	1.87e+006	1.000	27.12	0.00	267.36	179.09	0.00	0.00	179.09	0.00
10255		10255:WVGD13	133.31	130.00	131.66	24.743	1.93e+006	1.000	27.12	0.00	276.69	185.26	0.00	0.00	185.26	0.00
10255	10255:WVGD13		130.00	125.00	127.50	25.777	2.01e+006	1.000	27.12	0.00	435.33	291.32	0.00	0.00	291.32	0.00
10255		10255:WVGD12	125.00	120.00	122.50	27.020	2.11e+006	1.000	27.12	0.00	456.59	305.38	0.00	0.00	305.38	0.00
10255	10255:WVGD12		120.00	117.31	118.66	27.976	2.18e+006	1.000	27.12	0.00	254.20	169.95	0.00	0.00	169.95	0.00
10255		10255:Arm3	117.31	114.63	115.97	28.645	2.23e+006	1.000	27.12	0.00	260.34	174.01	0.00	0.00	174.01	0.00
10255	10255:Arm3	10255:WVGD11	114.63	110.00	112.31	29.554	2.3e+006	1.000	27.12	0.00	462.41	308.97	0.00	0.00	308.97	0.00
10255	10255:WVGD11		110.00	105.00	107.50	30.751	2.4e+006	1.000	27.12	0.00	520.37	347.55	0.00	0.00	347.55	0.00
10255		10255:WVGD10	105.00	100.00	102.50	31.995	2.49e+006	1.000	27.12	0.00	541.63	361.60	0.00	0.00	361.60	0.00
10255	10255:WVGD10		100.00	99.67	99.84	32.658	2.55e+006	1.000	27.12	0.00	36.50	24.36	0.00	0.00	24.36	0.00
10255			99.67	95.00	97.34	32.967	2.57e+006	1.000	27.12	0.00	1246.59	348.00	0.00	0.00	348.00	0.00
10255		10255:Arm4	95.00	92.63	93.81	33.531	2.61e+006	1.000	27.12	0.00	376.32	180.01	0.00	0.00	180.01	0.00
10255	10255:Arm4	10255:WVGD9	92.63	90.00	91.31	34.153	2.66e+006	1.000	27.12	0.00	423.64	202.64	0.00	0.00	202.64	0.00
10255	10255:WVGD9		90.00	85.00	87.50	35.101	2.74e+006	1.000	27.12	0.00	829.63	396.71	0.00	0.00	396.71	0.00
10255		10255:WVGD8	85.00	80.00	82.50	36.345	2.83e+006	1.000	27.12	0.00	859.40	410.76	0.00	0.00	410.76	0.00
10255	10255:WVGD8		80.00	75.00	77.50	37.588	2.93e+006	1.000	27.12	0.00	889.16	424.82	0.00	0.00	424.82	0.00
10255		10255:WVGD7	75.00	70.00	72.50	38.832	3.03e+006	1.000	27.12	0.00	918.93	438.87	0.00	0.00	438.87	0.00

10255	10255:WVGD7		70.00	65.00	67.50	40.076	3.12e+006	1.000	27.12	0.00	948.70	452.93	0.00	0.00	452.93	0.00
10255		10255:WVGD6	65.00	60.00	62.50	41.319	3.22e+006	1.000	27.12	0.00	978.46	466.98	0.00	0.00	466.98	0.00
10255	10255:WVGD6		60.00	55.59	57.79	42.490	3.31e+006	1.000	27.12	0.00	888.73	424.03	0.00	0.00	424.03	0.00
10255			55.59	51.17	53.38	43.588	3.4e+006	1.000	27.12	0.00	911.94	434.99	0.00	0.00	434.99	0.00
10255		10255:WVGD5	51.17	50.00	50.59	43.845	3.42e+006	1.000	27.12	0.00	503.22	115.96	0.00	0.00	115.96	0.00
10255	10255:WVGD5		50.00	45.00	47.50	44.175	3.44e+006	1.000	27.12	0.00	2188.55	499.26	0.00	0.00	499.26	0.00
10255		10255:WVGD4	45.00	40.00	42.50	45.419	3.54e+006	1.000	27.12	0.00	1152.68	513.32	0.00	0.00	513.32	0.00
10255	10255:WVGD4		40.00	35.00	37.50	46.662	3.64e+006	1.000	27.12	0.00	1184.57	527.37	0.00	0.00	527.37	0.00
10255		10255:WVGD3	35.00	30.00	32.50	47.906	3.74e+006	1.000	27.12	0.00	1216.46	541.43	0.00	0.00	541.43	0.00
10255	10255:WVGD3		30.00	25.00	27.50	49.150	3.83e+006	1.000	27.12	0.00	1248.36	555.49	0.00	0.00	555.49	0.00
10255		10255:WVGD2	25.00	20.00	22.50	50.394	3.93e+006	1.000	27.12	0.00	1280.25	569.54	0.00	0.00	569.54	0.00
10255	10255:WVGD2		20.00	15.00	17.50	51.637	4.03e+006	1.000	27.12	0.00	1312.14	583.60	0.00	0.00	583.60	0.00
10255		10255:WVGD1	15.00	10.00	12.50	52.881	4.12e+006	1.000	27.12	0.00	1344.03	597.65	0.00	0.00	597.65	0.00
10255	10255:WVGD1		10.00	5.00	7.50	54.125	4.22e+006	1.000	27.12	0.00	1375.92	611.71	0.00	0.00	611.71	0.00
10255		10255:g	5.00	0.00	2.50	55.368	4.32e+006	1.000	27.12	0.00	1407.82	625.76	0.00	0.00	625.76	0.00

*** Analysis Results:

Maximum element usage is 96.84% for Base Plate "10255" in load case "NESC Extreme"
Maximum insulator usage is 23.11% for Clamp "Clamp9" 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)
10255:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10255:t	0.01802	8.373	-0.3236	-5.9550	0.0114	0.0003	0.01802	8.373	149.7
10255:Arm1	0.01788	8.3	-0.3198	-5.9550	0.0114	0.0003	0.01788	8.3	149

10255:TopConn	0.01731	8.001	-0.3042	-5.9501	0.0114	0.0003	0.01731	8.001	146.1
10255:BotConn	0.01609	7.364	-0.2711	-5.8975	0.0114	0.0003	0.01609	7.364	140
10255:Arm2	0.01537	6.993	-0.252	-5.8434	0.0113	0.0003	0.01537	6.993	136.4
10255:WVGD13	0.01407	6.327	-0.2181	-5.6782	0.0112	0.0002	0.01407	6.327	129.8
10255:WVGD12	0.01216	5.366	-0.1714	-5.3257	0.0107	0.0002	0.01216	5.366	119.8
10255:Arm3	0.01117	4.877	-0.1488	-5.1061	0.0104	0.0002	0.01117	4.877	114.5
10255:WVGD11	0.01034	4.473	-0.1309	-4.8927	0.0101	0.0002	0.01034	4.473	109.9
10255:WVGD10	0.008644	3.663	-0.09741	-4.3752	0.0093	0.0001	0.008644	3.663	99.9
10255:Arm4	0.007477	3.122	-0.07719	-4.0335	0.0088	0.0001	0.007477	3.122	92.55
10255:WVGD9	0.007079	2.94	-0.07072	-3.9173	0.0086	0.0001	0.007079	2.94	89.93
10255:WVGD8	0.005646	2.296	-0.04938	-3.4556	0.0078	0.0001	0.005646	2.296	79.95
10255:WVGD7	0.004356	1.734	-0.033	-2.9801	0.0069	0.0001	0.004356	1.734	69.97
10255:WVGD6	0.003222	1.254	-0.02095	-2.5052	0.0060	0.0000	0.003222	1.254	59.98
10255:WVGD5	0.002251	0.8574	-0.01252	-2.0401	0.0051	0.0000	0.002251	0.8574	49.99
10255:WVGD4	0.001449	0.54	-0.00695	-1.5932	0.0041	0.0000	0.001449	0.54	39.99
10255:WVGD3	0.0008196	0.2989	-0.003518	-1.1650	0.0031	0.0000	0.0008196	0.2989	30
10255:WVGD2	0.0003669	0.1309	-0.001583	-0.7567	0.0021	0.0000	0.0003669	0.1309	20
10255:WVGD1	9.313e-005	0.03242	-0.000575	-0.3684	0.0010	0.0000	9.313e-005	0.03242	9.999
Davit1:O	0.01791	8.305	-0.2318	-5.9550	0.0114	0.0003	0.01791	7.457	149.1
Davit1:End	0.0184	8.478	0.7759	-5.7255	0.0114	0.0003	0.0184	-2.37	151.3
Davit2:O	0.01786	8.296	-0.4078	-5.9550	0.0114	0.0003	0.01786	9.144	148.9
Davit2:End	0.01784	8.367	-1.482	-6.2521	0.0114	0.0003	0.01784	19.21	149
Davit3:O	0.0154	6.998	-0.1522	-5.8434	0.0113	0.0003	0.0154	6.018	136.5
Davit3:End	0.01615	7.258	1.272	-5.1969	0.0114	0.0003	0.01615	-8.721	139.9
Davit4:O	0.01535	6.988	-0.3517	-5.8434	0.0113	0.0003	0.01535	7.967	136.3
Davit4:End	0.01535	7.116	-2	-6.5991	0.0113	0.0003	0.01535	23.1	136.6
Davit5:O	0.0112	4.881	-0.04136	-5.1061	0.0104	0.0002	0.0112	3.674	114.6
Davit5:End	0.01184	5.098	1.192	-4.4528	0.0105	0.0002	0.01184	-11.11	117.8
Davit6:O	0.01115	4.872	-0.2563	-5.1061	0.0104	0.0002	0.01115	6.079	114.4
Davit6:End	0.0112	4.995	-1.711	-5.8663	0.0104	0.0002	0.0112	21.2	114.9
Davit7:O	0.007495	3.126	0.02194	-4.0335	0.0088	0.0001	0.007495	1.716	92.65
Davit7:End	0.007983	3.285	0.9765	-3.3705	0.0088	0.0001	0.007983	-13.12	95.6
Davit8:O	0.007459	3.119	-0.1763	-4.0335	0.0088	0.0001	0.007459	4.528	92.45
Davit8:End	0.00756	3.229	-1.349	-4.7999	0.0088	0.0001	0.00756	19.64	93.28

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 %
10255:g	-0.17	0.0	-33.68	0.0	0.0	-126.22	0.0	0.0	130.63	0.0	4165.10	0.0	-12.1	0.0	0.0	-0.02	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.
10255	10255:t	Origin	0.00	100.47	0.22	-3.88	-0.00	-0.00	0.0	-0.04	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
10255	10255:Arm1	End	0.70	99.60	0.21	-3.84	0.01	-0.00	0.0	-0.04	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	3
10255	10255:Arm1	Origin	0.70	99.60	0.21	-3.84	2.85	-0.00	0.0	-2.82	2.51	-0.00	-0.14	0.25	0.18	0.00	0.50	0.8	3

	10255	10255:TopConn	End	3.58	96.02	0.21	-3.65	10.08	-0.01	0.0	-2.82	2.51	-0.00	-0.14	1.11	0.06	0.00	1.25	1.9
2	10255	10255:TopConn	Origin	3.58	96.02	0.21	-3.65	10.08	-0.01	0.0	-12.44	9.41	-0.01	-0.60	0.81	0.65	0.00	1.81	2.8
3	10255	Tube 1	End	6.67	92.18	0.20	-3.45	39.11	-0.03	0.0	-12.44	9.41	-0.01	-0.57	4.00	0.23	0.00	4.59	7.1
2	10255	Tube 1	Origin	6.67	92.18	0.20	-3.45	39.11	-0.03	0.0	-12.82	9.52	-0.01	-0.59	4.00	0.23	0.00	4.61	7.1
2	10255	10255:BotConn	End	9.75	88.36	0.19	-3.25	68.47	-0.05	0.0	-12.82	9.52	-0.01	-0.57	6.52	0.23	0.00	7.10	10.9
2	10255	10255:BotConn	Origin	9.75	88.36	0.19	-3.25	68.47	-0.05	0.0	-15.00	6.07	-0.01	-0.67	6.52	0.14	0.00	7.19	11.1
2	10255	10255:Arm2	End	13.38	83.91	0.18	-3.02	90.49	-0.09	0.0	-15.00	6.07	-0.01	-0.64	7.95	0.14	0.00	8.60	13.2
2	10255	10255:Arm2	Origin	13.38	83.91	0.18	-3.02	107.29	-0.10	0.0	-30.76	15.09	-0.02	-1.32	9.43	0.34	0.00	10.77	16.6
2	10255	Tube 1	End	16.69	79.89	0.18	-2.82	157.29	-0.16	0.0	-30.76	15.09	-0.02	-1.27	12.89	0.33	0.00	14.17	21.8
2	10255	Tube 1	Origin	16.69	79.89	0.18	-2.82	157.29	-0.16	0.0	-31.24	15.18	-0.02	-1.29	12.89	0.33	0.00	14.19	21.8
2	10255	10255:WVGD13	End	20.00	75.92	0.17	-2.62	207.58	-0.23	0.0	-31.24	15.18	-0.02	-1.25	15.89	0.32	0.00	17.15	26.4
2	10255	10255:WVGD13	Origin	20.00	75.92	0.17	-2.62	207.58	-0.23	0.0	-33.00	15.50	-0.02	-1.32	15.89	0.33	0.00	17.22	26.5
2	10255	Tube 1	End	25.00	70.06	0.16	-2.33	285.06	-0.34	0.0	-33.00	15.50	-0.02	-1.26	19.78	0.31	0.00	21.05	32.4
2	10255	Tube 1	Origin	25.00	70.06	0.16	-2.33	285.06	-0.34	0.0	-33.80	15.61	-0.03	-1.29	19.78	0.32	0.00	21.08	32.4
2	10255	10255:WVGD12	End	30.00	64.39	0.15	-2.06	363.12	-0.48	0.0	-33.80	15.61	-0.03	-1.23	22.95	0.30	0.00	24.18	37.2
2	10255	10255:WVGD12	Origin	30.00	64.39	0.15	-2.06	363.12	-0.48	0.0	-35.57	15.89	-0.03	-1.30	22.95	0.31	0.00	24.25	37.3
2	10255	Tube 1	End	32.69	61.42	0.14	-1.92	405.83	-0.56	0.0	-35.57	15.89	-0.03	-1.26	24.43	0.30	0.00	25.70	39.5
2	10255	Tube 1	Origin	32.69	61.42	0.14	-1.92	405.83	-0.56	0.0	-36.04	15.95	-0.03	-1.28	24.43	0.30	0.00	25.72	39.6
2	10255	10255:Arm3	End	35.38	58.52	0.13	-1.79	448.70	-0.65	0.0	-36.04	15.95	-0.03	-1.25	25.76	0.29	0.00	27.01	41.6
2	10255	10255:Arm3	Origin	35.38	58.52	0.13	-1.79	465.14	-0.66	0.0	-52.11	24.70	-0.04	-1.81	26.70	0.45	0.00	28.52	43.9
2	10255	10255:WVGD11	End	40.00	53.68	0.12	-1.57	579.39	-0.84	0.0	-52.11	24.70	-0.04	-1.74	30.73	0.44	0.00	32.48	50.0
2	10255	10255:WVGD11	Origin	40.00	53.68	0.12	-1.57	579.39	-0.84	0.0	-54.17	24.91	-0.04	-1.81	30.73	0.44	0.00	32.55	50.1
2	10255	Tube 1	End	45.00	48.68	0.11	-1.36	703.95	-1.06	0.0	-54.17	24.91	-0.04	-1.74	34.39	0.42	0.00	36.14	55.6
2	10255	Tube 1	Origin	45.00	48.68	0.11	-1.36	703.95	-1.06	0.0	-55.17	24.91	-0.05	-1.77	34.39	0.42	0.00	36.17	55.6
2	10255	10255:WVGD10	End	50.00	43.96	0.10	-1.17	828.49	-1.31	0.0	-55.17	24.91	-0.05	-1.70	37.41	0.41	0.00	39.12	60.2
2	10255	10255:WVGD10	Origin	50.00	43.96	0.10	-1.17	828.49	-1.31	0.0	-56.86	25.08	-0.05	-1.75	37.41	0.41	0.00	39.17	60.3
2	10255	SpliceT	End	50.33	43.66	0.10	-1.16	836.77	-1.32	0.0	-56.86	25.08	-0.05	-1.75	37.59	0.41	0.00	39.35	60.5
2	10255	SpliceT	Origin	50.33	43.66	0.10	-1.16	836.77	-1.32	0.0	-57.93	25.13	-0.05	-1.78	37.59	0.41	0.00	39.38	60.6
2	10255	SpliceB	End	55.00	39.50	0.09	-1.00	954.13	-1.57	0.0	-57.93	25.13	-0.05	-1.26	29.96	0.29	0.00	31.22	48.0
2	10255	SpliceB	Origin	55.00	39.50	0.09	-1.00	954.13	-1.57	0.0	-59.28	25.19	-0.06	-1.28	29.96	0.29	0.00	31.25	48.1

2	10255	10255:Arm4	End	57.38	37.47	0.09	-0.93	1013.95	-1.71	0.0	-59.28	25.19	-0.06	-1.26	30.72	0.28	0.00	31.98	49.2
2	10255	10255:Arm4	Origin	57.38	37.47	0.09	-0.93	1029.86	-1.71	0.0	-75.56	33.62	-0.06	-1.61	31.20	0.38	0.00	32.81	50.5
2	10255	10255:WVGD9	End	60.00	35.28	0.08	-0.85	1118.11	-1.88	0.0	-75.56	33.62	-0.06	-1.58	32.58	0.37	0.00	34.16	52.6
2	10255	10255:WVGD9	Origin	60.00	35.28	0.08	-0.85	1118.11	-1.88	0.0	-77.82	33.78	-0.07	-1.63	32.58	0.37	0.00	34.21	52.6
2	10255	Tube 2	End	65.00	31.30	0.08	-0.71	1287.00	-2.21	0.0	-77.82	33.78	-0.07	-1.57	34.88	0.36	0.00	36.46	56.1
2	10255	Tube 2	Origin	65.00	31.30	0.08	-0.71	1287.00	-2.21	0.0	-79.33	33.75	-0.07	-1.60	34.88	0.36	0.00	36.49	56.1
2	10255	10255:WVGD8	End	70.00	27.55	0.07	-0.59	1455.73	-2.57	0.0	-79.33	33.75	-0.07	-1.54	36.80	0.35	0.00	38.35	59.0
2	10255	10255:WVGD8	Origin	70.00	27.55	0.07	-0.59	1455.73	-2.57	0.0	-82.04	33.87	-0.08	-1.60	36.80	0.35	0.00	38.40	59.1
2	10255	Tube 2	End	75.00	24.05	0.06	-0.49	1625.08	-2.95	0.0	-82.04	33.87	-0.08	-1.54	38.41	0.34	0.00	39.96	61.5
2	10255	Tube 2	Origin	75.00	24.05	0.06	-0.49	1625.08	-2.95	0.0	-83.65	33.82	-0.08	-1.57	38.41	0.34	0.00	39.99	61.5
2	10255	10255:WVGD7	End	80.00	20.80	0.05	-0.40	1794.17	-3.35	0.0	-83.65	33.82	-0.08	-1.52	39.73	0.33	0.00	41.26	63.5
2	10255	10255:WVGD7	Origin	80.00	20.80	0.05	-0.40	1794.17	-3.35	0.0	-86.46	33.92	-0.09	-1.58	39.73	0.33	0.00	41.31	63.6
2	10255	Tube 2	End	85.00	17.80	0.05	-0.32	1963.75	-3.79	0.0	-86.46	33.92	-0.09	-1.53	40.83	0.32	0.00	42.36	65.2
2	10255	Tube 2	Origin	85.00	17.80	0.05	-0.32	1963.75	-3.79	0.0	-88.17	33.86	-0.09	-1.56	40.83	0.32	0.00	42.39	65.2
2	10255	10255:WVGD6	End	90.00	15.05	0.04	-0.25	2133.02	-4.25	0.0	-88.17	33.86	-0.09	-1.51	41.72	0.31	0.00	43.23	66.5
2	10255	10255:WVGD6	Origin	90.00	15.05	0.04	-0.25	2133.02	-4.25	0.0	-90.97	33.94	-0.10	-1.56	41.72	0.31	0.00	43.28	66.6
2	10255	Tube 2	End	94.42	12.83	0.03	-0.20	2282.84	-4.68	0.0	-90.97	33.94	-0.10	-1.52	42.37	0.30	0.00	43.89	67.5
2	10255	Tube 2	Origin	94.42	12.83	0.03	-0.20	2282.84	-4.68	0.0	-92.56	33.88	-0.10	-1.54	42.37	0.30	0.00	43.91	67.6
2	10255	SpliceT	End	98.83	10.80	0.03	-0.16	2432.40	-5.13	0.0	-92.56	33.88	-0.10	-1.51	42.89	0.29	0.00	44.40	68.3
2	10255	SpliceT	Origin	98.83	10.80	0.03	-0.16	2432.40	-5.13	0.0	-93.77	33.84	-0.11	-1.53	42.89	0.29	0.00	44.42	68.3
2	10255	10255:WVGD5	End	100.00	10.29	0.03	-0.15	2471.99	-5.25	0.0	-93.77	33.84	-0.11	-1.44	41.89	0.28	0.00	43.34	66.7
2	10255	10255:WVGD5	Origin	100.00	10.29	0.03	-0.15	2471.99	-5.25	0.0	-97.10	33.97	-0.11	-1.50	41.89	0.28	0.00	43.39	66.7
2	10255	SpliceB	End	105.00	8.27	0.02	-0.11	2641.83	-5.80	0.0	-97.10	33.97	-0.11	-1.45	42.28	0.27	0.00	43.73	67.3
2	10255	SpliceB	Origin	105.00	8.27	0.02	-0.11	2641.83	-5.80	0.0	-99.88	33.92	-0.12	-1.49	42.28	0.27	0.00	43.78	67.3
2	10255	10255:WVGD4	End	110.00	6.48	0.02	-0.08	2811.40	-6.38	0.0	-99.88	33.92	-0.12	-1.45	42.56	0.26	0.00	44.01	67.7
2	10255	10255:WVGD4	Origin	110.00	6.48	0.02	-0.08	2811.40	-6.38	0.0	-103.05	33.96	-0.12	-1.50	42.56	0.26	0.00	44.06	67.8
2	10255	Tube 3	End	115.00	4.92	0.01	-0.06	2981.19	-6.98	0.0	-103.05	33.96	-0.12	-1.46	42.75	0.25	0.00	44.22	68.0
2	10255	Tube 3	Origin	115.00	4.92	0.01	-0.06	2981.19	-6.98	0.0	-105.13	33.88	-0.13	-1.49	42.75	0.25	0.00	44.24	68.1
2	10255	10255:WVGD3	End	120.00	3.59	0.01	-0.04	3150.58	-7.62	0.0	-105.13	33.88	-0.13	-1.45	42.86	0.25	0.00	44.32	68.2
2																			

10255	10255:WVGD3	Origin	120.00	3.59	0.01	-0.04	3150.58	-7.62	0.0	-108.40	33.91	-0.13	-1.50	42.86	0.25	0.00	44.36	68.2	2
10255	Tube 3	End	125.00	2.47	0.01	-0.03	3320.14	-8.28	0.0	-108.40	33.91	-0.13	-1.46	42.91	0.24	0.00	44.37	68.3	2
10255	Tube 3	Origin	125.00	2.47	0.01	-0.03	3320.14	-8.28	0.0	-110.57	33.83	-0.14	-1.49	42.91	0.24	0.00	44.40	68.3	2
10255	10255:WVGD2	End	130.00	1.57	0.00	-0.02	3489.30	-8.98	0.0	-110.57	33.83	-0.14	-1.45	42.90	0.23	0.00	44.35	68.2	2
10255	10255:WVGD2	Origin	130.00	1.57	0.00	-0.02	3489.30	-8.98	0.0	-113.94	33.86	-0.15	-1.50	42.90	0.23	0.00	44.39	68.3	2
10255	Tube 3	End	135.00	0.88	0.00	-0.01	3658.60	-9.71	0.0	-113.94	33.86	-0.15	-1.46	42.84	0.23	0.00	44.30	68.1	2
10255	Tube 3	Origin	135.00	0.88	0.00	-0.01	3658.60	-9.71	0.0	-116.21	33.78	-0.15	-1.49	42.84	0.23	0.00	44.33	68.2	2
10255	10255:WVGD1	End	140.00	0.39	0.00	-0.01	3827.50	-10.48	0.0	-116.21	33.78	-0.15	-1.45	42.73	0.22	0.00	44.18	68.0	2
10255	10255:WVGD1	Origin	140.00	0.39	0.00	-0.01	3827.50	-10.48	0.0	-119.68	33.80	-0.16	-1.50	42.73	0.22	0.00	44.23	68.0	2
10255	Tube 3	End	145.00	0.10	0.00	-0.00	3996.49	-11.27	0.0	-119.68	33.80	-0.16	-1.46	42.59	0.22	0.00	44.05	67.8	2
10255	Tube 3	Origin	145.00	0.10	0.00	-0.00	3996.49	-11.27	0.0	-122.05	33.72	-0.17	-1.49	42.59	0.22	0.00	44.08	67.8	2
10255	10255:g	End	150.00	0.00	0.00	0.00	4165.10	-12.11	0.0	-122.05	33.72	-0.17	-1.46	42.41	0.21	0.00	43.87	67.5	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Heavy":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	99.66	0.21	-2.78	-9.98	0.00	0.0	-1.34	1.06	-0.00	-0.20	6.99	0.00	0.00	7.19	11.1	1
Davit1	#Davit1:0	End	5.00	100.70	0.22	3.28	-4.70	0.00	0.0	-1.34	1.06	-0.00	-0.25	5.48	0.00	0.00	5.73	8.8	1
Davit1	#Davit1:0	Origin	5.00	100.70	0.22	3.28	-4.70	0.00	0.0	-1.32	0.95	-0.00	-0.25	5.48	0.00	0.00	5.72	8.8	1
Davit1	#Davit1:1	End	7.54	101.22	0.22	6.31	-2.28	0.00	0.0	-1.32	0.95	-0.00	-0.29	3.65	0.00	0.00	3.94	6.1	1
Davit1	#Davit1:1	Origin	7.54	101.22	0.22	6.31	-2.28	0.00	0.0	-1.30	0.90	-0.00	-0.29	3.65	0.00	0.00	3.94	6.1	1
Davit1	Davit1:End	End	10.07	101.74	0.22	9.31	-0.00	0.00	0.0	-1.30	0.90	-0.00	-0.35	0.00	0.51	0.00	0.94	1.5	3
Davit2	Davit2:O	Origin	0.00	99.55	0.21	-4.89	-12.82	-0.00	-0.0	1.06	1.34	0.00	0.15	8.98	0.00	0.00	9.13	14.1	1
Davit2	#Davit2:0	End	5.00	99.97	0.21	-11.21	-6.10	-0.00	-0.0	1.06	1.34	0.00	0.20	7.11	0.00	0.00	7.31	11.2	1
Davit2	#Davit2:0	Origin	5.00	99.97	0.21	-11.21	-6.10	-0.00	-0.0	1.06	1.23	0.00	0.20	7.11	0.00	0.00	7.31	11.3	1
Davit2	#Davit2:1	End	7.54	100.18	0.21	-14.48	-2.97	-0.00	-0.0	1.06	1.23	0.00	0.23	4.77	0.00	0.00	5.00	7.7	1
Davit2	#Davit2:1	Origin	7.54	100.18	0.21	-14.48	-2.97	-0.00	0.0	1.07	1.17	0.00	0.23	4.77	0.00	0.00	5.00	7.7	1
Davit2	Davit2:End	End	10.07	100.40	0.21	-17.79	0.00	0.00	0.0	1.07	1.17	0.00	0.28	0.00	0.66	0.00	1.18	1.8	3
Davit3	Davit3:O	Origin	0.00	83.97	0.18	-1.83	-99.25	0.03	0.0	-5.37	6.83	-0.00	-0.36	18.00	0.00	0.00	18.35	28.2	1
Davit3	#Davit3:0	End	5.00	85.06	0.19	4.06	-65.11	0.02	0.0	-5.37	6.83	-0.00	-0.43	17.25	0.00	0.00	17.68	27.2	1
Davit3	#Davit3:0	Origin	5.00	85.06	0.19	4.06	-65.11	0.02	0.0	-5.27	6.54	-0.00	-0.42	17.25	0.00	0.00	17.67	27.2	1
Davit3	#Davit3:1	End	10.00	86.09	0.19	9.70	-32.40	0.01	0.0	-5.27	6.54	-0.00	-0.53	13.72	0.00	0.00	14.25	21.9	1
Davit3	#Davit3:1	Origin	10.00	86.09	0.19	9.70	-32.40	0.01	0.0	-5.20	6.36	-0.00	-0.53	13.72	0.00	0.00	14.24	21.9	1
Davit3	#Davit3:2	End	12.57	86.60	0.19	12.51	-16.07	0.00	0.0	-5.20	6.36	-0.00	-0.61	9.10	0.00	0.00	9.71	14.9	1
Davit3	#Davit3:2	Origin	12.57	86.60	0.19	12.51	-16.07	0.00	0.0	-5.17	6.26	-0.00	-0.60	9.10	0.00	0.00	9.70	14.9	1
Davit3	Davit3:End	End	15.13	87.10	0.19	15.26	-0.00	0.00	0.0	-5.17	6.26	-0.00	-0.71	0.00	1.79	0.00	3.18	4.9	3
Davit4	Davit4:O	Origin	0.00	83.85	0.18	-4.22	-116.05	-0.02	-0.0	3.43	7.99	0.00	0.23	21.04	0.00	0.00	21.27	32.7	1
Davit4	#Davit4:0	End	5.00	84.36	0.18	-10.47	-76.11	-0.02	-0.0	3.43	7.99	0.00	0.27	20.17	0.00	0.00	20.44	31.4	1
Davit4	#Davit4:0	Origin	5.00	84.36	0.18	-10.47	-76.11	-0.02	-0.0	3.48	7.65	0.00	0.28	20.17	0.00	0.00	20.45	31.5	1
Davit4	#Davit4:1	End	10.00	84.87	0.18	-17.01	-37.86	-0.01	-0.0	3.48	7.65	0.00	0.35	16.03	0.00	0.00	16.38	25.2	1

Davit4	#Davit4:1	Origin	10.00	84.87	0.18	-17.01	-37.86	-0.01	-0.0	3.51	7.44	0.00	0.35	16.03	0.00	0.00	16.38	25.2	1
Davit4	#Davit4:2	End	12.57	85.13	0.18	-20.48	-18.78	-0.00	-0.0	3.51	7.44	0.00	0.41	10.63	0.00	0.00	11.04	17.0	1
Davit4	#Davit4:2	Origin	12.57	85.13	0.18	-20.48	-18.78	-0.00	0.0	3.52	7.32	0.00	0.41	10.63	0.00	0.00	11.04	17.0	1
Davit4	Davit4:End	End	15.13	85.40	0.18	-24.00	-0.00	0.00	0.0	3.52	7.32	0.00	0.49	0.00	2.09	0.00	3.66	5.6	3
Davit5	Davit5:O	Origin	0.00	58.58	0.13	-0.50	-100.28	0.03	0.0	-5.28	6.90	-0.00	-0.35	18.18	0.00	0.00	18.53	28.5	1
Davit5	#Davit5:0	End	5.00	59.49	0.14	4.64	-65.80	0.02	0.0	-5.28	6.90	-0.00	-0.42	17.43	0.00	0.00	17.86	27.5	1
Davit5	#Davit5:0	Origin	5.00	59.49	0.14	4.64	-65.80	0.02	0.0	-5.18	6.61	-0.00	-0.41	17.43	0.00	0.00	17.85	27.5	1
Davit5	#Davit5:1	End	10.00	60.35	0.14	9.52	-32.74	0.01	0.0	-5.18	6.61	-0.00	-0.52	13.86	0.00	0.00	14.38	22.1	1
Davit5	#Davit5:1	Origin	10.00	60.35	0.14	9.52	-32.74	0.01	0.0	-5.12	6.43	-0.00	-0.52	13.86	0.00	0.00	14.38	22.1	1
Davit5	#Davit5:2	End	12.57	60.77	0.14	11.94	-16.24	0.00	0.0	-5.12	6.43	-0.00	-0.60	9.20	0.00	0.00	9.80	15.1	1
Davit5	#Davit5:2	Origin	12.57	60.77	0.14	11.94	-16.24	0.00	0.0	-5.09	6.33	-0.00	-0.59	9.20	0.00	0.00	9.79	15.1	1
Davit5	Davit5:End	End	15.13	61.18	0.14	14.30	-0.00	0.00	0.0	-5.09	6.33	-0.00	-0.70	0.00	1.81	0.00	3.21	4.9	3
Davit6	Davit6:O	Origin	0.00	58.46	0.13	-3.08	-116.71	-0.02	-0.0	3.33	8.03	0.00	0.22	21.16	0.00	0.00	21.38	32.9	1
Davit6	#Davit6:0	End	5.00	58.94	0.13	-8.55	-76.56	-0.01	-0.0	3.33	8.03	0.00	0.27	20.29	0.00	0.00	20.55	31.6	1
Davit6	#Davit6:0	Origin	5.00	58.94	0.13	-8.55	-76.56	-0.01	-0.0	3.38	7.70	0.00	0.27	20.29	0.00	0.00	20.56	31.6	1
Davit6	#Davit6:1	End	10.00	59.43	0.13	-14.33	-38.09	-0.01	-0.0	3.38	7.70	0.00	0.34	16.12	0.00	0.00	16.46	25.3	1
Davit6	#Davit6:1	Origin	10.00	59.43	0.13	-14.33	-38.09	-0.01	-0.0	3.41	7.48	0.00	0.34	16.12	0.00	0.00	16.47	25.3	1
Davit6	#Davit6:2	End	12.57	59.68	0.13	-17.40	-18.89	-0.00	-0.0	3.41	7.48	0.00	0.40	10.70	0.00	0.00	11.10	17.1	1
Davit6	#Davit6:2	Origin	12.57	59.68	0.13	-17.40	-18.89	-0.00	0.0	3.43	7.36	0.00	0.40	10.70	0.00	0.00	11.10	17.1	1
Davit6	Davit6:End	End	15.13	59.94	0.13	-20.53	-0.00	0.00	0.0	3.43	7.36	0.00	0.47	0.00	2.10	0.00	3.68	5.7	3
Davit7	Davit7:O	Origin	0.00	37.51	0.09	0.26	-101.75	0.02	0.0	-5.15	7.00	-0.00	-0.34	18.45	0.00	0.00	18.79	28.9	1
Davit7	#Davit7:0	End	5.00	38.19	0.09	4.30	-66.77	0.01	0.0	-5.15	7.00	-0.00	-0.41	17.69	0.00	0.00	18.10	27.9	1
Davit7	#Davit7:0	Origin	5.00	38.19	0.09	4.30	-66.77	0.01	0.0	-5.06	6.71	-0.00	-0.40	17.69	0.00	0.00	18.10	27.8	1
Davit7	#Davit7:1	End	10.00	38.82	0.09	8.08	-33.23	0.01	0.0	-5.06	6.71	-0.00	-0.51	14.07	0.00	0.00	14.58	22.4	1
Davit7	#Davit7:1	Origin	10.00	38.82	0.09	8.08	-33.23	0.01	0.0	-5.00	6.53	-0.00	-0.50	14.07	0.00	0.00	14.57	22.4	1
Davit7	#Davit7:2	End	12.57	39.12	0.09	9.92	-16.49	0.00	0.0	-5.00	6.53	-0.00	-0.58	9.34	0.00	0.00	9.92	15.3	1
Davit7	#Davit7:2	Origin	12.57	39.12	0.09	9.92	-16.49	0.00	0.0	-4.97	6.42	-0.00	-0.58	9.34	0.00	0.00	9.92	15.3	1
Davit7	Davit7:End	End	15.13	39.42	0.10	11.72	-0.00	0.00	0.0	-4.97	6.42	-0.00	-0.69	0.00	1.84	0.00	3.25	5.0	3
Davit8	Davit8:O	Origin	0.00	37.43	0.09	-2.12	-117.65	-0.02	-0.0	3.17	8.09	0.00	0.21	21.33	0.00	0.00	21.54	33.1	1
Davit8	#Davit8:0	End	5.00	37.85	0.09	-6.47	-77.19	-0.01	-0.0	3.17	8.09	0.00	0.25	20.45	0.00	0.00	20.71	31.9	1
Davit8	#Davit8:0	Origin	5.00	37.85	0.09	-6.47	-77.19	-0.01	-0.0	3.23	7.76	0.00	0.26	20.45	0.00	0.00	20.71	31.9	1
Davit8	#Davit8:1	End	10.00	38.28	0.09	-11.13	-38.41	-0.01	-0.0	3.23	7.76	0.00	0.33	16.26	0.00	0.00	16.58	25.5	1
Davit8	#Davit8:1	Origin	10.00	38.28	0.09	-11.13	-38.41	-0.01	-0.0	3.27	7.54	0.00	0.33	16.26	0.00	0.00	16.59	25.5	1
Davit8	#Davit8:2	End	12.57	38.52	0.09	-13.63	-19.05	-0.00	-0.0	3.27	7.54	0.00	0.38	10.79	0.00	0.00	11.17	17.2	1
Davit8	#Davit8:2	Origin	12.57	38.52	0.09	-13.63	-19.05	-0.00	0.0	3.29	7.42	0.00	0.38	10.79	0.00	0.00	11.17	17.2	1
Davit8	Davit8:End	End	15.13	38.75	0.09	-16.19	-0.00	0.00	0.0	3.29	7.42	0.00	0.45	0.00	2.12	0.00	3.70	5.7	3

Summary of Clamp Capacities and Usages for Load Case "NESC Heavy":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	1.565	80.00	80.00	1.96
Clamp2	1.565	80.00	80.00	1.96
Clamp3	8.074	80.00	80.00	10.09
Clamp4	8.074	80.00	80.00	10.09
Clamp5	8.074	80.00	80.00	10.09
Clamp6	8.074	80.00	80.00	10.09
Clamp7	8.074	80.00	80.00	10.09
Clamp8	8.074	80.00	80.00	10.09
Clamp9	11.482	80.00	80.00	14.35
Clamp10	3.966	80.00	80.00	4.96

Clamp11	1.154	80.00	80.00	1.44
Clamp12	1.154	80.00	80.00	1.44
Clamp13	1.154	80.00	80.00	1.44
Clamp14	1.154	80.00	80.00	1.44
Clamp15	1.154	80.00	80.00	1.44
Clamp16	1.154	80.00	80.00	1.44
Clamp17	1.154	80.00	80.00	1.44
Clamp18	1.154	80.00	80.00	1.44
Clamp19	1.154	80.00	80.00	1.44
Clamp20	1.154	80.00	80.00	1.44
Clamp21	1.154	80.00	80.00	1.44
Clamp22	1.154	80.00	80.00	1.44
Clamp23	1.154	80.00	80.00	1.44

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 19

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)
10255:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10255:t	0.005253	11.77	-0.6292	-8.4606	0.0033	0.0002	0.005253	11.77	149.4
10255:Arm1	0.005214	11.67	-0.6216	-8.4606	0.0033	0.0002	0.005214	11.67	148.7
10255:TopConn	0.00505	11.25	-0.5903	-8.4573	0.0033	0.0002	0.00505	11.25	145.8
10255:BotConn	0.0047	10.34	-0.5236	-8.3648	0.0033	0.0001	0.0047	10.34	139.7
10255:Arm2	0.004495	9.818	-0.4854	-8.2636	0.0033	0.0001	0.004495	9.818	136.1
10255:WVGD13	0.004124	8.879	-0.4185	-7.9968	0.0032	0.0001	0.004124	8.879	129.6
10255:WVGD12	0.003575	7.531	-0.327	-7.4695	0.0031	0.0001	0.003575	7.531	119.7
10255:Arm3	0.003289	6.847	-0.2831	-7.1501	0.0030	0.0001	0.003289	6.847	114.3
10255:WVGD11	0.00305	6.282	-0.2484	-6.8451	0.0029	0.0001	0.00305	6.282	109.8
10255:WVGD10	0.002556	5.151	-0.1839	-6.1173	0.0027	0.0001	0.002556	5.151	99.82
10255:Arm4	0.002216	4.395	-0.145	-5.6408	0.0026	0.0001	0.002216	4.395	92.48
10255:WVGD9	0.0021	4.141	-0.1326	-5.4794	0.0025	0.0001	0.0021	4.141	89.87
10255:WVGD8	0.00168	3.24	-0.0916	-4.8407	0.0023	0.0000	0.00168	3.24	79.91
10255:WVGD7	0.0013	2.452	-0.06023	-4.1840	0.0021	0.0000	0.0013	2.452	69.94
10255:WVGD6	0.0009645	1.778	-0.03724	-3.5273	0.0018	0.0000	0.0009645	1.778	59.96
10255:WVGD5	0.0006758	1.218	-0.02129	-2.8816	0.0015	0.0000	0.0006758	1.218	49.98
10255:WVGD4	0.0004362	0.7693	-0.01092	-2.2582	0.0012	0.0000	0.0004362	0.7693	39.99
10255:WVGD3	0.0002475	0.427	-0.004793	-1.6574	0.0009	0.0000	0.0002475	0.427	30
10255:WVGD2	0.0001111	0.1875	-0.001651	-1.0806	0.0006	0.0000	0.0001111	0.1875	20
10255:WVGD1	2.829e-005	0.04659	-0.0003838	-0.5283	0.0003	0.0000	2.829e-005	0.04659	10
Davit1:O	0.005223	11.68	-0.4968	-8.4606	0.0033	0.0002	0.005223	10.83	148.8
Davit1:End	0.005405	11.96	0.9581	-8.4298	0.0033	0.0002	0.005405	1.116	151.5
Davit2:O	0.005204	11.66	-0.7464	-8.4606	0.0033	0.0002	0.005204	12.51	148.6
Davit2:End	0.005161	11.73	-2.239	-8.5357	0.0033	0.0002	0.005161	22.58	148.3
Davit3:O	0.004505	9.828	-0.3446	-8.2636	0.0033	0.0001	0.004505	8.849	136.3
Davit3:End	0.004781	10.26	1.766	-8.0899	0.0033	0.0002	0.004781	-5.715	140.4
Davit4:O	0.004484	9.808	-0.6262	-8.2636	0.0033	0.0001	0.004484	10.79	136
Davit4:End	0.004434	9.939	-2.849	-8.5790	0.0033	0.0001	0.004434	25.92	135.8
Davit5:O	0.003299	6.856	-0.1328	-7.1501	0.0030	0.0001	0.003299	5.648	114.5
Davit5:End	0.00353	7.215	1.692	-6.9651	0.0030	0.0001	0.00353	-8.993	118.3
Davit6:O	0.003279	6.837	-0.4334	-7.1501	0.0030	0.0001	0.003279	8.045	114.2
Davit6:End	0.003258	6.97	-2.364	-7.4754	0.0030	0.0001	0.003258	23.18	114.3
Davit7:O	0.002224	4.402	-0.006461	-5.6408	0.0026	0.0001	0.002224	2.993	92.62
Davit7:End	0.002396	4.665	1.429	-5.4405	0.0026	0.0001	0.002396	-11.74	96.05
Davit8:O	0.002209	4.389	-0.2835	-5.6408	0.0026	0.0001	0.002209	5.798	92.34
Davit8:End	0.002216	4.514	-1.817	-5.9791	0.0026	0.0001	0.002216	20.92	92.81

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 %
10255:g	-0.05	0.0	-53.27	0.0	0.0	-63.62	0.0	0.0	82.98	0.0	5995.33	0.0	-3.7	0.0	0.0	-0.01	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Extreme":

Element	Joint	Joint	Rel.	Trans.	Long.	Vert.	Trans. Mom.	Long. Mom.	Tors.	Axial	Tran.	Long.	P/A	M/S.	V/Q.	T/R.	Res.	Max.	At

Label	Label	Position	Dist. (ft)	Defl. (in)	Defl. (in)	Defl. (in)	(Local Mx) (ft-k)	(Local My) (ft-k)	Mom. (ft-k)	Force (kips)	Shear (kips)	Shear (kips)	(ksi)	(ksi)	(ksi)	(ksi)	(ksi)	Usage %	Pt.
10255	10255:t	Origin	0.00	141.28	0.06	-7.55	-0.00	-0.00	-0.0	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
10255	10255:Arm1	End	0.70	140.04	0.06	-7.46	0.01	-0.00	-0.0	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
10255	10255:Arm1	Origin	0.70	140.04	0.06	-7.46	1.90	-0.00	0.0	-0.84	1.67	-0.00	-0.04	0.06	0.16	0.00	0.30	0.5	4
10255	10255:TopConn	End	3.58	134.96	0.06	-7.08	6.72	-0.00	0.0	-0.84	1.67	-0.00	-0.04	0.74	0.04	0.00	0.78	1.2	2
10255	10255:TopConn	Origin	3.58	134.96	0.06	-7.08	6.72	-0.00	0.0	-2.89	20.23	-0.00	-0.14	0.00	1.98	0.00	3.42	5.3	5
10255	Tube 1	End	6.67	129.52	0.06	-6.68	69.14	-0.01	0.0	-2.89	20.23	-0.00	-0.13	7.06	0.50	0.00	7.25	11.1	2
10255	Tube 1	Origin	6.67	129.52	0.06	-6.68	69.14	-0.01	0.0	-3.13	20.41	-0.00	-0.14	7.06	0.50	0.00	7.26	11.2	2
10255	10255:BotConn	End	9.75	124.11	0.06	-6.28	132.12	-0.01	0.0	-3.13	20.41	-0.00	-0.14	12.57	0.48	0.00	12.74	19.6	2
10255	10255:BotConn	Origin	9.75	124.11	0.06	-6.28	132.12	-0.01	0.0	-5.68	9.08	-0.00	-0.25	12.57	0.22	0.00	12.83	19.7	2
10255	10255:Arm2	End	13.38	117.81	0.05	-5.83	165.04	-0.02	0.0	-5.68	9.08	-0.00	-0.24	14.50	0.21	0.00	14.75	22.7	2
10255	10255:Arm2	Origin	13.38	117.81	0.05	-5.83	186.62	-0.03	0.0	-11.71	20.23	-0.00	-0.50	16.40	0.46	0.00	16.92	26.0	2
10255	Tube 1	End	16.69	112.14	0.05	-5.42	253.63	-0.04	0.0	-11.71	20.23	-0.00	-0.49	20.78	0.44	0.00	21.28	32.7	2
10255	Tube 1	Origin	16.69	112.14	0.05	-5.42	253.63	-0.04	0.0	-12.03	20.42	-0.01	-0.50	20.78	0.45	0.00	21.29	32.8	2
10255	10255:WVGD13	End	20.00	106.55	0.05	-5.02	321.26	-0.06	0.0	-12.03	20.42	-0.01	-0.48	24.59	0.43	0.00	25.08	38.6	2
10255	10255:WVGD13	Origin	20.00	106.55	0.05	-5.02	321.26	-0.06	0.0	-12.73	20.92	-0.01	-0.51	24.59	0.44	0.00	25.11	38.6	2
10255	Tube 1	End	25.00	98.33	0.05	-4.45	425.85	-0.09	0.0	-12.73	20.92	-0.01	-0.49	29.54	0.42	0.00	30.04	46.2	2
10255	Tube 1	Origin	25.00	98.33	0.05	-4.45	425.85	-0.09	0.0	-13.27	21.21	-0.01	-0.51	29.54	0.43	0.00	30.06	46.2	2
10255	10255:WVGD12	End	30.00	90.37	0.04	-3.92	531.91	-0.13	0.0	-13.27	21.21	-0.01	-0.48	33.60	0.41	0.00	34.09	52.5	2
10255	10255:WVGD12	Origin	30.00	90.37	0.04	-3.92	531.91	-0.13	0.0	-13.99	21.70	-0.01	-0.51	33.60	0.42	0.00	34.12	52.5	2
10255	Tube 1	End	32.69	86.22	0.04	-3.65	590.22	-0.15	0.0	-13.99	21.70	-0.01	-0.50	35.52	0.41	0.00	36.02	55.4	2
10255	Tube 1	Origin	32.69	86.22	0.04	-3.65	590.22	-0.15	0.0	-14.30	21.86	-0.01	-0.51	35.52	0.41	0.00	36.03	55.4	2
10255	10255:Arm3	End	35.38	82.16	0.04	-3.40	648.96	-0.18	0.0	-14.30	21.86	-0.01	-0.50	37.24	0.40	0.00	37.75	58.1	2
10255	10255:Arm3	Origin	35.38	82.16	0.04	-3.40	670.30	-0.18	0.0	-20.72	32.90	-0.01	-0.72	38.47	0.60	0.00	39.20	60.3	2
10255	10255:WVGD11	End	40.00	75.39	0.04	-2.98	822.46	-0.23	0.0	-20.72	32.90	-0.01	-0.69	43.61	0.58	0.00	44.31	68.2	2
10255	10255:WVGD11	Origin	40.00	75.39	0.04	-2.98	822.46	-0.23	0.0	-21.69	33.41	-0.01	-0.72	43.61	0.59	0.00	44.35	68.2	2
10255	Tube 1	End	45.00	68.41	0.03	-2.57	989.52	-0.29	0.0	-21.69	33.41	-0.01	-0.69	48.33	0.57	0.00	49.04	75.4	2
10255	Tube 1	Origin	45.00	68.41	0.03	-2.57	989.52	-0.29	0.0	-22.43	33.68	-0.01	-0.72	48.33	0.57	0.00	49.06	75.5	2
10255	10255:WVGD10	End	50.00	61.81	0.03	-2.21	1157.93	-0.36	0.0	-22.43	33.68	-0.01	-0.69	52.27	0.55	0.00	52.97	81.5	2
10255	10255:WVGD10	Origin	50.00	61.81	0.03	-2.21	1157.93	-0.36	0.0	-23.12	34.07	-0.01	-0.71	52.27	0.55	0.00	52.99	81.5	2
10255	SpliceT	End	50.33	61.39	0.03	-2.18	1169.17	-0.37	0.0	-23.12	34.07	-0.01	-0.71	52.51	0.55	0.00	53.23	81.9	2
10255	SpliceT	Origin	50.33	61.39	0.03	-2.18	1169.17	-0.37	0.0	-23.86	34.26	-0.02	-0.73	52.51	0.56	0.00	53.25	81.9	2
10255	SpliceB	End	55.00	55.58	0.03	-1.88	1329.15	-0.44	0.0	-23.86	34.26	-0.02	-0.52	41.72	0.39	0.00	42.24	65.0	2
10255	SpliceB	Origin	55.00	55.58	0.03	-1.88	1329.15	-0.44	0.0	-24.80	34.50	-0.02	-0.54	41.72	0.40	0.00	42.26	65.0	2
10255	10255:Arm4	End	57.38	52.75	0.03	-1.74	1411.10	-0.48	0.0	-24.80	34.50	-0.02	-0.53	42.73	0.39	0.00	43.26	66.6	2
10255	10255:Arm4	Origin	57.38	52.75	0.03	-1.74	1432.09	-0.48	0.0	-31.55	45.33	-0.02	-0.67	43.37	0.51	0.00	44.05	67.8	2
10255	10255:WVGD9	End	60.00	49.69	0.03	-1.59	1551.08	-0.52	0.0	-31.55	45.33	-0.02	-0.66	45.17	0.50	0.00	45.84	70.5	2
10255	10255:WVGD9	Origin	60.00	49.69	0.03	-1.59	1551.08	-0.52	0.0	-32.65	45.80	-0.02	-0.68	45.17	0.51	0.00	45.86	70.6	2
10255	Tube 2	End	65.00	44.12	0.02	-1.33	1780.06	-0.62	0.0	-32.65	45.80	-0.02	-0.66	48.23	0.49	0.00	48.90	75.2	2
10255	Tube 2	Origin	65.00	44.12	0.02	-1.33	1780.06	-0.62	0.0	-33.74	46.09	-0.02	-0.68	48.23	0.49	0.00	48.92	75.3	2
10255	10255:WVGD8	End	70.00	38.88	0.02	-1.10	2010.51	-0.73	0.0	-33.74	46.09	-0.02	-0.66	50.81	0.47	0.00	51.47	79.2	2
10255	10255:WVGD8	Origin	70.00	38.88	0.02	-1.10	2010.51	-0.72	0.0	-35.17	46.63	-0.02	-0.68	50.81	0.48	0.00	51.50	79.2	2
10255	Tube 2	End	75.00	33.98	0.02	-0.90	2243.63	-0.84	0.0	-35.17	46.63	-0.02	-0.66	53.01	0.46	0.00	53.68	82.6	2
10255	Tube 2	Origin	75.00	33.98	0.02	-0.90	2243.63	-0.84	0.0	-36.34	46.92	-0.02	-0.68	53.01	0.47	0.00	53.70	82.6	2
10255	10255:WVGD7	End	80.00	29.42	0.02	-0.72	2478.23	-0.96	0.0	-36.34	46.92	-0.02	-0.66	54.86	0.45	0.00	55.53	85.4	2
10255	10255:WVGD7	Origin	80.00	29.42	0.02	-0.72	2478.23	-0.96	0.0	-37.84	47.46	-0.03	-0.69	54.86	0.46	0.00	55.55	85.5	2
10255	Tube 2	End	85.00	25.21	0.01	-0.57	2715.53	-1.09	0.0	-37.84	47.46	-0.03	-0.67	56.44	0.44	0.00	57.11	87.9	2
10255	Tube 2	Origin	85.00	25.21	0.01	-0.57	2715.53	-1.09	0.0	-39.07	47.76	-0.03	-0.69	56.44	0.45	0.00	57.13	87.9	2
10255	10255:WVGD6	End	90.00	21.34	0.01	-0.45	2954.33	-1.23	0.0	-39.07	47.76	-0.03	-0.67	57.76	0.43	0.00	58.43	89.9	2
10255	10255:WVGD6	Origin	90.00	21.34	0.01	-0.45	2954.33	-1.23	0.0	-40.56	48.29	-0.03	-0.69	57.76	0.44	0.00	58.46	89.9	2
10255	Tube 2	End	94.42	18.21	0.01	-0.35	3167.51	-1.36	0.0	-40.56	48.29	-0.03	-0.68	58.76	0.43	0.00	59.44	91.4	2
10255	Tube 2	Origin	94.42	18.21	0.01	-0.35	3167.51	-1.36	0.0	-41.70	48.56	-0.03	-0.70	58.76	0.43	0.00	59.46	91.5	2
10255	SpliceT	End	98.83	15.34	0.01	-0.27	3381.90	-1.49	0.0	-41.70	48.56	-0.03	-0.68	59.61	0.42	0.00	60.29	92.8	2
10255	SpliceT	Origin	98.83	15.34	0.01	-0.27	3381.90	-1.49	0.0	-42.56	48.74	-0.03	-0.69	59.61	0.42	0.00	60.30	92.8	2
10255	10255:WVGD5	End	100.00	14.62	0.01	-0.26	3438.93	-1.53	0.0	-42.56	48.74	-0.03	-0.66	58.25	0.40	0.00	58.91	90.6	2
10255	10255:WVGD5	Origin	100.00	14.62	0.01	-0.26	3438.93	-1.53	0.0	-44.37	49.20	-0.03	-0.68	58.25	0.40	0.00	58.93	90.7	2
10255	SpliceB	End	105.00	11.76	0.01	-0.19	3684.92	-1.70	0.0	-44.37	49.20	-0.03	-0.66	58.94	0.39	0.00	59.61	91.7	2

10255	SpliceB	Origin	105.00	11.76	0.01	-0.19	3684.92	-1.70	0.0	-46.31	49.53	-0.04	-0.69	58.94	0.39	0.00	59.64	91.8	2
10255	10255:WVGD4	End	110.00	9.23	0.01	-0.13	3932.58	-1.88	0.0	-46.31	49.53	-0.04	-0.67	59.50	0.38	0.00	60.18	92.6	2
10255	10255:WVGD4	Origin	110.00	9.23	0.01	-0.13	3932.58	-1.88	0.0	-48.05	50.08	-0.04	-0.70	59.50	0.39	0.00	60.21	92.6	2
10255	Tube 3	End	115.00	7.02	0.00	-0.09	4182.96	-2.06	0.0	-48.05	50.08	-0.04	-0.68	59.96	0.38	0.00	60.64	93.3	2
10255	Tube 3	Origin	115.00	7.02	0.00	-0.09	4182.96	-2.06	0.0	-49.51	50.40	-0.04	-0.70	59.96	0.38	0.00	60.66	93.3	2
10255	10255:WVGD3	End	120.00	5.12	0.00	-0.06	4434.93	-2.26	0.0	-49.51	50.40	-0.04	-0.68	60.31	0.37	0.00	60.99	93.8	2
10255	10255:WVGD3	Origin	120.00	5.12	0.00	-0.06	4434.93	-2.26	0.0	-51.31	50.95	-0.04	-0.71	60.31	0.37	0.00	61.02	93.9	2
10255	Tube 3	End	125.00	3.54	0.00	-0.04	4689.66	-2.47	0.0	-51.31	50.95	-0.04	-0.69	60.58	0.36	0.00	61.27	94.3	2
10255	Tube 3	Origin	125.00	3.54	0.00	-0.04	4689.66	-2.47	0.0	-52.83	51.28	-0.04	-0.71	60.58	0.36	0.00	61.29	94.3	2
10255	10255:WVGD2	End	130.00	2.25	0.00	-0.02	4946.04	-2.69	0.0	-52.83	51.28	-0.04	-0.69	60.77	0.36	0.00	61.47	94.6	2
10255	10255:WVGD2	Origin	130.00	2.25	0.00	-0.02	4946.04	-2.69	0.0	-54.69	51.84	-0.05	-0.72	60.77	0.36	0.00	61.49	94.6	2
10255	Tube 3	End	135.00	1.26	0.00	-0.01	5205.22	-2.92	0.0	-54.69	51.84	-0.05	-0.70	60.91	0.35	0.00	61.61	94.8	2
10255	Tube 3	Origin	135.00	1.26	0.00	-0.01	5205.22	-2.92	0.0	-56.27	52.18	-0.05	-0.72	60.91	0.35	0.00	61.63	94.8	2
10255	10255:WVGD1	End	140.00	0.56	0.00	-0.00	5466.10	-3.16	0.0	-56.27	52.18	-0.05	-0.70	60.98	0.34	0.00	61.69	94.9	2
10255	10255:WVGD1	Origin	140.00	0.56	0.00	-0.00	5466.10	-3.16	0.0	-58.18	52.75	-0.05	-0.73	60.98	0.35	0.00	61.72	94.9	2
10255	Tube 3	End	145.00	0.14	0.00	-0.00	5729.83	-3.42	0.0	-58.18	52.75	-0.05	-0.71	61.02	0.34	0.00	61.73	95.0	2
10255	Tube 3	Origin	145.00	0.14	0.00	-0.00	5729.83	-3.42	0.0	-59.82	53.10	-0.05	-0.73	61.02	0.34	0.00	61.75	95.0	2
10255	10255:g	End	150.00	0.00	0.00	0.00	5995.33	-3.68	0.0	-59.82	53.10	-0.05	-0.71	61.01	0.33	0.00	61.72	95.0	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	140.15	0.06	-5.96	-1.57	0.00	-0.0	-0.80	0.20	-0.00	-0.12	1.10	0.00	0.00	1.22	1.9	1
Davit1	#Davit1:0	End	5.00	141.85	0.06	2.71	-0.58	0.00	-0.0	-0.80	0.20	-0.00	-0.15	0.68	0.00	0.00	0.83	1.3	1
Davit1	#Davit1:0	Origin	5.00	141.85	0.06	2.71	-0.58	0.00	0.0	-0.78	0.13	-0.00	-0.15	0.68	0.00	0.00	0.83	1.3	1
Davit1	#Davit1:1	End	7.54	142.71	0.06	7.11	-0.25	0.00	0.0	-0.78	0.13	-0.00	-0.17	0.40	0.00	0.00	0.57	0.9	1
Davit1	#Davit1:1	Origin	7.54	142.71	0.06	7.11	-0.25	0.00	0.0	-0.77	0.10	-0.00	-0.17	0.40	0.00	0.00	0.57	0.9	1
Davit1	Davit1:End	End	10.07	143.57	0.06	11.50	-0.00	0.00	0.0	-0.77	0.10	-0.00	-0.20	0.00	0.06	0.00	0.22	0.3	3
Davit2	Davit2:O	Origin	0.00	139.93	0.06	-8.96	-3.45	-0.00	-0.0	0.73	0.39	0.00	0.11	2.42	0.00	0.00	2.52	3.9	1
Davit2	#Davit2:0	End	5.00	140.34	0.06	-17.83	-1.50	-0.00	-0.0	0.73	0.39	0.00	0.14	1.75	0.00	0.00	1.89	2.9	1
Davit2	#Davit2:0	Origin	5.00	140.34	0.06	-17.83	-1.50	-0.00	-0.0	0.72	0.32	0.00	0.14	1.75	0.00	0.00	1.89	2.9	1
Davit2	#Davit2:1	End	7.54	140.54	0.06	-22.34	-0.70	-0.00	-0.0	0.72	0.32	0.00	0.16	1.13	0.00	0.00	1.29	2.0	1
Davit2	#Davit2:1	Origin	7.54	140.54	0.06	-22.34	-0.70	-0.00	0.0	0.72	0.28	0.00	0.16	1.13	0.00	0.00	1.28	2.0	1
Davit2	Davit2:End	End	10.07	140.74	0.06	-26.86	0.00	0.00	0.0	0.72	0.28	0.00	0.19	0.00	0.16	0.00	0.33	0.5	3
Davit3	Davit3:O	Origin	0.00	117.94	0.05	-4.14	-27.59	0.01	0.0	-5.77	2.00	-0.00	-0.38	5.00	0.00	0.00	5.39	8.3	1
Davit3	#Davit3:0	End	5.00	119.68	0.06	4.30	-17.60	0.00	0.0	-5.77	2.00	-0.00	-0.46	4.66	0.00	0.00	5.13	7.9	1
Davit3	#Davit3:0	Origin	5.00	119.68	0.06	4.30	-17.60	0.00	0.0	-5.71	1.81	-0.00	-0.46	4.66	0.00	0.00	5.12	7.9	1
Davit3	#Davit3:1	End	10.00	121.41	0.06	12.66	-8.53	0.00	0.0	-5.71	1.81	-0.00	-0.58	3.61	0.00	0.00	4.19	6.4	1
Davit3	#Davit3:1	Origin	10.00	121.41	0.06	12.66	-8.53	0.00	0.0	-5.67	1.70	-0.00	-0.57	3.61	0.00	0.00	4.19	6.4	1
Davit3	#Davit3:2	End	12.57	122.29	0.06	16.93	-4.18	0.00	0.0	-5.67	1.70	-0.00	-0.66	2.37	0.00	0.00	3.03	4.7	1
Davit3	#Davit3:2	Origin	12.57	122.29	0.06	16.93	-4.18	0.00	0.0	-5.65	1.63	-0.00	-0.66	2.37	0.00	0.00	3.03	4.7	1
Davit3	Davit3:End	End	15.13	123.17	0.06	21.19	-0.00	0.00	0.0	-5.65	1.63	-0.00	-0.78	0.00	0.47	0.00	1.12	1.7	3
Davit4	Davit4:O	Origin	0.00	117.69	0.05	-7.51	-49.14	-0.00	-0.0	5.04	3.46	0.00	0.33	8.91	0.00	0.00	9.24	14.2	1
Davit4	#Davit4:0	End	5.00	118.21	0.05	-16.21	-31.85	-0.00	-0.0	5.04	3.46	0.00	0.40	8.44	0.00	0.00	8.84	13.6	1
Davit4	#Davit4:0	Origin	5.00	118.21	0.05	-16.21	-31.85	-0.00	-0.0	5.05	3.24	0.00	0.40	8.44	0.00	0.00	8.84	13.6	1
Davit4	#Davit4:1	End	10.00	118.73	0.05	-25.03	-15.67	-0.00	-0.0	5.05	3.24	0.00	0.51	6.63	0.00	0.00	7.14	11.0	1
Davit4	#Davit4:1	Origin	10.00	118.73	0.05	-25.03	-15.67	-0.00	-0.0	5.05	3.09	0.00	0.51	6.63	0.00	0.00	7.14	11.0	1
Davit4	#Davit4:2	End	12.57	119.00	0.05	-29.60	-7.73	-0.00	-0.0	5.05	3.09	0.00	0.59	4.38	0.00	0.00	4.97	7.6	1
Davit4	#Davit4:2	Origin	12.57	119.00	0.05	-29.60	-7.73	-0.00	0.0	5.05	3.01	0.00	0.59	4.38	0.00	0.00	4.97	7.6	1
Davit4	Davit4:End	End	15.13	119.27	0.05	-34.19	-0.00	0.00	0.0	5.05	3.01	0.00	0.70	0.00	0.86	0.00	1.65	2.5	3
Davit5	Davit5:O	Origin	0.00	82.27	0.04	-1.59	-29.31	0.01	0.0	-5.73	2.11	-0.00	-0.38	5.31	0.00	0.00	5.69	8.8	1

Davit5	#Davit5:0	End	5.00	83.71	0.04	5.71	-18.74	0.00	0.0	-5.73	2.11	-0.00	-0.46	4.96	0.00	0.00	5.42	8.3	1
Davit5	#Davit5:0	Origin	5.00	83.71	0.04	5.71	-18.74	0.00	0.0	-5.67	1.93	-0.00	-0.45	4.96	0.00	0.00	5.42	8.3	1
Davit5	#Davit5:1	End	10.00	85.13	0.04	12.94	-9.11	0.00	0.0	-5.67	1.93	-0.00	-0.57	3.85	0.00	0.00	4.43	6.8	1
Davit5	#Davit5:1	Origin	10.00	85.13	0.04	12.94	-9.11	0.00	0.0	-5.64	1.81	-0.00	-0.57	3.85	0.00	0.00	4.42	6.8	1
Davit5	#Davit5:2	End	12.57	85.86	0.04	16.63	-4.47	0.00	0.0	-5.64	1.81	-0.00	-0.66	2.53	0.00	0.00	3.19	4.9	1
Davit5	#Davit5:2	Origin	12.57	85.86	0.04	16.63	-4.47	0.00	0.0	-5.62	1.74	-0.00	-0.65	2.53	0.00	0.00	3.19	4.9	1
Davit5	Davit5:End	End	15.13	86.58	0.04	20.30	-0.00	0.00	0.0	-5.62	1.74	-0.00	-0.78	0.00	0.50	0.00	1.16	1.8	3
Davit6	Davit6:0	Origin	0.00	82.05	0.04	-5.20	-50.61	-0.00	-0.0	4.98	3.56	0.00	0.33	9.18	0.00	0.00	9.51	14.6	1
Davit6	#Davit6:0	End	5.00	82.57	0.04	-12.73	-32.83	-0.00	-0.0	4.98	3.56	0.00	0.40	8.70	0.00	0.00	9.10	14.0	1
Davit6	#Davit6:0	Origin	5.00	82.57	0.04	-12.73	-32.83	-0.00	-0.0	4.98	3.33	0.00	0.40	8.70	0.00	0.00	9.10	14.0	1
Davit6	#Davit6:1	End	10.00	83.10	0.04	-20.39	-16.17	-0.00	-0.0	4.98	3.33	0.00	0.50	6.84	0.00	0.00	7.35	11.3	1
Davit6	#Davit6:1	Origin	10.00	83.10	0.04	-20.39	-16.17	-0.00	-0.0	4.99	3.19	0.00	0.50	6.84	0.00	0.00	7.35	11.3	1
Davit6	#Davit6:2	End	12.57	83.37	0.04	-24.37	-7.98	-0.00	-0.0	4.99	3.19	0.00	0.58	4.52	0.00	0.00	5.10	7.9	1
Davit6	#Davit6:2	Origin	12.57	83.37	0.04	-24.37	-7.98	-0.00	0.0	4.99	3.11	0.00	0.58	4.52	0.00	0.00	5.10	7.9	1
Davit6	Davit6:End	End	15.13	83.64	0.04	-28.37	-0.00	0.00	0.0	4.99	3.11	0.00	0.69	0.00	0.89	0.00	1.69	2.6	3
Davit7	Davit7:0	Origin	0.00	52.83	0.03	-0.08	-31.61	0.01	0.0	-5.67	2.27	-0.00	-0.38	5.73	0.00	0.00	6.11	9.4	1
Davit7	#Davit7:0	End	5.00	53.89	0.03	5.69	-20.27	0.00	0.0	-5.67	2.27	-0.00	-0.45	5.37	0.00	0.00	5.82	9.0	1
Davit7	#Davit7:0	Origin	5.00	53.89	0.03	5.69	-20.27	0.00	0.0	-5.62	2.08	-0.00	-0.45	5.37	0.00	0.00	5.82	9.0	1
Davit7	#Davit7:1	End	10.00	54.93	0.03	11.38	-9.87	0.00	0.0	-5.62	2.08	-0.00	-0.57	4.18	0.00	0.00	4.75	7.3	1
Davit7	#Davit7:1	Origin	10.00	54.93	0.03	11.38	-9.87	0.00	0.0	-5.59	1.96	-0.00	-0.56	4.18	0.00	0.00	4.74	7.3	1
Davit7	#Davit7:2	End	12.57	55.46	0.03	14.27	-4.85	0.00	0.0	-5.59	1.96	-0.00	-0.65	2.75	0.00	0.00	3.40	5.2	1
Davit7	#Davit7:2	Origin	12.57	55.46	0.03	14.27	-4.85	0.00	0.0	-5.57	1.89	-0.00	-0.65	2.75	0.00	0.00	3.40	5.2	1
Davit7	Davit7:End	End	15.13	55.98	0.03	17.15	-0.00	0.00	0.0	-5.57	1.89	-0.00	-0.77	0.00	0.54	0.00	1.21	1.9	3
Davit8	Davit8:0	Origin	0.00	52.66	0.03	-3.40	-52.58	-0.00	-0.0	4.88	3.69	0.00	0.32	9.53	0.00	0.00	9.86	15.2	1
Davit8	#Davit8:0	End	5.00	53.16	0.03	-9.35	-34.15	-0.00	-0.0	4.88	3.69	0.00	0.39	9.05	0.00	0.00	9.44	14.5	1
Davit8	#Davit8:0	Origin	5.00	53.16	0.03	-9.35	-34.15	-0.00	-0.0	4.89	3.46	0.00	0.39	9.05	0.00	0.00	9.44	14.5	1
Davit8	#Davit8:1	End	10.00	53.66	0.03	-15.44	-16.83	-0.00	-0.0	4.89	3.46	0.00	0.49	7.13	0.00	0.00	7.62	11.7	1
Davit8	#Davit8:1	Origin	10.00	53.66	0.03	-15.44	-16.83	-0.00	-0.0	4.90	3.32	0.00	0.50	7.13	0.00	0.00	7.62	11.7	1
Davit8	#Davit8:2	End	12.57	53.91	0.03	-18.61	-8.32	-0.00	-0.0	4.90	3.32	0.00	0.57	4.71	0.00	0.00	5.28	8.1	1
Davit8	#Davit8:2	Origin	12.57	53.91	0.03	-18.61	-8.32	-0.00	0.0	4.91	3.24	0.00	0.57	4.71	0.00	0.00	5.28	8.1	1
Davit8	Davit8:End	End	15.13	54.17	0.03	-21.81	-0.00	0.00	0.0	4.91	3.24	0.00	0.68	0.00	0.93	0.00	1.74	2.7	3

Summary of Clamp Capacities and Usages for Load Case "NESC Extreme":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	0.768	80.00	80.00	0.96
Clamp2	0.768	80.00	80.00	0.96
Clamp3	5.864	80.00	80.00	7.33
Clamp4	5.864	80.00	80.00	7.33
Clamp5	5.864	80.00	80.00	7.33
Clamp6	5.864	80.00	80.00	7.33
Clamp7	5.864	80.00	80.00	7.33
Clamp8	5.864	80.00	80.00	7.33
Clamp9	18.485	80.00	80.00	23.11
Clamp10	11.755	80.00	80.00	14.69
Clamp11	0.381	80.00	80.00	0.48
Clamp12	0.381	80.00	80.00	0.48
Clamp13	0.381	80.00	80.00	0.48
Clamp14	0.381	80.00	80.00	0.48
Clamp15	0.381	80.00	80.00	0.48
Clamp16	0.381	80.00	80.00	0.48

Clamp17	0.381	80.00	80.00	0.48
Clamp18	0.381	80.00	80.00	0.48
Clamp19	0.381	80.00	80.00	0.48
Clamp20	0.381	80.00	80.00	0.48
Clamp21	0.381	80.00	80.00	0.48
Clamp22	0.381	80.00	80.00	0.48
Clamp23	0.381	80.00	80.00	0.48

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
10255	95.01	NESC Extreme	37	30952.3

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 %
10255	NESC Heavy	1	2.364	1.329	-0.017	2.704	32.990	37.308	153.850	6	100.181	2.366	3.000	62.18
10255	NESC Heavy	2	2.704	-0.017	1.329	2.364	32.990	13.981	57.657	4	86.008	1.448	3.000	23.30
10255	NESC Heavy	3	2.333	-0.375	2.333	0.375	9.010	1.547	1.742	1	4.641	0.482	3.000	2.58
10255	NESC Heavy	4	1.329	-2.364	2.704	0.017	32.990	12.006	49.509	4	-76.293	1.342	3.000	20.01
10255	NESC Heavy	5	-0.017	-2.704	2.364	-1.329	32.990	33.188	136.862	6	-90.116	2.231	3.000	55.31
10255	NESC Heavy	6	-1.500	-2.333	1.500	-2.333	36.011	37.493	168.770	5	-90.116	2.371	3.000	62.49
10255	NESC Heavy	7	-2.364	-1.329	0.017	-2.704	32.990	32.981	136.009	6	-89.911	2.224	3.000	54.97
10255	NESC Heavy	8	-2.704	0.017	-1.329	-2.364	32.990	11.853	48.881	4	-75.738	1.333	3.000	19.76
10255	NESC Heavy	9	-2.333	0.375	-2.333	-0.375	9.010	1.876	2.113	1	5.629	0.531	3.000	3.13
10255	NESC Heavy	10	-1.329	2.364	-2.704	-0.017	32.990	14.140	58.309	4	86.563	1.456	3.000	23.57
10255	NESC Heavy	11	0.017	2.704	-2.364	1.329	32.990	37.515	154.703	6	100.387	2.372	3.000	62.52
10255	NESC Heavy	12	1.500	2.333	-1.500	2.333	36.011	41.776	188.049	5	100.387	2.503	3.000	69.63
10255	NESC Heavy	13	1.671	2.053	-0.630	2.669	28.583	35.755	127.750	5	100.284	2.316	3.000	59.59
10255	NESC Heavy	14	2.312	1.103	0.707	2.708	27.239	27.417	93.351	4	99.976	2.028	3.000	45.69
10255	NESC Heavy	15	2.566	-0.246	2.053	1.671	23.810	4.450	13.243	2	58.082	0.817	3.000	7.42
10255	NESC Heavy	16	2.053	-1.671	2.566	0.246	23.810	3.778	11.245	2	-48.655	0.753	3.000	6.30
10255	NESC Heavy	17	0.707	-2.708	2.312	-1.103	27.239	24.071	81.961	4	-90.116	1.900	3.000	40.12
10255	NESC Heavy	18	-0.630	-2.669	1.671	-2.053	28.583	32.106	114.712	5	-90.116	2.195	3.000	53.51
10255	NESC Heavy	19	-1.671	-2.053	0.630	-2.669	28.583	32.000	114.332	5	-90.013	2.191	3.000	53.33
10255	NESC Heavy	20	-2.312	-1.103	-0.707	-2.708	27.239	23.854	81.220	4	-89.706	1.892	3.000	39.76
10255	NESC Heavy	21	-2.566	0.246	-2.053	-1.671	23.810	3.785	11.265	2	-47.811	0.753	3.000	6.31
10255	NESC Heavy	22	-2.053	1.671	-2.566	-0.246	23.810	4.576	13.621	2	58.926	0.829	3.000	7.63
10255	NESC Heavy	23	-0.707	2.708	-2.312	1.103	27.239	27.634	94.092	4	100.387	2.036	3.000	46.06
10255	NESC Heavy	24	0.630	2.669	-1.671	2.053	28.583	35.861	128.130	5	100.387	2.319	3.000	59.77
10255	NESC Extreme	1	2.364	1.329	-0.017	2.704	32.990	51.770	213.489	6	139.338	2.787	3.000	86.28
10255	NESC Extreme	2	2.704	-0.017	1.329	2.364	32.990	19.191	79.139	4	119.252	1.697	3.000	31.98
10255	NESC Extreme	3	2.333	-0.375	2.333	0.375	9.010	0.792	0.892	1	2.377	0.345	3.000	1.32
10255	NESC Extreme	4	1.329	-2.364	2.704	0.017	32.990	18.189	75.010	4	-114.367	1.652	3.000	30.32
10255	NESC Extreme	5	-0.017	-2.704	2.364	-1.329	32.990	49.704	204.969	6	-134.347	2.730	3.000	82.84
10255	NESC Extreme	6	-1.500	-2.333	1.500	-2.333	36.011	55.997	252.063	5	-134.347	2.898	3.000	93.33
10255	NESC Extreme	7	-2.364	-1.329	0.017	-2.704	32.990	49.641	204.709	6	-134.284	2.729	3.000	82.73
10255	NESC Extreme	8	-2.704	0.017	-1.329	-2.364	32.990	18.143	74.819	4	-114.198	1.650	3.000	30.24
10255	NESC Extreme	9	-2.333	0.375	-2.333	-0.375	9.010	0.892	1.005	1	2.677	0.366	3.000	1.49
10255	NESC Extreme	10	-1.329	2.364	-2.704	-0.017	32.990	19.239	79.338	4	119.421	1.699	3.000	32.06
10255	NESC Extreme	11	0.017	2.704	-2.364	1.329	32.990	51.833	213.748	6	139.401	2.788	3.000	86.39
10255	NESC Extreme	12	1.500	2.333	-1.500	2.333	36.011	58.104	261.550	5	139.401	2.952	3.000	96.84
10255	NESC Extreme	13	1.671	2.053	-0.630	2.669	28.583	49.748	177.746	5	139.370	2.732	3.000	82.91
10255	NESC Extreme	14	2.312	1.103	0.707	2.708	27.239	37.900	129.046	4	139.276	2.384	3.000	63.17
10255	NESC Extreme	15	2.566	-0.246	2.053	1.671	23.810	5.802	17.269	2	79.218	0.933	3.000	9.67
10255	NESC Extreme	16	2.053	-1.671	2.566	0.246	23.810	5.460	16.252	2	-74.421	0.905	3.000	9.10
10255	NESC Extreme	17	0.707	-2.708	2.312	-1.103	27.239	36.213	123.302	4	-134.347	2.331	3.000	60.36

10255	NESC Extreme	18	-0.630	-2.669	1.671	-2.053	28.583	47.932	171.259	5	-134.347	2.681	3.000	79.89
10255	NESC Extreme	19	-1.671	-2.053	0.630	-2.669	28.583	47.900	171.143	5	-134.315	2.680	3.000	79.83
10255	NESC Extreme	20	-2.312	-1.103	-0.707	-2.708	27.239	36.147	123.076	4	-134.222	2.329	3.000	60.24
10255	NESC Extreme	21	-2.566	0.246	-2.053	-1.671	23.810	5.462	16.258	2	-74.164	0.905	3.000	9.10
10255	NESC Extreme	22	-2.053	1.671	-2.566	-0.246	23.810	5.841	17.384	2	79.475	0.936	3.000	9.73
10255	NESC Extreme	23	-0.707	2.708	-2.312	1.103	27.239	37.966	129.271	4	139.401	2.386	3.000	63.28
10255	NESC Extreme	24	0.630	2.669	-1.671	2.053	28.583	49.780	177.862	5	139.401	2.733	3.000	82.97

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	11.06	NESC Heavy	1	182.3
Davit2	14.05	NESC Heavy	1	182.3
Davit3	28.23	NESC Heavy	1	575.0
Davit4	32.72	NESC Heavy	1	575.0
Davit5	28.51	NESC Heavy	1	575.0
Davit6	32.90	NESC Heavy	1	575.0
Davit7	28.91	NESC Heavy	1	575.0
Davit8	33.14	NESC Heavy	1	575.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	69.63	10255	Base Plate
NESC Extreme	96.84	10255	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	68.34	10255	27
NESC Extreme	95.01	10255	37

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	10255	12	36.011	123.245	4165.095	-12.106	41.776	188.049	5	100.387	2.503	69.63
NESC Extreme	10255	12	36.011	60.648	5995.326	-3.682	58.104	261.550	5	139.401	2.952	96.84

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	33.14	Davit8	1
NESC Extreme	15.16	Davit8	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	1.96	NESC Heavy	0.0
Clamp2	Clamp	1.96	NESC Heavy	0.0
Clamp3	Clamp	10.09	NESC Heavy	0.0
Clamp4	Clamp	10.09	NESC Heavy	0.0
Clamp5	Clamp	10.09	NESC Heavy	0.0
Clamp6	Clamp	10.09	NESC Heavy	0.0
Clamp7	Clamp	10.09	NESC Heavy	0.0
Clamp8	Clamp	10.09	NESC Heavy	0.0
Clamp9	Clamp	23.11	NESC Extreme	0.0
Clamp10	Clamp	14.69	NESC Extreme	0.0
Clamp11	Clamp	1.44	NESC Heavy	0.0
Clamp12	Clamp	1.44	NESC Heavy	0.0
Clamp13	Clamp	1.44	NESC Heavy	0.0
Clamp14	Clamp	1.44	NESC Heavy	0.0
Clamp15	Clamp	1.44	NESC Heavy	0.0
Clamp16	Clamp	1.44	NESC Heavy	0.0
Clamp17	Clamp	1.44	NESC Heavy	0.0
Clamp18	Clamp	1.44	NESC Heavy	0.0
Clamp19	Clamp	1.44	NESC Heavy	0.0
Clamp20	Clamp	1.44	NESC Heavy	0.0
Clamp21	Clamp	1.44	NESC Heavy	0.0
Clamp22	Clamp	1.44	NESC Heavy	0.0
Clamp23	Clamp	1.44	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	Clamp1	Clamp	Davit1:End	0.000	1.078	1.134	1.565
NESC Heavy	Clamp2	Clamp	Davit2:End	0.000	1.078	1.134	1.565
NESC Heavy	Clamp3	Clamp	Davit3:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp4	Clamp	Davit4:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp5	Clamp	Davit5:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp6	Clamp	Davit6:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp7	Clamp	Davit7:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp8	Clamp	Davit8:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp9	Clamp	10255:TopConn	0.000	5.794	9.913	11.482
NESC Heavy	Clamp10	Clamp	10255:BotConn	0.000	-3.724	1.364	3.966
NESC Heavy	Clamp11	Clamp	10255:WVGD1	0.000	0.093	1.150	1.154
NESC Heavy	Clamp12	Clamp	10255:WVGD2	0.000	0.093	1.150	1.154
NESC Heavy	Clamp13	Clamp	10255:WVGD3	0.000	0.093	1.150	1.154
NESC Heavy	Clamp14	Clamp	10255:WVGD4	0.000	0.093	1.150	1.154
NESC Heavy	Clamp15	Clamp	10255:WVGD5	0.000	0.093	1.150	1.154
NESC Heavy	Clamp16	Clamp	10255:WVGD6	0.000	0.093	1.150	1.154
NESC Heavy	Clamp17	Clamp	10255:WVGD7	0.000	0.093	1.150	1.154
NESC Heavy	Clamp18	Clamp	10255:WVGD8	0.000	0.093	1.150	1.154
NESC Heavy	Clamp19	Clamp	10255:WVGD9	0.000	0.093	1.150	1.154
NESC Heavy	Clamp20	Clamp	10255:WVGD10	0.000	0.093	1.150	1.154
NESC Heavy	Clamp21	Clamp	10255:WVGD11	0.000	0.093	1.150	1.154

NESC Heavy	Clamp22	Clamp	10255:WVGD12	0.000	0.093	1.150	1.154
NESC Heavy	Clamp23	Clamp	10255:WVGD13	0.000	0.093	1.150	1.154
NESC Extreme	Clamp1	Clamp	Davit1:End	0.000	0.715	0.280	0.768
NESC Extreme	Clamp2	Clamp	Davit2:End	0.000	0.715	0.280	0.768
NESC Extreme	Clamp3	Clamp	Davit3:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp4	Clamp	Davit4:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp5	Clamp	Davit5:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp6	Clamp	Davit6:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp7	Clamp	Davit7:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp8	Clamp	Davit8:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp9	Clamp	10255:TopConn	0.000	17.923	4.525	18.485
NESC Extreme	Clamp10	Clamp	10255:BotConn	0.000	-11.741	0.574	11.755
NESC Extreme	Clamp11	Clamp	10255:WVGD1	0.000	0.218	0.312	0.381
NESC Extreme	Clamp12	Clamp	10255:WVGD2	0.000	0.218	0.312	0.381
NESC Extreme	Clamp13	Clamp	10255:WVGD3	0.000	0.218	0.312	0.381
NESC Extreme	Clamp14	Clamp	10255:WVGD4	0.000	0.218	0.312	0.381
NESC Extreme	Clamp15	Clamp	10255:WVGD5	0.000	0.218	0.312	0.381
NESC Extreme	Clamp16	Clamp	10255:WVGD6	0.000	0.218	0.312	0.381
NESC Extreme	Clamp17	Clamp	10255:WVGD7	0.000	0.218	0.312	0.381
NESC Extreme	Clamp18	Clamp	10255:WVGD8	0.000	0.218	0.312	0.381
NESC Extreme	Clamp19	Clamp	10255:WVGD9	0.000	0.218	0.312	0.381
NESC Extreme	Clamp20	Clamp	10255:WVGD10	0.000	0.218	0.312	0.381
NESC Extreme	Clamp21	Clamp	10255:WVGD11	0.000	0.218	0.312	0.381
NESC Extreme	Clamp22	Clamp	10255:WVGD12	0.000	0.218	0.312	0.381
NESC Extreme	Clamp23	Clamp	10255:WVGD13	0.000	0.218	0.312	0.381

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	27.341	0.000	71.701	3289.962	-0.000	-0.000
NESC Extreme	40.440	0.000	28.105	4889.256	-0.000	-0.000

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 3814.7
Weight of Steel Poles: 30952.3
Total: 34767.0

*** End of Report

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force = $T_{Max} := 140 \cdot kips$ (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 Yeild 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:

Calculated Anchor Bolt Properties:

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Bolt Tension Check:

Allowable Tensile Force (Net Area) = $T_{ALL.Net} := 1.0 \cdot \left(A_n \cdot F_y\right) = 243.576 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 57.48 \cdot \%$

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

$Condition1 = "OK"$

Foundation:

Input Data:

Tower Data

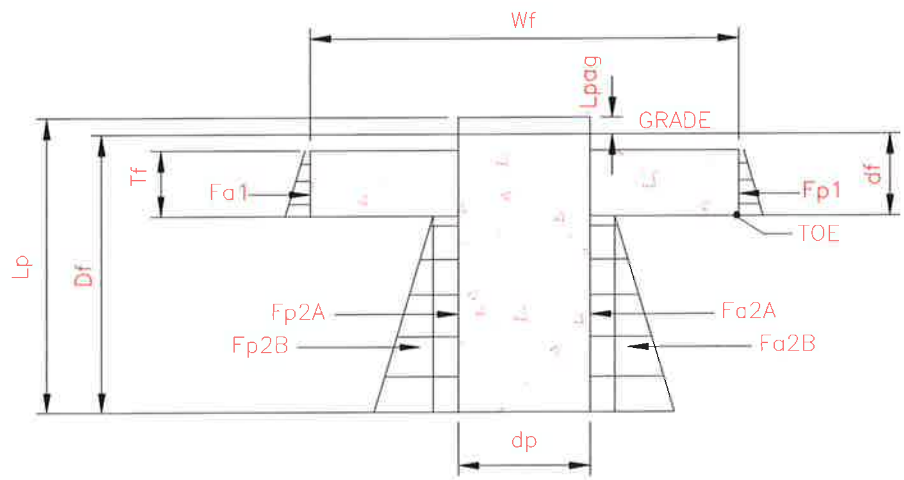
Overturning Moment =	$OM := 5995.3 \cdot ft \cdot kips \cdot 1.1 = 6595 \cdot ft \cdot kips$	(User Input)
Shear Force =	$Shear := 53.3 \cdot kip \cdot 1.1 = 59 \cdot kips$	(User Input)
Axial Force =	$Axial := 63.6 \cdot kip \cdot 1.1 = 70 \cdot kips$	(User Input)
Tower Height =	$H_t := 145 \cdot ft$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 20 \cdot ft$	(User Input)
Length of Pier =	$L_p := 20.5 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Diameter of Cassion =	$d_p := 8 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 4 \cdot ft$	(User Input)
Width of Footing =	$W_f := 24 \cdot ft$	(User Input)
Water Depth =	$D_{water} := 0 \cdot ft$	(User Input)
Distance From Grade to Bottom of Pad =	$d_f := 5 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(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 (mat) =	$\Phi_{s1} := 30 \cdot deg$	(User Input)	
Internal Friction Angle of Soil (below mat) =	$\Phi_{s2} := 30 \cdot deg$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil1} := 100 \cdot pcf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil2} := 100 \cdot pcf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	(Conservative)
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(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)



Calculated Factors:

Coefficient of Lateral Soil Pressure =

$$K_{p1} := \frac{1+\sin(\Phi_{s1})}{1-\sin(\Phi_{s1})} = 3 \qquad Ka1 := \frac{(1-\sin(\Phi_{s1}))}{(1+\sin(\Phi_{s1}))} = 0.333$$

$$K_{p2} := \frac{1+\sin(\Phi_{s2})}{1-\sin(\Phi_{s2})} = 3 \qquad Ka2 := \frac{(1-\sin(\Phi_{s2}))}{(1+\sin(\Phi_{s2}))} = 0.333$$

Stability of Footing:

Passive Pressure 1 =

$$P_{p1.top} := K_{p1} \cdot \gamma_{soil1} \cdot (0) = 0 \cdot ksf$$

$$P_{p1.bot} := K_{p1} \cdot \gamma_{soil1} \cdot d_f = 1.5 \cdot ksf$$

$$P_{p1.ave} := \frac{P_{p1.top} + P_{p1.bot}}{2} = 0.75 \cdot ksf$$

Active Pressure 1 =

$$P_{a1.top} := Ka1 \cdot \gamma_{soil1} \cdot (0) = 0 \cdot ksf$$

$$P_{a1.bot} := Ka1 \cdot \gamma_{soil1} \cdot d_f = 0.167 \cdot ksf$$

$$P_{a1.ave} := \frac{P_{a1.top} + P_{a1.bot}}{2} = 0.083 \cdot ksf$$

Area of Pressure 1 =

$$A_{p1} := T_f \cdot W_f = 96\,ft^2$$

Forces 1 =

$$F_{p1} := P_{p1.ave} \cdot A_{p1} = 72 \cdot kip$$

$$F_{a1} := P_{a1.ave} \cdot A_{p1} = 8 \cdot kip$$

Ultimate Shear 1 =

$$S_{u1} := (F_{p1} - F_{a1}) = 64 \cdot kip$$

Passive Pressure 2 = $P_{p2.top} := K_{p2} \cdot \gamma_{soil2} \cdot d_f = 1.5 \cdot ksf$

$P_{p2.bot} := K_{p2} \cdot \gamma_{soil2} \cdot D_f = 6 \cdot ksf$

Active Pressure 2 = $P_{a2.top} := Ka2 \cdot \gamma_{soil2} \cdot d_f = 0.167 \cdot ksf$

$P_{a2.bot} := Ka2 \cdot \gamma_{soil2} \cdot D_f = 0.667 \cdot ksf$

Area of Pressure 2 = $A_{p2} := \left(D_f - d_f\right) \cdot d_p = 120ft^2$

Forces 2 = $F_{p2A} := P_{p2.top} \cdot A_{p2} = 180 \cdot kips$

$F_{a2A} := P_{a2.top} \cdot A_{p2} = 20 \cdot kips$

$F_{p2B} := \frac{1}{2} \cdot \left(P_{p2.bot} - P_{p2.top}\right) \cdot A_{p2} = 270 \cdot kips$

$F_{a2B} := \frac{1}{2} \cdot \left(P_{a2.bot} - P_{a2.top}\right) \cdot A_{p2} = 30 \cdot kips$

Ultimate Shear 2 = $S_{u2A} := F_{p2A} - F_{a2A} = 160 \cdot kip$

$S_{u2B} := F_{p2B} - F_{a2B} = 240 \cdot kip$

Weight of Concrete Mat = $WT_{mat} := \left(W_f^2 - \frac{d_p^2 \cdot \pi}{4}\right) \cdot T_f \cdot \gamma_{conc} = 315.44 \cdot kip$

Weight of Concrete Caission = $WT_{caission} := \left(\frac{d_p^2 \cdot \pi}{4} L_p\right) \cdot \gamma_{conc} = 154.57 \cdot kip$

Weight of Soil Above Mat = $WT_s := \left[\left(W_f^2 - \frac{d_p^2 \cdot \pi}{4}\right) \cdot \left(d_f - T_f\right)\right] \cdot \gamma_{soil1} = 52.57 \cdot kip$

Total Weight = $W_{tot} := WT_{mat} + WT_{caission} + WT_s + Axial = 592.541 \cdot kips$

Overturning Moment = $M_{ot} := OM + Shear \cdot \left(d_f + L_{pag}\right) = 6917 \cdot kip \cdot ft$

Resisting Moment = $M_r := \left(W_{tot}\right) \cdot \frac{W_f}{2} + S_{u1} \cdot T_f \cdot \frac{1}{3} + S_{u2A} \cdot \frac{\left(D_f - d_f\right)}{2} + S_{u2B} \cdot \frac{2 \cdot \left(D_f - d_f\right)}{3} = 10796 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.56$

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

Overturing_Check := if($FS \geq FS_{req}$, "Okay" , "No Good")

Overturing_Check = "Okay"

Bearing Pressure Check:

Area of Mat = $A_{mat} := W_f^2 - \frac{d_p^2 \cdot \pi}{4} = 525.735\,ft^2$

Section Modulus of Mat = $S_{mat} := \frac{W_f^3}{6} - \frac{d_p^3 \cdot \pi}{32} = 2254 \cdot ft^3$

Axial Force @ Base of Mat = $P_{mat} := WT_{mat} + WT_s = 368.014 \cdot kips$

Resisting Moment Capacity of Caissson = $M_{cap} := S_{u2A} \cdot \left[\frac{1}{2} \cdot (D_f - d_f) + d_f + L_{pag}\right] + S_{u2B} \cdot \left[\frac{2}{3} \cdot (D_f - d_f) + d_f + L_{pag}\right] = 5800 \cdot kip \cdot ft$

Residual Moment @ Base of Mat = $M_{mat} := (OM - M_{cap}) + Shear \cdot (d_f + L_{pag}) - \left(S_{u1} \cdot T_f \cdot \frac{1}{3}\right) = 1032 \cdot kip \cdot ft$

Maximum Pressure in Mat = $P_{max} := \frac{P_{mat}}{A_{mat}} + \frac{M_{mat}}{S_{mat}} = 1.158 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{P_{mat}}{A_{mat}} - \frac{M_{mat}}{S_{mat}} = 0.242 \cdot ksf$

Min_Pressure_Check := if[($P_{min} \geq 0$)·($P_{min} < q_s$),"Okay" ,"No Good"]

Min_Pressure_Check = "Okay"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 10.115\,ft$

Distance to Kern = $X_k := \frac{W_f}{6} = 4\,ft$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{mat}}{P_{mat}} = 2.804\,ft$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot P_{mat}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.112 \cdot ksf$

$q_{adj} :=$ if($P_{min} < 0, P_a, P_{max}$) = 1.158·ksf

Pressure_Check := if($q_{adj} < q_s$,"Okay" ,"No Good")

Pressure_Check = "Okay"

SITE NAME	BETHEL NORTH CT	ECP - CELL #	5 / 124
LATITUDE	41-24-48.49 N	LONGITUDE	73-24-03.14 W
		SAVE BUTTON	
		STRUCTURE TYPE	POWER MOUNT

Notes: PCS/AWS share the same antenna (diplexed in-shelter), 700/850 share same antenna (diplexed in shelter). Antenna swap only, cabling to remain the same. Bias Ts required for RETs.

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	ALU 1900 RRH	ALU 1900 RRH	ALU 1900 RRH
ANTENNA TYPE	Antel WWX063X13G00	Antel WWX063X13G00	Antel WWX063X13G00
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (ELEC + MECH)	2 Elec + 0 Mech	2 Elec + 0 Mech	2 Elec + 0 Mech
RAD CTR (FT AGL)	167.5	167.5	167.5
TMA - QTY / MODEL	1 ALU RH_2X60-PCS	1 ALU RH_2X60-PCS	1 ALU RH_2X60-PCS
1900 PCS - Future Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	ALU 1900 RRH	ALU 1900 RRH	ALU 1900 RRH
ANTENNA TYPE	**HBX-6516DS-A1M**	**HBX-6516DS-A1M**	**HBX-6516DS-A1M**
QTY OF ANTENNAS PER FACE	**1**	**1**	**1**
ORIENTATION (DEG)	0	120	240
DOWN TILT (ELEC + MECH)	2 Elec + 0 Mech	2 Elec + 0 Mech	2 Elec + 0 Mech
RAD CTR (FT AGL)	167.5	167.5	167.5
TMA - QTY / MODEL	1 ALU RH_2X60-PCS	1 ALU RH_2X60-PCS	1 ALU RH_2X60-PCS
DIPLEXER - QTY / MODEL	Diplexed w/ PCS	Diplexed w/ PCS	Diplexed w/ PCS
2100 AWS - Current Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	ALU 2100 TRDU	ALU 2100 TRDU	ALU 2100 TRDU
ANTENNA TYPE	Antel WWX063X13G00	Antel WWX063X13G00	Antel WWX063X13G00
QTY OF ANTENNAS PER FACE	0	0	0
ORIENTATION (DEG)	0	120	240
DOWN TILT (ELEC + MECH)	2 Elec + 0 Mech	2 Elec + 0 Mech	2 Elec + 0 Mech
RAD CTR (FT AGL)	167.5	167.5	167.5
TMA - QTY / MODEL			
2100 AWS - Future Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	ALU 2100 TRDU	ALU 2100 TRDU	ALU 2100 TRDU
ANTENNA TYPE	**HBX-6516DS-A1M**	**HBX-6516DS-A1M**	**HBX-6516DS-A1M**
QTY OF ANTENNAS PER FACE	**0**	**0**	**0**
ORIENTATION (DEG)	0	120	240
DOWN TILT (ELEC + MECH)	2 Elec + 0 Mech	2 Elec + 0 Mech	2 Elec + 0 Mech
RAD CTR (FT AGL)	167.5	167.5	167.5
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	Diplexed w/ PCS	Diplexed w/ PCS	Diplexed w/ PCS
700 MHz - Current Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	ALU 700 eNodeB	ALU 700 eNodeB	ALU 700 eNodeB
ANTENNA TYPE	BXA-80063/4CF	BXA-80063/4CF	BXA-80063/4CF
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	0	120	240
DOWN TILT (ELEC + MECH)	0 Elec + 0 Mech	0 Elec + 0 Mech	0 Elec + 0 Mech
RAD CTR (FT AGL)	167.5	167.5	167.5
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2 DPX-051	2 DPX-051	2 DPX-051
700 MHZ - Future Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	ALU 700 eNodeB	ALU 700 eNodeB	ALU 700 eNodeB
ANTENNA TYPE	**LNX-6513DS-A1M**	**LNX-6513DS-A1M**	**LNX-6513DS-A1M**
QTY OF ANTENNAS PER FACE	**1**	**1**	**1**
ORIENTATION (DEG)	0	120	240
DOWN TILT (ELEC + MECH)	0 Elec + 0 Mech	0 Elec + 0 Mech	0 Elec + 0 Mech
RAD CTR (FT AGL)	167.5	167.5	167.5
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2 DPX-051	2 DPX-051	2 DPX-051

850 Cellular - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Modcell 4.0B		Cellular Modcell 4.0B		Cellular Modcell 4.0B	
ANTENNA TYPE	BXA-80063/4CF		BXA-80063/4CF		BXA-80063/4CF	
QTY OF ANTENNAS PER FACE	0		0		0	
ORIENTATION (DEG)	0		120		240	
DOWN TILT (ELEC + MECH)	0 Elec + 0 Mech		0 Elec + 0 Mech		0 Elec + 0 Mech	
RAD CTR (FT AGL)	167.5		167.5		167.5	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	2	shelter only	2	shelter only	2	shelter only
DIPLEX WITH LTE 700 CABLE	Diplexed w/ LTE Cable		Diplexed w/ LTE Cable		Diplexed w/ LTE Cable	
850 MHz - Future Config	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	Cellular Modcell 4.0B		Cellular Modcell 4.0B		Cellular Modcell 4.0B	
ANTENNA TYPE	**LNX-6513DS-A1M**		**LNX-6513DS-A1M**		**LNX-6513DS-A1M**	
QTY OF ANTENNAS PER FACE	0		0		0	
ORIENTATION (DEG)	0		120		240	
DOWN TILT (ELEC + MECH)	0 Elec + 0 Mech		0 Elec + 0 Mech		0 Elec + 0 Mech	
RAD CTR (FT AGL)	167.5		167.5		167.5	
TMA - QTY / MODEL	2	shelter only	2	shelter only	2	shelter only
DIPLEXER - QTY / MODEL	Diplexed w/ LTE Cable		Diplexed w/ LTE Cable		Diplexed w/ LTE Cable	

NUMBER OF CABLE'S NEEDED					
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES			12
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			12
Equipment Cable Ordering		**MAIN CABLE**	12	+	0

ESTIMATED CABLE LENGTH			
MAINLINE (FT)			
TOP JUMPER (FT)			12
TOP JUMPER #	12	+	0

TX / RX FREQUENCIES		
Cellular A-Band	**PCS F / AWS-Band**	**700 Mhz C - E**
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-21	TX - 746-757
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-17	RX - 776-787

TX POWER OUTPUT	
Cellular (Watts)	20
PCS (Watts)	60
LTE (Watts)	60

ALPHA				**BETA**				**GAMMA**			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By:Maria Montrose	Alejandro Restrepo	MMM	1/24/2017

Site Configuration

QTY - 6 Bias Ts required for RETs, 3 on top & 3 on bottom
QTY - 3 AISG RET control cables required

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6513DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Extended tilt range offers better coverage
- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	14.6	15.1
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	16.0	14.5
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	20	20
Front-to-Back Ratio at 180°, dB	30	30
CPR at Boresight, dB	12	12
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	698 – 896 MHz

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity, total	2
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
Wind Loading, maximum	437.9 N @ 150 km/h 98.4 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	181.0 mm | 7.1 in

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6513DS-VTM

Length	1390.0 mm | 54.7 in
Width	301.0 mm | 11.9 in
Net Weight	14.1 kg | 31.1 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-6513DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNX-6513DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBX-6516DS-VTM

Andrew® Teletilt® Antenna, 1710–2170 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry to minimize any sector overlap
- Rugged, reliable design with excellent passive intermodulation suppression
- The values presented on this datasheet have been calculated based on N-P-BASTA White Paper version 9.6 by the NGMN Alliance

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2170**
Gain by all Beam Tilts, average, dBi	17.1	17.3	17.5
Gain by all Beam Tilts Tolerance, dB	±0.2	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 17.1 5 ° | 17.2 10 ° | 16.9	0 ° | 17.3 5 ° | 17.5 10 ° | 17.0	0 ° | 17.6 5 ° | 17.7 10 ° | 17.1
Beamwidth, Horizontal, degrees	68	65	64
Beamwidth, Horizontal Tolerance, degrees	±1.9	±1.6	±2.1
Beamwidth, Vertical, degrees	7.5	7.0	6.7
Beamwidth, Vertical Tolerance, degrees	±0.4	±0.3	±0.4
Beam Tilt, degrees	0–10	0–10	0–10
USLS, dB	19	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	22	22
CPR at Sector, dB	11	9	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2170 MHz
Number of Ports	2

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity, total	2
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant

HBX-6516DS-VTM

Wind Loading, maximum	257.0 N @ 150 km/h 57.8 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	83.0 mm | 3.3 in
Length	1306.0 mm | 51.4 in
Width	166.0 mm | 6.5 in
Net Weight	4.7 kg | 10.4 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	HBX-6516DS-R2M
Model with Factory Installed AISG 2.0 Actuator	HBX-6516DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

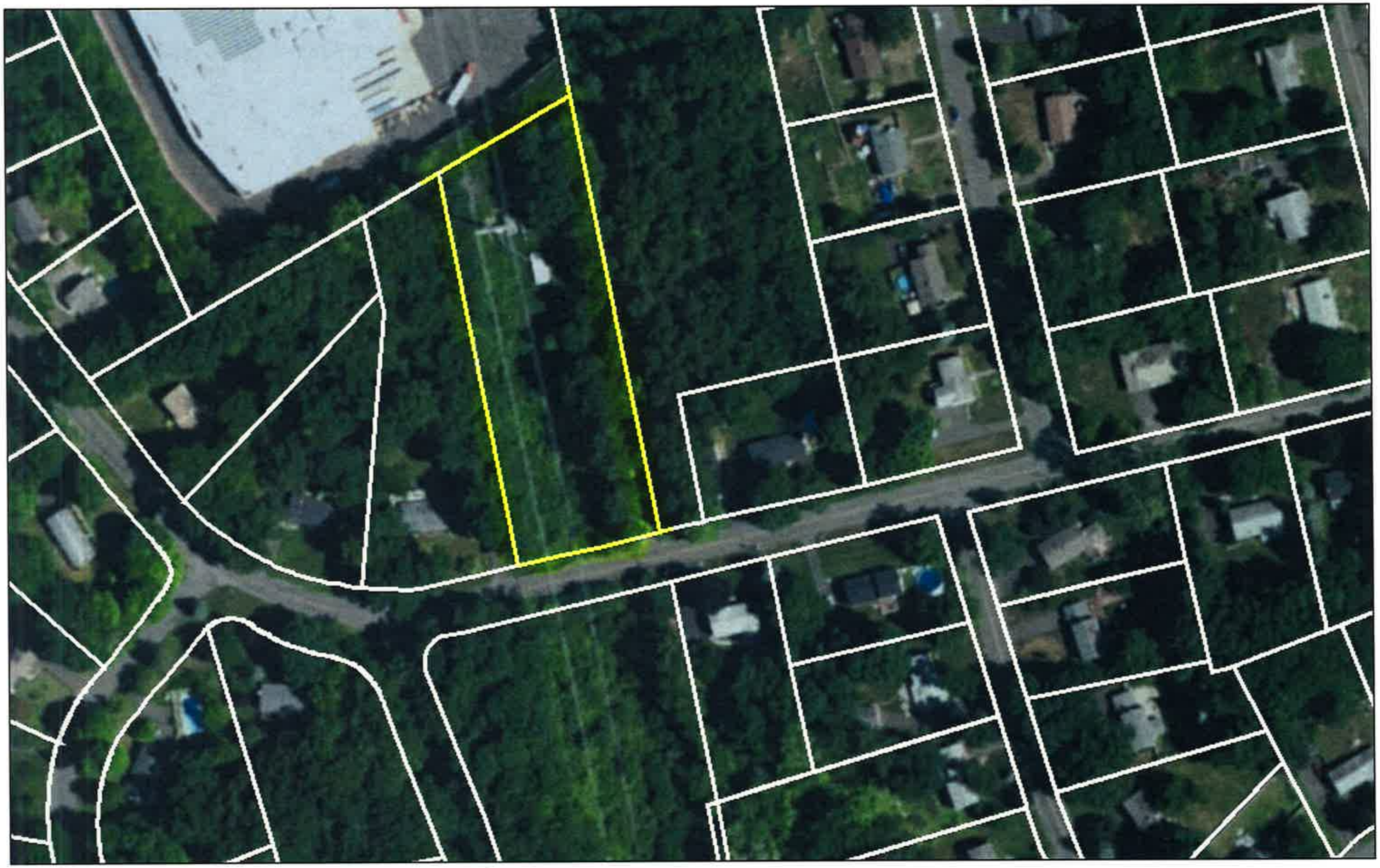
Included Products

DB390 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Use for narrow panel antennas. Includes two pipe mounts.

DB5098E — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

ATTACHMENT 4

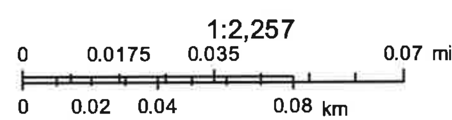
ArcGIS Web Map



June 9, 2017

Parcels

Town Boundary



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Web AppBuilder for ArcGIS
Microsoft |

Bethel, CT : Residential Property Record Card

[Back to Search Results] [Start a New Search][Help with Printing]

Search For Properties

Account Map Block Lot Street # Street Name

Search
Reset Search

Account	Card	Map-Block-Lot	Location	Zoning	State Class	Acres
R01090	1	59 095 23	8 SKY EDGE LANE	R-30	130 - Developable Land	1.480

Living Units
0

Owner Information

Conn Light & Power Co % Tax Department
Po Box 270
Hartford CT 061410270

Property Picture

Deed Information

Book/Page:	188/199
Deed Date:	n/a

Dwelling Information

Style:	
Story Height:	0
Attic:	
Basement:	
Year Built:	0
Ground Flr Area:	0
Tot Living Area:	0
Rooms:	0
Bedrooms:	0
Full Baths:	0
Half Baths:	0
Ext Walls:	
Finished Basement Size:	0
Rec Room Size:	0 x 0
WB FP Stacks/Openings	0 / 0
MT FP Stacks/Openings	0 / 0
Heating Type:	Undefined
Fuel Type:	
System Type:	None

Valuation

Land:	$148,750
Building:	$4,100
Total:	$152,850
Net Assessment:	$107,000

Sales History

Book/Page	Date	Price	Type	Validity

Permit History

Date	Purpose	Price
2016/05/03	AT&T ANTENNAS	$40,000
2007/01/31	CELLTOWER ANTEN	$75,000

Out Building Information

Type	Qty	Year	Size1	Size2	Grade	Cond
Shed-Frame	1	2012	12	30	A	E

Building Sketch

	Descriptor/Area

Notice

The information delivered through this on-line database is provided in the spirit of open access to government information and is intended as an enhanced service and convenience for citizens of Bethel, CT.

The providers of this database: CLT, Big Room Studios, and Bethel, CT assume no liability for any error or omission in the information provided here.

Currently All Values Have Not Been Finalized and Are Subject To Change.

Comments regarding this service should be directed to: Assessor@betheltownhall.org

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 08/01/2017 US POSTAGE $002.38 ZIP 06103 041L STATE HOUSE STATION 06103 AUG 01 2017 USPS
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Matthew S. Knickerbocker, First Selectman Town of Bethel Clifford J. Hurgin Municipal Center 1 School Street Bethel, CT 06801				
2.	Beth Cavagna, Town Planner Town of Bethel Land Use Department Clifford J. Hurgin Municipal Center 1 School Street Bethel, CT 06801				
3.	Steven J. Florio Eversource 107 Selden Street Berlin, CT 06037				
4.					
5.					
6.					

STATE HOUSE STATION 06103 AUG 01 2017 USPS