EM-SPRINT-009-131008

HPC WIRELESS SERVICES

...ury, CT, 06810
P.: 203.797.1112

ORIGINAL

October 4, 2013

VIA OVERNIGHT COURIER

Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051
Attn: Ms. Melanie Bachman, Acting Executive Director

Re: Sprint Spectrum, L.P. – Exempt Modification
8 Sky Edge Drive, Bethel, Connecticut

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of Sprint Spectrum, L.P. ("Sprint"). Sprint is undertaking modifications to certain existing sites in its Connecticut system in order to implement updated technology. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction that constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the First Selectman of the Town of Bethel.

Sprint plans to modify the existing wireless communications facility owned by The Connecticut Light and Power Company and located at 8 Sky Edge Drive, Bethel (coordinates 41°-24'-48.6" N, 73°-24'-3.12" W). Attached are plan and elevation drawings depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration. Also included is a power density report reflecting the modification to Sprint's operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. Sprint will remove the existing six (6) CMDA antennas and add three (3) dual-band panel LTE antennas on existing pipe masts on the existing platform, at the centerline height of the existing antennas of approximately 157.6' AGL. Sprint will also install ~~six (6)~~ nine (9) RRHs (remote radio heads) on existing canopy posts, also at a centerline height of approximately 157.6' AGL. During an interim period of up to one year, the six (6) existing CDMA antennas will remain. Sprint will also install three (3) hybriflex

cables along the existing coaxial cable run, and will remove the coaxial cable at the end of the interim period. The proposed modifications will not extend the height of the approximately 150' structure, which is approximately 167.6' when the tower extension is included.

2. Sprint will replace the three (3) existing cabinets with three (3) similar cabinets on the existing concrete pad. Sprint will also add a new surge suppressor, and place a new fiber junction box on new unistruts on a proposed H-frame, all on the existing concrete pad. The existing GPS antenna will be replaced by another GPS antenna. These changes will have no effect on the site boundaries.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated on the attached report prepared by EBI Consulting, Sprint's operations at the site will result in a power density of approximately 19.525%; the combined site operations will result in a total power density of approximately 33.215%.

Please contact me by phone at (203) 610-1071 or by e-mail at mjhowlett@optonline.net with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

Melanie J. Howlett

Attachments

cc: Honorable Matt Knickerbocker, First Selectman, Town of Bethel
Ms. Alvera Chiarella (underlying property owner)

Connecticut Light & Power

TOWER FOUNDATION IMPROVEMENTS DESIGN

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

VICINITY MAP

NORTH

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 ℄ HEIGHT:	167'-6" A.T.B.
SPRINT	
CONTACT:	MELODY MESSICK 410.782.9495
SITE NO.:	CT03XC351
ANTENNA ℄ 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

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DESIGNED BY:	TJL		
DRAWN BY:	DEB		
CHK'D BY:	CFC		
2	4/1/13	TJL	CFC	ISSUED FOR CONSTRUCTION
1	3/22/13	TJL	CFC	ISSUED FOR CONSTRUCTION
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REV	DATE	DRAWN BY	CHK'D BY	DESCRIPTION

CENTEK engineering
Connecticut Light & Power

VERIZON WIRELESS
TOWER FOUNDATION IMPROVEMENTS DESIGN
CL&P STRUCTURE NO. 10255
SKY EDGE LANE
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DATE: 02/04/13
SCALE: AS SHOWN
JOB NO. 12001.C085

TITLE SHEET

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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:	TJL
DRAWN BY:	DED
CHK'D BY:	CFC

NO.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
3	4/17/13	TJL	CFC	ISSUED FOR CONSTRUCTION
2	3/7/13	DED	CFC	ISSUED FOR CONSTRUCTION
1	2/18/13	DED	CFC	ISSUED FOR CONSTRUCTION

CENTEK engineering
Connecticut Light & Power

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

DATE:	02/04/13
SCALE:	AS SHOWN
JOB NO.	12001.C085

DESIGN BASIS, GENERAL AND SITE NOTES

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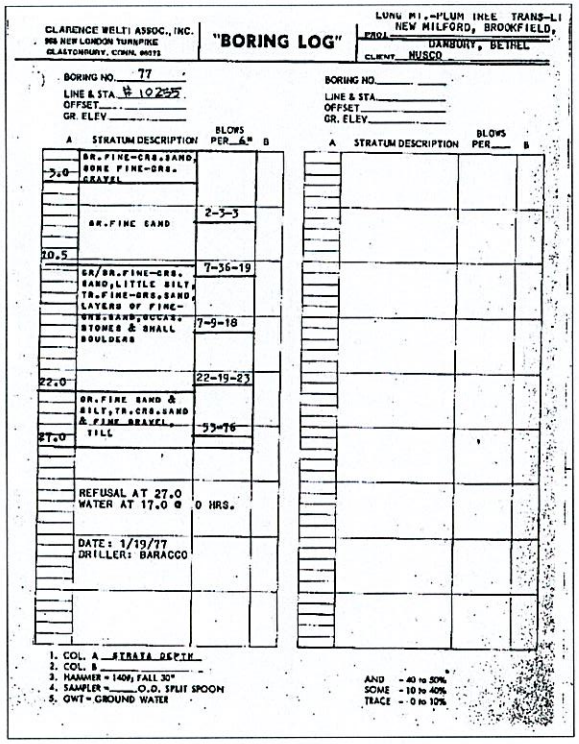

CLARENCE WELTI ASSOC., INC.
995 NEW LONDON TURNPIKE
GLASTONBURY, CONN. 06073

"BORING LOG"

LONG MT.-PLUM IRLE TRANS-LI
NEW MILFORD, BROOKFIELD,
PROJ. DANBURY, BETHEL
CLIENT NUSCO

BORING NO. 77
LINE & STA. # 10255
OFFSET
GR. ELEV

BORING NO.
LINE & STA.
OFFSET
GR. ELEV.

A	STRATUM DESCRIPTION	BLOWS PER 6"	B
5.0	BR. FINE-CRS. SAND, SOME FINE-CRS. GRAVEL		
	BR. FINE SAND	2-3-3	
10.5	GR/BR. FINE-CRS. SAND, LITTLE SILT, TR. FINE-CRS. SAND, LAYERS OF FINE-MED. SAND, OCCAS. STONES & SMALL BOULDERS	7-36-19	
		7-9-18	
22.0		22-19-23	
27.0	BR. FINE SAND & SILT, TR. CRS. SAND & FINE GRAVEL, TILL	53-76	
	REFUSAL AT 27.0 WATER AT 17.0 @	0 HRS.	
	DATE: 1/19/77 DRILLER: BARACCO		

A	STRATUM DESCRIPTION	BLOWS PER	B

1. COL. A STRATA DEPTH
2. COL. B
3. HAMMER = 140#; FALL 30"
4. SAMPLER = O.D. SPLIT SPOON
5. GWT = GROUND WATER

AND - 40 to 50%
SOME - 10 to 40%
TRACE - 0 to 10%

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 ½"	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
¾"	90–100
½"	0–15
⅜"	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 COMPACTION 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 DAMPPROOFING SHALL COMPLY WITH BUILDING CODE REQUIREMENTS UNLESS A MORE SUBSTANTIAL SYSTEM IS INDICATED OR SPECIFIED.

DESIGNED BY:	TJL
DRAWN BY:	DEB
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	4/1/13	TJL	CFC	ISSUED FOR CONSTRUCTION
1	3/22/13	DEB	CFC	ISSUED FOR CONSTRUCTION
0	2/4/13	DEB	CFC	ISSUED FOR CONSTRUCTION

CONNECTICUT LICENSED PROFESSIONAL ENGINEER
CERTIFICATE OF AUTHORIZATION
No. 1669-D

Connecticut Light & Power

CENTEK engineering
Centered on Solutions
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(203) 488-8587 Fax
63-2 North Branford Road
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BORING LOG, EARTHWORK AND FOUNDATION CONSTRUCTION NOTES

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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 APRROVED 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:		TJL
DRAWN BY:		DEB
CHK'D BY:		CFC
2	4/1/13	TJL	CFC	SSUED FOR CONSTRUCTION
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CONCRETE CONSTRUCTION NOTES

SHEET NO.
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Sheet No. 4 of 9

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTUCTION		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
4. MPII – "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION 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 COMPILATION & 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:	TJL
DRAWN BY:	DEB
CHK'D BY:	CFC

NO.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	4/17/13	TJL	CFC	ISSUED FOR CONSTRUCTION
1	3/22/13	TJL	CFC	ISSUED FOR CONSTRUCTION
0	2/04/13	TJL	CFC	ISSUED FOR CONSTRUCTION

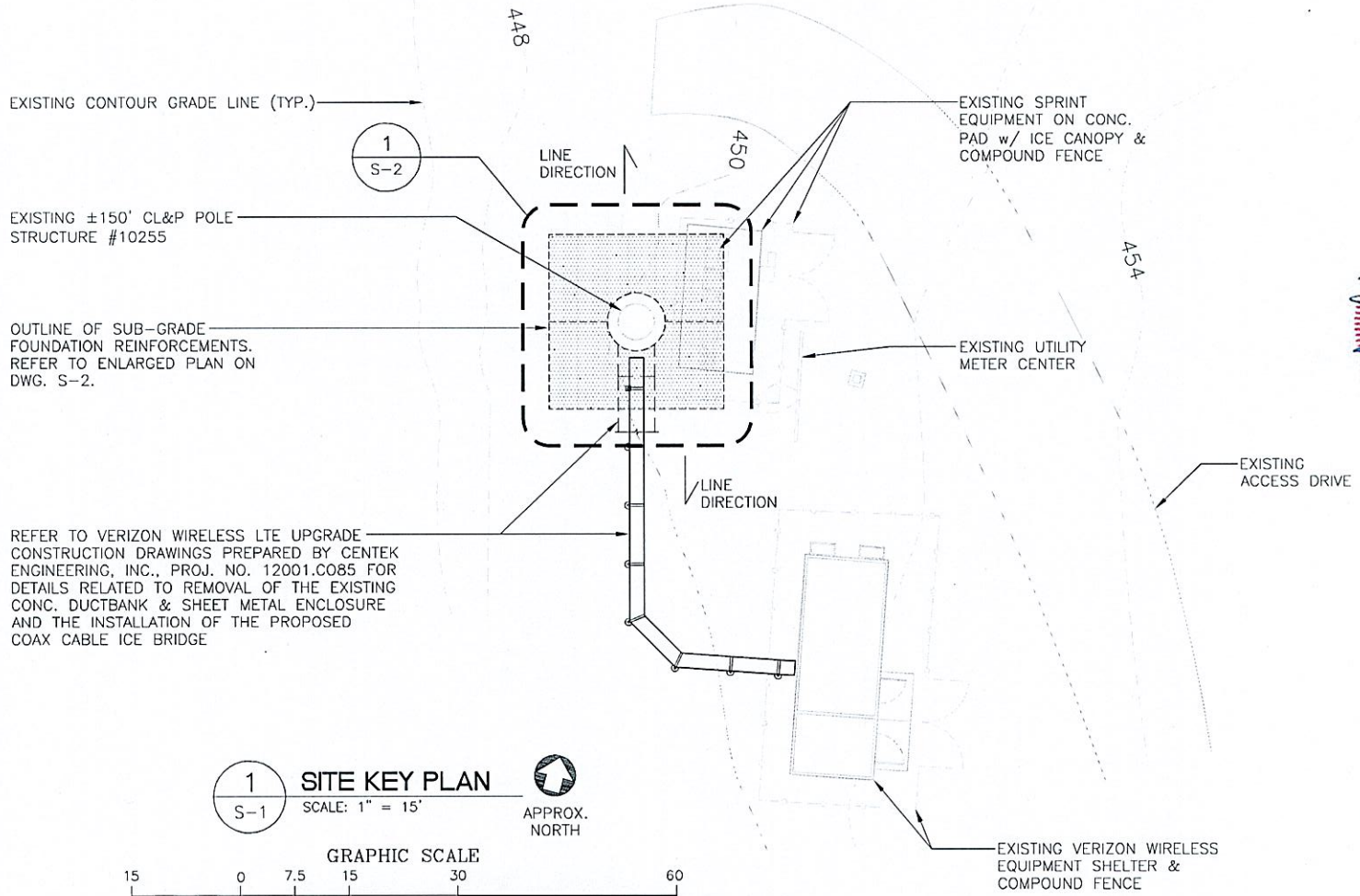
CENTEK engineering
Connecticut Light & Power

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

DATE:	02/04/13
SCALE:	AS SHOWN
JOB NO.	12001.C085

MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 1 of 2



1 / S-1 **SITE KEY PLAN**

SCALE: 1" = 15'

APPROX. NORTH

GRAPHIC SCALE

15 0 7.5 15 30 60

(IN FEET)
1 inch = 15 ft.

DESIGNED BY:	TJL
DRAWN BY:	DEB
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	2/4/13	TJL	CFC	ISSUED FOR CONSTRUCTION
1	2/22/13	TJL	CFC	ISSUED FOR CONSTRUCTION
0	2/18/13	DEB	CFC	ISSUED FOR CONSTRUCTION

CENTEK engineering
Centered on Solutions
(203) 488-0580
(800) 783-9972 fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

Connecticut Light & Power

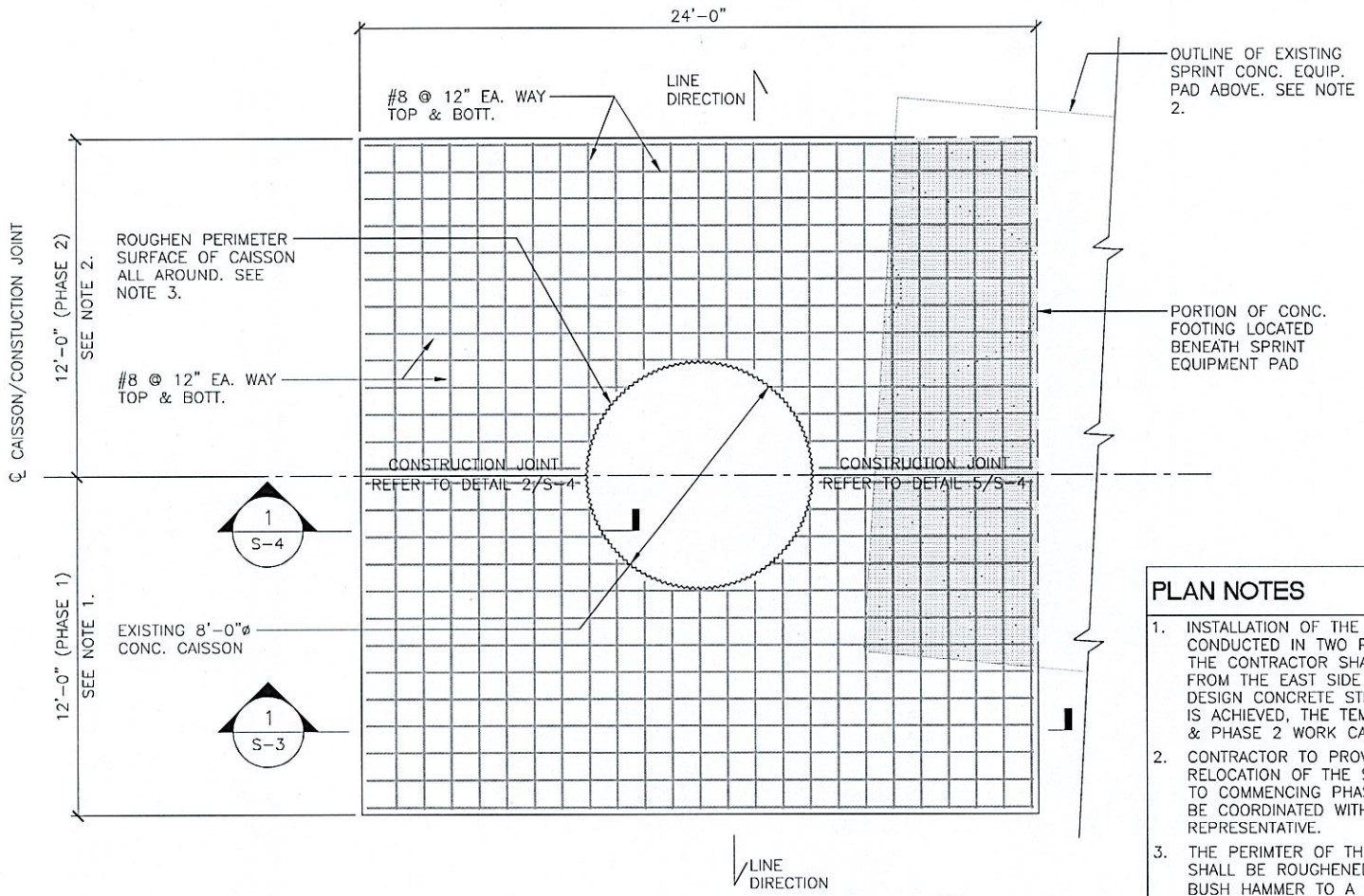
VERIZON WIRELESS

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

DATE:	02/04/13
SCALE:	AS SHOWN
JOB NO.	12001.C085

SITE KEY PLAN

SHEET NO.
S-1
Sheet No. 1 of 2



1 S-2 **CAISSON COLLAR PLAN**

SCALE: 1/4" = 1'-0"

APPROX. NORTH

GRAPHIC SCALE

4 0 2 8 16 32

(IN FEET)
1 inch = 4 ft.

PLAN NOTES

1. INSTALLATION OF THE CAISSON COLLAR SHALL BE CONDUCTED IN TWO PHASES AS NOTED ON THE PLAN. THE CONTRACTOR SHALL TEMPORARILY GUY THE TOWER FROM THE EAST SIDE FOR PHASE 1 WORK. ONCE THE DESIGN CONCRETE STRENGTH OF THE PHASE 1 COLLAR IS ACHIEVED, THE TEMPORARY GUYS CAN BE REMOVED & PHASE 2 WORK CAN PROCEED.
2. CONTRACTOR TO PROVIDE TEMPORARY SHORING OR RELOCATION OF THE SPRINT PAD & EQUIPMENT PRIOR TO COMMENCING PHASE 2 WORK. THIS EFFORT SHALL BE COORDINATED WITH AN AUTHORIZED SPRINT REPRESENTATIVE.
3. THE PERIMTER OF THE EXISTING CAISSON SURFACE SHALL BE ROUGHENED WITH A LIGHT DUTY PNEUMATIC BUSH HAMMER TO A DEPTH OF APPROXIMATELY 1/4" – SUFFICIENT TO EXPOSE AGGREGATE WITHOUT DAMAGING THE CAISSON. SURFACES SHALL BE THOROUGHLY CLEANED ONCE ROUGHENED.

DESIGNED BY:	TJL
DRAWN BY:	DEB
CHK'D BY:	CFC

NO.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
3	4/1/13	TJL	CFC	ISSUED FOR CONSTRUCTION
2	3/29/13	DEB	CFC	ISSUED FOR CONSTRUCTION
1	3/18/13	DEB	CFC	ISSUED FOR CONSTRUCTION

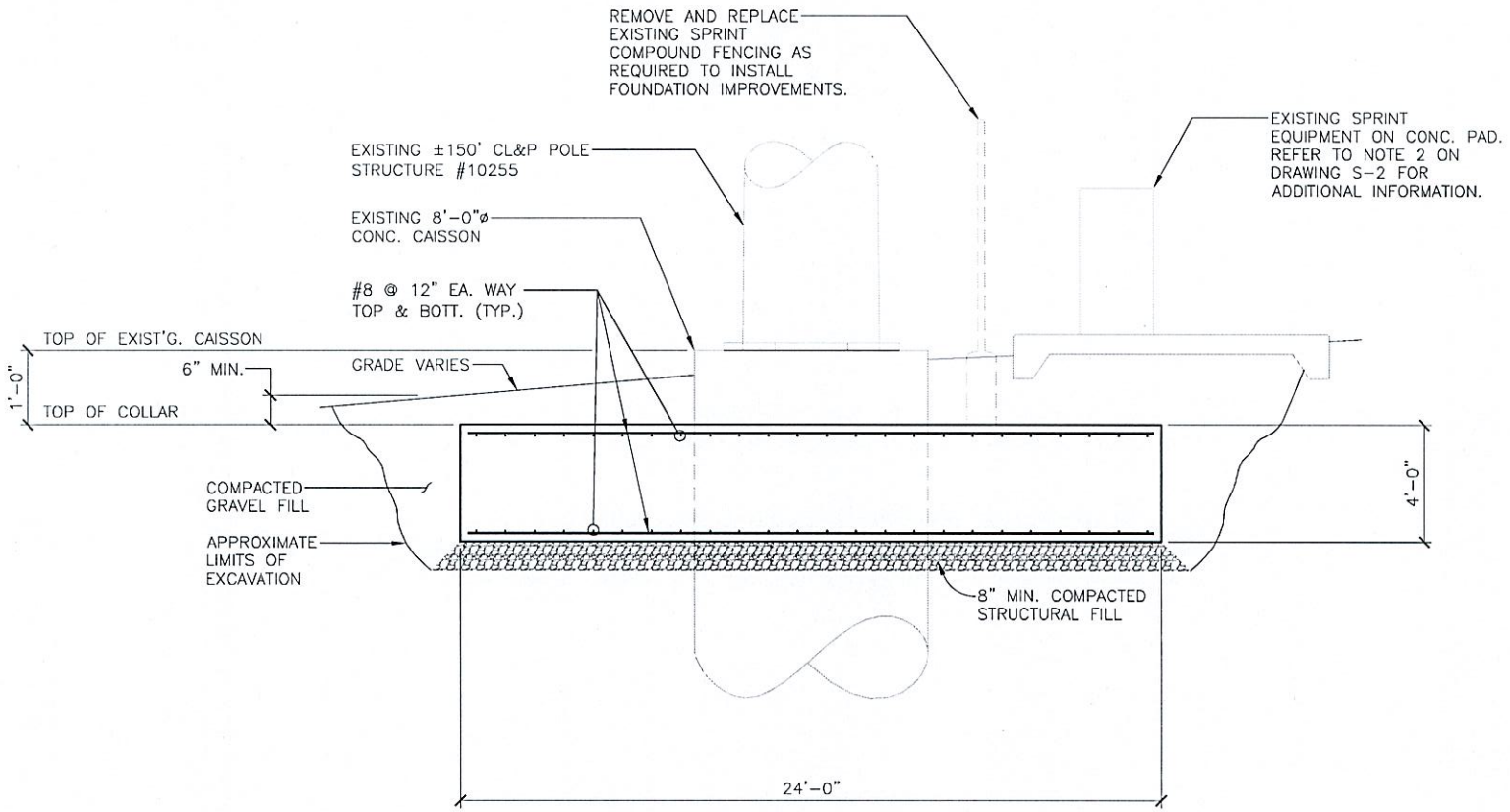
CENTEK engineering
Connecticut Light & Power

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

DATE:	02/04/13
SCALE:	AS SHOWN
JOB NO.	12001.C085

CAISSON COLLAR PLAN

SHEET NO. S-2
Sheet No. 7 of 9



1 / S-3 **SECTION (CAISSON BEYOND)**

SCALE: 1/4" = 1'-0"

GRAPHIC SCALE

4 0 2 8 16 32

(IN FEET)
1 inch = 4 ft.

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:	TJL
DRAWN BY:	DEB
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	4/17/13	TJL	CFC	ISSUED FOR CONSTRUCTION
1	2/26/13	DEB	CFC	ISSUED FOR CONSTRUCTION
0	2/18/13	DEB	CFC	ISSUED FOR CONSTRUCTION

Connecticut Light & Power

CENTEK engineering
Connect on Solutions
FCC# 40-0290
CT# 0000-0000-0000-0000
4424 North Stanford Road
Stanford, CT 06403
www.CentekEng.com

VERIZON WIRELESS

TOWER FOUNDATION IMPROVEMENTS DESIGN

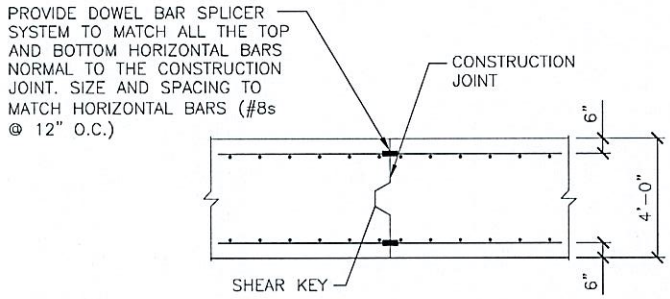
CL&P STRUCTURE NO. 10255

SKY EDGE LANE
BETHEL, CT 06801

DATE:	02/04/13
SCALE:	AS SHOWN
JOB NO.	12001.C085

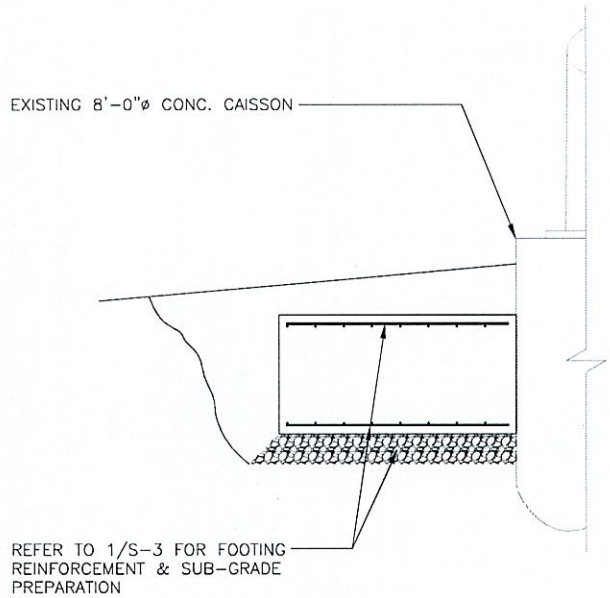
SECTION (CAISSON BEYOND)

SHEET NO.
S-3
Sheet No. 2 of 2



2 / S-4 **CONSTRUCTION JOINT DETAIL**

NOT TO SCALE



1 / S-4 **SECTION THRU CAISSON**

SCALE: 1/4" = 1'-0"

GRAPHIC SCALE

4 0 2 8 16 32

(IN FEET)

1 inch = 4 ft.

DESIGNED BY:		TJL
DRAWN BY:		DEB
CHK'D BY:		CFC
2	4/1/13	TJL CFC ISSUED FOR CONSTRUCTION
1	3/22/13	TJL CFC ISSUED FOR CONSTRUCTION
0	2/18/13	DEB CFC ISSUED FOR CONSTRUCTION
NO.	DATE	DRAWN BY CHK'D BY ISSUE FOR

CENTEK engineering
Connecticut Light & Power

VERIZON WIRELESS

TOWER FOUNDATION IMPROVEMENTS DESIGN

CL&P STRUCTURE NO. 10255

SKY EDGE LANE
BETHEL, CT 06801

DATE:	02/04/13
SCALE:	AS SHOWN
JOB NO.	12001.C085

SECTION AND DETAIL

SHEET NO.

S-4

Sheet No. 2 of 2

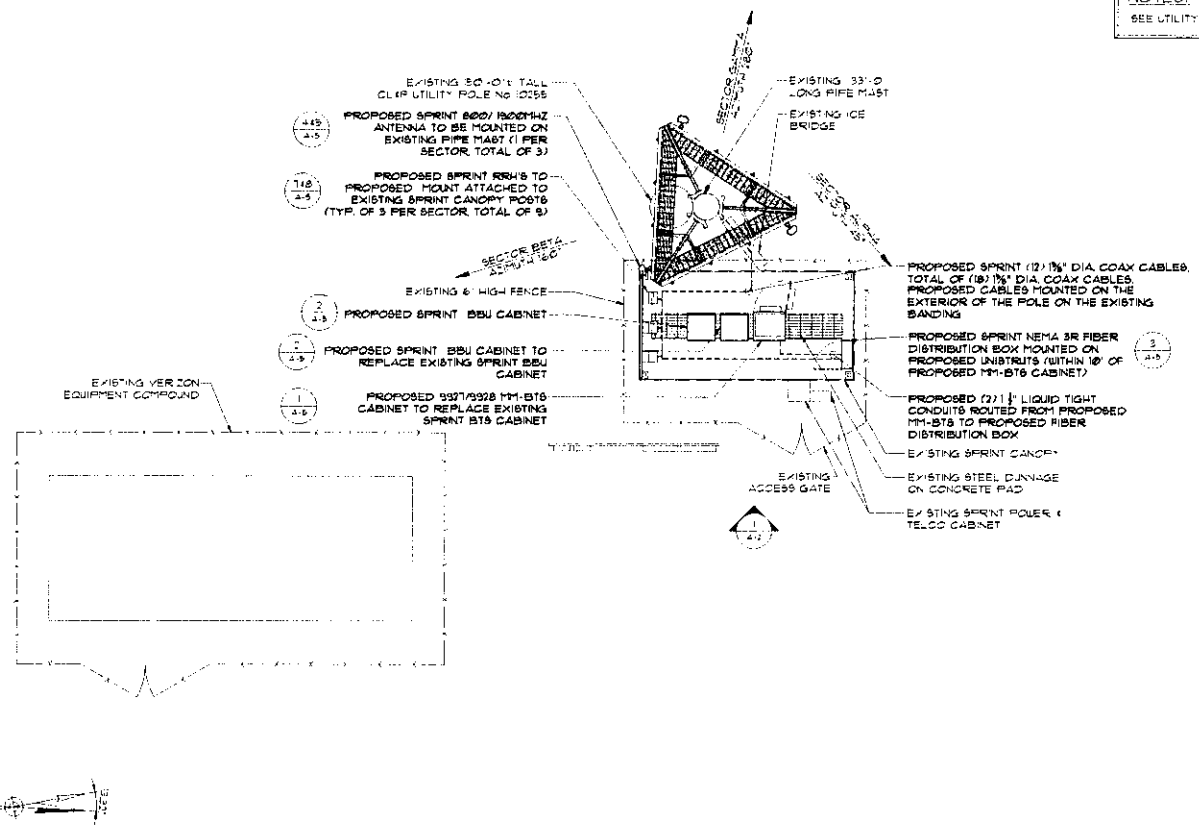
ANTENNA CONFIGURATION NOTE

ALL EXISTING CDMA ANTENNAS TO BE REMOVED & REPLACED WITH NETWORK VISION ANTENNAS FOR FINAL CONFIGURATION.

ANTENNA SEPARATION TO BE FIELD VERIFIED BY THE GENERAL CONTRACTOR.

NOTES:

SEE UTILITY POLE NOTES ON GN-2



1 COMPOUND PLAN

SCALE = 3/16"=1'-0"

Sprint

1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
P: 800-357-7641

Alcatel·Lucent

600 - 700 MOUNTAIN AVE.
MURRAY HILL, NJ 07974

Salient ARCHITECTS, LLC

8 East Palisade Avenue
Englewood, NJ 07631
P 201-567-0032 - F 201-567-9556

PAUL CIONFRIDDO P.E.
CT # 19060

SUBMITTALS

NO	DATE	DESCRIPTION	BY
1	4/20/12	PRELIMINARY	PJF
2	06/20/12	REVISED PER COMMENTS	JHP
3	09/24/13	ISSUED AS FINAL	PS

SITE NUMBER:
CT03XC351

SITE NAME:
BETHEL CL+P POLE# 10255

SITE ADDRESS:
8 SKY EDGE LANE
BETHEL, CT 06801

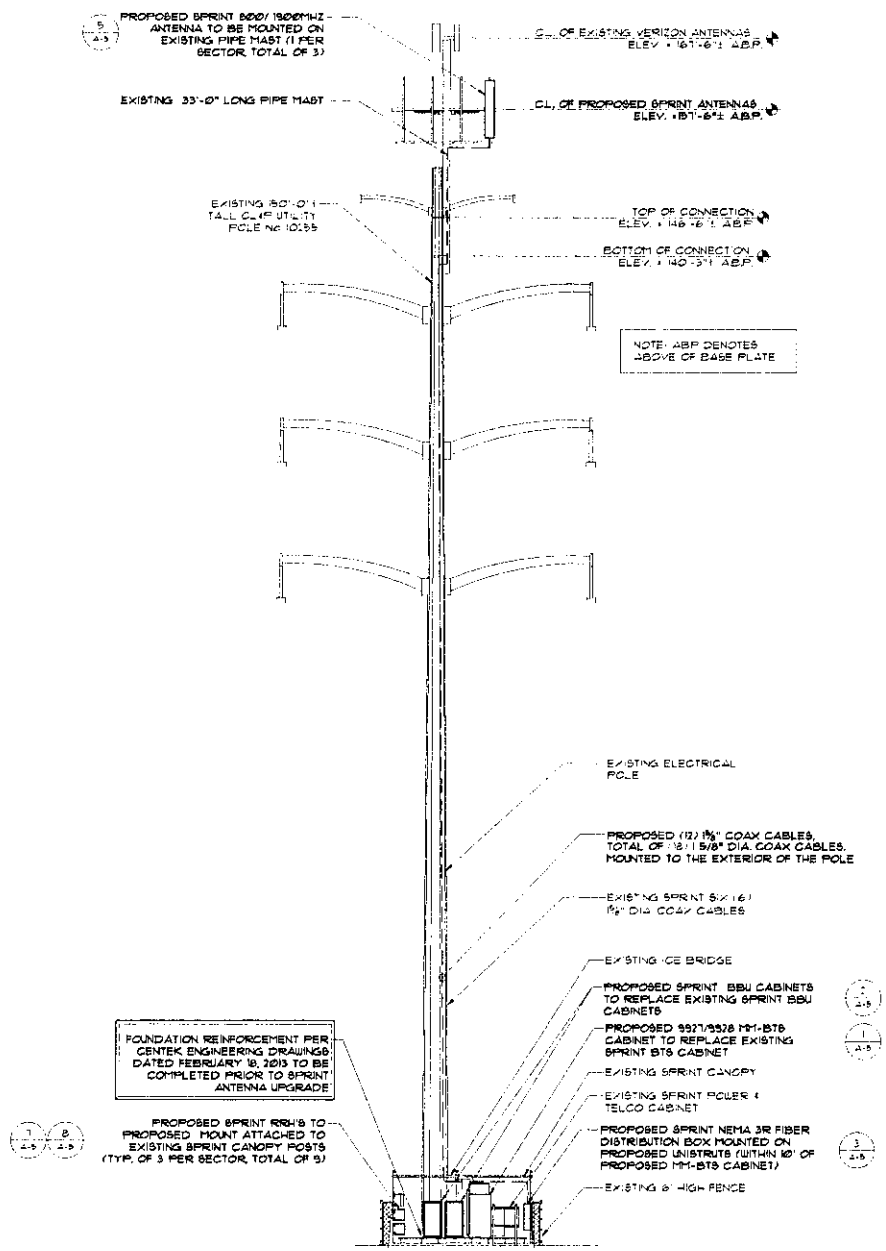
SHEET TITLE:
COMPOUND PLAN

SALIENT PROJ. NO: CT03XC35

DATE

CHECKED BY: AD

SHEET NO



ANTENNA CONFIGURATION NOTE

ALL EXISTING CDMA ANTENNAS TO BE REMOVED / REPLACED WITH NETWORK VISION ANTENNAS FOR FINAL CONFIGURATION.

ANTENNA SEPARATION TO BE FIELD VERIFIED BY THE GENERAL CONTRACTOR.

NOTES:

SEE UTILITY POLE NOTES ON GN-2

1 ELEVATION

SCALE = 1/8"=1'-0"

Sprint

1 INTERNATIONAL BLVD, SUITE 600
MAHWAH, NJ 07495
P: 800-357-7641

Alcatel·Lucent

600 - 700 MOUNTAIN AVE.
MURRAY HILL, NJ 07974

Salient ARCHITECTS, LLC

8 East Palisade Avenue
Englewood, NJ 07631
P: 201-567-0032 F: 201-567-9556

PAUL CIONFRIDDO P.E.
CT # 19860

SUBMITTALS

NO	DATE	DESCRIPTION	BY
1	4/26/13	PRELIMINARY	PJC
2	06/27/13	REVISED PER COMMENTS	JHP
3	09/24/13	ISSUED AS FINAL	FS

SITE NUMBER
CT03XC351

SITE NAME
BETHEL CL-P
POLE# 10255

SITE ADDRESS
8 SKY EDGE LANE
BETHEL, CT 06801

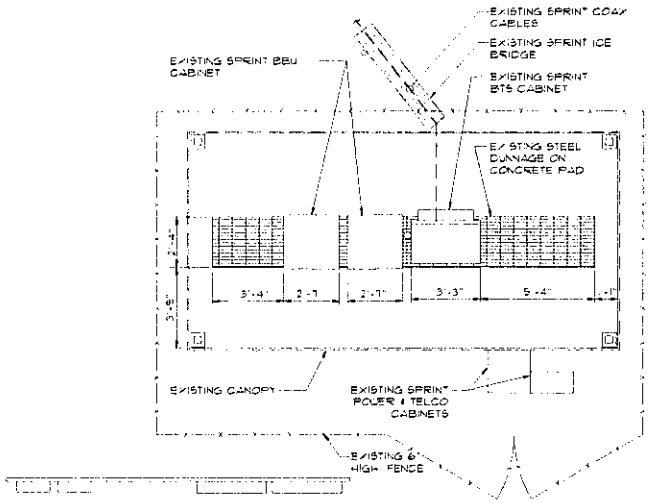
SHEET TITLE
ELEVATION

SALIENT PROJ. NO
CT03XC351

DATE

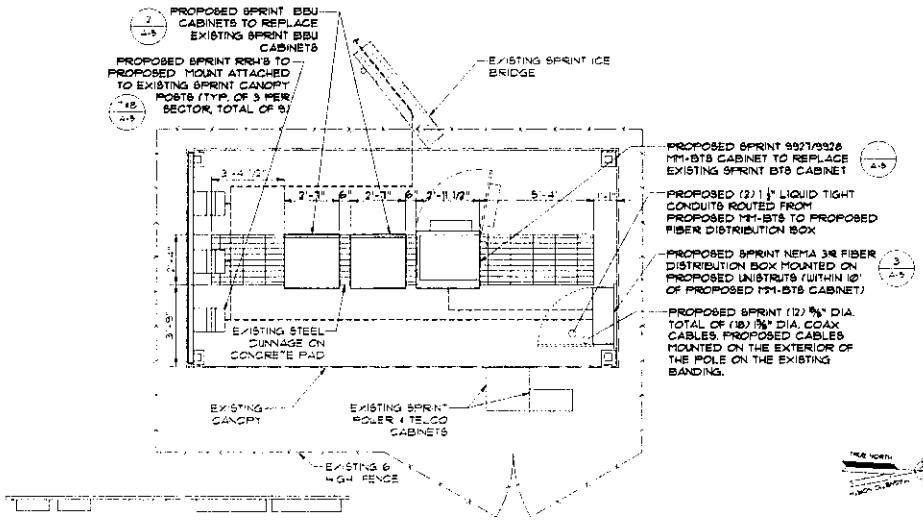
CHECKED BY
JHP

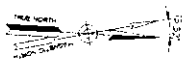
SHEET NO:
A-2



1 ENLARGED EXISTING EQUIPMENT CABINET LAYOUT

SCALE = 3/8"=1'-0"





EQUIPMENT CABINET CONFIGURATION	
EXISTING LAYOUT	2 CABINETS
PROPOSED LAYOUT	3 CABINETS

2 ENLARGED FINAL EQUIPMENT CABINET LAYOUT

SCALE = 3/8"=1'-0"

Sprint

1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
P: 800-357-7641

Alcatel·Lucent

600 - 700 MOUNTAIN AVE.
MURRAY HILL, NJ 07974

Salient ARCHITECTS, LLC

8 East Palisade Avenue
Englewood, NJ 07631
P: 201-587-0002 - F: 201-587-0566

DATE: SIGNATURE PE
CT # 13868

SUBMITTALS

NO	DATE	DESCRIPTION	BY
	4-26-12	PRELIMINARY	PJP
2	06-12-12	REVISED PER COMMENTS	JWP
3	09-24-12	ISSUED AS FINAL	AS

SITE NUMBER
CT03XC351

SITE NAME
BETHEL CL+P
POLE# 10255

SITE ADDRESS
8 SKY EDGE LANE
BETHEL, CT 06801

SHEET TITLE
ENLARGED EQUIPMENT CABINET LAYOUT

SALIENT PROJ. NO
CT03XC351

DATE

CHECKED BY
JWP

SHEET NO
A-3

Northeast Utilities System

107 Selden Street, Berlin, CT 06037

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

September 19, 2013

Ms. Jennifer Gaudet
HPC Development

Sprint,
1 International Blvd.
Suite 300
Mahwah NJ
07495

RE: Sprint Antenna Site, CT-03XC351, 8 Sky Edge Lane, Bethel CT, structure 10255.

Dear Ms. Gaudet:

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

Since there are no outstanding structural issues to resolve at this time please contact Mr. O'Brien (860-665-6987) to resolve any lease issues; once the lease amendment is secured you may then contact Mr. John Landry directly (860-665-5425) to begin the construction arrangements.

Sincerely,

Robert Gray
Transmission Line Engineering

REF: NV_CT03XC351_Issued as Final CD_V3_PE S&S(2).pdf
CL-P Pole 10255 Foundation Improvements Design - Rev-2 04.1.13(2).pdf
12047.CO3 - CT03XC351.pdf

CENTEK engineering

Centered on Solutions℠

Structural Analysis of PCS Structure and CL&P Pole

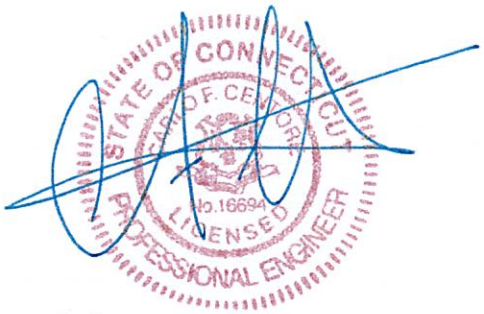
Sprint Site Ref: CT03XC351

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

Sky Edge Lane
Bethel, CT

CENTEK Project No. 12047.CO3

Date: February 18, 2013



Prepared for:
Sprint Nextel
8 Airline Drive, Suite 105
Albany, NY 12205

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

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 Sprint.

The proposed loads consist of the following:

- VERIZON (EXISTING/RESERVED):

  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.

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

- SPRINT (Existing to Remain):

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

- SPRINT (Existing to Remove):

  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.

- **SPRINT (PROPOSED):**

  Antennas: Three (3) RFS APXVSPP18-C 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: Twelve (12) 1-5/8" ∅ coax cables running on the outside of the existing tower as indicated in section 4 of this report.

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.

Analysis

Structural analysis of the existing *PCS Mast Structure* was independently completed using the current version of RISA-3D computer program licensed to CENTEK 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.

Design Basis

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, Section25, 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.

Results

PCS MAST

The proposed mast was determined to be structurally adequate.

Member	Stress Ratio (% of capacity)	Result
12" Sch. 80 Pipe	73.5% [1]	**PASS**
Flange Plate	71.3% [2]	**PASS**
PCS Mast to Pole Connection Bolts	49.6% [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 **97.5%** 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)	95.68%	**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	97.5%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 8-ft ∅ x 20.5-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (24) 2.25"∅, 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	33.73 kips	121.21 kips	4170.18 ft-kips
NESC Extreme Wind	53.58 kips	59.23 kips	6039.79 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	57.9%	**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	1.54	**PASS**

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

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 Sprint equipment upgrade.

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

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 18884
LICENSED
PROFESSIONAL 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, Marino\WARE
- Wood Shapes: Complete NDS species/grade database
- Full seamless integration with RISAFoot (Ver 2 or better) for advanced footing design and detailing
- Plate force summation tool

Results Features:

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM~PLS-POLE

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

Modeling Features:

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

Analysis Features:

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

Results Features:

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

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

Introduction

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

ANSI Standard TIA/EIA-222 covering the design of telecommunications structures specifies a working strength/allowable stress design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed some defined percentage of failure strength (allowable stress).

ANSI Standard C2-2007 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

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

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

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

Note 1: Prepared from documentation provide from Northeast Utilities.

PCS Mast

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

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

ELECTRIC TRANSMISSION TOWER

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

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

The uniform loadings and factors specified for the above components in the table are based upon the National Electrical Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to TIA and its loads and factors with the exceptions noted above. (Note that the NESC does not require the projected wind surfaces of structures and equipment to be increased by the ice covering.)

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

Attachment A

NU Design Criteria

			Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (.75Wi)	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
Ice Condition	NESC Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)	----	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
Ice Condition	NESC Heavy	Tower/Pole Analysis with Antennas below top of Tower/Pole (on two faces)	----	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
Ice Condition	NESC Heavy	Conductors:	Conductor loads provided by NU					
High Wind Condtion	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
High Wind Condtion	NESC Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
High Wind Condtion	NESC Extreme Wind	Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
High Wind Condtion	NESC Extreme Wind	Conductors:	Conductor loads provided by NU					
NESC Extreme Ice with Wind Conditon*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
NESC Extreme Ice with Wind Conditon*		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
NESC Extreme Ice with Wind Conditon*		Conductors:	Conductor loads provided by NU					
		* Only for Structures Installed after 2007						

Shape Factor Criteria shall be per TIA Shape Factors.

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

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

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

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

c) Electric Transmission Structure

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

ii) Shape Factor Multiplier:

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

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

Mount Type	Cable Cd	Pole Cd
Coaxial Cables on outside periphery (One layer)	1.45	1.45
Coaxial Cables mounted on stand offs	1.6	1.3

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

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

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

Northeast Utilities System

Job :	Spec. Number	Page	of
Description:	Computed by	Sheet	of
		Date	10/25/10
	Checked by	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	1272.000	1272.000	2 Number of Conductors per phase
	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:

					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**

Northeast Utilities System

Job :	Spec. Number	Page	of
Description:	Computed by	Sheet	of
		Date	10/25/10
	Checked by	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!	4,600 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

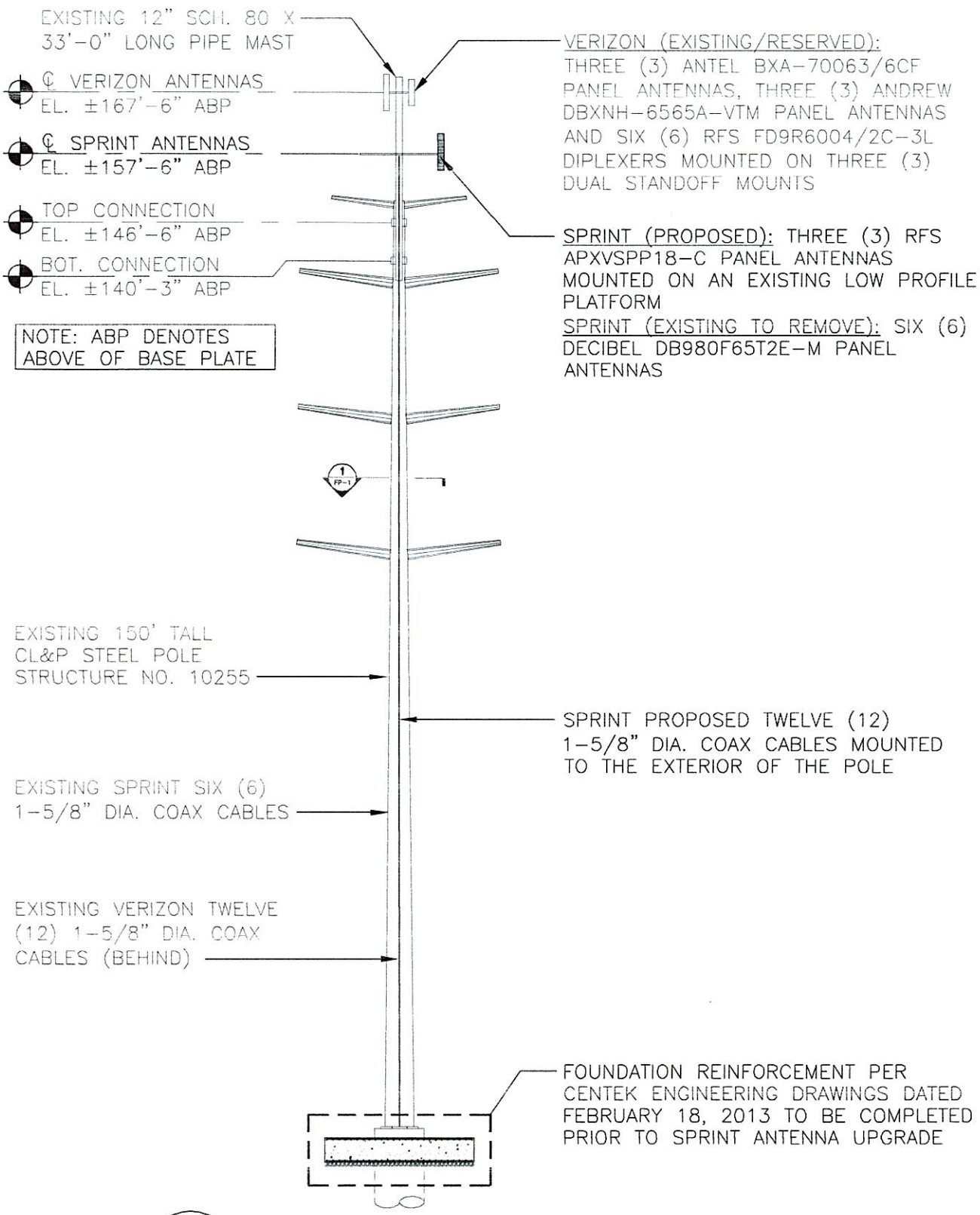
	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	365 lb
Conductor =	0 lb	0 lb	3,998 lb

Northeast
Utilities System

Job :	Spec. Number	Page	of
Description:	Computed by	Sheet	of
	Checked by	Date	10/25/10
		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**



1 / EL-1

TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

REVISIONS		
00	2/18/13	ISSUED FOR NU REVIEW

CENTEK engineering
Centered on Solutions™
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(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road, Branford, CT 06405

CT03XC351
CL&P 10255

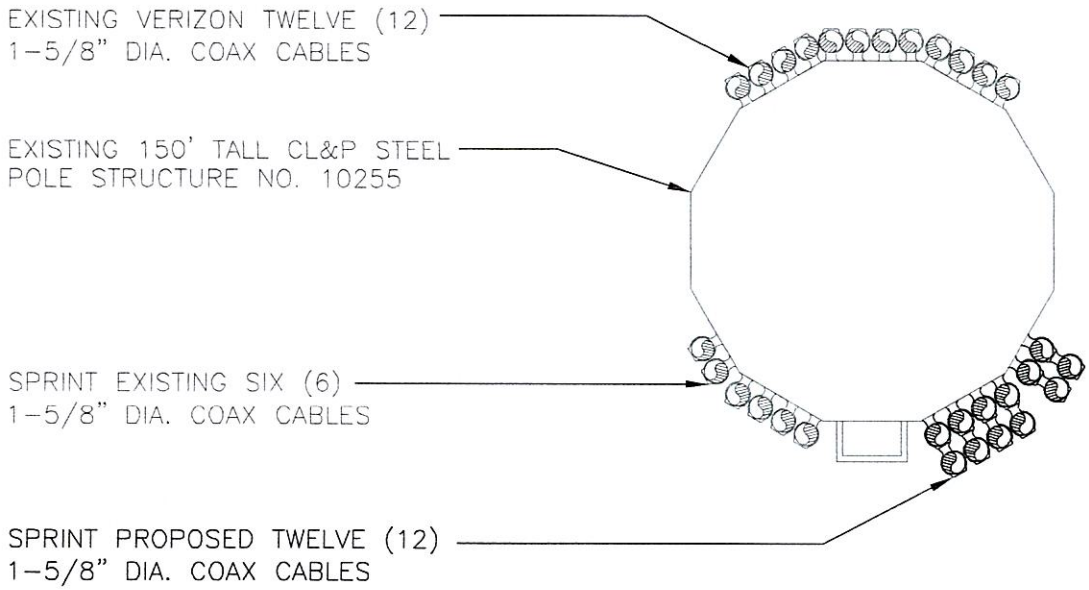
SKY EDGE LANE
BETHEL, CT 06801

PROJECT NO:	12047.CO3
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	2/12/13

TOWER AND MAST ELEVATION

EL-1

DWG. 1 OF 2



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FP-1

FEEDLINE PLAN - TOWER

SCALE: NOT TO SCALE

REVISIONS		
00	2/18/13	ISSUED FOR NU REVIEW

CENTEK engineering
Centered on Solutions™
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63-2 North Branford Road, Branford, CT 06405

CT03XC351
CL&P 10255

SKY EDGE LANE
BETHEL, CT 06801

PROJECT NO:	12047.CO3
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	2/12/13

FEEDLINE PLAN

FP-1

DWG. 2 OF 2

EBI Consulting

environmental | engineering | due diligence

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

Sprint Existing Facility

Site ID: CT03XC351

Bethel NU Pole # 10255
8 Sky Drive
Bethel, CT 06801

May 24, 2013

EBI Project Number: 62136519

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

EBI Consulting
environmental | engineering | due diligence

May 24, 2013

Sprint
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Re: Emissions Values for Site: **CT03XC351 – Bethel NU Pole # 10255**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 8 Sky Drive, Bethel, CT, for the purpose of determining whether the emissions from the proposed Sprint equipment upgrades on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the cellular band is approximately 567 $\mu W/cm^2$, and the general population exposure limit for the PCS band is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed upgrades to the existing Sprint Wireless antenna facility located at 8 Sky Drive, Bethel, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario. Actual values seen from this site will be dramatically less than those shown in this report. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all emissions were calculated using the following assumptions:

1) 5 CDMA Carriers (1900 MHz) were considered for each sector of the proposed installation.
2) 1 CDMA Carrier (850 MHz) was considered for each sector of the proposed installation
3) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
4) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
5) The antenna used in this modeling is the APXVSPP18-C-A20. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario.

6) The antenna mounting height centerline of the proposed antennas is **157.5 feet** above ground level (AGL)
7) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

Site ID	CT03XC351 - Bethel NU Pole # 10255
Site Addresss	8 Sky Drive, Bethel, CT, 06801
Site Type	Utility Transmission Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	5	100	15.9	157.5	151.5	1/2 "	0.5	0	3467.3685	54.31011	5.43101%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	157.5	151.5	1/2 "	0.5	0	389.96892	6.108164	1.07728%
														Sector total Power Density Value:		6.508%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	5	100	15.9	157.5	151.5	1/2 "	0.5	0	3467.3685	54.31011	5.43101%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	157.5	151.5	1/2 "	0.5	0	389.96892	6.108164	1.07728%
														Sector total Power Density Value:		6.508%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	5	100	15.9	157.5	151.5	1/2 "	0.5	0	3467.3685	54.31011	5.43101%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	157.5	151.5	1/2 "	0.5	0	389.96892	6.108164	1.07728%
														Sector total Power Density Value:		6.508%	

Site Composite MPE %	
Carrier	MPE %
Sprint	19.525%
Verizon Wireless	13.690%
Total Site MPE %	**33.215%**

Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **19.525% (6.508% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **33.215%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions

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

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

Exposure Coefficients, kz

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

Mast $$Kz_{mast} := \left(\frac{z_{mast}}{33}\right)^{\frac{2}{7}} = 1.551$$

Verizon $$Kz_{vz} := \left(\frac{z_{vz}}{33}\right)^{\frac{2}{7}} = 1.591$$

Sprint $$Kz_{sprt} := \left(\frac{z_{sprt}}{33}\right)^{\frac{2}{7}} = 1.563$$

Coax Cable $$Kz_{coax} := \left(\frac{z_{coax}}{33}\right)^{\frac{2}{7}} = 1.551$$

Velocity Pressure without ice, qz

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

Mast $$qz_{mast} := 0.00256 \cdot Kz_{mast} \cdot V^2 = 28.696$$

Verizon $$qz_{vz} := 0.00256 \cdot Kz_{vz} \cdot V^2 = 29.42$$

Sprint $$qz_{sprt} := 0.00256 \cdot Kz_{sprt} \cdot V^2 = 28.908$$

Coax Cable $$qz_{coax} := 0.00256 \cdot Kz_{coax} \cdot V^2 = 28.696$$

Velocity Pressure with ice, qzICE (per TIA/EIA-222-F Section 2.3.3)

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

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

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

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

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 =	$Ir := 0.50$	in	(User Input per TIA/EIA-222-F Section 2.3.1)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)

Development of Wind & Ice Load on PCS Mast (per TIA/EIA-222-F-1996 Criteria)

Mast Data: (Pipe 12.0" SCH. 80) (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 12.8$ in (User Input)

Mast Length = $L_{mast} := 33$ ft (User Input)

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

Mast Aspect Ratio = $Ar_{mast} := \frac{12 L_{mast}}{D_{mast}} = 30.9$

Mast Force Coefficient = $Ca_{mast} = 1.2$ (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 = $A_{mast} := \frac{D_{mast}}{12} = 1.067$

Total Mast Wind Force = $qz_{mast} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 62$ plf **BLC 5**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 1.15$

Total Mast Wind Force w/ Ice = $qzICE_{mast} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 51$ 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 = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^2\right] = 20.9$ sq in

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

Development of Wind & Ice Load on Antennas	(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**
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 =	$Fi_{ant} := qzICE_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 965$	lbs	**BLC 4**
Gravity Load (without ice)			
Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 51$	lbs	**BLC 2**
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 =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1311$	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**

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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 12.6$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 875$	lbs	**BLC 5**

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 =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 13.9$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qzICE_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 733$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 103$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4283$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1120$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 36$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 109$	lbs	**BLC 3**

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**

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 =	$Fi_{dplx} := qzICE_{vz} \cdot G_H \cdot Ca_{dplx} \cdot A_{ICEdplx} = 112$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Diplexers =	$WT_{dplx} \cdot N_{dplx} = 18$	lbs	**BLC 2**

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 =	$V_{ice} := (L_{dplx} + 1)(W_{dplx} + 1) \cdot (T_{dplx} + 1) - V_{dplx} = 71$	cu in	
Weight of Ice on Each Diplexer =	$W_{ICEdplx} := \frac{V_{ice}}{1728} \cdot ld = 2$	lbs	
Weight of Ice on All Diplexers =	$W_{ICEdplx} \cdot N_{dplx} = 14$	lbs	**BLC 3**

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 = $F_{plt} := qz_{vz} \cdot G_H \cdot A_{plt} = 348$ lbs **BLC 5**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force w/ Ice = $Fi_{plt} := qzICE_{vz} \cdot G_H \cdot A_{ICE.plt} = 377$ 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 =	RFS APX VSPP18-C		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 11.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 57$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 6.1$		
Antenna Force Coefficient =	$Ca_{ant} = 1.4$		(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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.9$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 17.7$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{sprt} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 1211$	lbs	**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 =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.5$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 19.5$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qzICE_{sprt} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 1009$	lbs	**BLC 4**

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5947$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1528$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 50$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 149$	lbs	**BLC 3**

Development of Wind & Ice Load on 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 =	$F_{plt} := qz_{sprt} \cdot G_H \cdot A_{plt} = 977$	lbs	**BLC 5**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force w/ Ice =	$Fi_{plt} := qzICE_{sprt} \cdot G_H \cdot A_{ICE.plt} = 926$	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: (Bottom Mast to Sprint Antennas)

Coax Type =	HELIAX 1-5/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)
Coax Cable Length =	$L_{coax} := 31$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 30$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 4$		(User Input)
Coax aspect ratio,	$Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 187.9$		
Coax Cable Force Factor Coefficient =	$Ca_{coax} = 1.2$	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 =	$A_{coax} := \frac{NP_{coax} \cdot D_{coax}}{12} = 0.7$	ft	
Total Coax Wind Force =	$F_{coax} := Ca_{coax} \cdot qz_{coax} \cdot G_H \cdot A_{coax} = 38$	plf	BLC 5

Wind Load (with ice) — per TIA/EIA-222-F-96 Section 2.3.2

Coax projected surface area w/ Ice =	$AICE_{coax} := \frac{NP_{coax} \cdot (D_{coax} + 2 \cdot Ir)}{12} = 1$	ft	
Total Coax Wind Force w/ Ice =	$Fi_{coax} := Ca_{coax} \cdot qzICE_{coax} \cdot G_H \cdot AICE_{coax} = 44$	plf	BLC 4

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot =	$Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot Ir)^2 - D_{coax}^2\right] = 3.9$	sq in	
Ice Weight All Coax per foot =	$WTi_{coax} := Id \cdot \left(N_{coax} \cdot \frac{Ai_{coax}}{144}\right) = 45$	plf	BLC 3

Development of Wind & Ice Load on Coax Cables — per TIA/EIA-222-F-96 Criteria

Coax Cable Data: (Above Sprint Antennas)

Coax Type = HELIAX 1-5/8"

Shape = Round (User Input)

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

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

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

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

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

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

Coax Cable Force Factor Coefficient = $Ca_{coax} = 1.2$ 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 = $A_{coax} := \frac{NP_{coax} \cdot D_{coax}}{12} = 0.3$ ft

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

Wind Load (with ice) — per TIA/EIA-222-F-96 Section 2.3.2

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

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qzICE_{coax} \cdot G_H \cdot AICE_{coax} = 22$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

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

Ice Weight All Coax per foot = $WTi_{coax} := Id \cdot \left(N_{coax} \cdot \frac{Ai_{coax}}{144}\right) = 18$ plf **BLC 3**

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

Subject: **Analysis of TIA/EIA Wind and Ice Loads for Analysis of Mast Only**
Tabulated Load Cases

Location: **Bethel, CT**

Date: 2/4/13 Prepared by: T.J.L. Checked by: C.F.C. Job No. 12047.CO3

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

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Subject: **Analysis of TIA/EIA Wind and Ice Loads for Analysis of Mast Only**
Load Combinations Table

Location: **Bethel, CT**

Date: 2/4/13 Prepared by: T.J.L. Checked by: C.F.C. Job No. 12047.CO3

Load Combination	Description	Envelope Soultion	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
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

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
Parme 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	Lengt...	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	-.171	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	-.149	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	1.009	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	1.211	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	-.031	-.031	0	0
2	M2	Y	-.031	-.031	0	6.5
3	M2	Y	-.012	-.012	6.5	16.5

Member Distributed Loads (BLC 3 : Weight of Ice Only 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	-.045	-.045	0	0
4	M2	Y	-.045	-.045	0	6.5
5	M2	Y	-.018	-.018	6.5	16.5

Member Distributed Loads (BLC 4 : 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,%]
1	M1	X	.051	.051	0	0
2	M2	X	.051	.051	0	0
3	M1	X	.044	.044	0	0
4	M2	X	.044	.044	0	6.5
5	M2	X	.022	.022	6.5	16.5

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	.038	.038	0	0
4	M2	X	.038	.038	0	6.5
5	M2	X	.019	.019	6.5	16.5

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	3		
3	Weight of Ice Only on PCS Struct	None					6	5		
4	TIA/EIA Wind with Ice on P	None					6	5		
5	TIA/EIA Wind on PCS Struct	None					6	5		

Load Combinations

	Description	So...	PDelta	SRSS	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..
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	.411	1	-13.905	1	0	1	0	1	0	1	4.454	2
4			min	.261	2	-15.717	2	0	1	0	1	0	1	3.975	1
5		3	max	-.061	2	-14.238	1	0	1	0	1	0	1	60.076	2
6			min	-.096	1	-16.067	2	0	1	0	1	0	1	53.225	1
7		4	max	6.152	1	6.638	2	0	1	0	1	0	1	92.024	2
8			min	4.218	2	5.929	1	0	1	0	1	0	1	81.499	1
9		5	max	5.645	1	6.288	2	0	1	0	1	0	1	69.403	2
10			min	3.897	2	5.597	1	0	1	0	1	0	1	61.328	1
11	M2	1	max	5.645	1	6.288	2	0	1	0	1	0	1	69.403	2
12			min	3.897	2	5.597	1	0	1	0	1	0	1	61.328	1
13		2	max	4.957	1	5.813	2	0	1	0	1	0	1	40.663	2
14			min	3.46	2	5.146	1	0	1	0	1	0	1	35.814	1
15		3	max	2.087	1	3.207	2	0	1	0	1	0	1	20.658	2
16			min	1.41	2	2.826	1	0	1	0	1	0	1	18.149	1
17		4	max	1.617	1	2.822	2	0	1	0	1	0	1	6.339	2
18			min	1.063	2	2.479	1	0	1	0	1	0	1	5.552	1

Envelope Member Section Forces (Continued)

	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
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	1
2			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
3		2	max	.023	1	-1.554	1	0	1	-.897	1	1.005	2	0	1	0	1
4			min	.015	2	-1.756	2	0	1	-1.005	2	.897	1	0	1	0	1
5		3	max	-.003	2	-1.591	1	0	1	-12.011	1	13.557	2	0	1	0	1
6			min	-.005	1	-1.795	2	0	1	-13.557	2	12.011	1	0	1	0	1
7		4	max	.344	1	.742	2	0	1	-18.391	1	20.766	2	0	1	0	1
8			min	.236	2	.663	1	0	1	-20.766	2	18.391	1	0	1	0	1
9		5	max	.315	1	.703	2	0	1	-13.84	1	15.662	2	0	1	0	1
10			min	.218	2	.625	1	0	1	-15.662	2	13.84	1	0	1	0	1
11	M2	1	max	.315	1	.703	2	0	1	-13.84	1	15.662	2	0	1	0	1
12			min	.218	2	.625	1	0	1	-15.662	2	13.84	1	0	1	0	1
13		2	max	.277	1	.649	2	0	1	-8.082	1	9.176	2	0	1	0	1
14			min	.193	2	.575	1	0	1	-9.176	2	8.082	1	0	1	0	1
15		3	max	.117	1	.358	2	0	1	-4.096	1	4.662	2	0	1	0	1
16			min	.079	2	.316	1	0	1	-4.662	2	4.096	1	0	1	0	1
17		4	max	.09	1	.315	2	0	1	-1.253	1	1.43	2	0	1	0	1
18			min	.059	2	.277	1	0	1	-1.43	2	1.253	1	0	1	0	1
19		5	max	0	1	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	0	1

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	15.367	2	.918	1	0	1	0	1	0	1	0	1
2		min	13.573	1	.582	2	0	1	0	1	0	1	0	1
3	N3	max	-20.5	1	6.756	1	0	1	0	1	LOCKED		0	1
4		min	-23.055	2	4.601	2	0	1	0	1	LOCKED		0	1
5	Totals:	max	-6.927	1	7.674	1	0	1						
6		min	-7.688	2	5.184	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	.053	2	0	2	0	1	0	1	0	1	1.354e-3	2
2		min	.047	1	0	1	0	1	0	1	0	1	1.201e-3	1
3	N2	max	0	1	0	2	0	1	0	1	0	1	1.346e-3	2
4		min	0	2	0	1	0	1	0	1	0	1	1.193e-3	1
5	N3	max	0	2	0	2	0	1	0	1	0	1	-2.777e-3	1
6		min	0	1	0	1	0	1	0	1	0	1	-3.134e-3	2
7	N4	max	.34	2	0	2	0	1	0	1	0	1	-7.774e-3	1
8		min	.301	1	0	1	0	1	0	1	0	1	-8.78e-3	2
9	N5	max	3.506	2	-.001	2	0	1	0	1	0	1	-1.384e-2	1
10		min	3.1	1	-.002	1	0	1	0	1	0	1	-1.567e-2	2

Envelope AISC ASD Steel Code Checks

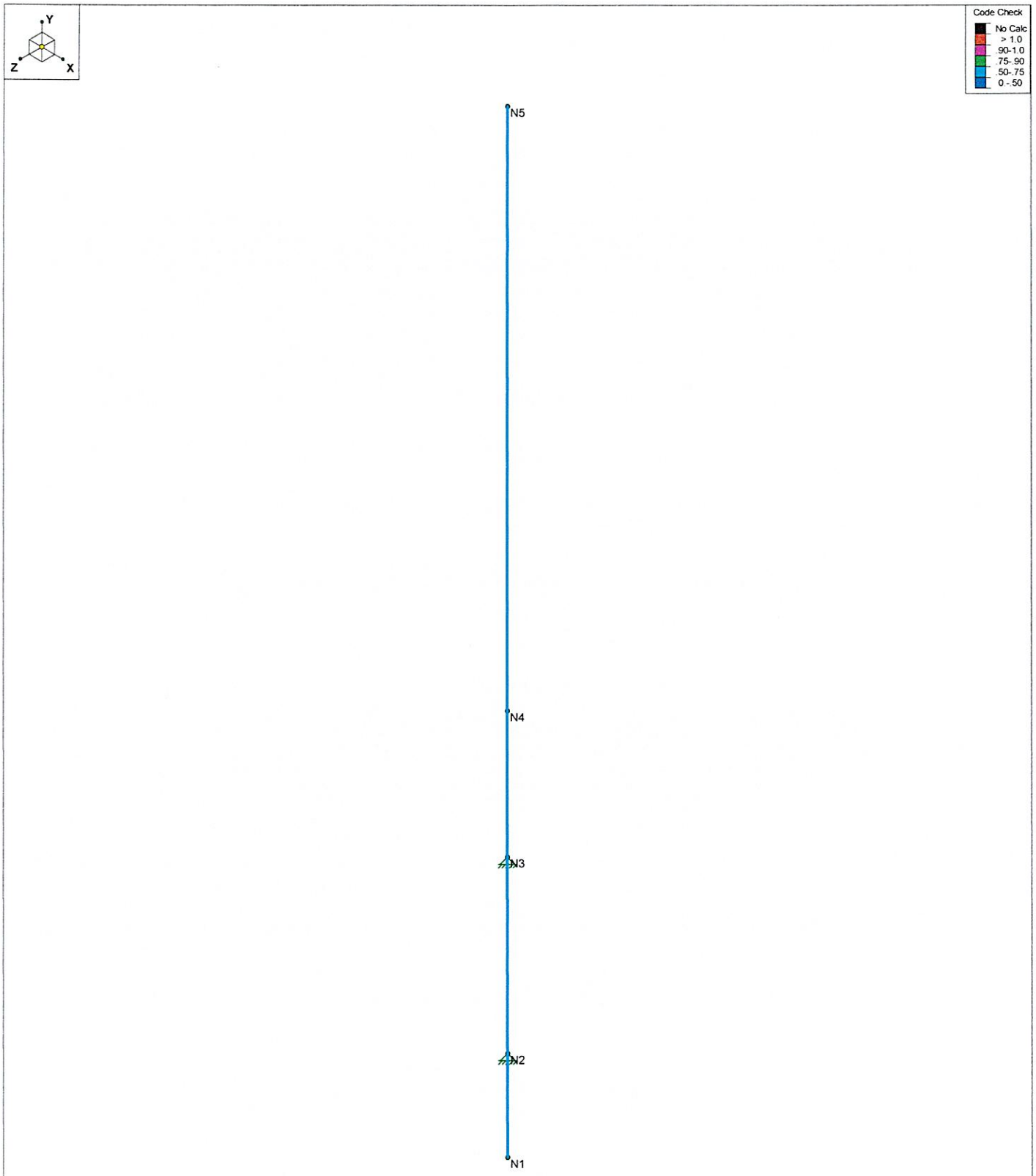
	Member	Shape	Code Check	Loc[ft]	LC	Sh...	Loc[ft]	.....	Fa...	Ft [ksi]	Fb y-y [ksi]	Fb.....	...	AS...
1	M1	PIPE_1...	.735	9.479	2	.098	9.333	2	25...	27.93	30.723	30...	1	.6	...	H1...
2	M2	PIPE_1...	.518	0	2	.038	0	2	23...	27.93	30.723	30...	...	.6	...	H1...

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	13.573	.918	0	0	0	0
2	1	N3	-20.5	6.756	0	0	LOCKED	0
3	1	Totals:	-6.927	7.674	0			
4	1	COG (ft):	X: 0	Y: 19.022	Z: 0			

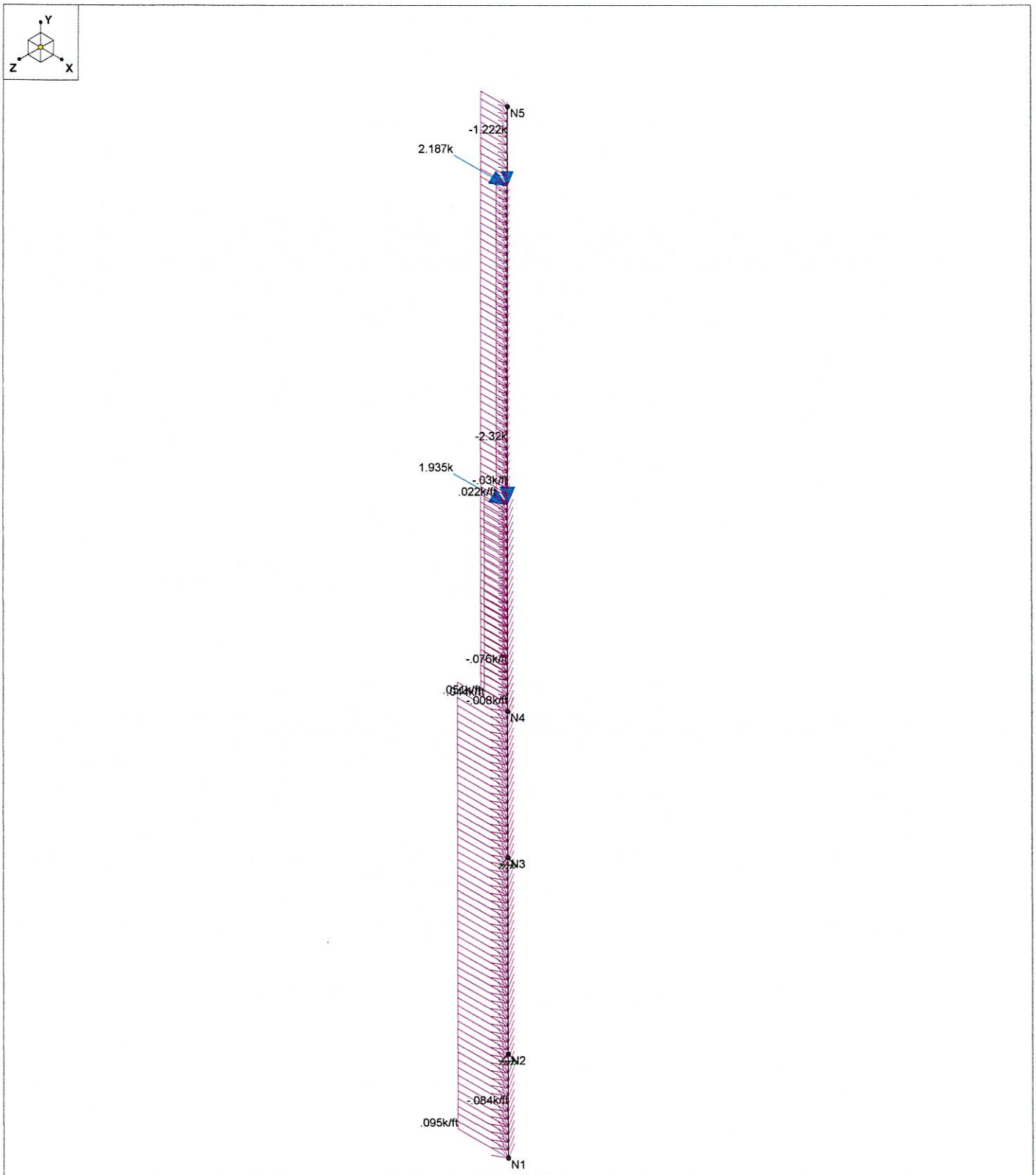
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	15.367	.582	0	0	0	0
2	2	N3	-23.055	4.601	0	0	LOCKED	0
3	2	Totals:	-7.688	5.184	0			
4	2	COG (ft):	X: 0	Y: 19.249	Z: 0			



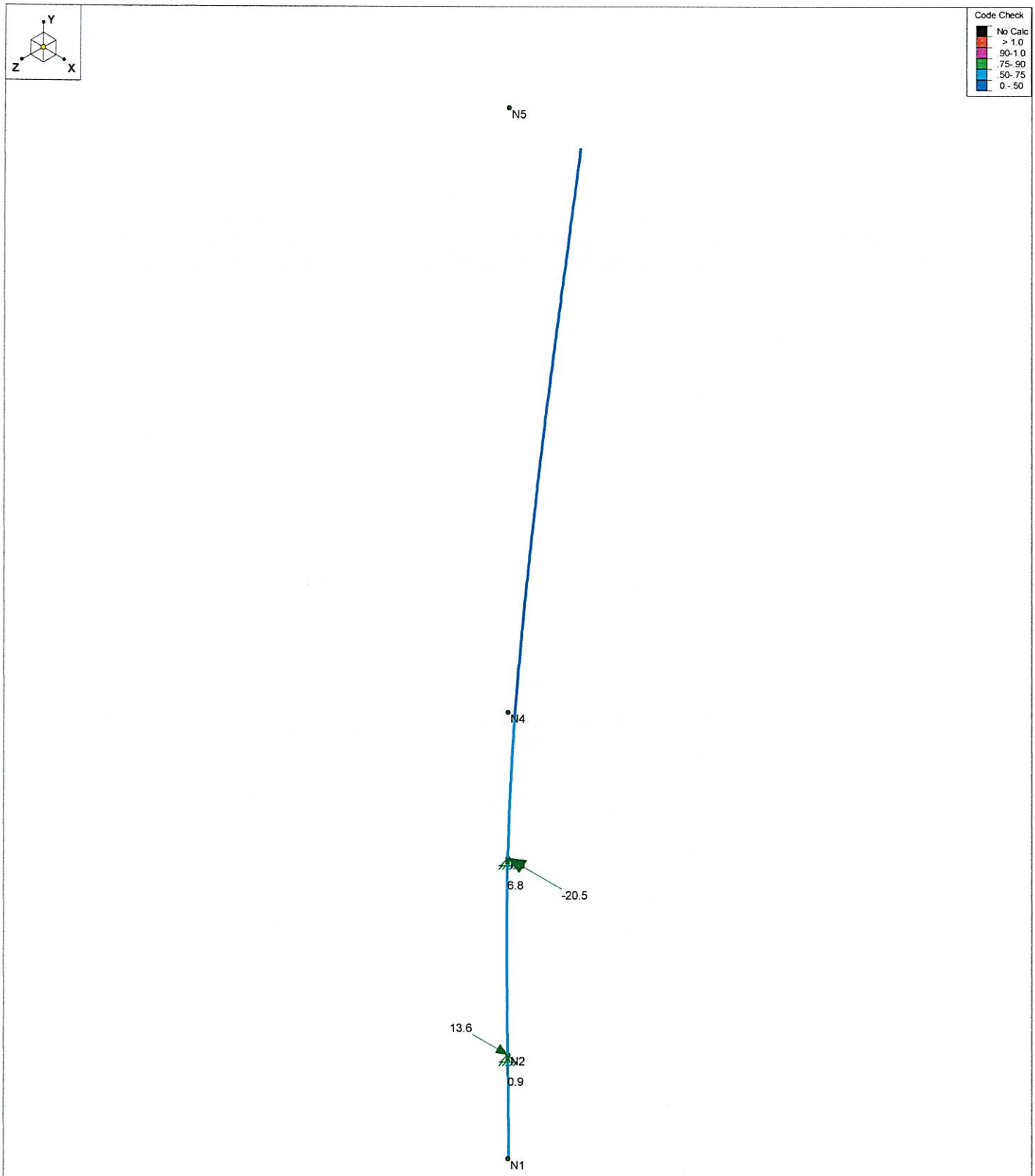
Solution: Envelope
Z-direction Reaction units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 4, 2013 at 4:17 PM
12047.CO3 - CT03XC351	Unity Check	EIA-TIA.r3d



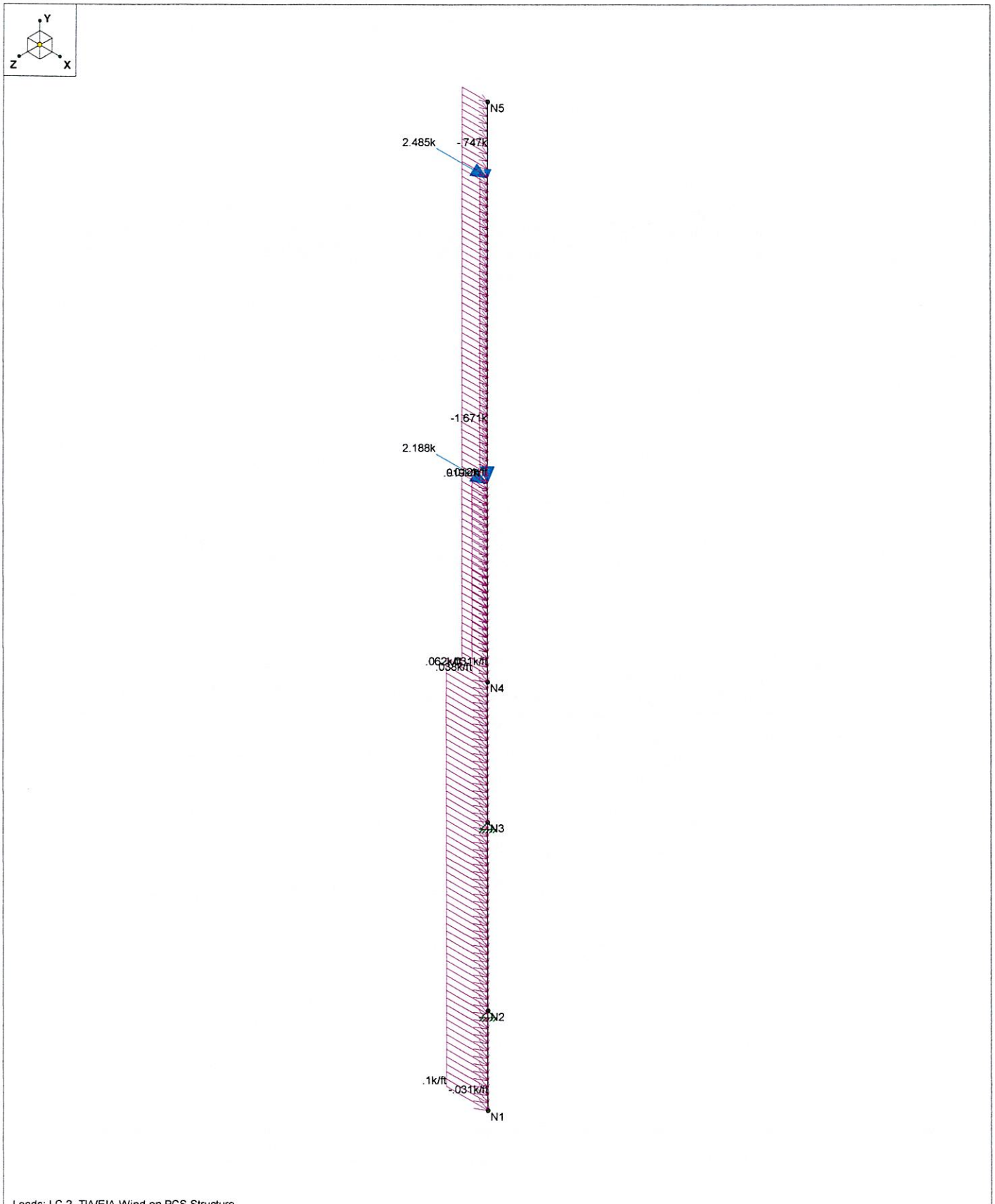
Loads: LC 1, TIA/EIA Wind + Ice on PCS Structure

CENTEK Engineering, INC.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 4, 2013 at 4:15 PM
12047.CO3 - CT03XC351	LC #1 Loads	EIA-TIA.r3d



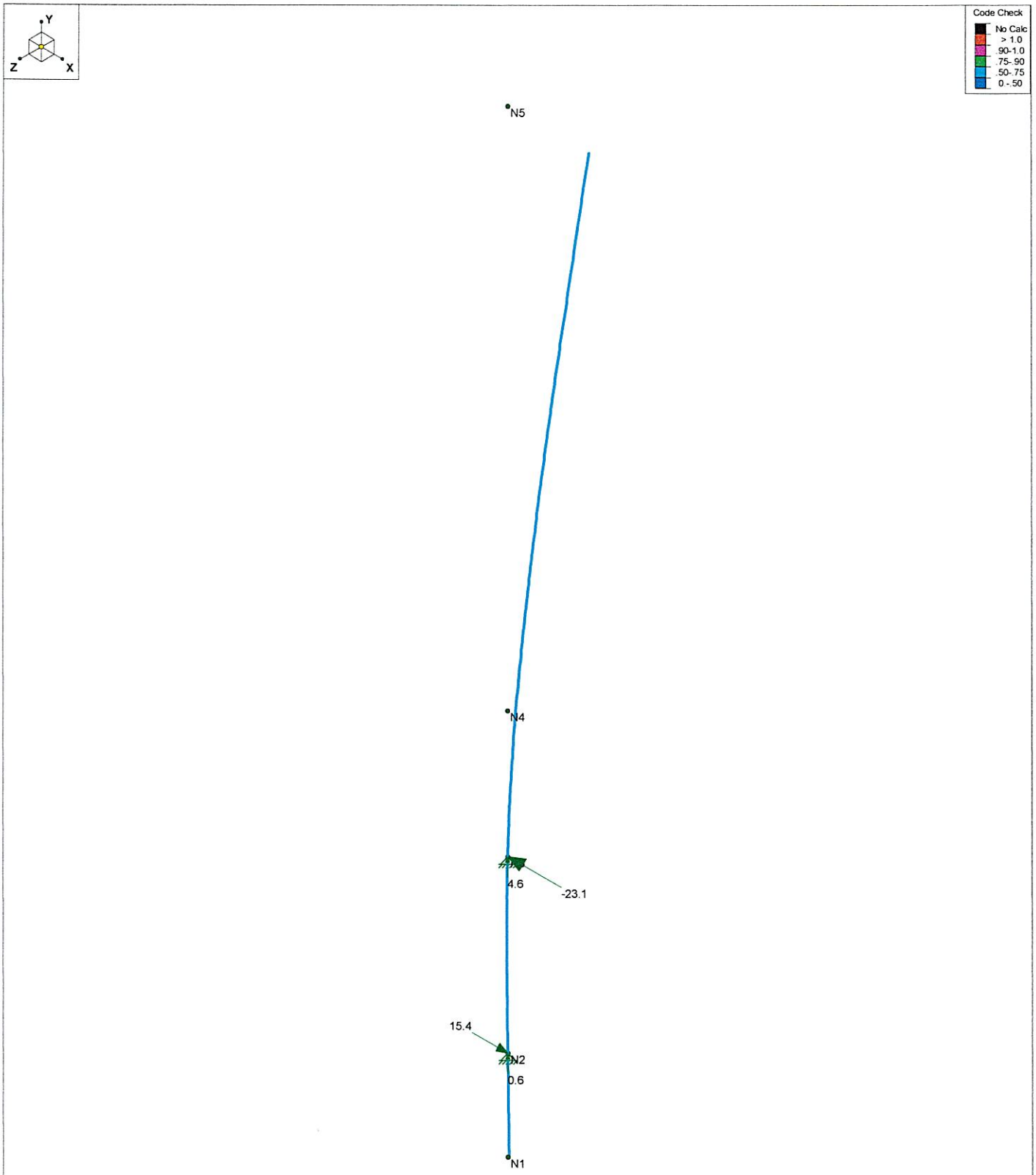
Results for LC 1, TIA/EIA Wind + Ice on PCS Structure
Z-direction Reaction units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 4, 2013 at 4:16 PM
12047.CO3 - CT03XC351	LC #1 Reactions and Deflected Shape	EIA-TIA.r3d



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

CENTEK Engineering, INC.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 4, 2013 at 4:15 PM
12047.CO3 - CT03XC351	LC #2 Loads	EIA-TIA.r3d

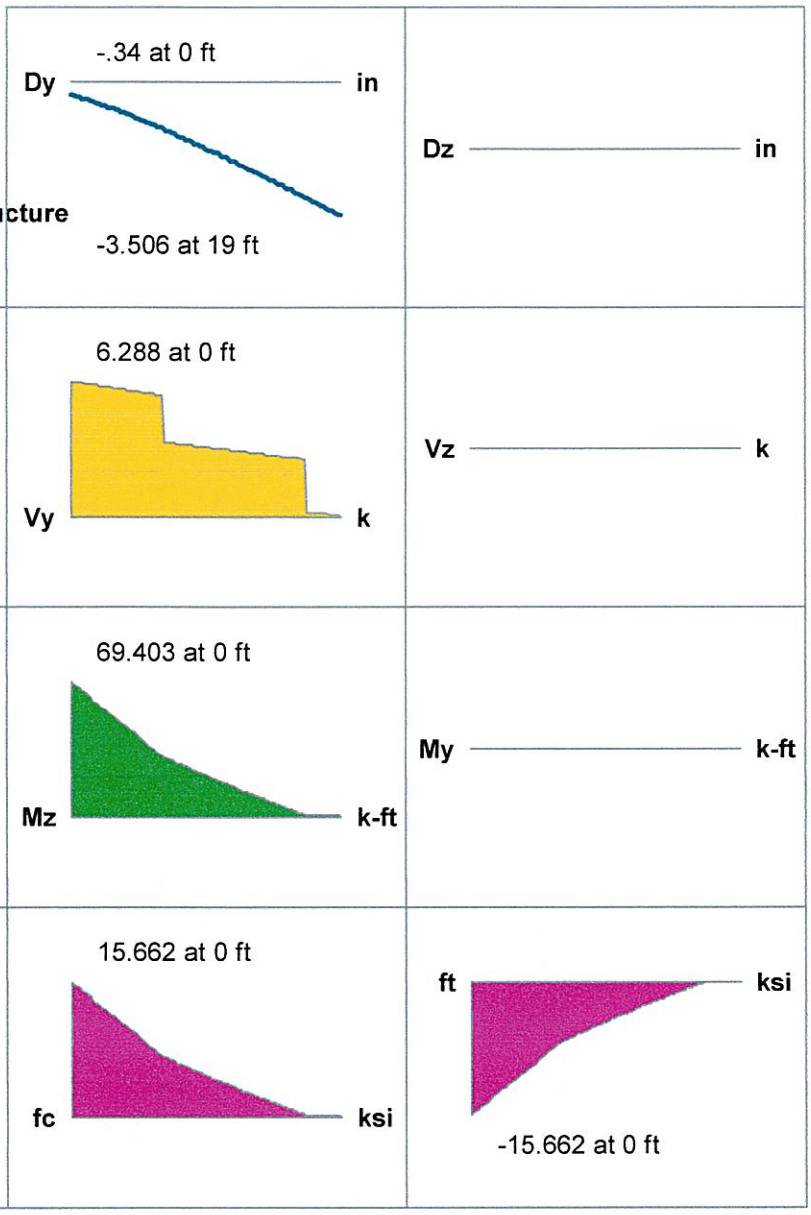


Results for LC 2, TIA/EIA Wind on PCS Structure
Z-direction Reaction units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 4, 2013 at 4:17 PM
12047.CO3 - CT03XC351	LC #2 Reactions and Deflected Shape	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: **0.518 (bending)**
Report Based On 97 Sections



AISC 9th: ASD Code Check

Max Bending Check	**0.518**	Max Shear Check	**0.038 (s)**
Location	**0 ft**	Location	**0 ft**
Equation	**H1-2**	Max Defl Ratio	**L/72**

Compact
Allowables Increase: **1.33**

			y-y	z-z
Fy	**35 ksi**			
Fa	**23.538 ksi**	Cm	**.6**	**.85**
Ft	**27.93 ksi**	Lb	**19 ft**	**19 ft**
Fby	**30.723 ksi**	KL/r	**52.392**	**52.392**
Fbz	**30.723 ksi**	Sway	**No**	**No**
Fvy	**18.62 ksi**			
Fvz	**18.62 ksi**	L Comp Flange	**19 ft**	
Cb	**1.75**	Torque Length	**NC**	

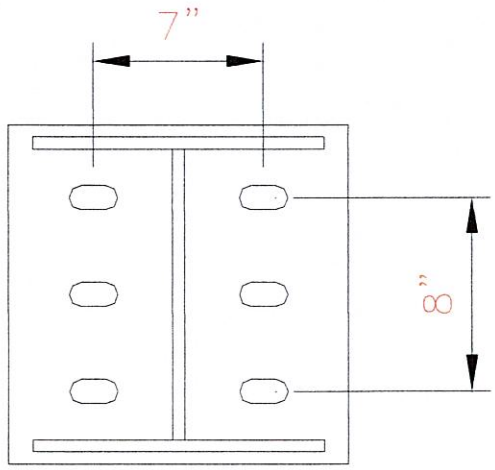
Mast Connection to CL&P Pole:

Maximum Design Reactions at Brace:

Vertical =	$Vert := 4.6 \cdot kips$	(User Input)
Horizontal =	$Horz := 23.1 \cdot kips$	(User Input)
Moment =	$Moment := 0$	(User Input)

Bolt Data:

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



Check Bolt Stresses:

Wind Acting Parallel to Bolts:

Shear Force per Bolt = $F_{v.conn} := \frac{Vert}{n_b} = 0.767 \cdot kips$

Shear Stress per Bolt = $F_{v.act} := \frac{F_{v.conn}}{a_b} = 0.976 \cdot ksi$

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

Condition1 = "OK"

Allowable Tensile Stress Adjusted for Shear = $F_{t.adj} := \sqrt{F_{t.all}^2 - 4.39 \cdot F_{v.act}^2} = 43.95 \cdot ksi$ (AISC 9th Ed. Table J3.3)

Moment From Mast Eccentricity = $M_{par} := Vert \cdot e = 55.2 \cdot kips \cdot in$

Tension Force Each Bolt = $F_{tension.bolt} := \frac{Horz}{n_b} + \frac{M_{par}}{S_{vert} \cdot 2} = 7.3 \cdot kips$

Tension Stress Each Bolt = $F_{t.act} := \frac{F_{tension.bolt}}{a_b} = 9.3 \cdot ksi$

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

Condition2 = "OK"

Wind Acting Perpendicular to Bolts:

Shear Force per Bolt = $F_{v.conn} := \frac{\sqrt{Vert^2 + Horz^2}}{n_b} = 3.926 \cdot kips$

Shear Stress per Bolt = $F_{v.act} := \frac{F_{v.conn}}{a_b} = 5 \cdot ksi$

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

Condition3 = "OK"

Allowable Tensile Stress Adjusted for Shear = $F_{t.adj} := \sqrt{F_{t.all}^2 - 4.39 \cdot F_{v.act}^2} = 42.74 \cdot ksi$ (AISC 9th Ed. Table J3.3)

Moment from Mast Eccentricity = $M_{perp} := Horz \cdot e = 277 \cdot kips \cdot in$

Tension Force per Bolt = $F_{tension.conn} := \frac{M_{perp}}{S_{horz} \cdot 3} + \frac{M_{par}}{S_{vert} \cdot 2} = 16.65 \cdot kips$

Tension Stress Each Bolt = $F_{tension.act} := \frac{F_{tension.conn}}{a_b} = 21.199 \cdot ksi$

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

Condition4 = "OK"

Flange Bolt and Flange Plate Analysis:

Input Data:

Mast Reactions:

Overturning Moment =	$OM := 69.4 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 6.3 \cdot kips$	(Input From RisaTower)
Axial Force =	$Axial := 3.9 \cdot kips$	(Input From RisaTower)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	$N := 8$	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 17 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 120 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 92 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Flange Bolts =	$D := 1.0 \cdot in$	(User Input)
Threads per Inch =	$n := 8$	(User Input)

Flange Plate Data:

Use ASTM A36

Plate Yield Strength =	$Fy_{bp} := 36 \cdot ksi$	(User Input)
Flange Plate Thickness =	$t_{bp} := 1.00 \cdot in$	(User Input)
Flange Plate Diameter =	$D_{bp} := 20 \cdot in$	(User Input)
Outer Pole Diameter =	$D_{pole} := 12.8 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

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

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

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

$d_1 = 6.01 \cdot in$ $d_7 = -6.01 \cdot in$

$d_2 = 8.50 \cdot in$ $d_8 = -0.00 \cdot in$

$d_3 = 6.01 \cdot in$

$d_4 = 0.00 \cdot in$

$d_5 = -6.01 \cdot in$

$d_6 = -8.50 \cdot in$

Critical Distances For Bending in Plate:

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

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

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

$MA_2 = 2.10 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 0.00 \cdot in$

$MA_4 = 0.00 \cdot in$

$MA_5 = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$

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

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

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

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

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

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

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

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

Check Flange Bolt Tension Force:

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

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

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 57.9 \cdot \%$

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

Condition1 = "OK"

Flange Plate Analysis:

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

$C_1 = 17.8 \cdot kips$

$C_2 = 25.0 \cdot kips$

$C_3 = 17.8 \cdot kips$

$C_4 = 0.5 \cdot kips$

$C_5 = -16.8 \cdot kips$

$C_6 = -24.0 \cdot kips$

$C_7 = -16.8 \cdot kips$

$C_8 = 0.5 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} t_{bp}^2\right)} = 25.6 \cdot ksi$$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 35.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 71.3 \cdot \%$

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

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)

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

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

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

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

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

Shape Factors NUS Design Criteria Issued April 12, 2007

Shape Factor for Round Members =	$Cd_R := 1.3$	(User Input)
Shape Factor for Flat Members =	$Cd_F := 1.6$	(User Input)
Shape Factor for Coax Cables Attached to Outside of Pole =	$Cd_{coax} := 1.45$	(User Input)

Overload Factors NU Design Criteria Table

Overload Factors for Wind Loads:

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

Overload Factors for Vertical Loads:

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

Development of Wind & Ice Load on PCS Mast

PCS Mast Data: (Pipe 12.0' SCH. 80)

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

Wind Load (NESC Extreme)

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

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

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 1.15$

Total Mast Wind Force w/ Ice = $p \cdot Cd_R \cdot AICE_{mast} = 6$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^2\right] = 20.9$ sq in

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

Development of Wind & Ice Load on Antennas

Antenna Data: (Verizon)

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

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

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 992$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

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

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 18.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 117$ lbs **BLC 4**

Gravity Load (without ice)

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

Gravity Load (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 = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1311$ 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**

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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 12.6$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 752$	lbs	BLC 5

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 13.9$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 89$	lbs	BLC 4

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 103$	lbs	BLC 2

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 4283$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1120$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 36$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 109$	lbs 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 =	$SA_{dplx} := \frac{L_{dplx} \cdot W_{dplx}}{144} = 0.3$	sf	
Diplexer Projected Surface Area =	$A_{dplx} := SA_{dplx} \cdot N_{dplx} = 1.6$	sf	
Total Diplexer Wind Force =	$F_{dplx} := qz \cdot Cd_F \cdot A_{dplx} \cdot m = 94$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Diplexers Simultaneously

Surface Area for One Diplexer w/ Ice =	$SA_{ICEdplx} := \frac{(L_{dplx} + 1) \cdot (W_{dplx} + 1)}{144} = 0.4$	sf	
Diplexer Projected Surface Area w/ Ice =	$A_{ICEdplx} := SA_{ICEdplx} \cdot N_{dplx} = 2.1$	sf	
Total Diplexer Wind Force w/ Ice =	$Fi_{dplx} := p \cdot Cd_F \cdot A_{ICEdplx} = 14$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Diplexers =	$WT_{dplx} \cdot N_{dplx} = 18$	lbs	**BLC 2**

Gravity Load (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 =	$V_{ice} := (L_{dplx} + 1)(W_{dplx} + 1) \cdot (T_{dplx} + 1) - V_{dplx} = 71$	cu in	
Weight of Ice on Each Diplexer =	$W_{ICEdplx} := \frac{V_{ice}}{1728} \cdot Id = 2$	lbs	
Weight of Ice on All Diplexers =	$W_{ICEdplx} \cdot N_{dplx} = 14$	lbs	**BLC 3**

Development of Wind & Ice Load on Mounts

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

Wind Load (NESC Extreme)

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

Wind Load (NESC Heavy)

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

Gravity Load (without ice)

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

Gravity Load (ice only)

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

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APX VSPP18-C		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 11.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 57$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.9$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 17.7$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1059$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.5$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 19.5$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 125$	lbs	**BLC 4**

Gravity Load (without ice)

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

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5947$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1528$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 50$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 149$	lbs	**BLC 3**

Development of Wind & Ice Load on Mounts

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

Wind Load (NESC Extreme)

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

Wind Load (NESC Heavy)

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

Gravity Load (without ice)

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

Gravity Load (ice only)

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

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (Bottom Mast to Sprint Antennas / Below Top of CL&P Pole)

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

Wind Load (NESC Extreme)

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

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

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

Wind Load (NESC Heavy)

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

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

Gravity Loads (without ice)

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

Gravity Load (ice only)

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

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 45$ plf **BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (Above Sprint Artennas)

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

Wind Load (NESC Extreme)

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

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

Wind Load (NESC Heavy)

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

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

Gravity Loads (without ice)

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

Gravity Load (ice only)

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

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 18$ plf **BLC 3**

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

Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining PCS Structure Reactions Applied to CL&P Pole Tabulated Load Cases**

Location: **Bethel, CT**

Date:2/4/13 Prepared by: T.J.L. Checked by: C.F.C. Job No. 12047.CO3

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

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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: 2/4/13 Prepared by: T.J.L. Checked by: C.F.C. Job No. 12047.CO3

Load Combination	Description	Envelope Soultion	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	NESC Heavy Wind on PCS Structure		1		1	1.5	2	1.5	3	1.5	4	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
Parme 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	Lengt...	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	-.171	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	-.149	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	.125	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	1.059	6.5
6	M2	X	1.197	6.5

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

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

Member Distributed Loads (BLC 3 : Weight of Ice Only 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	-.045	-.045	0	0
4	M2	Y	-.045	-.045	0	6.5
5	M2	Y	-.018	-.018	6.5	16.5

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

	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	.006	.006	0	0
4	M2	X	.006	.006	0	6.5
5	M2	X	.003	.003	6.5	16.5

Member Distributed Loads (BLC 5 : NESC Extreme Wind 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	.029	.029	0	0
4	M2	X	.036	.036	0	6.5
5	M2	X	.018	.018	6.5	16.5

Basic Load Cases

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

Load Combinations

	Description	So...	PDelta	SRSS	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
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	0	1
2			min	0	1	0	1	0	1	0	1	0	1	0	1
3		2	max	.353	1	-4.41	1	0	1	0	1	0	1	3.775	2
4			min	.085	2	-13.63	2	0	1	0	1	0	1	1.26	1
5		3	max	-.02	2	-4.515	1	0	1	0	1	0	1	51.91	2
6			min	-.083	1	-13.875	2	0	1	0	1	0	1	16.879	1
7		4	max	7.939	1	5.794	2	0	1	0	1	0	1	79.395	2
8			min	3.358	2	1.925	1	0	1	0	1	0	1	25.797	1
9		5	max	7.503	1	5.549	2	0	1	0	1	0	1	59.545	2
10			min	3.254	2	1.82	1	0	1	0	1	0	1	19.243	1
11	M2	1	max	7.503	1	5.549	2	0	1	0	1	0	1	59.545	2
12			min	3.254	2	1.82	1	0	1	0	1	0	1	19.243	1
13		2	max	6.913	1	5.183	2	0	1	0	1	0	1	34.056	2
14			min	3.112	2	1.678	1	0	1	0	1	0	1	10.937	1
15		3	max	2.878	1	2.615	2	0	1	0	1	0	1	16.991	2
16			min	1.242	2	.845	1	0	1	0	1	0	1	5.411	1
17		4	max	2.344	1	2.335	2	0	1	0	1	0	1	5.233	2
18			min	1.009	2	.738	1	0	1	0	1	0	1	1.651	1

Envelope Member Section Forces (Continued)

	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
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	1
2			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
3		2	max	.02	1	-.493	1	0	1	-.284	1	.852	2	0	1	0	1
4			min	.005	2	-1.523	2	0	1	-.852	2	.284	1	0	1	0	1
5		3	max	-.001	2	-.504	1	0	1	-3.809	1	11.714	2	0	1	0	1
6			min	-.005	1	-1.55	2	0	1	-11.714	2	3.809	1	0	1	0	1
7		4	max	.444	1	.647	2	0	1	-5.821	1	17.917	2	0	1	0	1
8			min	.188	2	.215	1	0	1	-17.917	2	5.821	1	0	1	0	1
9		5	max	.419	1	.62	2	0	1	-4.342	1	13.437	2	0	1	0	1
10			min	.182	2	.203	1	0	1	-13.437	2	4.342	1	0	1	0	1
11	M2	1	max	.419	1	.62	2	0	1	-4.342	1	13.437	2	0	1	0	1
12			min	.182	2	.203	1	0	1	-13.437	2	4.342	1	0	1	0	1
13		2	max	.386	1	.579	2	0	1	-2.468	1	7.685	2	0	1	0	1
14			min	.174	2	.187	1	0	1	-7.685	2	2.468	1	0	1	0	1
15		3	max	.161	1	.292	2	0	1	-1.221	1	3.834	2	0	1	0	1
16			min	.069	2	.094	1	0	1	-3.834	2	1.221	1	0	1	0	1
17		4	max	.131	1	.261	2	0	1	-.373	1	1.181	2	0	1	0	1
18			min	.056	2	.082	1	0	1	-1.181	2	.373	1	0	1	0	1
19		5	max	0	1	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	0	1

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	13.385	2	.788	1	0	1	0	1	0	1	0	1
2		min	4.305	1	.189	2	0	1	0	1	0	1	0	1
3	N3	max	-6.545	1	8.457	1	0	1	0	1	LOCKED		0	1
4		min	-19.914	2	3.483	2	0	1	0	1	LOCKED		0	1
5	Totals:	max	-2.24	1	9.245	1	0	1						
6		min	-6.529	2	3.673	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	.046	2	0	2	0	1	0	1	0	1	1.167e-3	2
2		min	.015	1	0	1	0	1	0	1	0	1	3.808e-4	1
3	N2	max	0	1	0	2	0	1	0	1	0	1	1.162e-3	2
4		min	0	2	0	1	0	1	0	1	0	1	3.783e-4	1
5	N3	max	0	2	0	2	0	1	0	1	0	1	-8.807e-4	1
6		min	0	1	0	1	0	1	0	1	0	1	-2.707e-3	2
7	N4	max	.293	2	0	2	0	1	0	1	0	1	-2.458e-3	1
8		min	.095	1	0	1	0	1	0	1	0	1	-7.571e-3	2
9	N5	max	3.001	2	-.001	2	0	1	0	1	0	1	-4.313e-3	1
10		min	.971	1	-.003	1	0	1	0	1	0	1	-1.335e-2	2

Envelope AISC ASD Steel Code Checks

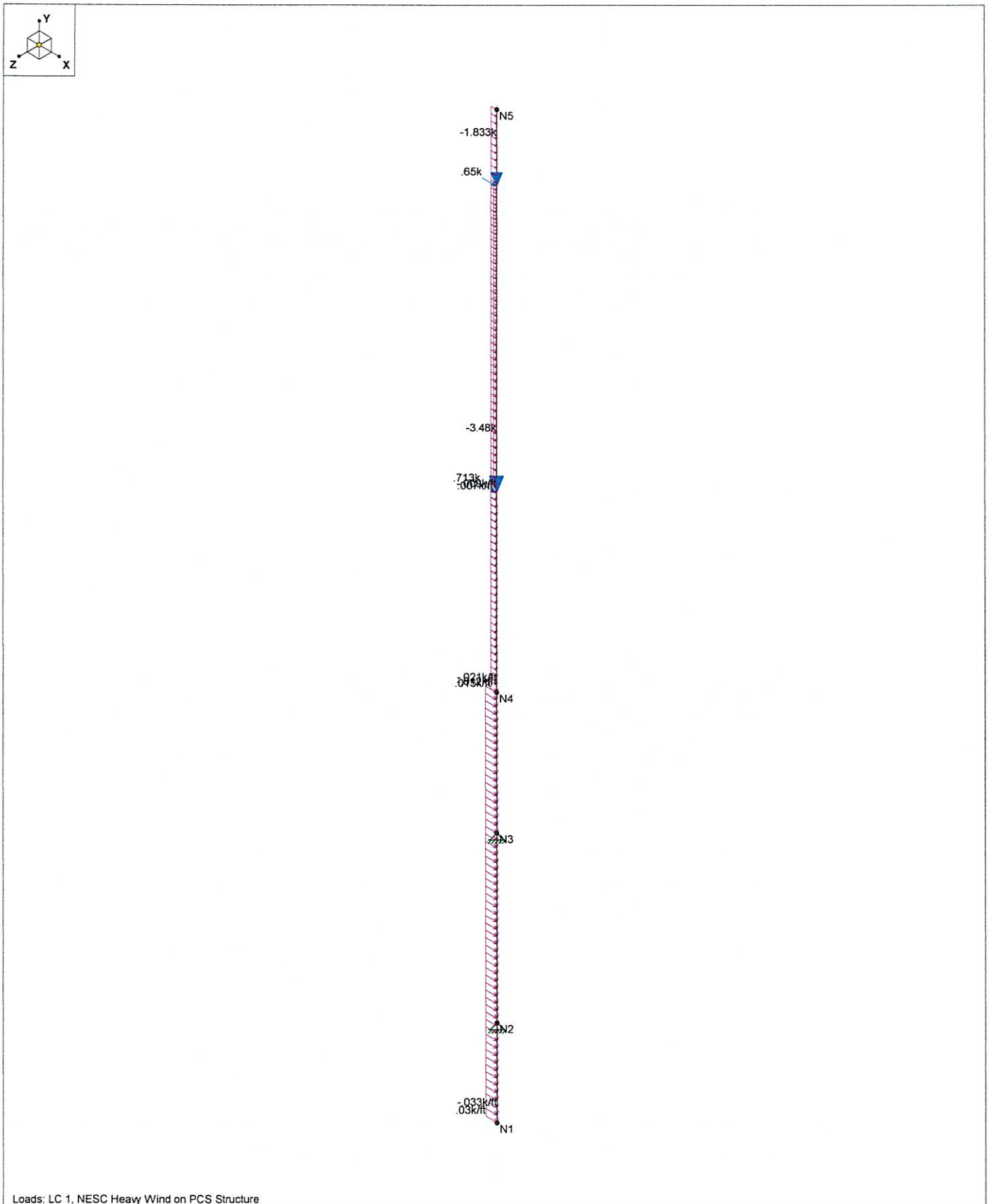
	Member	Shape	Code Check	Loc[ft]	LC	Sh...	Loc[ft]	.....	Fa...	Ft [ksi]	Fb y-y [ksi]	Fb.....	...	AS...
1	M1	PIPE_1...	.843	9.479	2	.112	9.333	2	18...	21	23.1	23.1	1	.6	...	H1...
2	M2	PIPE_1...	.590	0	2	.044	0	2	17...	21	23.1	23.1	...	.6	...	H1...

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	4.305	.788	0	0	0	0
2	1	N3	-6.545	8.457	0	0	LOCKED	0
3	1	Totals:	-2.24	9.245	0			
4	1	COG (ft):	X: 0	Y: 20.578	Z: 0			

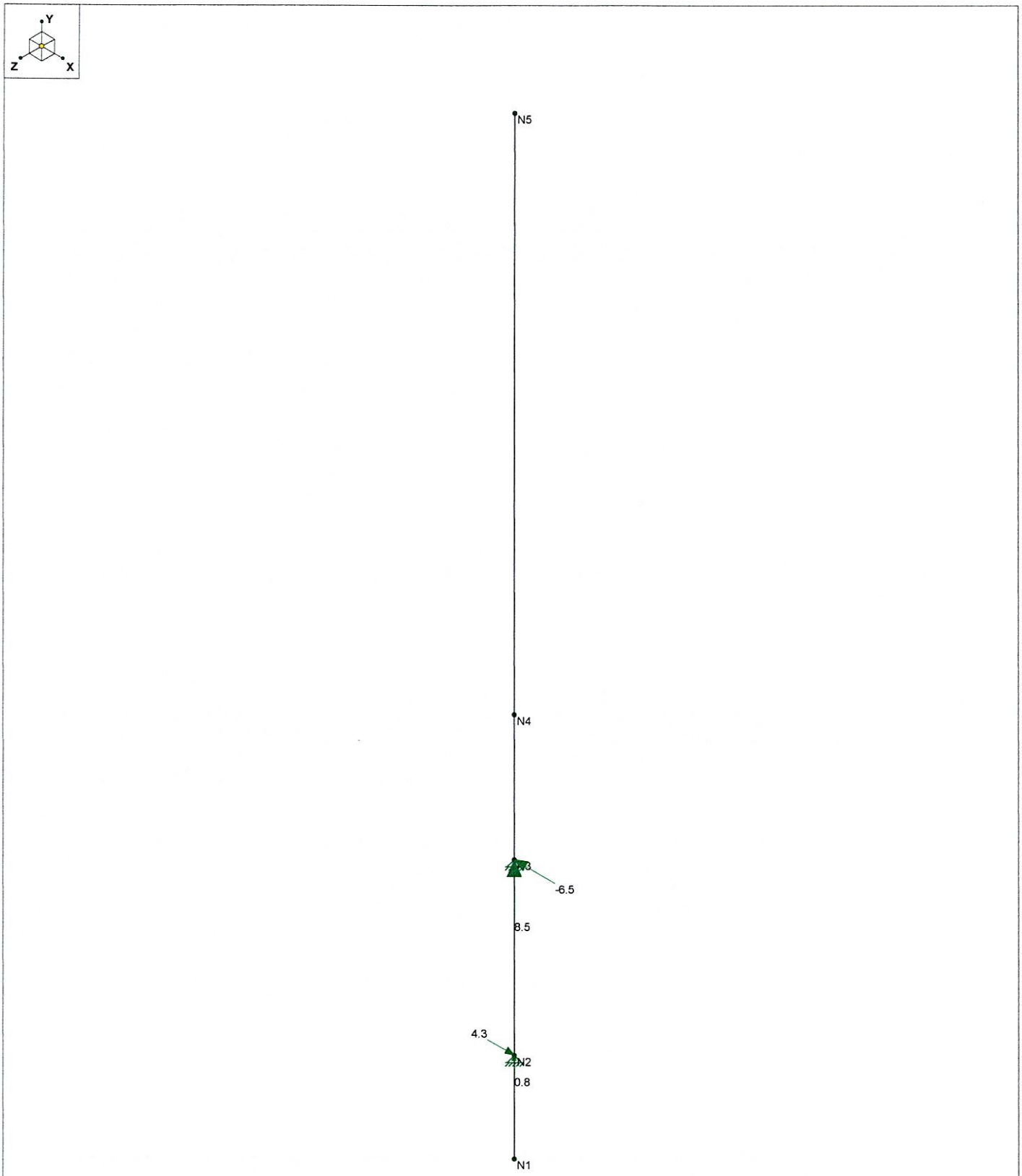
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	13.385	.189	0	0	0	0
2	2	N3	-19.914	3.483	0	0	LOCKED	0
3	2	Totals:	-6.529	3.673	0			
4	2	COG (ft):	X: 0	Y: 21.955	Z: 0			



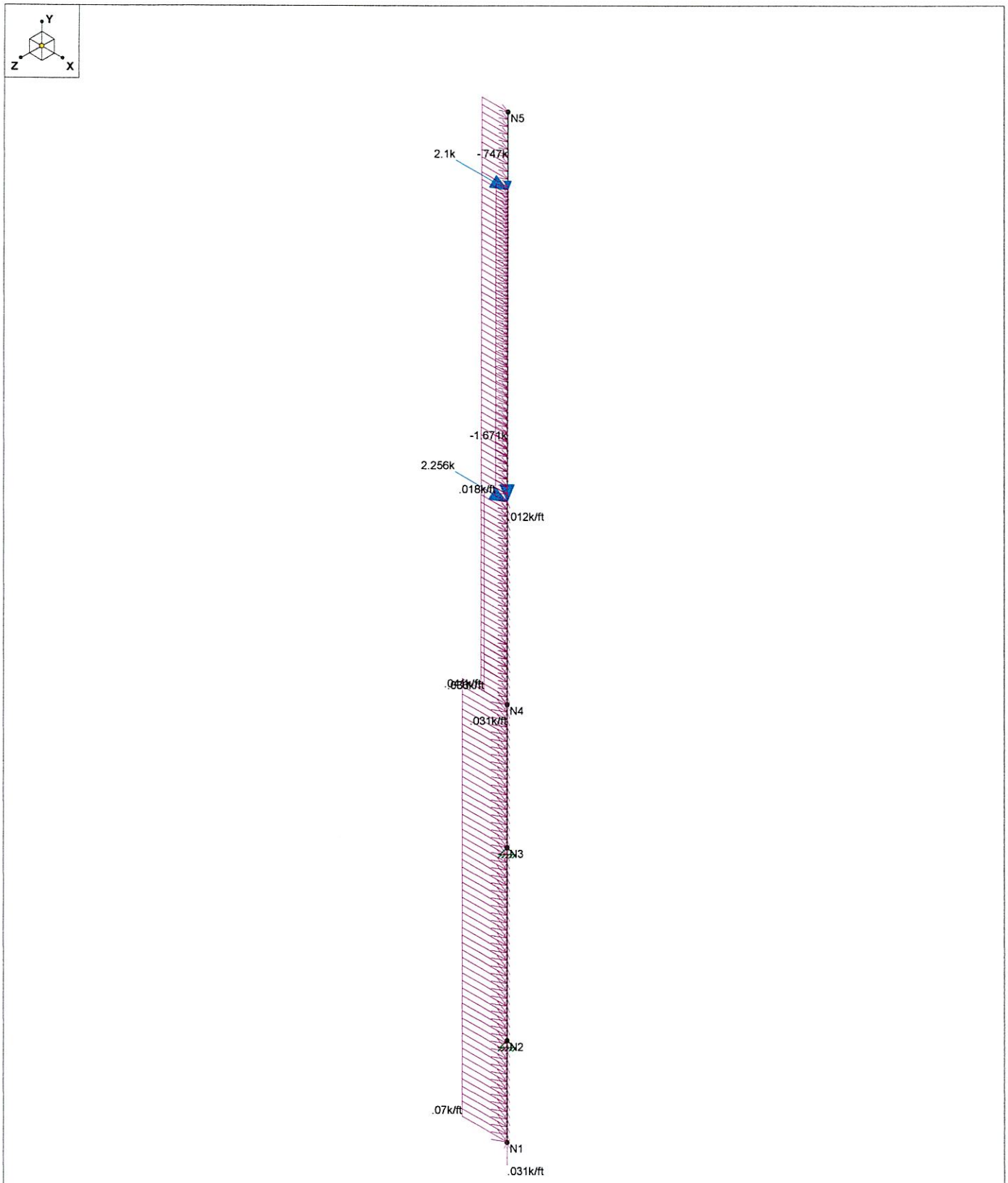
Loads: LC 1, NESC Heavy Wind on PCS Structure

CENTEK Engineering, Inc.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 13, 2013 at 1:27 PM
12047.CO3 - CT03XC351	LC #1 Loads	NESC.r3d



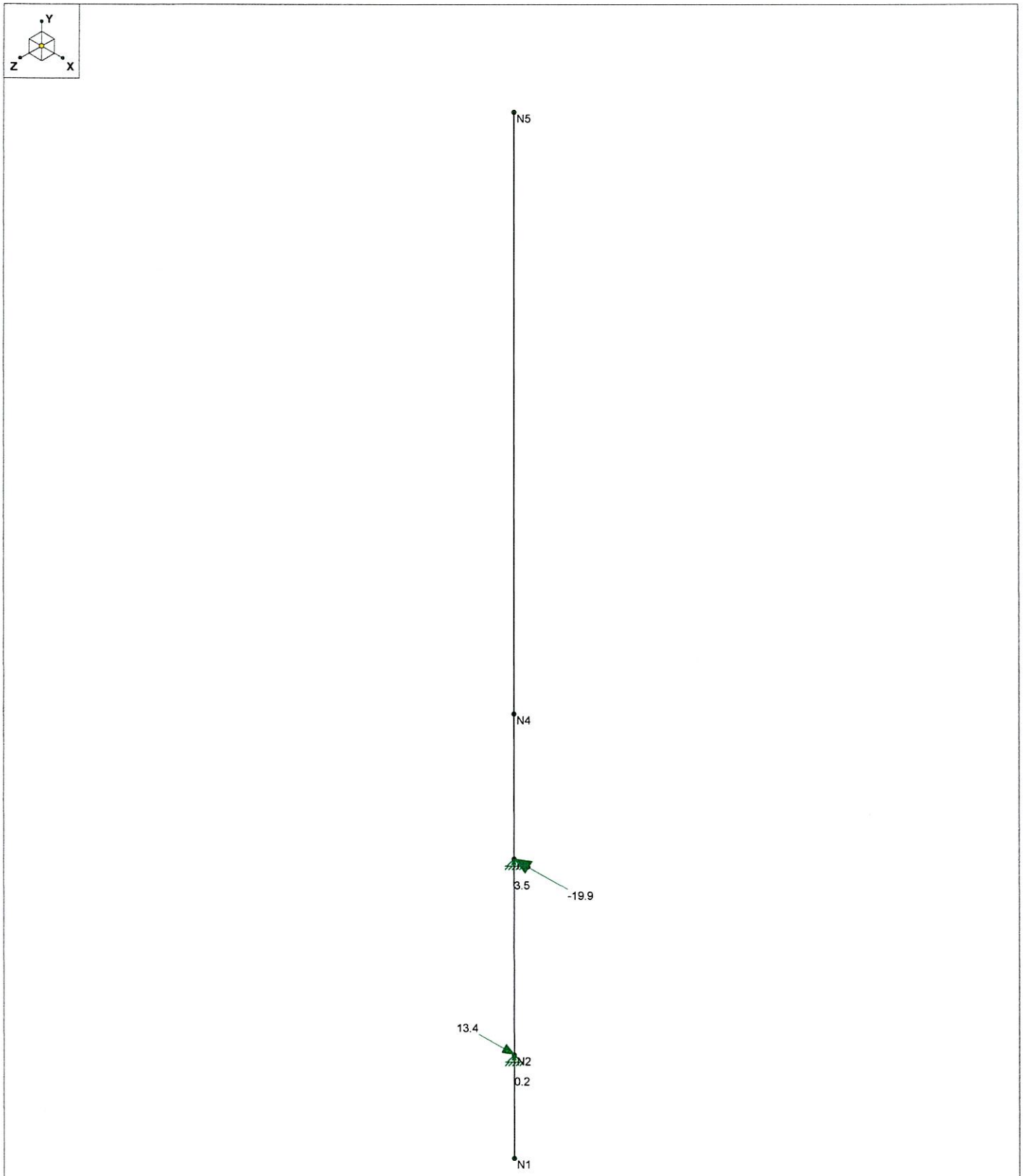
Results for LC 1, NESC Heavy Wind on PCS Structure
Z-direction Reaction units are k and k-ft

CENTEK Engineering, Inc.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 13, 2013 at 1:28 PM
12047.CO3 - CT03XC351	LC #1 Reactions	NESC.r3d



Loads: LC 2, NESC Extreme Wind on PCS Structure

CENTEK Engineering, Inc.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 13, 2013 at 1:28 PM
12047.CO3 - CT03XC351	LC #2 Loads	NESC.r3d



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

CENTEK Engineering, Inc.		
tjl, cfc	CL&P Pole # 10255 - PCS Mast	Feb 13, 2013 at 1:29 PM
12047.CO3 - CT03XC351	LC #2 Reactions	NESC.r3d

Coax Cable on CL&P Pole

Distance Between Coax Cable Attach Points =

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

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

Diameter of Coax Cable =	$D_{coax1} := 1.98 \cdot in$	*(User Input)*	
Weight of Coax Cable =	$W_{coax1} := 1.04 \cdot plf$	*(User Input)*	
Number of Coax Cables =	$N_{coax1} := 30$	*(User Input)*	(12 Verizon and 18 Sprint)
Number of Projected Coax Cables =	$NP_{coax1} := 3$	*(User Input)*	
Extreme Wind Pressure =	$qz := 29.9 \cdot psf$	*(User Input)*	
Heavy Wind Pressure =	$p := 4 \cdot psf$	*(User Input)*	
Radial Ice Thickness =	$Ir := 0.5 \cdot in$	*(User Input)*	
Radial Ice Density =	$Id := 56 \cdot pcf$	*(User Input)*	
Shape Factor =	$Cd_{coax} := 1.45$	*(User Input)*	
Overload Factor for NESC Heavy Wind Load =	$OF_{HW} := 2.5$	*(User Input)*	
Overload Factor for NESC Extreme Wind Load =	$OF_{EW} := 1.0$	*(User Input)*	
Overload Factor for NESC Heavy Vertical Load =	$OF_{HV} := 1.5$	*(User Input)*	
Overload Factor for NESC Extreme Vertical Load =	$OF_{EV} := 1.0$	*(User Input)*	
Wind Area with Ice =	$A_{ice} := \left(NP_{coax1} \cdot D_{coax1} + 2 \cdot Ir\right) = 6.94 \cdot in$		
Wind Area without Ice =	$A := \left(NP_{coax1} \cdot D_{coax1}\right) = 5.94 \cdot in$		
Ice Area per Liner Ft =	$Ai_{coax1} := \frac{\pi}{4} \cdot \left[\left(D_{coax1} + 2 \cdot Ir\right)^2 - D_{coax1}^2\right] = 0.027\,ft^2$		
Weight of Ice on All Coax Cables =	$W_{ice} := Ai_{coax1} \cdot Id \cdot N_{coax1} = 45 \cdot plf$		

Heavy Vertical Load =

$$Heavy_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HV}\right]}$$

Heavy Transverse Load =

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

$$Heavy_{Vert} = \begin{pmatrix} 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \\ 1150 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \\ 84 \end{pmatrix} lb$$

Extreme Vertical Load =

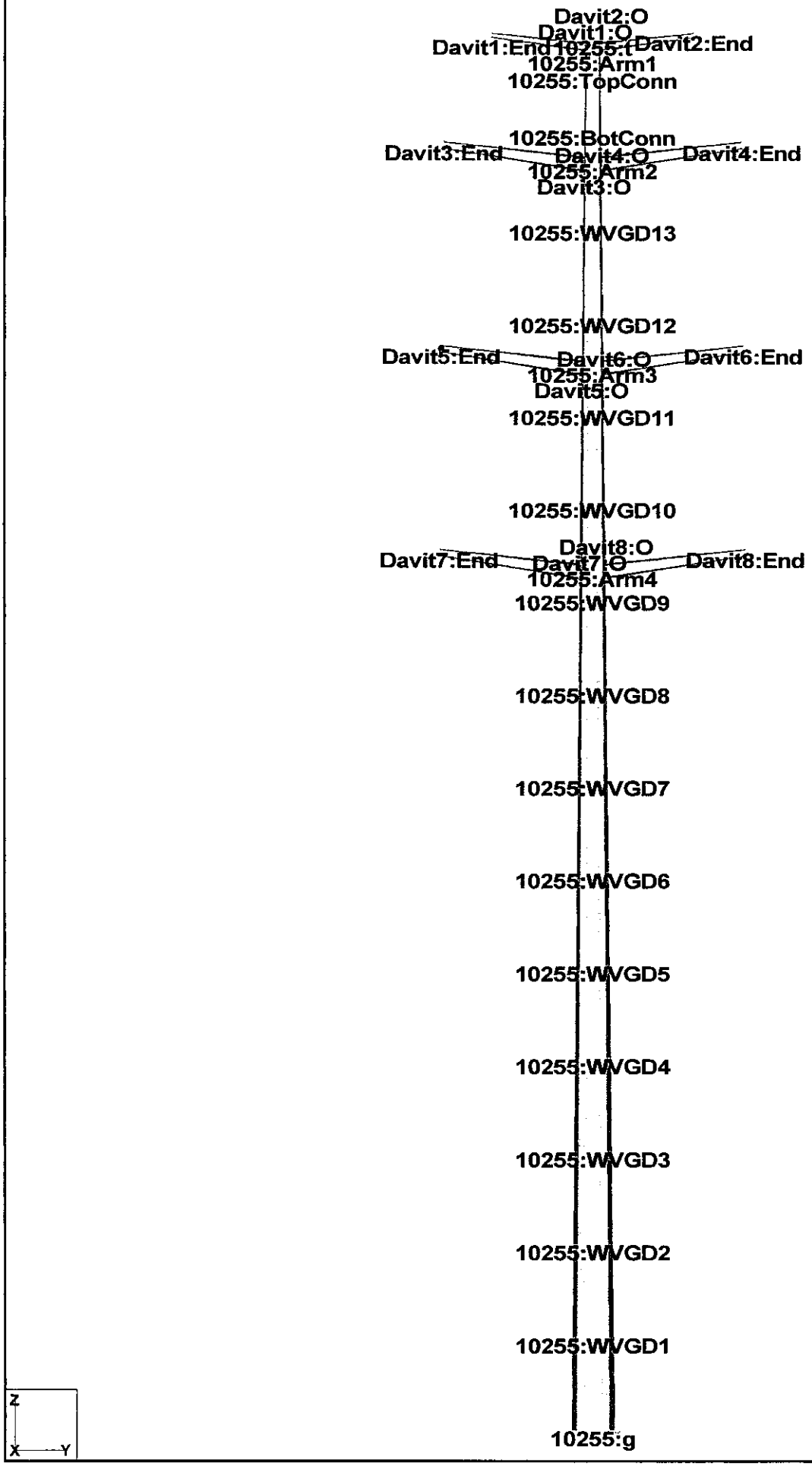
$$Extreme_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1}\right) \cdot Coax_{Span} \cdot OF_{EV}\right]}$$

Extreme Transverse Load =

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

$$Extreme_{Vert} = \begin{pmatrix} 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \\ 312 \end{pmatrix} lb \qquad Extreme_{Trans} = \begin{pmatrix} 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \\ 215 \end{pmatrix} lb$$

Centek Engineering Inc, Project: "cl&p structure # 10255"
PLS-POLE Version 11.11, 10:34:02 AM Monday, February 04, 2013
Undeformed geometry displayed



Project Name : 12047.CO3 - Bethel, CT
Project Notes: CL&P - Str # 10255/ Sprint CT03XC351
Project File : J:\Jobs\1204700.WI\CO3 - CT03XC351\Calcs\PLS-Pole\cl&p structure # 10255.pol
Date run : 9:50:35 AM Wednesday, February 13, 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\1204700.wi\co3 - ct03xc351\calcs\pls-pole\cl&p #10255.lca

*** Analysis Results:

Maximum element usage is 97.50% for Base Plate "10255" in load case "NESC Extreme"
Maximum insulator usage is 25.27% for Clamp "Clamp9" in load case "NESC Extreme"

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kips)	Tran. Force (kips)	Vert. Force (kips)	Shear Force (kips)	Tran. Moment (ft-k)	Long. Moment (ft-k)	Vert. Moment (ft-k)	Bending Moment (ft-k)	Found. Usage %
NESC Heavy	10255:g	-0.17	-33.73	121.21	33.73	4170.16	-12.06	-0.02	4170.18	0.00
NESC Extreme	10255:g	-0.05	-53.58	59.23	53.58	6039.79	-3.68	-0.01	6039.79	0.00

Summary of Tip Deflections For All Load Cases:

Note: postive tip load results in positive rotation

Load Case	Joint Label	Long. Defl. (in)	Tran. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Tran. Rot. (deg)	Twist (deg)
NESC Heavy	10255:t	0.21	100.69	-3.90	100.76	0.01	-5.98	0.00
NESC Extreme	10255:t	0.06	142.81	-7.72	143.02	0.00	-8.59	0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
10255	1	5022	NESC Extreme	83.12	1187.56
10255	2	10058	NESC Extreme	93.55	3411.75
10255	3	12901	NESC Extreme	95.68	5772.78

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

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
10255	95.68	NESC Extreme	37	30952.3

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	11.05	NESC Heavy	1	182.3
Davit2	14.05	NESC Heavy	1	182.3
Davit3	28.23	NESC Heavy	1	575.0
Davit4	32.72	NESC Heavy	1	575.0
Davit5	28.51	NESC Heavy	1	575.0
Davit6	32.89	NESC Heavy	1	575.0
Davit7	28.91	NESC Heavy	1	575.0
Davit8	33.14	NESC Heavy	1	575.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	69.65	10255	Base Plate
NESC Extreme	97.50	10255	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	68.37	10255	27
NESC Extreme	95.68	10255	37

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	10255	12	36.011	121.214	4170.162	-12.064	41.789	188.107	5	100.417	2.504	69.65
NESC Extreme	10255	12	36.011	59.228	6039.786	-3.676	58.503	263.343	5	140.356	2.962	97.50

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	33.14	Davit8	1
NESC Extreme	15.15	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	25.27	NESC Extreme	0.0
Clamp10	Clamp	16.73	NESC Extreme	0.0
Clamp11	Clamp	1.44	NESC Heavy	0.0
Clamp12	Clamp	1.44	NESC Heavy	0.0
Clamp13	Clamp	1.44	NESC Heavy	0.0
Clamp14	Clamp	1.44	NESC Heavy	0.0
Clamp15	Clamp	1.44	NESC Heavy	0.0
Clamp16	Clamp	1.44	NESC Heavy	0.0
Clamp17	Clamp	1.44	NESC Heavy	0.0
Clamp18	Clamp	1.44	NESC Heavy	0.0
Clamp19	Clamp	1.44	NESC Heavy	0.0
Clamp20	Clamp	1.44	NESC Heavy	0.0
Clamp21	Clamp	1.44	NESC Heavy	0.0
Clamp22	Clamp	1.44	NESC Heavy	0.0
Clamp23	Clamp	1.44	NESC Heavy	0.0

*** Weight of structure (lbs):

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

*** End of Report

```
***********************************************************************
*                                                                     *
*                              PLS-POLE                               *
*                    POLE AND FRAME ANALYSIS AND DESIGN               *
*              Copyright Power Line Systems, Inc. 1999-2011           *
*                                                                     *
***********************************************************************
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Project Name : 12047.CO3 - Bethel, CT
Project Notes: CL&P - Str # 10255/ Sprint CT03XC351
Project File : J:\Jobs\1204700.WI\CO3 - CT03XC351\Calcs\PLS-Pole\cl&p structure # 10255.pol
Date run : 9:50:35 AM Wednesday, February 13, 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 Property	Stock Length	Number	Default Embedded	Base Plate	Shape	Tip Diameter	Base Diameter	Taper	Default Drag	Tubes	Modulus of Elasticity	Weight Density	Shape At	Strength Check	Distance From	Ultimate	Ultimate

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

Steel Tubes Properties:

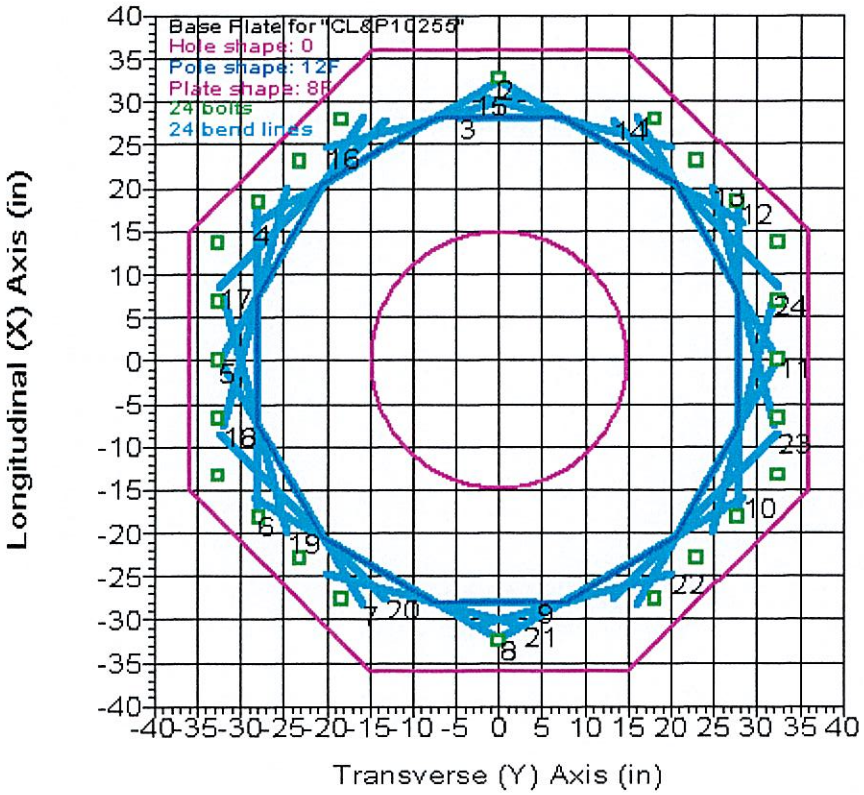
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)
CL&P10255	1	55	0.3125	4.670	0.000	65.000	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:

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

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

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



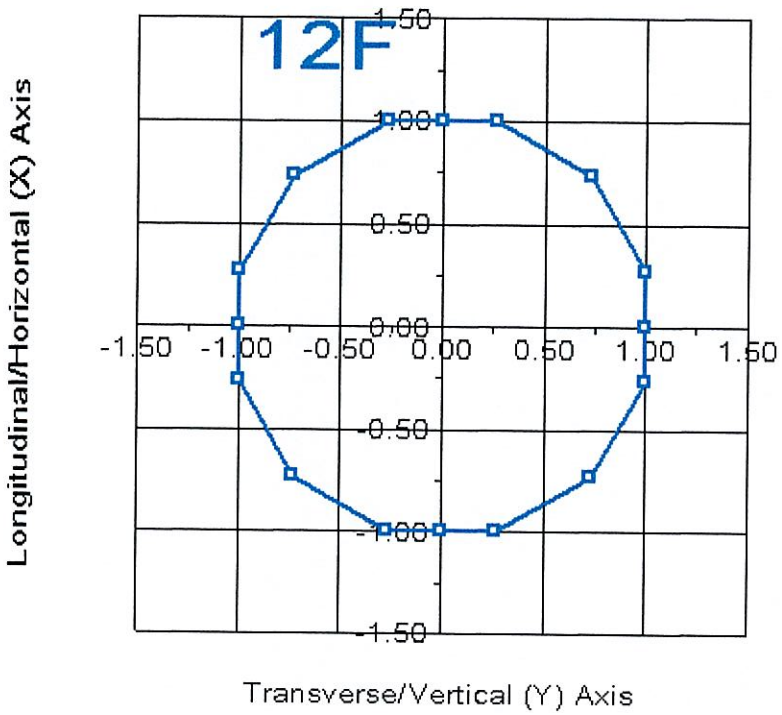
Steel Pole Connectivity:

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

Relative Attachment Labels for Steel Pole "10255":

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

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



Pole Steel Properties:

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

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

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

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

Tubular Davit Properties:

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

Intermediate Joints for Davit Property "ARM1":

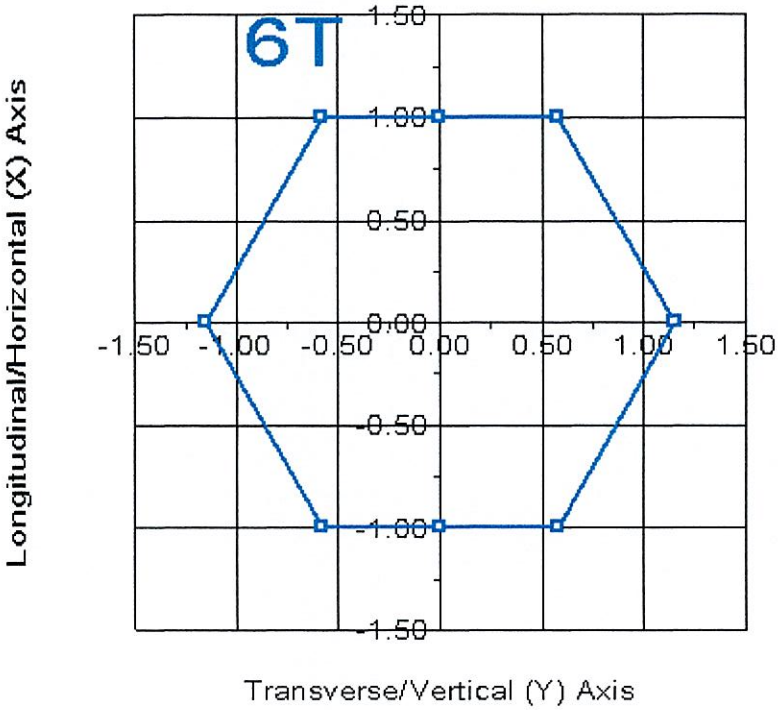
Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	10	-1.2

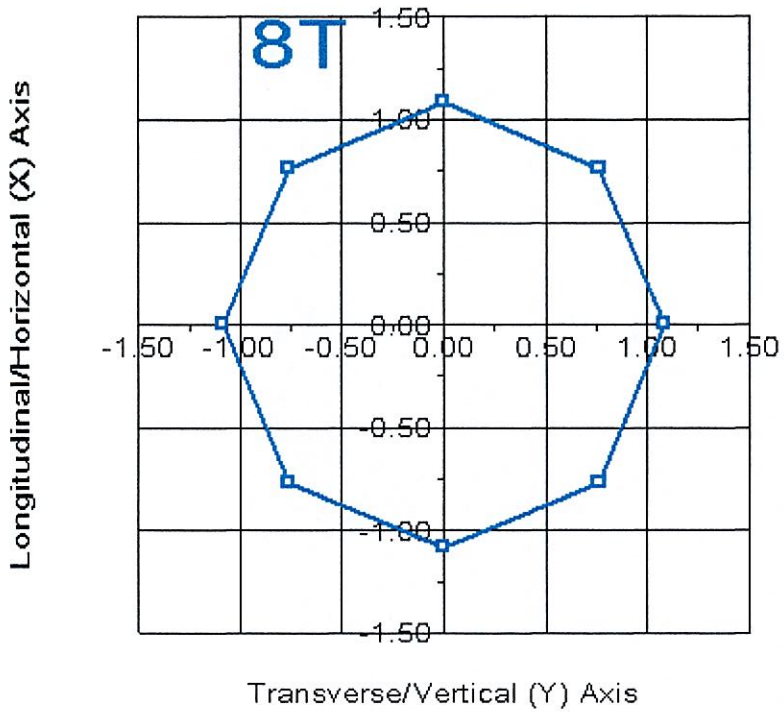
Intermediate Joints for Davit Property "ARM2":

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

Tubular Davit Arm Connectivity:

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


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



Tubular Davit Arm Steel Properties:

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

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

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)

clamp clamp1 8e+004

Clamp Insulator Connectivity:

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

*** Loads Data

Loads from file: j:\jobs\1204700.wi\co3 - ct03xc351\calcs\pls-pole\cl&p #10255.lca

Insulator dead and wind loads are already included in the point loads printed below.

Loading Method Parameters:

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

Z of ground for wind height adjust	0.00	(ft) and structure Z coordinate that will be put on the centerline ground profile in PLS-CADD.
Ground elevation shift	0.00	(ft)
Z of ground with shift	0.00	(ft)
Z of structure top (highest joint)	150.50	(ft)
Structure height	150.50	(ft)
Structure height above ground	150.50	(ft)

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Area Factor	SF for Steel Tubular Arms and Towers	SF for Poles Deflection	SF for Wood Poles Deflection	SF for Pole Ult. % or (ft)	SF for Conc. First Crack	SF for Conc. Zero Tens.	SF for Guys and Cables	SF for Non Tubular Arms	SF for Braces	SF for Insuls.	SF For Found.	Point Loads	Wind/Ice Model	Trans. Wind Pressure (psf)	Longit. Wind Pressure (psf)	Ice Thick. (in)	Ice Density (lbs/ft^3)	Temperature (deg F)	Check Limit
NESC Heavy	1.5000	2.5000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	23 loads	Wind on All		4	0	0.500	56.000	0.0	No Limit 0
NESC Extreme	1.0000	1.0000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	23 loads	NESC 2007		25.6	0	0.000	0.000	0.0	No Limit 0

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	1134	1078	0	Shield Wire
Davit2:End	1134	1078	0	Shield Wire
Davit3:End	7201	3651	0	Conductor
Davit4:End	7201	3651	0	Conductor
Davit5:End	7201	3651	0	Conductor
Davit6:End	7201	3651	0	Conductor
Davit7:End	7201	3651	0	Conductor
Davit8:End	7201	3651	0	Conductor
10255:TopConn	8457	6545	0	Top Connection
10255:BotConn	788	-4305	0	Bottom Connection
10255:WVGD1	1150	84	0	Coax Cables
10255:WVGD2	1150	84	0	Coax Cables
10255:WVGD3	1150	84	0	Coax Cables
10255:WVGD4	1150	84	0	Coax Cables
10255:WVGD5	1150	84	0	Coax Cables
10255:WVGD6	1150	84	0	Coax Cables

10255:WVGD7	1150	84	0	Coax Cables
10255:WVGD8	1150	84	0	Coax Cables
10255:WVGD9	1150	84	0	Coax Cables
10255:WVGD10	1150	84	0	Coax Cables
10255:WVGD11	1150	84	0	Coax Cables
10255:WVGD12	1150	84	0	Coax Cables
10255:WVGD13	1150	84	0	Coax Cables

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

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

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

Point Loads for Load Case "NESC Extreme":

Joint	Vertical	Transverse	Longitudinal	Load

Label	Load (lbs)	Load (lbs)	Load (lbs)	Comment
Davit1:End	280	715	0	Shield Wire
Davit2:End	280	715	0	Shield Wire
Davit3:End	3065	4999	0	Conductor
Davit4:End	3065	4999	0	Conductor
Davit5:End	3065	4999	0	Conductor
Davit6:End	3065	4999	0	Conductor
Davit7:End	3065	4999	0	Conductor
Davit8:End	3065	4999	0	Conductor
10255:TopConn	3483	19914	0	Top Connection
10255:BotConn	189	-13385	0	Bottom Connection
10255:WVGD1	312	215	0	Coax Cables
10255:WVGD2	312	215	0	Coax Cables
10255:WVGD3	312	215	0	Coax Cables
10255:WVGD4	312	215	0	Coax Cables
10255:WVGD5	312	215	0	Coax Cables
10255:WVGD6	312	215	0	Coax Cables
10255:WVGD7	312	215	0	Coax Cables
10255:WVGD8	312	215	0	Coax Cables
10255:WVGD9	312	215	0	Coax Cables
10255:WVGD10	312	215	0	Coax Cables
10255:WVGD11	312	215	0	Coax Cables
10255:WVGD12	312	215	0	Coax Cables
10255:WVGD13	312	215	0	Coax Cables

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

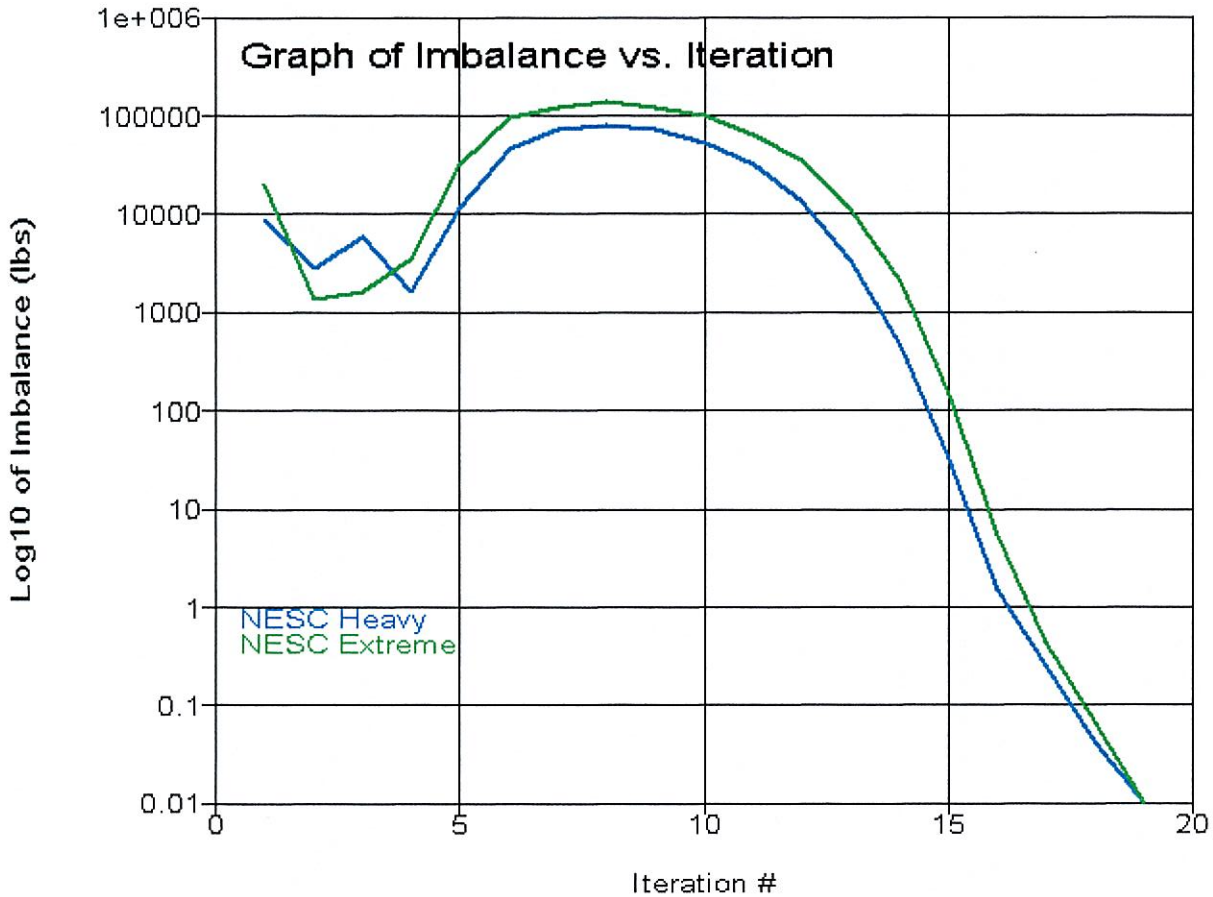
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

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

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

*** Analysis Results:

Maximum element usage is 97.50% for Base Plate "10255" in load case "NESC Extreme"
Maximum insulator usage is 25.27% 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	0.01789	8.391	-0.3249	-5.9796	0.0113	0.0003	0.01789	8.391	149.7
10255:Arm1	0.01775	8.318	-0.321	-5.9796	0.0113	0.0003	0.01775	8.318	149

10255:TopConn	0.01719	8.018	-0.3054	-5.9748	0.0113	0.0003	0.01719	8.018	146.1
10255:BotConn	0.01598	7.377	-0.2719	-5.9197	0.0113	0.0003	0.01598	7.377	140
10255:Arm2	0.01527	7.005	-0.2527	-5.8631	0.0112	0.0003	0.01527	7.005	136.4
10255:WVGD13	0.01398	6.337	-0.2187	-5.6942	0.0111	0.0002	0.01398	6.337	129.8
10255:WVGD12	0.01209	5.374	-0.1717	-5.3375	0.0106	0.0002	0.01209	5.374	119.8
10255:Arm3	0.01111	4.884	-0.1491	-5.1163	0.0103	0.0002	0.01111	4.884	114.5
10255:WVGD11	0.01028	4.479	-0.1311	-4.9017	0.0100	0.0002	0.01028	4.479	109.9
10255:WVGD10	0.008595	3.668	-0.09754	-4.3821	0.0093	0.0001	0.008595	3.668	99.9
10255:Arm4	0.007437	3.126	-0.07728	-4.0393	0.0087	0.0001	0.007437	3.126	92.55
10255:WVGD9	0.007041	2.944	-0.07079	-3.9229	0.0085	0.0001	0.007041	2.944	89.93
10255:WVGD8	0.005617	2.299	-0.04941	-3.4602	0.0078	0.0001	0.005617	2.299	79.95
10255:WVGD7	0.004335	1.736	-0.033	-2.9839	0.0069	0.0001	0.004335	1.736	69.97
10255:WVGD6	0.003207	1.256	-0.02094	-2.5083	0.0060	0.0000	0.003207	1.256	59.98
10255:WVGD5	0.002241	0.8585	-0.01249	-2.0425	0.0050	0.0000	0.002241	0.8585	49.99
10255:WVGD4	0.001443	0.5406	-0.006925	-1.5951	0.0041	0.0000	0.001443	0.5406	39.99
10255:WVGD3	0.0008164	0.2993	-0.003496	-1.1664	0.0031	0.0000	0.0008164	0.2993	30
10255:WVGD2	0.0003656	0.1311	-0.001566	-0.7576	0.0021	0.0000	0.0003656	0.1311	20
10255:WVGD1	9.28e-005	0.03246	-0.0005665	-0.3689	0.0010	0.0000	9.28e-005	0.03246	9.999
Davit1:O	0.01778	8.322	-0.2327	-5.9796	0.0113	0.0003	0.01778	7.474	149.1
Davit1:End	0.01827	8.496	0.7793	-5.7503	0.0113	0.0003	0.01827	-2.352	151.3
Davit2:O	0.01773	8.313	-0.4094	-5.9796	0.0113	0.0003	0.01773	9.161	148.9
Davit2:End	0.0177	8.384	-1.488	-6.2766	0.0113	0.0003	0.0177	19.23	149
Davit3:O	0.01529	7.01	-0.1527	-5.8631	0.0112	0.0003	0.01529	6.031	136.5
Davit3:End	0.01604	7.272	1.277	-5.2168	0.0113	0.0003	0.01604	-8.708	139.9
Davit4:O	0.01524	7	-0.3528	-5.8631	0.0112	0.0003	0.01524	7.98	136.3
Davit4:End	0.01524	7.129	-2.007	-6.6186	0.0112	0.0003	0.01524	23.11	136.6
Davit5:O	0.01113	4.888	-0.04142	-5.1163	0.0103	0.0002	0.01113	3.681	114.6
Davit5:End	0.01177	5.106	1.194	-4.4631	0.0104	0.0002	0.01177	-11.1	117.8
Davit6:O	0.01108	4.879	-0.2568	-5.1163	0.0103	0.0002	0.01108	6.086	114.4
Davit6:End	0.01113	5.002	-1.714	-5.8764	0.0103	0.0002	0.01113	21.21	114.9
Davit7:O	0.007455	3.13	0.022	-4.0393	0.0087	0.0001	0.007455	1.72	92.65
Davit7:End	0.00794	3.289	0.9781	-3.3764	0.0088	0.0001	0.00794	-13.12	95.6
Davit8:O	0.007419	3.123	-0.1766	-4.0393	0.0087	0.0001	0.007419	4.532	92.45
Davit8:End	0.007518	3.233	-1.351	-4.8057	0.0087	0.0001	0.007518	19.64	93.27

Joint Support Reactions for Load Case "NESC Heavy":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
10255:g	-0.17	0.0	-33.73	0.0	121.21	0.0	0.0	125.82	0.0	4170.16	0.0	-12.1	0.0	-0.02	0.0	0.0

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %
10255	10255:t	Origin	0.00	100.69	0.21	-3.90	-0.00	-0.00	0.0	-0.04	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0
10255	10255:Arm1	End	0.70	99.81	0.21	-3.85	0.01	-0.00	0.0	-0.04	0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0
10255	10255:Arm1	Origin	0.70	99.81	0.21	-3.85	2.85	-0.00	0.0	-2.82	2.51	-0.00	-0.14	0.25	0.18	0.00	0.50	0.8

2	10255	10255:TopConn	End	3.58	96.21	0.21	-3.66	10.09	-0.01	0.0	-2.82	2.51	-0.00	-0.14	1.11	0.06	0.00	1.25	1.9
4	10255	10255:TopConn	Origin	3.58	96.21	0.21	-3.66	10.09	-0.01	0.0	-10.91	10.01	-0.01	-0.52	0.30	0.95	0.00	1.83	2.8
2	10255	Tube 1	End	6.67	92.36	0.20	-3.46	40.97	-0.03	0.0	-10.91	10.01	-0.01	-0.50	4.18	0.25	0.00	4.71	7.2
2	10255	Tube 1	Origin	6.67	92.36	0.20	-3.46	40.97	-0.03	0.0	-11.29	10.12	-0.01	-0.52	4.18	0.25	0.00	4.73	7.3
2	10255	10255:BotConn	End	9.75	88.53	0.19	-3.26	72.19	-0.05	0.0	-11.29	10.12	-0.01	-0.50	6.87	0.24	0.00	7.39	11.4
2	10255	10255:BotConn	Origin	9.75	88.53	0.19	-3.26	72.19	-0.05	0.0	-12.96	6.04	-0.01	-0.58	6.87	0.14	0.00	7.45	11.5
2	10255	10255:Arm2	End	13.38	84.06	0.18	-3.03	94.08	-0.09	0.0	-12.96	6.04	-0.01	-0.56	8.27	0.14	0.00	8.83	13.6
2	10255	10255:Arm2	Origin	13.38	84.06	0.18	-3.03	110.89	-0.10	0.0	-28.72	15.07	-0.02	-1.23	9.75	0.34	0.00	10.99	16.9
2	10255	Tube 1	End	16.69	80.02	0.18	-2.83	160.80	-0.15	0.0	-28.72	15.07	-0.02	-1.19	13.17	0.33	0.00	14.38	22.1
2	10255	Tube 1	Origin	16.69	80.02	0.18	-2.83	160.80	-0.15	0.0	-29.19	15.16	-0.02	-1.21	13.17	0.33	0.00	14.40	22.1
2	10255	10255:WVGD13	End	20.00	76.04	0.17	-2.62	211.01	-0.22	0.0	-29.19	15.16	-0.02	-1.17	16.15	0.32	0.00	17.33	26.7
2	10255	10255:WVGD13	Origin	20.00	76.04	0.17	-2.62	211.01	-0.22	0.0	-30.96	15.47	-0.02	-1.24	16.15	0.33	0.00	17.40	26.8
2	10255	Tube 1	End	25.00	70.17	0.16	-2.33	288.34	-0.33	0.0	-30.96	15.47	-0.02	-1.18	20.01	0.31	0.00	21.20	32.6
2	10255	Tube 1	Origin	25.00	70.17	0.16	-2.33	288.34	-0.33	0.0	-31.76	15.59	-0.03	-1.21	20.01	0.31	0.00	21.23	32.7
2	10255	10255:WVGD12	End	30.00	64.48	0.15	-2.06	366.27	-0.47	0.0	-31.76	15.59	-0.03	-1.16	23.15	0.30	0.00	24.31	37.4
2	10255	10255:WVGD12	Origin	30.00	64.48	0.15	-2.06	366.27	-0.47	0.0	-33.53	15.87	-0.03	-1.22	23.15	0.31	0.00	24.37	37.5
2	10255	Tube 1	End	32.69	61.51	0.14	-1.92	408.91	-0.55	0.0	-33.53	15.87	-0.03	-1.19	24.61	0.30	0.00	25.81	39.7
2	10255	Tube 1	Origin	32.69	61.51	0.14	-1.92	408.91	-0.55	0.0	-34.00	15.92	-0.03	-1.21	24.61	0.30	0.00	25.83	39.7
2	10255	10255:Arm3	End	35.38	58.60	0.13	-1.79	451.70	-0.64	0.0	-34.00	15.92	-0.03	-1.18	25.93	0.29	0.00	27.12	41.7
2	10255	10255:Arm3	Origin	35.38	58.60	0.13	-1.79	468.15	-0.64	0.0	-50.07	24.69	-0.04	-1.74	26.87	0.45	0.00	28.62	44.0
2	10255	10255:WVGD11	End	40.00	53.75	0.12	-1.57	582.32	-0.83	0.0	-50.07	24.69	-0.04	-1.67	30.89	0.44	0.00	32.57	50.1
2	10255	10255:WVGD11	Origin	40.00	53.75	0.12	-1.57	582.32	-0.83	0.0	-52.13	24.89	-0.04	-1.74	30.89	0.44	0.00	32.64	50.2
2	10255	Tube 1	End	45.00	48.75	0.11	-1.36	706.78	-1.05	0.0	-52.13	24.89	-0.04	-1.67	34.53	0.42	0.00	36.21	55.7
2	10255	Tube 1	Origin	45.00	48.75	0.11	-1.36	706.78	-1.05	0.0	-53.13	24.90	-0.05	-1.70	34.53	0.42	0.00	36.24	55.8
2	10255	10255:WVGD10	End	50.00	44.01	0.10	-1.17	831.28	-1.29	0.0	-53.13	24.90	-0.05	-1.64	37.54	0.41	0.00	39.18	60.3
2	10255	10255:WVGD10	Origin	50.00	44.01	0.10	-1.17	831.28	-1.29	0.0	-54.82	25.07	-0.05	-1.69	37.54	0.41	0.00	39.23	60.4
2	10255	SpliceT	End	50.33	43.71	0.10	-1.16	839.55	-1.30	0.0	-54.82	25.07	-0.05	-1.68	37.72	0.41	0.00	39.41	60.6
2	10255	SpliceT	Origin	50.33	43.71	0.10	-1.16	839.55	-1.30	0.0	-55.89	25.12	-0.05	-1.72	37.72	0.41	0.00	39.44	60.7
2	10255	SpliceB	End	55.00	39.55	0.09	-1.00	956.86	-1.55	0.0	-55.89	25.12	-0.05	-1.21	30.05	0.29	0.00	31.26	48.1
2	10255	SpliceB	Origin	55.00	39.55	0.09	-1.00	956.86	-1.55	0.0	-57.25	25.18	-0.06	-1.24	30.05	0.29	0.00	31.29	48.1

2																			
10255	10255:Arm4	End	57.38	37.52	0.09	-0.93	1016.67	-1.68	0.0	-57.25	25.18	-0.06	-1.22	30.80	0.28	0.00	32.02	49.3
2																			
10255	10255:Arm4	Origin	57.38	37.52	0.09	-0.93	1032.58	-1.69	0.0	-73.52	33.62	-0.06	-1.57	31.28	0.38	0.00	32.85	50.5
2																			
10255	10255:WVGD9	End	60.00	35.33	0.08	-0.85	1120.82	-1.85	0.0	-73.52	33.62	-0.06	-1.54	32.65	0.37	0.00	34.20	52.6
2																			
10255	10255:WVGD9	Origin	60.00	35.33	0.08	-0.85	1120.82	-1.85	0.0	-75.78	33.78	-0.07	-1.58	32.65	0.37	0.00	34.24	52.7
2																			
10255	Tube 2	End	65.00	31.34	0.08	-0.71	1289.70	-2.18	0.0	-75.78	33.78	-0.07	-1.53	34.96	0.36	0.00	36.49	56.1
2																			
10255	Tube 2	Origin	65.00	31.34	0.08	-0.71	1289.70	-2.18	0.0	-77.29	33.75	-0.07	-1.56	34.96	0.36	0.00	36.52	56.2
2																			
10255	10255:WVGD8	End	70.00	27.59	0.07	-0.59	1458.46	-2.54	0.0	-77.29	33.75	-0.07	-1.50	36.87	0.35	0.00	38.38	59.0
2																			
10255	10255:WVGD8	Origin	70.00	27.59	0.07	-0.59	1458.46	-2.54	0.0	-80.00	33.87	-0.08	-1.56	36.87	0.35	0.00	38.43	59.1
2																			
10255	Tube 2	End	75.00	24.08	0.06	-0.49	1627.82	-2.92	0.0	-80.00	33.87	-0.08	-1.51	38.47	0.34	0.00	39.98	61.5
2																			
10255	Tube 2	Origin	75.00	24.08	0.06	-0.49	1627.82	-2.92	0.0	-81.61	33.83	-0.08	-1.54	38.47	0.34	0.00	40.01	61.6
2																			
10255	10255:WVGD7	End	80.00	20.83	0.05	-0.40	1796.97	-3.32	0.0	-81.61	33.83	-0.08	-1.49	39.79	0.33	0.00	41.28	63.5
2																			
10255	10255:WVGD7	Origin	80.00	20.83	0.05	-0.40	1796.97	-3.32	0.0	-84.42	33.93	-0.09	-1.54	39.79	0.33	0.00	41.34	63.6
2																			
10255	Tube 2	End	85.00	17.83	0.05	-0.32	1966.60	-3.76	0.0	-84.42	33.93	-0.09	-1.49	40.89	0.32	0.00	42.38	65.2
2																			
10255	Tube 2	Origin	85.00	17.83	0.05	-0.32	1966.60	-3.76	0.0	-86.13	33.87	-0.09	-1.52	40.89	0.32	0.00	42.41	65.3
2																			
10255	10255:WVGD6	End	90.00	15.07	0.04	-0.25	2135.96	-4.22	0.0	-86.13	33.87	-0.09	-1.48	41.78	0.31	0.00	43.25	66.5
2																			
10255	10255:WVGD6	Origin	90.00	15.07	0.04	-0.25	2135.96	-4.22	0.0	-88.93	33.95	-0.10	-1.52	41.78	0.31	0.00	43.30	66.6
2																			
10255	Tube 2	End	94.42	12.85	0.03	-0.20	2285.86	-4.64	0.0	-88.93	33.95	-0.10	-1.48	42.42	0.30	0.00	43.91	67.6
2																			
10255	Tube 2	Origin	94.42	12.85	0.03	-0.20	2285.86	-4.64	0.0	-90.52	33.90	-0.10	-1.51	42.42	0.30	0.00	43.93	67.6
2																			
10255	SpliceT	End	98.83	10.81	0.03	-0.16	2435.53	-5.10	0.0	-90.52	33.90	-0.10	-1.47	42.95	0.29	0.00	44.42	68.3
2																			
10255	SpliceT	Origin	98.83	10.81	0.03	-0.16	2435.53	-5.10	0.0	-91.74	33.87	-0.11	-1.49	42.95	0.29	0.00	44.44	68.4
2																			
10255	10255:WVGD5	End	100.00	10.30	0.03	-0.15	2475.15	-5.22	0.0	-91.74	33.87	-0.11	-1.41	41.94	0.28	0.00	43.36	66.7
2																			
10255	10255:WVGD5	Origin	100.00	10.30	0.03	-0.15	2475.15	-5.22	0.0	-95.07	33.99	-0.11	-1.46	41.94	0.28	0.00	43.41	66.8
2																			
10255	SpliceB	End	105.00	8.28	0.02	-0.11	2645.11	-5.76	0.0	-95.07	33.99	-0.11	-1.42	42.33	0.27	0.00	43.76	67.3
2																			
10255	SpliceB	Origin	105.00	8.28	0.02	-0.11	2645.11	-5.76	0.0	-97.85	33.95	-0.12	-1.46	42.33	0.27	0.00	43.80	67.4
2																			
10255	10255:WVGD4	End	110.00	6.49	0.02	-0.08	2814.83	-6.34	0.0	-97.85	33.95	-0.12	-1.42	42.61	0.26	0.00	44.04	67.7
2																			
10255	10255:WVGD4	Origin	110.00	6.49	0.02	-0.08	2814.83	-6.34	0.0	-101.02	33.99	-0.12	-1.47	42.61	0.26	0.00	44.08	67.8
2																			
10255	Tube 3	End	115.00	4.93	0.01	-0.06	2984.78	-6.94	0.0	-101.02	33.99	-0.12	-1.43	42.80	0.25	0.00	44.24	68.1
2																			
10255	Tube 3	Origin	115.00	4.93	0.01	-0.06	2984.78	-6.94	0.0	-103.09	33.92	-0.13	-1.46	42.80	0.25	0.00	44.27	68.1
2																			
10255	10255:WVGD3	End	120.00	3.59	0.01	-0.04	3154.35	-7.58	0.0	-103.09	33.92	-0.13	-1.42	42.91	0.25	0.00	44.34	68.2
2																			

10255	10255:WVGD3	Origin	120.00	3.59	0.01	-0.04	3154.35	-7.58	0.0	-106.37	33.95	-0.13	-1.47	42.91	0.25	0.00	44.39	68.3	2
10255	Tube 3	End	125.00	2.47	0.01	-0.03	3324.10	-8.24	0.0	-106.37	33.95	-0.13	-1.43	42.96	0.24	0.00	44.40	68.3	2
10255	Tube 3	Origin	125.00	2.47	0.01	-0.03	3324.10	-8.24	0.0	-108.54	33.88	-0.14	-1.46	42.96	0.24	0.00	44.42	68.3	2
10255	10255:WVGD2	End	130.00	1.57	0.00	-0.02	3493.47	-8.94	0.0	-108.54	33.88	-0.14	-1.42	42.95	0.23	0.00	44.37	68.3	2
10255	10255:WVGD2	Origin	130.00	1.57	0.00	-0.02	3493.47	-8.94	0.0	-111.91	33.90	-0.15	-1.47	42.95	0.24	0.00	44.42	68.3	2
10255	Tube 3	End	135.00	0.88	0.00	-0.01	3662.97	-9.67	0.0	-111.91	33.90	-0.15	-1.43	42.89	0.23	0.00	44.32	68.2	2
10255	Tube 3	Origin	135.00	0.88	0.00	-0.01	3662.97	-9.67	0.0	-114.18	33.83	-0.15	-1.46	42.89	0.23	0.00	44.35	68.2	2
10255	10255:WVGD1	End	140.00	0.39	0.00	-0.01	3832.09	-10.44	0.0	-114.18	33.83	-0.15	-1.43	42.78	0.22	0.00	44.21	68.0	2
10255	10255:WVGD1	Origin	140.00	0.39	0.00	-0.01	3832.09	-10.44	0.0	-117.65	33.85	-0.16	-1.47	42.78	0.22	0.00	44.25	68.1	2
10255	Tube 3	End	145.00	0.10	0.00	-0.00	4001.31	-11.23	0.0	-117.65	33.85	-0.16	-1.44	42.64	0.22	0.00	44.08	67.8	2
10255	Tube 3	Origin	145.00	0.10	0.00	-0.00	4001.31	-11.23	0.0	-120.02	33.77	-0.17	-1.47	42.64	0.22	0.00	44.11	67.9	2
10255	10255:g	End	150.00	0.00	0.00	0.00	4170.16	-12.06	0.0	-120.02	33.77	-0.17	-1.43	42.46	0.21	0.00	43.90	67.5	2

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	99.87	0.21	-2.79	-9.98	0.00	0.0	-1.34	1.06	-0.00	-0.20	6.99	0.00	0.00	7.18	11.1	1
Davit1	#Davit1:0	End	5.00	100.92	0.22	3.30	-4.69	0.00	0.0	-1.34	1.06	-0.00	-0.25	5.47	0.00	0.00	5.73	8.8	1
Davit1	#Davit1:0	Origin	5.00	100.92	0.22	3.30	-4.69	0.00	0.0	-1.32	0.95	-0.00	-0.25	5.47	0.00	0.00	5.72	8.8	1
Davit1	#Davit1:1	End	7.54	101.44	0.22	6.34	-2.28	0.00	0.0	-1.32	0.95	-0.00	-0.29	3.65	0.00	0.00	3.94	6.1	1
Davit1	#Davit1:1	Origin	7.54	101.44	0.22	6.34	-2.28	0.00	0.0	-1.31	0.90	-0.00	-0.29	3.65	0.00	0.00	3.94	6.1	1
Davit1	Davit1:End	End	10.07	101.96	0.22	9.35	-0.00	0.00	0.0	-1.31	0.90	-0.00	-0.35	0.00	0.51	0.00	0.94	1.5	3
Davit2	Davit2:O	Origin	0.00	99.76	0.21	-4.91	-12.82	-0.00	-0.0	1.06	1.34	0.00	0.15	8.98	0.00	0.00	9.13	14.0	1
Davit2	#Davit2:0	End	5.00	100.18	0.21	-11.26	-6.10	-0.00	-0.0	1.06	1.34	0.00	0.20	7.11	0.00	0.00	7.31	11.2	1
Davit2	#Davit2:0	Origin	5.00	100.18	0.21	-11.26	-6.10	-0.00	-0.0	1.06	1.23	0.00	0.20	7.11	0.00	0.00	7.31	11.2	1
Davit2	#Davit2:1	End	7.54	100.39	0.21	-14.54	-2.97	-0.00	-0.0	1.06	1.23	0.00	0.23	4.77	0.00	0.00	5.00	7.7	1
Davit2	#Davit2:1	Origin	7.54	100.39	0.21	-14.54	-2.97	-0.00	0.0	1.07	1.17	0.00	0.23	4.77	0.00	0.00	5.00	7.7	1
Davit2	Davit2:End	End	10.07	100.61	0.21	-17.86	0.00	0.00	0.0	1.07	1.17	0.00	0.28	0.00	0.66	0.00	1.18	1.8	3
Davit3	Davit3:O	Origin	0.00	84.12	0.18	-1.83	-99.22	0.03	0.0	-5.37	6.83	-0.00	-0.36	17.99	0.00	0.00	18.35	28.2	1
Davit3	#Davit3:0	End	5.00	85.22	0.19	4.08	-65.10	0.02	0.0	-5.37	6.83	-0.00	-0.43	17.25	0.00	0.00	17.68	27.2	1
Davit3	#Davit3:0	Origin	5.00	85.22	0.19	4.08	-65.10	0.02	0.0	-5.27	6.54	-0.00	-0.42	17.25	0.00	0.00	17.67	27.2	1
Davit3	#Davit3:1	End	10.00	86.25	0.19	9.74	-32.39	0.01	0.0	-5.27	6.54	-0.00	-0.53	13.71	0.00	0.00	14.24	21.9	1
Davit3	#Davit3:1	Origin	10.00	86.25	0.19	9.74	-32.39	0.01	0.0	-5.21	6.36	-0.00	-0.53	13.71	0.00	0.00	14.24	21.9	1
Davit3	#Davit3:2	End	12.57	86.76	0.19	12.55	-16.07	0.00	0.0	-5.21	6.36	-0.00	-0.61	9.10	0.00	0.00	9.71	14.9	1
Davit3	#Davit3:2	Origin	12.57	86.76	0.19	12.55	-16.07	0.00	0.0	-5.17	6.26	-0.00	-0.60	9.10	0.00	0.00	9.70	14.9	1
Davit3	Davit3:End	End	15.13	87.26	0.19	15.32	-0.00	0.00	0.0	-5.17	6.26	-0.00	-0.71	0.00	1.79	0.00	3.18	4.9	3
Davit4	Davit4:O	Origin	0.00	84.00	0.18	-4.23	-116.03	-0.02	-0.0	3.43	7.99	0.00	0.23	21.04	0.00	0.00	21.27	32.7	1
Davit4	#Davit4:0	End	5.00	84.50	0.18	-10.50	-76.10	-0.02	-0.0	3.43	7.99	0.00	0.27	20.16	0.00	0.00	20.44	31.4	1
Davit4	#Davit4:0	Origin	5.00	84.50	0.18	-10.50	-76.10	-0.02	-0.0	3.48	7.65	0.00	0.28	20.16	0.00	0.00	20.44	31.5	1
Davit4	#Davit4:1	End	10.00	85.02	0.18	-17.06	-37.85	-0.01	-0.0	3.48	7.65	0.00	0.35	16.02	0.00	0.00	16.37	25.2	1

Davit4	#Davit4:1	Origin	10.00	85.02	0.18	-17.06	-37.85	-0.01	-0.0	3.51	7.43	0.00	0.35	16.02	0.00	0.00	16.38	25.2	1
Davit4	#Davit4:2	End	12.57	85.28	0.18	-20.54	-18.77	-0.00	-0.0	3.51	7.43	0.00	0.41	10.63	0.00	0.00	11.04	17.0	1
Davit4	#Davit4:2	Origin	12.57	85.28	0.18	-20.54	-18.77	-0.00	0.0	3.52	7.32	0.00	0.41	10.63	0.00	0.00	11.04	17.0	1
Davit4	Davit4:End	End	15.13	85.55	0.18	-24.08	-0.00	0.00	0.0	3.52	7.32	0.00	0.49	0.00	2.09	0.00	3.66	5.6	3
Davit5	Davit5:O	Origin	0.00	58.66	0.13	-0.50	-100.27	0.03	0.0	-5.28	6.90	-0.00	-0.35	18.18	0.00	0.00	18.53	28.5	1
Davit5	#Davit5:0	End	5.00	59.58	0.14	4.65	-65.79	0.02	0.0	-5.28	6.90	-0.00	-0.42	17.43	0.00	0.00	17.85	27.5	1
Davit5	#Davit5:0	Origin	5.00	59.58	0.14	4.65	-65.79	0.02	0.0	-5.18	6.61	-0.00	-0.41	17.43	0.00	0.00	17.85	27.5	1
Davit5	#Davit5:1	End	10.00	60.44	0.14	9.54	-32.74	0.01	0.0	-5.18	6.61	-0.00	-0.52	13.86	0.00	0.00	14.38	22.1	1
Davit5	#Davit5:1	Origin	10.00	60.44	0.14	9.54	-32.74	0.01	0.0	-5.12	6.43	-0.00	-0.52	13.86	0.00	0.00	14.38	22.1	1
Davit5	#Davit5:2	End	12.57	60.86	0.14	11.96	-16.24	0.00	0.0	-5.12	6.43	-0.00	-0.60	9.20	0.00	0.00	9.79	15.1	1
Davit5	#Davit5:2	Origin	12.57	60.86	0.14	11.96	-16.24	0.00	0.0	-5.09	6.33	-0.00	-0.59	9.20	0.00	0.00	9.79	15.1	1
Davit5	Davit5:End	End	15.13	61.27	0.14	14.33	-0.00	0.00	0.0	-5.09	6.33	-0.00	-0.70	0.00	1.81	0.00	3.21	4.9	3
Davit6	Davit6:O	Origin	0.00	58.55	0.13	-3.08	-116.71	-0.02	-0.0	3.33	8.03	0.00	0.22	21.16	0.00	0.00	21.38	32.9	1
Davit6	#Davit6:0	End	5.00	59.02	0.13	-8.57	-76.56	-0.01	-0.0	3.33	8.03	0.00	0.27	20.28	0.00	0.00	20.55	31.6	1
Davit6	#Davit6:0	Origin	5.00	59.02	0.13	-8.57	-76.56	-0.01	-0.0	3.38	7.69	0.00	0.27	20.28	0.00	0.00	20.55	31.6	1
Davit6	#Davit6:1	End	10.00	59.51	0.13	-14.35	-38.08	-0.01	-0.0	3.38	7.69	0.00	0.34	16.12	0.00	0.00	16.46	25.3	1
Davit6	#Davit6:1	Origin	10.00	59.51	0.13	-14.35	-38.08	-0.01	-0.0	3.41	7.48	0.00	0.34	16.12	0.00	0.00	16.47	25.3	1
Davit6	#Davit6:2	End	12.57	59.77	0.13	-17.43	-18.89	-0.00	-0.0	3.41	7.48	0.00	0.40	10.70	0.00	0.00	11.10	17.1	1
Davit6	#Davit6:2	Origin	12.57	59.77	0.13	-17.43	-18.89	-0.00	0.0	3.43	7.36	0.00	0.40	10.70	0.00	0.00	11.10	17.1	1
Davit6	Davit6:End	End	15.13	60.02	0.13	-20.57	-0.00	0.00	0.0	3.43	7.36	0.00	0.47	0.00	2.10	0.00	3.68	5.7	3
Davit7	Davit7:O	Origin	0.00	37.56	0.09	0.26	-101.74	0.02	0.0	-5.15	7.00	-0.00	-0.34	18.45	0.00	0.00	18.79	28.9	1
Davit7	#Davit7:0	End	5.00	38.24	0.09	4.30	-66.77	0.01	0.0	-5.15	7.00	-0.00	-0.41	17.69	0.00	0.00	18.10	27.9	1
Davit7	#Davit7:0	Origin	5.00	38.24	0.09	4.30	-66.77	0.01	0.0	-5.06	6.71	-0.00	-0.40	17.69	0.00	0.00	18.10	27.8	1
Davit7	#Davit7:1	End	10.00	38.87	0.09	8.09	-33.23	0.01	0.0	-5.06	6.71	-0.00	-0.51	14.07	0.00	0.00	14.58	22.4	1
Davit7	#Davit7:1	Origin	10.00	38.87	0.09	8.09	-33.23	0.01	0.0	-5.00	6.52	-0.00	-0.50	14.07	0.00	0.00	14.57	22.4	1
Davit7	#Davit7:2	End	12.57	39.17	0.09	9.94	-16.49	0.00	0.0	-5.00	6.52	-0.00	-0.58	9.34	0.00	0.00	9.92	15.3	1
Davit7	#Davit7:2	Origin	12.57	39.17	0.09	9.94	-16.49	0.00	0.0	-4.97	6.42	-0.00	-0.58	9.34	0.00	0.00	9.92	15.3	1
Davit7	Davit7:End	End	15.13	39.47	0.10	11.74	-0.00	0.00	0.0	-4.97	6.42	-0.00	-0.69	0.00	1.84	0.00	3.25	5.0	3
Davit8	Davit8:O	Origin	0.00	37.47	0.09	-2.12	-117.64	-0.02	-0.0	3.18	8.09	0.00	0.21	21.33	0.00	0.00	21.54	33.1	1
Davit8	#Davit8:0	End	5.00	37.90	0.09	-6.48	-77.19	-0.01	-0.0	3.18	8.09	0.00	0.25	20.45	0.00	0.00	20.71	31.9	1
Davit8	#Davit8:0	Origin	5.00	37.90	0.09	-6.48	-77.19	-0.01	-0.0	3.23	7.76	0.00	0.26	20.45	0.00	0.00	20.71	31.9	1
Davit8	#Davit8:1	End	10.00	38.33	0.09	-11.14	-38.41	-0.01	-0.0	3.23	7.76	0.00	0.33	16.26	0.00	0.00	16.58	25.5	1
Davit8	#Davit8:1	Origin	10.00	38.33	0.09	-11.14	-38.41	-0.01	-0.0	3.27	7.54	0.00	0.33	16.26	0.00	0.00	16.59	25.5	1
Davit8	#Davit8:2	End	12.57	38.56	0.09	-13.65	-19.05	-0.00	-0.0	3.27	7.54	0.00	0.38	10.79	0.00	0.00	11.17	17.2	1
Davit8	#Davit8:2	Origin	12.57	38.56	0.09	-13.65	-19.05	-0.00	0.0	3.29	7.42	0.00	0.38	10.79	0.00	0.00	11.17	17.2	1
Davit8	Davit8:End	End	15.13	38.80	0.09	-16.21	-0.00	0.00	0.0	3.29	7.42	0.00	0.45	0.00	2.12	0.00	3.70	5.7	3

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	1.565	80.00	80.00	1.96
Clamp2	1.565	80.00	80.00	1.96
Clamp3	8.074	80.00	80.00	10.09
Clamp4	8.074	80.00	80.00	10.09
Clamp5	8.074	80.00	80.00	10.09
Clamp6	8.074	80.00	80.00	10.09
Clamp7	8.074	80.00	80.00	10.09
Clamp8	8.074	80.00	80.00	10.09
Clamp9	10.694	80.00	80.00	13.37
Clamp10	4.377	80.00	80.00	5.47

Clamp11	1.153	80.00	80.00	1.44
Clamp12	1.153	80.00	80.00	1.44
Clamp13	1.153	80.00	80.00	1.44
Clamp14	1.153	80.00	80.00	1.44
Clamp15	1.153	80.00	80.00	1.44
Clamp16	1.153	80.00	80.00	1.44
Clamp17	1.153	80.00	80.00	1.44
Clamp18	1.153	80.00	80.00	1.44
Clamp19	1.153	80.00	80.00	1.44
Clamp20	1.153	80.00	80.00	1.44
Clamp21	1.153	80.00	80.00	1.44
Clamp22	1.153	80.00	80.00	1.44
Clamp23	1.153	80.00	80.00	1.44

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

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

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
10255:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
10255:t	0.005231	11.9	-0.6437	-8.5927	0.0033	0.0002	0.005231	11.9	149.4
10255:Arm1	0.005192	11.8	-0.6359	-8.5927	0.0033	0.0002	0.005192	11.8	148.7
10255:TopConn	0.005029	11.37	-0.6036	-8.5894	0.0033	0.0002	0.005029	11.37	145.8
10255:BotConn	0.004681	10.45	-0.5348	-8.4893	0.0033	0.0002	0.004681	10.45	139.7
10255:Arm2	0.004477	9.916	-0.4956	-8.3804	0.0032	0.0001	0.004477	9.916	136.1
10255:WVGD13	0.004108	8.965	-0.4268	-8.1005	0.0032	0.0001	0.004108	8.965	129.6
10255:WVGD12	0.003562	7.6	-0.3331	-7.5562	0.0031	0.0001	0.003562	7.6	119.7
10255:Arm3	0.003278	6.908	-0.2882	-7.2287	0.0030	0.0001	0.003278	6.908	114.3
10255:WVGD11	0.00304	6.337	-0.2528	-6.9172	0.0029	0.0001	0.00304	6.337	109.7
10255:WVGD10	0.002549	5.195	-0.187	-6.1765	0.0027	0.0001	0.002549	5.195	99.81
10255:Arm4	0.00221	4.432	-0.1474	-5.6929	0.0026	0.0001	0.00221	4.432	92.48
10255:WVGD9	0.002094	4.175	-0.1347	-5.5294	0.0025	0.0001	0.002094	4.175	89.87
10255:WVGD8	0.001675	3.266	-0.09303	-4.8829	0.0023	0.0000	0.001675	3.266	79.91
10255:WVGD7	0.001297	2.471	-0.06113	-4.2192	0.0020	0.0000	0.001297	2.471	69.94
10255:WVGD6	0.0009621	1.792	-0.03777	-3.5562	0.0018	0.0000	0.0009621	1.792	59.96
10255:WVGD5	0.0006742	1.228	-0.02157	-2.9046	0.0015	0.0000	0.0006742	1.228	49.98
10255:WVGD4	0.0004352	0.7752	-0.01105	-2.2759	0.0012	0.0000	0.0004352	0.7752	39.99
10255:WVGD3	0.000247	0.4302	-0.004836	-1.6702	0.0009	0.0000	0.000247	0.4302	30
10255:WVGD2	0.0001109	0.1889	-0.001656	-1.0888	0.0006	0.0000	0.0001109	0.1889	20
10255:WVGD1	2.823e-005	0.04694	-0.0003799	-0.5322	0.0003	0.0000	2.823e-005	0.04694	10
Davit1:O	0.005201	11.81	-0.5092	-8.5927	0.0033	0.0002	0.005201	10.96	148.8
Davit1:End	0.005384	12.1	0.9682	-8.5624	0.0033	0.0002	0.005384	1.248	151.5
Davit2:O	0.005182	11.79	-0.7626	-8.5927	0.0033	0.0002	0.005182	12.63	148.5
Davit2:End	0.005136	11.85	-2.278	-8.6674	0.0033	0.0002	0.005136	22.7	148.2
Davit3:O	0.004488	9.926	-0.3528	-8.3804	0.0032	0.0001	0.004488	8.947	136.3
Davit3:End	0.004765	10.37	1.787	-8.2078	0.0032	0.0002	0.004765	-5.608	140.4
Davit4:O	0.004467	9.905	-0.6383	-8.3804	0.0032	0.0001	0.004467	10.88	136
Davit4:End	0.004414	10.04	-2.892	-8.6948	0.0032	0.0001	0.004414	26.02	135.7
Davit5:O	0.003288	6.917	-0.1363	-7.2287	0.0030	0.0001	0.003288	5.71	114.5
Davit5:End	0.003519	7.281	1.709	-7.0444	0.0030	0.0001	0.003519	-8.926	118.3
Davit6:O	0.003268	6.898	-0.4402	-7.2287	0.0030	0.0001	0.003268	8.106	114.2
Davit6:End	0.003245	7.031	-2.391	-7.5532	0.0030	0.0001	0.003245	23.24	114.2
Davit7:O	0.002217	4.439	-0.007552	-5.6929	0.0026	0.0001	0.002217	3.03	92.62
Davit7:End	0.002389	4.705	1.442	-5.4932	0.0026	0.0001	0.002389	-11.7	96.07
Davit8:O	0.002202	4.425	-0.2872	-5.6929	0.0026	0.0001	0.002202	5.835	92.34
Davit8:End	0.002208	4.551	-1.835	-6.0308	0.0026	0.0001	0.002208	20.96	92.79

Joint Support Reactions for Load Case "NESC Extreme":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	Z Force (kips)	Z Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
10255:g	-0.05	0.0	-53.58	0.0	59.23	0.0	0.0	79.87	0.0	6039.79	0.0	-3.7	0.0	-0.01	0.0	0.0

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

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

Label	Label	Position	Dist. (ft)	Defl. (in)	Defl. (in)	Defl. (in)	(Local Mx) (ft-k)	(Local My) (ft-k)	Mom. (ft-k)	Force (kips)	Shear (kips)	Shear (kips)	(ksi)	(ksi)	(ksi)	(ksi)	(ksi)	Usage %	Pt.
10255	10255:t	Origin	0.00	142.81	0.06	-7.72	-0.00	-0.00	-0.0	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	5
10255	10255:Arm1	End	0.70	141.55	0.06	-7.63	0.01	-0.00	-0.0	-0.02	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
10255	10255:Arm1	Origin	0.70	141.55	0.06	-7.63	1.91	-0.00	0.0	-0.83	1.67	-0.00	-0.04	0.06	0.16	0.00	0.30	0.5	4
10255	10255:TopConn	End	3.58	136.39	0.06	-7.24	6.72	-0.00	0.0	-0.83	1.67	-0.00	-0.04	0.74	0.04	0.00	0.78	1.2	2
10255	10255:TopConn	Origin	3.58	136.39	0.06	-7.24	6.72	-0.00	0.0	-1.51	22.05	-0.00	-0.07	0.00	2.15	0.00	3.73	5.7	5
10255	Tube 1	End	6.67	130.87	0.06	-6.83	74.76	-0.01	0.0	-1.51	22.05	-0.00	-0.07	7.64	0.54	0.00	7.76	11.9	2
10255	Tube 1	Origin	6.67	130.87	0.06	-6.83	74.76	-0.01	0.0	-1.76	22.24	-0.00	-0.08	7.64	0.55	0.00	7.77	12.0	2
10255	10255:BotConn	End	9.75	125.37	0.06	-6.42	143.36	-0.01	0.0	-1.76	22.24	-0.00	-0.08	13.64	0.53	0.00	13.75	21.2	2
10255	10255:BotConn	Origin	9.75	125.37	0.06	-6.42	143.36	-0.01	0.0	-4.20	9.23	-0.00	-0.19	13.64	0.22	0.00	13.84	21.3	2
10255	10255:Arm2	End	13.38	118.99	0.05	-5.95	176.80	-0.02	0.0	-4.20	9.23	-0.00	-0.18	15.54	0.21	0.00	15.72	24.2	2
10255	10255:Arm2	Origin	13.38	118.99	0.05	-5.95	198.41	-0.03	0.0	-10.21	20.39	-0.00	-0.44	17.44	0.46	0.00	17.89	27.5	2
10255	Tube 1	End	16.69	113.23	0.05	-5.53	265.95	-0.04	0.0	-10.21	20.39	-0.00	-0.42	21.79	0.45	0.00	22.22	34.2	2
10255	Tube 1	Origin	16.69	113.23	0.05	-5.53	265.95	-0.04	0.0	-10.53	20.58	-0.01	-0.44	21.79	0.45	0.00	22.24	34.2	2
10255	10255:WVGD13	End	20.00	107.58	0.05	-5.12	334.12	-0.06	0.0	-10.53	20.58	-0.01	-0.42	25.57	0.44	0.00	26.01	40.0	2
10255	10255:WVGD13	Origin	20.00	107.58	0.05	-5.12	334.12	-0.06	0.0	-11.24	21.08	-0.01	-0.45	25.57	0.45	0.00	26.04	40.1	2
10255	Tube 1	End	25.00	99.25	0.05	-4.54	439.54	-0.09	0.0	-11.24	21.08	-0.01	-0.43	30.49	0.43	0.00	30.93	47.6	2
10255	Tube 1	Origin	25.00	99.25	0.05	-4.54	439.54	-0.09	0.0	-11.78	21.38	-0.01	-0.45	30.49	0.43	0.00	30.95	47.6	2
10255	10255:WVGD12	End	30.00	91.20	0.04	-4.00	546.44	-0.13	0.0	-11.78	21.38	-0.01	-0.43	34.52	0.41	0.00	34.96	53.8	2
10255	10255:WVGD12	Origin	30.00	91.20	0.04	-4.00	546.44	-0.13	0.0	-12.50	21.87	-0.01	-0.46	34.52	0.42	0.00	34.98	53.8	2
10255	Tube 1	End	32.69	87.00	0.04	-3.72	605.21	-0.15	0.0	-12.50	21.87	-0.01	-0.44	36.42	0.41	0.00	36.87	56.7	2
10255	Tube 1	Origin	32.69	87.00	0.04	-3.72	605.21	-0.15	0.0	-12.82	22.03	-0.01	-0.46	36.42	0.41	0.00	36.88	56.7	2
10255	10255:Arm3	End	35.38	82.89	0.04	-3.46	664.43	-0.17	0.0	-12.82	22.03	-0.01	-0.44	38.13	0.40	0.00	38.58	59.4	2
10255	10255:Arm3	Origin	35.38	82.89	0.04	-3.46	685.79	-0.18	0.0	-19.23	33.09	-0.01	-0.67	39.36	0.61	0.00	40.04	61.6	2
10255	10255:WVGD11	End	40.00	76.05	0.04	-3.03	838.81	-0.23	0.0	-19.23	33.09	-0.01	-0.64	44.48	0.58	0.00	45.13	69.4	2
10255	10255:WVGD11	Origin	40.00	76.05	0.04	-3.03	838.81	-0.23	0.0	-20.19	33.61	-0.01	-0.67	44.48	0.59	0.00	45.16	69.5	2
10255	Tube 1	End	45.00	69.00	0.03	-2.62	1006.84	-0.29	0.0	-20.19	33.61	-0.01	-0.65	49.18	0.57	0.00	49.83	76.7	2
10255	Tube 1	Origin	45.00	69.00	0.03	-2.62	1006.84	-0.29	0.0	-20.94	33.88	-0.01	-0.67	49.18	0.57	0.00	49.86	76.7	2
10255	10255:WVGD10	End	50.00	62.33	0.03	-2.24	1176.25	-0.36	0.0	-20.94	33.88	-0.01	-0.65	53.09	0.55	0.00	53.75	82.7	2
10255	10255:WVGD10	Origin	50.00	62.33	0.03	-2.24	1176.25	-0.36	0.0	-21.64	34.28	-0.01	-0.67	53.09	0.56	0.00	53.77	82.7	2
10255	SpliceT	End	50.33	61.91	0.03	-2.22	1187.56	-0.36	0.0	-21.64	34.28	-0.01	-0.66	53.33	0.56	0.00	54.01	83.1	2
10255	SpliceT	Origin	50.33	61.91	0.03	-2.22	1187.56	-0.36	0.0	-22.38	34.46	-0.02	-0.69	53.33	0.56	0.00	54.03	83.1	2
10255	SpliceB	End	55.00	56.05	0.03	-1.91	1348.51	-0.43	0.0	-22.38	34.46	-0.02	-0.48	42.33	0.40	0.00	42.82	65.9	2
10255	SpliceB	Origin	55.00	56.05	0.03	-1.91	1348.51	-0.43	0.0	-23.32	34.72	-0.02	-0.51	42.33	0.40	0.00	42.84	65.9	2
10255	10255:Arm4	End	57.38	53.18	0.03	-1.77	1430.96	-0.47	0.0	-23.32	34.72	-0.02	-0.50	43.33	0.39	0.00	43.83	67.4	2
10255	10255:Arm4	Origin	57.38	53.18	0.03	-1.77	1451.97	-0.47	0.0	-30.06	45.55	-0.02	-0.64	43.97	0.51	0.00	44.62	68.6	2
10255	10255:WVGD9	End	60.00	50.10	0.03	-1.62	1571.53	-0.52	0.0	-30.06	45.55	-0.02	-0.63	45.77	0.50	0.00	46.41	71.4	2
10255	10255:WVGD9	Origin	60.00	50.10	0.03	-1.62	1571.53	-0.52	0.0	-31.16	46.02	-0.02	-0.65	45.77	0.51	0.00	46.43	71.4	2
10255	Tube 2	End	65.00	44.48	0.02	-1.35	1801.63	-0.62	0.0	-31.16	46.02	-0.02	-0.63	48.82	0.49	0.00	49.45	76.1	2
10255	Tube 2	Origin	65.00	44.48	0.02	-1.35	1801.63	-0.62	0.0	-32.26	46.32	-0.02	-0.65	48.82	0.49	0.00	49.47	76.1	2
10255	10255:WVGD8	End	70.00	39.19	0.02	-1.12	2033.22	-0.72	0.0	-32.26	46.32	-0.02	-0.63	51.38	0.48	0.00	52.02	80.0	2
10255	10255:WVGD8	Origin	70.00	39.19	0.02	-1.12	2033.22	-0.72	0.0	-33.69	46.86	-0.02	-0.66	51.38	0.48	0.00	52.05	80.1	2
10255	Tube 2	End	75.00	34.25	0.02	-0.91	2267.51	-0.83	0.0	-33.69	46.86	-0.02	-0.63	53.57	0.47	0.00	54.21	83.4	2
10255	Tube 2	Origin	75.00	34.25	0.02	-0.91	2267.51	-0.83	0.0	-34.87	47.16	-0.02	-0.66	53.57	0.47	0.00	54.24	83.4	2
10255	10255:WVGD7	End	80.00	29.65	0.02	-0.73	2503.32	-0.95	0.0	-34.87	47.16	-0.02	-0.64	55.41	0.45	0.00	56.05	86.2	2
10255	10255:WVGD7	Origin	80.00	29.65	0.02	-0.73	2503.32	-0.95	0.0	-36.37	47.70	-0.03	-0.66	55.41	0.46	0.00	56.08	86.3	2
10255	Tube 2	End	85.00	25.41	0.01	-0.58	2741.84	-1.08	0.0	-36.37	47.70	-0.03	-0.64	56.98	0.45	0.00	57.63	88.7	2
10255	Tube 2	Origin	85.00	25.41	0.01	-0.58	2741.84	-1.08	0.0	-37.61	48.01	-0.03	-0.66	56.98	0.45	0.00	57.65	88.7	2
10255	10255:WVGD6	End	90.00	21.51	0.01	-0.45	2981.90	-1.22	0.0	-37.61	48.01	-0.03	-0.64	58.30	0.43	0.00	58.94	90.7	2
10255	10255:WVGD6	Origin	90.00	21.51	0.01	-0.45	2981.90	-1.22	0.0	-39.10	48.54	-0.03	-0.67	58.30	0.44	0.00	58.97	90.7	2
10255	Tube 2	End	94.42	18.35	0.01	-0.36	3196.21	-1.35	0.0	-39.10	48.54	-0.03	-0.65	59.29	0.43	0.00	59.95	92.2	2
10255	Tube 2	Origin	94.42	18.35	0.01	-0.36	3196.21	-1.35	0.0	-40.24	48.82	-0.03	-0.67	59.29	0.43	0.00	59.97	92.3	2
10255	SpliceT	End	98.83	15.46	0.01	-0.28	3411.75	-1.49	0.0	-40.24	48.82	-0.03	-0.65	60.13	0.42	0.00	60.79	93.5	2
10255	SpliceT	Origin	98.83	15.46	0.01	-0.28	3411.75	-1.49	0.0	-41.11	49.00	-0.03	-0.67	60.13	0.42	0.00	60.81	93.5	2
10255	10255:WVGD5	End	100.00	14.73	0.01	-0.26	3469.08	-1.53	0.0	-41.11	49.00	-0.03	-0.63	58.76	0.40	0.00	59.40	91.4	2
10255	10255:WVGD5	Origin	100.00	14.73	0.01	-0.26	3469.08	-1.53	0.0	-42.92	49.47	-0.03	-0.66	58.76	0.40	0.00	59.42	91.4	2
10255	SpliceB	End	105.00	11.85	0.01	-0.19	3716.41	-1.69	0.0	-42.92	49.47	-0.03	-0.64	59.45	0.39	0.00	60.09	92.5	2

10255	SpliceB	Origin	105.00	11.85	0.01	-0.19	3716.41	-1.69	0.0	-44.86	49.81	-0.04	-0.67	59.45	0.39	0.00	60.12	92.5	2
10255	10255:WVGD4	End	110.00	9.30	0.01	-0.13	3965.43	-1.87	0.0	-44.86	49.81	-0.04	-0.65	60.00	0.38	0.00	60.66	93.3	2
10255	10255:WVGD4	Origin	110.00	9.30	0.01	-0.13	3965.43	-1.87	0.0	-46.60	50.35	-0.04	-0.68	60.00	0.39	0.00	60.68	93.4	2
10255	Tube 3	End	115.00	7.07	0.00	-0.09	4217.18	-2.06	0.0	-46.60	50.35	-0.04	-0.66	60.45	0.38	0.00	61.11	94.0	2
10255	Tube 3	Origin	115.00	7.07	0.00	-0.09	4217.18	-2.06	0.0	-48.07	50.68	-0.04	-0.68	60.45	0.38	0.00	61.13	94.0	2
10255	10255:WVGD3	End	120.00	5.16	0.00	-0.06	4470.56	-2.26	0.0	-48.07	50.68	-0.04	-0.66	60.79	0.37	0.00	61.46	94.6	2
10255	10255:WVGD3	Origin	120.00	5.16	0.00	-0.06	4470.56	-2.26	0.0	-49.87	51.23	-0.04	-0.69	60.79	0.37	0.00	61.48	94.6	2
10255	Tube 3	End	125.00	3.56	0.00	-0.04	4726.71	-2.46	0.0	-49.87	51.23	-0.04	-0.67	61.06	0.36	0.00	61.73	95.0	2
10255	Tube 3	Origin	125.00	3.56	0.00	-0.04	4726.71	-2.46	0.0	-51.39	51.57	-0.04	-0.69	61.06	0.37	0.00	61.75	95.0	2
10255	10255:WVGD2	End	130.00	2.27	0.00	-0.02	4984.54	-2.68	0.0	-51.39	51.57	-0.04	-0.67	61.25	0.36	0.00	61.92	95.3	2
10255	10255:WVGD2	Origin	130.00	2.27	0.00	-0.02	4984.54	-2.68	0.0	-53.26	52.13	-0.05	-0.70	61.25	0.36	0.00	61.95	95.3	2
10255	Tube 3	End	135.00	1.27	0.00	-0.01	5245.18	-2.91	0.0	-53.26	52.13	-0.05	-0.68	61.38	0.35	0.00	62.06	95.5	2
10255	Tube 3	Origin	135.00	1.27	0.00	-0.01	5245.18	-2.91	0.0	-54.84	52.48	-0.05	-0.70	61.38	0.36	0.00	62.08	95.5	2
10255	10255:WVGD1	End	140.00	0.56	0.00	-0.00	5507.55	-3.16	0.0	-54.84	52.48	-0.05	-0.69	61.45	0.35	0.00	62.14	95.6	2
10255	10255:WVGD1	Origin	140.00	0.56	0.00	-0.00	5507.55	-3.16	0.0	-56.76	53.05	-0.05	-0.71	61.45	0.35	0.00	62.16	95.6	2
10255	Tube 3	End	145.00	0.14	0.00	-0.00	5772.77	-3.41	0.0	-56.76	53.05	-0.05	-0.69	61.48	0.34	0.00	62.17	95.7	2
10255	Tube 3	Origin	145.00	0.14	0.00	-0.00	5772.77	-3.41	0.0	-58.40	53.40	-0.05	-0.71	61.48	0.34	0.00	62.19	95.7	2
10255	10255:g	End	150.00	0.00	0.00	0.00	6039.79	-3.68	0.0	-58.40	53.40	-0.05	-0.70	61.46	0.34	0.00	62.16	95.6	2

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	141.67	0.06	-6.11	-1.55	0.00	-0.0	-0.80	0.20	-0.00	-0.12	1.09	0.00	0.00	1.21	1.9	1
Davit1	#Davit1:0	End	5.00	143.40	0.06	2.70	-0.58	0.00	-0.0	-0.80	0.20	-0.00	-0.15	0.67	0.00	0.00	0.82	1.3	1
Davit1	#Davit1:0	Origin	5.00	143.40	0.06	2.70	-0.58	0.00	0.0	-0.78	0.13	-0.00	-0.15	0.67	0.00	0.00	0.82	1.3	1
Davit1	#Davit1:1	End	7.54	144.28	0.06	7.16	-0.24	0.00	0.0	-0.78	0.13	-0.00	-0.17	0.39	0.00	0.00	0.56	0.9	1
Davit1	#Davit1:1	Origin	7.54	144.28	0.06	7.16	-0.24	0.00	0.0	-0.77	0.10	-0.00	-0.17	0.39	0.00	0.00	0.56	0.9	1
Davit1	Davit1:End	End	10.07	145.16	0.06	11.62	-0.00	0.00	0.0	-0.77	0.10	-0.00	-0.20	0.00	0.05	0.00	0.22	0.3	3
Davit2	Davit2:O	Origin	0.00	141.44	0.06	-9.15	-3.43	-0.00	-0.0	0.73	0.39	0.00	0.11	2.41	0.00	0.00	2.51	3.9	1
Davit2	#Davit2:0	End	5.00	141.84	0.06	-18.16	-1.50	-0.00	-0.0	0.73	0.39	0.00	0.14	1.74	0.00	0.00	1.88	2.9	1
Davit2	#Davit2:0	Origin	5.00	141.84	0.06	-18.16	-1.50	-0.00	-0.0	0.73	0.31	0.00	0.14	1.74	0.00	0.00	1.88	2.9	1
Davit2	#Davit2:1	End	7.54	142.04	0.06	-22.74	-0.70	-0.00	-0.0	0.73	0.31	0.00	0.16	1.12	0.00	0.00	1.28	2.0	1
Davit2	#Davit2:1	Origin	7.54	142.04	0.06	-22.74	-0.70	-0.00	0.0	0.72	0.28	0.00	0.16	1.12	0.00	0.00	1.28	2.0	1
Davit2	Davit2:End	End	10.07	142.24	0.06	-27.34	0.00	0.00	0.0	0.72	0.28	0.00	0.19	0.00	0.16	0.00	0.33	0.5	3
Davit3	Davit3:O	Origin	0.00	119.11	0.05	-4.23	-27.41	0.01	0.0	-5.77	1.99	-0.00	-0.38	4.97	0.00	0.00	5.35	8.2	1
Davit3	#Davit3:0	End	5.00	120.90	0.05	4.32	-17.48	0.00	0.0	-5.77	1.99	-0.00	-0.46	4.63	0.00	0.00	5.09	7.8	1
Davit3	#Davit3:0	Origin	5.00	120.90	0.05	4.32	-17.48	0.00	0.0	-5.71	1.80	-0.00	-0.46	4.63	0.00	0.00	5.09	7.8	1
Davit3	#Davit3:1	End	10.00	122.66	0.06	12.80	-8.47	0.00	0.0	-5.71	1.80	-0.00	-0.58	3.59	0.00	0.00	4.16	6.4	1
Davit3	#Davit3:1	Origin	10.00	122.66	0.06	12.80	-8.47	0.00	0.0	-5.68	1.68	-0.00	-0.57	3.59	0.00	0.00	4.16	6.4	1
Davit3	#Davit3:2	End	12.57	123.56	0.06	17.13	-4.15	0.00	0.0	-5.68	1.68	-0.00	-0.66	2.35	0.00	0.00	3.01	4.6	1
Davit3	#Davit3:2	Origin	12.57	123.56	0.06	17.13	-4.15	0.00	0.0	-5.65	1.62	-0.00	-0.66	2.35	0.00	0.00	3.01	4.6	1
Davit3	Davit3:End	End	15.13	124.45	0.06	21.45	-0.00	0.00	0.0	-5.65	1.62	-0.00	-0.78	0.00	0.46	0.00	1.12	1.7	3
Davit4	Davit4:O	Origin	0.00	118.86	0.05	-7.66	-48.99	-0.00	-0.0	5.05	3.45	0.00	0.33	8.88	0.00	0.00	9.22	14.2	1
Davit4	#Davit4:0	End	5.00	119.38	0.05	-16.48	-31.75	-0.00	-0.0	5.05	3.45	0.00	0.40	8.41	0.00	0.00	8.82	13.6	1
Davit4	#Davit4:0	Origin	5.00	119.38	0.05	-16.48	-31.75	-0.00	-0.0	5.05	3.23	0.00	0.40	8.41	0.00	0.00	8.82	13.6	1
Davit4	#Davit4:1	End	10.00	119.90	0.05	-25.42	-15.62	-0.00	-0.0	5.05	3.23	0.00	0.51	6.61	0.00	0.00	7.12	11.0	1
Davit4	#Davit4:1	Origin	10.00	119.90	0.05	-25.42	-15.62	-0.00	-0.0	5.06	3.08	0.00	0.51	6.61	0.00	0.00	7.12	11.0	1
Davit4	#Davit4:2	End	12.57	120.17	0.05	-30.05	-7.71	-0.00	-0.0	5.06	3.08	0.00	0.59	4.37	0.00	0.00	4.96	7.6	1
Davit4	#Davit4:2	Origin	12.57	120.17	0.05	-30.05	-7.71	-0.00	0.0	5.06	3.00	0.00	0.59	4.37	0.00	0.00	4.96	7.6	1
Davit4	Davit4:End	End	15.13	120.43	0.05	-34.71	-0.00	0.00	0.0	5.06	3.00	0.00	0.70	0.00	0.86	0.00	1.64	2.5	3
Davit5	Davit5:O	Origin	0.00	83.01	0.04	-1.64	-29.19	0.01	0.0	-5.73	2.11	-0.00	-0.38	5.29	0.00	0.00	5.67	8.7	1

Davit5	#Davit5:0	End	5.00	84.47	0.04	5.75	-18.66	0.00	0.0	-5.73	2.11	-0.00	-0.46	4.94	0.00	0.00	5.40	8.3	1
Davit5	#Davit5:0	Origin	5.00	84.47	0.04	5.75	-18.66	0.00	0.0	-5.68	1.92	-0.00	-0.45	4.94	0.00	0.00	5.40	8.3	1
Davit5	#Davit5:1	End	10.00	85.91	0.04	13.06	-9.07	0.00	0.0	-5.68	1.92	-0.00	-0.57	3.84	0.00	0.00	4.41	6.8	1
Davit5	#Davit5:1	Origin	10.00	85.91	0.04	13.06	-9.07	0.00	0.0	-5.64	1.80	-0.00	-0.57	3.84	0.00	0.00	4.41	6.8	1
Davit5	#Davit5:2	End	12.57	86.65	0.04	16.79	-4.45	0.00	0.0	-5.64	1.80	-0.00	-0.66	2.52	0.00	0.00	3.18	4.9	1
Davit5	#Davit5:2	Origin	12.57	86.65	0.04	16.79	-4.45	0.00	0.0	-5.62	1.73	-0.00	-0.66	2.52	0.00	0.00	3.17	4.9	1
Davit5	Davit5:End	End	15.13	87.38	0.04	20.51	-0.00	0.00	0.0	-5.62	1.73	-0.00	-0.78	0.00	0.50	0.00	1.16	1.8	3
Davit6	Davit6:O	Origin	0.00	82.78	0.04	-5.28	-50.51	-0.00	-0.0	4.98	3.55	0.00	0.33	9.16	0.00	0.00	9.49	14.6	1
Davit6	#Davit6:0	End	5.00	83.30	0.04	-12.89	-32.76	-0.00	-0.0	4.98	3.55	0.00	0.40	8.68	0.00	0.00	9.08	14.0	1
Davit6	#Davit6:0	Origin	5.00	83.30	0.04	-12.89	-32.76	-0.00	-0.0	4.99	3.33	0.00	0.40	8.68	0.00	0.00	9.08	14.0	1
Davit6	#Davit6:1	End	10.00	83.83	0.04	-20.63	-16.13	-0.00	-0.0	4.99	3.33	0.00	0.50	6.83	0.00	0.00	7.33	11.3	1
Davit6	#Davit6:1	Origin	10.00	83.83	0.04	-20.63	-16.13	-0.00	-0.0	4.99	3.18	0.00	0.50	6.83	0.00	0.00	7.33	11.3	1
Davit6	#Davit6:2	End	12.57	84.10	0.04	-24.65	-7.97	-0.00	-0.0	4.99	3.18	0.00	0.58	4.51	0.00	0.00	5.09	7.8	1
Davit6	#Davit6:2	Origin	12.57	84.10	0.04	-24.65	-7.97	-0.00	0.0	5.00	3.10	0.00	0.58	4.51	0.00	0.00	5.09	7.8	1
Davit6	Davit6:End	End	15.13	84.37	0.04	-28.70	-0.00	0.00	0.0	5.00	3.10	0.00	0.69	0.00	0.89	0.00	1.68	2.6	3
Davit7	Davit7:O	Origin	0.00	53.27	0.03	-0.09	-31.53	0.01	0.0	-5.67	2.26	-0.00	-0.38	5.72	0.00	0.00	6.09	9.4	1
Davit7	#Davit7:0	End	5.00	54.34	0.03	5.73	-20.21	0.00	0.0	-5.67	2.26	-0.00	-0.45	5.36	0.00	0.00	5.81	8.9	1
Davit7	#Davit7:0	Origin	5.00	54.34	0.03	5.73	-20.21	0.00	0.0	-5.62	2.07	-0.00	-0.45	5.36	0.00	0.00	5.81	8.9	1
Davit7	#Davit7:1	End	10.00	55.39	0.03	11.47	-9.85	0.00	0.0	-5.62	2.07	-0.00	-0.57	4.17	0.00	0.00	4.74	7.3	1
Davit7	#Davit7:1	Origin	10.00	55.39	0.03	11.47	-9.85	0.00	0.0	-5.59	1.95	-0.00	-0.56	4.17	0.00	0.00	4.73	7.3	1
Davit7	#Davit7:2	End	12.57	55.93	0.03	14.39	-4.84	0.00	0.0	-5.59	1.95	-0.00	-0.65	2.74	0.00	0.00	3.39	5.2	1
Davit7	#Davit7:2	Origin	12.57	55.93	0.03	14.39	-4.84	0.00	0.0	-5.57	1.89	-0.00	-0.65	2.74	0.00	0.00	3.39	5.2	1
Davit7	Davit7:End	End	15.13	56.46	0.03	17.30	-0.00	0.00	0.0	-5.57	1.89	-0.00	-0.77	0.00	0.54	0.00	1.21	1.9	3
Davit8	Davit8:O	Origin	0.00	53.10	0.03	-3.45	-52.51	-0.00	-0.0	4.88	3.68	0.00	0.32	9.52	0.00	0.00	9.84	15.1	1
Davit8	#Davit8:0	End	5.00	53.60	0.03	-9.45	-34.10	-0.00	-0.0	4.88	3.68	0.00	0.39	9.04	0.00	0.00	9.43	14.5	1
Davit8	#Davit8:0	Origin	5.00	53.60	0.03	-9.45	-34.10	-0.00	-0.0	4.90	3.46	0.00	0.39	9.04	0.00	0.00	9.43	14.5	1
Davit8	#Davit8:1	End	10.00	54.10	0.03	-15.59	-16.81	-0.00	-0.0	4.90	3.46	0.00	0.49	7.12	0.00	0.00	7.61	11.7	1
Davit8	#Davit8:1	Origin	10.00	54.10	0.03	-15.59	-16.81	-0.00	-0.0	4.91	3.31	0.00	0.50	7.12	0.00	0.00	7.61	11.7	1
Davit8	#Davit8:2	End	12.57	54.36	0.03	-18.79	-8.30	-0.00	-0.0	4.91	3.31	0.00	0.57	4.70	0.00	0.00	5.27	8.1	1
Davit8	#Davit8:2	Origin	12.57	54.36	0.03	-18.79	-8.30	-0.00	0.0	4.91	3.24	0.00	0.57	4.70	0.00	0.00	5.28	8.1	1
Davit8	Davit8:End	End	15.13	54.62	0.03	-22.02	-0.00	0.00	0.0	4.91	3.24	0.00	0.68	0.00	0.93	0.00	1.74	2.7	3

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	0.768	80.00	80.00	0.96
Clamp2	0.768	80.00	80.00	0.96
Clamp3	5.864	80.00	80.00	7.33
Clamp4	5.864	80.00	80.00	7.33
Clamp5	5.864	80.00	80.00	7.33
Clamp6	5.864	80.00	80.00	7.33
Clamp7	5.864	80.00	80.00	7.33
Clamp8	5.864	80.00	80.00	7.33
Clamp9	20.216	80.00	80.00	25.27
Clamp10	13.386	80.00	80.00	16.73
Clamp11	0.379	80.00	80.00	0.47
Clamp12	0.379	80.00	80.00	0.47
Clamp13	0.379	80.00	80.00	0.47
Clamp14	0.379	80.00	80.00	0.47
Clamp15	0.379	80.00	80.00	0.47
Clamp16	0.379	80.00	80.00	0.47

Clamp17	0.379	80.00	80.00	0.47
Clamp18	0.379	80.00	80.00	0.47
Clamp19	0.379	80.00	80.00	0.47
Clamp20	0.379	80.00	80.00	0.47
Clamp21	0.379	80.00	80.00	0.47
Clamp22	0.379	80.00	80.00	0.47
Clamp23	0.379	80.00	80.00	0.47

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

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
10255	95.68	NESC Extreme	37	30952.3

Base Plate Results by Bend Line:

Pole Label	Load Case	Bend Line #	Start X (ft)	Start Y (ft)	End X (ft)	End Y (ft)	Length (in)	Bending Stress (ksi)	Bolt Mom. Sum (ft-k)	# Bolts Acting	Bolt Max Load (kips)	Min Plate Thickness (in)	Actual Thickness (in)	Usage %
10255	NESC Heavy	1	2.364	1.329	-0.017	2.704	32.990	37.315	153.881	6	100.212	2.366	3.000	62.19
10255	NESC Heavy	2	2.704	-0.017	1.329	2.364	32.990	13.980	57.649	4	86.023	1.448	3.000	23.30
10255	NESC Heavy	3	2.333	-0.375	2.333	0.375	9.010	1.519	1.711	1	4.558	0.477	3.000	2.53
10255	NESC Heavy	4	1.329	-2.364	2.704	0.017	32.990	12.039	49.645	4	-76.475	1.344	3.000	20.06
10255	NESC Heavy	5	-0.017	-2.704	2.364	-1.329	32.990	33.267	137.185	6	-90.316	2.234	3.000	55.44
10255	NESC Heavy	6	-1.500	-2.333	1.500	-2.333	36.011	37.577	169.146	5	-90.316	2.374	3.000	62.63
10255	NESC Heavy	7	-2.364	-1.329	0.017	-2.704	32.990	33.060	136.335	6	-90.111	2.227	3.000	55.10
10255	NESC Heavy	8	-2.704	0.017	-1.329	-2.364	32.990	11.887	49.019	4	-75.922	1.335	3.000	19.81
10255	NESC Heavy	9	-2.333	0.375	-2.333	-0.375	9.010	1.848	2.081	1	5.543	0.526	3.000	3.08
10255	NESC Heavy	10	-1.329	2.364	-2.704	-0.017	32.990	14.137	58.300	4	86.576	1.456	3.000	23.56
10255	NESC Heavy	11	0.017	2.704	-2.364	1.329	32.990	37.522	154.732	6	100.417	2.372	3.000	62.54
10255	NESC Heavy	12	1.500	2.333	-1.500	2.333	36.011	41.789	188.107	5	100.417	2.504	3.000	69.65
10255	NESC Heavy	13	1.671	2.053	-0.630	2.669	28.583	35.766	127.788	5	100.315	2.316	3.000	59.61
10255	NESC Heavy	14	2.312	1.103	0.707	2.708	27.239	27.419	93.359	4	100.008	2.028	3.000	45.70
10255	NESC Heavy	15	2.566	-0.246	2.053	1.671	23.810	4.443	13.223	2	58.063	0.816	3.000	7.40
10255	NESC Heavy	16	2.053	-1.671	2.566	0.246	23.810	3.783	11.260	2	-48.803	0.753	3.000	6.31
10255	NESC Heavy	17	0.707	-2.708	2.312	-1.103	27.239	24.132	82.166	4	-90.316	1.903	3.000	40.22
10255	NESC Heavy	18	-0.630	-2.669	1.671	-2.053	28.583	32.178	114.969	5	-90.316	2.197	3.000	53.63
10255	NESC Heavy	19	-1.671	-2.053	0.630	-2.669	28.583	32.072	114.591	5	-90.213	2.193	3.000	53.45
10255	NESC Heavy	20	-2.312	-1.103	-0.707	-2.708	27.239	23.915	81.428	4	-89.906	1.894	3.000	39.86
10255	NESC Heavy	21	-2.566	0.246	-2.053	-1.671	23.810	3.790	11.280	2	-47.962	0.754	3.000	6.32
10255	NESC Heavy	22	-2.053	1.671	-2.566	-0.246	23.810	4.569	13.599	2	58.904	0.828	3.000	7.62
10255	NESC Heavy	23	-0.707	2.708	-2.312	1.103	27.239	27.636	94.098	4	100.417	2.036	3.000	46.06
10255	NESC Heavy	24	0.630	2.669	-1.671	2.053	28.583	35.871	128.166	5	100.417	2.320	3.000	59.79
10255	NESC Extreme	1	2.364	1.329	-0.017	2.704	32.990	52.121	214.938	6	140.294	2.796	3.000	86.87
10255	NESC Extreme	2	2.704	-0.017	1.329	2.364	32.990	19.317	79.659	4	120.059	1.702	3.000	32.19
10255	NESC Extreme	3	2.333	-0.375	2.333	0.375	9.010	0.773	0.870	1	2.318	0.340	3.000	1.29
10255	NESC Extreme	4	1.329	-2.364	2.704	0.017	32.990	18.340	75.631	4	-115.292	1.659	3.000	30.57
10255	NESC Extreme	5	-0.017	-2.704	2.364	-1.329	32.990	50.105	206.623	6	-135.420	2.741	3.000	83.51
10255	NESC Extreme	6	-1.500	-2.333	1.500	-2.333	36.011	56.445	254.078	5	-135.420	2.910	3.000	94.07
10255	NESC Extreme	7	-2.364	-1.329	0.017	-2.704	32.990	50.042	206.364	6	-135.358	2.740	3.000	83.40
10255	NESC Extreme	8	-2.704	0.017	-1.329	-2.364	32.990	18.294	75.440	4	-115.124	1.657	3.000	30.49
10255	NESC Extreme	9	-2.333	0.375	-2.333	-0.375	9.010	0.873	0.983	1	2.618	0.362	3.000	1.45
10255	NESC Extreme	10	-1.329	2.364	-2.704	-0.017	32.990	19.365	79.858	4	120.228	1.704	3.000	32.28
10255	NESC Extreme	11	0.017	2.704	-2.364	1.329	32.990	52.184	215.197	6	140.356	2.798	3.000	86.97
10255	NESC Extreme	12	1.500	2.333	-1.500	2.333	36.011	58.503	263.343	5	140.356	2.962	3.000	97.50
10255	NESC Extreme	13	1.671	2.053	-0.630	2.669	28.583	50.089	178.963	5	140.325	2.741	3.000	83.48
10255	NESC Extreme	14	2.312	1.103	0.707	2.708	27.239	38.155	129.912	4	140.231	2.392	3.000	63.59
10255	NESC Extreme	15	2.566	-0.246	2.053	1.671	23.810	5.835	17.365	2	79.729	0.936	3.000	9.72
10255	NESC Extreme	16	2.053	-1.671	2.566	0.246	23.810	5.501	16.373	2	-75.049	0.908	3.000	9.17
10255	NESC Extreme	17	0.707	-2.708	2.312	-1.103	27.239	36.508	124.307	4	-135.420	2.340	3.000	60.85

10255	NESC Extreme	18	-0.630	-2.669	1.671	-2.053	28.583	48.316	172.630	5	-135.420	2.692	3.000	80.53
10255	NESC Extreme	19	-1.671	-2.053	0.630	-2.669	28.583	48.284	172.515	5	-135.389	2.691	3.000	80.47
10255	NESC Extreme	20	-2.312	-1.103	-0.707	-2.708	27.239	36.442	124.082	4	-135.296	2.338	3.000	60.74
10255	NESC Extreme	21	-2.566	0.246	-2.053	-1.671	23.810	5.503	16.379	2	-74.793	0.909	3.000	9.17
10255	NESC Extreme	22	-2.053	1.671	-2.566	-0.246	23.810	5.873	17.480	2	79.985	0.939	3.000	9.79
10255	NESC Extreme	23	-0.707	2.708	-2.312	1.103	27.239	38.221	130.137	4	140.356	2.394	3.000	63.70
10255	NESC Extreme	24	0.630	2.669	-1.671	2.053	28.583	50.121	179.078	5	140.356	2.742	3.000	83.53

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	11.05	NESC Heavy	1	182.3
Davit2	14.05	NESC Heavy	1	182.3
Davit3	28.23	NESC Heavy	1	575.0
Davit4	32.72	NESC Heavy	1	575.0
Davit5	28.51	NESC Heavy	1	575.0
Davit6	32.89	NESC Heavy	1	575.0
Davit7	28.91	NESC Heavy	1	575.0
Davit8	33.14	NESC Heavy	1	575.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	69.65	10255	Base Plate
NESC Extreme	97.50	10255	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	68.37	10255	27
NESC Extreme	95.68	10255	37

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	10255	12	36.011	121.214	4170.162	-12.064	41.789	188.107	5	100.417	2.504	69.65
NESC Extreme	10255	12	36.011	59.228	6039.786	-3.676	58.503	263.343	5	140.356	2.962	97.50

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	33.14	Davit8	1
NESC Extreme	15.15	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	25.27	NESC Extreme	0.0
Clamp10	Clamp	16.73	NESC Extreme	0.0
Clamp11	Clamp	1.44	NESC Heavy	0.0
Clamp12	Clamp	1.44	NESC Heavy	0.0
Clamp13	Clamp	1.44	NESC Heavy	0.0
Clamp14	Clamp	1.44	NESC Heavy	0.0
Clamp15	Clamp	1.44	NESC Heavy	0.0
Clamp16	Clamp	1.44	NESC Heavy	0.0
Clamp17	Clamp	1.44	NESC Heavy	0.0
Clamp18	Clamp	1.44	NESC Heavy	0.0
Clamp19	Clamp	1.44	NESC Heavy	0.0
Clamp20	Clamp	1.44	NESC Heavy	0.0
Clamp21	Clamp	1.44	NESC Heavy	0.0
Clamp22	Clamp	1.44	NESC Heavy	0.0
Clamp23	Clamp	1.44	NESC Heavy	0.0

Loads At Insulator Attachments For All Load Cases:

Load Case	Insulator Label	Insulator Type	Structure Attach Label	Structure Attach Load X (kips)	Structure Attach Load Y (kips)	Structure Attach Load Z (kips)	Structure Attach Load Res. (kips)
NESC Heavy	Clamp1	Clamp	Davit1:End	0.000	1.078	1.134	1.565
NESC Heavy	Clamp2	Clamp	Davit2:End	0.000	1.078	1.134	1.565
NESC Heavy	Clamp3	Clamp	Davit3:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp4	Clamp	Davit4:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp5	Clamp	Davit5:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp6	Clamp	Davit6:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp7	Clamp	Davit7:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp8	Clamp	Davit8:End	0.000	3.651	7.201	8.074
NESC Heavy	Clamp9	Clamp	10255:TopConn	0.000	6.545	8.457	10.694
NESC Heavy	Clamp10	Clamp	10255:BotConn	0.000	-4.305	0.788	4.377
NESC Heavy	Clamp11	Clamp	10255:WVGD1	0.000	0.084	1.150	1.153
NESC Heavy	Clamp12	Clamp	10255:WVGD2	0.000	0.084	1.150	1.153
NESC Heavy	Clamp13	Clamp	10255:WVGD3	0.000	0.084	1.150	1.153
NESC Heavy	Clamp14	Clamp	10255:WVGD4	0.000	0.084	1.150	1.153
NESC Heavy	Clamp15	Clamp	10255:WVGD5	0.000	0.084	1.150	1.153
NESC Heavy	Clamp16	Clamp	10255:WVGD6	0.000	0.084	1.150	1.153
NESC Heavy	Clamp17	Clamp	10255:WVGD7	0.000	0.084	1.150	1.153
NESC Heavy	Clamp18	Clamp	10255:WVGD8	0.000	0.084	1.150	1.153
NESC Heavy	Clamp19	Clamp	10255:WVGD9	0.000	0.084	1.150	1.153
NESC Heavy	Clamp20	Clamp	10255:WVGD10	0.000	0.084	1.150	1.153
NESC Heavy	Clamp21	Clamp	10255:WVGD11	0.000	0.084	1.150	1.153

NESC Heavy	Clamp22	Clamp	10255:WVGD12	0.000	0.084	1.150	1.153
NESC Heavy	Clamp23	Clamp	10255:WVGD13	0.000	0.084	1.150	1.153
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	19.914	3.483	20.216
NESC Extreme	Clamp10	Clamp	10255:BotConn	0.000	-13.385	0.189	13.386
NESC Extreme	Clamp11	Clamp	10255:WVGD1	0.000	0.215	0.312	0.379
NESC Extreme	Clamp12	Clamp	10255:WVGD2	0.000	0.215	0.312	0.379
NESC Extreme	Clamp13	Clamp	10255:WVGD3	0.000	0.215	0.312	0.379
NESC Extreme	Clamp14	Clamp	10255:WVGD4	0.000	0.215	0.312	0.379
NESC Extreme	Clamp15	Clamp	10255:WVGD5	0.000	0.215	0.312	0.379
NESC Extreme	Clamp16	Clamp	10255:WVGD6	0.000	0.215	0.312	0.379
NESC Extreme	Clamp17	Clamp	10255:WVGD7	0.000	0.215	0.312	0.379
NESC Extreme	Clamp18	Clamp	10255:WVGD8	0.000	0.215	0.312	0.379
NESC Extreme	Clamp19	Clamp	10255:WVGD9	0.000	0.215	0.312	0.379
NESC Extreme	Clamp20	Clamp	10255:WVGD10	0.000	0.215	0.312	0.379
NESC Extreme	Clamp21	Clamp	10255:WVGD11	0.000	0.215	0.312	0.379
NESC Extreme	Clamp22	Clamp	10255:WVGD12	0.000	0.215	0.312	0.379
NESC Extreme	Clamp23	Clamp	10255:WVGD13	0.000	0.215	0.312	0.379

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	27.394	0.000	69.669	3310.248	-0.000
NESC Extreme	40.748	0.000	26.678	4947.477	-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 = $T_{Max} := 141 \cdot kips$ (User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = $N := 24$ (User Input)

Bolt "Column" Distance = $l := 3.0 \cdot in$ (User Input)

Bolt Ultimate Strength = $F_u := 100 \cdot ksi$ (User Input)

Bolt Yeild Strength= $F_y := 75 \cdot ksi$ (User Input)

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

Diameter of Anchor Bolts = $D := 2.25 \cdot in$ (User Input)

Threads per Inch = $n := 4.5$ (User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

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

Bolt Tension Check:

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

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 57.89 \cdot \%$

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

Condition1 = "OK"

Foundation:

Input Data:

Tower Data

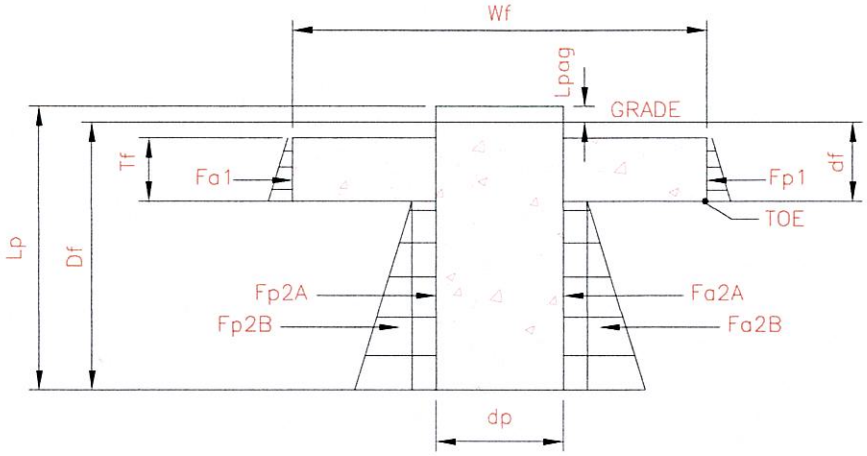
Overturning Moment =	$OM := 6040 \cdot ft \cdot kips \cdot 1.1 = 6644 \cdot ft \cdot kips$	(User Input)
Shear Force =	$Shear := 54 \cdot kip \cdot 1.1 = 59 \cdot kips$	(User Input)
Axial Force =	$Axial := 60 \cdot kip \cdot 1.1 = 66 \cdot kips$	(User Input)
Tower Height =	$H_t := 160 \cdot ft$	(User Input)

Footing Data:

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

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil (mat) =	$\Phi_{s1} := 30 \cdot deg$	(User Input)	
Internal Friction Angle of Soil (below mat) =	$\Phi_{s2} := 30 \cdot deg$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil1} := 100 \cdot pcf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil2} := 100 \cdot pcf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	(Conservative)
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)



Calculated Factors:

Coefficient of Lateral Soil Pressure =

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

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

Stability of Footing:

Passive Pressure 1 =

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

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

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

Active Pressure 1 =

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

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

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

Area of Pressure 1 =

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

Forces 1 =

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

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

Ultimate Shear 1 =

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Total Weight = $W_{tot} := WT_{mat} + WT_{caission} + WT_s + Axial = 588.581 \cdot kips$

Overturning Moment = $M_{ot} := OM + Shear \cdot (d_f + L_{pag}) = 6971 \cdot kip \cdot ft$

Resisting Moment = $M_r := (W_{tot}) \cdot \frac{W_f}{2} + S_{u1} \cdot T_f \cdot \frac{1}{3} + S_{u2A} \cdot \frac{(D_f - d_f)}{2} + S_{u2B} \cdot \frac{2 \cdot (D_f - d_f)}{3} = 10748 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.54$

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

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

$Overturing\_Check = "Okay"$

Bearing Pressure Check:

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

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

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

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

Residual Moment @ Base of Mat = $M_{mat} := (OM - M_{cap}) + Shear \cdot (d_f + L_{pag}) - \left(S_{u1} \cdot T_f \cdot \frac{1}{3}\right) = 1085 \cdot kip \cdot ft$

Maximum Pressure in Mat = $P_{max} := \frac{P_{mat}}{A_{mat}} + \frac{M_{mat}}{S_{mat}} = 1.182 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < q_s, "Okay", "No\ Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{P_{mat}}{A_{mat}} - \frac{M_{mat}}{S_{mat}} = 0.218 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < q_s), "Okay", "No\ Good"]$

Min_Pressure_Check = "Okay"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.814\,ft$

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

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

Eccentricity = $e := \frac{M_{mat}}{P_{mat}} = 2.949\,ft$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot P_{mat}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.129 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.182 \cdot ksf$

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

Pressure_Check = "Okay"

Product Data Sheet APXVSPP18-C

Triple Band Dual Polarized Antenna, 806-1995, 65deg, 16-18dBi, 1.8m, VET, 0-10deg, 0.5m AISG Cable

Product Description

This antenna is an ideal choice for dual band site upgrade for high traffic areas. It features 4 ports in 1900 MHz and 2 ports in 800 MHz.

Features/Benefits

- **Variable electrical downtilt – provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.**
- **High suppression of all upper sidelobes (Typically < 18 dB)**
- **Independent control of electrical downtilt for 800 and PCS bands**
- **Remote tilt – AISG compatible**
- **Low profile for low visual impact**
- **Quick and easy to adjust**
- **High front-to-back ratio**

Technical Specifications

Electrical Specifications

Frequency Range, MHz	806-869	1850-1995	1850-1995
Horizontal Beamwidth, deg	65	65	65
Vertical Beamwidth, deg	11.5	5.5	5.5
Electrical Downtilt, deg		0-10	
Gain, dBi (dBd)	15.5 (13.4)	18.0 (15.9)	18.0 (15.9)
1st Upper Sidelobe Suppression, dB, typ. @ T0° & T8°		>18	
Front-To-Back Ratio, dB, @ 180° ± 15°	>30	>27	>27
Polarization		Dual pol +/-45°	
Return Loss, dB		> 14	
Isolation between Ports, dB		>28	
3rd Order IMP @ 2 x 43 dBm, @ 2 min. duration		>110	
Cross Polar Discrimination (XPD) 0°, dB	>15	>20	>20
Cross Polar Discrimination (XPD) ± 60°, dB	>9.5	>11	>11
HBW Squint accross same band ports, °		±5	
Impedance, Ohms		50	
Maximum Power Input, W		250	
Lightning Protection		Direct Ground	
Connector Type		(6) 7-16 DIN Female	

Mechanical Specifications

Dimensions - HxWxD, mm (in)	1829 x 302 x 178 (72.0 x 11.8 x 7)
Weight w/o Mtg Hardware, kg (lb)	25.8 (57)
Radome Material	ASA
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum and Galvanized Steel

Ordering Information

Mounting Hardware	APM40-2 Downtilt Kit
AISG System Cable	0.5 m, included
Mounting Pipe Diameter, mm (in)	60-120 (2.4-4.7)
Mounting Hardware Weight, kg (lb)	3.4 (7.5)