EM-CING-018-110707

New Cingular Wireless PCS, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 463-5511
Fax: (860) 513-7190

Douglas L. Culp
Real Estate Consultant

HAND DELIVERED

July 7, 2011

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

Re: New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located 761 Federal Road Brookfield, CT (CL&P).

Dear Ms. Roberts:
In order to accommodate technological changes, implement Uniform Mobile Telecommunications System ("UMTS") and/or Long Term Evolution ("LTE") capabilities, and enhance system performance in the State of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which 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 chief elected official of the municipality in which the affected cell site is located.

UMTS technology offers services to mobile computer and phone users anywhere in the world. Based on the Global System for Mobile ("GSM") communication standard, UMTS is the planned worldwide standard for mobile users. UMTS, fully implemented, gives computer and phone users high-speed access to the Internet as they travel. They have the same capabilities even when they roam, through both terrestrial wireless and satellite transmissions.

LTE is a new high-performance air interface for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in AT&T's operations at the site. Also included is documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration.

The changes to the facility do not constitute modifications 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 or altered. 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. The height of the overall structure will be unaffected.

2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound other than some enlarged equipment pads as may be noted in the attachments.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more.

4. Radio frequency power density may increase due to use of one or more GSM channel for UMTS transmissions. Moreover, LTE will utilize additional radio frequencies newly-licensed by the FCC for cellular mobile communications. However, the changes 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.

For the foregoing reasons, New Cingular Wireless respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at (860) 463-5511 with questions concerning this matter. Thank you for your consideration.

Sincerely,

Douglas L. Culp
Real Estate Consultant

Attachments

NEW CINGULAR WIRELESS PCS, LLC
Equipment Modification

761 Federal Road Brookfield, CT
Site Number CT2185
Exempt Modification

Tower Owner/Manager: CL&P

Equipment configuration: Power Mount

Current and/or approved: Three PowerWave P7770 antennas @ 97 ft
Six PowerWave TMA's @ 97 ft
Nine runs 1 ¼ inch coax to 97 ft
Equipment Shelter

Planned Modifications: Retain existing PowerWave P7770 Antenna's and TMA's @ 97 ft
Retain all Coax Cabling
Install six runs of 1 ¼ inch coax to 97 ft
Install three PowerWave Twin BP TMA's TT19-08BP111-001 @ 97 ft
Install three PowerWave P65-16 antennas or equivalent @ 97 ft

Power Density:

Worst-case calculations for existing wireless operations at the site, using standard parameters for other carriers, indicate a radio frequency electromagnetic radiation power density, measured at ground level beside the Tower, of approximately 41.6 % of the standard adopted by the FCC. As depicted in the second table below, the total radio frequency electromagnetic radiation power density following proposed modifications would be approximately 44.2 % of the standard.

Existing

Other Users							12.01
AT&T UMTS	97	1900 Band	1	500	0.0191	1.0000	1.91
AT&T UMTS	97	800 Band	2	500	0.0382	0.5867	6.51
AT&T GSM	97	800Band	11	296	0.1244	0.5867	21.21
Total							**41.6%**

* Data for other users are from Siting Council records.

Proposed

Company	Centerline Ht (feet)	Frequency (MHz)	Number of Channels	Power Per Channel (Watts)	Power Density (mW/cm^2)	Standard Limits (mW/cm^2)	Percent of Limit
Other Users							12.01
AT&T UMTS	97	800 Band	1	500	0.0191	0.5867	3.26
AT&T UMTS	97	1900 Band	2	500	0.0382	1.0000	3.82
AT&T GSM	97	880 - 894	11	296	0.1244	0.5867	21.21
AT&T LTE	97	740 - 746	1	500	0.0191	0.4933	3.87
Total							**44.2%**

* Data for other users are from Siting Council records.

Structural information:

The attached structural analysis demonstrates that the monopole and foundation have adequate structural capacity to accommodate the proposed modifications. (Centek dated 6-29-11).

WIRELESS COMMUNICATIONS FACILITY

CT2185
BROOKFIELD
CL&P STRUCT. NO.: 2683
761 FEDERAL ROAD
BROOKFIELD, CT 06804

SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT

TO: 761 FEDERAL ROAD, BROOKFIELD, CONNECTICUT

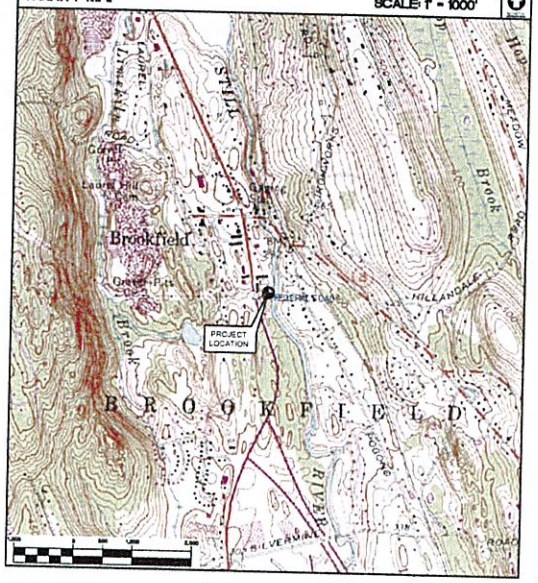
1. Depart Enterprise Dr toward Capitol Blvd	0.4 mi.
2. Turn left onto Capitol Blvd	0.2 mi.
3. Turn left onto West St	0.3 mi.
4. Take ramp left for I-91 South	9.1 mi.
5. At exit 18, take ramp right for I-691 West toward Waterbury / Meriden	7.9 mi.
6. At exit 1, take ramp left for I-84 West toward Waterbury / Danbury	33.1 mi.
7. At exit 7, take ramp right for US-7 North / US-202 East toward Brookfield / New Milford	0.3 mi.
8. Road name changes to US-7 North	4.2 mi.
9. Turn right onto US-7 / US-202 / Federal Rd	0.4 mi.
10. Arrive at near 761 Federal Rd, Brookfield CT 06804 on right.	

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2005 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES," 2005 CONNECTICUT FIRE SAFETY CODE AND 2009 AMENDMENTS, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. 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 WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO "EXTRA" WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. 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.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK GENERALLY CONSISTS OF THE INSTALLATION OF ONE (1) LTE ANTENNA PER SECTOR FOR A TOTAL OF (3) LTE ANTENNAS TO THE EXISTING AT&T ANTENNA ARRAY. AN LTE BASEBAND EQUIPMENT UNIT (RBS) WILL BE INSTALLED WITHIN THE EXISTING AT&T EQUIPMENT SHELTER.
2. ADDITIONALLY, (2) REMOTE RADIO UNITS (RRUs) PER SECTOR WILL BE INSTALLED. SURGE ARRESTORS WILL BE INSTALLED AT BOTH AT&T RRU AND EQUIPMENT LOCATIONS. REFER TO THESE ACCOMPANYING DRAWINGS FOR FURTHER INFORMATION.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT2185
AT&T SITE NAME:	BROOKFIELD
SITE ADDRESS:	CL&P STRUCTURE NO.: 2683 761 FEDERAL ROAD BROOKFIELD, CT 06804
LESSEE/APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT. 06405
PROJECT COORDINATES:	LATITUDE: 41°-28'-43.57" N LONGITUDE: 73°-24'-29.89" W GROUND ELEVATION: ±291' AMSL

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
N-1	NOTES AND SPECIFICATIONS	1
C-1	PLANS AND ELEVATION	1
C-2	LTE SYSTEM EQUIPMENT PLANS & DETAILS	1
E-1	ELECTRICAL DETAILS AND NOTES	1
E-2	ELECTRICAL DETAILS	1

REV.	DATE	DRAWN BY	CHK'D BY	
1	7/06/11	DAD	CFC	CONSTRUCTION
0	3/22/11	DEB	CFC	CONSTRUCTION - CLIENT REVIEW

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

PROFESSIONAL ENGINEER SEAL

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

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2185
SITE NAME: BROOKFIELD
CL&P STRUCT. NO.: 2683
761 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE: 3/22/11
SCALE: AS NOTED
JOB NO. 11021.C050

TITLE SHEET

T-1

Sheet No. 1 of 6

STRUCTURAL SPECIFICATIONS

DESIGN BASIS

GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2005 CONNECTICUT STATE BUILDING CODE AND 2006 AMENDMENTS.

1. DESIGN CRITERIA:
   - WIND LOAD: PER EIA/TIA 222 F-96 & MU CRITERIA (ANTENNA MOUNTS): 85 MPH (FASTEST MILE), EQUIVALENT TO 105 MPH (3 SECOND GUST).
   - BASIC WIND SPEED (OTHER STRUCTURE): 95 MPH (3 SECOND GUST) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-02) PER 2003 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2005 CONNECTICUT SUPPLEMENT AND 2006 AMMENDMENT.
   - SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-95 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.

GENERAL NOTES

1. 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.
2. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST THE PRE MANUFACTURED EQUIPMENT BUILDING SHOP DRAWINGS.
3. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
4. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

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.

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 PAGSSES 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 8" 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.

CONCRETE CONSTRUCTION NOTES

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 DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

   SLABS ON GRADE 4,000 PSI
   ALL OTHER CONCRETE 3,000 PSI

   - PORTLAND CEMENT: ASTM C150, TYPE II, (540 LBS/CUBIC YARD)
   - AGGREGATE: ASTM C33, No. 67, TYPICAL
   - WATER: POTABLE WITH MAXIMUM WATER CEMENT RATIO OF .55
   - SLUMP: 3" TO 4"
   - ADMIXTURES: USE AIR ENTRAINING AGENT CONFORMING TO ASTM C260 WITH 4 TO 6% TOTAL AIR. USE WATER REDUCING AGENT CONFORMING TO ASTM C494, TYPE A, IN ALL CONCRETE. CALCIUM CHLORIDE MAY NOT BE USED TO ACCELERATE THE CONCRETE SETTING TIME.
3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.
4. WELDED WIRE FABRIC SHALL CONFORM TO ASTM– A-185.
5. 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".
6. CONCRETE COVER OVER REINFORCING SHALL CONFORM TO THE FOLLOWING, UNLESS OTHERWISE SHOWN:

   BOTTOM OF FOOTINGS 3 INCHES

   SURFACES NOT EXPOSED TO EARTH OR WEATHER 1-1/2 INCHES
7. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.
8. ALL REINFORCEMENT SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED. SPLICES SHALL BE WELL STAGGERED. ADDITIONAL BARS AND SPECIAL BENDING DETAILS ARE REQUIRED AT INTERSECTING WALLS AND AT JOINTS. SUCH DETAILS SHALL COMPLY WITH ACI 315 RECOMMENDATIONS UNLESS OTHERWISE SHOWN.
9. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.
10. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1% CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.
11. UNLESS OTHERWISE NOTED, ALL LAP SPLICES SHALL BE 48 BAR DIAMETERS.
12. SLAB ON GRADE FINISHES:

    EXTERIOR SLAB: NON-SLIP BROOM FINISH
    INTERIOR SLAB: STEEL TROWEL FINISH

GENERAL NOTES (REFERENCE)

CONTRACTOR TO REFER TO THE GENERAL NOTES ON SHEET T-1 FOR ADDITIONAL INFORMATION.

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

REV.	DATE	DRAWN BY	CHK'D BY	
1	7/06/11	DMD	CFC	CONSTRUCTION
0	3/23/11	DEB	CFC	CONSTRUCTION – CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

at&t

SAI COMMUNICATIONS

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

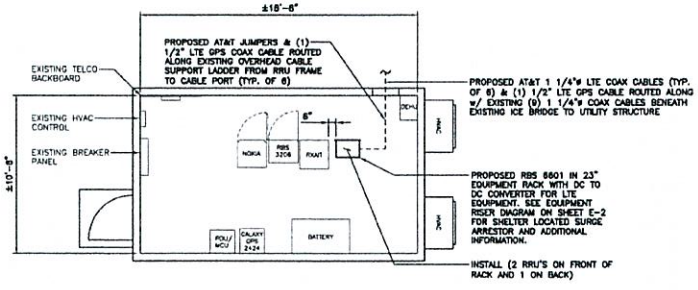
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2185
SITE NAME: BROOKFIELD
CL&P STRUCT. NO.: 2683
291 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE:	3/22/11
SCALE:	AS NOTED
JOB NO.	11021.0050

NOTES AND SPECIFICATIONS

N-1

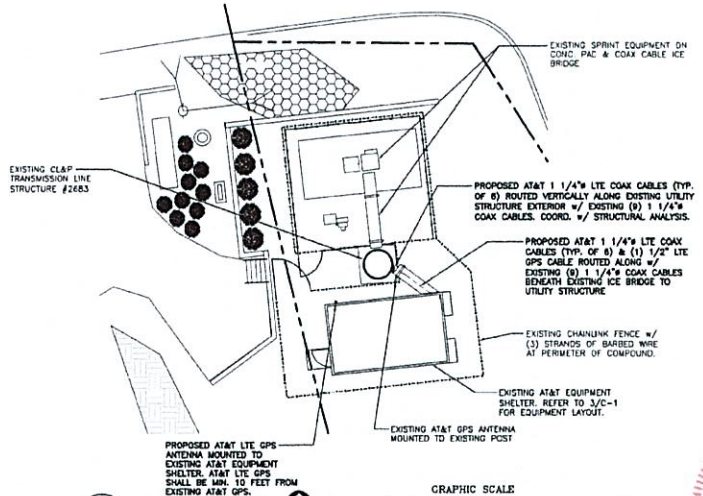
Sheet No. 2 of 6



3 / C-1 **EQUIPMENT SHELTER PLAN**
SCALE: 1/4" = 1'-0"

TRUE NORTH

GRAPHIC SCALE
(IN FEET)
1 inch = 4 ft.

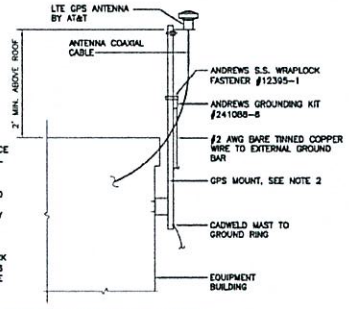


1 / C-1 **COMPOUND PLAN**
SCALE: 1" = 10'

TRUE NORTH

GRAPHIC SCALE
(IN FEET)
1 inch = 10 ft.

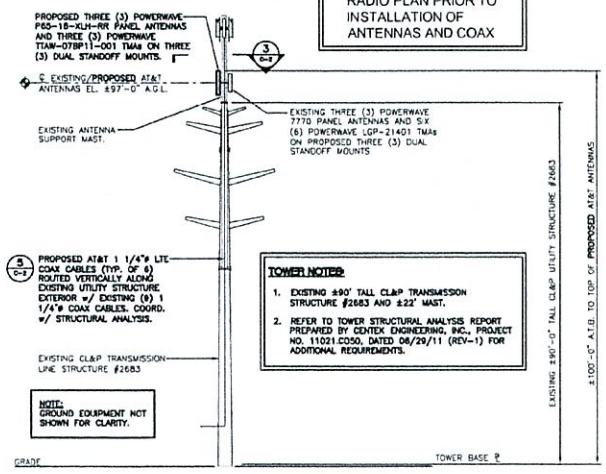
REFER TO FINAL AT&T RF ENGINEER'S RF RADIO PLAN PRIOR TO INSTALLATION OF ANTENNAS AND COAX



GPS ANTENNA MOUNTING NOTES:

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT AND SHALL BE COORDINATED WITH AT&T'S CONSTRUCTION MANAGER.
2. GPS ANTENNA MOUNT, 3/4"ø THREADED MAST, 4 FEET LONG WITH (4) 7/16" MOUNTING HOLES AND 6" STANDOFF BY SITE PRO 1, INC., TELEPHONE 1-800-438-7761, PART NUMBER GPS1.
3. HOLLOW WALL KITS (HWK38) FOR "STICK BUILD" SHELTERS AND SOLID WALL KITS (SWK38) FOR CONCRETE SHELTERS ARE ALSO AVAILABLE FROM SITE PRO 1.

4 / C-1 **GPS ANTENNA MOUNTING DETAIL**
N.T.S.



TOWER NOTES:

1. EXISTING ±90' TALL CL&P TRANSMISSION STRUCTURE #2683 AND ±22' MAST.
2. REFER TO TOWER STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC., PROJECT NO. 11021.C050, DATED 08/29/11 (REV-1) FOR ADDITIONAL REQUIREMENTS.

NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY.

2 / C-1 **TOWER ELEVATION**
SCALE: 1" = 15'

GRAPHIC SCALE
(IN FEET)
1 inch = 15 ft.

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

REV.	DATE	DRAWN BY	CHK'D BY	
0	3/22/11	DEB	CFC	CONSTRUCTION
1	7/26/11	DEB	CFC	CONSTRUCTION - CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

at&t

SAI COMMUNICATIONS

CENTEK engineering
Centered on Solutions

(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405

www.Centekeng.com

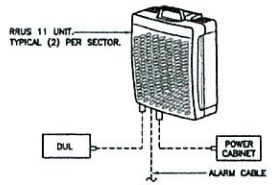
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2185
SITE NAME: BROOKFIELD
CL&P STRUCT. NO.: 2683
191 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE: 3/22/11
SCALE: AS NOTED
JOB NO. 11021.C050

PLANS AND ELEVATION

C-1

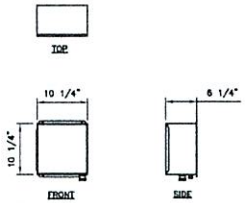
Sheet No. 1 of 6



RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERRICSON MODEL: RRUS 11	17.8"L x 17.3"W x 7.2"D	BAND 4: 44 LBS. BAND 12: 50 LBS.	ABOVE: 18" MIN. BELOW: 12" MIN. SIDE: 0" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

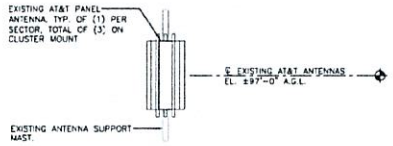
6 / C-2 **RRU DETAIL**
NOT TO SCALE



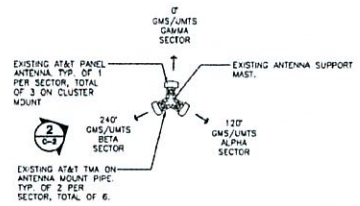
SURGE ARRESTOR				
SITE TYPE	ARRESTOR MAKE/MODEL	QTY REQUIRED	ARRESTOR LOCATION	WEIGHT
TOWER	MAKE: RAYCAP MODEL: DC2-48-60-0-9E	(1) PER SITE	SUPPORT FRAME AT GRADE, ADJACENT TO AT&T RRU'S.	16 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL SURGE ARRESTOR MODEL SELECTION(S) WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. CONTRACTOR TO INSTALL ARRESTOR IN CONFORMANCE WITH MANUFACTURERS RECOMMENDATIONS.

7 / C-2 **SURGE ARRESTOR DETAIL**
NOT TO SCALE



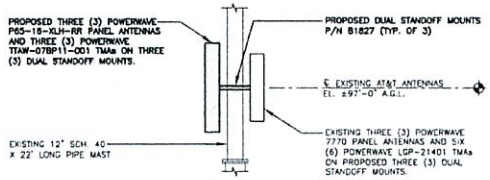
2 / C-2 **EXISTING ANTENNA SECTOR ELEVATION**
SCALE: 3/16" = 1'-0"



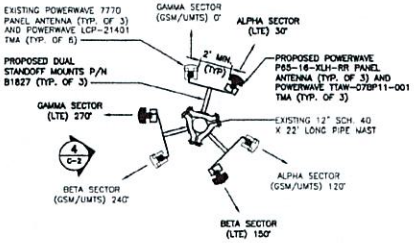
1 / C-2 **EXISTING ANTENNA PLAN**
SCALE: 3/16" = 1'-0"

NORTH

REFER TO FINAL AT&T RF ENGINEER'S RF RADIO PLAN PRIOR TO INSTALLATION OF ANTENNAS AND COAX

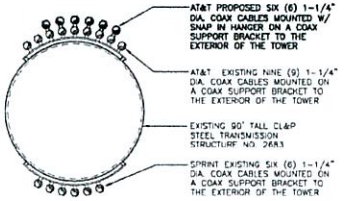


4 / C-2 **PROPOSED ANTENNA SECTOR ELEVATION**
SCALE: 3/16" = 1'-0"



3 / C-2 **PROPOSED ANTENNA PLAN**
SCALE: 3/16" = 1'-0"

NORTH



5 / C-2 **COAX CABLE PLAN**
SCALE: 1" = 1'-0"

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

REV.	DATE	DRAWN BY	CHK'D BY	
0	3/23/11	DEB	CFC	CONSTRUCTION
1	7/06/11	DEB	CFC	CONSTRUCTION - CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

at&t

SAI communications

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

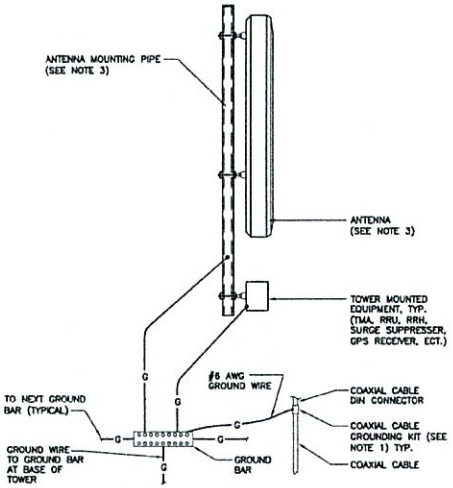
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2185
SITE NAME: BROOKFIELD
CL&P STRUCT. NO.: 2683
PLEASANT VALLEY ROAD
BROOKFIELD, CT 06804

DATE: 3/22/11
SCALE: AS NOTED
JOB NO. 11021.0050

LTE SYSTEM EQUIPMENT PLANS AND DETAILS

C-2

Sheet No. 4 of 6

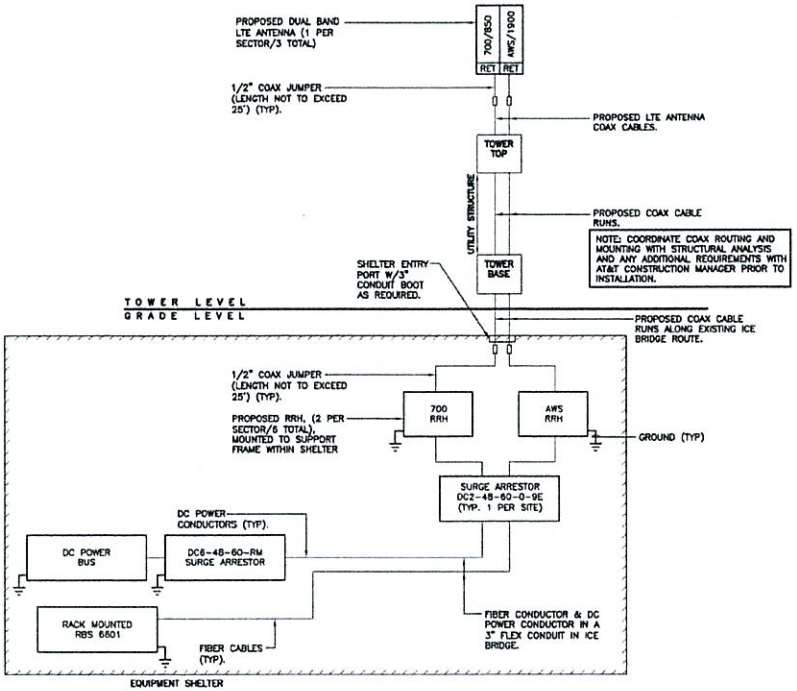


NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

1 / E-1 TYPICAL ANTENNA GROUNDING DETAIL

NOT TO SCALE

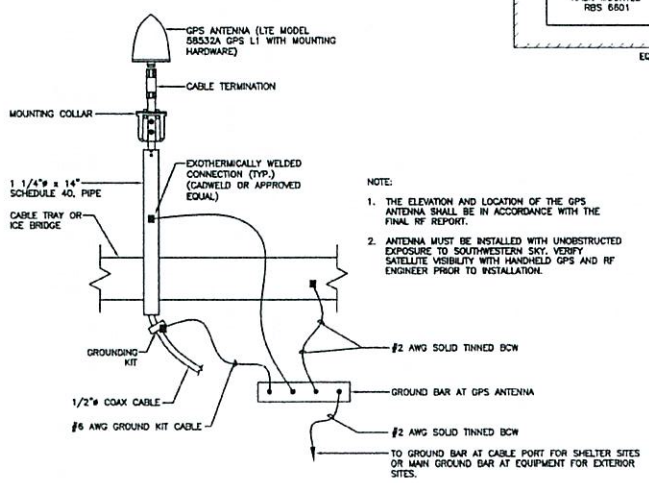


NOTES:

1. CONTRACTOR TO CONFIRM ALL PARTS.
2. INSTALL ALL EQUIPMENT TO MANUFACTURERS RECOMMENDATIONS.

2 / E-1 LTE SCHEMATIC DIAGRAM

NOT TO SCALE



NOTE:

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT.
2. ANTENNA MUST BE INSTALLED WITH UNOBSTRUCTED EXPOSURE TO SOUTHWESTERN SKY. VERIFY SATELLITE VISIBILITY WITH HANDHELD GPS AND RF ENGINEER PRIOR TO INSTALLATION.

3 / E-1 GPS GROUNDING DETAIL

NOT TO SCALE

ELECTRICAL NOTES

1. PRIOR TO START OF CONSTRUCTION CONTRACTOR SHALL COORDINATE WITH OWNER FOR ALL CONSTRUCTION STANDARDS AND SPECIFICATIONS, AND ALL MANUFACTURER DOCUMENTATION FOR ALL EQUIPMENT TO BE INSTALLED.
2. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH LOCAL BUILDING CODE, NATIONAL ELECTRIC CODE, OWNER AND MANUFACTURER'S SPECIFICATIONS.
3. CONNECT ALL NEW EQUIPMENT TO EXISTING TELCO AS REQUIRED BY MANUFACTURER.
4. MAINTAIN ALL CLEARANCES REQUIRED BY NEC AND EQUIPMENT MANUFACTURER.
5. PRIOR TO INSTALLATION CONTRACTOR SHALL MEASURE EXISTING ELECTRICAL LOAD AND VERIFY EXISTING AVAILABLE CAPACITY FOR PROPOSED INSTALLATION. IF INADEQUATE CAPACITY IS AVAILABLE, CONTRACTOR SHALL COORDINATE WITH LOCAL ELECTRIC UTILITY COMPANY TO UPGRADE EXISTING ELECTRIC SERVICE.
6. CONTRACTOR SHALL INSPECT EXISTING GROUNDING AND LIGHTNING PROTECTION SYSTEM AND ENSURE THAT IT IS IN COMPLIANCE WITH NEC, AND SITE OWNER'S SPECIFICATIONS. THE RESULTS OF THIS INSPECTION SHALL BE PRESENTED TO OWNERS REPRESENTATIVE, AND ANY DEFICIENCIES SHALL BE CORRECTED.
7. ALL TRANSMISSION TOWER SITES CONTAIN AN EXTENSIVE BURIED GROUNDING SYSTEM. ALL GROUNDING WORK MUST BE COORDINATED WITH, AND APPROVED BY, THE TOWER OWNER'S SITE REPRESENTATIVE. ALL OF THE TOWER OWNER'S SPECIFICATIONS MUST BE STRICTLY FOLLOWED.
8. PROVIDE AND INSTALL GROUND KITS FOR ALL NEW COAXIAL CABLES AND BOND TO EXISTING OWNERS GROUNDING SYSTEM PER OWNERS SPECIFICATIONS AND NEC.
9. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION.
10. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.
11. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.
12. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNER'S REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS MAY BE REQUIRED BY THE LOCAL AUTHORITY.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE SITE AND/OR BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.
15. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.
16. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.
17. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.
18. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.
19. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122. (MIN. #12 AWG).
20. CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 5 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16960).

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. TESTING SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNERS CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

DESIGNED BY:	CKD
DRAWN BY:	TJB
CHK'D BY:	CKD

REV.	DATE	DRAWN BY	CHK'D BY	
1	7/26/11	TJB	CFC	CONSTRUCTION - CLIENT REVIEW
0	3/23/11	SJB	CFC	CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

SAI COMMUNICATIONS

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

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY

SITE NUMBER: CT2185
SITE NAME: BROOKFIELD
CL&P STRUCT. NO.: 2683

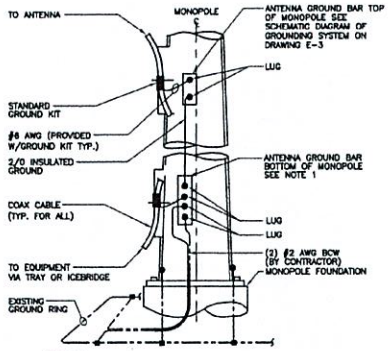
781 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE:	3/23/11
SCALE:	AS NOTED
JOB NO.	11021.C050

ELECTRICAL DETAILS AND NOTES

E-1

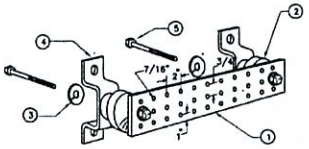
Sheet No. E of E



NOTES:

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

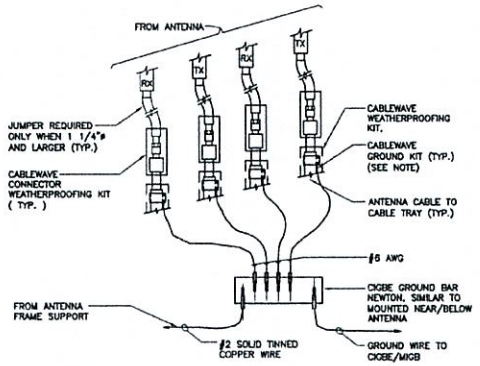
1 / E-2 **ANTENNA CABLE GROUNDING - MONOPOLE**
NOT TO SCALE



LEGEND

1. TINNED COPPER GROUND BAR, 1/4"x 4"x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG .
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 2. 3061-4.
3. 3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. 4. CAT NO. A-6056.
5. STAINLESS STEEL SECURITY SCREWS.

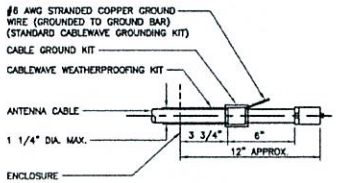
2 / E-2 **GROUND BAR DETAIL**
NOT TO SCALE



NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

3 / E-2 **CONNECTION OF GROUND WIRES TO GROUND BAR**
NOT TO SCALE



NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

4 / E-2 **ANTENNA CABLE GROUNDING DETAIL**
NOT TO SCALE

DESIGNED BY:	CKD
DRAWN BY:	TJB
CHK'D BY:	CKD

REV.	DATE	DRAWN BY	CHK'D BY	
A	7/06/11	CKD	CFC	CONSTRUCTION
B	3/22/11	TJB	CFC	CONSTRUCTION - CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

at&t

SAI

CENTEK engineering
Connect or Isolate

(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405

www.CentekEng.com

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2185
SITE NAME: BROOKFIELD
CL&P STRUCT. NO.: 2683
751 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE:	3/22/11
SCALE:	AS NOTED
JOB NO.	11021.0060

ELECTRICAL DETAILS

E-2

Sheet No. E of E

Northeast Utilities System

107 Selden Street, Berlin, CT 06037

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

July 7, 2011

Mr. Tim Burks
AT&T Wireless.
500 Enterprise Drive
Rocky Hill, CT 06067

RE: AT&T Antenna Site, CT-2185, 761 Federal Rd., Brookfield CT, structure 2683.

Dear Mr. Burks:

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

Since there are no outstanding structural issues to resolve at this time please contact Mr. Green (860-665-6926) to resolve any lease issues; once the lease amendment is secured you may contact Mr. Eriks Surmanis directly (860-665-5849) to begin these arrangements.

Sincerely,

Robert Gray
Transmission Line Engineering

ref: CT2185 LTE CD Rev 1 7-6-11 (2)
CT2185 LTE Structural 6-29-11

CENTEK engineering

Centered on Solutions℠

Structural Analysis of PCS Mast and CL&P Pole

AT&T Site Ref: CT2185: Brookfield

CL&P Structure No. 2683
90' Electric Transmission Pole

761 Federal Road
Brookfield, CT

CENTEK Project No. 11021.CO50

~~Date: June 15, 2011~~
Rev 1: June 29, 2011

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 16094
LICENSED
PROFESSIONAL ENGINEER

Prepared for:
AT&T Mobility
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

632 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 mast and 90' CL&P pole located at 761 Federal Road in Brookfield, CT for the proposed antenna and equipment upgrade by AT&T.

The existing/proposed loads consist of the following:

- SPRINT (Existing to Remain):

  Antennas: Three (3) EMS RR90-17-00DP panel antennas flush mounted on the existing mast with a RAD center elevation of 110-ft-8-in above grade level.
  Coax Cables: Six (6) 1-1/4" ∅ coax cables running on the exterior of the CL&P pole and pcs mast.
  Mast: 12" Sch. 40 x 22' long pipe flange connected to a HSS16"x0.375" x 42' long pipe.

- AT&T (Existing to Remain):

  Antennas: Three (3) Powerwave 7770 panel antennas and six (6) Powerwave LGP-21401 TMAs mounted on the proposed dual standoff mounts to the existing mast with a RAD center elevation of 97-ft above grade level.
  Coax Cables: Nine (9) 1-1/4" ∅ coax cables running on the exterior of the CL&P pole.

- **AT&T (Proposed):**

  Antennas: Three (3) Powerwave P65-16-XLH-RR panel antennas and three (3) Powerwave TTAW-07BP111-001 TMAs mounted on the proposed dual standoff mount sto the existing mast with a RAD center elevation of 97-ft above grade level.
  Coax Cables: Six (6) 1-1/4" ∅ coax cables running on the exterior of the CL&P pole.

Primary assumptions used in the analysis

- Allowable steel stresses are defined by AISC-ASD 9th edition for design of the PCS Mast and antenna supporting elements.
- ASCE Manual No. 72, "Design of Steel Transmission Pole Structures Second Edition", defines allowable steel stresses for evaluation of the CL&P utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- Pipe mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Pipe mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

Analysis

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

The existing mast consisting of a 12" Sch. 40 x 22' long pipe conforming to ASTM A53 Grade B (Fy = 35ksi) flange connected to a HSS16"x0.375" x 42' long pipe conforming to ASTM A500 Grade B (Fy = 42ksi) 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 also applied to the mast 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
  Vertical Overload Capacity Factor..... 1.50
  Wind Overload Capacity Factor..... 2.50
  Wire Tension Overload Capacity Factor..... 1.65

  Load Case 2: NESC Extreme
  Wind Speed..... 100 mph (1)
  Radial Ice Thickness..... 0"

  Note 1: NESC C2-2007, Section25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)

- MAST ASSEMBLY ANALYSIS

Mast, appurtenances and connections to the utility tower were analyzed and designed in accordance with the NU Design Criteria Table, TIA/EIA-222-F, and AISC-ASD standards.

Load cases considered:

Load Case 1:
Wind Speed..... 85 mph (2)
Radial Ice Thickness..... 0"

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

Note 2: Per NU Mast Design Criteria Exception 1.

Results

- MAST ASSEMBLY

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

Member	Stress Ratio (% of capacity)	Result
12" Sch. 40 pipe x 22-ft long	51.0%	**PASS**
HSS 16"x0.375" pipe x 42-ft long	64.1%	**PASS**
5/8" ∅ ASTM A325 Bolt	36.0% (1)	**PASS**

Note 1 – 1/3 increase in allowable stress not used per OTRM 059.

- 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 **68.81%** occurs in the utility pole under the **NESC Heavy** 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'-20.67' (AGL)	68.81%	**PASS**

BASE PLATE:
The base plate was found to be within allowable limits from the PLS output based on 10 bend lines.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Base Plate	Bending	56.66%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 10-ft square x 9-ft long reinforced concrete pier with (16) rock anchors. The base of the tower is connected to the foundation by means of (12) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 8-ft into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01039-60001.

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	24.4 kips	48.5 kips	1846.4 ft-kips
NESC Extreme Wind	25.2 kips	23.9 kips	1785.8 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	34.36%	**PASS**

FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Allowable Load (1)	Proposed Loading (2)	Result
Reinf. Conc. Pier w/ Rock Anchors	OTM(3)	3234.5 ft-kips	2031.1 ft-kips	**PASS**

Note 1: Allowable Load taken from NUSCO drawing no. 01039-50002.
Note 2: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.
Note 3: OTM denotes Overturning Moment

Conclusions and Recommendations

This analysis shows that the subject utility pole **is adequate** to support the proposed AT&T equipment upgrade.

The analysis is based, in part on the information provided to this office by Northeast Utilities and AT&T Mobility. 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.16694
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

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.

If the electric transmission structure is not sufficient to support the additional loadings of the wireless communication mast, reinforcement will be required to upgrade the strength of the overstressed members. Any reinforcement design will be reviewed by NU TL&CE to determine the feasibility of construction and its impact on the use of the structure as a transmission structure.

TITLE _____ 06/05/2000

STRUCT CL&P #2683

CONDUCTOR

	AHEAD		BACK	
	LINNET		LINNET	
	336		336	
	26/7 ACSR		26/7 ACSR	
DIAM =	0.720		0.720	
WEIGHT =	0.462		0.462	
TENSION (LBS)	AHEAD	4,000	BACK	4,000

LOADCASE	NESC HEAVY
WIND (PSF)	4
ICE (IN)	0.50
OLF ANG	1.65
OLF WIND	2.50
OLF WT	1.50

STR	ANGLE	WIND SPAN	WGT SPAN	NESC HEAVY H	L	V
BACK	7	243	345	1152	-6551	632
AHEAD	7	243	345	1153	6551	632
TOTALS	**14.0**	**486**	**690**	**2305**	**0**	**1263**

TITLE _____ 06/05/2000

STRUCT CL&P #2683

CONDUCTOR

	AHEAD		BACK	
	LINNET		LINNET	
	336		336	
	26/7 ACSR		26/7 ACSR	
DIAM =	0.720		0.720	
WEIGHT =	0.462		0.462	
TENSION (LBS)	AHEAD	2,904	BACK	2,904

LOADCASE	HI WIND
WIND (PSF)	20
ICE (IN)	0.00
OLF ANG	1.15
OLF WIND	1.15
OLF WT	1.15

STR	ANGLE	WIND SPAN	WGT SPAN	HI WIND H	L	V
BACK	7	243	345	742	-3315	183
AHEAD	7	243	345	742	3315	183
TOTALS	**14.0**	**486**	**690**	**1484**	**0**	**367**

TITLE _____ 06/05/2000

STRUCT CL&P #2683

CONDUCTOR SHIELD WIRE

	AHEAD		BACK	
	3/8 AW		3/8 AW	
	0.000		0.000	
	7 #8 Al Weld		7 #8 Al Weld	
DIAM =	0.385		0.385	
WEIGHT =	0.262		0.262	
TENSION (LBS)	AHEAD	2,749	BACK	2,749

LOADCASE	HI WIND
WIND (PSF)	20
ICE (IN)	0.00
OLF ANG	1.15
OLF WIND	1.15
OLF WT	1.15

STR	ANGLE	WIND SPAN	WGT SPAN	HI WIND H	L	V
BACK	7	243	345	564	-3138	104
AHEAD	7	243	345	565	3138	104
TOTALS	**14.0**	**486**	**690**	**1129**	**0**	**208**

TITLE _____ 06/05/2000

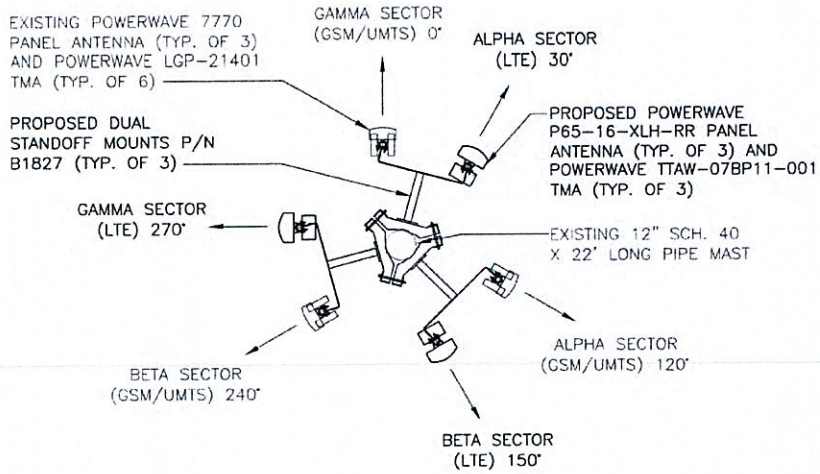
STRUCT CL&P #2683

CONDUCTOR SHIELD WIRE

	AHEAD		BACK	
	3/8 AW		3/8 AW	
	0.000		0.000	
	7 #8 Al Weld		7 #8 Al Weld	
DIAM =	0.385		0.385	
WEIGHT =	0.262		0.262	
TENSION (LBS)	AHEAD	4,200	BACK	4,200

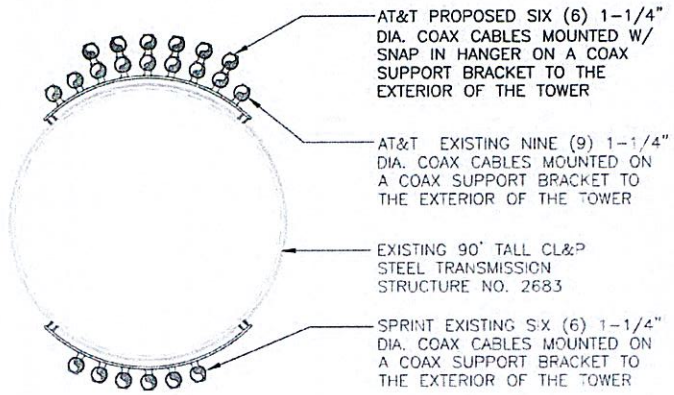
LOADCASE	NESC HEAVY
WIND (PSF)	4
ICE (IN)	0.50
OLF ANG	1.65
OLF WIND	2.50
OLF WT	1.50

STR	ANGLE	WIND SPAN	WGT SPAN	NESC HEAVY H	L	V
BACK	7	243	345	1125	-6878	420
AHEAD	7	243	345	1125	6878	420
TOTALS	**14.0**	**486**	**690**	**2250**	**0**	**840**



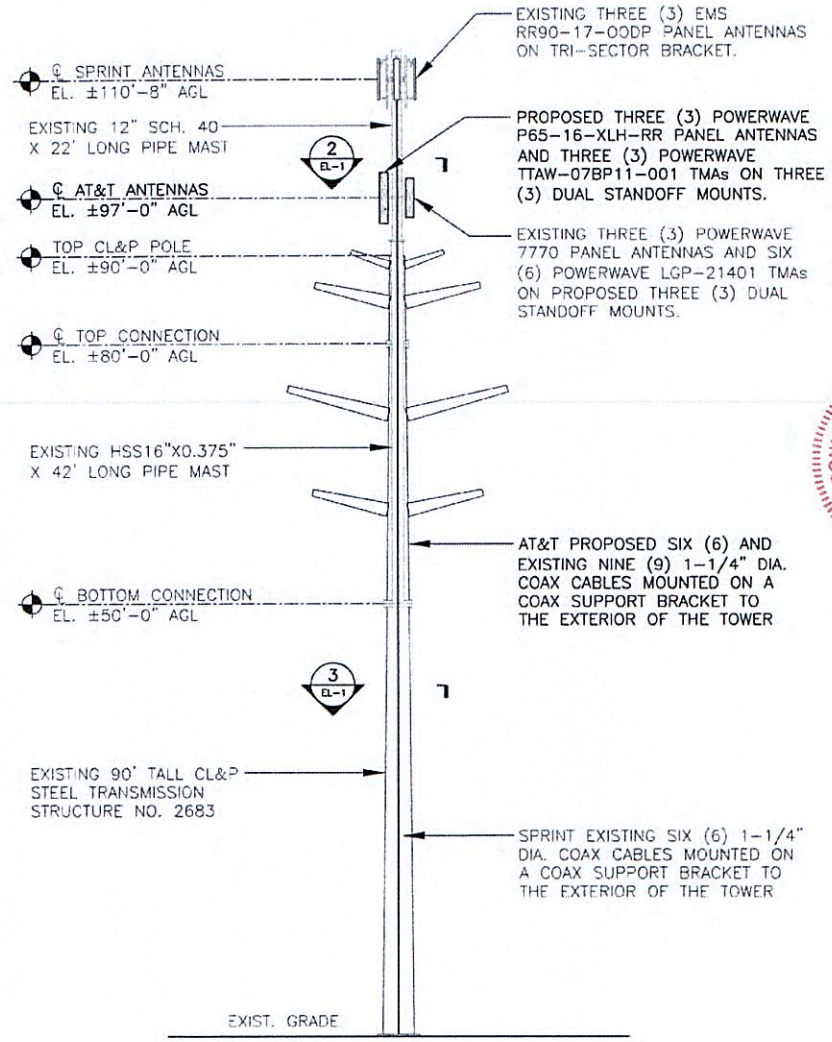
2 / EL-1 ANTENNA CONFIGURATION PLAN

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



3 / EL-1 COAX CABLE PLAN

SCALE: 1" = 1'-0"



1 / EL-1 TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

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

REV.	DATE	DRAWN BY	CHK'D BY	ISSUED FOR CONSTRUCTION
0	6/29/11	TJL	CFC	ISSUED FOR REVIEW
1	6/15/11	TJL	CFC	ISSUED FOR REVIEW

PROFESSIONAL ENGINEER STAMP

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

AT&T MOBILITY
PROPOSED WIRELESS COMMUNICATIONS FACILITY
CT2185
CL&P STRUCTURE 2683
791 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE:	6/15/11
SCALE:	AS SHOWN
JOB NO.	11021.C050

POLE AND MAST ELEVATION

SHEET NO.
EL-1
Sheet No. 1 of 1

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

Wind Speeds

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

Heights above ground level, z

Mast 1	$z_{mast1} := 103$	ft	(User Input)
Mast 2	$z_{mast2} := 71$	ft	(User Input)
Sprint	$z_{Sprint} := 110.67$	ft	(User Input)
AT&T	$z_{AT\&T} := 97$	ft	(User Input)
Coax Cable	$z_{coax} := 82$	ft	(User Input)

Exposure Coefficients, kz

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

Mast 1 $$Kz_{mast1} := \left(\frac{z_{mast1}}{33}\right)^{\frac{2}{7}} = 1.384$$

Mast 2 $$Kz_{mast2} := \left(\frac{z_{mast2}}{33}\right)^{\frac{2}{7}} = 1.245$$

Sprint $$Kz_{Sprint} := \left(\frac{z_{Sprint}}{33}\right)^{\frac{2}{7}} = 1.413$$

AT&T $$Kz_{AT\&T} := \left(\frac{z_{AT\&T}}{33}\right)^{\frac{2}{7}} = 1.361$$

Coax Cable $$Kz_{coax} := \left(\frac{z_{coax}}{33}\right)^{\frac{2}{7}} = 1.297$$

Velocity Pressure without ice, qz (per TIA/EIA-222-F Section 2.3.3)

Mast 1 $qz_{mast1} := 0.00256 \cdot Kz_{mast1} \cdot V^2 = 25.604$

Mast 2 $qz_{mast2} := 0.00256 \cdot Kz_{mast2} \cdot V^2 = 23.022$

Sprint $qz_{Sprint} := 0.00256 \cdot Kz_{Sprint} \cdot V^2 = 26.135$

AT&T $qz_{AT\&T} := 0.00256 \cdot Kz_{AT\&T} \cdot V^2 = 25.169$

Coax Cable $qz_{coax} := 0.00256 \cdot Kz_{coax} \cdot V^2 = 23.989$

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

Mast 1 $qzICE_{mast1} := 0.00256 \cdot Kz_{mast1} \cdot V_i^2 = 19.406$

Mast 2 $qzICE_{mast2} := 0.00256 \cdot Kz_{mast2} \cdot V_i^2 = 17.449$

Sprint $qzICE_{Sprint} := 0.00256 \cdot Kz_{Sprint} \cdot V_i^2 = 19.808$

AT&T $qzICE_{AT\&T} := 0.00256 \cdot Kz_{AT\&T} \cdot V_i^2 = 19.076$

Coax Cable $qzICE_{coax} := 0.00256 \cdot Kz_{coax} \cdot V_i^2 = 18.182$

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)

Existing Upper Mast Data (Pipe 12 STD) (User Input)

Mast Shape = Round (User Input)

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

Mast Length = $L_{mast} := 22.417$ ft (User Input)

Mast Thickness = $t_{mast} := 0.375$ in (User Input)

Mast Aspect Ratio = $Ar_{mast} := \frac{12L_{mast}}{D_{mast}} = 21.0$

Mast Force Coefficient = $Ca_{mast} = 1.11$ (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 = $A_{mast} := \frac{D_{mast}}{12} = 1.067$ sf/ft

Total Mast Wind Force = $qz_{mast1} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 51$ plf **BLC 5**

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

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

Total Mast Wind Force w/ Ice = $qzICE_{mast1} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 42$ 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 PCS Mast (per TIA/EIA-222-F-1996 Criteria)

Existing Lower Mast Data HSS16.0x0.375 (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 16.0$ in (User Input)

Mast Length = $L_{mast} := 41.583$ ft (User Input)

Mast Thickness = $t_{mast} := 0.375$ in (User Input)

Mast Aspect Ratio = $Ar_{mast} := \frac{12L_{mast}}{D_{mast}} = 31.2$

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 = $A_{mast} := \frac{D_{mast}}{12} = 1.333$ sf/ft

Total Mast Wind Force = $qz_{mast2} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 62$ plf **BLC 5**

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

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 1.417$ sf/ft

Total Mast Wind Force w/ Ice = $qzICE_{mast2} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 50$ 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)

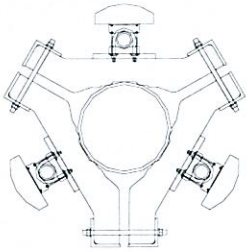
Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^2\right] = 25.9$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 10$ plf **BLC 3**

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

Existing Antenna Data: (Sprint)

Antenna Model =	RR90-17-XXDP		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.0$	in	(User Input)
Antenna Width =	$W_{ant} := 8.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 2.75$	in	(User Input)
Antenna Weight =	$WT_{ant} := 18.0$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 7.0$		
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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.1$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 9.3$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 577$	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 =	$SA_{ICEant} := \frac{(L_{ant}+1)\cdot(W_{ant}+1)}{144} = 3.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 10.7$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qzICE_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 501$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 54$	lbs	**BLC 2**

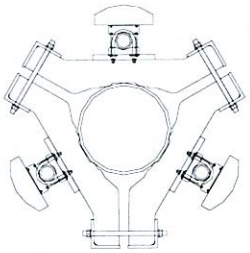
Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1232$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant}+1)(W_{ant}+1)\cdot(T_{ant}+1) - V_{ant} = 692$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 22$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 67$	lbs	**BLC 3**

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

Mount Data: (Sprint)

Mount Type: Microflect Universal Tri-Bracket



Mount Shape =	Flat		(User Input)
Pipe Mount Length =	$L_{mnt} := 72$	in	(User Input)
2 inch Pipe Mount Linear Weight =	$W_{mnt} := 3.66$	plf	(User Input)
Pipe Mount Outside Diameter =	$D_{mnt} := 2.375$	in	(User Input)
Number of Mounting Pipes =	$N_{mnt} := 3$		(User Input)
Tri Bracket Weight =	$W_{tb.mnt} := 197$	lbs	(User Input)
Mount Aspect Ratio =	$Ar_{mnt} := \frac{L_{mnt}}{D_{mnt}} = 30$		
Mount Force Coefficient =	$Ca_{mnt} = 2$		(per TIA/EIA-222-F Table 3)

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area =	$A_{mnt} := 0.0$	sf	
Total Mount Wind Force =	$F_{mnt} := qz_{Sprint} \cdot G_H \cdot Ca_{mnt} \cdot A_{mnt} = 0$	lbs	**BLC 5**

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

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice =	$A_{ICEmnt} := 0.0$	sf	
Total Mount Wind Force =	$Fi_{mnt} := qzICE_{Sprint} \cdot G_H \cdot Ca_{mnt} \cdot A_{ICEmnt} = 0$	lbs	**BLC 4**

Gravity Loads (without ice) (per TIA/EIA-222-F-1996)

Weight Each Pipe Mount =	$WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 22$	lbs	
Weight of All Mounts =	$WT_{mnt} \cdot N_{mnt} + W_{tb.mnt} = 263$	lbs	**BLC 2**

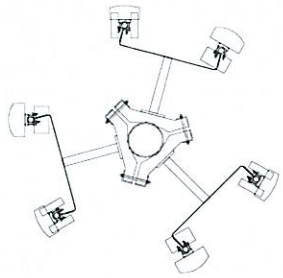
Gravity Loads (ice only) (per TIA/EIA-222-F-1996)

Volume of Each Pipe =	$V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^2 \cdot L_{mnt} = 319$	cu in	
Volume of Ice on Each Pipe =	$V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 1\right)^2\right] \cdot \left(L_{mnt} + 1\right)\right] - V_{mnt} = 334$	cu in	
Weight of Ice each mount (incl, hardware) =	$W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot ld = 11$	lbs	
Weight of Ice on All Mounts =	$W_{ICEmnt} \cdot N_{mnt} + 5 = 37$	lbs	**BLC 3**

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

Existing Antenna Data: (AT&T)

Antenna Model =	Powerwave 7770.00		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55$	in	(User Input)
Antenna Width =	$W_{ant} := 11$	in	(User Input)
Antenna Thickness =	$T_{ant} := 5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 39$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 5.0$		
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 =	$F_{ant} := qz_{AT\&T} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 751$	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 =	$SA_{ICEant} := \frac{(L_{ant}+1)\cdot(W_{ant}+1)}{144} = 4.7$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 14$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qzICE_{AT\&T} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 632$	lbs	**BLC 4**

Gravity Load (without Ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 117$	lbs	**BLC 2**

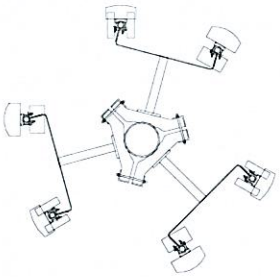
Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant}+1)(W_{ant}+1)\cdot(T_{ant}+1) - V_{ant} =$ ▮	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 98$	lbs	**BLC 3**

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

Proposed Antenna Data: (AT&T)

Antenna Model =	Powerwave P65-16-XLH-RR		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 12$	in	(User Input)
Antenna Thickness =	$T_{ant} := 6$	in	(User Input)
Antenna Weight =	$WT_{ant} := 64$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 6.0$		
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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 6$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 18$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{AT\&T} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 1072$	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 =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 19.8$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qzICE_{AT\&T} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 892$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 192$	lbs	**BLC 2**

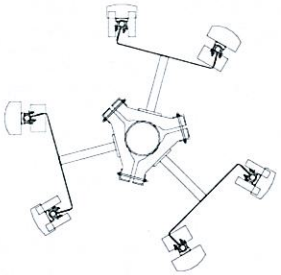
Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5184$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} =$ ▮	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot ld = 47$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 142$	lbs	**BLC 3**

Development of Wind & Ice Load on TMA's (per TIA/EIA-222-F-1996 Criteria)

Existing TMA Data: (AT&T)

TMA Model =	Powerwave LGP 21401		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 14.4$	in	(User Input)
TMA Width =	$W_{TMA} := 9.2$	in	(User Input)
TMA Thickness =	$T_{TMA} := 2.6$	in	(User Input)
TMA Weight =	$WT_{TMA} := 14.1$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 6$		(User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1.6$		
TMA Force Coefficient =	$Ca_{TMA} = 1.4$		(per TIA/EIA-222-F Table 3)



Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

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

Surface Area for One TMA =	$SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.9$	sf	
TMA Projected Surface Area =	$A_{TMA} := SA_{TMA} \cdot N_{TMA} = 5.5$	sf	
Total TMA Wind Force =	$F_{TMA} := qz_{AT\&T} \cdot G_H \cdot Ca_{TMA} \cdot A_{TMA} = 329$	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 TMA's Simultaneously

Surface Area for One TMA w/ Ice =	$SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 1.1$	sf	
TMA Projected Surface Area w/ Ice =	$A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 6.5$	sf	
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qzICE_{AT\&T} \cdot G_H \cdot Ca_{TMA} \cdot A_{ICETMA} = 295$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All TMA's =	$WT_{TMA} \cdot N_{TMA} = 85$	lbs	**BLC 2**

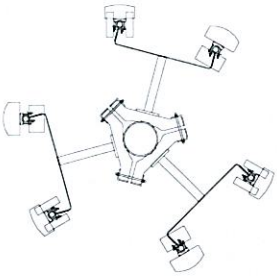
Gravity Load (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 344$	cu in	
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1)(T_{TMA} + 1) - V_{TMA} = 221$	cu in	
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 7$	lbs	
Weight of Ice on All TMA's	$W_{ICETMA} \cdot N_{TMA} = 43$	lbs	**BLC 3**

Development of Wind & Ice Load on TMA's (per TIA/EIA-222-F-1996 Criteria)

Proposed TMA Data: (AT&T)

TMA Model =	Powerwave TTAW-07BP111-001		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 9.9$	in	(User Input)
TMA Width =	$W_{TMA} := 6.7$	in	(User Input)
TMA Thickness =	$T_{TMA} := 5.4$	in	(User Input)
TMA Weight =	$WT_{TMA} := 18$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 3$		(User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1.5$		
TMA Force Coefficient =	$Ca_{TMA} = 1.4$		(per TIA/EIA-222-F Table 3)



Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

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

Surface Area for One TMA =	$SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.5$	sf	
TMA Projected Surface Area =	$A_{TMA} := SA_{TMA} \cdot N_{TMA} = 1.4$	sf	
Total TMA Wind Force =	$F_{TMA} := qz_{AT\&T} \cdot G_H \cdot Ca_{TMA} \cdot A_{TMA} = 82$	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 TMA's Simultaneously

Surface Area for One TMA w/ Ice =	$SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 0.6$	sf	
TMA Projected Surface Area w/ Ice =	$A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 1.7$	sf	
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qzICE_{AT\&T} \cdot G_H \cdot Ca_{TMA} \cdot A_{ICETMA} = 79$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All TMA's =	$WT_{TMA} \cdot N_{TMA} = 54$	lbs	**BLC 2**

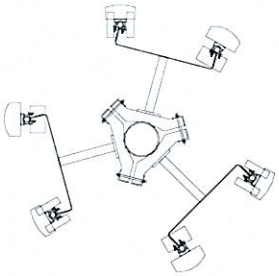
Gravity Load (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 358$	cu in	
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1)(T_{TMA} + 1) - V_{TMA} = 179$	cu in	
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 6$	lbs	
Weight of Ice on All TMA's	$W_{ICETMA} \cdot N_{TMA} = 17$	lbs	**BLC 3**

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

Mount Data: (AT&T)

Mount Type: (3) Valmont Dual Standoff Mounts w/ Universal Tr-Bracket



Mount Shape =	Flat		(User Input)
Mount Area =	$A_{mnt} := 4.0$	sq ft	(User Input)
Mount Area w/ Ice =	$A_{ICE.mnt} := 4.6$	sq ft	(User Input)
Mount Weight =	$WT_{mnt} := 610$	lbs	(User Input)
Mount Weight w/ Ice =	$WT_{ICE.mnt} := 700$	lbs	(User Input)

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Total Mount Wind Force = $F_{mnt} := qz_{AT\&T} \cdot G_H \cdot Ca_{mnt} \cdot A_{mnt} = 238$ lbs **BLC 5**

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

Total Mount Wind Force w/ Ice = $Fi_{mnt} := qzICE_{AT\&T} \cdot G_H \cdot Ca_{mnt} \cdot A_{ICE.mnt} = 208$ lbs **BLC 4**

Gravity Load (without ice)

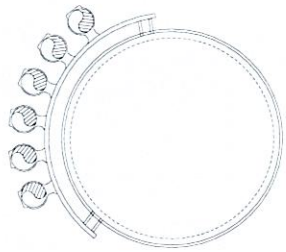
Weight of Mount = $WT_{mnt} = 610$ lbs **BLC 2**

Gravity Loads (ice only)

Weight of Ice on Mount = $WT_{ICE.mnt} - WT_{mnt} = 90$ lbs **BLC 3**

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

Existing Coax Cable Data: (Sprint)



Coax Type =	HELIAX 1-1/4"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.55$	in	(User Input)
Coax Cable Length =	$L_{coax} := 64$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 0.66$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 6$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 1$		(User Input)

Note: AT&T Existing/Proposed cables attached to CL&P Pole

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 495.5$

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

Wind Load (without ice) — per TIA/EIA-222-F-96 Section 2.3.2

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.1$ ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{coax} \cdot G_H \cdot A_{coax} = 6$ plf **BLC 5**

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

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.2$ ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qzICE_{coax} \cdot G_H \cdot AICE_{coax} = 8$ plf **BLC 4**

Gravity Loads (without ice)

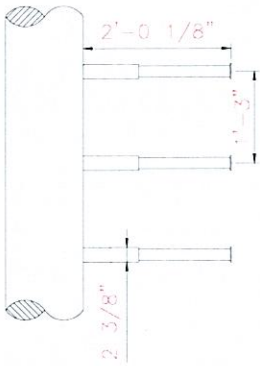
Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 4$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot Ir)^2 - D_{coax}^2\right] = 3.2$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 8$ plf **BLC 3**

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



Member Data: Step Bolts

Shape =	Round		(User Input)
Diameter =	$D_{mem} := 2.38$	in	(User Input)
Length =	$L_{mem} := 2$	ft	(User Input)
Spacing =	$Sp_{mem} := 1.25$	ft	(User Input)
Weight =	$Wt_{mem} := 3.66$	plf	

Member Aspect Ratio = $Ar_{mem} := \frac{D_{mem}}{L_{mem} \cdot 12} = 0.1$

Member Force Coefficient = $Ca_{mem} = 1.4$ (per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area = $A_{mem} := \frac{D_{mem} \cdot L_{mem}}{12 \cdot Sp_{mem}} = 0.3$ sf/ft

Total Member Wind Force = $F_{mem} := qz_{mast1} \cdot G_H \cdot Ca_{mem} \cdot A_{mem} = 19$ lbs **BLC 5**

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

Member Projected Surface Area w/ Ice = $A_{ICEmem} := \frac{(D_{mem} + 2 \cdot Ir) \cdot (L_{mem} + 2 \cdot Ir)}{12 \cdot Sp_{mem}} = 0.7$ plf

Total Member Wind Force w/ Ice = $Fi_{mem} := qzICE_{mast1} \cdot G_H \cdot Ca_{mem} \cdot A_{ICEmem} = 31$ lbs **BLC 4**

Gravity Load (without ice)

Weight of Member = $\frac{Wt_{mem} \cdot L_{mem}}{Sp_{mem}} = 6$ lbs **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear foot = $Ai_{mem} := \frac{1}{4} \cdot \pi \cdot \left[(D_{mem} + 2 \cdot Ir)^2 - D_{mem}^2 \right] = 4.5$ sq in

Weight of Ice on Member = $W_{ICEmem} := Id \cdot \frac{Ai_{mem}}{144} \cdot \frac{L_{mem}}{Sp_{mem}} = 3$ lbs **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: **Brookfield, CT**

Date: 6/15/11 Prepared by: T.J.L. Checked by: C.F.C. Job No. 11021.CO50

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

Footnotes:
(1) PCS Structure includes: Mast and Appurtenances

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 Load Combinations Table**

Location: **Brookfield, CT**

Date: 6/16/11 Prepared by: T.J.L. Checked by: C.F.C. Job No. 11021.CO50

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 (\1E5 F)	Densi...	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 s...	z s...	Functi...
1	M1	Existing...	41.583	30		30									Lateral
2	M2	Existing...	22.417	30		30									Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Existing Upper M...	PIPE 12.0	Beam	Pipe	A53 Gr. B	Typical	13.6	262	262	523
2	Existing Lower M...	HSS16X0.375	Beam	Pipe	A500 Gr.42	Typical	17.2	526	526	1050

Member Primary Data

	Label	I Joint	J Joint	K ...	Rotate(deg)	Section/Shape	Type	Design Li...	Material	Design Rules
1	M1	BOT_CONN	SPLICE			Existing Lower Mast	Beam	Pipe	A500 Gr...	Typical
2	M2	SPLICE	TOP_MA...			Existing Upper Mast	Beam	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Di...
1	BOT_CONN	0	50	0	0	
2	TOP_CONN	0	80	0	0	
3	SPLICE	0	91.583	0	0	
4	TOP_MAST	0	114	0	0	
5	CL_SPRINT	0	110.667	0	0	
6	CL_ATT	0	97	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	BOT_CONN	Reaction	Reaction	Reaction		Reaction		
2	TOP_CONN	Reaction	Reaction	Reaction		Reaction		

Joint Loads and Enforced Displacements (BLC 2 : Weight of Appurtenances)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	Y	-.054
2	CL_SPRINT	L	Y	-.263
3	CL_ATT	L	Y	-.117
4	CL_ATT	L	Y	-.192
5	CL_ATT	L	Y	-.085
6	CL_ATT	L	Y	-.054
7	CL_ATT	L	Y	-.61

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only on PCS Struct)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only on PCS Struct) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	Y	-.067
2	CL_SPRINT	L	Y	-.037
3	CL_ATT	L	Y	-.098
4	CL_ATT	L	Y	-.142
5	CL_ATT	L	Y	-.043
6	CL_ATT	L	Y	-.017
7	CL_ATT	L	Y	-.09

Joint Loads and Enforced Displacements (BLC 4 : TIA/EIA Wind with Ice on PCS Str)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	X	.501
2	CL_ATT	L	X	.632
3	CL_ATT	L	X	.892
4	CL_ATT	L	X	.295
5	CL_ATT	L	X	.079
6	CL_ATT	L	X	.208

Joint Loads and Enforced Displacements (BLC 5 : TIA/EIA Wind on PCS Structure)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	X	.577
2	CL_ATT	L	X	.751
3	CL_ATT	L	X	1.072
4	CL_ATT	L	X	.329
5	CL_ATT	L	X	.082
6	CL_ATT	L	X	.238

Member Point Loads

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.004	-.004	0	0
2	M2	Y	-.004	-.004	0	0
3	M1	Y	-.006	-.006	36	0
4	M2	Y	-.006	-.006	0	10

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.01	-.01	0	0
2	M2	Y	-.008	-.008	0	0
3	M1	Y	-.008	-.008	0	0
4	M2	Y	-.008	-.008	0	0
5	M1	Y	-.003	-.003	36	0
6	M2	Y	-.003	-.003	0	10

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.05	.05	0	0
2	M2	X	.042	.042	0	0
3	M1	X	.008	.008	0	0
4	M2	X	.008	.008	0	0
5	M1	X	.031	.031	36	0

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
6	M2	X	.031	.031	0	10

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.062	.062	0	0
2	M2	X	.051	.051	0	0
3	M1	X	.006	.006	0	0
4	M2	X	.006	.006	0	0
5	M1	X	.019	.019	36	0
6	M2	X	.019	.019	0	10

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint Po...	Distrib...	Area(Me...	Surf...
1	Self Weight (PCS Mast)	None		-1					
2	Weight of Appurtenances	None				7	4		
3	Weight of Ice Only on PCS Struct	None				7	6		
4	TIA/EIA Wind with Ice on PCS Str	None				6	6		
5	TIA/EIA Wind on PCS Structure	None				6	6		

Load Combinations

	Description	Solve	PDel...	SR...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	TIA/EIA Wind + Ice on PCS Structure	Yes			1	1	2	1	3	1	4	1								
2	TIA/EIA Wind on PCS Structure	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...	LC	Torque[...	LC	y-y Mo...	LC	z-z Mom...	LC
1	M1	1	max	1.208	1	-2.039	1	0	1	0	1	0	1	0	1
2			min	.938	2	-2.23	2	0	1	0	1	0	1	0	1
3		2	max	.371	1	-2.642	1	0	1	0	1	0	1	26.853	2
4			min	.288	2	-2.936	2	0	1	0	1	0	1	24.33	1
5		3	max	-.362	2	-3.245	1	0	1	0	1	0	1	61.054	2
6			min	-.466	1	-3.643	2	0	1	0	1	0	1	54.928	1
7		4	max	4.332	1	5.33	2	0	1	0	1	0	1	91.111	2
8			min	3.246	2	4.814	1	0	1	0	1	0	1	81.509	1
9		5	max	3.445	1	4.517	2	0	1	0	1	0	1	39.674	2
10			min	2.562	2	4.038	1	0	1	0	1	0	1	35.082	1
11	M2	1	max	3.445	1	4.517	2	0	1	0	1	0	1	39.674	2
12			min	2.562	2	4.038	1	0	1	0	1	0	1	35.082	1
13		2	max	1.575	1	1.619	2	0	1	0	1	0	1	16.018	2
14			min	1.189	2	1.478	1	0	1	0	1	0	1	14.12	1
15		3	max	1.164	1	1.216	2	0	1	0	1	0	1	8.125	2
16			min	.881	2	1.061	1	0	1	0	1	0	1	7.086	1
17		4	max	.792	1	.896	2	0	1	0	1	0	1	2.206	2
18			min	.599	2	.781	1	0	1	0	1	0	1	1.923	1
19		5	max	0	1	0	1	0	1	0	1	0	1	0	1
20			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[...	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	.07	1	-.237	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
2			min	.055	2	-.259	2	0	1	0	1	0	1	0	1	0	1
3		2	max	.022	1	-.307	1	0	1	-4.44	1	4.901	2	0	1	0	1
4			min	.017	2	-.341	2	0	1	-4.901	2	4.44	1	0	1	0	1
5		3	max	-.021	2	-.377	1	0	1	-10.025	1	11.143	2	0	1	0	1
6			min	-.027	1	-.424	2	0	1	-11.143	2	10.025	1	0	1	0	1
7		4	max	.252	1	.62	2	0	1	-14.876	1	16.629	2	0	1	0	1
8			min	.189	2	.56	1	0	1	-16.629	2	14.876	1	0	1	0	1
9		5	max	.2	1	.525	2	0	1	-6.403	1	7.241	2	0	1	0	1
10			min	.149	2	.47	1	0	1	-7.241	2	6.403	1	0	1	0	1
11	M2	1	max	.253	1	.664	2	0	1	-10.244	1	11.584	2	0	1	0	1
12			min	.188	2	.594	1	0	1	-11.584	2	10.244	1	0	1	0	1
13		2	max	.116	1	.238	2	0	1	-4.123	1	4.677	2	0	1	0	1
14			min	.087	2	.217	1	0	1	-4.677	2	4.123	1	0	1	0	1
15		3	max	.086	1	.179	2	0	1	-2.069	1	2.372	2	0	1	0	1
16			min	.065	2	.156	1	0	1	-2.372	2	2.069	1	0	1	0	1
17		4	max	.058	1	.132	2	0	1	-.562	1	.644	2	0	1	0	1
18			min	.044	2	.115	1	0	1	-.644	2	.562	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	BOT CONN	max	2.23	2	1.208	1	0	1	0	1	0	1	0	1
2		min	2.039	1	.938	2	0	1	0	1	0	1	0	1
3	TOP CONN	max	-8.662	1	5.636	1	0	1	0	1	0	1	0	1
4		min	-9.68	2	4.258	2	0	1	0	1	0	1	0	1
5	Totals:	max	-6.623	1	6.844	1	0	1						
6		min	-7.45	2	5.196	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	BOT CONN	max	0	1	0	2	0	1	0	1	0	1	3.847e-3	2
2		min	0	2	0	1	0	1	0	1	0	1	3.474e-3	1
3	TOP CONN	max	0	2	0	2	0	1	0	1	0	1	-7.651e-3	1
4		min	0	1	0	1	0	1	0	1	0	1	-8.513e-3	2
5	SPLICE	max	1.778	2	0	2	0	1	0	1	0	1	-1.425e-2	1
6		min	1.595	1	-.001	1	0	1	0	1	0	1	-1.592e-2	2
7	TOP MAST	max	7.043	2	-.002	2	0	1	0	1	0	1	-1.844e-2	1
8		min	6.294	1	-.002	1	0	1	0	1	0	1	-2.068e-2	2
9	CL SPRINT	max	6.216	2	-.002	2	0	1	0	1	0	1	-1.844e-2	1
10		min	5.556	1	-.002	1	0	1	0	1	0	1	-2.068e-2	2
11	CL ATT	max	2.922	2	-.001	2	0	1	0	1	0	1	-1.677e-2	1
12		min	2.617	1	-.002	1	0	1	0	1	0	1	-1.877e-2	2

Envelope AISC ASD Steel Code Checks

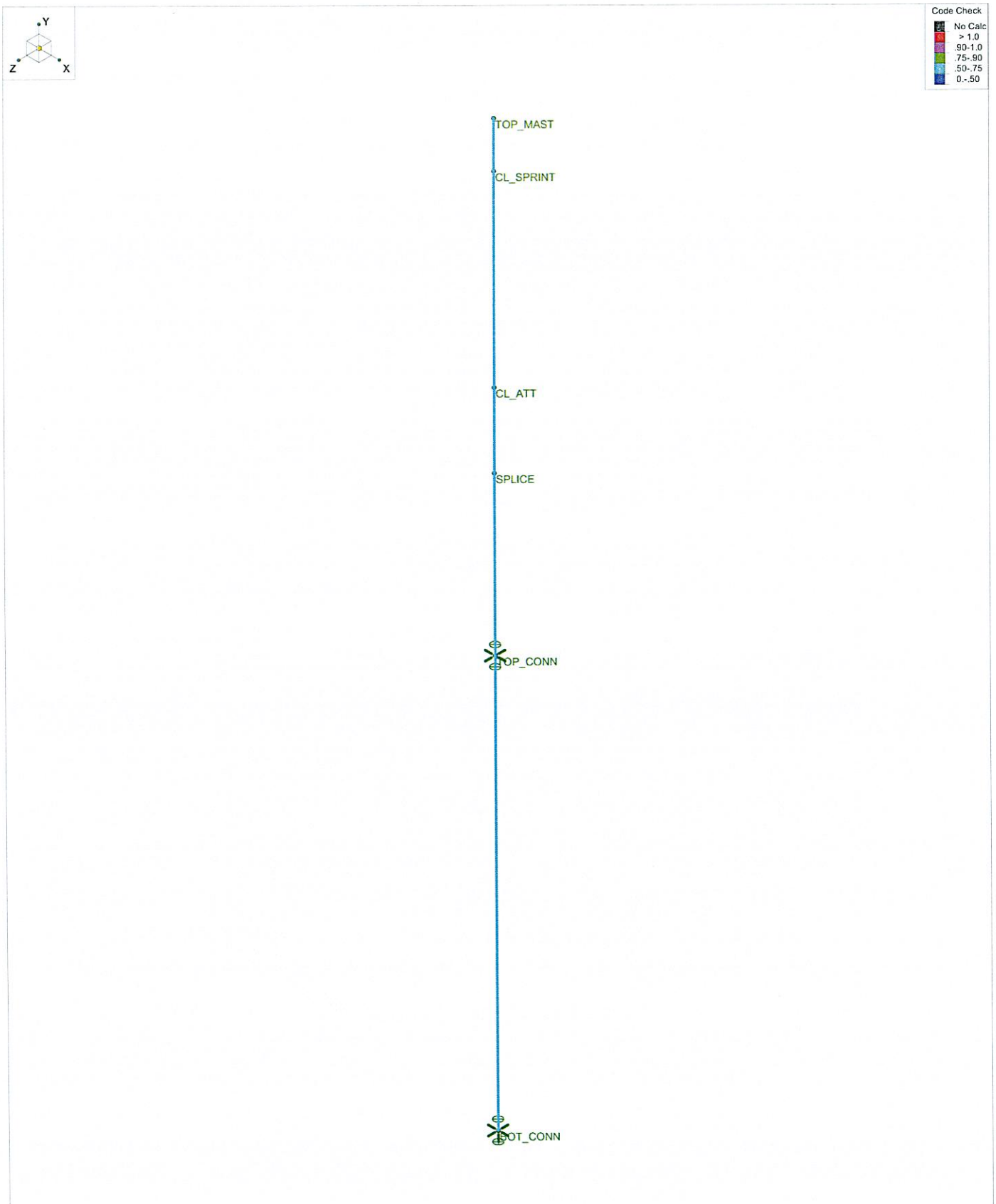
	Member	Shape	Code Check	Loc[ft]	L...	Shear Ch...	Loc[ft]	...LC	Fa...	Ft ...	Fb y-y [ksi]	Fb.....	...	AS...
1	M1	HSS16X0....	.641	29.888	2	.037	30.321	2	15...	25.2	27.72	27...1	.6	....H2...
2	M2	PIPE_12.0	.510	0	2	.047	0	2	14...	21	23.1	23.1...	.6	...H1...

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOT_CONN	2.039	1.208	0	0	0	0
2	1	TOP_CONN	-8.662	5.636	0	0	0	0
3	1	Totals:	-6.623	6.844	0			
4	1	COG (ft):	X: 0	Y: 86.208	Z: 0			

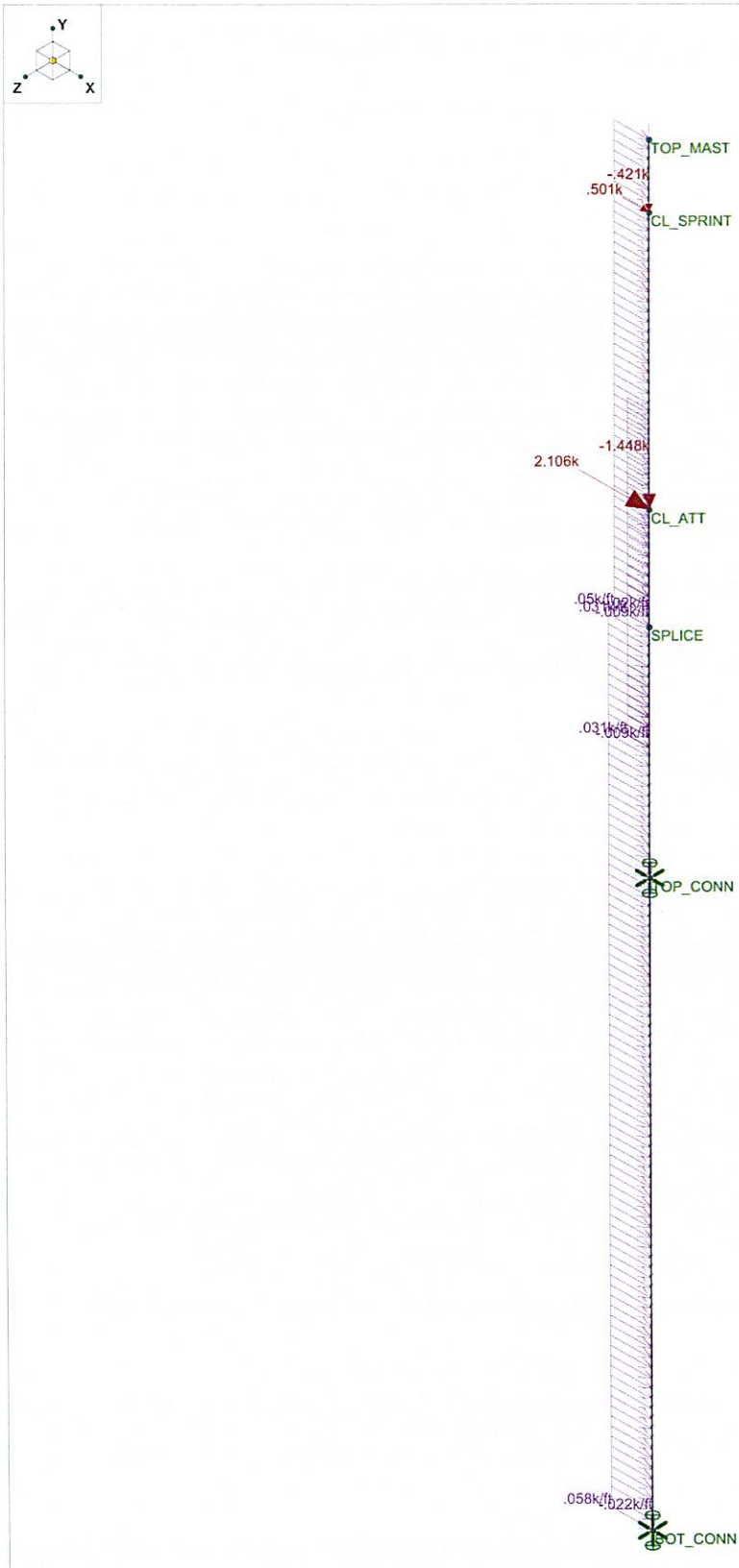
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOT_CONN	2.23	.938	0	0	0	0
2	2	TOP_CONN	-9.68	4.258	0	0	0	0
3	2	Totals:	-7.45	5.196	0			
4	2	COG (ft):	X: 0	Y: 85.917	Z: 0			



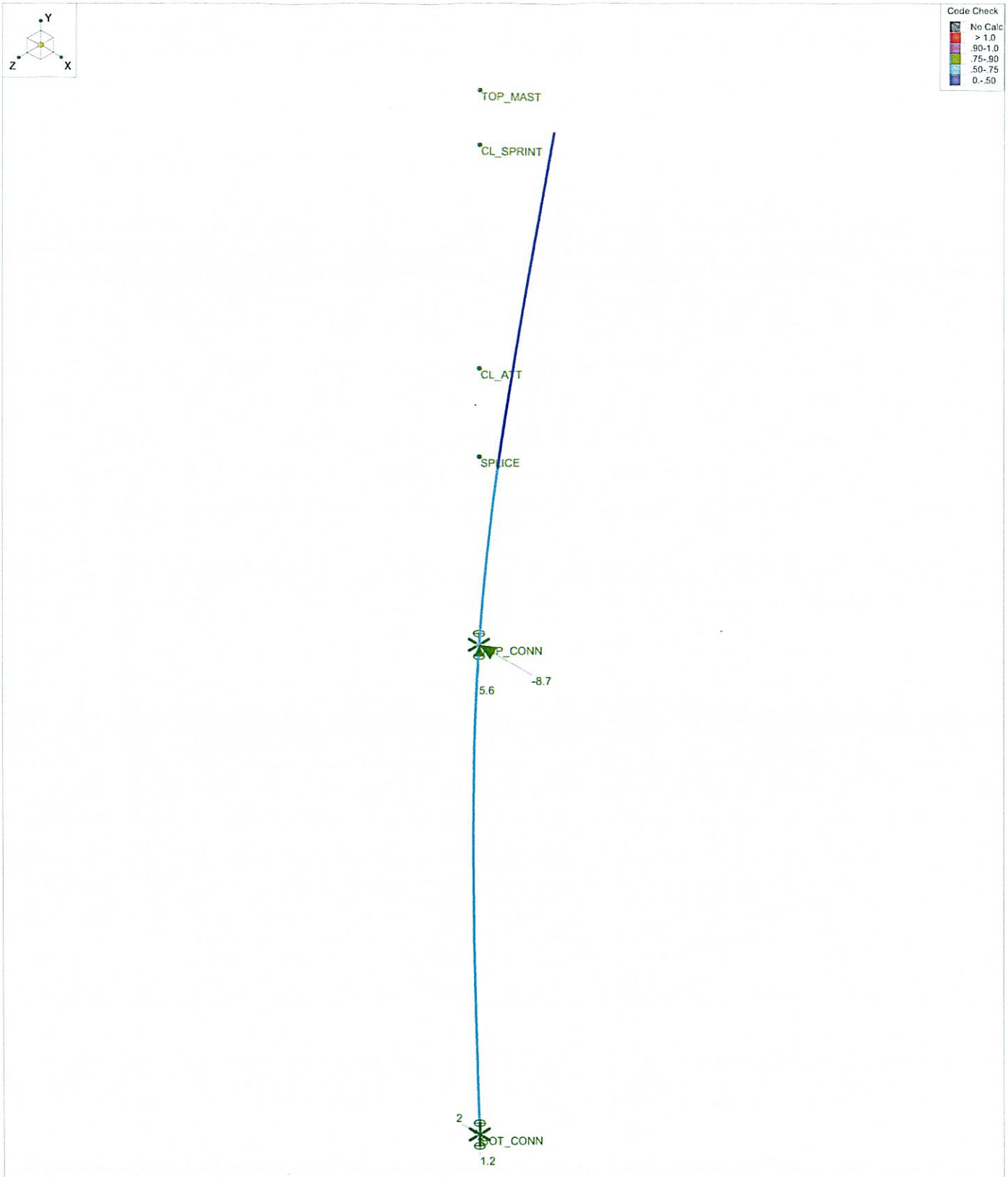
Solution: Envelope

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:35 PM
11021.CO50 /AT&T 2185	Unity Check	2185 EIA-TIA Loads.r3d



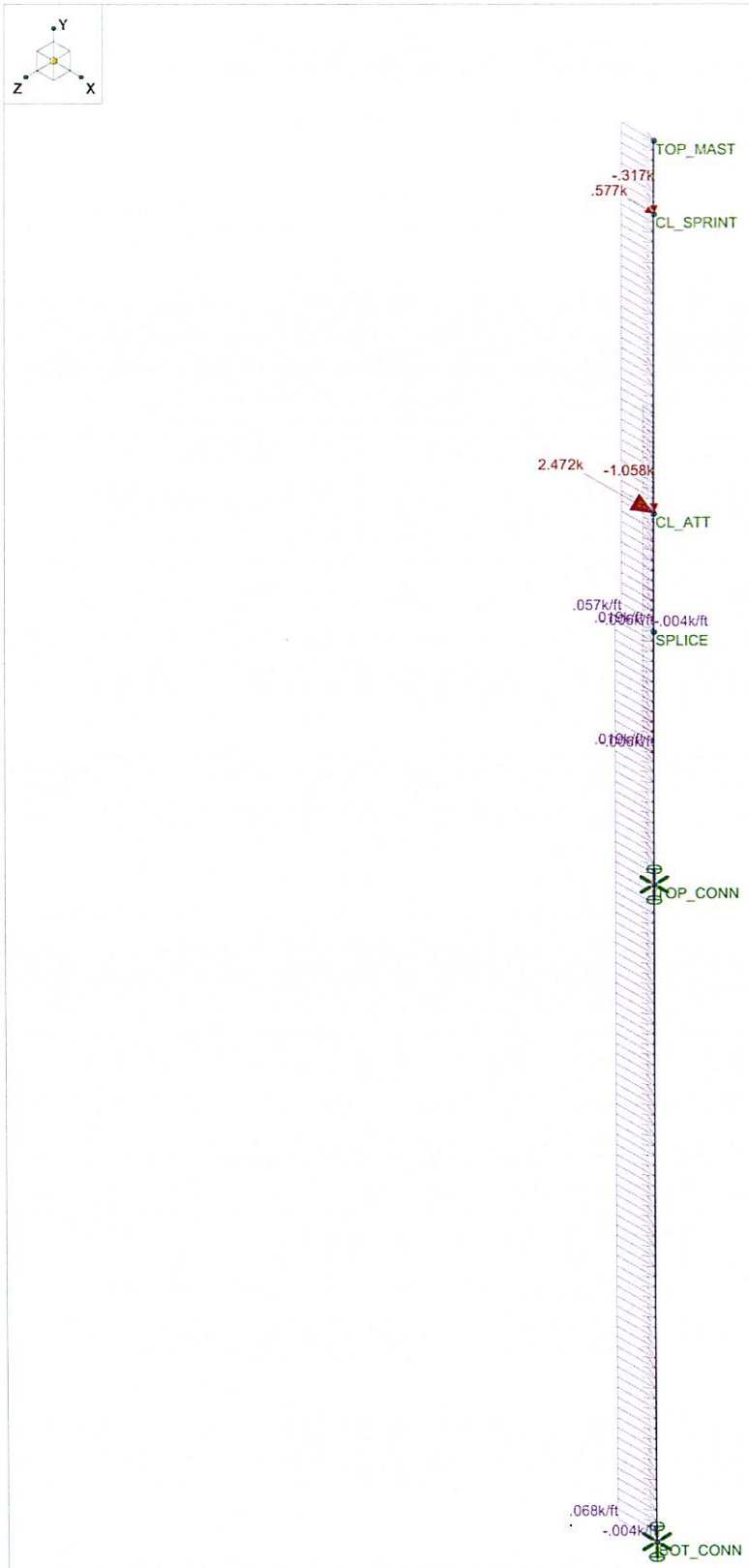
Loads: LC 1, TIA/EIA Wind + Ice on PCS Structure

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:36 PM
11021.CO50 /AT&T 2185	LC # 1 Loads	2185 EIA-TIA Loads.r3d



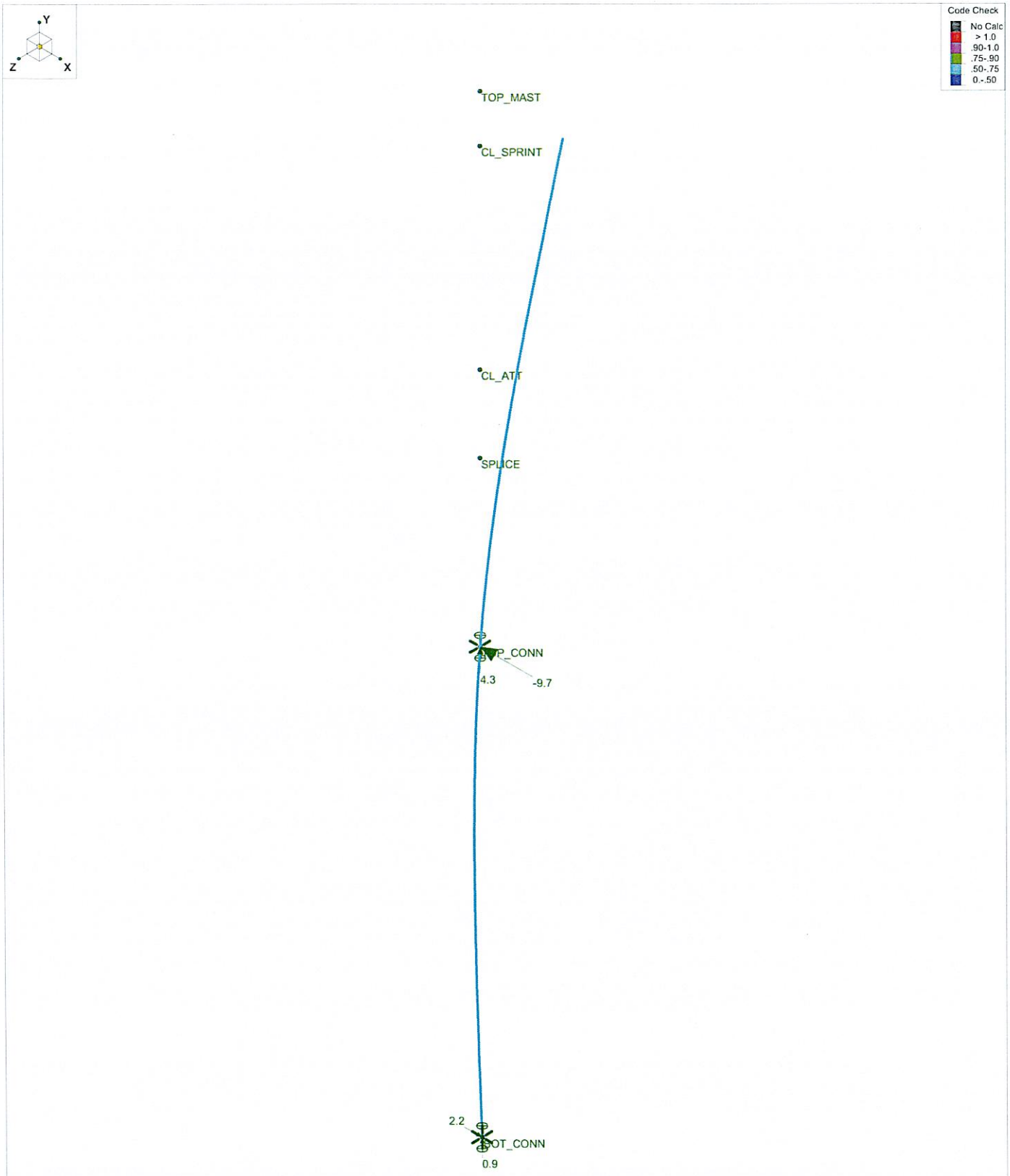
Results for LC 1, TIA/EIA Wind + Ice on PCS Structure
Z-moment Reaction units are k and k-ft

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:37 PM
11021.CO50 /AT&T 2185	LC # 1 Reactions and Deflected Shape	2185 EIA-TIA Loads.r3d



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

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:36 PM
11021.CO50 /AT&T 2185	LC # 2 Loads	2185 EIA-TIA Loads.r3d



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

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:38 PM
11021.CO50 /AT&T 2185	LC # 2 Reactions and Deflected Shape	2185 EIA-TIA Loads.r3d

Mast Connection to CL&P Tower:

Reactions:

Moment =	$Moment := 0 \cdot kips$	(Input From Risa-3D)
Vertical =	$Vertical := 4.3 \cdot kips$	(Input From Risa-3D)
Horizontal x-dir =	$Horizontal_x := 9.7 \cdot kips$	(Input From Risa-3D)
Horizontal z-dir =	$Horizontal_z := 9.7 \cdot kips$	(Input From Risa-3D)

Bolt Data:

Bolt Type =	ASTM A325	(User Input)
Bolt Diameter =	$D := 0.625 \cdot in$	(User Input)
Number of Bolts =	$N_b := 4$	(User Input)
Allowable Tensile Strength =	$F_t := 13.8 \cdot kips$	(User Input)
Allowable Shear Strength =	$F_v := 7.36 \cdot kips$	(User Input)

Shear Force = $f_v := \frac{\sqrt{Horizontal_z^2 + Vertical^2}}{N_b} = 2.7 \cdot kips$

Bolt Shear % of Capacity = $\frac{f_v}{F_v} = 36.04 \cdot \%$

Check Bolt Shear = $Bolt\_Shear := if\left(\frac{f_v}{F_v} \le 1.00, "OK", "Overstressed"\right)$

$Bolt\_Shear = "OK"$

Tension Force = $f_t := \frac{Horizontal_x}{N_b} = 2.4 \cdot kips$

Bolt Tenison % of Capacity = $\frac{f_t}{F_t} = 17.57 \cdot \%$

Check Bolt Tension = $Bolt\_Tension := if\left(\frac{f_t}{F_t} \le 1.00, "OK", "Overstressed"\right)$

$Bolt\_Tension = "OK"$

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 =	$TME := 114$	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 = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.301$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346\left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.307$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.837$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.86$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 28.6$ 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

Existing Upper PCS Mast Data: (Pipe 12 STD)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 12.8$	in	(User Input)
Mast Length =	$L_{mast} := 22.417$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.375$	in	(User Input)

Wind Load (NESC Extreme)

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

Total Mast Wind Force (Above NU Structure) = $qz \cdot Cd_R \cdot A_{mast} \cdot m = 50$ plf **BLC 5**

Wind Load (NESE Heavy)

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

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

Gravity Loads (without ice)

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

Gravity Loads (ice only)

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

Existing Lower PCS Mast Data: HSS16.0x0.375

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 16.0$	in	(User Input)
Mast Length =	$L_{mast} := 41.583$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.375$	in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.333$ sf/ft

Total Mast Wind Force (Below NU Structure) = $qz \cdot Cd_R \cdot A_{mast} = 50$ plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 1.417$ sf/ft

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

Gravity Loads (without ice)

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

Gravity Loads (ice only)

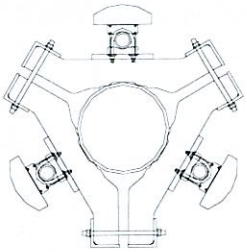
Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^2\right] = 25.9$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 10$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Existing Antenna Data: (Sprint)

Antenna Model =	RR90-17-XXDP		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.0$	in	(User Input)
Antenna Width =	$W_{ant} := 8.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 2.75$	in	(User Input)
Antenna Weight =	$WT_{ant} := 18.0$	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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.1$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 9.3$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 535$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 3.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 10.7$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 68$	lbs	**BLC 4**

Gravity Load (without Ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 54$	lbs	**BLC 2**

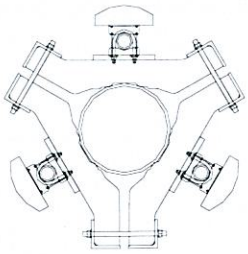
Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1232$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 692$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot ld = 22$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 67$	lbs	**BLC 3**

Development of Wind & Ice Load on Antenna Mounts

Mount Data: (Sprint)

Mount Type:	Microflect Universal Tri-Bracket		
Mount Shape =	Flat		(User Input)
Pipe Mount Length =	$L_{mnt} := 72$	in	(User Input)
2 inch Pipe Mount Linear Weight =	$W_{mnt} := 3.66$	plf	(User Input)
Pipe Mount Outside Diameter =	$D_{mnt} := 2.375$	in	(User Input)
Number of Mounting Pipes =	$N_{mnt} := 3$		(User Input)
Tri-Bracket Weight =	$W_{tb.mnt} := 197$	lbs	(User Input)



Wind Load (NESC Extreme)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area =	$A_{mnt} := 0.0$	sf	
Total Mount Wind Force =	$F_{mnt} := qz \cdot Cd_F \cdot A_{mnt} \cdot m = 0$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice =	$A_{ICEmnt} := 0.0$	sf	
Total Mount Wind Force =	$Fi_{mnt} := p \cdot Cd_F \cdot A_{ICEmnt} = 0$	lbs	**BLC 4**

Gravity Loads (without ice)

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

Weight Each Pipe Mount =	$WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 22$	lbs	
Weight of All Mounts =	$WT_{mnt} \cdot N_{mnt} + W_{tb.mnt} = 263$	lbs	**BLC 2**

Gravity Load (ice only)

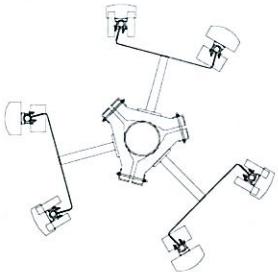
(per TIA/EIA-222-F-1996)

Volume of Each Pipe =	$V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^2 \cdot L_{mnt} = 319$	cu in	
Volume of Ice on Each Pipe =	$V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 1\right)^2\right] \cdot \left(L_{mnt} + 1\right)\right] - V_{mnt} = 334$	cu in	
Weight of Ice each mount (incl, hardware) =	$W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot ld = 11$	lbs	
Weight of Ice on All Mounts =	$W_{ICEmnt} \cdot N_{mnt} + 5 = 37$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Existing Antenna Data: (AT&T)

Antenna Model =	Powerwave 7770.00		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55$	in	(User Input)
Antenna Width =	$W_{ant} := 11.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 39$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(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 =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 722$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.7$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 14$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 90$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 117$	lbs	**BLC 2**

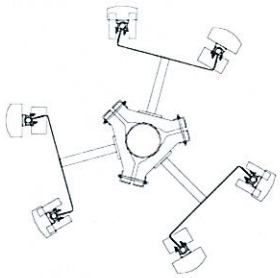
Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1007$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 98$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Proposed Antenna Data: (AT&T)

Antenna Model =	Powerwave P65-16-XLH-RR		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 12$	in	(User Input)
Antenna Thickness =	$T_{ant} := 6$	in	(User Input)
Antenna Weight =	$WT_{ant} := 64$	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 =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 6$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 18$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1031$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.6$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 19.8$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 127$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 192$	lbs	**BLC 2**

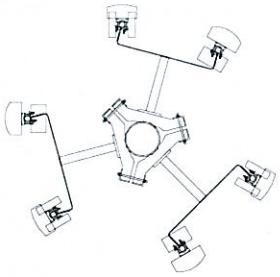
Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5184$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1459$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot ld = 47$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 142$	lbs	**BLC 3**

Development of Wind & Ice Load on TMA's

Existing TMA Data: (AT&T)

TMA Model =	Powerwave LGP 21401		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 14.4$	in	(User Input)
TMA Width =	$W_{TMA} := 9.2$	in	(User Input)
TMA Thickness =	$T_{TMA} := 2.6$	in	(User Input)
TMA Weight =	$WT_{TMA} := 14.1$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 6$		(User Input)



Wind Load (NESC Extreme)

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

Surface Area for One TMA =	$SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.9$	sf	
TMA Projected Surface Area =	$A_{TMA} := SA_{TMA} \cdot N_{TMA} = 5.5$	sf	
Total TMA Wind Force =	$F_{TMA} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 316$	lbs	**BLC 5**

Wind Load (NESC Heavy)

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

Surface Area for One TMA w/ Ice =	$SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 1.1$	sf	
TMA Projected Surface Area w/ Ice =	$A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 6.5$	sf	
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := p \cdot Cd_F \cdot A_{ICETMA} = 42$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All TMA's =	$WT_{TMA} \cdot N_{TMA} = 85$	lbs	**BLC 2**

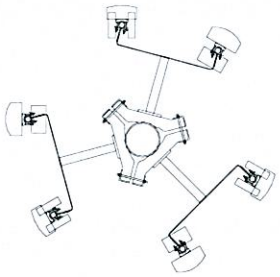
Gravity Load (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 344$	cu in	
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1)(T_{TMA} + 1) - V_{TMA} = 221$	cu in	
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 7$	lbs	
Weight of Ice on All TMA's	$W_{ICETMA} \cdot N_{TMA} = 43$	lbs	**BLC 3**

Development of Wind & Ice Load on TMA's

Proposed TMA Data: (AT&T)

TMA Model =	Powerwave TTAW-07BP111-001		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 9.9$	in	(User Input)
TMA Width =	$W_{TMA} := 6.7$	in	(User Input)
TMA Thickness =	$T_{TMA} := 5.4$	in	(User Input)
TMA Weight =	$WT_{TMA} := 18$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 3$		(User Input)



Wind Load (NESC Extreme)

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

Surface Area for One TMA =	$SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.5$	sf	
TMA Projected Surface Area =	$A_{TMA} := SA_{TMA} \cdot N_{TMA} = 1.4$	sf	
Total TMA Wind Force =	$F_{TMA} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 79$	lbs	**BLC 5**

Wind Load (NESC Heavy)

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

Surface Area for One TMA w/ Ice =	$SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 0.6$	sf	
TMA Projected Surface Area w/ Ice =	$A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 1.7$	sf	
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := p \cdot Cd_F \cdot A_{ICETMA} = 11$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All TMA's =	$WT_{TMA} \cdot N_{TMA} = 54$	lbs	**BLC 2**

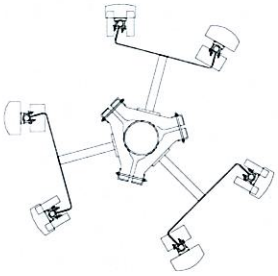
Gravity Load (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 358$	cu in	
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1)(T_{TMA} + 1) - V_{TMA} = 179$	cu in	
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 6$	lbs	
Weight of Ice on All TMA's	$W_{ICETMA} \cdot N_{TMA} = 17$	lbs	**BLC 3**

Development of Wind & Ice Load on Mounts

Mount Data: (AT&T)

Mount Type =	(3) Valmont Dual Standoff Mounts w/ Universal Tri-Bracket		
Mount Shape =	Flat		(User Input)
Mount Area =	$A_{mnt} := 4.0$	sq ft	(User Input)
Mount Area w/ Ice =	$A_{ICEmnt} := 4.6$	sq ft	(User Input)
Mount Weight =	$WT_{mnt} := 610$	lbs	(User Input)
Mount Weight w/ Ice =	$WT_{ICEmnt} := 700$	lbs	(User Input)



Wind Load (NESC Extreme)

Total Mount Wind Force = $F_{mnt} := qz \cdot Cd_F \cdot A_{mnt} \cdot m = 229$ lbs **BLC 5**

Wind Load (NESC Heavy)

Total Mount Wind Force w/ Ice = $Fi_{mnt} := p \cdot Cd_F \cdot A_{ICEmnt} = 29$ lbs **BLC 4**

Gravity Load (without ice)

Weight of Mount = $WT_{mnt} = 610$ lbs **BLC 2**

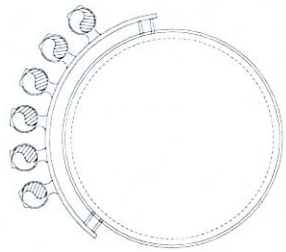
Gravity Load (ice only)

Weight of Ice on Mount = $WT_{ICEmnt} - WT_{mnt} = 90$ lbs **BLC 3**

Development of Wind & Ice Load on Coax Cables

Existing Coax Cable Data: (Sprint)

Coax Type =	HELIAX 1-1/4"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.55$	in	(User Input)
Coax Cable Length =	$L_{coax} := 64$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 0.66$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 6$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 1$		(User Input)



Note: AT&T Existing/Proposed cables attached to CL&P Pole

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.1$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 7$ plf **BLC 5**

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

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.2$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 1$ plf **BLC 4**

Gravity Loads (without ice)

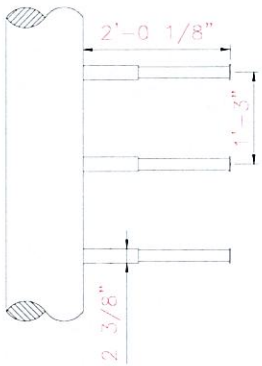
Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 4$ plf **BLC 2**

Gravity Load (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot Ir)^2 - D_{coax}^2\right] = 3.2$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 8$ plf **BLC 3**

Development of Wind & Ice Load on Brace Member



Member Data: Step Bolts

Shape =	Round		(User Input)
Diameter =	$D_{mem} := 2.38$	in	(User Input)
Length =	$L_{mem} := 2$	ft	(User Input)
Spacing =	$Sp_{mem} := 1.25$	ft	(User Input)
Weight =	$Wt_{mem} := 3.66$	plf	(User Input)

Wind Load (NESC Extreme)

Member Projected Surface Area = $A_{mem} := \frac{D_{mem} \cdot L_{mem}}{12 \cdot Sp_{mem}} = 0.317$ sf/ft

Total Member Wind Force = $qz \cdot Cd_R \cdot A_{mem} \cdot m = 15$ plf **BLC 5**

Wind Load (NESE Heavy)

Member Projected Surface Area w/ Ice = $AICE_{mem} := \frac{(D_{mem} + 2 \cdot Ir) \cdot (L_{mem} + 2 \cdot Ir)}{12 \cdot Sp_{mem}} = 0.676$ sf/ft

Total Member Wind Force w/ Ice = $p \cdot Cd_R \cdot AICE_{mem} = 4$ plf **BLC 4**

Gravity Loads (without ice)

Weight of the Member = $\frac{Wt_{mem} \cdot L_{mem}}{Sp_{mem}} = 6$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mem} := \frac{1}{4} \cdot \pi \cdot \left[(D_{mem} + 2 \cdot Ir)^2 - D_{mem}^2 \right] = 4.5$ sq in

Weight of Ice on Member = $W_{ICEmem} := Id \cdot \frac{Ai_{mem}}{144} \cdot \frac{L_{mem}}{Sp_{mem}} = 3$ 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: **Brookfield, CT**

Date:6/15/11 Prepared by: T.J.L. Checked by: C.F.C. Job No. 11021.CO50

Load Case	Description
1	Self Weight (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

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 Load Combinations Table**

Location: **Brookfield, CT**

Date: 6/15/11 Prepared by: T.J.L. Checked by: C.F.C. Job No. 11021.CO50

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 (\1E5 F)	Densi...	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 s...	z s...	Functi...
1	M1	Existing...	41.583	30		30									Lateral
2	M2	Existing...	22.417	30		30									Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Existing Upper M...	PIPE 12.0	Beam	Pipe	A53 Gr. B	Typical	13.6	262	262	523
2	Existing Lower M...	HSS16X0.375	Beam	Pipe	A500 Gr.42	Typical	17.2	526	526	1050

Member Primary Data

	Label	I Joint	J Joint	K ...	Rotate(deg)	Section/Shape	Type	Design Li...	Material	Design Rules
1	M1	BOT_CONN	SPLICE			Existing Lower Mast	Beam	Pipe	A500 Gr...	Typical
2	M2	SPLICE	TOP_MA...			Existing Upper Mast	Beam	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Di...
1	BOT_CONN	0	50	0	0	
2	TOP_CONN	0	80	0	0	
3	SPLICE	0	91.583	0	0	
4	TOP_MAST	0	114	0	0	
5	CL_SPRINT	0	110.667	0	0	
6	CL_ATT	0	97	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	BOT_CONN	Reaction	Reaction	Reaction		Reaction		
2	TOP_CONN	Reaction	Reaction	Reaction		Reaction		

Joint Loads and Enforced Displacements (BLC 2 : Weight of Appurtenances)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	Y	-.054
2	CL_SPRINT	L	Y	-.263
3	CL_ATT	L	Y	-.117
4	CL_ATT	L	Y	-.192
5	CL_ATT	L	Y	-.085
6	CL_ATT	L	Y	-.054
7	CL_ATT	L	Y	-.61

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only on PCS Struct)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only on PCS Struct) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	Y	-.067
2	CL_SPRINT	L	Y	-.037
3	CL_ATT	L	Y	-.098
4	CL_ATT	L	Y	-.142
5	CL_ATT	L	Y	-.043
6	CL_ATT	L	Y	-.017
7	CL_ATT	L	Y	-.09

Joint Loads and Enforced Displacements (BLC 4 : NESC Heavy Wind on PCS Structure)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	X	.068
2	CL_ATT	L	X	.09
3	CL_ATT	L	X	.127
4	CL_ATT	L	X	.042
5	CL_ATT	L	X	.011
6	CL_ATT	L	X	.029

Joint Loads and Enforced Displacements (BLC 5 : NESC Extreme Wind on PCS Structu)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	CL_SPRINT	L	X	.535
2	CL_ATT	L	X	.722
3	CL_ATT	L	X	1.031
4	CL_ATT	L	X	.316
5	CL_ATT	L	X	.079
6	CL_ATT	L	X	.229

Member Point Loads

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.004	-.004	0	0
2	M2	Y	-.004	-.004	0	0
3	M1	Y	-.006	-.006	36	0
4	M2	Y	-.006	-.006	0	10

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.01	-.01	0	0
2	M2	Y	-.008	-.008	0	0
3	M1	Y	-.008	-.008	0	0
4	M2	Y	-.008	-.008	0	0
5	M1	Y	-.003	-.003	36	0
6	M2	Y	-.003	-.003	0	10

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.007	.007	0	0
2	M2	X	.006	.006	0	0
3	M1	X	.001	.001	0	0
4	M2	X	.001	.001	0	0
5	M1	X	.004	.004	36	0

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
6	M2	X	.004	.004	0	10

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

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.05	.05	0	0
2	M2	X	.05	.05	0	0
3	M1	X	.005	.005	0	0
4	M2	X	.007	.007	0	0
5	M1	X	.015	.015	36	0
6	M2	X	.015	.015	0	10

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint Po...	Distrib...	Area(Me...	Surf...
1	Self Weight (PCS Mast)	None		-1					
2	Weight of Appurtenances	None				7	4		
3	Weight of Ice Only on PCS Struct	None				7	6		
4	NESC Heavy Wind on PCS Structure	None				6	6		
5	NESC Extreme Wind on PCS Structu	None				6	6		

Load Combinations

	Description	Solve	PDel...	SR...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	NESC Heavy Wind on PCS Structure	Yes			1	1.5	2	1.5	3	1.5	4	2.5								
2	NESC Extreme Wind on PCS Struct...	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...	LC	Torque[...	LC	y-y Mo...	LC	z-z Mom...	LC
1	M1	1	max	1.812	1	-.712	1	0	1	0	1	0	1	0	1
2			min	.938	2	-2.27	2	0	1	0	1	0	1	0	1
3		2	max	.556	1	-.92	1	0	1	0	1	0	1	26.571	2
4			min	.288	2	-2.842	2	0	1	0	1	0	1	8.48	1
5		3	max	-.362	2	-1.128	1	0	1	0	1	0	1	59.086	2
6			min	-.7	1	-3.414	2	0	1	0	1	0	1	19.122	1
7		4	max	6.498	1	4.995	2	0	1	0	1	0	1	86.882	2
8			min	3.246	2	1.674	1	0	1	0	1	0	1	28.352	1
9		5	max	5.167	1	4.34	2	0	1	0	1	0	1	38.158	2
10			min	2.562	2	1.41	1	0	1	0	1	0	1	12.191	1
11	M2	1	max	5.167	1	4.34	2	0	1	0	1	0	1	38.158	2
12			min	2.562	2	1.41	1	0	1	0	1	0	1	12.191	1
13		2	max	2.362	1	1.559	2	0	1	0	1	0	1	15.413	2
14			min	1.189	2	.508	1	0	1	0	1	0	1	4.862	1
15		3	max	1.746	1	1.174	2	0	1	0	1	0	1	7.794	2
16			min	.881	2	.366	1	0	1	0	1	0	1	2.438	1
17		4	max	1.189	1	.854	2	0	1	0	1	0	1	2.11	2
18			min	.599	2	.268	1	0	1	0	1	0	1	.661	1
19		5	max	0	1	0	1	0	1	0	1	0	1	0	1
20			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[...	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	.105	1	-.083	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
2			min	.055	2	-.264	2	0	1	0	1	0	1	0	1	0	1
3		2	max	.032	1	-.107	1	0	1	-1.548	1	4.85	2	0	1	0	1
4			min	.017	2	-.33	2	0	1	-4.85	2	1.548	1	0	1	0	1
5		3	max	-.021	2	-.131	1	0	1	-3.49	1	10.784	2	0	1	0	1
6			min	-.041	1	-.397	2	0	1	-10.784	2	3.49	1	0	1	0	1
7		4	max	.378	1	.581	2	0	1	-5.174	1	15.857	2	0	1	0	1
8			min	.189	2	.195	1	0	1	-15.857	2	5.174	1	0	1	0	1
9		5	max	.3	1	.505	2	0	1	-2.225	1	6.964	2	0	1	0	1
10			min	.149	2	.164	1	0	1	-6.964	2	2.225	1	0	1	0	1
11	M2	1	max	.38	1	.638	2	0	1	-3.559	1	11.142	2	0	1	0	1
12			min	.188	2	.207	1	0	1	-11.142	2	3.559	1	0	1	0	1
13		2	max	.174	1	.229	2	0	1	-1.42	1	4.5	2	0	1	0	1
14			min	.087	2	.075	1	0	1	-4.5	2	1.42	1	0	1	0	1
15		3	max	.128	1	.173	2	0	1	-.712	1	2.276	2	0	1	0	1
16			min	.065	2	.054	1	0	1	-2.276	2	.712	1	0	1	0	1
17		4	max	.087	1	.126	2	0	1	-.193	1	.616	2	0	1	0	1
18			min	.044	2	.039	1	0	1	-.616	2	.193	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	BOT CONN	max	2.27	2	1.812	1	0	1	0	1	0	1	0	1
2		min	.712	1	.938	2	0	1	0	1	0	1	0	1
3	TOP CONN	max	-3.009	1	8.453	1	0	1	0	1	0	1	0	1
4		min	-8.981	2	4.258	2	0	1	0	1	0	1	0	1
5	Totals:	max	-2.297	1	10.265	1	0	1						
6		min	-6.711	2	5.196	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	BOT CONN	max	0	1	0	2	0	1	0	1	0	1	3.768e-3	2
2		min	0	2	0	1	0	1	0	1	0	1	1.21e-3	1
3	TOP CONN	max	0	2	0	2	0	1	0	1	0	1	-2.663e-3	1
4		min	0	1	0	1	0	1	0	1	0	1	-8.212e-3	2
5	SPLICE	max	1.71	2	0	2	0	1	0	1	0	1	-4.959e-3	1
6		min	.555	1	-.002	1	0	1	0	1	0	1	-1.53e-2	2
7	TOP MAST	max	6.77	2	-.002	2	0	1	0	1	0	1	-6.407e-3	1
8		min	2.188	1	-.003	1	0	1	0	1	0	1	-1.988e-2	2
9	CL SPRINT	max	5.975	2	-.002	2	0	1	0	1	0	1	-6.405e-3	1
10		min	1.932	1	-.003	1	0	1	0	1	0	1	-1.987e-2	2
11	CL ATT	max	2.809	2	-.001	2	0	1	0	1	0	1	-5.832e-3	1
12		min	.911	1	-.002	1	0	1	0	1	0	1	-1.805e-2	2

Envelope AISC ASD Steel Code Checks

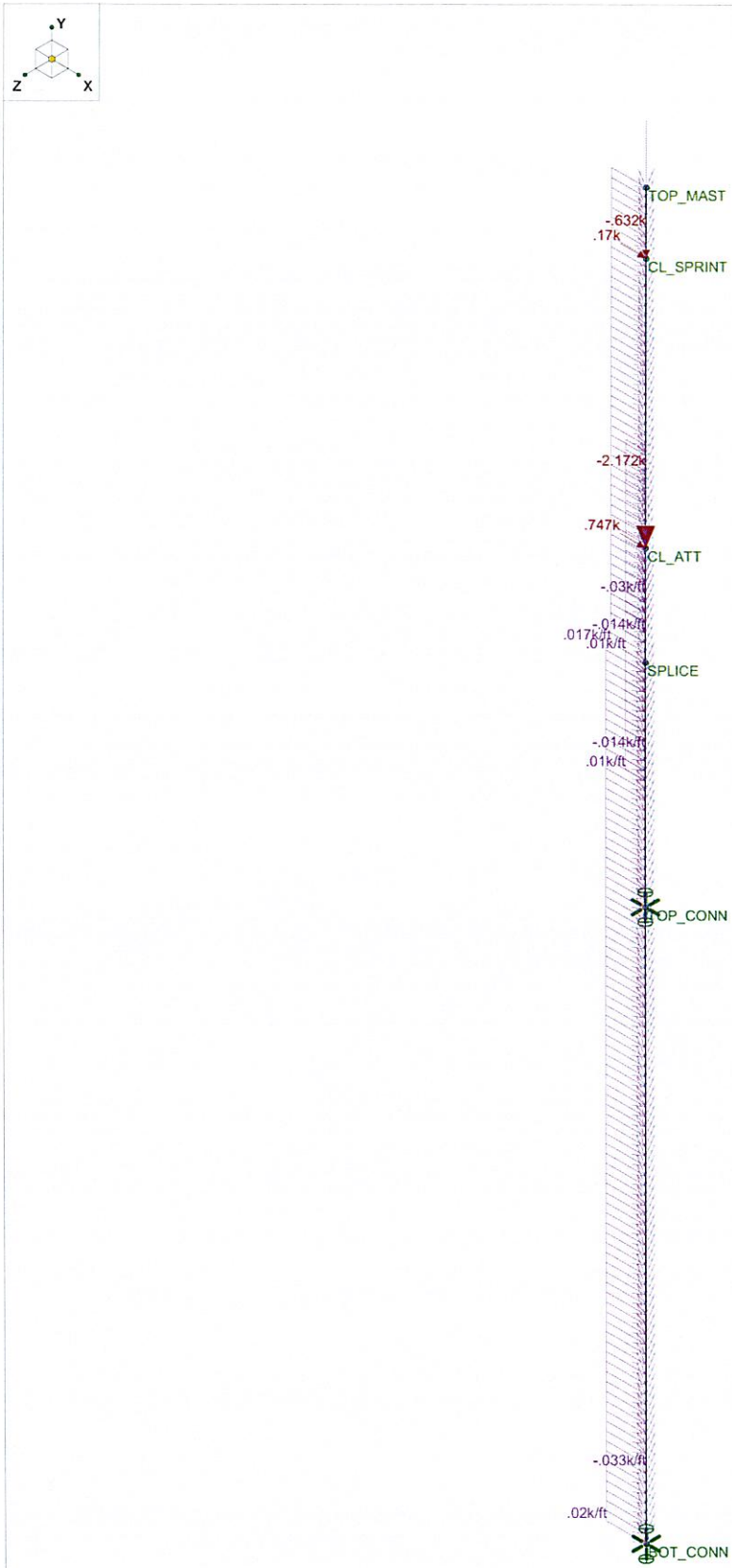
	Member	Shape	Code Check	Loc[ft]	L...	Shear Ch...	Loc[ft]	...LC	Fa...	Ft ...	Fb y-y [ksi]	Fb.....	...	AS...
1	M1	HSS16X0....	.611	29.888	2	.035	30.321	2	15...	25.2	27.72	27...1	.6	....H2...
2	M2	PIPE_12.0	.491	0	2	.046	0	2	14...	21	23.1	23.1...	.6	....H1...

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOT_CONN	.712	1.812	0	0	0	0
2	1	TOP_CONN	-3.009	8.453	0	0	0	0
3	1	Totals:	-2.297	10.265	0			
4	1	COG (ft):	X: 0	Y: 86.208	Z: 0			

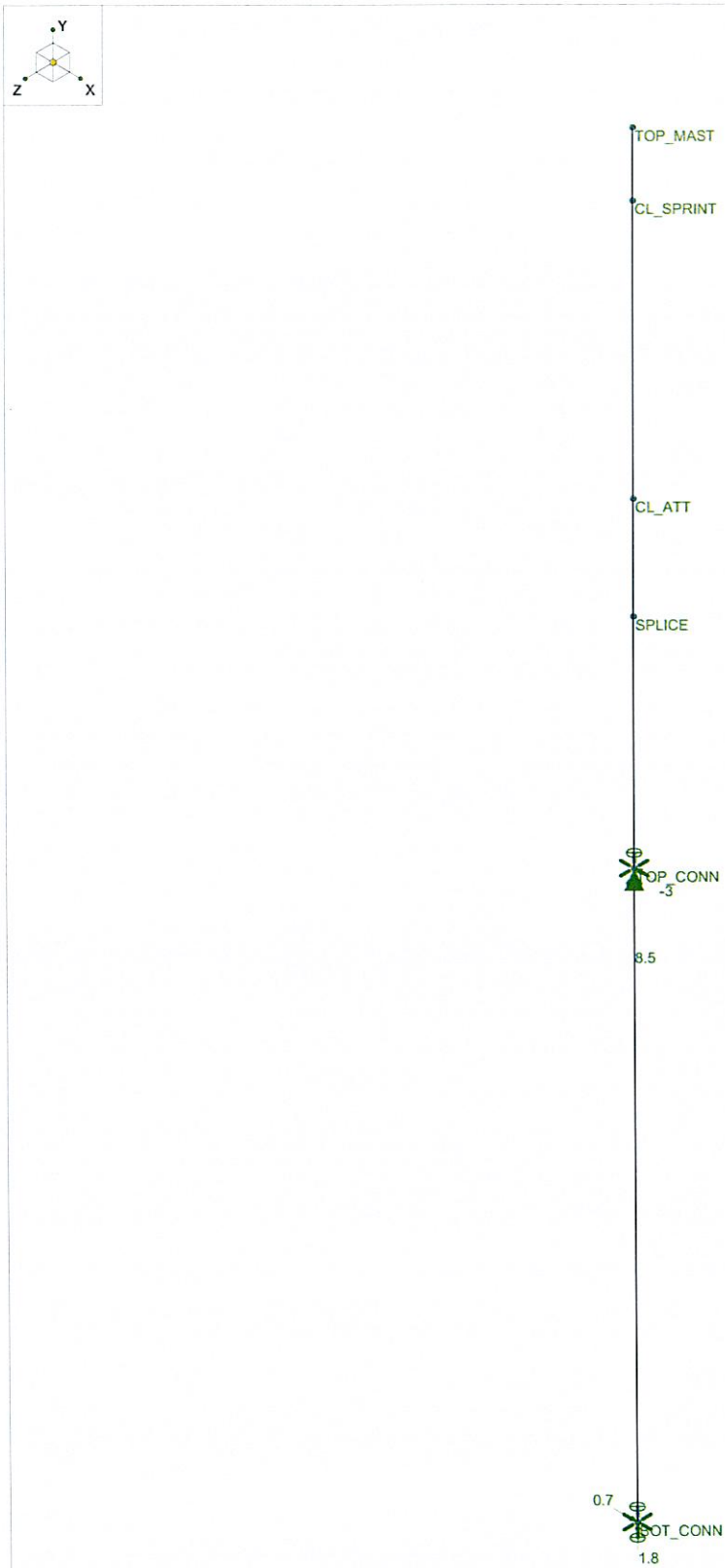
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOT_CONN	2.27	.938	0	0	0	0
2	2	TOP_CONN	-8.981	4.258	0	0	0	0
3	2	Totals:	-6.711	5.196	0			
4	2	COG (ft):	X: 0	Y: 85.917	Z: 0			



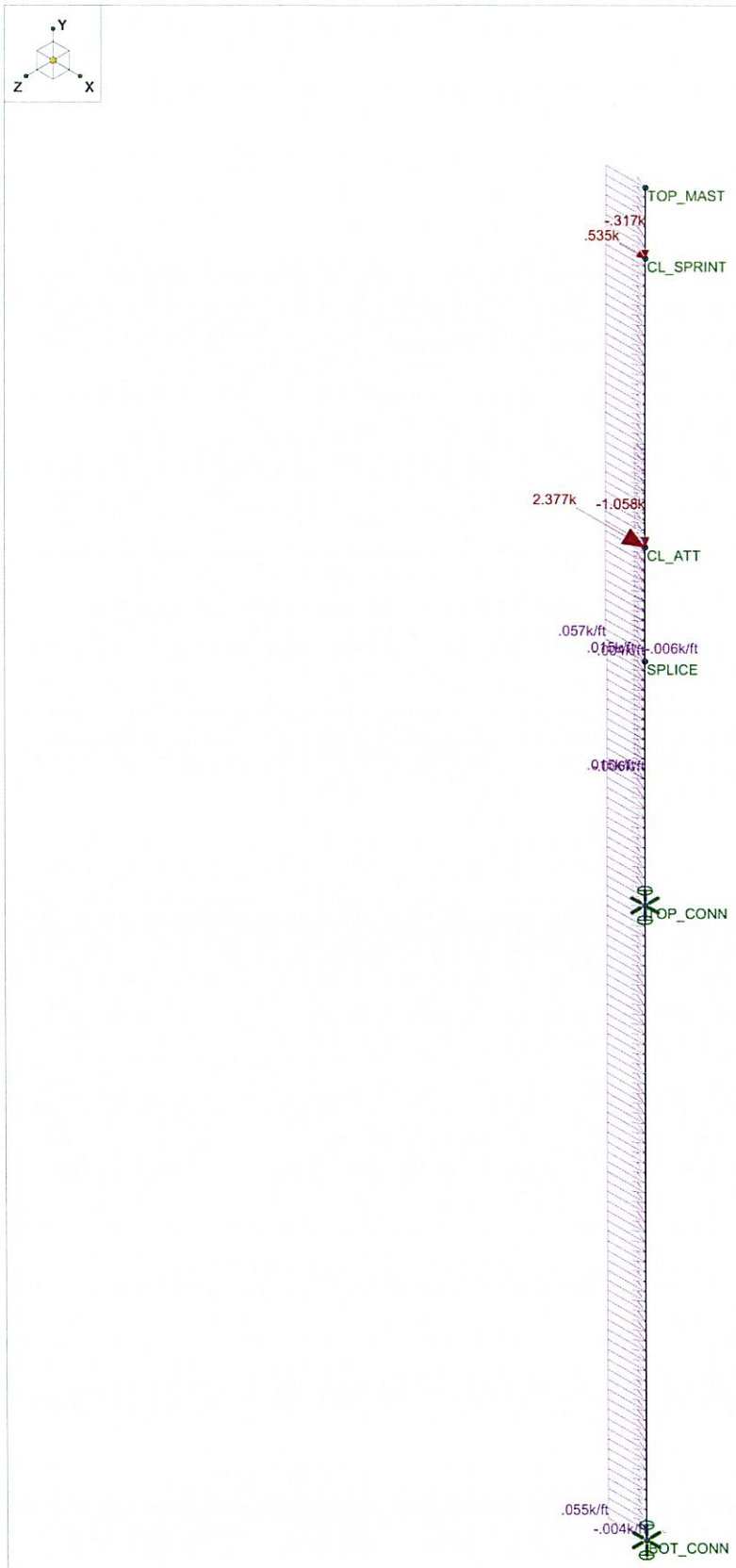
Loads: LC 1, NESC Heavy Wind on PCS Structure

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:42 PM
11021.CO50 /AT&T 2185	LC # 1 Loads	2185 NESC Loads.r3d



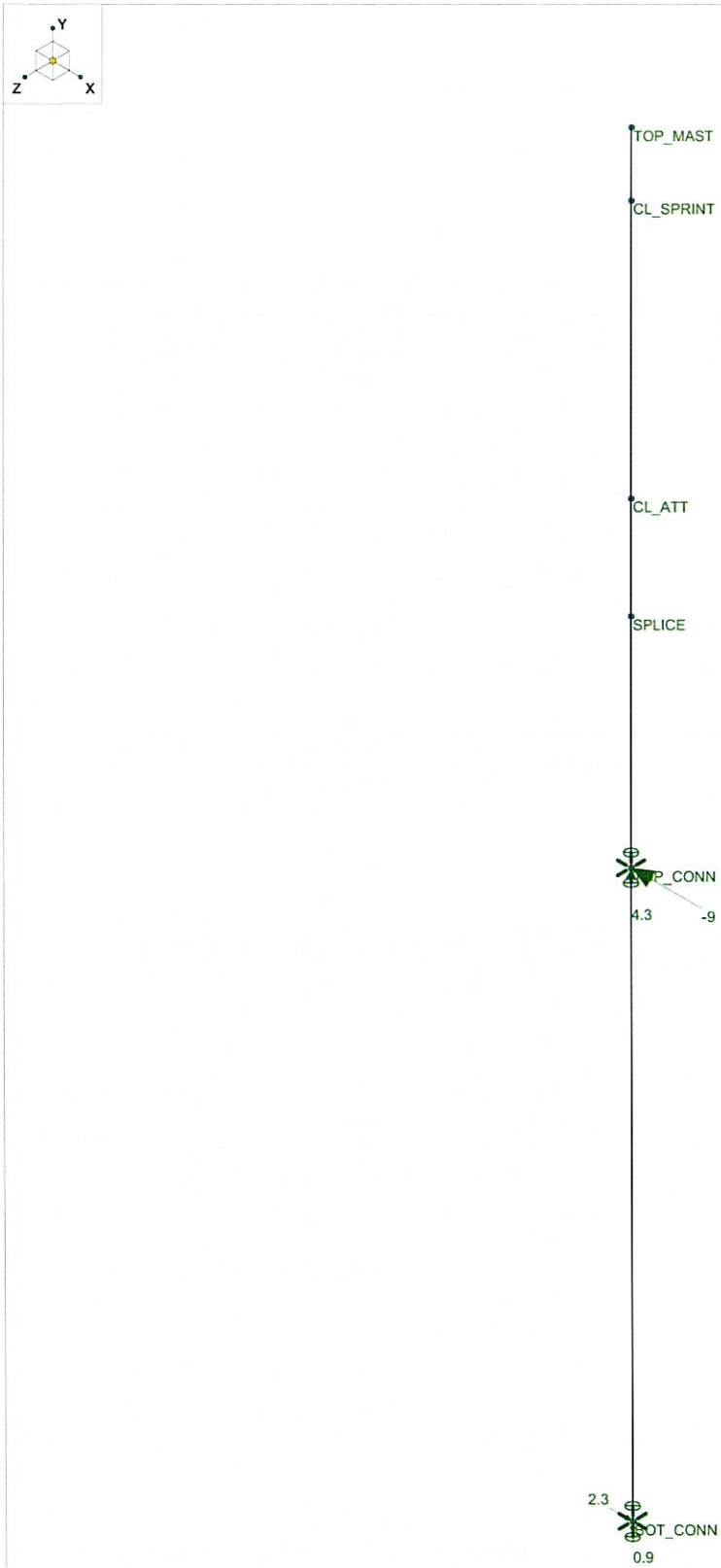
Results for LC 1, NESC Heavy Wind on PCS Structure
Z-moment Reaction units are k and k-ft

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:43 PM
11021.CO50 /AT&T 2185	LC # 1 Reactions	2185 NESC Loads.r3d



Loads: LC 2, NESC Extreme Wind on PCS Structure

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:42 PM
11021.CO50 /AT&T 2185	LC # 2 Loads	2185 NESC Loads.r3d



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

CENTEK Engineering, INC.		
elb, cfc	CL&P # 2683 - Mast	June 15, 2011 at 2:43 PM
11021.CO50 /AT&T 2185	LC # 2 Reactions	2185 NESC Loads.r3d

Coax Cable on CL&P Pole

(Below 50-ft AGL)

Distance Between Coax Cable Attach Points =

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

Diameter of Coax Cable = $D_{coax1} := 1.55 \cdot in$ *(User Input)*

Weight of Coax Cable = $W_{coax1} := 0.66 \cdot plf$ *(User Input)*

Number of Coax Cables = $N_{coax1} := 21$ *(User Input)* 15 AT&T Cables and 6 Sprint Cables

Number of Projected Coax Cables = $NP_{coax1} := 3$ *(User Input)*

Extreme Wind Pressure = $qz := 28.6 \cdot psf$ *(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 = $A_{ice} := \left(NP_{coax1} \cdot D_{coax1} + 2 \cdot Ir\right) = 5.65 \cdot in$

Wind Area without Ice = $A := \left(NP_{coax1} \cdot D_{coax1}\right) = 4.65 \cdot in$

Ice Area per Liner Ft = $Ai_{coax1} := \frac{\pi}{4} \cdot \left[\left(D_{coax1} + 2 \cdot Ir\right)^2 - D_{coax1}^{\ 2}\right] = 0.022 ft^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax1} \cdot Id \cdot N_{coax1} = 26 \cdot plf$

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 =

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

$$Heavy_{Vert} = \begin{pmatrix} 602 \\ 602 \\ 602 \\ 602 \\ 602 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 68 \\ 68 \\ 68 \\ 68 \\ 68 \end{pmatrix} lb$$

Extreme Vertical Load =

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

Extreme Transverse Load =

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

$$Extreme_{Vert} = \begin{pmatrix} 139 \\ 139 \\ 139 \\ 139 \\ 139 \end{pmatrix} lb \qquad Extreme_{Trans} = \begin{pmatrix} 161 \\ 161 \\ 161 \\ 161 \\ 161 \end{pmatrix} lb$$

Coax Cable on CL&P Pole

(Above 50-ft AGL)

Distance Between Coax Cable Attach Points =

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

Diameter of Coax Cable = $D_{coax1} := 1.55 \cdot in$ *(User Input)*

Weight of Coax Cable = $W_{coax1} := 0.66 \cdot plf$ *(User Input)*

Number of Coax Cables = $N_{coax1} := 15$ *(User Input)* 15 AT&T Cables

Number of Projected Coax Cables = $NP_{coax1} := 2$ *(User Input)* Sprint Cables on PCS Mast

Extreme Wind Pressure = $qz := 28.6 \cdot psf$ *(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 = $A_{ice} := \left(NP_{coax1} \cdot D_{coax1} + 2 \cdot Ir\right) = 4.1 \cdot in$

Wind Area without Ice = $A := \left(NP_{coax1} \cdot D_{coax1}\right) = 3.1 \cdot in$

Ice Area per Liner Ft = $Ai_{coax1} := \frac{\pi}{4} \cdot \left[\left(D_{coax1} + 2 \cdot Ir\right)^2 - D_{coax1}^{\ 2}\right] = 0.022 ft^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax1} \cdot Id \cdot N_{coax1} = 19 \cdot plf$

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 =

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

$$Heavy_{Vert} = \begin{pmatrix} 430 \\ 430 \\ 430 \\ 430 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 50 \\ 50 \\ 50 \\ 50 \end{pmatrix} lb$$

Extreme Vertical Load =

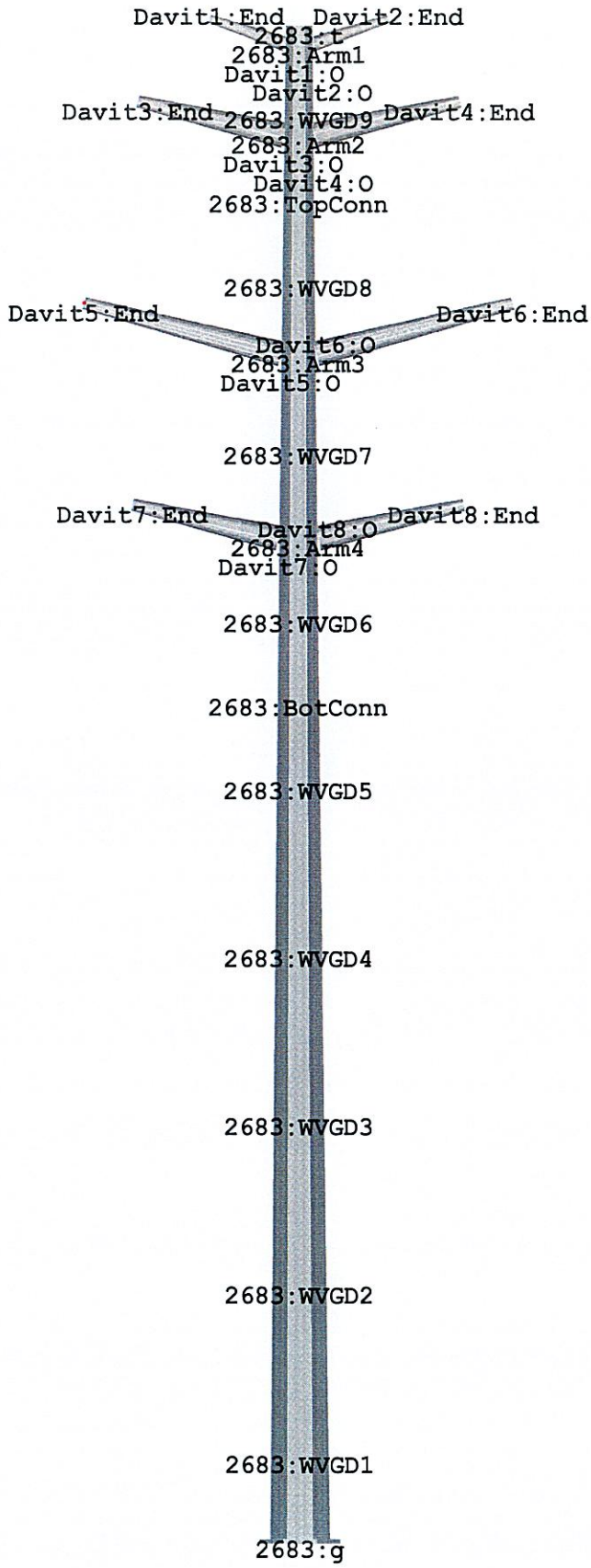
$$Extreme_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1}\right) \cdot Coax_{Span} \cdot OF_{EV}\right]}$$

Extreme Transverse Load =

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

$$Extreme_{Vert} = \begin{pmatrix} 99 \\ 99 \\ 99 \\ 99 \end{pmatrix} lb \qquad Extreme_{Trans} = \begin{pmatrix} 107 \\ 107 \\ 107 \\ 107 \end{pmatrix} lb$$

Centek Engineering Inc, Project: "ci&p structure # 2683"
PLS-POLE Version 11.11, 11:34:11 AM Wednesday, June 29, 2011
Undeformed geometry displayed



Project Name : 11021.CO50 - Brookfield, CT
Project Notes: CL&P # 2683/ AT&T 2185
Project File : J:\Jobs\1102100.WI\CO-50 - CT2185 - 761 FEDERAL ROAD, BROOKFIELD, CT\Structural\Rev (1)\Calcs\PLS Pole\cl&p structure # 2683.pol
Date run : 11:32:47 AM Wednesday, June 29, 2011
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\1102100.wi\co-50 - ct2185 - 761 federal road, brookfield, ct\structural\rev (1)\calcs\pls pole\cl&p #2683.lca

*** Analysis Results:

Maximum element usage is 68.81% for Steel Pole "2683" in load case "NESC Heavy"
Maximum insulator usage is 12.42% for Clamp "Clamp21" 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	2683:g	-0.09	-24.35	48.48	24.35	1846.38	-3.85	-0.01	1846.38	0.00
NESC Extreme	2683:g	-0.03	-25.20	23.90	25.20	1785.77	-1.17	-0.00	1785.78	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	2683:t	0.05	35.66	-0.79	35.67	0.00	-3.28	0.00
NESC Extreme	2683:t	0.02	34.00	-0.71	34.01	0.00	-3.08	0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
2683	1	3397	NESC Heavy	46.32	534.31
2683	2	5750	NESC Heavy	59.51	1357.41
2683	3	3427	NESC Heavy	68.81	1846.38

*** 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)
2683	68.81	NESC Heavy	25	13920.9

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	1.33	NESC Extreme	1	77.9
Davit2	8.45	NESC Heavy	1	77.9
Davit3	2.28	NESC Heavy	1	321.0
Davit4	4.98	NESC Heavy	1	321.0
Davit5	3.03	NESC Heavy	1	434.7
Davit6	7.08	NESC Heavy	1	434.7
Davit7	2.36	NESC Heavy	1	321.0

Davit8	5.04	NESC Heavy	1	321.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	68.81	2683	Steel Pole
NESC Extreme	65.74	2683	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	68.81	2683	25
NESC Extreme	65.74	2683	25

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	2683	6	30.544	48.478	1846.381	-3.851	31.165	118.987	6	83.720	2.258	56.66
NESC Extreme	2683	6	30.544	23.902	1785.775	-1.173	29.426	112.346	6	78.827	2.194	53.50

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	8.45	Davit2	1
NESC Extreme	3.21	Davit2	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	3.00	NESC Heavy	0.0
Clamp2	Clamp	3.00	NESC Heavy	0.0
Clamp3	Clamp	3.29	NESC Heavy	0.0
Clamp4	Clamp	3.29	NESC Heavy	0.0
Clamp5	Clamp	3.29	NESC Heavy	0.0
Clamp6	Clamp	3.29	NESC Heavy	0.0
Clamp7	Clamp	3.29	NESC Heavy	0.0
Clamp8	Clamp	3.29	NESC Heavy	0.0
Clamp9	Clamp	0.76	NESC Heavy	0.0
Clamp10	Clamp	0.76	NESC Heavy	0.0
Clamp11	Clamp	0.76	NESC Heavy	0.0
Clamp12	Clamp	0.76	NESC Heavy	0.0
Clamp13	Clamp	0.76	NESC Heavy	0.0
Clamp14	Clamp	0.54	NESC Heavy	0.0
Clamp15	Clamp	0.54	NESC Heavy	0.0
Clamp16	Clamp	0.54	NESC Heavy	0.0
Clamp17	Clamp	0.54	NESC Heavy	0.0
Clamp21	Clamp	12.42	NESC Extreme	0.0
Clamp23	Clamp	3.07	NESC Extreme	0.0

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 2309.3
Weight of Steel Poles: 13920.9

Total: 16230.2

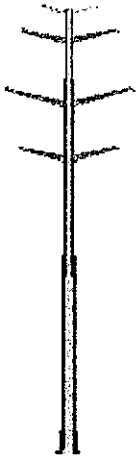
*** End of Report

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

Project Name : 11021.CO50 - Brookfield, CT
Project Notes: CL&P # 2683/ AT&T 2185
Project File : J:\Jobs\1102100.WI\CO-50 - CT2185 - 761 FEDERAL ROAD, BROOKFIELD, CT\Structural\Rev (1)\Calcs\PLS Pole\cl&p structure # 2683.pol
Date run : 11:32:46 AM Wednesday, June 29, 2011
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 Label	Stock Number	Length (ft)	Default Embedded Length (ft)	Base Plate	Shape	Tip Diameter (in)	Base Diameter (in)	Taper (in/ft)	Default Drag Coef.	Tubes	Modulus of Elasticity Override (ksi)	Weight Density Override (lbs/ft^3)	Shape At Base	Strength Check Type	Distance From Tip (ft)	Ultimate Trans. Load (kips)	Ultimate Long. Load (kips)
CL&P2683	2683	90.00	0	Yes	8F	19.63	43.21	0	1.3	3 tubes	0	0		Calculated	0.000	0.0000	0.0000

Steel Tubes Properties:

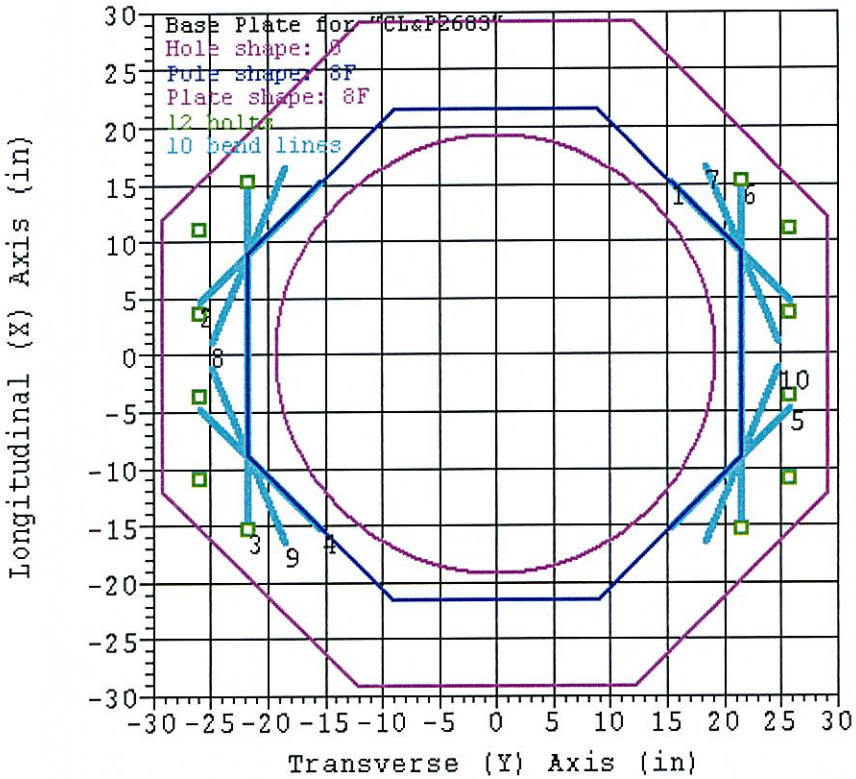
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)
CL&P2683	1	39	0.3125	4.167	0.000	65.000	0.000	3397	20.92	0.27728	19.63	30.44	3.73
CL&P2683	2	40.1667	0.375	5.250	0.000	65.000	0.000	5750	21.18	0.27728	28.66	39.80	4.88
CL&P2683	3	20.25	0.375	0.000	0.000	65.000	0.000	3427	10.36	0.27728	37.59	43.20	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&P2683	58.250	8F	3.000	1347	0.000	38.750	0	490.00	55.000	2.250	51.750	12	28733.01	5839.56

Base Plate Bolt Coordinates for Property "CL&P2683":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0.5894	0.8357	0
0.4251	1	0
0.1425	1	0



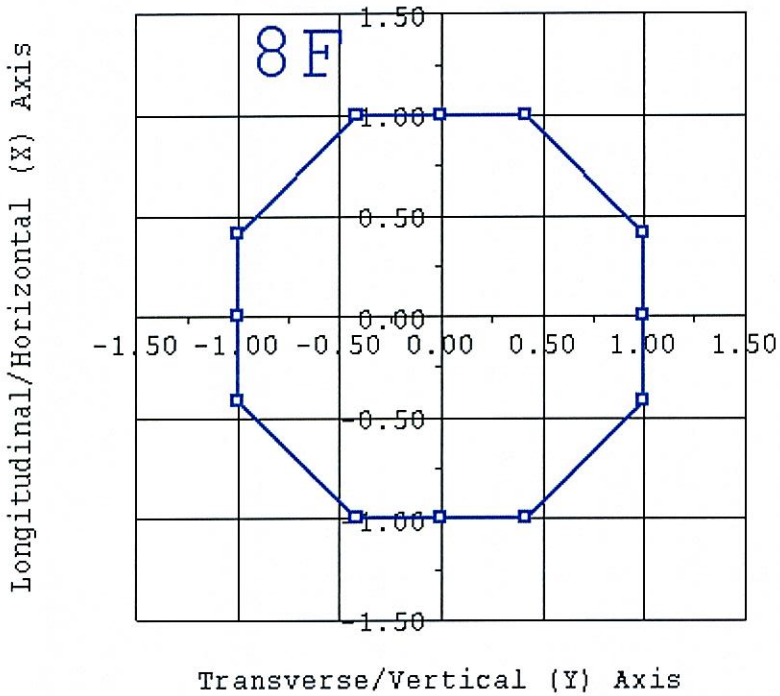
Steel Pole Connectivity:

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)
2683			0	0	0	0	0	CL&P2683	15 labels	Fixed	0.00	0

Relative Attachment Labels for Steel Pole "2683":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
2683:WVGD1	0.00	5.00
2683:WVGD2	0.00	15.00
2683:WVGD3	0.00	25.00
2683:WVGD4	0.00	35.00
2683:WVGD5	0.00	45.00
2683:WVGD6	0.00	55.00
2683:WVGD7	0.00	65.00
2683:WVGD8	0.00	75.00

2683:TopConn	0.00	80.00
2683:BotConn	0.00	50.00
2683:WVGD9	0.00	85.00
2683:Arm1	0.00	88.92
2683:Arm2	0.00	83.50
2683:Arm3	0.00	70.50
2683:Arm4	0.00	59.50



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)
2683	2683:t	2683:t Ori	0.00	19.63	20.00	985.95	985.95	0.00	21.9	65.00	65.00	544.26	544.26
2683	2683:Arm1	2683:Arm1 End	1.08	19.92	20.31	1032.52	1032.52	0.00	22.3	65.00	65.00	561.40	561.40
2683	2683:Arm1	2683:Arm1 Ori	1.08	19.92	20.31	1032.52	1032.52	0.00	22.3	65.00	65.00	561.40	561.40
2683	2683:WVGD9	2683:WVGD9 End	5.00	21.01	21.43	1213.85	1213.85	0.00	23.7	65.00	65.00	625.85	625.85
2683	2683:WVGD9	2683:WVGD9 Ori	5.00	21.01	21.43	1213.85	1213.85	0.00	23.7	65.00	65.00	625.85	625.85
2683	2683:Arm2	2683:Arm2 End	6.50	21.43	21.87	1288.49	1288.49	0.00	24.3	65.00	65.00	651.44	651.44
2683	2683:Arm2	2683:Arm2 Ori	6.50	21.43	21.87	1288.49	1288.49	0.00	24.3	65.00	65.00	651.44	651.44
2683	2683:TopConn	2683:TopConn End	10.00	22.40	22.87	1474.42	1474.42	0.00	25.5	65.00	65.00	713.14	713.14
2683	2683:TopConn	2683:TopConn Ori	10.00	22.40	22.87	1474.42	1474.42	0.00	25.5	65.00	65.00	713.15	713.15
2683	2683:WVGD8	2683:WVGD8 End	15.00	23.78	24.31	1769.84	1769.84	0.00	27.4	65.00	65.00	806.14	806.14
2683	2683:WVGD8	2683:WVGD8 Ori	15.00	23.78	24.31	1769.84	1769.84	0.00	27.4	65.00	65.00	806.14	806.14
2683	2683:Arm3	2683:Arm3 End	19.50	25.03	25.60	2067.33	2067.33	0.00	29.0	65.00	65.00	894.70	894.70
2683	2683:Arm3	2683:Arm3 Ori	19.50	25.03	25.60	2067.33	2067.33	0.00	29.0	65.00	65.00	894.70	894.70

2683	#2683:0	Tube 1	End	22.25	25.79	26.39	2264.58	2264.58	0.00	30.0	65.00	65.00	951.09	951.09
2683	#2683:0	Tube 1	Ori	22.25	25.79	26.39	2264.58	2264.58	0.00	30.0	65.00	65.00	951.09	951.09
2683	2683:WVGD7	2683:WVGD7	End	25.00	26.56	27.18	2474.00	2474.00	0.00	31.1	65.00	65.00	1009.21	1009.21
2683	2683:WVGD7	2683:WVGD7	Ori	25.00	26.56	27.18	2474.00	2474.00	0.00	31.1	65.00	65.00	1009.21	1009.21
2683	#2683:1	Tube 1	End	27.75	27.32	27.97	2695.95	2695.95	0.00	32.1	65.00	65.00	1069.06	1069.06
2683	#2683:1	Tube 1	Ori	27.75	27.32	27.97	2695.95	2695.95	0.00	32.1	65.00	65.00	1069.06	1069.06
2683	2683:Arm4	2683:Arm4	End	30.50	28.08	28.76	2930.78	2930.78	0.00	33.1	65.00	64.24	1117.35	1117.35
2683	2683:Arm4	2683:Arm4	Ori	30.50	28.08	28.76	2930.78	2930.78	0.00	33.1	65.00	64.24	1117.35	1117.35
2683	#2683:2	SpliceT	End	34.83	29.28	30.00	3327.87	3327.87	0.00	34.7	65.00	62.89	1191.09	1191.09
2683	#2683:2	SpliceT	Ori	34.83	29.28	30.00	3327.87	3327.87	0.00	34.7	65.00	62.89	1191.10	1191.10
2683	2683:WVGD6	2683:WVGD6	End	35.00	28.70	35.20	3734.31	3734.31	0.00	27.6	65.00	65.00	1409.35	1409.35
2683	2683:WVGD6	2683:WVGD6	Ori	35.00	28.70	35.20	3734.31	3734.31	0.00	27.6	65.00	65.00	1409.35	1409.35
2683	#2683:3	SpliceB	End	39.00	29.81	36.58	4190.24	4190.24	0.00	28.8	65.00	65.00	1522.59	1522.59
2683	#2683:3	SpliceB	Ori	39.00	29.81	36.58	4190.24	4190.24	0.00	28.8	65.00	65.00	1522.59	1522.59
2683	2683:BotConn	2683:BotConn	End	40.00	30.09	36.93	4309.75	4309.75	0.00	29.1	65.00	65.00	1551.58	1551.58
2683	2683:BotConn	2683:BotConn	Ori	40.00	30.09	36.93	4309.75	4309.75	0.00	29.1	65.00	65.00	1551.58	1551.58
2683	2683:WVGD5	2683:WVGD5	End	45.00	31.48	38.65	4941.47	4941.47	0.00	30.6	65.00	65.00	1700.66	1700.66
2683	2683:WVGD5	2683:WVGD5	Ori	45.00	31.48	38.65	4941.47	4941.47	0.00	30.6	65.00	65.00	1700.66	1700.66
2683	#2683:4	Tube 2	End	50.00	32.86	40.37	5632.09	5632.09	0.00	32.2	65.00	65.00	1856.57	1856.57
2683	#2683:4	Tube 2	Ori	50.00	32.86	40.37	5632.09	5632.09	0.00	32.2	65.00	65.00	1856.57	1856.57
2683	2683:WVGD4	2683:WVGD4	End	55.00	34.25	42.09	6384.24	6384.24	0.00	33.7	65.00	63.72	1979.56	1979.56
2683	2683:WVGD4	2683:WVGD4	Ori	55.00	34.25	42.09	6384.24	6384.24	0.00	33.7	65.00	63.72	1979.56	1979.56
2683	#2683:5	Tube 2	End	60.00	35.64	43.82	7200.54	7200.54	0.00	35.2	65.00	62.42	2102.06	2102.06
2683	#2683:5	Tube 2	Ori	60.00	35.64	43.82	7200.54	7200.54	0.00	35.2	65.00	62.42	2102.06	2102.06
2683	2683:WVGD3	2683:WVGD3	End	65.00	37.02	45.54	8083.61	8083.61	0.00	36.8	65.00	61.12	2224.22	2224.22
2683	2683:WVGD3	2683:WVGD3	Ori	65.00	37.02	45.54	8083.61	8083.61	0.00	36.8	65.00	61.12	2224.22	2224.22
2683	#2683:6	SpliceT	End	69.75	38.34	47.18	8986.78	8986.78	0.00	38.2	65.00	59.89	2339.57	2339.57
2683	#2683:6	SpliceT	Ori	69.75	38.34	47.18	8986.78	8986.78	0.00	38.2	65.00	59.89	2339.57	2339.57
2683	#2683:7	Tube 2	End	72.38	38.32	47.15	8971.06	8971.06	0.00	38.2	65.00	59.91	2337.64	2337.64
2683	#2683:7	Tube 2	Ori	72.38	38.32	47.15	8971.06	8971.06	0.00	38.2	65.00	59.91	2337.64	2337.64
2683	2683:WVGD2	2683:WVGD2	End	75.00	39.05	48.05	9497.27	9497.27	0.00	39.0	65.00	59.23	2400.97	2400.97
2683	2683:WVGD2	2683:WVGD2	Ori	75.00	39.05	48.05	9497.27	9497.27	0.00	39.0	65.00	59.23	2400.97	2400.97
2683	#2683:8	Tube 3	End	80.00	40.43	49.78	10555.72	10555.72	0.00	40.5	65.00	57.93	2520.52	2520.52
2683	#2683:8	Tube 3	Ori	80.00	40.43	49.78	10555.72	10555.72	0.00	40.5	65.00	57.93	2520.52	2520.52
2683	2683:WVGD1	2683:WVGD1	End	85.00	41.82	51.50	11690.03	11690.03	0.00	42.0	65.00	56.63	2638.31	2638.31
2683	2683:WVGD1	2683:WVGD1	Ori	85.00	41.82	51.50	11690.03	11690.03	0.00	42.0	65.00	56.63	2638.31	2638.31
2683	2683:g	2683:g	End	90.00	43.20	53.22	12902.82	12902.82	0.00	43.6	65.00	55.27	2751.00	2751.00

Tubular Davit Properties:

Davit Property Label	Stock Number	Steel Shape	Thickness (in)	Base Diameter or Depth (in)	Tip Diameter or Depth (in)	Taper (in/ft)	Drag Coef.	Modulus of Elasticity (ksi)	Geometry	Strength Check Type	Vertical Capacity (lbs)	Tension Capacity (lbs)	Compres. Capacity (lbs)	Long. Capacity (lbs)	Yield Stress (ksi)	Weight Density Override (lbs/ft^3)	Steel Shape At End
ARM A	0		0.1875	10.76	6	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0	
ARM B	0		0.25	18.5	9	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0	
ARM C	0		0.25	18.5	9	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0	

Intermediate Joints for Davit Property "ARM A":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	4.5	-1.5

Intermediate Joints for Davit Property "ARM B":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	8.67	-2

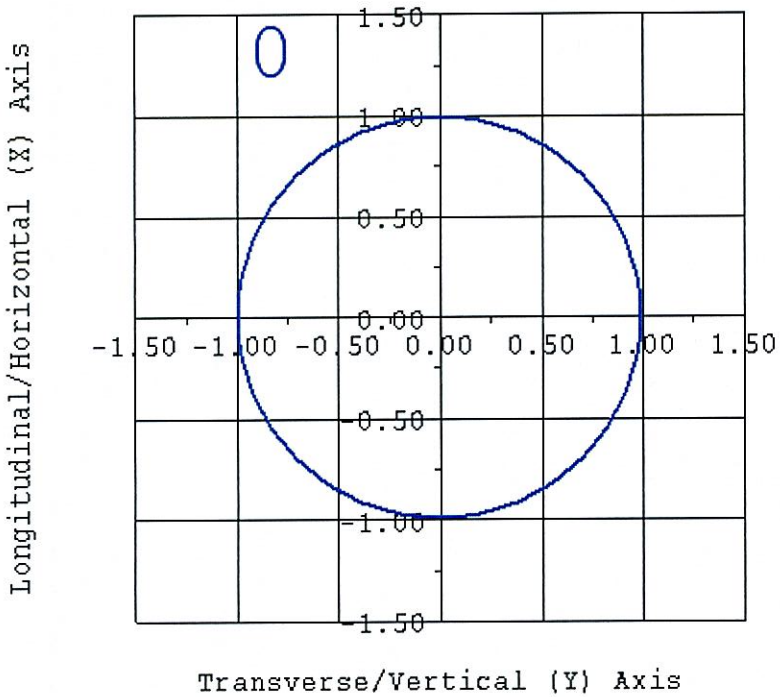
Intermediate Joints for Davit Property "ARM C":

Joint	Horz.	Vert.

Label	Offset (ft)	Offset (ft)
End	11.67	-3

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property Set	Azimuth (deg)
Davit1	2683:Arm1	ARM A	180
Davit2	2683:Arm1	ARM A	0
Davit3	2683:Arm2	ARM B	180
Davit4	2683:Arm2	ARM B	0
Davit5	2683:Arm3	ARM C	180
Davit6	2683:Arm3	ARM C	0
Davit7	2683:Arm4	ARM B	180
Davit8	2683:Arm4	ARM B	0



Tubular Davit Arm Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	V-Moment Inertia (in^4)	H-Moment Inertia (in^4)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	ASCE Cap V-Mom. (ft-k)	ASCE Cap H-Mom. (ft-k)
Davit1	Davit1:O	Origin	0.00	10.76	6.23	87.04	87.04	57.39	0.0	65.00	65.00	87.64	87.64
Davit1	Davit1:End	End	4.74	6.00	3.42	14.47	14.47	32.00	0.0	65.00	65.00	26.13	26.13

Davit2	Davit2:O	Origin	0.00	10.76	6.23	87.04	87.04	57.39	0.0	65.00	65.00	87.64	87.64
Davit2	Davit2:End	End	4.74	6.00	3.42	14.47	14.47	32.00	0.0	65.00	65.00	26.13	26.13
Davit3	Davit3:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit3	#Davit3:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit3	#Davit3:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit3	Davit3:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit4	Davit4:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit4	#Davit4:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit4	#Davit4:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit4	Davit4:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit5	Davit5:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit5	#Davit5:0	End	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit5	#Davit5:0	Origin	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit5	#Davit5:1	End	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit5	#Davit5:1	Origin	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit5	Davit5:End	End	12.05	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit6	Davit6:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit6	#Davit6:0	End	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit6	#Davit6:0	Origin	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit6	#Davit6:1	End	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit6	#Davit6:1	Origin	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit6	Davit6:End	End	12.05	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit7	Davit7:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit7	#Davit7:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit7	#Davit7:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit7	Davit7:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit8	Davit8:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit8	#Davit8:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit8	#Davit8:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit8	Davit8:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23

*** 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	2683:WVGD1	clamp	No Limit
Clamp10	2683:WVGD2	clamp	No Limit
Clamp11	2683:WVGD3	clamp	No Limit
Clamp12	2683:WVGD4	clamp	No Limit
Clamp13	2683:WVGD5	clamp	No Limit
Clamp14	2683:WVGD6	clamp	No Limit

Clamp15	2683:WVGD7	clamp	No Limit
Clamp16	2683:WVGD8	clamp	No Limit
Clamp17	2683:WVGD9	clamp	No Limit
Clamp21	2683:TopConn	clamp	No Limit
Clamp23	2683:BotConn	clamp	No Limit

*** Loads Data

Loads from file: j:\jobs\1102100.wi\co-50 - ct2185 - 761 federal road, brookfield, ct\structural\rev (1)\calcs\pls pole\cl&p #2683.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)	90.42	(ft)
Structure height	90.42	(ft)
Structure height above ground	90.42	(ft)

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Pole Area Factor	SF for Steel Tubular Arms and Towers	SF for Poles	SF for Wood Poles	SF for Conc. Ult.	SF for Conc. First Crack	SF for Conc. Zero Tens.	SF for Guys and Cables	SF for Non Tubular Arms	SF for Braces	SF for Insuls.	SF For Found.	Point Loads	Wind/Ice Model	Trans. Wind Pressure (psf)	Longit. Wind Pressure (psf)	Ice Thick. (in)	Ice Density (lbs/ft^3)	Temperature Deflection Check (deg F)	Deflection Limit % or (ft)
NESC Heavy	1.5000	2.5000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	19 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	19 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	840	2250	0	
Davit2:End	840	2250	0	
Davit3:End	1263	2305	0	
Davit4:End	1263	2305	0	
Davit5:End	1263	2305	0	
Davit6:End	1263	2305	0	
Davit7:End	1263	2305	0	
Davit8:End	1263	2305	0	
2683:TopConn	8453	3009	0	
2683:BotConn	1812	-712	0	
2683:WVGD1	602	68	0	
2683:WVGD2	602	68	0	
2683:WVGD3	602	68	0	
2683:WVGD4	602	68	0	
2683:WVGD5	602	68	0	
2683:WVGD6	430	50	0	
2683:WVGD7	430	50	0	
2683:WVGD8	430	50	0	
2683:WVGD9	430	50	0	

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

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

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

Label	Joint	Joint	Top Z (ft)	Bottom Z (ft)	Average Elevation (ft)	Diameter (in)	Number	Coef.	Wind Pressure (psf)	Ice Thickness (in)	Vert. Load (lbs)	Wind Load (lbs)	Vertical Load (lbs)	Wind Load (lbs)	Wind Load (lbs)	Wind Load (lbs)
2683	2683:t	2683:Arm1	90.00	88.92	89.46	19.775	9.36e+005	1.300	10.00	0.50	111.10	23.14	13.76	1.17	24.31	0.00
2683	2683:Arm1	2683:WVGD9	88.92	85.00	86.96	20.468	9.69e+005	1.300	10.00	0.50	417.61	86.93	51.70	4.25	91.17	0.00
2683	2683:WVGD9	2683:Arm2	85.00	83.50	84.25	21.219	1e+006	1.300	10.00	0.50	165.76	34.48	20.51	1.63	36.11	0.00
2683	2683:Arm2	2683:TopConn	83.50	80.00	81.75	21.913	1.04e+006	1.300	10.00	0.50	399.59	83.09	49.42	3.79	86.88	0.00
2683	2683:TopConn	2683:WVGD8	80.00	75.00	77.50	23.091	1.09e+006	1.300	10.00	0.50	601.98	125.08	74.39	5.42	130.50	0.00
2683	2683:WVGD8	2683:Arm3	75.00	70.50	72.75	24.408	1.16e+006	1.300	10.00	0.50	573.11	119.00	70.77	4.88	123.87	0.00
2683	2683:Arm3		70.50	67.75	69.13	25.413	1.2e+006	1.300	10.00	0.50	364.84	75.71	45.03	2.98	78.69	0.00
2683		2683:WVGD7	67.75	65.00	66.38	26.176	1.24e+006	1.300	10.00	0.50	375.93	77.99	46.38	2.98	80.97	0.00
2683	2683:WVGD7		65.00	62.25	63.63	26.938	1.28e+006	1.300	10.00	0.50	387.01	80.26	47.73	2.98	83.24	0.00
2683		2683:Arm4	62.25	59.50	60.88	27.701	1.31e+006	1.300	10.00	0.50	398.09	82.53	49.08	2.98	85.51	0.00
2683	2683:Arm4		59.50	55.17	57.33	28.683	1.36e+006	1.300	10.00	0.50	649.79	134.66	80.08	4.69	139.35	0.00
2683		2683:WVGD6	55.17	55.00	55.08	28.994	1.37e+006	1.300	10.00	0.50	55.48	5.24	3.11	0.18	5.42	0.00
2683	2683:WVGD6		55.00	51.00	53.00	29.259	1.39e+006	1.300	10.00	0.50	1358.02	126.80	75.41	4.33	131.13	0.00
2683		2683:BotConn	51.00	50.00	50.50	29.952	1.42e+006	1.300	10.00	0.50	187.72	32.45	19.30	1.08	33.53	0.00
2683	2683:BotConn	2683:WVGD5	50.00	45.00	47.50	30.784	1.46e+006	1.300	10.00	0.50	964.38	166.76	99.18	5.42	172.17	0.00
2683	2683:WVGD5		45.00	40.00	42.50	32.171	1.52e+006	1.300	10.00	0.50	1008.34	174.27	103.64	5.42	179.68	0.00
2683		2683:WVGD4	40.00	35.00	37.50	33.557	1.59e+006	1.300	10.00	0.50	1052.31	181.78	108.11	5.42	187.19	0.00
2683	2683:WVGD4		35.00	30.00	32.50	34.943	1.65e+006	1.300	10.00	0.50	1096.28	189.29	112.58	5.42	194.70	0.00
2683		2683:WVGD3	30.00	25.00	27.50	36.330	1.72e+006	1.300	10.00	0.50	1140.24	196.80	117.04	5.42	202.21	0.00
2683	2683:WVGD3		25.00	20.25	22.63	37.682	1.78e+006	1.300	10.00	0.50	1123.96	193.91	115.33	5.15	199.06	0.00
2683			20.25	17.63	18.94	38.329	1.81e+006	1.300	10.00	0.50	1263.83	109.00	64.83	2.84	111.85	0.00
2683		2683:WVGD2	17.63	15.00	16.31	38.682	1.83e+006	1.300	10.00	0.50	1288.06	110.01	65.43	2.84	112.85	0.00
2683	2683:WVGD2		15.00	10.00	12.50	39.739	1.88e+006	1.300	10.00	0.50	1248.51	215.26	128.03	5.42	220.68	0.00
2683		2683:WVGD1	10.00	5.00	7.50	41.125	1.95e+006	1.300	10.00	0.50	1292.33	222.77	132.49	5.42	228.19	0.00
2683	2683:WVGD1	2683:g	5.00	0.00	2.50	42.512	2.01e+006	1.300	10.00	0.50	1336.29	230.28	136.96	5.42	235.70	0.00

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	208	1129	0	
Davit2:End	208	1129	0	
Davit3:End	367	1484	0	
Davit4:End	367	1484	0	
Davit5:End	367	1484	0	
Davit6:End	367	1484	0	
Davit7:End	367	1484	0	
Davit8:End	367	1484	0	
2683:TopConn	4258	8981	0	
2683:BotConn	938	-2270	0	
2683:WVGD1	139	161	0	
2683:WVGD2	139	161	0	
2683:WVGD3	139	161	0	
2683:WVGD4	139	161	0	
2683:WVGD5	139	161	0	
2683:WVGD6	99	107	0	
2683:WVGD7	99	107	0	
2683:WVGD8	99	107	0	
2683:WVGD9	99	107	0	

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

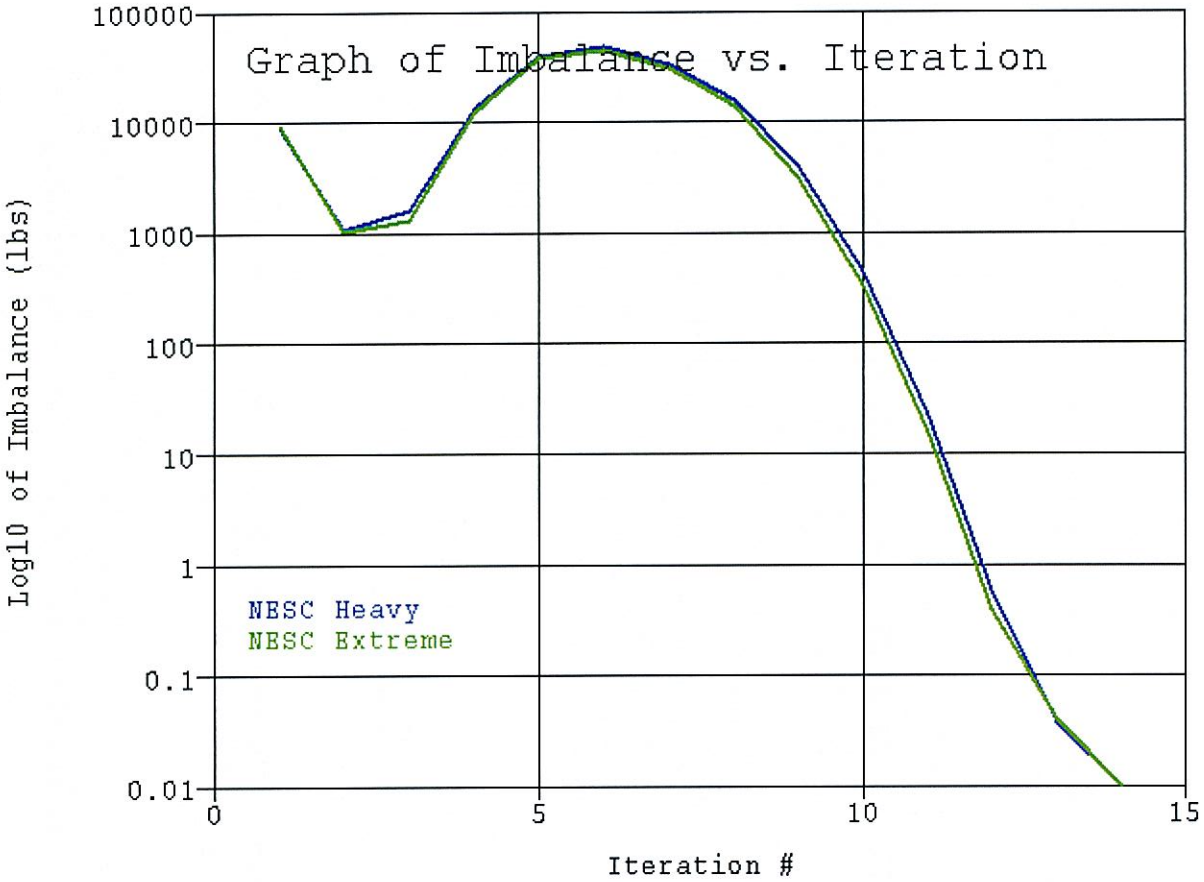
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

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)
2683	2683:t	2683:Arm1	90.00	88.92	89.46	19.775	1.5e+006	1.000	25.60	0.00	74.07	45.56	0.00	0.00	45.56	0.00
2683	2683:Arm1	2683:WVGD9	88.92	85.00	86.96	20.468	1.55e+006	1.000	25.60	0.00	278.40	171.18	0.00	0.00	171.18	0.00
2683	2683:WVGD9	2683:Arm2	85.00	83.50	84.25	21.219	1.61e+006	1.000	25.60	0.00	110.50	67.91	0.00	0.00	67.91	0.00

2683	2683:Arm2	2683:TopConn	83.50	80.00	81.75	21.913	1.66e+006	1.000	25.60	0.00	266.39	163.63	0.00	0.00	163.63	0.00
2683	2683:TopConn	2683:WVGD8	80.00	75.00	77.50	23.091	1.75e+006	1.000	25.60	0.00	401.32	246.32	0.00	0.00	246.32	0.00
2683	2683:WVGD8	2683:Arm3	75.00	70.50	72.75	24.408	1.85e+006	1.000	25.60	0.00	382.07	234.34	0.00	0.00	234.34	0.00
2683	2683:Arm3		70.50	67.75	69.13	25.413	1.93e+006	1.000	25.60	0.00	243.23	149.10	0.00	0.00	149.10	0.00
2683		2683:WVGD7	67.75	65.00	66.38	26.176	1.98e+006	1.000	25.60	0.00	250.62	153.58	0.00	0.00	153.58	0.00
2683	2683:WVGD7		65.00	62.25	63.63	26.938	2.04e+006	1.000	25.60	0.00	258.01	158.05	0.00	0.00	158.05	0.00
2683		2683:Arm4	62.25	59.50	60.88	27.701	2.1e+006	1.000	25.60	0.00	265.40	162.52	0.00	0.00	162.52	0.00
2683	2683:Arm4		59.50	55.17	57.33	28.683	2.17e+006	1.000	25.60	0.00	433.19	265.18	0.00	0.00	265.18	0.00
2683		2683:WVGD6	55.17	55.00	55.08	28.994	2.2e+006	1.000	25.60	0.00	36.98	10.31	0.00	0.00	10.31	0.00
2683	2683:WVGD6		55.00	51.00	53.00	29.259	2.22e+006	1.000	25.60	0.00	905.35	249.70	0.00	0.00	249.70	0.00
2683		2683:BotConn	51.00	50.00	50.50	29.952	2.27e+006	1.000	25.60	0.00	125.15	63.90	0.00	0.00	63.90	0.00
2683	2683:BotConn	2683:WVGD5	50.00	45.00	47.50	30.784	2.33e+006	1.000	25.60	0.00	642.92	328.39	0.00	0.00	328.39	0.00
2683	2683:WVGD5		45.00	40.00	42.50	32.171	2.44e+006	1.000	25.60	0.00	672.23	343.18	0.00	0.00	343.18	0.00
2683		2683:WVGD4	40.00	35.00	37.50	33.557	2.54e+006	1.000	25.60	0.00	701.54	357.97	0.00	0.00	357.97	0.00
2683	2683:WVGD4		35.00	30.00	32.50	34.943	2.65e+006	1.000	25.60	0.00	730.85	372.76	0.00	0.00	372.76	0.00
2683		2683:WVGD3	30.00	25.00	27.50	36.330	2.75e+006	1.000	25.60	0.00	760.16	387.55	0.00	0.00	387.55	0.00
2683	2683:WVGD3		25.00	20.25	22.63	37.682	2.85e+006	1.000	25.60	0.00	749.30	381.87	0.00	0.00	381.87	0.00
2683			20.25	17.63	18.94	38.329	2.9e+006	1.000	25.60	0.00	842.55	214.66	0.00	0.00	214.66	0.00
2683		2683:WVGD2	17.63	15.00	16.31	38.682	2.93e+006	1.000	25.60	0.00	858.71	216.64	0.00	0.00	216.64	0.00
2683	2683:WVGD2		15.00	10.00	12.50	39.739	3.01e+006	1.000	25.60	0.00	832.34	423.92	0.00	0.00	423.92	0.00
2683		2683:WVGD1	10.00	5.00	7.50	41.125	3.12e+006	1.000	25.60	0.00	861.55	438.71	0.00	0.00	438.71	0.00
2683	2683:WVGD1	2683:g	5.00	0.00	2.50	42.512	3.22e+006	1.000	25.60	0.00	890.86	453.50	0.00	0.00	453.50	0.00

*** Analysis Results:

Maximum element usage is 68.81% for Steel Pole "2683" in load case "NESC Heavy"
Maximum insulator usage is 12.42% for Clamp "Clamp21" in load case "NESC Extreme"



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

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

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
2683:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
2683:t	0.004583	2.972	-0.06623	-3.2789	0.0045	0.0001	0.004583	2.972	89.93
2683:Arm1	0.004498	2.91	-0.06447	-3.2789	0.0045	0.0001	0.004498	2.91	88.86
2683:WVGD9	0.004192	2.686	-0.05806	-3.2629	0.0045	0.0001	0.004192	2.686	84.94
2683:Arm2	0.004074	2.601	-0.05562	-3.2530	0.0045	0.0001	0.004074	2.601	83.44
2683:TopConn	0.003801	2.403	-0.05001	-3.2103	0.0045	0.0001	0.003801	2.403	79.95
2683:WVGD8	0.003415	2.127	-0.04225	-3.1142	0.0044	0.0001	0.003415	2.127	74.96

2683:Arm3	0.003074	1.886	-0.03572	-2.9985	0.0043	0.0001	0.003074	1.886	70.46
2683:WVGD7	0.002669	1.607	-0.02846	-2.8132	0.0041	0.0001	0.002669	1.607	64.97
2683:Arm4	0.002281	1.346	-0.02215	-2.5982	0.0039	0.0000	0.002281	1.346	59.48
2683:WVGD6	0.00198	1.15	-0.01771	-2.4006	0.0037	0.0000	0.00198	1.15	54.98
2683:BotConn	0.001664	0.949	-0.01354	-2.1893	0.0035	0.0000	0.001664	0.949	49.99
2683:WVGD5	0.00137	0.767	-0.01009	-1.9694	0.0032	0.0000	0.00137	0.767	44.99
2683:WVGD4	0.0008551	0.4615	-0.005115	-1.5211	0.0026	0.0000	0.0008551	0.4615	34.99
2683:WVGD3	0.0004497	0.2341	-0.002221	-1.0773	0.0020	0.0000	0.0004497	0.2341	25
2683:WVGD2	0.0001665	0.08346	-0.0007688	-0.6384	0.0012	0.0000	0.0001665	0.08346	15
2683:WVGD1	1.945e-005	0.009323	-0.0001657	-0.2066	0.0004	0.0000	1.945e-005	0.009323	5
Davit1:O	0.004503	2.911	-0.01698	-3.2789	0.0045	0.0001	0.004503	2.081	88.9
Davit1:End	0.004649	3.004	0.2379	-3.2789	0.0045	0.0001	0.004649	-2.326	90.66
Davit2:O	0.004494	2.908	-0.1119	-3.2789	0.0045	0.0001	0.004494	3.739	88.81
Davit2:End	0.004584	2.988	-0.3768	-3.3706	0.0045	0.0001	0.004584	8.318	90.04
Davit3:O	0.004079	2.602	-0.004961	-3.2530	0.0045	0.0001	0.004079	1.709	83.5
Davit3:End	0.004288	2.729	0.4814	-3.2260	0.0045	0.0001	0.004288	-6.834	85.98
Davit4:O	0.004069	2.599	-0.1063	-3.2530	0.0045	0.0001	0.004069	3.492	83.39
Davit4:End	0.004175	2.7	-0.6076	-3.3212	0.0045	0.0001	0.004175	12.26	84.89
Davit5:O	0.003079	1.888	0.01884	-2.9985	0.0043	0.0001	0.003079	0.8446	70.52
Davit5:End	0.003367	2.059	0.6196	-2.9508	0.0043	0.0001	0.003367	-10.65	74.12
Davit6:O	0.003069	1.885	-0.09028	-2.9985	0.0043	0.0001	0.003069	2.928	70.41
Davit6:End	0.003236	2.029	-0.7202	-3.1305	0.0043	0.0001	0.003236	14.74	72.78
Davit7:O	0.002285	1.348	0.03089	-2.5982	0.0039	0.0000	0.002285	0.1776	59.53
Davit7:End	0.002457	1.447	0.4193	-2.5701	0.0039	0.0001	0.002457	-8.393	61.92
Davit8:O	0.002276	1.345	-0.07519	-2.5982	0.0039	0.0000	0.002276	2.515	59.42
Davit8:End	0.00238	1.428	-0.4765	-2.6673	0.0039	0.0000	0.00238	11.27	61.02

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 %
2683:g	-0.09	0.0	-24.35	0.0	48.48	0.0	0.0	54.25	0.0	1846.38	0.0	-3.9	0.0	-0.01	0.0	0.0

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
2683	2683:t	Origin	0.00	35.66	0.05	-0.79	-0.00	-0.00	0.0	-0.06	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
2683	2683:Arm1	End	1.08	34.92	0.05	-0.77	0.02	-0.00	0.0	-0.06	0.02	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	2
2683	2683:Arm1	Origin	1.08	34.92	0.05	-0.77	6.93	-0.00	0.0	-2.01	4.69	-0.00	-0.10	0.80	0.18	0.00	0.96	1.5	2
2683	2683:WVGD9	End	5.00	32.23	0.05	-0.70	25.33	-0.01	0.0	-2.01	4.69	-0.00	-0.09	2.63	0.17	0.00	2.74	4.2	2
2683	2683:WVGD9	Origin	5.00	32.23	0.05	-0.70	25.33	-0.01	0.0	-2.76	4.85	-0.00	-0.13	2.63	0.18	0.00	2.78	4.3	2
2683	2683:Arm2	End	6.50	31.21	0.05	-0.67	32.61	-0.02	0.0	-2.76	4.85	-0.00	-0.13	3.25	0.18	0.00	3.39	5.2	2
2683	2683:Arm2	Origin	6.50	31.21	0.05	-0.67	42.20	-0.02	0.0	-6.30	9.73	-0.01	-0.29	4.21	0.35	0.00	4.54	7.0	2
2683	2683:TopConn	End	10.00	28.84	0.05	-0.60	76.26	-0.05	0.0	-6.30	9.73	-0.01	-0.28	6.95	0.34	0.00	7.25	11.2	2
2683	2683:TopConn	Origin	10.00	28.84	0.05	-0.60	76.26	-0.05	0.0	-15.15	13.34	-0.01	-0.66	6.95	0.46	0.00	7.66	11.8	2
2683	2683:WVGD8	End	15.00	25.52	0.04	-0.51	142.94	-0.11	0.0	-15.15	13.34	-0.01	-0.62	11.53	0.44	0.00	12.18	18.7	2
2683	2683:WVGD8	Origin	15.00	25.52	0.04	-0.51	142.94	-0.11	0.0	-16.26	13.54	-0.01	-0.67	11.53	0.44	0.00	12.22	18.8	2
2683	2683:Arm3	End	19.50	22.63	0.04	-0.43	203.88	-0.17	0.0	-16.26	13.54	-0.01	-0.64	14.82	0.42	0.00	15.47	23.8	2
2683	2683:Arm3	Origin	19.50	22.63	0.04	-0.43	218.28	-0.18	0.0	-20.39	18.45	-0.02	-0.80	15.86	0.57	0.00	16.69	25.7	2
2683	Tube 1	End	22.25	20.93	0.03	-0.38	269.01	-0.23	0.0	-20.39	18.45	-0.02	-0.77	18.39	0.55	0.00	19.19	29.5	2
2683	Tube 1	Origin	22.25	20.93	0.03	-0.38	269.01	-0.23	0.0	-20.83	18.52	-0.02	-0.79	18.39	0.56	0.00	19.21	29.5	2
2683	2683:WVGD7	End	25.00	19.28	0.03	-0.34	319.93	-0.29	0.0	-20.83	18.52	-0.02	-0.77	20.61	0.54	0.00	21.40	32.9	2
2683	2683:WVGD7	Origin	25.00	19.28	0.03	-0.34	319.93	-0.29	0.0	-21.72	18.65	-0.02	-0.80	20.61	0.54	0.00	21.43	33.0	2
2683	Tube 1	End	27.75	17.69	0.03	-0.30	371.22	-0.36	0.0	-21.72	18.65	-0.02	-0.78	22.58	0.53	0.00	23.37	36.0	2
2683	Tube 1	Origin	27.75	17.69	0.03	-0.30	371.22	-0.36	0.0	-22.20	18.72	-0.03	-0.79	22.58	0.53	0.00	23.39	36.0	2
2683	2683:Arm4	End	30.50	16.16	0.03	-0.27	422.69	-0.43	0.0	-22.20	18.72	-0.03	-0.77	24.31	0.52	0.00	25.10	39.1	2
2683	2683:Arm4	Origin	30.50	16.16	0.03	-0.27	432.22	-0.43	0.0	-26.11	23.56	-0.03	-0.91	24.86	0.65	0.00	25.79	40.2	2
2683	SpliceT	End	34.83	13.88	0.02	-0.21	534.31	-0.57	0.0	-26.11	23.56	-0.03	-0.87	28.22	0.62	0.00	29.11	46.3	2
2683	SpliceT	Origin	34.83	13.88	0.02	-0.21	534.31	-0.57	0.0	-26.55	23.60	-0.03	-0.88	28.22	0.62	0.00	29.13	46.3	2
2683	2683:WVGD6	End	35.00	13.80	0.02	-0.21	538.24	-0.57	0.0	-26.55	23.60	-0.03	-0.75	24.83	0.53	0.00	25.61	39.4	2
2683	2683:WVGD6	Origin	35.00	13.80	0.02	-0.21	538.24	-0.57	0.0	-27.76	23.73	-0.03	-0.79	24.83	0.54	0.00	25.64	39.4	2
2683	SpliceB	End	39.00	11.85	0.02	-0.17	633.14	-0.71	0.0	-27.76	23.73	-0.03	-0.76	27.04	0.51	0.00	27.81	42.8	2
2683	SpliceB	Origin	39.00	11.85	0.02	-0.17	633.14	-0.71	0.0	-28.62	23.79	-0.04	-0.78	27.04	0.52	0.00	27.84	42.8	2

2683	2683:BotConn	End	40.00	11.39	0.02	-0.16	656.93	-0.75	0.0	-28.62	23.79	-0.04	-0.78	27.53	0.51	0.00	28.32	43.6	2
2683	2683:BotConn	Origin	40.00	11.39	0.02	-0.16	656.93	-0.75	0.0	-31.14	23.20	-0.04	-0.84	27.53	0.50	0.00	28.39	43.7	2
2683	2683:WVGD5	End	45.00	9.20	0.02	-0.12	772.95	-0.95	0.0	-31.14	23.20	-0.04	-0.81	29.56	0.48	0.00	30.37	46.7	2
2683	2683:WVGD5	Origin	45.00	9.20	0.02	-0.12	772.95	-0.95	0.0	-32.92	23.38	-0.04	-0.85	29.56	0.48	0.00	30.42	46.8	2
2683	Tube 2	End	50.00	7.25	0.01	-0.09	889.85	-1.17	0.0	-32.92	23.38	-0.04	-0.82	31.17	0.46	0.00	32.00	49.2	2
2683	Tube 2	Origin	50.00	7.25	0.01	-0.09	889.85	-1.17	0.0	-34.15	23.47	-0.05	-0.85	31.17	0.46	0.00	32.03	49.3	2
2683	2683:WVGD4	End	55.00	5.54	0.01	-0.06	1007.19	-1.42	0.0	-34.15	23.47	-0.05	-0.81	32.44	0.44	0.00	33.26	52.2	2
2683	2683:WVGD4	Origin	55.00	5.54	0.01	-0.06	1007.19	-1.42	0.0	-36.03	23.64	-0.05	-0.86	32.44	0.44	0.00	33.30	52.3	2
2683	Tube 2	End	60.00	4.06	0.01	-0.04	1125.37	-1.68	0.0	-36.03	23.64	-0.05	-0.82	33.44	0.43	0.00	34.27	54.9	2
2683	Tube 2	Origin	60.00	4.06	0.01	-0.04	1125.37	-1.68	0.0	-37.35	23.72	-0.06	-0.85	33.44	0.43	0.00	34.30	54.9	2
2683	2683:WVGD3	End	65.00	2.81	0.01	-0.03	1243.98	-1.98	0.0	-37.35	23.72	-0.06	-0.82	34.21	0.41	0.00	35.03	57.3	2
2683	2683:WVGD3	Origin	65.00	2.81	0.01	-0.03	1243.98	-1.98	0.0	-39.29	23.88	-0.06	-0.86	34.21	0.42	0.00	35.08	57.4	2
2683	SpliceT	End	69.75	1.84	0.00	-0.02	1357.41	-2.28	0.0	-39.29	23.88	-0.06	-0.83	34.77	0.40	0.00	35.61	59.5	2
2683	SpliceT	Origin	69.75	1.84	0.00	-0.02	1357.41	-2.28	0.0	-40.64	23.94	-0.07	-0.86	34.77	0.40	0.00	35.64	59.5	2
2683	Tube 2	End	72.38	1.39	0.00	-0.01	1420.26	-2.46	0.0	-40.64	23.94	-0.07	-0.86	36.42	0.40	0.00	37.29	62.2	2
2683	Tube 2	Origin	72.38	1.39	0.00	-0.01	1420.26	-2.46	0.0	-42.03	23.99	-0.07	-0.89	36.42	0.40	0.00	37.32	62.3	2
2683	2683:WVGD2	End	75.00	1.00	0.00	-0.01	1483.24	-2.65	0.0	-42.03	23.99	-0.07	-0.87	36.62	0.39	0.00	37.50	63.3	2
2683	2683:WVGD2	Origin	75.00	1.00	0.00	-0.01	1483.24	-2.65	0.0	-44.06	24.12	-0.07	-0.92	36.62	0.40	0.00	37.54	63.4	2
2683	Tube 3	End	80.00	0.44	0.00	-0.00	1603.84	-3.02	0.0	-44.06	24.12	-0.07	-0.89	36.89	0.38	0.00	37.78	65.2	2
2683	Tube 3	Origin	80.00	0.44	0.00	-0.00	1603.84	-3.02	0.0	-45.56	24.19	-0.08	-0.92	36.89	0.38	0.00	37.81	65.3	2
2683	2683:WVGD1	End	85.00	0.11	0.00	-0.00	1724.77	-3.42	0.0	-45.56	24.19	-0.08	-0.88	37.05	0.37	0.00	37.94	67.0	2
2683	2683:WVGD1	Origin	85.00	0.11	0.00	-0.00	1724.77	-3.42	0.0	-47.70	24.32	-0.09	-0.93	37.05	0.37	0.00	37.98	67.1	2
2683	2683:g	End	90.00	0.00	0.00	0.00	1846.38	-3.85	0.0	-47.70	24.32	-0.09	-0.90	37.13	0.36	0.00	38.03	68.8	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	34.93	0.05	-0.20	0.00	0.00	0.0	-2.42	-0.00	-0.00	-0.39	0.00	0.00	0.00	0.39	0.6	1
Davit1	Davit1:End	End	4.74	36.05	0.06	2.86	-0.00	0.00	0.0	-2.42	-0.00	-0.00	-0.71	0.00	0.00	0.00	0.71	1.1	1
Davit2	Davit2:O	Origin	0.00	34.90	0.05	-1.34	-6.90	-0.00	0.0	1.94	1.45	0.00	0.31	5.12	0.47	0.00	5.49	8.4	1
Davit2	Davit2:End	End	4.74	35.86	0.06	-4.52	0.00	0.00	0.0	1.94	1.45	0.00	0.57	0.00	0.85	0.00	1.58	2.4	1
Davit3	Davit3:O	Origin	0.00	31.23	0.05	-0.06	-6.89	0.00	0.0	-2.66	0.89	-0.00	-0.19	1.28	0.12	0.00	1.48	2.3	1
Davit3	#Davit3:0	End	4.45	31.99	0.05	2.87	-2.95	0.00	0.0	-2.66	0.89	-0.00	-0.25	1.01	0.17	0.00	1.29	2.0	1
Davit3	#Davit3:0	Origin	4.45	31.99	0.05	2.87	-2.95	0.00	0.0	-2.59	0.66	-0.00	-0.24	1.01	0.12	0.00	1.27	2.0	1
Davit3	Davit3:End	End	8.90	32.75	0.05	5.78	-0.00	0.00	0.0	-2.59	0.66	-0.00	-0.38	0.00	0.19	0.00	0.50	0.8	1
Davit4	Davit4:O	Origin	0.00	31.19	0.05	-1.28	-16.47	-0.00	-0.0	2.00	1.97	0.00	0.14	3.06	0.28	0.00	3.24	5.0	1
Davit4	#Davit4:0	End	4.45	31.79	0.05	-4.27	-7.70	-0.00	-0.0	2.00	1.97	0.00	0.19	2.63	0.37	0.00	2.89	4.4	1
Davit4	#Davit4:0	Origin	4.45	31.79	0.05	-4.27	-7.70	-0.00	0.0	2.04	1.73	0.00	0.19	2.63	0.33	0.00	2.88	4.4	1
Davit4	Davit4:End	End	8.90	32.40	0.05	-7.29	0.00	0.00	0.0	2.04	1.73	0.00	0.30	0.00	0.50	0.00	0.92	1.4	1
Davit5	Davit5:O	Origin	0.00	22.65	0.04	0.23	-9.50	0.01	0.0	-2.72	0.97	-0.00	-0.19	1.77	0.14	0.00	1.97	3.0	1
Davit5	#Davit5:0	End	5.00	23.51	0.04	3.23	-4.65	0.00	0.0	-2.72	0.97	-0.00	-0.24	1.41	0.17	0.00	1.68	2.6	1
Davit5	#Davit5:0	Origin	5.00	23.51	0.04	3.23	-4.65	0.00	0.0	-2.65	0.73	-0.00	-0.24	1.41	0.13	0.00	1.66	2.6	1
Davit5	#Davit5:1	End	8.52	24.11	0.04	5.34	-2.06	0.00	0.0	-2.65	0.73	-0.00	-0.29	0.97	0.16	0.00	1.29	2.0	1
Davit5	#Davit5:1	Origin	8.52	24.11	0.04	5.34	-2.06	0.00	0.0	-2.60	0.58	-0.00	-0.29	0.97	0.13	0.00	1.27	2.0	1
Davit5	Davit5:End	End	12.05	24.71	0.04	7.43	-0.00	0.00	0.0	-2.60	0.58	-0.00	-0.38	0.00	0.17	0.00	0.48	0.7	1
Davit6	Davit6:O	Origin	0.00	22.62	0.04	-1.08	-23.88	-0.01	-0.0	1.91	2.18	0.00	0.13	4.44	0.30	0.00	4.60	7.1	1
Davit6	#Davit6:0	End	5.00	23.33	0.04	-4.18	-12.99	-0.00	-0.0	1.91	2.18	0.00	0.17	3.94	0.39	0.00	4.17	6.4	1
Davit6	#Davit6:0	Origin	5.00	23.33	0.04	-4.18	-12.99	-0.00	-0.0	1.97	1.92	0.00	0.17	3.94	0.34	0.00	4.16	6.4	1
Davit6	#Davit6:1	End	8.52	23.83	0.04	-6.40	-6.21	-0.00	-0.0	1.97	1.92	0.00	0.22	2.91	0.42	0.00	3.22	4.9	1
Davit6	#Davit6:1	Origin	8.52	23.83	0.04	-6.40	-6.21	-0.00	0.0	2.00	1.76	0.00	0.22	2.91	0.39	0.00	3.21	4.9	1
Davit6	Davit6:End	End	12.05	24.35	0.04	-8.64	0.00	0.00	0.0	2.00	1.76	0.00	0.29	0.00	0.51	0.00	0.93	1.4	1
Davit7	Davit7:O	Origin	0.00	16.17	0.03	0.37	-7.16	0.00	0.0	-2.65	0.92	-0.00	-0.18	1.33	0.13	0.00	1.53	2.4	1
Davit7	#Davit7:0	End	4.45	16.77	0.03	2.71	-3.08	0.00	0.0	-2.65	0.92	-0.00	-0.25	1.05	0.17	0.00	1.34	2.1	1
Davit7	#Davit7:0	Origin	4.45	16.77	0.03	2.71	-3.08	0.00	0.0	-2.59	0.69	-0.00	-0.24	1.05	0.13	0.00	1.31	2.0	1
Davit7	Davit7:End	End	8.90	17.36	0.03	5.03	-0.00	0.00	0.0	-2.59	0.69	-0.00	-0.38	0.00	0.20	0.00	0.51	0.8	1
Davit8	Davit8:O	Origin	0.00	16.14	0.03	-0.90	-16.68	-0.00	-0.0	1.98	1.99	0.00	0.14	3.10	0.28	0.00	3.28	5.0	1
Davit8	#Davit8:0	End	4.45	16.64	0.03	-3.29	-7.81	-0.00	-0.0	1.98	1.99	0.00	0.19	2.66	0.38	0.00	2.93	4.5	1
Davit8	#Davit8:0	Origin	4.45	16.64	0.03	-3.29	-7.81	-0.00	0.0	2.02	1.75	0.00	0.19	2.66	0.33	0.00	2.91	4.5	1

Davit8	Davit8:End	End	8.90	17.14	0.03	-5.72	0.00	0.00	0.0	2.02	1.75	0.00	0.29	0.00	0.51	0.00	0.93	1.4	1

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	2.402	80.00	80.00	3.00
Clamp2	2.402	80.00	80.00	3.00
Clamp3	2.628	80.00	80.00	3.29
Clamp4	2.628	80.00	80.00	3.29
Clamp5	2.628	80.00	80.00	3.29
Clamp6	2.628	80.00	80.00	3.29
Clamp7	2.628	80.00	80.00	3.29
Clamp8	2.628	80.00	80.00	3.29
Clamp9	0.606	80.00	80.00	0.76
Clamp10	0.606	80.00	80.00	0.76
Clamp11	0.606	80.00	80.00	0.76
Clamp12	0.606	80.00	80.00	0.76
Clamp13	0.606	80.00	80.00	0.76
Clamp14	0.433	80.00	80.00	0.54
Clamp15	0.433	80.00	80.00	0.54
Clamp16	0.433	80.00	80.00	0.54
Clamp17	0.433	80.00	80.00	0.54
Clamp21	8.973	80.00	80.00	11.22
Clamp23	1.947	80.00	80.00	2.43

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

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

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
2683:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
2683:t	0.001395	2.833	-0.05902	-3.0800	0.0014	0.0000	0.001395	2.833	89.94
2683:Arm1	0.001369	2.775	-0.05746	-3.0800	0.0014	0.0000	0.001369	2.775	88.86
2683:WVGD9	0.001276	2.565	-0.0518	-3.0718	0.0014	0.0000	0.001276	2.565	84.95
2683:Arm2	0.00124	2.485	-0.04965	-3.0666	0.0014	0.0000	0.00124	2.485	83.45
2683:TopConn	0.001157	2.298	-0.04465	-3.0425	0.0014	0.0000	0.001157	2.298	79.96
2683:WVGD8	0.00104	2.035	-0.03768	-2.9707	0.0013	0.0000	0.00104	2.035	74.96
2683:Arm3	0.0009359	1.805	-0.03177	-2.8671	0.0013	0.0000	0.0009359	1.805	70.47
2683:WVGD7	0.0008125	1.538	-0.0252	-2.6938	0.0013	0.0000	0.0008125	1.538	64.97
2683:Arm4	0.0006945	1.289	-0.01948	-2.4870	0.0012	0.0000	0.0006945	1.289	59.48
2683:WVGD6	0.0006027	1.1	-0.01548	-2.2966	0.0011	0.0000	0.0006027	1.1	54.98
2683:BotConn	0.0005067	0.9083	-0.01173	-2.0927	0.0011	0.0000	0.0005067	0.9083	49.99
2683:WVGD5	0.0004171	0.7344	-0.008643	-1.8814	0.0010	0.0000	0.0004171	0.7344	44.99
2683:WVGD4	0.0002603	0.4425	-0.004232	-1.4540	0.0008	0.0000	0.0002603	0.4425	35
2683:WVGD3	0.0001369	0.2249	-0.001712	-1.0320	0.0006	0.0000	0.0001369	0.2249	25
2683:WVGD2	5.068e-005	0.08041	-0.0005078	-0.6136	0.0004	0.0000	5.068e-005	0.08041	15
2683:WVGD1	5.924e-006	0.009018	-8.522e-005	-0.1994	0.0001	0.0000	5.924e-006	0.009018	5
Davit1:O	0.001371	2.777	-0.01285	-3.0800	0.0014	0.0000	0.001371	1.946	88.91
Davit1:End	0.001415	2.864	0.2274	-3.0921	0.0014	0.0000	0.001415	-2.466	90.65
Davit2:O	0.001368	2.774	-0.1021	-3.0800	0.0014	0.0000	0.001368	3.604	88.82
Davit2:End	0.001396	2.849	-0.3479	-3.1141	0.0014	0.0000	0.001396	8.179	90.07
Davit3:O	0.001242	2.486	-0.001883	-3.0666	0.0014	0.0000	0.001242	1.593	83.5
Davit3:End	0.001305	2.605	0.4589	-3.0657	0.0014	0.0000	0.001305	-6.957	85.96
Davit4:O	0.001239	2.483	-0.09741	-3.0666	0.0014	0.0000	0.001239	3.376	83.4
Davit4:End	0.001272	2.578	-0.5666	-3.0940	0.0014	0.0000	0.001272	12.14	84.93
Davit5:O	0.0009375	1.807	0.0204	-2.8671	0.0013	0.0000	0.0009375	0.7636	70.52
Davit5:End	0.001025	1.971	0.6002	-2.8669	0.0013	0.0000	0.001025	-10.74	74.1
Davit6:O	0.0009343	1.804	-0.08394	-2.8671	0.0013	0.0000	0.0009343	2.847	70.42
Davit6:End	0.0009858	1.941	-0.6779	-2.9217	0.0013	0.0000	0.0009858	14.65	72.82
Davit7:O	0.0006958	1.29	0.03129	-2.4870	0.0012	0.0000	0.0006958	0.1196	59.53
Davit7:End	0.0007482	1.385	0.4054	-2.4854	0.0012	0.0000	0.0007482	-8.455	61.91
Davit8:O	0.0006931	1.287	-0.07025	-2.4870	0.0012	0.0000	0.0006931	2.458	59.43
Davit8:End	0.0007249	1.367	-0.4509	-2.5150	0.0012	0.0000	0.0007249	11.21	61.05

Joint Support Reactions for Load Case "NESC Extreme":

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 %
2683:g	-0.03	0.0	-25.20	0.0	23.90	0.0	0.0	34.73	0.0	1785.77	0.0	-1.2	0.0	-0.00	0.0	0.0

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
2683	2683:t	Origin	0.00	34.00	0.02	-0.71	-0.00	0.00	0.0	-0.04	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
2683	2683:Arm1	End	1.08	33.31	0.02	-0.69	0.03	-0.00	0.0	-0.04	0.02	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	2
2683	2683:Arm1	Origin	1.08	33.31	0.02	-0.69	3.52	-0.00	0.0	-0.66	2.43	-0.00	-0.03	0.41	0.10	0.00	0.47	0.7	2
2683	2683:WVGD9	End	5.00	30.78	0.02	-0.62	13.06	-0.00	0.0	-0.66	2.43	-0.00	-0.03	1.36	0.09	0.00	1.40	2.1	2
2683	2683:WVGD9	Origin	5.00	30.78	0.02	-0.62	13.06	-0.00	0.0	-0.94	2.68	-0.00	-0.04	1.36	0.10	0.00	1.41	2.2	2
2683	2683:Arm2	End	6.50	29.82	0.01	-0.60	17.08	-0.01	0.0	-0.94	2.68	-0.00	-0.04	1.70	0.10	0.00	1.76	2.7	2
2683	2683:Arm2	Origin	6.50	29.82	0.01	-0.60	23.29	-0.01	0.0	-2.33	5.85	-0.00	-0.11	2.32	0.21	0.00	2.46	3.8	2
2683	2683:TopConn	End	10.00	27.58	0.01	-0.54	43.75	-0.01	0.0	-2.33	5.85	-0.00	-0.10	3.99	0.20	0.00	4.11	6.3	2
2683	2683:TopConn	Origin	10.00	27.58	0.01	-0.54	43.75	-0.01	0.0	-6.45	15.26	-0.00	-0.28	3.99	0.53	0.00	4.37	6.7	2
2683	2683:WVGD8	End	15.00	24.42	0.01	-0.45	120.05	-0.03	0.0	-6.45	15.26	-0.00	-0.27	9.68	0.50	0.00	9.98	15.4	2
2683	2683:WVGD8	Origin	15.00	24.42	0.01	-0.45	120.05	-0.03	0.0	-6.96	15.62	-0.00	-0.29	9.68	0.51	0.00	10.01	15.4	2

2683	2683:Arm3	End	19.50	21.66	0.01	-0.38	190.35	-0.05	0.0	-6.96	15.62	-0.00	-0.27	13.83	0.48	0.00	14.13	21.7	2
2683	2683:Arm3	Origin	19.50	21.66	0.01	-0.38	199.78	-0.05	0.0	-8.73	18.87	-0.01	-0.34	14.52	0.59	0.00	14.89	22.9	2
2683	Tube 1	End	22.25	20.03	0.01	-0.34	251.68	-0.07	0.0	-8.73	18.87	-0.01	-0.33	17.20	0.57	0.00	17.56	27.0	2
2683	Tube 1	Origin	22.25	20.03	0.01	-0.34	251.68	-0.07	0.0	-9.01	19.02	-0.01	-0.34	17.20	0.57	0.00	17.57	27.0	2
2683	2683:WVGD7	End	25.00	18.45	0.01	-0.30	304.00	-0.09	0.0	-9.01	19.02	-0.01	-0.33	19.58	0.55	0.00	19.94	30.7	2
2683	2683:WVGD7	Origin	25.00	18.45	0.01	-0.30	304.00	-0.09	0.0	-9.39	19.29	-0.01	-0.35	19.58	0.56	0.00	19.95	30.7	2
2683	Tube 1	End	27.75	16.93	0.01	-0.27	357.04	-0.11	0.0	-9.39	19.29	-0.01	-0.34	21.71	0.55	0.00	22.07	33.9	2
2683	Tube 1	Origin	27.75	16.93	0.01	-0.27	357.04	-0.11	0.0	-9.68	19.44	-0.01	-0.35	21.71	0.55	0.00	22.08	34.0	2
2683	2683:Arm4	End	30.50	15.46	0.01	-0.23	410.51	-0.13	0.0	-9.68	19.44	-0.01	-0.34	23.60	0.54	0.00	23.96	37.3	2
2683	2683:Arm4	Origin	30.50	15.46	0.01	-0.23	416.71	-0.13	0.0	-11.32	22.68	-0.01	-0.39	23.96	0.62	0.00	24.38	37.9	2
2683	SpliceT	End	34.83	13.28	0.01	-0.19	514.97	-0.17	0.0	-11.32	22.68	-0.01	-0.38	27.19	0.60	0.00	27.59	43.9	2
2683	SpliceT	Origin	34.83	13.28	0.01	-0.19	514.97	-0.17	0.0	-11.59	22.80	-0.01	-0.39	27.19	0.60	0.00	27.60	43.9	2
2683	2683:WVGD6	End	35.00	13.20	0.01	-0.19	518.77	-0.17	0.0	-11.59	22.80	-0.01	-0.33	23.93	0.51	0.00	24.28	37.3	2
2683	2683:WVGD6	Origin	35.00	13.20	0.01	-0.19	518.77	-0.17	0.0	-12.19	23.05	-0.01	-0.35	23.93	0.52	0.00	24.29	37.4	2
2683	SpliceB	End	39.00	11.34	0.01	-0.15	610.96	-0.22	0.0	-12.19	23.05	-0.01	-0.33	26.09	0.50	0.00	26.43	40.7	2
2683	SpliceB	Origin	39.00	11.34	0.01	-0.15	610.96	-0.22	0.0	-12.75	23.20	-0.01	-0.35	26.09	0.50	0.00	26.45	40.7	2
2683	2683:BotConn	End	40.00	10.90	0.01	-0.14	634.16	-0.23	0.0	-12.75	23.20	-0.01	-0.35	26.57	0.50	0.00	26.93	41.4	2
2683	2683:BotConn	Origin	40.00	10.90	0.01	-0.14	634.16	-0.23	0.0	-14.20	21.15	-0.01	-0.38	26.57	0.45	0.00	26.97	41.5	2
2683	2683:WVGD5	End	45.00	8.81	0.01	-0.10	739.89	-0.29	0.0	-14.20	21.15	-0.01	-0.37	28.28	0.43	0.00	28.66	44.1	2
2683	2683:WVGD5	Origin	45.00	8.81	0.01	-0.10	739.89	-0.29	0.0	-15.07	21.61	-0.01	-0.39	28.28	0.44	0.00	28.68	44.1	2
2683	Tube 2	End	50.00	6.95	0.00	-0.07	847.96	-0.36	0.0	-15.07	21.61	-0.01	-0.37	29.69	0.42	0.00	30.07	46.3	2
2683	Tube 2	Origin	50.00	6.95	0.00	-0.07	847.96	-0.36	0.0	-15.84	21.93	-0.01	-0.39	29.69	0.43	0.00	30.09	46.3	2
2683	2683:WVGD4	End	55.00	5.31	0.00	-0.05	957.59	-0.43	0.0	-15.84	21.93	-0.01	-0.38	30.83	0.41	0.00	31.21	49.0	2
2683	2683:WVGD4	Origin	55.00	5.31	0.00	-0.05	957.59	-0.43	0.0	-16.77	22.41	-0.02	-0.40	30.83	0.42	0.00	31.24	49.0	2
2683	Tube 2	End	60.00	3.89	0.00	-0.03	1069.66	-0.51	0.0	-16.77	22.41	-0.02	-0.38	31.77	0.41	0.00	32.16	51.5	2
2683	Tube 2	Origin	60.00	3.89	0.00	-0.03	1069.66	-0.51	0.0	-17.60	22.75	-0.02	-0.40	31.77	0.41	0.00	32.18	51.6	2
2683	2683:WVGD3	End	65.00	2.70	0.00	-0.02	1183.39	-0.60	0.0	-17.60	22.75	-0.02	-0.39	32.53	0.40	0.00	32.92	53.9	2
2683	2683:WVGD3	Origin	65.00	2.70	0.00	-0.02	1183.39	-0.60	0.0	-18.57	23.24	-0.02	-0.41	32.53	0.40	0.00	32.94	53.9	2
2683	SpliceT	End	69.75	1.77	0.00	-0.01	1293.80	-0.69	0.0	-18.57	23.24	-0.02	-0.39	33.13	0.39	0.00	33.53	56.0	2
2683	SpliceT	Origin	69.75	1.77	0.00	-0.01	1293.80	-0.69	0.0	-19.43	23.50	-0.02	-0.41	33.13	0.39	0.00	33.54	56.0	2
2683	Tube 2	End	72.38	1.33	0.00	-0.01	1355.49	-0.75	0.0	-19.43	23.50	-0.02	-0.41	34.75	0.39	0.00	35.16	58.7	2
2683	Tube 2	Origin	72.38	1.33	0.00	-0.01	1355.49	-0.75	0.0	-20.33	23.69	-0.02	-0.43	34.75	0.40	0.00	35.18	58.7	2
2683	2683:WVGD2	End	75.00	0.96	0.00	-0.01	1417.68	-0.81	0.0	-20.33	23.69	-0.02	-0.42	34.98	0.39	0.00	35.41	59.8	2
2683	2683:WVGD2	Origin	75.00	0.96	0.00	-0.01	1417.68	-0.81	0.0	-21.37	24.12	-0.02	-0.44	34.98	0.40	0.00	35.43	59.8	2
2683	Tube 3	End	80.00	0.43	0.00	-0.00	1538.30	-0.92	0.0	-21.37	24.12	-0.02	-0.43	35.36	0.38	0.00	35.80	61.8	2
2683	Tube 3	Origin	80.00	0.43	0.00	-0.00	1538.30	-0.92	0.0	-22.31	24.48	-0.02	-0.45	35.36	0.39	0.00	35.82	61.8	2
2683	2683:WVGD1	End	85.00	0.11	0.00	-0.00	1660.71	-1.04	0.0	-22.31	24.48	-0.02	-0.43	35.65	0.38	0.00	36.09	63.7	2
2683	2683:WVGD1	Origin	85.00	0.11	0.00	-0.00	1660.71	-1.04	0.0	-23.41	25.01	-0.03	-0.45	35.65	0.38	0.00	36.12	63.8	2
2683	2683:g	End	90.00	0.00	0.00	0.00	1785.77	-1.17	0.0	-23.41	25.01	-0.03	-0.44	35.89	0.37	0.00	36.33	65.7	2

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

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	33.32	0.02	-0.15	0.91	0.00	0.0	-1.14	-0.19	-0.00	-0.18	0.68	0.06	0.00	0.86	1.3	1
Davit1	Davit1:End	End	4.74	34.37	0.02	2.73	-0.00	0.00	0.0	-1.14	-0.19	-0.00	-0.33	0.00	0.11	0.00	0.39	0.6	1
Davit2	Davit2:O	Origin	0.00	33.29	0.02	-1.22	-2.56	-0.00	0.0	1.02	0.54	0.00	0.16	1.90	0.17	0.00	2.09	3.2	1
Davit2	Davit2:End	End	4.74	34.19	0.02	-4.17	0.00	0.00	0.0	1.02	0.54	0.00	0.30	0.00	0.32	0.00	0.62	1.0	1
Davit3	Davit3:O	Origin	0.00	29.83	0.01	-0.02	-0.63	0.00	0.0	-1.59	0.14	-0.00	-0.11	0.12	0.02	0.00	0.23	0.4	1
Davit3	#Davit3:0	End	4.45	30.55	0.02	2.74	-0.00	0.00	0.0	-1.59	0.14	-0.00	-0.15	0.00	0.03	0.00	0.16	0.2	1
Davit3	#Davit3:0	Origin	4.45	30.55	0.02	2.74	-0.00	0.00	0.0	-1.55	0.00	-0.00	-0.15	0.00	0.00	0.00	0.15	0.2	1
Davit3	Davit3:End	End	8.90	31.26	0.02	5.51	-0.00	0.00	0.0	-1.55	0.00	-0.00	-0.22	0.00	0.00	0.00	0.22	0.3	1
Davit4	Davit4:O	Origin	0.00	29.80	0.01	-1.17	-6.81	-0.00	-0.0	1.36	0.85	0.00	0.09	1.27	0.12	0.00	1.38	2.1	1
Davit4	#Davit4:0	End	4.45	30.37	0.02	-3.98	-3.04	-0.00	-0.0	1.36	0.85	0.00	0.13	1.04	0.16	0.00	1.20	1.8	1
Davit4	#Davit4:0	Origin	4.45	30.37	0.02	-3.98	-3.04	-0.00	0.0	1.39	0.68	0.00	0.13	1.04	0.13	0.00	1.19	1.8	1
Davit4	Davit4:End	End	8.90	30.94	0.02	-6.80	0.00	0.00	0.0	1.39	0.68	0.00	0.20	0.00	0.20	0.00	0.40	0.6	1
Davit5	Davit5:O	Origin	0.00	21.68	0.01	0.24	-0.93	0.00	0.0	-1.62	0.19	-0.00	-0.11	0.17	0.03	0.00	0.29	0.5	1
Davit5	#Davit5:0	End	5.00	22.50	0.01	3.13	0.02	0.00	0.0	-1.62	0.19	-0.00	-0.14	0.01	0.03	0.00	0.16	0.2	1
Davit5	#Davit5:0	Origin	5.00	22.50	0.01	3.13	0.02	0.00	0.0	-1.57	0.04	-0.00	-0.14	0.01	0.01	0.00	0.15	0.2	1
Davit5	#Davit5:1	End	8.52	23.08	0.01	5.17	0.17	0.00	0.0	-1.57	0.04	-0.00	-0.17	0.08	0.01	0.00	0.26	0.4	1
Davit5	#Davit5:1	Origin	8.52	23.08	0.01	5.17	0.17	0.00	0.0	-1.54	-0.05	-0.00	-0.17	0.08	0.01	0.00	0.25	0.4	1
Davit5	Davit5:End	End	12.05	23.66	0.01	7.20	-0.00	0.00	0.0	-1.54	-0.05	-0.00	-0.22	0.00	0.01	0.00	0.23	0.3	1

Davit6	Davit6:O	Origin	0.00	21.65	0.01	-1.01	-10.30	-0.00	-0.0	1.32	0.99	0.00	0.09	1.92	0.14	0.00	2.02	3.1	1
Davit6	#Davit6:0	End	5.00	22.33	0.01	-3.95	-5.36	-0.00	-0.0	1.32	0.99	0.00	0.12	1.63	0.18	0.00	1.77	2.7	1
Davit6	#Davit6:0	Origin	5.00	22.33	0.01	-3.95	-5.36	-0.00	-0.0	1.35	0.82	0.00	0.12	1.63	0.15	0.00	1.76	2.7	1
Davit6	#Davit6:1	End	8.52	22.81	0.01	-6.04	-2.48	-0.00	-0.0	1.35	0.82	0.00	0.15	1.17	0.18	0.00	1.35	2.1	1
Davit6	#Davit6:1	Origin	8.52	22.81	0.01	-6.04	-2.48	-0.00	0.0	1.37	0.70	0.00	0.15	1.17	0.16	0.00	1.34	2.1	1
Davit6	Davit6:End	End	12.05	23.29	0.01	-8.13	0.00	0.00	0.0	1.37	0.70	0.00	0.20	0.00	0.20	0.00	0.41	0.6	1
Davit7	Davit7:O	Origin	0.00	15.48	0.01	0.38	-0.78	0.00	0.0	-1.59	0.16	-0.00	-0.11	0.15	0.02	0.00	0.26	0.4	1
Davit7	#Davit7:0	End	4.45	16.05	0.01	2.62	-0.07	0.00	0.0	-1.59	0.16	-0.00	-0.15	0.03	0.03	0.00	0.18	0.3	1
Davit7	#Davit7:0	Origin	4.45	16.05	0.01	2.62	-0.07	0.00	0.0	-1.55	0.02	-0.00	-0.15	0.03	0.00	0.00	0.17	0.3	1
Davit7	Davit7:End	End	8.90	16.62	0.01	4.87	-0.00	0.00	0.0	-1.55	0.02	-0.00	-0.22	0.00	0.00	0.00	0.23	0.3	1
Davit8	Davit8:O	Origin	0.00	15.45	0.01	-0.84	-6.94	-0.00	-0.0	1.35	0.86	0.00	0.09	1.29	0.12	0.00	1.40	2.2	1
Davit8	#Davit8:0	End	4.45	15.92	0.01	-3.12	-3.11	-0.00	-0.0	1.35	0.86	0.00	0.13	1.06	0.16	0.00	1.22	1.9	1
Davit8	#Davit8:0	Origin	4.45	15.92	0.01	-3.12	-3.11	-0.00	0.0	1.38	0.70	0.00	0.13	1.06	0.13	0.00	1.21	1.9	1
Davit8	Davit8:End	End	8.90	16.40	0.01	-5.41	0.00	0.00	0.0	1.38	0.70	0.00	0.20	0.00	0.20	0.00	0.41	0.6	1

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	1.148	80.00	80.00	1.44
Clamp2	1.148	80.00	80.00	1.44
Clamp3	1.529	80.00	80.00	1.91
Clamp4	1.529	80.00	80.00	1.91
Clamp5	1.529	80.00	80.00	1.91
Clamp6	1.529	80.00	80.00	1.91
Clamp7	1.529	80.00	80.00	1.91
Clamp8	1.529	80.00	80.00	1.91
Clamp9	0.213	80.00	80.00	0.27
Clamp10	0.213	80.00	80.00	0.27
Clamp11	0.213	80.00	80.00	0.27
Clamp12	0.213	80.00	80.00	0.27
Clamp13	0.213	80.00	80.00	0.27
Clamp14	0.146	80.00	80.00	0.18
Clamp15	0.146	80.00	80.00	0.18
Clamp16	0.146	80.00	80.00	0.18
Clamp17	0.146	80.00	80.00	0.18
Clamp21	9.939	80.00	80.00	12.42
Clamp23	2.456	80.00	80.00	3.07

*** 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)
2683	68.81	NESC Heavy	25	13920.9

Base Plate Results by Bend Line:

Pole Label	Load Case	Bend Line #	Start X (ft)	Start Y (ft)	End X (ft)	End Y (ft)	Length (in)	Bending Stress (ksi)	Bolt Mom. Sum (ft-k)	# Bolts Acting	Bolt Max Load (kips)	Min Plate Thickness (in)	Actual Thickness (in)	Usage %
2683	NESC Heavy	1	1.271	1.275	0.390	2.156	14.956	30.475	56.972	2	83.027	2.233	3.000	55.41
2683	NESC Heavy	2	0.390	-2.156	1.271	-1.275	14.956	27.584	51.566	2	-75.640	2.125	3.000	50.15
2683	NESC Heavy	3	-1.273	-1.800	1.273	-1.800	30.544	28.143	107.451	6	-75.640	2.146	3.000	51.17
2683	NESC Heavy	4	-1.271	-1.275	-0.390	-2.156	14.956	27.254	50.951	2	-74.948	2.112	3.000	49.55
2683	NESC Heavy	5	-0.390	2.156	-1.271	1.275	14.956	30.805	57.588	2	83.720	2.245	3.000	56.01
2683	NESC Heavy	6	1.273	1.800	-1.273	1.800	30.544	31.165	118.987	6	83.720	2.258	3.000	56.66
2683	NESC Heavy	7	1.381	1.537	0.097	2.069	16.676	28.936	60.317	3	83.257	2.176	3.000	52.61
2683	NESC Heavy	8	0.097	-2.069	1.381	-1.537	16.676	26.240	54.696	3	-75.640	2.072	3.000	47.71
2683	NESC Heavy	9	-1.381	-1.537	-0.097	-2.069	16.676	25.998	54.191	3	-75.178	2.063	3.000	47.27
2683	NESC Heavy	10	-0.097	2.069	-1.381	1.537	16.676	29.179	60.822	3	83.720	2.185	3.000	53.05
2683	NESC Extreme	1	1.271	1.275	0.390	2.156	14.956	28.820	53.879	2	78.616	2.172	3.000	52.40
2683	NESC Extreme	2	0.390	-2.156	1.271	-1.275	14.956	27.333	51.097	2	-74.843	2.115	3.000	49.70
2683	NESC Extreme	3	-1.273	-1.800	1.273	-1.800	30.544	27.936	106.659	6	-74.843	2.138	3.000	50.79
2683	NESC Extreme	4	-1.271	-1.275	-0.390	-2.156	14.956	27.232	50.910	2	-74.632	2.111	3.000	49.51
2683	NESC Extreme	5	-0.390	2.156	-1.271	1.275	14.956	28.921	54.066	2	78.827	2.175	3.000	52.58
2683	NESC Extreme	6	1.273	1.800	-1.273	1.800	30.544	29.426	112.346	6	78.827	2.194	3.000	53.50
2683	NESC Extreme	7	1.381	1.537	0.097	2.069	16.676	27.370	57.052	3	78.686	2.116	3.000	49.76
2683	NESC Extreme	8	0.097	-2.069	1.381	-1.537	16.676	25.995	54.186	3	-74.843	2.062	3.000	47.26
2683	NESC Extreme	9	-1.381	-1.537	-0.097	-2.069	16.676	25.921	54.032	3	-74.702	2.060	3.000	47.13
2683	NESC Extreme	10	-0.097	2.069	-1.381	1.537	16.676	27.444	57.206	3	78.827	2.119	3.000	49.90

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	1.33	NESC Extreme	1	77.9
Davit2	8.45	NESC Heavy	1	77.9
Davit3	2.28	NESC Heavy	1	321.0
Davit4	4.98	NESC Heavy	1	321.0
Davit5	3.03	NESC Heavy	1	434.7
Davit6	7.08	NESC Heavy	1	434.7
Davit7	2.36	NESC Heavy	1	321.0
Davit8	5.04	NESC Heavy	1	321.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	68.81	2683	Steel Pole
NESC Extreme	65.74	2683	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number

NESC Heavy	68.81	2683	25
NESC Extreme	65.74	2683	25

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	2683	6	30.544	48.478	1846.381	-3.851	31.165	118.987	6	83.720	2.258	56.66
NESC Extreme	2683	6	30.544	23.902	1785.775	-1.173	29.426	112.346	6	78.827	2.194	53.50

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	8.45	Davit2	1
NESC Extreme	3.21	Davit2	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	3.00	NESC Heavy	0.0
Clamp2	Clamp	3.00	NESC Heavy	0.0
Clamp3	Clamp	3.29	NESC Heavy	0.0
Clamp4	Clamp	3.29	NESC Heavy	0.0
Clamp5	Clamp	3.29	NESC Heavy	0.0
Clamp6	Clamp	3.29	NESC Heavy	0.0
Clamp7	Clamp	3.29	NESC Heavy	0.0
Clamp8	Clamp	3.29	NESC Heavy	0.0
Clamp9	Clamp	0.76	NESC Heavy	0.0
Clamp10	Clamp	0.76	NESC Heavy	0.0
Clamp11	Clamp	0.76	NESC Heavy	0.0
Clamp12	Clamp	0.76	NESC Heavy	0.0
Clamp13	Clamp	0.76	NESC Heavy	0.0
Clamp14	Clamp	0.54	NESC Heavy	0.0
Clamp15	Clamp	0.54	NESC Heavy	0.0
Clamp16	Clamp	0.54	NESC Heavy	0.0
Clamp17	Clamp	0.54	NESC Heavy	0.0
Clamp21	Clamp	12.42	NESC Extreme	0.0
Clamp23	Clamp	3.07	NESC Extreme	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	2.250	0.840	2.402
NESC Heavy	Clamp2	Clamp	Davit2:End	0.000	2.250	0.840	2.402
NESC Heavy	Clamp3	Clamp	Davit3:End	0.000	2.305	1.263	2.628
NESC Heavy	Clamp4	Clamp	Davit4:End	0.000	2.305	1.263	2.628
NESC Heavy	Clamp5	Clamp	Davit5:End	0.000	2.305	1.263	2.628
NESC Heavy	Clamp6	Clamp	Davit6:End	0.000	2.305	1.263	2.628
NESC Heavy	Clamp7	Clamp	Davit7:End	0.000	2.305	1.263	2.628
NESC Heavy	Clamp8	Clamp	Davit8:End	0.000	2.305	1.263	2.628
NESC Heavy	Clamp9	Clamp	2683:WVGD1	0.000	0.068	0.602	0.606
NESC Heavy	Clamp10	Clamp	2683:WVGD2	0.000	0.068	0.602	0.606
NESC Heavy	Clamp11	Clamp	2683:WVGD3	0.000	0.068	0.602	0.606
NESC Heavy	Clamp12	Clamp	2683:WVGD4	0.000	0.068	0.602	0.606
NESC Heavy	Clamp13	Clamp	2683:WVGD5	0.000	0.068	0.602	0.606
NESC Heavy	Clamp14	Clamp	2683:WVGD6	0.000	0.050	0.430	0.433

NESC Heavy	Clamp15	Clamp	2683:WVGD7	0.000	0.050	0.430	0.433
NESC Heavy	Clamp16	Clamp	2683:WVGD8	0.000	0.050	0.430	0.433
NESC Heavy	Clamp17	Clamp	2683:WVGD9	0.000	0.050	0.430	0.433
NESC Heavy	Clamp21	Clamp	2683:TopConn	0.000	3.009	8.453	8.973
NESC Heavy	Clamp23	Clamp	2683:BotConn	0.000	-0.712	1.812	1.947
NESC Extreme	Clamp1	Clamp	Davit1:End	0.000	1.129	0.208	1.148
NESC Extreme	Clamp2	Clamp	Davit2:End	0.000	1.129	0.208	1.148
NESC Extreme	Clamp3	Clamp	Davit3:End	0.000	1.484	0.367	1.529
NESC Extreme	Clamp4	Clamp	Davit4:End	0.000	1.484	0.367	1.529
NESC Extreme	Clamp5	Clamp	Davit5:End	0.000	1.484	0.367	1.529
NESC Extreme	Clamp6	Clamp	Davit6:End	0.000	1.484	0.367	1.529
NESC Extreme	Clamp7	Clamp	Davit7:End	0.000	1.484	0.367	1.529
NESC Extreme	Clamp8	Clamp	Davit8:End	0.000	1.484	0.367	1.529
NESC Extreme	Clamp9	Clamp	2683:WVGD1	0.000	0.161	0.139	0.213
NESC Extreme	Clamp10	Clamp	2683:WVGD2	0.000	0.161	0.139	0.213
NESC Extreme	Clamp11	Clamp	2683:WVGD3	0.000	0.161	0.139	0.213
NESC Extreme	Clamp12	Clamp	2683:WVGD4	0.000	0.161	0.139	0.213
NESC Extreme	Clamp13	Clamp	2683:WVGD5	0.000	0.161	0.139	0.213
NESC Extreme	Clamp14	Clamp	2683:WVGD6	0.000	0.107	0.099	0.146
NESC Extreme	Clamp15	Clamp	2683:WVGD7	0.000	0.107	0.099	0.146
NESC Extreme	Clamp16	Clamp	2683:WVGD8	0.000	0.107	0.099	0.146
NESC Extreme	Clamp17	Clamp	2683:WVGD9	0.000	0.107	0.099	0.146
NESC Extreme	Clamp21	Clamp	2683:TopConn	0.000	8.981	4.258	9.939
NESC Extreme	Clamp23	Clamp	2683:BotConn	0.000	-2.270	0.938	2.456

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	21.167	0.000	24.253	1651.015	-0.000
NESC Extreme	19.106	0.000	8.905	1513.677	-0.000

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	2309.3
Weight of Steel Poles:	13920.9
Total:	16230.2

*** End of Report

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force = $T_{Max} := 83.7 \cdot kips$ (User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = $N := 12$ (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 = $\frac{T_{Max}}{T_{ALL.Net}} = 34.36 \cdot \%$

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

Condition1 = "OK"

TTAW-07BP111-001 | TMA Twin Dual Band AWS with 700 Bypass 13 dB AISG

ELECTRICAL SPECIFICATIONS	
UL Frequency Range (MHz)	1710-1770 with 698-746 bypass
UL Rejection	>80 dB TX rejection, >25 dB rejection at 1700 and 1800 MHz
UL Gain(dB)	13
UL Return Loss	>18 dB
UL Noise Figure	<1.6 dB
UL Output 3rd Order Intercept Point(dBm)	>+23 (Input IP3 >+11)
UL Bypass Loss(dB)	<1.9
UL Max Input Power (dBm)	+14 dBm
DL Frequency Range (MHz)	2110-2170 with 698-746 bypass
DL Return Loss	>18 dB
DL Insertion Loss (dB)	<0.4
Intermodulation	<-155 dBc (2x43 dBm TX)
Input Voltage (V)	8.0-30V (AISG Mode 10-30V; Current Alarm Mode 8-17)
Alarm Functionality	AISG compatible or in case of no AISG command received, current alarm mode 170-190 mA
Power Consumption	<1.5 W
Power Handling, RMS	700: 500 W; AWS 300W
AISG Compatibility	AISG 1.1 fully upgreadable to AISG 2.0 (AISG version only depended on loaded SW version) TTAW-07BP112-001 has AISG 2.0 loaded from factory

MECHANICAL SPECIFICATIONS	
Dimension HxWxD mm(ft)	250x169x139 (9.9"x6.7"x5.4")
Weight(lbs)	<18 (<8 kg)
Colors	Off white (NCS 1502-R)
RF Connectors	Female 7/16 DIN, long neck
Mounting Kit	Mounting kit for pole and wall is included

ENVIRONMENTAL SPECIFICATIONS	
Temperature Range	-40 to +65°C
Operational	ETS 300 019-1-4
Transportation	ETS 300 019-1-2
Storage	ETS 300 019-1-1
Lightning Protection	IEC 61312-1: 2 kA 8/20 µs, 3 kA 10/350 µs
Housing	Aluminium
MTBF	>1 million hours
Ingress Protection	IP67 minimum

APPROVAL AND TESTS	
Safety	UL 60950; UL 1950, TUV
EMC	FCC part 15

*All specifications subject to change without notice. Contact your Powerwave representative for complete performance data.

Updated: 2010-12-02

P65-16-XLH-RR : Dual Broadband Antennas

POLARIZATION: Dual linear ±45°
FREQUENCY (MHz): 698-894, 1710-2170
HORIZONTAL BEAM WIDTH (°): 65, 65
GAIN (dBi/dBd): 15.5/13.4 17.5/15.4
TILT: 1-12, 0-8
LENGTH: 72"

ELECTRICAL SPECIFICATIONS*

Frequency range (MHz)	698-894		1710-2170		
Frequency band (MHz)	698-806	806-894	1710-1880	1850-1990	1900-2170
Gain (dBi/dBd)	14.8/12.7	15.5/13.4	16.9/14.8	17.2/15.1	17.5/15.4
Polarization	Dual Linear +/- 45		Dual Linear +/- 45		
Nominal Impedance (Ω)	50		50		
VSWR	< 1.5:1		< 1.5:1		
Horizontal beam width, -3 dB (°)	66	65	60	63	63
Vertical beam width, -3 dB (°)	14.7	12.5	6.8	6.4	5.7
Electrical down tilt (°)	1 to 12		0 to 8		
Side lobe suppression, vertical 1st upper (dB)	> 16	>16	> 16		
	>16	>16			
Isolation between inputs (dB)	> 30	> 30	> 30	> 30	
Inter band Isolation (dB)	> 40		> 40		
Tracking, horizontal plane ±60° (dB)	< 2		< 2	< 2	< 2
First null fill (dB)			>-20	>-20	>-20
Vertical beam squint (°)	< 0.8	< 0.8	< 0.5	< 0.5	< 0.5
Front to back ratio (dB) 180°±30° copolar	>24	>24	> 30	>30	>28
Front to back ratio (dB) 180°±30° total power					
Cross polar discrimination (XPD) 0° (dB)	> 15	> 15	> 15	> 15	> 15
Cross polar discrimination (XPD) ±60° (dB)	> 10	> 10	> 10	> 10	> 10
Far field coupling					
IM3, 2xTx@43dBm (dBc)	<-153		<-153		
IM7, 2xTx@43dBm (dBc)					
Power handling, average per input (W)	500		250		
Power handling, average total (W)	1000		500		

MECHANICAL SPECIFICATIONS*

Connector	4 X 7/16 DIN Female, IP67
Connector position	Bottom
Dimensions, HxWxD, mm (ft)	72" x 12" x 6" (1829 x 305 x 152)
Mounting	Pre-mounted Tilt Brackets
Weight, with brackets, kg (lbs)	29 (64)
Weight, without brackets, kg (lbs)	24 (53)
Wind load, frontal/lateral/rear side 42 m/s Cd=1.6 (N)	1380
Maximum operational wind speed, m/s (mph)	100 (45)
Survival wind speed, m/s (mph)	150 (67)
Lightning protection	DC Ground
Operating Temperature	-40C to +60C
Radome material	PVC, IP55
Packet size, HxWxD, mm (ft)	87" x 16" x 10" (2225 x 400 x 225)
Radome colour	Light Grey
Shipping weight, kg (lbs)	34 (75)
RET	iRET AISGv1.1, MET and AISGv2.0
Brackets	7256.00, 7454.00

*All specifications subject to change without notice. Please contact your Powerwave representative for complete performance data.

ANTENNA PATTERNS*

For detailed patterns visit http://www.powerwave.com/rpa/.

New Cingular Wireless PCS, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 463-5511
Fax: (860) 513-7190

Douglas L. Culp
Real Estate Consultant

July 7, 2011

Honorable Bill Davidson
Brookfield Town Hall
100 Pocono Road, #201
PO Box 5106
Brookfield, CT 06804

Re: Telecommunications Facility – 761 Federal Road Brookfield, CT

Dear First Selectman Davidson:

In order to accommodate technological changes, implement Uniform Mobile Telecommunications System ("UMTS") and Long Term Evolution ("LTE") capabilities, and enhance system performance in the State of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") will be changing its equipment configuration at certain cell sites.

As required by Regulations of Connecticut State Agencies ("R.C.S.A.") Section 16-50j-73, the Connecticut Siting Council has been notified of the changes and will review AT&T's proposal. Please accept this letter as notification under Section 16-50j-73 of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2).

The accompanying letter to the Siting Council fully describes Cingular's proposal for the referenced cell site. However, if you have any questions or require any further information on our plans or the Siting Council's procedures; please call me at (860) 463-5511 or Ms. Linda Roberts, Executive Director, Connecticut Siting Council at (860) 827-2935.

Sincerely,

Douglas L. Culp
Real Estate Consultant

Enclosure