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CONNECTICUT
SITING COUNCIL

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

September 4, 2014

Melanie Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-009-130411 – Cellco Partnership d/b/a Verizon Wireless
Sky Edge Lane, Bethel, Connecticut**

Dear Ms. Bachman:

On May 1, 2013, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its telecommunications facility off Sky Edge Lane in Bethel. The modification involved the replacement of certain antennas and the installation of additional coaxial cables.

As a condition of the acknowledgement, Cellco was required to provide the Council with a letter stating that the recommendations specified in the structural report were implemented. Attached is a Tower Modification Certification Letter verifying that these conditions have been satisfied. All construction associated with these modifications has now been completed.

If you have any questions please do not hesitate to contact me.

Sincerely,



Kenneth C. Baldwin

Attachment

Copy to:

Sandy M. Carter
Brian Ragozzine
Mark Gauger

September 4, 2014

Mr. Mark Gauger

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Tower Modification Certification

Project: Verizon Bethel North
Sky Edge Lane, Bethel, CT

Tower Owner: Northeast Utilities
107 Selden Street, Berlin, CT

Engineer: Centek Engineering
63-2 North Branford Road, Branford, CT

Centek Project No.: 14055.015

Dear Mr. Gauger,

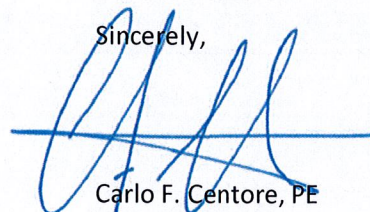
We are providing this "Tower Modification Certification" with regard to the structural components at the above referenced project.

The following are the basis for substantiating compliance with the tower modification documents prepared by Centek Engineering (Centek Project Number: 12001.026):

- ☐ Review of the Centek Engineering Structural Analysis dated 02/18/2013 Rev-1.
- ☐ Review of the Centek Engineering Modification Drawings T-1, N-1 thru N-3, MI-1, and S-1 thru S-4, dated 04/01/2013 Rev-2.
- ☐ Review of the Centek Engineering Letter of Professional Opinion dated 09/02/2014.
- ☐ Field observations by Centek Engineering personnel on 05/22/2014 of the completed modifications.

The modification design prepared by this office demonstrates the tower will not exceed 100 percent of the post construction structural rating. The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above.

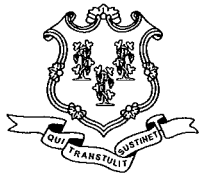
Sincerely,



Carlo F. Centore, PE
Senior Project Manager



Cc: Aleksey Tyurin, Tim Parks, Rachel Mayo



STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

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

May 1, 2013

Kenneth C. Baldwin, Esq.
Robinson & Cole
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-009-130411** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Sky Edge Lane, Bethel, Connecticut.

Dear Attorney Baldwin:

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

- Prior to antenna installation, the proposed foundation modifications identified in the Structural Analysis of PCS Structure and CL&P Pole prepared Centek Engineering dated February 18, 2013, and stamped by Carlo Centore shall be implemented;
- Within 45 days following completion of the antenna installation, a signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the recommended modifications have been completed and the structure and foundation do not exceed 100 percent of the post-construction structural rating;
- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated April 10, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.



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

Very truly yours,



Melanie A. Bachman
Acting Executive Director

MAB/CDM/jb

- c: The Honorable Matthew S. Knickerbocker, First Selectman, Town of Bethel
Steve Palmer, Planning & Zoning Official, Town of Bethel
Robert D. Gray, Program Administrator, Third Party Attachments Transmission Projects, Northeast
Utilities Service Company



STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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www.ct.gov/csc

April 16, 2013

The Honorable Matthew S. Knickerbocker
First Selectman
Town of Bethel
1 School Street
Bethel Municipal Center
Bethel, CT 06801-2105

RE: **EM-VER-009-130411** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Sky Edge Lane, Bethel, Connecticut.

Dear First Selectman Knickerbocker:

The Connecticut Siting Council (Council) received a request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72, a copy of which has already been provided to you.

If you have any questions or comments regarding the proposal, please call me or inform the Council by April 30, 2013.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts
Executive Director

LR/jb

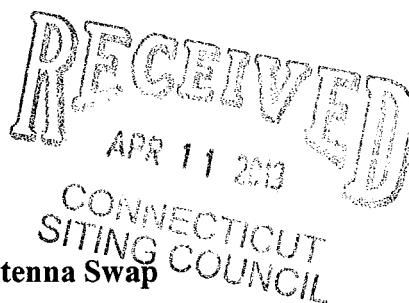
c: Steve Palmer, Planning & Zoning Official, Town of Bethel

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Hartford, CT 06103-3597
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Also admitted in Massachusetts

April 10, 2013

Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051



Re: **Notice of Exempt Modification – Antenna Swap
Sky Edge Lane, Bethel, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains six (6) wireless telecommunications antennas attached to a mast that extends above an existing 150-foot steel transmission line tower structure off Sky Edge Lane in Bethel. The mast supports Sprint antennas at the 157.5-foot level and Cellco antennas at the 167.5-foot level. The transmission line tower and underlying property are owned by Northeast Utilities. The Council approved Cellco's shared use of this structure in 2007. Cellco now intends to replace all of its existing antennas with three (3) model BXA-70063-6CF LTE antennas and three (3) model DBXNH-6565-VTM dual band cellular/PCS antennas, all at the same 167.5-foot level. Cellco also intends to install six (6) coaxial cable diplexers behind its antennas. Attached behind Tab 1 are the specifications for the replacement antennas and cable diplexers.

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

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

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's replacement antennas and cable diplexers will be located at the same 167.5-foot level.



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12190188-v1

Linda Roberts
April 10, 2013
Page 2

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Tab 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing transmission line structure and its foundation, with certain modifications, can support Cellco's proposed modifications. (A Structural Analysis Report including a foundation modification plan is attached behind Tab 3).

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Matthew S. Knickerbocker, Bethel First Selectman
Sandy M. Carter



BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

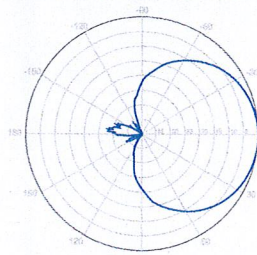
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz			
Frequency bands	696-806 MHz		806-900 MHz	
Polarization	±45°			
Horizontal beamwidth	65°		63°	
Vertical beamwidth	13°		11°	
Gain	14.0 dBd (16.1 dBi)		14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.35:1			
Upper sidelobe suppression (0°)	-18.3 dB		-18.2 dB	
Front-to-back ratio (+/-30°)	-33.4 dB		-36.3 dB	
Null fill	5% (-26.02 dB)			
Isolation between ports	< -25 dB			
Input power with EDIN connectors	500 W			
Input power with NE connectors	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1804 x 285 x 132 mm		71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm		6.8 in	
Weight without mounting brackets	7.9 kg		17 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.51 m ²	Side: 0.24 m ²	Front: 5.5 ft ²	Side: 2.6 ft ²
Wind load @ 161 km/hr (100 mph)	Front: 759 N	Side: 391 N	Front: 169 lbf	Side: 89 lbf
Mounting Options	Part Number	Fits Pipe Diameter		Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in		6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP			

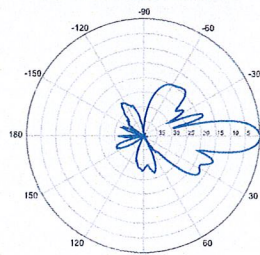


BXA-70063-6CF-EDIN-X



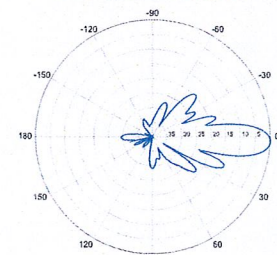
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

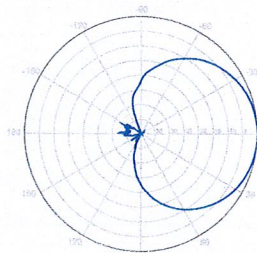


0° | Vertical | 750 MHz

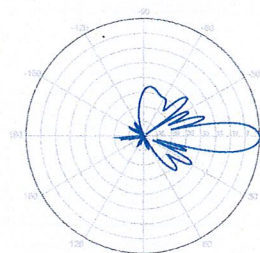
BXA-70063-6CF-EDIN-2



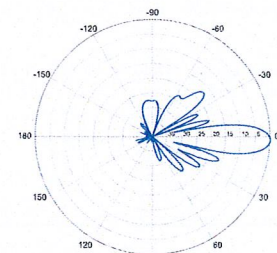
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



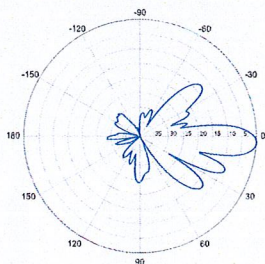
2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-70063-6CF-EDIN-X

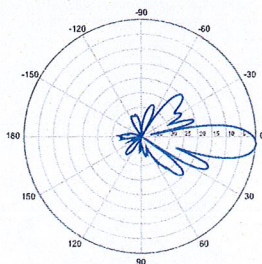
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



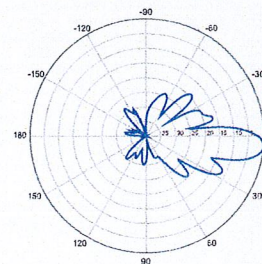
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

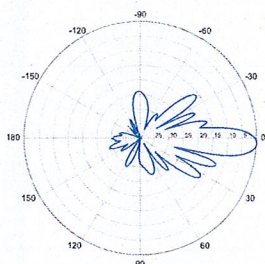


4° | Vertical | 750 MHz

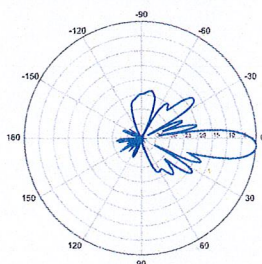
BXA-70063-6CF-EDIN-5



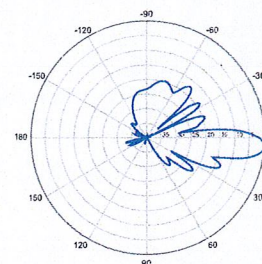
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

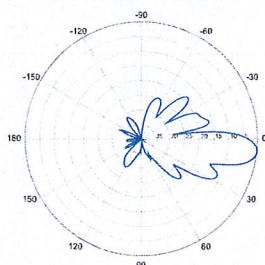


4° | Vertical | 850 MHz



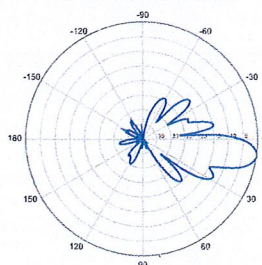
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



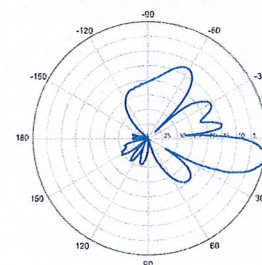
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

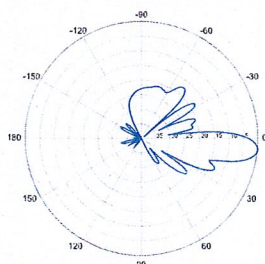


8° | Vertical | 750 MHz

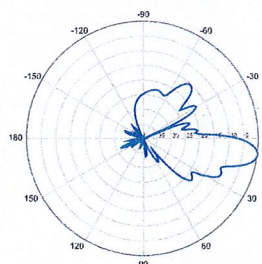
BXA-70063-6CF-EDIN-10



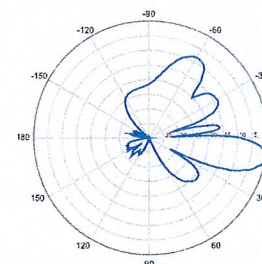
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz

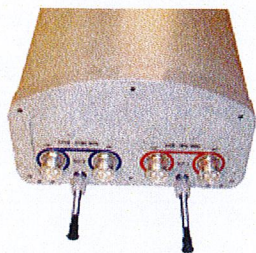
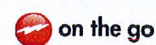


10° | Vertical | 850 MHz

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Product Specifications

COMMScope®



Andrew Solutions DBXNH-6565A-VTM

Andrew® DualPol® Dual Band Teletilt® Antenna, 698–896 MHz and 1710–2180 MHz,
65° horizontal beamwidth, RET compatible

- Ultra wideband capability for LTE 700 MHz and 850 MHz cellular technology
- Interleaved dipole technology providing for attractive, low wind load mechanical package
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180
Gain, dBi	13.4	14.6	16.6	17.6	17.1
Beamwidth, Horizontal, degrees	68	65	65	60	60
Beamwidth, Vertical, degrees	19.0	17.0	7.5	7.0	6.6
Beam Tilt, degrees	0–15	0–15	0–8	0–8	0–8
USLS, typical, dB	16	16	15	16	15
Front-to-Back Ratio at 180°, dB	25	27	30	32	30
Front-to-Back Total Power at 180° ± 20°, dB	18	21	28	29	27
CPR at Boresight, dB	16	15	21	21	24
CPR at Sector, dB	9	6	10	10	7
Isolation, dB	30	28	30	30	30
Isolation, Intersystem, dB	35	33	40	40	40
VSWR Return Loss, dB	1.5:1 14.0	1.5:1 14.0	1.5:1 14.0	1.5:1 14.0	1.5:1 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150
Input Power per Port, maximum, watts	400	400	300	300	300
Polarization	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm
Lightning Protection	dc Ground	dc Ground	dc Ground	dc Ground	dc Ground

Mechanical Specifications

Color Radome Material	Light gray Fiberglass, UV resistant
Connector Interface Location Quantity	7-16 DIN Female Bottom 4
Wind Loading, maximum	402.7 N @ 150 km/h 90.5 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	181.0 mm 7.1 in
Length	1293.00 mm 50.91 in
Width	301.00 mm 11.85 in
Net Weight	15.50 kg 34.17 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator DBXNH-6565A-R2M
Model with Factory Installed AISG 2.0 Actuator DBXNH-6565A-A2M

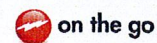
Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption

Product Specifications

COMMScope®

DBXNH-6565A-VTM



China RoHS SJ/T 11364-2006
ISO 9001:2008

Above Maximum Concentration Value (MCV)
Designed, manufactured and/or distributed under this quality management system



Included Products

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

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

Product Specifications

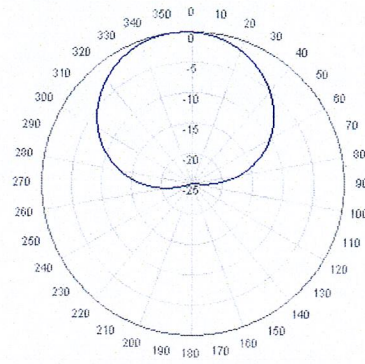
COMMScope®

DBXNH6565A-VTM

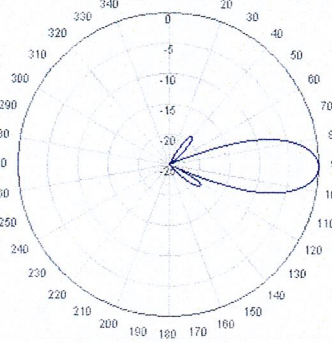


Horizontal Pattern

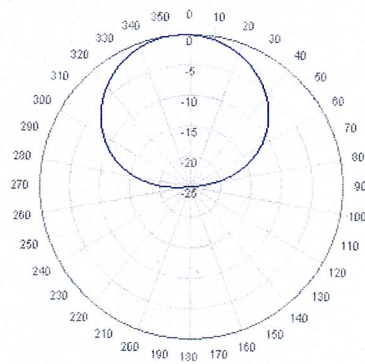
Vertical Pattern



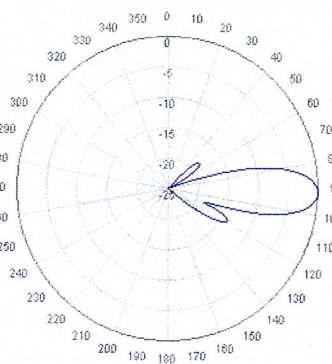
Freq: 725 MHz, Tilt: 0°



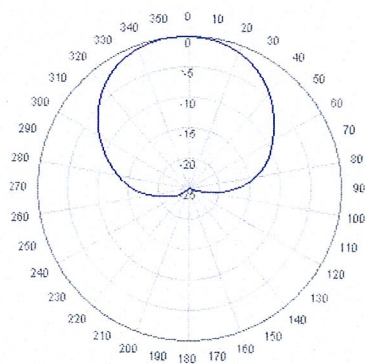
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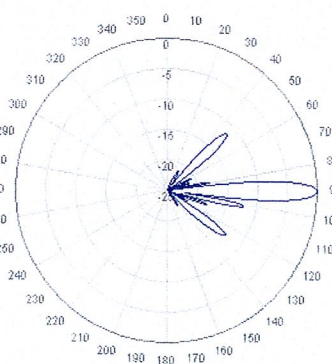
Freq: 850 MHz, Tilt: 0°



Freq: 850 MHz, Tilt: 0°



Freq: 1730 MHz, Tilt: 0°

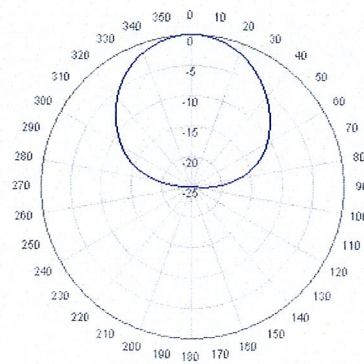
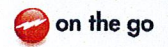


Freq: 1730 MHz, Tilt: 0°

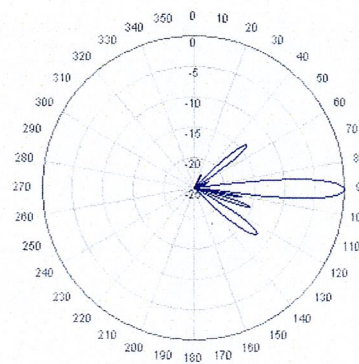
Product Specifications

COMMScope®

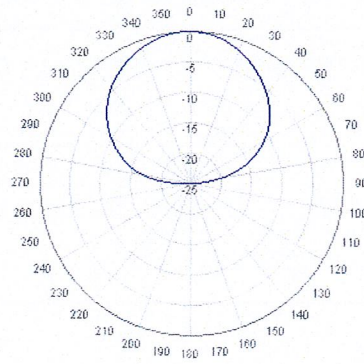
DBXNH6565A-VTM



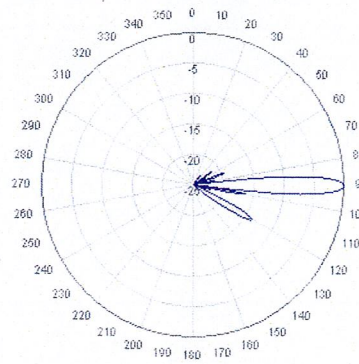
Freq: 1920 MHz, Tilt: 0°



Freq: 1920 MHz, Tilt: 0°



Freq: 2130 MHz, Tilt: 0°



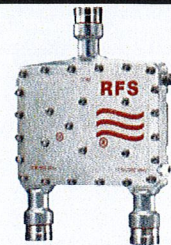
Freq: 2130 MHz, Tilt: 0°



ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



Features/Benefits

- LTE ready design
- Extremely Low Insertion Loss
- High level of Rejection between bands – Protection against interferences
- Extremely High Power Handling Capability
- Integrated DC block/bypass versions available
- Very compact & small size design – Easy installation and reduced tower load
- In-line long-neck connectors for easy connection & waterproofing
- Exceptional reliability & environmental protection (IP 67)
- Equipped with 1 * Breathable Vent – Prevent any humidity inside the product
- Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)
- Grounding already provided through the mounting bracket
- Kit available for easy dual mount

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Application	LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS
Frequency Range 1, MHz	698-960
Frequency Range 2, MHz	1710-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710-2170MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss, Path 1, dB	0.07 typ.
Insertion Loss, Path 2, dB	0.13 typ.
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 57/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

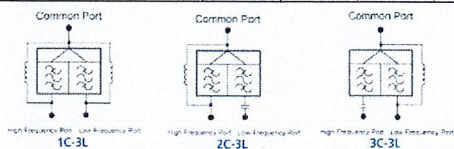
Notes

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Other Documentation

FD9R6004/2C-3L Installation Instructions: Wideband_Diplexer_Installation_Rev5.pdf

Selection Guide Diplexer 698-960 / 1710-2200MHz					
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	Description	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FD9R6004/C-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, includes lugs (Optional)	
CA030-2	Ground Cable, 2m, includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	

Structural Analysis of PCS
Structure and CL&P Pole

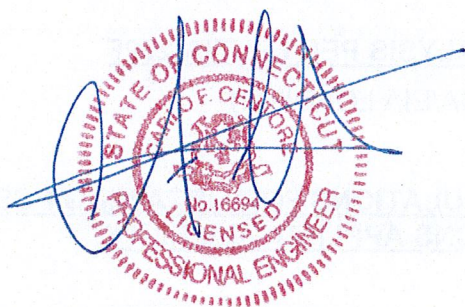
Verizon Wireless Site Ref:
Bethel North

CL&P Structure No. 10255
150' Electric Transmission Pole

Sky Edge Lane
Bethel, CT

CEN TEK Project No. 12001.CO85

~~Date: August 21, 2012~~
Rev 1: February 18, 2013



Prepared for:
Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108

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SITE NAME		BETHEL NORTH CT			ECP - CELL #		5		124							
LATITUDE		41-24-48.49 N			LONGITUDE		73-24-03.14 W									
Additional Comments: LTE antenna add, keeping with 6 antennas and adding diplexers to the main lines. Cell and PCS are the same antenna					SAVE BUTTON		POWER MOUNT									
					STRUCTURE TYPE											
700 Mhz - LTE ANTENNA ADD		ALPHA		BETA		GAMMA										
EQUIPMENT TYPE		eNodeB		eNodeB		eNodeB										
ANTENNA TYPE		BXA-70063-6CF_2		BXA-70063-6CF_2		BXA-70063-6CF_2										
QTY OF ANTENNAS PER FACE		1		1		1										
ORIENTATION (DEG)		0		120		240										
DOWN TILT (MECH/DEG)		0		3		3										
RAD CTR (FT AGL)		167.5		167.5		167.5										
TMA - QTY / MODEL																
DIPLEXER - QTY / MODEL																
850 Cellular - Current Config		ALPHA		BETA		GAMMA										
EQUIPMENT TYPE		Cellular Modcell 4.0B		Cellular Modcell 4.0B		Cellular Modcell 4.0B										
ANTENNA TYPE		BXA-80063/4CF		BXA-80063/4CF		BXA-80063/4CF										
QTY OF ANTENNAS PER FACE		1		1		1										
ORIENTATION (DEG)		0		120		240										
DOWN TILT (MECH/DEG)		0		0		0										
RAD CTR (FT AGL)		167.5		167.5		167.5										
TMA - QTY / MODEL																
DIPLEXER - QTY / MODEL																
850 Cellular - Future Config		ALPHA		BETA		GAMMA										
EQUIPMENT TYPE		Cellular Modcell 4.0B		Cellular Modcell 4.0B		Cellular Modcell 4.0B										
ANTENNA TYPE		DBXNH-6565A-VTM_4		DBXNH-6565A-VTM_4		DBXNH-6565A-VTM_4										
QTY OF ANTENNAS PER FACE		1		1		1										
ORIENTATION (DEG)		0		120		240										
DOWN TILT (MECH/DEG)		0		0		0										
RAD CTR (FT AGL)		167.5		167.5		167.5										
TMA - QTY / MODEL																
DIPLEXER - QTY / MODEL		2	FD9R6004/2C-3L	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L									
DIPLEX WITH LTE CABLE																
1900 PCS - Current Config		ALPHA		BETA		GAMMA										
EQUIPMENT TYPE		PCS Modcell 4.0B		PCS Modcell 4.0B		PCS Modcell 4.0B										
ANTENNA TYPE		BXA-185063/8CF		BXA-185063/8CF		BXA-185063/8CF										
QTY OF ANTENNAS PER FACE		1		1		1										
ORIENTATION (DEG)		0		120		240										
DOWN TILT (MECH/DEG)		0		0		0										
RAD CTR (FT AGL)		167.5		167.5		167.5										
TMA - QTY / MODEL																
DIPLEXER - QTY / MODEL																
1900 PCS - Future Config		ALPHA		BETA		GAMMA										
EQUIPMENT TYPE		PCS Modcell 4.0B		PCS Modcell 4.0B		PCS Modcell 4.0B										
ANTENNA TYPE		DBXNH-6565A-VTM_2		DBXNH-6565A-VTM_2		DBXNH-6565A-VTM_2										
QTY OF ANTENNAS PER FACE		1		1		1										
ORIENTATION (DEG)		0		120		240										
DOWN TILT (MECH/DEG)		0		0		0										
RAD CTR (FT AGL)		167.5		167.5		167.5										
TMA - QTY / MODEL																
DIPLEX WITH CELLULAR CABLE		DIPLEX with Cellular Cable		DIPLEX with Cellular Cable		DIPLEX with Cellular Cable										
NUMBER OF CABLE'S NEEDED					ESTIMATED CABLE LENGTH											
MAINLINE SIZE		1 5/8"		TOTAL # OF MAINLINES		12		MAINLINE (FT)								
JUMPER SIZE		1/2 "		TOTAL # OF TOP JUMPERS		18		TOP JUMPER (FT)			12					
Equipment Cable Ordering		MAIN CABLE		12		+		0		TOP JUMPER #		12	+		6	
TX / RX FREQUENCIES							TX POWER OUTPUT									
Cellular A-Band		PCS F / AWS-Band		700 Mhz C - B		Cellular (Watts)					20					
TX - 869-880,890-891.5 MHz		TX - 1970-1975 / 2145-21		TX - 746-757		PCS (Watts)					16					
RX - 824-835,845-846.5 MHz		RX - 1890-1895 / 1745-17		RX - 776-787		LTE (Watts)					40					

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
RF ENGINEER				RF MANAGER				INITIALS		DATE	
Prepared By: Mark Brauer				Steve Weatherbee				MB		6/18/2012	

Site Configuration

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

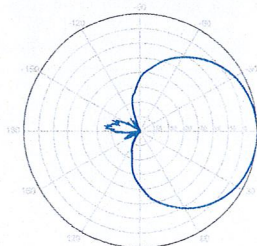
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz			
Frequency bands	696-806 MHz		806-900 MHz	
Polarization	±45°			
Horizontal beamwidth	65°		63°	
Vertical beamwidth	13°		11°	
Gain	14.0 dBd (16.1 dBi)		14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.35:1			
Upper sidelobe suppression (0°)	-18.3 dB		-18.2 dB	
Front-to-back ratio (+/-30°)	-33.4 dB		-36.3 dB	
Null fill	5% (-26.02 dB)			
Isolation between ports	< -25 dB			
Input power with EDIN connectors	500 W			
Input power with NE connectors	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1804 x 285 x 132 mm		71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm		6.8 in	
Weight without mounting brackets	7.9 kg		17 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.51 m ²	Side: 0.24 m ²	Front: 5.5 ft ²	Side: 2.6 ft ²
Wind load @ 161 km/hr (100 mph)	Front: 759 N	Side: 391 N	Front: 169 lbf	Side: 89 lbf
Mounting Options	Part Number	Fits Pipe Diameter		Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in		6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP			

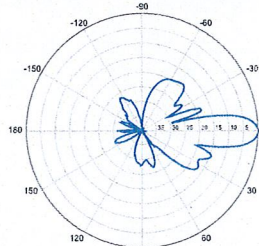


BXA-70063-6CF-EDIN-X



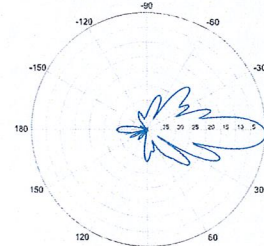
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

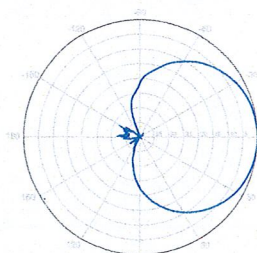


0° | Vertical | 750 MHz

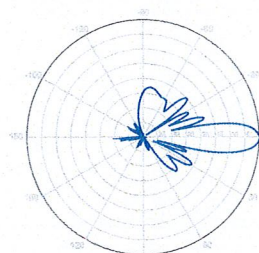
BXA-70063-6CF-EDIN-2



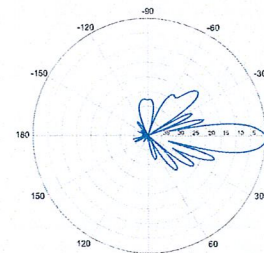
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

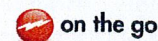


2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

Product Specifications

COMMScope®



Andrew Solutions

DBXNH-6565A-VTM

DualPol® Dual Band Teletilt® Antenna, 698–896 and 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Ultra wideband capability for LTE 700 MHz and 850 MHz cellular technology
- Interleaved dipole technology providing for attractive, low wind load mechanical package
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180
Gain, dBi	13.4	14.6	16.6	17.6	17.1
Beamwidth, Horizontal, degrees	68	65	65	60	60
Beamwidth, Vertical, degrees	19.0	17.0	7.5	7.0	6.6
Beam Tilt, degrees	0–15	0–15	0–8	0–8	0–8
USLS, typical, dB	16	16	15	16	15
Front-to-Back Ratio at 180°, dB	25	27	30	32	30
Front-to-Back Total Power at 180° ± 20°, dB	18	21	28	29	27
CPR at Boresight, dB	16	15	21	21	24
CPR at Sector, dB	9	6	10	10	7
Isolation, dB	30	28	30	30	30
Isolation, Intersystem, dB	35	33	40	40	40
VSWR Return Loss, dB	1.5:1 14.0	1.5:1 14.0	1.5:1 14.0	1.5:1 14.0	1.5:1 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150
Input Power per Port, maximum, watts	400	400	300	300	300
Polarization	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm
Lightning Protection	dc Ground	dc Ground	dc Ground	dc Ground	dc Ground

Mechanical Specifications

Color Radome Material	Light gray Fiberglass, UV resistant
Connector Interface Location Quantity	7-16 DIN Female Bottom 4
Wind Loading, maximum	402.7 N @ 150 km/h 90.5 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	181.0 mm 7.1 in
Length	1293.00 mm 50.91 in
Width	301.00 mm 11.85 in
Net Weight	15.50 kg 34.17 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator DBXNH-6565A-R2M

Model with Factory Installed AISG 2.0 Actuator DBXNH-6565A-A2M

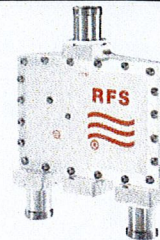
Regulatory Compliance/Certifications



ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



Features/Benefits

- LTE ready design
- Extremely Low Insertion Loss
- High level of Rejection between bands – Protection against interferences
- Extremely High Power Handling Capability
- Integrated DC block/bypass versions available
- Very compact & small size design – Easy installation and reduced tower load
- In-line long-neck connectors for easy connection & waterproofing
- Exceptional reliability & environmental protection (IP 67)
- Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)
- Grounding already provided through the mounting bracket
- Kit available for easy dual mount

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Frequency Band, MHz	698-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710 - 2170 MHz path, with mounting hardware SEM2-1A
Mounting	Wall, pole
Frequency Range Low Frequency Path, MHz	698-960
Frequency Range High Frequency Path, MHz	1710-2200
Return Loss All Ports, Min, dB	19
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss 698-960 MHz Path, Typ, dB	0.07
Insertion Loss 1710-2200MHz path, Typ, dB	0.13
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 60/70@1710-2200MHz
Rejection between Bands, Min, dB	60
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Application	LTE 700MHz, GSM900/3G/UMTS, GSM900/GSM1800, Cellular 800/PCS
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

Notes

All information contained in the present datasheet is subject to confirmation at time of ordering

Introduction

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

The proposed loads consist of the following:

- **SPRINT (Existing):**

Antennas: Six (6) Andrew DB980F65E-M panel antennas mounted on an existing 13-ft low profile platform to a 12-in Sch. 80 pipe mast with RAD center elevation of 157-ft 6-in above tower base plate.

Coax Cables: Six (6) 1-5/8" Ø coax cables running on the outside of the existing tower as indicated in section 4 of this report.

- **VERIZON (Existing to Remain):**

Coax Cables: Twelve (12) 1-5/8" Ø coax cables running on the outside of the tower as indicated in section 4 of this report

- **VERIZON (Existing to Remove):**

Antennas: Three (3) Antel BXA-80063/4CF and three (3) Antel BXA-185063/8CF panel antennas mounted on three (3) dual standoff mounts to a 12-in Sch. 80 pipe mast with RAD center elevation of 167-ft 6-in above tower base plate.

- **VERIZON (Proposed):**

Antennas: Three (3) Antel BXA-70063/6CF panel antennas, three (3) Andrew DBXNH-6565A-VTM panel antennas and six (6) RFS FD9R6004/2C-3L diplexers mounted on three (3) dual standoff mounts to a 12-in Sch. 80 pipe mast with RAD center elevation of 167-ft 6-in above tower base plate.

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.
- Pipe mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Pipe mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.
- Existing mast information was taken from URS Corp. construction drawings project no. 38929204 dated 1/15/2007.

A n a l y s i s

Structural analysis of the existing PCS Mast Structure was independently completed using the current version of RISA-3D computer program licensed to CEN TEK engineering, Inc.

The existing mast consisting of a 33-ft long pipe 12-in SCH. 80 (O.D. = 12.8-in) connected at two points to the existing pole was analyzed for its ability to resist loads prescribed by the TIA/EIA standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were applied to the existing mast structure in order to obtain reactions needed for analyzing the CL&P pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA/EIA loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

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

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

D e s i g n B a s i s

Our analysis was performed in accordance with TIA/EIA-222-F-1996, 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 pcs antenna mast was analyzed under two conditions:

▪ 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 Pressure.....	4.0 psf
Radial Ice Thickness.....	0.5"
Vertical Overload Capacity Factor.....	1.50
Wind Overload Capacity Factor.....	2.50
Wire Tension Overload Capacity Factor.....	1.65

Load Case 2: NESC Extreme

Wind Speed.....	100 mph ⁽¹⁾
Radial Ice Thickness.....	0"

Note 1: NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)

■ PCS MAST ANALYSIS

The PCS mast, appurtenances and connections to the utility pole 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.

R e s u l t s

PCS MAST

The proposed mast was determined to be structurally adequate.

Member	Stress Ratio (% of capacity)	Result
12" Sch. 80 Pipe	72.8% ⁽¹⁾	PASS
Flange Plate	71.3% ⁽²⁾	PASS
PCS Mast to Pole Connection Bolts	48.6% ⁽²⁾	PASS

Note 1 – 1/3 Increase in allowable stress used for mast.

Note 2 – 1/3 increase in allowable stress not used for mast connection.

■ 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 **95.73%** occurs in the utility pole base plate under the **NESC Extreme** loading condition.

POLE SECTION:

The utility pole was found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Tube Number 3	0' -51.2' (AGL)	93.95%	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	95.73%	PASS

▪ FOUNDATION AND ANCHORS

The existing foundation consists of a 8-ft Ø x 20.5-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (24) 2.25"Ø, ASTM A615-75 anchor bolts embedded approximately 7.5-ft into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01143-60001 Sh. 3. Reinforcement to the existing foundation with a proposed 24-ft square by 4-ft deep reinforced concrete mat installed at the periphery of the existing caisson is required prior to the Sprint antenna upgrade.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

BASE REACTIONS:

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

Load Case	Shear	Axial	Moment
NESC Heavy Wind	33.11 kips	113.19 kips	4098.58 ft-kips
NESC Extreme Wind	52.30 kips	58.85 kips	5928.28 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	56.7%	PASS

FOUNDATION:

The foundation with modifications per the reinforcement drawings prepared by this office dated February 18, 2013 was found to be within allowable limits.

Foundation	Design Limit	Required FS ⁽¹⁾	Proposed Loading FS ⁽¹⁾	Result
Reinf. Conc. Pad and Pier	OTM ⁽²⁾	1.0	1.57	PASS

Note: 1. FS denote Factor of Safety
 2. OTM denotes Overturning Moment

CEN TEK Engineering, Inc.
Structural Analysis – 150-ft CL&P Pole # 10255
Verizon Wireless Antenna Upgrade – Bethel North
Bethel, CT
Rev 1 ~ February 18, 2013

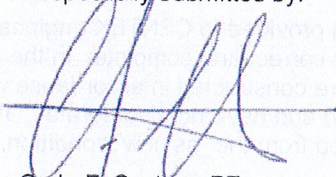
Conclusions and Recommendations

This analysis shows that **provided the proposed foundation modifications prepared by this office dated February 18, 2013 have been implemented** the subject utility pole **is adequate** to support the proposed Verizon equipment upgrade.

The analysis is based, in part on the information provided to this office by Northeast Utilities and Verizon Wireless. 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.

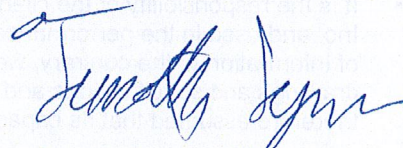
Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:



Timothy J. Lynn, EIT
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 ~ RISA-3D

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

Modeling Features:

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

Analysis Features:

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

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

Graphics Features:

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

Design Features:

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

Results Features:

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-POLE

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

Modeling Features:

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

Analysis Features:

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

CEN TEK Engineering, Inc.
Structural Analysis – 150-ft CL&P Pole # 10255
Verizon Wireless Antenna Upgrade – Bethel North
Bethel, CT
Rev 1 ~ February 18, 2013

Results Features:

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

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

Introduction

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

ANSI Standard TIA/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.

P C S M a s t

The PCS facility (mast, external cable/trays, including the initial and any planned future support platforms, antennas, etc. extending the full height above the top level of the electric transmission structure) shall be designed in accordance with the provisions of TIA/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 stress increase of TIA Section 3.1.1.1 is disallowed. The combined wind and ice condition shall consider $\frac{1}{2}$ " radial ice in combination with the wind load (0.75 W_i) as specified in TIA section 2.3.16.

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

The electric transmission tower shall be analyzed using yield stress theory in accordance with the attached table titled "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.



Northeast Utilities Overhead Transmission Standards



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 Condition	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 Condition*		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

Communication Antennas on Transmission Structures (CL&P & WMECo Only)

Northeast Utilities

Approved by: KMS (NU)

Design

NU Confidential Information

OTRM 059

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03/17/2011



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.

Communication Antennas on Transmission Structures (CL&P & WMECo Only)



Job :
Description:

Spec. Number
Computed by
Checked by

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Date 10/25/10
Date

INPUT DATA

TOWER ID: 10255

Structure Height (ft) : 150

Wind Zone : Central CT (green)

Wind Speed : 90.5711047 mph

Tower Type : ☒ Suspension
☐ Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

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

Conductor Properties:

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

Insulator Weight = 0 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

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

Line Geometry:

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



Job :
Description:

Spec. Number
Computed by
Checked by

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Date 10/25/10
Date

WIRE LOADING AT ATTACHMENTS

TOWER ID: 10255

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

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

1. NESC RULE 250B Heavy Loading:

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

2. NESC RULE 250C Transverse Extreme Wind Loading:

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

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

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

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

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

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

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

6. 60 Deg. F. No Wind

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

7. Construction

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



Northeast
Utilities System

Job :

Description:

Spec. Number

Computed by

Checked by

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Date

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

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

EXISTING 12" SCH. 80 X
33'-0" LONG PIPE MAST

☉ VERIZON ANTENNAS
EL. ±167'-6" ABP

☉ SPRINT ANTENNAS
EL. ±157'-6" ABP

☉ TOP CONNECTION
EL. ±146'-6" ABP

☉ BOT. CONNECTION
EL. ±140'-3" ABP

NOTE: ABP DENOTES
ABOVE OF BASE PLATE

VERIZON (PROPOSED):

THREE (3) ANTEL BXA-70063/6CF
PANEL ANTENNAS, THREE (3) ANDREW
DBXNH-6565A-VTM PANEL ANTENNAS
AND SIX (6) RFS FD9R6004/2C-3L
DIPLEXERS MOUNTED ON THREE (3)
DUAL STANDOFF MOUNTS

VERIZON (EXISTING TO REMOVE)

THREE (3) ANTEL BXA-80063/4CF
PANEL ANTENNAS AND THREE (3)
ANTEL BXA-185063/8CF PANEL
ANTENNAS MOUNTED ON THREE (3)
DUAL STANDOFF MOUNTS

SPRINT (EXISTING):

SIX (6) EXISTING DB980F65E-M PANEL
ANTENNAS MOUNTED ON AN EXISTING
LOW PROFILE PLATFORM.

EXISTING 150' TALL
CL&P STEEL POLE
STRUCTURE NO. 10255

EXISTING SPRINT SIX (6)
1-5/8" DIA. COAX CABLES

EXISTING VERIZON TWELVE
(12) 1-5/8" DIA. COAX
CABLES (BEHIND)

FOUNDATION REINFORCEMENT PER
CENTEK ENGINEERING DRAWINGS DATED
FEBRUARY 18, 2013 TO BE COMPLETED
PRIOR TO VERIZON WIRELESS ANTENNA
UPGRADE

1

TOWER & MAST ELEVATION

EL-1

SCALE: NOT TO SCALE

REVISIONS

00	8/21/12	ISSUED FOR NJ REVIEW
01	2/18/13	ISSUED FOR NJ REVIEW

CEN TEK engineering
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BETHEL NORTH
CL&P 10255

SKY EDGE LANE
BETHEL, CT 06801

PROJECT NO: 12001.C085
DRAWN BY: TJL
CHECKED BY: CFC
SCALE: AS NOTED
DATE: 8/21/12

TOWER AND MAST
ELEVATION
EL-1
DWG. 1 OF 1

**Development of Design Heights, Exposure Coefficients,
and Velocity Pressures Per TIA/EIA**

Wind Speeds

Basic Wind Speed	$V := 85$	mph	(User Input per NU Mast Design Criteria Exception 1)
Basic Wind Speed with Ice	$V_i := 74$	mph	(User Input per TIA/EIA-222-F Section 2.3.16)

Heights above ground level, z

Mast	$z_{\text{mast}} := 153.5$	ft	(User Input)
Verizon	$z_{\text{vz}} := 167.5$	ft	(User Input)
Sprint	$z_{\text{sprt}} := 157.5$	ft	(User Input)
Coax Cable	$z_{\text{coax}} := 153.5$	ft	(User Input)

Exposure Coefficients, k_z

(per TIA/EIA-222-F Section 2.3.3)

Mast	$Kz_{\text{mast}} := \left(\frac{z_{\text{mast}}}{33} \right)^{\frac{2}{7}} = 1.551$
Verizon	$Kz_{\text{vz}} := \left(\frac{z_{\text{vz}}}{33} \right)^{\frac{2}{7}} = 1.591$
Sprint	$Kz_{\text{sprt}} := \left(\frac{z_{\text{sprt}}}{33} \right)^{\frac{2}{7}} = 1.563$
Coax Cable	$Kz_{\text{coax}} := \left(\frac{z_{\text{coax}}}{33} \right)^{\frac{2}{7}} = 1.551$

Velocity Pressure without ice, q_z

(per TIA/EIA-222-F Section 2.3.3)

Mast	$qz_{\text{mast}} := 0.00256 \cdot Kz_{\text{mast}} \cdot V^2 = 28.696$
Verizon	$qz_{\text{vz}} := 0.00256 \cdot Kz_{\text{vz}} \cdot V^2 = 29.42$
Sprint	$qz_{\text{sprt}} := 0.00256 \cdot Kz_{\text{sprt}} \cdot V^2 = 28.908$
Coax Cable	$qz_{\text{coax}} := 0.00256 \cdot Kz_{\text{coax}} \cdot V^2 = 28.696$

Subject:

Load Analysis of PCS Mast on CL&P Pole #
10255

Location:

Bethel, CT

Rev. 1: 2/12/13

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 12001.CO85**Velocity Pressure with ice, qzICE**

(per TIA/EIA-222-F Section 2.3.3)

Mast

$$qzICE_{\text{mast}} := 0.00256 \cdot Kz_{\text{mast}} \cdot V_i^2 = 21.749$$

Verizon

$$qzICE_{\text{vz}} := 0.00256 \cdot Kz_{\text{vz}} \cdot V_i^2 = 22.298$$

Sprint

$$qzICE_{\text{sprt}} := 0.00256 \cdot Kz_{\text{sprt}} \cdot V_i^2 = 21.91$$

Coax Cable

$$qzICE_{\text{coax}} := 0.00256 \cdot Kz_{\text{coax}} \cdot V_i^2 = 21.749$$

TIA/EIA Common Factors:

Gust Response Factor =

$$G_H := 1.69$$

(User Input per TIA/EIA-222-F Section 2.3.4)

Gust Response Factor Multiplier =

$$m := 1.25$$

(User Input per TIA/EIA-222-F Section 2.3.4.4)

Radial Ice Thickness =

$$I_r := 0.50$$

in

(User Input per TIA/EIA-222-F Section 2.3.1)

Radial Ice Density =

$$I_d := 56.00$$

pcf

(User Input)

Development of Wind & Ice Load on PCS Mast

(per TIA/EIA-222-F-1996 Criteria)

Mast Data:

Mast Shape =

(Pipe 12.0" SCH. 80)

(User Input)

Mast Diameter =

Round

(User Input)

 $D_{\text{mast}} := 12.8 \text{ in}$

(User Input)

Mast Length =

 $L_{\text{mast}} := 33 \text{ ft}$

(User Input)

Mast Thickness =

 $t_{\text{mast}} := 0.5 \text{ in}$

(User Input)

Mast Aspect Ratio =

$$A_{r_{\text{mast}}} := \frac{12L_{\text{mast}}}{D_{\text{mast}}} = 30.9$$

Mast Force Coefficient =

 $C_{a_{\text{mast}}} = 1.2$

(per TIA/EIA-222-F Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Mast Projected Surface Area =

$$A_{\text{mast}} := \frac{D_{\text{mast}}}{12} = 1.067$$

Total Mast Wind Force =

$$qz_{\text{mast}} G_H C_{a_{\text{mast}}} A_{\text{mast}} = 62$$

plf

BLC 5
Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Mast Projected Surface Area w/ Ice =

$$A_{\text{ICE}_{\text{mast}}} := \frac{(D_{\text{mast}} + 2I_r)}{12} = 1.15$$

Total Mast Wind Force w/ Ice =

$$qz_{\text{ICE}_{\text{mast}}} G_H C_{a_{\text{mast}}} A_{\text{ICE}_{\text{mast}}} = 51$$

plf

BLC 4
Gravity Loads (without ice)

Weight of the mast =

Self Weight

(Computed internally by Risa-3D)

plf

BLC 1
Gravity Loads (ice only)

Ice Area per Linear Foot =

$$A_{i_{\text{mast}}} := \frac{\pi}{4} \left[(D_{\text{mast}} + I_r \cdot 2)^2 - D_{\text{mast}}^2 \right] = 20.9$$

sq in

Weight of Ice on Mast =

$$W_{\text{ICE}_{\text{mast}}} := I_d \frac{A_{i_{\text{mast}}}}{144} = 8$$

plf

BLC 3

Subject:

Load Analysis of PCS Mast on CL&P Pole # 10255

Location:

Bethel, CT

Rev. 1: 2/12/13

 Prepared by: T.J.L. Checked by: C.F.C.
 Job No. 12001.CO85

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

(Verizon)

Antenna Model =	Antel BXA-70063/6CF	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 71$	in (User Input)
Antenna Width =	$W_{ant} := 11.2$	in (User Input)
Antenna Thickness =	$T_{ant} := 5.2$	in (User Input)
Antenna Weight =	$WT_{ant} := 17$	lbs (User Input)
Number of Antennas =	$N_{ant} := 3$	(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 6.3$	
Antenna Force Coefficient =	$Ca_{ant} = 1.4$	(per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

*Assumes Maximum Possible Wind Pressure
 Applied to All Antennas Simultaneously*

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.5$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 16.6$	sf

Total Antenna Wind Force =	$F_{ant} := qz_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 1153$	lbs	BLC 5
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Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

*Assumes Maximum Possible Wind Pressure
 Applied to All Antennas Simultaneously*

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.1$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 18.3$	sf

Total Antenna Wind Force w/ Ice =	$F_{ICEant} := qz_{ICEvz} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 965$	lbs	BLC 4
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Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 51$	lbs	BLC 2
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Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4135$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1311$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 42$	lbs

Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 127$	lbs	BLC 3
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Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

(Verizon)

Antenna Model =	Andrew DBXNH-6565A-VTM
Antenna Shape =	Flat (User Input)
Antenna Height =	$L_{ant} := 50.91$ in (User Input)
Antenna Width =	$W_{ant} := 11.85$ in (User Input)
Antenna Thickness =	$T_{ant} := 7.1$ in (User Input)
Antenna Weight =	$WT_{ant} := 34.17$ lbs (User Input)
Number of Antennas =	$N_{ant} := 3$ (User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$
Antenna Force Coefficient =	$Ca_{ant} = 1.4$ (per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

*Assumes Maximum Possible Wind Pressure
 Applied to All Antennas Simultaneously*

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} W_{ant}}{144} = 4.2$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} N_{ant} = 12.6$	sf

Total Antenna Wind Force =	$F_{ant} := qz_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 875$	lbs	BLC 5
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Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

*Assumes Maximum Possible Wind Pressure
 Applied to All Antennas Simultaneously*

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1)(W_{ant} + 1)}{144} = 4.6$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} N_{ant} = 13.9$	sf

Total Antenna Wind Force w/ Ice =	$F_{ant} := qz_{ICEvz} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 733$	lbs	BLC 4
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Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} N_{ant} = 103$	lbs	BLC 2
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Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} W_{ant} T_{ant} = 4283$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1)(T_{ant} + 1) - V_{ant} = 1120$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 36$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} N_{ant} = 109$	lbs

Development of Wind & Ice Load on Diplexers

(per TIA/EIA-222-F-1996 Criteria)

Diplexer Data:

(Verizon)

Diplexer Model =	RFS FD9R6004/2C-3L Diplexer
Diplexer Shape =	Flat (User Input)
Diplexer Height =	$L_{dplx} := 5.8$ in (User Input)
Diplexer Width =	$W_{dplx} := 6.5$ in (User Input)
Diplexer Thickness =	$T_{dplx} := 1.5$ in (User Input)
Diplexer Weight =	$WT_{dplx} := 3$ lbs (User Input)
Number of Diplexers =	$N_{dplx} := 6$ (User Input)
Diplexer Aspect Ratio =	$Ar_{dplx} := \frac{L_{dplx}}{W_{dplx}} = 0.9$
Diplexer Force Coefficient =	$Ca_{dplx} = 1.4$ (per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure Applied to All Diplexers Simultaneously

Surface Area for One Diplexer =	$SA_{dplx} := \frac{L_{dplx} \cdot W_{dplx}}{144} = 0.3$	sf
Diplexer Projected Surface Area =	$A_{dplx} := SA_{dplx} \cdot N_{dplx} = 1.6$	sf

Total Diplexer Wind Force =	$F_{dplx} := qz_{vz} \cdot G_H \cdot Ca_{dplx} \cdot A_{dplx} = 109$	lbs	BLC 5
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Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure Applied to All Diplexers Simultaneously

Surface Area for One Diplexer w/ Ice =	$SA_{ICEdplx} := \frac{(L_{dplx} + 1) \cdot (W_{dplx} + 1)}{144} = 0.4$	sf
Diplexer Projected Surface Area w/ Ice =	$A_{ICEdplx} := SA_{ICEdplx} \cdot N_{dplx} = 2.1$	sf

Total Diplexer Wind Force w/ Ice =	$F_{dplx} := qz_{ICE} \cdot v_z \cdot G_H \cdot Ca_{dplx} \cdot A_{ICEdplx} = 112$	lbs	BLC 4
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Gravity Load (without ice)

Weight of All Diplexers =	$WT_{dplx} \cdot N_{dplx} = 18$	lbs	BLC 2
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Gravity Loads (ice only)

Volume of Each Diplexer =	$V_{dplx} := L_{dplx} \cdot W_{dplx} \cdot T_{dplx} = 57$	cu in
Volume of Ice on Each Diplexer =	$V_{ice} := (L_{dplx} + 1)(W_{dplx} + 1)(T_{dplx} + 1) - V_{dplx} = 71$	cu in
Weight of Ice on Each Diplexer =	$W_{ICEdplx} := \frac{V_{ice}}{1728} \cdot \rho_d = 2$	lbs
Weight of Ice on All Diplexers =	$W_{ICEdplx} \cdot N_{dplx} = 14$	lbs

Subject:

Load Analysis of PCS Mast on CL&P Pole #
10255

Location:

Bethel, CT

Rev. 1: 2/12/13

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 12001.CO85**Development of Wind & Ice Load on Antenna Mounts**

(per TIA/EIA-222-F-1996 Criteria)

Mount Data:

(Verizon)

Mount Type:

Dual Standoff Mount
B1827 w/ 6 Pipe Mounts

Platform Shape =

Flat (User Input)

Platform Area =

 $A_{plt} := 7$ sq ft (User Input) (Force Coefficient Included)

Platform Area w/ Ice =

 $A_{ICE,plt} := 10$ sq ft (User Input) (Force Coefficient Included)

Platform Weight =

 $WT_{plt} := 575$ lbs (User Input)

Platform Weight w/ Ice =

 $WT_{ICE,plt} := 800$ lbs (User Input)**Wind Load (without ice)**

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force =

 $F_{plt} := q_{z_{vz}} G_H A_{plt} = 348$ lbs **BLC 5****Wind Load (with ice)**

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force w/ Ice =

 $F_{plt} := q_{z_{ICE}} G_H A_{ICE,plt} = 377$ lbs **BLC 4****Gravity Load (without ice)**

Weight of Platform =

 $WT_{plt} = 575$ lbs **BLC 2****Gravity Loads (ice only)**

Weight of Ice on Platform =

 $WT_{ICE,plt} - WT_{plt} = 225$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

(Sprint)

Antenna Model =	Andrew DB980F65E-M	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 60$	in (User Input)
Antenna Width =	$W_{ant} := 6.3$	in (User Input)
Antenna Thickness =	$T_{ant} := 3$	in (User Input)
Antenna Weight =	$WT_{ant} := 8.5$	lbs (User Input)
Number of Antennas =	$N_{ant} := 6$	(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 9.5$	
Antenna Force Coefficient =	$Ca_{ant} = 1.48$	(per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

*Assumes Maximum Possible Wind Pressure
Applied to All Antennas Simultaneously*

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.6$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 15.8$	sf

Total Antenna Wind Force =

$$F_{ant} := qz_{sprt} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 1142 \quad \text{lbs} \quad \text{BLC 5}$$

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

*Assumes Maximum Possible Wind Pressure
Applied to All Antennas Simultaneously*

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 3.1$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 18.6$	sf

Total Antenna Wind Force w/ Ice =

$$F_{ant} := qz_{ICE} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 1020 \quad \text{lbs} \quad \text{BLC 4}$$

Gravity Load (without ice)

Weight of All Antennas =

$$WT_{ant} \cdot N_{ant} = 51 \quad \text{lbs} \quad \text{BLC 2}$$

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1134$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 647$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 21$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 126$	lbs BLC 3

Subject:

Load Analysis of PCS Mast on CL&P Pole # 10255

Location:

Bethel, CT

Rev. 1: 2/12/13

Prepared by: T.J.L. Checked by: C.F.C.
 Job No. 12001.CO85

Development of Wind & Ice Load on Antenna Mounts

(per TIA/EIA-222-F-1996 Criteria)

Mount Data:

(Sprint)

Mount Type:

13-ft Low Profile Platform

Platform Shape =

Flat (User Input)

Platform Area =

$A_{plt} := 20$ sq ft (User Input) (Force Coefficient Included)

Platform Area w/ Ice =

$A_{ICE,plt} := 25$ sq ft (User Input) (Force Coefficient Included)

Platform Weight =

$WT_{plt} := 1500$ lbs (User Input)

Platform Weight w/ Ice =

$WT_{ICE,plt} := 2000$ lbs (User Input)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force =

$F_{plt} := qz_{sprt} G_H A_{plt} = 977$ lbs BLC 5

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force w/ Ice =

$F_{plt} := qz_{ICE,sp} G_H A_{ICE,plt} = 926$ lbs BLC 4

Gravity Load (without ice)

Weight of Platform =

$WT_{plt} = 1500$ lbs BLC 2

Gravity Loads (ice only)

Weight of Ice on Platform =

$WT_{ICE,plt} - WT_{plt} = 500$ lbs BLC 3

Development of Wind & Ice Load on Coax Cables

per TIA/EIA-222-F-96 Criteria

Coax Cable Data:

Coax Type =	HELIAX 1-5/8"
Shape =	Round (User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$ in (User Input)
Coax Cable Length =	$L_{coax} := 31$ ft (User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$ plf (User Input)
Total Number of Coax =	$N_{coax} := 18$ (User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 2$ (User Input)

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

Coax Cable Force Factor Coefficient = $Ca_{coax} = 1.2$ TIA/EIA-222-F-96 Table 3

Wind Load (without ice)

per TIA/EIA-222-F-96 Section 2.3.2

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

Total Coax Wind Force = $F_{coax} := Ca_{coax} qz_{coax} G_H A_{coax} = 19$ plf **BLC 5**

Wind Load (with ice)

per TIA/EIA-222-F-96 Section 2.3.2

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

Total Coax Wind Force w/ Ice = $F_{i_{coax}} := Ca_{coax} qz_{ICE_{coax}} G_H A_{ICE_{coax}} = 22$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} N_{coax} = 19$ plf **BLC 2**

Gravity Loads (ice only)

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

Ice Weight All Coax per foot = $WT_{i_{coax}} := Id \left(N_{coax} \frac{A_{i_{coax}}}{144} \right) = 27$ plf **BLC 3**

CEN TEK engineering, INC. Consulting Engineers 63-2 North Branford Road Branford, CT 06405 Ph. 203-488-0580 / Fax. 203-488-8587		Subject: Analysis of TIA/EIA Wind and Ice Loads for Analysis of Mast Only Tabulated Load Cases Location: Bethel, CT Date: 8/20/12 Prepared by: T.J.L. Checked by: C.F.C. Job No. 12001.CO85	
Load Case	Description		
1	Self Weight (Mast)		
2	Weight of Appurtenances		
3	Weight of Ice Only on PCS Structure		
4	TIA/EIA Wind with Ice on PCS Structure		
5	TIA/EIA Wind on PCS Structure		
Footnotes: (1) PCS Structure includes: Mast and Appurtenances			

CEN TEK engineering, INC. Consulting Engineers 63-2 North Branford Road Branford, CT 06405 Ph. 203-488-0580 / Fax. 203-488-8587		Subject: Analysis of TIA/EIA Wind and Ice Loads for Analysis of Mast Only Load Combinations Table										Job No. 12001.CO85
Location: Bethel, CT Date: 8/20/12 Prepared by: T.J.L. Checked by: C.F.C.												
Load Combination	Description	Envelope Wind										BLC Factor
		Soulltion	Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	
1	TIA/EIA Wind + Ice on PCS Structure	1			1	1	2	1	3	1	4	1
2	TIA/EIA Wind on PCS Structure	1			1	1	2	1	5	1		
Footnotes: (1) BLC = Basic Load Case (2) PCS Structure includes: Mast and Appurtenances												

Company : CENTEK Engineering, INC.
 Designer : tjf, cfc
 Job Number : 12001.CO85 -Bethel North CL&P Pole # 10255 - PCS Mast

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Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y
Global Member Orientation Plane	XZ

Hot Rolled Steel Code	AISC 9th: ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-05/08: ASD
Aluminum Code	AA ADM1-05: ASD

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parame Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ct Exp. X	.75
Ct Exp. Z	.75
Ca	.36
Cv	.54
Nv	1
SD1	1
SDS	1
S1	1
Occupancy Code	4
Seismic Zone	3
Use Group	I
Use Gravity Self Wt in Diaphragm Mass	Yes
Use Deck Self Wt in Diaphragm Mass	Yes
Use Lateral Self Wt in Diaphragm Mass	Yes
Seismic Detailing Code	None
Om X	1
Om Z	1
Rho X	1
Rho Z	1

Hot Rolled Steel Properties

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

Hot Rolled Steel Design Parameters

	Label	Shape	Length...	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	Kyy	Kzz	Cm-...Cm-...	Cb	y sw...z sw...	Function
1	M1	Mast	14										Lateral
2	M2	Mast	19										Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE 12.0X	Beam	Pipe	A53 Gr. B	Typical	17.9	339	339	678

Member Primary Data

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

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3.25	0	0	
3	N3	0	9.42	0	0	
4	N4	0	14	0	0	
5	N5	0	33	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	N1							
2	N2	Reaction	Reaction	Reaction				
3	N4							
4	N3	Reaction	Reaction	Reaction				

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude(k,k-ft), (in,rad), (k*s^2/f...
No Data to Print ...			

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.051	16.5
2	M2	Y	-.103	16.5
3	M2	Y	-.018	16.5
4	M2	Y	-.575	16.5
5	M2	Y	-.051	6.5
6	M2	Y	-1.5	6.5

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.127	16.5
2	M2	Y	-.109	16.5
3	M2	Y	-.014	16.5
4	M2	Y	-.225	16.5
5	M2	Y	-.126	6.5
6	M2	Y	-.5	6.5

Member Point Loads (BLC 4 : TIA/EIA Wind with Ice on P)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.965	16.5
2	M2	X	.733	16.5
3	M2	X	.112	16.5
4	M2	X	.377	16.5
5	M2	X	1.02	6.5
6	M2	X	.926	6.5

Member Point Loads (BLC 5 : TIA/EIA Wind on PCS Struct)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	1.153	16.5
2	M2	X	.875	16.5
3	M2	X	.109	16.5
4	M2	X	.348	16.5
5	M2	X	1.142	6.5
6	M2	X	.977	6.5

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.019	-.019	0	0
2	M2	Y	-.019	-.019	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.008	-.008	0	0
2	M2	Y	-.008	-.008	0	0
3	M1	Y	-.027	-.027	0	0
4	M2	Y	-.027	-.027	0	0

Member Distributed Loads (BLC 4 : TIA/EIA Wind with Ice on P)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
--	--------------	-----------	---------------------------	----------------------	----------------------	--------------------

Company : CENTEK Engineering, INC.
 Designer : tjf, cfc
 Job Number : 12001.CO85 -Bethel North CL&P Pole # 10255 - PCS Mast

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Member Distributed Loads (BLC 4 : TIA/EIA Wind with Ice on P) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.051	.051	0	0
2	M2	X	.051	.051	0	0
3	M1	X	.022	.022	0	0
4	M2	X	.022	.022	0	0

Member Distributed Loads (BLC 5 : TIA/EIA Wind on PCS Struct)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.062	.062	0	0
2	M2	X	.062	.062	0	0
3	M1	X	.019	.019	0	0
4	M2	X	.019	.019	0	0

Basic Load Cases

	BLC Description	Category	X Grav...	Y Grav...	Z Gravity	Joint	Point	Distrib...	Area(...	Surfac...
1	Self Weight	None		-1						
2	Weight of Appurtenances	None					6	2		
3	Weight of Ice Only on PCS Struct	None					6	4		
4	TIA/EIA Wind with Ice on P	None					6	4		
5	TIA/EIA Wind on PCS Struct	None					6	4		

Load Combinations

	Description	So...	PDelta	SRSS	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...
1	TIA/EIA Wind + Ice on PCS ...	Yes			1	1	2	1	3	1	4	1				
2	TIA/EIA Wind on PCS Struct...	Yes			1	1	2	1	5	1						
3	Self Weight															

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Momen...	LC	z-z Momen...	LC
1	M1	1	max	0	1	0	1	0	1	0	1	0	1	0	1
2			min	0	1	0	1	0	1	0	1	0	1	0	1
3		2	max	.326	1	-13.986	1	0	1	0	1	0	1	4.337	2
4				min	.227	2	-15.646	2	0	1	0	1	0	1	3.88
5		3	max	-.053	2	-14.242	1	0	1	0	1	0	1	59.594	2
6			min	-.076	1	-15.93	2	0	1	0	1	0	1	53.279	1
7		4	max	5.984	1	6.426	2	0	1	0	1	0	1	91.393	2
8			min	4.096	2	5.775	1	0	1	0	1	0	1	81.678	1
9		5	max	5.582	1	6.143	2	0	1	0	1	0	1	69.397	2
10			min	3.816	2	5.52	1	0	1	0	1	0	1	61.911	1
11	M2	1	max	5.582	1	6.143	2	0	1	0	1	0	1	69.396	2
12			min	3.816	2	5.52	1	0	1	0	1	0	1	61.911	1
13		2	max	5.036	1	5.758	2	0	1	0	1	0	1	41.131	2
14			min	3.437	2	5.173	1	0	1	0	1	0	1	36.515	1
15		3	max	2.314	1	3.254	2	0	1	0	1	0	1	21.05	2
16			min	1.506	2	2.881	1	0	1	0	1	0	1	18.603	1
17		4	max	1.768	1	2.87	2	0	1	0	1	0	1	6.505	2
18			min	1.127	2	2.534	1	0	1	0	1	0	1	5.744	1
19		5	max	0	1	0	1	0	1	0	1	0	1	0	1
20			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses

Member	Sec		Axial[ksi]	LC	y Shear[...]	LC	z Shear[...]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	0	1	0	1	0	1	0	1	0	1	0	1	0
2			min	0	1	0	1	0	1	0	1	0	1	0	1	0
3		2	max	.018	1	-1.563	1	0	1	-.876	1	.979	2	0	1	0
4			min	.013	2	-1.748	2	0	1	-.979	2	.876	1	0	1	0
5		3	max	-.003	2	-1.591	1	0	1	-12.023	1	13.448	2	0	1	0
6			min	-.004	1	-1.78	2	0	1	-13.448	2	12.023	1	0	1	0
7		4	max	.334	1	.718	2	0	1	-18.432	1	20.624	2	0	1	0
8			min	.229	2	.645	1	0	1	-20.624	2	18.432	1	0	1	0
9		5	max	.312	1	.686	2	0	1	-13.971	1	15.66	2	0	1	0
10			min	.213	2	.617	1	0	1	-15.66	2	13.971	1	0	1	0
11	M2	1	max	.312	1	.686	2	0	1	-13.971	1	15.66	2	0	1	0
12			min	.213	2	.617	1	0	1	-15.66	2	13.971	1	0	1	0
13		2	max	.281	1	.643	2	0	1	-8.24	1	9.282	2	0	1	0
14			min	.192	2	.578	1	0	1	-9.282	2	8.24	1	0	1	0
15		3	max	.129	1	.364	2	0	1	-4.198	1	4.75	2	0	1	0
16			min	.084	2	.322	1	0	1	-4.75	2	4.198	1	0	1	0
17		4	max	.099	1	.321	2	0	1	-1.296	1	1.468	2	0	1	0
18			min	.063	2	.283	1	0	1	-1.468	2	1.296	1	0	1	0
19		5	max	0	1	0	1	0	1	0	1	0	1	0	1	0
20			min	0	1	0	1	0	1	0	1	0	1	0	1	0

Envelope Joint Reactions

Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	15.363	2	.728	1	0	1	0	1	0	1	0
2		min	13.731	1	.506	2	0	1	0	1	0	1	0
3	N3	max	-20.273	1	6.463	1	0	1	0	1	LOCKED	0	1
4		min	-22.64	2	4.429	2	0	1	0	1	LOCKED	0	1
5	Totals:	max	-6.542	1	7.191	1	0	1					
6		min	-7.277	2	4.935	2	0	1					

Envelope Joint Displacements

Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation...	LC	Y Rotation...	LC	Z Rotation...	LC
1	N1	max	.052	2	0	2	0	1	0	1	0	1	1.34e-3
2		min	.047	1	0	1	0	1	0	1	0	1	1.198e-3
3	N2	max	0	1	0	2	0	1	0	1	0	1	1.334e-3
4		min	0	2	0	1	0	1	0	1	0	1	1.192e-3
5	N3	max	0	2	0	2	0	1	0	1	0	1	-2.779e-3
6		min	0	1	0	1	0	1	0	1	0	1	-3.108e-3
7	N4	max	.337	2	0	2	0	1	0	1	0	1	-7.797e-3
8		min	.302	1	0	1	0	1	0	1	0	1	-8.726e-3
9	N5	max	3.502	2	-.001	2	0	1	0	1	0	1	-1.398e-2
10		min	3.124	1	-.002	1	0	1	0	1	0	1	-1.569e-2

Envelope AISC ASD Steel Code Checks

Member	Shape	Code Check	Loc[ft]	LC	Sh...	Loc[ft]	Fa...	Ft [ksi]	Fb y-y [ksi]	Fb.....	AS...
1	M1	PIPE_1...	.728	9.479	2	.097	9.333	225...	27.93	30.723	30...1.6...H1...
2	M2	PIPE_1...	.517	0	2	.037	0	223...	27.93	30.723	30...1.6...H1...

Company : CENTEK Engineering, INC.
Designer : tjf, cfc
Job Number : 12001.CO85 -Bethel North CL&P Pole # 10255 - PCS Mast

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Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	13.731	.728	0	0	0	0
2	1	N3	-20.273	6.463	0	0	LOCKED	0
3	1	Totals:	-6.542	7.191	0			
4	1	COG (ft):	X: 0	Y: 20.09	Z: 0			

Company : CENTEK Engineering, INC.
Designer : tjf, cfc
Job Number : 12001.CO85 -Bethel North CL&P Pole # 10255 - PCS Mast

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Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	15.363	.506	0	0	0	0
2	2	N3	-22.64	4.429	0	0	LOCKED	0
3	2	Totals:	-7.277	4.935	0			
4	2	COG (ft):	X: 0	Y: 19.876	Z: 0			

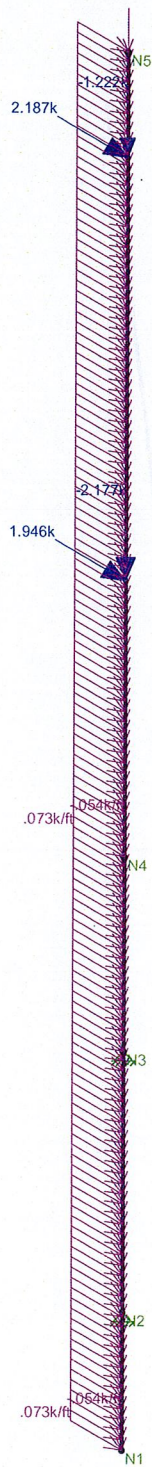


Code Check	
No Calc	
> 1.0	
.90-1.0	
.75-.90	
.50-.75	
0-.50	



Solution: Envelope

CENTEK Engineering, INC.	CL&P Pole # 10255 - PCS Mast Unity Check	
tjl, cfc		Feb 12, 2013 at 4:52 PM
12001.CO85 -Bethel North		EIA-TIA.r3d



Loads: LC 1, TIA/EIA Wind + Ice on PCS Structure

CEN TEK Engineering, INC.

tjl, cfc

12001.CO85 -Bethel North

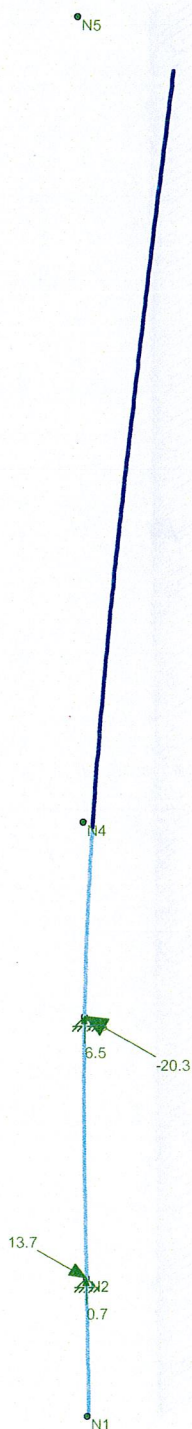
CL&P Pole # 10255 - PCS Mast
LC #1 Loads

Feb 12, 2013 at 4:53 PM

EIA-TIA.r3d

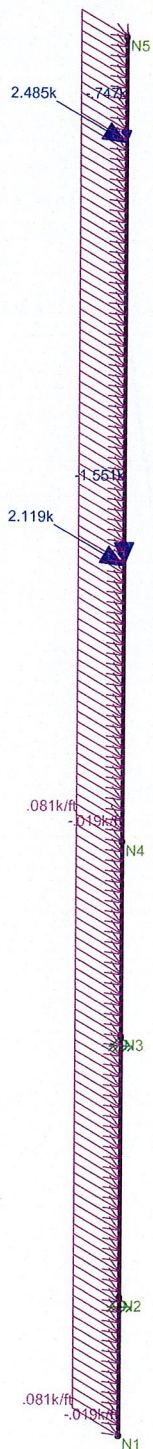


Code Check	
No Calc	> 1.0
90-1.0	75-90
50-75	0-.50



Results for LC 1, TIA/EIA Wind + Ice on PCS Structure
Z-direction Reaction units are k and k-ft

CEN TEK Engineering, INC.	CL&P Pole # 10255 - PCS Mast LC #1 Reactions and Deflected Shape	
tjl, cfc		Feb 12, 2013 at 4:57 PM
12001.CO85 -Bethel North		EIA-TIA.r3d



Loads: LC 2, TIA/EIA Wind on PCS Structure

CEN TEK Engineering, INC.

tjl, cfc

12001.CO85 -Bethel North

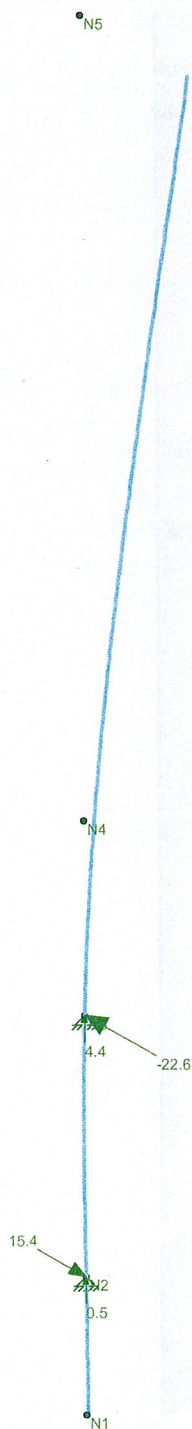
CL&P Pole # 10255 - PCS Mast
LC #2 Loads

Feb 12, 2013 at 4:53 PM

EIA-TIA.r3d



Code Check	
No Calc	
> 1.0	
90-1.0	
75-90	
50-75	
0 - 50	



Results for LC 2, TIA/EIA Wind on PCS Structure
Z-direction Reaction units are k and k-ft

CENTEK Engineering, INC.	CL&P Pole # 10255 - PCS Mast LC #2 Reactions and Deflected Shape	
tjl, cfc		Feb 12, 2013 at 4:58 PM
12001.CO85 -Bethel North		EIA-TIA.r3d

Beam: **M2**

Shape: **PIPE_12.0X**

Material: **A53 Gr. B**

Length: **19 ft**

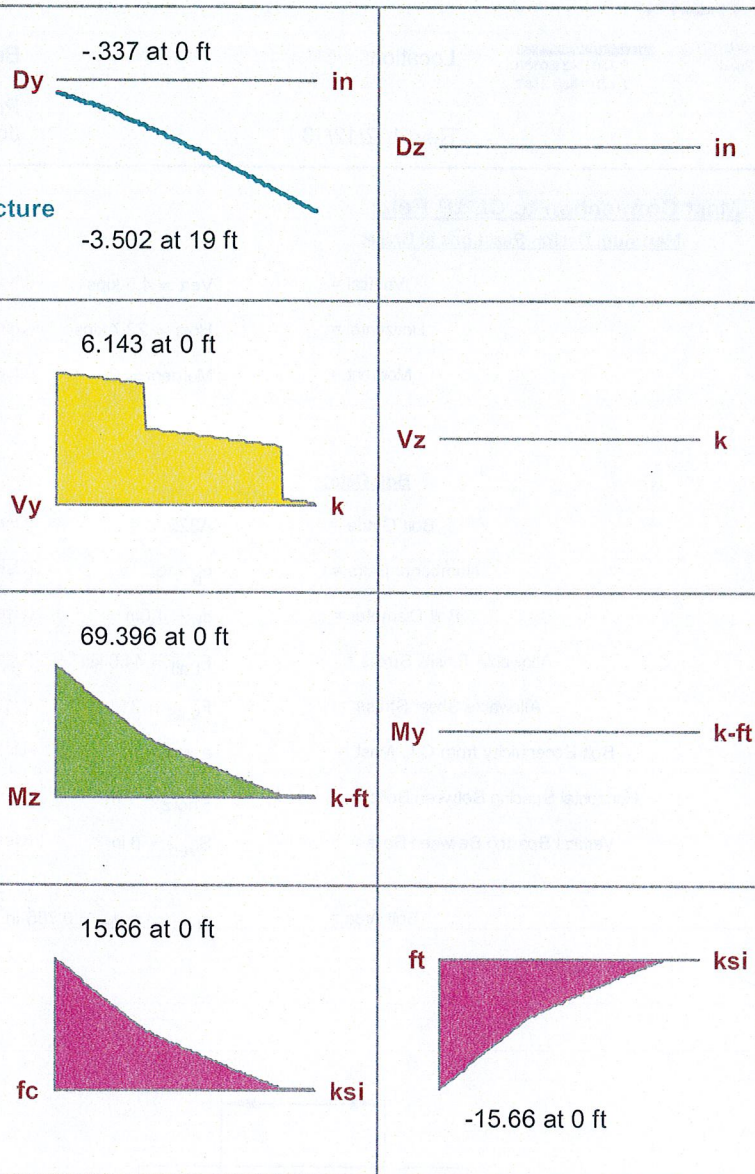
I Joint: **N4**

J Joint: **N5**

LC 2: TIA/EIA Wind on PCS Structure

Code Check: **0.517 (bending)**

Report Based On 97 Sections



AISC 9th: ASD Code Check

Max Bending Check **0.517**

Location **0 ft**

Equation **H1-2**

Max Shear Check **0.037 (s)**

Location **0 ft**

Max Defl Ratio **L/72**

Compact

Allowables Increase: **1.33**

Fy **35 ksi**
Fa **23.538 ksi**
Ft **27.93 ksi**
Fby **30.723 ksi**
Fbz **30.723 ksi**
Fvy **18.62 ksi**
Fvz **18.62 ksi**
Cb **1.75**

y-y
Cm **.6**
Lb **19 ft**
KL/r **52.392**
Sway **No**
L Comp Flange **19 ft**
Torque Length **NC**

z-z
Cm **.85**
Lb **19 ft**
KL/r **52.392**
Sway **No**

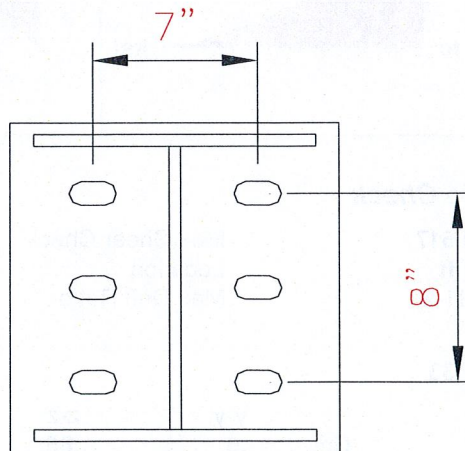
Mast Connection to CL&P Pole:

Maximum Design Reactions at Brace:

Vertical =	Vert := 4.5-kips	(User Input)
Horizontal =	Horz := 22.7-kips	(User Input)
Moment =	Moment := 0	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 6$	(User Input)
Bolt Diameter =	$d_b := 1.0\text{in}$	(User Input)
Allowable Tensile Stress =	$F_{t,all} := 44.0\text{-ksi}$	(User Input)
Allowable Shear Stress =	$F_{v,all} := 21\text{-ksi}$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 12\text{-in}$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 7\text{-in}$	(User Input)
Vertical Spacing Between Bolts =	$S_{vert} := 8\text{-in}$	(User Input)
Bolt Area =	$a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.785\text{-in}^2$	



Check Bolt Stresses:**Wind Acting Parallel to Bolts:**

Shear Force per Bolt =

$$F_{v.conn} := \frac{Vert}{n_b} = 0.75 \text{ kips}$$

Shear Stress per Bolt =

$$F_{v.act} := \frac{F_{v.conn}}{a_b} = 0.955 \text{ ksi}$$

$$Condition1 := \text{if}(F_{v.act} < F_{v.all}, "OK", "Overstressed")$$

$$Condition1 = "OK"$$

Allowable Tensile Stress Adjusted for Shear =

$$F_{t.adj} := \sqrt{F_{t.all}^2 - 4.39 \cdot F_{v.act}^2} = 43.95 \text{ ksi} \quad (\text{AISC 9th Ed. Table J3.3})$$

Moment From Mast Eccentricity =

$$M_{par} := Vert \cdot e = 54 \text{ kips-in}$$

Tension Force Each Bolt =

$$F_{tension.bolt} := \frac{Horz}{n_b} + \frac{M_{par}}{S_{vert}^2} = 7.158 \text{ kips}$$

Tension Stress Each Bolt =

$$F_{t.act} := \frac{F_{tension.bolt}}{a_b} = 9.1 \text{ ksi}$$

$$Condition2 := \text{if}(F_{t.act} < F_{t.adj}, "OK", "Overstressed")$$

$$Condition2 = "OK"$$

Wind Acting Perpendicular to Bolts:

Shear Force per Bolt =

$$F_{v.conn} := \frac{\sqrt{Vert^2 + Horz^2}}{n_b} = 3.857 \text{ kips}$$

Shear Stress per Bolt =

$$F_{v.act} := \frac{F_{v.conn}}{a_b} = 4.9 \text{ ksi}$$

$$Condition3 := \text{if}(F_{v.act} < F_{v.all}, "OK", "Overstressed")$$

$$Condition3 = "OK"$$

Allowable Tensile Stress Adjusted for Shear =

$$F_{t.adj} := \sqrt{F_{t.all}^2 - 4.39 \cdot F_{v.act}^2} = 42.78 \text{ ksi} \quad (\text{AISC 9th Ed. Table J3.3})$$

Moment from Mast Eccentricity =

$$M_{perp} := Horz \cdot e = 272 \text{ kips-in}$$

Tension Force per Bolt =

$$F_{tension.conn} := \frac{M_{perp}}{S_{horz}^3} + \frac{M_{par}}{S_{vert}^2} = 16.346 \text{ kips}$$

Tension Stress Each Bolt =

$$F_{tension.act} := \frac{F_{tension.conn}}{a_b} = 20.813 \text{ ksi}$$

$$Condition4 := \text{if}(F_{tension.act} < F_{t.adj}, "OK", "Overstressed")$$

$$Condition4 = "OK"$$

Flange Bolt and Flange Plate Analysis:**Input Data:**Mast Reactions:

Overturing Moment =	OM := 69.4-ft-kips	(Input From RisaTower)
Shear Force =	Shear := 6.2-kips	(Input From RisaTower)
Axial Force =	Axial := 3.9-kips	(Input From RisaTower)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	N := 8	(User Input)
Diameter of Bolt Circle =	D _{bc} := 17-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 A36

Plate Yield Strength =	F _{ybp} := 36-ksi	(User Input)
Flange Plate Thickness =	t _{bp} := 1.00-in	(User Input)
Flange Plate Diameter =	D _{bp} := 20-in	(User Input)
Outer Pole Diameter =	D _{pole} := 12.8-in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =:

$$R_{bc} := \frac{D_{bc}}{2} = 8.5 \cdot \text{in}$$

Distance to Bolts =

$$i := 1 \dots N$$

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

$$d_1 = 6.01 \cdot \text{in}$$

$$d_7 = -6.01 \cdot \text{in}$$

$$d_2 = 8.50 \cdot \text{in}$$

$$d_8 = -0.00 \cdot \text{in}$$

$$d_3 = 6.01 \cdot \text{in}$$

$$d_4 = 0.00 \cdot \text{in}$$

$$d_5 = -6.01 \cdot \text{in}$$

$$d_6 = -8.50 \cdot \text{in}$$

Critical Distances For Bending in Plate:

Outer Pole Radius =

$$R_{pole} := \frac{D_{pole}}{2} = 6.4 \cdot \text{in}$$

Moment Arms of Bolts about Neutral Axis =

$$MA_i := \text{if}(d_i \geq R_{pole}, d_i - R_{pole}, 0 \cdot \text{in})$$

$$MA_1 = 0.00 \cdot \text{in}$$

$$MA_7 = 0.00 \cdot \text{in}$$

$$MA_2 = 2.10 \cdot \text{in}$$

$$MA_8 = 0.00 \cdot \text{in}$$

$$MA_3 = 0.00 \cdot \text{in}$$

$$MA_4 = 0.00 \cdot \text{in}$$

$$MA_5 = 0.00 \cdot \text{in}$$

$$MA_6 = 0.00 \cdot \text{in}$$

Effective Width of Flangeplate for Bending =

$$B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 12.3 \cdot \text{in}$$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia =

$$I_p := \sum_i (d_i)^2 = 289 \cdot \text{in}^2$$

Gross Area of Bolt =

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

Net Area of Bolt =

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

Net Diameter =

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

Radius of Gyration of Bolt =

$$r := \frac{D_n}{4} = 0.22 \cdot \text{in}$$

Section Modulus of Bolt =

$$S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot \text{in}^3$$

Check Flange Bolt Tension Force:

Maximum Tensile Force =

$$T_{\text{Max}} := OM \cdot \frac{R_{bc}}{I_p} - \frac{\text{Axial}}{N} = 24 \cdot \text{kips}$$

Allowable Tensile Force =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 41.5 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Bolt Tension % of Capacity =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Gross}}} = 57.9 \cdot \%$$

Condition1 =

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

Condition1 = "OK"

Flange Plate Analysis:

Force from Bolts =

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

$$C_1 = 17.8 \text{ kips}$$

$$C_7 = -16.8 \text{ kips}$$

$$C_2 = 25.0 \text{ kips}$$

$$C_8 = 0.5 \text{ kips}$$

$$C_3 = 17.8 \text{ kips}$$

$$C_4 = 0.5 \text{ kips}$$

$$C_5 = -16.8 \text{ kips}$$

$$C_6 = -24.0 \text{ kips}$$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot M A_i}{(B_{eff} t_{bp})^2} = 25.6 \text{ ksi}$$

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot F_{y_{bp}} = 35.9 \text{ ksi}$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 71.3 \%$$

Condition3 =

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

Condition2 = "Ok"

Basic Components

Heavy Wind Pressure =	p := 4.00	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	V := 100	mph	(User Input NESC 2007 Figure 250-2(e))
Radial Ice Thickness =	Ir := 0.50	in	(User Input)
Radial Ice Density =	Id := 56.0	pcf	(User Input)

Factors for Extreme Wind Calculation

Elevation of Top of PCS Mast Above Grade =	TME := 170	ft	(User Input)
Multiplier Gust Response Factor =	m := 1.25		(User Input - Only for NESC Extreme wind case)
NESC Factor =	kv := 1.43		(User Input from NESC 2007 Table 250-3 equation)
Importance Factor =	I := 1.0		(User Input from NESC 2007 Section 250.C.2)

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

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

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

$$\text{Gust Response Factor} = G_{rf} := \frac{\left[1 + \left(2.7 \cdot E_s \cdot B_s^{\frac{1}{2}} \right) \right]}{k_v^2} = 0.826 \quad (\text{NESC 2007 Table 250-3})$$

$$\text{Wind Pressure} = q_z := 0.00256 \cdot K_z \cdot V^2 \cdot G_{rf} \cdot I = 29.9 \quad \text{psf} \quad (\text{NESC 2007 Section 250.C.2})$$

Shape Factors

Shape Factor for Round Members =	Cd _R := 1.3	(User Input)
Shape Factor for Flat Members =	Cd _F := 1.6	(User Input)
Shape Factor for Coax Cables Attached to Outside of Pole =	Cd _{coax} := 1.45	(User Input)

NUS Design Criteria Issued April 12, 2007

Overload Factors

NU Design Criteria Table

Overload Factors for Wind Loads:

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

Overload Factors for Vertical Loads:

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

Development of Wind & Ice Load on PCS Mast

PCS Mast Data:

(Pipe 12.0" SCH. 80)

Mast Shape = Round (User Input)
Mast Diameter = $D_{\text{mast}} := 12.8$ in (User Input)
Mast Length = $L_{\text{mast}} := 33$ ft (User Input)
Mast Thickness = $t_{\text{mast}} := 0.5$ in (User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{\text{mast}} := \frac{D_{\text{mast}}}{12} = 1.067$

Total Mast Wind Force = $qz \cdot C_d R \cdot A_{\text{mast}} = 41$ plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $A_{\text{ICE mast}} := \frac{(D_{\text{mast}} + 2 \cdot I_r)}{12} = 1.15$

Total Mast Wind Force w/ Ice = $p \cdot C_d R \cdot A_{\text{ICE mast}} = 6$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $A_{\text{imast}} := \frac{\pi}{4} [(D_{\text{mast}} + I_r \cdot 2)^2 - D_{\text{mast}}^2] = 20.9$ sq in

Weight of Ice on Mast = $W_{\text{ICE mast}} := I_d \cdot \frac{A_{\text{imast}}}{144} = 8$ plf **BLC 3**

Development of Wind & Ice Load on Antennas
Antenna Data:

(Verizon)

Antenna Model =	Antel BXA-70063/6CF	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 71.0$	in (User Input)
Antenna Width =	$W_{ant} := 11.2$	in (User Input)
Antenna Thickness =	$T_{ant} := 5.2$	in (User Input)
Antenna Weight =	$WT_{ant} := 17$	lbs (User Input)
Number of Antennas =	$N_{ant} := 3$	(User Input)

Wind Load (NESC Extreme)

*Assumes Maximum Possible Wind Pressure
 Applied to all Antennas Simultaneously*

Surface Area for One Antenna =

$$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.5 \quad sf$$

Antenna Projected Surface Area =

$$A_{ant} := SA_{ant} \cdot N_{ant} = 16.6 \quad sf$$

Total Antenna Wind Force =

$$F_{ant} := qz \cdot C_d F \cdot A_{ant} m = 992 \quad lbs \quad BLC 5$$

Wind Load (NESC Heavy)

*Assumes Maximum Possible Wind Pressure
 Applied to all Antennas Simultaneously*

Surface Area for One Antenna w/ Ice =

$$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.1 \quad sf$$

Antenna Projected Surface Area w/ Ice =

$$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 18.3 \quad sf$$

Total Antenna Wind Force w/ Ice =

$$F_{ant} := p \cdot C_d F \cdot A_{ICEant} = 117 \quad lbs \quad BLC 4$$

Gravity Load (without ice)

Weight of All Antennas =

$$WT_{ant} \cdot N_{ant} = 51 \quad lbs \quad BLC 2$$

Gravity Load (ice only)

Volume of Each Antenna =

$$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4135 \quad cu \text{ in}$$

Volume of Ice on Each Antenna =

$$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1311 \quad cu \text{ in}$$

Weight of Ice on Each Antenna =

$$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 42 \quad lbs$$

Weight of Ice on All Antennas =

$$W_{ICEant} \cdot N_{ant} = 127 \quad lbs \quad BLC 3$$

Development of Wind & Ice Load on Antennas
Antenna Data:

(Verizon)

Antenna Model =	Andrew DBXNH-6565A-VTM
Antenna Shape =	Flat (User Input)
Antenna Height =	$L_{ant} := 50.91$ in (User Input)
Antenna Width =	$W_{ant} := 11.85$ in (User Input)
Antenna Thickness =	$T_{ant} := 7.1$ in (User Input)
Antenna Weight =	$WT_{ant} := 34.17$ lbs (User Input)
Number of Antennas =	$N_{ant} := 3$ (User Input)

Wind Load (NESC Extreme)

*Assumes Maximum Possible Wind Pressure
 Applied to all Antennas Simultaneously*

Surface Area for One Antenna =

$$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2 \quad sf$$

Antenna Projected Surface Area =

$$A_{ant} := SA_{ant} \cdot N_{ant} = 12.6 \quad sf$$

Total Antenna Wind Force =

$$F_{ant} := qz \cdot C_d \cdot A_{ant} = 752 \quad lbs \quad \text{BLC 5}$$

Wind Load (NESC Heavy)

*Assumes Maximum Possible Wind Pressure
 Applied to all Antennas Simultaneously*

Surface Area for One Antenna w/ Ice =

$$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.6 \quad sf$$

Antenna Projected Surface Area w/ Ice =

$$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 13.9 \quad sf$$

Total Antenna Wind Force w/ Ice =

$$F_{ant} := p \cdot C_d \cdot A_{ICEant} = 89 \quad lbs \quad \text{BLC 4}$$

Gravity Load (without ice)

Weight of All Antennas =

$$WT_{ant} \cdot N_{ant} = 103 \quad lbs \quad \text{BLC 2}$$

Gravity Load (ice only)

Volume of Each Antenna =

$$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4283 \quad cu \text{ in}$$

Volume of Ice on Each Antenna =

$$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1120 \quad cu \text{ in}$$

Weight of Ice on Each Antenna =

$$W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho = 36 \quad lbs$$

Weight of Ice on All Antennas =

$$W_{ICEant} \cdot N_{ant} = 109 \quad lbs \quad \text{BLC 3}$$

Development of Wind & Ice Load on Diplexers

Diplexer Data:

(Verizon)

Diplexer Model =	RFS FD9R6004/2C-3L Diplexer
Diplexer Shape =	Flat (User Input)
Diplexer Height =	$L_{dplx} := 5.8$ in (User Input)
Diplexer Width =	$W_{dplx} := 6.5$ in (User Input)
Diplexer Thickness =	$T_{dplx} := 1.5$ in (User Input)
Diplexer Weight =	$WT_{dplx} := 3$ lbs (User Input)
Number of Diplexers =	$N_{dplx} := 6$ (User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Diplexers Simultaneously

Surface Area for One Diplexer =

$$SA_{dplx} := \frac{L_{dplx} \cdot W_{dplx}}{144} = 0.3 \quad sf$$

Diplexer Projected Surface Area =

$$A_{dplx} := SA_{dplx} \cdot N_{dplx} = 1.6 \quad sf$$

Total Diplexer Wind Force =

$$F_{dplx} := qz \cdot C_d \cdot F \cdot A_{dplx} \cdot m = 94 \quad lbs \quad \text{BLC 5}$$

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Diplexers Simultaneously

Surface Area for One Diplexer w/ Ice =

$$SA_{ICEdplx} := \frac{(L_{dplx} + 1) \cdot (W_{dplx} + 1)}{144} = 0.4 \quad sf$$

Diplexer Projected Surface Area w/ Ice =

$$A_{ICEdplx} := SA_{ICEdplx} \cdot N_{dplx} = 2.1 \quad sf$$

Total Diplexer Wind Force w/ Ice =

$$F_{Idplx} := p \cdot C_d \cdot F \cdot A_{ICEdplx} = 14 \quad lbs \quad \text{BLC 4}$$

Gravity Load (without ice)

Weight of All Diplexers =

$$WT_{dplx} \cdot N_{dplx} = 18 \quad lbs \quad \text{BLC 2}$$

Gravity Load (ice only)

Volume of Each Diplexer =

$$V_{dplx} := L_{dplx} \cdot W_{dplx} \cdot T_{dplx} = 57 \quad cu \text{ in}$$

Volume of Ice on Each Diplexer =

$$V_{ice} := (L_{dplx} + 1) \cdot (W_{dplx} + 1) \cdot (T_{dplx} + 1) - V_{dplx} = 71 \quad cu \text{ in}$$

Weight of Ice on Each Diplexer =

$$W_{ICEdplx} := \frac{V_{ice}}{1728} \cdot \rho_{ice} = 2 \quad lbs$$

Weight of Ice on All Diplexers =

$$W_{ICEdplx} \cdot N_{dplx} = 14 \quad lbs \quad \text{BLC 3}$$

Development of Wind & Ice Load on Mounts**Mount Data:**

(Verizon)

Mount Type =

Dual Standoff Mount
B1827 w/ 6 Pipe Mounts

Platform Shape =

Flat

(User Input)

Platform Area =

 $A_{plt} := 7$

sq ft

(User Input)

(Shape Factor Included)

Platform Area w/ Ice =

 $A_{ICEplt} := 10$

sq ft

(User Input)

(Shape Factor Included)

Platform Weight =

 $WT_{plt} := 575$

lbs

(User Input)

Platform Weight w/ Ice =

 $WT_{ICEplt} := 800$

lbs

(User Input)

Wind Load (NESC Extreme)

Total Platform Wind Force =

 $F_{plt} := qz \cdot A_{plt} \cdot m = 262$

lbs

BLC 5

Wind Load (NESC Heavy)

Total Platform Wind Force w/ Ice =

 $F_{plt} := p \cdot A_{ICEplt} = 40$

lbs

BLC 4

Gravity Load (without ice)

Weight of Platform =

 $WT_{plt} = 575$

lbs

BLC 2

Gravity Load (ice only)

Weight of Ice on Platform =

 $WT_{ICEplt} - WT_{plt} = 225$

lbs

BLC 3

Development of Wind & Ice Load on Antennas
Antenna Data:

(Sprint)

Antenna Model =	Andrew DB980F65E-M	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 60$	in (User Input)
Antenna Width =	$W_{ant} := 6.3$	in (User Input)
Antenna Thickness =	$T_{ant} := 3$	in (User Input)
Antenna Weight =	$WT_{ant} := 8.5$	lbs (User Input)
Number of Antennas =	$N_{ant} := 6$	(User Input)

Wind Load (NESC Extreme)

*Assumes Maximum Possible Wind Pressure
 Applied to all Antennas Simultaneously*

$$\text{Surface Area for One Antenna} = SA_{ant} := \frac{L_{ant} W_{ant}}{144} = 2.6 \quad sf$$

$$\text{Antenna Projected Surface Area} = A_{ant} := SA_{ant} N_{ant} = 15.8 \quad sf$$

$$\text{Total Antenna Wind Force} = F_{ant} := qz C_d F A_{ant} m = 943 \quad lbs \quad \text{BLC 5}$$

Wind Load (NESC Heavy)

*Assumes Maximum Possible Wind Pressure
 Applied to all Antennas Simultaneously*

$$\text{Surface Area for One Antenna w/ Ice} = SA_{ICEant} := \frac{(L_{ant} + 1)(W_{ant} + 1)}{144} = 3.1 \quad sf$$

$$\text{Antenna Projected Surface Area w/ Ice} = A_{ICEant} := SA_{ICEant} N_{ant} = 18.6 \quad sf$$

$$\text{Total Antenna Wind Force w/ Ice} = F_{ice} := p C_d F A_{ICEant} = 119 \quad lbs \quad \text{BLC 4}$$

Gravity Load (without ice)

$$\text{Weight of All Antennas} = WT_{ant} N_{ant} = 51 \quad lbs \quad \text{BLC 2}$$

Gravity Load (ice only)

$$\text{Volume of Each Antenna} = V_{ant} := L_{ant} W_{ant} T_{ant} = 1134 \quad cu \text{ in}$$

$$\text{Volume of Ice on Each Antenna} = V_{ice} := (L_{ant} + 1)(W_{ant} + 1)(T_{ant} + 1) - V_{ant} = 647 \quad cu \text{ in}$$

$$\text{Weight of Ice on Each Antenna} = W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho = 21 \quad lbs$$

$$\text{Weight of Ice on All Antennas} = W_{ICEant} N_{ant} = 126 \quad lbs \quad \text{BLC 3}$$

Development of Wind & Ice Load on Mounts**Mount Data:**

(Sprint)

Mount Type =

13-ft Low Profile Platform

Platform Shape =

Flat

(User Input)

Platform Area =

 $A_{\text{plt}} := 20$

sq ft

(User Input)

(Shape Factor Included)

Platform Area w/ Ice =

 $A_{\text{ICEplt}} := 25$

sq ft

(User Input)

(Shape Factor Included)

Platform Weight =

 $WT_{\text{plt}} := 1500$

lbs

(User Input)

Platform Weight w/ Ice =

 $WT_{\text{ICEplt}} := 2000$

lbs

(User Input)

Wind Load (NESC Extreme)

Total Platform Wind Force =

 $F_{\text{plt}} := qz \cdot C_d F \cdot A_{\text{plt}} \cdot m = 1197$

lbs

BLC 5

Wind Load (NESC Heavy)

Total Platform Wind Force w/ Ice =

 $F_{\text{plt}} := p \cdot C_d F \cdot A_{\text{ICEplt}} = 160$

lbs

BLC 4

Gravity Load (without ice)

Weight of Platform =

 $WT_{\text{plt}} = 1500$

lbs

BLC 2

Gravity Load (ice only)

Weight of Ice on Platform =

 $WT_{\text{ICEplt}} - WT_{\text{plt}} = 500$

lbs

BLC 3

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type =	HELIAX 1-5/8"	
Shape =	Round	(User Input)
Coax Outside Diameter =	$D_{\text{coax}} := 1.98$	in (User Input)
Coax Cable Length =	$L_{\text{coax}} := 31$	ft (User Input)
Weight of Coax per foot =	$W_{t_{\text{coax}}} := 1.04$	plf (User Input)
Total Number of Coax =	$N_{\text{coax}} := 18$	(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{\text{coax}} := 2$	(User Input)

Wind Load (NESC Extreme)

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

Total Coax Wind Force (Above NU Structure) =

$F_{\text{coax}} := qz C_{d_{\text{coax}}} A_{\text{coax}} = 18$	plf	BLC 5
--	-----	-------

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice =	$A_{\text{ICE}_{\text{coax}}} := \frac{NP_{\text{coax}} (D_{\text{coax}} + 2 \cdot Ir)}{12} = 0.5$	ft
--------------------------------------	--	----

Total Coax Wind Force w/ Ice =

$F_{\text{coax}} := p C_{d_{\text{coax}}} A_{\text{ICE}_{\text{coax}}} = 3$	plf	BLC 4
---	-----	-------

Gravity Loads (without ice)

Weight of all cables w/o ice

$W_{T_{\text{coax}}} := W_{t_{\text{coax}}} N_{\text{coax}} = 19$	plf	BLC 2
---	-----	-------

Gravity Load (ice only)

Ice Area per Linear Foot =

$A_{i_{\text{coax}}} := \frac{\pi}{4} [(D_{\text{coax}} + 2 \cdot Ir)^2 - D_{\text{coax}}^2] = 3.9$	sq in
---	-------

Ice Weight All Coax per foot =

$W_{T_{\text{coax}}} := N_{\text{coax}} Id \frac{A_{i_{\text{coax}}}}{144} = 27$	plf	BLC 3
--	-----	-------

CEN TEK engineering, INC. Consulting Engineers 63-2 North Branford Road Branford, CT 06405 Ph. 203-488-0580 / Fax. 203-488-8587		Subject: Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining PCS Structure Reactions Applied to CL&P Pole Tabulated Load Cases Location: Bethel, CT Date: 8/20/12 Prepared by: T.J.L. Checked by: C.F.C. Job No. 12001.CO85	
Load Case	Description		
1	Self Weight (PCS Mast)		
2	Weight of Appurtenances		
3	Weight of Ice Only on PCS Structure ⁽¹⁾		
4	NESC Heavy Wind on PCS Structure ⁽¹⁾		
5	NESC Extreme Wind on PCS Structure ⁽¹⁾		
Footnotes: (1) PCS Structure includes: Mast and Appurtenances			

CEN TEK engineering, INC. Consulting Engineers 63-2 North Branford Road Branford, CT 06405 Ph. 203-488-0580 / Fax. 203-488-8587													Subject: Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining PCS Structure Reactions Applied to CL&P Pole Load Combinations Table Location: Bethel, CT Date: 8/20/12 Prepared by: T.J.L. Checked by: C.F.C. Job No. 12001.CO85														
Load Combination		Description		Envelope		Wind																					
1		NESC Heavy Wind on PCS Structure		Soutlion		Factor		1		BLC		Factor		BLC		Factor		BLC		Factor		BLC		Factor		2.5	
2		NESC Extreme Wind on PCS Structure				1		1		1		2		1		5		1									
Footnotes: (1) BLC = Basic Load Case (2) PCS Structure includes: Mast and Appurtenances																											

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y
Global Member Orientation Plane	XZ

Hot Rolled Steel Code	AISC 9th: ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-05/08: ASD
Aluminum Code	AA ADM1-05: ASD

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parame Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ct Exp. X	.75
Ct Exp. Z	.75
Ca	.36
Cv	.54
Nv	1
SD1	1
SDS	1
S1	1
Occupancy Code	4
Seismic Zone	3
Use Group	I
Use Gravity Self Wt in Diaphragm Mass	Yes
Use Deck Self Wt in Diaphragm Mass	Yes
Use Lateral Self Wt in Diaphragm Mass	Yes
Seismic Detailing Code	None
Om X	1
Om Z	1
Rho X	1
Rho Z	1

Company : CENTEK Engineering, Inc.
 Designer : tjf, cfc
 Job Number : 12001.CO85 - Bethel North CL&P Pole # 10255 - PCS Mast

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Hot Rolled Steel Properties

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

Hot Rolled Steel Design Parameters

	Label	Shape	Length...	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	Kyy	Kzz	Cm-...	Cm-...	Cb	y sw...	z sw...	Function
1	M1	Mast	14												Lateral
2	M2	Mast	19												Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE 12.0X	Beam	Pipe	A53 Gr. B	Typical	17.9	339	339	678

Member Primary Data

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

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3.25	0	0	
3	N3	0	9.42	0	0	
4	N4	0	14	0	0	
5	N5	0	33	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	N1							
2	N2	Reaction	Reaction	Reaction				
3	N3	Reaction	Reaction	Reaction				
4	N4							

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
No Data to Print ...			

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.051	16.5
2	M2	Y	-.103	16.5
3	M2	Y	-.018	16.5
4	M2	Y	-.575	16.5
5	M2	Y	-.051	6.5
6	M2	Y	-1.5	6.5

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.127	16.5
2	M2	Y	-.109	16.5
3	M2	Y	-.014	16.5
4	M2	Y	-.225	16.5
5	M2	Y	-.126	6.5
6	M2	Y	-.5	6.5

Member Point Loads (BLC 4 : NESC Heavy Wind on PCS Str)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.117	16.5
2	M2	X	.089	16.5
3	M2	X	.014	16.5
4	M2	X	.04	16.5
5	M2	X	.119	6.5
6	M2	X	.16	6.5

Member Point Loads (BLC 5 : NESC Extreme Wind on PCS S)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	X	.992	16.5
2	M2	X	.752	16.5
3	M2	X	.094	16.5
4	M2	X	.262	16.5
5	M2	X	.943	6.5
6	M2	X	1.197	6.5

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.019	-.019	0	0
2	M2	Y	-.019	-.019	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.008	-.008	0	0
2	M2	Y	-.008	-.008	0	0
3	M1	Y	-.027	-.027	0	0
4	M2	Y	-.027	-.027	0	0

Member Distributed Loads (BLC 4 : NESC Heavy Wind on PCS Str)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
--	--------------	-----------	---------------------------	-----------------------	----------------------	--------------------

Company : CENTEK Engineering, Inc.
 Designer : tjf, cfc
 Job Number : 12001.CO85 - Bethel North CL&P Pole # 10255 - PCS Mast

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Member Distributed Loads (BLC 4 : NESC Heavy Wind on PCS Str) (Continued)

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

Member Distributed Loads (BLC 5 : NESC Extreme Wind on PCS S)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.041	.041	0	0
2	M2	X	.041	.041	0	0
3	M1	X	.018	.018	0	0
4	M2	X	.018	.018	0	0

Basic Load Cases

	BLC Description	Category	X Grav...	Y Grav...	Z Gravity	Joint	Point	Distrib...	Area(...	Surfac...
1	Self Weight (PCS Mast)	None		-1						
2	Weight of Appurtenances	None					6	2		
3	Weight of Ice Only on PCS Struct	None					6	4		
4	NESC Heavy Wind on PCS Str	None					6	4		
5	NESC Extreme Wind on PCS S	None					6	4		

Load Combinations

	Description	So... PDelta	SRSS	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...	BLCFac...
1	NESC Heavy Wind on PCS ...	Yes		1	1.5	2	1.5	3	1.5	4	2.5		
2	NESC Extreme Wind on PCS...	Yes		1	1	2	1	5	1				
3	Self Weight			1	1								

Envelope Member Section Forces

Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Momen...	LC	z-z Momen...	LC
1	M1	1	max	0	1	0	1	0	1	0	1	0	1	1
2			min	0	1	0	1	0	1	0	1	0	1	1
3		2	max	.489	1	-4.404	1	0	1	0	1	0	1	3.674
4			min	.227	2	-13.458	2	0	1	0	1	0	1	1.219
5		3	max	-.053	2	-4.483	1	0	1	0	1	0	1	51.14
6			min	-.115	1	-13.665	2	0	1	0	1	0	1	16.771
7		4	max	8.977	1	5.567	2	0	1	0	1	0	1	78.334
8			min	4.096	2	1.854	1	0	1	0	1	0	1	25.67
9		5	max	8.373	1	5.361	2	0	1	0	1	0	1	59.21
10			min	3.816	2	1.775	1	0	1	0	1	0	1	19.32
11	M2	1	max	8.373	1	5.361	2	0	1	0	1	0	1	59.209
12			min	3.816	2	1.775	1	0	1	0	1	0	1	19.32
13		2	max	7.555	1	5.081	2	0	1	0	1	0	1	34.41
14			min	3.437	2	1.668	1	0	1	0	1	0	1	11.143
15		3	max	3.47	1	2.661	2	0	1	0	1	0	1	17.362
16			min	1.506	2	.864	1	0	1	0	1	0	1	5.565
17		4	max	2.652	1	2.38	2	0	1	0	1	0	1	5.391
18			min	1.127	2	.757	1	0	1	0	1	0	1	1.716
19		5	max	0	1	0	1	0	1	0	1	0	1	0
20			min	0	1	0	1	0	1	0	1	0	1	0

Envelope Member Section Stresses

Member	Sec		Axial[ksi]	LC	y Shear[...]	LC	z Shear[...]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	0	1	0	1	0	1	0	1	0	1	0	1	0
2			min	0	1	0	1	0	1	0	1	0	1	0	1	0
3		2	max	.027	1	-.492	1	0	1	-.275	1	.829	2	0	1	0
4			min	.013	2	-1.504	2	0	1	-.829	2	.275	1	0	1	0
5		3	max	-.003	2	-.501	1	0	1	-3.785	1	11.54	2	0	1	0
6			min	-.006	1	-1.527	2	0	1	-11.54	2	3.785	1	0	1	0
7		4	max	.501	1	.622	2	0	1	-5.793	1	17.677	2	0	1	0
8			min	.229	2	.207	1	0	1	-17.677	2	5.793	1	0	1	0
9		5	max	.468	1	.599	2	0	1	-4.36	1	13.361	2	0	1	0
10			min	.213	2	.198	1	0	1	-13.361	2	4.36	1	0	1	0
11	M2	1	max	.468	1	.599	2	0	1	-4.36	1	13.361	2	0	1	0
12			min	.213	2	.198	1	0	1	-13.361	2	4.36	1	0	1	0
13		2	max	.422	1	.568	2	0	1	-2.514	1	7.765	2	0	1	0
14			min	.192	2	.186	1	0	1	-7.765	2	2.514	1	0	1	0
15		3	max	.194	1	.297	2	0	1	-1.256	1	3.918	2	0	1	0
16			min	.084	2	.097	1	0	1	-3.918	2	1.256	1	0	1	0
17		4	max	.148	1	.266	2	0	1	-.387	1	1.216	2	0	1	0
18			min	.063	2	.085	1	0	1	-1.216	2	.387	1	0	1	0
19		5	max	0	1	0	1	0	1	0	1	0	1	0	1	0
20			min	0	1	0	1	0	1	0	1	0	1	0	1	0

Envelope Joint Reactions

Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	13.252	2	1.092	1	0	1	0	1	0	1	0
2		min	4.325	1	.506	2	0	1	0	1	0	1	0
3	N3	max	-6.415	1	9.695	1	0	1	0	1	0	1	0
4		min	-19.439	2	4.429	2	0	1	0	1	0	1	0
5	Totals:	max	-2.09	1	10.787	1	0	1					
6		min	-6.187	2	4.935	2	0	1					

Envelope Joint Displacements

Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation...	LC	Y Rotation...	LC	Z Rotation...	LC
1	N1	max	.045	2	0	2	0	1	0	1	0	1	1.149e-3
2		min	.015	1	0	1	0	1	0	1	0	1	3.772e-4
3	N2	max	0	1	0	2	0	1	0	1	0	1	1.144e-3
4		min	0	2	0	1	0	1	0	1	0	1	3.753e-4
5	N3	max	0	2	0	2	0	1	0	1	0	1	-8.747e-4
6		min	0	1	0	1	0	1	0	1	0	1	-2.667e-3
7	N4	max	.289	2	0	2	0	1	0	1	0	1	-2.449e-3
8		min	.095	1	0	1	0	1	0	1	0	1	-7.476e-3
9	N5	max	2.982	2	-.001	2	0	1	0	1	0	1	-4.337e-3
10		min	.973	1	-.003	1	0	1	0	1	0	1	-1.331e-2

Envelope AISC ASD Steel Code Checks

Member	Shape	Code Check	Loc[ft]	LC	Sh...	Loc[ft]	Fa...	Ft [ksi]	Fb y-y [ksi]	Fb.....	AS...
1	M1	PIPE_1...	.832	9.479	2	.110	9.333	218...	21	23.1	23.11.6...H1...
2	M2	PIPE_1...	.589	0	2	.043	0	217...	21	23.1	23.1...6...H1...

Company : CENTEK Engineering, Inc.
 Designer : tjf, cfc
 Job Number : 12001.CO85 - Bethel North CL&P Pole # 10255 - PCS Mast

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Joint Reactions

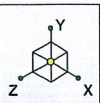
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	4.325	1.092	0	0	0	0
2	1	N3	-6.415	9.695	0	0	LOCKED	0
3	1	Totals:	-2.09	10.787	0			
4	1	COG (ft):	X: 0	Y: 20.09	Z: 0			

Company : CENTEK Engineering, Inc.
Designer : tjf, cfc
Job Number : 12001.CO85 - Bethel North CL&P Pole # 10255 - PCS Mast

Feb 12, 2013
5:01 PM
Checked By: _____

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	13.252	.506	0	0	0	0
2	2	N3	-19.439	4.429	0	0	LOCKED	0
3	2	Totals:	-6.187	4.935	0			
4	2	COG (ft):	X: 0	Y: 19.876	Z: 0			



Loads: LC 1, NESC Heavy Wind on PCS Structure

CENTEK Engineering, Inc.

tjl, cfc

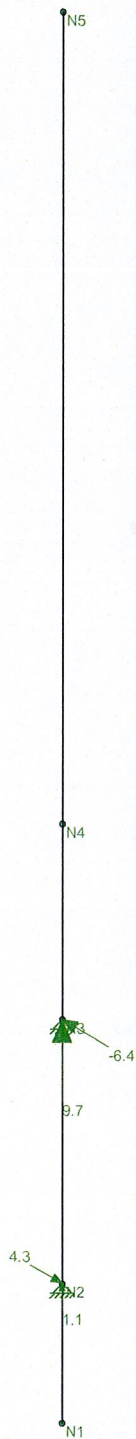
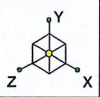
12001.CO85 - Bethel North

CL&P Pole # 10255 - PCS Mast

LC #1 Loads

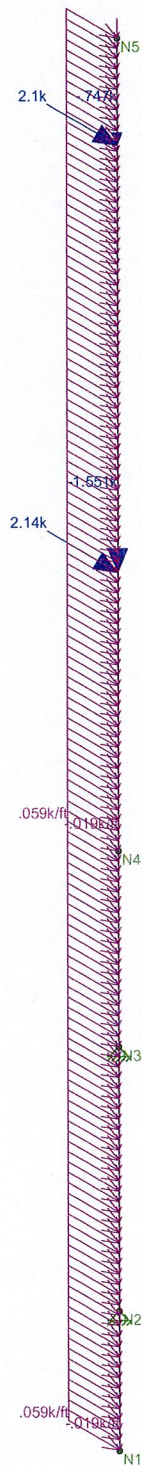
Feb 12, 2013 at 5:00 PM

NESC.r3d



Results for LC 1, NESC Heavy Wind on PCS Structure
Z-direction Reaction units are k and k-ft

CENTEK Engineering, Inc.	CL&P Pole # 10255 - PCS Mast LC #1 Reactions	
tjl, cfc		Feb 12, 2013 at 5:01 PM
12001.CO85 - Bethel North		NESC.r3d



Loads: LC 2, NESC Extreme Wind on PCS Structure

CEN TEK Engineering, Inc.

tjl, cfc

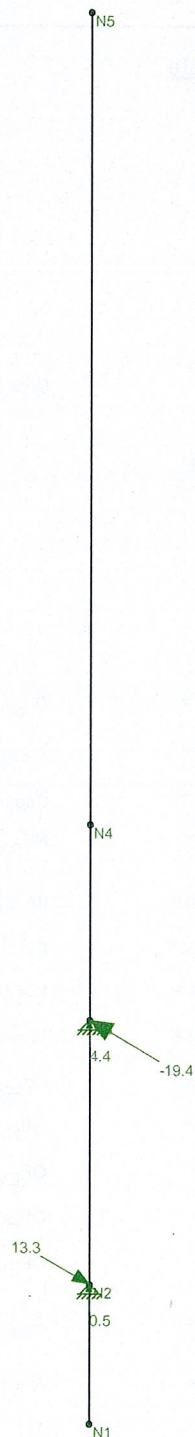
12001.CO85 - Bethel North

CL&P Pole # 10255 - PCS Mast

LC #2 Loads

Feb 12, 2013 at 5:00 PM

NESC.r3d



Results for LC 2, NESC Extreme Wind on PCS Structure
Z-direction Reaction units are k and k-ft

CENTEK Engineering, Inc.	CL&P Pole # 10255 - PCS Mast LC #2 Reactions	
tjl, cfc		Feb 12, 2013 at 5:01 PM
12001.CO85 - Bethel North		NESC.r3d

Coax Cable on CL&P Pole

Distance Between Coax Cable Attach Points =

Coaxial Cable Span =

Notes:

1. Cables attached to Pole @ 5-ft AGL
2. Cables attached to PCS Mast @ 137-ft AGL

$$\text{CoaxSpan} := \begin{pmatrix} 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \end{pmatrix} \cdot \text{ft} \quad (\text{User Input})$$

Diameter of Coax Cable =

$$D_{\text{coax1}} := 1.98 \cdot \text{in} \quad (\text{User Input})$$

Weight of Coax Cable =

$$W_{\text{coax1}} := 1.04 \cdot \text{plf} \quad (\text{User Input})$$

Number of Coax Cables =

$$N_{\text{coax1}} := 18 \quad (\text{User Input}) \quad (12 \text{ Verizon and } 6 \text{ Sprint})$$

Number of Projected Coax Cables =

$$NP_{\text{coax1}} := 2 \quad (\text{User Input})$$

Extreme Wind Pressure =

$$q_z := 29.9 \cdot \text{psf} \quad (\text{User Input})$$

Heavy Wind Pressure =

$$p := 4 \cdot \text{psf} \quad (\text{User Input})$$

Radial Ice Thickness =

$$I_r := 0.5 \cdot \text{in} \quad (\text{User Input})$$

Radial Ice Density =

$$I_d := 56 \cdot \text{pcf} \quad (\text{User Input})$$

Shape Factor =

$$C_{d_{\text{coax}}} := 1.45 \quad (\text{User Input})$$

Overload Factor for NESC Heavy Wind Load =

$$OF_{\text{HW}} := 2.5 \quad (\text{User Input})$$

Overload Factor for NESC Extreme Wind Load =

$$OF_{\text{EW}} := 1.0 \quad (\text{User Input})$$

Overload Factor for NESC Heavy Vertical Load =

$$OF_{\text{HV}} := 1.5 \quad (\text{User Input})$$

Overload Factor for NESC Extreme Vertical Load =

$$OF_{\text{EV}} := 1.0 \quad (\text{User Input})$$

Wind Area with Ice =

$$A_{\text{ice}} := (NP_{\text{coax1}} \cdot D_{\text{coax1}} + 2 \cdot I_r) = 4.96 \cdot \text{in}$$

Wind Area without Ice =

$$A := (NP_{\text{coax1}} \cdot D_{\text{coax1}}) = 3.96 \cdot \text{in}$$

Ice Area per Liner Ft =

$$A_{i_{\text{coax1}}} := \frac{\pi}{4} \left[(D_{\text{coax1}} + 2 \cdot I_r)^2 - D_{\text{coax1}}^2 \right] = 0.027 \cdot \text{ft}^2$$

Weight of Ice on All Coax Cables =

$$W_{\text{ice}} := A_{i_{\text{coax1}}} \cdot I_d \cdot N_{\text{coax1}} = 27 \cdot \text{plf}$$

Heavy Vertical Load =

$$\text{HeavyVert} := \overrightarrow{[(N_{\text{coax1}} \cdot W_{\text{coax1}} + W_{\text{ice}}) \cdot \text{CoaxSpan} \cdot \text{OF}_{\text{HV}}]}$$

Heavy Transverse Load =

$$\text{HeavyTrans} := \overrightarrow{(p \cdot A_{\text{ice}} \cdot C_{d_{\text{coax}}} \cdot \text{CoaxSpan} \cdot \text{OF}_{\text{HW}})}$$

HeavyVert = $\begin{pmatrix} 690 \\ 690 \\ 690 \\ 690 \\ 690 \\ 690 \\ 690 \\ 690 \\ 690 \\ 690 \end{pmatrix}$ lb.

HeavyTrans = $\begin{pmatrix} 60 \\ 60 \\ 60 \\ 60 \\ 60 \\ 60 \\ 60 \\ 60 \\ 60 \\ 60 \end{pmatrix}$ lb

Extreme Vertical Load =

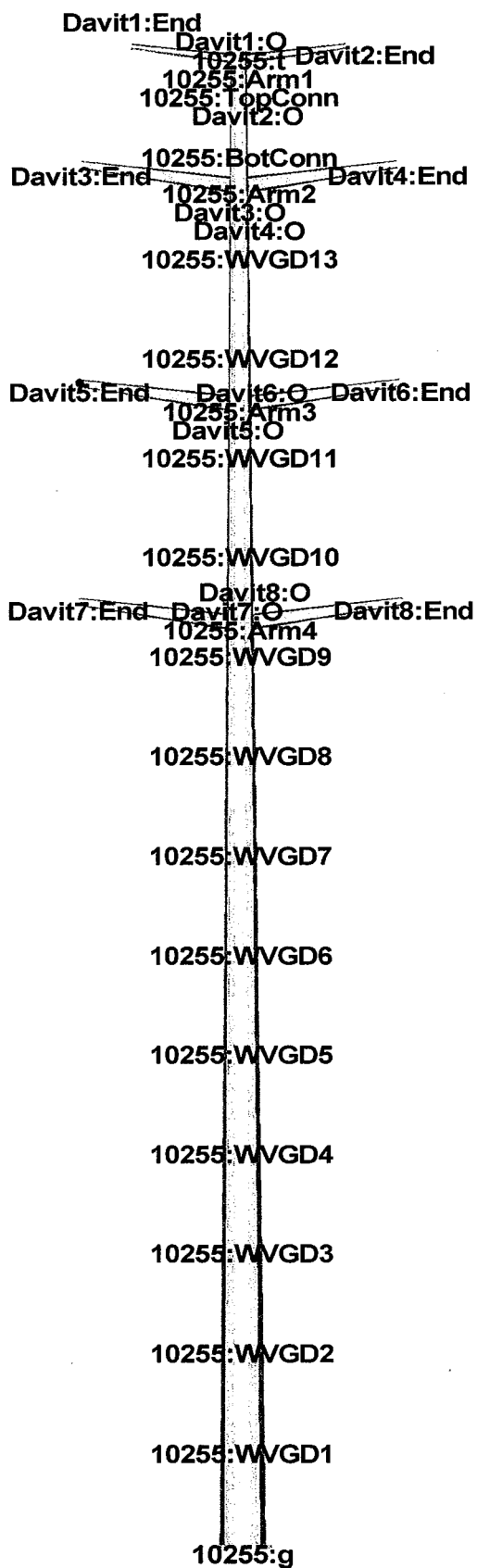
$$\text{ExtremeVert} := \overrightarrow{[(N_{\text{coax1}} \cdot W_{\text{coax1}}) \cdot \text{CoaxSpan} \cdot \text{OF}_{\text{EV}}]}$$

Extreme Transverse Load =

$$\text{ExtremeTrans} := \overrightarrow{[(q_z \cdot A \cdot C_{d_{\text{coax}}}) \cdot \text{CoaxSpan} \cdot \text{OF}_{\text{EW}}]}$$

ExtremeVert = $\begin{pmatrix} 187 \\ 187 \\ 187 \\ 187 \\ 187 \\ 187 \\ 187 \\ 187 \\ 187 \\ 187 \end{pmatrix}$ lb

ExtremeTrans = $\begin{pmatrix} 143 \\ 143 \\ 143 \\ 143 \\ 143 \\ 143 \\ 143 \\ 143 \\ 143 \\ 143 \end{pmatrix}$ lb



Project Name : 12001.CO85 - Bethel, CT
 Project Notes: CL&P - Str # 10255/ Verizon Bethel North
 Project File : J:\Jobs\1200100.WI\CO85- Bethel North\Rev (1)\Calcs\PLS-Pole\cl&p structure # 10255.pol
 Date run : 4:27:17 PM Tuesday, February 12, 2013
 by : PLS-POLE Version 11.11
 Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: j:\jobs\1200100.wi\co85- bethel north\rev (1)\calcs\pls-pole\cl&p #10255.lca

*** Analysis Results:

Maximum element usage is 95.73% for Base Plate "10255" in load case "NESC Extreme"
 Maximum insulator usage is 24.92% for Clamp "Clamp9" in load case "NESC Extreme"

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kips)	Trans. Force (kips)	Vert. Force (kips)	Shear Force (kips)	Trans. Moment (ft-k)	Long. Moment (ft-k)	Vert. Moment (ft-k)	Bending Moment (ft-k)	Found. Usage %
NESC Heavy 10255:g		-0.17	-33.11	113.19	33.11	4098.56	-11.69	-0.02	4098.58	0.00
NESC Extreme 10255:g		-0.05	-52.30	58.85	52.30	5928.28	-3.68	-0.01	5928.28	0.00

Summary of Tip Deflections For All Load Cases:

Note: positive tip load results in positive rotation

Load Case	Joint Label	Long. Defl. (in)	Trans. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Trans. Rot. (deg)	Twist (deg)
NESC Heavy 10255:t		0.21	99.21	-3.79	99.29	0.01	-5.90	0.00
NESC Extreme 10255:t		0.06	140.58	-7.49	140.78	0.00	-8.47	0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
10255	1	5022	NESC Extreme	82.08	1171.89
10255	2	10058	NESC Extreme	92.12	3358.92
10255	3	12901	NESC Extreme	93.95	5667.66

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

Summary of Steel Pole Usages:

Steel Pole Label	Pole Maximum Usage %	Load Case	Segment Number	Weight (lbs)
10255	93.95	NESC Extreme	37	30952.3

Summary of Tubular Davit Usages:

Centek Engineering Inc - cl&p structure # 10255

Tubular Davit Maximum Load Case Segment Weight
Label Usage % Number (lbs)

Davit1	11.07	NESC Heavy	1	182.3
Davit2	14.06	NESC Heavy	1	182.3
Davit3	28.26	NESC Heavy	1	575.0
Davit4	32.74	NESC Heavy	1	575.0
Davit5	28.54	NESC Heavy	1	575.0
Davit6	32.91	NESC Heavy	1	575.0
Davit7	28.93	NESC Heavy	1	575.0
Davit8	33.15	NESC Heavy	1	575.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case Maximum Element Usage % Label Element Type			
NESC Heavy	68.28	10255	Base Plate
NESC Extreme	95.73	10255	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case Maximum Steel Pole Segment Usage % Label Number			
NESC Heavy	67.26	10255	27
NESC Extreme	93.95	10255	37

Summary of Base Plate Usages by Load Case:

Load Case Pole Bend Length Vertical Load	X Moment (ft-k)	Y Bending Moment Stress (ksi)	Bolt Moment Acting On Sum Bend Line (ft-k)	# Bolts	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %		
NESC Heavy 10255	12 36.011	113.186	4098.563	-11.691	40.968	184.412	5 98.442	2.479	68.28
NESC Extreme 10255	12 36.011	58.855	5928.284	-3.679	57.435	258.538	5 137.796	2.935	95.73

Summary of Tubular Davit Usages by Load Case:

Load Case Maximum Tubular Davit Segment Usage % Label Number			
NESC Heavy	33.15	Davit8	1
NESC Extreme	15.18	Davit8	1

Summary of Insulator Usages:

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

Centek Engineering Inc - cl&p structure # 10255

Clamp4	Clamp	10.09	NESC Heavy	0.0
Clamp5	Clamp	10.09	NESC Heavy	0.0
Clamp6	Clamp	10.09	NESC Heavy	0.0
Clamp7	Clamp	10.09	NESC Heavy	0.0
Clamp8	Clamp	10.09	NESC Heavy	0.0
Clamp9	Clamp	24.92	NESC Extreme	0.0
Clamp10	Clamp	16.58	NESC Extreme	0.0
Clamp11	Clamp	0.87	NESC Heavy	0.0
Clamp12	Clamp	0.87	NESC Heavy	0.0
Clamp13	Clamp	0.87	NESC Heavy	0.0
Clamp14	Clamp	0.87	NESC Heavy	0.0
Clamp15	Clamp	0.87	NESC Heavy	0.0
Clamp16	Clamp	0.87	NESC Heavy	0.0
Clamp17	Clamp	0.87	NESC Heavy	0.0
Clamp18	Clamp	0.87	NESC Heavy	0.0
Clamp19	Clamp	0.87	NESC Heavy	0.0
Clamp20	Clamp	0.87	NESC Heavy	0.0
Clamp21	Clamp	0.87	NESC Heavy	0.0
Clamp22	Clamp	0.87	NESC Heavy	0.0
Clamp23	Clamp	0.87	NESC Heavy	0.0

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

*** End of Report

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

Project Name : 12001.CO85 - Bethel, CT
Project Notes: CL&P - Str # 10255/ Verizon Bethel North
Project File : J:\Jobs\1200100.WI\CO85- Bethel North\Rev (1)\Calcs\PLS-Pole\cl&p structure # 10255.pol
Date run : 4:27:17 PM Tuesday, February 12, 2013
by : PLS-POLE Version 11.11
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 Ultimate Property Number	Stock length	Default Base	Shape	Tip	Base	Taper Default	Drag	Modulus of Elasticity	Weight Density	Shape	Strength Distance
		Embedded Plate		Diameter	Diameter					At	Check From

Trans. Label	Long. Load	Length (ft)	Coef.	Override (ksi)	Base Type	Tip (ft)
CL&P10255	10255	150.00	1.3	3 tubes	0	0.000
0.0000	0.0000				Calculated	

Steel Tubes Properties:

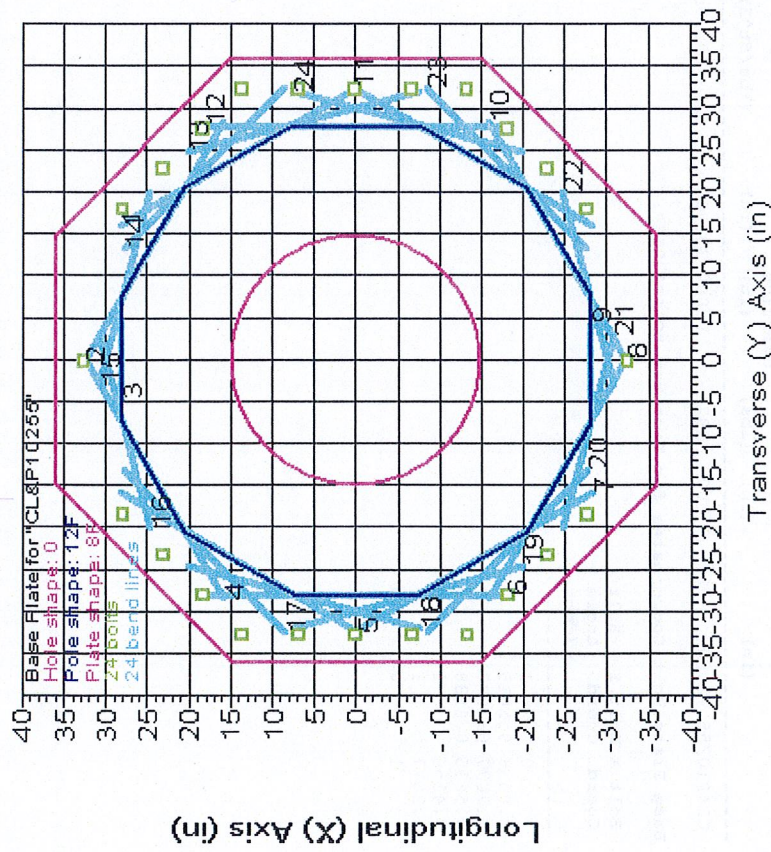
Property No.	Pole Tube Length (ft)	Thickness (in)	Lap Length (ft)	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Tube Top Taper Diameter (in)	Tube Bot. 1.5x Diam. Diameter (in)	Lap Length (ft)		
CL&P10255	1	55	0.3125	4.670	0.000	65.000	0.000	5022	29.85	0.24873	20.18	33.86	4.15
CL&P10255	2	54.67	0.4375	6.170	0.000	65.000	0.000	10058	28.95	0.24873	32.07	45.67	5.60
CL&P10255	3	51.17	0.46875	0.000	0.000	65.000	0.000	12901	26.69	0.24873	43.26	55.99	0.00

Base Plate Properties:

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

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

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



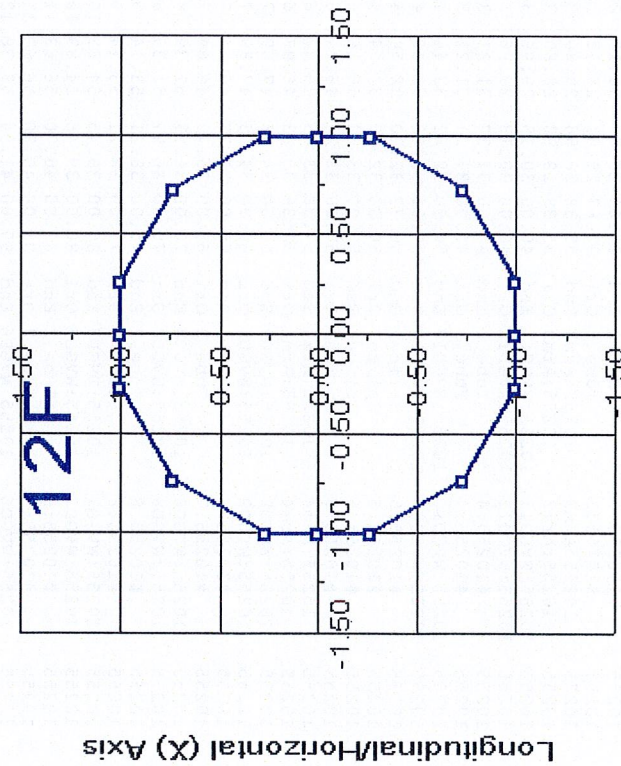
Steel Pole Connectivity:

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

Relative Attachment Labels for Steel Pole "10255":

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

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



Transverse/Vertical (Y) Axis

Pole Steel Properties:

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

Element Label	Joint Label	Joint Position	Rel. Outer Dist. Diam. (ft)	Area (in^2)	T-Moment Inertia (in^4)	D/t Max.	Fy (ksi)	Fa Min. (ksi)	ASCE Cap Trans. (ft-k)	ASCE Cap Long. (ft-k)
10255	10255:t	10255:t Ori	0.00	20.18	19.96	1008.79	0.00	14.6	65.00	541.55

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

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

Tubular Davit Properties:

Davit Steel	Stock	Thickness	Base	Tip	Taper	Drag	Modulus Geometry	Strength Vertical	Tension Compres.	Long.	Yield	Weight
Property Number	Shape	Diameter	Diameter	Diameter	Coef.	of	Elasticity	Check Capacity	Capacity	Capacity	Stress	Density
Label	Shape	or Depth	or Depth	or Depth	or Depth	or Depth	or Depth	or Depth	or Depth	or Depth	or Depth	or Depth
At End	(in)	(in)	(in)	(in)	(in/ft)	(ksi)	(ksi)	(lbs)	(lbs)	(lbs)	(ksi)	(lbs/ft^3)
ARM1 601420	6T	0.1875	10.75	6	0	1	29000 1 point	Calculated	0	0	0	65
ARM2 601515	8T	0.25	18.46	9	0	1	29000 1 point	Calculated	0	0	0	65

Intermediate Joints for Davit Property "ARM1":

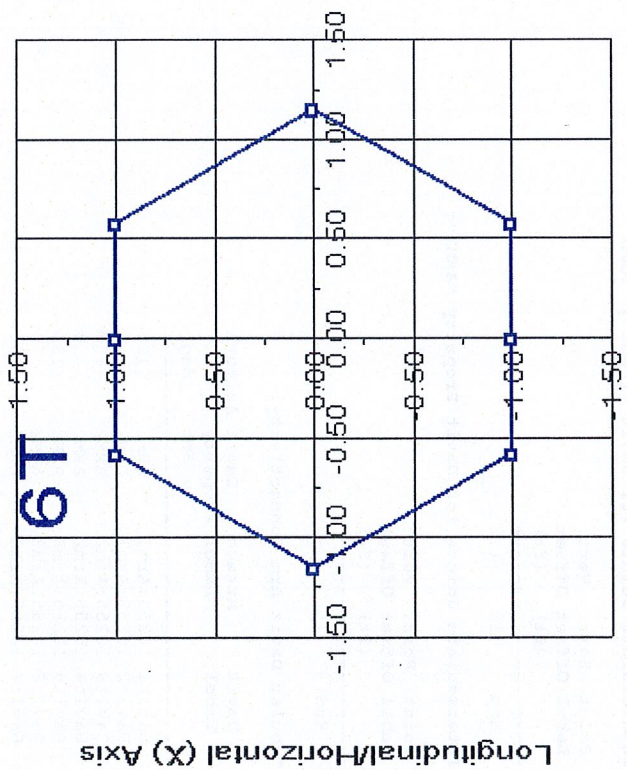
Joint Horiz. Vert.	Label	Offset	Offset
(ft)	(ft)	(ft)	(ft)
End	10	-1.2	

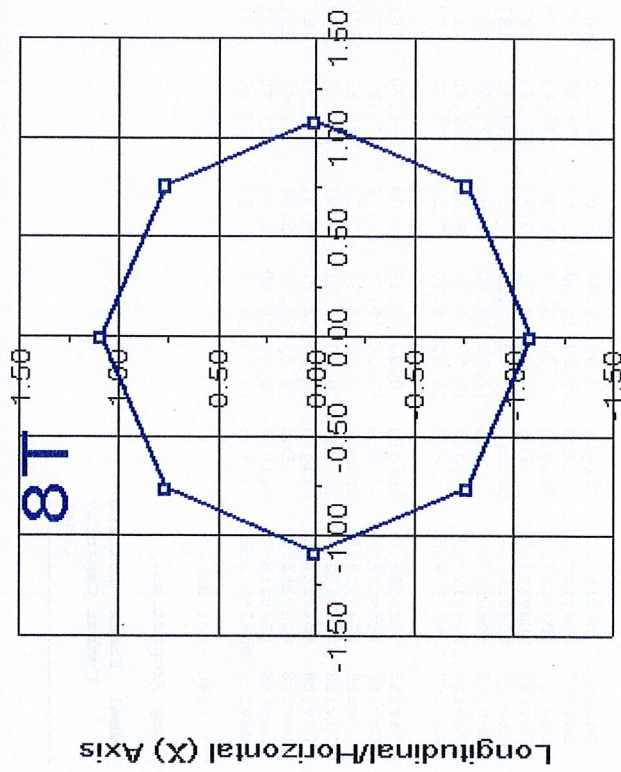
Intermediate Joints for Davit Property "ARM2":

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

Tubular Davit Arm Connectivity:

Davit	Attach	Davit Azimuth	Label	Property	Set	(deg)
Davit1	10255:Arm1	ARM1	ARM1	180		
Davit2	10255:Arm1	ARM1	ARM1	0		
Davit3	10255:Arm2	ARM2	ARM2	180		
Davit4	10255:Arm2	ARM2	ARM2	0		
Davit5	10255:Arm3	ARM3	ARM3	180		
Davit6	10255:Arm3	ARM3	ARM3	0		
Davit7	10255:Arm4	ARM4	ARM4	180		





Transverse/Vertical (Y) Axis

Tubular Davit Arm Steel Properties:

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

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

*** Insulator Data

Clamp Properties:

Label	Stock	Holding
Number	Capacity	
(lbs)		
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clamp clamp1 8e+004

Clamp Insulator Connectivity:

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

Loads from file: j:\jobs\1200100.wi\co85- bethel north\rev (1)\calcs\pls-pole\cl& #10255.1ca

Loading Method Parameters:

Structure Height Summary (used for calculating wind/ice adjust with height):

structure height, diameter, and weight, and the structure Z coordinate that will be put on the centerline ground profile in PLS-CADD.

Ground elevation shift

Ground elevation shift	0.00 (ft)
Z of ground with shift	0.00 (ft)

Location	Depth (ft)
Z of ground with shale	0.00 (ft)
Z of structure top (highest joint)	150.50 (ft)

2 of structure top (highest joint)	150.50 (ft)
Structure height	150.50 (ft)

Structure height	Structure height above ground	130-150 (ft)	150-50 (ft)
Structure height	Structure height above ground	130-150 (ft)	150-50 (ft)

[illegible]

	(in) (lbs/ft^3)	(deg F)	% or (ft)
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[illegible]

0 000	heavy	1:3000	2:3000	1:000000	0:0000
0 000	heavy	56 000	0 0	No Limit	0

0:000	36:000	0:0	NO BUILT
NESC	Extreme	1 0000 1 0000	1 00000 0 6500 0 0000

Variable	Mean	Standard deviation	Minimum	Maximum
Age	35.00	10.00	18	65
Gender	0.50	0.50	0	1
Married	0.70	0.45	0	1
Children	1.50	1.00	0	5
Education	12.50	2.00	8	16
Income	15.00	10.00	0	50
Health	1.00	0.80	0	2
Smoking	0.20	0.40	0	1
Alcohol	0.10	0.30	0	1
Exercise	0.30	0.45	0	1
Stress	2.00	1.50	0	5
Depression	1.00	0.80	0	2
Loneliness	1.50	1.00	0	4
Social support	3.00	1.50	0	5
Life satisfaction	4.00	1.00	0	5
Quality of life	3.50	1.20	0	5
Overall health	2.50	1.00	0	4
Physical health	2.00	0.80	0	3
Mental health	2.00	0.80	0	3
Emotional health	2.00	0.80	0	3
Social health	2.00	0.80	0	3
Environmental health	2.00	0.80	0	3
Healthcare access	2.00	0.80	0	3
Healthcare quality	2.00	0.80	0	3
Healthcare cost	2.00	0.80	0	3
Healthcare coverage	2.00	0.80	0	3
Healthcare utilization	2.00	0.80	0	3
Healthcare satisfaction	2.00	0.80	0	3
Healthcare quality of life	2.00	0.80	0	3
Healthcare overall health	2.00	0.80	0	3
Healthcare physical health	2.00	0.80	0	3
Healthcare mental health	2.00	0.80	0	3
Healthcare emotional health	2.00	0.80	0	3
Healthcare social health	2.00	0.80	0	3
Healthcare environmental health	2.00	0.80	0	3
Healthcare healthcare access	2.00	0.80	0	3
Healthcare healthcare quality	2.00	0.80	0	3
Healthcare healthcare cost	2.00	0.80	0	3
Healthcare healthcare coverage	2.00	0.80	0	3
Healthcare healthcare utilization	2.00	0.80	0	3
Healthcare healthcare satisfaction	2.00	0.80	0	3
Healthcare healthcare quality of life	2.00	0.80	0	3
Healthcare healthcare overall health	2.00	0.80	0	3
Healthcare healthcare physical health	2.00	0.80	0	3
Healthcare healthcare mental health	2.00	0.80	0	3
Healthcare healthcare emotional health	2.00	0.80	0	3
Healthcare healthcare social health	2.00	0.80	0	3
Healthcare healthcare environmental health	2.00	0.80	0	3
Healthcare healthcare healthcare access	2.00	0.80	0	3
Healthcare healthcare healthcare quality	2.00	0.80	0	3
Healthcare healthcare healthcare cost	2.00	0.80	0	3
Healthcare healthcare healthcare coverage	2.00	0.80	0	3
Healthcare healthcare healthcare utilization	2.00	0.80	0	3
Healthcare healthcare healthcare satisfaction	2.00	0.80	0	3
Healthcare healthcare healthcare quality of life	2.00	0.80	0	3
Healthcare healthcare healthcare overall health	2.00	0.80	0	3
Healthcare healthcare healthcare physical health	2.00	0.80	0	3
Healthcare healthcare healthcare mental health	2.00	0.80	0	3
Healthcare healthcare healthcare emotional health	2.00	0.80	0	3
Healthcare healthcare healthcare social health	2.00	0.80	0	3
Healthcare healthcare healthcare environmental health	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare access	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare quality	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare cost	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare coverage	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare utilization	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare satisfaction	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare quality of life	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare overall health	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare physical health	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare mental health	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare emotional health	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare social health	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare environmental health	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare healthcare access	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare healthcare quality	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare healthcare cost	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare healthcare coverage	2.00	0.80	0	3
Healthcare healthcare healthcare healthcare healthcare utilization	2.00	0		

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical		Transverse		Longitudinal		Load Comment
	Load (lbs)	Load (lbs)	Load (lbs)	Load (lbs)			
Davit1:End	1134	1078	0	Shield Wire			
Davit2:End	1134	1078	0	Shield Wire			
Davit3:End	7201	3651	0	Conductor			
Davit4:End	7201	3651	0	Conductor			
Davit5:End	7201	3651	0	Conductor			
Davit6:End	7201	3651	0	Conductor			
Davit7:End	7201	3651	0	Conductor			
Davit8:End	7201	3651	0	Conductor			
10255:TopConn	9695	6415	0	Top Connection			
10255:BotConn	1092	-4325	0	Bottom Connection			
10255:WVG1	690	60	0	Coax Cables			
10255:WVG2	690	60	0	Coax Cables			
10255:WVG3	690	60	0	Coax Cables			
10255:WVG4	690	60	0	Coax Cables			
10255:WVG5	690	60	0	Coax Cables			
10255:WVG6	690	60	0	Coax Cables			

10255:WVGD7	690	60	0	Coax Cables
10255:WVGD8	690	60	0	Coax Cables
10255:WVGD9	690	60	0	Coax Cables
10255:WVGD10	690	60	0	Coax Cables
10255:WVGD11	690	60	0	Coax Cables
10255:WVGD12	690	60	0	Coax Cables
10255:WVGD13	690	60	0	Coax Cables

Point Loads for Load Case "NESC Extreme":

Joint Vertical		Transverse		Longitudinal	Load Comment
Label	Load (lbs)	Load (lbs)	Load (lbs)		
Davit1:End	280	715	0	Shield Wire	
Davit2:End	280	715	0	Shield Wire	
Davit3:End	3065	4999	0	Conductor	
Davit4:End	3065	4999	0	Conductor	
Davit5:End	3065	4999	0	Conductor	
Davit6:End	3065	4999	0	Conductor	
Davit7:End	3065	4999	0	Conductor	
Davit8:End	3065	4999	0	Conductor	
10255:TopConn	4429	19439	0	Top Connection	
10255:BotConn	506	-13252	0	Bottom Connection	
10255:WVGD1	187	143	0	Coax Cables	
10255:WVGD2	187	143	0	Coax Cables	
10255:WVGD3	187	143	0	Coax Cables	
10255:WVGD4	187	143	0	Coax Cables	
10255:WVGD5	187	143	0	Coax Cables	
10255:WVGD6	187	143	0	Coax Cables	
10255:WVGD7	187	143	0	Coax Cables	
10255:WVGD8	187	143	0	Coax Cables	
10255:WVGD9	187	143	0	Coax Cables	
10255:WVGD10	187	143	0	Coax Cables	
10255:WVGD11	187	143	0	Coax Cables	
10255:WVGD12	187	143	0	Coax Cables	
10255:WVGD13	187	143	0	Coax Cables	

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

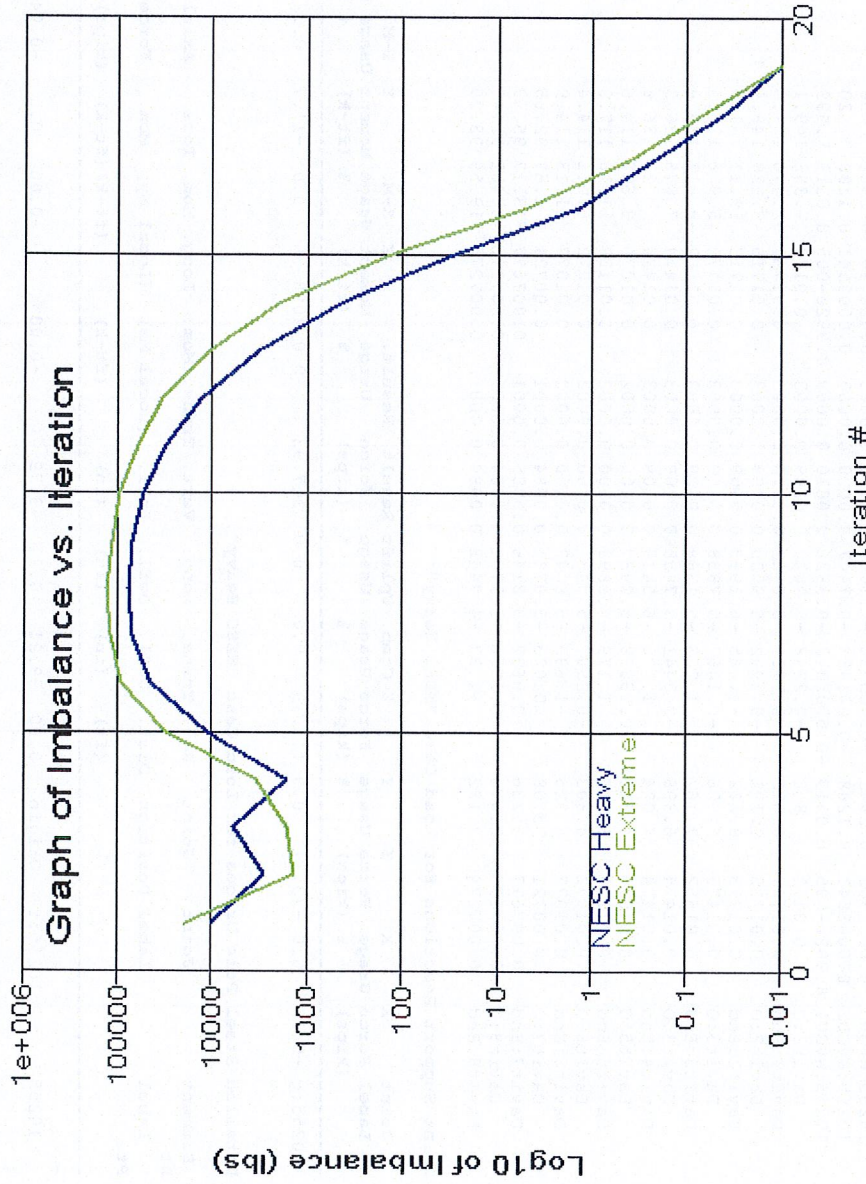
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

Pole Label	Top Joint	Bottom Joint	Section Z	Section Bottom Z	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)	Ice Pole Load (lbs)	Wind Ice Load (lbs)	Tran. Wind (lbs)	Long. Wind (lbs)
10255	10255:t	10255:Arm1	150.00	149.30	149.65	20.267	1.58e+006	1.000	27.12	0.00	47.76	32.07	0.00	0.00	32.07	0.00
10255	10255:Arm1	10255:TopConn	149.30	146.42	147.86	20.712	1.62e+006	1.000	27.12	0.00	200.88	134.83	0.00	0.00	134.83	0.00
10255	10255:TopConn		146.42	143.34	144.88	21.454	1.67e+006	1.000	27.12	0.00	223.00	149.61	0.00	0.00	149.61	0.00
10255		10255:BotConn	143.34	140.25	141.79	22.221	1.73e+006	1.000	27.12	0.00	231.10	154.96	0.00	0.00	154.96	0.00
10255	10255:BotConn	10255:Arm2	140.25	136.63	138.44	23.056	1.8e+006	1.000	27.12	0.00	281.89	188.92	0.00	0.00	188.92	0.00
10255	10255:Arm2		136.63	133.31	134.97	23.919	1.87e+006	1.000	27.12	0.00	267.36	179.09	0.00	0.00	179.09	0.00
10255		10255:WVGD13	133.31	130.00	131.66	24.743	1.93e+006	1.000	27.12	0.00	276.69	185.26	0.00	0.00	185.26	0.00
10255	10255:WVGD13		130.00	125.00	127.50	25.777	2.01e+006	1.000	27.12	0.00	435.33	291.32	0.00	0.00	291.32	0.00
10255		10255:WVGD12	125.00	120.00	122.50	27.020	2.11e+006	1.000	27.12	0.00	456.59	305.38	0.00	0.00	305.38	0.00
10255	10255:WVGD12		120.00	117.31	118.66	27.976	2.18e+006	1.000	27.12	0.00	254.20	169.95	0.00	0.00	169.95	0.00
10255		10255:Arm3	117.31	114.63	115.97	28.645	2.23e+006	1.000	27.12	0.00	260.34	174.01	0.00	0.00	174.01	0.00

10255	10255:Arm3	10255:WVGD11	114.63	110.00	112.31	29.554	2.3e+006	1.000	27.12	0.00	462.41	308.97	0.00
10255	10255:WVGD11		110.00	105.00	107.50	30.751	2.4e+006	1.000	27.12	0.00	520.37	347.55	0.00
10255		10255:WVGD10	105.00	100.00	102.50	31.995	2.49e+006	1.000	27.12	0.00	541.63	361.60	0.00
10255	10255:WVGD10		100.00	99.67	99.84	32.658	2.55e+006	1.000	27.12	0.00	36.50	24.36	0.00
10255			99.67	95.00	97.34	32.967	2.57e+006	1.000	27.12	0.00	1246.59	348.00	0.00
10255		10255:Arm4	95.00	92.63	93.81	33.531	2.61e+006	1.000	27.12	0.00	376.32	180.01	0.00
10255	10255:Arm4	10255:WVGD9	92.63	90.00	91.31	34.153	2.66e+006	1.000	27.12	0.00	423.64	202.64	0.00
10255	10255:WVGD9		90.00	85.00	87.50	35.101	2.74e+006	1.000	27.12	0.00	829.63	396.71	0.00
10255		10255:WVGD8	85.00	80.00	82.50	36.345	2.83e+006	1.000	27.12	0.00	859.40	410.76	0.00
10255	10255:WVGD8		80.00	75.00	77.50	37.588	2.93e+006	1.000	27.12	0.00	889.16	424.82	0.00
10255		10255:WVGD7	75.00	70.00	72.50	38.832	3.03e+006	1.000	27.12	0.00	918.93	438.87	0.00
10255	10255:WVGD7		70.00	65.00	67.50	40.076	3.12e+006	1.000	27.12	0.00	948.70	452.93	0.00
10255		10255:WVGD6	65.00	60.00	62.50	41.319	3.22e+006	1.000	27.12	0.00	978.46	466.98	0.00
10255	10255:WVGD6		60.00	55.59	57.79	42.490	3.31e+006	1.000	27.12	0.00	888.73	424.03	0.00
10255			55.59	51.17	53.38	43.588	3.4e+006	1.000	27.12	0.00	911.94	434.99	0.00
10255		10255:WVGD5	51.17	50.00	50.59	43.845	3.42e+006	1.000	27.12	0.00	503.22	115.96	0.00
10255	10255:WVGD5		50.00	45.00	47.50	44.175	3.44e+006	1.000	27.12	0.00	2188.55	499.26	0.00
10255		10255:WVGD4	45.00	40.00	42.50	45.419	3.54e+006	1.000	27.12	0.00	1152.68	513.32	0.00
10255	10255:WVGD4		40.00	35.00	37.50	46.662	3.64e+006	1.000	27.12	0.00	1184.57	527.37	0.00
10255		10255:WVGD3	35.00	30.00	32.50	47.906	3.74e+006	1.000	27.12	0.00	1216.46	541.43	0.00
10255	10255:WVGD3		30.00	25.00	27.50	49.150	3.83e+006	1.000	27.12	0.00	1248.36	555.49	0.00
10255		10255:WVGD2	25.00	20.00	22.50	50.394	3.93e+006	1.000	27.12	0.00	1280.25	569.54	0.00
10255	10255:WVGD2		20.00	15.00	17.50	51.637	4.03e+006	1.000	27.12	0.00	1312.14	583.60	0.00
10255		10255:WVGD1	15.00	10.00	12.50	52.881	4.12e+006	1.000	27.12	0.00	1344.03	597.65	0.00
10255	10255:WVGD1		10.00	5.00	7.50	54.125	4.22e+006	1.000	27.12	0.00	1375.92	611.71	0.00
10255		10255:g	5.00	0.00	2.50	55.368	4.32e+006	1.000	27.12	0.00	1407.82	625.76	0.00

*** Analysis Results:

Maximum element usage is 95.73% for Base Plate "10255" in load case "NESC Extreme"
 Maximum insulator usage is 24.92% for Clamp "Clamp9" in load case "NESC Extreme"



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

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

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
10255:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10255:t	0.01731	8.268	-0.3157	-5.9020	0.0109	0.0003	0.01731	8.268	149.7
10255:Arm1	0.01717	8.196	-0.312	-5.9020	0.0109	0.0003	0.01717	8.196	149

2	10255	10255:TopConn	End	3.58	94.80	0.20	-3.56	10.06	-0.01	0.0	-2.80	2.50	-0.00	-0.13	1.11	0.06	0.00	1.24	1.9
2	10255	10255:TopConn	Origin	3.58	94.80	0.20	-3.56	10.06	-0.01	0.0	-12.10	9.98	-0.01	-0.58	0.30	0.94	0.00	1.86	2.9
4	10255	Tube 1	End	6.67	91.00	0.19	-3.36	40.85	-0.03	0.0	-12.10	9.98	-0.01	-0.56	4.17	0.24	0.00	4.75	7.3
2	10255	Tube 1	Origin	6.67	91.00	0.19	-3.36	40.85	-0.03	0.0	-12.44	10.08	-0.01	-0.58	4.17	0.25	0.00	4.77	7.3
2	10255	10255:BotConn	End	9.75	87.21	0.19	-3.17	71.95	-0.05	0.0	-12.44	10.08	-0.01	-0.56	6.85	0.24	0.00	7.42	11.4
2	10255	10255:BotConn	Origin	9.75	87.21	0.19	-3.17	71.95	-0.05	0.0	-14.36	6.00	-0.01	-0.64	6.85	0.14	0.00	7.49	11.5
2	10255	10255:Arm2	End	13.38	82.81	0.18	-2.94	93.70	-0.09	0.0	-14.36	6.00	-0.01	-0.62	8.24	0.14	0.00	8.85	13.6
2	10255	10255:Arm2	Origin	13.38	82.81	0.18	-2.94	110.48	-0.09	0.0	-30.08	15.00	-0.02	-1.29	9.71	0.34	0.00	11.02	16.9
2	10255	Tube 1	End	16.69	78.82	0.17	-2.74	160.15	-0.15	0.0	-30.08	15.00	-0.02	-1.25	13.12	0.33	0.00	14.38	22.1
2	10255	Tube 1	Origin	16.69	78.82	0.17	-2.74	160.15	-0.15	0.0	-30.51	15.08	-0.02	-1.26	13.12	0.33	0.00	14.40	22.1
2	10255	10255:WVGD13	End	20.00	74.89	0.16	-2.55	210.09	-0.22	0.0	-30.51	15.08	-0.02	-1.22	16.08	0.32	0.00	17.32	26.6
2	10255	10255:WVGD13	Origin	20.00	74.89	0.16	-2.55	210.09	-0.21	0.0	-31.75	15.30	-0.02	-1.27	16.08	0.32	0.00	17.37	26.7
2	10255	Tube 1	End	25.00	69.10	0.15	-2.26	286.59	-0.33	0.0	-31.75	15.30	-0.02	-1.21	19.89	0.31	0.00	21.11	32.5
2	10255	Tube 1	Origin	25.00	69.10	0.15	-2.26	286.59	-0.33	0.0	-32.47	15.41	-0.03	-1.24	19.89	0.31	0.00	21.13	32.5
2	10255	10255:WVGD12	End	30.00	63.49	0.14	-2.00	363.62	-0.46	0.0	-32.47	15.41	-0.03	-1.18	22.98	0.30	0.00	24.17	37.2
2	10255	10255:WVGD12	Origin	30.00	63.49	0.14	-2.00	363.62	-0.46	0.0	-33.72	15.61	-0.03	-1.23	22.98	0.30	0.00	24.21	37.2
2	10255	Tube 1	End	32.69	60.56	0.13	-1.86	405.56	-0.54	0.0	-33.72	15.61	-0.03	-1.20	24.41	0.29	0.00	25.62	39.4
2	10255	Tube 1	Origin	32.69	60.56	0.13	-1.86	405.56	-0.54	0.0	-34.13	15.66	-0.03	-1.21	24.41	0.29	0.00	25.63	39.4
2	10255	10255:Arm3	End	35.38	57.69	0.13	-1.73	447.64	-0.62	0.0	-34.13	15.66	-0.03	-1.19	25.70	0.29	0.00	26.89	41.4
2	10255	10255:Arm3	Origin	35.38	57.69	0.13	-1.73	464.05	-0.63	0.0	-50.15	24.39	-0.04	-1.74	26.64	0.45	0.00	28.39	43.7
2	10255	10255:WVGD11	End	40.00	52.91	0.12	-1.52	576.84	-0.80	0.0	-50.15	24.39	-0.04	-1.67	30.60	0.43	0.00	32.28	49.7
2	10255	10255:WVGD11	Origin	40.00	52.91	0.12	-1.52	576.84	-0.80	0.0	-51.66	24.52	-0.04	-1.72	30.60	0.43	0.00	32.33	49.7
2	10255	Tube 1	End	45.00	47.98	0.11	-1.32	699.44	-1.01	0.0	-51.66	24.52	-0.04	-1.66	34.17	0.42	0.00	35.84	55.1
2	10255	Tube 1	Origin	45.00	47.98	0.11	-1.32	699.44	-1.01	0.0	-52.57	24.52	-0.05	-1.68	34.17	0.42	0.00	35.87	55.2
2	10255	10255:WVGD10	End	50.00	43.32	0.10	-1.13	822.03	-1.25	0.0	-52.57	24.52	-0.05	-1.62	37.12	0.40	0.00	38.74	59.6
2	10255	10255:WVGD10	Origin	50.00	43.32	0.10	-1.13	822.03	-1.25	0.0	-53.75	24.62	-0.05	-1.66	37.12	0.40	0.00	38.78	59.7
2	10255	SpliceT	End	50.33	43.02	0.10	-1.12	830.15	-1.26	0.0	-53.75	24.62	-0.05	-1.65	37.29	0.40	0.00	38.95	59.9
2	10255	SpliceT	Origin	50.33	43.02	0.10	-1.12	830.15	-1.26	0.0	-54.76	24.67	-0.05	-1.68	37.29	0.40	0.00	38.98	60.0
2	10255	SpliceB	End	55.00	38.92	0.09	-0.97	945.36	-1.50	0.0	-54.76	24.67	-0.05	-1.19	29.68	0.28	0.00	30.88	47.5
2	10255	SpliceB	Origin	55.00	38.92	0.09	-0.97	945.36	-1.50	0.0	-56.04	24.73	-0.05	-1.21	29.68	0.28	0.00	30.90	47.5

2	10255	10255:Arm4	End	57.38	36.92	0.09	-0.90	1004.09	-1.63	0.0	-56.04	24.73	-0.05	-1.19	30.42	0.28	0.00	31.61	48.6
2	10255	10255:Arm4	Origin	57.38	36.92	0.09	-0.90	1019.97	-1.63	0.0	-72.27	33.14	-0.06	-1.54	30.90	0.37	0.00	32.44	49.9
2	10255	10255:WVGD9	End	60.00	34.76	0.08	-0.82	1106.97	-1.79	0.0	-72.27	33.14	-0.06	-1.51	32.25	0.37	0.00	33.77	51.9
2	10255	10255:WVGD9	Origin	60.00	34.76	0.08	-0.82	1106.97	-1.79	0.0	-73.99	33.24	-0.06	-1.55	32.25	0.37	0.00	33.80	52.0
2	10255	Tube 2	End	65.00	30.83	0.07	-0.69	1273.17	-2.11	0.0	-73.99	33.24	-0.06	-1.49	34.51	0.35	0.00	36.01	55.4
2	10255	Tube 2	Origin	65.00	30.83	0.07	-0.69	1273.17	-2.11	0.0	-75.38	33.22	-0.07	-1.52	34.51	0.35	0.00	36.03	55.4
2	10255	10255:WVGD8	End	70.00	27.14	0.07	-0.57	1439.25	-2.45	0.0	-75.38	33.22	-0.07	-1.47	36.39	0.34	0.00	37.86	58.2
2	10255	10255:WVGD8	Origin	70.00	27.14	0.07	-0.57	1439.25	-2.45	0.0	-77.51	33.28	-0.07	-1.51	36.39	0.34	0.00	37.90	58.3
2	10255	Tube 2	End	75.00	23.69	0.06	-0.47	1605.66	-2.82	0.0	-77.51	33.28	-0.07	-1.46	37.95	0.33	0.00	39.41	60.6
2	10255	Tube 2	Origin	75.00	23.69	0.06	-0.47	1605.66	-2.82	0.0	-79.00	33.24	-0.08	-1.49	37.95	0.33	0.00	39.44	60.7
2	10255	10255:WVGD7	End	80.00	20.49	0.05	-0.38	1771.87	-3.21	0.0	-79.00	33.24	-0.08	-1.44	39.24	0.32	0.00	40.68	62.6
2	10255	10255:WVGD7	Origin	80.00	20.49	0.05	-0.38	1771.87	-3.21	0.0	-81.23	33.30	-0.08	-1.48	39.24	0.32	0.00	40.72	62.6
2	10255	Tube 2	End	85.00	17.53	0.04	-0.31	1938.34	-3.63	0.0	-81.23	33.30	-0.08	-1.43	40.30	0.31	0.00	41.74	64.2
2	10255	Tube 2	Origin	85.00	17.53	0.04	-0.31	1938.34	-3.63	0.0	-82.81	33.25	-0.09	-1.46	40.30	0.31	0.00	41.77	64.3
2	10255	10255:WVGD6	End	90.00	14.82	0.04	-0.24	2104.57	-4.07	0.0	-82.81	33.25	-0.09	-1.42	41.16	0.30	0.00	42.58	65.5
2	10255	10255:WVGD6	Origin	90.00	14.82	0.04	-0.24	2104.57	-4.07	0.0	-85.02	33.29	-0.09	-1.46	41.16	0.30	0.00	42.62	65.6
2	10255	Tube 2	End	94.42	12.63	0.03	-0.19	2251.54	-4.49	0.0	-85.02	33.29	-0.09	-1.42	41.78	0.29	0.00	43.21	66.5
2	10255	Tube 2	Origin	94.42	12.63	0.03	-0.19	2251.54	-4.49	0.0	-86.49	33.24	-0.10	-1.44	41.78	0.29	0.00	43.23	66.5
2	10255	SpliceT	End	98.83	10.63	0.03	-0.15	2398.30	-4.92	0.0	-86.49	33.24	-0.10	-1.41	42.29	0.29	0.00	43.70	67.2
2	10255	SpliceT	Origin	98.83	10.63	0.03	-0.15	2398.30	-4.92	0.0	-87.62	33.22	-0.10	-1.43	42.29	0.29	0.00	43.72	67.3
2	10255	10255:WVGD5	End	100.00	10.13	0.03	-0.14	2437.17	-5.04	0.0	-87.62	33.22	-0.10	-1.35	41.30	0.27	0.00	42.65	65.6
2	10255	10255:WVGD5	Origin	100.00	10.13	0.03	-0.14	2437.17	-5.04	0.0	-90.41	33.31	-0.11	-1.39	41.30	0.27	0.00	42.69	65.7
2	10255	SpliceB	End	105.00	8.14	0.02	-0.11	2603.70	-5.57	0.0	-90.41	33.31	-0.11	-1.35	41.67	0.26	0.00	43.02	66.2
2	10255	SpliceB	Origin	105.00	8.14	0.02	-0.11	2603.70	-5.57	0.0	-93.04	33.28	-0.11	-1.39	41.67	0.26	0.00	43.06	66.2
2	10255	10255:WVGD4	End	110.00	6.38	0.02	-0.08	2770.08	-6.13	0.0	-93.04	33.28	-0.11	-1.35	41.93	0.26	0.00	43.29	66.6
2	10255	10255:WVGD4	Origin	110.00	6.38	0.02	-0.08	2770.08	-6.12	0.0	-95.61	33.30	-0.12	-1.39	41.93	0.26	0.00	43.33	66.7
2	10255	Tube 3	End	115.00	4.84	0.01	-0.06	2936.56	-6.71	0.0	-95.61	33.30	-0.12	-1.35	42.11	0.25	0.00	43.47	66.9
2	10255	Tube 3	Origin	115.00	4.84	0.01	-0.06	2936.56	-6.71	0.0	-97.53	33.24	-0.12	-1.38	42.11	0.25	0.00	43.50	66.9
2	10255	10255:WVGD3	End	120.00	3.53	0.01	-0.04	3102.75	-7.33	0.0	-97.53	33.24	-0.12	-1.35	42.21	0.24	0.00	43.56	67.0

2	10255	10255:WVG03	Origin	120.00	3.53	0.01	-0.04	3102.75	-7.33	0.0	-100.18	33.26	-0.13	-1.38	42.21	0.24	0.00	43.60	67.1
2	10255	Tube 3	End	125.00	2.43	0.01	-0.03	3269.04	-7.97	0.0	-100.18	33.26	-0.13	-1.35	42.25	0.24	0.00	43.60	67.1
2	10255	Tube 3	Origin	125.00	2.43	0.01	-0.03	3269.04	-7.97	0.0	-102.20	33.20	-0.14	-1.38	42.25	0.24	0.00	43.63	67.1
2	10255	10255:WVG02	End	130.00	1.55	0.00	-0.02	3435.05	-8.65	0.0	-102.20	33.20	-0.14	-1.34	42.23	0.23	0.00	43.57	67.0
2	10255	10255:WVG02	Origin	130.00	1.55	0.00	-0.02	3435.05	-8.65	0.0	-104.94	33.22	-0.14	-1.38	42.23	0.23	0.00	43.61	67.1
2	10255	Tube 3	End	135.00	0.86	0.00	-0.01	3601.14	-9.36	0.0	-104.94	33.22	-0.14	-1.34	42.16	0.22	0.00	43.51	66.9
2	10255	Tube 3	Origin	135.00	0.86	0.00	-0.01	3601.14	-9.36	0.0	-107.05	33.17	-0.15	-1.37	42.16	0.22	0.00	43.54	67.0
2	10255	10255:WVG01	End	140.00	0.38	0.00	-0.01	3766.98	-10.10	0.0	-107.05	33.17	-0.15	-1.34	42.05	0.22	0.00	43.39	66.8
2	10255	10255:WVG01	Origin	140.00	0.38	0.00	-0.01	3766.98	-10.10	0.0	-109.88	33.18	-0.16	-1.37	42.05	0.22	0.00	43.43	66.8
2	10255	Tube 3	End	145.00	0.10	0.00	-0.00	3932.89	-10.88	0.0	-109.88	33.18	-0.16	-1.34	41.91	0.21	0.00	43.25	66.5
2	10255	Tube 3	Origin	145.00	0.10	0.00	-0.00	3932.89	-10.88	0.0	-112.08	33.14	-0.16	-1.37	41.91	0.21	0.00	43.28	66.6
2	10255	10255:g	End	150.00	0.00	0.00	0.00	4098.56	-11.69	0.0	-112.08	33.14	-0.16	-1.34	41.73	0.21	0.00	43.07	66.3

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)	Shear Force (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage Pt. %
Davit1	Davit1:0	Origin	0.00	98.40	0.21	-2.70	-9.99	0.00	0.0	-1.34	1.06	-0.00	-0.20	7.00	0.00	0.00	7.20	11.1
Davit1	#Davit1:0	End	5.00	99.44	0.21	3.31	-4.70	0.00	0.0	-1.34	1.06	-0.00	-0.25	5.48	0.00	0.00	5.74	8.8
Davit1	#Davit1:0	Origin	5.00	99.44	0.21	3.31	-4.70	0.00	0.0	-1.32	0.95	-0.00	-0.25	5.48	0.00	0.00	5.73	8.8
Davit1	#Davit1:1	End	7.54	99.95	0.21	6.31	-2.28	0.00	0.0	-1.32	0.95	-0.00	-0.29	3.66	0.00	0.00	3.95	6.1
Davit1	#Davit1:1	Origin	7.54	99.95	0.21	6.31	-2.28	0.00	0.0	-1.30	0.90	-0.00	-0.29	3.66	0.00	0.00	3.94	6.1
Davit1	Davit1:End	End	10.07	100.46	0.21	9.29	-0.00	0.00	0.0	-1.30	0.90	-0.00	-0.35	0.00	0.51	0.00	0.94	1.5
Davit2	Davit2:0	Origin	0.00	98.30	0.21	-4.79	-12.83	-0.00	-0.0	1.06	1.35	0.00	0.15	8.99	0.00	0.00	9.14	14.1
Davit2	#Davit2:0	End	5.00	98.72	0.21	-11.06	-6.10	-0.00	-0.0	1.06	1.35	0.00	0.20	7.12	0.00	0.00	7.32	11.3
Davit2	#Davit2:0	Origin	5.00	98.72	0.21	-11.06	-6.10	-0.00	-0.0	1.06	1.23	0.00	0.20	7.12	0.00	0.00	7.32	11.3
Davit2	#Davit2:1	End	7.54	98.93	0.21	-14.30	-2.98	-0.00	-0.0	1.06	1.23	0.00	0.23	4.77	0.00	0.00	5.01	7.7
Davit2	#Davit2:1	Origin	7.54	98.93	0.21	-14.30	-2.98	-0.00	0.0	1.06	1.17	0.00	0.23	4.77	0.00	0.00	5.01	7.7
Davit2	Davit2:End	End	10.07	99.15	0.21	-17.57	0.00	0.00	0.0	1.06	1.17	0.00	0.28	0.00	0.66	0.00	1.18	1.8
Davit3	Davit3:0	Origin	0.00	82.87	0.18	-1.76	-99.33	0.00	0.0	-5.36	6.83	-0.00	-0.36	18.01	0.00	0.00	18.37	28.3
Davit3	#Davit3:0	End	5.00	83.94	0.18	4.07	-65.17	0.02	0.0	-5.36	6.83	-0.00	-0.43	17.27	0.00	0.00	17.70	27.2
Davit3	#Davit3:0	Origin	5.00	83.94	0.18	4.07	-65.17	0.02	0.0	-5.26	6.55	-0.00	-0.42	17.27	0.00	0.00	17.69	27.2
Davit3	#Davit3:1	End	10.00	84.96	0.18	9.65	-32.43	0.01	0.0	-5.26	6.55	-0.00	-0.53	13.73	0.00	0.00	14.26	21.9
Davit3	#Davit3:1	Origin	10.00	84.96	0.18	9.65	-32.43	0.01	0.0	-5.20	6.37	-0.00	-0.52	13.73	0.00	0.00	14.25	21.9
Davit3	#Davit3:2	End	12.57	85.46	0.18	12.43	-16.09	0.00	0.0	-5.20	6.37	-0.00	-0.61	9.11	0.00	0.00	9.72	14.9
Davit3	#Davit3:2	Origin	12.57	85.46	0.18	12.43	-16.09	0.00	0.0	-5.16	6.27	-0.00	-0.60	9.11	0.00	0.00	9.71	14.9
Davit3	Davit3:End	End	15.13	85.95	0.19	15.15	-0.00	0.00	0.0	-5.16	6.27	-0.00	-0.71	0.00	1.79	0.00	3.18	4.9
Davit4	Davit4:0	Origin	0.00	82.75	0.18	-4.13	-116.10	-0.02	-0.0	3.42	7.99	0.00	0.23	21.05	0.00	0.00	21.28	32.7
Davit4	#Davit4:0	End	5.00	83.25	0.18	-10.32	-76.15	-0.01	-0.0	3.42	7.99	0.00	0.27	20.18	0.00	0.00	20.45	31.5
Davit4	#Davit4:0	Origin	5.00	83.25	0.18	-10.32	-76.15	-0.01	-0.0	3.47	7.65	0.00	0.28	20.18	0.00	0.00	20.45	31.5
Davit4	#Davit4:1	End	10.00	83.76	0.18	-16.80	-37.88	-0.01	-0.0	3.47	7.65	0.00	0.35	16.03	0.00	0.00	16.38	25.2

Davit4	#Davit4:1	Origin	10.00	83.76	0.18	-16.80	-37.88	-0.01	-0.0	3.50	7.44	0.00	0.35	16.03	0.00	0.00	16.39	25.2	1
Davit4	#Davit4:2	End	12.57	84.02	0.18	-20.24	-18.79	-0.00	-0.0	3.50	7.44	0.00	0.41	10.64	0.00	0.00	11.05	17.0	1
Davit4	#Davit4:2	Origin	12.57	84.02	0.18	-20.24	-18.79	-0.00	0.0	3.51	7.32	0.00	0.41	10.64	0.00	0.00	11.05	17.0	1
Davit4	Davit4:End	End	15.13	84.29	0.18	-23.73	-0.00	0.00	0.0	3.51	7.32	0.00	0.48	0.00	2.09	0.00	3.66	5.6	3
Davit5	Davit5:0	Origin	0.00	57.75	0.13	-0.46	-100.37	0.03	0.0	-5.27	6.90	-0.00	-0.35	18.20	0.00	0.00	18.55	28.5	1
Davit5	#Davit5:0	End	5.00	58.65	0.13	4.61	-65.86	0.02	0.0	-5.27	6.90	-0.00	-0.42	17.45	0.00	0.00	17.87	27.5	1
Davit5	#Davit5:0	Origin	5.00	58.65	0.13	4.61	-65.86	0.02	0.0	-5.18	6.62	-0.00	-0.41	17.45	0.00	0.00	17.86	27.5	1
Davit5	#Davit5:1	End	10.00	59.49	0.13	9.43	-32.77	0.01	0.0	-5.18	6.62	-0.00	-0.52	13.87	0.00	0.00	14.40	22.1	1
Davit5	#Davit5:1	Origin	10.00	59.49	0.13	9.43	-32.77	0.01	0.0	-5.11	6.44	-0.00	-0.52	13.87	0.00	0.00	14.39	22.1	1
Davit5	#Davit5:2	End	12.57	59.91	0.14	11.81	-16.26	0.00	0.0	-5.11	6.44	-0.00	-0.60	9.21	0.00	0.00	9.80	15.1	1
Davit5	#Davit5:2	Origin	12.57	59.91	0.14	11.81	-16.26	0.00	0.0	-5.08	6.33	-0.00	-0.59	9.21	0.00	0.00	9.80	15.1	1
Davit5	Davit5:End	End	15.13	60.31	0.14	14.14	-0.00	0.00	0.0	-5.08	6.33	-0.00	-0.70	0.00	1.81	0.00	3.21	4.9	3
Davit6	Davit6:0	Origin	0.00	57.64	0.13	-3.01	-116.77	-0.02	-0.0	3.32	8.03	0.00	0.22	21.17	0.00	0.00	21.39	32.9	1
Davit6	#Davit6:0	End	5.00	58.11	0.13	-8.42	-76.60	-0.01	-0.0	3.32	8.03	0.00	0.27	20.30	0.00	0.00	20.56	31.6	1
Davit6	#Davit6:0	Origin	5.00	58.11	0.13	-8.42	-76.60	-0.01	-0.0	3.37	7.70	0.00	0.27	20.30	0.00	0.00	20.57	31.6	1
Davit6	#Davit6:1	End	10.00	58.60	0.13	-14.13	-38.11	-0.01	-0.0	3.37	7.70	0.00	0.34	16.13	0.00	0.00	16.47	25.3	1
Davit6	#Davit6:1	Origin	10.00	58.60	0.13	-14.13	-38.11	-0.01	-0.0	3.40	7.48	0.00	0.34	16.13	0.00	0.00	16.47	25.3	1
Davit6	#Davit6:2	End	12.57	58.85	0.13	-17.17	-18.90	-0.00	-0.0	3.40	7.48	0.00	0.40	10.70	0.00	0.00	11.10	17.1	1
Davit6	#Davit6:2	Origin	12.57	58.85	0.13	-17.17	-18.90	-0.00	0.0	3.42	7.36	0.00	0.40	10.70	0.00	0.00	11.10	17.1	1
Davit6	Davit6:End	End	15.13	59.11	0.13	-20.27	-0.00	0.00	0.0	3.42	7.36	0.00	0.47	0.00	2.11	0.00	3.68	5.7	3
Davit7	Davit7:0	Origin	0.00	36.96	0.09	0.28	-101.83	0.02	0.0	-5.14	7.00	-0.00	-0.34	18.46	0.00	0.00	18.80	28.9	1
Davit7	#Davit7:0	End	5.00	37.62	0.09	4.25	-66.82	0.01	0.0	-5.14	7.00	-0.00	-0.41	17.71	0.00	0.00	18.12	27.9	1
Davit7	#Davit7:0	Origin	5.00	37.62	0.09	4.25	-66.82	0.01	0.0	-5.05	6.71	-0.00	-0.40	17.71	0.00	0.00	18.11	27.9	1
Davit7	#Davit7:1	End	10.00	38.24	0.09	7.97	-33.26	0.01	0.0	-5.05	6.71	-0.00	-0.51	14.08	0.00	0.00	14.59	22.4	1
Davit7	#Davit7:1	Origin	10.00	38.24	0.09	7.97	-33.26	0.01	0.0	-4.99	6.53	-0.00	-0.50	14.08	0.00	0.00	14.58	22.4	1
Davit7	#Davit7:2	End	12.57	38.54	0.09	9.79	-16.50	0.00	0.0	-4.99	6.53	-0.00	-0.58	9.34	0.00	0.00	9.93	15.3	1
Davit7	#Davit7:2	Origin	12.57	38.54	0.09	9.79	-16.50	0.00	0.0	-4.96	6.43	-0.00	-0.58	9.34	0.00	0.00	9.92	15.3	1
Davit7	Davit7:End	End	15.13	38.83	0.09	11.56	-0.00	0.00	0.0	-4.96	6.43	-0.00	-0.68	0.00	1.84	0.00	3.26	5.0	3
Davit8	Davit8:0	Origin	0.00	36.88	0.09	-2.07	-117.70	-0.02	-0.0	3.17	8.09	0.00	0.21	21.34	0.00	0.00	21.55	33.2	1
Davit8	#Davit8:0	End	5.00	37.29	0.09	-6.37	-77.22	-0.01	-0.0	3.17	8.09	0.00	0.25	20.46	0.00	0.00	20.71	31.9	1
Davit8	#Davit8:0	Origin	5.00	37.29	0.09	-6.37	-77.22	-0.01	-0.0	3.23	7.76	0.00	0.26	20.46	0.00	0.00	20.72	31.9	1
Davit8	#Davit8:1	End	10.00	37.73	0.09	-10.97	-38.42	-0.01	-0.0	3.23	7.76	0.00	0.33	16.26	0.00	0.00	16.59	25.5	1
Davit8	#Davit8:1	Origin	10.00	37.73	0.09	-10.97	-38.42	-0.01	-0.0	3.26	7.54	0.00	0.33	16.26	0.00	0.00	16.59	25.5	1
Davit8	#Davit8:2	End	12.57	37.96	0.09	-13.44	-19.06	-0.00	-0.0	3.26	7.54	0.00	0.38	10.79	0.00	0.00	11.17	17.2	1
Davit8	#Davit8:2	Origin	12.57	37.96	0.09	-13.44	-19.06	-0.00	0.0	3.28	7.43	0.00	0.38	10.79	0.00	0.00	11.18	17.2	1
Davit8	Davit8:End	End	15.13	38.19	0.09	-15.97	-0.00	0.00	0.0	3.28	7.43	0.00	0.45	0.00	2.12	0.00	3.71	5.7	3

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

Clamp Label	Force (kips)	Input Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	1.565	80.00	80.00	1.96
Clamp2	1.565	80.00	80.00	1.96
Clamp3	8.074	80.00	80.00	10.09
Clamp4	8.074	80.00	80.00	10.09
Clamp5	8.074	80.00	80.00	10.09
Clamp6	8.074	80.00	80.00	10.09
Clamp7	8.074	80.00	80.00	10.09
Clamp8	8.074	80.00	80.00	10.09
Clamp9	11.625	80.00	80.00	14.53
Clamp10	4.461	80.00	80.00	5.58

Clamp11	0.693	80.00	80.00	0.87
Clamp12	0.693	80.00	80.00	0.87
Clamp13	0.693	80.00	80.00	0.87
Clamp14	0.693	80.00	80.00	0.87
Clamp15	0.693	80.00	80.00	0.87
Clamp16	0.693	80.00	80.00	0.87
Clamp17	0.693	80.00	80.00	0.87
Clamp18	0.693	80.00	80.00	0.87
Clamp19	0.693	80.00	80.00	0.87
Clamp20	0.693	80.00	80.00	0.87
Clamp21	0.693	80.00	80.00	0.87
Clamp22	0.693	80.00	80.00	0.87
Clamp23	0.693	80.00	80.00	0.87

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

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

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
10255:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10255:t	0.005245	11.72	-0.6244	-8.4658	0.0033	0.0002	0.005245	11.72	149.4
10255:Arm1	0.005205	11.61	-0.6167	-8.4658	0.0033	0.0002	0.005205	11.61	148.7
10255:TopConn	0.005042	11.19	-0.5853	-8.4626	0.0033	0.0002	0.005042	11.19	145.8
10255:BotConn	0.004693	10.28	-0.5186	-8.3639	0.0033	0.0001	0.004693	10.28	139.7
10255:Arm2	0.004488	9.759	-0.4805	-8.2565	0.0033	0.0001	0.004488	9.759	136.1
10255:WVGD13	0.004417	8.822	-0.4138	-7.9802	0.0032	0.0001	0.004417	8.822	129.6
10255:WVGD12	0.00357	7.478	-0.3228	-7.4423	0.0031	0.0001	0.00357	7.478	119.7
10255:Arm3	0.003284	6.796	-0.2793	-7.1190	0.0030	0.0001	0.003284	6.796	114.3
10255:WVGD11	0.003045	6.234	-0.2449	-6.8115	0.0029	0.0001	0.003045	6.234	109.8
10255:WVGD10	0.002553	5.109	-0.1811	-6.0804	0.0027	0.0001	0.002553	5.109	99.82
10255:Arm4	0.002213	4.359	-0.1427	-5.6033	0.0026	0.0001	0.002213	4.359	92.48
10255:WVGD9	0.002097	4.106	-0.1304	-5.4420	0.0025	0.0001	0.002097	4.106	89.87
10255:WVGD8	0.001678	3.211	-0.09002	-4.8045	0.0023	0.0000	0.001678	3.211	79.91
10255:WVGD7	0.001299	2.429	-0.05914	-4.1502	0.0020	0.0000	0.001299	2.429	69.94
10255:WVGD6	0.0009633	1.761	-0.03654	-3.4968	0.0018	0.0000	0.0009633	1.761	59.96
10255:WVGD5	0.000675	1.206	-0.02086	-2.8552	0.0015	0.0000	0.000675	1.206	49.98
10255:WVGD4	0.0004357	0.7614	-0.0107	-2.2365	0.0012	0.0000	0.0004357	0.7614	39.99
10255:WVGD3	0.0002472	0.4225	-0.004687	-1.6407	0.0009	0.0000	0.0002472	0.4225	30
10255:WVGD2	0.000111	0.1855	-0.001612	-1.0693	0.0006	0.0000	0.000111	0.1855	20
10255:WVGD1	2.826e-005	0.04608	-0.0003733	-0.5225	0.0003	0.0000	2.826e-005	0.04608	10
Davit1:O	0.005215	11.62	-0.4919	-8.4658	0.0033	0.0002	0.005215	10.77	148.8
Davit1:End	0.005397	11.91	0.964	-8.4351	0.0033	0.0002	0.005397	1.058	151.5
Davit2:O	0.005196	11.6	-0.7416	-8.4658	0.0033	0.0002	0.005196	12.45	148.6
Davit2:End	0.005152	11.67	-2.235	-8.5410	0.0033	0.0002	0.005152	22.52	148.3
Davit3:O	0.004498	9.77	-0.3398	-8.2565	0.0033	0.0001	0.004498	8.79	136.3
Davit3:End	0.004774	10.21	1.769	-8.0827	0.0033	0.0002	0.004774	-5.774	140.4
Davit4:O	0.004478	9.749	-0.6211	-8.2565	0.0033	0.0001	0.004478	10.73	136
Davit4:End	0.004427	9.881	-2.843	-8.5720	0.0033	0.0001	0.004427	25.86	135.8
Davit5:O	0.003294	6.805	-0.1296	-7.1190	0.0030	0.0001	0.003294	5.598	114.5
Davit5:End	0.003524	7.162	1.687	-6.9337	0.0030	0.0001	0.003524	-9.045	118.3
Davit6:O	0.003275	6.787	-0.4289	-7.1190	0.0030	0.0001	0.003275	7.994	114.2
Davit6:End	0.003254	6.92	-2.351	-7.4445	0.0030	0.0001	0.003254	23.13	114.3
Davit7:O	0.002221	4.365	-0.005045	-5.6033	0.0026	0.0001	0.002221	2.956	92.62
Davit7:End	0.002392	4.626	1.421	-5.4027	0.0026	0.0001	0.002392	-11.78	96.05
Davit8:O	0.002206	4.352	-0.2803	-5.6033	0.0026	0.0001	0.002206	5.761	92.34
Davit8:End	0.002213	4.477	-1.804	-5.9420	0.0026	0.0001	0.002213	20.89	92.82

Joint Support Reactions for Load Case "NESC Extreme":

Joint Label	X Force Usage (kips)	X Force Usage % (kips)	Y Force Usage (kips)	Y Force Usage % (kips)	Z Comp. Usage (kips)	Z Comp. Usage % (kips)	Uplift Result. Force Usage (kips)	Uplift Result. Force Usage % (kips)	Result. Force Usage (kips)	Result. Force Usage % (kips)	X-M. Moment Usage (ft-k)	X-M. Moment Usage % (ft-k)	Y-M. Moment Usage (ft-k)	Y-M. Moment Usage % (ft-k)	Z-M. Moment Usage (ft-k)	Z-M. Moment Usage % (ft-k)	Max. Usage	Max. Usage
10255:g	-0.05	0.0	-52.30	0.0	58.85	0.0	0.0	0.0	78.74	0.0	5928.28	0.0	-3.7	0.0	-0.01	0.0	0.0	0.0

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

Element	Joint	Joint	Rel. Trans.	Long.	Vert.	Trans. Mom.	Long. Mom.	Tors.	Axial	Tran.	Long.	P/A	M/S.	V/Q.	T/R.	Res.	Max.	At
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Label	Label Position	Dist. (ft)	Defl. (in)	Defl. (in)	(Local Mx) (ft-k)	(Local My) (ft-k)	Mom. (ft-k)	Force (kips)	Shear (kips)	Shear (kips)	(ksi)	(ksi)	(ksi)	(ksi)	Usage Pt. %
10255	10255:t	Origin	0.00	140.58	0.06	-7.49	-0.00	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.0
10255	10255:Arm1	End	0.70	139.35	0.06	-7.40	-0.00	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.0
10255	10255:Arm1	Origin	0.70	139.35	0.06	-7.40	-0.00	-0.84	1.67	-0.00	-0.04	0.06	0.16	0.00	0.0
10255	10255:TopConn	End	3.58	134.26	0.06	-7.02	-0.00	-0.84	1.67	-0.00	-0.04	0.74	0.04	0.00	0.78
10255	10255:TopConn	Origin	3.58	134.26	0.06	-7.02	-0.00	-2.57	21.72	-0.00	-0.12	0.00	2.12	0.00	3.68
10255	Tube 1	End	6.67	128.82	0.06	-6.62	-0.01	-2.57	21.72	-0.00	-0.12	7.53	0.53	0.00	7.70
10255	Tube 1	Origin	6.67	128.82	0.06	-6.62	-0.01	-2.81	21.90	-0.00	-0.13	7.53	0.54	0.00	7.72
10255	10255:BotConn	End	9.75	123.40	0.06	-6.22	-0.01	-2.81	21.90	-0.00	-0.13	13.45	0.52	0.00	13.60
10255	10255:BotConn	Origin	9.75	123.40	0.06	-6.22	-0.01	-5.52	9.06	-0.00	-0.25	13.45	0.21	0.00	13.70
10255	10255:Arm2	End	13.38	117.11	0.05	-5.77	-0.02	-5.52	9.06	-0.00	-0.24	15.30	0.21	0.00	15.54
10255	10255:Arm2	Origin	13.38	117.11	0.05	-5.77	-0.03	-11.55	20.21	-0.00	-0.50	17.20	0.46	0.00	17.71
10255	Tube 1	End	16.69	111.44	0.05	-5.36	-0.04	-11.55	20.21	-0.00	-0.48	21.52	0.44	0.00	22.01
10255	Tube 1	Origin	16.69	111.44	0.05	-5.36	-0.04	-11.87	20.40	-0.01	-0.49	21.52	0.45	0.00	22.02
10255	10255:WVGD13	End	20.00	105.87	0.05	-4.97	-0.06	-11.87	20.40	-0.01	-0.48	25.28	0.43	0.00	25.76
10255	10255:WVGD13	Origin	20.00	105.87	0.05	-4.97	-0.06	-12.46	20.81	-0.01	-0.50	25.28	0.44	0.00	25.79
10255	Tube 1	End	25.00	97.66	0.05	-4.40	-0.09	-12.46	20.81	-0.01	-0.48	30.13	0.42	0.00	30.61
10255	Tube 1	Origin	25.00	97.66	0.05	-4.40	-0.09	-13.00	21.10	-0.01	-0.50	30.13	0.43	0.00	30.63
10255	10255:WVGD12	End	30.00	89.73	0.04	-3.87	-0.13	-13.00	21.10	-0.01	-0.47	34.10	0.41	0.00	34.58
10255	10255:WVGD12	Origin	30.00	89.73	0.04	-3.87	-0.13	-13.61	21.49	-0.01	-0.50	34.10	0.41	0.00	34.60
10255	Tube 1	End	32.69	85.60	0.04	-3.61	-0.15	-13.61	21.49	-0.01	-0.48	35.96	0.40	0.00	36.45
10255	Tube 1	Origin	32.69	85.60	0.04	-3.61	-0.15	-13.92	21.66	-0.01	-0.49	35.96	0.41	0.00	36.46
10255	10255:Arm3	End	35.38	81.55	0.04	-3.35	-0.18	-13.92	21.66	-0.01	-0.48	37.63	0.40	0.00	38.12
10255	10255:Arm3	Origin	35.38	81.55	0.04	-3.35	-0.18	-20.35	32.69	-0.01	-0.71	38.85	0.60	0.00	39.57
10255	10255:WVGD11	End	40.00	74.81	0.04	-2.94	-0.23	-20.35	32.69	-0.01	-0.68	43.92	0.58	0.00	44.61
10255	10255:WVGD11	Origin	40.00	74.81	0.04	-2.94	-0.23	-21.20	33.12	-0.01	-0.71	43.92	0.58	0.00	44.61
10255	Tube 1	End	45.00	67.87	0.03	-2.53	-0.29	-21.20	33.12	-0.01	-0.68	48.54	0.56	0.00	49.23
10255	Tube 1	Origin	45.00	67.87	0.03	-2.53	-0.29	-21.94	33.39	-0.01	-0.70	48.54	0.57	0.00	49.25
10255	10255:WVGD10	End	50.00	61.31	0.03	-2.17	-0.36	-21.94	33.39	-0.01	-0.68	52.40	0.54	0.00	53.08
10255	10255:WVGD10	Origin	50.00	61.31	0.03	-2.17	-0.36	-22.52	33.70	-0.01	-0.69	52.40	0.55	0.00	53.10
10255	SpliceT	End	50.33	60.89	0.03	-2.15	-0.36	-22.52	33.70	-0.01	-0.69	52.63	0.55	0.00	53.33
10255	SpliceT	Origin	50.33	60.89	0.03	-2.15	-0.36	-23.25	33.88	-0.02	-0.71	52.63	0.55	0.00	53.35
10255	SpliceB	End	55.00	55.12	0.03	-1.85	-0.44	-23.25	33.88	-0.02	-0.50	41.75	0.39	0.00	42.26
10255	SpliceB	Origin	55.00	55.12	0.03	-1.85	-0.44	-24.19	34.13	-0.02	-0.52	41.75	0.39	0.00	42.28
10255	10255:Arm4	End	57.38	52.30	0.03	-1.71	-0.48	-24.19	34.13	-0.02	-0.52	42.73	0.39	0.00	43.25
10255	10255:Arm4	Origin	57.38	52.30	0.03	-1.71	-0.48	-30.94	44.95	-0.02	-0.66	43.37	0.51	0.00	44.04
10255	10255:WVGD9	End	60.00	49.27	0.03	-1.56	-0.52	-30.94	44.95	-0.02	-0.65	45.15	0.50	0.00	45.80
10255	10255:WVGD9	Origin	60.00	49.27	0.03	-1.56	-0.52	-31.92	45.34	-0.02	-0.67	45.15	0.50	0.00	45.82
10255	Tube 2	End	65.00	43.73	0.02	-1.31	-0.62	-31.92	45.34	-0.02	-0.64	48.14	0.48	0.00	48.79
10255	Tube 2	Origin	65.00	43.73	0.02	-1.31	-0.62	-33.02	45.63	-0.02	-0.67	48.14	0.49	0.00	48.82
10255	10255:WVGD8	End	70.00	38.53	0.02	-1.08	-0.72	-33.02	45.63	-0.02	-0.67	50.67	0.47	0.00	51.32
10255	10255:WVGD8	Origin	70.00	38.53	0.02	-1.08	-0.72	-34.32	46.09	-0.02	-0.67	50.67	0.47	0.00	51.34
10255	Tube 2	End	75.00	33.67	0.02	-0.88	-0.84	-34.32	46.09	-0.02	-0.65	52.81	0.46	0.00	53.47
10255	Tube 2	Origin	75.00	33.67	0.02	-0.88	-0.84	-35.49	46.39	-0.02	-0.67	52.81	0.46	0.00	53.49
10255	10255:WVGD7	End	80.00	29.15	0.02	-0.71	-0.96	-35.49	46.39	-0.02	-0.65	54.62	0.45	0.00	55.27
10255	10255:WVGD7	Origin	80.00	29.15	0.02	-0.71	-0.96	-36.86	46.85	-0.03	-0.67	54.62	0.45	0.00	55.29
10255	Tube 2	End	85.00	24.97	0.01	-0.56	-1.09	-36.86	46.85	-0.03	-0.65	56.15	0.44	0.00	56.80
10255	Tube 2	Origin	85.00	24.97	0.01	-0.56	-1.09	-38.09	47.16	-0.03	-0.67	56.15	0.44	0.00	56.82
10255	10255:WVGD6	End	90.00	21.13	0.01	-0.44	-1.22	-38.09	47.16	-0.03	-0.65	57.42	0.43	0.00	58.08
10255	10255:WVGD6	Origin	90.00	21.13	0.01	-0.44	-1.22	-39.46	47.60	-0.03	-0.68	57.42	0.43	0.00	58.11
10255	Tube 2	End	94.42	18.03	0.01	-0.35	-1.35	-39.46	47.60	-0.03	-0.66	58.39	0.42	0.00	59.05
10255	Tube 2	Origin	94.42	18.03	0.01	-0.35	-1.35	-40.59	47.88	-0.03	-0.68	58.39	0.42	0.00	59.07
10255	SpliceT	End	98.83	15.19	0.01	-0.27	-1.49	-40.59	47.88	-0.03	-0.66	59.20	0.41	0.00	59.87
10255	SpliceT	Origin	98.83	15.19	0.01	-0.27	-1.49	-41.45	48.07	-0.03	-0.67	59.20	0.41	0.00	59.88
10255	10255:WVGD5	End	100.00	14.48	0.01	-0.25	-1.53	-41.45	48.07	-0.03	-0.64	57.84	0.39	0.00	58.49
10255	10255:WVGD5	Origin	100.00	14.48	0.01	-0.25	-1.53	-43.13	48.45	-0.03	-0.66	57.84	0.39	0.00	58.51
10255	SpliceB	End	105.00	11.64	0.01	-0.18	-1.70	-43.13	48.45	-0.03	-0.65	58.50	0.38	0.00	59.15

10255	SpliceB	Origin	105.00	11.64	0.01	-0.18	3657.40	-1.70	0.0	-45.07	48.79	-0.04	-0.67	58.50	0.39	0.00	59.18	91.0	2
10255	10255:WVGD4	End	110.00	9.14	0.01	-0.13	3901.35	-1.87	0.0	-45.07	48.79	-0.04	-0.66	59.03	0.38	0.00	59.69	91.8	2
10255	10255:WVGD4	Origin	110.00	9.14	0.01	-0.13	3901.35	-1.87	0.0	-46.67	49.26	-0.04	-0.68	59.03	0.38	0.00	59.71	91.9	2
10255	Tube 3	End	115.00	6.95	0.00	-0.09	4147.67	-2.06	0.0	-46.67	49.26	-0.04	-0.66	59.45	0.37	0.00	60.12	92.5	2
10255	Tube 3	Origin	115.00	6.95	0.00	-0.09	4147.67	-2.06	0.0	-48.13	49.59	-0.04	-0.68	59.45	0.37	0.00	60.14	92.5	2
10255	10255:WVGD3	End	120.00	5.07	0.00	-0.06	4395.62	-2.26	0.0	-48.13	49.59	-0.04	-0.66	59.77	0.36	0.00	60.44	93.0	2
10255	10255:WVGD3	Origin	120.00	5.07	0.00	-0.06	4395.62	-2.26	0.0	-49.80	50.07	-0.04	-0.69	59.77	0.37	0.00	60.46	93.0	2
10255	Tube 3	End	125.00	3.50	0.00	-0.03	4645.99	-2.47	0.0	-49.80	50.07	-0.04	-0.69	60.02	0.36	0.00	60.69	93.4	2
10255	Tube 3	Origin	125.00	3.50	0.00	-0.03	4645.99	-2.47	0.0	-51.31	50.41	-0.04	-0.69	60.02	0.36	0.00	60.71	93.4	2
10255	10255:WVGD2	End	130.00	2.23	0.00	-0.02	4898.05	-2.69	0.0	-51.31	50.41	-0.04	-0.67	60.18	0.35	0.00	60.86	93.6	2
10255	10255:WVGD2	Origin	130.00	2.23	0.00	-0.02	4898.05	-2.69	0.0	-53.04	50.91	-0.05	-0.70	60.18	0.35	0.00	60.88	93.7	2
10255	Tube 3	End	135.00	1.25	0.00	-0.01	5152.58	-2.92	0.0	-53.04	50.91	-0.05	-0.68	60.29	0.34	0.00	60.98	93.8	2
10255	Tube 3	Origin	135.00	1.25	0.00	-0.01	5152.58	-2.92	0.0	-54.61	51.26	-0.05	-0.70	60.29	0.35	0.00	61.00	93.8	2
10255	10255:WVGD1	End	140.00	0.55	0.00	-0.00	5408.86	-3.16	0.0	-54.61	51.26	-0.05	-0.68	60.35	0.34	0.00	61.03	93.9	2
10255	10255:WVGD1	Origin	140.00	0.55	0.00	-0.00	5408.86	-3.16	0.0	-56.40	51.76	-0.05	-0.71	60.35	0.34	0.00	61.05	93.9	2
10255	Tube 3	End	145.00	0.14	0.00	-0.00	5667.66	-3.41	0.0	-56.40	51.76	-0.05	-0.69	60.36	0.33	0.00	61.05	93.9	2
10255	Tube 3	Origin	145.00	0.14	0.00	-0.00	5667.66	-3.41	0.0	-58.03	52.13	-0.05	-0.71	60.36	0.34	0.00	61.07	94.0	2
10255	10255:g	End	150.00	0.00	0.00	0.00	5928.28	-3.68	0.0	-58.03	52.13	-0.05	-0.69	60.33	0.33	0.00	61.02	93.9	2

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S (ksi)	V/Q (ksi)	T/R (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:0	Origin	0.00	139.46	0.06	-5.90	-1.57	0.00	-0.0	-0.80	0.20	-0.00	-0.12	1.10	0.00	0.00	1.22	1.9	1
Davit1	#Davit1:0	End	5.00	141.16	0.06	2.78	-0.58	0.00	-0.0	-0.80	0.20	-0.00	-0.15	0.68	0.00	0.00	0.83	1.3	1
Davit1	#Davit1:0	Origin	5.00	141.16	0.06	2.78	-0.58	0.00	0.0	-0.78	0.13	-0.00	-0.15	0.68	0.00	0.00	0.83	1.3	1
Davit1	#Davit1:1	End	7.54	142.02	0.06	7.17	-0.25	0.00	0.0	-0.78	0.13	-0.00	-0.17	0.40	0.00	0.00	0.57	0.9	1
Davit1	#Davit1:1	Origin	7.54	142.02	0.06	7.17	-0.25	0.00	0.0	-0.77	0.10	-0.00	-0.17	0.40	0.00	0.00	0.57	0.9	1
Davit1	Davit1:End	End	10.07	142.88	0.06	11.57	-0.00	0.00	0.0	-0.77	0.10	-0.00	-0.20	0.00	0.06	0.00	0.22	0.3	3
Davit2	Davit2:0	Origin	0.00	139.24	0.06	-8.90	-3.45	-0.00	-0.0	0.73	0.39	0.00	0.11	2.42	0.00	0.00	2.52	3.9	1
Davit2	#Davit2:0	End	5.00	139.64	0.06	-17.77	-1.50	-0.00	-0.0	0.73	0.39	0.00	0.14	1.75	0.00	0.00	1.89	2.9	1
Davit2	#Davit2:0	Origin	5.00	139.64	0.06	-17.77	-1.50	-0.00	-0.0	0.72	0.32	0.00	0.14	1.75	0.00	0.00	1.89	2.9	1
Davit2	#Davit2:1	End	7.54	139.84	0.06	-22.29	-0.70	-0.00	-0.0	0.72	0.32	0.00	0.16	1.13	0.00	0.00	1.28	2.0	1
Davit2	#Davit2:1	Origin	7.54	139.84	0.06	-22.29	-0.70	-0.00	0.0	0.72	0.28	0.00	0.16	1.13	0.00	0.00	1.28	2.0	1
Davit2	Davit2:End	End	10.07	140.05	0.06	-26.82	0.00	0.00	0.0	0.72	0.28	0.00	0.19	0.00	0.16	0.00	0.33	0.5	3
Davit3	Davit3:0	Origin	0.00	117.23	0.05	-4.08	-27.60	0.01	0.0	-5.77	2.00	-0.00	-0.38	5.01	0.00	0.00	5.39	8.3	1
Davit3	#Davit3:0	End	5.00	118.98	0.06	4.35	-17.61	0.00	0.0	-5.77	2.00	-0.00	-0.46	4.67	0.00	0.00	5.13	7.9	1
Davit3	#Davit3:0	Origin	5.00	118.98	0.06	4.35	-17.61	0.00	0.0	-5.71	1.81	-0.00	-0.46	4.67	0.00	0.00	5.12	7.9	1
Davit3	#Davit3:1	End	10.00	120.71	0.06	12.70	-8.54	0.00	0.0	-5.71	1.81	-0.00	-0.58	3.61	0.00	0.00	4.19	6.4	1
Davit3	#Davit3:1	Origin	10.00	120.71	0.06	12.70	-8.54	0.00	0.0	-5.67	1.70	-0.00	-0.57	3.61	0.00	0.00	4.19	6.4	1
Davit3	#Davit3:2	End	12.57	121.59	0.06	16.97	-4.19	0.00	0.0	-5.67	1.70	-0.00	-0.66	2.37	0.00	0.00	3.03	4.7	1
Davit3	#Davit3:2	Origin	12.57	121.59	0.06	16.97	-4.19	0.00	0.0	-5.65	1.63	-0.00	-0.66	2.37	0.00	0.00	3.03	4.7	1
Davit3	Davit3:End	End	15.13	122.47	0.06	21.22	-0.00	0.00	0.0	-5.65	1.63	-0.00	-0.78	0.00	0.47	0.00	1.12	1.7	3
Davit4	Davit4:0	Origin	0.00	116.99	0.05	-7.45	-49.15	-0.00	-0.0	5.04	3.46	0.00	0.33	8.91	0.00	0.00	9.25	14.2	1
Davit4	#Davit4:0	End	5.00	117.51	0.05	-16.14	-31.86	-0.00	-0.0	5.04	3.46	0.00	0.40	8.44	0.00	0.00	8.84	13.6	1
Davit4	#Davit4:0	Origin	5.00	117.51	0.05	-16.14	-31.86	-0.00	-0.0	5.05	3.24	0.00	0.40	8.44	0.00	0.00	8.84	13.6	1
Davit4	#Davit4:1	End	10.00	118.03	0.05	-24.95	-15.68	-0.00	-0.0	5.05	3.24	0.00	0.51	6.64	0.00	0.00	7.14	11.0	1
Davit4	#Davit4:1	Origin	10.00	118.03	0.05	-24.95	-15.68	-0.00	-0.0	5.05	3.09	0.00	0.51	6.64	0.00	0.00	7.15	11.0	1
Davit4	#Davit4:2	End	12.57	118.30	0.05	-29.52	-7.74	-0.00	-0.0	5.05	3.09	0.00	0.59	4.38	0.00	0.00	4.97	7.6	1
Davit4	#Davit4:2	Origin	12.57	118.30	0.05	-29.52	-7.74	-0.00	-0.0	5.05	3.01	0.00	0.59	4.38	0.00	0.00	4.97	7.6	1
Davit4	Davit4:End	End	15.13	118.57	0.05	-34.11	-0.00	0.00	0.0	5.05	3.01	0.00	0.70	0.00	0.86	0.00	1.65	2.5	3
Davit5	Davit5:0	Origin	0.00	81.66	0.04	-1.56	-29.36	0.01	0.0	-5.73	2.12	-0.00	-0.38	5.32	0.00	0.00	5.70	8.8	1

Davit5	#Davit5:0	End	5.00	83.10	0.04	5.72	-18.77	0.00	0.0	-5.73	2.12	-0.00	-0.46	4.97	0.00	0.00	5.43	8.4	1
Davit5	#Davit5:0	Origin	5.00	83.10	0.04	5.72	-18.77	0.00	0.0	-5.67	1.93	-0.00	-0.45	4.97	0.00	0.00	5.43	8.3	1
Davit5	#Davit5:1	End	10.00	84.51	0.04	12.92	-9.12	0.00	0.0	-5.67	1.93	-0.00	-0.57	3.86	0.00	0.00	4.43	6.8	1
Davit5	#Davit5:1	Origin	10.00	84.51	0.04	12.92	-9.12	0.00	0.0	-5.64	1.81	-0.00	-0.57	3.86	0.00	0.00	4.43	6.8	1
Davit5	#Davit5:2	End	12.57	85.23	0.04	16.59	-4.48	0.00	0.0	-5.64	1.81	-0.00	-0.66	2.54	0.00	0.00	3.19	4.9	1
Davit5	#Davit5:2	Origin	12.57	85.23	0.04	16.59	-4.48	0.00	0.0	-5.62	1.74	-0.00	-0.65	2.54	0.00	0.00	3.19	4.9	1
Davit5	Davit5:End	End	15.13	85.95	0.04	20.25	-0.00	0.00	0.0	-5.62	1.74	-0.00	-0.77	0.00	0.50	0.00	1.16	1.8	3
Davit6	#Davit6:0	Origin	0.00	81.44	0.04	-5.15	-50.65	-0.00	-0.0	4.97	3.56	0.00	0.33	9.18	0.00	0.00	9.51	14.6	1
Davit6	#Davit6:0	End	5.00	81.97	0.04	-12.64	-32.86	-0.00	-0.0	4.97	3.56	0.00	0.40	8.71	0.00	0.00	9.10	14.0	1
Davit6	#Davit6:1	End	5.00	81.97	0.04	-12.64	-32.86	-0.00	-0.0	4.98	3.34	0.00	0.40	8.71	0.00	0.00	9.11	14.0	1
Davit6	#Davit6:1	Origin	10.00	82.49	0.04	-20.27	-16.18	-0.00	-0.0	4.98	3.34	0.00	0.50	6.85	0.00	0.00	7.35	11.3	1
Davit6	#Davit6:2	End	10.00	82.49	0.04	-20.27	-16.18	-0.00	-0.0	4.99	3.19	0.00	0.50	6.85	0.00	0.00	7.35	11.3	1
Davit6	#Davit6:2	Origin	12.57	82.76	0.04	-24.23	-7.99	-0.00	-0.0	4.99	3.19	0.00	0.58	4.53	0.00	0.00	5.11	7.9	1
Davit6	Davit6:End	End	15.13	83.03	0.04	-28.22	-0.00	0.00	0.0	4.99	3.11	0.00	0.58	4.53	0.00	0.00	5.11	7.9	1
Davit7	#Davit7:0	Origin	0.00	52.38	0.03	-0.06	-31.67	0.01	0.0	-5.67	2.27	-0.00	-0.38	5.74	0.00	0.00	6.12	9.4	1
Davit7	#Davit7:0	End	5.00	53.43	0.03	5.67	-20.30	0.00	0.0	-5.67	2.27	-0.00	-0.45	5.38	0.00	0.00	5.83	9.0	1
Davit7	#Davit7:1	Origin	5.00	53.43	0.03	5.67	-20.30	0.00	0.0	-5.62	2.08	-0.00	-0.45	5.38	0.00	0.00	5.83	9.0	1
Davit7	#Davit7:1	End	10.00	54.47	0.03	11.32	-9.89	0.00	0.0	-5.62	2.08	-0.00	-0.57	4.19	0.00	0.00	4.75	7.3	1
Davit7	#Davit7:2	End	10.00	54.47	0.03	11.32	-9.89	0.00	0.0	-5.59	1.96	-0.00	-0.56	4.19	0.00	0.00	4.75	7.3	1
Davit7	#Davit7:2	Origin	12.57	54.99	0.03	14.19	-4.86	0.00	0.0	-5.59	1.96	-0.00	-0.65	2.75	0.00	0.00	3.40	5.2	1
Davit7	Davit7:End	End	15.13	55.51	0.03	17.05	-0.00	0.00	0.0	-5.57	1.89	-0.00	-0.65	2.75	0.00	0.00	3.40	5.2	1
Davit8	#Davit8:0	Origin	0.00	52.22	0.03	-3.36	-52.62	-0.00	-0.0	4.88	3.69	0.00	0.32	9.54	0.00	0.00	9.86	15.2	1
Davit8	#Davit8:0	End	5.00	52.71	0.03	-9.28	-34.18	-0.00	-0.0	4.88	3.69	0.00	0.39	9.06	0.00	0.00	9.45	14.5	1
Davit8	#Davit8:1	Origin	5.00	52.71	0.03	-9.28	-34.18	-0.00	-0.0	4.89	3.47	0.00	0.39	9.06	0.00	0.00	9.45	14.5	1
Davit8	#Davit8:1	End	10.00	53.21	0.03	-15.32	-16.85	-0.00	-0.0	4.89	3.47	0.00	0.49	7.13	0.00	0.00	7.63	11.7	1
Davit8	#Davit8:2	End	10.00	53.21	0.03	-15.32	-16.85	-0.00	-0.0	4.90	3.32	0.00	0.49	7.13	0.00	0.00	7.63	11.7	1
Davit8	#Davit8:2	Origin	12.57	53.47	0.03	-18.47	-8.32	-0.00	-0.0	4.90	3.32	0.00	0.57	4.71	0.00	0.00	5.29	8.1	1
Davit8	Davit8:End	End	15.13	53.73	0.03	-21.65	-0.00	-0.00	0.0	4.91	3.24	0.00	0.57	4.71	0.00	0.00	5.29	8.1	1
Davit8	Davit8:End	End	15.13	53.73	0.03	-21.65	-0.00	0.00	0.0	4.91	3.24	0.00	0.68	0.00	0.93	0.00	1.74	2.7	3

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

Clamp Label	Clamp Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	0.768	80.00	80.00	0.96
Clamp2	0.768	80.00	80.00	0.96
Clamp3	5.864	80.00	80.00	7.33
Clamp4	5.864	80.00	80.00	7.33
Clamp5	5.864	80.00	80.00	7.33
Clamp6	5.864	80.00	80.00	7.33
Clamp7	5.864	80.00	80.00	7.33
Clamp8	5.864	80.00	80.00	7.33
Clamp9	19.937	80.00	80.00	24.92
Clamp10	13.262	80.00	80.00	16.58
Clamp11	0.235	80.00	80.00	0.29
Clamp12	0.235	80.00	80.00	0.29
Clamp13	0.235	80.00	80.00	0.29
Clamp14	0.235	80.00	80.00	0.29
Clamp15	0.235	80.00	80.00	0.29
Clamp16	0.235	80.00	80.00	0.29

Clamp17	0.235	80.00	80.00	0.29
Clamp18	0.235	80.00	80.00	0.29
Clamp19	0.235	80.00	80.00	0.29
Clamp20	0.235	80.00	80.00	0.29
Clamp21	0.235	80.00	80.00	0.29
Clamp22	0.235	80.00	80.00	0.29
Clamp23	0.235	80.00	80.00	0.29

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

Summary of Steel Pole Usages:

Steel Pole Maximum Label Usage %		Load Case Segment Number		Weight (lbs)										
10255		93.95 NESC Extreme		37 30952.3										
Base Plate Results by Bend Line:														
Pole Label	Load Case Line	Bend #	Start (ft)	End (ft)	X (ft)	Y (ft)	End Length (ft)	Bending (ksi)	Stress Mom. (ft-k)	Bolt # Acting	Max Load (kips)	Bolt Min Thickness (in)	Plate Thickness (in)	Usage %
10255	NESC Heavy	1	2.364	1.329	-0.017	2.704	32.990	36.572	150.815	6	98.244	2.342	3.000	60.95
10255	NESC Heavy	2	2.704	-0.017	1.329	2.364	32.990	13.689	56.449	4	84.302	1.433	3.000	22.81
10255	NESC Heavy	3	2.333	-0.375	2.333	0.375	9.010	1.413	1.591	1	4.239	0.460	3.000	2.35
10255	NESC Heavy	4	1.329	-2.364	2.704	0.017	32.990	11.882	48.997	4	-75.406	1.335	3.000	19.80
10255	NESC Heavy	5	-0.017	-2.704	2.364	-1.329	32.990	32.798	135.254	6	-89.010	2.218	3.000	54.66
10255	NESC Heavy	6	-1.500	-2.333	1.500	-2.333	36.011	37.035	166.707	5	-89.010	2.357	3.000	61.72
10255	NESC Heavy	7	-2.364	-1.329	0.017	-2.704	32.990	32.599	134.430	6	-88.812	2.211	3.000	54.33
10255	NESC Heavy	8	-2.704	0.017	-1.329	-2.364	32.990	11.734	48.391	4	-74.870	1.327	3.000	19.56
10255	NESC Heavy	9	-2.333	0.375	-2.333	-0.375	9.010	1.731	1.950	1	5.193	0.510	3.000	2.89
10255	NESC Heavy	10	-1.329	2.364	-2.704	-0.017	32.990	13.841	57.079	4	84.838	1.441	3.000	23.07
10255	NESC Heavy	11	0.017	2.704	-2.364	1.329	32.990	36.772	151.639	6	98.442	2.349	3.000	61.29
10255	NESC Heavy	12	1.500	2.333	-1.500	2.333	36.011	40.968	184.412	5	98.442	184.412	3.000	68.28
10255	NESC Heavy	13	1.671	2.053	-0.630	-2.669	28.583	35.062	125.273	5	98.343	2.293	3.000	58.44
10255	NESC Heavy	14	2.312	1.103	0.707	2.708	27.239	26.864	91.469	4	98.046	2.007	3.000	44.77
10255	NESC Heavy	15	2.566	-0.246	2.053	1.671	23.810	4.333	12.896	2	56.824	0.806	3.000	7.22
10255	NESC Heavy	16	2.053	-1.671	2.566	-0.246	23.810	3.719	11.070	2	-48.207	0.747	3.000	6.20
10255	NESC Heavy	17	0.707	-2.708	2.312	-1.103	27.239	23.802	81.043	4	-89.010	1.890	3.000	39.67
10255	NESC Heavy	18	-0.630	-2.669	1.671	-2.053	28.583	31.715	113.316	5	-89.010	2.181	3.000	52.86
10255	NESC Heavy	19	-1.671	-2.053	0.630	-2.669	28.583	31.613	112.950	5	-88.911	2.178	3.000	52.69
10255	NESC Heavy	20	-2.312	-1.103	-0.707	-2.708	27.239	23.592	80.327	4	-88.613	1.881	3.000	39.32
10255	NESC Heavy	21	-2.566	0.246	-2.053	-1.671	23.810	3.726	11.088	2	-47.392	0.748	3.000	6.21
10255	NESC Heavy	22	-2.053	1.671	-2.566	-0.246	23.810	4.455	13.261	2	57.640	0.818	3.000	7.43
10255	NESC Heavy	23	-0.707	2.708	-2.312	1.103	27.239	27.074	92.184	4	98.442	2.015	3.000	45.12
10255	NESC Heavy	24	-0.630	2.669	-1.671	2.053	28.583	35.164	125.639	5	98.442	2.297	3.000	58.61

Model	18	-0.630	-2.669	1.671	-2.053	28.583	47.413	169.405	5	-132.891	2.667	3.000	79.02
10255 NESC Extreme	18	-0.630	-2.669	1.671	-2.053	28.583	47.413	169.405	5	-132.891	2.667	3.000	79.02
10255 NESC Extreme	19	-1.671	-2.053	0.630	-2.669	28.583	47.381	169.289	5	-132.860	2.666	3.000	78.97
10255 NESC Extreme	20	-2.312	-1.103	0.707	-2.708	27.239	35.758	121.754	4	-132.767	2.316	3.000	59.60
10255 NESC Extreme	21	-2.566	0.246	-0.073	-1.671	23.810	5.402	16.077	2	-73.380	0.900	3.000	9.00
10255 NESC Extreme	22	-2.053	1.671	-2.566	-0.246	23.810	5.769	17.171	2	78.541	0.930	3.000	9.62
10255 NESC Extreme	23	-0.707	2.708	-2.312	1.103	27.239	37.526	127.772	4	137.796	2.373	3.000	62.54
10255 NESC Extreme	24	0.630	2.669	-1.671	2.053	28.583	49.207	175.813	5	137.796	2.17	3.000	82.01

Summary of Tubular Davit Usages:

Tubular Label	Davit	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
David1	11.07	NESC Heavy	1	182.3	
David2	14.06	NESC Heavy	1	182.3	
David3	28.26	NESC Heavy	1	575.0	
David4	28.74	NESC Heavy	1	575.0	
David5	28.54	NESC Heavy	1	575.0	
David6	32.91	NESC Heavy	1	575.0	
David7	28.93	NESC Heavy	1	575.0	
David8	33.15	NESC Heavy	1	575.0	

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

	Load Case	Maximum Usage %	Element Label	Element Type
	NESC Heavy	68.28	10255	Base Plate
	NESC Extreme	95.73	10255	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	67.26	10255	27
NESC Extreme	93.95	10255	37

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Bending Moment (ft-k)	Bolt Moment (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load (kips)	Minimum Plate Thickness (in)	Usage
NESC Heavy	10255	12	36.011	113.186	4098.563	-11.691	184.412	5	98.442	2.479	68.28
NESC Extreme	10255	12	36.011	58.855	5928.284	-3.679	258.538	5	137.796	2.935	95.73

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Label	Davit Segment
NESC Heavy	33.15	Davit8	1
NESC Extreme	15.18	Davit8	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	1.96	NESC Heavy	0.0
Clamp2	Clamp	1.96	NESC Heavy	0.0
Clamp3	Clamp	10.09	NESC Heavy	0.0
Clamp4	Clamp	10.09	NESC Heavy	0.0
Clamp5	Clamp	10.09	NESC Heavy	0.0
Clamp6	Clamp	10.09	NESC Heavy	0.0
Clamp7	Clamp	10.09	NESC Heavy	0.0
Clamp8	Clamp	10.09	NESC Heavy	0.0
Clamp9	Clamp	24.92	NESC Extreme	0.0
Clamp10	Clamp	16.58	NESC Extreme	0.0
Clamp11	Clamp	0.87	NESC Heavy	0.0
Clamp12	Clamp	0.87	NESC Heavy	0.0
Clamp13	Clamp	0.87	NESC Heavy	0.0
Clamp14	Clamp	0.87	NESC Heavy	0.0
Clamp15	Clamp	0.87	NESC Heavy	0.0
Clamp16	Clamp	0.87	NESC Heavy	0.0
Clamp17	Clamp	0.87	NESC Heavy	0.0
Clamp18	Clamp	0.87	NESC Heavy	0.0
Clamp19	Clamp	0.87	NESC Heavy	0.0
Clamp20	Clamp	0.87	NESC Heavy	0.0
Clamp21	Clamp	0.87	NESC Heavy	0.0
Clamp22	Clamp	0.87	NESC Heavy	0.0
Clamp23	Clamp	0.87	NESC Heavy	0.0

Loads At Insulator Attachments For All Load Cases:

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 Res. (kips)
NESC Heavy	Clamp1	Clamp	Davit1:End	0.000	1.078	1.134	1.565
NESC Heavy	Clamp2	Clamp	Davit2:End	0.000	1.078	1.134	1.565
NESC Heavy	Clamp3	Clamp	Davit3:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp4	Clamp	Davit4:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp5	Clamp	Davit5:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp6	Clamp	Davit6:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp7	Clamp	Davit7:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp8	Clamp	Davit8:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp9	Clamp	10255:TopConn	0.000	6.415	9.695	11.625
NESC Heavy	Clamp10	Clamp	10255:BotConn	0.000	-4.325	1.092	4.461
NESC Heavy	Clamp11	Clamp	10255:WVGD1	0.000	0.060	0.690	0.693
NESC Heavy	Clamp12	Clamp	10255:WVGD2	0.000	0.060	0.690	0.693
NESC Heavy	Clamp13	Clamp	10255:WVGD3	0.000	0.060	0.690	0.693
NESC Heavy	Clamp14	Clamp	10255:WVGD4	0.000	0.060	0.690	0.693
NESC Heavy	Clamp15	Clamp	10255:WVGD5	0.000	0.060	0.690	0.693
NESC Heavy	Clamp16	Clamp	10255:WVGD6	0.000	0.060	0.690	0.693
NESC Heavy	Clamp17	Clamp	10255:WVGD7	0.000	0.060	0.690	0.693
NESC Heavy	Clamp18	Clamp	10255:WVGD8	0.000	0.060	0.690	0.693
NESC Heavy	Clamp19	Clamp	10255:WVGD9	0.000	0.060	0.690	0.693
NESC Heavy	Clamp20	Clamp	10255:WVGD10	0.000	0.060	0.690	0.693
NESC Heavy	Clamp21	Clamp	10255:WVGD11	0.000	0.060	0.690	0.693

NESC Heavy	Clamp22	Clamp	10255:WVGDI2	0.000	0.060	0.690	0.693
NESC Heavy	Clamp23	Clamp	10255:WVGDI3	0.000	0.060	0.690	0.693
NESC Extreme	Clamp1	Clamp	Davit1:End	0.000	0.715	0.280	0.768
NESC Extreme	Clamp2	Clamp	Davit2:End	0.000	0.715	0.280	0.768
NESC Extreme	Clamp3	Clamp	Davit3:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp4	Clamp	Davit4:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp5	Clamp	Davit5:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp6	Clamp	Davit6:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp7	Clamp	Davit7:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp8	Clamp	Davit8:End	0.000	4.999	3.065	5.864
NESC Extreme	Clamp9	Clamp	10255:TopConn	0.000	19.439	4.429	19.937
NESC Extreme	Clamp10	Clamp	10255:BotConn	0.000	-13.252	0.506	13.262
NESC Extreme	Clamp11	Clamp	10255:WVGDI1	0.000	0.143	0.187	0.235
NESC Extreme	Clamp12	Clamp	10255:WVGDI2	0.000	0.143	0.187	0.235
NESC Extreme	Clamp13	Clamp	10255:WVGDI3	0.000	0.143	0.187	0.235
NESC Extreme	Clamp14	Clamp	10255:WVGDI4	0.000	0.143	0.187	0.235
NESC Extreme	Clamp15	Clamp	10255:WVGDI5	0.000	0.143	0.187	0.235
NESC Extreme	Clamp16	Clamp	10255:WVGDI6	0.000	0.143	0.187	0.235
NESC Extreme	Clamp17	Clamp	10255:WVGDI7	0.000	0.143	0.187	0.235
NESC Extreme	Clamp18	Clamp	10255:WVGDI8	0.000	0.143	0.187	0.235
NESC Extreme	Clamp19	Clamp	10255:WVGDI9	0.000	0.143	0.187	0.235
NESC Extreme	Clamp20	Clamp	10255:WVGDI10	0.000	0.143	0.187	0.235
NESC Extreme	Clamp21	Clamp	10255:WVGDI11	0.000	0.143	0.187	0.235
NESC Extreme	Clamp22	Clamp	10255:WVGDI12	0.000	0.143	0.187	0.235
NESC Extreme	Clamp23	Clamp	10255:WVGDI13	0.000	0.143	0.187	0.235

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)

NESC Heavy	26.932	0.000	65.231	3266.568	-0.000
NESC Extreme	39.470	0.000	26.316	4831.061	-0.000

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

*** End of Report

Anchor Bolt Analysis:**Input Data:**Bolt Force:Maximum Tensile Force = $T_{Max} := 138 \text{ kips}$ (User Input from PLS-Pole)Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = $N := 24$ (User Input)Bolt "Column" Distance = $L := 3.0 \text{ in}$ (User Input)Bolt Ultimate Strength = $F_u := 100 \text{ ksi}$ (User Input)Bolt Yield Strength = $F_y := 75 \text{ ksi}$ (User Input)Bolt Modulus = $E := 29000 \text{ ksi}$ (User Input)Diameter of Anchor Bolts = $D := 2.25 \text{ in}$ (User Input)Threads per Inch = $n := 4.5$ (User Input)**Anchor Bolt Analysis:**Calculated Anchor Bolt Properties:Net Area of Bolt = $A_n := \frac{\pi}{4} \left(D - \frac{0.9743 \text{ in}}{n} \right)^2 = 3.248 \text{ in}^2$ Bolt Tension Check:Allowable Tensile Force (Net Area) = $T_{ALL.Net} := 1.0 \cdot (A_n F_y) = 243.576 \text{ kips}$ Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 56.66\%$

Condition1 =

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

Condition1 = "OK"

Foundation:**Input Data:**Tower Data

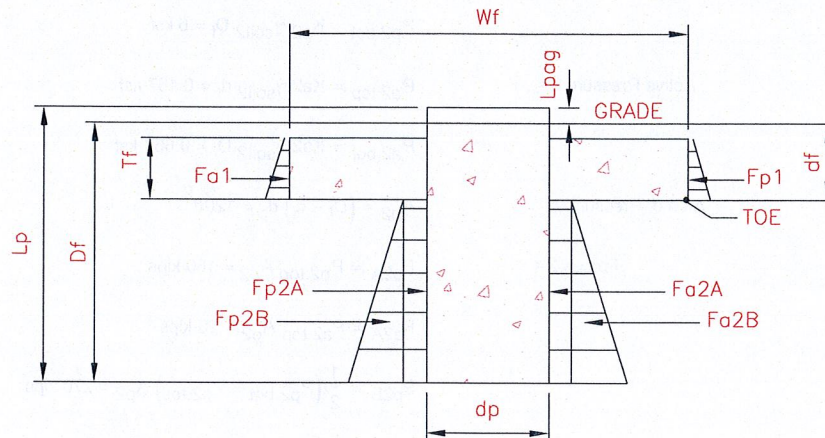
Overturing Moment =	OM := 5929-ft-kips · 1.1 = 6522-ft-kips	(User Input)
Shear Force =	Shear := 52.3-kip · 1.1 = 58-kips	(User Input)
Axial Force =	Axial := 58.9-kip · 1.1 = 65-kips	(User Input)
Tower Height =	H _t := 160-ft	(User Input)

Footing Data:

Overall Depth of Footing =	D _f := 20-ft	(User Input)
Length of Pier =	L _p := 20.5-ft	(User Input)
Extension of Pier Above Grade =	L _{pag} := 0.5-ft	(User Input)
Diameter of Cassion =	d _p := 8-ft	(User Input)
Thickness of Footing =	T _f := 4-ft	(User Input)
Width of Footing =	W _f := 24-ft	(User Input)
Water Depth =	D _{water} := 0-ft	(User Input)
Distance From Grade to Bottom of Pad =	d _f := 5-ft	(User Input)

Material Properties:

Concrete Compressive Strength =	f _c := 3000-psi	(User Input)
Steel Reinforcement Yield Strength =	f _y := 60000-psi	(User Input)
Anchor Bolt Yield Strength =	f _{ya} := 75000-psi	(User Input)
Internal Friction Angle of Soil (mat) =	Φ _{s1} := 30-deg	(User Input)
Internal Friction Angle of Soil (below mat) =	Φ _{s2} := 30-deg	(User Input)
Unit Weight of Soil =	γ _{soil1} := 100-pcf	(User Input)
Unit Weight of Soil =	γ _{soil2} := 100-pcf	(User Input)
Allowable Soil Bearing Capacity =	q _s := 4000-psf	(User Input) (Conservative)
Unit Weight of Concrete =	γ _{conc} := 150-pcf	(User Input)
Foundation Bouyancy =	Bouyancy := 0	(User Input) (Yes=1 / No=0)
Depth to Neglect =	n := 0-ft	(User Input)
Cohesion of Clay Type Soil =	c := 0-ksf	(User Input) (Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input) (UBC-1997 Fig 23-2)


Calculated Factors:

Coefficient of Lateral Soil Pressure =

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

$$K_{a1} := \frac{1 - \sin(\Phi_{s1})}{1 + \sin(\Phi_{s1})} = 0.333$$

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

$$K_{a2} := \frac{1 - \sin(\Phi_{s2})}{1 + \sin(\Phi_{s2})} = 0.333$$

Stability of Footing:

Passive Pressure 1 =

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

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

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

Active Pressure 1 =

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

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

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

Area of Pressure 1 =

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

Forces 1 =

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

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

Ultimate Shear 1 =

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

Passive Pressure 2 =

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

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

Active Pressure 2 =

$$P_{a2.top} := K_{a2} \cdot \gamma_{soil2} \cdot d_f = 0.167 \cdot \text{ksf}$$

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

Area of Pressure 2 =

$$A_{p2} := (D_f - d_f) \cdot d_p = 120 \text{ft}^2$$

Forces 2 =

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

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

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

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

Ultimate Shear 2 =

$$S_{u2A} := F_{p2A} - F_{a2A} = 160 \cdot \text{kip}$$

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

Weight of Concrete Mat =

$$W_{Tmat} := \left(W_f^2 - \frac{d_p^2 \cdot \pi}{4} \right) \cdot T_f \cdot \gamma_{conc} = 315.44 \cdot \text{kip}$$

Weight of Concrete Caission =

$$W_{Tcaission} := \left(\frac{d_p^2 \cdot \pi}{4} \cdot L_p \right) \cdot \gamma_{conc} = 154.57 \cdot \text{kip}$$

Weight of Soil Above Mat =

$$W_{Ts} := \left[\left(W_f^2 - \frac{d_p^2 \cdot \pi}{4} \right) \cdot (d_f - T_f) \right] \cdot \gamma_{soil1} = 52.57 \cdot \text{kip}$$

Total Weight =

$$W_{tot} := W_{Tmat} + W_{Tcaission} + W_{Ts} + \text{Axial} = 587.371 \cdot \text{kips}$$

Overturing Moment =

$$M_{ot} := OM + \text{Shear} \cdot (d_f + L_{pag}) = 6838 \cdot \text{kip} \cdot \text{ft}$$

Resisting Moment =

$$M_r := \left(W_{tot} \right) \cdot \frac{W_f}{2} + S_{u1} \cdot T_f \cdot \frac{1}{3} + S_{u2A} \cdot \frac{(D_f - d_f)}{2} + S_{u2B} \cdot \frac{2 \cdot (D_f - d_f)}{3} = 10734 \cdot \text{kip} \cdot \text{ft}$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 1.57$$

Factor of Safety Required =

$$FS_{req} := 1.0$$

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

$$\text{Overturing_Check} = \text{"Okay"}$$

Bearing Pressure Check:

Area of Mat =

$$A_{mat} := W_f^2 - \frac{d_p^2 \cdot \pi}{4} = 525.735 \text{ ft}^2$$

Section Modulus of Mat =

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

Axial Force @ Base of Mat =

$$P_{mat} := WT_{mat} + WT_s = 368.014 \text{ kips}$$

Resisting Moment Capacity of Caisson =

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

Residual Moment @ Base of Mat =

$$M_{mat} := (OM - M_{cap}) + \text{Shear} \cdot (d_f + L_{pag}) - \left(S_{u1} \cdot T_f \cdot \frac{1}{3} \right) = 953 \text{ kip-ft}$$

Maximum Pressure in Mat =

$$P_{max} := \frac{P_{mat}}{A_{mat}} + \frac{M_{mat}}{S_{mat}} = 1.123 \text{ ksf}$$

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

$$\text{Max_Pressure_Check} = \text{"Okay"}$$

Minimum Pressure in Mat =

$$P_{min} := \frac{P_{mat}}{A_{mat}} - \frac{M_{mat}}{S_{mat}} = 0.277 \text{ ksf}$$

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

$$\text{Min_Pressure_Check} = \text{"Okay"}$$

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{\frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3}}{\frac{W_f}{W_f}} = 10.622 \text{ ft}$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 4 \text{ ft}$$

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

Eccentricity =

$$e := \frac{M_{mat}}{P_{mat}} = 2.59 \text{ ft}$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot P_{mat}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)} = 1.086 \text{ ksf}$$

$$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 1.123 \text{ ksf}$$

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

$$\text{Pressure_Check} = \text{"Okay"}$$



CL&P STRUCT. NO. 10255
SKY EDGE LANE
BETHEL, CT 06801



SITE INFO		
CL&P STRUCT. NO.	10255	
SITE ADDRESS:	SKY EDGE LANE BETHEL, CT 06801	
PROJECT COORDINATES:	LAT: 41°-24'-48.46"N LON.: 73°-24'-3.12W ELEV.: 450' AMSL	
CL&P CONTACT:	ROBERT GRAY 860.665.3175	
CO-LOCATOR INFO		
VERIZON WIRELESS		
CONTACT:	BRIAN RAGOZZINE 860.982.4246	
SITE NAME:	BETHEL NORTH	
ANTENNA C. HEIGHT:	167'-6" A.T.B.	
SPRINT		
CONTACT:	MELODY MESSICK 410.782.9495	
SITE NO.:	CT03XC351	
ANTENNA C. HEIGHT:	157'-6" A.T.B.	
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405	
CONTACT:	CARLO F. CENTORE, PE 203.488.0580, EXT 102	
SHEET INDEX		
SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS, GENERAL AND SITE NOTES	0
N-2	BORING LOG, EARTHWORK AND FOUNDATION CONSTRUCTION NOTES	0
N-3	CONCRETE CONSTRUCTION NOTES	0
M-1	MODIFICATION INSPECTION REQUIREMENTS	0
S-1	SITE KEY PLAN	0
S-2	CAISSON COLLAR PLAN	0
S-3	SECTION (BEYOND CAISSON)	0
S-4	SECTION AND DETAIL	2

DESIGN BASIS

1. GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.

2. TIA/EIA-222-F-1996, ASCE MANUAL NO. 72 - "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2-2007 AND NORTHEAST UTILITIES DESIGN CRITERIA.

3. DESIGN CRITERIA

WIND LOAD: (PCS, MAST)

BASIC WIND SPEED (V) = 85 MPH (FASTEST MILE); BASED ON TIA/EIA-222F AND NU MAST DESIGN CRITERIA EXCEPTION 1.

WIND LOAD: (UTILITY POLE & FOUNDATION)

BASIC WIND SPEED (V) = 110 MPH (3-SECOND GUST) BASED ON NESC C2-2007, SECTION 25 RULE 250C.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR VERIZON WIRELESS, REVISION #0, DATED 2/14/13.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DOCUMENTS PREPARED BY AMERICAN POLE STRUCTURES COMBUSTION ENGINEERING, INC. CUST. ORDER NO. CLP-409642. CIRCA 1976/1977. CAISSON DESIGN INFORMATION WAS OBTAINED FROM THE ORIGINAL DESIGN DOCUMENTS PREPARED BY NORTHEAST UTILITIES SERVICE CO., DWG. NO. 01143-60001 SH. 3, DATED MARCH, 1977.

3. THE CONTRACTOR SHALL LIMIT THE DURATION OF THE FOUNDATION REINFORCEMENT WORK. THE EXISTING CAISSON WITHIN THE SHOWN LIMITS IS STABLE FOR WIND SPEEDS LESS THAN 50 MPH WITHOUT ICE LOADING. IF HIGHER WIND SPEED OR ICE EVENT IS EXPECTED, THE EXCAVATION AREA SHALL BE FILLED WITH COMPACT FILL MATERIAL.

4. THE TOWER STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER REINFORCEMENTS ARE COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE & SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, UNDERPINNING, TEMPORARY ANCHORS, GUYING, BARRICADES, ETC. AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY. MAINTAIN EXISTING SITE OPERATIONS AND COORDINATE WORK WITH TOWER OWNER.

5. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GOVERNING BUILDING CODE.

6. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

7. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK. THIS INCLUDES VERIFYING ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.

8. FOUNDATION REINFORCEMENTS SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF TRANSMISSION STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.

9. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH THE TOWER FOUNDATION REINFORCEMENT WORK.

10. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

12. NO DRILLING WELDING OR TAPING IS PERMITTED ON CL&P OWNED EQUIPMENT.

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. ALL RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED OFF SITE AND BE LEGALLY DISPOSED, AT NO ADDITIONAL COST.
4. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE EQUIPMENT AND TOWER AREAS.
5. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
6. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
7. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
8. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

DESIGNED BY: T.E.	DATE: 02/04/13	SCALE: AS SHOWN	JOB NO.: 10001.0005
DRAWN BY: DEB			
CHECKED BY: CFC			

REV.	DATE	BY	DESCRIPTION
1	2/14/13	DEB	ISSUED FOR CONSTRUCTION
2	2/14/13	T.E.	ISSUED FOR CONSTRUCTION
3	2/14/13	T.E.	ISSUED FOR CONSTRUCTION

VERIZON WIRELESS	CL&P STRUCTURE NO. 10255	TOWER FOUNDATION IMPROVEMENTS DESIGN	BETHEL, CT 06801
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DESIGN BASIS, GENERAL AND SITE NOTES	Sheet No. 2 of 2
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EARTHWORK NOTES

1. COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES, WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.
2. CRUSHED STONE FILL SHALL BE PLACED IN 12" MAX. LIFTS AND CONSOLIDATED USING A HAND OPERATED VIBRATORY PLATE COMPACTOR WITH A MINIMUM OF 2 PASSES OF COMPACTOR PER LIFT.
3. COMPACTED GRAVEL FILL TO BE WELL GRADED BANK RUN GRAVEL MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1 1/2"	100
No. 4	40-70
No. 100	5-20
No. 200	4-8
4. CRUSHED STONE TO BE UNIFORMLY GRADED, CLEAN, HARD PROCESS AGGREGATE MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1"	100
3/4"	90-100
1/2"	0-15
3/8"	0-5
5. SELECT BACKFILL FOR FOUNDATION WALLS SHALL BE FREE OF ORGANIC MATERIAL, TOPSOIL, DEBRIS AND BOULDERS LARGER THAN 6".
6. GRAVEL AND GRANULAR FILL SHALL BE INSTALLED IN 10" MAX. LIFTS. COMPACTED TO 95% MIN. AT MAX. DRY DENSITY.
7. NON WOVEN GEOTEXTILE FOR SEPARATION PURPOSES SHALL BE MIRAFI 140N, OR ENGINEER APPROVED EQUAL.

FOUNDATION CONSTRUCTION NOTES

1. ALL FOOTINGS SHALL BE PLACED ON SUITABLE, COMPACTED SOIL HAVING ADEQUATE BEARING CAPACITY AND FREE OF ORGANIC CONTENT, CLAY, OR OTHER UNSUITABLE MATERIAL. ADDITIONAL EXCAVATION MAY BE REQUIRED BELOW FOOTING ELEVATIONS INDICATED IF UNSUITABLE MATERIAL IS ENCOUNTERED.
2. SUBGRADE PREPARATION: IF UNSUITABLE SOIL IS ENCOUNTERED, REMOVE ALL UNSUITABLE MATERIALS FROM BELOW PROPOSED STRUCTURE FOUNDATIONS AND COMPACT EXPOSED SOIL SURFACES. PLACE AND COMPACT APPROVED GRAVEL FILL. PLACEMENT OF ALL COMPACTED FILL MUST BE UNDER SUPERVISION OF AN APPROVED TESTING LABORATORY. FILL SHALL BE COMPACTED IN LAYERS NOT TO EXCEED 10" BEFORE COMPACTION. DETERMINE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557-70 AND MAKE ONE (1) FIELD DENSITY TEST IN ACCORDANCE WITH ASTM D2167-66 FOR EACH 50 CUBIC YARDS OF COMPACTED FILL. BUT NOT LESS THAN ONE (1) PER LAYER, TO INSURE COMPACTED TO 95% OF MAX. DRY DENSITY.
3. ALL SOIL SURROUNDING AND UNDER ALL FOOTINGS SHALL BE KEPT REASONABLY DRY AND PROTECTED FROM FREEZING AND FROST ACTION DURING THE COURSE OF CONSTRUCTION.
4. WHERE GROUNDWATER IS ENCOUNTERED, DEWATERING SHALL BE ACCOMPLISHED CONTINUOUSLY AND COMPLETELY DURING FOUNDATION CONSTRUCTION. PROVIDE CRUSHED STONE AS REQUIRED TO STABILIZE FOOTING SUBGRADE.
5. ALL FOOTINGS ARE TO REST ON FIRM SOIL, REGARDLESS OF ELEVATIONS SHOWN ON THE DRAWINGS, BUT IN NO CASE MAY FOOTING ELEVATIONS BE HIGHER THAN INDICATED ON THE FOUNDATION PLAN, UNLESS SPECIFICALLY DIRECTED BY THE ENGINEER.
6. FOUNDATION WATERPROOFING AND DAMPROOFING SHALL COMPLY WITH BUILDING CODE REQUIREMENTS UNLESS A MORE SUBSTANTIAL SYSTEM IS INDICATED OR SPECIFIED.

CLARENCE WELT ASSOC., INC. 500 NEW LONDON TURNPIKE GROTON, CT 06340		"BORING LOG"		LUNA, MI - PLUM HOLE TRANS-LI NEW MILFORD, BROOKFIELD, DANBURY, BETHEL	
BORING NO. 77		DATE 10/23/22		CLIENT NUSCO	
LINE & STA. 10+23.25		BORING NO. 77		DATE 10/23/22	
OFFSET		LINE & STA. 10+23.25		BORING NO. 77	
OR ELEV.		LINE & STA. 10+23.25		BORING NO. 77	
A. STRATUM DESCRIPTION PER 6"		B. STRATUM DESCRIPTION PER 6"		C. STRATUM DESCRIPTION PER 6"	
0-5' DR. FINE-CO. SAND & GRAVEL		5-10' DR. FINE SAND		10-15' DR. FINE SAND	
10-15' DR. FINE SAND		15-20' DR. FINE SAND		20-25' DR. FINE SAND	
20-25' DR. FINE SAND		25-30' DR. FINE SAND		30-35' DR. FINE SAND	
30-35' DR. FINE SAND		35-40' DR. FINE SAND		40-45' DR. FINE SAND	
40-45' DR. FINE SAND		45-50' DR. FINE SAND		50-55' DR. FINE SAND	
50-55' DR. FINE SAND		55-60' DR. FINE SAND		60-65' DR. FINE SAND	
60-65' DR. FINE SAND		65-70' DR. FINE SAND		70-75' DR. FINE SAND	
70-75' DR. FINE SAND		75-80' DR. FINE SAND		80-85' DR. FINE SAND	
80-85' DR. FINE SAND		85-90' DR. FINE SAND		90-95' DR. FINE SAND	
90-95' DR. FINE SAND		95-100' DR. FINE SAND		100-105' DR. FINE SAND	
100-105' DR. FINE SAND		105-110' DR. FINE SAND		110-115' DR. FINE SAND	
110-115' DR. FINE SAND		115-120' DR. FINE SAND		120-125' DR. FINE SAND	
120-125' DR. FINE SAND		125-130' DR. FINE SAND		130-135' DR. FINE SAND	
130-135' DR. FINE SAND		135-140' DR. FINE SAND		140-145' DR. FINE SAND	
140-145' DR. FINE SAND		145-150' DR. FINE SAND		150-155' DR. FINE SAND	
150-155' DR. FINE SAND		155-160' DR. FINE SAND		160-165' DR. FINE SAND	
160-165' DR. FINE SAND		165-170' DR. FINE SAND		170-175' DR. FINE SAND	
170-175' DR. FINE SAND		175-180' DR. FINE SAND		180-185' DR. FINE SAND	
180-185' DR. FINE SAND		185-190' DR. FINE SAND		190-195' DR. FINE SAND	
190-195' DR. FINE SAND		195-200' DR. FINE SAND		200-205' DR. FINE SAND	
200-205' DR. FINE SAND		205-210' DR. FINE SAND		210-215' DR. FINE SAND	
210-215' DR. FINE SAND		215-220' DR. FINE SAND		220-225' DR. FINE SAND	
220-225' DR. FINE SAND		225-230' DR. FINE SAND		230-235' DR. FINE SAND	
230-235' DR. FINE SAND		235-240' DR. FINE SAND		240-245' DR. FINE SAND	
240-245' DR. FINE SAND		245-250' DR. FINE SAND		250-255' DR. FINE SAND	
250-255' DR. FINE SAND		255-260' DR. FINE SAND		260-265' DR. FINE SAND	
260-265' DR. FINE SAND		265-270' DR. FINE SAND		270-275' DR. FINE SAND	
270-275' DR. FINE SAND		275-280' DR. FINE SAND		280-285' DR. FINE SAND	
280-285' DR. FINE SAND		285-290' DR. FINE SAND		290-295' DR. FINE SAND	
290-295' DR. FINE SAND		295-300' DR. FINE SAND		300-305' DR. FINE SAND	
300-305' DR. FINE SAND		305-310' DR. FINE SAND		310-315' DR. FINE SAND	
310-315' DR. FINE SAND		315-320' DR. FINE SAND		320-325' DR. FINE SAND	
320-325' DR. FINE SAND		325-330' DR. FINE SAND		330-335' DR. FINE SAND	
330-335' DR. FINE SAND		335-340' DR. FINE SAND		340-345' DR. FINE SAND	
340-345' DR. FINE SAND		345-350' DR. FINE SAND		350-355' DR. FINE SAND	
350-355' DR. FINE SAND		355-360' DR. FINE SAND		360-365' DR. FINE SAND	
360-365' DR. FINE SAND		365-370' DR. FINE SAND		370-375' DR. FINE SAND	
370-375' DR. FINE SAND		375-380' DR. FINE SAND		380-385' DR. FINE SAND	
380-385' DR. FINE SAND		385-390' DR. FINE SAND		390-395' DR. FINE SAND	
390-395' DR. FINE SAND		395-400' DR. FINE SAND		400-405' DR. FINE SAND	
400-405' DR. FINE SAND		405-410' DR. FINE SAND		410-415' DR. FINE SAND	
410-415' DR. FINE SAND		415-420' DR. FINE SAND		420-425' DR. FINE SAND	
420-425' DR. FINE SAND		425-430' DR. FINE SAND		430-435' DR. FINE SAND	
430-435' DR. FINE SAND		435-440' DR. FINE SAND		440-445' DR. FINE SAND	
440-445' DR. FINE SAND		445-450' DR. FINE SAND		450-455' DR. FINE SAND	
450-455' DR. FINE SAND		455-460' DR. FINE SAND		460-465' DR. FINE SAND	
460-465' DR. FINE SAND		465-470' DR. FINE SAND		470-475' DR. FINE SAND	
470-475' DR. FINE SAND		475-480' DR. FINE SAND		480-485' DR. FINE SAND	
480-485' DR. FINE SAND		485-490' DR. FINE SAND		490-495' DR. FINE SAND	
490-495' DR. FINE SAND		495-500' DR. FINE SAND		500-505' DR. FINE SAND	
500-505' DR. FINE SAND		505-510' DR. FINE SAND		510-515' DR. FINE SAND	
510-515' DR. FINE SAND		515-520' DR. FINE SAND		520-525' DR. FINE SAND	
520-525' DR. FINE SAND		525-530' DR. FINE SAND		530-535' DR. FINE SAND	
530-535' DR. FINE SAND		535-540' DR. FINE SAND		540-545' DR. FINE SAND	
540-545' DR. FINE SAND		545-550' DR. FINE SAND		550-555' DR. FINE SAND	
550-555' DR. FINE SAND		555-560' DR. FINE SAND		560-565' DR. FINE SAND	
560-565' DR. FINE SAND		565-570' DR. FINE SAND		570-575' DR. FINE SAND	
570-575' DR. FINE SAND		575-580' DR. FINE SAND		580-585' DR. FINE SAND	
580-585' DR. FINE SAND		585-590' DR. FINE SAND		590-595' DR. FINE SAND	
590-595' DR. FINE SAND		595-600' DR. FINE SAND		600-605' DR. FINE SAND	
600-605' DR. FINE SAND		605-610' DR. FINE SAND		610-615' DR. FINE SAND	
610-615' DR. FINE SAND		615-620' DR. FINE SAND		620-625' DR. FINE SAND	
620-625' DR. FINE SAND		625-630' DR. FINE SAND		630-635' DR. FINE SAND	
630-635' DR. FINE SAND		635-640' DR. FINE SAND		640-645' DR. FINE SAND	
640-645' DR. FINE SAND		645-650' DR. FINE SAND		650-655' DR. FINE SAND	
650-655' DR. FINE SAND		655-660' DR. FINE SAND		660-665' DR. FINE SAND	
660-665' DR. FINE SAND		665-670' DR. FINE SAND		670-675' DR. FINE SAND	
670-675' DR. FINE SAND		675-680' DR. FINE SAND		680-685' DR. FINE SAND	
680-685' DR. FINE SAND		685-690' DR. FINE SAND		690-695' DR. FINE SAND	
690-695' DR. FINE SAND		695-700' DR. FINE SAND		700-705' DR. FINE SAND	
700-705' DR. FINE SAND		705-710' DR. FINE SAND		710-715' DR. FINE SAND	
710-715' DR. FINE SAND		715-720' DR. FINE SAND		720-725' DR. FINE SAND	
720-725' DR. FINE SAND		725-730' DR. FINE SAND		730-735' DR. FINE SAND	
730-735' DR. FINE SAND		735-740' DR. FINE SAND		740-745' DR. FINE SAND	
740-745' DR. FINE SAND		745-750' DR. FINE SAND		750-755' DR. FINE SAND	
750-755' DR. FINE SAND		755-760' DR. FINE SAND		760-765' DR. FINE SAND	
760-765' DR. FINE SAND		765-770' DR. FINE SAND		770-775' DR. FINE SAND	
770-775' DR. FINE SAND		775-780' DR. FINE SAND		780-785' DR. FINE SAND	
780-785' DR. FINE SAND		785-790' DR. FINE SAND		790-795' DR. FINE SAND	
790-795' DR. FINE SAND		795-800' DR. FINE SAND		800-805' DR. FINE SAND	
800-805' DR. FINE SAND		805-810' DR. FINE SAND		810-815' DR. FINE SAND	
810-815' DR. FINE SAND		815-820' DR. FINE SAND		820-825' DR. FINE SAND	
820-825' DR. FINE SAND		825-830' DR. FINE SAND		830-835' DR. FINE SAND	
830-835' DR. FINE SAND		835-840' DR. FINE SAND		840-845' DR. FINE SAND	
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850-855' DR. FINE SAND		855-860' DR. FINE SAND		860-865' DR. FINE SAND	
860-865' DR. FINE SAND		865-870' DR. FINE SAND		870-875' DR. FINE SAND	
870-875' DR. FINE SAND		875-880' DR. FINE SAND		880-885' DR. FINE SAND	
880-885' DR. FINE SAND		885-890' DR. FINE SAND		890-895' DR. FINE SAND	
890-895' DR. FINE SAND		895-900' DR. FINE SAND		900-905' DR. FINE SAND	
900-905' DR. FINE SAND		905-910' DR. FINE SAND		910-915' DR. FINE SAND	
910-915' DR. FINE SAND		915-920' DR. FINE SAND		920-925' DR. FINE SAND	
920-925' DR. FINE SAND		925-930' DR. FINE SAND		930-935' DR. FINE SAND	
930-935' DR. FINE SAND		935-940' DR. FINE SAND		940-945' DR. FINE SAND	
940-945' DR. FINE SAND		945-950' DR. FINE SAND		950-955' DR. FINE SAND	
950-955' DR. FINE SAND		955-960' DR. FINE SAND		960-965' DR. FINE SAND	
960-965' DR. FINE SAND		965-970' DR. FINE SAND		970-975' DR. FINE SAND	
970-975' DR. FINE SAND		975-980' DR. FINE SAND		980-985' DR. FINE SAND	
980-985' DR. FINE SAND		985-990' DR. FINE SAND		990-995' DR. FINE SAND	
990-995' DR. FINE SAND		995-1000' DR. FINE SAND		1000-1005' DR. FINE SAND	
1000-1005' DR. FINE SAND		1005-1010' DR. FINE SAND		1010-1015' DR. FINE SAND	
1010-1015' DR. FINE SAND		1015-1020' DR. FINE SAND		1020-1025' DR. FINE SAND	
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1030-1035' DR. FINE SAND		1035-1040' DR. FINE SAND		1040-1045' DR. FINE SAND	
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1050-1055' DR. FINE SAND		1055-1060' DR. FINE SAND		1060-1065' DR. FINE SAND	
1060-1065' DR. FINE SAND		1065-1070' DR. FINE SAND		1070-1075' DR. FINE SAND	
1070-1075' DR. FINE SAND		1075-1080' DR. FINE SAND		1080-1085' DR. FINE SAND	
1080-1085' DR. FINE SAND		1085-1090' DR. FINE SAND		1090-1095' DR. FINE SAND	
1090-1095' DR. FINE SAND		1095-1100' DR. FINE SAND		1100-1105' DR. FINE SAND	
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1110-1115' DR. FINE SAND		1115-1120' DR. FINE SAND		1120-1125' DR. FINE SAND	
1120-1125' DR. FINE SAND		1125-1130' DR. FINE SAND		1130-1135' DR. FINE SAND	
1130-1135' DR. FINE SAND		1135-1140' DR. FINE SAND		1140-1145' DR. FINE SAND	
1140-1145' DR. FINE SAND		1145-1150' DR. FINE SAND		1150-1155' DR. FINE SAND	
1150-1155' DR. FINE SAND		1155-1160' DR. FINE SAND		1160-1165' DR. FINE SAND	
1160-1165' DR. FINE SAND		1165-1170' DR. FINE SAND		1170-1175' DR. FINE SAND	
1170-1175' DR. FINE SAND		1175-1180' DR. FINE SAND		1180-1185' DR. FINE SAND	
1180-1185' DR. FINE SAND		1185-1190' DR. FINE SAND		1190-1195' DR. FINE SAND	
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1260-1265' DR. FINE SAND		1265-1270' DR. FINE SAND		1270-1275' DR. FINE SAND	
1270-1275' DR. FINE SAND		1275-1280' DR. FINE SAND		1280-1285' DR. FINE SAND	
1280-1285' DR. FINE SAND		1285-1290' DR. FINE SAND		1290-1295' DR. FINE SAND	
1290-1295' DR. FINE SAND		1295-1300' DR. FINE SAND		1300-1305' DR. FINE SAND	
1300-1305' DR. FINE SAND		1305-1310' DR. FINE SAND		1310-1315' DR. FINE SAND	
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1360-1365' DR. FINE SAND		1365-1370' DR. FINE SAND		1370-1375' DR. FINE SAND	
1370-1375' DR. FINE SAND		1375-1380' DR. FINE SAND		1380-1385' DR. FINE SAND	
1380-1385' DR. FINE SAND		1385-1390' DR. FINE SAND		1390-1395' DR. FINE SAND	
1390-1395' DR. FINE SAND		1395-1400' DR. FINE SAND		1400-1405' DR. FINE SAND	
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1420-1425' DR. FINE SAND		1425-1430' DR. FINE SAND		1430-	

CONCRETE CONSTRUCTION

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:
 - ACI 211 – STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE.
 - ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.
 - ACI 302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION
 - ACI 304 – RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.
 - ACI 306.1 – STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING
 - ACI 318 – BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.
 2. CONCRETE SHALL BE AIR ENTRAINED AND SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:
 - ALL CONCRETE 3,500 PSI
 3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.
 4. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
 5. CONCRETE COVER OVER REINFORCING SHALL BE 3 INCHES.
 6. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.
 7. ALL REINFORCEMENT SHALL BE CONTINUOUS. SPLICES WILL NOT BE ALLOWED.
 8. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.
 9. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1 % CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.
 10. TOP OF FOOTING SURFACES SHALL RECEIVE A UNIFORM FLOAT FINISH. CURE FOOTING SURFACE WITH SONNEBORN KURE-N-SEAL WB OR APPROVED EQUAL, APPLIED AS RECOMMENDED BY MANUFACTURER.
11. PREPARATION OF SURFACES WHERE NEW CONCRETE WILL INTERFACE WITH EXISTING CAISSON:
THE PERIMETER OF THE EXISTING CAISSON SHALL BE THOROUGHLY CLEANED OF ALL DIRT AND DELETERIOUS MATERIALS PRIOR TO APPLICATION OF BONDING AGENT. CONTRACTOR SHALL NOTIFY NORTHEAST UTILITIES 24 HOURS IN ADVANCE OF CLEANING.

SIKADUR 32, HI-MOD OR ENGINEER APPROVED EQUAL SHALL BE APPLIED, IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, TO ALL INTERFACING SURFACES BEFORE CONCRETE IS PLACED.

CAULK JOINT BETWEEN EXISTING CONCRETE PIER AND NEW CONCRETE WITH SIKAFLEX 1-A BY SIKA CORP. OR ENGINEER APPROVED EQUAL.

SUBMIT MANUFACTURER'S PRODUCT SPECIFICATION DATA AND INSTALLATION INSTRUCTIONS FOR REVIEW AND APPROVAL BY OWNER.
 12. NEW CONCRETE FOOTING SHALL BE ALLOWED TO CURE AT LEAST 14 DAYS BEFORE WIRELESS ANTENNA MOUNT, ANTENNAS, AND CABLES ARE INSTALLED.
 13. INSPECTION AND TESTING OF CONCRETE WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, APPROVED AND PAID BY THE OWNER. THE INSPECTOR SHALL OBSERVE THE CONDITION OF SOILS AND FORMWORK BEFORE FOOTINGS ARE PLACED, SIZE, SPACING AND LOCATION OF REINFORCEMENT, AND PLACEMENT OF CONCRETE.
 14. THE TESTING COMPANY SHALL ALSO OBTAIN A MINIMUM OF THREE (3) COMPRESSIVE STRENGTH TEST SPECIMENS FOR EACH CONCRETE MIX DESIGN. ONE SPECIMEN TESTED AT 7 DAYS, ONE AT 28 DAYS, AND ONE HELD IN RESERVE FOR FUTURE TESTING, IF NEEDED.
 15. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE OWNER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

DESIGNED BY:	1A
DRAWN BY:	DSB
CHECK BY:	CFB
DATE:	02/24/13
SCALE:	AS SHOWN
JOB NO.	12001.0005

DATE:	02/24/13
SCALE:	AS SHOWN
JOB NO.	12001.0005



VERIZON WIRELESS
TOWER FOUNDATION
IMPROVEMENTS DESIGN
CLASP STRUCTURE NO. 10255
BETHEL, CT 06801

DATE:	02/24/13
SCALE:	AS SHOWN
JOB NO.	12001.0005

SHEET NO.	
N-3	
Sheet No. <u>3</u>	of <u>3</u>

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTRUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	X	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	X	EARTHWORK: BACKFILL MATERIAL & COMPACTION	-	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
-	EOR APPROVED POST-INSTALLED ANCHOR MPII	X	REBAR & FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
-	FABRICATION INSPECTION	X	CONCRETE TESTING		
-	FABRICATOR CERTIFIED WELDER INSPECTION	-	STEEL INSPECTION		
X	MATERIAL CERTIFICATIONS	-	POST INSTALLED ANCHOR ROD VERIFICATION		
		-	BASE PLATE GROUT VERIFICATION		
		-	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		-	ON-SITE COLD GALVANIZING VERIFICATION		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

NOTES:

1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
2. "X" DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
3. "-" DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
4. EOR - ENGINEER OF RECORD
5. MPII - "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS. TO INCLUDE A REVIEW AND COMPLETION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
 - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON-SITE INSPECTIONS AND COMPIATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
 - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:
 - CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
 - WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:
 - PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
 - DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING, REPAIRS.
 - POST-CONSTRUCTION: FINAL CONDITION OF THE SITE.

DESIGNED BY: T.A.	DATE: 12/13/13	SCALE: AS SHOWN	PROJECT NO. 10255
DRAWN BY: DEB	DATE: 12/13/13	SCALE: AS SHOWN	PROJECT NO. 10255
CHECKED BY: CFC	DATE: 12/13/13	SCALE: AS SHOWN	PROJECT NO. 10255

VERIZON WIRELESS

TOWER FOUNDATION

IMPROVEMENT DESIGN

CL&P STRUCTURE NO. 10255

BETHEL, CT 06801

www.verizonwireless.com

1000 Main Street

06801-0000

Bethel, CT 06801

Contracted by: VeriCorp

1000 Main Street

06801-0000

Bethel, CT 06801

MI-1

Sheet No. 1 of 2

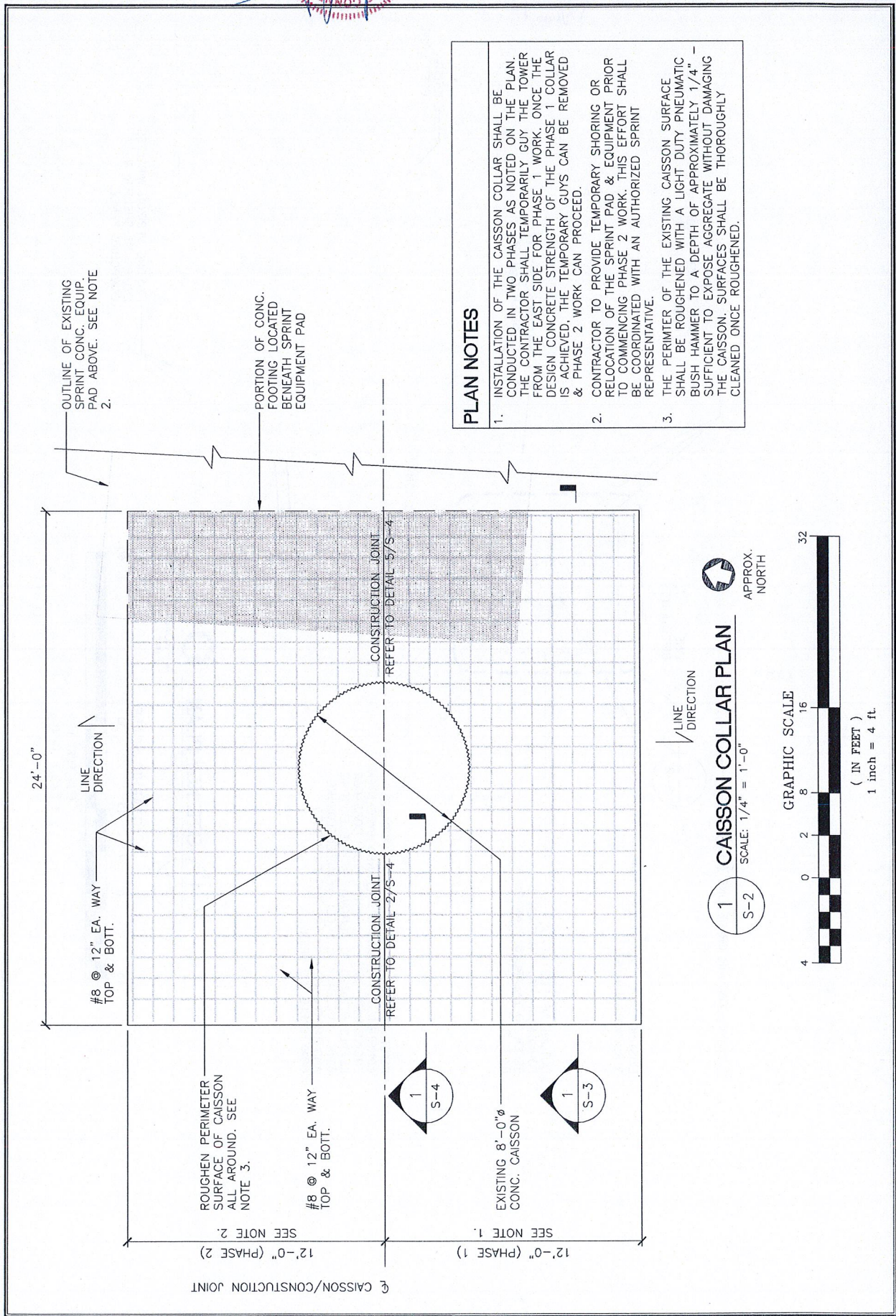
MODIFICATION INSPECTION REQUIREMENTS

DESIGNED BY: T.A.L.	DATE: 02/04/13	SCALE: AS SHOWN	JOB NO. 12001.0000
DRAWN BY: DEB	DATE: 02/04/13	SCALE: AS SHOWN	JOB NO. 12001.0000
CHECKED BY: CFC	DATE: 02/04/13	SCALE: AS SHOWN	JOB NO. 12001.0000

REV	DATE	DESCRIPTION
1	2/22/13	ISSUED FOR CONSTRUCTION
2	4/1/13	ISSUED FOR CONSTRUCTION

PROJECT NO.	10000
PROJECT NAME	VERIZON WIRELESS
PROJECT ADDRESS	SKY EDGE LANE
PROJECT CITY	BETHEL, CT 06801
PROJECT STATE	CT
PROJECT ZIP	06801

CAISSON COLLAR PLAN
SHEET NO. S-2
SHEET NO. 2 OF 2



DESIGNED BY: T.A.
 DRAWN BY: D.B.
 CHECKED BY: C.F.C.

REV.	DATE	BY	DESCRIPTION
1	1/22/13	T.A.	ISSUED FOR CONSTRUCTION
2	4/1/13	T.A.	ISSUED FOR CONSTRUCTION
3	7/18/13	C.F.C.	ISSUED FOR CONSTRUCTION

VERIZON WIRELESS
 TOWER FOUNDATION
 IMPROVEMENTS DESIGN
 CL&P STRUCTURE NO. 10255
 845 EDGE LANE
 BETHEL, CT 06801

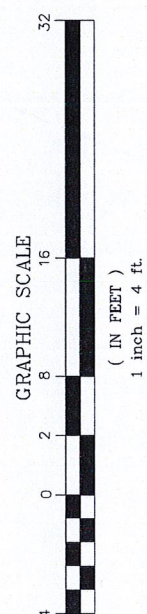
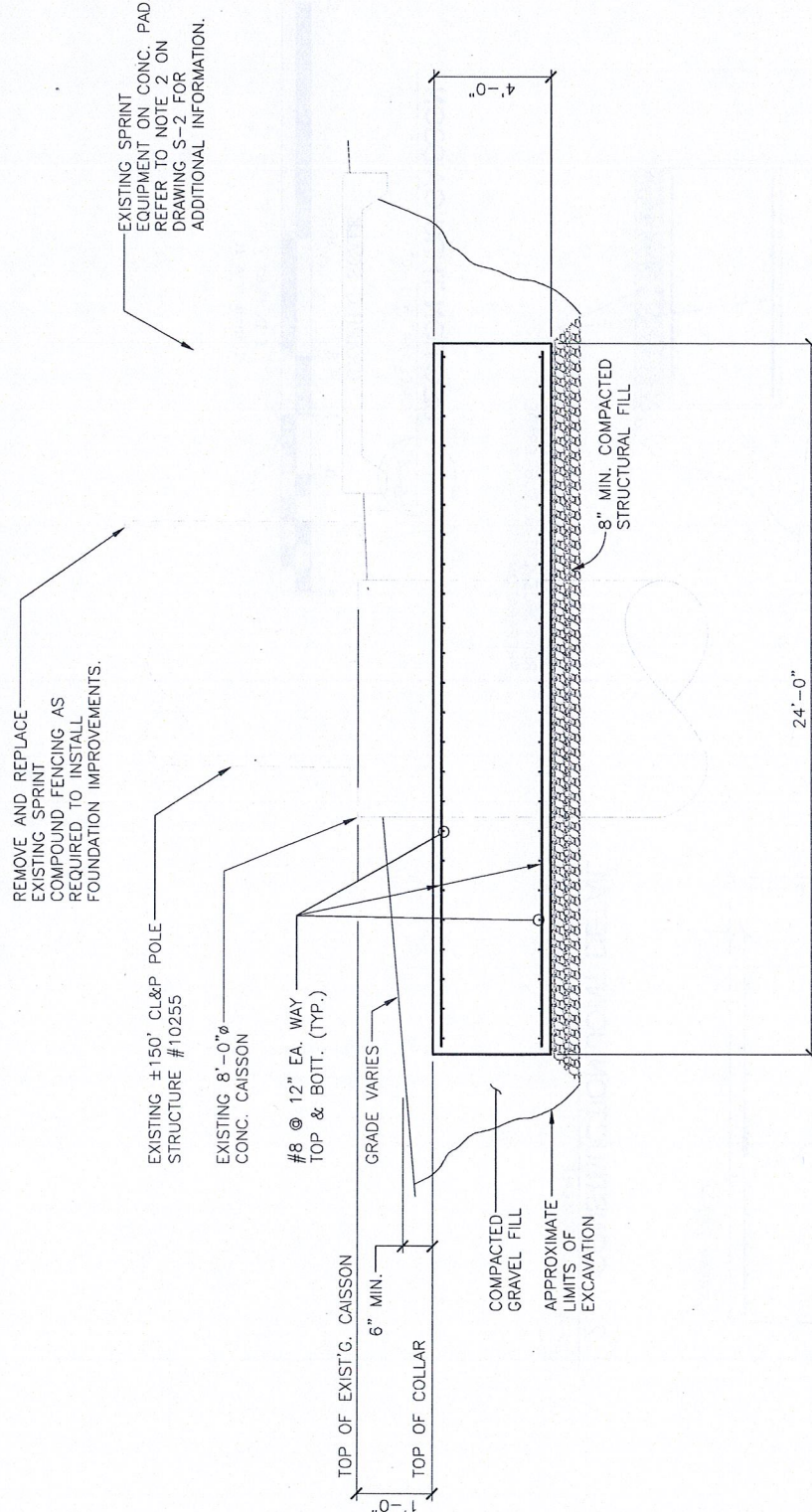


CENTEK Engineering, Inc.
 40 West Main Street
 Bethel, CT 06801
 www.centekeng.com

DATE: 07/24/13
 DRAWN BY: D.B.
 CHECKED BY: C.F.C.

SECTION
 (CAISSON BEYOND)

SHEET NO.
S-3
 OF 3



1 SECTION (CAISSON BEYOND)
 SCALE: 1/4" = 1'-0"

NOTE
 REFER TO VERIZON WIRELESS LTE UPGRADE CONSTRUCTION DRAWINGS PREPARED BY CENTEK ENGINEERING, INC., PROJ. NO. 12001.C085 FOR ADDITIONAL GROUNDING AND UTILITY REPAIR REQUIREMENTS.

DESIGNED BY: T.A.	DATE: 12/18/13	REV: 1	DESCRIPTION: ISSUED FOR CONSTRUCTION
DRAWN BY: DGB	DATE: 12/22/13	REV: 2	DESCRIPTION: ISSUED FOR CONSTRUCTION
CHECKED BY: CFC	DATE: 1/17/14	REV: 3	DESCRIPTION: ISSUED FOR CONSTRUCTION

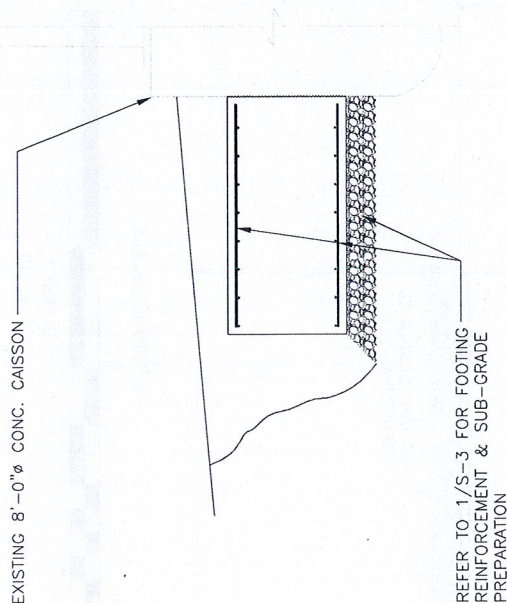
DATE: 07/04/13	SCALE: AS SHOWN
JOB NO. 12007.0000	

SECTION AND DETAIL

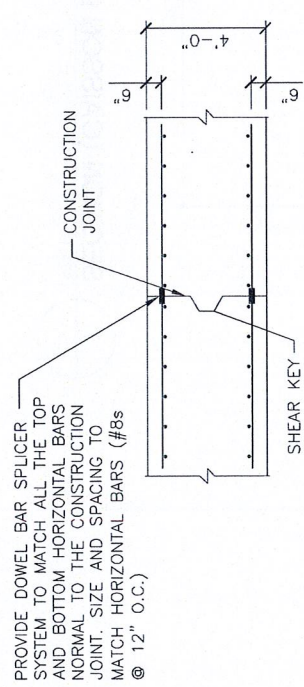
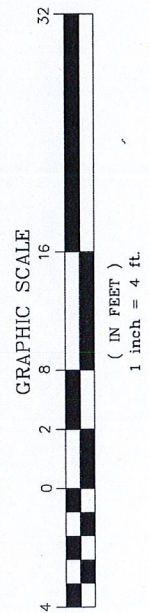
SHEET NO. S-4

VERIZON WIRELESS
TOWER FOUNDATION
IMPROVEMENTS DESIGN
CL&P STRUCTURE NO. 10265
SKY EDGE LANE
BETHEL, CT 06801

www.Centering.com
1201 4th Street
4th Floor
Westborough, MA 01581
Phone: 508.853.1100
Fax: 508.853.1101
Email: info@centering.com



1 SECTION THRU CAISSON
SCALE: 1/4" = 1'-0"



2 CONSTRUCTION JOINT DETAIL
NOT TO SCALE



**Northeast
Utilities System**

107 Selden Street, Berlin, CT 06037

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

Mr. Brian Ragozzine
Verizon Wireless
99 East River Dr, 9th Floor
East Hartford, CT 06108

April 9, 2013
RECEIVED
APR 17 2013

CONNECTICUT
SITING COUNCIL

RE: Verizon Wireless Antenna Site, Sky Edge Lane, Bethel CT, structure 10265.

Dear Mr. Ragozzine:

Based on our reviews of the site drawings, the structural analysis and foundation Modification provided by Centek Engineering, along with a structural review performed by Northeast Utilities we have reviewed for acceptance this modification.

Since there are no outstanding structural issues to resolve at this time please contact Mr. Charamella (860-665-6959) to resolve any lease issues; once the lease amendment is secured you may contact Mr. John Landry directly (860-665-5425) to begin these arrangements..

Sincerely,

Robert Gray
Transmission Line Engineering

ref: 12001.CO85 -- Rev 1 Bethel North.pdf
CL-P Pole 10255 Foundation Improvements Design - Rev-2 04.1.13(2)
Bethel North CD Rev-1 04.08.13.pdf