STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

RE: PETITION BY T-MOBILE NORTHEAST LLC FOR A DECLARATORY RULING THAT NO CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED IS REQUIRED TO MODIFY THE TELECOMMUNICATIONS FACILITY AT 4280 WHITNEY AVENUE IN THE TOWN OF HAMDEN, CONNECTICUT

PETITION NO. _____

Date: December 10, 2014

PETITION FOR DECLARATORY RULING

Pursuant to General Statutes § 16-50g *et seq.* and § 16-50j-1 *et seq.* of the Regulations of Connecticut State Agencies, T-Mobile Northeast LLC ("T-Mobile") submits this Petition for a Declaratory Ruling ("Petition") for a determination that T-Mobile does not require a Certificate of Environmental Compatibility and Public Need ("Certificate") for the modification of the wireless telecommunications facility at 4280 Whitney Avenue, in the Town of Hamden ("Hamden Facility" or "Facility"). T-Mobile respectfully requests that the Connecticut Siting Council ("Council") issue a declaratory ruling that the modified Hamden Facility would not have a substantial adverse impact on the environment and, accordingly, T-Mobile does not need to obtain a Certificate for the modifications to the Hamden Facility.

II. BACKGROUND INFORMATION

A. The Applicant

T-Mobile is a limited liability company, organized under the laws of Delaware, with a Connecticut office at 35 Griffin Road South, Bloomfield, Connecticut 06002. The

company and its affiliated entities are licensed by the Federal Communications Commission ("FCC") to construct and operate a personal wireless services system in Connecticut, which has been interpreted as a "cellular system" within the meaning of General Statutes § 16-50i (a) (6). T-Mobile does not conduct any other business in the State of Connecticut other than the provision of cellular services under FCC rules and regulations.

Correspondence and/or communications regarding this Petition should be addressed to the attorneys for the Applicant:

Cohen and Wolf, P.C.
1115 Broad Street
Bridgeport, CT 06604
Telephone: (203) 368-0211
Attention: Julie D. Kohler, Esq.
Rachel A. Schwartzman, Esq.

B. The Hamden Facility

On July 28, 2006, in TS-T-MOBILE-062-060621, the Council approved a tower sharing application for Omnipoint Communications, Inc. (as then subsidiary of T-Mobile USA, Inc.) to share an existing tower facility at 4280 Whitney Avenue, Hamden, Connecticut. The Council approved shared use of the existing telecommunications tower, as well as placement of all necessary equipment within the tower compound. A copy of the TS-T-MOBILE-062-060621 approval is attached hereto as Exhibit A.

T-Mobile is currently collocated on the Hamden Facility and maintains its equipment within the compound area.

II. PROPOSED MODIFICATIONS TO THE HAMDEN FACILITY

T-Mobile seeks to modify the existing Hamden Facility by:

- Replacing three (3) existing antennas at a centerline of 106 feet;
- Adding three (3) new antennas mounted on a low-profile platform at a centerline of 106 feet;
- Adding three (3) remote radio units ("RRUs") mounted on a proposed H-frame unit;
- Adding six (6) tower-mounted amplifiers (TMAs) mounted on the same proposed H-frame unit;
- Adding an eight (8) foot tall stockade fence around the perimeter of the existing transmission tower and ice bridge;
- Adding coax cable and reuse existing coax cable;
- Adding an equipment cabinet mounted to an ice bridge; and
- Replacing an existing equipment cabinet.

Plans (revised to October 17, 2014) detailing these proposed modifications are attached hereto as Exhibit B.

The majority of proposed modifications to this Facility qualify for acknowledgement as an exempt modification. However, the proposed stockade fence, which will enclose the existing transmission tower upon which the replacement and proposed antennas will be mounted, will technically expand the boundaries of the existing site delineated by the underlying tower sharing approval dated July 28, 2006. The proposed additional and existing underground coax cable, connecting the proposed equipment cabinet to the transmission tower, will also be installed outside of the

boundaries of the existing site in two (2) discrete locations. Although not substantial changes, these are deviations from the current compound area and T-Mobile seeks a Petition to allow for these minor modifications.[1]

III. STATEMENT OF NEED

The Facility is an integral component of T-Mobile's wireless network in Hamden and the surrounding area. It is imperative that T-Mobile upgrade its antennas and equipment so that it may provide improved wireless services to people living in and traveling through this area of the State.

T-Mobile has acquired 700 MHz wireless spectrum in Connecticut to improve the service provided to customers. As T-Mobile's current spectrum deployment is in the PCS (1900 MHz) and AWS (2100 MHz) bands, this new spectrum provides an opportunity to significantly improve coverage for wireless subscribers throughout the area. The 700 MHz spectrum is primarily intended to improve in-building coverage for voice and E911 services. The 700 MHz spectrum has a better ability to penetrate building structures so it will provide superior coverage and will now become the priority use of spectrum for customers that attempt to utilize their phones in poorly covered areas.

As part of this new deployment, T-Mobile has chosen to use the best antennas available so that the best possible service can be provided to customers. The proposed antenna has a gain of 16.7 dBi, which is 1 dB more than a shorter model. This additional gain allows each existing antenna installation to provide the absolute

[1] T-Mobile also seeks approval of the other proposed facility modifications identified in Section II.

maximum possible coverage from that location. The incremental coverage from each site will provide additional in-building coverage to residents in the area and will ensure fewer areas are out of coverage. Ensuring maximum possible coverage will provide voice service to more customers and provides the ability for E911 services to more areas. By utilizing each location to the cell site's maximum coverage, T-Mobile strives to minimize the need to build additional cell-sites in the town.

To summarize, the proposed antennas do provide a significant amount of additional coverage that is necessary to provide the full utilization of every T-Mobile installation to best provide voice coverage and E911 services to residents.

IV. THE PROPOSED MODIFICATIONS WILL NOT HAVE A SUBSTANTIAL ADVERSE ENVIRONMENTAL EFFECT

As indicated above, this proposed modification is being filed as a Petition only as a result of the minimal expansion of the site boundaries. Northeast Utilities/Connecticut Light and Power ("CL&P"), the structure and tower owner, has required that T-Mobile enclose the existing transmission tower and ice bridge with a fence (to which the proposed and existing underground coax cable will run) as part of this equipment upgrade.[2] A Letter of Approval from Northeast Utilities is attached hereto as Exhibit C.

The de minimus modifications will not result in any adverse environmental effect. The remainder of the proposed site modifications fall within the exempt modification criteria, so by regulation have been established to not have a substantial adverse environmental effect.

[2] CL&P also requires that this fencing be set back a minimum distance of five (5) feet from the existing structure.

A. No Site Impacts

T-Mobile is already collocated on this Facility and it seeks to install a necessary equipment upgrade. The proposed modifications would be situated on the existing structure and include an expansion of fenced area simply to enclose the transmission tower and ice bridge structure. No clearing or grading is required and the area is already disturbed by the presence of the existing transmission structure and transmission line right of way. Further, T-Mobile does not propose any generators or HVAC units. The proposed modifications to the Facility would not have a significant adverse impact on the environment.

B. Compliance with MPE Limits

The operation of the proposed antennas will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI Consulting dated October 13, 2014 T-Mobile's operations would add 13.04% of the FCC Standard. Therefore, the calculated "worst case" power density for the planned combined operation at the site including all of the proposed antennas would be 36.93% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as Exhibit D.

C. Structural Analysis

The Hamden Facility is structurally capable of supporting T-Mobile's proposed antennas. The Structural Analysis Report dated October 22, 2014 and attached hereto

as Exhibit E concluded that "the subject tower is adequate to support the proposed modified antenna configuration."

D. Other Environmental Factors

T-Mobile's continued collocation on the Hamden Facility, alone and cumulatively with other existing facilities, is consistent with the Council's other environmental mandates. As such, the Hamden Facility will not have a significant adverse effect on any of the following: the natural environment; ecological balance; public health and safety; scenic, historic, and recreational values; forests and parks; air; water purity; and fish, aquaculture, and wildlife.

V. NOTICE REQUIRED

In accordance with R.C.S.A. § 16-50j-40(a), T-Mobile sent notice of its intent to file this Petition to each person appearing of record as an owner of property that abuts the site, as well as the appropriate municipal officials as required by R.C.S.A. § 16-50j-40. A copy of the notice, list of the property owners, and municipal officials to whom the notice was sent and a certification of such notice are included in Exhibit F.

VI. CONCLUSION

The information and exhibits referenced above demonstrate that a Petition should issue for the modifications T-Mobile proposes at this Facility.

This Petition and the accompanying materials and documentation demonstrate that the only aspect of the proposal that would not receive acknowledgement as exempt

activities are the location of the proposed stockade fence and underground coax cable outside the compound area. CL&P has required T-Mobile to enclose the existing transmission structure and ice bridge with a fence as part of the equipment upgrade.

The Facility is an integral component of T-Mobile's wireless network in this area of Hamden. It is imperative that T-Mobile upgrade its antennas and equipment so that it may provide improved wireless services to this area of the State.

The proposed stockade fence and underground coax cable will minimally extend the compound area, which would not result in any substantial adverse environmental effect. The other modifications will all be located within the existing compound and on the existing transmission structure. T-Mobile therefore respectfully requests that the Council issue a declaratory ruling approving the Hamden Facility modifications as proposed.

Respectfully Submitted,

T-MOBILE NORTHEAST LLC

By: _____

Julie D. Kohler, Esq.
Rachel A. Schwartzman, Esq.
Cohen and Wolf, P.C.
1115 Broad Street
Bridgeport, CT 06604
Tel. (203) 368-0211
Fax (203) 394-9901
jkohler@cohenandwolf.com
rschwartzman@cohenandwolf.com

EXHIBIT A

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

July 28, 2006

Karina Fournier
Zoning Department
T-Mobile
30 Cold Spring Road
Rocky Hill, CT 06067

RE: **TS-T-MOBILE-062-060621** - Omnipoint Communications, Inc. request for an order to approve tower sharing at an existing telecommunications facility located at 4280 Whitney Avenue, Hamden, Connecticut.

Dear Ms. Fournier:

At a public meeting held July 27, 2006, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility may require an explicit request to this agency pursuant to General Statutes § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction. Please be advised that the validity of this action shall expire one year from the date of this letter.

The proposed shared use is to be implemented as specified in your letter dated June 21, 2006, including the placement of all necessary equipment and shelters within the tower compound.

Thank you for your attention and cooperation.

Very truly yours,

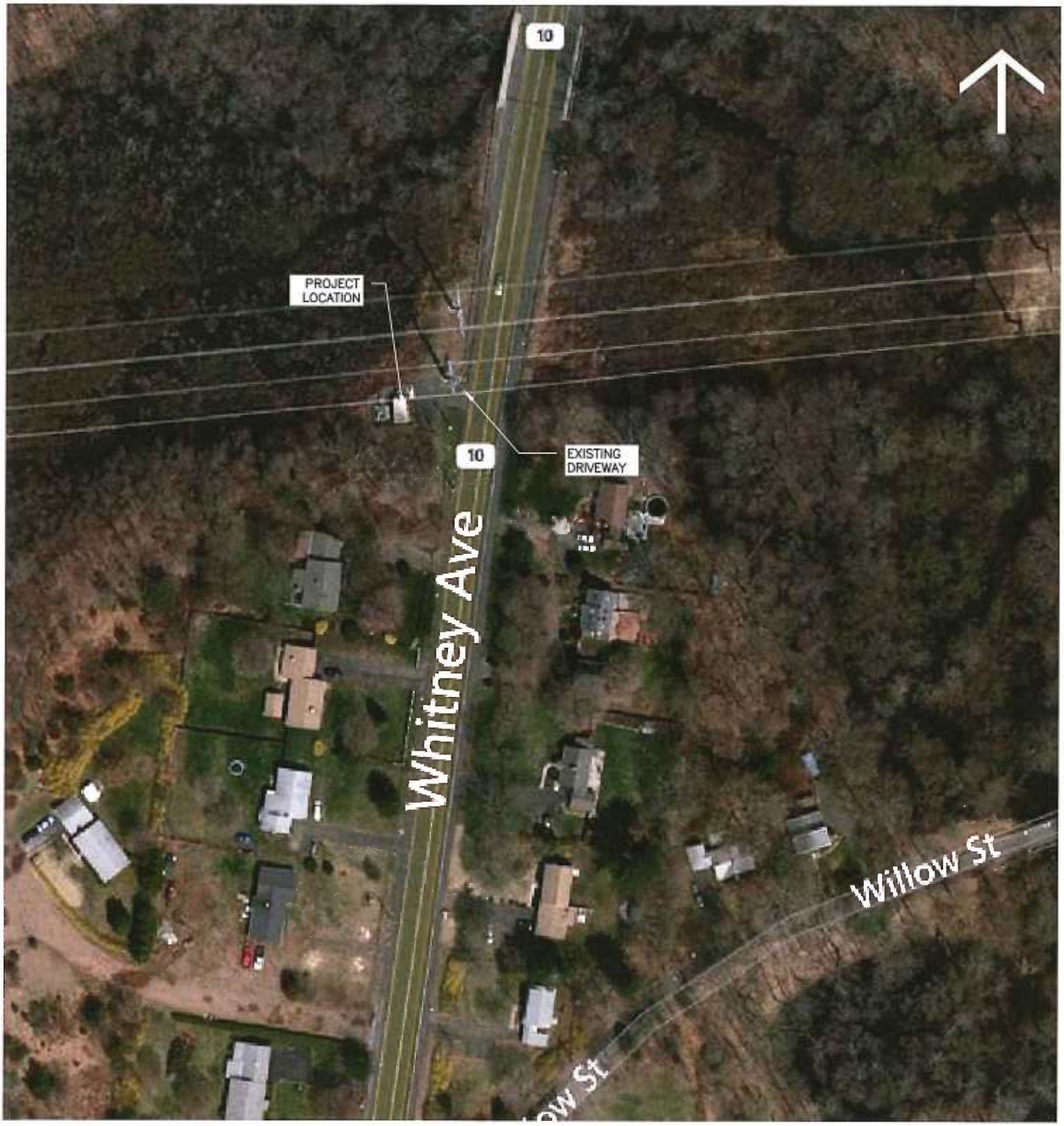
Colin C. Tait

Colin C. Tait
Chairman

CCT/MP/laf

c: The Honorable Craig B. Henrici, Mayor, Town of Hamden
Leslie Creane, Town Planner, Town of Hamden
Michael Green, Real Estate Department, Northeast Utilities
Michele G. Briggs, New Cingular Wireless PCS, LLC
Christopher B. Fisher, Esq., Cuddy & Feder LLP

EXHIBIT B



KEY PLAN

N.T.S.

CONFIGURATION

704BU

SUBMITTALS	
LE REV A	08.06.14
LE REV 0	08.07.14
LE REV 1	10.17.14

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CTNH221A

SITE NAME:
NH221 HAMDEN-CL&P

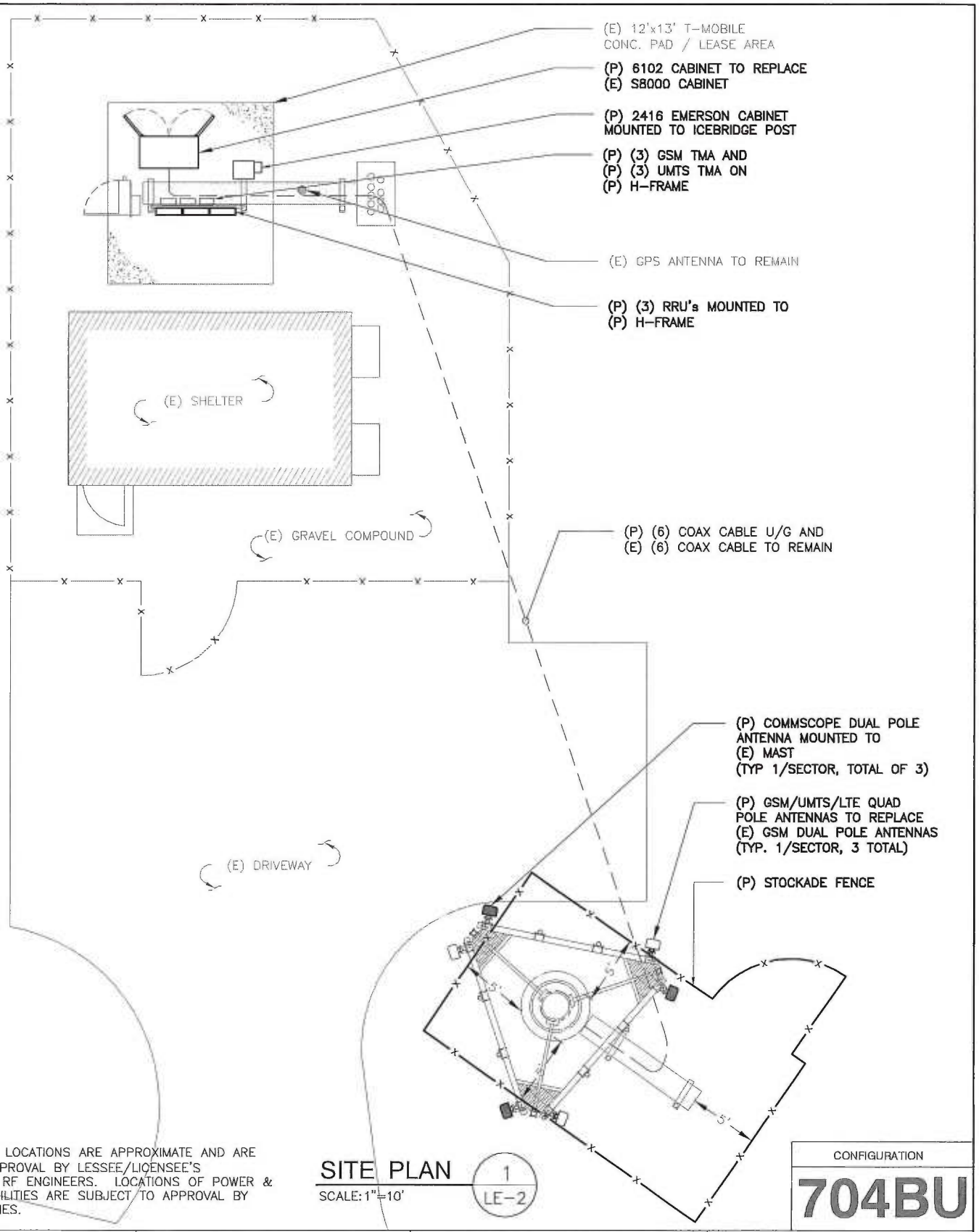
SITE ADDRESS:
4280 WHITNEY AVE
HAMDEN, CT 06518

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

FOR

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: EB | CHECKED BY: SM



ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.

SITE PLAN

SCALE: 1"=10'

1 / LE-2

CONFIGURATION

704BU

SUBMITTALS	
LE REV A	08.06.14
LE REV 0	08.07.14
LE REV 1	10.17.14

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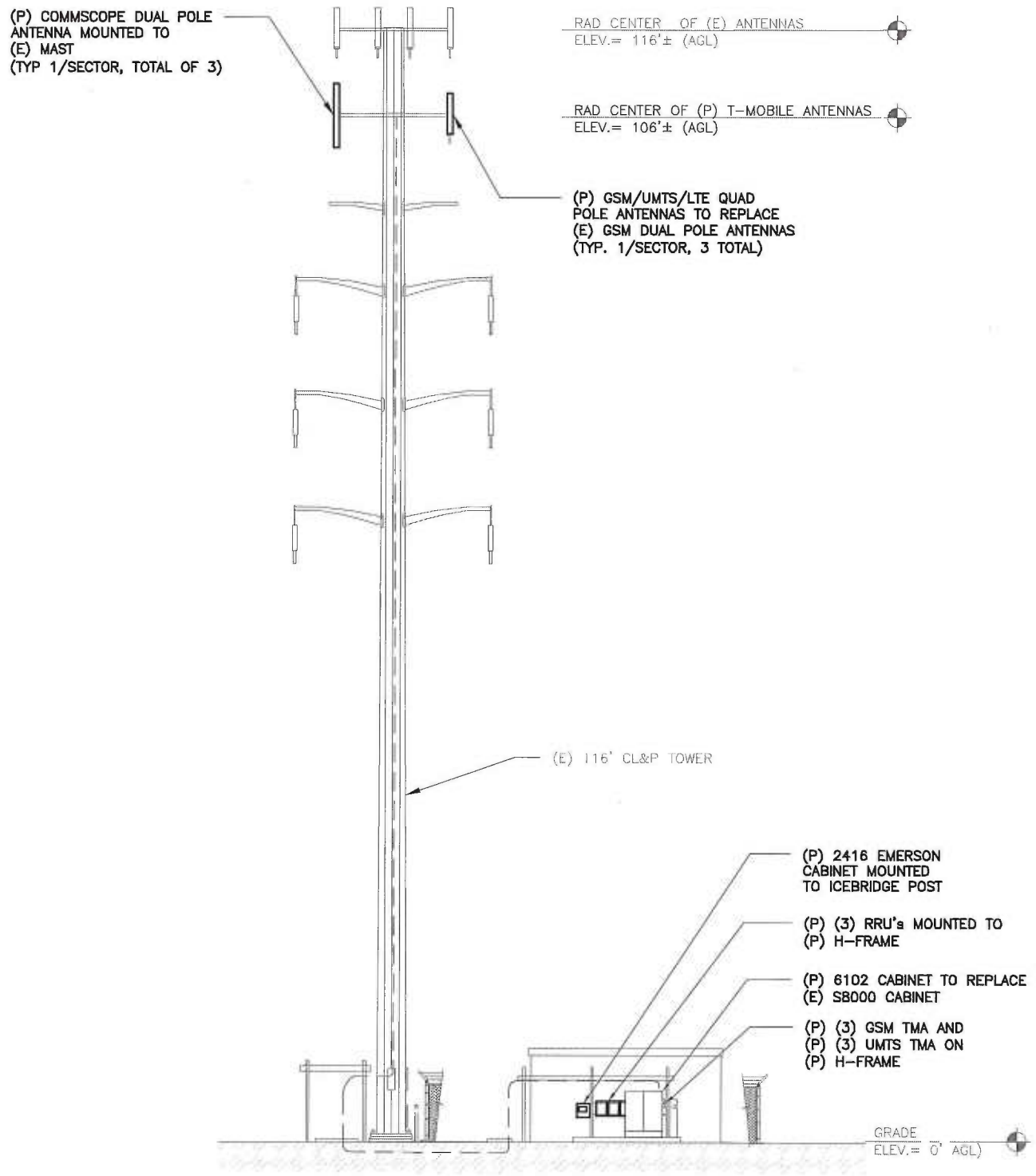

ELEVATION 1
N.T.S. LE-3

CONFIGURATION
704BU

SUBMITTALS	
LE REV A	08.06.14
LE REV 0	08.07.14
LE REV 1	10.17.14

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Fax: 617-213-5056

LEASE EXHIBIT

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CTNH221A

SITE NAME:
NH221 HAMDEN-CL&P

SITE ADDRESS:
4280 WHITNEY AVE
HAMDEN, CT 06518

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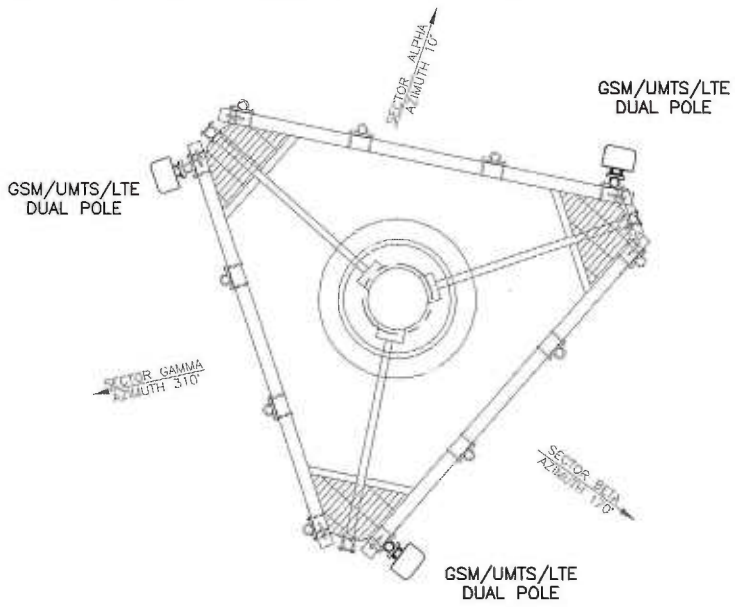
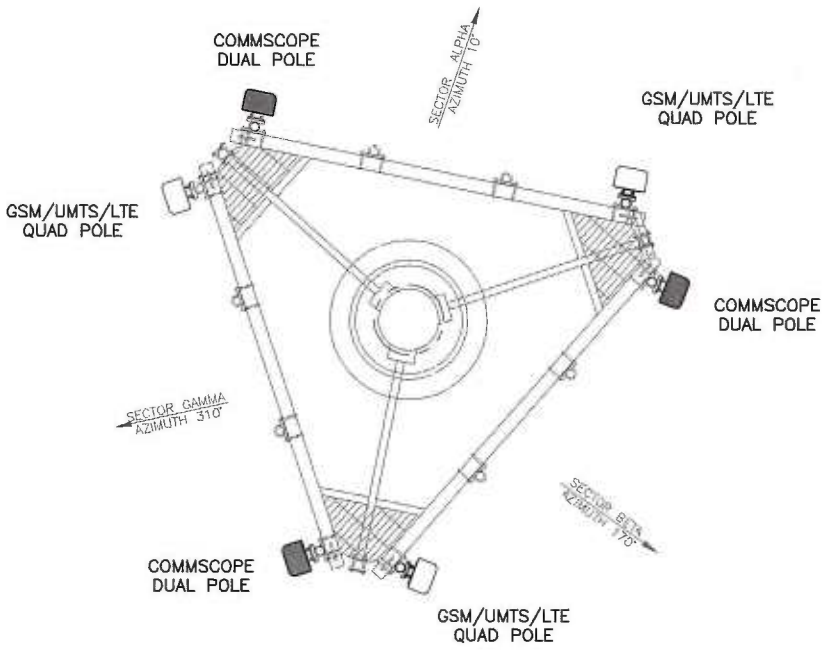


EXISTING ANTENNA CONFIGURATION



PROPOSED ANTENNA CONFIGURATION

CONFIGURATION

704BU

SUBMITTALS	
LE REV A	08.06.14
LE REV 0	08.07.14
LE REV 1	10.17.14

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LEASE EXHIBIT

SITE NUMBER:
CTNH221A

SITE NAME:
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SITE ADDRESS:
4280 WHITNEY AVE
HAMDEN, CT 06518

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

FOR

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: EB | CHECKED BY: SM

EXHIBIT C

Northeast Utilities System

56 Prospect Street, Hartford, CT 06103

Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(203) 665-5000

October 23, 2014

Mr. Mark Richard
T-Mobile
35 Griffin Rd.
Bloomfield, CT 06002

RE: T-Mobile Antenna Site, CT-NH 221A, 4286 Whitney Ave, Hamden CT, structure 4008.

Dear Mr. Richard:

Based on our reviews of the site drawings, the structural analysis provided by Centek Engineering and, and the foundation analyses performed by Centek Engineering, we have reviewed for acceptance this modification

Since there are no outstanding structural or site related issues to resolve at this time, construction at these locations may begin as soon as scheduling allows. You may contact Mr. O'Brien (860-665-6987); once the lease issues are secured you may then contact Mr. John Landry directly (860-665-5425) to begin the construction arrangements

Sincerely,

Robert Gray
Transmission Line Engineering

ref: CTNH221A-L700-CD-V1.pdf
CTNH221A-L700-SA-V2.pdf

EXHIBIT D

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

T-Mobile Existing Facility

Site ID: CTNH221A

NH221 / Hamden CL&P
4280 Whitney Avenue
Hamden, CT 06518

October 13, 2014

EBI Project Number: 62145488

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	36.93 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

October 13, 2014

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CTNH221A – NH221 / Hamden CL&P**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **4280 Whitney Avenue, Hamden, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **4280 Whitney Avenue, Hamden, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

6) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antennas used in this modeling are the **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APX16DWV-16DWVS-E-A20** has a maximum gain of **16.3 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **106 feet** above ground level (AGL).

9) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	106	Height (AGL):	106	Height (AGL):	106
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	6	Channel Count	6	# PCS Channels:	6
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	3,833.82	ERP (W):	3,833.82	ERP (W):	3,833.82
Antenna A1 MPE%	3.68	Antenna B1 MPE%	3.68	Antenna C1 MPE%	3.68
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	106	Height (AGL):	106	Height (AGL):	106
Frequency Bands	700 Mhz	Frequency Bands	700 Mhz	Frequency Bands	700 Mhz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	445.37	ERP (W):	445.37	ERP (W):	445.37
Antenna A2 MPE%	0.67	Antenna B2 MPE%	0.67	Antenna C2 MPE%	0.67

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**13.04**
AT&T	23.89 %
Site Total MPE %:	**36.93 %**

T-Mobile Sector 1 Total:	4.35 %
T-Mobile Sector 2 Total:	4.35 %
T-Mobile Sector 3 Total:	4.35 %
Site Total:	36.93 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector 1:	4.35 %
Sector 2:	4.35 %
Sector 3 :	4.35 %
T-Mobile Total:	13.04 %
Site Total:	36.93 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **36.93%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803`

EXHIBIT E

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Antenna Mast and CL&P Pole

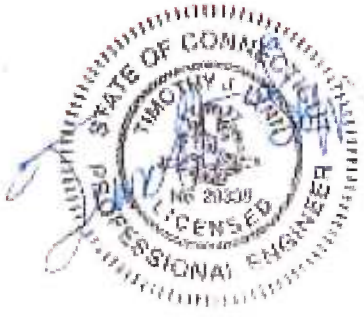
T-Mobile: CTNH221A

CL&P Structure No. 4008
96' Electric Transmission Pole
w/ 20.5-ft Extension

4286 Whitney Ave.
Hamden, CT

CENTEK Project No. 14025.014

~~Date: September 30, 2014~~
Rev 1: October 22, 2014



Prepared for:
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Introduction

The purpose of this report is to analyze the existing 20.5-ft mast and 96' CL&P pole located at 4286 Whitney Ave., in Hamden, CT for the proposed antenna and equipment upgrade by T-Mobile.

The proposed loads consist of the following:

- AT&T (Existing):

  Antennas: Three (3) KMW AM-X-CD-16-65-00T-RET panel antennas, three (3) CCI DTMABP7819VG12A TMAs, six (6) Powerwave 7770 panel antennas and twelve (12) Powerwave LGP-21401 TMAs mounted on a low profile platform with a RAD center elevation of 116-ft above grade level.
  Coax Cables: Eighteen (18) 1-5/8" ∅ coax cables running on the interior of the CL&P pole.

- T-MOBILE (Existing to be removed):

  Antennas: Three (3) RFS APX16PV-16PVL-E panel antennas and three (3) Remec G20057A1 TMAs mounted on a low profile platform with a RAD center elevation of 106-ft above grade level.

- T-MOBILE (Existing to remain):
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the interior of the CL&P pole.

- **T-MOBILE (Proposed):**

  Antennas: Three (3) RFS APX16DWV-16DWVS and three (3) Andrew LNX-6515DS panel antennas mounted on a low profile platform with a RAD center elevation of 106-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the interior of the CL&P pole.

Primary assumptions used in the analysis

- Allowable steel stresses are defined by AISC-ASD 9th edition for design of the PCS Mast and antenna supporting elements.
- ASCE Manual No. 72, "Design of Steel Transmission Pole Structures Second Edition", defines allowable steel stresses for evaluation of the CL&P utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Antenna mast and utility pole are in plum condition.
- All utility pole 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 antenna mast was independently completed using the current version of tnx-Tower computer program licensed to CENTEK Engineering, Inc.

The antenna mast consisting of a 20.5-ft long 12-sided tapered shaft conforming to ASTM A572 Grade 65 specifications flange connected to the top of the CL&P tower was analyzed for its ability to resist loads prescribed by the TIA/EIA standard. Section 5 of this report details this analysis. NESC prescribed loads were also applied to the antenna mast in order to analyze the CL&P pole structure. These loads are developed in Section 6 of this report.

Design Basis

Our analysis was performed in accordance with ASCE Manual No. 72 – "Design of Steel Transmission Pole Structures Second Edition", NESC C2-2007 and Northeast Utilities Design Criteria.

The CL&P pole structure, considering existing and future conductor and shield wire loading, with the proposed T-Mobile equipment was analyzed as follows:

- 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 Manual No. 72.

  Load cases considered:

  Load Case 1: NESC Heavy Wind

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

Wind Speed.....	110 mph (1)
Radial Ice Thickness.....	0"

  Load Case 3: NESC Extreme Ice w/ Wind

Wind Pressure.....	6.4 psf
Radial Ice Thickness.....	0.75"
Vertical Overload Capacity Factor.....	1.0
Wind Overload Capacity Factor.....	1.0

  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/EIA-222-F, and AISC-ASD standards.

  Load cases considered:

  Load Case 1:
  Wind Speed..... 85 mph [2]
  Radial Ice Thickness..... 0"

  Load Case 2:
  Wind Pressure..... 75% of 85 mph wind pressure
  Radial Ice Thickness..... 0.5"

  Note 2: Per NU Mast Design Criteria Exception 1.

Results

- MAST ASSEMBLY

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

Member	Stress Ratio (% of capacity)	Result
20.5-ft long tapered 12-sided shaft	28.5%	**PASS**
Flange Bolts	33.0%	**PASS**
Flange Plate	15.7%	**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 Manual No. 72, "Design of Steel Transmission Pole Structures Second Edition", for the applied NESC Heavy and Hi-Wind load cases. The detailed analysis results are provided in Section 9 of this report. The analysis results are summarized as follows:

  A maximum usage of **71.83%** occurs in the utility pole under the **NESC Extreme** loading condition.

  POLE SECTION:

  The utility pole was found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Tube Number 2	45.00' -96.00' (AGL)	71.83%	**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	70.33%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 8-ft ∅ x 27.5-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (20) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 8.0-ft into the concrete foundation structure. Foundation information was obtained from the original foundation drawing prepared by Paul J. Ford job no. 29205-0284 dated March 15, 2006.

BASE REACTIONS:

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

Load Case	Shear	Axial	Moment
NESC Heavy Wind	25.12 kips	100.32 kips	2008.96 ft-kips
NESC Extreme Wind	50.09 kips	48.77 kips	3973.45 ft-kips
NESC Extreme Ice w/ Wind	20.07 kips	86.18 kips	1642.64 ft-kips

Note 1 – 10% increase 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	60.35%	**PASS**

FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	47.6%	**PASS**
	Lateral Deflection	1.63 in.(1)	**PASS**

(1) Lateral deflection limited to L/100 per OTRM 059 Rev 4 dated 2/01/10. (L/100 = 27.5'*12/100=3.3-in)

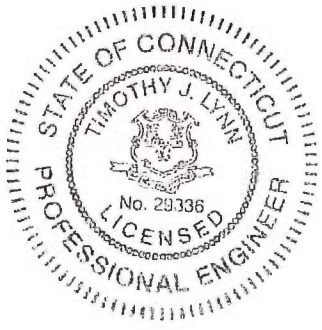
Conclusion

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 Northeast Utilities and T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

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 ~ PLS-POLE

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

Modeling Features:

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

Analysis Features:

- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Design checks for ASCE, ANSI/TIA/EIA 222 (Revisions F and G) or other requirements
- Automatic calculation of dead and wind loads
- Automated loading on structure (wind, ice and drag coefficients) according to:
  - ASCE 74-1991
  - NESC 2002
  - NESC 2007
  - IEC 60826:2003
  - EN50341-1:2001 (CENELEC)
  - EN50341-3-9:2001 (UK NNA)
  - EN50341-3-17:2001 (Portugal NNA)
  - ESAA C(b)1-2003 (Australia)
  - TPNZ (New Zealand)
  - REE (Spain)
  - EIA/TIA 222-F
  - ANSI/TIA 222-G
  - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Detects buckling by nonlinear analysis

Results Features:

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ tnxTower

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

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/EIA-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/EIA Standard 222 with two exceptions:

1. An 85 mph extreme wind speed shall be used for locations in all counties throughout the NU system.
2. The allowable stress increase of TIA Section 3.1.1.1 is allowed for mast section, but is disallowed for the mast to CL&P structure connection.
3. The combined wind and ice condition shall consider ½" radial ice in combination with the wind load (0.75 Wi) as specified in TIA section 2.3.16.

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

			Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (.75Wi)	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	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
		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
		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
	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
		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
		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
		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
		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

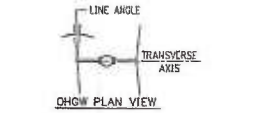
iii) When Coaxial Cables are mounted along side the pole structure, the shape multiplier shall be:

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

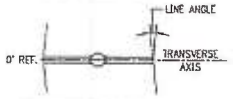
d) The uniform loadings and factors specified for the above components in Attachment A, "NU Design Criteria" are based upon the National Electric Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to the TIA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

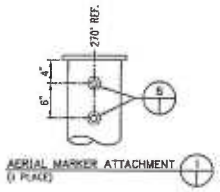
e) Mast reaction loads shall be evaluated for local effects on the transmission structure members at the attachment points.



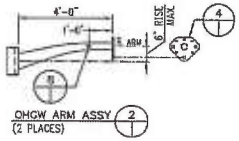
OHGW PLAN VIEW



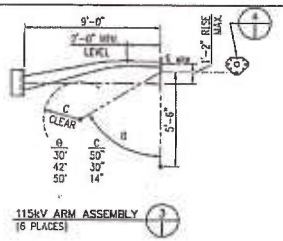
TRANSMISSION PLAN VIEW



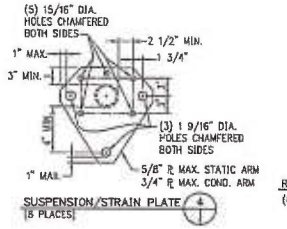
AERIAL MARKER ATTACHMENT (1 PLACE) 1



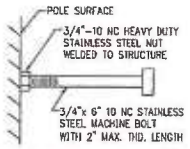
OHGW ARM ASSY (2 PLACES) 2



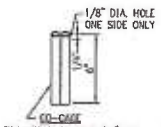
115kV ARM ASSEMBLY (6 PLACES) 3



SUSPENSION/STRAIN PLATE (8 PLACES) 4



REMOVABLE GROUNDING BOLT (8 PLACES) SEE NOTE 9. 5



TWO SECTIONS OF 13/16" O.D. ROUND MECHANICAL TUBING CARBON STEEL-WELDED OR BRAZED TOGETHER. THICKNESS OF TUBING SUFFICIENT FOR WELDING OR BRAZING.

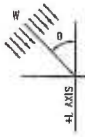
TWO SECTIONS OF 7/8" O.D. ROUND MECHANICAL TUBING CARBON STEEL-WELDED OR BRAZED TOGETHER. THICKNESS OF TUBING SUFFICIENT FOR WELDING OR BRAZING.

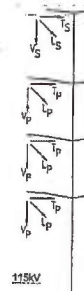
RECEPTACLE GAGES

NOTES:

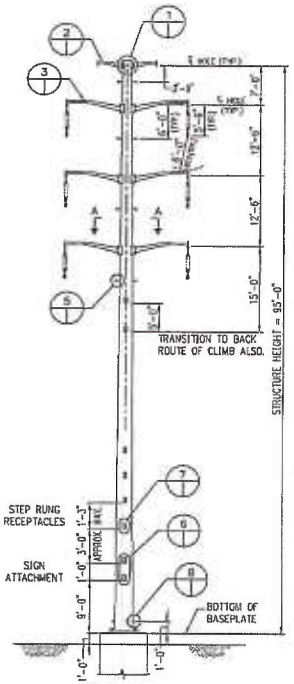
1. ALL INDICATED LOADS ARE ULTIMATE AND INCLUDE ALL OVERLOAD FACTORS.
2. V, T & L ARE IN KIPS AND ARE THE STRUCTURES VERTICAL, TRANSVERSE AND LONGITUDINAL AXIS RESPECTIVELY.
3. W IS THE WIND LOAD APPLIED TO THE STRUCTURE IN PSF. A SHAPE FACTOR OF 1.3 SHALL BE APPLIED TO "W".
4. THETA IS THE ANGLE IN DEGREES BETWEEN THE L-AXIS AND THE WIND DIRECTION AS SHOWN ON THE LOADING TREE DIAGRAM.
5. THE DEAD LOAD OF THE STRUCTURE SHALL BE MULTIPLIED BY K.
6. PROVIDE STEP RUNG RECEPTACLES FOR CLIMBING, STARTING APPROXIMATELY 13'-0" ABOVE GROUND TO THE TOP OF THE STRUCTURE IN CENTER OF FLAT 6 (SEE RECEPTACLE LOCATIONS) AND AS NOTED FOR BACK ROUTE OF CLIMB TO TOP. PROVIDE ADDITIONAL RECEPTACLES ON FLATS WHERE NECESSARY, SO THAT ALL PARTS OF THE STRUCTURE, INSULATORS, AND HARDWARE ASSEMBLIES CAN BE REACHED FOR MAINTENANCE.

   CAUTION: "CLIMBING SPACE" HAS BEEN PROVIDED FOR CLIMBING CLEARANCE TO ENERGIZED CONDUCTORS. ADDITIONAL STEP RUNG LOCATIONS MAY NOT PROVIDE ELECTRICAL CLEARANCES TO ENERGIZED CONDUCTORS.
7. STRUCTURE SHALL BE DESIGNED FOR THE FOLLOWING OPTIONS:
   A. ALL CONDUCTORS AND GROUNDWIRES INSTALLED.
   B. ONE GROUNDWIRE AND THREE PHASES ON ONE SIDE INSTALLED.
   C. OPTIONS A. & B. ABOVE AND THE BROKEN CONDUCTOR LOADING CASE APPLIED SINGULARLY AT EACH LOAD POINT.
   D. OPTIONS A. & B. ABOVE AND THE BROKEN SHIELD WIRE LOADING CASE APPLIED SINGULARLY AT EACH LOAD POINT.
8. TIT IN STRUCTURE TYPE DESIGNATION REFERS TO THE HEIGHT OF THE STRUCTURE ABOVE ITS FOUNDATION.
9. QUANTITIES OF BOLTS AS REQUIRED BY SPECIFICATIONS.

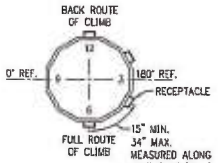




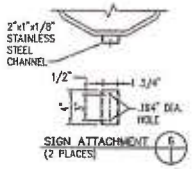
LOADING TREE



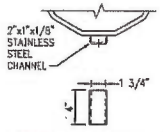
ELEVATION



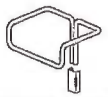
RECEPTACLE LOCATIONS



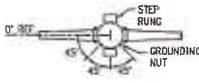
SIGN ATTACHMENT (2 PLACES) 6



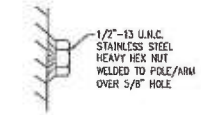
STEP RUNG RECEPTACLE (AS REQ'D) 7



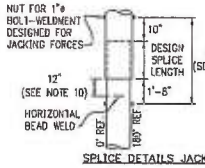
RECEPTACLE & STEP RUNG



SECTION A



GROUNDING LUG (8 PLACES) B



SPLICE DETAILS JACKING NUT LOCATIONS

NOTES:
10. PERMISSIBLE VARIATION FROM THIS 12" DESIGN DIMENSION SHALL BE INDICATED IN FINAL DESIGN AND ERECTION DRAWING.
11. THE 10" AND 1'-8" DIMENSIONS MAY BE INCREASED TO ACHIEVE THIS 60" MIN.

CKT. #1640	
STR. NO.	HEIGHT

TYPE 11-DCSP-02-UGC.TIT
115kV CONDUCTOR: 1 - 1590 KCMIL 45/7 ACSR "LAPWING" CONDUCTOR PER PHASE (14000# @ NESC HEAVY, FINAL)
OPGW: S1-B1 144 FIBERS 0.868 DIA. 0.477 lbs./FT. (5500# @ NESC HEAVY, FINAL)
WIND SPAN: 800 FT.
WEIGHT SPAN: 1200 FT.
LINE ANGLE: 0-2 DEGREES

LOADING CASE					DESIGN LOADS								
NO.	DESCRIPTION	TEMP. F	ICE R-IN	WIND MPH	V_S	T_S	L_S	V_P	T_P	L_P	W	θ	K
1	NESC HEAVY (250 B)	0	0.50	39.5	2.20	1.43	0	5.84	2.44	0	10.0	90	1.50
2	NO HEAVY ICE	0	1.00	0.0	3.40	0.26	0	6.86	0.67	0	0.0	90	1.10
3	ASCE ICE/WIND (NESC PROPOSED 250 D)	32	0.75	50.0	2.40	1.26	0	5.41	1.96	0	7.0	90	1.10
4	NESC EXT. WIND (250 C)	90	0.00	112.0	0.66	1.78	0	2.53	4.07	0	40.7	90	1.10
5	BROKEN SHIELD WIRE	0	0.50	39.5	2.20	1.25	5.55	5.84	2.39	0	4.4	90	1.10
6	BROKEN CONDUCTOR	0	0.50	39.5	2.20	1.39	0	5.84	2.03	14.48	4.4	90	1.10
7	UNBALANCED ICE	0	0.50	39.5	2.20	1.32	2.75	5.84	2.27	4.72	4.4	90	1.10
8	DEFLECTION	60	0.00	0.0	0.60	0.07	0	2.30	0.23	0	0.0	90	1.00
9	CONSTRUCTION	30	0.00	30.0	2.54	0.29	0.23	8.62	0.84	0.66	3.5	90	1.50

DRAWING NOT TO SCALE

Burns & McDonnell SINCE 1898

38505

date	detailed
JUNE 2, 2005	D.D. LAURSEN
designed	checked
J.J. WELLER	MEC

NO.	DATE	REVISIONS	BY	CHK	APP	APP

NORTHEAST UTILITIES SERVICE CO.

FOR THE CONNECTICUT LIGHT & POWER CO.

TITLE 115-kV DOUBLE CIRCUIT MONOPOLE

0-2 DEGREE TANGENT

11-DCSP-02-UGC.TIT

BY	CHKD	APP	APP
DATE 6/21/2005	DATE	DATE	DATE
SCALE NONE	D	DWG. NO. CINGULAR	

*** Loads Data

Loads from file: x:\jobs 25000\25050\eng\spole\hamden hybrid rev1.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 (lowest joint)	0.00	(ft)
Ground elevation shift	0.00	(ft)
Z of ground with shift	0.00	(ft)
Z of structure top (highest joint)	116.50	(ft)
Structure height	116.50	(ft)
Structure height above ground	116.50	(ft)

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Area Factor	SF for Steel Poles and Towers	SF for Arms	SF for Wood Poles	SF for 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)	Pole Deflection Check	Pole Deflection Limit % or (ft)
NESC HEAVY	1.5000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	10	0	0.500	56.000	No Limit	0
NU HEAVY ICE	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	0	0	1.000	56.000	No Limit	0
ASCE ICE/WIND	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	7	0	0.750	56.000	No Limit	0
EX WIND	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	40.7	0	0.000	56.000	No Limit	0
UNBALANCED ICE	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	4.4	0	0.500	56.000	No Limit	0
DEFLECTION	1.0000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	0	0	0.000	56.000	No Limit	0
CONSTRUCTION	1.5000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	3.5	0	0.000	56.000	No Limit	0
EIA	1.0000	1.0000	0.80000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	41.12	0	0.000	56.000	No Limit	0
BROKEN SW	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	4.4	0	0.500	56.000	No Limit	0
BROKEN COND	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	10	loads	Wind on All	4.4	0	0.500	56.000	No Limit	0
NESC HEAVY 1 SIDE	1.5000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	10	0	0.500	56.000	No Limit	0
NU HEAVY ICE 1 SIDE	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	0	0	1.000	56.000	No Limit	0
ASCE ICE/WIND 1 SIDE	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	7	0	0.750	56.000	No Limit	0
EX WIND 1 SIDE	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	40.7	0	0.000	56.000	No Limit	0
UNBALANCED ICE 1SIDE	1.1000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	4.4	0	0.500	56.000	No Limit	0
DEFLECTION 1 SIDE	1.0000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	0	0	0.000	56.000	No Limit	0
CONSTRUCTION 1 SIDE	1.5000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	3.5	0	0.000	56.000	No Limit	0
EIA 1 SIDE	1.0000	1.0000	0.80000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	6	loads	Wind on All	41.12	0	0.000	56.000	No Limit	0

Point Loads for Load Case "NESC HEAVY":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
25050:P1	5010	1320	0	
25050:P2	4110	1500	0	
SWL:T	2200	1430	0	
SWR:T	2200	1430	0	
C1L:T	5840	2440	0	
C2L:T	5840	2440	0	
C3L:T	5840	2440	0	
C1R:T	5840	2440	0	
C2R:T	5840	2440	0	
C3R:T	5840	2440	0	

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	Top	Bottom Section	Section	Section	Outer	Reynolds	Drag	Adjusted	Adjusted	Pole	Pole	Pole Ice	Pole Ice	Tran.	Long.

25050	25050:P2		106.00	101.00	103.50	24.225	0	1.300	0.00	1.00	271.22	0.00	151.46	0.00	0.00	0.00
25050			101.00	96.00	98.50	25.850	0	1.300	0.00	1.00	289.57	0.00	161.62	0.00	0.00	0.00
25050		25050:A1	96.00	94.50	95.25	27.156	0	1.300	0.00	1.00	151.41	0.00	50.94	0.00	0.00	0.00
25050	25050:A1		94.50	90.67	92.58	28.022	0	1.300	0.00	1.00	399.16	0.00	134.20	0.00	0.00	0.00
25050		25050:A2	90.67	86.84	88.75	29.267	0	1.300	0.00	1.00	417.09	0.00	140.16	0.00	0.00	0.00
25050	25050:A2		86.84	81.84	84.34	30.702	0	1.300	0.00	1.00	571.48	0.00	191.95	0.00	0.00	0.00
25050			81.84	78.09	79.96	32.124	0	1.300	0.00	1.00	448.67	0.00	150.63	0.00	0.00	0.00
25050		25050:A3	78.09	74.34	76.21	33.343	0	1.300	0.00	1.00	465.86	0.00	156.35	0.00	0.00	0.00
25050	25050:A3		74.34	69.34	71.84	34.765	0	1.300	0.00	1.00	647.88	0.00	217.35	0.00	0.00	0.00
25050			69.34	65.59	67.47	36.186	0	1.300	0.00	1.00	505.96	0.00	169.68	0.00	0.00	0.00
25050		25050:A4	65.59	61.84	63.72	37.405	0	1.300	0.00	1.00	523.15	0.00	175.40	0.00	0.00	0.00
25050	25050:A4		61.84	56.84	59.34	38.827	0	1.300	0.00	1.00	724.28	0.00	242.75	0.00	0.00	0.00
25050			56.84	53.67	55.26	40.155	0	1.300	0.00	1.00	475.02	0.00	159.17	0.00	0.00	0.00
25050			53.67	50.50	52.08	41.185	0	1.300	0.00	1.00	487.30	0.00	163.25	0.00	0.00	0.00
25050			50.50	47.75	49.12	41.834	0	1.300	0.00	1.00	1027.59	0.00	143.86	0.00	0.00	0.00
25050			47.75	45.00	46.37	42.416	0	1.300	0.00	1.00	1049.59	0.00	145.85	0.00	0.00	0.00
25050			45.00	40.00	42.50	43.675	0	1.300	0.00	1.00	1138.33	0.00	273.06	0.00	0.00	0.00
25050			40.00	35.00	37.50	45.300	0	1.300	0.00	1.00	1181.11	0.00	283.22	0.00	0.00	0.00
25050			35.00	30.00	32.50	46.925	0	1.300	0.00	1.00	1223.89	0.00	293.38	0.00	0.00	0.00
25050			30.00	25.00	27.50	48.550	0	1.300	0.00	1.00	1266.68	0.00	303.54	0.00	0.00	0.00
25050			25.00	20.00	22.50	50.175	0	1.300	0.00	1.00	1309.46	0.00	313.70	0.00	0.00	0.00
25050			20.00	15.00	17.50	51.800	0	1.300	0.00	1.00	1352.24	0.00	323.86	0.00	0.00	0.00
25050			15.00	10.00	12.50	53.425	0	1.300	0.00	1.00	1395.02	0.00	334.02	0.00	0.00	0.00
25050			10.00	5.00	7.50	55.050	0	1.300	0.00	1.00	1437.80	0.00	344.18	0.00	0.00	0.00
25050		25050:g	5.00	0.00	2.50	56.675	0	1.300	0.00	1.00	1480.59	0.00	354.34	0.00	0.00	0.00

Point Loads for Load Case "ASCE ICE/WIND":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
25050:P1	4609	994	0	
25050:P2	3520	1113	0	
SWL:T	2400	1260	0	
SWR:T	2400	1260	0	
C1L:T	5410	1960	0	
C2L:T	5410	1960	0	
C3L:T	5410	1960	0	
C1R:T	5410	1960	0	
C2R:T	5410	1960	0	
C3R:T	5410	1960	0	

Detailed Pole Loading Data for Load Case "ASCE ICE/WIND":

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)
25050	25050:t	25050:P1	116.50	116.00	116.25	20.081	7.95e+005	1.300	7.00	0.75	22.45	7.61	9.42	0.57	8.18	0.00
25050	25050:P1		116.00	111.00	113.50	20.975	8.31e+005	1.300	7.00	0.75	234.55	79.53	98.35	5.69	85.22	0.00
25050		25050:P2	111.00	106.00	108.50	22.600	8.95e+005	1.300	7.00	0.75	252.88	85.69	105.97	5.69	91.38	0.00
25050	25050:P2		106.00	101.00	103.50	24.225	9.6e+005	1.300	7.00	0.75	271.22	91.85	113.59	5.69	97.54	0.00
25050			101.00	96.00	98.50	25.850	1.02e+006	1.300	7.00	0.75	289.57	98.01	121.21	5.69	103.70	0.00
25050		25050:A1	96.00	94.50	95.25	27.156	1.08e+006	1.300	7.00	0.75	151.41	30.89	38.20	1.71	32.60	0.00
25050	25050:A1		94.50	90.67	92.58	28.022	1.11e+006	1.300	7.00	0.75	399.16	81.39	100.65	4.36	85.75	0.00
25050		25050:A2	90.67	86.84	88.75	29.267	1.16e+006	1.300	7.00	0.75	417.09	85.00	105.12	4.36	89.36	0.00
25050	25050:A2		86.84	81.84	84.34	30.702	1.22e+006	1.300	7.00	0.75	571.48	116.41	143.97	5.69	122.10	0.00
25050			81.84	78.09	79.96	32.124	1.27e+006	1.300	7.00	0.75	448.67	91.35	112.97	4.27	95.62	0.00

25050		25050:A3	78.09	74.34	76.21	33.343	1.32e+006	1.300	7.00	0.75	465.86	94.82	117.26	4.27	99.08	0.00
25050	25050:A3		74.34	69.34	71.84	34.765	1.38e+006	1.300	7.00	0.75	647.88	131.82	163.01	5.69	137.50	0.00
25050			69.34	65.59	67.47	36.186	1.43e+006	1.300	7.00	0.75	505.96	102.90	127.26	4.27	107.17	0.00
25050		25050:A4	65.59	61.84	63.72	37.405	1.48e+006	1.300	7.00	0.75	523.15	106.37	131.55	4.27	110.64	0.00
25050	25050:A4		61.84	56.84	59.34	38.827	1.54e+006	1.300	7.00	0.75	724.28	147.22	182.06	5.69	152.91	0.00
25050			56.84	53.67	55.26	40.155	1.59e+006	1.300	7.00	0.75	475.02	96.53	119.38	3.61	100.13	0.00
25050			53.67	50.50	52.08	41.185	1.63e+006	1.300	7.00	0.75	487.30	99.00	122.44	3.61	102.61	0.00
25050			50.50	47.75	49.12	41.834	1.66e+006	1.300	7.00	0.75	1027.59	87.24	107.89	3.13	90.37	0.00
25050			47.75	45.00	46.37	42.416	1.68e+006	1.300	7.00	0.75	1049.59	88.45	109.39	3.13	91.58	0.00
25050			45.00	40.00	42.50	43.675	1.73e+006	1.300	7.00	0.75	1138.33	165.60	204.80	5.69	171.29	0.00
25050			40.00	35.00	37.50	45.300	1.79e+006	1.300	7.00	0.75	1181.11	171.76	212.42	5.69	177.45	0.00
25050			35.00	30.00	32.50	46.925	1.86e+006	1.300	7.00	0.75	1223.89	177.92	220.04	5.69	183.61	0.00
25050			30.00	25.00	27.50	48.550	1.92e+006	1.300	7.00	0.75	1266.68	184.09	227.66	5.69	189.77	0.00
25050			25.00	20.00	22.50	50.175	1.99e+006	1.300	7.00	0.75	1309.46	190.25	235.28	5.69	195.93	0.00
25050			20.00	15.00	17.50	51.800	2.05e+006	1.300	7.00	0.75	1352.24	196.41	242.90	5.69	202.10	0.00
25050			15.00	10.00	12.50	53.425	2.12e+006	1.300	7.00	0.75	1395.02	202.57	250.52	5.69	208.26	0.00
25050			10.00	5.00	7.50	55.050	2.18e+006	1.300	7.00	0.75	1437.80	208.73	258.14	5.69	214.42	0.00
25050		25050:g	5.00	0.00	2.50	56.675	2.24e+006	1.300	7.00	0.75	1480.59	214.89	265.76	5.69	220.58	0.00

Point Loads for Load Case "EX WIND":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
25050:P1	2712	4762	0	
25050:P2	2350	5536	0	
SWL:T	660	1780	0	
SWR:T	660	1780	0	
C1L:T	2530	4070	0	
C2L:T	2530	4070	0	
C3L:T	2530	4070	0	
C1R:T	2530	4070	0	
C2R:T	2530	4070	0	
C3R:T	2530	4070	0	

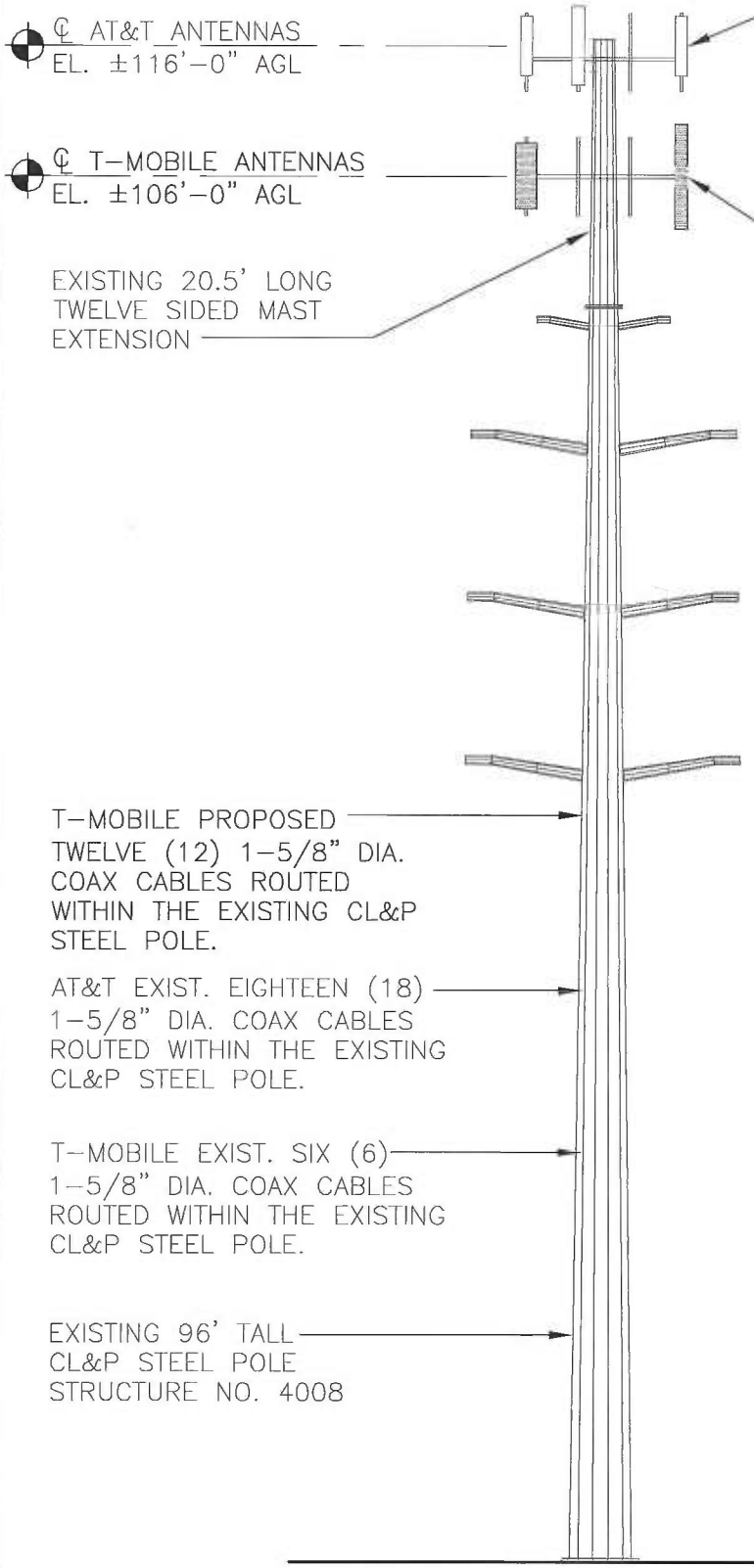
Point Loads for Load Case "UNBALANCED ICE":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
25050:P1	3674	581	0	
25050:P2	3014	660	0	
SWL:T	2200	1320	2750	
SWR:T	2200	1320	2750	
C1L:T	5840	2270	4720	
C2L:T	5840	2270	4720	
C3L:T	5840	2270	4720	
C1R:T	5840	2270	4720	
C2R:T	5840	2270	4720	
C3R:T	5840	2270	4720	

Detailed Pole Loading Data for Load Case "UNBALANCED ICE":

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 Vertical Load (lbs)	Pole Ice Wind Load (lbs)	Tran. Wind Load (lbs)	Long. Wind Load (lbs)



AT&T EXISTING THREE (3) KMW AM-X-CD-16-65-00T-RET PANEL ANTENNAS, THREE (3) CCI DTMABP7819VG12A TMAs, SIX (6) POWERWAVE 7770 PANEL ANTENNAS AND TWELVE (12) POWERWAVE LGP-21401 TMAs TO REMAIN.

T-MOBILE (TO BE REMOVED):
THREE (3) RFS APX16PV-16PVL-E PANEL ANTENNAS AND THREE (3) REMEC G20057A1 TMA'S MOUNTED ON A LOW PROFILE PLATFORM.

T-MOBILE (PROPOSED):
THREE (3) RFS APX16DWV-16DWVS AND THREE (3) ANDREW LNX-6515DS PANEL ANTENNAS MOUNTED ON A LOW PROFILE PLATFORM.

1 / EL-1 TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

REVISIONS		
00	9/30/14	ISSUED FOR NU REVIEW
01	10/22/14	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

CTNH221A
CL&P 4008

4286 WHITNEY AVE
HAMDEN, CT 06518

PROJECT NO:	14025.014
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	9/30/14

TOWER AND MAST ELEVATION

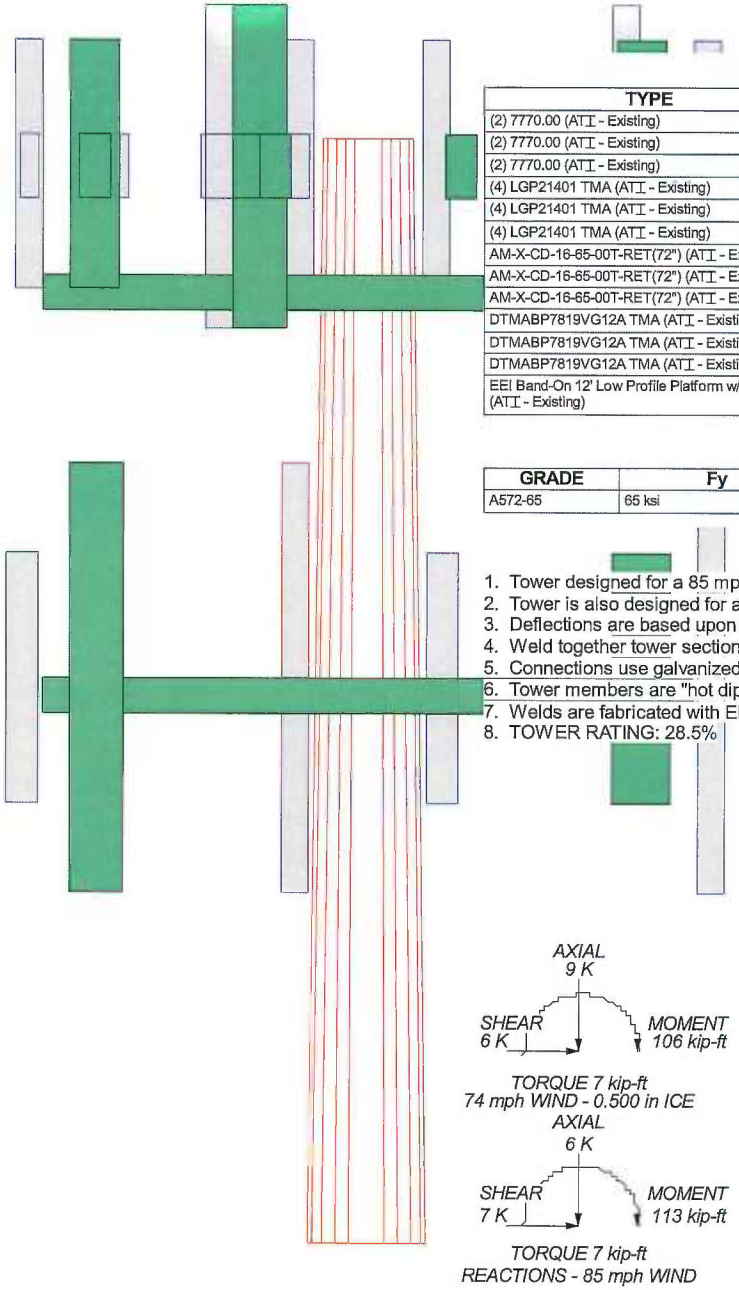
EL-1

DWG. 1 OF 1

116.5 ft

Section	Length (ft)	Number of Sides	Thickness (in)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	20.500	12	0.188	20.000	26.620	A572-65	1.0
							1.0

96.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
(2) 7770.00 (ATI - Existing)	116
(2) 7770.00 (ATI - Existing)	116
(2) 7770.00 (ATI - Existing)	116
(4) LGP21401 TMA (ATI - Existing)	116
(4) LGP21401 TMA (ATI - Existing)	116
(4) LGP21401 TMA (ATI - Existing)	116
AM-X-CD-16-65-00T-RET(72") (ATI - Existing)	116
AM-X-CD-16-65-00T-RET(72") (ATI - Existing)	116
AM-X-CD-16-65-00T-RET(72") (ATI - Existing)	116
DTMABP7819VG12A TMA (ATI - Existing)	116
DTMABP7819VG12A TMA (ATI - Existing)	116
DTMABP7819VG12A TMA (ATI - Existing)	116
EEI Band-On 12' Low Profile Platform w/12 pipe (ATI - Existing)	114

TYPE	ELEVATION
EEI Band-On 12' Low Profile Platform w/12 pipe (T-Mobile - Existing)	106.5
APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	106.5
APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	106.5
APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	106.5
LNX-6515DS (T-Mobile - Proposed)	106.5
LNX-6515DS (T-Mobile - Proposed)	106.5
LNX-6515DS (T-Mobile - Proposed)	106.5

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 28.5%

TORQUE 7 kip-ft
74 mph WIND - 0.500 in ICE

TORQUE 7 kip-ft
REACTIONS - 85 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: ***14025.014 / CTNH221A / CL&P #4008***		
Project: ***21-ft PCS Mast Extension- 4286 Whitney Ave., Hamde***		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 10/22/14	Scale: NTS
Path: J:\Jobs\14025\00.WI\014 - CTNH221A\Backup Documents\Env\Rev (1)\CR Files\21' PennSummit Extension - Hamden CT.ef		Dwg No. E-1

tnxTower	Job	Page
	14025.014 / CTNH221A / CL&P #4008	1 of 15
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 21-ft PCS Mast Extension- 4286 Whitney Ave., Hamden, CT	**Date** 09:40:39 10/22/14
	Client T-Mobile	**Designed by** TJL

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
User specified elevation for calculation of G_h is 0.000 ft.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	116.500-96.000	20.500		12	20.000	26.620	0.188	0.750	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	20.706	11.962	599.323	7.093	10.360	57.850	1214.391	5.887	4.857	25.907
	27.559	15.959	1423.173	9.463	13.789	103.210	2883.735	7.854	6.632	35.369

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 116.500-96.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
1 5/8	B	No	Inside Pole	116.500 - 99.000	18	No Ice	0.000	0.001
(AT&T - Existing)						1/2" Ice	0.000	0.001
1 5/8	B	No	Inside Pole	106.500 - 99.000	6	No Ice	0.000	0.001
(T-Mobile - Existing)						1/2" Ice	0.000	0.001
1 5/8	B	No	Inside Pole	106.500 - 99.000	12	No Ice	0.000	0.001
(T-Mobile - Proposed)						1/2" Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	116.500-96.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.468
		C	0.000	0.000	0.000	0.000	0.000

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	116.500-96.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.468
		C		0.000	0.000	0.000	0.000	0.000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 7770.00	A	From Face	3.500	0.000	116.000	No Ice	5.882	2.928	0.035
(AT&T - Existing)			0.000			1/2" Ice	6.314	3.273	0.068
			0.000						
(2) 7770.00	B	From Face	3.500	0.000	116.000	No Ice	5.882	2.928	0.035
(AT&T - Existing)			0.000			1/2" Ice	6.314	3.273	0.068
			0.000						
(2) 7770.00	C	From Face	3.500	0.000	116.000	No Ice	5.882	2.928	0.035
(AT&T - Existing)			0.000			1/2" Ice	6.314	3.273	0.068
			0.000						
(4) LGP21401 TMA	A	From Face	3.500	0.000	116.000	No Ice	0.953	0.367	0.018
(AT&T - Existing)			0.000			1/2" Ice	1.093	0.480	0.023
			0.000						
(4) LGP21401 TMA	B	From Face	3.500	0.000	116.000	No Ice	0.953	0.367	0.018
(AT&T - Existing)			0.000			1/2" Ice	1.093	0.480	0.023
			0.000						
(4) LGP21401 TMA	C	From Face	3.500	0.000	116.000	No Ice	0.953	0.367	0.018
(AT&T - Existing)			0.000			1/2" Ice	1.093	0.480	0.023
			0.000						
AM-X-CD-16-65-00T-RET(72")	A	From Face	3.500	0.000	116.000	No Ice	8.260	4.642	0.050
			2.000			1/2" Ice	8.807	5.088	0.096
(AT&T - Existing)			0.000						
AM-X-CD-16-65-00T-RET(72")	B	From Face	3.500	0.000	116.000	No Ice	8.260	4.642	0.050
			2.000			1/2" Ice	8.807	5.088	0.096
(AT&T - Existing)			0.000						
AM-X-CD-16-65-00T-RET(72")	C	From Face	3.500	0.000	116.000	No Ice	8.260	4.642	0.050
			2.000			1/2" Ice	8.807	5.088	0.096
(AT&T - Existing)			0.000						
DTMABP7819VG12A TMA	A	From Face	3.500	0.000	116.000	No Ice	1.588	0.578	0.020
(AT&T - Existing)			2.000			1/2" Ice	1.759	0.701	0.030
			0.000						
DTMABP7819VG12A TMA	B	From Face	3.500	0.000	116.000	No Ice	1.588	0.578	0.020
(AT&T - Existing)			2.000			1/2" Ice	1.759	0.701	0.030
			0.000						
DTMABP7819VG12A TMA	C	From Face	3.500	0.000	116.000	No Ice	1.588	0.578	0.020
(AT&T - Existing)			2.000			1/2" Ice	1.759	0.701	0.030
			0.000						
EEI Band-On 12' Low Profile	C	From Face	2.000	0.000	114.000	No Ice	39.000	39.000	2.000
Platform w/12 pipe			0.000			1/2" Ice	50.000	50.000	3.000
(AT&T - Existing)			0.000						
EEI Band-On 12' Low Profile	C	From Face	2.000	0.000	106.500	No Ice	39.000	39.000	2.000
Platform w/12 pipe			0.000			1/2" Ice	50.000	50.000	3.000
(T-Mobile - Existing)			0.000						
APX16DWV-16DWVS-E-A20	A	From Face	3.500	0.000	106.500	No Ice	7.065	2.150	0.041
			-5.000			1/2" Ice	7.516	2.490	0.074
(T-Mobile - Proposed)			0.000						
APX16DWV-16DWVS-E-A20	B	From Face	3.500	0.000	106.500	No Ice	7.065	2.150	0.041
			-5.000			1/2" Ice	7.516	2.490	0.074
(T-Mobile - Proposed)			0.000						
APX16DWV-16DWVS-E-A20	C	From Face	3.500	0.000	106.500	No Ice	7.065	2.150	0.041
			-5.000			1/2" Ice	7.516	2.490	0.074
(T-Mobile - Proposed)			0.000						
LNX-6515DS	A	From Face	3.500	0.000	106.500	No Ice	11.445	7.696	0.055
(T-Mobile - Proposed)			5.000			1/2" Ice	12.064	8.289	0.121
			0.000						
LNX-6515DS	B	From Face	3.500	0.000	106.500	No Ice	11.445	7.696	0.055
(T-Mobile - Proposed)			5.000			1/2" Ice	12.064	8.289	0.121

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LNX-6515DS (T-Mobile - Proposed)	C	From Face	0.000 3.500 5.000 0.000	0.000	106.500	No Ice 1/2" Ice	11.445 12.064	7.696 8.289	0.055 0.121

Tower Pressures - No Ice

$G_H = 1.250$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 116.500-96.00 0	105.765	1.395	0.026	39.821	A B C	0.000 0.000 0.000	39.821 39.821 39.821	39.821	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000

Tower Pressure - With Ice

$G_H = 1.250$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 116.500-96.000	105.765	1.395	0.019	0.500	41.530	A B C	0.000 0.000 0.000	41.530 41.530 41.530	41.530	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000

Tower Pressure - Service

$G_H = 1.250$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 116.500-96.00 0	105.765	1.395	0.009	39.821	A B C	0.000 0.000 0.000	39.821 39.821 39.821	39.821	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	klf	
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	1.323	0.065	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	12.916 kip-ft	1.323		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	klf	
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	1.323	0.065	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	12.916 kip-ft	1.323		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	klf	
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	1.323	0.065	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	12.916 kip-ft	1.323		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	klf	
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	1.323	0.065	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	12.916 kip-ft	1.323		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.468	1.279	A	1	1.03	1	1	1	41.530	1.035	0.050	C
116.500-96.00			B	1	1.03	1	1	1	41.530			
0			C	1	1.03	1	1	1	41.530			
Sum Weight:	0.468	1.279						OTM	10.103 kip-ft	1.035		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.468	1.279	A	1	1.03	1	1	1	41.530	1.035	0.050	C
116.500-96.00			B	1	1.03	1	1	1	41.530			
0			C	1	1.03	1	1	1	41.530			
Sum Weight:	0.468	1.279						OTM	10.103 kip-ft	1.035		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.468	1.279	A	1	1.03	1	1	1	41.530	1.035	0.050	C
116.500-96.00			B	1	1.03	1	1	1	41.530			
0			C	1	1.03	1	1	1	41.530			
Sum Weight:	0.468	1.279						OTM	10.103 kip-ft	1.035		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.468	1.279	A	1	1.03	1	1	1	41.530	1.035	0.050	C
116.500-96.00			B	1	1.03	1	1	1	41.530			
0			C	1	1.03	1	1	1	41.530			
Sum Weight:	0.468	1.279						OTM	10.103 kip-ft	1.035		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	0.458	0.022	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	4.469 kip-ft	0.458		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	0.458	0.022	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	4.469 kip-ft	0.458		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	0.458	0.022	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	4.469 kip-ft	0.458		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.468	0.974	A	1	1.03	1	1	1	39.821	0.458	0.022	C
116.500-96.00			B	1	1.03	1	1	1	39.821			
0			C	1	1.03	1	1	1	39.821			
Sum Weight:	0.468	0.974						OTM	4.469 kip-ft	0.458		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	0.974					
Bracing Weight	0.000					
Total Member Self-Weight	0.974			11.670	0.000	
Total Weight	6.366			11.670	0.000	
Wind 0 deg - No Ice		0.000	-7.128	-89.753	0.000	0.000
Wind 30 deg - No Ice		3.564	-6.173	-76.165	-50.712	3.712
Wind 45 deg - No Ice		5.040	-5.040	-60.047	-71.717	5.250
Wind 60 deg - No Ice		6.173	-3.564	-39.042	-87.835	6.429
Wind 90 deg - No Ice		7.128	0.000	11.670	-101.423	7.424
Wind 120 deg - No Ice		6.173	3.564	62.381	-87.835	6.429
Wind 135 deg - No Ice		5.040	5.040	83.387	-71.717	5.250
Wind 150 deg - No Ice		3.564	6.173	99.505	-50.712	3.712
Wind 180 deg - No Ice		0.000	7.128	113.093	0.000	0.000
Wind 210 deg - No Ice		-3.564	6.173	99.505	50.712	-3.712
Wind 225 deg - No Ice		-5.040	5.040	83.387	71.717	-5.250
Wind 240 deg - No Ice		-6.173	3.564	62.381	87.835	-6.429
Wind 270 deg - No Ice		-7.128	0.000	11.670	101.423	-7.424
Wind 300 deg - No Ice		-6.173	-3.564	-39.042	87.835	-6.429
Wind 315 deg - No Ice		-5.040	-5.040	-60.047	71.717	-5.250
Wind 330 deg - No Ice		-3.564	-6.173	-76.165	50.712	-3.712
Member Ice	0.306					
Total Weight Ice	9.396			17.505	0.000	
Wind 0 deg - Ice		0.000	-6.143	-70.306	0.000	0.000
Wind 30 deg - Ice		3.072	-5.320	-58.541	-43.905	3.569
Wind 45 deg - Ice		4.344	-4.344	-44.587	-62.091	5.048
Wind 60 deg - Ice		5.320	-3.072	-26.401	-76.046	6.182
Wind 90 deg - Ice		6.143	0.000	17.505	-87.810	7.138
Wind 120 deg - Ice		5.320	3.072	61.410	-76.046	6.182
Wind 135 deg - Ice		4.344	4.344	79.596	-62.091	5.048
Wind 150 deg - Ice		3.072	5.320	93.551	-43.905	3.569
Wind 180 deg - Ice		0.000	6.143	105.315	0.000	0.000
Wind 210 deg - Ice		-3.072	5.320	93.551	43.905	-3.569
Wind 225 deg - Ice		-4.344	4.344	79.596	62.091	-5.048
Wind 240 deg - Ice		-5.320	3.072	61.410	76.046	-6.182
Wind 270 deg - Ice		-6.143	0.000	17.505	87.810	-7.138
Wind 300 deg - Ice		-5.320	-3.072	-26.401	76.046	-6.182
Wind 315 deg - Ice		-4.344	-4.344	-44.587	62.091	-5.048
Wind 330 deg - Ice		-3.072	-5.320	-58.541	43.905	-3.569
Total Weight	6.366			11.670	0.000	
Wind 0 deg - Service		0.000	-2.466	-23.425	0.000	0.000
Wind 30 deg - Service		1.233	-2.136	-18.723	-17.547	1.284
Wind 45 deg - Service		1.744	-1.744	-13.146	-24.816	1.816
Wind 60 deg - Service		2.136	-1.233	-5.878	-30.393	2.225
Wind 90 deg - Service		2.466	0.000	11.670	-35.095	2.569
Wind 120 deg - Service		2.136	1.233	29.217	-30.393	2.225
Wind 135 deg - Service		1.744	1.744	36.485	-24.816	1.816
Wind 150 deg - Service		1.233	2.136	42.062	-17.547	1.284
Wind 180 deg - Service		0.000	2.466	46.764	0.000	0.000
Wind 210 deg - Service		-1.233	2.136	42.062	17.547	-1.284
Wind 225 deg - Service		-1.744	1.744	36.485	24.816	-1.816
Wind 240 deg - Service		-2.136	1.233	29.217	30.393	-2.225
Wind 270 deg - Service		-2.466	0.000	11.670	35.095	-2.569
Wind 300 deg - Service		-2.136	-1.233	-5.878	30.393	-2.225

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 315 deg - Service		-1.744	-1.744	-13.146	24.816	-1.816
Wind 330 deg - Service		-1.233	-2.136	-18.723	17.547	-1.284

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service

Comb. No.	Description
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	116.5 - 96	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-9.396	0.000	-17.574
			Max. Mx	14	-6.365	101.601	-11.701
			Max. My	10	-6.364	0.000	-113.302
			Max. Vy	6	7.129	-101.601	-11.701
			Max. Vx	10	7.129	0.000	-113.302
			Max. Torque	6			-7.412

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	9.396	0.000	-6.143
	Max. H_x	14	6.366	7.128	0.000
	Max. H_z	2	6.366	0.000	7.128
	Max. M_x	2	89.901	0.000	7.128
	Max. M_z	6	101.601	-7.128	0.000
	Max. Torsion	14	7.412	7.128	0.000
	Min. Vert	43	6.366	0.000	-2.466
	Min. H_x	6	6.366	-7.128	0.000
	Min. H_z	10	6.366	0.000	-7.128
	Min. M_x	10	-113.302	0.000	-7.128
	Min. M_z	14	-101.601	7.128	0.000
	Min. Torsion	6	-7.412	-7.128	0.000

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	6.366	0.000	0.000	11.700	0.000	0.000
Dead+Wind 0 deg - No Ice	6.366	0.000	-7.128	-89.901	0.000	0.000
Dead+Wind 30 deg - No Ice	6.366	3.564	-6.173	-76.289	-50.801	3.706
Dead+Wind 45 deg - No Ice	6.366	5.040	-5.040	-60.142	-71.843	5.241
Dead+Wind 60 deg - No Ice	6.366	6.173	-3.564	-39.100	-87.989	6.419
Dead+Wind 90 deg - No Ice	6.366	7.128	0.000	11.701	-101.601	7.412
Dead+Wind 120 deg - No Ice	6.366	6.173	3.564	62.501	-87.989	6.419
Dead+Wind 135 deg - No Ice	6.366	5.040	5.040	83.544	-71.843	5.241
Dead+Wind 150 deg - No Ice	6.366	3.564	6.173	99.690	-50.801	3.706
Dead+Wind 180 deg - No Ice	6.366	0.000	7.128	113.302	0.000	0.000
Dead+Wind 210 deg - No Ice	6.366	-3.564	6.173	99.690	50.801	-3.706
Dead+Wind 225 deg - No Ice	6.366	-5.040	5.040	83.544	71.843	-5.241
Dead+Wind 240 deg - No Ice	6.366	-6.173	3.564	62.501	87.989	-6.419

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 270 deg - No Ice	6.366	-7.128	0.000	11.701	101.601	-7.412
Dead+Wind 300 deg - No Ice	6.366	-6.173	-3.564	-39.100	87.989	-6.419
Dead+Wind 315 deg - No Ice	6.366	-5.040	-5.040	-60.142	71.843	-5.241
Dead+Wind 330 deg - No Ice	6.366	-3.564	-6.173	-76.289	50.801	-3.706
Dead+Ice+Temp	9.396	0.000	0.000	17.574	0.000	0.000
Dead+Wind 0 deg+Ice+Temp	9.396	0.000	-6.143	-70.468	0.000	0.000
Dead+Wind 30 deg+Ice+Temp	9.396	3.072	-5.320	-58.672	-44.021	3.561
Dead+Wind 45 deg+Ice+Temp	9.396	4.344	-4.344	-44.681	-62.255	5.037
Dead+Wind 60 deg+Ice+Temp	9.396	5.320	-3.072	-26.447	-76.247	6.168
Dead+Wind 90 deg+Ice+Temp	9.396	6.143	0.000	17.575	-88.043	7.123
Dead+Wind 120 deg+Ice+Temp	9.396	5.320	3.072	61.596	-76.247	6.168
Dead+Wind 135 deg+Ice+Temp	9.396	4.344	4.344	79.830	-62.255	5.036
Dead+Wind 150 deg+Ice+Temp	9.396	3.072	5.320	93.822	-44.021	3.561
Dead+Wind 180 deg+Ice+Temp	9.396	0.000	6.143	105.617	0.000	0.000
Dead+Wind 210 deg+Ice+Temp	9.396	-3.072	5.320	93.822	44.021	-3.561
Dead+Wind 225 deg+Ice+Temp	9.396	-4.344	4.344	79.830	62.255	-5.036
Dead+Wind 240 deg+Ice+Temp	9.396	-5.320	3.072	61.596	76.247	-6.168
Dead+Wind 270 deg+Ice+Temp	9.396	-6.143	0.000	17.575	88.043	-7.123
Dead+Wind 300 deg+Ice+Temp	9.396	-5.320	-3.072	-26.447	76.247	-6.168
Dead+Wind 315 deg+Ice+Temp	9.396	-4.344	-4.344	-44.681	62.255	-5.037
Dead+Wind 330 deg+Ice+Temp	9.396	-3.072	-5.320	-58.672	44.021	-3.561
Dead+Wind 0 deg - Service	6.366	0.000	-2.466	-23.455	0.000	0.000
Dead+Wind 30 deg - Service	6.366	1.233	-2.136	-18.745	-17.578	1.282
Dead+Wind 45 deg - Service	6.366	1.744	-1.744	-13.158	-24.859	1.813
Dead+Wind 60 deg - Service	6.366	2.136	-1.233	-5.877	-30.446	2.221
Dead+Wind 90 deg - Service	6.366	2.466	0.000	11.701	-35.156	2.565
Dead+Wind 120 deg - Service	6.366	2.136	1.233	29.279	-30.446	2.221
Dead+Wind 135 deg - Service	6.366	1.744	1.744	36.560	-24.859	1.813
Dead+Wind 150 deg - Service	6.366	1.233	2.136	42.147	-17.578	1.282
Dead+Wind 180 deg - Service	6.366	0.000	2.466	46.857	0.000	0.000
Dead+Wind 210 deg - Service	6.366	-1.233	2.136	42.147	17.578	-1.282
Dead+Wind 225 deg - Service	6.366	-1.744	1.744	36.560	24.859	-1.813
Dead+Wind 240 deg - Service	6.366	-2.136	1.233	29.279	30.446	-2.221
Dead+Wind 270 deg - Service	6.366	-2.466	0.000	11.701	35.156	-2.565
Dead+Wind 300 deg - Service	6.366	-2.136	-1.233	-5.877	30.446	-2.221
Dead+Wind 315 deg - Service	6.366	-1.744	-1.744	-13.158	24.859	-1.813
Dead+Wind 330 deg - Service	6.366	-1.233	-2.136	-18.745	17.578	-1.282

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.000	-6.366	0.000	0.000	6.366	0.000	0.000%
2	0.000	-6.366	-7.128	0.000	6.366	7.128	0.000%
3	3.564	-6.366	-6.173	-3.564	6.366	6.173	0.000%
4	5.040	-6.366	-5.040	-5.040	6.366	5.040	0.000%
5	6.173	-6.366	-3.564	-6.173	6.366	3.564	0.000%
6	7.128	-6.366	0.000	-7.128	6.366	0.000	0.000%
7	6.173	-6.366	3.564	-6.173	6.366	-3.564	0.000%
8	5.040	-6.366	5.040	-5.040	6.366	-5.040	0.000%
9	3.564	-6.366	6.173	-3.564	6.366	-6.173	0.000%
10	0.000	-6.366	7.128	0.000	6.366	-7.128	0.000%
11	-3.564	-6.366	6.173	3.564	6.366	-6.173	0.000%
12	-5.040	-6.366	5.040	5.040	6.366	-5.040	0.000%
13	-6.173	-6.366	3.564	6.173	6.366	-3.564	0.000%
14	-7.128	-6.366	0.000	7.128	6.366	0.000	0.000%
15	-6.173	-6.366	-3.564	6.173	6.366	3.564	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
16	-5.040	-6.366	-5.040	5.040	6.366	5.040	0.000%
17	-3.564	-6.366	-6.173	3.564	6.366	6.173	0.000%
18	0.000	-9.396	0.000	0.000	9.396	0.000	0.000%
19	0.000	-9.396	-6.143	0.000	9.396	6.143	0.000%
20	3.072	-9.396	-5.320	-3.072	9.396	5.320	0.000%
21	4.344	-9.396	-4.344	-4.344	9.396	4.344	0.000%
22	5.320	-9.396	-3.072	-5.320	9.396	3.072	0.000%
23	6.143	-9.396	0.000	-6.143	9.396	0.000	0.000%
24	5.320	-9.396	3.072	-5.320	9.396	-3.072	0.000%
25	4.344	-9.396	4.344	-4.344	9.396	-4.344	0.000%
26	3.072	-9.396	5.320	-3.072	9.396	-5.320	0.000%
27	0.000	-9.396	6.143	0.000	9.396	-6.143	0.000%
28	-3.072	-9.396	5.320	3.072	9.396	-5.320	0.000%
29	-4.344	-9.396	4.344	4.344	9.396	-4.344	0.000%
30	-5.320	-9.396	3.072	5.320	9.396	-3.072	0.000%
31	-6.143	-9.396	0.000	6.143	9.396	0.000	0.000%
32	-5.320	-9.396	-3.072	5.320	9.396	3.072	0.000%
33	-4.344	-9.396	-4.344	4.344	9.396	4.344	0.000%
34	-3.072	-9.396	-5.320	3.072	9.396	5.320	0.000%
35	0.000	-6.366	-2.466	0.000	6.366	2.466	0.000%
36	1.233	-6.366	-2.136	-1.233	6.366	2.136	0.000%
37	1.744	-6.366	-1.744	-1.744	6.366	1.744	0.000%
38	2.136	-6.366	-1.233	-2.136	6.366	1.233	0.000%
39	2.466	-6.366	0.000	-2.466	6.366	0.000	0.000%
40	2.136	-6.366	1.233	-2.136	6.366	-1.233	0.000%
41	1.744	-6.366	1.744	-1.744	6.366	-1.744	0.000%
42	1.233	-6.366	2.136	-1.233	6.366	-2.136	0.000%
43	0.000	-6.366	2.466	0.000	6.366	-2.466	0.000%
44	-1.233	-6.366	2.136	1.233	6.366	-2.136	0.000%
45	-1.744	-6.366	1.744	1.744	6.366	-1.744	0.000%
46	-2.136	-6.366	1.233	2.136	6.366	-1.233	0.000%
47	-2.466	-6.366	0.000	2.466	6.366	0.000	0.000%
48	-2.136	-6.366	-1.233	2.136	6.366	1.233	0.000%
49	-1.744	-6.366	-1.744	1.744	6.366	1.744	0.000%
50	-1.233	-6.366	-2.136	1.233	6.366	2.136	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001

17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	116.5 - 96	0.324	43	0.118	0.013

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
116.000	(2) 7770.00	43	0.316	0.115	0.012	Inf
114.000	EEI Band-On 12' Low Profile Platform w/12 pipe	43	0.284	0.103	0.011	Inf
106.500	EEI Band-On 12' Low Profile Platform w/12 pipe	43	0.166	0.060	0.007	Inf

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	116.5 - 96	0.720	10	0.254	0.037

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
116.000	(2) 7770.00	10	0.703	0.248	0.036	Inf
114.000	EEI Band-On 12' Low Profile Platform w/12 pipe	10	0.633	0.223	0.033	Inf
106.500	EEI Band-On 12' Low Profile Platform w/12 pipe	10	0.369	0.130	0.019	Inf

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	116.5 - 96 (1)	TP26.62x20x0.188	20.500	0.000	0.0	35.748	15.959	-6.364	570.493	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	116.5 - 96 (1)	TP26.62x20x0.188	113.302	13.173	35.748	0.369	0.000	0.000	35.748	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	116.5 - 96 (1)	TP26.62x20x0.188	7.129	0.447	26.000	0.035	0.000	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	116.5 - 96 (1)	0.011	0.369	0.000	0.035	0.000	0.380 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	116.5 - 96	Pole	TP26.62x20x0.188	1	-6.364	760.467	28.5	Pass
							Summary	
							Pole (L1) 28.5	Pass
							RATING = **28.5**	**Pass**

Program Version 6.0.0.8 - 9/7/2011 File:J:/Jobs/1402500.WI/014 - CTNH221A/Backup Documentation/Rev (1)/ERI Files/21' PennSummit Extension_ Hamden CT.eri

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Subject:	Flange Bolts and Flangeplate Analysis
Location:	21-ft Summit Extension Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.014

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 113·ft·kips	(Input From tnxTower)
Shear Force =	Shear := 7·kips	(Input From tnxTower)
Axial Force =	Axial := 6·kips	(Input From tnxTower)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	N := 12	(User Input)
Diameter of Bolt Circle =	D_{bc} := 32.0·in	(User Input)
Bolt Ultimate Strength =	F_u := 120·ksi	(User Input)
Bolt Yield Strength =	F_y := 92·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Flange Bolts =	D := 1.0·in	(User Input)
Threads per Inch =	n := 8	(User Input)

Flange Plate Data:

Use ASTM A572 Grade 50

Plate Yield Strength =	Fy_{bp} := 50·ksi	(User Input)
Flange Plate Thickness =	t_{bp} := 1.5·in	(User Input)
Flange Plate Diameter =	D_{bp} := 35.0·in	(User Input)
Outer Pole Diameter =	D_{pole} := 26.62·in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 16 \cdot in$

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

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

$d_1 = 8.00 \cdot in$ $d_7 = -8.00 \cdot in$

$d_2 = 13.86 \cdot in$ $d_8 = -13.86 \cdot in$

$d_3 = 16.00 \cdot in$ $d_9 = -16.00 \cdot in$

$d_4 = 13.86 \cdot in$ $d_{10} = -13.86 \cdot in$

$d_5 = 8.00 \cdot in$ $d_{11} = -8.00 \cdot in$

$d_6 = 0.00 \cdot in$ $d_{12} = -0.00 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 13.3 \cdot in$

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

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

$MA_2 = 0.55 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 2.69 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 0.55 \cdot in$ $MA_{10} = 0.00 \cdot in$

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

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

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 18.2 \cdot in$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 1.536 \times 10^3 \cdot in^2$

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 = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 13.6 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 41.5 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 33 \cdot \%$

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

Condition1 = "OK"

Flange Plate Analysis:

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

$C_1 = 7.6 \cdot kips$ $C_7 = -6.6 \cdot kips$

$C_2 = 12.7 \cdot kips$ $C_8 = -11.7 \cdot kips$

$C_3 = 14.6 \cdot kips$ $C_9 = -13.6 \cdot kips$

$C_4 = 12.7 \cdot kips$ $C_{10} = -11.7 \cdot kips$

$C_5 = 7.6 \cdot kips$ $C_{11} = -6.6 \cdot kips$

$C_6 = 0.5 \cdot kips$ $C_{12} = 0.5 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 7.8 \cdot ksi$$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 49.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 15.7 \cdot \%$

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

Condition2 = "Ok"

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Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Basic Components

Heavy Wind Pressure =	p := 4.00	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	V := 110	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 PCS Mast Above Grade =	TME := 116.5 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 =	$Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.307$	(NESC 2007 Table 250-2)
Exposure Factor =	$Es := 0.346\left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.306$	(NESC 2007 Table 250-3)
Response Term =	$Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.834$	(NESC 2007 Table 250-3)
Gust Response Factor =	$Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.858$	(NESC 2007 Table 250-3)
Wind Pressure =	$qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 34.7$ psf	(NESC 2007 Section 250.C.2)

NESC Extreme Ice w/ Wind Components

Heavy Wind Pressure =	$p_{ex} := 6.4$	psf	(User Input NESC 2007 Figure 250-3 & Table 250-4)
Radial Ice Thickness =	$Ir_{ex} := 0.75$	in	(User Input NESC 2007 Figure 250-3)

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 Wind Loading =	**2.5**	(User Input)
NESC Extreme Wind Loading =	**1.0**	(User Input)
NESC Extreme Ice w/ Wind Loading =	**1.0**	(User Input)

Overload Factors for Vertical Loads:

NESC Heavy Wind Loading =	**1.5**	(User Input)
NESC Extreme Wind Loading =	**1.0**	(User Input)
NESC Extreme Ice w/ Wind Loading =	**1.0**	(User Input)

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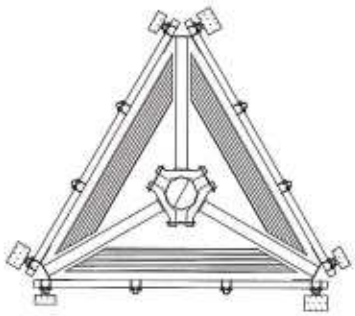
Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model =	KMW AM-X-CD-16-65-00T-RET		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 11.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 5.9$	in	(User Input)
Antenna Weight =	$WT_{ant} := 49$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)



Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant1} := WT_{ant} \cdot N_{ant} = 147$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5013$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 1435$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 46$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant1} := W_{ICEant} \cdot N_{ant} = 139$ lbs

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex})(W_{ant} + 2 \cdot Ir_{ex})(T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 2221$ cu in

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 72$ lbs

Weight of Extreme Ice on All Antennas = $Wt_{ice.ex.ant1} := W_{ICE.exant} \cdot N_{ant} = 216$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 6.5$ sf

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

Total Antenna Wind Force w/ Ice = $Fi_{ant1} := p \cdot Cd_F \cdot A_{ICEant} = 125$ lbs

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Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
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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 = $F_{ant1} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1230$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Extreme Ice = $SA_{ICE.exant} := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 6.8$ sf

Antenna Projected Surface Area w/ Extreme Ice = $A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 20.4$ sf

Total Antenna Wind Force w/ Extreme Ice = $Fi_{ex.ant1} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 261$ lbs

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Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
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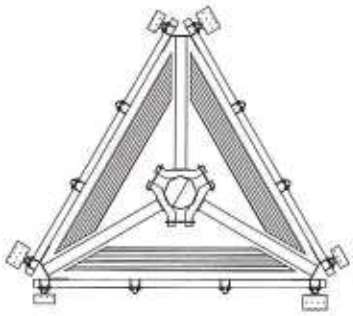
Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model =	Powerwave 7770		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55$	in	(User Input)
Antenna Width =	$W_{ant} := 11.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 39$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 6$		(User Input)



Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant2} := WT_{ant} \cdot N_{ant} = 234$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot Ir\right)\left(W_{ant} + 2 \cdot Ir\right)\left(T_{ant} + 2 \cdot Ir\right) - V_{ant} = 1007$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant2} := W_{ICEant} \cdot N_{ant} = 196$ lbs

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := \left(L_{ant} + 2 \cdot Ir_{ex}\right)\left(W_{ant} + 2 \cdot Ir_{ex}\right)\left(T_{ant} + 2 \cdot Ir_{ex}\right) - V_{ant} = 1566$ cu in

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 51$ lbs

Weight of Extreme Ice on All Antennas = $Wt_{ice.ex.ant2} := W_{ICE.exant} \cdot N_{ant} = 304$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot Ir\right) \cdot \left(W_{ant} + 2 \cdot Ir\right)}{144} = 4.7$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 28$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant2} := p \cdot Cd_F \cdot A_{ICEant} = 179$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 25.2$ sf

Total Antenna Wind Force = $F_{ant2} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1751$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Extreme Ice = $SA_{ICE.exant} := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 4.9$ sf

Antenna Projected Surface Area w/ Extreme Ice = $A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 29.4$ sf

Total Antenna Wind Force w/ Extreme Ice = $Fi_{ex.ant2} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 377$ lbs

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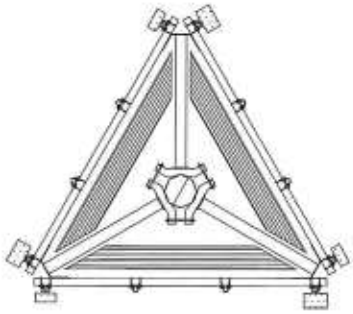
Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Development of Wind & Ice Load on TMA's

TMA Data: (AT&T)

TMA Model =	CCI DTMABP7819VG12A		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 14.25$	in	(User Input)
TMA Width =	$W_{TMA} := 11.46$	in	(User Input)
TMA Thickness =	$T_{TMA} := 4.17$	in	(User Input)
TMA Weight =	$WT_{TMA} := 20$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 3$		(User Input)



Gravity Load (without ice)

Weight of All TMA's = $Wt_{TMA1} := WT_{TMA} \cdot N_{TMA} = 60$ lbs

Gravity Load (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 681$ cu in

Volume of Ice on Each TMA = $V_{ice} := \left(L_{TMA} + 2 \cdot Ir\right)\left(W_{TMA} + 2 \cdot Ir\right)\left(T_{TMA} + 2 \cdot Ir\right) - V_{TMA} = 301$ cu in

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

Weight of Ice on All TMA's = $Wt_{ice.TMA1} := W_{ICETMA} \cdot N_{TMA} = 29$ lbs

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each TMA = $V_{ice.ex} := \left(L_{TMA} + 2 \cdot Ir_{ex}\right)\left(W_{TMA} + 2 \cdot Ir_{ex}\right)\left(T_{TMA} + 2 \cdot Ir_{ex}\right) - V_{TMA} = 476$ cu in

Weight of Extreme Ice on Each TMA = $W_{ICE.exTMA} := \frac{V_{ice.ex}}{1728} \cdot Id = 15$ lbs

Weight of Extreme Ice on All TMA's = $Wt_{ice.ex.TMA1} := W_{ICE.exTMA} \cdot N_{TMA} = 46$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all TMA's Simultaneously

Surface Area for One TMA w/ Ice = $SA_{ICETMA} := \frac{\left(L_{TMA} + 2 \cdot Ir\right) \cdot \left(W_{TMA} + 2 \cdot Ir\right)}{144} = 1.3$ sf

TMA Projected Surface Area w/ Ice = $A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 4$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA1} := p \cdot Cd_F \cdot A_{ICETMA} = 25$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all TMA's Simultaneously

Surface Area for One TMA = $SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 1.1$ sf

TMA Projected Surface Area = $A_{TMA} := SA_{TMA} \cdot N_{TMA} = 3.4$ sf

Total TMA Wind Force = $F_{TMA1} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 236$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Assumes Maximum Possible Wind Pressure Applied to all TMA's Simultaneously

Surface Area for One TMA w/ Extreme Ice = $SA_{ICE.exTMA} := \frac{\left(L_{TMA} + 2 \cdot Ir_{ex}\right) \cdot \left(W_{TMA} + 2 \cdot Ir_{ex}\right)}{144} = 1.4$ sf

TMA Projected Surface Area w/ Extreme Ice = $A_{ICE.exTMA} := SA_{ICE.exTMA} \cdot N_{TMA} = 4.3$ sf

Total TMA Wind Force w/ Extreme Ice = $Fi_{ex.TMA1} := p_{ex} \cdot Cd_F \cdot A_{ICE.exTMA} \cdot m = 54$ lbs

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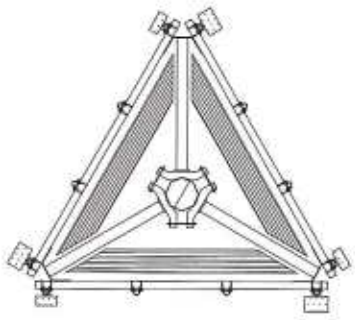
Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Development of Wind & Ice Load on TMA's

TMA Data: (AT&T)



TMA Model =	Powerwave LGP 21401		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 14.4$	in	(User Input)
TMA Width =	$W_{TMA} := 9.2$	in	(User Input)
TMA Thickness =	$T_{TMA} := 2.6$	in	(User Input)
TMA Weight =	$WT_{TMA} := 14$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 12$		(User Input)

Gravity Load (without ice)

Weight of All TMA's = $Wt_{TMA2} := WT_{TMA} \cdot N_{TMA} = 168$ lbs

Gravity Load (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 344$ cu in

Volume of Ice on Each TMA = $V_{ice} := \left(L_{TMA} + 2 \cdot Ir\right)\left(W_{TMA} + 2 \cdot Ir\right)\left(T_{TMA} + 2 \cdot Ir\right) - V_{TMA} = 221$ cu in

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

Weight of Ice on All TMA's = $Wt_{ice.TMA2} := W_{ICETMA} \cdot N_{TMA} = 86$ lbs

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each TMA = $V_{ice.ex} := \left(L_{TMA} + 2 \cdot Ir_{ex}\right)\left(W_{TMA} + 2 \cdot Ir_{ex}\right)\left(T_{TMA} + 2 \cdot Ir_{ex}\right) - V_{TMA} = 353$ cu in

Weight of Extreme Ice on Each TMA = $W_{ICE.exTMA} := \frac{V_{ice.ex}}{1728} \cdot Id = 11$ lbs

Weight of Extreme Ice on All TMA's = $Wt_{ice.ex.TMA2} := W_{ICE.exTMA} \cdot N_{TMA} = 137$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all TMA's Simultaneously

Surface Area for One TMA w/ Ice = $SA_{ICETMA} := \frac{\left(L_{TMA} + 2 \cdot Ir\right) \cdot \left(W_{TMA} + 2 \cdot Ir\right)}{144} = 1.1$ sf

TMA Projected Surface Area w/ Ice = $A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 13.1$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA2} := p \cdot Cd_F \cdot A_{ICETMA} = 84$ lbs

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Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all TMA's Simultaneously

Surface Area for One TMA = $SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.9$ sf

TMA Projected Surface Area = $A_{TMA} := SA_{TMA} \cdot N_{TMA} = 11$ sf

Total TMA Wind Force = $F_{TMA2} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 767$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Assumes Maximum Possible Wind Pressure Applied to all TMA's Simultaneously

Surface Area for One TMA w/ Extreme Ice = $SA_{ICE.exTMA} := \frac{\left(L_{TMA} + 2 \cdot Ir_{ex}\right) \cdot \left(W_{TMA} + 2 \cdot Ir_{ex}\right)}{144} = 1.2$ sf

TMA Projected Surface Area w/ Extreme Ice = $A_{ICE.exTMA} := SA_{ICE.exTMA} \cdot N_{TMA} = 14.2$ sf

Total TMA Wind Force w/ Extreme Ice = $Fi_{ex.TMA2} := p_{ex} \cdot Cd_F \cdot A_{ICE.exTMA} \cdot m = 181$ lbs

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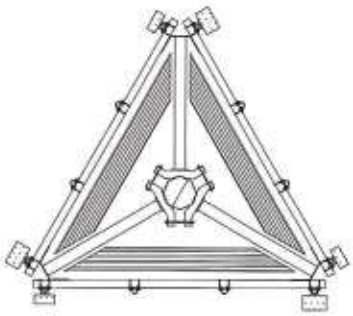
Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Development of Wind & Ice Load on Platform

Platform Data: (AT&T)

Platform Model =	12' Low Profile Platform w/ (12) Pipe Masts		(User Input)
Platform Shape =	Flat		(User Input)
Platform Area =	$CdA_{plt} := 39$	sq ft	(User Input)
Platform Area w/ Ice =	$CdA_{ICEplt} := 50$	sq ft	(User Input)
Platform Area w/ Extreme Ice =	$CdA_{ICE.EXplt} := 75$	sq ft	(User Input)
Platform Weight =	$WT_{plt} := 2000$	lbs	(User Input)
Platform Weight w/ Ice =	$WT_{ICEplt} := 3000$	lbs	(User Input)
Platform Weight w/ Extreme Ice =	$WT_{ICE.EXplt} := 4500$	lbs	(User Input)



Gravity Load (without ice)

Weight of Platform = $Wt_{plt1} := WT_{plt} = 2000$ lbs

Gravity Load (ice only)

Weight of Ice on Platform = $Wt_{ice.plt1} := WT_{ICEplt} - WT_{plt} = 1000$ lbs

Gravity Load (Extreme ice only)

Weight of Extreme Ice on Platform = $Wt_{ice.ex.plt1} := WT_{ICE.EXplt} - WT_{plt} = 2500$ lbs

Wind Load (NESC Heavy)

Total Platform Wind Force w/ Ice = $Fi_{plt1} := p \cdot CdA_{ICEplt} = 200$ lbs

Wind Load (NESC Extreme)

Total Platform Wind Force = $F_{plt1} := qz \cdot CdA_{plt} \cdot m = 1693$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Total Platform Wind Force w/ Extreme Ice = $Fi_{ex.plt1} := p_{ex} \cdot CdA_{ICE.EXplt} \cdot m = 600$ lbs

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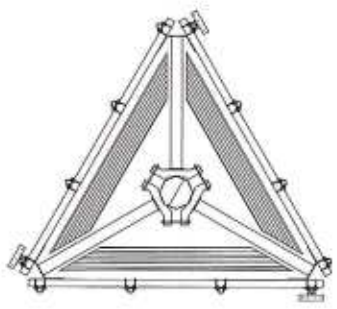
Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)



Antenna Model =	RFS APX 16DWV-16DWVS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55.9$	in	(User Input)
Antenna Width =	$W_{ant} := 13$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in	(User Input)
Antenna Weight =	$WT_{ant} := 45$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant3} := WT_{ant} \cdot N_{ant} = 135$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot Ir\right)\left(W_{ant} + 2 \cdot Ir\right)\left(T_{ant} + 2 \cdot Ir\right) - V_{ant} = 1017$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant3} := W_{ICEant} \cdot N_{ant} = 99$ lbs

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := \left(L_{ant} + 2 \cdot Ir_{ex}\right)\left(W_{ant} + 2 \cdot Ir_{ex}\right)\left(T_{ant} + 2 \cdot Ir_{ex}\right) - V_{ant} = 1581$ cu in

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 51$ lbs

Weight of Extreme Ice on All Antennas = $Wt_{ice.ex.ant3} := W_{ICE.exant} \cdot N_{ant} = 154$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot Ir\right) \cdot \left(W_{ant} + 2 \cdot Ir\right)}{144} = 5.5$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 16.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant3} := p \cdot Cd_F \cdot A_{ICEant} = 106$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 15.1$ sf

Total Antenna Wind Force = $F_{ant3} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1052$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Extreme Ice = $SA_{ICE.exant} := \frac{\left(L_{ant} + 2 \cdot Ir_{ex}\right) \cdot \left(W_{ant} + 2 \cdot Ir_{ex}\right)}{144} = 5.8$ sf

Antenna Projected Surface Area w/ Extreme Ice = $A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 17.3$ sf

Total Antenna Wind Force w/ Extreme Ice = $Fi_{ex.ant3} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 222$ lbs

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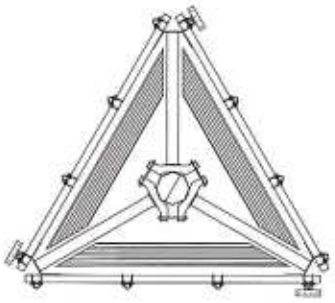
Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model =	Andrew LNX-6515DS		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 96.4$	in	(User Input)
Antenna Width =	$W_{ant} := 11.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.1$	in	(User Input)
Antenna Weight =	$WT_{ant} := 45$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)



Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant4} := WT_{ant} \cdot N_{ant} = 135$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 8145$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot Ir\right)\left(W_{ant} + 2 \cdot Ir\right)\left(T_{ant} + 2 \cdot Ir\right) - V_{ant} = 2032$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 66$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant4} := W_{ICEant} \cdot N_{ant} = 198$ lbs

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := \left(L_{ant} + 2 \cdot Ir_{ex}\right)\left(W_{ant} + 2 \cdot Ir_{ex}\right)\left(T_{ant} + 2 \cdot Ir_{ex}\right) - V_{ant} = 3137$ cu in

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := \frac{V_{ice.ex}}{1728} \cdot Id = 102$ lbs

Weight of Extreme Ice on All Antennas = $Wt_{ice.ex.ant4} := W_{ICE.exant} \cdot N_{ant} = 305$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot Ir\right) \cdot \left(W_{ant} + 2 \cdot Ir\right)}{144} = 8.7$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 26.2$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant4} := p \cdot Cd_F \cdot A_{ICEant} = 168$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 8$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 23.9$ sf

Total Antenna Wind Force = $F_{ant4} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1660$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Extreme Ice = $SA_{ICE.exant} := \frac{(L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex})}{144} = 9.1$ sf

Antenna Projected Surface Area w/ Extreme Ice = $A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 27.3$ sf

Total Antenna Wind Force w/ Extreme Ice = $Fi_{ex.ant4} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 350$ lbs

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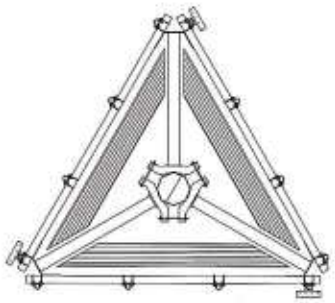
Subject:	Load Analysis of Pipe Mast on CL&P Structure #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Development of Wind & Ice Load on Platform

Platform Data: (T-Mobile)

Platform Model =	12' Low Profile Platform w/ (12) Pipe Masts		(User Input)
Platform Shape =	Flat		(User Input)
Platform Area =	$CdA_{plt} := 39$	sq ft	(User Input)
Platform Area w/ Ice =	$CdA_{ICEplt} := 50$	sq ft	(User Input)
Platform Area w/ Extreme Ice =	$CdA_{ICE.EXplt} := 75$	sq ft	(User Input)
Platform Weight =	$WT_{plt} := 2000$	lbs	(User Input)
Platform Weight w/ Ice =	$WT_{ICEplt} := 3000$	lbs	(User Input)
Platform Weight w/ Extreme Ice =	$WT_{ICE.EXplt} := 4500$	lbs	(User Input)



Gravity Load (without ice)

Weight of Platform = $Wt_{plt2} := WT_{plt} = 2000$ lbs

Gravity Load (ice only)

Weight of Ice on Platform = $Wt_{ice.plt2} := WT_{ICEplt} - WT_{plt} = 1000$ lbs

Gravity Load (Extreme ice only)

Weight of Extreme Ice on Platform = $Wt_{ice.ex.plt2} := WT_{ICE.EXplt} - WT_{plt} = 2500$ lbs

Wind Load (NESC Heavy)

Total Platform Wind Force w/ Ice = $Fi_{plt2} := p \cdot CdA_{ICEplt} = 200$ lbs

Wind Load (NESC Extreme)

Total Platform Wind Force = $F_{plt2} := qz \cdot CdA_{plt} \cdot m = 1693$ lbs

Wind Load (NESC Extreme Ice w/ Wind)

Total Platform Wind Force w/ Extreme Ice = $Fi_{ex.plt2} := p_{ex} \cdot CdA_{ICE.EXplt} \cdot m = 600$ lbs

Total Equipment Loads:

AT&T @ 116-ft AGL

NESC Heavy Wind Vertical =

$$\left(Wt_{ant1} + Wt_{ice.ant1} + Wt_{ant2} + Wt_{ice.ant2} + Wt_{TMA1} + Wt_{ice.TMA1} + Wt_{TMA2} + Wt_{ice.TMA2} + Wt_{plt1} + Wt_{ice.plt1}\right)\cdot 1.5 = 6089 \text{ lbs}$$

NESC Heavy Wind Trasnsverse = $\left(Fi_{ant1} + Fi_{ant2} + Fi_{TMA1} + Fi_{TMA2} + Fi_{plt1}\right)\cdot 2.5 = 1532$ lbs

NESC Extreme Wind Vertical = $\left(Wt_{ant1} + Wt_{ant2} + Wt_{TMA1} + Wt_{TMA2} + Wt_{plt1}\right) = 2609$ lbs

NESC Extreme Wind Trasnsverse = $\left(F_{ant1} + F_{ant2} + F_{TMA1} + F_{TMA2} + F_{plt1}\right) = 5678$ lbs

NESC Extreme Ice w/ Wind Vertical =

$$\left(Wt_{ant1} + Wt_{ice.ex.ant1} + Wt_{ant2} + Wt_{ice.ex.ant2} + Wt_{TMA1} + Wt_{ice.ex.TMA1} + Wt_{TMA2} + Wt_{ice.ex.TMA2} + Wt_{plt1} + Wt_{ice.ex.plt1}\right) = 5813 \text{ lbs}$$

NESC Extreme Ice w/ Wind Trasnsverse = $\left(Fi_{ex.ant1} + Fi_{ex.ant2} + Fi_{ex.TMA1} + Fi_{ex.TMA2} + Fi_{ex.plt1}\right) = 1473$ lbs

T-Mobile @ 106-ft AGL

NESC Heavy Wind Vertical =

$$\left(Wt_{ant3} + Wt_{ice.ant3} + Wt_{ant4} + Wt_{ice.ant4} + Wt_{plt2} + Wt_{ice.plt2}\right)\cdot 1.5 = 5350 \text{ lbs}$$

NESC Heavy Wind Trasnsverse = $\left(Fi_{ant3} + Fi_{ant4} + Fi_{plt2}\right)\cdot 2.5 = 1184$ lbs

NESC Extreme Wind Vertical = $\left(Wt_{ant3} + Wt_{ant4} + Wt_{plt2}\right) = 2270$ lbs

NESC Extreme Wind Trasnsverse = $\left(F_{ant3} + F_{ant4} + F_{plt2}\right) = 4406$ lbs

NESC Extreme Ice w/ Wind Vertical =

$$\left(Wt_{ant3} + Wt_{ice.ex.ant3} + Wt_{ant4} + Wt_{ice.ex.ant4} + Wt_{plt2} + Wt_{ice.ex.plt2}\right) = 5229 \text{ lbs}$$

NESC Extreme Ice w/ Wind Trasnsverse = $\left(Fi_{ex.ant3} + Fi_{ex.ant4} + Fi_{ex.plt2}\right) = 1172$ lbs

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	Subject:	Coax Cable on CL&P Pole # 4008
	Location:	Hamden, CT
	Rev. 0: 9/30/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Coax Cable on CL&P Pole

Distance Between Coax Cable Attach Points =

Coaxial Cable Span = $Coax_{Span} := \begin{pmatrix} 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \end{pmatrix} \cdot ft$ *(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 =	$N_{coax} := 36$	*(User Input)*
Number of Projected Coax Cables =	$NP_{coax} := 0$	*(User Input)*
Extreme Wind Pressure =	$qz := 34.7 \cdot psf$	*(User Input)*
Heavy Wind Pressure =	$p := 4 \cdot psf$	*(User Input)*
Radial Ice Thickness =	$Ir := 0.5 \cdot in$	*(User Input)*
Radial Ice Density =	$Id := 56 \cdot pcf$	*(User Input)*
Extreme Ice w/ Wind Pressure =	$p_{ex} := 6.4 \cdot psf$	*(User Input)*
Extreme Radial Ice Thickness =	$Ir_{ex} := 0.75 \cdot in$	*(User Input)*
Shape Factor =	$Cd_{coax} := 1.45$	*(User Input)*
Overload Factor for NESC Heavy Wind Transverse Load =	$OF_{HWT} := 2.5$	*(User Input)*
Overload Factor for NESC Heavy Wind Vertical Load =	$OF_{HWV} := 1.5$	*(User Input)*
Overload Factor for NESC Extreme Wind Transverse Load =	$OF_{EWT} := 1.0$	*(User Input)*
Overload Factor for NESC Extreme Wind Vertical Load =	$OF_{EWV} := 1.0$	*(User Input)*
Overload Factor for NESC Extreme Ice w/ Wind Transverse Load =	$OF_{EIT} := 1.0$	*(User Input)*
Overload Factor for NESC Extreme Ice w/ Wind Vertical Load =	$OF_{EIV} := 1.0$	*(User Input)*

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Subject:	Coax Cable on CL&P Pole # 4008
Location:	Hamden, CT
Rev. 0: 9/30/14	Prepared by: T.J.L Checked by: C.F.C. Job No. 14025.014

Wind Area without Ice = $A := \left(NP_{coax} \cdot D_{coax}\right) = 0 \cdot in$

Wind Area with Ice = $A_{ice} := 0 = 0 \cdot in$

Wind Area with Extreme Ice = $A_{ice.ex} := 0 = 0 \cdot in$

Ice Area per Liner Ft = $Ai_{coax} := \frac{\pi}{4} \cdot \left[\left(D_{coax} + 2 \cdot lr\right)^2 - D_{coax}^2\right] = 0.027\,ft^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax} \cdot ld \cdot N_{coax} = 54.538 \cdot plf$

Extreme Ice Area per Liner Ft = $Ai_{coax.ex} := \frac{\pi}{4} \cdot \left[\left(D_{coax} + 2 \cdot lr_{ex}\right)^2 - D_{coax}^2\right] = 0.045\,ft^2$

Weight of Extreme Ice on All Coax Cables = $W_{ice.ex} := Ai_{coax.ex} \cdot ld \cdot N_{coax} = 90.054 \cdot plf$

Heavy Vertical Load =

$$\overrightarrow{Heavy_{Vert} := \left[\left(N_{coax} \cdot W_{coax} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HWV}\right]}$$

Heavy Transverse Load =

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

$$Heavy_{Vert} = \begin{pmatrix} 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \\ 1380 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

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 =

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

$$Extreme\_Wind_{Vert} = \begin{pmatrix} 374 \\ 374 \\ 374 \\ 374 \\ 374 \\ 374 \\ 374 \\ 374 \\ 374 \\ 374 \\ 374 \end{pmatrix} lb \qquad Extreme\_Wind_{Trans} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

Extreme Ice w/ Wind Vertical Load =

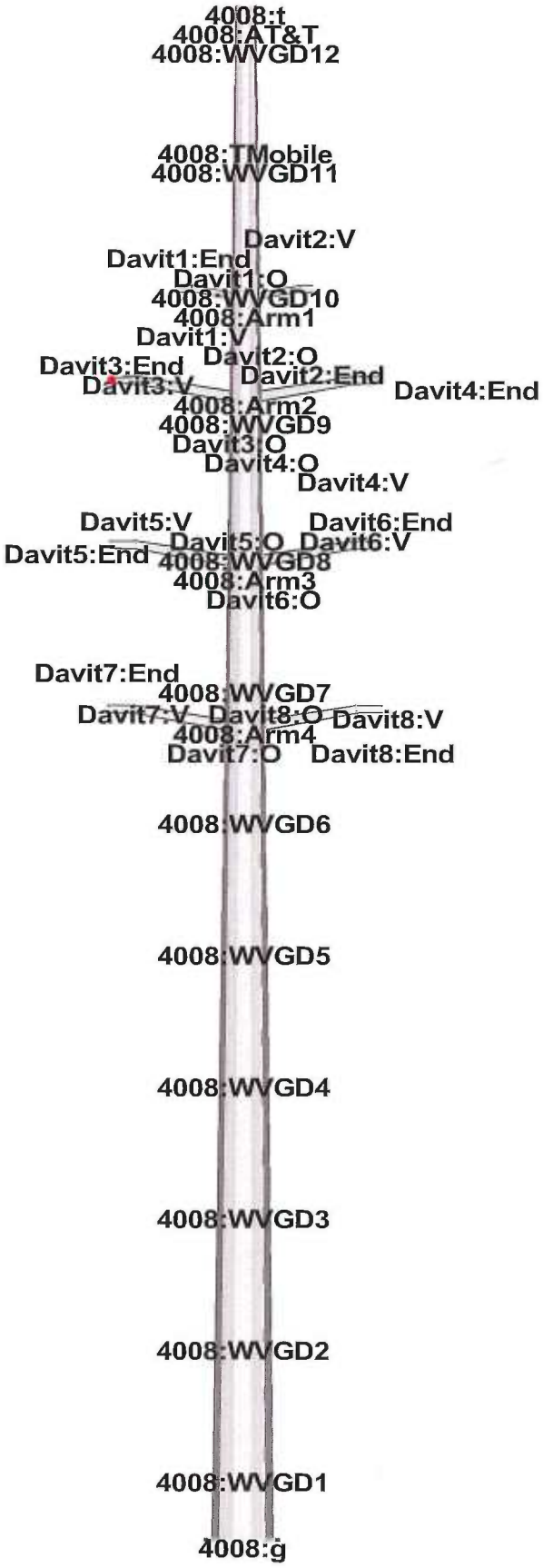
$$Extreme\_Ice_{Vert} := \overrightarrow{\left[\left(N_{coax} \cdot W_{coax} + W_{ice.ex}\right) \cdot Coax_{Span} \cdot OF_{EIV}\right]}$$

Extreme Ice w/ Wind Transverse Load =

$$Extreme\_Ice_{Trans} := \overrightarrow{\left(p_{ex} \cdot A_{ice.ex} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{EIT}\right)}$$

$$Extreme\_Ice_{Vert} = \begin{pmatrix} 1275 \\ 1275 \\ 1275 \\ 1275 \\ 1275 \\ 1275 \\ 1275 \\ 1275 \\ 1275 \\ 1275 \\ 1275 \end{pmatrix} lb \qquad Extreme\_Ice_{Trans} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

-POLE Version 12.50, 9:29:37 AM Wednesday, October 22, 2014
eformed geometry displayed



Project Name : 14025.014 - Hamden, CT
Project Notes: CL&P Structure # 4008 / T-Mobile CTNH221A
Project File : J:\Jobs\1402500.WI\014 - CTNH221A\Backup Documentation\Rev (1)\PLS-Pole\cl&p structure #4008.pol
Date run : 9:29:06 AM Wednesday, October 22, 2014
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\1402500.wi\014 - ctnh221a\backup documentation\rev (1)\pls-pole\cl&p #4008.lca

*** Analysis Results:

Maximum element usage is 71.83% for Steel Pole "4008" in load case "NESC Extreme"
Maximum insulator usage is 7.91% for Clamp "Clamp3" in load case "NESC Heavy"

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	4008:g	-0.13	-25.12	-100.32	25.12	2008.95	-6.67	2008.96	-0.00	0.00
NESC Extreme	4008:g	-0.04	-50.09	-48.77	50.09	3973.45	-2.08	3973.45	-0.00	0.00
NESC Extreme Ice w/ Wind	4008:g	-0.05	-20.07	-86.18	20.07	1642.64	-2.66	1642.64	-0.00	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	4008:t	0.07	25.62	-0.36	25.62	0.00	-1.80	0.00
NESC Extreme	4008:t	0.02	53.12	-1.37	53.14	0.00	-3.95	0.00
NESC Extreme Ice w/ Wind	4008:t	0.03	21.38	-0.27	21.38	0.00	-1.52	0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
4008	1	973	NESC Extreme	33.65	175.93
4008	2	6084	NESC Extreme	71.83	1590.58
4008	3	11808	NESC Extreme	66.66	3973.45

*** 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)
4008	71.83	NESC Extreme	23	20879.9

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	33.51	NESC Extreme Ice w/ Wind	1	50.3
Davit2	37.88	NESC Extreme Ice w/ Wind	1	50.3
Davit3	41.57	NESC Heavy	1	260.4
Davit4	45.89	NESC Heavy	1	260.4
Davit5	41.64	NESC Heavy	1	260.4
Davit6	45.93	NESC Heavy	1	260.4
Davit7	41.74	NESC Heavy	1	260.4
Davit8	45.98	NESC Heavy	1	260.4

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	45.98	Davit8	Tubular Davit
NESC Extreme	71.83	4008	Steel Pole
NESC Extreme Ice w/ Wind	42.02	Davit8	Tubular Davit

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	37.45	4008	23
NESC Extreme	71.83	4008	23
NESC Extreme Ice w/ Wind	31.47	4008	23

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	4008	12	25.762	98.304	2008.951	-6.674	18.698	60.213	3	77.902	1.835	37.40
NESC Extreme	4008	12	25.762	46.756	3973.451	-2.083	35.164	113.238	3	146.697	2.516	70.33
NESC Extreme Ice w/ Wind	4008	12	25.762	84.169	1642.637	-2.659	15.335	49.384	3	63.887	1.661	30.67

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	45.98	Davit8	1
NESC Extreme	22.45	Davit8	1
NESC Extreme Ice w/ Wind	42.02	Davit8	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	3.39	NESC Extreme Ice w/ Wind	0.0
Clamp2	Clamp	3.39	NESC Extreme Ice w/ Wind	0.0
Clamp3	Clamp	7.91	NESC Heavy	0.0
Clamp4	Clamp	7.91	NESC Heavy	0.0
Clamp5	Clamp	7.91	NESC Heavy	0.0
Clamp6	Clamp	7.91	NESC Heavy	0.0
Clamp7	Clamp	7.91	NESC Heavy	0.0
Clamp8	Clamp	7.91	NESC Heavy	0.0
Clamp9	Clamp	1.72	NESC Heavy	0.0
Clamp10	Clamp	1.72	NESC Heavy	0.0
Clamp11	Clamp	1.72	NESC Heavy	0.0
Clamp12	Clamp	1.72	NESC Heavy	0.0
Clamp13	Clamp	1.72	NESC Heavy	0.0
Clamp14	Clamp	1.72	NESC Heavy	0.0
Clamp15	Clamp	1.72	NESC Heavy	0.0
Clamp16	Clamp	1.72	NESC Heavy	0.0
Clamp17	Clamp	1.72	NESC Heavy	0.0
Clamp18	Clamp	1.72	NESC Heavy	0.0
Clamp19	Clamp	1.72	NESC Heavy	0.0
Clamp20	Clamp	1.72	NESC Heavy	0.0
Clamp21	Clamp	7.85	NESC Heavy	0.0
Clamp22	Clamp	6.85	NESC Heavy	0.0

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 1663.2
Weight of Steel Poles: 20879.9
Total: 22543.1

*** End of Report

```
**************************************************************************
*                                                                        *
*                              PLS-POLE                                  *
*                   POLE AND FRAME ANALYSIS AND DESIGN                   *
*               Copyright Power Line Systems, Inc. 1999-2011             *
*                                                                        *
**************************************************************************

Project Name : 14025.014 - Hamden, CT
Project Notes: CL&P Structure # 4008 / T-Mobile CTNH221A
Project File : J:\Jobs\1402500.WI\014 - CTNH221A\Backup Documentation\Rev (1)\PLS-Pole\cl&p structure #4008.pol
Date run     : 9:29:05 AM Wednesday, October 22, 2014
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 Length Number	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

Trans. Load (kips)	Long. Load (kips)	Label	Length (ft)	(ft)		(in)	(in)	Coef. (in/ft)			Override (ksi)	Override (lbs/ft^3)	Base	Type	Tip (ft)
		CL&P4008	4008	116.50	0	Yes	12F	20	57.49	0	1.3	3 tubes	0	0	Calculated	0.000
0.0000	0.0000															

Steel Tubes Properties:

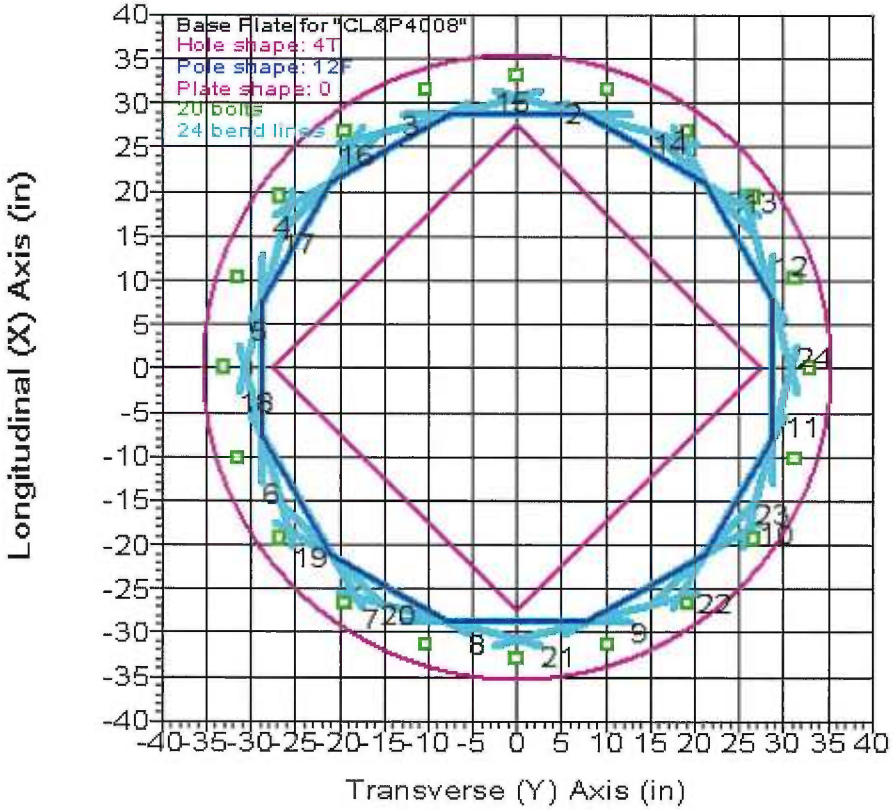
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)	Actual Overlap (ft)
CL&P4008	1	20.5	0.1875	0.000	0.000	0.000	65.000	0.000	973	10.74	0.32502	20.00	26.66	3.286	0.000
CL&P4008	2	51	0.3125	5.500	0.000	0.000	65.000	0.000	6084	27.52	0.32502	26.91	43.49	5.358	5.500
CL&P4008	3	50.5	0.4375	0.000	0.000	0.000	65.000	0.000	11808	26.66	0.32502	41.08	57.49	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&P4008	71.000	0	3.000	2015	0.000	38.875	4T	490.00	50.000	2.250	66.000	20	43338.49	43338.49

Base Plate Bolt Coordinates for Property "CL&P4008":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0	1	0
0.3106	0.9508	0
0.5871	0.8106	0
0.8106	0.5871	0
0.9508	0.3106	0
1	0	0



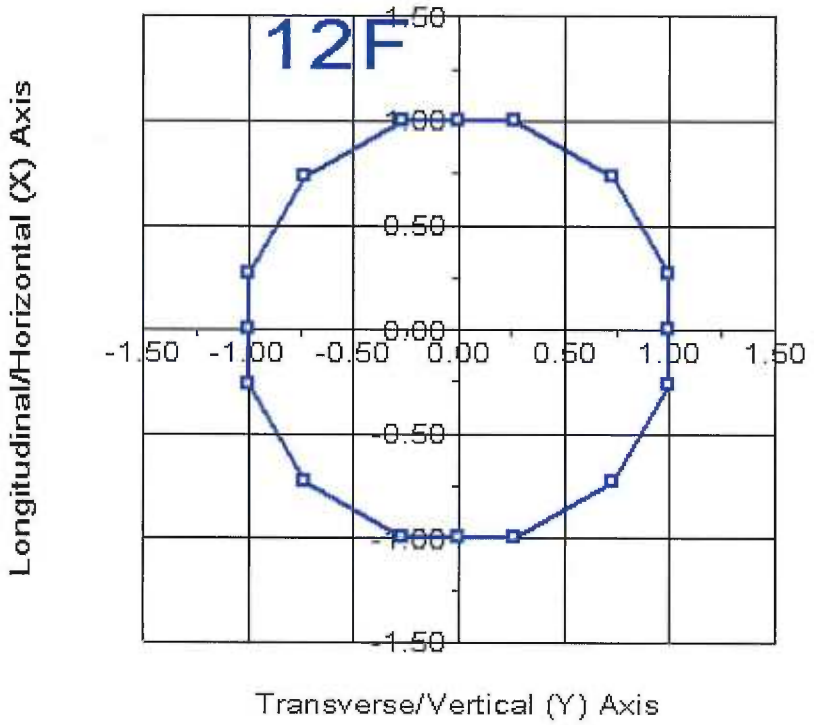
Steel Pole Connectivity:

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)
4008			0	0	0	0	0	CL&P4008	18 labels		0.00	0

Relative Attachment Labels for Steel Pole "4008":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
4008:Arm1	0.00	94.50
4008:Arm2	0.00	86.84
4008:Arm3	0.00	74.34
4008:Arm4	0.00	61.84
4008:WVGD1	0.00	5.00

4008:WVGD2	0.00	15.00
4008:WVGD3	0.00	25.00
4008:WVGD4	0.00	35.00
4008:WVGD5	0.00	45.00
4008:WVGD6	0.00	55.00
4008:WVGD7	0.00	65.00
4008:WVGD8	0.00	75.00
4008:WVGD9	0.00	85.50
4008:WVGD10	0.00	95.00
4008:WVGD11	0.00	105.00
4008:TMobile	0.00	106.00
4008:AT&T	0.00	116.00
4008:WVGD12	0.00	115.00



Pole Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	T-Moment Inertia (in^4)	L-Moment Inertia (in^4)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	T-Moment Capacity (ft-k)	L-Moment Capacity (ft-k)
4008	4008:t	4008:t Ori	0.00	20.00	11.94	600.17	600.17	0.00	25.9	65.00	65.00	325.09	325.09
4008	4008:AT&T	4008:AT&T End	0.50	20.16	12.04	615.06	615.06	0.00	26.1	65.00	65.00	330.47	330.47
4008	4008:AT&T	4008:AT&T Ori	0.50	20.16	12.04	615.06	615.06	0.00	26.1	65.00	65.00	330.47	330.47
4008	4008:WVGD12	4008:WVGD12 End	1.50	20.49	12.24	645.57	645.57	0.00	26.6	65.00	65.00	341.36	341.36

4008	4008:WVGD12	4008:WVGD12	Ori	1.50	20.49	12.24	645.57	645.57	0.00	26.6	65.00	65.00	341.36	341.36
4008	#4008:0	Tube 1	End	6.00	21.95	13.12	795.39	795.39	0.00	28.7	65.00	65.00	392.56	392.56
4008	#4008:0	Tube 1	Ori	6.00	21.95	13.12	795.39	795.39	0.00	28.7	65.00	65.00	392.56	392.56
4008	4008:TMobile	4008:TMobile	End	10.50	23.41	14.00	966.77	966.77	0.00	30.8	65.00	64.08	441.00	441.00
4008	4008:TMobile	4008:TMobile	Ori	10.50	23.41	14.00	966.77	966.77	0.00	30.8	65.00	64.08	441.00	441.00
4008	4008:WVGD11	4008:WVGD11	End	11.50	23.74	14.20	1007.93	1007.93	0.00	31.2	65.00	63.62	450.26	450.26
4008	4008:WVGD11	4008:WVGD11	Ori	11.50	23.74	14.20	1007.93	1007.93	0.00	31.2	65.00	63.62	450.26	450.26
4008	#4008:1	Tube 1	End	16.00	25.20	15.08	1207.62	1207.62	0.00	33.3	65.00	61.58	491.79	491.79
4008	#4008:1	Tube 1	Ori	16.00	25.20	15.08	1207.62	1207.62	0.00	33.3	65.00	61.58	491.79	491.79
4008	#4008:2	SpliceT	End	20.50	26.66	15.96	1432.08	1432.08	0.00	35.4	65.00	59.53	532.87	532.87
4008	#4008:2	SpliceT	Ori	20.50	26.91	26.73	2420.97	2420.97	0.00	20.4	65.00	65.00	974.52	974.52
4008	4008:WVGD10	4008:WVGD10	End	21.50	27.24	27.05	2510.80	2510.80	0.00	20.7	65.00	65.00	998.62	998.62
4008	4008:WVGD10	4008:WVGD10	Ori	21.50	27.24	27.05	2510.80	2510.80	0.00	20.7	65.00	65.00	998.62	998.62
4008	4008:Arm1	4008:Arm1	End	22.00	27.40	27.22	2556.53	2556.53	0.00	20.8	65.00	65.00	1010.77	1010.77
4008	4008:Arm1	4008:Arm1	Ori	22.00	27.40	27.22	2556.53	2556.53	0.00	20.8	65.00	65.00	1010.77	1010.77
4008	#4008:3	Tube 2	End	25.83	28.65	28.47	2925.45	2925.45	0.00	21.9	65.00	65.00	1106.36	1106.36
4008	#4008:3	Tube 2	Ori	25.83	28.65	28.47	2925.45	2925.45	0.00	21.9	65.00	65.00	1106.36	1106.36
4008	4008:Arm2	4008:Arm2	End	29.66	29.89	29.72	3328.26	3328.26	0.00	22.9	65.00	65.00	1206.27	1206.27
4008	4008:Arm2	4008:Arm2	Ori	29.66	29.89	29.72	3328.26	3328.26	0.00	22.9	65.00	65.00	1206.27	1206.27
4008	4008:WVGD9	4008:WVGD9	End	31.00	30.33	30.16	3477.33	3477.33	0.00	23.3	65.00	65.00	1242.22	1242.22
4008	4008:WVGD9	4008:WVGD9	Ori	31.00	30.33	30.16	3477.33	3477.33	0.00	23.3	65.00	65.00	1242.22	1242.22
4008	#4008:4	Tube 2	End	36.00	31.95	31.79	4073.28	4073.28	0.00	24.7	65.00	65.00	1381.10	1381.10
4008	#4008:4	Tube 2	Ori	36.00	31.95	31.79	4073.28	4073.28	0.00	24.7	65.00	65.00	1381.10	1381.10
4008	#4008:5	Tube 2	End	38.75	32.84	32.69	4428.33	4428.33	0.00	25.5	65.00	65.00	1460.62	1460.62
4008	#4008:5	Tube 2	Ori	38.75	32.84	32.69	4428.33	4428.33	0.00	25.5	65.00	65.00	1460.62	1460.62
4008	4008:WVGD8	4008:WVGD8	End	41.50	33.74	33.59	4803.42	4803.42	0.00	26.2	65.00	65.00	1542.37	1542.37
4008	4008:WVGD8	4008:WVGD8	Ori	41.50	33.74	33.59	4803.43	4803.43	0.00	26.2	65.00	65.00	1542.37	1542.37
4008	4008:Arm3	4008:Arm3	End	42.16	33.95	33.80	4896.64	4896.64	0.00	26.4	65.00	65.00	1562.35	1562.35
4008	4008:Arm3	4008:Arm3	Ori	42.16	33.95	33.80	4896.64	4896.64	0.00	26.4	65.00	65.00	1562.35	1562.35
4008	#4008:6	Tube 2	End	46.83	35.47	35.33	5589.67	5589.67	0.00	27.7	65.00	65.00	1707.16	1707.16
4008	#4008:6	Tube 2	Ori	46.83	35.47	35.33	5589.67	5589.67	0.00	27.7	65.00	65.00	1707.16	1707.16
4008	4008:WVGD7	4008:WVGD7	End	51.50	36.99	36.85	6345.20	6345.20	0.00	29.0	65.00	65.00	1858.40	1858.40
4008	4008:WVGD7	4008:WVGD7	Ori	51.50	36.99	36.85	6345.20	6345.20	0.00	29.0	65.00	65.00	1858.40	1858.40
4008	4008:Arm4	4008:Arm4	End	54.66	38.02	37.88	6893.49	6893.49	0.00	29.9	65.00	64.92	1962.14	1962.14
4008	4008:Arm4	4008:Arm4	Ori	54.66	38.02	37.88	6893.49	6893.49	0.00	29.9	65.00	64.92	1962.14	1962.14
4008	#4008:7	Tube 2	End	58.08	39.13	39.00	7521.22	7521.22	0.00	30.9	65.00	63.99	2050.08	2050.08
4008	#4008:7	Tube 2	Ori	58.08	39.13	39.00	7521.22	7521.22	0.00	30.9	65.00	63.99	2050.08	2050.08
4008	4008:WVGD6	4008:WVGD6	End	61.50	40.24	40.12	8185.94	8185.94	0.00	31.8	65.00	63.06	2137.96	2137.96
4008	4008:WVGD6	4008:WVGD6	Ori	61.50	40.24	40.12	8185.94	8185.94	0.00	31.8	65.00	63.06	2137.96	2137.96
4008	#4008:8	SpliceT	End	66.00	41.70	41.59	9118.87	9118.87	0.00	33.1	65.00	61.83	2253.29	2253.29
4008	#4008:8	SpliceT	Ori	66.00	41.70	41.59	9118.88	9118.88	0.00	33.1	65.00	61.83	2253.29	2253.29
4008	#4008:9	Tube 2	End	68.75	41.97	58.43	12900.64	12900.64	0.00	23.0	65.00	65.00	3329.90	3329.90
4008	#4008:9	Tube 2	Ori	68.75	41.97	58.43	12900.64	12900.64	0.00	23.0	65.00	65.00	3329.90	3329.90
4008	4008:WVGD5	4008:WVGD5	End	71.50	42.86	59.68	13751.52	13751.52	0.00	23.6	65.00	65.00	3475.51	3475.51
4008	4008:WVGD5	4008:WVGD5	Ori	71.50	42.86	59.68	13751.52	13751.52	0.00	23.6	65.00	65.00	3475.52	3475.52
4008	#4008:10	Tube 3	End	76.50	44.49	61.97	15392.92	15392.92	0.00	24.6	65.00	65.00	3748.25	3748.25
4008	#4008:10	Tube 3	Ori	76.50	44.49	61.97	15392.93	15392.93	0.00	24.6	65.00	65.00	3748.25	3748.25
4008	4008:WVGD4	4008:WVGD4	End	81.50	46.11	64.25	17160.01	17160.01	0.00	25.6	65.00	65.00	4031.29	4031.29
4008	4008:WVGD4	4008:WVGD4	Ori	81.50	46.11	64.25	17160.01	17160.01	0.00	25.6	65.00	65.00	4031.29	4031.29
4008	#4008:11	Tube 3	End	86.50	47.74	66.54	19057.41	19057.41	0.00	26.6	65.00	65.00	4324.63	4324.63
4008	#4008:11	Tube 3	Ori	86.50	47.74	66.54	19057.41	19057.41	0.00	26.6	65.00	65.00	4324.63	4324.63
4008	4008:WVGD3	4008:WVGD3	End	91.50	49.36	68.83	21089.76	21089.76	0.00	27.6	65.00	65.00	4628.27	4628.27
4008	4008:WVGD3	4008:WVGD3	Ori	91.50	49.36	68.83	21089.76	21089.76	0.00	27.6	65.00	65.00	4628.27	4628.27
4008	#4008:12	Tube 3	End	96.50	50.99	71.11	23261.71	23261.71	0.00	28.5	65.00	65.00	4942.22	4942.22
4008	#4008:12	Tube 3	Ori	96.50	50.99	71.11	23261.71	23261.71	0.00	28.5	65.00	65.00	4942.22	4942.22
4008	4008:WVGD2	4008:WVGD2	End	101.50	52.61	73.40	25577.88	25577.88	0.00	29.5	65.00	65.00	5266.46	5266.46
4008	4008:WVGD2	4008:WVGD2	Ori	101.50	52.61	73.40	25577.88	25577.88	0.00	29.5	65.00	65.00	5266.46	5266.46
4008	#4008:13	Tube 3	End	106.50	54.24	75.69	28042.92	28042.92	0.00	30.5	65.00	64.31	5541.88	5541.88
4008	#4008:13	Tube 3	Ori	106.50	54.24	75.69	28042.92	28042.92	0.00	30.5	65.00	64.31	5541.88	5541.88

4008	4008:WVGD1	4008:WVGD1 End	111.50	55.86	77.97	30661.45	30661.45	0.00	31.5	65.00	63.34	5793.85	5793.85	
4008	4008:WVGD1	4008:WVGD1 Ori	111.50	55.86	77.97	30661.46	30661.46	0.00	31.5	65.00	63.34	5793.85	5793.85	
4008	4008:g	4008:g End	116.50	57.49	80.26	33438.13	33438.13	0.00	32.5	65.00	62.36	6045.35	6045.35	

Tubular Davit Properties:

Davit Property Label	Stock Number	Steel Shape	Thickness (in)	Base Diameter or Depth (in)	Tip Diameter or Depth (in)	Taper (in/ft)	Drag Coef.	Modulus of Elasticity (ksi)	Geometry Check Type	Strength Vertical Capacity (lbs)	Tension Capacity (lbs)	Compres. Capacity (lbs)	Long. Capacity (lbs)	Yield Stress (ksi)	Weight Steel Density (lbs/ft^3)	Shape Override At End
ARMA	5-25050-009	8T	0.19	6	6	0	1.3	29000	2 points Calculated	0	0	0	0	65	0	
ARMB	5-25050-010	8T	0.31	10	7	0	1.3	29000	2 points Calculated	0	0	0	0	65	0	

Intermediate Joints for Davit Property "ARMA":

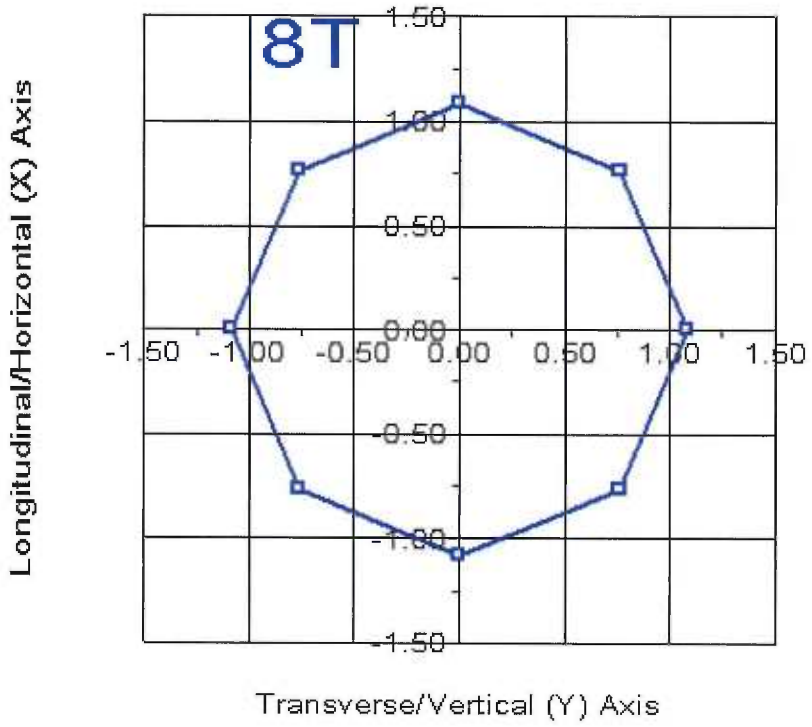
Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
V	3	-0.5
End	4	-0.5

Intermediate Joints for Davit Property "ARMB":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
V	7	-1.17
End	9	-1.17

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property Set	Azimuth (deg)
Davit1	4008:Arm1	ARMA	180
Davit2	4008:Arm1	ARMA	0
Davit3	4008:Arm2	ARMB	180
Davit4	4008:Arm2	ARMB	0
Davit5	4008:Arm3	ARMB	180
Davit6	4008:Arm3	ARMB	0
Davit7	4008:Arm4	ARMB	180
Davit8	4008:Arm4	ARMB	0



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	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit1	Davit1:V	End	3.04	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit1	Davit1:V	Origin	3.04	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit1	Davit1:End	End	4.04	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit2	Davit2:O	Origin	0.00	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit2	Davit2:V	End	3.04	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit2	Davit2:V	Origin	3.04	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit2	Davit2:End	End	4.04	6.00	3.66	16.33	16.33	0.00	8.9	65.00	65.00	27.25	27.25
Davit3	Davit3:O	Origin	0.00	10.00	9.95	123.64	123.64	0.00	9.2	65.00	65.00	123.74	123.74
Davit3	#Davit3:0	End	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit3	#Davit3:0	Origin	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit3	Davit3:V	End	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit3	Davit3:V	Origin	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit3	Davit3:End	End	9.10	7.00	6.87	40.73	40.73	0.00	5.2	65.00	65.00	58.24	58.24

Davit4	Davit4:O	Origin	0.00	10.00	9.95	123.64	123.64	0.00	9.2	65.00	65.00	123.74	123.74
Davit4	#Davit4:0	End	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit4	#Davit4:0	Origin	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit4	Davit4:V	End	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit4	Davit4:V	Origin	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit4	Davit4:End	End	9.10	7.00	6.87	40.73	40.73	0.00	5.2	65.00	65.00	58.24	58.24
Davit5	Davit5:O	Origin	0.00	10.00	9.95	123.64	123.64	0.00	9.2	65.00	65.00	123.74	123.74
Davit5	#Davit5:0	End	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit5	#Davit5:0	Origin	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit5	Davit5:V	End	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit5	Davit5:V	Origin	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit5	Davit5:End	End	9.10	7.00	6.87	40.73	40.73	0.00	5.2	65.00	65.00	58.24	58.24
Davit6	Davit6:O	Origin	0.00	10.00	9.95	123.64	123.64	0.00	9.2	65.00	65.00	123.74	123.74
Davit6	#Davit6:0	End	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit6	#Davit6:0	Origin	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit6	Davit6:V	End	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit6	Davit6:V	Origin	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit6	Davit6:End	End	9.10	7.00	6.87	40.73	40.73	0.00	5.2	65.00	65.00	58.24	58.24
Davit7	Davit7:O	Origin	0.00	10.00	9.95	123.64	123.64	0.00	9.2	65.00	65.00	123.74	123.74
Davit7	#Davit7:0	End	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit7	#Davit7:0	Origin	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit7	Davit7:V	End	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit7	Davit7:V	Origin	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit7	Davit7:End	End	9.10	7.00	6.87	40.73	40.73	0.00	5.2	65.00	65.00	58.24	58.24
Davit8	Davit8:O	Origin	0.00	10.00	9.95	123.64	123.64	0.00	9.2	65.00	65.00	123.74	123.74
Davit8	#Davit8:0	End	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit8	#Davit8:0	Origin	3.55	8.83	8.75	84.06	84.06	0.00	7.7	65.00	65.00	95.28	95.28
Davit8	Davit8:V	End	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit8	Davit8:V	Origin	7.10	7.66	7.55	53.98	53.98	0.00	6.1	65.00	65.00	70.54	70.54
Davit8	Davit8:End	End	9.10	7.00	6.87	40.73	40.73	0.00	5.2	65.00	65.00	58.24	58.24

*** 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	4008:WVGD1	clamp	No Limit
Clamp10	4008:WVGD2	clamp	No Limit
Clamp11	4008:WVGD3	clamp	No Limit
Clamp12	4008:WVGD4	clamp	No Limit
Clamp13	4008:WVGD5	clamp	No Limit
Clamp14	4008:WVGD6	clamp	No Limit
Clamp15	4008:WVGD7	clamp	No Limit
Clamp16	4008:WVGD8	clamp	No Limit
Clamp17	4008:WVGD9	clamp	No Limit
Clamp18	4008:WVGD10	clamp	No Limit
Clamp19	4008:WVGD11	clamp	No Limit
Clamp20	4008:WVGD12	clamp	No Limit
Clamp21	4008:AT&T	clamp	No Limit
Clamp22	4008:TMobile	clamp	No Limit

*** Loads Data

Loads from file: j:\jobs\1402500.wi\014 - ctnh221a\backup documentation\rev (1)\pls-pole\cl&p #4008.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)	116.50	(ft)	
Structure height	116.50	(ft)	
Structure height above ground	116.50	(ft)	

Vector Load Cases:

Longit.	Ice	Load Case Description	Dead Load	Wind Area	SF for Steel Poles Deflection	SF for Wood Poles Deflection	SF for Pole Conc. Ult.	SF for Pole Conc. First	SF for Conc. Zero	SF for Guys and	SF for Non Tubular	SF for Braces	SF for Insuls.	SF For Found.	Point Loads	Wind/Ice Model	Trans. Wind
Wind	Thick.	Density	Factor	Factor	Tubular Arms	Poles	Limit				Tubular						Pressure
Pressure					Check												
(psf)	(in)	(lbs/ft^3)	(deg F)		and Towers		% or (ft)	Crack	Tens.	Cables	Arms						(psf)
		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	22 loads	Wind on All	4
0	0.000	0.000	0.0		No Limit		0										
		NESC Extreme	1.0000	1.0000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	22 loads	NESC 2012	31
0	0.000	0.000	0.0		No Limit		0										
NESC Extreme Ice w/ Wind			1.0000	1.0000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	22 loads	Wind on All	6.4
0	0.000	0.000	0.0		No Limit		0										

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	2200	1430	0	Shield Wire
Davit2:End	2200	1430	0	Shield Wire
Davit3:End	5840	2440	0	Conductor
Davit4:End	5840	2440	0	Conductor
Davit5:End	5840	2440	0	Conductor
Davit6:End	5840	2440	0	Conductor
Davit7:End	5840	2440	0	Conductor
Davit8:End	5840	2440	0	Conductor
4008:WVGD1	1380	0	0	Coax Cables
4008:WVGD2	1380	0	0	Coax Cables
4008:WVGD3	1380	0	0	Coax Cables
4008:WVGD4	1380	0	0	Coax Cables
4008:WVGD5	1380	0	0	Coax Cables
4008:WVGD6	1380	0	0	Coax Cables

4008:WVGD7	1380	0	0	Coax Cables
4008:WVGD8	1380	0	0	Coax Cables
4008:WVGD9	1380	0	0	Coax Cables
4008:WVGD10	1380	0	0	Coax Cables
4008:WVGD11	1380	0	0	Coax Cables
4008:WVGD12	1380	0	0	Coax Cables
4008:AT&T	6089	1532	0	AT&T Equipment
4008:TMobile	5350	1184	0	T-Mobile Equipment

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	660	1780	0	Shield Wire
Davit2:End	660	1780	0	Shield Wire
Davit3:End	2530	4070	0	Conductor
Davit4:End	2530	4070	0	Conductor
Davit5:End	2530	4070	0	Conductor
Davit6:End	2530	4070	0	Conductor
Davit7:End	2530	4070	0	Conductor
Davit8:End	2530	4070	0	Conductor
4008:WVGD1	374	0	0	Coax Cables
4008:WVGD2	374	0	0	Coax Cables
4008:WVGD3	374	0	0	Coax Cables
4008:WVGD4	374	0	0	Coax Cables
4008:WVGD5	374	0	0	Coax Cables
4008:WVGD6	374	0	0	Coax Cables
4008:WVGD7	374	0	0	Coax Cables
4008:WVGD8	374	0	0	Coax Cables
4008:WVGD9	374	0	0	Coax Cables
4008:WVGD10	374	0	0	Coax Cables
4008:WVGD11	374	0	0	Coax Cables
4008:WVGD12	374	0	0	Coax Cables
4008:AT&T	2609	5678	0	AT&T Equipment
4008:TMobile	2270	4406	0	T-Mobile Equipment

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)
4008	4008:t	4008:AT&T	116.50	116.00	116.25	20.081	1.7e+006	1.000	31.92	0.00	20.41	26.71	0.00	0.00	26.71	0.00
4008	4008:AT&T	4008:WVGD12	116.00	115.00	115.50	20.325	1.72e+006	1.000	31.92	0.00	41.31	54.07	0.00	0.00	54.07	0.00
4008	4008:WVGD12		115.00	110.50	112.75	21.219	1.79e+006	1.000	31.92	0.00	194.15	254.02	0.00	0.00	254.02	0.00
4008		4008:TMobile	110.50	106.00	108.25	22.681	1.92e+006	1.000	31.92	0.00	207.66	271.53	0.00	0.00	271.53	0.00
4008	4008:TMobile	4008:WVGD11	106.00	105.00	105.50	23.575	1.99e+006	1.000	31.92	0.00	47.98	62.72	0.00	0.00	62.72	0.00
4008	4008:WVGD11		105.00	100.50	102.75	24.469	2.07e+006	1.000	31.92	0.00	224.16	292.93	0.00	0.00	292.93	0.00
4008			100.50	96.00	98.25	25.932	2.19e+006	1.000	31.92	0.00	237.68	310.44	0.00	0.00	310.44	0.00
4008		4008:WVGD10	96.00	95.00	95.50	27.075	2.29e+006	1.000	31.92	0.00	91.48	72.03	0.00	0.00	72.03	0.00
4008	4008:WVGD10	4008:Arm1	95.00	94.50	94.75	27.319	2.31e+006	1.000	31.92	0.00	46.17	36.34	0.00	0.00	36.34	0.00
4008	4008:Arm1		94.50	90.67	92.58	28.023	2.37e+006	1.000	31.92	0.00	362.92	285.56	0.00	0.00	285.56	0.00
4008		4008:Arm2	90.67	86.84	88.75	29.268	2.48e+006	1.000	31.92	0.00	379.23	298.25	0.00	0.00	298.25	0.00

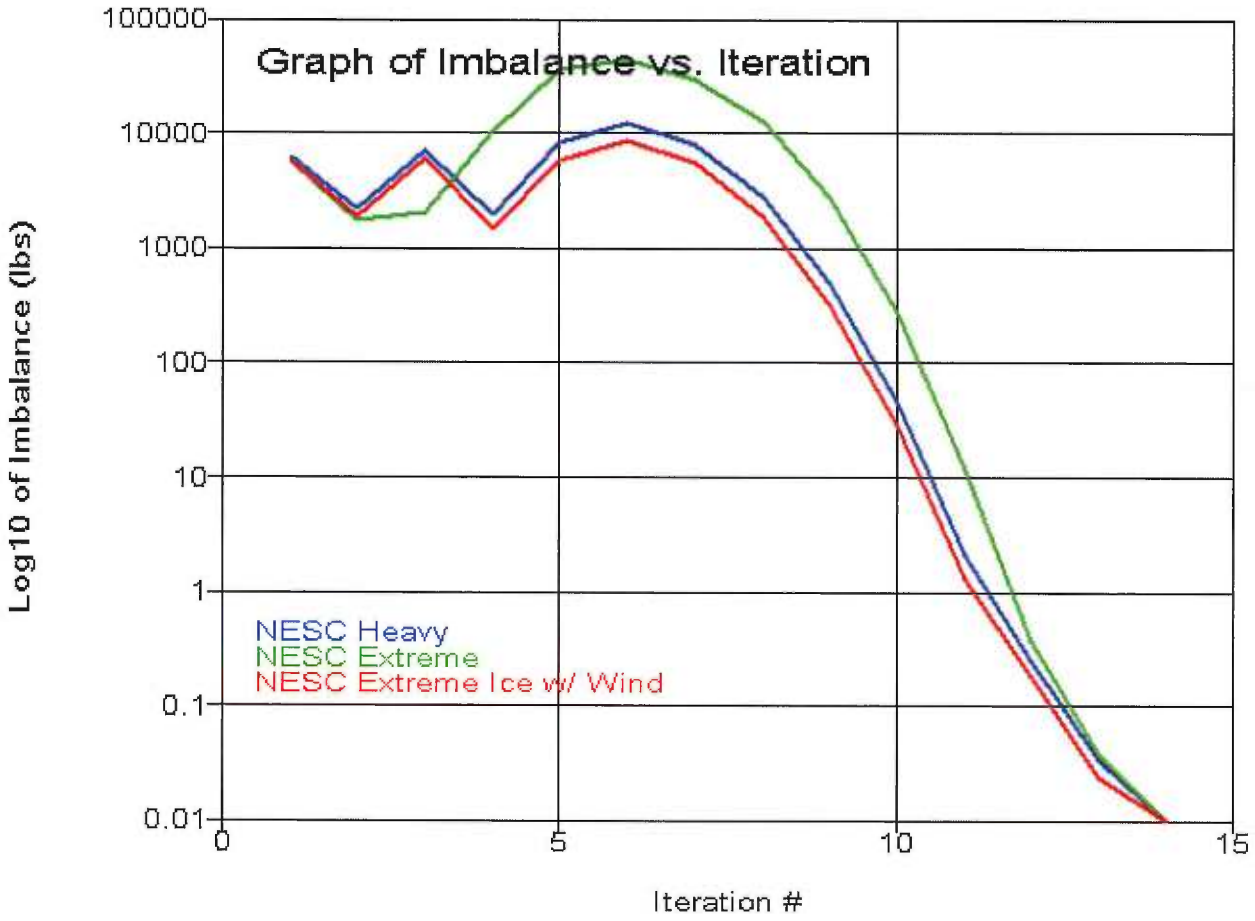
4008	4008:Arm2	4008:WVGD9	86.84	85.50	86.17	30.108	2.55e+006	1.000	31.92	0.00	136.41	107.25	0.00	0.00	107.25	0.00
4008	4008:WVGD9		85.50	80.50	83.00	31.138	2.63e+006	1.000	31.92	0.00	526.99	414.19	0.00	0.00	414.19	0.00
4008			80.50	77.75	79.13	32.398	2.74e+006	1.000	31.92	0.00	301.69	237.02	0.00	0.00	237.02	0.00
4008		4008:WVGD8	77.75	75.00	76.38	33.291	2.82e+006	1.000	31.92	0.00	310.09	243.56	0.00	0.00	243.56	0.00
4008	4008:WVGD8	4008:Arm3	75.00	74.34	74.67	33.846	2.86e+006	1.000	31.92	0.00	75.79	59.52	0.00	0.00	59.52	0.00
4008	4008:Arm3		74.34	69.67	72.00	34.712	2.94e+006	1.000	31.92	0.00	549.21	431.21	0.00	0.00	431.21	0.00
4008		4008:WVGD7	69.67	65.00	67.33	36.230	3.06e+006	1.000	31.92	0.00	573.44	450.06	0.00	0.00	450.06	0.00
4008	4008:WVGD7	4008:Arm4	65.00	61.84	63.42	37.502	3.17e+006	1.000	31.92	0.00	401.94	315.37	0.00	0.00	315.37	0.00
4008	4008:Arm4		61.84	58.42	60.13	38.572	3.26e+006	1.000	31.92	0.00	447.32	350.89	0.00	0.00	350.89	0.00
4008		4008:WVGD6	58.42	55.00	56.71	39.683	3.36e+006	1.000	31.92	0.00	460.31	361.00	0.00	0.00	361.00	0.00
4008	4008:WVGD6		55.00	50.50	52.75	40.970	3.47e+006	1.000	31.92	0.00	625.56	490.47	0.00	0.00	490.47	0.00
4008			50.50	47.75	49.12	41.836	3.54e+006	1.000	31.92	0.00	934.21	306.07	0.00	0.00	306.07	0.00
4008		4008:WVGD5	47.75	45.00	46.38	42.417	3.59e+006	1.000	31.92	0.00	954.21	310.32	0.00	0.00	310.32	0.00
4008	4008:WVGD5		45.00	40.00	42.50	43.677	3.69e+006	1.000	31.92	0.00	1034.98	580.97	0.00	0.00	580.97	0.00
4008		4008:WVGD4	40.00	35.00	37.50	45.302	3.83e+006	1.000	31.92	0.00	1073.78	602.59	0.00	0.00	602.59	0.00
4008	4008:WVGD4		35.00	30.00	32.50	46.927	3.97e+006	1.000	31.92	0.00	1112.67	624.20	0.00	0.00	624.20	0.00
4008		4008:WVGD3	30.00	25.00	27.50	48.552	4.11e+006	1.000	31.92	0.00	1151.57	645.82	0.00	0.00	645.82	0.00
4008	4008:WVGD3		25.00	20.00	22.50	50.177	4.24e+006	1.000	31.92	0.00	1190.47	667.44	0.00	0.00	667.44	0.00
4008		4008:WVGD2	20.00	15.00	17.50	51.802	4.38e+006	1.000	31.92	0.00	1229.36	689.05	0.00	0.00	689.05	0.00
4008	4008:WVGD2		15.00	10.00	12.50	53.427	4.52e+006	1.000	31.92	0.00	1268.26	710.67	0.00	0.00	710.67	0.00
4008		4008:WVGD1	10.00	5.00	7.50	55.052	4.66e+006	1.000	31.92	0.00	1307.15	732.29	0.00	0.00	732.29	0.00
4008	4008:WVGD1	4008:g	5.00	0.00	2.50	56.677	4.79e+006	1.000	31.92	0.00	1346.05	753.90	0.00	0.00	753.90	0.00

Point Loads for Load Case "NESC Extreme Ice w/ Wind":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	2400	1260	0	Shield Wire
Davit2:End	2400	1260	0	Shield Wire
Davit3:End	5410	1960	0	Conductor
Davit4:End	5410	1960	0	Conductor
Davit5:End	5410	1960	0	Conductor
Davit6:End	5410	1960	0	Conductor
Davit7:End	5410	1960	0	Conductor
Davit8:End	5410	1960	0	Conductor
4008:WVGD1	1275	0	0	Coax Cables
4008:WVGD2	1275	0	0	Coax Cables
4008:WVGD3	1275	0	0	Coax Cables
4008:WVGD4	1275	0	0	Coax Cables
4008:WVGD5	1275	0	0	Coax Cables
4008:WVGD6	1275	0	0	Coax Cables
4008:WVGD7	1275	0	0	Coax Cables
4008:WVGD8	1275	0	0	Coax Cables
4008:WVGD9	1275	0	0	Coax Cables
4008:WVGD10	1275	0	0	Coax Cables
4008:WVGD11	1275	0	0	Coax Cables
4008:WVGD12	1275	0	0	Coax Cables
4008:AT&T	5813	1473	0	AT&T Equipment
4008:TMobile	5229	1172	0	T-Mobile Equipment

*** Analysis Results:

Maximum element usage is 71.83% for Steel Pole "4008" in load case "NESC Extreme"
Maximum insulator usage is 7.91% for Clamp "Clamp3" in load case "NESC Heavy"



*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 14

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)
4008:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
4008:t	0.005824	2.135	-0.03028	-1.7987	0.0047	0.0000	0.005824	2.135	116.5
4008:AT&T	0.005783	2.119	-0.03003	-1.7987	0.0047	0.0000	0.005783	2.119	116

4008:WVGD12	0.0057	2.088	-0.02952	-1.7983	0.0047	0.0000	0.0057	2.088	115
4008:TMobile	0.004958	1.807	-0.02496	-1.7666	0.0047	0.0000	0.004958	1.807	106
4008:WVGD11	0.004876	1.776	-0.02445	-1.7606	0.0047	0.0000	0.004876	1.776	105
4008:WVGD10	0.004077	1.476	-0.01961	-1.6742	0.0045	0.0000	0.004077	1.476	94.98
4008:Arm1	0.004038	1.461	-0.01938	-1.6709	0.0044	0.0000	0.004038	1.461	94.48
4008:Arm2	0.003455	1.242	-0.01603	-1.6060	0.0043	0.0000	0.003455	1.242	86.82
4008:WVGD9	0.003355	1.204	-0.01545	-1.5917	0.0042	0.0000	0.003355	1.204	85.48
4008:WVGD8	0.002612	0.9248	-0.0113	-1.4465	0.0039	0.0000	0.002612	0.9248	74.99
4008:Arm3	0.002567	0.9081	-0.01107	-1.4359	0.0038	0.0000	0.002567	0.9081	74.33
4008:WVGD7	0.001974	0.6871	-0.007964	-1.2632	0.0034	0.0000	0.001974	0.6871	64.99
4008:Arm4	0.00179	0.6191	-0.007069	-1.1982	0.0033	0.0000	0.00179	0.6191	61.83
4008:WVGD6	0.001422	0.4846	-0.005328	-1.0452	0.0029	0.0000	0.001422	0.4846	54.99
4008:WVGD5	0.0009646	0.3216	-0.003464	-0.8286	0.0024	0.0000	0.0009646	0.3216	45
4008:WVGD4	0.0005924	0.193	-0.0022	-0.6388	0.0019	0.0000	0.0005924	0.193	35
4008:WVGD3	0.000307	0.09759	-0.001313	-0.4496	0.0014	0.0000	0.000307	0.09759	25
4008:WVGD2	0.0001127	0.0349	-0.0006877	-0.2647	0.0008	0.0000	0.0001127	0.0349	15
4008:WVGD1	1.323e-005	0.003952	-0.0002136	-0.0864	0.0003	0.0000	1.323e-005	0.003952	5
Davit1:O	0.004041	1.462	0.01391	-1.6709	0.0044	0.0000	0.004041	0.32	94.51
Davit1:V	0.004087	1.476	0.09261	-1.4000	0.0045	0.0000	0.004087	-2.666	95.09
Davit1:End	0.004089	1.476	0.1168	-1.3811	0.0045	0.0000	0.004089	-3.665	95.12
Davit2:O	0.004036	1.461	-0.05267	-1.6709	0.0044	0.0000	0.004036	2.602	94.45
Davit2:V	0.004067	1.475	-0.1504	-1.9799	0.0044	0.0000	0.004067	5.617	94.85
Davit2:End	0.004064	1.475	-0.1852	-1.9987	0.0044	0.0000	0.004064	6.617	94.81
Davit3:O	0.003457	1.242	0.01888	-1.6060	0.0043	0.0000	0.003457	-0.003202	86.86
Davit3:V	0.003558	1.269	0.166	-0.8966	0.0043	0.0000	0.003558	-6.977	88.18
Davit3:End	0.003561	1.269	0.1956	-0.8264	0.0043	0.0000	0.003561	-8.977	88.2
Davit4:O	0.003452	1.241	-0.05094	-1.6060	0.0043	0.0000	0.003452	2.487	86.79
Davit4:V	0.00352	1.279	-0.3013	-2.3753	0.0043	0.0000	0.00352	9.524	87.71
Davit4:End	0.003514	1.277	-0.386	-2.4446	0.0043	0.0000	0.003514	11.52	87.62
Davit5:O	0.00257	0.9086	0.02439	-1.4359	0.0038	0.0000	0.00257	-0.5061	74.36
Davit5:V	0.002658	0.931	0.1508	-0.7253	0.0038	0.0000	0.002658	-7.484	75.66
Davit5:End	0.002661	0.9312	0.1743	-0.6550	0.0038	0.0000	0.002661	-9.484	75.68
Davit6:O	0.002565	0.9077	-0.04652	-1.4359	0.0038	0.0000	0.002565	2.322	74.29
Davit6:V	0.002627	0.9422	-0.2761	-2.2060	0.0038	0.0000	0.002627	9.357	75.23
Davit6:End	0.002622	0.9407	-0.3548	-2.2754	0.0038	0.0000	0.002622	11.36	75.15
Davit7:O	0.001792	0.6194	0.02605	-1.1982	0.0033	0.0000	0.001792	-0.9646	61.87
Davit7:V	0.001866	0.6365	0.1233	-0.4860	0.0033	0.0000	0.001866	-7.947	63.13
Davit7:End	0.001867	0.6366	0.1385	-0.4156	0.0033	0.0000	0.001867	-9.947	63.15
Davit8:O	0.001788	0.6187	-0.04019	-1.1982	0.0033	0.0000	0.001788	2.203	61.8
Davit8:V	0.001843	0.6493	-0.2407	-1.9693	0.0033	-0.0000	0.001843	9.233	62.77
Davit8:End	0.001839	0.6481	-0.3112	-2.0388	0.0033	-0.0000	0.001839	11.23	62.7

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 %
4008:g	-0.13	0.0	-25.12	0.0	0.0	-100.32	0.0	0.0	103.42	0.0	2008.95	0.0	-6.7	0.0	0.0	-0.00	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.
4008	4008:t	Origin	0.00	25.62	0.07	-0.36	-0.00	-0.00	0.0	-0.02	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
4008	4008:AT&T	End	0.50	25.43	0.07	-0.36	0.00	-0.00	0.0	-0.02	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4

4008	4008:AT&T	Origin	0.50	25.43	0.07	-0.36	0.00	-0.00	0.0	-6.10	1.75	-0.00	-0.51	0.00	0.29	0.00	0.72	1.1	5
4008	4008:WVGD12	End	1.50	25.05	0.07	-0.35	1.75	-0.00	0.0	-6.10	1.75	-0.00	-0.50	0.33	0.08	0.00	0.84	1.3	2
4008	4008:WVGD12	Origin	1.50	25.05	0.07	-0.35	1.75	-0.00	0.0	-7.66	1.86	-0.00	-0.63	0.33	0.08	0.00	0.97	1.5	2
4008	Tube 1	End	6.00	23.36	0.06	-0.33	10.11	-0.01	0.0	-7.66	1.86	-0.00	-0.58	1.67	0.07	0.00	2.26	3.5	2
4008	Tube 1	Origin	6.00	23.36	0.06	-0.33	10.11	-0.01	0.0	-7.96	1.97	-0.01	-0.61	1.67	0.08	0.00	2.28	3.5	2
4008	4008:TMobile	End	10.50	21.68	0.06	-0.30	18.98	-0.04	0.0	-7.96	1.97	-0.01	-0.57	2.76	0.07	0.00	3.33	5.2	2
4008	4008:TMobile	Origin	10.50	21.68	0.06	-0.30	18.98	-0.04	-0.0	-13.46	3.39	-0.01	-0.96	2.76	0.13	0.00	3.73	5.8	2
4008	4008:WVGD11	End	11.50	21.31	0.06	-0.29	22.37	-0.05	-0.0	-13.46	3.39	-0.01	-0.95	3.16	0.13	0.00	4.12	6.5	2
4008	4008:WVGD11	Origin	11.50	21.31	0.06	-0.29	22.37	-0.05	0.0	-15.04	3.51	-0.01	-1.06	3.16	0.13	0.00	4.23	6.6	2
4008	Tube 1	End	16.00	19.67	0.05	-0.27	38.15	-0.09	0.0	-15.04	3.51	-0.01	-1.00	4.78	0.12	0.00	5.78	9.4	2
4008	Tube 1	Origin	16.00	19.67	0.05	-0.27	38.15	-0.09	0.0	-15.39	3.63	-0.01	-1.02	4.78	0.13	0.00	5.80	9.4	2
4008	SpliceT	End	20.50	18.06	0.05	-0.24	54.49	-0.15	0.0	-15.39	3.63	-0.01	-0.96	6.09	0.12	0.00	7.06	11.9	2
4008	SpliceT	Origin	20.50	18.06	0.05	-0.24	54.49	-0.15	-0.0	-15.64	3.71	-0.02	-0.59	3.64	0.07	0.00	4.22	6.5	2
4008	4008:WVGD10	End	21.50	17.71	0.05	-0.24	58.19	-0.17	-0.0	-15.64	3.71	-0.02	-0.58	3.79	0.07	0.00	4.37	6.7	2
4008	4008:WVGD10	Origin	21.50	17.71	0.05	-0.24	58.19	-0.17	-0.0	-17.12	3.77	-0.02	-0.63	3.79	0.07	0.00	4.43	6.8	2
4008	4008:Arm1	End	22.00	17.54	0.05	-0.23	60.08	-0.17	-0.0	-17.12	3.77	-0.02	-0.63	3.87	0.07	0.00	4.50	6.9	2
4008	4008:Arm1	Origin	22.00	17.54	0.05	-0.23	61.54	-0.17	0.0	-21.90	6.83	-0.02	-0.80	3.96	0.13	0.00	4.77	7.3	2
4008	Tube 2	End	25.83	16.20	0.04	-0.21	87.71	-0.24	0.0	-21.90	6.83	-0.02	-0.77	5.16	0.13	0.00	5.93	9.1	2
4008	Tube 2	Origin	25.83	16.20	0.04	-0.21	87.71	-0.24	0.0	-22.46	6.95	-0.02	-0.79	5.16	0.13	0.00	5.95	9.2	2
4008	4008:Arm2	End	29.66	14.90	0.04	-0.19	114.34	-0.32	0.0	-22.46	6.95	-0.02	-0.76	6.17	0.12	0.00	6.93	10.7	2
4008	4008:Arm2	Origin	29.66	14.90	0.04	-0.19	120.06	-0.33	0.0	-35.17	12.26	-0.02	-1.18	6.47	0.22	0.00	7.67	11.8	2
4008	4008:WVGD9	End	31.00	14.45	0.04	-0.19	136.48	-0.36	0.0	-35.17	12.26	-0.02	-1.17	7.15	0.22	0.00	8.32	12.8	2
4008	4008:WVGD9	Origin	31.00	14.45	0.04	-0.19	136.48	-0.36	0.0	-37.05	12.40	-0.03	-1.23	7.15	0.22	0.00	8.38	12.9	2
4008	Tube 2	End	36.00	12.81	0.04	-0.16	198.48	-0.50	0.0	-37.05	12.40	-0.03	-1.17	9.35	0.21	0.00	10.52	16.2	2
4008	Tube 2	Origin	36.00	12.81	0.04	-0.16	198.48	-0.50	0.0	-37.68	12.51	-0.03	-1.19	9.35	0.21	0.00	10.54	16.2	2
4008	Tube 2	End	38.75	11.94	0.03	-0.15	232.89	-0.58	0.0	-37.68	12.51	-0.03	-1.15	10.37	0.20	0.00	11.53	17.7	2
4008	Tube 2	Origin	38.75	11.94	0.03	-0.15	232.89	-0.58	0.0	-38.15	12.60	-0.03	-1.17	10.37	0.20	0.00	11.54	17.8	2
4008	4008:WVGD8	End	41.50	11.10	0.03	-0.14	267.53	-0.68	0.0	-38.15	12.60	-0.03	-1.14	11.28	0.20	0.00	12.42	19.1	2
4008	4008:WVGD8	Origin	41.50	11.10	0.03	-0.14	267.53	-0.68	0.0	-39.83	12.68	-0.04	-1.19	11.28	0.20	0.00	12.47	19.2	2
4008	4008:Arm3	End	42.16	10.90	0.03	-0.13	275.91	-0.70	0.0	-39.83	12.68	-0.04	-1.18	11.49	0.20	0.00	12.67	19.5	2
4008	4008:Arm3	Origin	42.16	10.90	0.03	-0.13	281.59	-0.70	0.0	-52.64	17.95	-0.04	-1.56	11.72	0.28	0.00	13.29	20.4	2
4008	Tube 2	End	46.83	9.53	0.03	-0.11	365.39	-0.88	0.0	-52.64	17.95	-0.04	-1.49	13.92	0.27	0.00	15.42	23.7	2
4008	Tube 2	Origin	46.83	9.53	0.03	-0.11	365.39	-0.88	0.0	-53.51	18.07	-0.04	-1.51	13.92	0.27	0.00	15.44	23.8	2
4008	4008:WVGD7	End	51.50	8.25	0.02	-0.10	449.74	-1.09	0.0	-53.51	18.07	-0.04	-1.45	15.74	0.26	0.00	17.20	26.5	2
4008	4008:WVGD7	Origin	51.50	8.25	0.02	-0.10	449.74	-1.09	0.0	-55.65	18.19	-0.05	-1.51	15.74	0.26	0.00	17.26	26.5	2
4008	4008:Arm4	End	54.66	7.43	0.02	-0.08	507.25	-1.24	0.0	-55.65	18.19	-0.05	-1.47	16.80	0.25	0.00	18.27	28.1	2
4008	4008:Arm4	Origin	54.66	7.43	0.02	-0.08	512.87	-1.24	0.0	-68.67	23.41	-0.05	-1.81	16.98	0.33	0.00	18.80	29.0	2
4008	Tube 2	End	58.08	6.59	0.02	-0.07	592.91	-1.42	0.0	-68.67	23.41	-0.05	-1.76	18.52	0.32	0.00	20.29	31.7	2
4008	Tube 2	Origin	58.08	6.59	0.02	-0.07	592.91	-1.42	0.0	-69.38	23.47	-0.06	-1.78	18.52	0.32	0.00	20.31	31.7	2
4008	4008:WVGD6	End	61.50	5.82	0.02	-0.06	673.17	-1.61	0.0	-69.38	23.47	-0.06	-1.73	19.87	0.31	0.00	21.60	34.3	2
4008	4008:WVGD6	Origin	61.50	5.82	0.02	-0.06	673.17	-1.61	0.0	-71.61	23.57	-0.06	-1.78	19.87	0.31	0.00	21.66	34.3	2
4008	SpliceT	End	66.00	4.88	0.01	-0.05	779.24	-1.88	0.0	-71.61	23.57	-0.06	-1.72	21.40	0.30	0.00	23.12	37.4	2
4008	SpliceT	Origin	66.00	4.88	0.01	-0.05	779.24	-1.88	0.0	-72.81	23.65	-0.06	-1.75	21.40	0.30	0.00	23.15	37.4	2
4008	Tube 2	End	68.75	4.35	0.01	-0.05	844.28	-2.06	0.0	-72.81	23.65	-0.06	-1.25	16.49	0.21	0.00	17.74	27.3	2
4008	Tube 2	Origin	68.75	4.35	0.01	-0.05	844.28	-2.06	0.0	-74.25	23.73	-0.07	-1.27	16.49	0.21	0.00	17.77	27.3	2
4008	4008:WVGD5	End	71.50	3.86	0.01	-0.04	909.52	-2.25	0.0	-74.25	23.73	-0.07	-1.24	17.02	0.21	0.00	18.27	28.1	2
4008	4008:WVGD5	Origin	71.50	3.86	0.01	-0.04	909.52	-2.25	0.0	-77.15	23.85	-0.07	-1.29	17.02	0.21	0.00	18.32	28.2	2
4008	Tube 3	End	76.50	3.04	0.01	-0.03	1028.77	-2.61	0.0	-77.15	23.85	-0.07	-1.25	17.85	0.20	0.00	19.10	29.4	2
4008	Tube 3	Origin	76.50	3.04	0.01	-0.03	1028.77	-2.61	0.0	-78.78	23.98	-0.08	-1.27	17.85	0.20	0.00	19.13	29.4	2
4008	4008:WVGD4	End	81.50	2.32	0.01	-0.03	1148.69	-3.00	0.0	-78.78	23.98	-0.08	-1.23	18.53	0.20	0.00	19.76	30.4	2
4008	4008:WVGD4	Origin	81.50	2.32	0.01	-0.03	1148.69	-3.00	0.0	-81.83	24.13	-0.08	-1.27	18.53	0.20	0.00	19.81	30.5	2
4008	Tube 3	End	86.50	1.69	0.01	-0.02	1269.36	-3.42	0.0	-81.83	24.13	-0.08	-1.23	19.09	0.19	0.00	20.33	31.3	2
4008	Tube 3	Origin	86.50	1.69	0.01	-0.02	1269.36	-3.42	0.0	-83.57	24.27	-0.09	-1.26	19.09	0.19	0.00	20.35	31.3	2
4008	4008:WVGD3	End	91.50	1.17	0.00	-0.02	1390.71	-3.88	0.0	-83.57	24.27	-0.09	-1.21	19.55	0.19	0.00	20.76	31.9	2
4008	4008:WVGD3	Origin	91.50	1.17	0.00	-0.02	1390.71	-3.88	0.0	-86.75	24.43	-0.10	-1.26	19.55	0.19	0.00	20.81	32.0	2
4008	Tube 3	End	96.50	0.75	0.00	-0.01	1512.84	-4.37	0.0	-86.75	24.43	-0.10	-1.22	19.91	0.18	0.00	21.13	32.5	2
4008	Tube 3	Origin	96.50	0.75	0.00	-0.01	1512.84	-4.37	0.0	-88.60	24.57	-0.10	-1.25	19.91	0.18	0.00	21.16	32.6	2
4008	4008:WVGD2	End	101.50	0.42	0.00	-0.01	1635.69	-4.89	0.0	-88.60	24.57	-0.10	-1.21	20.20	0.18	0.00	21.41	32.9	2
4008	4008:WVGD2	Origin	101.50	0.42	0.00	-0.01	1635.69	-4.89	0.0	-91.90	24.73	-0.11	-1.25	20.20	0.18	0.00	21.46	33.0	2

4008	Tube 3	End	106.50	0.19	0.00	-0.01	1759.32	-5.45	0.0	-91.90	24.73	-0.11	-1.21	20.43	0.17	0.00	21.65	33.7	2
4008	Tube 3	Origin	106.50	0.19	0.00	-0.01	1759.32	-5.45	0.0	-93.87	24.88	-0.12	-1.24	20.43	0.17	0.00	21.68	33.7	2
4008	4008:WVGD1	End	111.50	0.05	0.00	-0.00	1883.73	-6.04	0.0	-93.87	24.88	-0.12	-1.20	20.61	0.17	0.00	21.82	34.4	2
4008	4008:WVGD1	Origin	111.50	0.05	0.00	-0.00	1883.73	-6.04	0.0	-97.27	25.05	-0.13	-1.25	20.61	0.17	0.00	21.86	34.5	2
4008	4008:g	End	116.50	0.00	0.00	0.00	2008.95	-6.67	0.0	-97.27	25.05	-0.13	-1.21	20.74	0.16	0.00	21.96	35.2	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	17.54	0.05	0.17	-8.05	0.00	0.0	-1.83	1.93	-0.00	-0.50	19.21	0.00	0.00	19.71	30.3	1
Davit1	Davit1:V	End	3.04	17.71	0.05	1.11	-2.17	0.00	0.0	-1.83	1.93	-0.00	-0.50	5.19	0.00	0.00	5.69	8.7	1
Davit1	Davit1:V	Origin	3.04	17.71	0.05	1.11	-2.17	0.00	0.0	-1.48	2.17	-0.00	-0.41	5.19	0.00	0.00	5.59	8.6	1
Davit1	Davit1:End	End	4.04	17.72	0.05	1.40	-0.00	0.00	0.0	-1.48	2.17	-0.00	-0.41	0.00	1.23	0.00	2.18	3.3	3
Davit2	Davit2:O	Origin	0.00	17.53	0.05	-0.63	-9.51	-0.00	-0.0	1.12	2.42	0.00	0.31	22.68	0.00	0.00	22.99	35.4	1
Davit2	Davit2:V	End	3.04	17.71	0.05	-1.80	-2.16	-0.00	-0.0	1.12	2.42	0.00	0.31	5.15	0.00	0.00	5.45	8.4	1
Davit2	Davit2:V	Origin	3.04	17.71	0.05	-1.80	-2.16	-0.00	-0.0	1.51	2.16	0.00	0.41	5.15	0.00	0.00	5.56	8.6	1
Davit2	Davit2:End	End	4.04	17.70	0.05	-2.22	0.00	0.00	-0.0	1.51	2.16	0.00	0.41	0.00	1.22	0.00	2.16	3.3	3
Davit3	Davit3:O	Origin	0.00	14.91	0.04	0.23	-50.77	0.01	0.0	-3.56	5.57	-0.00	-0.36	26.67	0.00	0.00	27.02	41.6	1
Davit3	#Davit3:0	End	3.55	15.09	0.04	1.24	-30.99	0.00	0.0	-3.56	5.57	-0.00	-0.41	21.14	0.00	0.00	21.55	33.1	1
Davit3	#Davit3:0	Origin	3.55	15.09	0.04	1.24	-30.99	0.00	0.0	-3.49	5.44	-0.00	-0.40	21.14	0.00	0.00	21.54	33.1	1
Davit3	Davit3:V	End	7.10	15.22	0.04	1.99	-11.68	0.00	0.0	-3.49	5.44	-0.00	-0.46	10.76	0.00	0.00	11.23	17.3	1
Davit3	Davit3:V	Origin	7.10	15.22	0.04	1.99	-11.68	0.00	0.0	-2.53	5.84	-0.00	-0.33	10.76	0.00	0.00	11.10	17.1	1
Davit3	Davit3:End	End	9.10	15.23	0.04	2.35	-0.00	0.00	0.0	-2.53	5.84	-0.00	-0.37	0.00	1.77	0.00	3.09	4.8	3
Davit4	Davit4:O	Origin	0.00	14.90	0.04	-0.61	-56.48	-0.00	-0.0	1.60	6.42	0.00	0.16	29.67	0.00	0.00	29.83	45.9	1
Davit4	#Davit4:0	End	3.55	15.10	0.04	-1.97	-33.71	-0.00	-0.0	1.60	6.42	0.00	0.18	22.99	0.00	0.00	23.18	35.7	1
Davit4	#Davit4:0	Origin	3.55	15.10	0.04	-1.97	-33.71	-0.00	-0.0	1.67	6.25	0.00	0.19	22.99	0.00	0.00	23.18	35.7	1
Davit4	Davit4:V	End	7.10	15.34	0.04	-3.62	-11.54	-0.00	-0.0	1.67	6.25	0.00	0.22	10.63	0.00	0.00	10.85	16.7	1
Davit4	Davit4:V	Origin	7.10	15.34	0.04	-3.62	-11.54	-0.00	0.0	2.69	5.77	0.00	0.36	10.63	0.00	0.00	10.99	16.9	1
Davit4	Davit4:End	End	9.10	15.32	0.04	-4.63	0.00	0.00	0.0	2.69	5.77	0.00	0.39	0.00	1.75	0.00	3.06	4.7	3
Davit5	Davit5:O	Origin	0.00	10.90	0.03	0.29	-50.85	0.00	0.0	-3.54	5.58	-0.00	-0.36	26.71	0.00	0.00	27.07	41.6	1
Davit5	#Davit5:0	End	3.55	11.06	0.03	1.18	-31.04	0.00	0.0	-3.54	5.58	-0.00	-0.40	21.18	0.00	0.00	21.58	33.2	1
Davit5	#Davit5:0	Origin	3.55	11.06	0.03	1.18	-31.04	0.00	0.0	-3.48	5.45	-0.00	-0.40	21.18	0.00	0.00	21.57	33.2	1
Davit5	Davit5:V	End	7.10	11.17	0.03	1.81	-11.70	0.00	0.0	-3.48	5.45	-0.00	-0.46	10.78	0.00	0.00	11.24	17.3	1
Davit5	Davit5:V	Origin	7.10	11.17	0.03	1.81	-11.70	0.00	0.0	-2.51	5.85	-0.00	-0.33	10.78	0.00	0.00	11.11	17.1	1
Davit5	Davit5:End	End	9.10	11.17	0.03	2.09	-0.00	0.00	0.0	-2.51	5.85	-0.00	-0.37	0.00	1.77	0.00	3.10	4.8	3
Davit6	Davit6:O	Origin	0.00	10.89	0.03	-0.56	-56.53	-0.00	-0.0	1.58	6.42	0.00	0.16	29.69	0.00	0.00	29.85	45.9	1
Davit6	#Davit6:0	End	3.55	11.08	0.03	-1.79	-33.74	-0.00	-0.0	1.58	6.42	0.00	0.18	23.02	0.00	0.00	23.20	35.7	1
Davit6	#Davit6:0	Origin	3.55	11.08	0.03	-1.79	-33.74	-0.00	-0.0	1.65	6.25	0.00	0.19	23.02	0.00	0.00	23.21	35.7	1
Davit6	Davit6:V	End	7.10	11.31	0.03	-3.31	-11.55	-0.00	-0.0	1.65	6.25	0.00	0.22	10.65	0.00	0.00	10.86	16.7	1
Davit6	Davit6:V	Origin	7.10	11.31	0.03	-3.31	-11.55	-0.00	0.0	2.67	5.78	0.00	0.35	10.65	0.00	0.00	11.00	16.9	1
Davit6	Davit6:End	End	9.10	11.29	0.03	-4.26	0.00	0.00	0.0	2.67	5.78	0.00	0.39	0.00	1.75	0.00	3.06	4.7	3
Davit7	Davit7:O	Origin	0.00	7.43	0.02	0.31	-50.98	0.00	0.0	-3.52	5.60	-0.00	-0.35	26.78	0.00	0.00	27.13	41.7	1
Davit7	#Davit7:0	End	3.55	7.56	0.02	1.03	-31.11	0.00	0.0	-3.52	5.60	-0.00	-0.40	21.22	0.00	0.00	21.63	33.3	1
Davit7	#Davit7:0	Origin	3.55	7.56	0.02	1.03	-31.11	0.00	0.0	-3.45	5.47	-0.00	-0.39	21.22	0.00	0.00	21.62	33.3	1
Davit7	Davit7:V	End	7.10	7.64	0.02	1.48	-11.72	0.00	0.0	-3.45	5.47	-0.00	-0.46	10.80	0.00	0.00	11.25	17.3	1
Davit7	Davit7:V	Origin	7.10	7.64	0.02	1.48	-11.72	0.00	0.0	-2.48	5.86	-0.00	-0.33	10.80	0.00	0.00	11.12	17.1	1
Davit7	Davit7:End	End	9.10	7.64	0.02	1.66	-0.00	0.00	0.0	-2.48	5.86	-0.00	-0.36	0.00	1.78	0.00	3.10	4.8	3
Davit8	Davit8:O	Origin	0.00	7.42	0.02	-0.48	-56.60	-0.00	-0.0	1.56	6.43	0.00	0.16	29.73	0.00	0.00	29.89	46.0	1

Davit8	#Davit8:0	End	3.55	7.59	0.02	-1.54	-33.79	-0.00	-0.0	1.56	6.43	0.00	0.18	23.05	0.00	0.00	23.23	35.7	1
Davit8	#Davit8:0	Origin	3.55	7.59	0.02	-1.54	-33.79	-0.00	-0.0	1.62	6.26	0.00	0.19	23.05	0.00	0.00	23.23	35.7	1
Davit8	Davit8:V	End	7.10	7.79	0.02	-2.89	-11.57	-0.00	-0.0	1.62	6.26	0.00	0.21	10.67	0.00	0.00	10.88	16.7	1
Davit8	Davit8:V	Origin	7.10	7.79	0.02	-2.89	-11.57	-0.00	0.0	2.65	5.79	0.00	0.35	10.67	0.00	0.00	11.02	16.9	1
Davit8	Davit8:End	End	9.10	7.78	0.02	-3.73	0.00	0.00	0.0	2.65	5.79	0.00	0.38	0.00	1.76	0.00	3.07	4.7	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	2.624	80.00	80.00	3.28
Clamp2	2.624	80.00	80.00	3.28
Clamp3	6.329	80.00	80.00	7.91
Clamp4	6.329	80.00	80.00	7.91
Clamp5	6.329	80.00	80.00	7.91
Clamp6	6.329	80.00	80.00	7.91
Clamp7	6.329	80.00	80.00	7.91
Clamp8	6.329	80.00	80.00	7.91
Clamp9	1.380	80.00	80.00	1.72
Clamp10	1.380	80.00	80.00	1.72
Clamp11	1.380	80.00	80.00	1.72
Clamp12	1.380	80.00	80.00	1.72
Clamp13	1.380	80.00	80.00	1.72
Clamp14	1.380	80.00	80.00	1.72
Clamp15	1.380	80.00	80.00	1.72
Clamp16	1.380	80.00	80.00	1.72
Clamp17	1.380	80.00	80.00	1.72
Clamp18	1.380	80.00	80.00	1.72
Clamp19	1.380	80.00	80.00	1.72
Clamp20	1.380	80.00	80.00	1.72
Clamp21	6.279	80.00	80.00	7.85
Clamp22	5.479	80.00	80.00	6.85

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 14

Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
4008:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
4008:t	0.001785	4.427	-0.114	-3.9537	0.0014	0.0000	0.001785	4.427	116.4
4008:AT&T	0.001773	4.393	-0.1128	-3.9537	0.0014	0.0000	0.001773	4.393	115.9
4008:WVGD12	0.001748	4.324	-0.1104	-3.9523	0.0014	0.0000	0.001748	4.324	114.9
4008:TMobile	0.001522	3.709	-0.08931	-3.8483	0.0014	0.0000	0.001522	3.709	105.9
4008:WVGD11	0.001497	3.642	-0.08705	-3.8289	0.0014	0.0000	0.001497	3.642	104.9
4008:WVGD10	0.001254	2.997	-0.06607	-3.5488	0.0014	0.0000	0.001254	2.997	94.93
4008:Arm1	0.001242	2.966	-0.06511	-3.5381	0.0014	0.0000	0.001242	2.966	94.43
4008:Arm2	0.001064	2.505	-0.05114	-3.3488	0.0013	0.0000	0.001064	2.505	86.79
4008:WVGD9	0.001033	2.427	-0.04885	-3.3104	0.0013	0.0000	0.001033	2.427	85.45
4008:WVGD8	0.0008057	1.851	-0.03285	-2.9564	0.0012	0.0000	0.0008057	1.851	74.97
4008:Arm3	0.0007921	1.817	-0.03197	-2.9320	0.0012	0.0000	0.0007921	1.817	74.31
4008:WVGD7	0.0006102	1.368	-0.02099	-2.5488	0.0010	0.0000	0.0006102	1.368	64.98
4008:Arm4	0.0005536	1.231	-0.01795	-2.4093	0.0010	0.0000	0.0005536	1.231	61.82
4008:WVGD6	0.0004403	0.9618	-0.01246	-2.0889	0.0009	0.0000	0.0004403	0.9618	54.99
4008:WVGD5	0.0002992	0.637	-0.00693	-1.6467	0.0007	0.0000	0.0002992	0.637	44.99
4008:WVGD4	0.000184	0.3819	-0.003471	-1.2659	0.0006	0.0000	0.000184	0.3819	35
4008:WVGD3	9.55e-005	0.193	-0.00148	-0.8896	0.0004	0.0000	9.55e-005	0.193	25
4008:WVGD2	3.511e-005	0.06901	-0.0005034	-0.5235	0.0003	0.0000	3.511e-005	0.06901	15
4008:WVGD1	4.131e-006	0.007816	-0.0001064	-0.1708	0.0001	0.0000	4.131e-006	0.007816	5
Davit1:O	0.001244	2.968	0.00535	-3.5381	0.0014	0.0000	0.001244	1.826	94.51
Davit1:V	0.001261	3.004	0.188	-3.4867	0.0014	0.0000	0.001261	-1.137	95.19
Davit1:End	0.001262	3.006	0.2487	-3.4818	0.0014	0.0000	0.001262	-2.136	95.25
Davit2:O	0.00124	2.964	-0.1356	-3.5381	0.0014	0.0000	0.00124	4.105	94.36
Davit2:V	0.001247	2.989	-0.325	-3.6374	0.0014	0.0000	0.001247	7.131	94.68
Davit2:End	0.001245	2.987	-0.3885	-3.6422	0.0014	0.0000	0.001245	8.129	94.61
Davit3:O	0.001065	2.507	0.02161	-3.3488	0.0013	0.0000	0.001065	1.261	86.86
Davit3:V	0.001103	2.583	0.4122	-3.1038	0.0013	0.0000	0.001103	-5.662	88.42
Davit3:End	0.001106	2.586	0.5197	-3.0758	0.0013	0.0000	0.001106	-7.659	88.53
Davit4:O	0.001062	2.503	-0.1239	-3.3488	0.0013	0.0000	0.001062	3.748	86.72
Davit4:V	0.001078	2.562	-0.5596	-3.6975	0.0013	0.0000	0.001078	10.81	87.45
Davit4:End	0.001074	2.557	-0.6893	-3.7250	0.0013	0.0000	0.001074	12.8	87.32
Davit5:O	0.0007938	1.819	0.0404	-2.9320	0.0012	0.0000	0.0007938	0.4038	74.38
Davit5:V	0.0008262	1.884	0.3803	-2.6829	0.0012	0.0000	0.0008262	-6.531	75.89
Davit5:End	0.0008286	1.886	0.4732	-2.6545	0.0012	0.0000	0.0008286	-8.529	75.98
Davit6:O	0.0007905	1.815	-0.1043	-2.9320	0.0012	0.0000	0.0007905	3.23	74.23
Davit6:V	0.0008059	1.868	-0.489	-3.2843	0.0012	0.0000	0.0008059	10.28	75.02
Davit6:End	0.0008034	1.865	-0.6043	-3.3121	0.0012	0.0000	0.0008034	12.28	74.9
Davit7:O	0.0005549	1.233	0.04864	-2.4093	0.0010	0.0000	0.0005549	-0.3514	61.89
Davit7:V	0.0005812	1.285	0.3248	-2.1551	0.0010	0.0000	0.0005812	-7.299	63.33
Davit7:End	0.0005829	1.286	0.3993	-2.1263	0.0010	0.0000	0.0005829	-9.298	63.41
Davit8:O	0.0005523	1.23	-0.08454	-2.4093	0.0010	0.0000	0.0005523	2.814	61.75
Davit8:V	0.0005668	1.276	-0.4052	-2.7662	0.0010	0.0000	0.0005668	9.86	62.6
Davit8:End	0.000565	1.274	-0.5024	-2.7944	0.0010	0.0000	0.000565	11.86	62.51

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. Uplift Usage %	Result. 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 %

4008:g	-0.04	0.0	-50.09	0.0	0.0	-48.77	0.0	0.0	69.91	0.0	3973.45	0.0	-2.1	0.0	0.0	-0.00	0.0	0.0	

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
4008	4008:t	Origin	0.00	53.12	0.02	-1.37	-0.00	-0.00	-0.0	-0.01	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
4008	4008:AT&T	End	0.50	52.71	0.02	-1.35	0.01	-0.00	-0.0	-0.01	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
4008	4008:AT&T	Origin	0.50	52.71	0.02	-1.35	0.01	-0.00	0.0	-2.25	5.90	-0.00	-0.19	0.00	1.00	0.00	1.73	2.7	5
4008	4008:WVGD12	End	1.50	51.88	0.02	-1.32	5.91	-0.00	0.0	-2.25	5.90	-0.00	-0.18	0.30	0.95	0.00	1.71	2.6	4
4008	4008:WVGD12	Origin	1.50	51.88	0.02	-1.32	5.91	-0.00	0.0	-2.74	6.09	-0.00	-0.22	0.30	0.98	0.00	1.77	2.7	4
4008	Tube 1	End	6.00	48.17	0.02	-1.20	33.30	-0.00	0.0	-2.74	6.09	-0.00	-0.21	5.51	0.24	0.00	5.74	8.8	2
4008	Tube 1	Origin	6.00	48.17	0.02	-1.20	33.30	-0.00	0.0	-2.95	6.36	-0.00	-0.22	5.51	0.26	0.00	5.76	8.9	2
4008	4008:TMobile	End	10.50	44.51	0.02	-1.07	61.92	-0.01	0.0	-2.95	6.36	-0.00	-0.21	9.00	0.24	0.00	9.22	14.4	2
4008	4008:TMobile	Origin	10.50	44.51	0.02	-1.07	61.92	-0.01	-0.0	-5.05	11.08	-0.00	-0.36	9.00	0.42	0.00	9.39	14.6	2
4008	4008:WVGD11	End	11.50	43.70	0.02	-1.04	73.00	-0.01	-0.0	-5.05	11.08	-0.00	-0.36	10.32	0.41	0.00	10.70	16.8	2
4008	4008:WVGD11	Origin	11.50	43.70	0.02	-1.04	73.00	-0.01	0.0	-5.57	11.29	-0.00	-0.39	10.32	0.42	0.00	10.73	16.9	2
4008	Tube 1	End	16.00	40.14	0.02	-0.93	123.79	-0.03	0.0	-5.57	11.29	-0.00	-0.37	15.50	0.39	0.00	15.88	25.8	2
4008	Tube 1	Origin	16.00	40.14	0.02	-0.93	123.79	-0.03	0.0	-5.83	11.59	-0.00	-0.39	15.50	0.41	0.00	15.90	25.8	2
4008	SpliceT	End	20.50	36.71	0.02	-0.82	175.93	-0.04	0.0	-5.83	11.59	-0.00	-0.37	19.65	0.38	0.00	20.03	33.7	2
4008	SpliceT	Origin	20.50	36.71	0.02	-0.82	175.93	-0.04	-0.0	-6.01	11.78	-0.00	-0.22	11.74	0.23	0.00	11.97	18.4	2
4008	4008:WVGD10	End	21.50	35.96	0.02	-0.79	187.71	-0.05	-0.0	-6.01	11.78	-0.00	-0.22	12.22	0.23	0.00	12.45	19.2	2
4008	4008:WVGD10	Origin	21.50	35.96	0.02	-0.79	187.71	-0.05	-0.0	-6.46	11.86	-0.00	-0.24	12.22	0.23	0.00	12.46	19.2	2
4008	4008:Arm1	End	22.00	35.59	0.01	-0.78	193.64	-0.05	-0.0	-6.46	11.86	-0.00	-0.24	12.45	0.23	0.00	12.70	19.5	2
4008	4008:Arm1	Origin	22.00	35.59	0.01	-0.78	195.46	-0.05	0.0	-7.87	15.67	-0.01	-0.29	12.57	0.30	0.00	12.87	19.8	2
4008	Tube 2	End	25.83	32.78	0.01	-0.70	255.47	-0.07	0.0	-7.87	15.67	-0.01	-0.28	15.01	0.29	0.00	15.30	23.5	2
4008	Tube 2	Origin	25.83	32.78	0.01	-0.70	255.47	-0.07	0.0	-8.27	15.97	-0.01	-0.29	15.01	0.30	0.00	15.31	23.6	2
4008	4008:Arm2	End	29.66	30.06	0.01	-0.61	316.64	-0.10	0.0	-8.27	15.97	-0.01	-0.28	17.06	0.28	0.00	17.35	26.7	2
4008	4008:Arm2	Origin	29.66	30.06	0.01	-0.61	326.31	-0.10	0.0	-13.63	24.63	-0.01	-0.46	17.58	0.44	0.00	18.06	27.8	2
4008	4008:WVGD9	End	31.00	29.12	0.01	-0.59	359.28	-0.11	0.0	-13.63	24.63	-0.01	-0.45	18.80	0.43	0.00	19.27	29.6	2
4008	4008:WVGD9	Origin	31.00	29.12	0.01	-0.59	359.28	-0.11	0.0	-14.38	24.90	-0.01	-0.48	18.80	0.44	0.00	19.29	29.7	2
4008	Tube 2	End	36.00	25.73	0.01	-0.49	483.81	-0.15	0.0	-14.38	24.90	-0.01	-0.45	22.77	0.41	0.00	23.24	35.7	2
4008	Tube 2	Origin	36.00	25.73	0.01	-0.49	483.81	-0.15	0.0	-14.85	25.22	-0.01	-0.47	22.77	0.42	0.00	23.25	35.8	2
4008	Tube 2	End	38.75	23.94	0.01	-0.44	553.16	-0.17	0.0	-14.85	25.22	-0.01	-0.45	24.62	0.41	0.00	25.08	38.6	2
4008	Tube 2	Origin	38.75	23.94	0.01	-0.44	553.16	-0.17	0.0	-15.20	25.45	-0.01	-0.46	24.62	0.41	0.00	25.09	38.6	2
4008	4008:WVGD8	End	41.50	22.21	0.01	-0.39	623.14	-0.20	0.0	-15.20	25.45	-0.01	-0.45	26.26	0.40	0.00	26.72	41.1	2
4008	4008:WVGD8	Origin	41.50	22.21	0.01	-0.39	623.14	-0.20	0.0	-15.79	25.61	-0.01	-0.47	26.26	0.40	0.00	26.74	41.1	2
4008	4008:Arm3	End	42.16	21.80	0.01	-0.38	640.07	-0.21	0.0	-15.79	25.61	-0.01	-0.47	26.63	0.40	0.00	27.11	41.7	2
4008	4008:Arm3	Origin	42.16	21.80	0.01	-0.38	649.70	-0.21	0.0	-21.31	34.25	-0.01	-0.63	27.03	0.54	0.00	27.68	42.6	2
4008	Tube 2	End	46.83	19.02	0.01	-0.31	809.65	-0.27	0.0	-21.31	34.25	-0.01	-0.60	30.83	0.51	0.00	31.45	48.4	2
4008	Tube 2	Origin	46.83	19.02	0.01	-0.31	809.65	-0.27	0.0	-21.99	34.65	-0.01	-0.62	30.83	0.52	0.00	31.47	48.4	2
4008	4008:WVGD7	End	51.50	16.42	0.01	-0.25	971.44	-0.33	0.0	-21.99	34.65	-0.01	-0.60	33.98	0.50	0.00	34.59	53.2	2
4008	4008:WVGD7	Origin	51.50	16.42	0.01	-0.25	971.44	-0.33	0.0	-22.95	35.00	-0.01	-0.62	33.98	0.50	0.00	34.61	53.3	2
4008	4008:Arm4	End	54.66	14.77	0.01	-0.22	1082.08	-0.37	0.0	-22.95	35.00	-0.01	-0.61	35.81	0.49	0.00	36.42	56.1	2
4008	4008:Arm4	Origin	54.66	14.77	0.01	-0.22	1091.65	-0.37	0.0	-28.70	43.66	-0.02	-0.76	36.12	0.61	0.00	36.90	56.8	2
4008	Tube 2	End	58.08	13.10	0.01	-0.18	1240.92	-0.43	0.0	-28.70	43.66	-0.02	-0.74	38.74	0.59	0.00	39.49	61.7	2
4008	Tube 2	Origin	58.08	13.10	0.01	-0.18	1240.92	-0.43	0.0	-29.28	43.95	-0.02	-0.75	38.74	0.59	0.00	39.50	61.7	2
4008	4008:WVGD6	End	61.50	11.54	0.01	-0.15	1391.20	-0.49	0.0	-29.28	43.95	-0.02	-0.73	41.04	0.58	0.00	41.78	66.3	2
4008	4008:WVGD6	Origin	61.50	11.54	0.01	-0.15	1391.20	-0.49	0.0	-30.34	44.31	-0.02	-0.76	41.04	0.58	0.00	41.80	66.3	2
4008	SpliceT	End	66.00	9.67	0.00	-0.12	1590.58	-0.57	0.0	-30.34	44.31	-0.02	-0.73	43.65	0.56	0.00	44.39	71.8	2
4008	SpliceT	Origin	66.00	9.67	0.00	-0.12	1590.58	-0.57	0.0	-31.26	44.64	-0.02	-0.75	43.65	0.57	0.00	44.41	71.8	2
4008	Tube 2	End	68.75	8.62	0.00	-0.10	1713.33	-0.63	0.0	-31.26	44.64	-0.02	-0.53	33.45	0.40	0.00	33.99	52.3	2
4008	Tube 2	Origin	68.75	8.62	0.00	-0.10	1713.33	-0.63	0.0	-32.29	44.91	-0.02	-0.55	33.45	0.41	0.00	34.01	52.3	2
4008	4008:WVGD5	End	71.50	7.64	0.00	-0.08	1836.84	-0.69	0.0	-32.29	44.91	-0.02	-0.54	34.36	0.40	0.00	34.90	53.7	2
4008	4008:WVGD5	Origin	71.50	7.64	0.00	-0.08	1836.84	-0.69	0.0	-33.77	45.31	-0.02	-0.57	34.36	0.40	0.00	34.93	53.7	2

4008	Tube 3	End	76.50	6.01	0.00	-0.06	2063.41	-0.80	0.0	-33.77	45.31	-0.02	-0.54	35.79	0.39	0.00	36.34	55.9	2
4008	Tube 3	Origin	76.50	6.01	0.00	-0.06	2063.41	-0.80	0.0	-34.98	45.82	-0.02	-0.56	35.79	0.39	0.00	36.36	55.9	2
4008	4008:WVGD4	End	81.50	4.58	0.00	-0.04	2292.49	-0.92	0.0	-34.98	45.82	-0.02	-0.54	36.97	0.38	0.00	37.52	57.7	2
4008	4008:WVGD4	Origin	81.50	4.58	0.00	-0.04	2292.49	-0.92	0.0	-36.60	46.34	-0.03	-0.57	36.97	0.38	0.00	37.54	57.8	2
4008	Tube 3	End	86.50	3.35	0.00	-0.03	2524.21	-1.05	0.0	-36.60	46.34	-0.03	-0.55	37.94	0.37	0.00	38.50	59.2	2
4008	Tube 3	Origin	86.50	3.35	0.00	-0.03	2524.21	-1.05	0.0	-37.88	46.88	-0.03	-0.57	37.94	0.37	0.00	38.52	59.3	2
4008	4008:WVGD3	End	91.50	2.32	0.00	-0.02	2758.59	-1.20	0.0	-37.88	46.88	-0.03	-0.55	38.75	0.36	0.00	39.30	60.5	2
4008	4008:WVGD3	Origin	91.50	2.32	0.00	-0.02	2758.59	-1.20	0.0	-39.58	47.43	-0.03	-0.58	38.75	0.36	0.00	39.33	60.5	2
4008	Tube 3	End	96.50	1.48	0.00	-0.01	2995.75	-1.35	0.0	-39.58	47.43	-0.03	-0.56	39.40	0.35	0.00	39.97	61.5	2
4008	Tube 3	Origin	96.50	1.48	0.00	-0.01	2995.75	-1.35	0.0	-40.94	48.00	-0.03	-0.58	39.40	0.36	0.00	39.99	61.5	2
4008	4008:WVGD2	End	101.50	0.83	0.00	-0.01	3235.74	-1.52	0.0	-40.94	48.00	-0.03	-0.56	39.94	0.35	0.00	40.50	62.3	2
4008	4008:WVGD2	Origin	101.50	0.83	0.00	-0.01	3235.74	-1.52	0.0	-42.72	48.58	-0.04	-0.58	39.94	0.35	0.00	40.53	62.4	2
4008	Tube 3	End	106.50	0.37	0.00	-0.00	3478.64	-1.69	0.0	-42.72	48.58	-0.04	-0.56	40.37	0.34	0.00	40.94	63.7	2
4008	Tube 3	Origin	106.50	0.37	0.00	-0.00	3478.64	-1.69	0.0	-44.15	49.18	-0.04	-0.58	40.37	0.34	0.00	40.96	63.7	2
4008	4008:WVGD1	End	111.50	0.09	0.00	-0.00	3724.51	-1.88	0.0	-44.15	49.18	-0.04	-0.57	40.72	0.33	0.00	41.29	65.2	2
4008	4008:WVGD1	Origin	111.50	0.09	0.00	-0.00	3724.51	-1.88	0.0	-46.00	49.79	-0.04	-0.59	40.72	0.34	0.00	41.32	65.2	2
4008	4008:g	End	116.50	0.00	0.00	0.00	3973.45	-2.08	0.0	-46.00	49.79	-0.04	-0.57	41.00	0.33	0.00	41.57	66.7	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	35.62	0.01	0.06	-1.39	0.00	0.0	-1.89	0.27	-0.00	-0.52	3.31	0.00	0.00	3.82	5.9	1
Davit1	Davit1:V	End	3.04	36.05	0.02	2.26	-0.56	0.00	0.0	-1.89	0.27	-0.00	-0.52	1.33	0.00	0.00	1.84	2.8	1
Davit1	Davit1:V	Origin	3.04	36.05	0.02	2.26	-0.56	0.00	0.0	-1.82	0.56	-0.00	-0.50	1.33	0.00	0.00	1.83	2.8	1
Davit1	Davit1:End	End	4.04	36.07	0.02	2.98	-0.00	0.00	0.0	-1.82	0.56	-0.00	-0.50	0.00	0.32	0.00	0.74	1.1	3
Davit2	Davit2:O	Origin	0.00	35.56	0.01	-1.63	-3.20	-0.00	-0.0	1.70	0.87	0.00	0.46	7.63	0.00	0.00	8.09	12.4	1
Davit2	Davit2:V	End	3.04	35.87	0.01	-3.90	-0.55	-0.00	-0.0	1.70	0.87	0.00	0.46	1.32	0.00	0.00	1.78	2.7	1
Davit2	Davit2:V	Origin	3.04	35.87	0.01	-3.90	-0.55	-0.00	-0.0	1.82	0.55	0.00	0.50	1.32	0.00	0.00	1.81	2.8	1
Davit2	Davit2:End	End	4.04	35.85	0.01	-4.66	0.00	0.00	-0.0	1.82	0.55	0.00	0.50	0.00	0.31	0.00	0.74	1.1	3
Davit3	Davit3:O	Origin	0.00	30.08	0.01	0.26	-16.84	0.00	0.0	-4.57	1.76	-0.00	-0.46	8.84	0.00	0.00	9.30	14.3	1
Davit3	#Davit3:0	End	3.55	30.55	0.01	2.65	-10.59	0.00	0.0	-4.57	1.76	-0.00	-0.52	7.23	0.00	0.00	7.75	11.9	1
Davit3	#Davit3:0	Origin	3.55	30.55	0.01	2.65	-10.59	0.00	0.0	-4.55	1.67	-0.00	-0.52	7.23	0.00	0.00	7.75	11.9	1
Davit3	Davit3:V	End	7.10	31.00	0.01	4.95	-4.66	0.00	0.0	-4.55	1.67	-0.00	-0.60	4.30	0.00	0.00	4.90	7.5	1
Davit3	Davit3:V	Origin	7.10	31.00	0.01	4.95	-4.66	0.00	0.0	-4.20	2.33	-0.00	-0.56	4.30	0.00	0.00	4.85	7.5	1
Davit3	Davit3:End	End	9.10	31.04	0.01	6.24	-0.00	0.00	0.0	-4.20	2.33	-0.00	-0.61	0.00	0.71	0.00	1.37	2.1	3
Davit4	Davit4:O	Origin	0.00	30.03	0.01	-1.49	-26.49	-0.00	-0.0	3.76	3.15	0.00	0.38	13.92	0.00	0.00	14.29	22.0	1
Davit4	#Davit4:0	End	3.55	30.38	0.01	-4.04	-15.32	-0.00	-0.0	3.76	3.15	0.00	0.43	10.45	0.00	0.00	10.88	16.7	1
Davit4	#Davit4:0	Origin	3.55	30.38	0.01	-4.04	-15.32	-0.00	-0.0	3.78	3.03	0.00	0.43	10.45	0.00	0.00	10.88	16.7	1
Davit4	Davit4:V	End	7.10	30.74	0.01	-6.72	-4.57	-0.00	-0.0	3.78	3.03	0.00	0.50	4.21	0.00	0.00	4.71	7.2	1
Davit4	Davit4:V	Origin	7.10	30.74	0.01	-6.72	-4.57	-0.00	0.0	4.23	2.29	0.00	0.56	4.21	0.00	0.00	4.77	7.3	1
Davit4	Davit4:End	End	9.10	30.69	0.01	-8.27	-0.00	0.00	0.0	4.23	2.29	0.00	0.62	0.00	0.69	0.00	1.35	2.1	3
Davit5	Davit5:O	Origin	0.00	21.82	0.01	0.48	-17.14	0.00	0.0	-4.56	1.79	-0.00	-0.46	9.00	0.00	0.00	9.46	14.6	1
Davit5	#Davit5:0	End	3.55	22.23	0.01	2.57	-10.77	0.00	0.0	-4.56	1.79	-0.00	-0.52	7.35	0.00	0.00	7.87	12.1	1
Davit5	#Davit5:0	Origin	3.55	22.23	0.01	2.57	-10.77	0.00	0.0	-4.53	1.70	-0.00	-0.52	7.35	0.00	0.00	7.87	12.1	1
Davit5	Davit5:V	End	7.10	22.61	0.01	4.56	-4.73	0.00	0.0	-4.53	1.70	-0.00	-0.60	4.35	0.00	0.00	4.95	7.6	1
Davit5	Davit5:V	Origin	7.10	22.61	0.01	4.56	-4.73	0.00	0.0	-4.18	2.36	-0.00	-0.55	4.35	0.00	0.00	4.91	7.6	1
Davit5	Davit5:End	End	9.10	22.63	0.01	5.68	-0.00	0.00	0.0	-4.18	2.36	-0.00	-0.61	0.00	0.72	0.00	1.38	2.1	3
Davit6	Davit6:O	Origin	0.00	21.78	0.01	-1.25	-26.75	-0.00	-0.0	3.74	3.18	0.00	0.38	14.05	0.00	0.00	14.43	22.2	1
Davit6	#Davit6:0	End	3.55	22.09	0.01	-3.49	-15.48	-0.00	-0.0	3.74	3.18	0.00	0.43	10.56	0.00	0.00	10.99	16.9	1
Davit6	#Davit6:0	Origin	3.55	22.09	0.01	-3.49	-15.48	-0.00	-0.0	3.76	3.06	0.00	0.43	10.56	0.00	0.00	10.99	16.9	1

Davit6	Davit6:V	End	7.10	22.42	0.01	-5.87	-4.63	-0.00	-0.0	3.76	3.06	0.00	0.50	4.27	0.00	0.00	4.77	7.3	1
Davit6	Davit6:V	Origin	7.10	22.42	0.01	-5.87	-4.63	-0.00	0.0	4.21	2.32	0.00	0.56	4.27	0.00	0.00	4.83	7.4	1
Davit6	Davit6:End	End	9.10	22.38	0.01	-7.25	-0.00	0.00	0.0	4.21	2.32	0.00	0.61	0.00	0.70	0.00	1.36	2.1	3
Davit7	Davit7:O	Origin	0.00	14.79	0.01	0.58	-17.51	0.00	0.0	-4.54	1.84	-0.00	-0.46	9.20	0.00	0.00	9.66	14.9	1
Davit7	#Davit7:0	End	3.55	15.11	0.01	2.29	-11.00	0.00	0.0	-4.54	1.84	-0.00	-0.52	7.50	0.00	0.00	8.02	12.3	1
Davit7	#Davit7:0	Origin	3.55	15.11	0.01	2.29	-11.00	0.00	0.0	-4.52	1.75	-0.00	-0.52	7.50	0.00	0.00	8.02	12.3	1
Davit7	Davit7:V	End	7.10	15.41	0.01	3.90	-4.80	0.00	0.0	-4.52	1.75	-0.00	-0.60	4.43	0.00	0.00	5.02	7.7	1
Davit7	Davit7:V	Origin	7.10	15.41	0.01	3.90	-4.80	0.00	0.0	-4.16	2.40	-0.00	-0.55	4.43	0.00	0.00	4.98	7.7	1
Davit7	Davit7:End	End	9.10	15.43	0.01	4.79	-0.00	0.00	0.0	-4.16	2.40	-0.00	-0.61	0.00	0.73	0.00	1.40	2.2	3
Davit8	Davit8:O	Origin	0.00	14.76	0.01	-1.01	-27.07	-0.00	-0.0	3.71	3.21	0.00	0.37	14.22	0.00	0.00	14.59	22.4	1
Davit8	#Davit8:0	End	3.55	15.03	0.01	-2.87	-15.68	-0.00	-0.0	3.71	3.21	0.00	0.42	10.69	0.00	0.00	11.12	17.1	1
Davit8	#Davit8:0	Origin	3.55	15.03	0.01	-2.87	-15.68	-0.00	-0.0	3.73	3.09	0.00	0.43	10.69	0.00	0.00	11.12	17.1	1
Davit8	Davit8:V	End	7.10	15.31	0.01	-4.86	-4.71	-0.00	-0.0	3.73	3.09	0.00	0.49	4.34	0.00	0.00	4.83	7.4	1
Davit8	Davit8:V	Origin	7.10	15.31	0.01	-4.86	-4.71	-0.00	0.0	4.19	2.35	0.00	0.55	4.34	0.00	0.00	4.89	7.5	1
Davit8	Davit8:End	End	9.10	15.28	0.01	-6.03	-0.00	0.00	0.0	4.19	2.35	0.00	0.61	0.00	0.71	0.00	1.38	2.1	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	1.898	80.00	80.00	2.37
Clamp2	1.898	80.00	80.00	2.37
Clamp3	4.792	80.00	80.00	5.99
Clamp4	4.792	80.00	80.00	5.99
Clamp5	4.792	80.00	80.00	5.99
Clamp6	4.792	80.00	80.00	5.99
Clamp7	4.792	80.00	80.00	5.99
Clamp8	4.792	80.00	80.00	5.99
Clamp9	0.374	80.00	80.00	0.47
Clamp10	0.374	80.00	80.00	0.47
Clamp11	0.374	80.00	80.00	0.47
Clamp12	0.374	80.00	80.00	0.47
Clamp13	0.374	80.00	80.00	0.47
Clamp14	0.374	80.00	80.00	0.47
Clamp15	0.374	80.00	80.00	0.47
Clamp16	0.374	80.00	80.00	0.47
Clamp17	0.374	80.00	80.00	0.47
Clamp18	0.374	80.00	80.00	0.47
Clamp19	0.374	80.00	80.00	0.47
Clamp20	0.374	80.00	80.00	0.47
Clamp21	6.249	80.00	80.00	7.81
Clamp22	4.956	80.00	80.00	6.20

*** Analysis Results for Load Case No. 3 "NESC Extreme Ice w/ Wind" - Number of iterations in SAPS 14

Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme Ice w/ Wind":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
4008:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
4008:t	0.002315	1.782	-0.02218	-1.5214	0.0019	0.0000	0.002315	1.782	116.5
4008:AT&T	0.002299	1.768	-0.022	-1.5214	0.0019	0.0000	0.002299	1.768	116
4008:WVGD12	0.002266	1.742	-0.02163	-1.5210	0.0019	0.0000	0.002266	1.742	115
4008:TMobile	0.001971	1.504	-0.01833	-1.4918	0.0019	0.0000	0.001971	1.504	106
4008:WVGD11	0.001939	1.478	-0.01796	-1.4863	0.0019	0.0000	0.001939	1.478	105
4008:WVGD10	0.001621	1.225	-0.01445	-1.4070	0.0018	0.0000	0.001621	1.225	94.99
4008:Arm1	0.001606	1.213	-0.01429	-1.4039	0.0018	0.0000	0.001606	1.213	94.49
4008:Arm2	0.001374	1.029	-0.01188	-1.3451	0.0017	0.0000	0.001374	1.029	86.83
4008:WVGD9	0.001334	0.9977	-0.01146	-1.3323	0.0017	0.0000	0.001334	0.9977	85.49
4008:WVGD8	0.001039	0.7642	-0.008466	-1.2052	0.0015	0.0000	0.001039	0.7642	74.99
4008:Arm3	0.001021	0.7503	-0.008295	-1.1960	0.0015	0.0000	0.001021	0.7503	74.33
4008:WVGD7	0.0007853	0.5666	-0.006044	-1.0482	0.0014	0.0000	0.0007853	0.5666	64.99
4008:Arm4	0.000712	0.5101	-0.005392	-0.9930	0.0013	0.0000	0.000712	0.5101	61.83
4008:WVGD6	0.0005657	0.3988	-0.004107	-0.8640	0.0011	0.0000	0.0005657	0.3988	55
4008:WVGD5	0.0003838	0.2642	-0.002722	-0.6830	0.0009	0.0000	0.0003838	0.2642	45
4008:WVGD4	0.0002358	0.1584	-0.001774	-0.5254	0.0007	0.0000	0.0002358	0.1584	35
4008:WVGD3	0.0001222	0.07999	-0.001087	-0.3691	0.0005	0.0000	0.0001222	0.07999	25
4008:WVGD2	4.487e-005	0.02857	-0.0005826	-0.2170	0.0003	0.0000	4.487e-005	0.02857	15
4008:WVGD1	5.272e-006	0.00323	-0.000183	-0.0707	0.0001	0.0000	5.272e-006	0.00323	5
Davit1:O	0.001607	1.213	0.01369	-1.4039	0.0018	0.0000	0.001607	0.07181	94.51
Davit1:V	0.001624	1.225	0.07755	-1.1041	0.0018	0.0000	0.001624	-2.917	95.08
Davit1:End	0.001625	1.225	0.09652	-1.0834	0.0018	0.0000	0.001625	-3.917	95.1
Davit2:O	0.001605	1.213	-0.04226	-1.4039	0.0018	0.0000	0.001605	2.355	94.46
Davit2:V	0.001617	1.226	-0.1267	-1.7372	0.0018	0.0000	0.001617	5.367	94.87
Davit2:End	0.001616	1.225	-0.1573	-1.7578	0.0018	0.0000	0.001616	6.367	94.84
Davit3:O	0.001375	1.029	0.01736	-1.3451	0.0017	0.0000	0.001375	-0.2161	86.86
Davit3:V	0.001414	1.05	0.1362	-0.6862	0.0017	0.0000	0.001414	-7.195	88.15
Davit3:End	0.001415	1.05	0.1585	-0.6212	0.0017	0.0000	0.001415	-9.195	88.17
Davit4:O	0.001373	1.029	-0.04111	-1.3451	0.0017	0.0000	0.001373	2.274	86.8
Davit4:V	0.001401	1.061	-0.2551	-2.0524	0.0017	0.0000	0.001401	9.306	87.75
Davit4:End	0.001399	1.06	-0.3283	-2.1168	0.0017	0.0000	0.001399	11.31	87.68
Davit5:O	0.001022	0.7506	0.02123	-1.1960	0.0015	0.0000	0.001022	-0.6641	74.36
Davit5:V	0.001056	0.7683	0.1219	-0.5363	0.0015	0.0000	0.001056	-7.646	75.63
Davit5:End	0.001057	0.7684	0.1389	-0.4712	0.0015	0.0000	0.001057	-9.646	75.65
Davit6:O	0.00102	0.75	-0.03782	-1.1960	0.0015	0.0000	0.00102	2.165	74.3
Davit6:V	0.001046	0.7799	-0.2335	-1.9038	0.0015	-0.0000	0.001046	9.195	75.28
Davit6:End	0.001044	0.7788	-0.3016	-1.9682	0.0015	-0.0000	0.001044	11.19	75.21
Davit7:O	0.0007127	0.5104	0.02206	-0.9930	0.0013	0.0000	0.0007127	-1.074	61.86
Davit7:V	0.0007415	0.5236	0.09787	-0.3321	0.0013	0.0000	0.0007415	-8.06	63.11
Davit7:End	0.0007419	0.5236	0.1078	-0.2669	0.0013	0.0000	0.0007419	-10.06	63.12
Davit8:O	0.0007113	0.5099	-0.03284	-0.9930	0.0013	0.0000	0.0007113	2.094	61.81
Davit8:V	0.0007339	0.5363	-0.2037	-1.7015	0.0013	-0.0000	0.0007339	9.12	62.81
Davit8:End	0.0007326	0.5354	-0.2647	-1.7660	0.0013	-0.0000	0.0007326	11.12	62.74

Joint Support Reactions for Load Case "NESC Extreme Ice w/ Wind":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Comp. Force (kips)	Z 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 %

4008:g	-0.05	0.0	-20.07	0.0	0.0	-86.18	0.0	0.0	88.49	0.0	1642.64	0.0	-2.7	0.0	0.0	-0.00	0.0	0.0	

Detailed Steel Pole Usages for Load Case "NESC Extreme Ice w/ Wind":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
4008	4008:t	Origin	0.00	21.38	0.03	-0.27	-0.00	-0.00	0.0	-0.01	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
4008	4008:AT&T	End	0.50	21.22	0.03	-0.26	0.00	-0.00	0.0	-0.01	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
4008	4008:AT&T	Origin	0.50	21.22	0.03	-0.26	0.00	-0.00	0.0	-5.81	1.64	-0.00	-0.48	0.00	0.28	0.00	0.68	1.0	5
4008	4008:WVGD12	End	1.50	20.90	0.03	-0.26	1.64	-0.00	0.0	-5.81	1.64	-0.00	-0.47	0.31	0.07	0.00	0.80	1.2	2
4008	4008:WVGD12	Origin	1.50	20.90	0.03	-0.26	1.64	-0.00	0.0	-7.21	1.72	-0.00	-0.59	0.31	0.07	0.00	0.91	1.4	2
4008	Tube 1	End	6.00	19.47	0.03	-0.24	9.38	-0.01	0.0	-7.21	1.72	-0.00	-0.55	1.55	0.07	0.00	2.11	3.2	2
4008	Tube 1	Origin	6.00	19.47	0.03	-0.24	9.38	-0.01	0.0	-7.41	1.79	-0.00	-0.56	1.55	0.07	0.00	2.12	3.3	2
4008	4008:TMobile	End	10.50	18.05	0.02	-0.22	17.43	-0.02	0.0	-7.41	1.79	-0.00	-0.53	2.53	0.07	0.00	3.07	4.8	2
4008	4008:TMobile	Origin	10.50	18.05	0.02	-0.22	17.43	-0.02	-0.0	-12.73	3.14	-0.00	-0.91	2.53	0.12	0.00	3.45	5.4	2
4008	4008:WVGD11	End	11.50	17.74	0.02	-0.22	20.58	-0.02	-0.0	-12.73	3.14	-0.00	-0.90	2.91	0.12	0.00	3.81	6.0	2
4008	4008:WVGD11	Origin	11.50	17.74	0.02	-0.22	20.58	-0.02	0.0	-14.14	3.22	-0.00	-1.00	2.91	0.12	0.00	3.91	6.1	2
4008	Tube 1	End	16.00	16.35	0.02	-0.20	35.08	-0.04	0.0	-14.14	3.22	-0.00	-0.94	4.39	0.11	0.00	5.33	8.7	2
4008	Tube 1	Origin	16.00	16.35	0.02	-0.20	35.08	-0.04	0.0	-14.38	3.30	-0.01	-0.95	4.39	0.12	0.00	5.35	8.7	2
4008	SpliceT	End	20.50	15.00	0.02	-0.18	49.91	-0.06	0.0	-14.38	3.30	-0.01	-0.90	5.58	0.11	0.00	6.48	10.9	2
4008	SpliceT	Origin	20.50	15.00	0.02	-0.18	49.91	-0.06	-0.0	-14.54	3.34	-0.01	-0.54	3.33	0.07	0.00	3.88	6.0	2
4008	4008:WVGD10	End	21.50	14.71	0.02	-0.17	53.26	-0.07	-0.0	-14.54	3.34	-0.01	-0.54	3.47	0.07	0.00	4.01	6.2	2
4008	4008:WVGD10	Origin	21.50	14.71	0.02	-0.17	53.26	-0.07	-0.0	-15.89	3.39	-0.01	-0.59	3.47	0.07	0.00	4.06	6.2	2
4008	4008:Arm1	End	22.00	14.56	0.02	-0.17	54.95	-0.07	-0.0	-15.89	3.39	-0.01	-0.58	3.53	0.07	0.00	4.12	6.3	2
4008	4008:Arm1	Origin	22.00	14.56	0.02	-0.17	56.23	-0.07	0.0	-20.93	6.07	-0.01	-0.77	3.62	0.12	0.00	4.39	6.8	2
4008	Tube 2	End	25.83	13.44	0.02	-0.16	79.49	-0.10	0.0	-20.93	6.07	-0.01	-0.74	4.67	0.11	0.00	5.41	8.3	2
4008	Tube 2	Origin	25.83	13.44	0.02	-0.16	79.49	-0.10	0.0	-21.30	6.15	-0.01	-0.75	4.67	0.11	0.00	5.42	8.3	2
4008	4008:Arm2	End	29.66	12.35	0.02	-0.14	103.03	-0.13	0.0	-21.30	6.15	-0.01	-0.72	5.55	0.11	0.00	6.27	9.7	2
4008	4008:Arm2	Origin	29.66	12.35	0.02	-0.14	107.63	-0.13	0.0	-32.81	10.38	-0.01	-1.10	5.80	0.18	0.00	6.91	10.6	2
4008	4008:WVGD9	End	31.00	11.97	0.02	-0.14	121.53	-0.14	0.0	-32.81	10.38	-0.01	-1.09	6.36	0.18	0.00	7.46	11.5	2
4008	4008:WVGD9	Origin	31.00	11.97	0.02	-0.14	121.53	-0.14	0.0	-34.42	10.47	-0.01	-1.14	6.36	0.18	0.00	7.51	11.6	2
4008	Tube 2	End	36.00	10.60	0.01	-0.12	173.87	-0.20	0.0	-34.42	10.47	-0.01	-1.08	8.19	0.17	0.00	9.27	14.3	2
4008	Tube 2	Origin	36.00	10.60	0.01	-0.12	173.87	-0.20	0.0	-34.84	10.53	-0.01	-1.10	8.19	0.18	0.00	9.29	14.3	2
4008	Tube 2	End	38.75	9.88	0.01	-0.11	202.83	-0.23	0.0	-34.84	10.53	-0.01	-1.07	9.03	0.17	0.00	10.10	15.5	2
4008	Tube 2	Origin	38.75	9.88	0.01	-0.11	202.83	-0.23	0.0	-35.16	10.58	-0.01	-1.08	9.03	0.17	0.00	10.11	15.6	2
4008	4008:WVGD8	End	41.50	9.17	0.01	-0.10	231.93	-0.27	0.0	-35.16	10.58	-0.01	-1.05	9.78	0.17	0.00	10.83	16.7	2
4008	4008:WVGD8	Origin	41.50	9.17	0.01	-0.10	231.93	-0.27	0.0	-36.63	10.64	-0.01	-1.09	9.78	0.17	0.00	10.87	16.7	2
4008	4008:Arm3	End	42.16	9.00	0.01	-0.10	238.96	-0.28	0.0	-36.63	10.64	-0.01	-1.08	9.94	0.17	0.00	11.03	17.0	2
4008	4008:Arm3	Origin	42.16	9.00	0.01	-0.10	243.53	-0.28	0.0	-48.21	14.83	-0.02	-1.43	10.13	0.23	0.00	11.57	17.8	2
4008	Tube 2	End	46.83	7.87	0.01	-0.09	312.79	-0.35	0.0	-48.21	14.83	-0.02	-1.36	11.91	0.22	0.00	13.28	20.4	2
4008	Tube 2	Origin	46.83	7.87	0.01	-0.09	312.79	-0.35	0.0	-48.79	14.90	-0.02	-1.38	11.91	0.22	0.00	13.30	20.5	2
4008	4008:WVGD7	End	51.50	6.80	0.01	-0.07	382.34	-0.43	0.0	-48.79	14.90	-0.02	-1.32	13.38	0.21	0.00	14.71	22.6	2
4008	4008:WVGD7	Origin	51.50	6.80	0.01	-0.07	382.34	-0.43	0.0	-50.57	14.97	-0.02	-1.37	13.38	0.21	0.00	14.75	22.7	2
4008	4008:Arm4	End	54.66	6.12	0.01	-0.06	429.66	-0.49	0.0	-50.57	14.97	-0.02	-1.33	14.22	0.21	0.00	15.56	24.0	2
4008	4008:Arm4	Origin	54.66	6.12	0.01	-0.06	434.18	-0.49	0.0	-62.28	19.12	-0.02	-1.64	14.37	0.27	0.00	16.02	24.7	2
4008	Tube 2	End	58.08	5.43	0.01	-0.06	499.57	-0.56	0.0	-62.28	19.12	-0.02	-1.60	15.60	0.26	0.00	17.20	26.9	2
4008	Tube 2	Origin	58.08	5.43	0.01	-0.06	499.57	-0.56	0.0	-62.75	19.15	-0.02	-1.61	15.60	0.26	0.00	17.21	26.9	2
4008	4008:WVGD6	End	61.50	4.79	0.01	-0.05	565.06	-0.64	0.0	-62.75	19.15	-0.02	-1.56	16.67	0.25	0.00	18.24	28.9	2
4008	4008:WVGD6	Origin	61.50	4.79	0.01	-0.05	565.06	-0.64	0.0	-64.60	19.20	-0.02	-1.61	16.67	0.25	0.00	18.29	29.0	2
4008	SpliceT	End	66.00	4.01	0.01	-0.04	651.47	-0.75	0.0	-64.60	19.20	-0.02	-1.55	17.88	0.24	0.00	19.44	31.4	2
4008	SpliceT	Origin	66.00	4.01	0.01	-0.04	651.47	-0.75	0.0	-65.40	19.24	-0.03	-1.57	17.88	0.24	0.00	19.46	31.5	2
4008	Tube 2	End	68.75	3.58	0.01	-0.04	704.38	-0.82	0.0	-65.40	19.24	-0.03	-1.12	13.75	0.17	0.00	14.88	22.9	2
4008	Tube 2	Origin	68.75	3.58	0.01	-0.04	704.38	-0.82	0.0	-66.36	19.28	-0.03	-1.14	13.75	0.17	0.00	14.89	22.9	2
4008	4008:WVGD5	End	71.50	3.17	0.00	-0.03	757.39	-0.89	0.0	-66.36	19.28	-0.03	-1.11	14.17	0.17	0.00	15.28	23.5	2
4008	4008:WVGD5	Origin	71.50	3.17	0.00	-0.03	757.39	-0.89	0.0	-68.65	19.35	-0.03	-1.15	14.17	0.17	0.00	15.32	23.6	2

4008	Tube 3	End	76.50	2.49	0.00	-0.03	854.14	-1.04	0.0	-68.65	19.35	-0.03	-1.11	14.82	0.17	0.00	15.93	24.5	2
4008	Tube 3	Origin	76.50	2.49	0.00	-0.03	854.14	-1.04	0.0	-69.73	19.42	-0.03	-1.13	14.82	0.17	0.00	15.94	24.5	2
4008	4008:WVGD4	End	81.50	1.90	0.00	-0.02	951.24	-1.19	0.0	-69.73	19.42	-0.03	-1.09	15.34	0.16	0.00	16.43	25.3	2
4008	4008:WVGD4	Origin	81.50	1.90	0.00	-0.02	951.24	-1.19	0.0	-72.13	19.50	-0.03	-1.12	15.34	0.16	0.00	16.47	25.3	2
4008	Tube 3	End	86.50	1.39	0.00	-0.02	1048.76	-1.36	0.0	-72.13	19.50	-0.03	-1.08	15.77	0.15	0.00	16.85	25.9	2
4008	Tube 3	Origin	86.50	1.39	0.00	-0.02	1048.76	-1.36	0.0	-73.28	19.58	-0.04	-1.10	15.77	0.16	0.00	16.87	26.0	2
4008	4008:WVGD3	End	91.50	0.96	0.00	-0.01	1146.66	-1.54	0.0	-73.28	19.58	-0.04	-1.06	16.11	0.15	0.00	17.18	26.4	2
4008	4008:WVGD3	Origin	91.50	0.96	0.00	-0.01	1146.66	-1.54	0.0	-75.76	19.67	-0.04	-1.10	16.11	0.15	0.00	17.21	26.5	2
4008	Tube 3	End	96.50	0.61	0.00	-0.01	1244.99	-1.74	0.0	-75.76	19.67	-0.04	-1.07	16.38	0.15	0.00	17.45	26.8	2
4008	Tube 3	Origin	96.50	0.61	0.00	-0.01	1244.99	-1.74	0.0	-76.99	19.75	-0.04	-1.08	16.38	0.15	0.00	17.46	26.9	2
4008	4008:WVGD2	End	101.50	0.34	0.00	-0.01	1343.72	-1.95	0.0	-76.99	19.75	-0.04	-1.05	16.59	0.14	0.00	17.64	27.1	2
4008	4008:WVGD2	Origin	101.50	0.34	0.00	-0.01	1343.72	-1.95	0.0	-79.54	19.84	-0.04	-1.08	16.59	0.14	0.00	17.68	27.2	2
4008	Tube 3	End	106.50	0.15	0.00	-0.00	1442.91	-2.17	0.0	-79.54	19.84	-0.04	-1.05	16.75	0.14	0.00	17.80	27.7	2
4008	Tube 3	Origin	106.50	0.15	0.00	-0.00	1442.91	-2.17	0.0	-80.86	19.93	-0.05	-1.07	16.75	0.14	0.00	17.82	27.7	2
4008	4008:WVGD1	End	111.50	0.04	0.00	-0.00	1542.54	-2.41	0.0	-80.86	19.93	-0.05	-1.04	16.87	0.13	0.00	17.91	28.3	2
4008	4008:WVGD1	Origin	111.50	0.04	0.00	-0.00	1542.54	-2.41	0.0	-83.48	20.02	-0.05	-1.07	16.87	0.14	0.00	17.94	28.3	2
4008	4008:g	End	116.50	0.00	0.00	0.00	1642.64	-2.66	0.0	-83.48	20.02	-0.05	-1.04	16.95	0.13	0.00	17.99	28.9	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme Ice w/ Wind":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	14.56	0.02	0.16	-8.94	0.00	0.0	-1.69	2.16	-0.00	-0.46	21.32	0.00	0.00	21.78	33.5	1
Davit1	Davit1:V	End	3.04	14.70	0.02	0.93	-2.38	0.00	0.0	-1.69	2.16	-0.00	-0.46	5.68	0.00	0.00	6.14	9.5	1
Davit1	Davit1:V	Origin	3.04	14.70	0.02	0.93	-2.38	0.00	0.0	-1.31	2.38	-0.00	-0.36	5.68	0.00	0.00	6.04	9.3	1
Davit1	Davit1:End	End	4.04	14.70	0.02	1.16	-0.00	0.00	0.0	-1.31	2.38	-0.00	-0.36	0.00	1.35	0.00	2.37	3.6	3
Davit2	Davit2:O	Origin	0.00	14.55	0.02	-0.51	-10.22	-0.00	-0.0	0.92	2.58	0.00	0.25	24.37	0.00	0.00	24.62	37.9	1
Davit2	Davit2:V	End	3.04	14.71	0.02	-1.52	-2.37	-0.00	-0.0	0.92	2.58	0.00	0.25	5.65	0.00	0.00	5.90	9.1	1
Davit2	Davit2:V	Origin	3.04	14.71	0.02	-1.52	-2.37	-0.00	-0.0	1.33	2.37	0.00	0.36	5.65	0.00	0.00	6.01	9.2	1
Davit2	Davit2:End	End	4.04	14.70	0.02	-1.89	0.00	0.00	-0.0	1.33	2.37	0.00	0.36	0.00	1.34	0.00	2.35	3.6	3
Davit3	Davit3:O	Origin	0.00	12.35	0.02	0.21	-47.10	0.00	0.0	-2.96	5.15	-0.00	-0.30	24.74	0.00	0.00	25.04	38.5	1
Davit3	#Davit3:0	End	3.55	12.50	0.02	1.04	-28.81	0.00	0.0	-2.96	5.15	-0.00	-0.34	19.66	0.00	0.00	19.99	30.8	1
Davit3	#Davit3:0	Origin	3.55	12.50	0.02	1.04	-28.81	0.00	0.0	-2.91	5.07	-0.00	-0.33	19.66	0.00	0.00	19.99	30.8	1
Davit3	Davit3:V	End	7.10	12.60	0.02	1.63	-10.82	0.00	0.0	-2.91	5.07	-0.00	-0.39	9.97	0.00	0.00	10.36	15.9	1
Davit3	Davit3:V	Origin	7.10	12.60	0.02	1.63	-10.82	0.00	0.0	-2.02	5.41	-0.00	-0.27	9.97	0.00	0.00	10.24	15.8	1
Davit3	Davit3:End	End	9.10	12.61	0.02	1.90	-0.00	0.00	0.0	-2.02	5.41	-0.00	-0.29	0.00	1.64	0.00	2.86	4.4	3
Davit4	Davit4:O	Origin	0.00	12.34	0.02	-0.49	-51.70	-0.00	-0.0	1.17	5.83	0.00	0.12	27.16	0.00	0.00	27.28	42.0	1
Davit4	#Davit4:0	End	3.55	12.52	0.02	-1.64	-31.01	-0.00	-0.0	1.17	5.83	0.00	0.13	21.16	0.00	0.00	21.29	32.8	1
Davit4	#Davit4:0	Origin	3.55	12.52	0.02	-1.64	-31.01	-0.00	-0.0	1.22	5.72	0.00	0.14	21.16	0.00	0.00	21.29	32.8	1
Davit4	Davit4:V	End	7.10	12.73	0.02	-3.06	-10.72	-0.00	-0.0	1.22	5.72	0.00	0.16	9.88	0.00	0.00	10.04	15.4	1
Davit4	Davit4:V	Origin	7.10	12.73	0.02	-3.06	-10.72	-0.00	0.0	2.16	5.36	0.00	0.29	9.88	0.00	0.00	10.16	15.6	1
Davit4	Davit4:End	End	9.10	12.72	0.02	-3.94	0.00	0.00	0.0	2.16	5.36	0.00	0.31	0.00	1.63	0.00	2.83	4.4	3
Davit5	Davit5:O	Origin	0.00	9.01	0.01	0.25	-47.17	0.00	0.0	-2.95	5.16	-0.00	-0.30	24.78	0.00	0.00	25.07	38.6	1
Davit5	#Davit5:0	End	3.55	9.14	0.01	0.98	-28.85	0.00	0.0	-2.95	5.16	-0.00	-0.34	19.68	0.00	0.00	20.02	30.8	1
Davit5	#Davit5:0	Origin	3.55	9.14	0.01	0.98	-28.85	0.00	0.0	-2.90	5.08	-0.00	-0.33	19.68	0.00	0.00	20.01	30.8	1
Davit5	Davit5:V	End	7.10	9.22	0.01	1.46	-10.84	0.00	0.0	-2.90	5.08	-0.00	-0.38	9.98	0.00	0.00	10.37	16.0	1
Davit5	Davit5:V	Origin	7.10	9.22	0.01	1.46	-10.84	0.00	0.0	-2.01	5.42	-0.00	-0.27	9.98	0.00	0.00	10.25	15.8	1
Davit5	Davit5:End	End	9.10	9.22	0.01	1.67	-0.00	0.00	0.0	-2.01	5.42	-0.00	-0.29	0.00	1.64	0.00	2.86	4.4	3
Davit6	Davit6:O	Origin	0.00	9.00	0.01	-0.45	-51.74	-0.00	-0.0	1.15	5.83	0.00	0.12	27.18	0.00	0.00	27.29	42.0	1
Davit6	#Davit6:0	End	3.55	9.16	0.01	-1.49	-31.03	-0.00	-0.0	1.15	5.83	0.00	0.13	21.17	0.00	0.00	21.30	32.8	1
Davit6	#Davit6:0	Origin	3.55	9.16	0.01	-1.49	-31.03	-0.00	-0.0	1.20	5.72	0.00	0.14	21.17	0.00	0.00	21.31	32.8	1

Davit6	Davit6:V	End	7.10	9.36	0.01	-2.80	-10.73	-0.00	-0.0	1.20	5.72	0.00	0.16	9.89	0.00	0.00	10.05	15.5	1
Davit6	Davit6:V	Origin	7.10	9.36	0.01	-2.80	-10.73	-0.00	0.0	2.14	5.36	0.00	0.28	9.89	0.00	0.00	10.17	15.6	1
Davit6	Davit6:End	End	9.10	9.35	0.01	-3.62	0.00	0.00	0.0	2.14	5.36	0.00	0.31	0.00	1.63	0.00	2.84	4.4	3
Davit7	Davit7:O	Origin	0.00	6.12	0.01	0.26	-47.26	0.00	0.0	-2.93	5.17	-0.00	-0.29	24.82	0.00	0.00	25.12	38.6	1
Davit7	#Davit7:0	End	3.55	6.23	0.01	0.84	-28.90	0.00	0.0	-2.93	5.17	-0.00	-0.33	19.72	0.00	0.00	20.05	30.8	1
Davit7	#Davit7:0	Origin	3.55	6.23	0.01	0.84	-28.90	0.00	0.0	-2.88	5.09	-0.00	-0.33	19.72	0.00	0.00	20.04	30.8	1
Davit7	Davit7:V	End	7.10	6.28	0.01	1.17	-10.85	0.00	0.0	-2.88	5.09	-0.00	-0.38	10.00	0.00	0.00	10.38	16.0	1
Davit7	Davit7:V	Origin	7.10	6.28	0.01	1.17	-10.85	0.00	0.0	-1.99	5.42	-0.00	-0.26	10.00	0.00	0.00	10.26	15.8	1
Davit7	Davit7:End	End	9.10	6.28	0.01	1.29	-0.00	0.00	0.0	-1.99	5.42	-0.00	-0.29	0.00	1.65	0.00	2.87	4.4	3
Davit8	Davit8:O	Origin	0.00	6.12	0.01	-0.39	-51.78	-0.00	-0.0	1.13	5.84	0.00	0.11	27.20	0.00	0.00	27.31	42.0	1
Davit8	#Davit8:0	End	3.55	6.26	0.01	-1.29	-31.06	-0.00	-0.0	1.13	5.84	0.00	0.13	21.19	0.00	0.00	21.32	32.8	1
Davit8	#Davit8:0	Origin	3.55	6.26	0.01	-1.29	-31.06	-0.00	-0.0	1.18	5.73	0.00	0.14	21.19	0.00	0.00	21.33	32.8	1
Davit8	Davit8:V	End	7.10	6.44	0.01	-2.44	-10.74	-0.00	-0.0	1.18	5.73	0.00	0.16	9.90	0.00	0.00	10.06	15.5	1
Davit8	Davit8:V	Origin	7.10	6.44	0.01	-2.44	-10.74	-0.00	0.0	2.12	5.37	0.00	0.28	9.90	0.00	0.00	10.18	15.7	1
Davit8	Davit8:End	End	9.10	6.42	0.01	-3.18	0.00	0.00	0.0	2.12	5.37	0.00	0.31	0.00	1.63	0.00	2.84	4.4	3

Summary of Clamp Capacities and Usages for Load Case "NESC Extreme Ice w/ Wind":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	2.711	80.00	80.00	3.39
Clamp2	2.711	80.00	80.00	3.39
Clamp3	5.754	80.00	80.00	7.19
Clamp4	5.754	80.00	80.00	7.19
Clamp5	5.754	80.00	80.00	7.19
Clamp6	5.754	80.00	80.00	7.19
Clamp7	5.754	80.00	80.00	7.19
Clamp8	5.754	80.00	80.00	7.19
Clamp9	1.275	80.00	80.00	1.59
Clamp10	1.275	80.00	80.00	1.59
Clamp11	1.275	80.00	80.00	1.59
Clamp12	1.275	80.00	80.00	1.59
Clamp13	1.275	80.00	80.00	1.59
Clamp14	1.275	80.00	80.00	1.59
Clamp15	1.275	80.00	80.00	1.59
Clamp16	1.275	80.00	80.00	1.59
Clamp17	1.275	80.00	80.00	1.59
Clamp18	1.275	80.00	80.00	1.59
Clamp19	1.275	80.00	80.00	1.59
Clamp20	1.275	80.00	80.00	1.59
Clamp21	5.997	80.00	80.00	7.50
Clamp22	5.359	80.00	80.00	6.70

*** 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)
4008	71.83	NESC Extreme	23	20879.9

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 %
4008	NESC Heavy	1	2.272	1.454	0.450	2.506	25.252	15.666	49.450	3	74.236	1.679	3.000	31.33
4008	NESC Heavy	2	2.506	0.450	1.454	2.272	25.252	10.103	31.889	3	63.936	1.349	3.000	20.21
4008	NESC Heavy	3	2.395	-1.073	2.395	1.073	25.762	3.602	11.599	3	27.354	0.805	3.000	7.20
4008	NESC Heavy	4	1.454	-2.272	2.506	-0.450	25.252	7.845	24.763	3	-54.390	1.188	3.000	15.69
4008	NESC Heavy	5	0.450	-2.506	2.272	-1.454	25.252	13.372	42.209	3	-64.556	1.551	3.000	26.74
4008	NESC Heavy	6	-1.073	-2.395	1.073	-2.395	25.762	16.277	52.416	3	-68.072	1.712	3.000	32.55
4008	NESC Heavy	7	-2.272	-1.454	-0.450	-2.506	25.252	13.313	42.020	3	-64.406	1.548	3.000	26.63
4008	NESC Heavy	8	-2.506	-0.450	-1.454	-2.272	25.252	7.749	24.459	3	-54.106	1.181	3.000	15.50
4008	NESC Heavy	9	-2.395	1.073	-2.395	-1.073	25.762	3.655	11.771	3	27.815	0.811	3.000	7.31
4008	NESC Heavy	10	-1.454	2.272	-2.506	0.450	25.252	10.199	32.193	3	64.221	1.355	3.000	20.40
4008	NESC Heavy	11	-0.450	2.506	-2.272	1.454	25.252	15.726	49.638	3	74.387	1.682	3.000	31.45
4008	NESC Heavy	12	1.073	2.395	-1.073	2.395	25.762	18.698	60.213	3	77.902	1.835	3.000	37.40
4008	NESC Heavy	13	1.679	2.118	-0.216	2.625	23.542	13.379	39.371	3	77.902	1.552	3.000	26.76
4008	NESC Heavy	14	2.229	1.278	1.278	2.229	16.142	13.151	26.535	2	63.936	1.539	3.000	26.30
4008	NESC Heavy	15	2.625	-0.216	2.118	1.679	23.542	4.233	12.457	3	47.569	0.873	3.000	8.47
4008	NESC Heavy	16	2.118	-1.679	2.625	0.216	23.542	3.091	9.097	3	-38.132	0.746	3.000	6.18
4008	NESC Heavy	17	1.278	-2.229	2.229	-1.278	16.142	10.912	22.018	2	-54.390	1.401	3.000	21.82
4008	NESC Heavy	18	-0.216	-2.625	1.679	-2.118	23.542	11.617	34.185	3	-68.072	1.446	3.000	23.23
4008	NESC Heavy	19	-1.679	-2.118	0.216	-2.625	23.542	11.594	34.119	3	-68.072	1.445	3.000	23.19
4008	NESC Heavy	20	-2.229	-1.278	-1.278	-2.229	16.142	10.832	21.857	2	-54.106	1.396	3.000	21.66
4008	NESC Heavy	21	-2.625	0.216	-2.118	-1.679	23.542	3.067	9.024	3	-37.739	0.743	3.000	6.13
4008	NESC Heavy	22	-2.118	1.679	-2.625	-0.216	23.542	4.316	12.701	3	47.962	0.881	3.000	8.63
4008	NESC Heavy	23	-1.278	2.229	-2.229	1.278	16.142	13.231	26.697	2	64.221	1.543	3.000	26.46
4008	NESC Heavy	24	0.216	2.625	-1.679	2.118	23.542	13.401	39.437	3	77.902	1.553	3.000	26.80
4008	NESC Extreme	1	2.272	1.454	0.450	2.506	25.252	29.268	92.382	3	139.571	2.295	3.000	58.54
4008	NESC Extreme	2	2.506	0.450	1.454	2.272	25.252	18.294	57.745	3	119.311	1.815	3.000	36.59
4008	NESC Extreme	3	2.395	-1.073	2.395	1.073	25.762	6.355	20.467	3	47.104	1.070	3.000	12.71
4008	NESC Extreme	4	1.454	-2.272	2.506	-0.450	25.252	17.205	54.306	3	-114.724	1.760	3.000	34.41
4008	NESC Extreme	5	0.450	-2.506	2.272	-1.454	25.252	28.167	88.907	3	-134.942	2.252	3.000	56.33
4008	NESC Extreme	6	-1.073	-2.395	1.073	-2.395	25.762	34.012	109.529	3	-142.021	2.474	3.000	68.02
4008	NESC Extreme	7	-2.272	-1.454	-0.450	-2.506	25.252	28.148	88.848	3	-134.895	2.251	3.000	56.30
4008	NESC Extreme	8	-2.506	-0.450	-1.454	-2.272	25.252	17.175	54.211	3	-114.635	1.758	3.000	34.35
4008	NESC Extreme	9	-2.395	1.073	-2.395	-1.073	25.762	6.372	20.520	3	47.248	1.071	3.000	12.74
4008	NESC Extreme	10	-1.454	2.272	-2.506	0.450	25.252	18.324	57.840	3	119.400	1.816	3.000	36.65
4008	NESC Extreme	11	-0.450	2.506	-2.272	1.454	25.252	29.286	92.441	3	139.618	2.296	3.000	58.57
4008	NESC Extreme	12	1.073	2.395	-1.073	2.395	25.762	35.164	113.238	3	146.697	2.516	3.000	70.33
4008	NESC Extreme	13	1.679	2.118	-0.216	2.625	23.542	25.140	73.980	3	146.697	2.127	3.000	50.28
4008	NESC Extreme	14	2.229	1.278	1.278	2.229	16.142	24.336	49.104	2	119.311	2.093	3.000	48.67
4008	NESC Extreme	15	2.625	-0.216	2.118	1.679	23.542	7.101	20.897	3	87.030	1.131	3.000	14.20
4008	NESC Extreme	16	2.118	-1.679	2.625	0.216	23.542	6.549	19.273	3	-82.477	1.086	3.000	13.10
4008	NESC Extreme	17	1.278	-2.229	2.229	-1.278	16.142	23.258	46.929	2	-114.724	2.046	3.000	46.52

4008	NESC Extreme	18	-0.216	-2.625	1.679	-2.118	23.542	24.298	71.503	3	-142.021	2.091	3.000	48.60
4008	NESC Extreme	19	-1.679	-2.118	0.216	-2.625	23.542	24.291	71.482	3	-142.021	2.091	3.000	48.58
4008	NESC Extreme	20	-2.229	-1.278	-1.278	-2.229	16.142	23.233	46.878	2	-114.635	2.045	3.000	46.47
4008	NESC Extreme	21	-2.625	0.216	-2.118	-1.679	23.542	6.542	19.250	3	-82.354	1.085	3.000	13.08
4008	NESC Extreme	22	-2.118	1.679	-2.625	-0.216	23.542	7.127	20.973	3	87.152	1.133	3.000	14.25
4008	NESC Extreme	23	-1.278	2.229	-2.229	1.278	16.142	24.361	49.154	2	119.400	2.094	3.000	48.72
4008	NESC Extreme	24	0.216	2.625	-1.679	2.118	23.542	25.147	74.001	3	146.697	2.128	3.000	50.29
4008	NESC Extreme Ice w/ Wind	1	2.272	1.454	0.450	2.506	25.252	12.868	40.616	3	60.921	1.522	3.000	25.74
4008	NESC Extreme Ice w/ Wind	2	2.506	0.450	1.454	2.272	25.252	8.326	26.281	3	52.527	1.224	3.000	16.65
4008	NESC Extreme Ice w/ Wind	3	2.395	-1.073	2.395	1.073	25.762	2.977	9.587	3	22.653	0.732	3.000	5.95
4008	NESC Extreme Ice w/ Wind	4	1.454	-2.272	2.506	-0.450	25.252	6.349	20.041	3	-44.224	1.069	3.000	12.70
4008	NESC Extreme Ice w/ Wind	5	0.450	-2.506	2.272	-1.454	25.252	10.876	34.330	3	-52.564	1.399	3.000	21.75
4008	NESC Extreme Ice w/ Wind	6	-1.073	-2.395	1.073	-2.395	25.762	13.262	42.708	3	-55.470	1.545	3.000	26.52
4008	NESC Extreme Ice w/ Wind	7	-2.272	-1.454	-0.450	-2.506	25.252	10.852	34.255	3	-52.504	1.398	3.000	21.70
4008	NESC Extreme Ice w/ Wind	8	-2.506	-0.450	-1.454	-2.272	25.252	6.311	19.920	3	-44.110	1.066	3.000	12.62
4008	NESC Extreme Ice w/ Wind	9	-2.395	1.073	-2.395	-1.073	25.762	2.998	9.656	3	22.836	0.735	3.000	6.00
4008	NESC Extreme Ice w/ Wind	10	-1.454	2.272	-2.506	0.450	25.252	8.365	26.402	3	52.641	1.227	3.000	16.73
4008	NESC Extreme Ice w/ Wind	11	-0.450	2.506	-2.272	1.454	25.252	12.891	40.691	3	60.981	1.523	3.000	25.78
4008	NESC Extreme Ice w/ Wind	12	1.073	2.395	-1.073	2.395	25.762	15.335	49.384	3	63.887	1.661	3.000	30.67
4008	NESC Extreme Ice w/ Wind	13	1.679	2.118	-0.216	2.625	23.542	10.978	32.307	3	63.887	1.406	3.000	21.96
4008	NESC Extreme Ice w/ Wind	14	2.229	1.278	1.278	2.229	16.142	10.815	21.821	2	52.527	1.395	3.000	21.63
4008	NESC Extreme Ice w/ Wind	15	2.625	-0.216	2.118	1.679	23.542	3.513	10.338	3	39.167	0.795	3.000	7.03
4008	NESC Extreme Ice w/ Wind	16	2.118	-1.679	2.625	0.216	23.542	2.511	7.389	3	-30.907	0.672	3.000	5.02
4008	NESC Extreme Ice w/ Wind	17	1.278	-2.229	2.229	-1.278	16.142	8.861	17.879	2	-44.224	1.263	3.000	17.72
4008	NESC Extreme Ice w/ Wind	18	-0.216	-2.625	1.679	-2.118	23.542	9.459	27.836	3	-55.470	1.305	3.000	18.92
4008	NESC Extreme Ice w/ Wind	19	-1.679	-2.118	0.216	-2.625	23.542	9.450	27.810	3	-55.470	1.304	3.000	18.90
4008	NESC Extreme Ice w/ Wind	20	-2.229	-1.278	-1.278	-2.229	16.142	8.829	17.815	2	-44.110	1.261	3.000	17.66
4008	NESC Extreme Ice w/ Wind	21	-2.625	0.216	-2.118	-1.679	23.542	2.501	7.360	3	-30.751	0.671	3.000	5.00
4008	NESC Extreme Ice w/ Wind	22	-2.118	1.679	-2.625	-0.216	23.542	3.546	10.435	3	39.324	0.799	3.000	7.09
4008	NESC Extreme Ice w/ Wind	23	-1.278	2.229	-2.229	1.278	16.142	10.846	21.885	2	52.641	1.397	3.000	21.69
4008	NESC Extreme Ice w/ Wind	24	0.216	2.625	-1.679	2.118	23.542	10.987	32.333	3	63.887	1.406	3.000	21.97

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	33.51	NESC Extreme Ice w/ Wind	1	50.3
Davit2	37.88	NESC Extreme Ice w/ Wind	1	50.3
Davit3	41.57	NESC Heavy	1	260.4
Davit4	45.89	NESC Heavy	1	260.4
Davit5	41.64	NESC Heavy	1	260.4
Davit6	45.93	NESC Heavy	1	260.4
Davit7	41.74	NESC Heavy	1	260.4
Davit8	45.98	NESC Heavy	1	260.4

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	45.98	Davit8	Tubular Davit
NESC Extreme	71.83	4008	Steel Pole
NESC Extreme Ice w/ Wind	42.02	Davit8	Tubular Davit

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Steel Pole Segment Usage %	Label	Segment Number
NESC Heavy	37.45	4008	23
NESC Extreme	71.83	4008	23
NESC Extreme Ice w/ Wind	31.47	4008	23

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	4008	12	25.762	98.304	2008.951	-6.674	18.698	60.213	3	77.902	1.835	37.40
NESC Extreme	4008	12	25.762	46.756	3973.451	-2.083	35.164	113.238	3	146.697	2.516	70.33
NESC Extreme Ice w/ Wind	4008	12	25.762	84.169	1642.637	-2.659	15.335	49.384	3	63.887	1.661	30.67

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Tubular Davit Segment Usage %	Label	Segment Number
NESC Heavy	45.98	Davit8	1
NESC Extreme	22.45	Davit8	1
NESC Extreme Ice w/ Wind	42.02	Davit8	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	3.39	NESC Extreme Ice w/ Wind	0.0
Clamp2	Clamp	3.39	NESC Extreme Ice w/ Wind	0.0
Clamp3	Clamp	7.91	NESC Heavy	0.0
Clamp4	Clamp	7.91	NESC Heavy	0.0
Clamp5	Clamp	7.91	NESC Heavy	0.0
Clamp6	Clamp	7.91	NESC Heavy	0.0
Clamp7	Clamp	7.91	NESC Heavy	0.0
Clamp8	Clamp	7.91	NESC Heavy	0.0
Clamp9	Clamp	1.72	NESC Heavy	0.0
Clamp10	Clamp	1.72	NESC Heavy	0.0
Clamp11	Clamp	1.72	NESC Heavy	0.0
Clamp12	Clamp	1.72	NESC Heavy	0.0
Clamp13	Clamp	1.72	NESC Heavy	0.0
Clamp14	Clamp	1.72	NESC Heavy	0.0
Clamp15	Clamp	1.72	NESC Heavy	0.0
Clamp16	Clamp	1.72	NESC Heavy	0.0
Clamp17	Clamp	1.72	NESC Heavy	0.0
Clamp18	Clamp	1.72	NESC Heavy	0.0
Clamp19	Clamp	1.72	NESC Heavy	0.0
Clamp20	Clamp	1.72	NESC Heavy	0.0
Clamp21	Clamp	7.85	NESC Heavy	0.0
Clamp22	Clamp	6.85	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	1.430	2.200	2.624
NESC Heavy	Clamp2	Clamp	Davit2:End	0.000	1.430	2.200	2.624
NESC Heavy	Clamp3	Clamp	Davit3:End	0.000	2.440	5.840	6.329
NESC Heavy	Clamp4	Clamp	Davit4:End	0.000	2.440	5.840	6.329
NESC Heavy	Clamp5	Clamp	Davit5:End	0.000	2.440	5.840	6.329
NESC Heavy	Clamp6	Clamp	Davit6:End	0.000	2.440	5.840	6.329
NESC Heavy	Clamp7	Clamp	Davit7:End	0.000	2.440	5.840	6.329
NESC Heavy	Clamp8	Clamp	Davit8:End	0.000	2.440	5.840	6.329
NESC Heavy	Clamp9	Clamp	4008:WVGD1	0.000	0.000	1.380	1.380
NESC Heavy	Clamp10	Clamp	4008:WVGD2	0.000	0.000	1.380	1.380
NESC Heavy	Clamp11	Clamp	4008:WVGD3	0.000	0.000	1.380	1.380
NESC Heavy	Clamp12	Clamp	4008:WVGD4	0.000	0.000	1.380	1.380
NESC Heavy	Clamp13	Clamp	4008:WVGD5	0.000	0.000	1.380	1.380
NESC Heavy	Clamp14	Clamp	4008:WVGD6	0.000	0.000	1.380	1.380
NESC Heavy	Clamp15	Clamp	4008:WVGD7	0.000	0.000	1.380	1.380
NESC Heavy	Clamp16	Clamp	4008:WVGD8	0.000	0.000	1.380	1.380
NESC Heavy	Clamp17	Clamp	4008:WVGD9	0.000	0.000	1.380	1.380
NESC Heavy	Clamp18	Clamp	4008:WVGD10	0.000	0.000	1.380	1.380
NESC Heavy	Clamp19	Clamp	4008:WVGD11	0.000	0.000	1.380	1.380
NESC Heavy	Clamp20	Clamp	4008:WVGD12	0.000	0.000	1.380	1.380
NESC Heavy	Clamp21	Clamp	4008:AT&T	0.000	1.532	6.089	6.279
NESC Heavy	Clamp22	Clamp	4008:TMobile	0.000	1.184	5.350	5.479
NESC Extreme	Clamp1	Clamp	Davit1:End	0.000	1.780	0.660	1.898
NESC Extreme	Clamp2	Clamp	Davit2:End	0.000	1.780	0.660	1.898
NESC Extreme	Clamp3	Clamp	Davit3:End	0.000	4.070	2.530	4.792
NESC Extreme	Clamp4	Clamp	Davit4:End	0.000	4.070	2.530	4.792
NESC Extreme	Clamp5	Clamp	Davit5:End	0.000	4.070	2.530	4.792
NESC Extreme	Clamp6	Clamp	Davit6:End	0.000	4.070	2.530	4.792
NESC Extreme	Clamp7	Clamp	Davit7:End	0.000	4.070	2.530	4.792
NESC Extreme	Clamp8	Clamp	Davit8:End	0.000	4.070	2.530	4.792
NESC Extreme	Clamp9	Clamp	4008:WVGD1	0.000	0.000	0.374	0.374
NESC Extreme	Clamp10	Clamp	4008:WVGD2	0.000	0.000	0.374	0.374
NESC Extreme	Clamp11	Clamp	4008:WVGD3	0.000	0.000	0.374	0.374
NESC Extreme	Clamp12	Clamp	4008:WVGD4	0.000	0.000	0.374	0.374
NESC Extreme	Clamp13	Clamp	4008:WVGD5	0.000	0.000	0.374	0.374
NESC Extreme	Clamp14	Clamp	4008:WVGD6	0.000	0.000	0.374	0.374
NESC Extreme	Clamp15	Clamp	4008:WVGD7	0.000	0.000	0.374	0.374
NESC Extreme	Clamp16	Clamp	4008:WVGD8	0.000	0.000	0.374	0.374
NESC Extreme	Clamp17	Clamp	4008:WVGD9	0.000	0.000	0.374	0.374
NESC Extreme	Clamp18	Clamp	4008:WVGD10	0.000	0.000	0.374	0.374
NESC Extreme	Clamp19	Clamp	4008:WVGD11	0.000	0.000	0.374	0.374
NESC Extreme	Clamp20	Clamp	4008:WVGD12	0.000	0.000	0.374	0.374
NESC Extreme	Clamp21	Clamp	4008:AT&T	0.000	5.678	2.609	6.249
NESC Extreme	Clamp22	Clamp	4008:TMobile	0.000	4.406	2.270	4.956
NESC Extreme Ice w/ Wind	Clamp1	Clamp	Davit1:End	0.000	1.260	2.400	2.711
NESC Extreme Ice w/ Wind	Clamp2	Clamp	Davit2:End	0.000	1.260	2.400	2.711
NESC Extreme Ice w/ Wind	Clamp3	Clamp	Davit3:End	0.000	1.960	5.410	5.754
NESC Extreme Ice w/ Wind	Clamp4	Clamp	Davit4:End	0.000	1.960	5.410	5.754
NESC Extreme Ice w/ Wind	Clamp5	Clamp	Davit5:End	0.000	1.960	5.410	5.754
NESC Extreme Ice w/ Wind	Clamp6	Clamp	Davit6:End	0.000	1.960	5.410	5.754
NESC Extreme Ice w/ Wind	Clamp7	Clamp	Davit7:End	0.000	1.960	5.410	5.754
NESC Extreme Ice w/ Wind	Clamp8	Clamp	Davit8:End	0.000	1.960	5.410	5.754

NESC Extreme Ice w/ Wind	Clamp9	Clamp	4008:WVGD1	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp10	Clamp	4008:WVGD2	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp11	Clamp	4008:WVGD3	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp12	Clamp	4008:WVGD4	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp13	Clamp	4008:WVGD5	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp14	Clamp	4008:WVGD6	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp15	Clamp	4008:WVGD7	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp16	Clamp	4008:WVGD8	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp17	Clamp	4008:WVGD9	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp18	Clamp	4008:WVGD10	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp19	Clamp	4008:WVGD11	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp20	Clamp	4008:WVGD12	0.000	0.000	1.275	1.275
NESC Extreme Ice w/ Wind	Clamp21	Clamp	4008:AT&T	0.000	1.473	5.813	5.997
NESC Extreme Ice w/ Wind	Clamp22	Clamp	4008:TMobile	0.000	1.172	5.229	5.359

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	20.216	0.000	67.439	1680.368	-0.000	-0.000
NESC Extreme	38.064	0.000	25.867	3307.814	-0.000	-0.000
NESC Extreme Ice w/ Wind	16.925	0.000	63.602	1422.486	-0.000	-0.000

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 1663.2
Weight of Steel Poles: 20879.9
Total: 22543.1

*** End of Report

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Subject:	Anchor Bolt Analysis CL&P Pole #4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.014

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force = $T_{Max} := 147 \cdot kips$ (User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = $N := 20$ (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 = $\frac{T_{Max}}{T_{ALL.Net}} = 60.35 \cdot \%$

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

Condition1 = "OK"

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Subject:	CAISSON FOUNDATION - CL&P POLE # 4008
Location:	Hamden, CT
Rev. 1: 10/22/14	Prepared by: TJL Checked by: C.F.C. Job No. 14025.014

Caisson Foundation:

Input Data:

Shear Force =	S := 50.09·1.1k = 55.1·k	*USER INPUT-FROM PLS-Pole*
Overturning Moment =	M := 3973.45·1.1ft·k = 4371·ft·k	*USER INPUT-FROM PLS-Pole*
Applied Axial Load =	A1 := 48.77·1.1k = 53.6·k	*USER INPUT-FROM PLS-Pole*
Bending Moment =	Mu := 4626.2ft·k	*USER INPUT–FROM LPILE*
Moment Capacity =	Mn := 9836.6ft·k	*USER INPUT–FROM LPILE*
Foundation Diameter =	d := 8.0ft	*USER INPUT*
Overall Length of Caisson =	L_c := 27.5ft	*USER INPUT*
Depth From Top of Caisson to Grade =	L_{pag} := 0.5ft	*USER INPUT*
Number of Rebar =	n := 30	*USER INPUT*
Area of Rebar =	Ar := $1.56in^2$	*USER INPUT*
Rebar Yield Strength =	fy := 60ksi	*USER INPUT*
Concrete Comp Strength =	f'c := 3.5ksi	*USER INPUT*

Check Moment Capacity:

Factor of Safety =	$FS := \frac{Mn}{Mu} = 2.1$
Factor of Safety Required =	$FS_{reqd} := 1.0$

FOSCheck := if(FS ≥ FS_{reqd}, "OK", "NO GOOD")

FOSCheck = "OK"

LPILE Plus for Windows, Version 5.0 (5.0.47)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

TJL
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Files Used for Analysis

Path to file locations: J:\Jobs\1402500.WI\014 - CTNH221A\Backup Documentation\Rev (1)\L-Pile\
Name of input data file: Caisson Analysis.lpd
Name of output file: Caisson Analysis.lpo
Name of plot output file: Caisson Analysis.lpp
Name of runtime file: Caisson Analysis.lpr

Time and Date of Analysis

Date: October 22, 2014 Time: 9:32:48

Problem Title

14025.014 / CTNH221A / CL&P # 4008

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output summary table of values for pile-head deflection, maximum bending moment, and shear force only
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Only summary tables of pile-head deflection, maximum bending moment, and maximum shear force are to be printed in output file.

Pile Structural Properties and Geometry

Pile Length = 330.00 in

Depth of ground surface below top of pile = 6.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	96.00000000	4169220.	7238.2000	3300000.
2	330.0000	96.00000000	4169220.	7238.2000	3300000.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 6.000 in
Distance from top of pile to bottom of layer = 48.000 in
p-y subgrade modulus k for top of soil layer = 12.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 12.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 48.000 in
Distance from top of pile to bottom of layer = 228.000 in
p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 228.000 in
Distance from top of pile to bottom of layer = 246.000 in
p-y subgrade modulus k for top of soil layer = 20.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 20.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 246.000 in
Distance from top of pile to bottom of layer = 294.000 in
p-y subgrade modulus k for top of soil layer = 20.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 20.000 lbs/in**3

Layer 5 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 294.000 in
Distance from top of pile to bottom of layer = 414.000 in
p-y subgrade modulus k for top of soil layer = 20.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 20.000 lbs/in**3

(Depth of lowest layer extends 84.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 10 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	6.00	0.05800
2	48.00	0.05800
3	48.00	0.07200
4	228.00	0.07200
5	228.00	0.03600
6	246.00	0.03600
7	246.00	0.03600
8	294.00	0.03600
9	294.00	0.03600
10	414.00	0.03600

Shear Strength of Soils

Shear strength parameters with depth defined using 10 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	6.000	0.00000	20.00	------	------
2	48.000	0.00000	20.00	------	------
3	48.000	0.00000	32.00	------	------

4	228.000	0.00000	32.00	------	------
5	228.000	0.00000	32.00	------	------
6	246.000	0.00000	32.00	------	------
7	246.000	0.00000	32.00	------	------
8	294.000	0.00000	32.00	------	------
9	294.000	0.00000	32.00	------	------
10	414.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 55099.000 lbs
Bending moment at pile head = 52449540.000 in-lbs
Axial load at pile head = 53647.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 96.0000 in

Material Properties:

Compressive Strength of Concrete = 3.500 kip/in**2
Yield Stress of Reinforcement = 60. kip/in**2
Modulus of Elasticity of Reinforcement = 29000. kip/in**2
Number of Reinforcing Bars = 30
Area of Single Bar = 1.56000 in**2
Number of Rows of Reinforcing Bars = 15
Area of Steel = 46.800 in**2
Area of Shaft = 7238.229 in**2
Percentage of Steel Reinforcement = 0.647 percent
Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 24202.50 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	3.120	43.759
2	3.120	41.846
3	3.120	38.105
4	3.120	32.698
5	3.120	25.863
6	3.120	17.896
7	3.120	9.148
8	3.120	0.000

9	3.120	-9.148
10	3.120	-17.896
11	3.120	-25.863
12	3.120	-32.698
13	3.120	-38.105
14	3.120	-41.846
15	3.120	-43.759

Axial Thrust Force = 53647.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
9655267.	1.544843E+13	6.250000E-07	0.00003219	51.49963903	106.81566	856.56217
19207939.	1.536635E+13	0.00000125	0.00006230	49.84122133	204.87796	1653.00670
28658442.	1.528450E+13	0.00000188	0.00009246	49.31069899	301.36935	2450.66289
38003899.	1.520156E+13	0.00000250	0.00012257	49.02863932	396.01728	3247.10120
38003899.	1.216125E+13	0.00000313	0.00007755	24.81595659	249.82339	6066.70999
38003899.	1.013437E+13	0.00000375	0.00009134	24.35811853	292.93097	7329.84188
38003899.	8.686605E+12	0.00000438	0.00010515	24.03497744	335.74935	8592.48072
38003899.	7.600780E+12	0.00000500	0.00011922	23.84439325	379.04582	9847.61267
38003899.	6.756249E+12	0.00000563	0.00013301	23.64687109	421.11042	11110.78506
38003899.	6.080624E+12	0.00000625	0.00014682	23.49180937	462.88918	12373.42167
38003899.	5.527840E+12	0.00000688	0.00016065	23.36764669	504.38106	13635.51877
38003899.	5.067186E+12	0.00000750	0.00017450	23.26667261	545.58494	14897.07325
38003899.	4.677403E+12	0.00000813	0.00018837	23.18355989	586.49997	16158.07945
38003899.	4.343303E+12	0.00000875	0.00020225	23.11448908	627.12487	17418.53536
38003899.	4.053749E+12	0.00000938	0.00021616	23.05667353	667.45878	18678.43506
38003899.	3.800390E+12	0.00001000	0.00023008	23.00801325	707.50051	19937.77554
38003899.	3.576838E+12	0.00001063	0.00024402	22.96690607	747.24896	21196.55266
38003899.	3.378124E+12	0.00001125	0.00025799	22.93210745	786.70308	22454.76175
38003899.	3.200328E+12	0.00001188	0.00027197	22.90263605	825.86183	23712.39773
38003899.	3.040312E+12	0.00001250	0.00028597	22.87769938	864.72391	24969.45821
38003899.	2.895535E+12	0.00001313	0.00029999	22.85666513	903.28833	26225.93728
39109056.	2.844295E+12	0.00001375	0.00031404	22.83901262	941.55394	27481.83037
40799167.	2.838203E+12	0.00001438	0.00032810	22.82430983	979.51951	28737.13371
42487294.	2.832486E+12	0.00001500	0.00034218	22.81219912	1017.18390	29991.84246
44173425.	2.827099E+12	0.00001563	0.00035629	22.80238008	1054.54593	31245.95181
45857546.	2.822003E+12	0.00001625	0.00037041	22.79459810	1091.60439	32499.45714
47539650.	2.817164E+12	0.00001688	0.00038456	22.78863859	1128.35816	33752.35270
49219716.	2.812555E+12	0.00001750	0.00039873	22.78431273	1164.80586	35004.63522
50897737.	2.808151E+12	0.00001813	0.00041291	22.78146315	1200.94637	36256.29857
52573694.	2.803930E+12	0.00001875	0.00042712	22.77994967	1236.77834	37507.33872
54247583.	2.799875E+12	0.00001938	0.00044136	22.77965498	1272.30064	38757.74892
55919380.	2.795969E+12	0.00002000	0.00045561	22.78047037	1307.51182	40007.52595
57589081.	2.792198E+12	0.00002063	0.00046989	22.78230715	1342.41077	41256.66252
59256661.	2.788549E+12	0.00002125	0.00048418	22.78507948	1376.99594	42505.15596
60922121.	2.785011E+12	0.00002188	0.00049850	22.78872156	1411.26631	43752.99716
62585426.	2.781574E+12	0.00002250	0.00051285	22.79316187	1445.22013	45000.18550
64246584.	2.778231E+12	0.00002313	0.00052721	22.79835176	1478.85647	46246.71018
65905562.	2.774971E+12	0.00002375	0.00054160	22.80423403	1512.17360	47492.56985
67562360.	2.771789E+12	0.00002438	0.00055601	22.81076860	1545.17041	48737.75519
70869318.	2.765632E+12	0.00002563	0.00058491	22.82562304	1610.19668	51226.08856
74167357.	2.759716E+12	0.00002688	0.00061390	22.84264326	1673.92418	53711.65701
77456328.	2.754003E+12	0.00002813	0.00064298	22.86159468	1736.34070	56194.41636
80736103.	2.748463E+12	0.00002938	0.00067217	22.88229132	1797.43417	58674.31503
83754622.	2.734845E+12	0.00003063	0.00070071	22.88034868	1855.64431	60000.00000
86057909.	2.699856E+12	0.00003188	0.00072722	22.81469965	1908.23673	60000.00000
88060616.	2.658434E+12	0.00003313	0.00075287	22.72808504	1957.85661	60000.00000
89745908.	2.610790E+12	0.00003438	0.00077757	22.62019587	2004.45405	60000.00000
91406130.	2.565786E+12	0.00003563	0.00080226	22.51953077	2049.93551	60000.00000
92712609.	2.514240E+12	0.00003688	0.00082600	22.40000010	2092.57135	60000.00000
93934284.	2.463850E+12	0.00003813	0.00085161	22.33718920	2137.56820	60000.00000
95165247.	2.416895E+12	0.00003938	0.00087461	22.21233702	2176.81308	60000.00000
96216278.	2.368401E+12	0.00004063	0.00089688	22.07702494	2213.84849	60000.00000
97081827.	2.318372E+12	0.00004188	0.00091838	21.93135309	2248.70700	60000.00000
97944581.	2.271179E+12	0.00004313	0.00093992	21.79513121	2282.81962	60000.00000
98804527.	2.226581E+12	0.00004438	0.00096150	21.66757250	2316.18199	60000.00000
99661664.	2.184365E+12	0.00004563	0.00098313	21.54797888	2348.78983	60000.00000
1.004471E+08	2.142872E+12	0.00004688	0.00100443	21.42791319	2380.08173	60000.00000
1.010231E+08	2.099181E+12	0.00004813	0.00102468	21.29204035	2408.99862	60000.00000
1.015968E+08	2.057656E+12	0.00004938	0.00104496	21.16380644	2437.24933	60000.00000
1.021683E+08	2.018138E+12	0.00005063	0.00106528	21.04265356	2464.83023	60000.00000
1.027375E+08	1.980482E+12	0.00005188	0.00108564	20.92807531	2491.73743	60000.00000
1.033044E+08	1.944554E+12	0.00005313	0.00110604	20.81961393	2517.96706	60000.00000
1.038921E+08	1.910660E+12	0.00005438	0.00113100	20.79999876	2549.35234	60000.00000
1.044976E+08	1.878608E+12	0.00005563	0.00115141	20.69947672	2573.95926	60000.00000
1.050099E+08	1.846327E+12	0.00005688	0.00117108	20.59034300	2596.93542	60000.00000
1.053594E+08	1.812635E+12	0.00005813	0.00118958	20.46597719	2617.87008	60000.00000
1.057073E+08	1.780334E+12	0.00005938	0.00120813	20.34739351	2638.24559	60000.00000
1.060537E+08	1.749339E+12	0.00006063	0.00122670	20.23424006	2658.05902	60000.00000
1.063984E+08	1.719569E+12	0.00006188	0.00124531	20.12618780	2677.30701	60000.00000
1.067414E+08	1.690953E+12	0.00006313	0.00126395	20.02294207	2695.98676	60000.00000
1.070828E+08	1.663422E+12	0.00006438	0.00128262	19.92422247	2714.09480	60000.00000
1.074225E+08	1.636915E+12	0.00006563	0.00130133	19.82978010	2731.62834	60000.00000
1.077606E+08	1.611373E+12	0.00006688	0.00132007	19.73937464	2748.58383	60000.00000

1.080969E+08	1.586744E+12	0.00006813	0.00133885	19.65278578	2764.95790	60000.00000
1.084316E+08	1.562978E+12	0.00006938	0.00135766	19.56981897	2780.74773	60000.00000
1.087646E+08	1.540029E+12	0.00007063	0.00137650	19.49027967	2795.94956	60000.00000
1.090958E+08	1.517854E+12	0.00007188	0.00139538	19.41399336	2810.56004	60000.00000
1.093425E+08	1.495282E+12	0.00007313	0.00141348	19.32958746	2823.94807	60000.00000
1.095434E+08	1.472852E+12	0.00007438	0.00143116	19.24252653	2836.46803	60000.00000
1.100506E+08	1.431553E+12	0.00007688	0.00147499	19.18685675	2865.47024	60000.00000
1.104198E+08	1.391116E+12	0.00007938	0.00150897	19.01060629	2885.34798	60000.00000
1.107842E+08	1.353090E+12	0.00008188	0.00154306	18.84656668	2903.29962	60000.00000
1.111437E+08	1.317258E+12	0.00008438	0.00157728	18.69367361	2919.30379	60000.00000
1.114981E+08	1.283432E+12	0.00008688	0.00161162	18.55098581	2933.33862	60000.00000
1.118475E+08	1.251440E+12	0.00008938	0.00164608	18.41766787	2945.38171	60000.00000
1.121917E+08	1.221135E+12	0.00009188	0.00168067	18.29297876	2955.41017	60000.00000
1.125308E+08	1.192379E+12	0.00009438	0.00171538	18.17625475	2963.40046	60000.00000
1.128645E+08	1.165053E+12	0.00009688	0.00175023	18.06690359	2969.32843	60000.00000
1.131771E+08	1.138889E+12	0.00009938	0.00178495	17.96173239	2973.14689	60000.00000
1.133554E+08	1.112691E+12	0.00010188	0.00181762	17.84164953	2974.83615	60000.00000
1.135248E+08	1.087662E+12	0.00010438	0.00185041	17.72843313	2971.12639	60000.00000
1.136882E+08	1.063749E+12	0.00010688	0.00188331	17.62161398	2964.40189	60000.00000
1.136882E+08	1.039435E+12	0.00010938	0.00192500	17.59999895	2967.70697	60000.00000
1.141198E+08	1.020065E+12	0.00011188	0.00196408	17.55603933	2972.21467	60000.00000
1.142624E+08	9.990158E+11	0.00011438	0.00199564	17.44824743	2974.23995	60000.00000
1.144034E+08	9.788527E+11	0.00011688	0.00202732	17.34609461	2974.99504	60000.00000
1.145404E+08	9.595006E+11	0.00011938	0.00205925	17.25026464	2969.85456	60000.00000
1.146760E+08	9.409315E+11	0.00012188	0.00209128	17.15923262	2964.19051	60000.00000
1.148105E+08	9.230997E+11	0.00012438	0.00212341	17.07260942	2960.24130	60000.00000
1.149439E+08	9.059618E+11	0.00012688	0.00215563	16.99014902	2965.08493	60000.00000
1.150761E+08	8.894773E+11	0.00012938	0.00218794	16.91162252	2968.98318	60000.00000
1.152072E+08	8.736089E+11	0.00013188	0.00222036	16.83681536	2971.92361	60000.00000
1.153370E+08	8.583218E+11	0.00013438	0.00225287	16.76553011	2973.89349	60000.00000
1.154656E+08	8.435845E+11	0.00013688	0.00228548	16.69759226	2974.87986	60000.00000
1.155916E+08	8.293570E+11	0.00013938	0.00231829	16.63343668	2972.45802	60000.00000
1.157155E+08	8.156157E+11	0.00014188	0.00235125	16.57267714	2967.46149	60000.00000
1.158386E+08	8.023452E+11	0.00014438	0.00238428	16.51451826	2962.44935	60000.00000
1.159610E+08	7.895215E+11	0.00014688	0.00241739	16.45883417	2957.42141	60000.00000
1.160826E+08	7.771220E+11	0.00014938	0.00245057	16.40550756	2957.26994	60000.00000
1.161730E+08	7.649251E+11	0.00015188	0.00248274	16.34727716	2961.72056	60000.00000
1.162267E+08	7.528852E+11	0.00015438	0.00251369	16.28299284	2965.29237	60000.00000
1.162798E+08	7.412261E+11	0.00015688	0.00254469	16.22114897	2968.31569	60000.00000
1.163325E+08	7.299297E+11	0.00015938	0.00257576	16.16163397	2970.78452	60000.00000
1.163848E+08	7.189795E+11	0.00016188	0.00260689	16.10434771	2972.69278	60000.00000
1.164366E+08	7.083594E+11	0.00016438	0.00263809	16.04918718	2974.03417	60000.00000
1.165242E+08	6.982724E+11	0.00016688	0.00267000	16.00000048	2974.82018	60000.00000
1.170434E+08	6.910311E+11	0.00016938	0.00271000	16.00000048	2972.30248	60000.00000
1.175453E+08	6.839000E+11	0.00017188	0.00275000	16.00000048	2966.64520	60000.00000
1.180396E+08	6.769294E+11	0.00017438	0.00279000	16.00000048	2960.98792	60000.00000
1.180396E+08	6.580603E+11	0.00017938	0.00286179	15.95423269	2951.45968	60000.00000
1.180396E+08	6.402146E+11	0.00018438	0.00292488	15.86377573	2952.61636	60000.00000
1.180396E+08	6.233112E+11	0.00018938	0.00298818	15.77915812	2959.94567	60000.00000
1.180396E+08	6.072775E+11	0.00019438	0.00305168	15.69995928	2965.86517	60000.00000
1.180396E+08	5.920480E+11	0.00019938	0.00311539	15.62579870	2970.34237	60000.00000
1.180396E+08	5.775636E+11	0.00020438	0.00317933	15.55633879	2973.34342	60000.00000
1.180396E+08	5.637711E+11	0.00020938	0.00324348	15.49127054	2974.83277	60000.00000
1.180396E+08	5.506219E+11	0.00021438	0.00330813	15.43152952	2971.62055	60000.00000
1.180396E+08	5.380721E+11	0.00021938	0.00337315	15.37619162	2965.30661	60000.00000
1.180396E+08	5.260816E+11	0.00022438	0.00343829	15.32385206	2958.96671	60000.00000
1.180396E+08	5.146139E+11	0.00022938	0.00350599	15.28495932	2952.06956	60000.00000
1.180396E+08	5.036355E+11	0.00023438	0.00357508	15.25368261	2944.86865	60000.00000
1.180396E+08	4.931157E+11	0.00023938	0.00364439	15.22460604	2937.62119	60000.00000
1.180396E+08	4.830264E+11	0.00024438	0.00371392	15.19762659	2941.47299	60000.00000
1.180396E+08	4.733416E+11	0.00024938	0.00378368	15.17264986	2950.13013	60000.00000
1.180396E+08	4.640376E+11	0.00025438	0.00385368	15.14959002	2957.55875	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 118039.56716 in-kip

---

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head = 55099.000 lbs
Specified moment at pile head = 52449540.000 in-lbs
Specified axial load at pile head = 53647.000 lbs

Output Verification:

Computed forces and moments are within specified convergence limits.

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 55099.	M= 5.24E+07	53647.0000	1.6253	5.5514E+07	-368782.

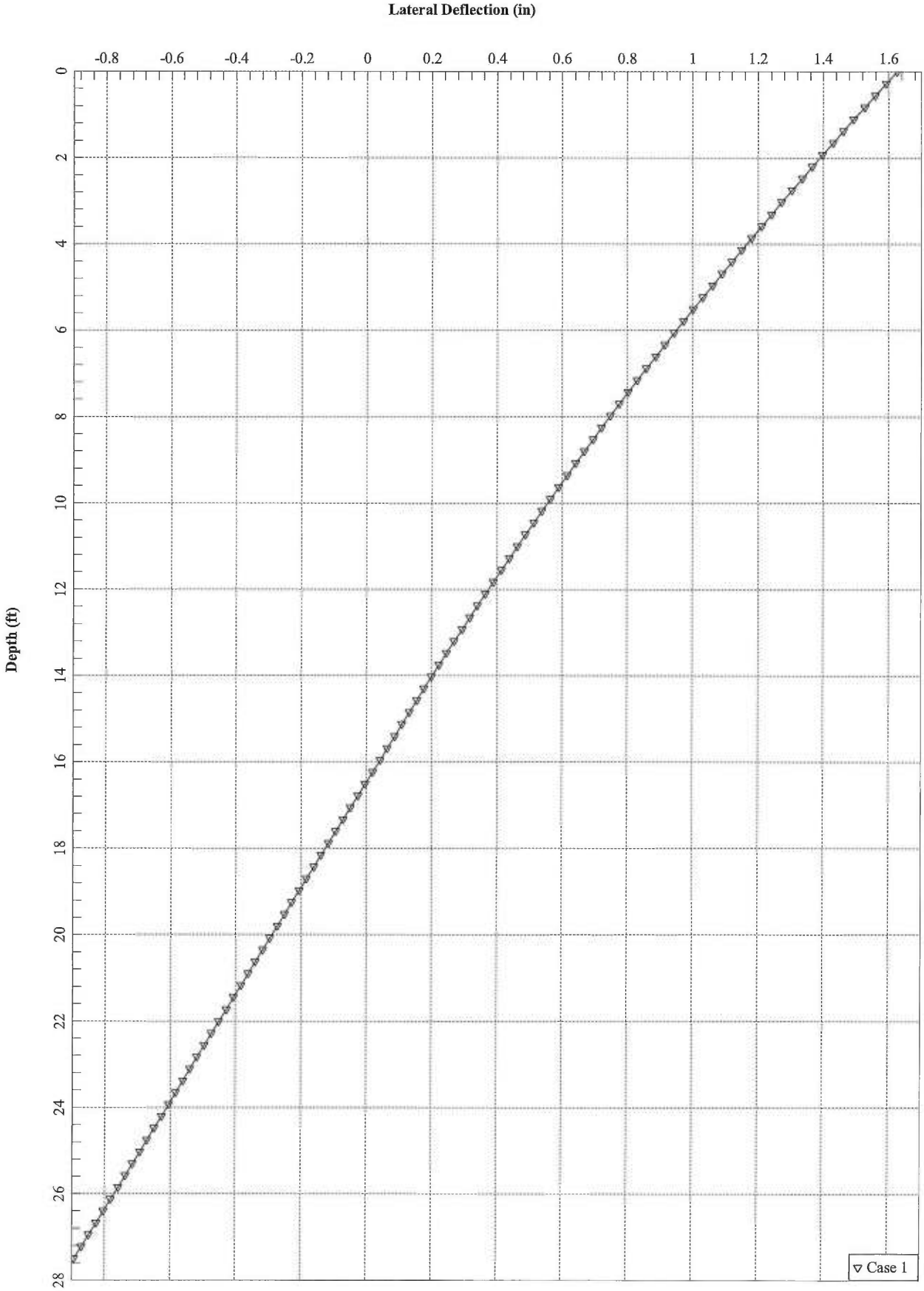
Computed Pile-head Stiffness Matrix Members
K22, K23, K32, K33 for Superstructure

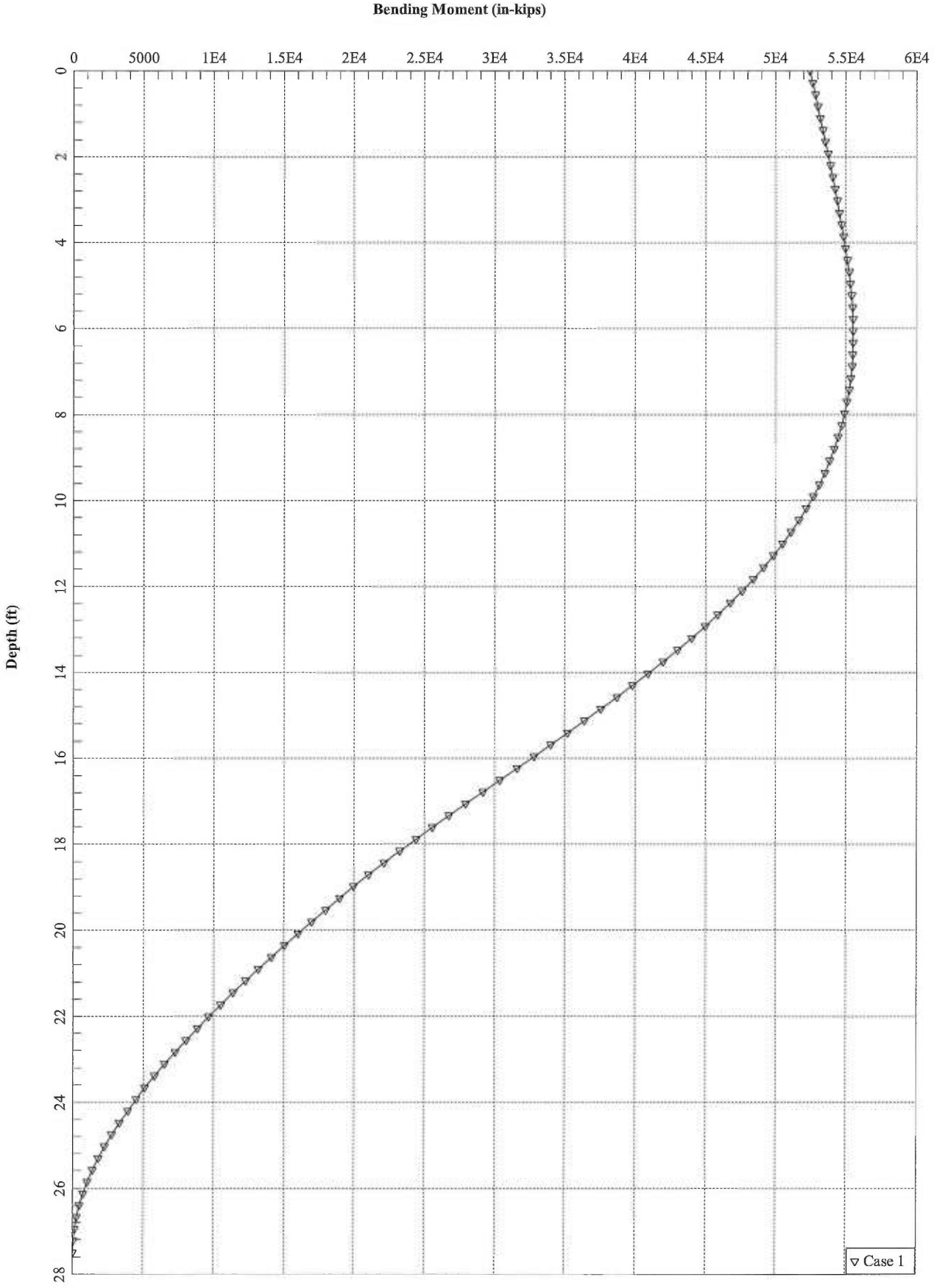
Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
0.00293709	5509.90008	964575.56954	1875971.	3.284117E+08
0.00884153	16586.45173	2903662.	1875971.	3.284117E+08
0.01401349	26288.90401	4602195.	1875971.	3.284117E+08
0.01768306	33172.90346	5807324.	1875971.	3.284117E+08
0.02052939	38512.54827	6742094.	1875971.	3.284117E+08
0.02285502	42875.35575	7505857.	1875971.	3.284117E+08
0.02482131	46564.05691	8151609.	1875971.	3.284117E+08
0.02652459	49759.35519	8710985.	1875971.	3.284117E+08
0.02802698	52577.80803	9204390.	1875971.	3.284117E+08
0.02937092	55099.00000	9645756.	1875971.	3.284117E+08

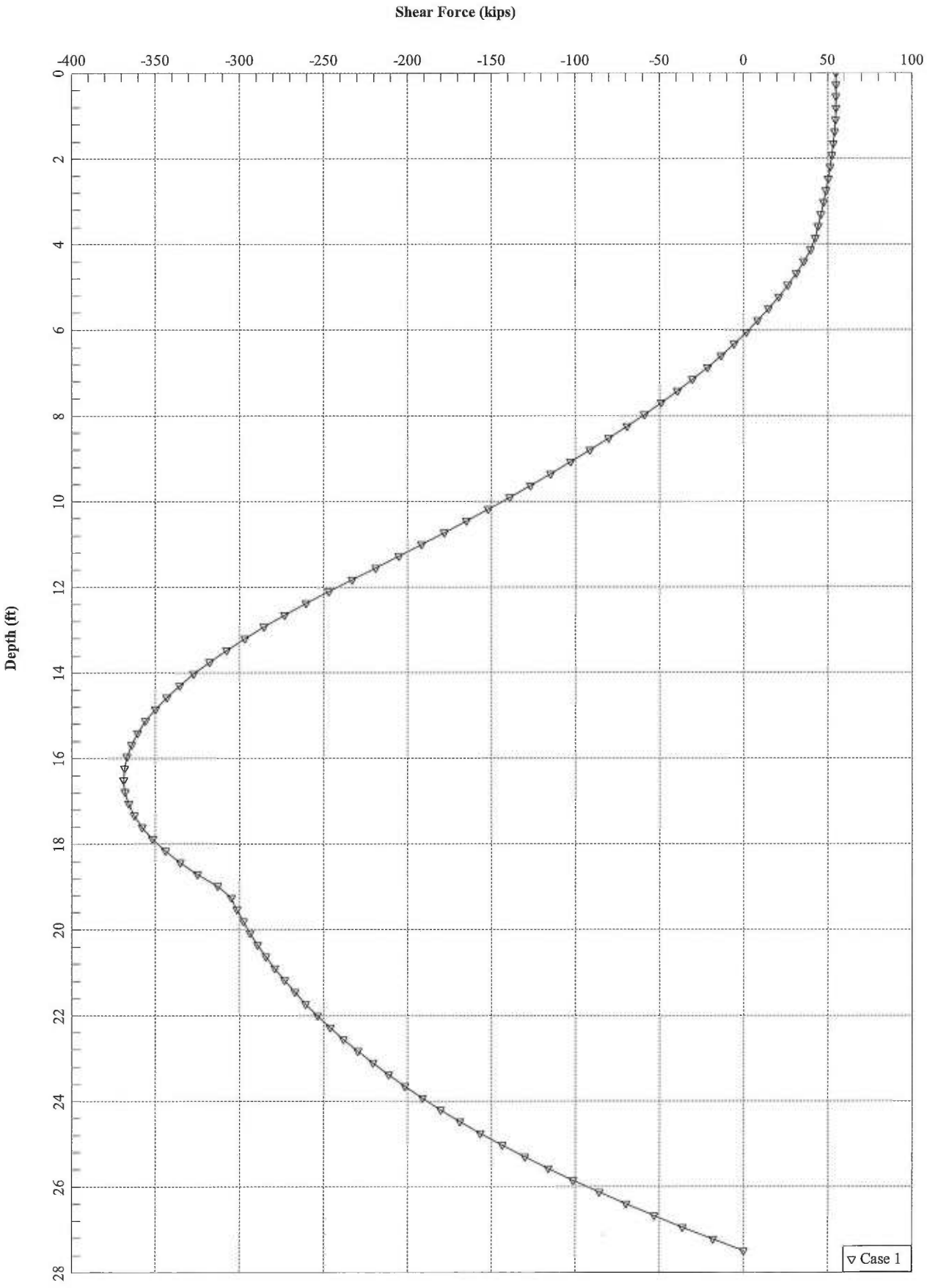
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
0.00007762	25490.46015	5244954.	3.284117E+08	6.757447E+10
0.00023380	76735.19167	15788885.	3.282082E+08	6.753148E+10
0.00037096	121628.49559	25024790.	3.278739E+08	6.745932E+10
0.00046848	153484.23321	31577770.	3.276239E+08	6.740517E+10
0.00054424	178195.46377	36660655.	3.274180E+08	6.736062E+10
0.00061163	198394.68483	40813675.	3.243727E+08	6.672981E+10
0.00068738	215533.76323	44325003.	3.135594E+08	6.448420E+10
0.00107555	232013.34929	47366654.	2.157151E+08	4.403929E+10
0.00122905	246293.99353	50049581.	2.003934E+08	4.072209E+10
0.00136745	259381.04329	52449540.	1.896822E+08	3.835571E+10

K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.


Lateral Deflection (in)
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
▽ Case 1


Bending Moment (in-kips)
0
5000
1E4
1.5E4
2E4
2.5E4
3E4
3.5E4
4E4
4.5E4
5E4
5.5E4
6E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
▽ Case 1


Shear Force (kips)
-400
-350
-300
-250
-200
-150
-100
-50
0
50
100
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 1

Network Modernization RFDS v3.0

Site ID	**CTNH221A**	**Latitude**	
		Longitude	
Site Name	NH221_Hamden-CI&P	**Site Type**	Energy Transmision Tower
Address	4280 Whitney Ave Hamden	**Site Class**	
Market	Connecticut	**CL&P**	

Configuration
704BU

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	

Date 07/16/2014

Site Information

Existing Configuration					Proposed Configuration			
1	2	3	4	Cabinet #	1	2	3	4
GSM				Technology	GSM/UMTS/LTE			
S8000				Cabinet type	6102			
				CBU				
				DUW30				
				DUL20				
				DUG20	1			
				DUS31	1			
				RBS6601				
3				dTRU/TRX				
				RU22 B4				
				RUS01 B2	6			
				RUS01 B4				

	Relocate cabinet
	Add cabinet
x	Swap cabinet
	Remove cabinet
	Make cabinet dark

Comments

Swap cabinet for Ericsson 6102

ALPHA - Scope of Work

	Add new mount	x	Add RRU	Add LTE 700 passive antenna. Add 2 coax. Add RRUS on ground.Add smart Bias-T
	Relocate antenna		Swap existing RRU	
	Add antenna		Remove RRU	
x	Swap antenna		Consolidate coax cables	
	Remove antenna	x	Add coax cables	
	Add TMA		Add fiber cables	
	Swap TMA		Add hybrid combiner	
	Remove TMA		Add filter combiner	

BETA - Scope of Work

	Add new mount	x	Add RRU	Add LTE 700 passive antenna. Add 2 coax. Add RRUS on ground.Add smart Bias-T
	Relocate antenna		Swap existing RRU	
	Add antenna		Remove RRU	
x	Swap antenna		Consolidate coax cables	
	Remove antenna	x	Add coax cables	
	Add TMA		Add fiber cables	
	Swap TMA		Add hybrid combiner	
	Remove TMA		Add filter combiner	

GAMMA - Scope of Work

	Add new mount	x	Add RRU	Add LTE 700 passive antenna. Add 2 coax. Add RRUS on ground.Add smart Bias-T
	Relocate antenna		Swap existing RRU	
	Add antenna		Remove RRU	
x	Swap antenna		Consolidate coax cables	
	Remove antenna	x	Add coax cables	
	Add TMA		Add fiber cables	
	Swap TMA		Add hybrid combiner	
	Remove TMA		Add filter combiner	

DELTA - Scope of Work

	Add new mount		Add RRU	
	Relocate antenna		Swap existing RRU	
	Add antenna		Remove RRU	
	Swap antenna		Consolidate coax cables	
	Remove antenna		Add coax cables	
	Add TMA		Add fiber cables	
	Swap TMA		Add hybrid combiner	
	Remove TMA		Add filter combiner	

Network Modernization RFDS v3.0

Site ID	**CTNH221A**	**Latitude**	
		Longitude	
Site Name	NH221_Hamden-CI&P	**Site Type**	Energy Transmision Tower
Address	4280 Whitney Ave Hamden	**Site Class**	
Market	Connecticut	**CL&P**	

Configuration

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Market Development	

RFDS Revision	
RFDS Final	

Date 07/16/2014

ALPHA (view from behind)

Existing Configuration				Mount	Proposed Configuration			
X	X	X			X	X	X	
	GSM			Technology	LTE	GSM/UMTS / UMTS/LTE		
	B2			Band	B12	B2 / B4		
	P			Active/Passive	P	P / P		
	Dual pole			Ant. Type	Dual pole	Quad pole		
	RR90_17_02DP			Ant. Model	LNX-6515DS-VTM	APX16DWV_16DWVS		
	EMS			Ant. Vendor	Commscope	RFS		
	106			Ant. Height	106	106		
	10			Azimuth	10	10		
				RET deployed	Yes	Yes / Yes		
	2			E-Tilt	2	2 / 2		
	0			M-Tilt	0	0 / 0		
	1			TMA #		1 / 1		
	dd B2			TMA Type		dd B2 / dd B4		
				RRU #	1			
				RRU Type	RRUS11_B12			
	2			Used Coax #	2	2 / 2		
	1-5/8"			Coax Type	1-5/8"	1-5/8" / 1-5/8"		
				Coax Length (ft)				
				Fiber (CPRI) #				
				Splitter #				
				Combiner #				
				Combiner Type				

	Add new mount	x	Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
x	Swap antenna		Consolidate coax cables
	Remove antenna	x	Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Add LTE 700 passive antenna. Add 2 coax. Add RRUS on ground.Add smart Bias-T

BETA (view from behind)

Existing Configuration					Proposed Configuration			
X	X	X			X	X		
	GSM			Technology	LTE	GSM/UMTS / UMTS/LTE		
	B2			Band	B12	B2 / B4		
	P			Active/Passive	P	P / P		
	Dual pole			Ant. Type	Dual pole	Quad pole		
	RR90_17_02DP			Ant. Model	LNX-6515DS-VTM	APX16DWV_16DWVS		
	EMS			Ant. Vendor	Commscope	RFS		
	106			Ant. Height	106	106		
	170			Azimuth	170	170		
				RET deployed	Yes	Yes / Yes		
	2			E-Tilt	2	2 / 2		
	0			M-Tilt	0	0 / 0		
	1			TMA #		1 / 1		
	dd B2			TMA Type		dd B2 / dd B4		
				RRU #	1			
				RRU Type	RRUS11_B12			
	2			Used Coax #	2	2 / 2		
	1-5/8"			Coax Type	1-5/8"	1-5/8" / 1-5/8"		
	210			Coax Length (ft)				
				Fiber (CPRI) #				
				Splitter #				
				Combiner #				
				Combiner Type				

	Add new mount	x	Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
x	Swap antenna		Consolidate coax cables
	Remove antenna	x	Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Add LTE 700 passive antenna. Add 2 coax. Add RRUS on ground.Add smart Bias-T

Network Modernization RFDS v3.0

Site ID	**CTNH221A**	**Latitude**	
		Longitude	
Site Name	NH221_Hamden-CI&P	**Site Type**	Energy Transmision Tower
Address	4280 Whitney Ave Hamden	**Site Class**	
Market	Connecticut	**CL&P**	

Configuration
704BU

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	

Date 07/16/2014

GAMMA (view from behind)

	Existing Configuration					Proposed Configuration			
	X	X	X	X	X	X	X	X	
Technology	GSM				LTE	GSM/UMTS	UMTS/LTE		
Band	B2				B12	B2	B4		
Active/Passive	P				P	P	P		
Ant. Type	Dual pole				Dual pole	Quad pole			
Ant. Model	RR90_17_02DP				LNX-6515DS-VTM	APX16DWV_16DWVS			
Ant. Vendor	EMS				Commscope	RFS			
Ant. Height	106				106	106			
Azimuth	310				310	310			
RET deployed					Yes	Yes	Yes		
E-Tilt	2				2	2	2		
M-Tilt	0				0	0	0		
TMA #	1					1	1		
TMA Type	dd B2					dd B2	dd B4		
RRU #					1				
RRU Type					RRUS11_B12				
Used Coax #	2				2	2	2		
Coax Type	1-5/8"				1-5/8"	1-5/8"	1-5/8"		
Coax Length (ft)	210								
Fiber (CPRI) #									
Splitter #									
Combiner #									
Combiner Type									

	Add new mount	x	Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
x	Swap antenna		Consolidate coax cables
	Remove antenna	x	Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Add LTE 700 passive antenna. Add 2 coax. Add RRUS on ground.Add smart Bias-T

DELTA (view from behind)

	Existing Configuration				Proposed Configuration			
Technology								
Band								
Active/Passive								
Ant. Type								
Ant. Model								
Ant. Vendor								
Ant. Height								
Azimuth								
RET deployed								
E-Tilt								
M-Tilt								
TMA #								
TMA Type								
RRU #								
RRU Type								
Used Coax #								
Coax Type								
Coax Length (ft)								
Splitter #								
Fiber (CPRI) #								
Combiner #								
Combiner Type								

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6515DS-VTM

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

- Excellent choice to maximize both coverage and capacity in suburban and rural applications
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- Exceptional horizontal pattern roll-off and strong front-to-back ratio
- Extended bandwidth allows one antenna to serve multiple frequency allocations
- Great solution to maximize network coverage and capacity
- The RF connectors are designed for IP67 rating and the radome for IP56 rating
- 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	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	16.6	16.9
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 16.6 4 ° | 16.6 8 ° | 16.4	0 ° | 17.0 4 ° | 17.0 8 ° | 16.8
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Horizontal Tolerance, degrees	±1	±0.9
Beamwidth, Vertical, degrees	9.7	8.6
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.4
Beam Tilt, degrees	0–8	0–8
USLS, dB	18	18
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	24	27
CPR at Sector, dB	15	13
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
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant

Product Specifications

LNX-6515DS-VTM

RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	878.0 N @ 150 km/h 197.4 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	2449.0 mm | 96.4 in
Width	301.0 mm | 11.9 in
Net Weight	19.8 kg | 43.7 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-6515DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNX-6515DS-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

DB380-3 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Used for wide panel antennas. Includes three clamp sets.

DB5083D — Downtilt Mounting Kit for 2.4"-4.5" (60-115 mm) OD round members. Consists of two DB5083 heavy-duty, galvanized steel downtilt mounting brackets. This kit is compatible with the DB380-3 pipe mount for panel antennas with three mounting points.

Product Data Sheet **APX16DWV-16DWVS-E-A20**

Optimizer® Side-by-Side Dual Polarized Antenna, 1710-2200, 65deg, 18.4dBi, 1.4m, VET, 0-10deg RET

Product Description

A combination of two X-Polarized antennas in a single radome, this pair of variable tilt antennas provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features a wide downtilt range. This antenna is optimized for performance across the entire frequency band (1710-2200 MHz). The antenna comes pre-connected with two antenna control units (ACU).

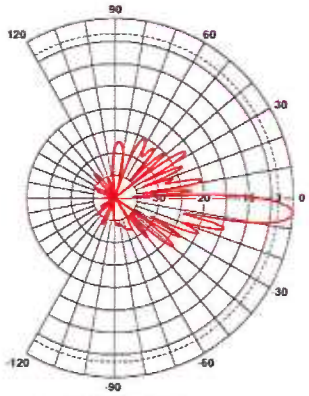
Features/Benefits

- **Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.**
- **High Suppression of all Upper Sidelobes (Typically <-20dB).**
- **Gain tracking – difference between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz) <1dB.**
- **Two X-Polarised panels in a single radome.**
- **Azimuth horizontal beamwidth difference <4deg between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz).**
- **Low profile for low visual impact.**
- **Dual polarization; Broadband design.**
- **Includes (2) AISG 2.0 Compatible ACU-A20-N antenna control units.**

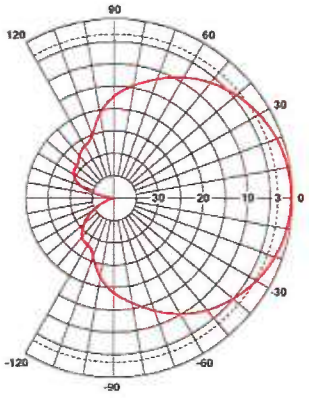
Technical Specifications

Electrical Specifications

Frequency Range, MHz	1710-2200
Horizontal Beamwidth, deg	65
Vertical Beamwidth, deg	5.9 to 7.7
Electrical Downtilt, deg	0-10
Gain, dBi (dBd)	18.4 (16.3)
1st Upper Sidelobe Suppression, dB	> 18 (typically > 20)
Upper Sidelobe Suppression, dB	> 18 all (typically > 20)
Front-To-Back Ratio, dB	>26 (typically 28)
Polarization	Dual pol +/-45°
VSWR	< 1.5:1
Isolation between Ports, dB	> 30
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)
Impedance, Ohms	50
Maximum Power Input, W	300
Lightning Protection	Direct Ground
Connector Type	(4) 7-16 Long Neck Female



Vertical Pattern



Horizontal Pattern

Mechanical Specifications

Dimensions - HxWxD, mm (in)	1420 x 331 x 80 (55.9 x 13 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	18.5 (40.7)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	160 (100)
Max Wind Loading Area, m² (ft²)	0.47 (5.03)
Front Thrust @ Rated Wind, N (lbf)	756 (170)
Maximum Thrust @ Rated Wind, N (lbf)	756 (170)
Wind Load - Side @ Rated Wind, N (lbf)	231 (52)
Wind Load - Rear @ Rated Wind, N (lbf)	408 (92)
Radome Material	Fiberglass
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Shipping Weight, kg (lb)	24.5 (53.9)
Packing Dimensions, HxWxD, mm (in)	1520 x 408 x 198 (59.8 x 16 x 7.8)

Ordering Information

Mounting Hardware	APM40-2 + APM40-E2

Other Documentation

APM40 Series Datasheet
APM40 Series Installation Instructions

Product Data Sheet **ATMAA1412D-1A20**

AWS Twin Wideband Dual Duplex TMA

Product Description

Designed for use in AWS projects, these units improve base station receiver sensitivity and enhance coverage. Use of these TMAs can increase data rates without a reduction in capacity. These TMAs are wideband and cover the entire 45 MHz in the AWS frequency band. The unit is extremely lightweight, weighing just 13 lbs (5.9 kg) for a twin unit. It is easy to install and meets IP66 requirements for ingress protection. The TMA has a metallic base and the radome cap is light grey allowing them to blend with antenna radomes. Its dual-duplex configuration enables the use of a single feeder for both Downlink and Uplink.

Features/Benefits

- **AISG 2.0 compliant**
- **Two TMAs in a single enclosure – Reduces tower load and installation time.**
- **Low noise figure overcomes feeder losses and enhances site coverage**
- **Filtering improves Tx-Rx isolation by reducing noise and interference**
- **Dual-duplex configuration enables use of a single feeder for both Downlink and Uplink**
- **Low insertion loss of Tx filter provides increased downlink coverage**
- **Extremely light weight – Reduces tower loading and facilitates installation.**
- **Equipped with breather valve – Guards against internal condensation.**
- **Option: AISG connector location at bottom or top**

Technical Specifications

Product Type	Tower Mount Amplifier
Frequency Band, MHz	1710-1755, 2110-2155
Noise Figure, Typical, dB	1.3 @ midband, 1.5 @ band edge
Gain, dB	12 ± 1
Configuration	AWS double dual-duplex TMA
Mounting	Wall, pole
Uplink Frequency, MHz	1710-1755
Downlink Frequency, MHz	2110-2155
Bandwidth Tx & Rx, MHz	45
Input IP3, Min, dBm	+13
Tx Loss, Max, dB	0.4
Return Loss All Ports, Min, dB	18
Tx Rejection in Rx Branch, Min, dB	80
Rx Rejection in Tx Branch, Min, dB	60
Tx Power Handling, Max, W	250 cw, 5000 peak
IMP Level at the ANT Port, Min, dBm	-117 @ 2 * 43
Nominal Current (ATMAA1412D-1A20), mA	AISG Mode: AWS 1 Port = 120-200 (AISG RS485 port), AWS 2 Port = 100 ± 20 ; Non-AISG Mode: Each port = 100 ± 20
Alarm Current (ATMAA1412D-1A20), mA	AISG Mode: AWS 1 port = AISG alarm, AWS 2 port = 190 ± 10 ; Non-AISG Mode: Each port = 190 ± 10
Impedance, Ohms	50
Temperature Range, °C (°F)	-40 to +65 (-40 to +149)
Ingress Protection	IP66
Connectors	7/16-Female Long-neck
Weight, kg (lb)	5.9 (13)
Application	AWS
Dimensions, H x W x D, mm (in)	305 x 254 x 101 (12 x 10 x 4), includes connector length
Supporting Power Distribution Unit	CNI-P1A20 and CNI-P2A20 with bias-T BITA2S-AL20

Notes

EXHIBIT F

CERTIFICATION OF SERVICE

I hereby certify that on the 9th day of December, 2014, a copy of the foregoing letter and notice was mailed by certified mail, return receipt requested to each of the abutting properties owners on the accompanying list.

Julie D. Kohler, Esq.
Cohen and Wolf, P.C.
1115 Broad Street
Bridgeport, CT 06604

Attorney for:
T-Mobile Northeast, LLC
("T-Mobile")

COHEN and WOLF P.C.
ATTORNEYS AT LAW

JULIE D. KOHLER

PLEASE REPLY TO: Bridgeport
WRITER'S DIRECT DIAL: (203) 337-4157
E-Mail Address: jkohler@cohenandwolf.com

December 9, 2014

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Re: T-Mobile Northeast LLC
Proposed Modifications to an Existing Telecommunications Facility
4280 Whitney Avenue, Hamden, Connecticut
Petition to the Connecticut Siting Council

To Whom It May Concern:

We are writing you on behalf of our client T-Mobile Northeast LLC ("T-Mobile") with respect to the above referenced matter. T-Mobile is currently collocated on the telecommunications facility located at 4280 Whitney Avenue in Hamden, Connecticut and seeks to modify its existing installation to improve its coverage and service from this location.

The attached notice is being sent to you pursuant to the Regulations of Connecticut State Agencies, which require that owners of records of property that abut a parcel on which the facility is located be sent notice of an applicant's intent to file a Petition with the Connecticut Siting Council.

If you have any question regarding this notice or the Petition, please don't hesitate to contact the Connecticut Siting Council or the undersigned.

Sincerely,

Julie D. Kohler

Enclosure

1115 Broad Street
P.O. Box 1821
Bridgeport, CT 06601-1821
Tel: (203) 368-0211
Fax: (203) 394-9901

158 Deer Hill Avenue
Danbury, CT 06810
Tel: (203) 792-2771
Fax: (203) 791-8149

320 Post Road West
Westport, CT 06880
Tel: (203) 222-1034
Fax: (203) 227-1373

657 Orange Center Road
Orange, CT 06477
Tel: (203) 298-4066
Fax: (203) 298-4068

NOTICE

Pursuant to Section 16-50j-40(a) of the Regulations of Connecticut State Agencies, notice is hereby given that T-Mobile Northeast LLC ("T-Mobile") will file a Petition for Declaratory Ruling ("Petition") with the Connecticut Siting Council ("Council") on or after December 9, 2014. T-Mobile will seek a ruling that no Certificate of Environmental Compatibility and Public Need is required to modify its existing wireless communications site at the telecommunication facility located at 4280 Whitney Avenue, Hamden, Connecticut ("Facility").

T-Mobile seeks to replace three (3) existing antennas and add three (3) new antennas mounted to the existing mast on a low-profile platform at a centerline of 106 feet; add three (3) remote radio units ("RRUs") and add six (6) tower mounted amplifiers (TMAs) mounted on a proposed H-frame unit; add an eight (8) foot high stockade fence around the perimeter of the existing transmission tower and ice bridge; add coax cable and reuse existing coax cable; add an equipment cabinet mounted to an ice bridge; and replace an existing equipment cabinet.

The modifications to this Facility are being proposed to allow T-Mobile to provide improved service to this area of Hamden.

The Petition will set forth the need, purpose and benefits of the modifications to the Facility and will also describe the environmental impact, if any. The Petition provides plans, details of the proposed modifications and explains why T-Mobile submits that these modifications present no significant adverse environmental effect.

Copies of the Petition will be available for review during normal business hours on or after December 9, 2014 at the Connecticut Siting Council:

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

or at the offices of T-Mobile's legal counsel:

Julie D. Kohler, Esq.
Cohen and Wolf, P.C.
1115 Broad Street
Bridgeport, CT 06604
Tel. (203) 368-0211
Fax (203) 394-9901

All inquiries should be addressed to the Council or to T-Mobile's legal counsel as listed above.

ADJACENT PROPERTY OWNERS
4280 Whitney Avenue, Hamden, CT

Andrew J. Brand and Michelle F. Brand
59 Brooksvale Avenue
Hamden, CT 06518

George L. Parente
13217 Sherbune Circle, 4504
Bonita Springs, FL 33923

Janice Slomskoski
4384 Whitney Avenue
Hamden, CT 06518

State of CT
c/o Department Public Works
165 Capital Avenue
Hamden, CT 06518

South Central Conn Regional Water Authority
90 Sargent Drive
New Haven, CT 06511

Hamden Fish & Game Protective Association Inc.
P.O. Box 5619
Hamden, CT 06518

Marion DePalma
4276 Whitney Avenue
Mt. Carmel, CT 06518

Jodi A. Novella
4266 Whitney Avenue
Hamden CT 06518

Jason Littlefield and Rebecca Rodriguez
4256 Whitney Avenue
Mt. Carmel, CT 06518

Furman W. Romas III
4246 Whitney Avenue
Hamden, CT 06518

Waterside Investments, LLC
c/o 480 North Brooksvale Road
Cheshire, CT 06410

ADJACENT PROPERTY OWNERS
4280 Whitney Avenue, Hamden, CT

Heather McGuiness
4230 Whitney Avenue
Hamden, CT 06518

William E. Copeland
4224 Whitney Avenue
Hamden, CT 06518

John S. Peccerillo and Lori A. Peccerillo
4285 Whitney Avenue
Mt. Carmel, CT 06518

Anne M. Steiner
60 Nolan Road
Hamden, CT 06514

Betsy A. Rosenblum and Michael R. Rosenblum
4275 Whitney Avenue
Mt. Carmel, CT 06518

Louis F. Barnhart and Filomena L. Barnhart
4240 Whitney Avenue
Hamden, CT 06517

Powder Ridge Realty LLC
c/o 56 Old Mill Road
Chester, NJ 07930

Mary R. Russo and Jean E. Russo
34 East Pearl Street
New Haven, CT 06513

Don Leone
17 Woodside Drive
Orange, CT 06477

Joseph J. Duda
395 Brooksvale Avenue
Hamden CT 06518

Cheryl Rennie-Smith
415 Brooksvale Avenue
Hamden CT 06518

ADJACENT PROPERTY OWNERS
4280 Whitney Avenue, Hamden, CT

Donna Parke Ornston
435 Brooksvale Avenue
Hamden CT 06518

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1115 Broad Street
Bridgeport, CT 06604
Tel. (203) 368-0211
Fax (203) 394-9901

All inquiries should be addressed to the Council or to T-Mobile's legal counsel as listed above.

CERTIFICATION OF SERVICE

I hereby certify that on the 9th day of December, 2014, copies of the attached notice of filing a Petition with the Connecticut Siting Council for a declaratory ruling was sent by certified mail, return receipt requested to the following:

Mayor Scott Jackson
Hamden Government Center
2750 Dixwell Avenue
Hamden, CT 06518

Julie D. Kohler, Esq.