EMPIRE telecom

May 15, 2017

Melanie A. Bachman
Executive Director
Connecticut Siting Council
10 Franklin Street
New Britain, CT 06051

Regarding:	Notice of Exempt Modification – Swap of 3 Antennas, Addition of (6) TMAs and addition of associated lines
Property Address:	310 Rowayton Ave, Norwalk, CT (the "Property")
Applicant:	AT&T Mobility ("AT&T" Site: CT5013)

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 95 foot utility tower ("tower") at the above-referenced address, latitude 41.07759444, longitude -73.4426083. AT&T's facility consists of three (3) wireless telecommunications antennas at 103 feet. The tower is controlled and owned by Eversource Energy. Assessor's information is attached hereto.

AT&T desires to modify its existing telecommunications facility by swapping three (3) antennas, adding (6) TMAs, and adding associated lines. The centerline height of said antennas is and will remain at 103 feet.

Please accept this application as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72 (b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to the Mayor of the City of Norwalk, the Chief Building Official of the City of Norwalk, and the Director of Planning and Zoning of the City of Norwalk. A copy of this letter is also being sent to Eversource Energy, the owner of the structure that AT&T is located.

The planned modifications to AT&T's facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The planned modifications will not result in an increase in the height of the existing structure. AT&T's antennas and associated lines will be installed at 103 foot level of the 95 foot utility tower.
2. The proposed modifications will not involve any changes to ground-mounted equipment and, therefore will not require an extension of the site boundary.
3. The proposed modification will not increase the noise level at the facility by six decibel or more, or to levels that exceed state and local criteria.

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. An RF emissions calculation is attached.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support AT&T's proposed modifications. (Please see attached Structural analysis completed by Centek Engineering Dated November 22, 2016).

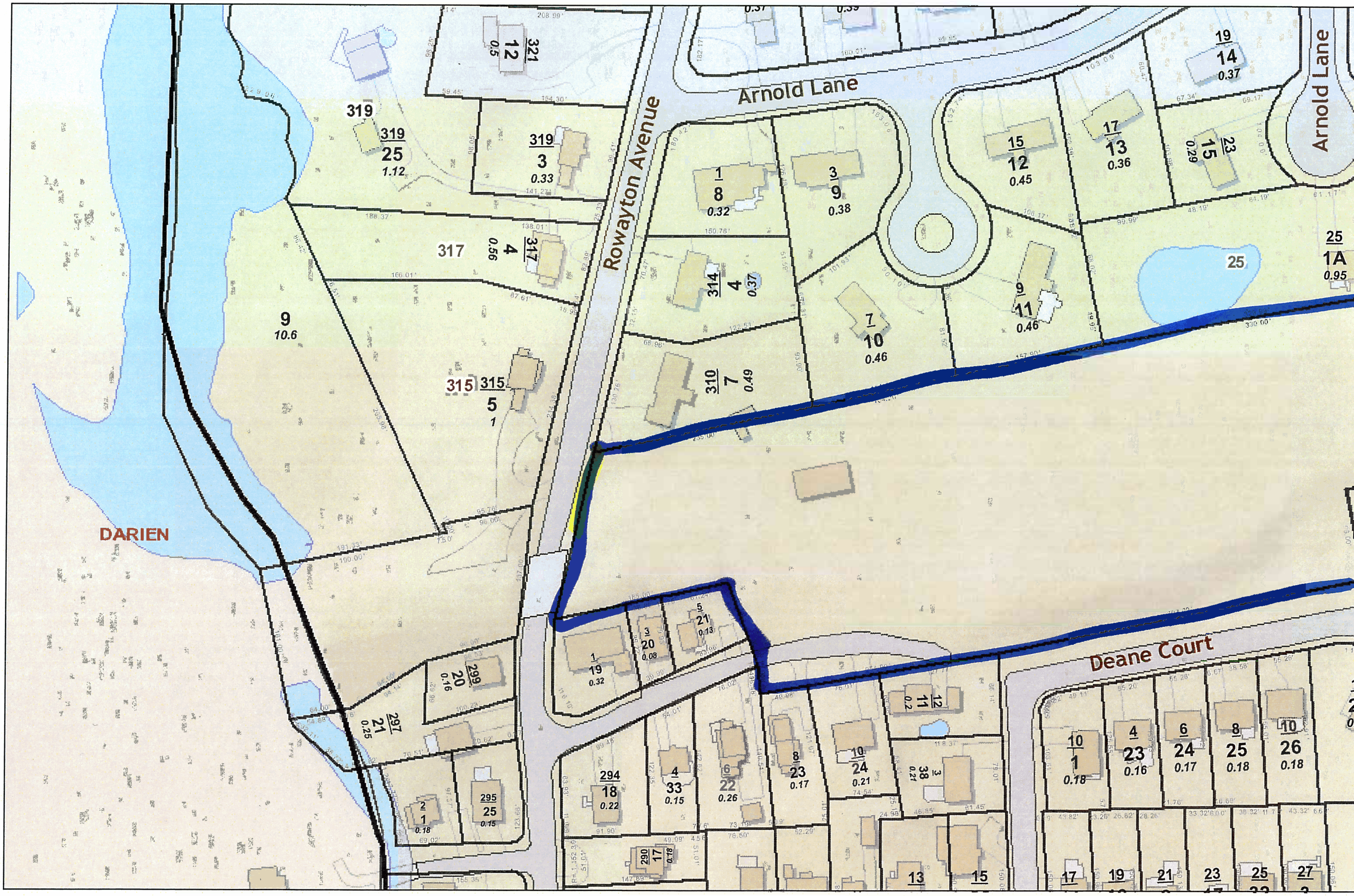
For the foregoing reasons AT&T respectfully requests that the proposed swap of 3 antennas, the addition of (6) TMAs, and addition of associated lines be allowed within the exempt modifications under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

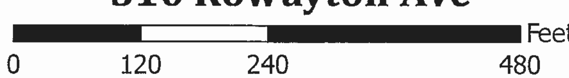
Nicole Caplan
Site Acquisition Specialist
Empire Telecom

CC: The Honorable Harry Rilling, Mayor, City of Norwalk
William Ireland, Chief Building Official, City of Norwalk
Steven Kleppin, Director of Planning and Zoning, City of Norwalk
Eversource Energy, c/o Joel Szarkowicz

16 Esquire Road, Billerica, MA 01862 Phone 978-284-3906 Email: ncaplan@empiretelecomm.com



310 Rowayton Ave



1 inch = 181 feet

WIRELESS COMMUNICATIONS FACILITY
CT5013 - LTE BWE
NORWALK CT
EVERSOURCE TOWER NO.: 489S
310 ROWAYTON AVE
NORWALK, CT 06853

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE, INCLUDING THE TIA–222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2016 CONNECTICUT FIRE SAFETY CODE AND, 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.

SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT

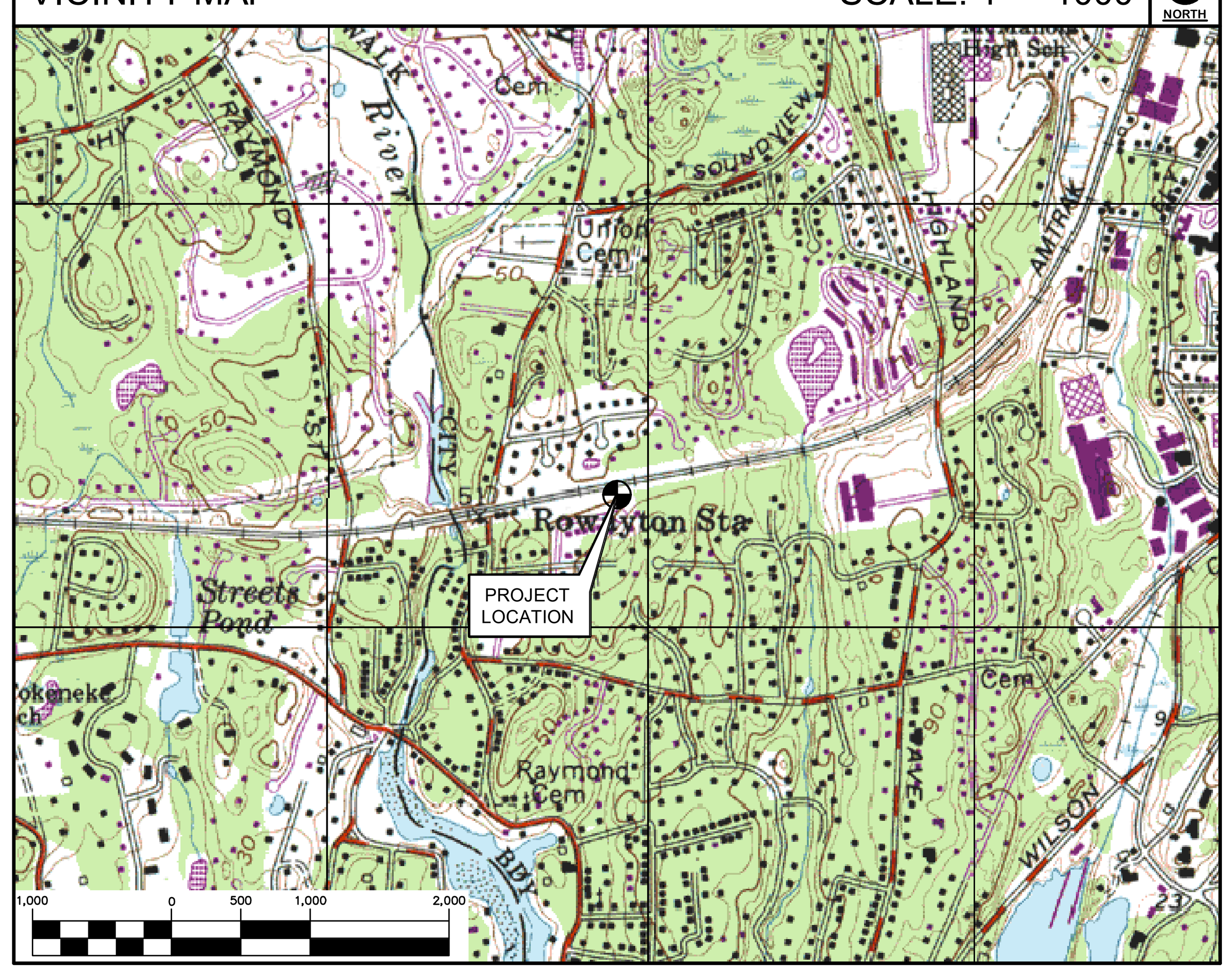
TO: 310 ROWAYTON AVE, NORWALK, CONNECTICUT

1. HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.37 MI
2. TURN LEFT ONTO CAPITAL BLVD	0.27 MI
3. TURN LEFT ONTO WEST ST	0.30 MI
4. TURN LEFT TO MERGE ONTO I–91 S TOWARD NEW HAVEN	9.59 MI
5. TAKE EXIT 17 FOR CT–15 S	49.00 MI
6. TAKE EXIT 38 FOR CT–123	0.15 MI
7. TURN RIGHT ONTO NEW CANAAN AVE	0.22 MI
8. TAKE FIRST RIGHT ONTO NURSERY ST	0.24 MI
9. TAKE FIRST LEFT ONTO PONUS AVE	0.34 MI
10. TAKE FIRST RIGHT ONTO FOX RUN RD	0.71 MI
11. FOX RUN RD BECOMES FILLOW ST	0.19 MI
12. TURN LEFT ONTO RICHARDS AVE	1.98 MI
13. TURN LEFT ONTO FLAX HILL RD	0.04 MI
14. STAY STRAIGHT ONTO ROWAYTON AVE. DESTINATION IS ON THE RIGHT	0.81 MI

VICINITY MAP

SCALE: 1" = 1000'

NORTH



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   A. REMOVE AND REPLACE EXISTING LTE ANTENNA FOR PROPOSED LTE HEXPORT ANTENNA, (1) PER SECTOR.
   B. REMOVE AND REPLACE (3) EXISTING RRUS–12'S FOR PROPOSED RRUS–32 B2'S, TYP. OF (3) TOTAL ON EXISTING EQUIPMENT RACK WITHIN EQUIPMENT SHELTER.
   C. INSTALL (6) NEW TOWER MOUNTED AMPLIFIERS BEHIND PROPOSED ANTENNAS, (2) PER SECTOR.
   D. INSTALL SIX (6) ADDITIONAL 1–5/8"ø COAX CABLES ROUTED ALONG EXISTING TOWER.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT5013
AT&T SITE NAME:	NORWALK CT
SITE ADDRESS:	EVERSOURCE TOWER NO.: 489S 310 ROWAYTON AVE NORWALK, CT 06853
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°–04'–39.47" N LONGITUDE: 73°–26'–33.43" W GROUND ELEVATION: ±53' AMSL GROUND ELEVATION AND COORDINATES REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T–1	TITLE SHEET	0
N–1	NOTES AND SPECIFICATIONS	0
C–1	PLANS AND ELEVATION	0
C–2	LTE BWE EQUIPMENT DETAILS	0
E–1	TYPICAL ELECTRICAL DETAILS AND NOTES	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	05/11/17	LGL	CAG	CONSTRUCTION DOCUMENTS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

EMPIRE telecom

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
NORWALK CT
CT5013 – LTE BWE
EVERSOURCE TOWER NO: 489S
310 ROWAYTON AVE
NORWALK, CT 06853

DATE: 11/10/16
SCALE: AS NOTED
JOB NO. 16071.40

TITLE SHEET

T–1

Sheet No. 1 of 5

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:
   ANTENNA MAST

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 90–110 MPH (3 SECOND GUST).
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 93 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.

TRANSMISSION TOWER

- WIND LOAD: PER NESC C2–2012 SECTION 25 RULE 250C (TOWER & FOUNDATION) 110 MPH (3 SECOND GUST)
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. 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.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
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 SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF–SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
   A. STRUCTURAL STEEL (W SHAPES)–––ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)–––ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)–––ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)–––ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE–––ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS–––ASTM A325–N
   G. U–BOLTS–––ASTM A36
   H. ANCHOR RODS–––ASTM F 1554
   I. WELDING ELECTRODE–––ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON–GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT–DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

PAINT NOTES

PAINTING SCHEDULE:

1. ANTENNA PANELS:
   A. SHERWIN WILLIAMS POLANE–B
   B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.
2. COAXIAL CABLES:
   A. ONE COAT OF DTM BONDING PRIMER (2–5 MILS. DRY FINISH)
   B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5–5 MILS. DRY FINISH)
   C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

1. DO NOT APPLY PAINT IN SNOW, RAIN, FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
2. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
3. TEST SHOP APPLIED PRIMER FOR COMPATIBILITY WITH SUBSEQUENT COVER MATERIALS.
4. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
5. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
6. IMPERVIOUS SURFACE: REMOVE MILDEW BY SCRUBBING WITH SOLUTION OF TRI–SODIUM PHOSPHATE AND BLEACH. RINSE WITH CLEAN WATER AND ALLOW SURFACE TO DRY.
7. ALUMINUM SURFACE SCHEDULED FOR PAINT FINISH: REMOVE SURFACE CONTAMINATION BY STEAM OR HIGH–PRESSURE WATER. REMOVE OXIDATION WITH ACID ETCH AND SOLVENT WASHING. APPLY ETCHING PRIMER IMMEDIATELY FOLLOWING CLEANING.
8. FERROUS METALS: CLEAN UNGALVANIZED FERROUS METAL SURFACES THAT HAVE NOT BEEN SHOP COATED; REMOVE OIL, GREASE, DIRT, LOOSE MILL SCALE, AND OTHER FOREIGN SUBSTANCES. USE SOLVENT OR MECHANICAL CLEANING METHODS THAT COMPLY WITH THE STEEL STRUCTURES PAINTING COUNCIL'S (SSPC) RECOMMENDATIONS. TOUCH UP BARE AREAS AND SHOP APPLIED PRIME COATS THAT HAVE BEEN DAMAGED. WIRE BRUSH, CLEAN WITH SOLVENTS RECOMMENDED BY PAINT MANUFACTURER, AND TOUCH UP WITH THE SAME PRIMER AS THE SHOP COAT.
9. GALVANIZED SURFACES: CLEAN GALVANIZED SURFACES WITH NON–PETROLEUM–BASED SOLVENTS SO SURFACE IS FREE OF OIL AND SURFACE CONTAMINANTS. REMOVE PRETREATMENT FROM GALVANIZED SHEET METAL FABRICATED FROM COIL STOCK BY MECHANICAL METHODS.
10. ANTENNA PANELS: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION. PANELS MUST BE WIPED WITH METHYL ETHYL KETONE (MEK).
11. COAXIAL CABLES: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.

CLEANING:

1. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.

APPLICATION:

1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
3. APPLY EACH COAT TO UNIFORM FINISH.
4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED FINISH.
6. VACUUM CLEAN SURFACES FREE OF LOOSE PARTICLES. USE TACK CLOTH JUST PRIOR TO APPLYING NEXT COAT.
7. ALLOW APPLIED COAT TO DRY BEFORE NEXT COAT IS APPLIED.

COMPLETED WORK:

1. SAMPLES: PREPARE 24" X 24" SAMPLE AREA FOR REVIEW.
2. MATCH APPROVED SAMPLES FOR COLOR, TEXTURE AND COVERAGE. REMOVE REFINISH OR REPAINT WORK NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	05/11/17	LGL	CAG	CONSTRUCTION DOCUMENTS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

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CENTEK engineering
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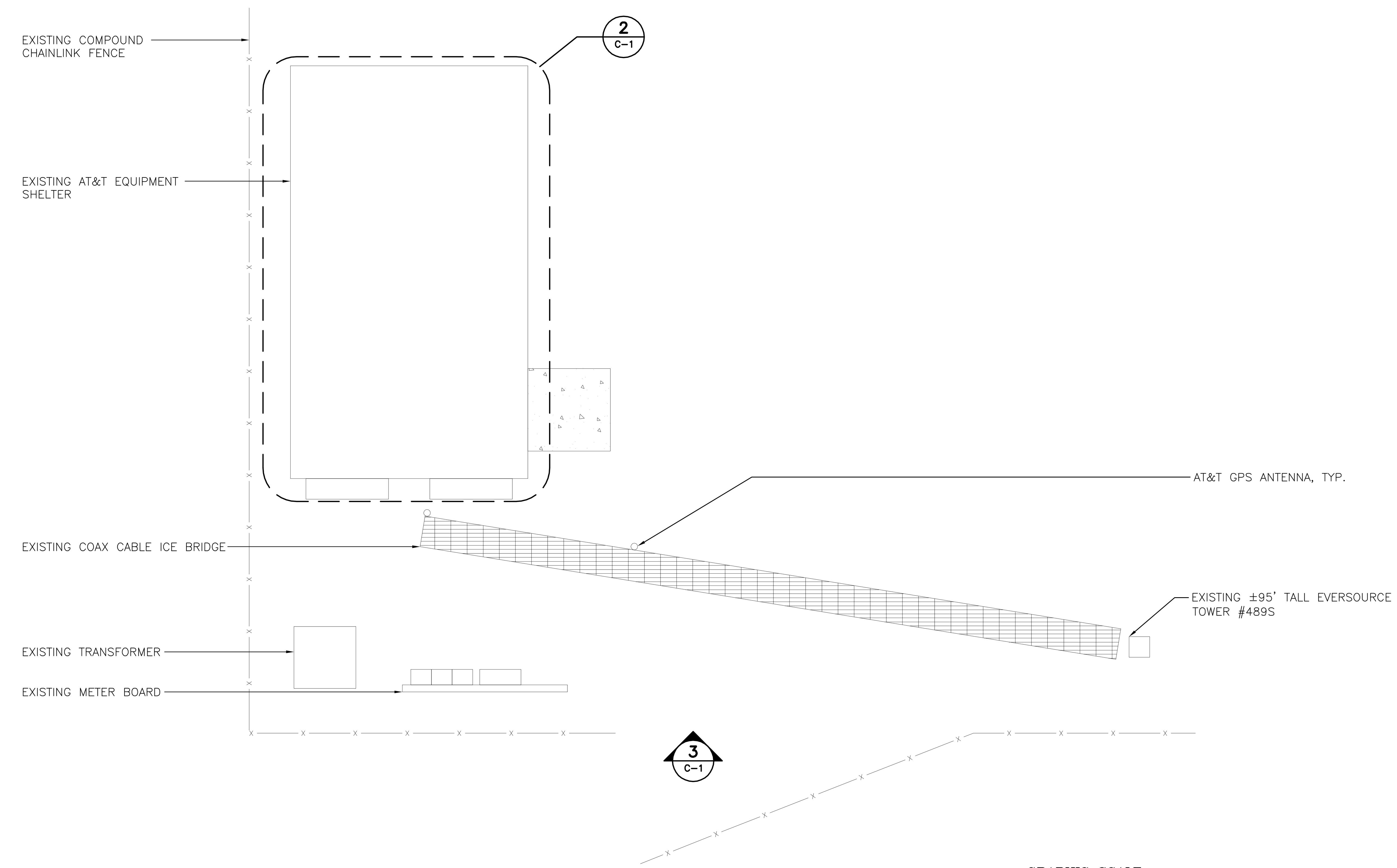
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
NORWALK CT
CT5013 – LTE BWE
EVERSOURCE TOWER NO: 489S
310 ROWAYTON AVE
NORWALK, CT 06853

DATE: 11/10/16
SCALE: AS NOTED
JOB NO. 16071.40

NOTES AND SPECIFICATIONS

N-1

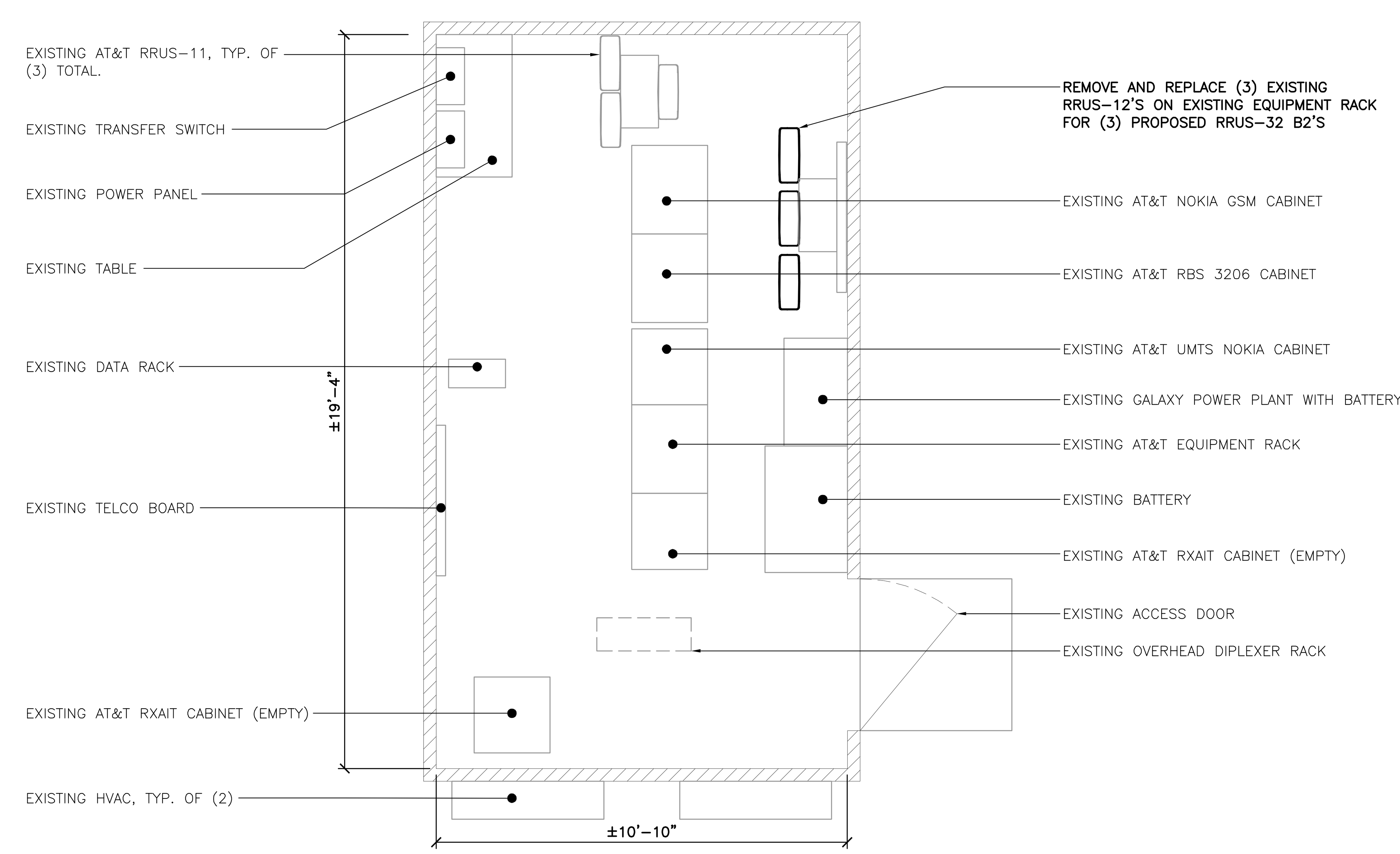
Sheet No. 2 of 5



1 C-1 **COMPOUND PLAN**
SCALE: 1/4" = 1'-0"

TRUE NORTH

GRAPHIC SCALE
4 0 2 4 8 16
(IN FEET)
1 inch = 4 ft.



2 C-1 **EQUIPMENT LAYOUT PLAN**
SCALE: 3/8" = 1'-0"

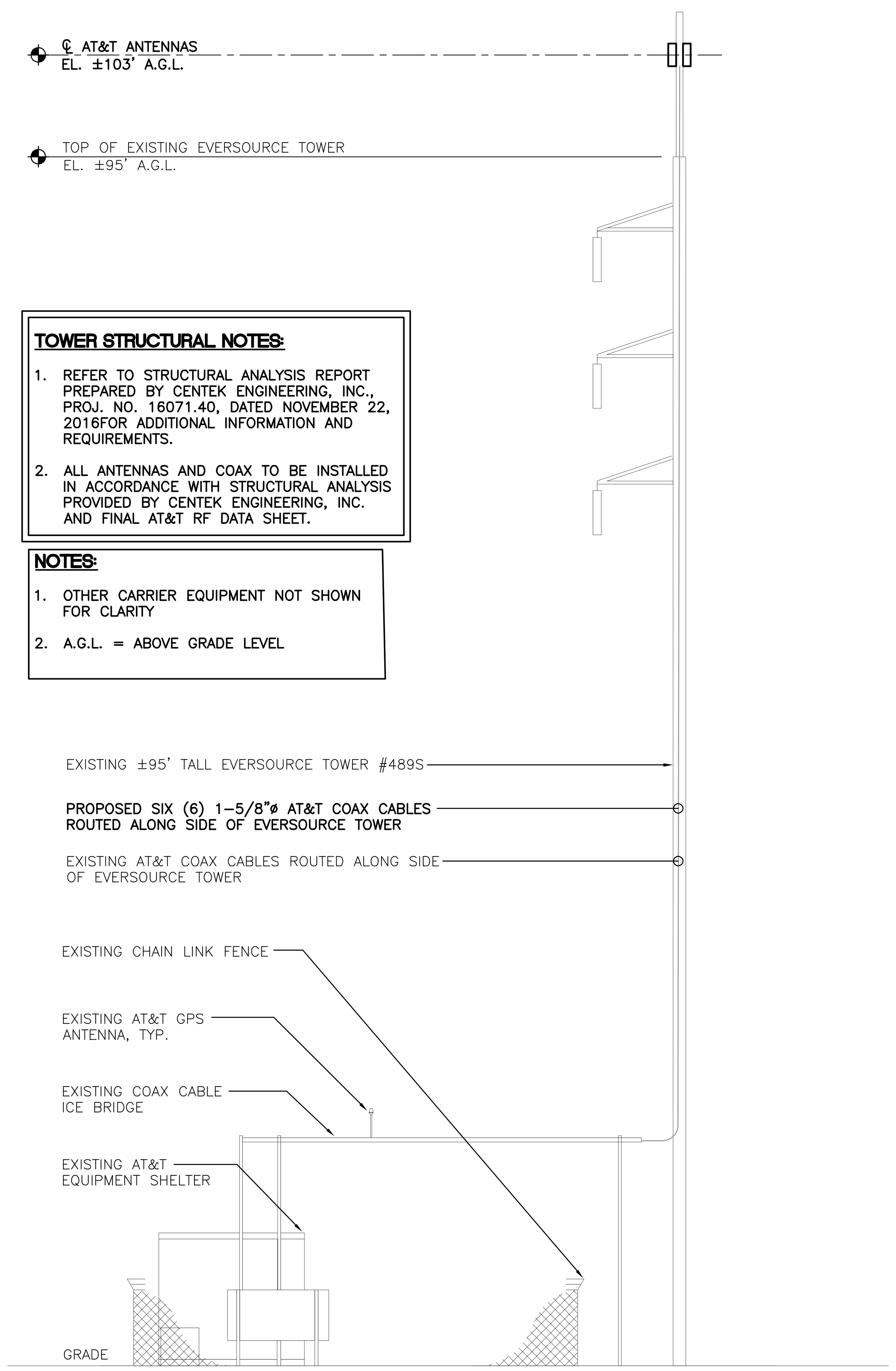
TRUE NORTH

TOWER STRUCTURAL NOTES:

1. REFER TO STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC., PROJ. NO. 16071.40, DATED NOVEMBER 22, 2016FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CENTEK ENGINEERING, INC. AND FINAL AT&T RF DATA SHEET.

NOTES:

1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
2. A.G.L. = ABOVE GRADE LEVEL



3 C-1 **TOWER ELEVATION**
SCALE: 1/8" = 1'-0"

GRAPHIC SCALE
8 0 4 8 16 32
(IN FEET)
1 inch = 8 ft.

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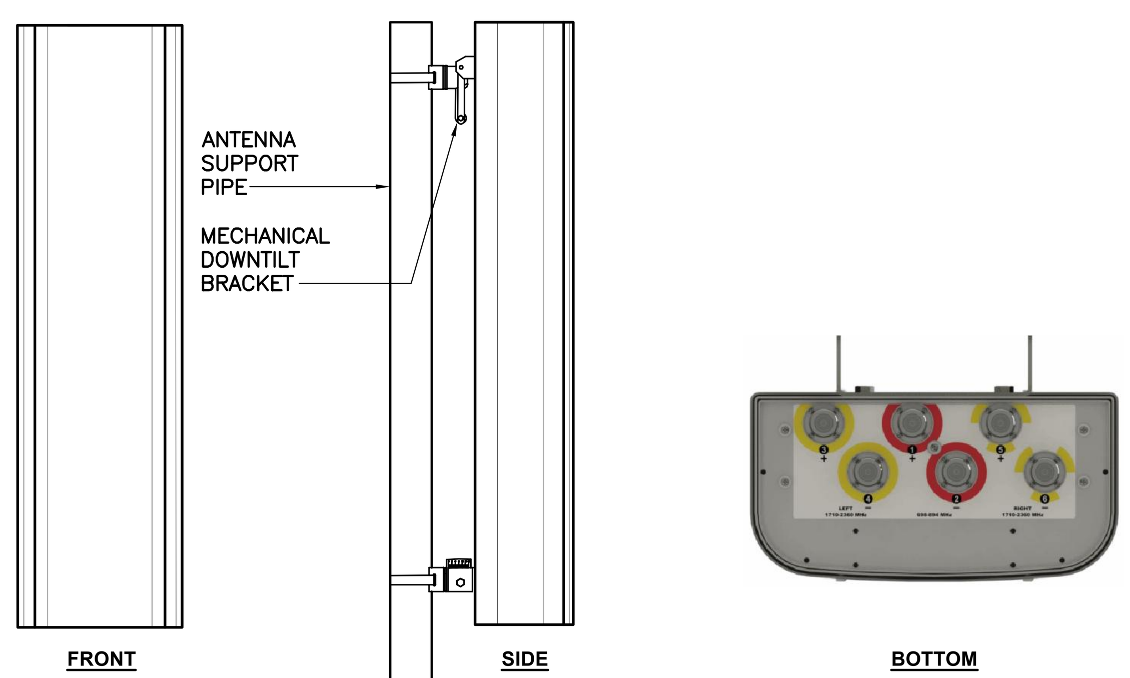
PLANS AND ELEVATION

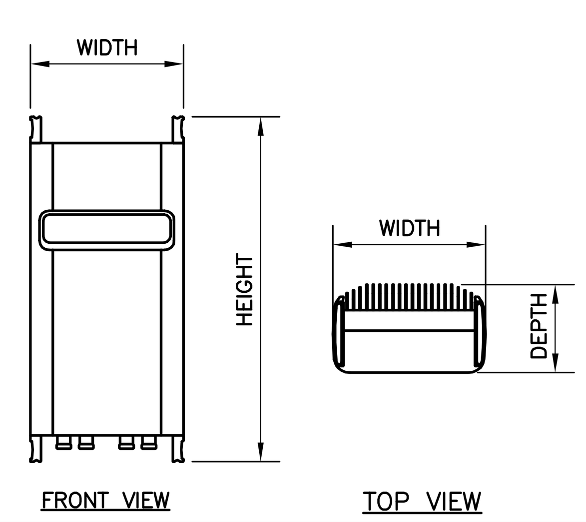
C-1

Sheet No. 3 of 5



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: CCI MODEL: HPA-65F-BUU-H2-K	21.4"L x 14.4"W x 7.3"D	13.8 LBS.

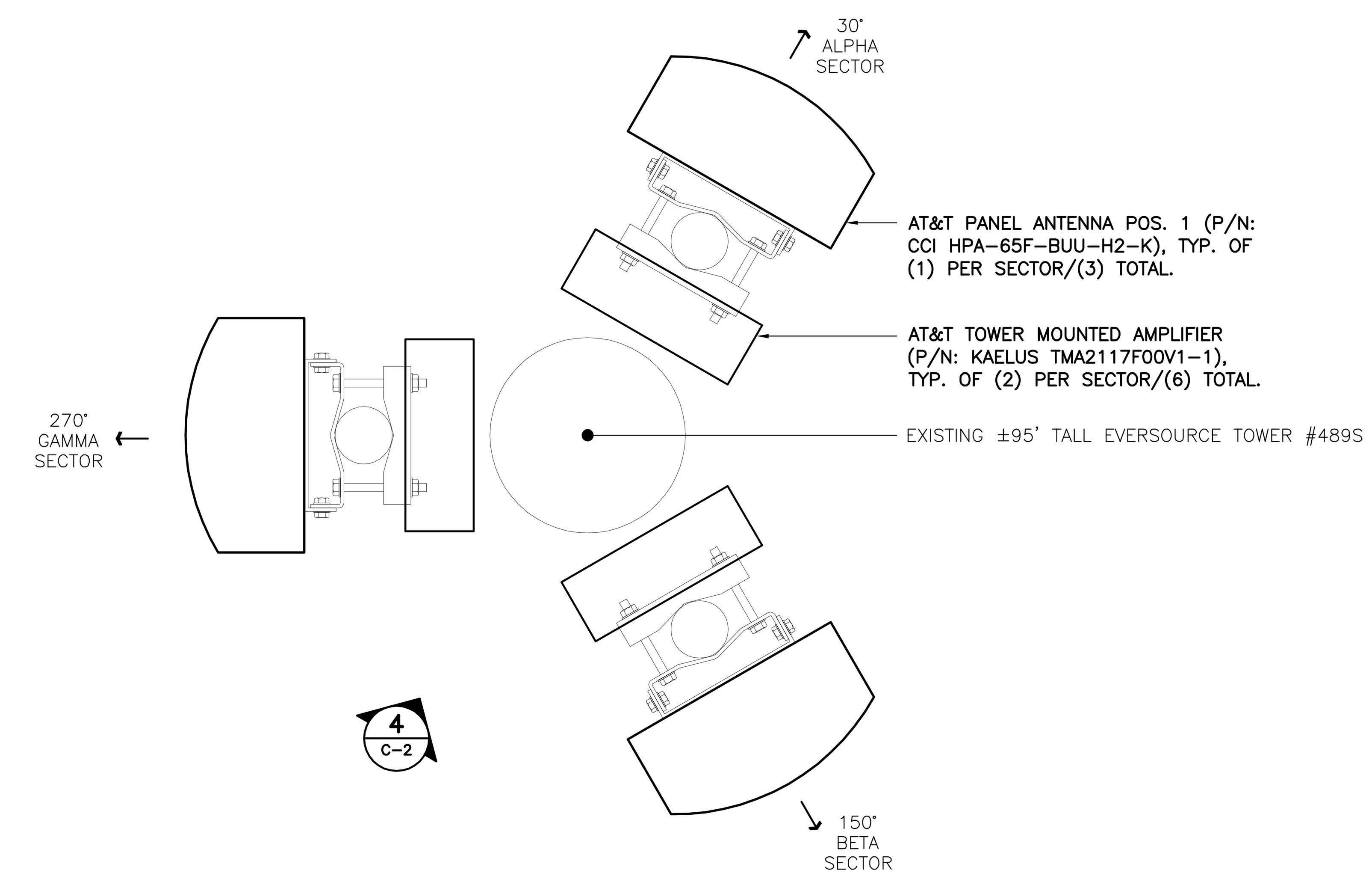
5 (C-2) PROPOSED ANTENNA DETAIL
SCALE: 1/2" = 1'-0"



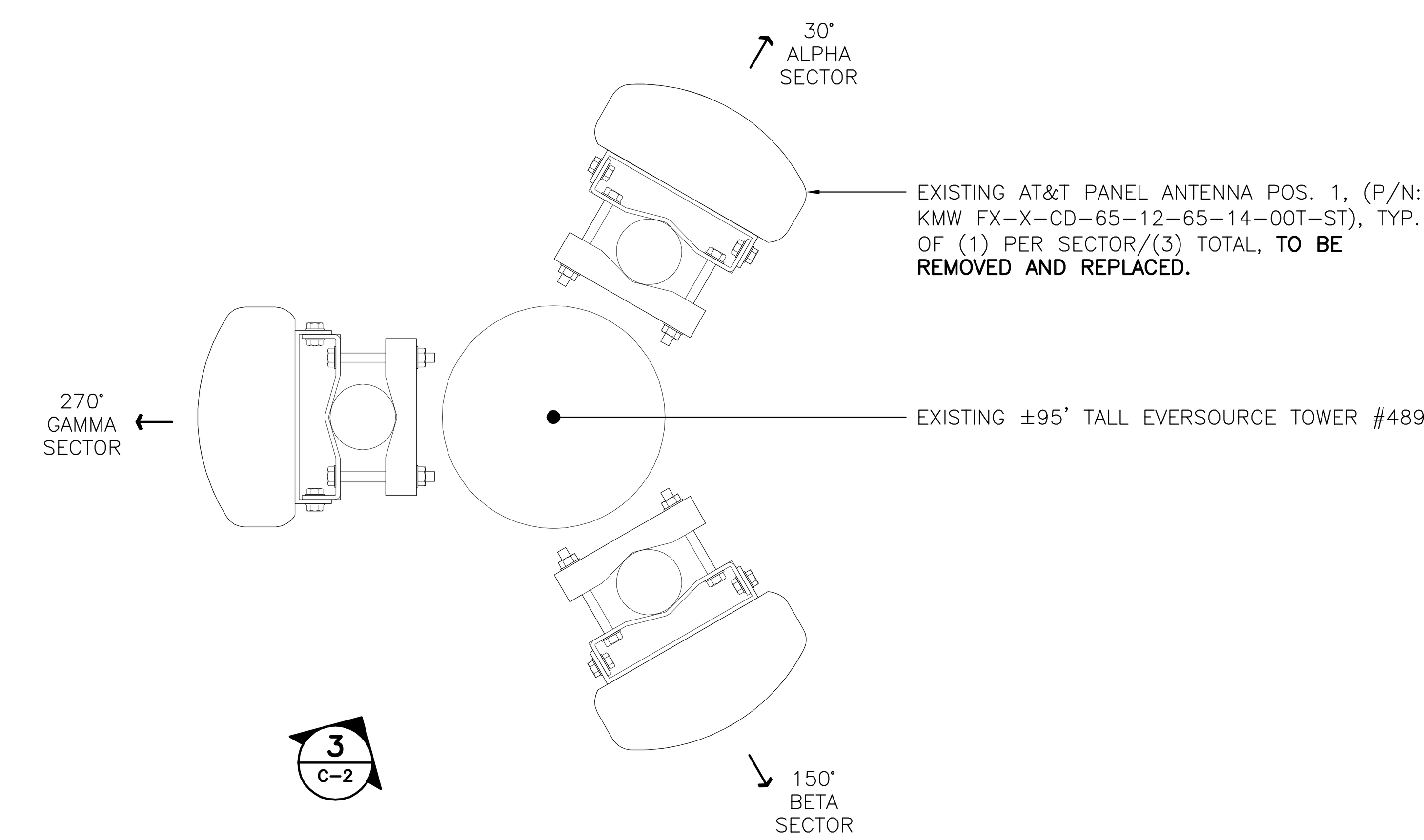
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS-32 B2	27.17"H x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

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

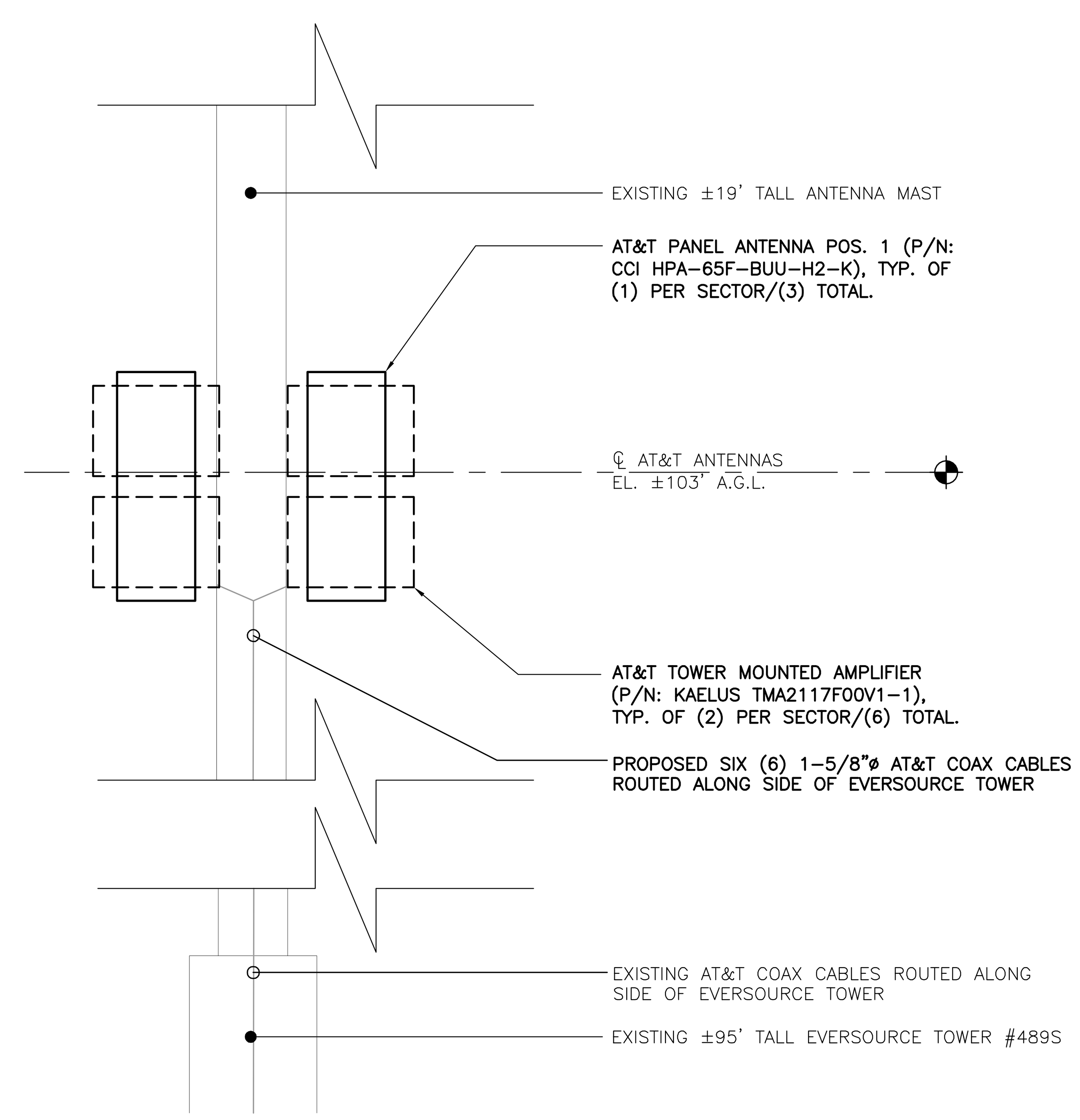
6 (C-2) ERICSSON RRUS 32 B2 DETAIL
SCALE: 1" = 1'-0"



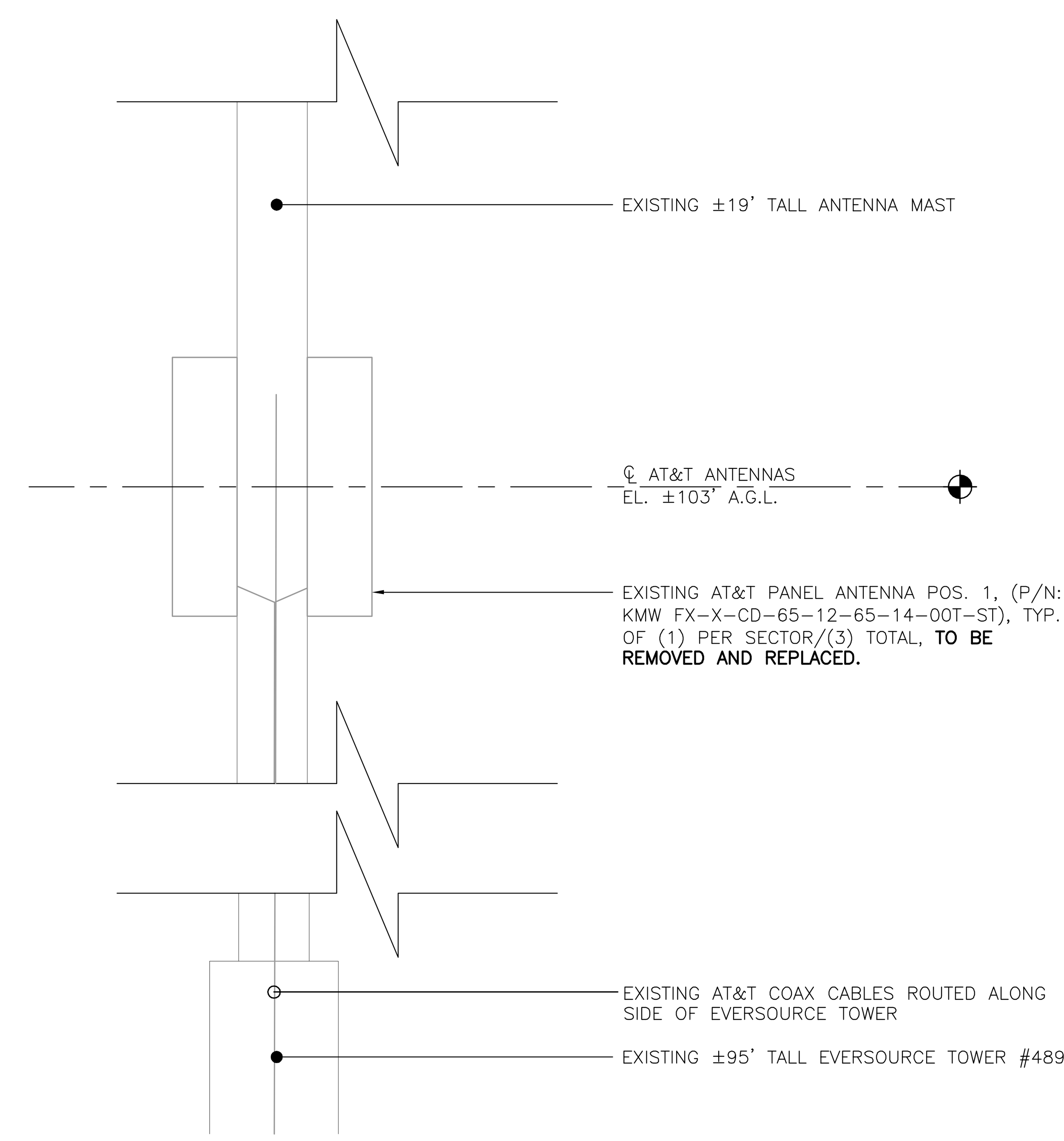
2 (C-2) PROPOSED ANTENNA PLAN
SCALE: 1 1/2" = 1'-0"
NORTH



1 (C-2) EXISTING ANTENNA PLAN
SCALE: 1 1/2" = 1'-0"
NORTH



4 (C-2) PROPOSED ANTENNA ELEVATION
SCALE: 1" = 1'-0"



3 (C-2) EXISTING ANTENNA ELEVATION
SCALE: 1" = 1'-0"

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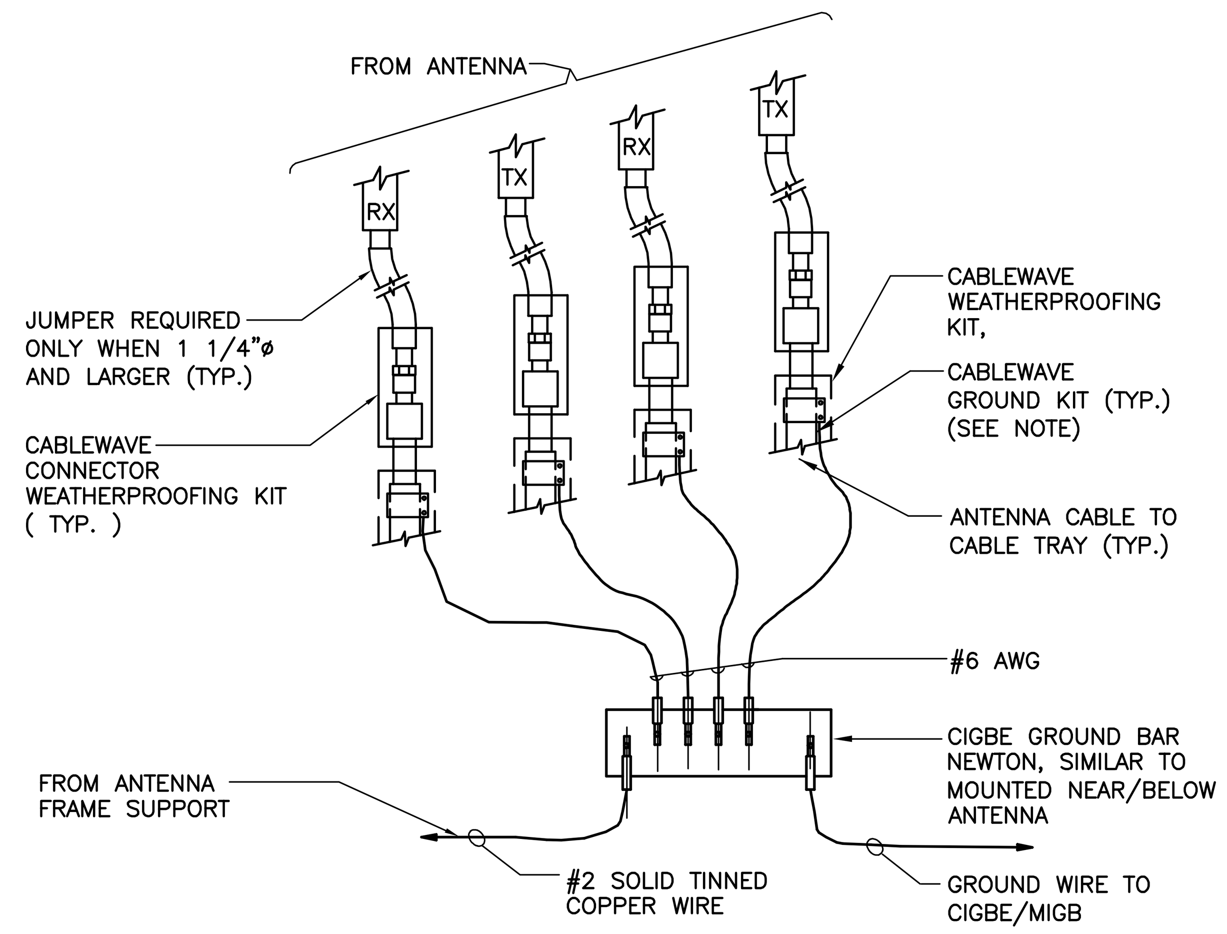
LTE BWE EQUIPMENT DETAILS

C-2

Sheet No. 4 of 5

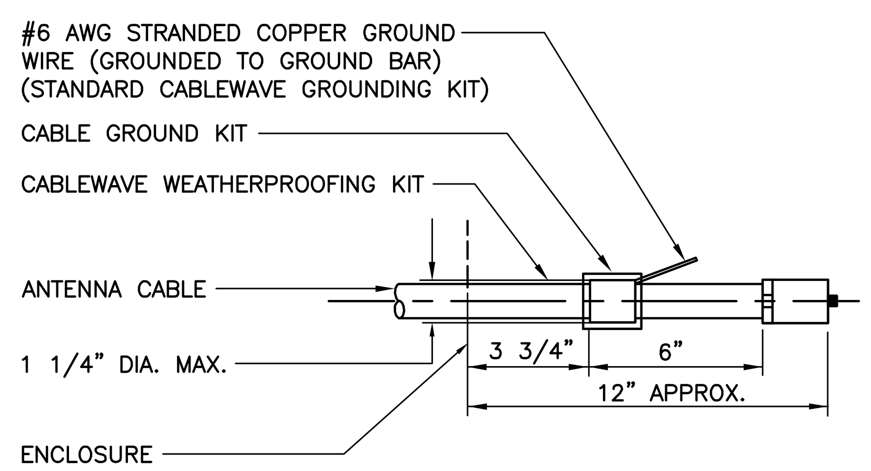


NOTE:

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

5 E-1 CONNECTION OF GROUND WIRES TO GROUND BAR

NOT TO SCALE

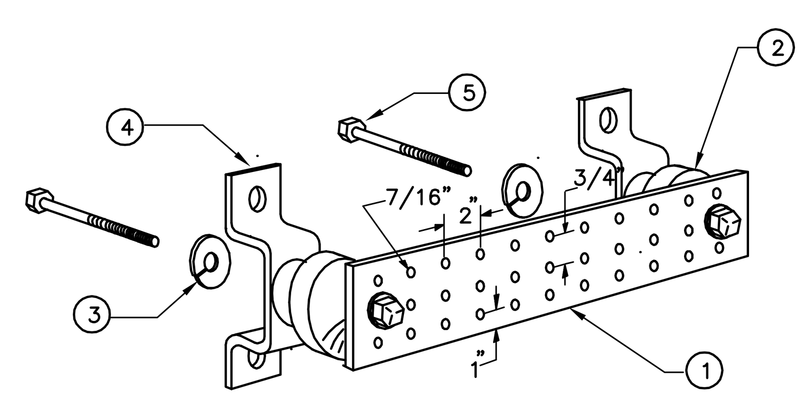


NOTE:

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

4 E-1 ANTENNA CABLE GROUNDING DETAIL

NOT TO SCALE

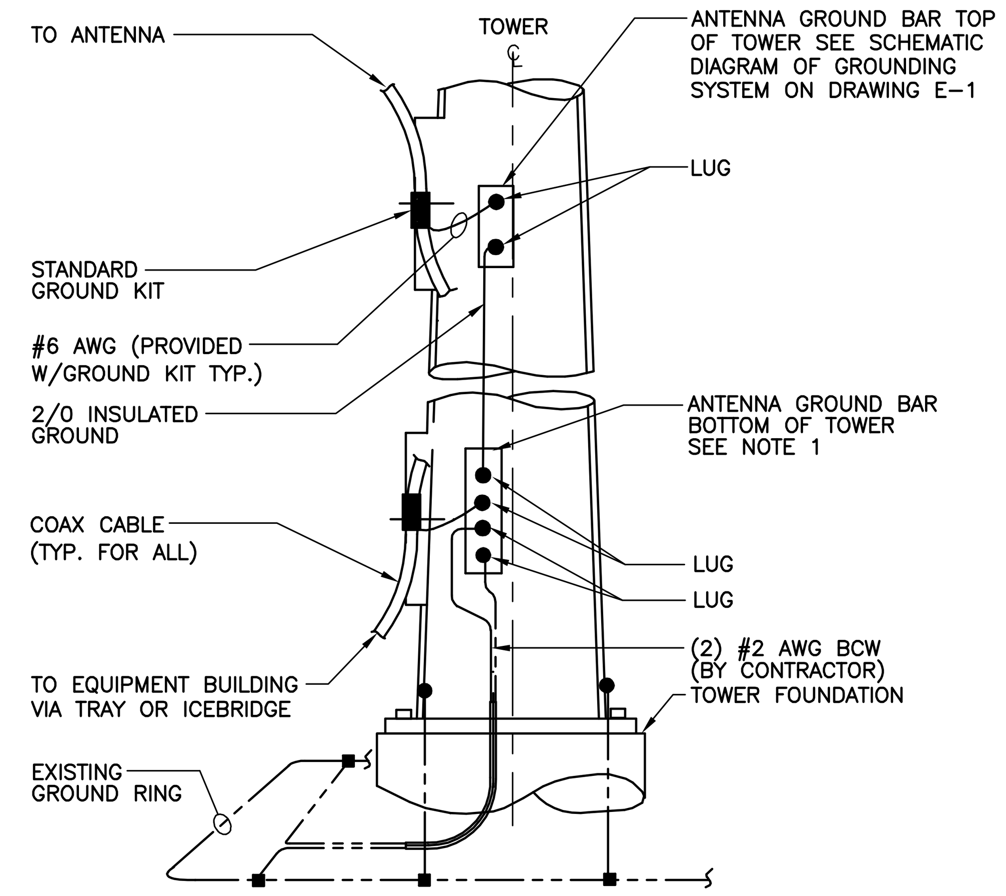


LEGEND

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.

3 E-1 GROUND BAR DETAIL

NOT TO SCALE

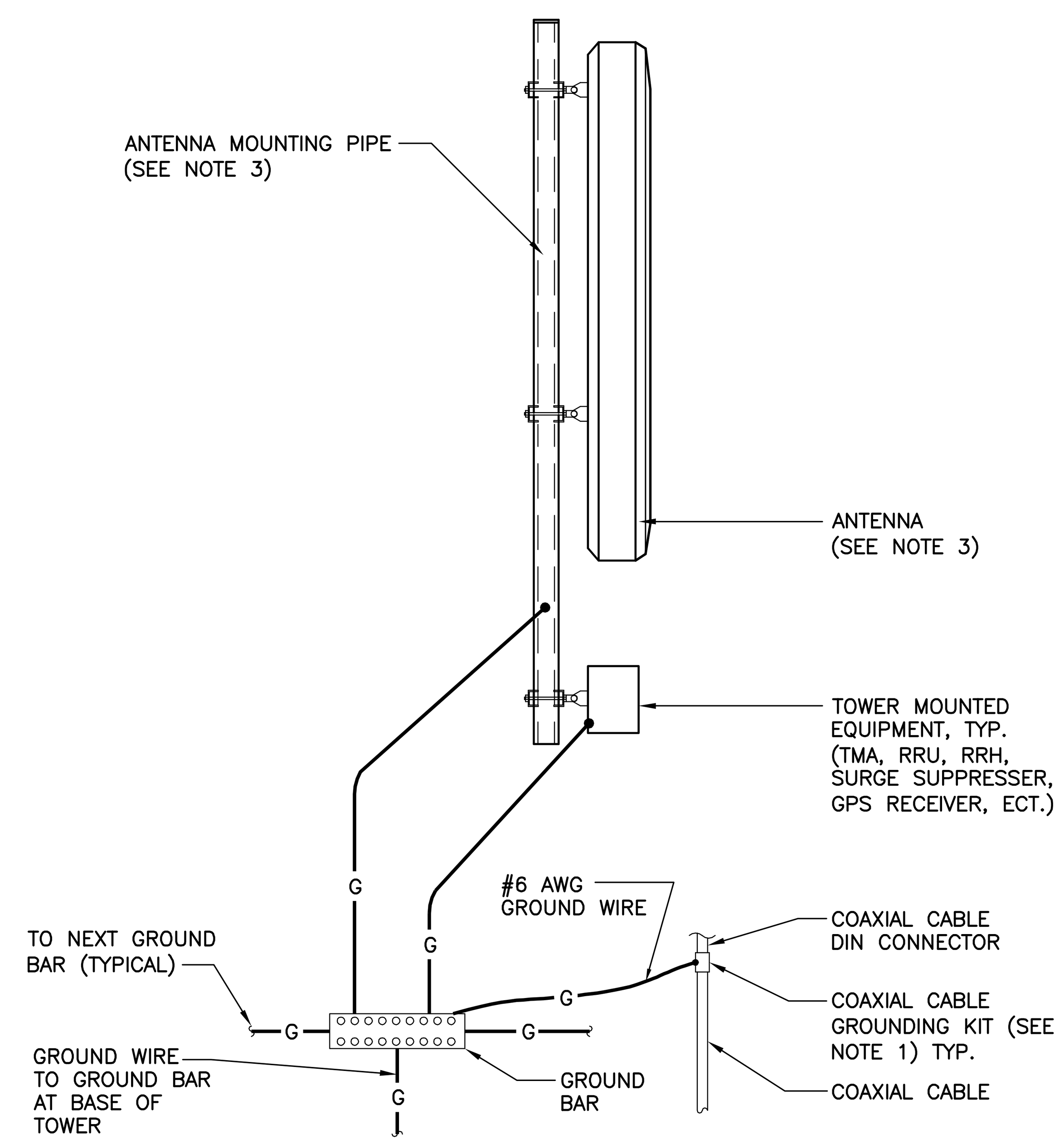


NOTES:

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.

2 E-1 ANTENNA CABLE GROUNDING - TOWER

NOT TO SCALE



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

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 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.

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TYPICAL ELECTRICAL DETAILS AND NOTES

E-1

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Antenna Mast and Tower

AT&T Site Ref: CT5013

Eversource Structure No. 489s
95' Electric Transmission Tower

310 Rowayton Ave
Norwalk, CT

CENTEK Project No. 16071.40

Date: November 22, 2016

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

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

Table of Contents

Introduction

The purpose of this report is to analyze the existing mast and 95' tower located at 310 Rowayton Ave in Norwalk, CT for the proposed antenna and equipment upgrade by AT&T.

The existing/proposed loads consist of the following:

- AT&T (Existing to Remain):
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the exterior of the existing tower.
  Mast: Pipe 5" Sch. 80 x 19-ft long.
- AT&T (Existing to Remove):
  Antennas: Three (3) KMW FX-X-CD-65-12-65-14 panel antennas pipe on the existing mast with a RAD center elevation of 103-ft above grade.
- **AT&T (Proposed):**
  Antennas: Three (3) CCI HPA-65F-BUU-H2 panel antennas and six (6) Kaelus TMA2117F00V1-1 TMAs flush pipe on the existing mast with a RAD center elevation of 103-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the exterior of the tower.

Primary assumptions used in the analysis

- Design steel stresses are defined by AISC-LRFD 14th edition for design of the antenna 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 utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- Pipe mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Pipe mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

Analysis

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

The existing mast consisting of a 5" Sch. 80 x 19' long pipe conforming to ASTM A53 Grade B (Fy = 53ksi) connected at two points to the existing pole was analyzed for its ability to resist loads prescribed by the TIA-222-G standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA/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 pole structure.

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

Design Basis

Our analysis was performed in accordance with TIA-222-G, ASCE Manual No. 72 – "Design of Steel Transmission Pole Structures Second Edition", NESC C2-2007 and Northeast Utilities Design Criteria.

- UTILITY POLE ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility pole to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the NU Design Criteria Table, NESC C2-2007 ~ Construction Grade B, and ASCE Manual No. 72.

  Load cases considered:

  Load Case 1: NESC Heavy
  Wind Pressure……………………………….. 4.0 psf
  Radial Ice Thickness………………………. 0.5"
  Vertical Overload Capacity Factor…………. 1.50
  Wind Overload Capacity Factor……………. 2.50
  Wire Tension Overload Capacity Factor…… 1.65

  Load Case 2: NESC Extreme
  Wind Speed………………………………… 110 mph (1)
  Radial Ice Thickness……………………….. 0"

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

- MAST ASSEMBLY ANALYSIS

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

  Load cases considered:

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

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

Results

- MAST ASSEMBLY

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

Member	Stress Ratio (% of capacity)	Result
Mast	64.3%	**PASS**
Connection	16.2%	**PASS**

- UTILITY TOWER

  This analysis finds that the subject utility structure is adequate to support the existing mast and related appurtenances. The tower stresses meet the requirements set forth by the ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures", 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 **96.5%** occurs in the utility tower under the **NESC Extreme** loading condition.

  TOWER SECTION:

  The utility tower was found to be within allowable limits.

Tower Section	Stress Ratio (% of capacity)	Result
Base	96.5%	**PASS**

- FOUNDATION AND ANCHORS

  The existing tower base foundation consists of a 4-ft ∅ x 23.0-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (4) 2.5"∅, ASTM A36 anchor bolts embedded approximately 6-ft into the concrete foundation structure. The existing guy anchor foundation consists of two (2) 6.5-ft x 4.0-ft x 1.83-ft thick reinforced concrete pads. Foundation information was obtained from NUSCO drawing # 01153-6001.

BASE REACTIONS:

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

Load Case	Transverse	Axial	Overturning Moment
NESC Heavy Wind	2.5 kips	63.3 kips	69.7 ft-kips
NESC Extreme Wind	9.8 kips	18.2 kips	498.6 ft-kips

ANCHOR BOLTS:

The anchor bolts were found to be within allowable limits.

Pole Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	87.2%	**PASS**

TOWER BASE FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading (1)	Result
Reinforced Concrete Caisson	Moment Capacity	38.5%	**PASS**
	Lateral Deflection	1.23 in.(2)	**PASS**

Note 1: 10% increase to base reactions used in foundation analysis per OTRM 051.
Note 2: Lateral deflection limited to L/100 per OTRM 059 Rev 4 dated 2/01/10. (L/100 = 23*12/100=2.76-in)

GUY REACTIONS:

From Risa3D analysis of CL&P pole based on NESC/NU prescribed loads.

Load Case	Horizontal (in plane)	Axial	Horizontal (out of plane)
NESC Heavy Wind	5.0 kips	13.7 kips	2.5 kips
NESC Extreme Wind	6.0 kips	16.5 kips	3.0 kips

Note 1 – 10% increase applied to guy reactions per OTRM 051

GUY ANCHOR FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Allowable	Proposed Loading (1)	Result
Reinforced Concrete Pad	Uplift	145.1 kips	18.2 kips	**PASS**
	Sliding	90.6 kips	6.6 kips	**PASS**

Note 1: 10% increase to guy reactions used in foundation analysis per OTRM 051.

C o n c l u s i o n

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 Eversource and AT&T. 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:

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

Timothy J. Lynn, PE
Structural Engineer

S T A N D A R D C O N D I T I O N S F O R F U R N I S H I N G O F P R O F E S S I O N A L E N G I N E E R I N G S E R V I C E S O N E X I S T I N G S T R U C T U R E S

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.

- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.

- It is the responsibility of the client to ensure that the information provided to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.

- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222.

- All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA-3D

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

Modeling Features:

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

Analysis Features:

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

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

Graphics Features:

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

Design Features:

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

Results Features:

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-TOWER

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

Modeling Features:

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

Analysis Features:

- Automatic handling of tension-only members
- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Automatic calculation of tower dead, ice, and wind loads as well as drag coefficients according to:
    - ASCE 74-1991
    - NESC 2002
    - NESC 2007
    - IEC 60826:2003
    - EN50341-1:2001 (CENELEC)
    - EN50341-3-9:2001 (UK NNA)
    - EN50341-3-17:2001 (Portugal NNA)
    - ESAA C(b)1-2003 (Australia)
    - TPNZ (New Zealand)
    - REE (Spain)
    - EIA/TIA 222-F
    - ANSI/TIA 222-G
    - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Minimization of problems caused by unstable joints and mechanisms
- Automatic bandwidth minimization and ability to solve large problems
- Design checks according to (other standards can be added easily):
    - ASCE Standard 10-90

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

<u>Results Features:</u>

- Design summaries printed for each group of members
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Capability to batch run multiple tower configurations and consolidate the results
- Automated optimum angle member size selection and bolt quantity determination

Tool for interactive angle member sizing and bolt quantity determination.

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

Introduction

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

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

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

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

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

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

Note 1: Prepared from documentation provide from Northeast Utilities.

P C S   M a s t

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

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

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

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

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

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

Attachment A

NU Design Criteria

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

* Only for Structures Installed after 2007

Shape Factor Criteria shall be per TIA Shape Factors.

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

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

a) Wireless communication mast for its total height above ground level, including the initial and any planned future equipment (Support Platforms, Antennas, TMA's etc.) above the top of an electric transmission structure.
b) Conductors and related devices and hardware (wire loads will be provided by NU).
c) Electric Transmission Structure
   i) The loads from the wireless communication equipment components based on NESC and NU Criteria in Attachment A, and from the electric conductors shall be applied to the structure at conductor and wireless communication mast attachment points, where those loads transfer to the tower.
   ii) Shape Factor Multiplier:

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

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

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

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

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

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

PLS-CADD Version 11.28x64   2:24:06 PM Tuesday, December 13, 2011
CG Power Solutions USA Inc
Project Name: 'c:\users\dmcclure\desktop\local saves\sai\line model for 489.DON'
Line Title: 'SAM'

Criteria Notes:
NUSCO Criteria File nusco_green.cri
This criteria file is based on the 2007 edition of the National Electric Safety Code
This criteria file is to be applied to new transmission line designs in Central CT.
For a detailed map on the NUSCO design wind zones, please consult OTRM 060
Rule 250C Wind speed assumed to be 110 MPH
Rule 250D Assumed 15 deg F, 4 psf wind and 1 inch of radial ice

Structure #8 'c:\users\dmcclure\desktop\local saves\sai\structures\strb-489s.str'
Station (ft) 2245.53, Line angle (deg) -4, Orientation angle (deg) 0
Cost 0.00

Weather Cases

WC #	Description	Air Density Factor (psf/mph^2)	Wind Vel. (mph)	Wind Pres. (psf)	Wire Ice Thick (in)	Wire Ice Density (lbs/ft^3)	Wire Ice Load (lbs/ft)	Wire Temp (deg F)	Ambient Temp (deg F)	Weather Load Factor	NESC Constant (lbs/ft)	Wire Wind Height Adjust Model	Wire Gust Response Factor
1	NESC Rule 250B	0.00256	40	4.0	0.50	57.000	0.00	0	0	1.00	0.30	None	1
2	NESC Rule 250C	0.00256	110	31.0	0.00	0.000	0.00	60	60	1.00	0.00	NESC 2007	NESC 2007
3	NESC Rule 250D	0.00256	40	4.1	1.00	57.000	0.00	15	15	1.00	0.00	None	1
4	Uplift	0.00256	0	0.0	0.00	0.000	0.00	-20	-20	1.00	0.00	None	1
5	Maximum Operating	0.00256	0	0.0	0.00	0.000	0.00	285	285	1.00	0.00	None	1
6	NESC Blowout 6PSF	0.00256	48	6.0	0.00	0.000	0.00	60	60	1.00	0.00	None	1
7	GALLOPING (SWING)	0.00256	28	2.0	0.50	57.000	0.00	32	32	1.00	0.00	None	1
8	GALLOPING (SAG)	0.00256	0	0.0	0.50	57.000	0.00	32	32	1.00	0.00	None	1
9	0 Deg F	0.00256	0	0.0	0.00	0.000	0.00	0	0	1.00	0.00	None	1
10	30 Deg F	0.00256	0	0.0	0.00	0.000	0.00	30	30	1.00	0.00	None	1
11	32 Deg F	0.00256	0	0.0	0.50	57.000	0.00	32	32	1.00	0.00	None	1
12	60 Deg F	0.00256	0	0.0	0.00	0.000	0.00	60	60	1.00	0.00	None	1
13	90 Deg F	0.00256	0	0.0	0.00	0.000	0.00	90	90	1.00	0.00	None	1
14	120 Deg F	0.00256	0	0.0	0.00	0.000	0.00	120	120	1.00	0.00	None	1
15	167 Deg F	0.00256	0	0.0	0.00	0.000	0.00	167	167	1.00	0.00	None	1
16	212 Deg F	0.00256	0	0.0	0.00	0.000	0.00	212	212	1.00	0.00	None	1
17	285 Deg F	0.00256	0	0.0	0.00	0.000	0.00	285	285	1.00	0.00	None	1
18	NU Blowout	0.00256	59	9.0	0.00	0.000	0.00	60	60	1.00	0.00	None	1
19	NU Swing Cw	0.00256	0	0.0	0.00	0.000	0.00	60	60	1.00	0.00	None	1
20	NU Swing Cl	0.00256	35	3.1	0.00	0.000	0.00	45	45	1.00	0.00	None	1
21	NU Swing Cs	0.00256	48	6.0	0.00	0.000	0.00	60	60	1.00	0.00	None	1
22	NU Swing Ch	0.00256	60	9.2	0.00	0.000	0.00	60	60	1.00	0.00	None	1
23	ACSS Maximum	0.00256	0	0.0	0.00	0.000	0.00	356	356	1.00	0.00	None	1

Structure Loads Criteria

LC #	WC #	Load Case Description	Cable Condition	Wind Dir.	Bisect Wind Angle	Wire Vert. Load Factor	Wire + Struct. Wind Load Factor	Wire Tension Load Factor	Struct Weight Load Factor	Struct Wind Area Factor	Struct. Wind Load Model	Struct. Ice Thick (in)	Struct. Ice Density (lbs/ft^3)	Pole Tip Deflection Check	Pole Tip Deflect Limit % or (m)
1	1	RULE 250B NA+	Creep RS	NA+		1.50	2.50	1.65	1.50	1.00	Pre V7 Standard	0.00	0.000	No Limit	0.00
2	1	RULE 250B NA-	Creep RS	NA-		1.50	2.50	1.65	1.50	1.00	Pre V7 Standard	0.00	0.000	No Limit	0.00
3	2	RULE 250C NA+	Creep RS	NA+		1.00	1.00	1.00	1.00	1.00	Pre V7 NESC 2002	0.00	0.000	No Limit	0.00
4	2	RULE 250C NA-	Creep RS	NA-		1.00	1.00	1.00	1.00	1.00	Pre V7 NESC 2002	0.00	0.000	No Limit	0.00
5	3	RULE 250D NA+	Creep RS	NA+		1.00	1.00	1.00	1.00	1.00	Pre V7 Standard	0.00	0.000	No Limit	0.00
6	3	RULE 250D NA-	Creep RS	NA-		1.00	1.00	1.00	1.00	1.00	Pre V7 Standard	0.00	0.000	No Limit	0.00

7	1	250B No OLF NA+	Creep RS	NA+	1.00	1.00	1.00	1.00	1.00	Pre V7 Standard	0.00	0.000	No Limit	0.00
8	1	250B No OLF NA-	Creep RS	NA-	1.00	1.00	1.00	1.00	1.00	Pre V7 Standard	0.00	0.000	No Limit	0.00
9	12	Deflection	Creep RS	NA+	1.00	1.00	1.00	1.00	1.00	Pre V7 Standard	0.00	0.000	No Limit	0.00

Span and Wire Summary

Span azimuth is measured clockwise from structure transverse axis (0=transverse, 90=back, 270=ahead)
Azimuth of structure transverse axis is 184.0000 (deg) measured clockwise from North.

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Back span Cable Name	Back span Len. (ft)	Back span Azi. (deg)	Back span Horiz. Load (lbs/ft)	Back span Vert. Load (lbs/ft)	Back span Horiz. Tension (lbs)	Ahead span Cable Name	Ahead span Len. (ft)	Ahead span Azi. (deg)	Ahead span Horiz. Load (lbs/ft)	Ahead span Vert. Load (lbs/ft)	Ahead span Horiz. Tension (lbs)
1	1	RULE 250B NA+	1	1		linnet_acsr.wir	302	92	1.43	1.83	6490	linnet_acsr.wir	268	265	1.43	1.83	6495
1	1		8	1		bittern_acsr.wir	303	92	1.95	3.87	15118	bittern_acsr.wir	267	265	1.95	3.87	15121
1	1		9	1		bittern_acsr.wir	302	89	1.95	3.87	15120	bittern_acsr.wir	267	265	1.95	3.87	15120
1	1		10	1		bittern_acsr.wir	302	88	1.95	3.87	15122	bittern_acsr.wir	267	265	1.95	3.87	15119
2	1	RULE 250B NA-	1	1		linnet_acsr.wir	302	92	1.43	1.83	6490	linnet_acsr.wir	268	265	1.43	1.83	6495
2	1		8	1		bittern_acsr.wir	303	92	1.95	3.87	15118	bittern_acsr.wir	267	265	1.95	3.87	15121
2	1		9	1		bittern_acsr.wir	302	89	1.95	3.87	15120	bittern_acsr.wir	267	265	1.95	3.87	15120
2	1		10	1		bittern_acsr.wir	302	88	1.95	3.87	15122	bittern_acsr.wir	267	265	1.95	3.87	15119
3	2	RULE 250C NA+	1	1		linnet_acsr.wir	302	92	1.71	0.46	3595	linnet_acsr.wir	268	265	1.78	0.46	3611
3	2		8	1		bittern_acsr.wir	303	92	3.14	1.43	7999	bittern_acsr.wir	267	265	3.25	1.43	8014
3	2		9	1		bittern_acsr.wir	302	89	3.10	1.43	7866	bittern_acsr.wir	267	265	3.16	1.43	7862
3	2		10	1		bittern_acsr.wir	302	88	3.06	1.43	7692	bittern_acsr.wir	267	265	3.05	1.43	7677
4	2	RULE 250C NA-	1	1		linnet_acsr.wir	302	92	1.71	0.46	3595	linnet_acsr.wir	268	265	1.78	0.46	3611
4	2		8	1		bittern_acsr.wir	303	92	3.14	1.43	7999	bittern_acsr.wir	267	265	3.25	1.43	8014
4	2		9	1		bittern_acsr.wir	302	89	3.10	1.43	7866	bittern_acsr.wir	267	265	3.16	1.43	7862
4	2		10	1		bittern_acsr.wir	302	88	3.06	1.43	7692	bittern_acsr.wir	267	265	3.05	1.43	7677
5	3	RULE 250D NA+	1	1		linnet_acsr.wir	302	92	0.93	2.60	5341	linnet_acsr.wir	268	265	0.93	2.60	5344
5	3		8	1		bittern_acsr.wir	303	92	1.14	4.35	11423	bittern_acsr.wir	267	265	1.14	4.35	11425
5	3		9	1		bittern_acsr.wir	302	89	1.14	4.35	11425	bittern_acsr.wir	267	265	1.14	4.35	11425
5	3		10	1		bittern_acsr.wir	302	88	1.14	4.35	11426	bittern_acsr.wir	267	265	1.14	4.35	11424
6	3	RULE 250D NA-	1	1		linnet_acsr.wir	302	92	0.93	2.60	5341	linnet_acsr.wir	268	265	0.93	2.60	5344
6	3		8	1		bittern_acsr.wir	303	92	1.14	4.35	11423	bittern_acsr.wir	267	265	1.14	4.35	11425
6	3		9	1		bittern_acsr.wir	302	89	1.14	4.35	11425	bittern_acsr.wir	267	265	1.14	4.35	11425
6	3		10	1		bittern_acsr.wir	302	88	1.14	4.35	11426	bittern_acsr.wir	267	265	1.14	4.35	11424
7	1	250B No OLF NA+	1	1		linnet_acsr.wir	302	92	0.57	1.22	3933	linnet_acsr.wir	268	265	0.57	1.22	3936
7	1		8	1		bittern_acsr.wir	303	92	0.78	2.58	9162	bittern_acsr.wir	267	265	0.78	2.58	9164
7	1		9	1		bittern_acsr.wir	302	89	0.78	2.58	9164	bittern_acsr.wir	267	265	0.78	2.58	9163
7	1		10	1		bittern_acsr.wir	302	88	0.78	2.58	9165	bittern_acsr.wir	267	265	0.78	2.58	9163
8	1	250B No OLF NA-	1	1		linnet_acsr.wir	302	92	0.57	1.22	3933	linnet_acsr.wir	268	265	0.57	1.22	3936
8	1		8	1		bittern_acsr.wir	303	92	0.78	2.58	9162	bittern_acsr.wir	267	265	0.78	2.58	9164
8	1		9	1		bittern_acsr.wir	302	89	0.78	2.58	9164	bittern_acsr.wir	267	265	0.78	2.58	9163
8	1		10	1		bittern_acsr.wir	302	88	0.78	2.58	9165	bittern_acsr.wir	267	265	0.78	2.58	9163
9	12	Deflection	1	1		linnet_acsr.wir	302	92	0.00	0.46	1215	linnet_acsr.wir	268	265	0.00	0.46	1215
9	12		8	1		bittern_acsr.wir	303	92	0.00	1.43	4006	bittern_acsr.wir	267	265	0.00	1.43	4006
9	12		9	1		bittern_acsr.wir	302	89	0.00	1.43	4006	bittern_acsr.wir	267	265	0.00	1.43	4006
9	12		10	1		bittern_acsr.wir	302	88	0.00	1.43	4006	bittern_acsr.wir	267	265	0.00	1.43	4006

Wire Loads In Span Coordinate System

Wire loads expressed in span coordinate system (Longitudinal axis is line connecting attach. points)
Note: Loads in this report do not include load from counter weights, insulator weight or insulator wind area.

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Loads from back span Vert. (lbs)	Loads from back span Trans. (lbs)	Loads from back span Long. (lbs)	Loads from ahead span Vert. (lbs)	Loads from ahead span Trans. (lbs)	Loads from ahead span Long. (lbs)	Warnings
1	1	RULE 250B NA+	1	1		753	218	6490	365	192	6495	
1	1		8	1		1550	297	15118	1009	262	15121	
1	1		9	1		1098	295	15120	1195	262	15120	
1	1		10	1		647	295	15122	1380	262	15119	

2	1	RULE 250B NA-	1	1		753	-218	6490	365	-192	6495
2	1		8	1		1550	-297	15118	1009	-262	15121
2	1		9	1		1098	-295	15120	1195	-262	15120
2	1		10	1		647	-295	15122	1380	-262	15119
3	2	RULE 250C NA+	1	1		424	260	3595	151	239	3611
3	2		8	1		840	478	7999	510	435	8014
3	2		9	1		543	469	7866	622	423	7862
3	2		10	1		255	462	7692	727	410	7677
4	2	RULE 250C NA-	1	1		424	-260	3595	151	-239	3611
4	2		8	1		840	-478	7999	510	-435	8014
4	2		9	1		543	-469	7866	622	-423	7862
4	2		10	1		255	-462	7692	727	-410	7677
5	3	RULE 250D NA+	1	1		921	141	5341	481	124	5344
5	3		8	1		1549	174	11423	1036	153	11425
5	3		9	1		1132	173	11425	1207	153	11425
5	3		10	1		714	172	11426	1379	153	11424
6	3	RULE 250D NA-	1	1		921	-141	5341	481	-124	5344
6	3		8	1		1549	-174	11423	1036	-153	11425
6	3		9	1		1132	-173	11425	1207	-153	11425
6	3		10	1		714	-172	11426	1379	-153	11424
7	1	250B No OLF NA+	1	1		502	87	3933	243	77	3936
7	1		8	1		1033	119	9162	673	105	9164
7	1		9	1		732	118	9164	796	105	9163
7	1		10	1		431	118	9165	920	105	9163
8	1	250B No OLF NA-	1	1		502	-87	3933	243	-77	3936
8	1		8	1		1033	-119	9162	673	-105	9164
8	1		9	1		732	-118	9164	796	-105	9163
8	1		10	1		431	-118	9165	920	-105	9163
9	12	Deflection	1	1		190	0	1215	92	0	1215
9	12		8	1		529	0	4006	351	0	4006
9	12		9	1		383	0	4006	411	0	4006
9	12		10	1		237	0	4006	471	0	4006

Wire Loads In Structure Coordinate System

Note: Loads in this report include load from counter weights, insulator weight and insulator wind area.

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	----Structure Loads---- Vert. (lbs)	Trans.	Long.	--Loads from back span- Vert. (lbs)	Trans.	Long.	-Loads from ahead span- Vert. (lbs)	Trans.	Long.	Warnings
1	1	RULE 250B NA+	1	1		1118	-291	4	753	34	6493	365	-326	-6490	
1	1		8	1		2859	-1408	36	1700	-300	15118	1159	-1108	-15082	
1	1		9	1		2593	-660	36	1248	448	15117	1345	-1108	-15081	
1	1		10	1		2327	-209	18	797	898	15098	1530	-1107	-15080	
2	1	RULE 250B NA-	1	1		1118	-1110	22	753	-402	6481	365	-709	-6459	
2	1		8	1		2859	-2543	60	1700	-904	15094	1159	-1639	-15034	
2	1		9	1		2593	-1792	89	1248	-153	15123	1345	-1639	-15033	
2	1		10	1		2327	-1341	89	797	299	15121	1530	-1640	-15032	
3	2	RULE 250C NA+	1	1		575	109	-17	424	159	3601	151	-49	-3618	
3	2		8	1		1550	-98	-8	940	178	8012	610	-276	-8020	
3	2		9	1		1365	290	-7	643	565	7861	722	-274	-7868	
3	2		10	1		1182	512	-15	355	784	7668	827	-272	-7683	
4	2	RULE 250C NA-	1	1		575	-887	7	424	-362	3587	151	-525	-3580	
4	2		8	1		1550	-1995	33	940	-815	7974	610	-1180	-7941	
4	2		9	1		1365	-1565	79	643	-411	7870	722	-1154	-7791	
4	2		10	1		1182	-1298	96	355	-175	7704	827	-1123	-7608	
5	3	RULE 250D NA+	1	1		1402	-311	6	921	-10	5343	481	-301	-5337	
5	3		8	1		2785	-1163	30	1649	-279	11421	1136	-884	-11392	
5	3		9	1		2539	-597	32	1232	286	11423	1307	-883	-11391	
5	3		10	1		2293	-257	19	814	627	11410	1479	-883	-11391	
6	3	RULE 250D NA-	1	1		1402	-842	18	921	-292	5335	481	-550	-5317	
6	3		8	1		2785	-1822	44	1649	-630	11407	1136	-1192	-11364	
6	3		9	1		2539	-1255	63	1232	-63	11426	1307	-1192	-11363	
6	3		10	1		2293	-914	61	814	278	11423	1479	-1192	-11363	

7	1	250B No OLF NA+	1	1	745	-261	4	502	-24	3934	243	-237	-3930
7	1		8	1	1906	-970	24	1133	-244	9160	773	-726	-9136
7	1		9	1	1729	-516	27	832	210	9162	896	-726	-9135
7	1		10	1	1551	-243	18	531	483	9153	1020	-726	-9134
8	1	250B No OLF NA-	1	1	745	-588	11	502	-198	3929	243	-390	-3918
8	1		8	1	1906	-1424	34	1133	-485	9150	773	-939	-9117
8	1		9	1	1729	-969	49	832	-31	9165	896	-939	-9116
8	1		10	1	1551	-696	47	531	243	9162	1020	-939	-9115
9	12	Deflection	1	1	282	-131	3	190	-34	1214	92	-97	-1211
9	12		8	1	1080	-523	13	629	-159	4003	451	-364	-3989
9	12		9	1	994	-325	16	483	39	4006	511	-364	-3989
9	12		10	1	908	-205	13	337	159	4003	571	-364	-3989

Wire Load Induced Ground Line Moments For Single Pole Centered At Structure Origin

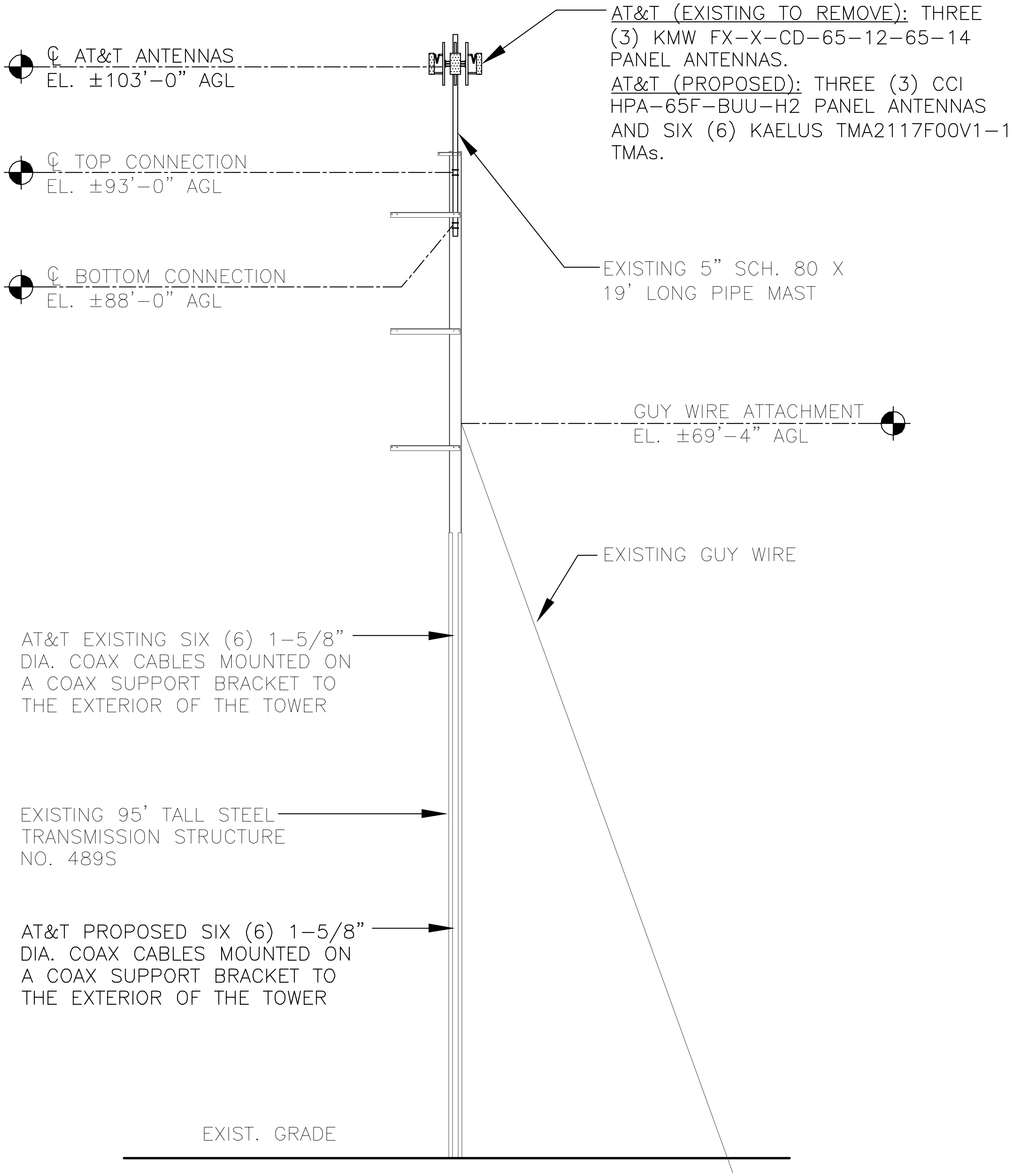
Note: not applicable to guyed structures or frames. These approximate values do not include nonlinear (P-delta) effects or wind on pole. ??

LC #	WC #	Load Case Description	Vert. Load (kips)	Trans. Shear (kips)	Long. Shear (kips)	Resultant Shear (kips)	Trans. Moment (ft-k)	Long. Moment (ft-k)	Resultant Moment (ft-k)
1	1	RULE 250B NA+	8.897	-2.568	0.093	2.569	-267.325	7.546	267.431
2	1	RULE 250B NA-	8.897	-6.786	0.260	6.791	-610.303	20.326	610.641
3	2	RULE 250C NA+	4.671	0.814	-0.047	0.815	32.916	-3.852	33.141
4	2	RULE 250C NA-	4.671	-5.746	0.215	5.750	-496.651	16.168	496.914
5	3	RULE 250D NA+	9.019	-2.327	0.087	2.329	-245.302	6.974	245.401
6	3	RULE 250D NA-	9.019	-4.834	0.185	4.838	-449.897	14.553	450.132
7	1	250B No OLF NA+	5.931	-1.991	0.074	1.992	-200.316	5.890	200.403
8	1	250B No OLF NA-	5.931	-3.678	0.140	3.681	-337.507	11.002	337.687
9	12	Deflection	3.264	-1.185	0.047	1.186	-116.584	3.688	116.643

Basic factored design wind pressure on structure

LC #	WC #	Load Case Description	Trans. Wind Press. (psf)	Long. Wind Press. (psf)	Notes
1	1	RULE 250B NA+	10.0	0.0	
2	1	RULE 250B NA-	-10.0	-0.0	
3	2	RULE 250C NA+	31.2	0.0	Wind adjusted for terrain category 'C' and hgt. 63.33 (ft) (larger of hgt*2/3 and 6.67m)
4	2	RULE 250C NA-	-31.2	-0.0	Wind adjusted for terrain category 'C' and hgt. 63.33 (ft) (larger of hgt*2/3 and 6.67m)
5	3	RULE 250D NA+	4.1	0.0	
6	3	RULE 250D NA-	-4.1	-0.0	
7	1	250B No OLF NA+	4.0	0.0	
8	1	250B No OLF NA-	-4.0	-0.0	
9	12	Deflection	0.0	0.0	

No structure image available (requires PLS-POLE or TOWER structure)



1
EL–1

TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

REVISIONS		
00	11/22/16	ISSUED FOR REVIEW

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63-2 North Branford Road, Branford, CT 06405

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EVERSOURCE 489S

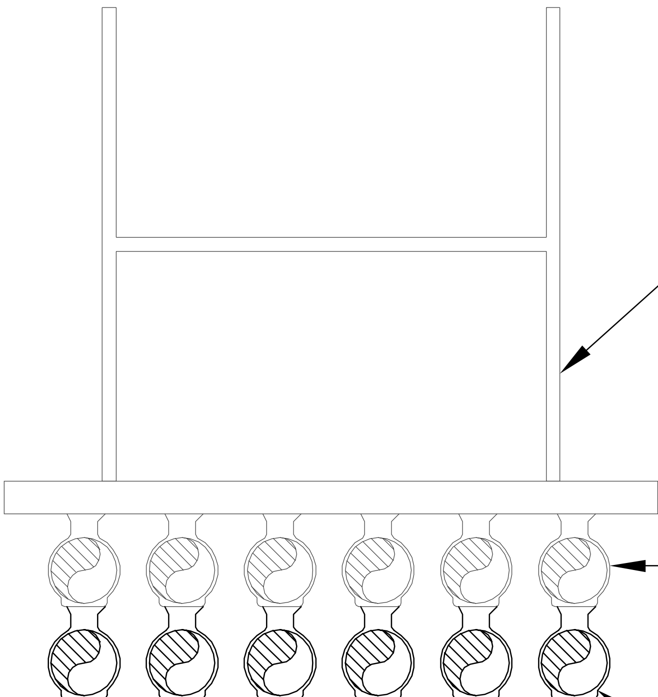
310 ROWAYTON
NORWALK, CT 06853

PROJECT NO:	16071.40
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	11/22/16

TOWER AND MAST ELEVATION

EL-1

DWG. 1 OF 2



1 / FP-1 **FEEDLINE PLAN - TOWER**

SCALE: NOT TO SCALE

REVISIONS		
00	11/22/16	ISSUED FOR REVIEW

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FEEDLINE PLAN

FP-1

DWG. 2 OF 2

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

Wind Speeds

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

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

Input

Structure Type = Structure_Type := Pole (User Input)

Structure Category = SC := III (User Input)

Exposure Category = Exp := C (User Input)

Structure Height = $h := 95$ ft (User Input)

Height to Center of Antennas = $z_{AT\&T} := 103$ ft (User Input)

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

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

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

$K_a := 1.0$ (User Input)

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

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 \text{ if } Structure\_Type = Pole \\ 0.85 \text{ if } Structure\_Type = Lattice \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-G)

Importance Factors =

$$I_{Wind} := \begin{cases} 0.87 \text{ if } SC = 1 \\ 1.00 \text{ if } SC = 2 \\ 1.15 \text{ if } SC = 3 \end{cases} = 1.15$$

(Per Table 2-3 of TIA-222-G)

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

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

$$K_{iz} := \left(\frac{z_{AT\&T}}{33}\right)^{0.1} = 1.121$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.101$$

Velocity Pressure Coefficient =

$$Kz_{AT\&T} := 2.01\left(\left(\frac{z_{AT\&T}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.274$$

Velocity Pressure w/o Ice =

$$qz_{AT\&T} := 0.00256 \cdot K_d \cdot Kz_{AT\&T} \cdot K_{zt} \cdot V^2 \cdot I_{Wind} = 30.806$$

Velocity Pressure with Ice =

$$qz_{ice.AT\&T} := 0.00256 \cdot K_d \cdot Kz_{AT\&T} \cdot K_{zt} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.743$$

Development of Wind & Ice Load on Mast

Mast Data: (Pipe 5" Sch 80) (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 5.56$ in (User Input)

Mast Length = $L_{mast} := 19$ ft (User Input)

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

Mast Aspect Ratio = $Ar_{mast} := \frac{12L_{mast}}{D_{mast}} = 41.0$

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

Wind Load (without ice)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 0.463$ sf/ft

Total Mast Wind Force = $qz_{AT\&T} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 23$ plf **BLC 5**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{iz})}{12} = 0.814$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.AT\&T} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 10$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + t_{iz} \cdot 2)^2 - D_{mast}^{\ 2}\right] = 50.6$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 20$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	CCI HPA-65F-BUU-H2		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 21.4$	in	(User Input)
Antenna Width =	$W_{ant} := 14.4$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 15$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.1$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 6.4$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{AT\&T} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 320$	lbs	**BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 3.3$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 9.9$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.AT\&T} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 124$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 45$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2250$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 3228$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 105$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 314$	lbs	**BLC 3**

Development of Wind & Ice Load on TMA's

TMA Data:

TMA Model =	Kaelus TMA2117F00V1-1		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 8.46$	in	(User Input)
TMA Width =	$W_{TMA} := 11.81$	in	(User Input)
TMA Thickness =	$T_{TMA} := 4.21$	in	(User Input)
TMA Weight =	$WT_{TMA} := 18$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 6$		(User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{T_{TMA}} = 2$		
TMA Force Coefficient =	$Ca_{TMA} = 1.2$		

Wind Load (without ice)

Surface Area for One TMA = $SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.7$ sf

TMA Projected Surface Area = $A_{TMA} := SA_{TMA} \cdot N_{TMA} = 4.2$ sf

Total TMA Wind Force = $F_{TMA} := qz_{AT\&T} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot A_{TMA} = 208$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One TMA w/ Ice = $SA_{ICETMA} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 1.4$ sf

TMA Projected Surface Area w/ Ice = $A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 8.4$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA} := qz_{ice.AT\&T} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot A_{ICETMA} = 106$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All TMA's = $WT_{TMA} \cdot N_{TMA} = 108$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 421$ cu in

Volume of Ice on Each TMA = $V_{ice} := (L_{TMA} + 2 \cdot t_{iz})(W_{TMA} + 2 \cdot t_{iz})(T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 1 \times 10^3$ cu in

Weight of Ice on Each TMA = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 42$ lbs

Weight of Ice on All TMA's = $W_{ICETMA} \cdot N_{TMA} = 250$ lbs **BLC 3**

Development of Wind & Ice Load on Antenna Mounts

Mount Data:

Mount Type:	Pipe Mounts		
Mount Shape =	Round		(User Input)
Pipe Mount Length =	$L_{mnt} := 60$	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)
Mount Bracket Weight =	$W_{b.mnt} := 101$	lbs	(User Input)
Mount Aspect Ratio =	$Ar_{mnt} := \frac{L_{mnt}}{D_{mnt}} = 25$		
Mount Force Coefficient =	$Ca_{mnt} := 1.2$		

Wind Load (without ice)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area = $A_{mnt} := 0.0$ sf

Total Mount Wind Force = $F_{mnt} := qz_{AT\&T} \cdot G_H \cdot Ca_{mnt} \cdot A_{mnt} = 0$ lbs **BLC 5**

Wind Load (with ice)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice = $A_{ICEmnt} := 0.0$ sf

Total Mount Wind Force = $Fi_{mnt} := qz_{ice.AT\&T} \cdot G_H \cdot Ca_{mnt} \cdot A_{ICEmnt} = 0$ lbs **BLC 4**

Gravity Loads (without ice)

Weight Each Pipe Mount = $WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 18$ lbs

Weight of All Mounts = $WT_{mnt} \cdot N_{mnt} + W_{b.mnt} = 156$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Pipe = $V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^2 \cdot L_{mnt} = 266$ cu in

Volume of Ice on Each Pipe = $V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 2 \cdot t_{iz}\right)^2\right] \cdot \left(L_{mnt} + 2 \cdot t_{iz}\right)\right] - V_{mnt} = 2 \times 10^3$ cu in

Weight of Ice each mount (incl, hardware) = $W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot Id = 62$ lbs

Weight of Ice on All Mounts = $W_{ICEmnt} \cdot N_{mnt} + 30 = 216$ lbs **BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type = HELIAX 1-5/8"

Shape = Round (User Input)

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

Coax Cable Length = $L_{coax} := 11$ ft (User Input)

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

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

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

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 66.7$

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

Wind Load (without ice)

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

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{AT\&T} \cdot G_H \cdot A_{coax} = 33$ plf **BLC 5**

Wind Load (with ice)

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

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.AT\&T} \cdot G_H \cdot AICE_{coax} = 13$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot t_{iz})^2 - D_{coax}{}^2\right] = 26.9$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 126$ plf **BLC 3**

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

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

Date: 11/22/16 Prepared by: T.J.L. Checked by: C.F.C. Job No. 16071.40

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

Footnotes:

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

Location: **Norwalk, CT**

Date: 11/22/16   Prepared by: T.J.L.   Checked by: C.F.C.   Job No. 16071.40

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

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

Global

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

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

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

Global, Continued

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct Z	.035
Ct X	.035
T Z (sec)	Not Entered
T X (sec)	Not Entered
R Z	8.5
R X	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Seismic Detailing Code	ASCE 7-05
Om Z	1
Om X	1
Rho Z	1
Rho X	1

Footing Overturning Safety Factor	1.5
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lamda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	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 t...	Lcomp b...	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Mast	19									Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE_5.0X	Beam	Pipe	A53 Gr. B	Typical	5.73	19.5	19.5	39

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design R...
1	M1	BOTTO...	TOP-M...			Mast	Beam	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From ...
1	BOTTOM-MAST	0	0	0	0	
2	BOTTOM-BRACE	0	1	0	0	
3	TOP-BRACE	0	6	0	0	
4	TOP-MAST	0	19	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	BOTTOM-MAST							
2	BOTTOM-BRACE	Reaction	Reaction	Reaction		Reaction		
3	TOP-BRACE	Reaction	Reaction	Reaction		Reaction		

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.045	16
2	M1	Y	-.108	16
3	M1	Y	-.156	16

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.314	16
2	M1	Y	-.25	16
3	M1	Y	-.216	16

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.124	16
2	M1	X	.106	16

Member Point Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.32	16

Member Point Loads (BLC 5 : TIA Wind) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
2	M1	X	.208	16

Joint Loads and Enforced Displacements

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

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.012	-.012	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.02	-.02	0	0
2	M1	Y	-.126	-.126	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.01	.01	0	0
2	M1	X	.013	.013	0	0

Member Distributed Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.023	.023	0	0
2	M1	X	.033	.033	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gravity	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Weight of Appurtenances	None					3	1		
3	Weight of Ice Only	None					3	2		
4	TIA Wind with Ice	None					2	2		
5	TIA Wind	None					2	2		

Load Combinations

	Description	Sol...	PDelta	SR..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact...
1	1.2D + 1.6W	Yes	Y		1	1.2	2	1.2	5	1.6										
2	0.9D + 1.6W	Yes	Y		1	.9	2	.9	5	1.6										
3	1.2D + 1.0Di + 1.0Wi	Yes	Y		1	1.2	2	1.2	3	1	4	1								

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torqu...	LC	y-y Mo...	LC	z-z Mo...	LC
1	M1	1	max	0	1	0	3	0	1	0	1	0	1	0	1
2			min	0	1	0	2	0	1	0	1	0	1	0	1
3		2	max	-.035	2	-.909	3	0	1	0	1	0	1	11.927	1
4			min	-.23	3	-3.337	1	0	1	0	1	0	1	3.257	3
5		3	max	2.897	3	1.707	1	0	1	0	1	0	1	9.643	1
6			min	.547	2	.461	3	0	1	0	1	0	1	2.656	3
7		4	max	2.024	3	1.282	1	0	1	0	1	0	1	2.544	1
8			min	.413	2	.352	3	0	1	0	1	0	1	.723	3
9		5	max	0	1	.013	3	0	1	0	1	0	1	0	1
10			min	0	1	.009	2	0	1	0	1	0	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	0	1	0	3	0	1	0	1	0	1	0	1	0	1
2			min	0	1	0	2	0	1	0	1	0	1	0	1	0	1
3		2	max	-.006	2	-.317	3	0	1	-5.573	3	20.405	1	0	1	0	1
4			min	-.04	3	-1.165	1	0	1	-20.405	1	5.573	3	0	1	0	1
5		3	max	.506	3	.596	1	0	1	-4.543	3	16.498	1	0	1	0	1
6			min	.096	2	.161	3	0	1	-16.498	1	4.543	3	0	1	0	1
7		4	max	.353	3	.447	1	0	1	-1.237	3	4.352	1	0	1	0	1
8			min	.072	2	.123	3	0	1	-4.352	1	1.237	3	0	1	0	1
9		5	max	0	1	.005	3	0	1	0	1	0	1	0	1	0	1
10			min	0	1	.003	2	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	BOTTOM-BR...	max	2.911	1	.643	3	0	1	0	1	0	1	0	1
2		min	.799	3	.099	2	0	1	0	1	0	1	0	1
3	TOP-BRACE	max	-1.466	3	4	3	0	1	0	1	0	1	0	1
4		min	-5.458	1	.717	2	0	1	0	1	0	1	0	1
5	Totals:	max	-.667	3	4.643	3	0	1						
6		min	-2.547	2	.817	2	0	1						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotatio...	LC	Y Rotatio...	LC	Z Rotation...	LC
1	BOTTOM-MA...	max	.049	1	0	2	0	1	0	1	0	1	4.074e-3	1
2		min	.013	3	0	3	0	1	0	1	0	1	1.113e-3	3
3	BOTTOM-BR...	max	0	3	0	2	0	1	0	1	0	1	4.069e-3	1
4		min	0	1	0	3	0	1	0	1	0	1	1.112e-3	3
5	TOP-BRACE	max	0	1	0	2	0	1	0	1	0	1	-2.331e-3	3
6		min	0	3	0	3	0	1	0	1	0	1	-8.535e-3	1
7	TOP-MAST	max	4.151	1	0	2	0	1	0	1	0	1	-9.019e-3	3
8		min	1.14	3	-.002	3	0	1	0	1	0	1	-3.273e-2	1

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

	Member	Shape	Code Check	Loc...	LC	Sh...	Loc[ft]	Dir	LC	phi*Pn..	phi*...	phi*...	phi*...	...	Eqn
1	M1	PIPE_5.0X	.643	6.135	1	.064	5.938		1	82.589	180...	24.9..	24.9...	...	H1...

Joint Reactions

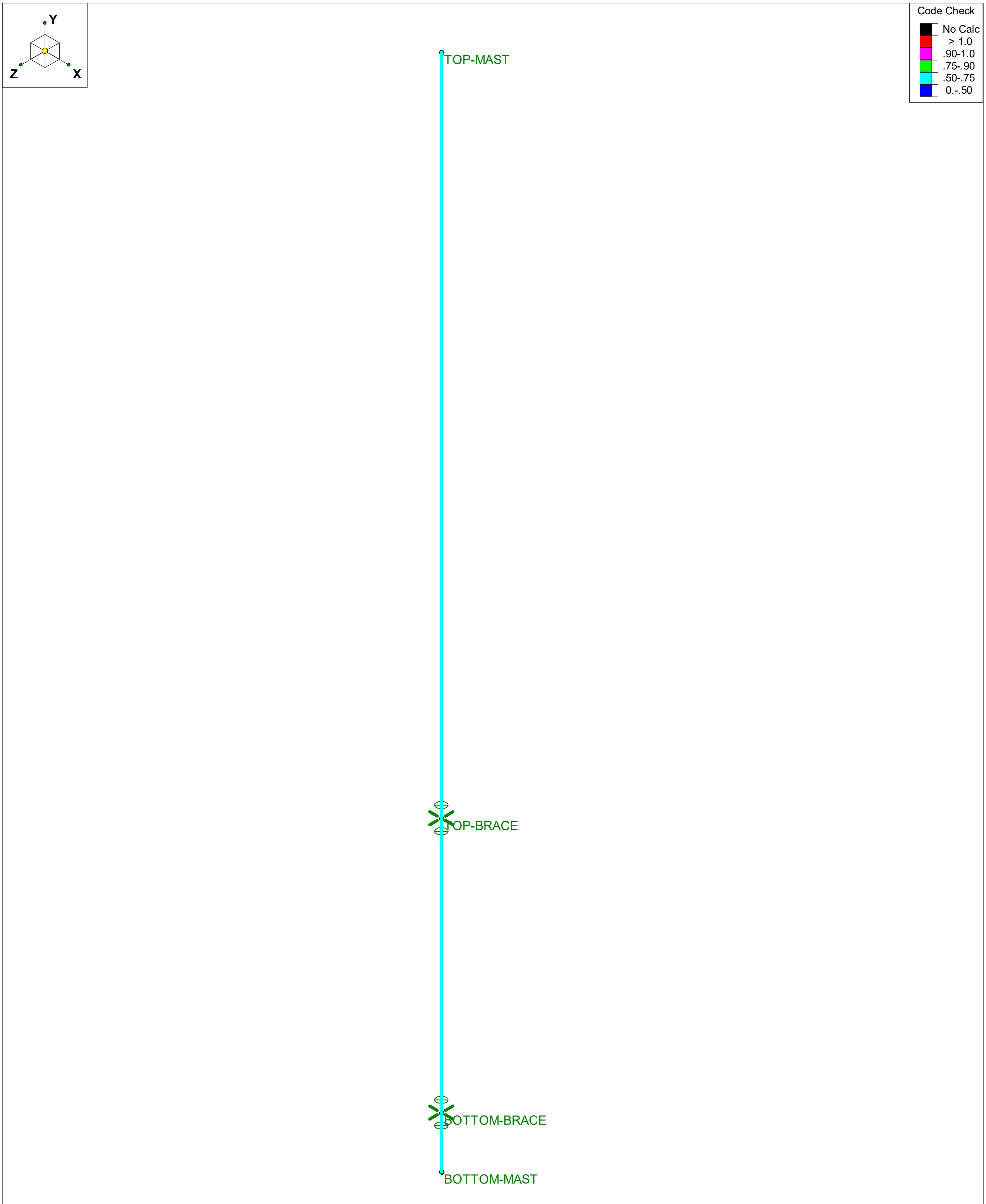
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTTOM-BRACE	2.911	.132	0	0	0	0
2	1	TOP-BRACE	-5.458	.957	0	0	0	0
3	1	Totals:	-2.547	1.089	0			
4	1	COG (ft):	X: 0	Y: 11.713	Z: 0			

Joint Reactions

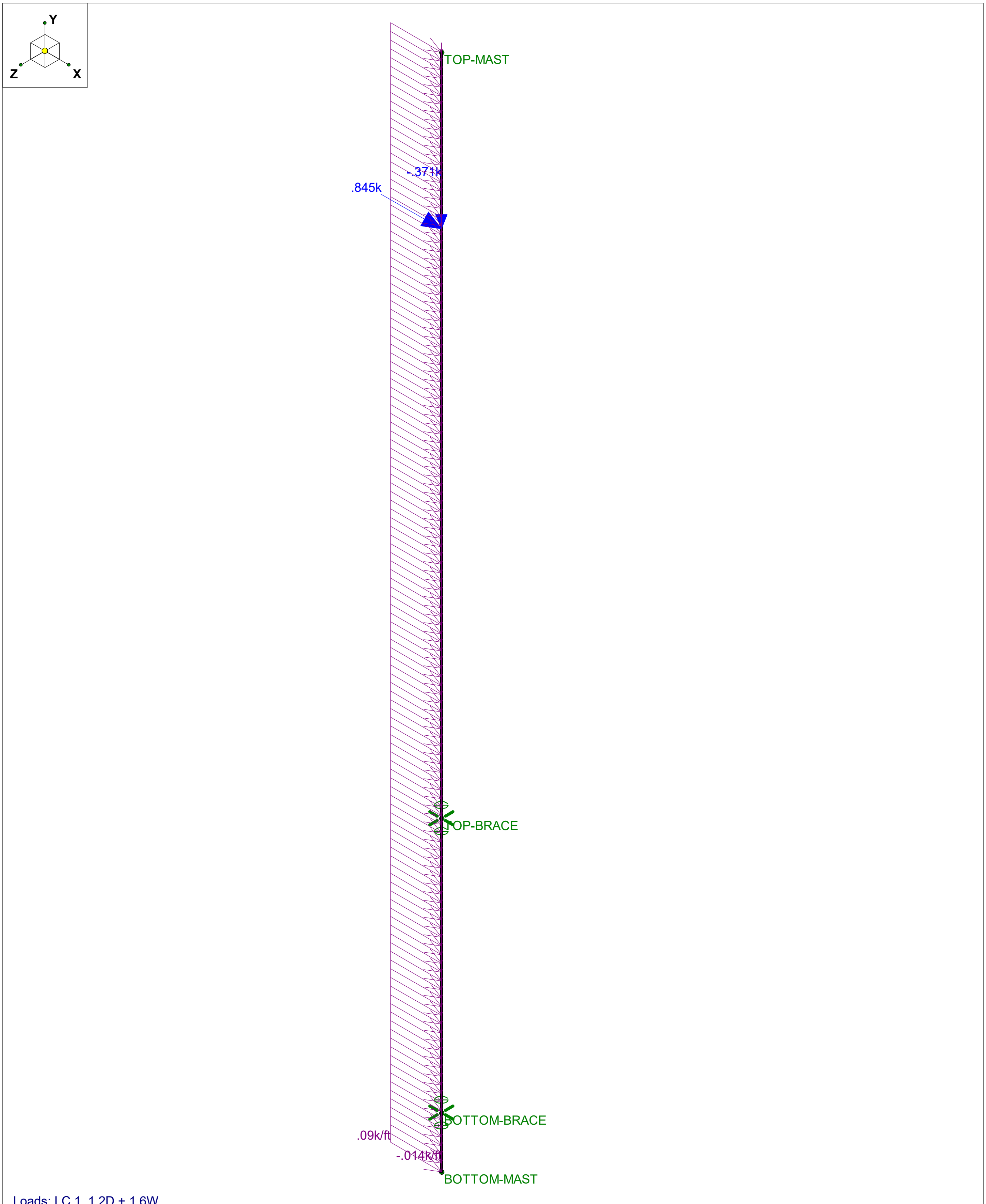
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTTOM-BRACE	2.904	.099	0	0	0	0
2	2	TOP-BRACE	-5.451	.717	0	0	0	0
3	2	Totals:	-2.547	.817	0			
4	2	COG (ft):	X: 0	Y: 11.713	Z: 0			

Joint Reactions

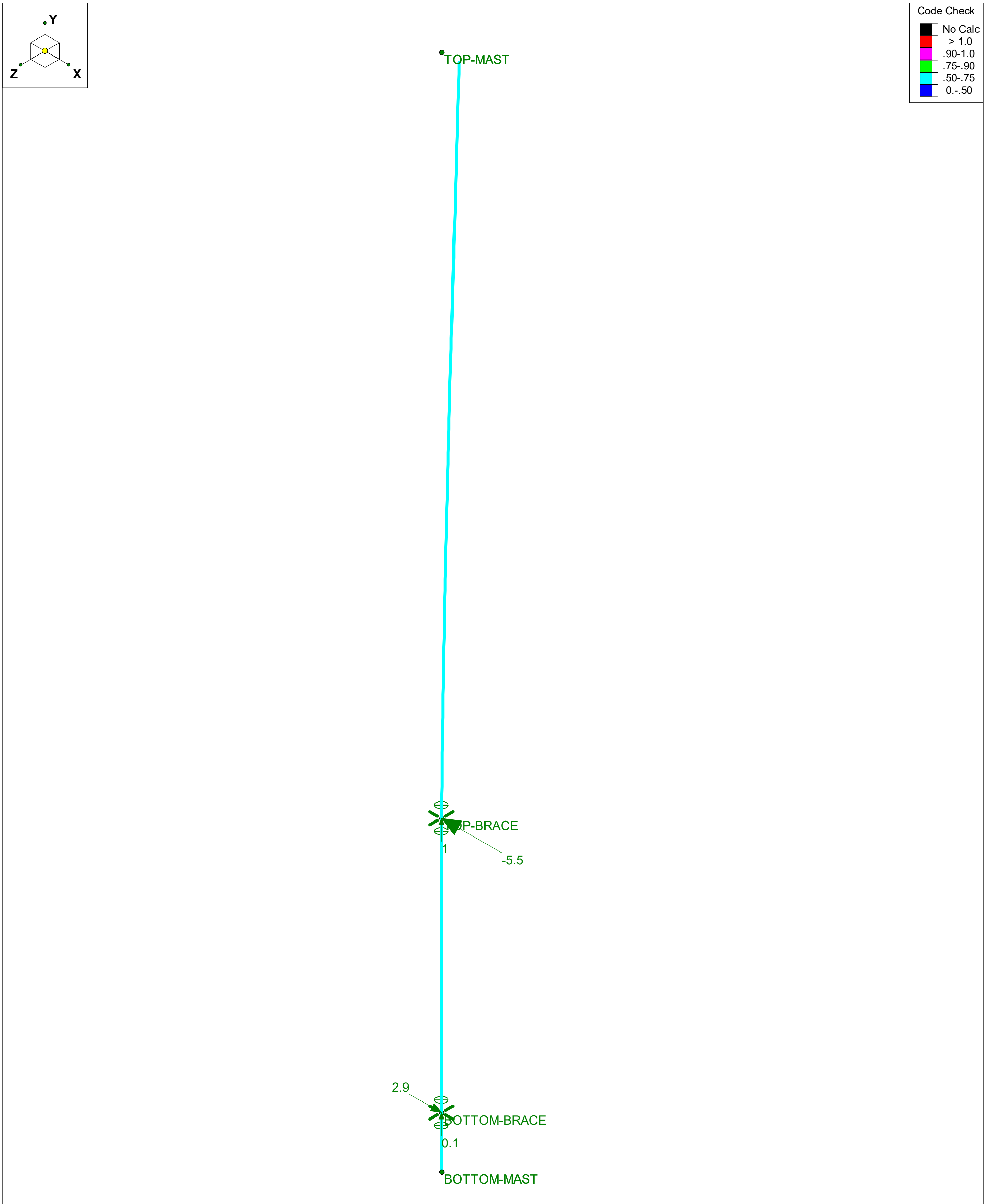
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	BOTTOM-BRACE	.799	.643	0	0	0	0
2	3	TOP-BRACE	-1.466	4	0	0	0	0
3	3	Totals:	-.667	4.643	0			
4	3	COG (ft):	X: 0	Y: 11.111	Z: 0			



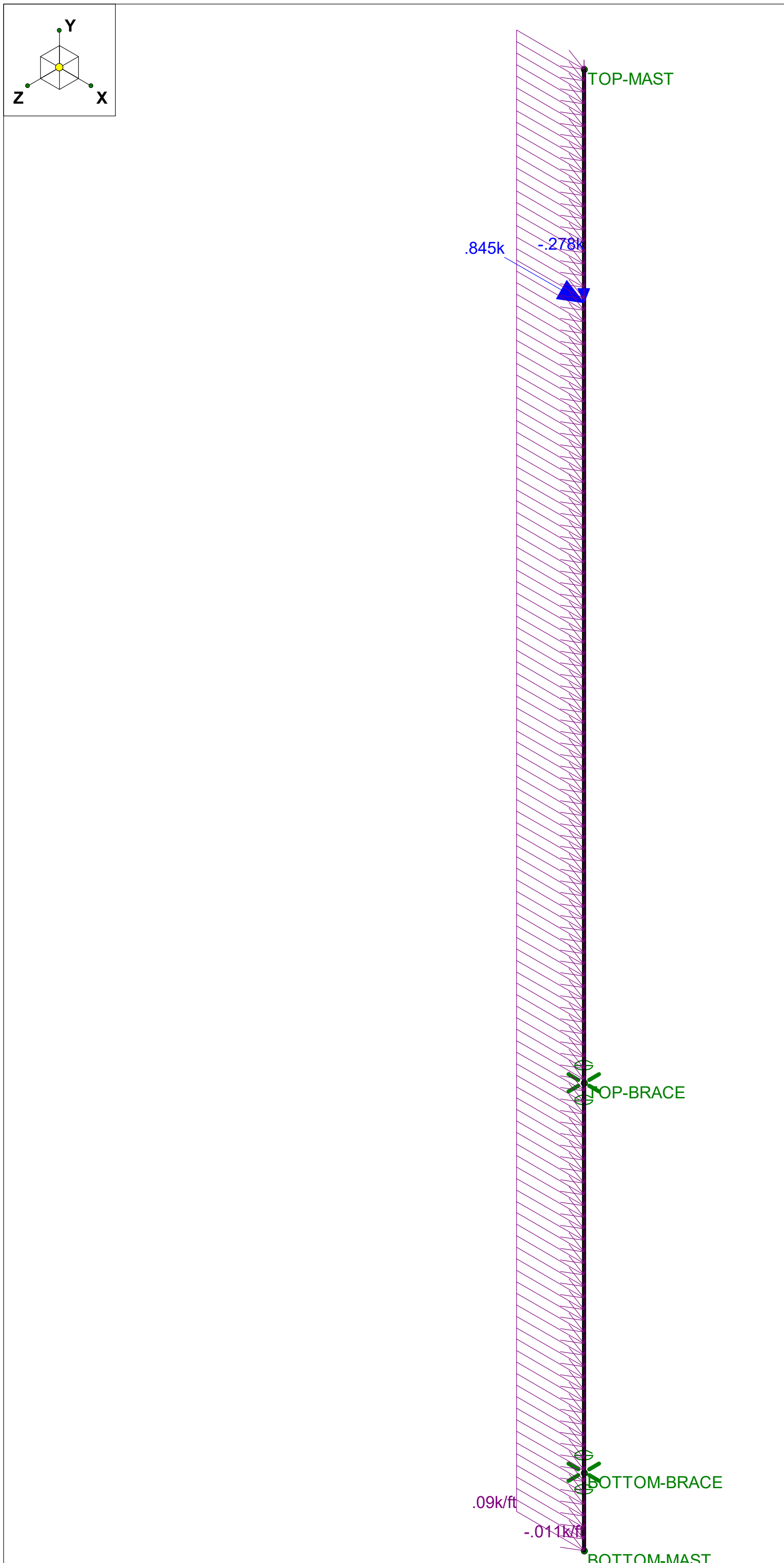
CENTEK Engineering, INC.		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 8:42 AM
16071.40 /AT&T CT5013	Unity Check	TIA.r3d



CENTEK Engineering, INC.		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 8:42 AM
16071.40 /AT&T CT5013	LC #1 Loads	TIA.r3d

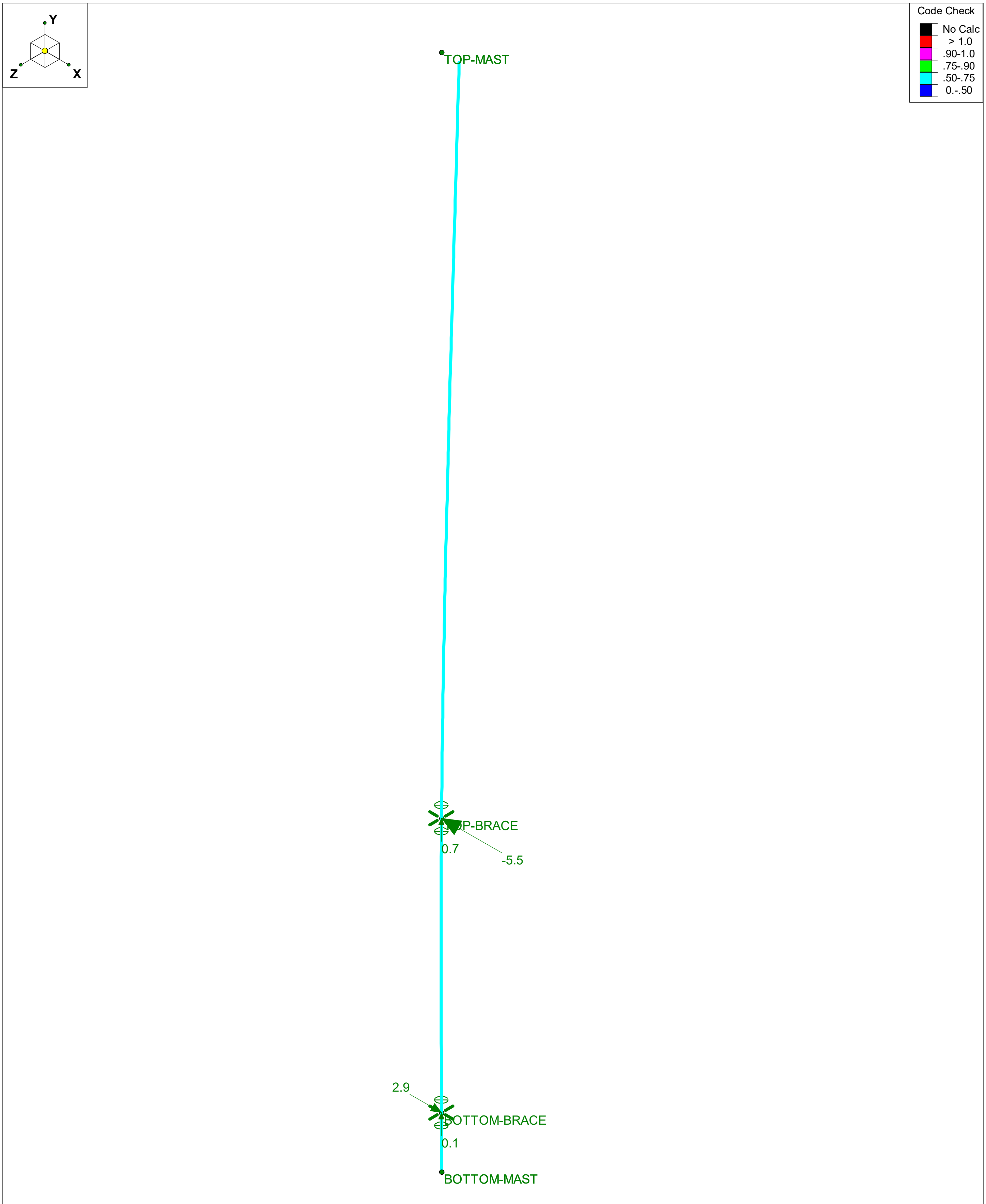


CENTEK Engineering, INC.		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 8:43 AM
16071.40 /AT&T CT5013	LC #1 Reactions and Deflected Shape	TIA.r3d

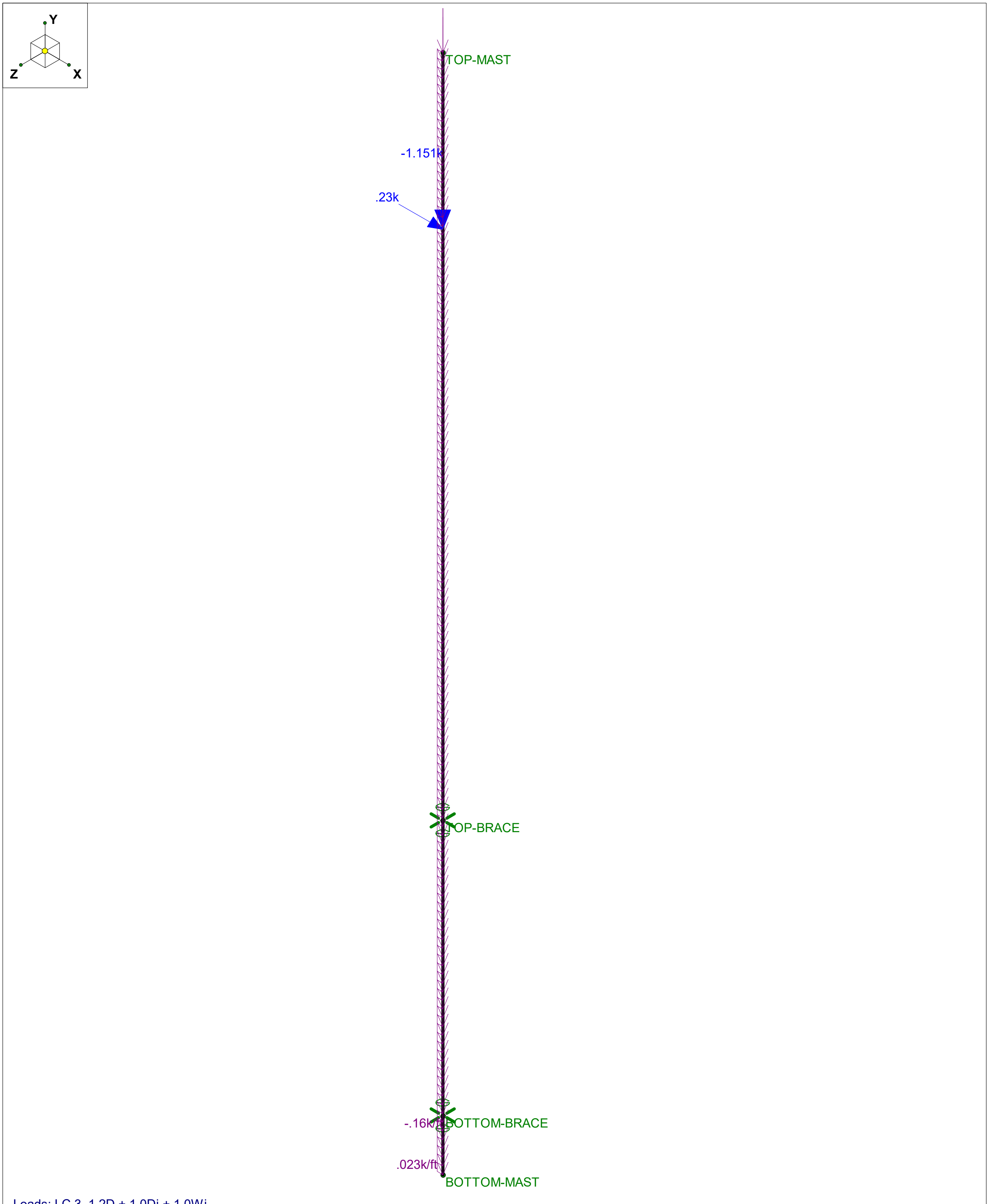


Loads: LC 2, 0.9D + 1.6W

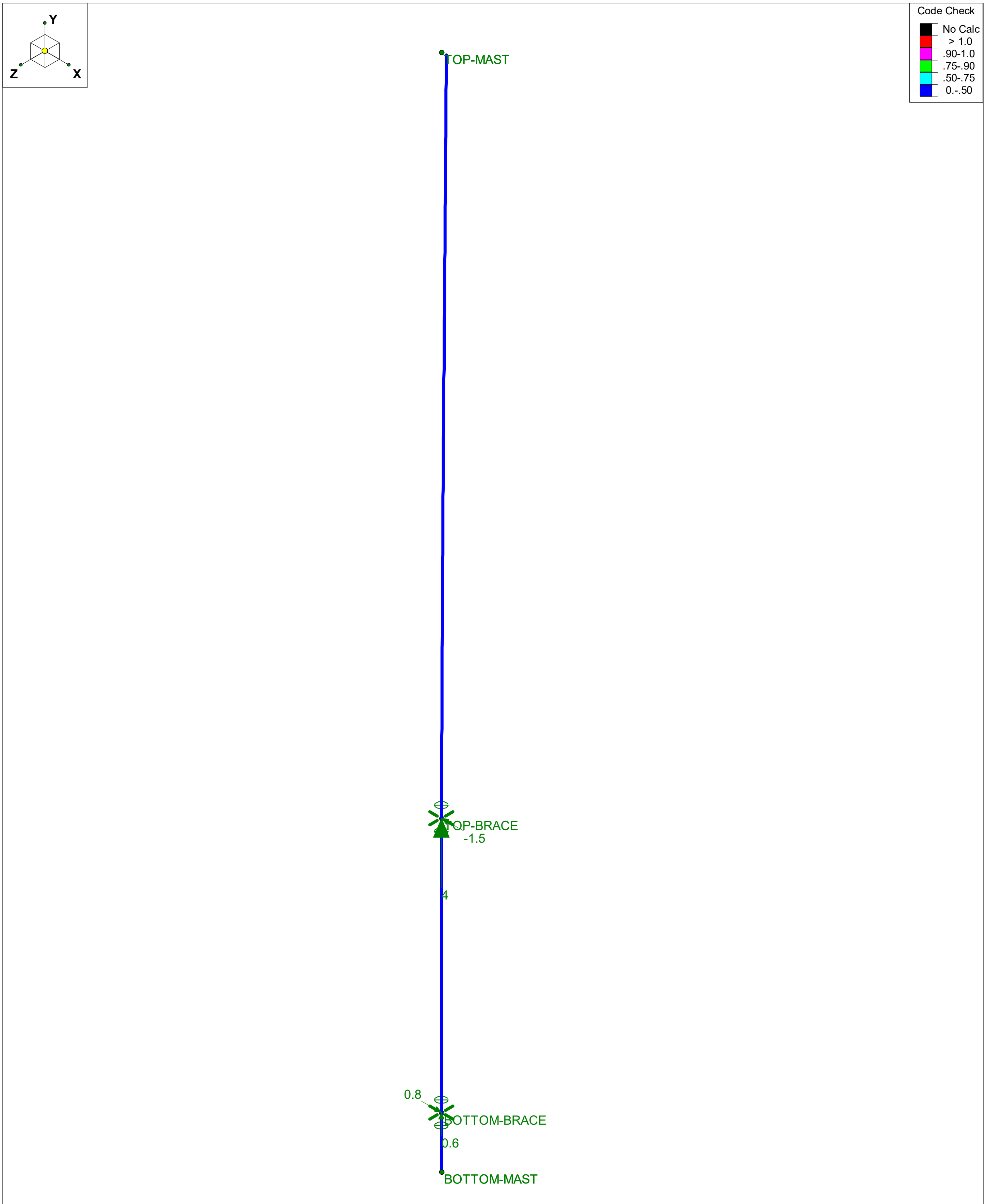
CENTEK Engineering, INC.		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 8:42 AM
16071.40 /AT&T CT5013	LC #2 Loads	TIA.r3d



CENTEK Engineering, INC.		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 8:44 AM
16071.40 /AT&T CT5013	LC #2 Reactions and Deflected Shape	TIA.r3d



CENTEK Engineering, INC.		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 8:42 AM
16071.40 /AT&T CT5013	LC #3 Loads	TIA.r3d



CENTEK Engineering, INC.		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 8:44 AM
16071.40 /AT&T CT5013	LC #3 Reactions and Deflected Shape	TIA.r3d

Mast Connection to Tower:

Reactions:

Moment =	Moment := 0·kips	(Input From Risa-3D)
Vertical =	Vertical := 1.0·kips	(Input From Risa-3D)
Horizontal x-dir =	Horizontal := 5.5·kips	(Input From Risa-3D)

Bolt Data:

Bolt Type =	ASTM A36	(User Input)
Bolt Diameter =	$D := 0.75 \cdot in$	(User Input)
Number of Bolts =	$N_b := 4$ (2 U-Bolts)	(User Input)
Bolt Ultimate Strength =	$F_u := 58 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 36 \cdot ksi$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)

Nominal Bolt Area = $A_b := \frac{1}{4} \cdot \pi \cdot D^2 = 0.442 \cdot in^2$

Design Tensile Strength = $F_{nt} := \phi \cdot 0.75 \cdot F_u \cdot A_b = 14.4 \cdot kips$

Design Shear Strength = $F_{nv} := \phi \cdot 0.45 \cdot F_u \cdot A_b = 8.6 \cdot kips$

Shear Force = $f_v := \frac{\sqrt{Horizontal^2 + Vertical^2}}{N_b} = 1.4 \cdot kips$

Bolt Shear % of Capacity = $\frac{f_v}{F_{nv}} = 16.16 \cdot \%$

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

Bolt_Shear = "OK"

Tension Force = $f_t := \frac{Horizontal}{N_b} = 1.4 \cdot kips$

Bolt Tenison % of Capacity = $\frac{f_t}{F_{nt}} = 9.54 \cdot \%$

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

Bolt_Tension = "OK"

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 110$	mph	(User Input NESC 2007 Figure 250-2(e))
Radial Ice Thickness =	$Ir := 0.50$	in	(User Input)
Radial Ice Density =	$Id := 56.0$	pcf	(User Input)

Factors for Extreme Wind Calculation

Elevation of Top of Mast Above Grade = $TME := 106$ 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 = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.281$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.31$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.847$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.866$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 34.4$ 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 Mast

Mast Data: (Pipe 5" Sch. 80)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 5.56$	in	(User Input)
Mast Length =	$L_{mast} := 19$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.375$	in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 0.463$ sf/ft

Total Mast Wind Force (Above NU Structure) = $qz \cdot Cd_R \cdot A_{mast} \cdot m = 26$ plf **BLC 5**

Total Mast Wind Force (Below NU Structure) = $qz \cdot Cd_R \cdot A_{mast} = 21$ plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 0.547$ sf/ft

Total Mast Wind Force w/ Ice = $p \cdot Cd_R \cdot AICE_{mast} = 3$ 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 = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^{\,2}\right] = 9.5$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 4$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	CCI HPA-65F-BUU-H2		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 21.4$	in	(User Input)
Antenna Width =	$W_{ant} := 14.4$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 15$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.1$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 6.4$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 441$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 2.4$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 7.2$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 46$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 45$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2250$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 614$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 20$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 60$ lbs **BLC 3**

Development of Wind & Ice Load on TMA's

TMA Data:

TMA Model =	Kaelus TMA2117F00V1-1		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 8.46$	in	(User Input)
TMA Width =	$W_{TMA} := 11.81$	in	(User Input)
TMA Thickness =	$T_{TMA} := 4.21$	in	(User Input)
TMA Weight =	$WT_{TMA} := 18$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 6$		(User Input)

Wind Load (NESC Extreme)

Surface Area for One TMA =	$SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.7$	sf	
TMA Projected Surface Area =	$A_{TMA} := SA_{TMA} \cdot N_{TMA} = 4.2$	sf	
Total TMA Wind Force =	$F_{TMA} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 286$	lbs	**BLC 5**

Wind Load (NESC Heavy)

Surface Area for One TMA w/ Ice =	$SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 0.8$	sf	
TMA Projected Surface Area w/ Ice =	$A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 5$	sf	
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := p \cdot Cd_F \cdot A_{ICETMA} = 32$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All TMA's =	$WT_{TMA} \cdot N_{TMA} = 108$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 421$	cu in	
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1)(T_{TMA} + 1) - V_{TMA} = 211$	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	$W_{ICETMA} \cdot N_{TMA} = 41$	lbs	**BLC 3**

Development of Wind & Ice Load on Antenna Mounts

Mount Data:

Mount Type:	Pipe Mounts		
Mount Shape =	Round		(User Input)
Pipe Mount Length =	$L_{mnt} := 60$	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 Sector Chain Mount Weight =	$W_{tsc.mnt} := 101$	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)

Weight Each Pipe Mount = $WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 18$ lbs

Weight of All Mounts = $WT_{mnt} \cdot N_{mnt} + W_{tsc.mnt} = 156$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Pipe = $V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^{\,2} \cdot L_{mnt} = 266$ cu in

Volume of Ice on Each Pipe = $V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 1\right)^2\right] \cdot \left(L_{mnt} + 1\right)\right] - V_{mnt} = 280$ cu in

Weight of Ice each mount (incl, hardware) = $W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot Id = 9$ lbs

Weight of Ice on All Mounts = $W_{ICEmnt} \cdot N_{mnt} + 5 = 32$ lbs **BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type = HELIAX 1-5/8"

Shape = Round (User Input)

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

Coax Cable Length = $L_{coax} := 8$ ft (User Input)

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

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

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

Wind Load (NESC Extreme)

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

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 21$ plf **BLC 5**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.4$ ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 2$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Load (ice only)

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

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

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

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

Date: 11/22/16 Prepared by: T.J.L. Checked by: C.F.C. Job No. 16071.40

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

Footnotes:

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Subject: **Analysis of NESC Heavy Wind and NESC Extreme Wind for Obtaining Reactions Applied to Utility Pole**
Load Combinations Table
Location: **Norwalk, CT**
Date: 11/22/16 Prepared by: T.J.L. Checked by: C.F.C. Job No. 16071.40

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

Footnotes:
(1) BLC = Basic Load Case

Global

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

Hot Rolled Steel Code	AISC 9th: ASD
RISAConnection Code	AISC 14th(360-10): 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: ASD
Aluminum Code	AA ADM1-05: ASD - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

Global, Continued

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct Z	.035
Ct X	.035
T Z (sec)	Not Entered
T X (sec)	Not Entered
R Z	8.5
R X	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Seismic Detailing Code	ASCE 7-05
Om Z	1
Om X	1
Rho Z	1
Rho X	1

Footing Overturning Safety Factor	1.5
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lamda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	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	Leng...	Lbyy[ft]	Lbzz[ft]	Lcomp ...	Lcomp ...	Kyy	Kzz	Cm...	Cm...	Cb	y s...	z s...	Functi...
1	M1	Mast	19												Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE_5.0X	Column	Pipe	A53 Gr. B	Typical	5.73	19.5	19.5	39

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design R...
1	M1	BOTTO...	TOP-M...			Mast	Column	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From ...
1	BOTTOM-MAST	0	0	0	0	
2	BOTTOM-BRACE	0	1	0	0	
3	TOP-BRACE	0	6	0	0	
4	TOP-MAST	0	19	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	BOTTOM-BRACE	Reaction	Reaction	Reaction		Reaction		
2	TOP-BRACE	Reaction	Reaction	Reaction		Reaction		

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.045	16
2	M1	Y	-.108	14
3	M1	Y	-.156	16

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.06	16
2	M1	Y	-.041	14
3	M1	Y	-.032	16

Member Point Loads (BLC 4 : NESC Heavy Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.046	16
2	M1	X	.032	14

Member Point Loads (BLC 5 : NESC Extreme Wind)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.441	16
2	M1	X	.286	14

Joint Loads and Enforced Displacements

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

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.012	-.012	8	14

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

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.004	-.004	0	0
2	M1	Y	-.018	-.018	8	14

Member Distributed Loads (BLC 4 : NESC Heavy Wind)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.003	.003	8	14
2	M1	X	.002	.002	8	14

Member Distributed Loads (BLC 5 : NESC Extreme Wind)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.026	.026	8	14
2	M1	X	.021	.021	8	14

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gravity	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Weight of Appurtenances	None					3	1		
3	Weight of Ice Only	None					3	2		
4	NESC Heavy Wind	None					2	2		
5	NESC Extreme Wind	None					2	2		

Load Combinations

	Description	Sol...	PDelta	SR..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact..	BLC	Fact...
1	NESC Heavy Wind on PC...	Yes			1	1.5	2	1.5	3	1.5	4	2.5								
2	NESC Extreme Wind on P...	Yes			1	1	2	1	5	1										
3	Self Weight				1	1														

Envelope Joint Reactions

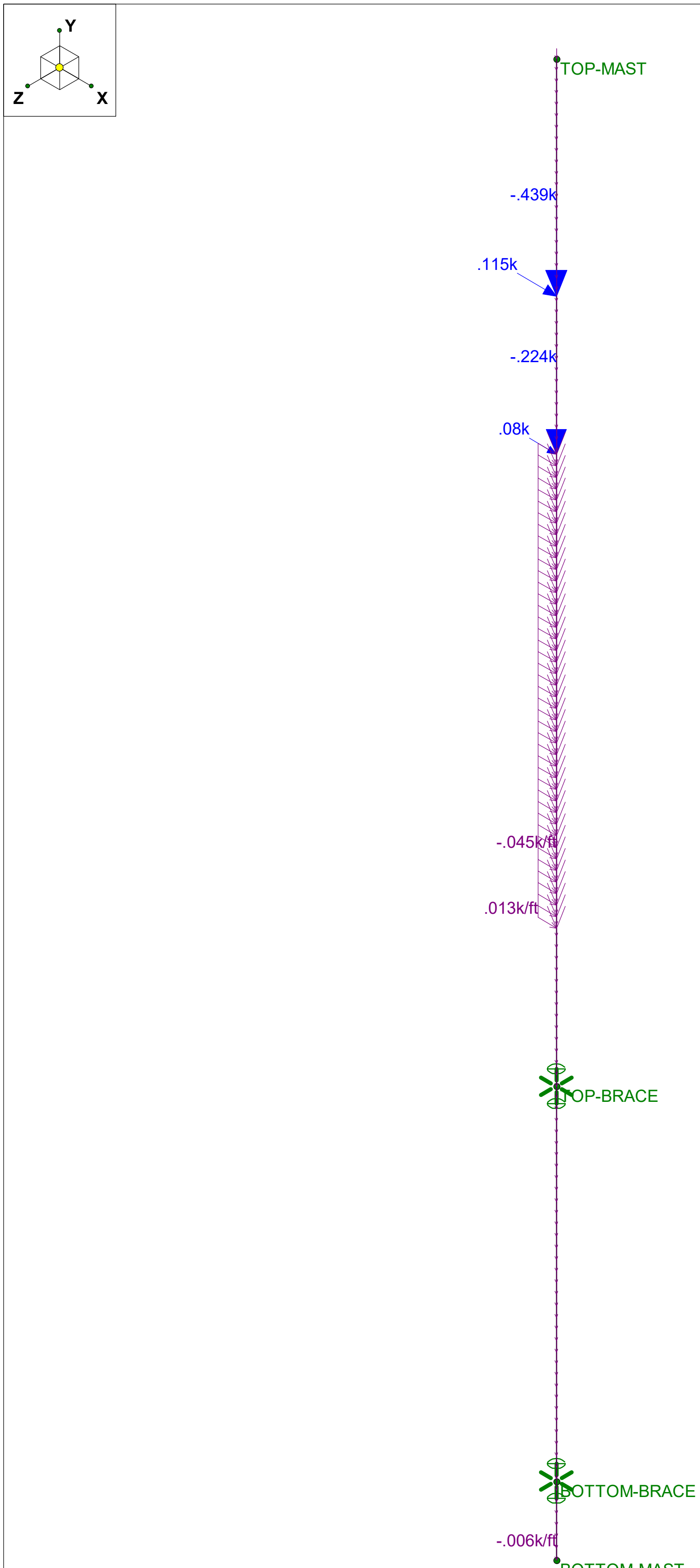
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	BOTTOM-BR...	max	1.622	2	.123	1	0	1	0	1	0	1	0	1
2		min	.433	1	.068	2	0	1	0	1	0	1	0	1
3	TOP-BRACE	max	-.703	1	1.479	1	0	1	0	1	0	1	0	1
4		min	-2.631	2	.683	2	0	1	0	1	0	1	0	1
5	Totals:	max	-.27	1	1.603	1	0	1						
6		min	-1.009	2	.751	2	0	1						

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTTOM-BRACE	.433	.123	0	0	0	0
2	1	TOP-BRACE	-.703	1.479	0	0	0	0
3	1	Totals:	-.27	1.603	0			
4	1	COG (ft):	X: 0	Y: 12.163	Z: 0			

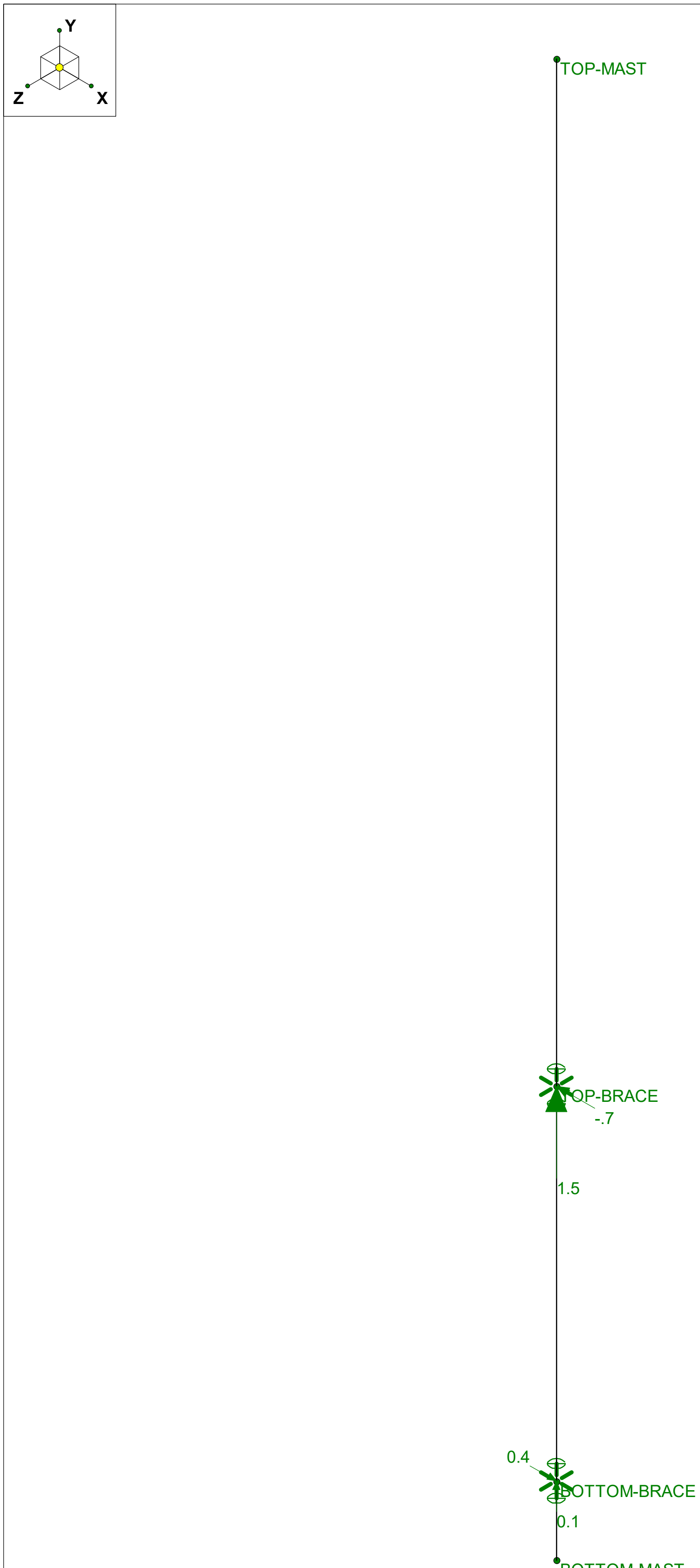
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTTOM-BRACE	1.622	.068	0	0	0	0
2	2	TOP-BRACE	-2.631	.683	0	0	0	0
3	2	Totals:	-1.009	.751	0			
4	2	COG (ft):	X: 0	Y: 12.029	Z: 0			



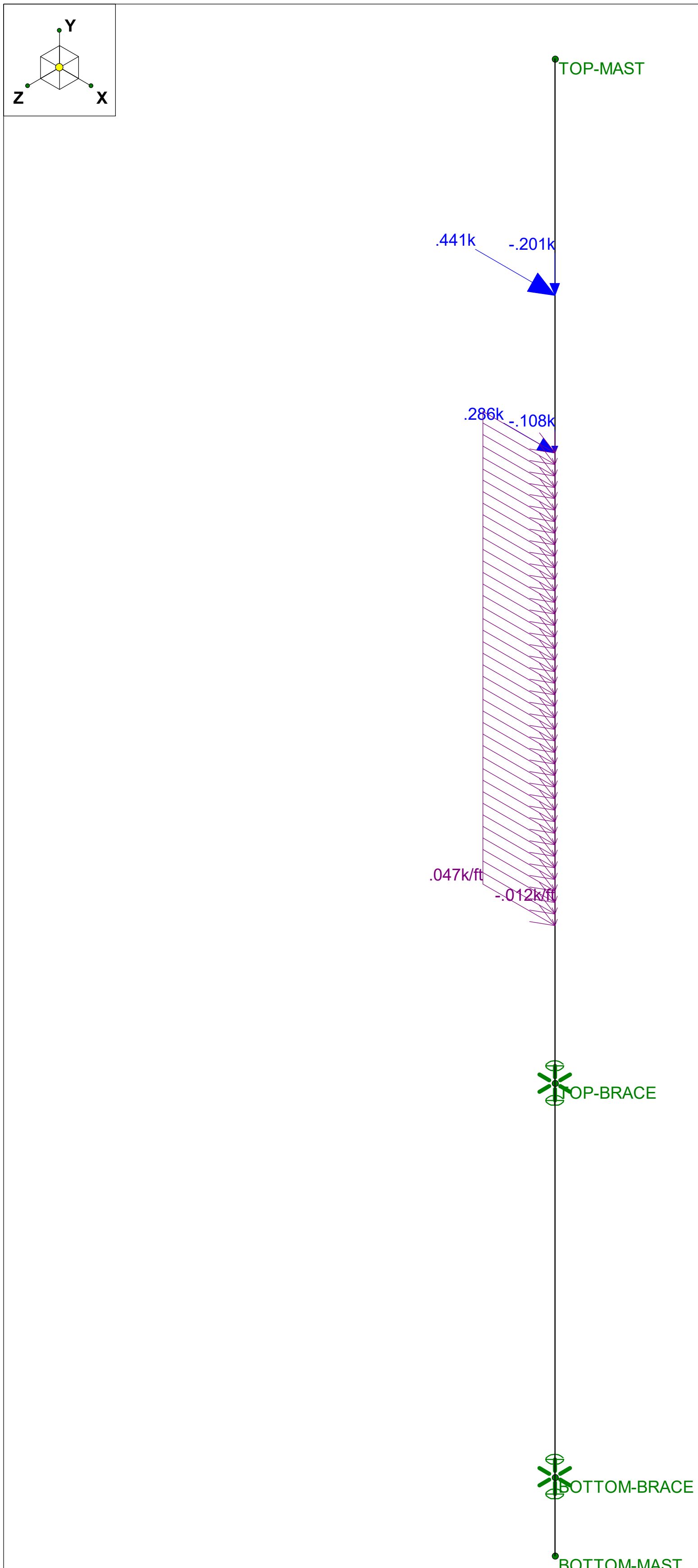
Loads: LC 1, NESC Heavy Wind on PCS Structure

Centek Engineering		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 1:48 PM
16071.40 / AT&T CT5013	LC #1 Loads	NESC.r3d



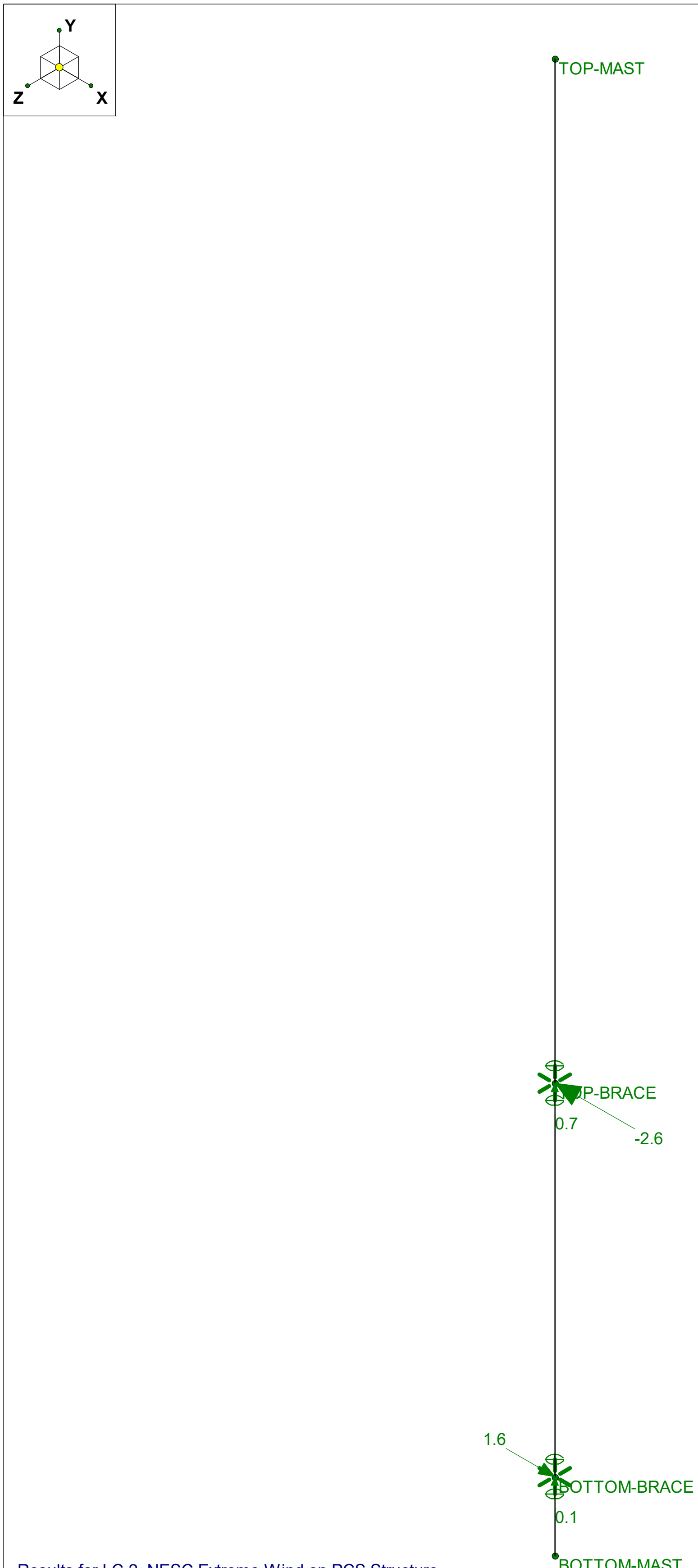
Results for LC 1, NESC Heavy Wind on PCS Structure
Z-direction Reaction Units are k and k-ft

Centek Engineering		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 1:50 PM
16071.40 / AT&T CT5013	LC #1 Reactions	NESC.r3d



Loads: LC 2, NESC Extreme Wind on PCS Structure

Centek Engineering		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 1:48 PM
16071.40 / AT&T CT5013	LC #2 Loads	NESC.r3d



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

Centek Engineering		
tjl, cfc	Structure # 489S Mast	Nov 22, 2016 at 1:50 PM
16071.40 / AT&T CT5013	LC #2 Reactions	NESC.r3d

Title Block Line 1
You can changes this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Title : CT5013 - Rowayton
Job # 11009.CO10
Dsgnr:
Project Desc.: Section Properties - Wf14x87 Reinforced

Project Notes :

Printed: 5 JUL 2011, 2:42PM

General Section Properties

ENERCALC, INC. 1983-2008, Ver: 6.0.19, N:33918

Lic. # : KW-06007028
License Owner : NATCOMM LLC

Description : WF14x87 Reinforced

Final Section Properties

Total Area : 40.0 in^2

Calculated final C.G. distance from Datum :

X cg Dist. : 0.0 in
Y cg Dist. : 0.0 in

Edge Distances from CG. :

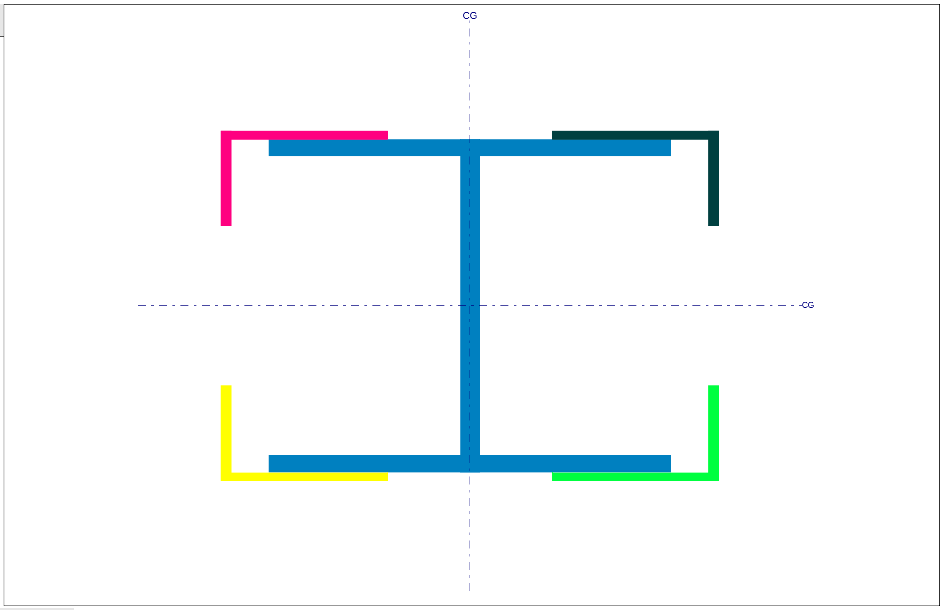
+X : 8.980 in
-X : -8.980 in
+Y : 7.3680 in
-Y : -7.3680 in

Ixx = : 1,584.29 in^4
Iyy = : 1,121.0 in^4

Sxx : -X : 215.023 in^3
Sxx : +X : 215.023 in^3

Syy : -Y : 124.833 in^3
Syy : +Y : 124.833 in^3

r xx : 6.2934 in
r yy : 5.2939 in



Steel Shapes

WF14x87 : 1		Ixx =	966.900 in^4	Rotation =	0 dec CCW
	Area =	25.560 in^2	Iyy =	349.700 in^4	Xcg =	0.000 in
	Height	14.500 in	Sxx =	138.129 in^3	Ycg =	0.000 in
	Width	14.000 in	Syy =	48.234 in^3		
L6X4X3/8 : 2			Ixx =	4.860 in^4	Rotation =	270 dec CCW
	Area =	3.610 in^2	Iyy =	13.400 in^4	Xcg =	-7.050 in
	Height	6.000 in	Sxx =	14.362 in^3	Ycg =	6.435 in
	Width	4.000 in	Syy =	2.518 in^3		
L6X4X3/8 : 3			Ixx =	4.860 in^4	Rotation =	90 dec CCW
	Area =	3.610 in^2	Iyy =	13.400 in^4	Xcg =	7.050 in
	Height	6.000 in	Sxx =	14.362 in^3	Ycg =	6.435 in
	Width	4.000 in	Syy =	2.518 in^3		
L6X4X3/8 : 4			Ixx =	4.860 in^4	Rotation =	270 dec CCW
	Area =	3.610 in^2	Iyy =	13.400 in^4	Xcg =	-7.050 in
	Height	6.000 in	Sxx =	14.362 in^3	Ycg =	-6.435 in
	Width	4.000 in	Syy =	2.518 in^3		
L6X4X3/8 : 5			Ixx =	4.860 in^4	Rotation =	90 dec CCW
	Area =	3.610 in^2	Iyy =	13.400 in^4	Xcg =	7.050 in
	Height	6.000 in	Sxx =	14.362 in^3	Ycg =	-6.435 in
	Width	4.000 in	Syy =	2.518 in^3		

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 110$	mph	(User Input NESC 2007 Figure 250-2(e))
Radial Ice Thickness =	$Ir := 0.50$	in	(User Input)
Radial Ice Density =	$Id := 56.0$	pcf	(User Input)

Factors for Extreme Wind Calculation

Elevation of Top of Pole Above Grade =	$TME := 95$	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 = $Kz := 2.01\cdot\left(\frac{0.67TME}{900}\right)^{\frac{2}{9.5}} = 1.151$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346\left[\frac{33}{(0.67\cdot TME)}\right]^{\frac{1}{7}} = 0.315$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375\cdot\frac{TME}{220}\right)} = 0.861$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7\cdot Es\cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.875$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256\cdot Kz\cdot V^2\cdot Grf\cdot I = 31.2$ 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:

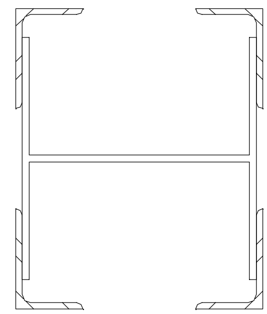
NESC Heavy Loading =	**2.5**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis

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 CL&P Pole: (0' - 59' AGL)

Existing Pole Data: W14x87 + (4) L 6x4x3/8



Pole Shape =	Flat		(User Input)
Pole Width Exposed to Wind =	$W_{pole} := 18.0$	in	(User Input)
Pole Section Length =	$L_{pole} := 59.0$	ft	(User Input)
Wide Flange Beam Dimension:			
Flange Width =	$bf := 14.5$	in	(User Input)
Beam Depth "d" =	$d := 14.0$	in	(User Input)
Flange Thickness =	$tf := 0.688$	in	(User Input)
Web Thickness =	$tw := 0.420$	in	(User Input)
Angle Dimensions:			
Length of 1 Leg =	$L1 := 6$	in	(User Input)
Length of Other Leg =	$L2 := 4$	in	(User Input)
Angle Thickness =	$Ta := 0.375$	in	(User Input)
Number of Angles =	$Na := 4$	in	(User Input)

Wind Load (NESC Extreme)

Pole Projected Surface Area = $A_{pole} := \frac{W_{pole}}{12} = 1.5$ sf/ft

Total Pole Wind Force = $qz \cdot Cd_F \cdot A_{pole} = 75$ plf **BLC 5**

Wind Load (NESE Heavy)

Pole Projected Surface Area w/ Ice = $AICE_{pole} := \frac{(W_{pole} + 2 \cdot Ir)}{12} = 1.583$ sf/ft

Total Pole Wind Force w/ Ice = $p \cdot Cd_F \cdot AICE_{pole} = 10$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Cross Sectional Area of WF = $As := 2 \cdot bf \cdot tf + (d - 2 \cdot tf) \cdot tw = 25.254$ sq in

Area of 1 Angle = $Aa := L1 \cdot Ta + (L2 - Ta) \cdot Ta = 3.609$ sq in

Cross Sectional Area of WF + Ice = $Asi := 2 \cdot [(bf + 2 \cdot Ir) \cdot (tf + 2 \cdot Ir)] + [d - 2 \cdot (tf + Ir)] \cdot (tw + 2 \cdot Ir) = 68.834$ sq in

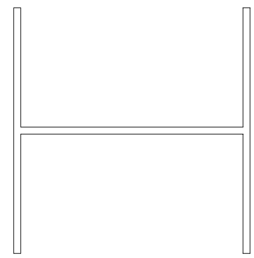
Area of 1 Angle + Ice = $Aai := (L1 + 2 \cdot Ir) \cdot (Ta + 2 \cdot Ir) + (L2 - Ta - Ir) \cdot (Ta + 2 \cdot Ir) = 13.922$ sq in

Ice Area per Linear Foot = $Ai_{ICEpole} := Asi - As + 4 \cdot (Aai - Aa) = 84.8$ sq in

Weight of Ice on Pole = $W_{ICEpole} := Id \cdot \frac{Ai_{ICEpole}}{144} = 33$ plf **BLC 3**

Development of Wind & Ice Load on CL&P Pole: (59' - 95' AGL)

Existing Pole Data: W14x87



Pole Shape =	Flat		(User Input)
Pole Width Exposed to Wind =	$W_{pole} := 14.5$	in	(User Input)
Pole Section Length =	$L_{pole} := 36.0$	ft	(User Input)
Flange Width =	$bf := 14.5$	in	(User Input)
Beam Depth "d" =	$d := 14.0$	in	(User Input)
Flange Thickness =	$tf := 0.688$	in	(User Input)
Web Thickness =	$tw := 0.420$	in	(User Input)

Wind Load (NESC Extreme)

Pole Projected Surface Area (per LF) = $A_{pole} := \frac{W_{pole}}{12} = 1.208$ sfft

Total Pole Wind Force = $qz \cdot Cd_F \cdot A_{pole} = 60$ plf **BLC 5**

Wind Load (NESE Heavy)

Pole Projected Surface Area w/ Ice = $AICE_{pole} := \frac{(W_{pole} + 2 \cdot Ir)}{12} = 1.292$ sfft

Total Pole Wind Force w/ Ice = $p \cdot Cd_F \cdot AICE_{pole} = 8$ plf **BLC 4**

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Cross Sectional Area of Steel = $As := 2 \cdot bf \cdot tf + (d - 2 \cdot tf) \cdot tw = 25.254$ sq in

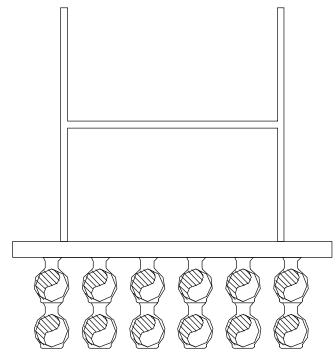
Cross Sectional Area of Steel + Ice = $Asi := 2 \cdot [(bf + 2 \cdot Ir) \cdot (tf + 2 \cdot Ir)] + [d - 2 \cdot (tf + Ir)] \cdot (tw + 2 \cdot Ir) = 68.834$

Ice Area per Linear Foot = $Ai_{ICEpole} := Asi - As = 43.6$ sq in

Weight of Ice on Pole = $W_{ICEpole} := Id \cdot \frac{Ai_{ICEpole}}{144} = 17$ plf **BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:



Coax Type =	HELIAX 1-5/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)
Coax Cable Length =	$L_{coax} := 95$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 12$		(User Input)
No. of Coax Projecting Outside Face of Pole =	$NP_{coax} := 2$		(User Input)

Wind Load (NESC Extreme)

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

Total Coax Wind Force (Below NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 15$ plf **BLC 5**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.4$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 2$ plf **BLC 4**

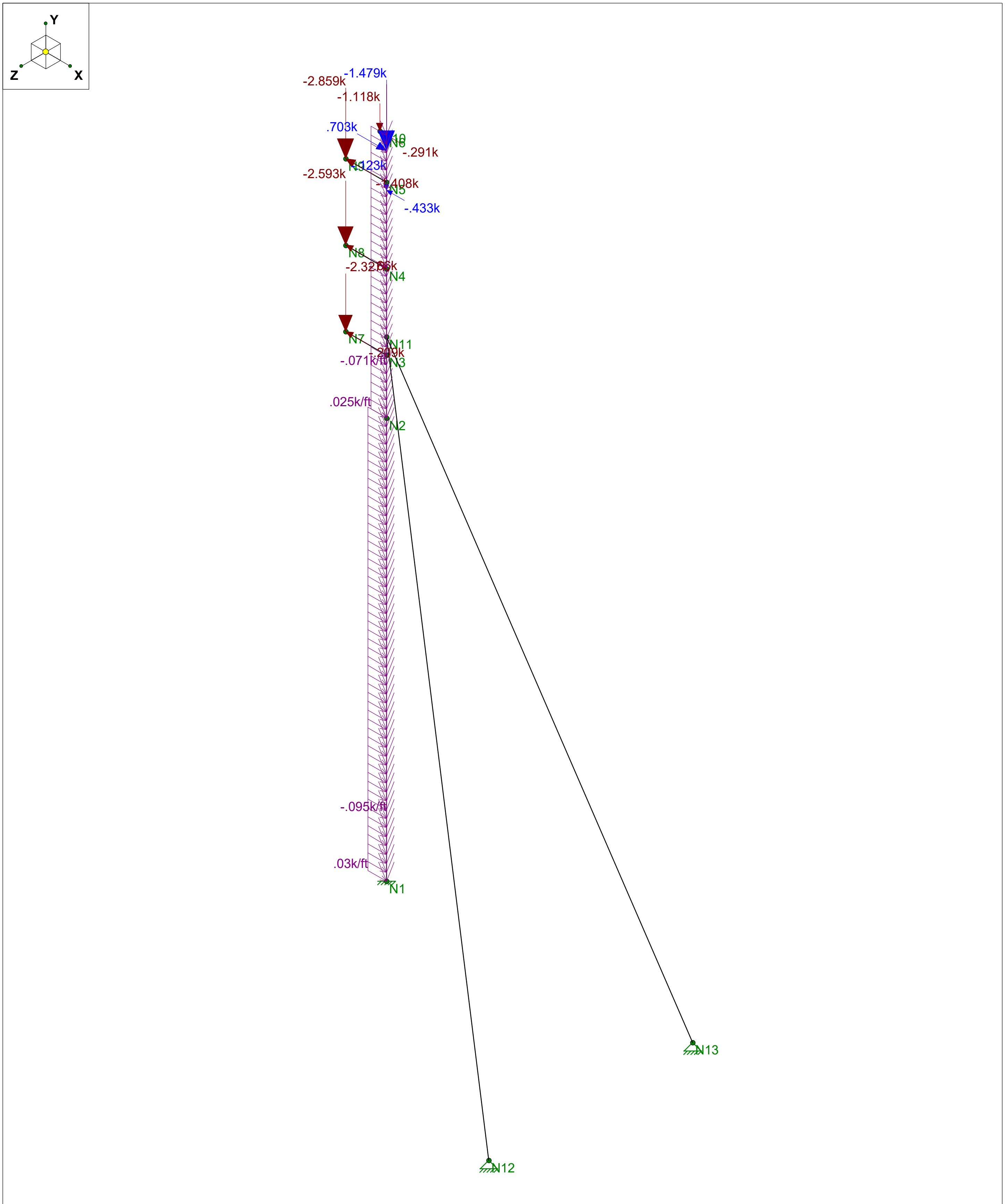
Gravity Loads (without ice)

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

Gravity Load (ice only)

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

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

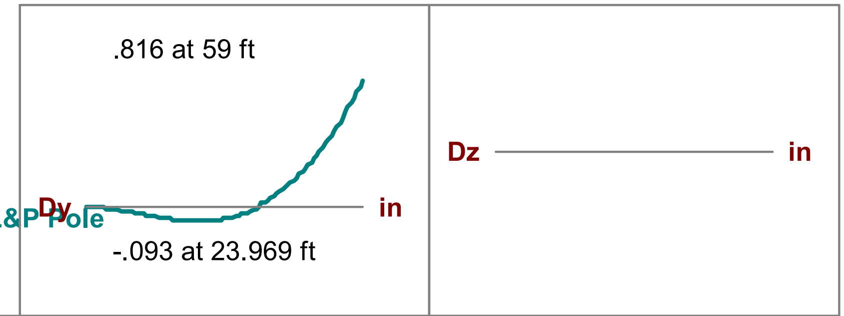


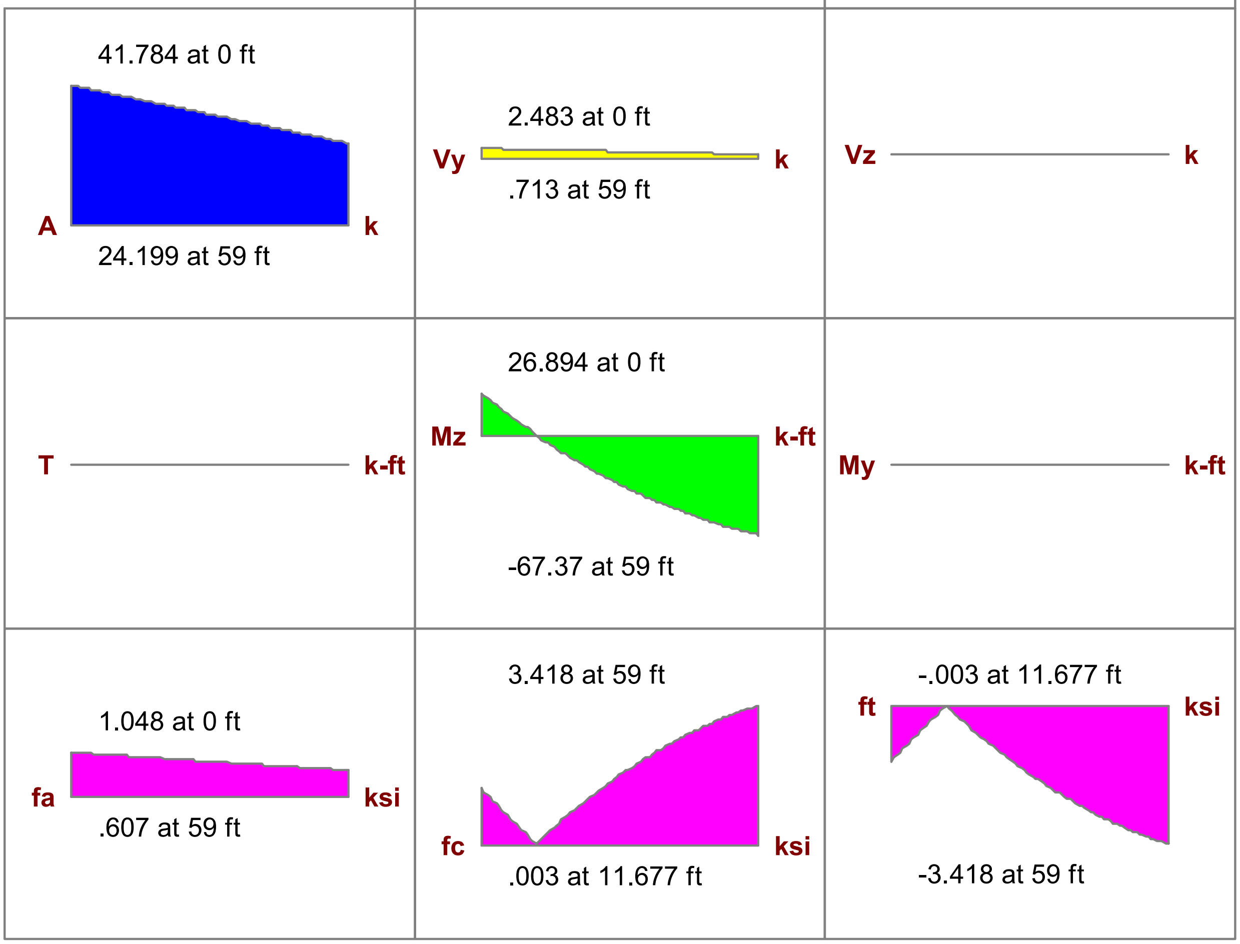
Loads: LC 1, NESC Heavy Wind on CL&P Pole

CENTEK Engineering, INC.		
tjl, cfc	Pole # 489S	Nov 22, 2016 at 1:59 PM
16071.40 /AT&T CT5013	LC #1 Loads	Pole Analysis Using NESC Loading.r...

Beam: *M1*

Shape: **W14x87 Reinforced**
Material: **A36 Gr.36**
Length: **59 ft**
I Joint: **N1**
J Joint: **N2**
LC 1: NESC Heavy Wind on CL&P Pole
Code Check: **0.236 (bending)**
Report Based On 97 Sections





AISC 9th: ASD Code Check

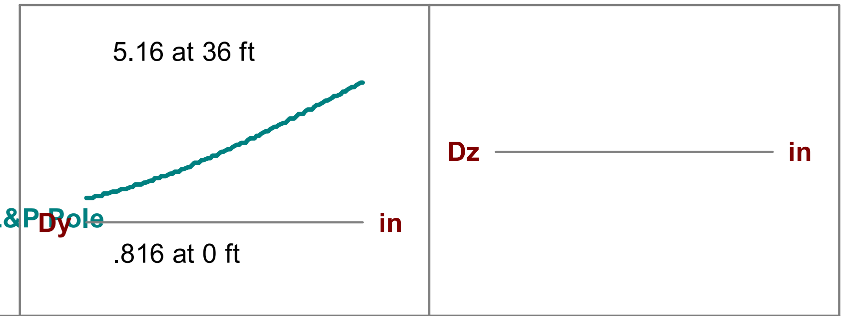
Max Bending Check	**0.236**	Max Shear Check	**0.029 (y)**
Location	**59 ft**	Location	**0 ft**
Equation	**H1-3**	Max Defl Ratio	**L/868**

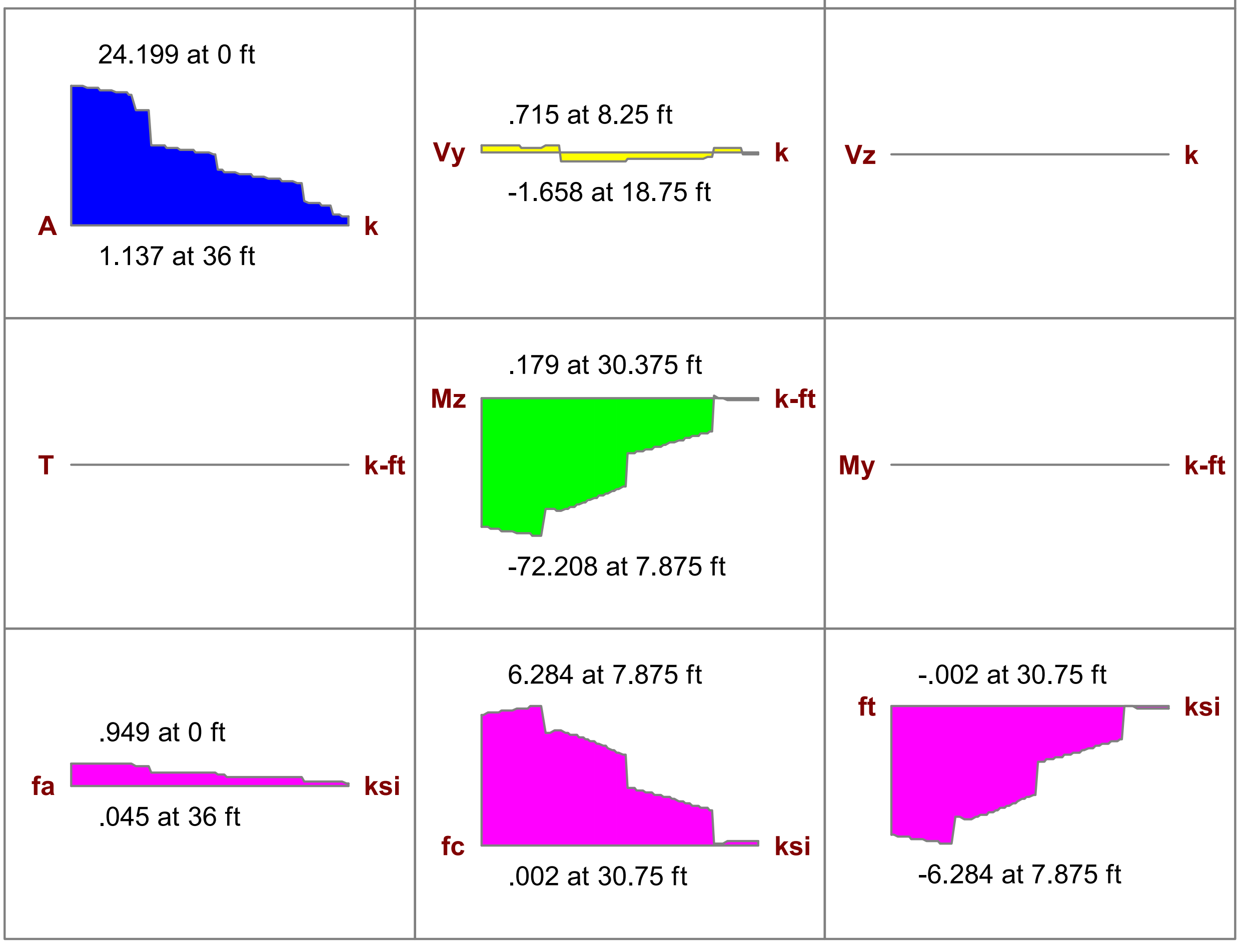
Compact

Fy	**36 ksi**		y-y	z-z
Fa	**7.758 ksi**	Cm	**.6**	**.85**
Ft	**21.6 ksi**	Lb	**59 ft**	**59 ft**
Fby	**27 ksi**	KL/r	**138.739**	**109.879**
Fbz	**21.6 ksi**	Sway	**No**	**No**
Fvy	**14.4 ksi**			
Fvz	**14.4 ksi**	L Comp Flange	**59 ft**	
Cb	**2.217**	Warp Length	**95 ft**	

Beam: ***M2***

Shape: **W14x87**
Material: **A36 Gr.36**
Length: **36 ft**
I Joint: **N2**
J Joint: **N6**
LC 1: NESC Heavy Wind on CL&P Pole
Code Check: **0.356 (bending)**
Report Based On 97 Sections



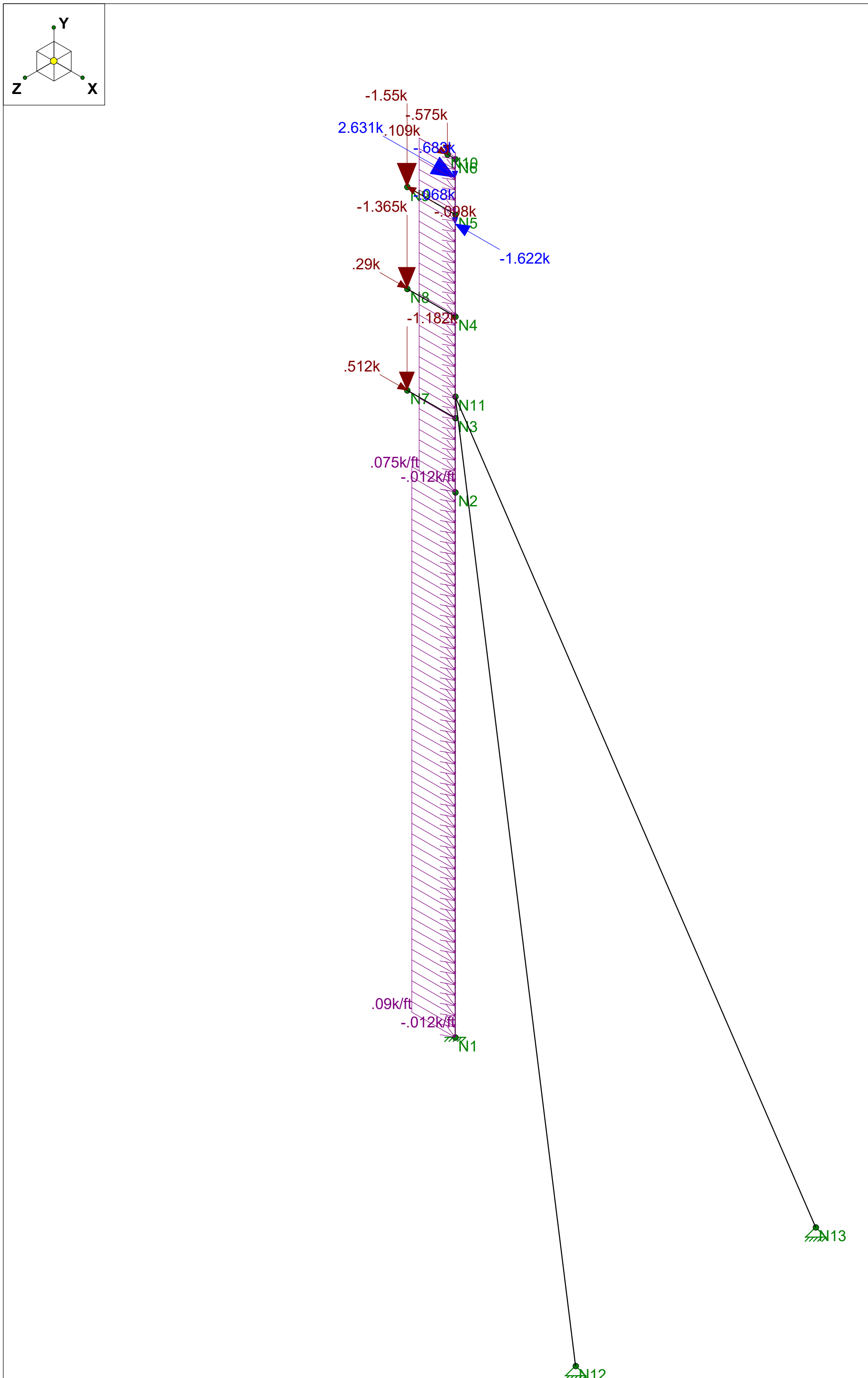


AISC 9th: ASD Code Check

Max Bending Check	**0.356**	Max Shear Check	**0.020 (y)**
Location	**7.875 ft**	Location	**18.75 ft**
Equation	**H1-1**	Max Defl Ratio	**L/99**

Compact

Fy	**36 ksi**		y-y	z-z
Fa	**10.859 ksi**	Cm	**.6**	**.85**
Ft	**21.6 ksi**	Lb	**36 ft**	**36 ft**
Fby	**27 ksi**	KL/r	**115.926**	**70.228**
Fbz	**20.053 ksi**	Sway	**No**	**No**
Fvy	**14.4 ksi**			
Fvz	**14.4 ksi**	L Comp Flange	**36 ft**	
Cb	**1**	Warp Length	**95 ft**	

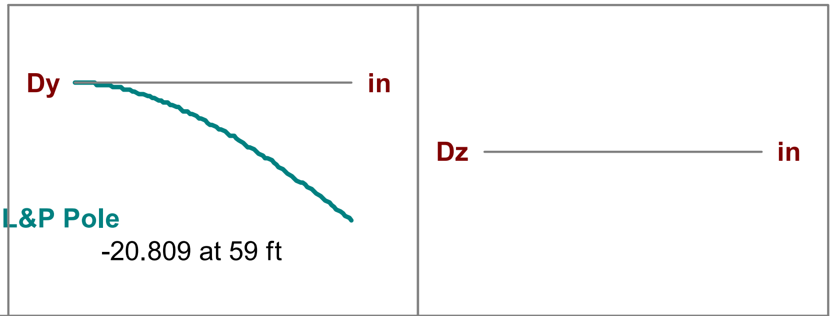


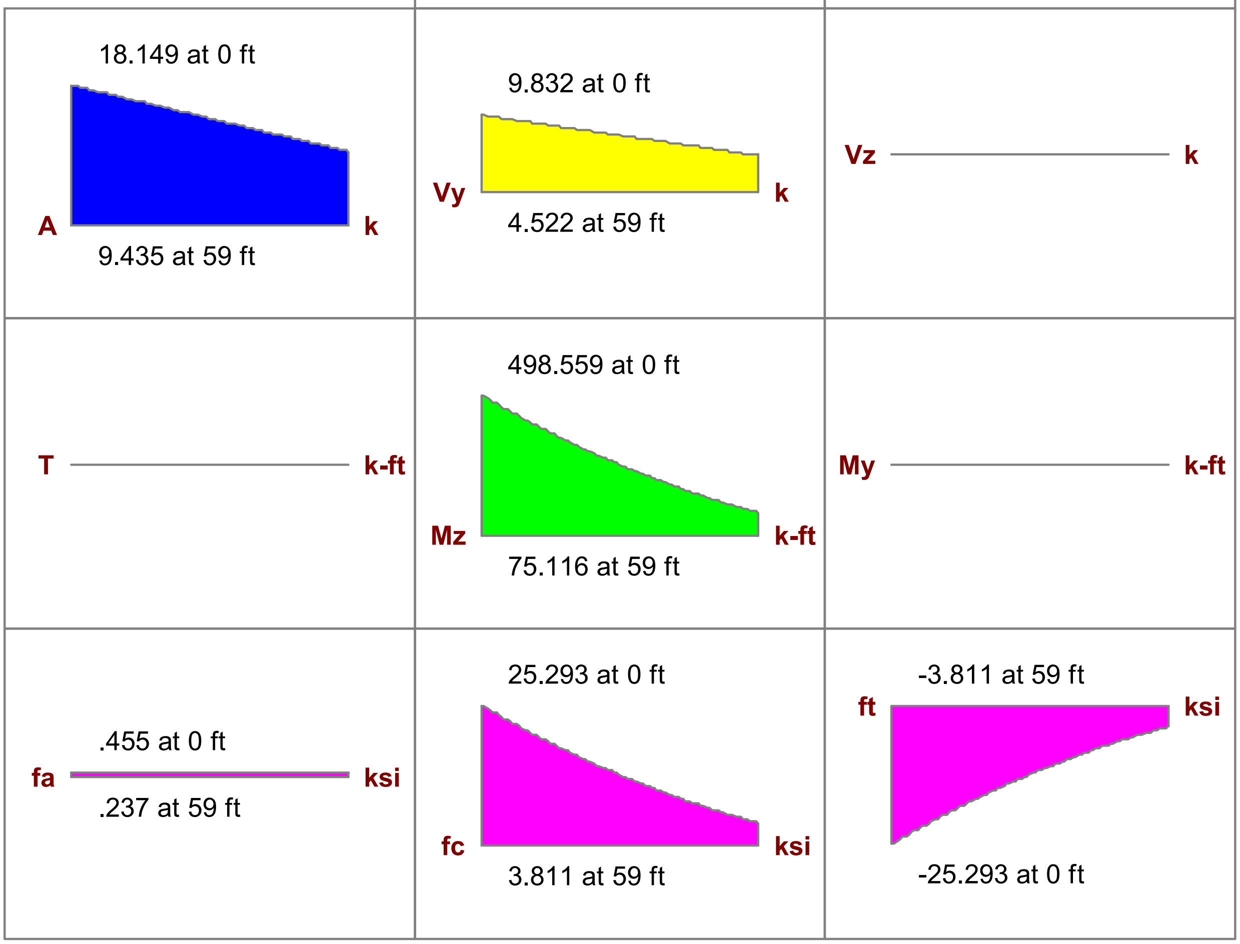
Loads: LC 2, NESC Extreme Wind on CL&P Pole

CENTEK Engineering, INC.		
tjl, cfc	Pole # 489S	Nov 22, 2016 at 1:59 PM
16071.40 /AT&T CT5013	LC #2 Loads	Pole Analysis Using NESC Loading.r...

Beam: *M1*

Shape: **W14x87 Reinforced**
Material: **A36 Gr.36**
Length: **59 ft**
I Joint: **N1**
J Joint: **N2**
LC 2: NESC Extreme Wind on CL&P Pole
Code Check: **1.352 (bending)**
Report Based On 97 Sections





AISC 9th: ASD Code Check

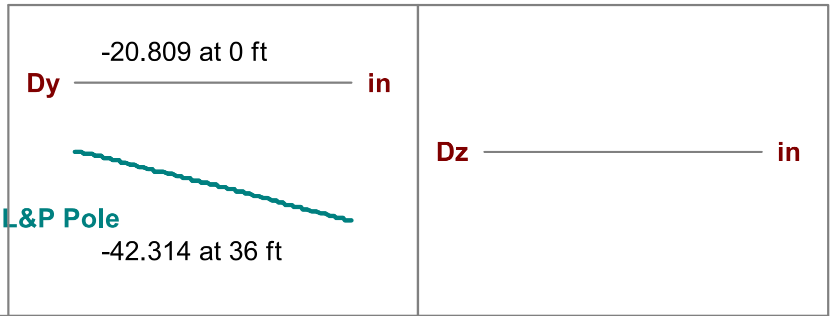
Max Bending Check	**1.352**	Max Shear Check	**0.116 (y)**
Location	**0 ft**	Location	**0 ft**
Equation	**H1-3**	Max Defl Ratio	**L/34**

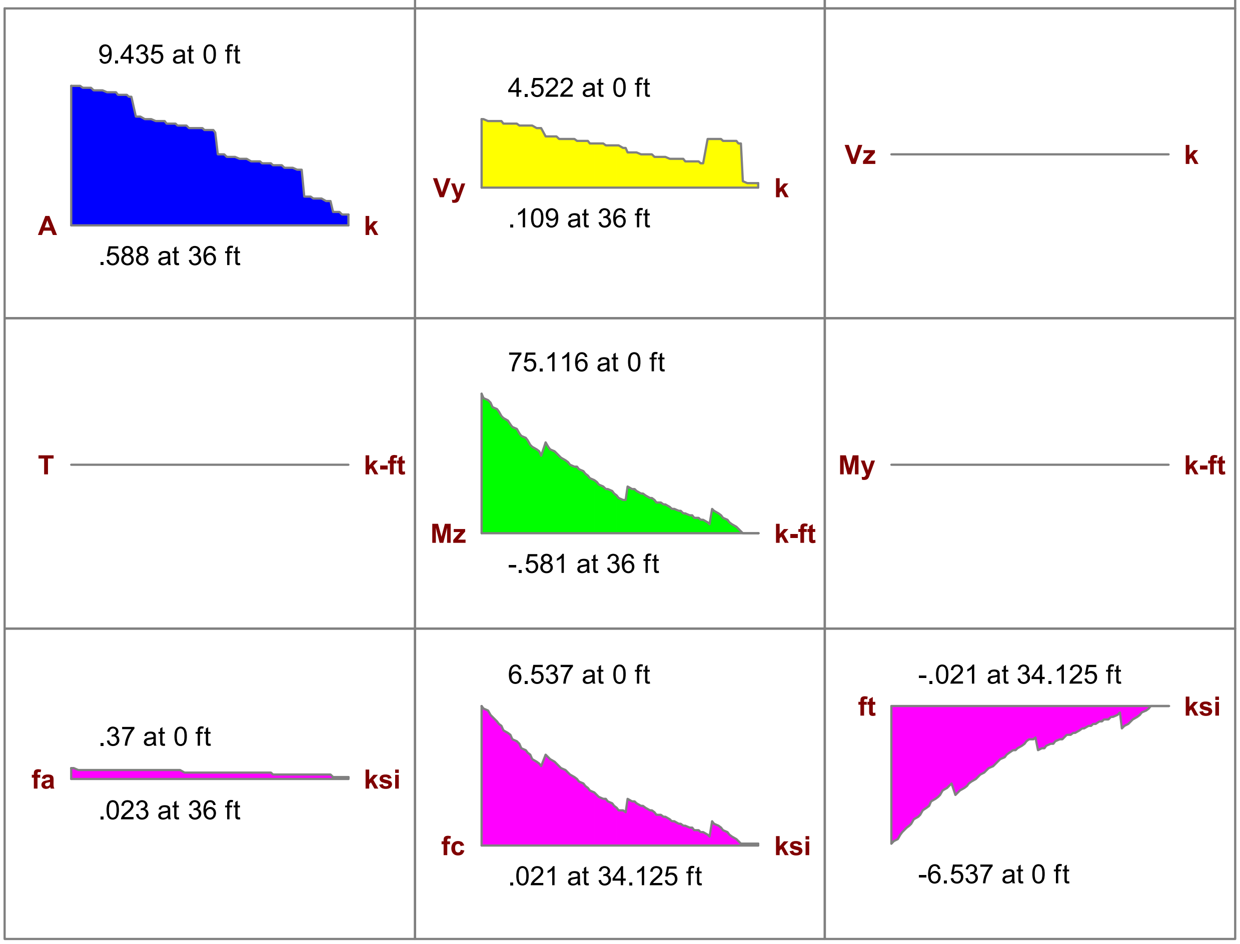
Compact

Fy	**36 ksi**		y-y	z-z
Fa	**7.758 ksi**	Cm	**.6**	**.85**
Ft	**21.6 ksi**	Lb	**59 ft**	**59 ft**
Fby	**27 ksi**	KL/r	**138.739**	**109.879**
Fbz	**19.56 ksi**	Sway	**No**	**No**
Fvy	**14.4 ksi**	L Comp Flange	**59 ft**	
Fvz	**14.4 ksi**	Warp Length	**95 ft**	
Cb	**1.599**			

Beam: *M2*

Shape: **W14x87**
Material: **A36 Gr.36**
Length: **36 ft**
I Joint: **N2**
J Joint: **N6**
LC 2: NESC Extreme Wind on CL&P Pole
Code Check: **0.320 (bending)**
Report Based On 97 Sections



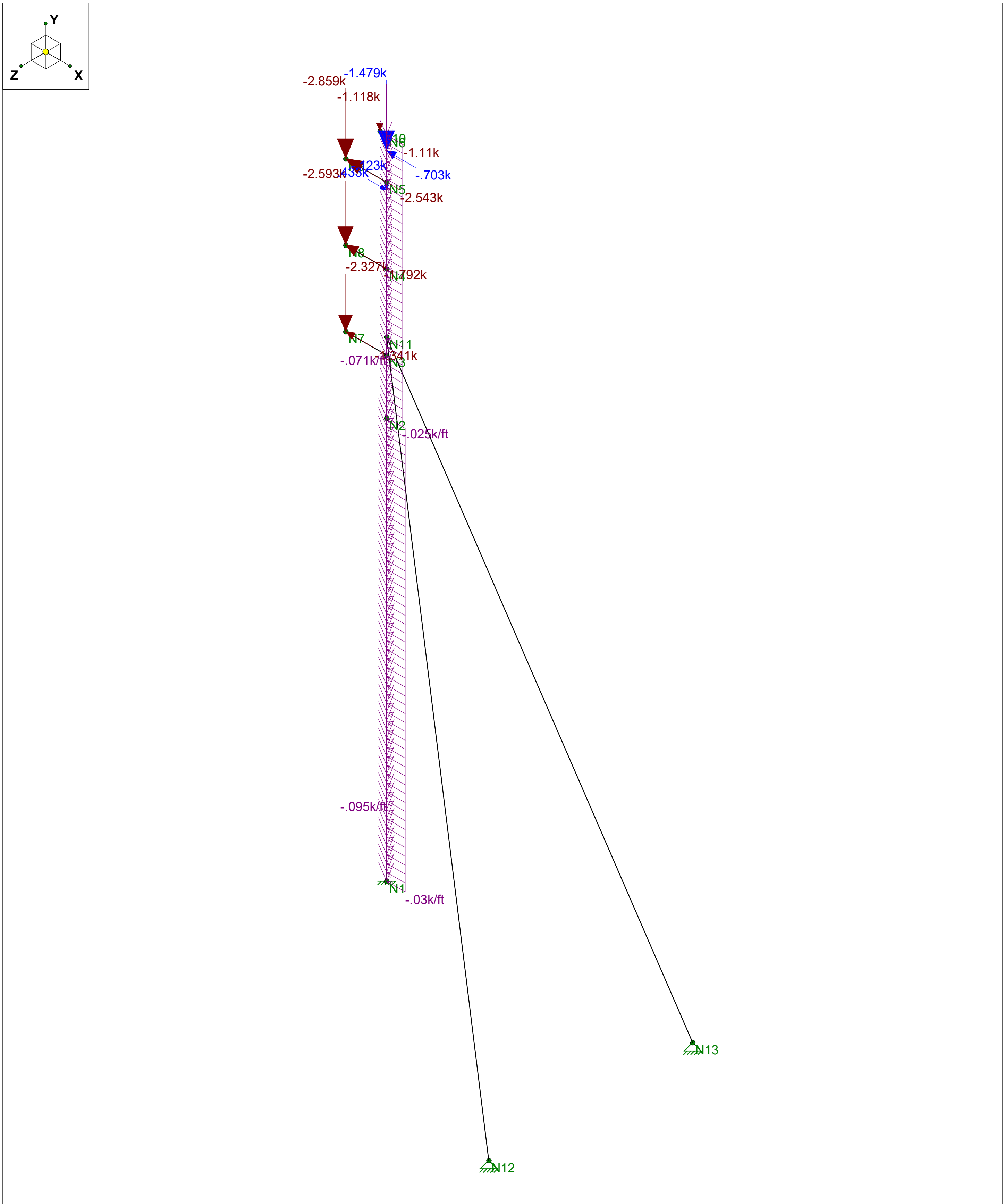


AISC 9th: ASD Code Check

Max Bending Check	**0.320**	Max Shear Check	**0.053 (y)**
Location	**0 ft**	Location	**0 ft**
Equation	**H1-2**	Max Defl Ratio	**L/20**

Compact

Fy	**36 ksi**		y-y	z-z
Fa	**10.859 ksi**	Cm	**.6**	**.85**
Ft	**21.6 ksi**	Lb	**36 ft**	**36 ft**
Fby	**27 ksi**	KL/r	**115.926**	**70.228**
Fbz	**21.6 ksi**	Sway	**No**	**No**
Fvy	**14.4 ksi**			
Fvz	**14.4 ksi**	L Comp Flange	**36 ft**	
Cb	**1.758**	Warp Length	**95 ft**	



Loads: LC 3, NESC Heavy Wind on CL&P Pole

CENTEK Engineering, INC.		
tjl, cfc	Pole # 489S	Nov 22, 2016 at 1:59 PM
16071.40 /AT&T CT5013	LC #3 Loads	Pole Analysis Using NESC Loading.r...

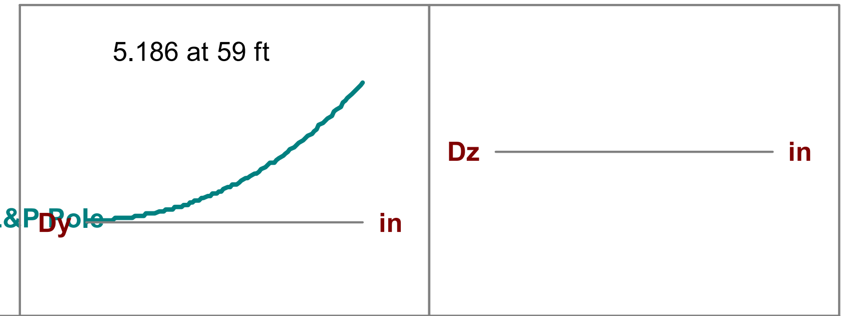
Beam: ***M1***

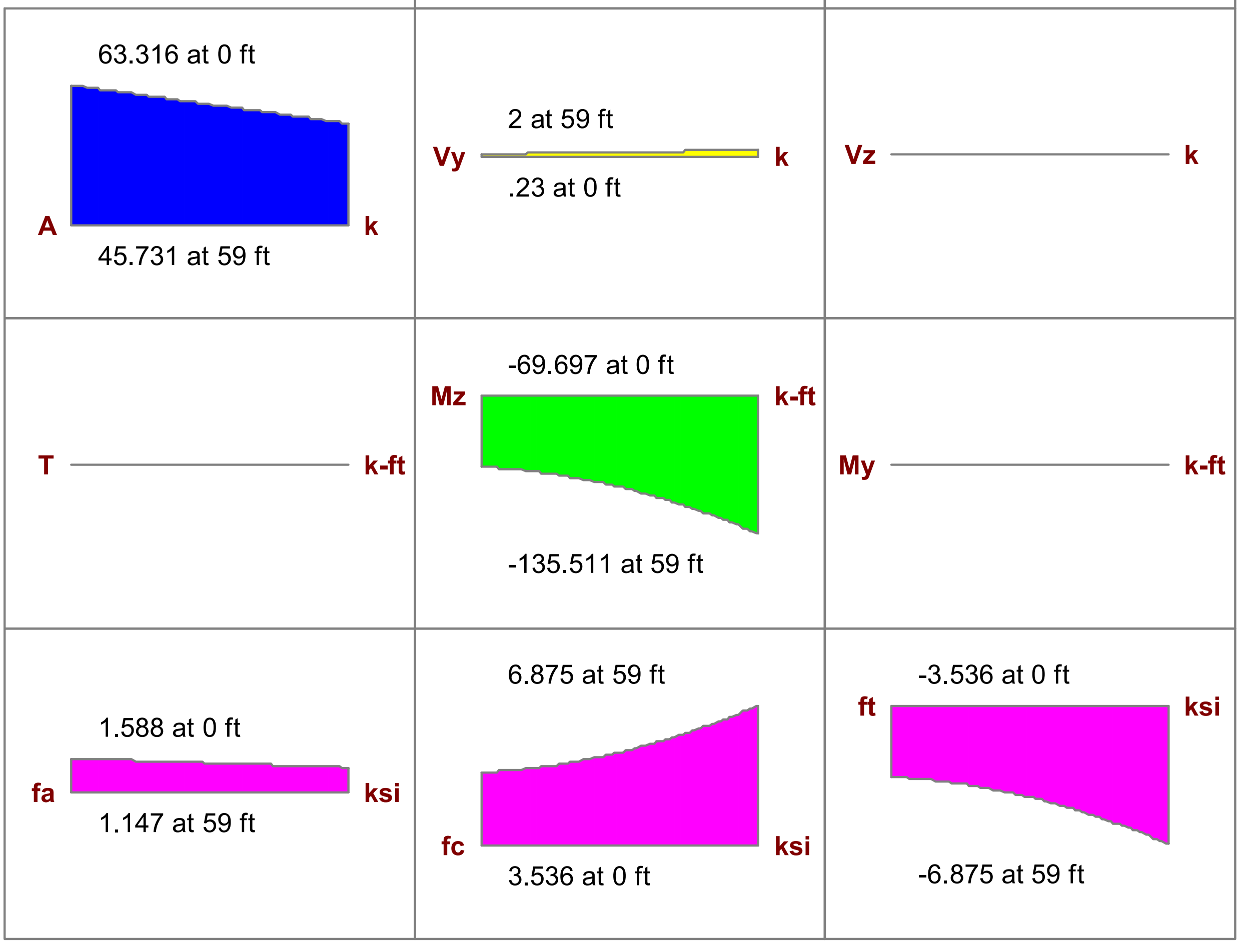
Shape:	**W14x87 Reinforced**
Material:	**A36 Gr.36**
Length:	**59 ft**
I Joint:	**N1**
J Joint:	**N2**

LC 3: NESC Heavy Wind on CL&P Pole

Code Check: **0.659 (bending)**

Report Based On 97 Sections





AISC 9th: ASD Code Check

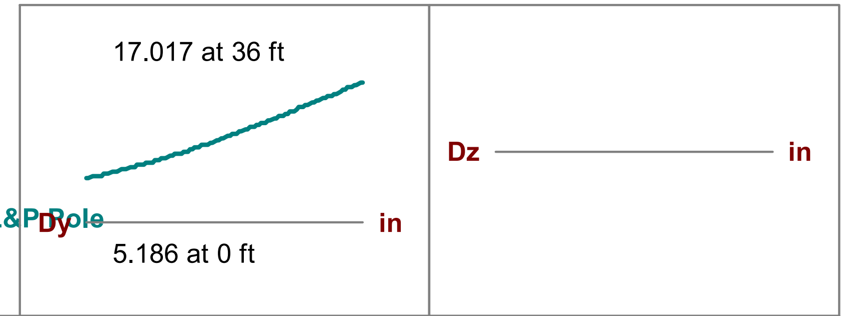
Max Bending Check	**0.659**	Max Shear Check	**0.024 (y)**
Location	**56.542 ft**	Location	**59 ft**
Equation	**H1-1**	Max Defl Ratio	**L/137**

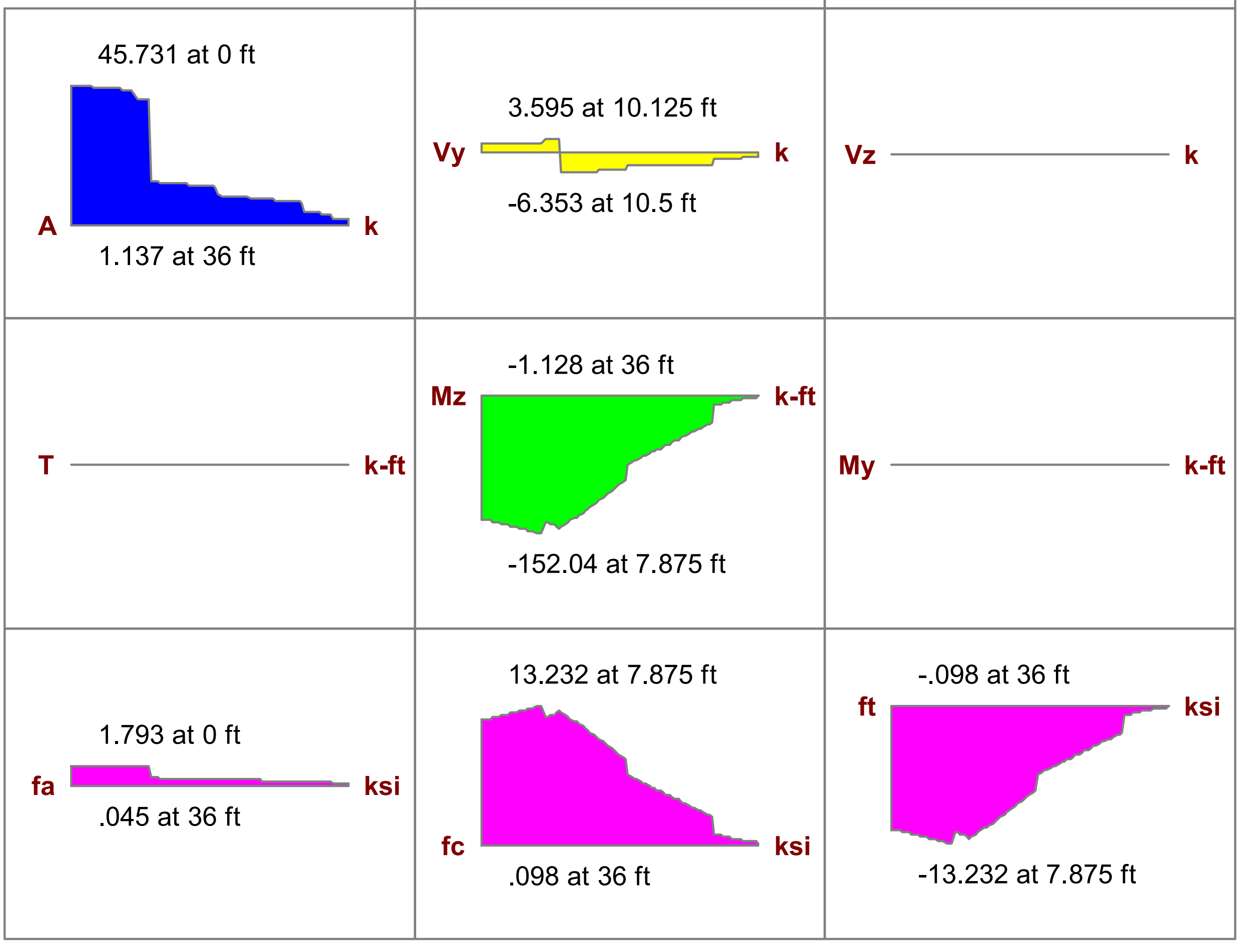
Compact

Fy	**36 ksi**		y-y	z-z
Fa	**7.758 ksi**	Cm	**.6**	**.85**
Ft	**21.6 ksi**	Lb	**59 ft**	**59 ft**
Fby	**27 ksi**	KL/r	**138.739**	**109.879**
Fbz	**12.235 ksi**	Sway	**No**	**No**
Fvy	**14.4 ksi**	L Comp Flange	**59 ft**	
Fvz	**14.4 ksi**	Warp Length	**95 ft**	
Cb	**1**			

Beam: ***M2***

Shape: **W14x87**
Material: **A36 Gr.36**
Length: **36 ft**
I Joint: **N2**
J Joint: **N6**
LC 3: NESC Heavy Wind on CL&P Pole
Code Check: **0.754 (bending)**
Report Based On 97 Sections



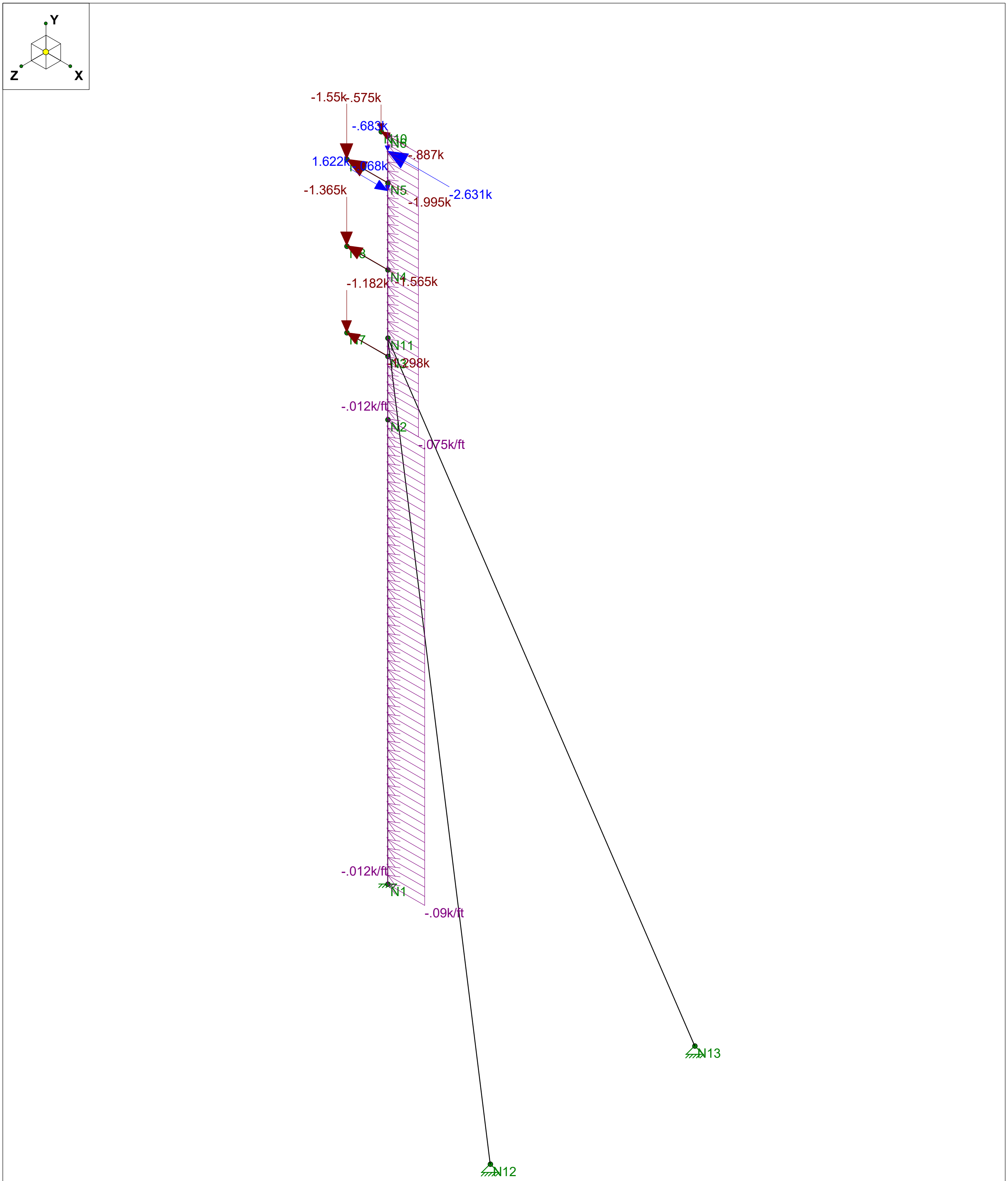


AISC 9th: ASD Code Check

Max Bending Check	**0.754**	Max Shear Check	**0.075 (y)**
Location	**7.875 ft**	Location	**10.5 ft**
Equation	**H1-1**	Max Defl Ratio	**L/37**

Compact

Fy	**36 ksi**		y-y	z-z
Fa	**10.859 ksi**	Cm	**.6**	**.85**
Ft	**21.6 ksi**	Lb	**36 ft**	**36 ft**
Fby	**27 ksi**	KL/r	**115.926**	**70.228**
Fbz	**20.053 ksi**	Sway	**No**	**No**
Fvy	**14.4 ksi**			
Fvz	**14.4 ksi**	L Comp Flange	**36 ft**	
Cb	**1**	Warp Length	**95 ft**	

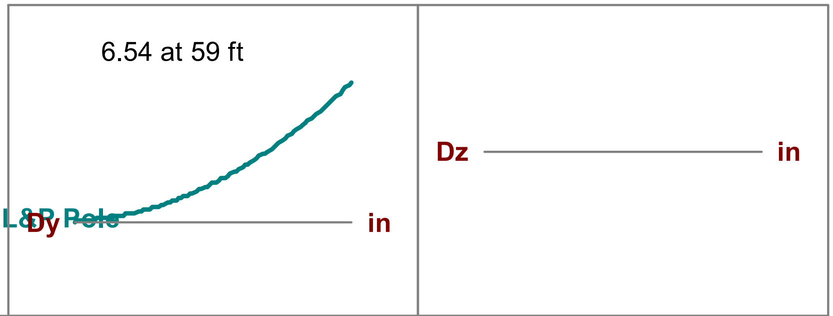


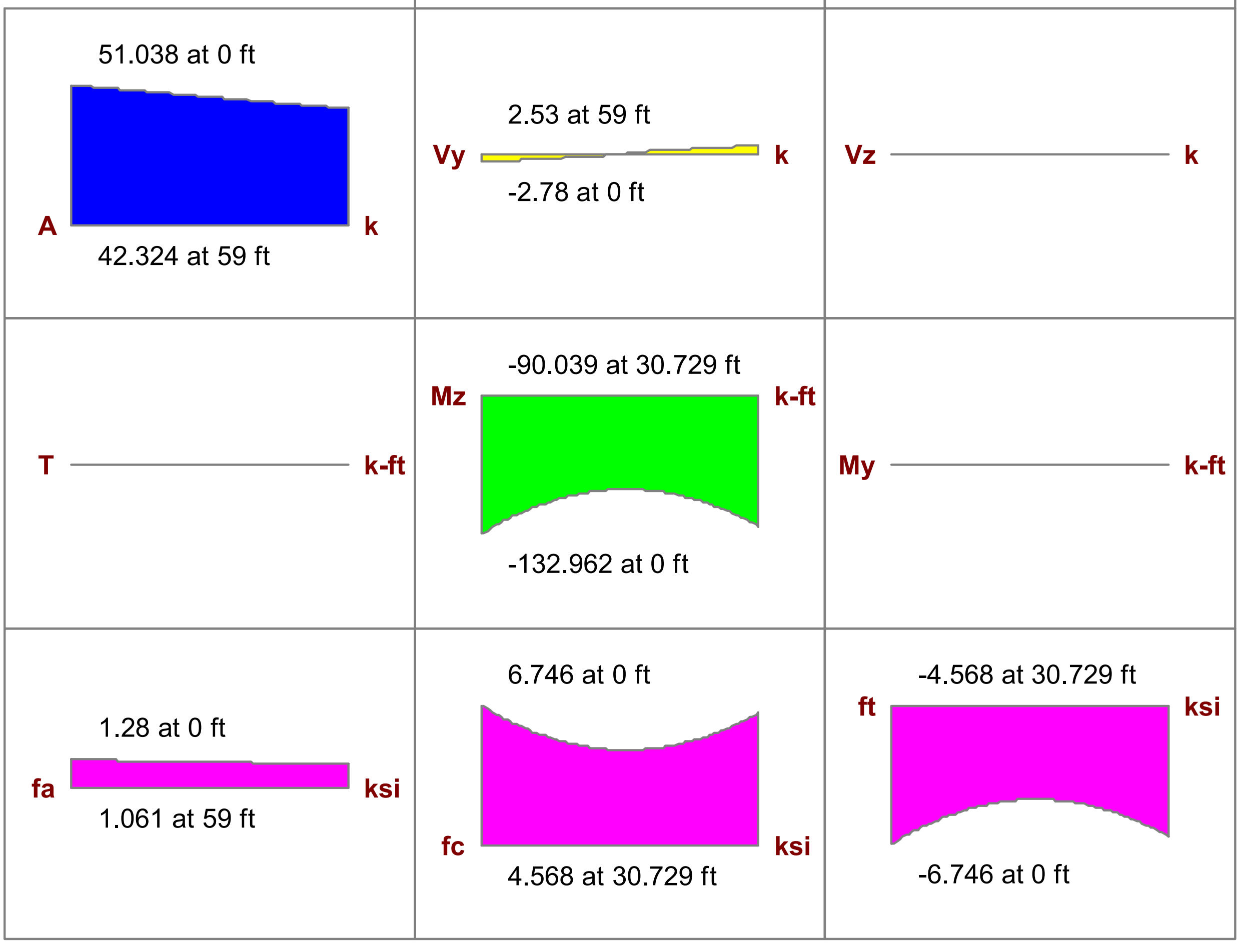
Loads: LC 4, NESC Extreme Wind on CL&P Pole

CENTEK Engineering, INC.		
tjl, cfc	Pole # 489S	Nov 22, 2016 at 1:59 PM
16071.40 /AT&T CT5013	LC #4 Loads	Pole Analysis Using NESC Loading.r...

Beam: ***M1***

Shape: **W14x87 Reinforced**
Material: **A36 Gr.36**
Length: **59 ft**
I Joint: **N1**
J Joint: **N2**
LC 4: NESC Extreme Wind on CL&P Pole
Code Check: **0.688 (bending)**
Report Based On 97 Sections





AISC 9th: ASD Code Check

Max Bending Check	**0.688**	Max Shear Check	**0.033 (y)**
Location	**0 ft**	Location	**0 ft**
Equation	**H1-1**	Max Defl Ratio	**L/108**

Compact

Fy	**36 ksi**		y-y	z-z
Fa	**7.758 ksi**	Cm	**.6**	**.85**
Ft	**21.6 ksi**	Lb	**59 ft**	**59 ft**
Fby	**27 ksi**	KL/r	**138.739**	**109.879**
Fbz	**12.235 ksi**	Sway	**No**	**No**
Fvy	**14.4 ksi**	L Comp Flange	**59 ft**	
Fvz	**14.4 ksi**	Warp Length	**95 ft**	
Cb	**1**			

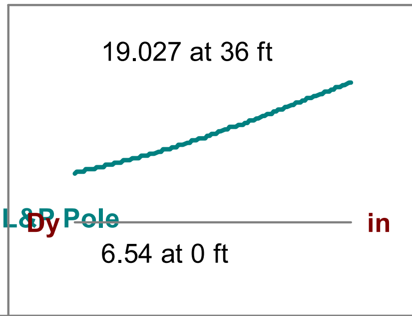
Beam: ***M2***

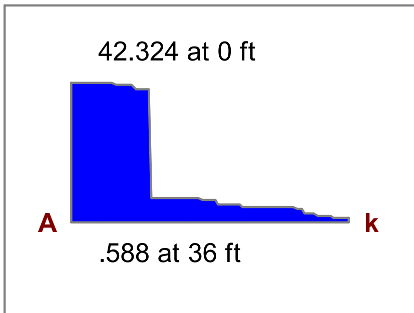
Shape:	**W14x87**
Material:	**A36 Gr.36**
Length:	**36 ft**
I Joint:	**N2**
J Joint:	**N6**

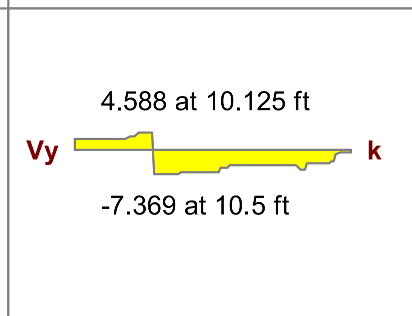
LC 4: NESC Extreme Wind on CL&P Pole

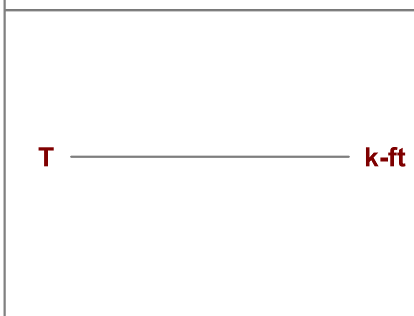
Code Check: **0.729 (bending)**

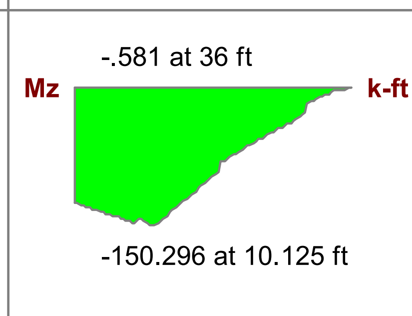
Report Based On 97 Sections

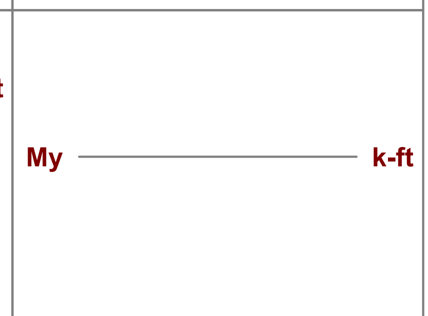


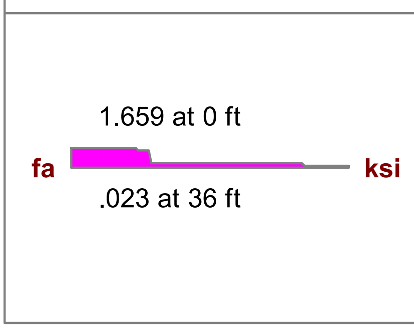


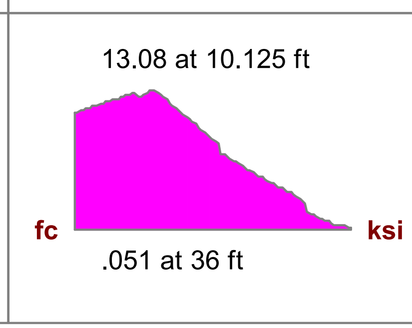


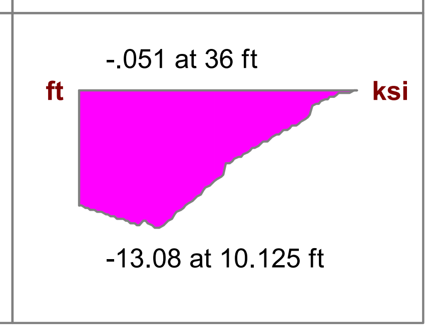












AISC 9th: ASD Code Check

Max Bending Check	**0.729**	Max Shear Check	**0.087 (y)**
Location	**10.125 ft**	Location	**10.5 ft**
Equation	**H1-1**	Max Defl Ratio	**L/35**

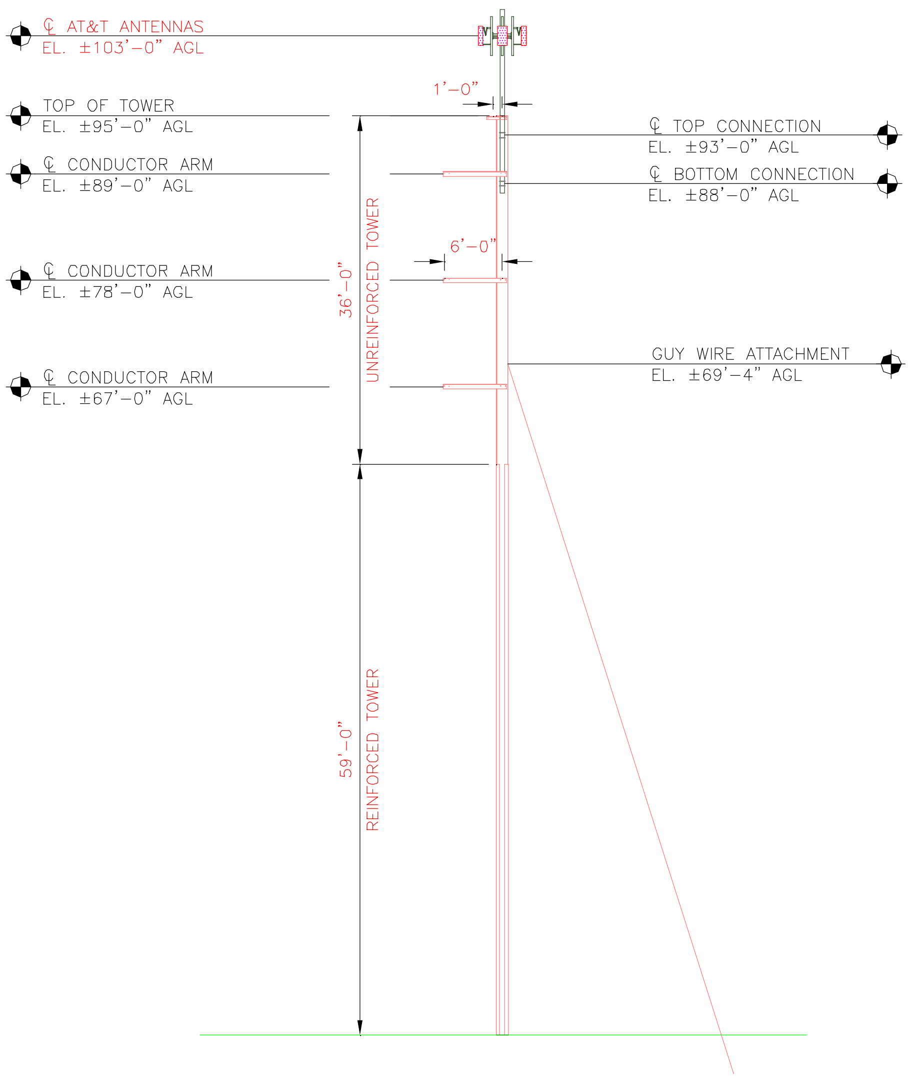
Compact

Fy	**36 ksi**
Fa	**10.859 ksi**
Ft	**21.6 ksi**
Fby	**27 ksi**
Fbz	**20.053 ksi**
Fvy	**14.4 ksi**
Fvz	**14.4 ksi**
Cb	**1**

	y-y	z-z
Cm	**.6**	**.85**
Lb	**36 ft**	**36 ft**
KL/r	**115.926**	**70.228**
Sway	**No**	**No**

L Comp Flange	**36 ft**
Warp Length	**95 ft**

CL&P Pole Analysis:



General Pole Properties:

Length of Pole =	$L_{pole} := 95 \cdot ft$	(User Input)
Yield Stress =	$F_y := 36 \cdot ksi$	(User Input)
Modulus of Elasticity =	$E := 29000 \cdot ksi$	(User Input)
Bending Stress Coefficient =	$C_b := 1.75$	(User Input)
Bending Term Coefficient =	$C_m := 0.85$	(User Input)
Column Slenderness Ratio =	$C_c := \pi \cdot \sqrt{\frac{2 \cdot E}{F_y}} = 126.1$	(EQ. 3.6.3)

Section Properties Top Section

Moment of Inertia x-axis = $I_{xtop} := 966.9 \cdot in^4$ (User Input from Enercalc)

Moment of Inertia y-axis = $I_{y.top} := 349.7 \cdot in^4$ (User Input from Enercalc)

Section Modulus x-axis = $S_{xtop} := 138.1 \cdot in^3$ (User Input from Enercalc)

Area = $A_{top} := 25.6 \cdot in^2$ (User Input from Enercalc)

Radius of Gyration x-axis = $r_{x.top} := 6.15 \cdot in$ (User Input from Enercalc)

Radius of Gyration y-axis = $r_{y.top} := 3.7 \cdot in$ (User Input from Enercalc)

Warping Constant = $C_{w.top} := 15492 \cdot in^6$ (User Input from Enercalc)

Torsional Constant = $J_{wtop} := 3.55 \cdot in^4$ (User Input from Enercalc)

Unbraced Length = $KL_{top} := 432 \cdot in$ (User Input)

$$KL_x := \frac{KL_{top}}{r_{x.top}} = 70.244$$

$$KL_y := \frac{KL_{top}}{r_{y.top}} = 116.757$$

$$KL\_r := \begin{cases} KL_x & \text{if } KL_x > KL_y \\ KL_y & \text{otherwise} \end{cases} = 116.757$$

Design Compressive Stress =

$$Fa_{top} := \begin{cases} \left[1 - \frac{1}{2} \cdot \left(\frac{KL\_r}{C_c}\right)^2\right] \cdot F_y & \text{if } KL\_r \le C_c \quad \text{(EQ 3.6-1)} \\ \frac{\pi^2 \cdot E}{(KL\_r)^2} & \text{otherwise} \quad \text{(EQ 3.6-2)} \end{cases} = 20.6 \cdot ksi$$

$$r := \sqrt{\frac{C_b \cdot \sqrt{I_{y.top}}}{S_{xtop}} \cdot \sqrt{C_{w.top} + 0.04 \cdot J_{wtop} \cdot (KL_{top})^2}} = 7 \cdot in \quad \text{(EQ 3.14-1)}$$

$$KL\_rb := \frac{KL_{top}}{r} = 62$$

Design Bending Stress =

$$Fb_{top} := \begin{cases} \left[1 - \frac{1}{2} \cdot \left(\frac{KL\_rb}{C_c}\right)^2\right] \cdot F_y & \text{if } KL\_rb \le C_c \quad \text{(EQ 3.6-1)} \\ \frac{\pi^2 \cdot E}{(KL\_rb)^2} & \text{otherwise} \quad \text{(EQ 3.6-2)} \end{cases} = 31.6 \cdot ksi$$

Design Axial Compression = $P_{a.top} := Fa_{top} \cdot A_{top} = 526.6 \cdot kip$

Allowable Moment = $Ma_{top} := Fb_{top} \cdot S_{xtop} = 364 \cdot kip \cdot ft$

Euler Buckling Load = $Pe_{top} := \frac{\left(\pi^2 \cdot E \cdot I_{xtop}\right)}{\left(KL_{top}\right)^2} = 1483 \cdot kip$

Section Properties Bottom Section

Moment of Inertia x-axis =	$I_{xbot} := 1584.3 \cdot in^4$	(User Input from Enercalc)
Moment of Inertia y-axis =	$I_{y.bot} := 1121.0 \cdot in^4$	(User Input from Enercalc)
Section Modulus x-axis =	$S_{xbot} := 215 \cdot in^3$	(User Input from Enercalc)
Area =	$A_{bot} := 40 \cdot in^2$	(User Input from Enercalc)
Radius of Gyration x-axis =	$r_{x.bot} := 6.29 \cdot in$	(User Input from Enercalc)
Radius of Gyration y-axis =	$r_{y.bot} := 5.29 \cdot in$	(User Input from Enercalc)
Warping Constant =	$C_{w.bot} := 15493 \cdot in^6$	(User Input from Enercalc)
Torsional Constant =	$J_{wbot} := 4.26 \cdot in^4$	(User Input from Enercalc)
Unbraced Length =	$KL_{bot} := 708 \cdot in$	(User Input)

$$KL_x := \frac{KL_{bot}}{r_{x.bot}} = 112.56$$

$$KL_y := \frac{KL_{bot}}{r_{y.bot}} = 133.837$$

$$KL\_r := \begin{cases} KL_x & \text{if } KL_x > KL_y \\ KL_y & \text{otherwise} \end{cases} = 133.837$$

Design Compressive Stress =

$$Fa_{bot} := \begin{cases} \left[1 - \frac{1}{2}\cdot\left(\frac{KL\_r}{C_c}\right)^2\right]\cdot F_y & \text{if } KL\_r \le C_c \quad \text{(EQ 3.6-1)} \\ \frac{\pi^2 \cdot E}{(KL\_r)^2} & \text{otherwise} \quad \text{(EQ 3.6-2)} \end{cases} = 16 \cdot ksi$$

$$r := \sqrt{\frac{C_b \cdot \sqrt{I_{y.bot}}}{S_{xbot}} \cdot \sqrt{C_{w.bot} + 0.04 \cdot J_{wbot} \cdot (KL_{bot})^2}} = 9.3 \cdot in \quad \text{(EQ 3.14-1)}$$

$$KL\_rb := \frac{KL_{bot}}{r} = 76.1$$

Design Bending Stress =

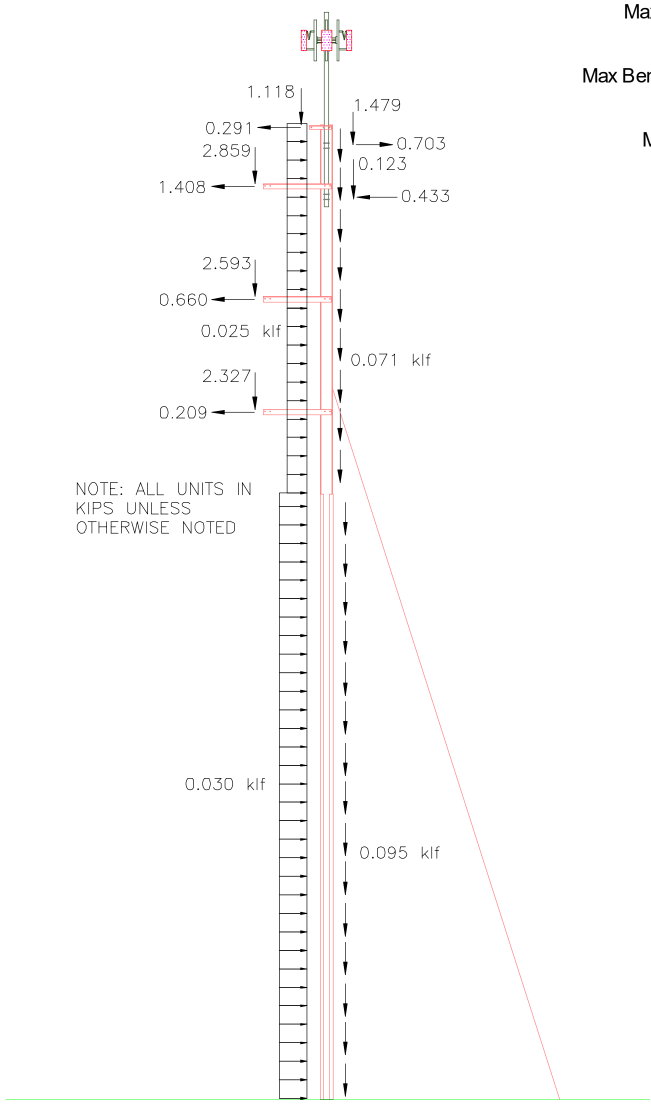
$$Fb_{bot} := \begin{cases} \left[1 - \frac{1}{2}\cdot\left(\frac{KL\_rb}{C_c}\right)^2\right]\cdot F_y & \text{if } KL\_rb \le C_c \quad \text{(EQ 3.6-1)} \\ \frac{\pi^2 \cdot E}{(KL\_rb)^2} & \text{otherwise} \quad \text{(EQ 3.6-2)} \end{cases} = 29.4 \cdot ksi$$

Design Axial Compression = $P_{a.bot} := Fa_{bot} \cdot A_{bot} = 639.1 \cdot kip$

Allowable Moment = $Ma_{bot} := Fb_{bot} \cdot S_{xbot} = 528 \cdot kip \cdot ft$

Euler Buckling Load = $Pe_{bot} := \frac{\left(\pi^2 \cdot E \cdot I_{xbot}\right)}{\left(KL_{bot}\right)^2} = 905 \cdot kip$

Load Combination # 1: *NESC Heavy Wind - Towards of Guy Wires*



Max Bending Moment Unreinforced Pole = $M_{xtop} := 72.2 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Unreinforced Pole = $P_{top} := 24.2 \cdot kip$ (From Risa-3D)

Max Bending Moment Reinforced Pole = $M_{xbot} := 67.4 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Reinforced Pole = $P_{bot} := 41.8 \cdot kip$ (From Risa-3D)

Combined Axial and Bending Stress Unreinforced Pole:

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{C_m \cdot M_{xtop}}{Ma_{top}} \cdot \left[\frac{1}{\left(1 - \frac{P_{top}}{Pe_{top}}\right)}\right] = 18.8 \cdot \% \qquad \text{(EQ 3.12-1)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

Stress_Check = "OK"

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{M_{xtop}}{Ma_{top}} = 21.5 \cdot \% \qquad \text{(EQ 3.12-2)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

Stress_Check = "OK"

Combined Axial and Bending Stress Reinforced Pole:

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{C_m \cdot M_{xbot}}{Ma_{bot}} \cdot \left[\frac{1}{\left(1 - \frac{P_{bot}}{Pe_{bot}}\right)}\right] = 16 \cdot \% \qquad \text{(EQ 3.12-1)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

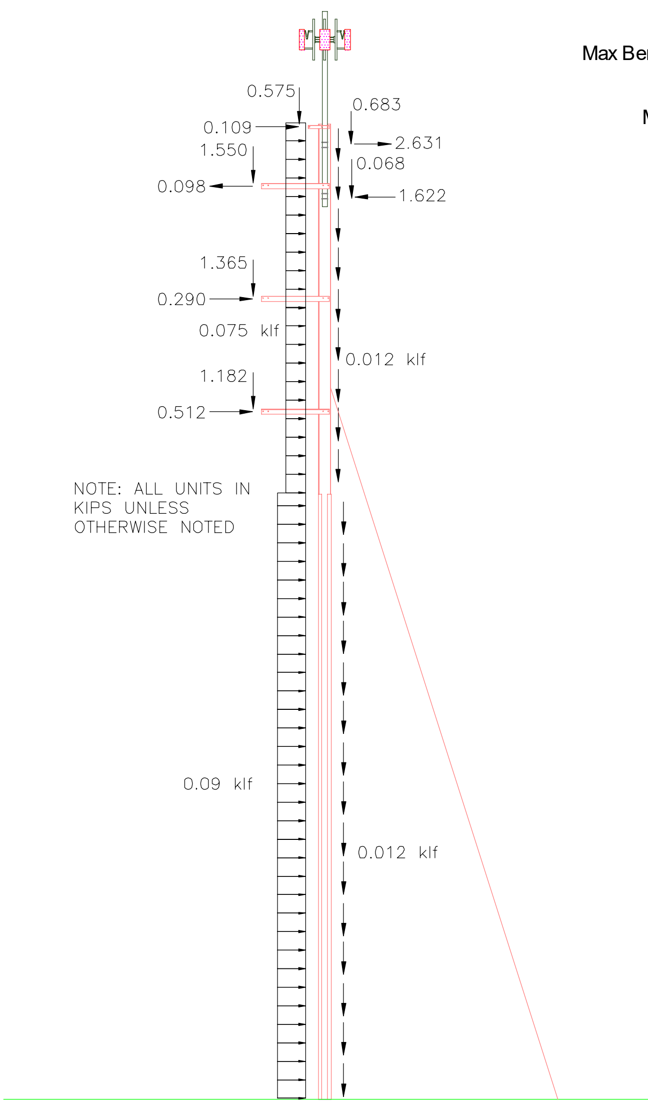
Stress_Check = "OK"

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{M_{xbot}}{Ma_{bot}} = 17.4 \cdot \% \qquad \text{(EQ 3.12-2)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

Stress_Check = "OK"

Load Combination # 2: *NESC Extreme Wind - Towards of Guy Wires*



Max Bending Moment Unreinforced Pole = $M_{xtop} := 75.1 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Unreinforced Pole = $P_{top} := 9.5 \cdot kip$ (From Risa-3D)

Max Bending Moment Reinforced Pole = $M_{xbot} := 498.6 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Reinforced Pole = $P_{bot} := 18.2 \cdot kip$ (From Risa-3D)

Combined Axial and Bending Stress Unreinforced Pole:

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{C_m \cdot M_{xtop}}{Ma_{top}} \cdot \left[\frac{1}{\left(1 - \frac{P_{top}}{Pe_{top}}\right)}\right] = 18.3 \cdot \%$$ (EQ 3.12-1)

Stress_Check := if(Stress < 1.0, "OK", "NG")

Stress_Check = "OK"

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{M_{xtop}}{Ma_{top}} = 21.3 \cdot \%$$ (EQ 3.12-2)

Stress_Check := if(Stress < 1.0, "OK", "NG")

Stress_Check = "OK"

Combined Axial and Bending Stress Reinforced Pole:

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{C_m \cdot M_{xbot}}{Ma_{bot}} \cdot \left[\frac{1}{\left(1 - \frac{P_{bot}}{Pe_{bot}}\right)}\right] = 84 \cdot \%$$ (EQ 3.12-1)

Stress_Check := if(Stress < 1.0, "OK", "NG")

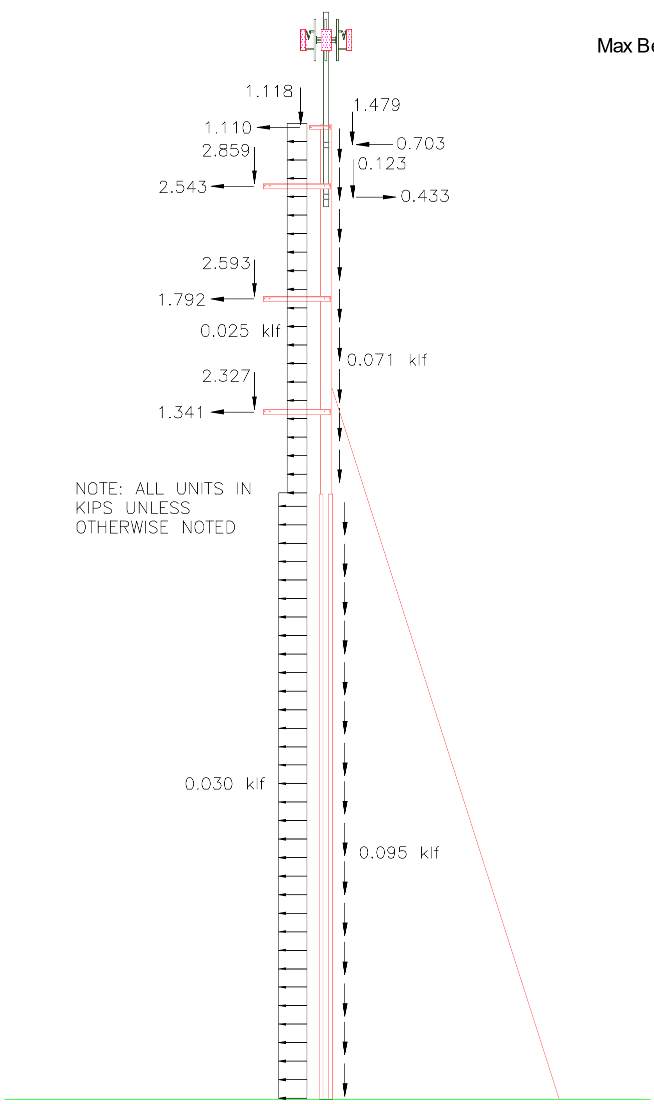
Stress_Check = "OK"

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{M_{xbot}}{Ma_{bot}} = 96.5 \cdot \%$$ (EQ 3.12-2)

Stress_Check := if(Stress < 1.0, "OK", "NG")

Stress_Check = "OK"

Load Combination # 3: *NESC Heavy Wind - Away from Guy Wires*



Max Bending Moment Unreinforced Pole = $M_{xtop} := 152.1 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Unreinforced Pole = $P_{top} := 45.7 \cdot kip$ (From Risa-3D)

Max Bending Moment Reinforced Pole = $M_{xbot} := 135.5 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Reinforced Pole = $P_{bot} := 63.3 \cdot kip$ (From Risa-3D)

Combined Axial and Bending Stress Unreinforced Pole:

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{C_m \cdot M_{xtop}}{Ma_{top}} \cdot \left[\frac{1}{\left(1 - \frac{P_{top}}{Pe_{top}}\right)}\right] = 39.7 \cdot \% \quad \text{(EQ 3.12-1)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

Stress_Check = "OK"

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{M_{xtop}}{Ma_{top}} = 44.8 \cdot \% \quad \text{(EQ 3.12-2)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

Stress_Check = "OK"

Combined Axial and Bending Stress Reinforced Pole:

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{C_m \cdot M_{xbot}}{Ma_{bot}} \cdot \left[\frac{1}{\left(1 - \frac{P_{bot}}{Pe_{bot}}\right)}\right] = 30.5 \cdot \% \quad \text{(EQ 3.12-1)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

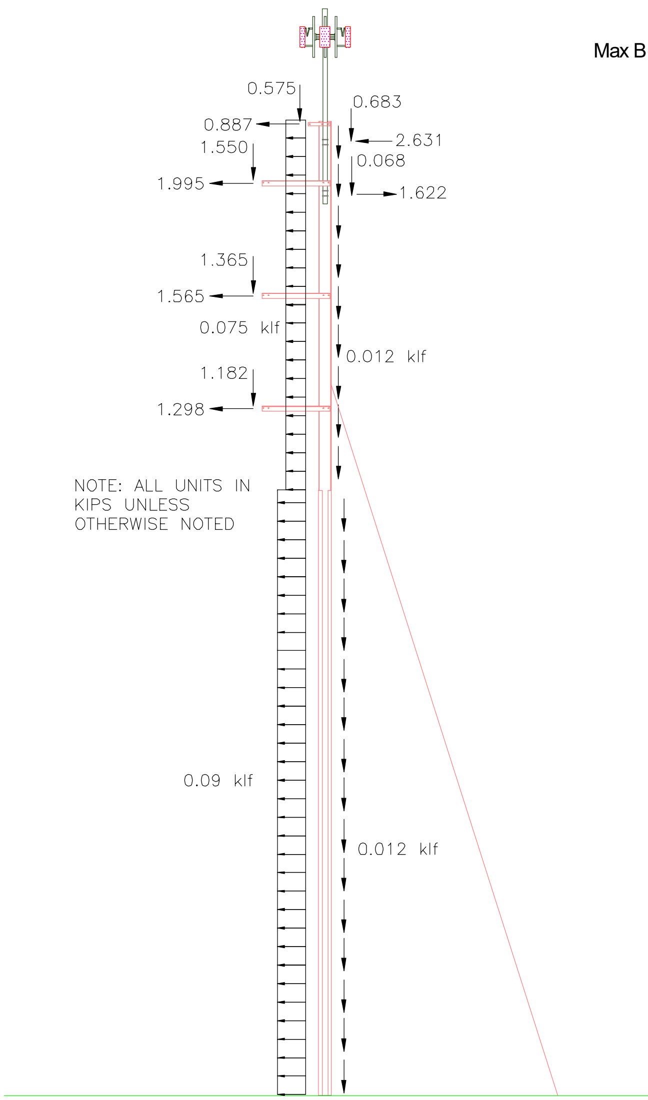
Stress_Check = "OK"

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{M_{xbot}}{Ma_{bot}} = 32.7 \cdot \% \quad \text{(EQ 3.12-2)}$$

Stress_Check := if(Stress < 1.0,"OK","NG")

Stress_Check = "OK"

Load Combination # 4: *NESC Extreme Wind - Away from Guy Wires*



Max Bending Moment Unreinforced Pole = $M_{xtop} := 150.3 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Unreinforced Pole = $P_{top} := 42.3 \cdot kip$ (From Risa-3D)

Max Bending Moment Reinforced Pole = $M_{xbot} := 133.0 \cdot kip \cdot ft$ (From Risa-3D)

Max Axial Force Reinforced Pole = $P_{bot} := 51.1 \cdot kip$ (From Risa-3D)

Combined Axial and Bending Stress Unreinforced Pole:

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{C_m \cdot M_{xtop}}{Ma_{top}} \cdot \left[\frac{1}{\left(1 - \frac{P_{top}}{Pe_{top}}\right)}\right] = 39 \cdot \% \qquad \text{(EQ 3.12-1)}$$

Stress_Check := if(Stress < 1.0, "OK", "NG")

Stress_Check = "OK"

$$Stress := \frac{P_{top}}{Pe_{top}} + \frac{M_{xtop}}{Ma_{top}} = 44.1 \cdot \% \qquad \text{(EQ 3.12-2)}$$

Stress_Check := if(Stress < 1.0, "OK", "NG")

Stress_Check = "OK"

Combined Axial and Bending Stress Reinforced Pole:

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{C_m \cdot M_{xbot}}{Ma_{bot}} \cdot \left[\frac{1}{\left(1 - \frac{P_{bot}}{Pe_{bot}}\right)}\right] = 28.4 \cdot \% \qquad \text{(EQ 3.12-1)}$$

Stress_Check := if(Stress < 1.0, "OK", "NG")

Stress_Check = "OK"

$$Stress := \frac{P_{bot}}{Pe_{bot}} + \frac{M_{xbot}}{Ma_{bot}} = 30.9 \cdot \% \qquad \text{(EQ 3.12-2)}$$

Stress_Check := if(Stress < 1.0, "OK", "NG")

Stress_Check = "OK"

WIND DIRECTION	LOAD CASE	COMPONENT	Mmax	Pmax	% STRESSED
TOWARDS GUY WIRE	NESC HEAVY	WF14X87	72.2 ft-k	24.2 k	21.5 %
		WF14X87 W/ (4) L6X4X3/8	67.4 ft-k	41.8 k	17.4 %
	NESC EXTREME	WF14X87	75.1 ft-k	9.5 k	21.3 %
		WF14X87 W/ (4) L6X4X3/8	498.6 ft-k	18.2 k	96.5 %
AWAY FROM GUY WIRE	NESC HEAVY	WF14X87	152.1 ft-k	45.7 k	44.8 %
		WF14X87 W/ (4) L6X4X3/8	135.5 ft-k	63.3 k	32.7 %
	NESC EXTREME	WF14X87	150.3 ft-k	42.3 k	44.1 %
		WF14X87 W/ (4) L6X4X3/8	133.0 ft-k	51.1 k	30.9 %

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Moment =	$Moment := 498.6 \cdot k \cdot ft$	(User Input from Risa3D)
Axial =	$Axial := 18.2 \cdot k$	(User Input from Risa3D)

Anchor Bolt Data:

Use ASTM A36

Number of Anchor Bolts =	$N := 4$	(User Input)
Distance Between Bolts =	$d := 23 \cdot in$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 58 \cdot ksi$	(User Input)
Bolt Yeild Strength=	$F_y := 36 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.5 \cdot in$	(User Input)
Threads per Inch =	$n := 4$	(User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.999 \cdot in^2$

Bolt Tension Check:

Maximum Tensile Force = $T_{Max} := \frac{Moment}{d \cdot \left(\frac{N}{2}\right)} - \frac{Axial}{N} = 125.5 \cdot k$

Allowable Tensile Force (Net Area) = $T_{ALL.Net} := 1.0 \cdot \left(A_n \cdot F_y\right) = 143.957 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 87.19 \cdot \%$

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

$Condition1 = \text{"OK"}$

Caisson Foundation:

Input Data:

Shear Force =	$S := 9.8k \cdot 1.1 = 10.8 \cdot kips$	*USER INPUT-FROM PLS-Pole*
Overturning Moment =	$M := 498.6ft \cdot k \cdot 1.1 = 548 \cdot ft \cdot k$	*USER INPUT-FROM PLS-Pole*
Applied Axial Load =	$A1 := 18.2k \cdot 1.1 = 20 \cdot kips$	*USER INPUT-FROM PLS-Pole*
Bending Moment =	$Mu := 603.7ft \cdot k$	*USER INPUT--FROM LPILE*
Moment Capacity =	$Mn := 1767.6ft \cdot k$	*USER INPUT--FROM LPILE*
Foundation Diameter =	$d := 4ft$	*USER INPUT*
Overall Length of Caisson =	$L_c := 23ft$	*USER INPUT*
Depth From Top of Caisson to Grade =	$L_{pag} := 3ft$	*USER INPUT*
Number of Rebar =	$n := 30$	*USER INPUT*
Area of Rebar =	$Ar := 0.6in^2$	*USER INPUT*
Rebar Yield Strength =	$fy := 60ksi$	*USER INPUT*
Concrete Comp Strength =	$f'c := 4ksi$	*USER INPUT*

Check Moment Capacity:

Factor of Safety = $FS := \frac{0.9Mn}{Mu} = 2.6$

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

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

$FOSCheck = "OK"$

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LPILE Plus for Windows, Version 5.0 (5.0.47)

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

===

This program is licensed to:

TJL
Centek Engineering

Files Used for Analysis

Path to file locations: J:\Jobs\1607100.WI\40_Norwalk CT CT5013\04_Structural\Backup Documentation\Calcs\L-Pile\
Name of input data file: Caisson Analysis.lpd
Name of output file: Caisson Analysis.lpo
Name of plot output file: Caisson Analysis.lpp
Name of runtime file: Caisson Analysis.lpr

Time and Date of Analysis

Date: November 22, 2016 Time: 14:46:25

Problem Title

16071.40 / CT5013 - Rowayton / CL&P # 489s

Program Options

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

Basic Program Options:

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

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- Additional p-y curves computed at specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 250
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 0

Pile Structural Properties and Geometry

Pile Length = 276.00 in

Depth of ground surface below top of pile = 36.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	48.00000000	260576.0000	1809.6000	3300000.
2	276.0000	48.00000000	260576.0000	1809.6000	3300000.

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

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 36.000 in
Distance from top of pile to bottom of layer = 276.000 in
p-y subgrade modulus k for top of soil layer = 20.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 20.000 lbs/in**3

(Depth of lowest layer extends 0.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	36.00	0.05800
2	276.00	0.05800

Shear Strength of Soils

Shear strength parameters with depth defined using 2 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	36.000	0.00000	30.00	------	------
2	276.000	0.00000	30.00	------	------

Notes:

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

Loading Type

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

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 10800.000 lbs
Bending moment at pile head = 6576000.000 in-lbs
Axial load at pile head = 20000.000 lbs

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

Output of p-y Curves at Specified Depths

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p-y curves are generated and printed for verification at 1 depths.

Depth No.	Depth Below Pile Head in	Depth Below Ground Surface in
1	144.000	108.000

Depth of ground surface below top of pile = 36.00 in

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Number of sections = 1

Pile Section No. 1

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

Outside Diameter = 48.0000 in

Material Properties:

```
Compressive Strength of Concrete       =        4.000 kip/in**2
Yield Stress of Reinforcement          =          60. kip/in**2
Modulus of Elasticity of Reinforcement =       29000. kip/in**2
Number of Reinforcing Bars             =           30
Area of Single Bar                     =      0.60000 in**2
Number of Rows of Reinforcing Bars     =           15
Area of Steel                          =       18.000 in**2
Area of Shaft                          =     1809.557 in**2
Percentage of Steel Reinforcement      =        0.995 percent
Cover Thickness (edge to bar center)   =        3.000 in

Unfactored Axial Squash Load Capacity  =      7171.30 kip
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Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.200	20.885
2	1.200	19.972
3	1.200	18.187
4	1.200	15.606
5	1.200	12.343
6	1.200	8.541
7	1.200	4.366
8	1.200	0.000
9	1.200	-4.366
10	1.200	-8.541

11	1.200	-12.343
12	1.200	-15.606
13	1.200	-18.187
14	1.200	-19.972
15	1.200	-20.885

Axial Thrust Force = 20000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
1324987.	1.059990E+12	0.00000125	0.00003296	26.36540365	117.00847	842.82568
2636922.	1.054769E+12	0.00000250	0.00006307	25.22897959	221.98712	1603.26061
3935784.	1.049542E+12	0.00000375	0.00009317	24.84465551	325.18842	2363.09567
5222215.	1.044443E+12	0.00000500	0.00012334	24.66888857	426.96508	3125.30801
5222215.	8.355544E+11	0.00000625	0.00008641	13.82550001	298.29981	5629.52709
5222215.	6.962953E+11	0.00000750	0.00010196	13.59450102	350.35252	6805.67479
5222215.	5.968245E+11	0.00000875	0.00011727	13.40211153	401.14626	7988.77275
5222215.	5.222215E+11	0.00001000	0.00013260	13.25978708	451.58008	9171.30009
5222215.	4.641969E+11	0.00001125	0.00014795	13.15085363	501.65282	10353.25214
5222215.	4.177772E+11	0.00001250	0.00016332	13.06530333	551.36314	11534.62547
5222215.	3.797974E+11	0.00001375	0.00017871	12.99677038	600.70984	12715.41553
5222215.	3.481476E+11	0.00001500	0.00019412	12.94100618	649.69144	13895.61982
5222215.	3.213671E+11	0.00001625	0.00020955	12.89507818	698.30694	15075.23171
5222215.	2.984123E+11	0.00001750	0.00022500	12.85688353	746.55484	16254.24871
5222215.	2.785181E+11	0.00001875	0.00024047	12.82488298	794.43377	17432.66677
5222215.	2.611107E+11	0.00002000	0.00025600	12.80000067	842.07351	18609.27630

5259564.	2.475089E+11	0.00002125	0.00027200	12.80000067	890.73148	19772.35607
5539490.	2.461996E+11	0.00002250	0.00028758	12.78131819	937.62143	20947.62615
5830224.	2.454831E+11	0.00002375	0.00030314	12.76380873	984.01136	22123.44280
6120579.	2.448231E+11	0.00002500	0.00031872	12.74896860	1030.02985	23298.59362
6410553.	2.442116E+11	0.00002625	0.00033433	12.73642588	1075.67563	24473.07145
6700146.	2.436417E+11	0.00002750	0.00034996	12.72587442	1120.94724	25646.87059
6989354.	2.431080E+11	0.00002875	0.00036562	12.71705961	1165.84303	26819.98678
7278173.	2.426058E+11	0.00003000	0.00038129	12.70976973	1210.36141	27992.41537
7566603.	2.421313E+11	0.00003125	0.00039699	12.70383024	1254.50103	29164.14866
7854639.	2.416812E+11	0.00003250	0.00041272	12.69908953	1298.26016	30335.18273
8142280.	2.412527E+11	0.00003375	0.00042847	12.69542170	1341.63735	31505.51042
8429524.	2.408435E+11	0.00003500	0.00044425	12.69271803	1384.63104	32675.12540
8716366.	2.404515E+11	0.00003625	0.00046004	12.69088125	1427.23930	33844.02508
9002806.	2.400748E+11	0.00003750	0.00047587	12.68983412	1469.46089	35012.19918
9288840.	2.397120E+11	0.00003875	0.00049172	12.68950510	1511.29410	36179.64222
9574464.	2.393616E+11	0.00004000	0.00050759	12.68982840	1552.73681	37346.35243
9859676.	2.390224E+11	0.00004125	0.00052349	12.69075251	1593.78762	38512.32048
10144474.	2.386935E+11	0.00004250	0.00053942	12.69223166	1634.44505	39677.53744
10428855.	2.383738E+11	0.00004375	0.00055537	12.69422007	1674.70695	40842.00104
10712813.	2.380625E+11	0.00004500	0.00057135	12.69668055	1714.57159	42005.70443
10996349.	2.377589E+11	0.00004625	0.00058736	12.69958162	1754.03740	43168.63848
11279460.	2.374623E+11	0.00004750	0.00060339	12.70289469	1793.10272	44330.79470
11562140.	2.371721E+11	0.00004875	0.00061945	12.70658827	1831.76514	45492.17276
12126198.	2.366087E+11	0.00005125	0.00065165	12.71503401	1907.87503	47812.55221
12688500.	2.360651E+11	0.00005375	0.00068396	12.72475576	1982.35204	

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52443.61207
   13807726.  2.350251E+11    0.00005875    0.00074892   12.74751520    2126.34460
54754.17124
   14364596.  2.345240E+11    0.00006125    0.00078157   12.76035261    2195.82777
57061.33352
   14919596.  2.340329E+11    0.00006375    0.00081435   12.77405405    2263.61289
59365.03701
   15407432.  2.325650E+11    0.00006625    0.00084591   12.76846075    2326.96434
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   15781782.  2.295532E+11    0.00006875    0.00087524   12.73069239    2384.05091
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   16404909.  2.224394E+11    0.00007375    0.00093139   12.62903166    2488.85554
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   16691086.  2.188995E+11    0.00007625    0.00095904   12.57757902    2538.33424
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   17690342.  1.993278E+11    0.00008875    0.00108758   12.25442362    2749.66268
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19192047.	1.582849E+11	0.00012125	0.00139559	11.51004267	3134.24115	60000.00000
19270026.	1.557174E+11	0.00012375	0.00141779	11.45685911	3155.35241	60000.00000
19330162.	1.531102E+11	0.00012625	0.00143920	11.39960718	3174.86119	60000.00000
19389961.	1.506016E+11	0.00012875	0.00146066	11.34490156	3193.59674	60000.00000
19449404.	1.481859E+11	0.00013125	0.00148215	11.29259062	3211.55340	60000.00000
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19696102.	1.394414E+11	0.00014125	0.00157390	11.14266729	3279.19277	60000.00000
19752150.	1.374063E+11	0.00014375	0.00159498	11.09548903	3292.56208	60000.00000
19807873.	1.354384E+11	0.00014625	0.00161609	11.05021906	3305.17385	60000.00000
19863262.	1.335345E+11	0.00014875	0.00163726	11.00676012	3317.02293	60000.00000
19973033.	1.299059E+11	0.00015375	0.00167971	10.92493773	3338.41394	60000.00000
20070939.	1.264311E+11	0.00015875	0.00172160	10.84469461	3356.38878	60000.00000
20134736.	1.229602E+11	0.00016375	0.00176131	10.75606298	3370.53750	60000.00000
20197469.	1.196887E+11	0.00016875	0.00180117	10.67358828	3381.96101	60000.00000
20259136.	1.165993E+11	0.00017375	0.00184119	10.59676123	3390.62632	60000.00000
20319705.	1.136767E+11	0.00017875	0.00188136	10.52511549	3396.49887	60000.00000
20379166.	1.109070E+11	0.00018375	0.00192170	10.45824766	3399.54364	60000.00000
20447417.	1.083307E+11	0.00018875	0.00196300	10.40000010	3395.34143	60000.00000
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60000.00000
   20759360.  9.489993E+10    0.00021875    0.00221183   10.11123133    3391.12450
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   20809642.  9.097111E+10    0.00022875    0.00228679    9.99691057    3398.39914
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    21292559.  5.935208E+10    0.00035875    0.00330132    9.20227575    3378.97202
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  60000.00000
    21332228.  5.094263E+10    0.00041875    0.00375829    8.97502184    3387.86624
  60000.00000
    21332399.  4.975487E+10    0.00042875    0.00383927    8.95457125    3378.09446
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Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 =   21214.46658 in-kip

p-y Curve in Sand Computed Using Reese Criteria for Static Loading Conditions

```
Soil Layer Number           =           1
Depth below pile head       =     144.000 in
Depth below ground surface  =     108.000 in
Equivalent Depth (see note) =     108.000 in
Pile Diameter               =      48.000 in
Angle of Friction           =      30.000 deg.
Avg. Eff. Unit Weight       =     0.05800 pci
k                           =      20.000 pci
A (static)                  =      1.3550
B (static)                  =      0.9550
Pst                         =    2095.083 lbs/in
Psd                         =    8642.855 lbs/in
Ps                          =    2095.083 lbs/in
Cbar                        =   2156.1406
```

n	=	2.9844
m	=	838.0332
yk	=	0.9973 in
pm	=	2000.804 lbs/in
ym	=	0.8000 in
pu	=	2838.838 lbs/in
yu	=	1.8000 in
p-multiplier	=	1.00000
y-multiplier	=	1.00000

This p-y curve is computed using the equivalent depth.

y, in	p, lbs/in	
0.0000	0.0000	
0.0666667	144.0000	*
0.1333333	288.0000	*
0.2000000	432.0000	*
0.2666667	576.0000	*
0.3333333	720.0000	*
0.4000000	864.0000	*
0.4666667	1008.0000	*
0.5333333	1152.0000	*
0.6000000	1296.0000	*
0.6666667	1440.0000	*
0.7333333	1584.0000	*
0.8000000	1728.0000	*
1.3000	2419.8209	
1.8000	2838.8376	
49.8000	2838.8376	
97.8000	2838.8376	

* p value(s) computed using p = k * Eff x * y

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

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head = 10800.000 lbs
Specified moment at pile head = 6576000.000 in-lbs
Specified axial load at pile head = 20000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in	Es*h F/L
0.000	1.231	6.58E+06	10800.	-0.008909	616.726	2.44E+11	0.000	0.000

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     1.23096277 in
Computed slope at pile head      =    -0.00890910
Maximum bending moment           =       7244822. lbs-in
Maximum shear force              =   -57275.06102 lbs
Depth of maximum bending moment  =    74.52000000 in
Depth of maximum shear force     =      198.72000 in
Number of iterations             =             30
Number of zero deflection points =              1
```

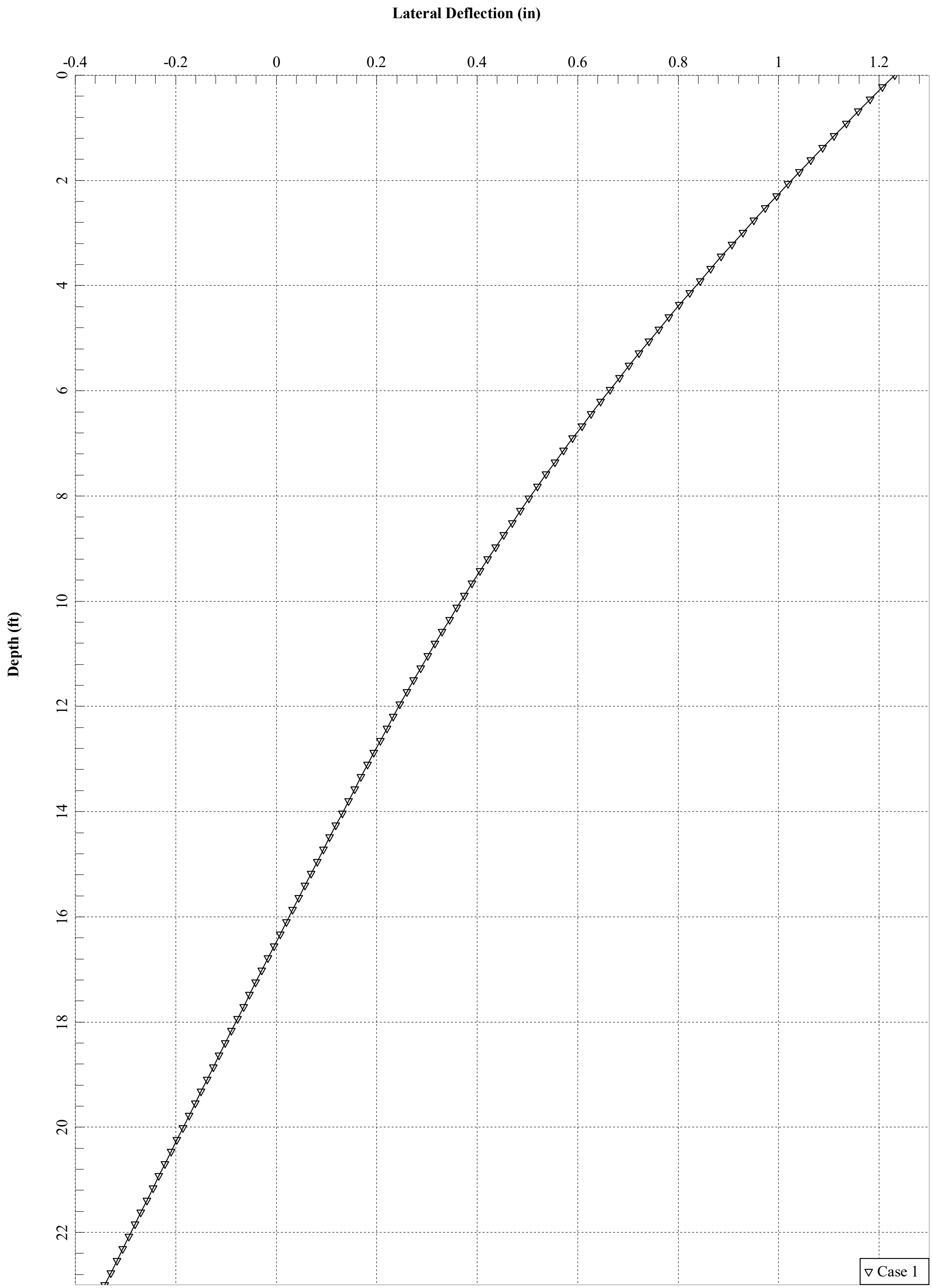
Summary of Pile Response(s)

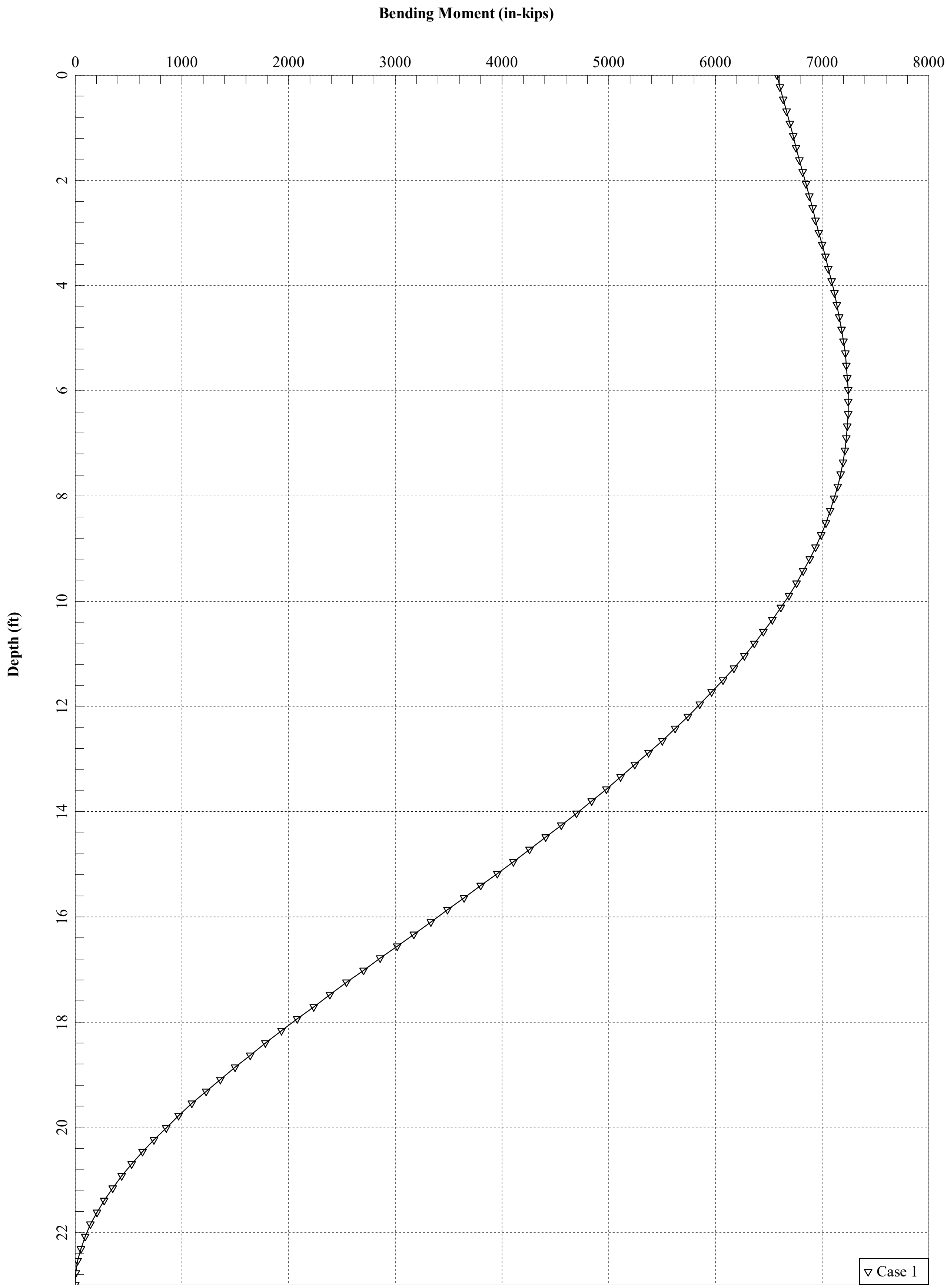
Definition of Symbols for Pile-Head Loading Conditions:

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

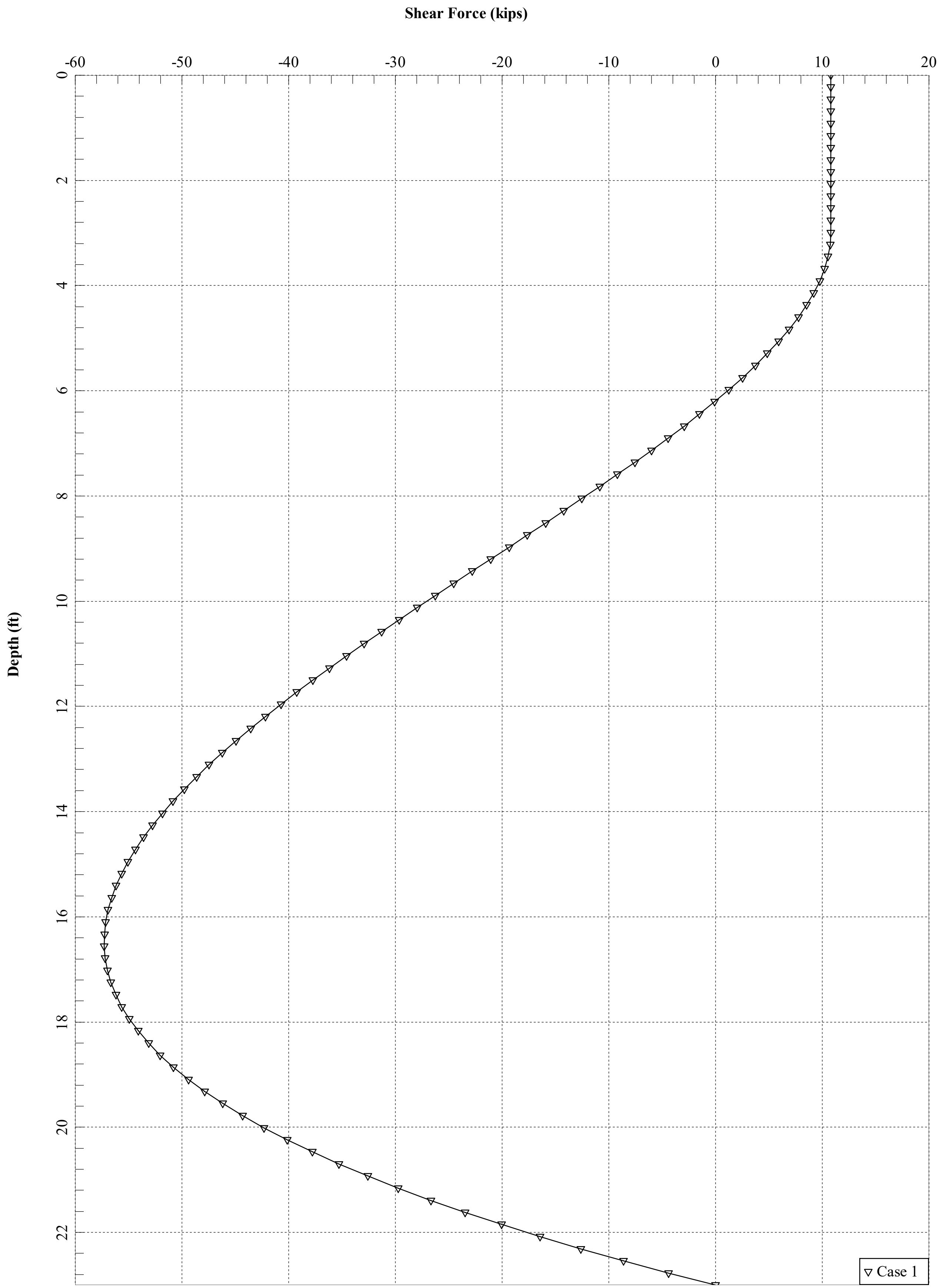
Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 10800.	M= 6.58E+06	20000.0000	1.2310	7244822.	-57275.0610

The analysis ended normally.


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



Bending Moment (in-kips)
0
1000
2000
3000
4000
5000
6000
7000
8000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
Case 1


Shear Force (kips)
-60
-50
-40
-30
-20
-10
0
10
20
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
Case 1

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

				Page	of
Job :	AT&T - CT5013 Rowayton	Project No.	16071.40	Sheet	1 of 2
Address:	310 Rowayton Ave., Norwalk, CT	Computed by	TJL	Date	11/22/16
Description:	Guy Anchor Evaluation	Checked by	CFC	Date	

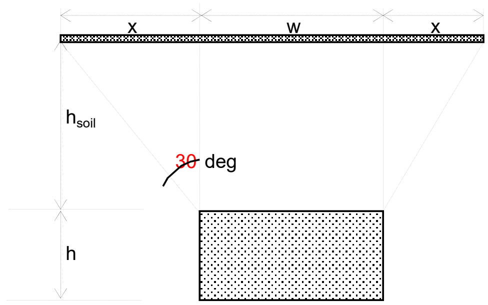
CHECK UPLIFT RESISTANCE

RESULTS FROM COMPUTER ANALYSIS:

Uplift =	16.5	kips
Sliding =	6	kips

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
w =	4	ft
h =	1.83	ft
d =	6.5	ft
Vol. =	*47.58*	ft^3
Wc =	*7.14*	kips



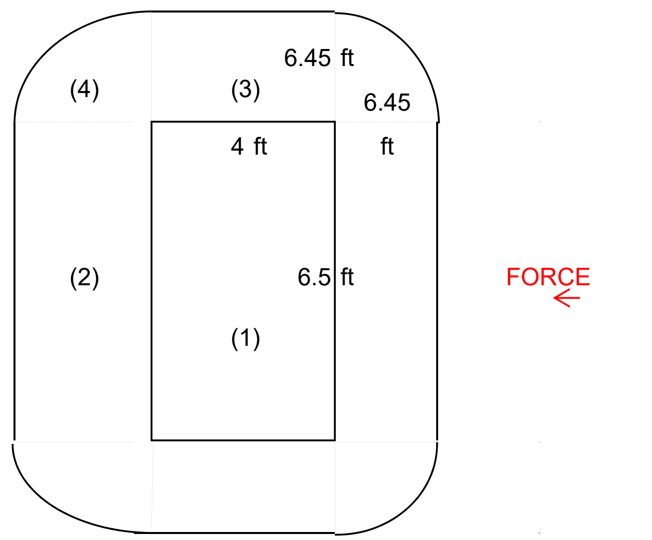
Foundation Section

SOIL PARAMETERS:

γ_{soil} =	90	pcf
h_{soil} =	11.17	ft
x =	*6.45*	ft

Soil Weight (Wr):

(1) =	26.14	kips
(2) =	42.14	kips
(3) =	25.93	kips
(4) =	43.78	kips
*(5) Anchor Reinf. =	0	kips
Total =	137.99	kips



Foundation Plan View

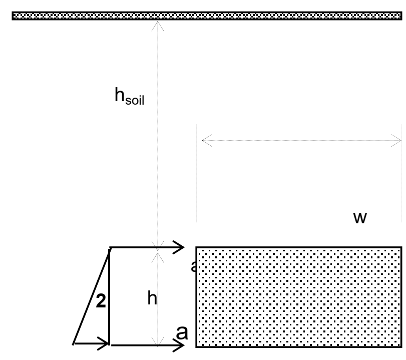
CHECK UPLIFT

Wr + Wc > UPLIFT

145.13 **>** *18.15* ***OK***

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

CHECK SLIDING RESISTANCE



Foundation Elevation View

SOIL PARAMETERS

γ soil =	90	pcf
γ soil2 =	27.6	pcf
h_{soil} =	11.17	ft
h =	1.83	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	4.0	ft
h =	1.8	ft
d =	6.5	ft

K_a = 0.33

K_p = 3.00

Δ = 2.67

HORIZONTAL FORCES

1 =	31.89	k
2 =	0.80	k
RESIST TO SLIDING =	32.69	k

SOIL & CONCRETE WEIGHT =	Wr + Wc =	145.13	k
UPLIFT REACTIONS =		-16.5	k
SUM =		128.63	k

COEF. OF FRICTION, (0.45) =	57.88	k
RESIST TO SLIDING =	32.69	k
SUM =	90.57	k

CHECK SLIDING

90.6 > 6.6 OK

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

Section 1 - RFDS GENERAL INFORMATION

RFDS NAME:	CT5013	DATE:	09/11/2015	RF DESIGN ENG:	Bayani Del Moro
ISSUE:	Bronze	Approved? (Y/N):	Yes	RF DESIGN PHONE:	(401)834-5095
REVISION:	Preliminary	RF MANAGER:	Cameron Syme	RF DESIGN EMAIL:	bd250h@att.com
INITIATIVE /PROJECT:	New RFDS (RRUS32, add XMU, 2nd CPRI from RRUS32)				

RF PERF ENG:		RFDS PROGRAM TYPE:	2016 LTE Multi Carrier
RF PERF PHONE:		RFDS TECHNOLOGY:	1xBBU RRH Add
RF PERF EMAIL:		State:	Final
TRIDENT:		Status:	RF Approval
GSM FREQUENCY:	850	RFDS ID:	1090396
UMTS FREQUENCY:	850, 1900	RFDS Version:	1.00
LTE FREQUENCY:	700, 1900	Created By:	om636a
		Date Created:	2/25/2016 11:29:14 AM
		Date Updated:	2/25/2016 3:24:38 PM
		Updated By:	om636a
I-PLAN JOB # 1:	NER-RCTB-16-00605	IPLAN PRD GRP || SUB GRP #1:	LTE Multi Carrier || LTE BWE
I-PLAN JOB # 2:		IPLAN PRD GRP || SUB GRP #2:	
I-PLAN JOB # 3:		IPLAN PRD GRP || SUB GRP #3:	
I-PLAN JOB # 4:		IPLAN PRD GRP || SUB GRP #4:	

Section 2 - LOCATION INFORMATION

USID:	46002	FA LOCATION CODE:	10071190	LOCATION NAME:	ROWAYTON
REGION:	NORTHEAST	MARKET CLUSTER:	NEW ENGLAND	MARKET:	CONNECTICUT
ADDRESS:	310 ROWAYTON AVENUE	CITY:	NORWALK	STATE:	CT
ZIP CODE:	06853	COUNTY:	FAIRFIELD	MSA / RSA:	
LATITUDE (D-M-S):	41d 4m38.97084s	LONGITUDE (D-M-S):	-73d -26m-32.99604s	LAT (DEC. DEG.):	41.0774919

DIRECTIONS, ACCESS AND EQUIPMENT LOCATION:

5013
ROWAYTON

I-95 NORTH NEW ENGLAND THRUWAY GET OFF AT EXIT 12
MAKE RIGHT AT END OF RAMP ONTO ROUTE 136 NORTH.TAKE THIS 1.1 MILES.MAKE LEFT AT TRAFFIC LIGHT ONTO ROWAYTON AVE.TAKE THIS TO STOP SIGN.MAKE RIGHT ONTO BELMONT PLACE AND THEN FIRST LEFT INTO ROWAYTON TRAIN STATION.OUR MODULAR IS LOCATED AT THE BACK OF THE LOT.ANTENNAS ARE MOUNTED AT TOP OF LATTICE POWER TOWER. DEMARC IN GRAY BOX OUTSIDE SITE.

ADDRESS: 310 ROWAYTON AVE.NORWALK, CONNECTICUT 06853

CONTACT: DAVE WILLARD 203 337-3606 METRO NORT/H
: VINNIE COLENERO 860 665-6633 NORTHEST UTILITIES FOR ANTENNA REPAIRS.

METER # : 02-489-852

GENERATOR PLUG #: AR20033RS

SECURITY: NONE

ACCESS: 24/7 GATE ACCESS 8899 COMBO

TRACESS: 7083664

POWER COMPANY: NORTHEAST UTILITIES 800-286-2000

FIRE: 203 853-9411 ROWAYTON FIRE DEPT.

POLICE: 203 655-9239 DARIEN POLICE DEPT.

T-1 CIRCUIT NUMBERS TDMA: HCGS 675232 AND HCGS 675233
GSM : HCGS691039

VERIZON COMMUNICATIONS

ORACLE PTN # 1:		PACE JOB # 1:	MRCTB018025
ORACLE PTN # 2:		PACE JOB # 2:	
ORACLE PTN # 3:		PACE JOB # 3:	
ORACLE PTN # 4:		PACE JOB # 4:	
SEARCH RING NAME:			
SEARCH RING ID:		CASPR INITIATIVE # 1:	
BTA:		CASPR INITIATIVE # 2:	
LONG (DEC. DEG.):	-73.4424989	CASPR INITIATIVE # 3:	
BORDER CELL WITH CONTOUR COORD:		CASPR INITIATIVE # 4:	
AM STUDY REQ'D (Y/N):	No		
FREQ COORD:			

Section 3 - LICENSE COVERAGE/FILING INFORMATION

CGSA - NO FILING TRIGGERED (Yes/No):	No	CGSA LOSS:		PCS REDUCED - UPS ZIP:	
CGSA - MINOR FILING NEEDED (Yes/No)::	No	CGSA EXT AGMT NEEDED:		PCS POPS REDUCED:	
CGSA - MAJOR FILING NEEDED (Yes/No):	Yes	CGSA SCORECARD UPDATED:			

CGSA CALL SIGNS:	KNKA256,KNKA256,KNKA256

Section 4 - TOWER/REGULATORY INFORMATION

STRUCTURE AT&T OWNED?:	Yes	GROUND ELEVATION (ft):		STRUCTURE TYPE:	UTILITY
ADDITIONAL REGULATORY?:	Yes	HEIGHT OVERALL (ft):	0.00	FCC ASR NUMBER:	NR
SUB-LEASE RIGHTS?:	Yes	STRUCTURE HEIGHT (ft):	95.00		
LIGHTING TYPE:	NOT REQUIRED				

MARKET LOCATION 700 MHz Band:	
MARKET LOCATION 850 MHz Band:	
MARKET LOCATION 1900 MHz Band:	
MARKET LOCATION AWS Band:	
MARKET LOCATION WCS Band:	
MARKET LOCATION Future Band:	

Section 5 - E-911 INFORMATION - existing

	PSAP NAME:	PSAP ID:	E911 PHASE:	MPC SVC PROVIDER:	LMU REQUIRED:	ESRN:	DATE LIVE PH1:	DATE LIVE PH2:		
SECTOR A E-911	NORWALK POLICE DEPARTMENT	1374		INTRADO_MIAMI		0				
SECTOR B	NORWALK POLICE DEPARTMENT	1374		INTRADO_MIAMI		0				
SECTOR C	DARIEN POLICE DEPARTMENT	1329		INTRADO_MIAMI		0				
SECTOR D										
SECTOR E										
SECTOR F										
OMNI										

Section 5 - E-911 INFORMATION - final

	PSAP NAME:	PSAP ID:	E911 PHASE:	MPC SVC PROVIDER:	LMU REQUIRED:	ESRN:	DATE LIVE PH1:	DATE LIVE PH2:		
SECTOR A E-911	NORWALK POLICE DEPARTMENT	1374		INTRADO_MIAMI		0				
SECTOR B	NORWALK POLICE DEPARTMENT	1374		INTRADO_MIAMI		0				
SECTOR C	DARIEN POLICE DEPARTMENT	1329		INTRADO_MIAMI		0				
SECTOR D										
SECTOR E										
SECTOR F										
OMNI										

Section 6 - RBS GENERAL INFORMATION - existing

	GSM 1ST RBS	UMTS 1ST RBS	UMTS 2ND RBS	UMTS 3RD RBS	LTE 1ST RBS							
RBS ID:	469109	172503	222793	401757	360162							
CTS COMMON ID:	321G5013	CTU5013	CTV5013	CTU4013	CTL05013							
CELL ID / BCF:	321G5013	CTU5013	CTU5013	CTU4013	CTL05013							
BTA/TID:	321M	321V	321U	321W	321L							
4-DIGIT SITE ID:	5013	5013	5013	04013	5013							
COW OR TOY?:	No	No	No	No	No							
CELL SITE TYPE:	SECTORIZED	SECTORIZED	SECTORIZED	SECTORIZED	SECTORIZED							
SITE TYPE:	BTS-CONVENTIONAL	MACRO-CONVENTIONAL	MACRO-CONVENTIONAL	MACRO-CONVENTIONAL	MACRO-CONVENTIONAL							
BTS LOCATION ID:	GROUND	INTERNAL	GROUND	INTERNAL	INTERNAL							
ORIGINATING CO:	CINGULAR	CINGULAR	CINGULAR	CINGULAR	CINGULAR							
CELLULAR NETWORK:	GOLD	GOLD	GOLD	GOLD	GOLD							
OPS DISTRICT:	CT-South	CT SOUTH-WEST	CT SOUTH-WEST	CT-SOUTH	CT SOUTH-WEST							
RF DISTRICT:	NPO Triage	NPO TRIAGE	BRIDGEPORT	NPO TRIAGE	NPO TRIAGE							
OPS ZONE:	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS							
RF ZONE:	Hotseat	HOTSEAT	BBP02	HOTSEAT	HOTSEAT							
BASE STATION TYPE:	BASE	BASE	OVERLAY	OVERLAY	BASE							
EQUIPMENT NAME:	ROWAYTON	ROWAYTON	ROWAYTON	ROWAYTON	ROWAYTON							
DISASTER PRIORITY:	0	2	0	0	3							

Section 6 - RBS GENERAL INFORMATION - final

	GSM 1ST RBS	UMTS 1ST RBS	UMTS 2ND RBS	UMTS 3RD RBS	LTE 1ST RBS							
RBS ID:	469109	172503	222793	401757	360162							
CTS COMMON ID:	321G5013	CTU5013	CTV5013	CTU4013	CTL05013							
CELL ID / BCF:	321G5013	CTU5013	CTU5013	CTU4013	CTL05013							
BTA/TID:	321M	321V	321U	321W	321L							
4-DIGIT SITE ID:	5013	5013	5013	04013	5013							
COW OR TOY?:	No	No	No	No	No							
CELL SITE TYPE:	SECTORIZED	SECTORIZED	SECTORIZED	SECTORIZED	SECTORIZED							
SITE TYPE:	BTS-CONVENTIONAL	MACRO-CONVENTIONAL	MACRO-CONVENTIONAL	MACRO-CONVENTIONAL	MACRO-CONVENTIONAL							
BTS LOCATION ID:	GROUND	INTERNAL	GROUND	INTERNAL	INTERNAL							
ORIGINATING CO:	CINGULAR	CINGULAR	CINGULAR	CINGULAR	CINGULAR							
CELLULAR NETWORK:	GOLD	GOLD	GOLD	GOLD	GOLD							
OPS DISTRICT:	CT-South	CT-South	CT-South	CT-South	CT-South							
RF DISTRICT:	NPO Triage	NPO Triage	Bridgeport	NPO Triage	NPO Triage							
OPS ZONE:	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS	NE_CT_S_FRFD_SW_CS							
RF ZONE:	Hotseat	Hotseat	BBP02	Hotseat	Hotseat							
BASE STATION TYPE:	BASE	BASE	OVERLAY	OVERLAY	BASE							
EQUIPMENT NAME:	ROWAYTON	ROWAYTON	ROWAYTON	ROWAYTON	ROWAYTON							
DISASTER PRIORITY:	0	2	0	0	3							

Section 7 - RBS SPECIFIC INFORMATION - existing

	GSM 1ST RBS	UMTS 1ST RBS	UMTS 2ND RBS	UMTS 3RD RBS	LTE 1ST RBS								
MSC:													
BSC/RNC/MME POOL ID:	BRIDGEPORT BSC 02	BRIDGEPORT RNC06 ERICSSON 3820	BRIDGEPORT RNC06 ERICSSON 3820	BRIDGEPORT RNC06 ERICSSON 3820	FF01								
LAC:	05011	05989	05989	05989									
RAC:													
EQUIPMENT VENDOR:	NOKIA	ERICSSON	ERICSSON	ERICSSON	ERICSSON								
EQUIPMENT TYPE:	ULTRASITE 850	3206 INDOOR	3106 OUTDOOR	6601 MAIN UNIT UMTS	6601 INDOOR MU								
BASEBAND CONFIGURATION:													
LOCATION:													
CABINET LOCATION:													
MARKET STATE CODE:					CT								
AGPS:	Yes	Yes	Yes	Yes	Yes								
NODE B NUMBER:	0	0	0	0	5013								
PARENT NAME:	BRIDGEPORT BSC 02	BRIDGEPORT RNC06 ERICSSON 3820	BRIDGEPORT RNC06 ERICSSON 3820	BRIDGEPORT RNC06 ERICSSON 3820	FF01								

Section 7 - RBS SPECIFIC INFORMATION - final

	GSM 1ST RBS	UMTS 1ST RBS	UMTS 2ND RBS	UMTS 3RD RBS	LTE 1ST RBS								
MSC:													
BSC/RNC/MME POOL ID:	BRPTCTBSC02	BRPTCT04CRBR06	BRPTCT04CRBR06	BRPTCT04CRBR06	FF01								
LAC:	05011	05989	05989	05989									
RAC:													
EQUIPMENT VENDOR:	NOKIA	ERICSSON	ERICSSON	ERICSSON	ERICSSON								
EQUIPMENT TYPE:	ULTRASITE 850	3206 INDOOR	3106 OUTDOOR	6601 MAIN UNIT UMTS	6601 INDOOR MU								
BASEBAND CONFIGURATION:													
LOCATION:													
CABINET LOCATION:													
MARKET STATE CODE:					CT								
AGPS:	Yes	Yes	Yes	Yes	Yes								
NODE B NUMBER:	0	0	0	0	5013								
PARENT NAME:	BRIDGEPORT BSC 02	BRIDGEPORT RNC06 ERICSSON 3820	BRIDGEPORT RNC06 ERICSSON 3820	BRIDGEPORT RNC06 ERICSSON 3820									

Section 8 - RBS/SECTOR ASSOCIATION - existing

	GSM 1ST RBS	UMTS 1ST RBS	UMTS 2ND RBS	UMTS 3RD RBS	LTE 1ST RBS															
CTS Common ID	321G5013	CTU5013	CTV5013	CTU4013	CTL05013															
Soft Sector IDs	321G50131	CTU50137	CTV50131	CTV4013A	CTL05013_7A_1															
	321G50132	CTU50138	CTV50132	CTV4013B	CTL05013_7B_1															
	321G50133	CTU50139	CTV50133	CTV4013C	CTL05013_7C_1															

Section 8 - RBS/SECTOR ASSOCIATION - final

	GSM 1ST RBS	UMTS 1ST RBS	UMTS 2ND RBS	UMTS 3RD RBS	LTE 1ST RBS															
CTS Common ID	321G5013	CTU5013	CTV5013	CTU4013	CTL05013															
Soft Sector IDs	321G50131	CTU50137	CTV50131	CTV4013A	CTL05013_7A_1															
	321G50132	CTU50138	CTV50132	CTV4013B	CTL05013_7B_1															
	321G50133	CTU50139	CTV50133	CTV4013C	CTL05013_7C_1															
					CTL05013_9A_1															
					CTL05013_9B_1															
					CTL05013_9C_1															

Section 9 - SOFT SECTOR ID - existing

	GSM 1ST 850	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900																					
USEID (excluding Hard Sector)	46002.850.25G.2	46002.850.3G.1	46002.1900.3G.1	46002.850.3G.2																							
SECTOR A SOFT SECTOR ID	321G50131	CTV50131	CTU50137	CTV4013A	CTL05013_7A_1																						
SECTOR B	321G50132	CTV50132	CTU50138	CTV4013B	CTL05013_7B_1																						
SECTOR C	321G50133	CTV50133	CTU50139	CTV4013C	CTL05013_7C_1																						
SECTOR D																											
SECTOR E																											
SECTOR F																											
OMNI																											

Section 9 - SOFT SECTOR ID - final

	GSM 1ST 850	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900																					
USEID (excluding Hard Sector)	46002.850.25G.2	46002.850.3G.1	46002.1900.3G.1	46002.850.3G.2																							
SECTOR A SOFT SECTOR ID	321G50131	CTV50131	CTU50137	CTV4013A	CTL05013_7A_1	CTL05013_9A_1																					
SECTOR B	321G50132	CTV50132	CTU50138	CTV4013B	CTL05013_7B_1	CTL05013_9B_1																					
SECTOR C	321G50133	CTV50133	CTU50139	CTV4013C	CTL05013_7C_1	CTL05013_9C_1																					
SECTOR D																											
SECTOR E																											
SECTOR F																											
OMNI																											

Section 9 - Cell Number - existing

	GSM 1ST 850	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900																				
USEID (excluding Hard Sector)	46002.850.25G.2	46002.850.3G.1	46002.1900.3G.1	46002.850.3G.2																						
SECTOR A CELL NUMBER					15																					
SECTOR B					16																					
SECTOR C					17																					
SECTOR D																										
SECTOR E																										
SECTOR F																										
OMNI																										

Section 9 - Cell Number - final

	GSM 1ST 850	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900																				
USEID (excluding Hard Sector)	46002.850.25G.2	46002.850.3G.1	46002.1900.3G.1	46002.850.3G.2																						
SECTOR A CELL NUMBER					15	8																				
SECTOR B					16	9																				
SECTOR C					17	10																				
SECTOR D																										
SECTOR E																										
SECTOR F																										
OMNI																										

Section 10 - CID/SAC - existing

	GSM 1ST 850	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900																					
SECTOR A CID/SAC	50131	50131	50137	40131																							
SECTOR B	50132	50132	50138	40132																							
SECTOR C	50133	50133	50139	40133																							
SECTOR D																											
SECTOR E																											
SECTOR F																											
OMNI																											

Section 10 - CID/SAC - final

	GSM 1ST 850	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900																					
SECTOR A CID/SAC	50131	50131	50137	40131																							
SECTOR B	50132	50132	50138	40132																							
SECTOR C	50133	50133	50139	40133																							
SECTOR D																											
SECTOR E																											
SECTOR F																											
OMNI																											

Section 11 - CURRENT RADIO COUNTS existing

	LTE 1ST 1900																										
SECTOR A RADIO COUNTS	1																										
SECTOR B	1																										
SECTOR C	1																										
SECTOR D																											
SECTOR E																											
SECTOR F																											
OMNI																											

Section 13 - NEW/PROPOSED RADIO COUNTS

	LTE 1ST 1900																										
SECTOR A **RADIO COUNTS**	1																										
SECTOR B	1																										
SECTOR C	1																										
SECTOR D																											
SECTOR E																											
SECTOR F																											
OMNI																											

Section 15A - CURRENT SECTOR/CELL INFORMATION - SECTOR A (OR OMNI)

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	FX-X-CD-65-12-65-14-00T-ST													
ANTENNA VENDOR	KMW													
ANTENNA SIZE (H x W x D)	24X11.8X6													
ANTENNA WEIGHT	15.4													
AZIMUTH	30													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT	2													
FEEDER AMOUNT	2													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	4	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	2	TRIASX TBC0020F1V24-Triplexers												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)														
PDU FOR TMAS (QTY/MODEL)														
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)	1	RRUS-11												
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-12												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1														
Local Market Note 2														
Local Market Note 3														

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 1		46002.A.850.3G.1	CTV50131	CTV50131		UMTS 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	30	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		1	
	PORT 2		46002.A.850.3G.2	CTV4013A	CTV4013A		UMTS 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	30	0	Bottom	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		1	
	PORT 3		46002.A.1900.3G.1	CTU50137	CTU50137		UMTS 1900	FX-X-CD-65-12-65-14-00T-ST_1930MHz_00DT	13.5	30	0	None	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC	NO		615		2	
	PORT 4		46002.A.1900.4G.111	CTL05013_9A_1	CTL05013_9A_1		LTE 1900	FX-X-CD-65-12-65-14-00T-ST_1930MHz_00DT	13.5	30	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		2	

	PORT 5		46002.A.700.4G.1	CTL05013_7A_1	CTL05013_7A_1		LTE 700	FX-X-CD-65-12-65-14-00T-ST_725MHz_00DT	12.69	30	0	Bottom	Andrew 1-5/8	175		0		NO		827		1	
	PORT 6		46002.A.850.25G.1	321G50131	321G50131		GSM 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	30	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		140		1	

Section 15B - CURRENT SECTOR/CELL INFORMATION - SECTOR B

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	FX-X-CD-65-12-65-14-00T-ST													
ANTENNA VENDOR	KMW													
ANTENNA SIZE (H x W x D)	24X11.8X6													
ANTENNA WEIGHT	15.4													
AZIMUTH	150													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT	0													
FEEDER AMOUNT	2													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	4	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	2	TRIASX TBC0020F1V24-Triplexers												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)														
PDU FOR TMAS (QTY/MODEL)														
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)	1	RRUS-11												
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-12												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1														
Local Market Note 2														
Local Market Note 3														

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 1		46002.B.850.3G.1	CTV50132	CTV50132		UMTS 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	150	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		9	
	PORT 2		46002.B.850.3G.2	CTV4013B	CTV4013B		UMTS 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	150	0	Bottom	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		9	
	PORT 3		46002.B.1900.3G.1	CTU50138	CTU50138		UMTS 1900	FX-X-CD-65-12-65-14-00T-ST_1930MHz_00DT	13.5	150	0	None	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC	NO		615		10	
	PORT 4		46002.B.1900.4G.111	CTL05013_9B_1	CTL05013_9B_1		LTE 1900	FX-X-CD-65-12-65-14-00T-ST_1930MHz_00DT	13.5	150	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		10	

	PORT 5		46002.B.700.4G.1	CTL05013_7B_1	CTL05013_7B_1		LTE 700	FX-X-CD-65-12-65-14-00T-ST_725MHz_00DT	12.69	150	0	Bottom	Andrew 1-5/8	175		0		NO		827		9	
	PORT 6		46002.B.850.25G.1	321G50132	321G50132		GSM 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	150	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		140		9	

Section 15C - CURRENT SECTOR/CELL INFORMATION - SECTOR C

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	FX-X-CD-65-12-65-14-00T-ST													
ANTENNA VENDOR	KMW													
ANTENNA SIZE (H x W x D)	24X11.8X6													
ANTENNA WEIGHT	15.4													
AZIMUTH	270													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT	0													
FEEDER AMOUNT	2													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	4	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	2	TRIASX TBC0020F1V24-Triplexers												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)														
PDU FOR TMAS (QTY/MODEL)														
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)	1	RRUS-11												
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-12												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1														
Local Market Note 2														
Local Market Note 3														

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/ Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	**PORT 1**		46002.C.850.3G.1	CTV50133	CTV50133		UMTS 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	270	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		17	
	PORT 2		46002.C.850.3G.2	CTV4013C	CTV4013C		UMTS 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	270	0	Bottom	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		17	
	PORT 3		46002.C.1900.3G.1	CTU50139	CTU50139		UMTS 1900	FX-X-CD-65-12-65-14-00T-ST_1930MHz_00DT	13.5	270	0	None	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC	NO		615		18	
	PORT 4		46002.C.1900.4G.111	CTL05013_9C_1	CTL05013_9C_1		LTE 1900	FX-X-CD-65-12-65-14-00T-ST_1930MHz_00DT	13.5	270	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		18	

	PORT 5		46002.C.700.4G.1	CTL05013_7C_1	CTL05013_7C_1		LTE 700	FX-X-CD-65-12-65-14-00T-ST_725MHz_00DT	12.69	270	0	Bottom	Andrew 1-5/8	175		0		NO		827		17	
	PORT 6		46002.C.850.25G.1	321G50133	321G50133		GSM 850	FX-X-CD-65-12-65-14-00T-ST_850MHz_00DT	12.39	270	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		140		17	

Section 16A - NEW/PROPOSED SECTOR/CELL INFORMATION - SECTOR A (OR OMNI)

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
Existing Antenna?														
ANTENNA MAKE - MODEL	HPA-65F-BUU-H2-K													
ANTENNA VENDOR	CCI													
ANTENNA SIZE (H x W x D)	21.4X14.4X7.3													
ANTENNA WEIGHT	13.8													
AZIMUTH	30													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT														
FEEDER AMOUNT	2													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	2	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	4	CCI Pentaplexer 5PX-0726-O												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)	1	K SBT 782-10253												
PDU FOR TMAS (QTY/MODEL)	1	KATHREIN 860-10006												
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)														
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-32 B2												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1	Swap exsiting antenna to Hex//Add 2 new Coax per sector//Add 4 pentaplexer per sector//Add 2 Twin-TMA at top per sector// Replace RRUS-12 to RRUS32 B2// Add XMU to existing DUS41 for BWE on LTE 2C 1900//Proposed UMTS1900 decom													
Local Market Note 2														
Local Market Note 3														

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 4		46002.A.1900.4G.111	CTL05013_9A_1	CTL05013_9A_1		LTE 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	30	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		2	

Section 16B - NEW/PROPOSED SECTOR/CELL INFORMATION - SECTOR B

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
Existing Antenna?														
ANTENNA MAKE - MODEL	HPA-65F-BUU-H2-K													
ANTENNA VENDOR	CCI													
ANTENNA SIZE (H x W x D)	21.4X14.4X7.3													
ANTENNA WEIGHT	13.8													
AZIMUTH	150													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT														
FEEDER AMOUNT	2													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	2	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	4	CCI Pentaplexer 5PX-0726-O												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)	1	K SBT 782-10253												
PDU FOR TMAS (QTY/MODEL)														
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)														
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-32 B2												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1	Swap exsiting antenna to Hex//Add 2 new Coax per sector//Add 4 pentaplexer per sector//Add 2 Twin-TMA at top per sector// Replace RRUS-12 to RRUS32 B2// Add XMU to existing DUS41 for BWE on LTE 2C 1900//Proposed UMTS1900 decom													
Local Market Note 2														
Local Market Note 3														

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 4		46002.B.1900.4G.111	CTL05013_9B_1	CTL05013_9B_1		LTE 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	150	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		10	

Section 16C - NEW/PROPOSED SECTOR/CELL INFORMATION - SECTOR C

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
Existing Antenna?														
ANTENNA MAKE - MODEL	HPA-65F-BUU-H2-K													
ANTENNA VENDOR	CCI													
ANTENNA SIZE (H x W x D)	21.4X14.4X7.3													
ANTENNA WEIGHT	13.8													
AZIMUTH	270													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT														
FEEDER AMOUNT	2													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	2	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	4	CCI Pentaplexer 5PX-0726-O												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)	1	K SBT 782-10253												
PDU FOR TMAS (QTY/MODEL)														
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)														
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-32 B2												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1	Swap exsiting antenna to Hex//Add 2 new Coax per sector//Add 4 pentaplexer per sector//Add 2 Twin-TMA at top per sector// Replace RRUS-12 to RRUS32 B2// Add XMU to existing DUS41 for BWE on LTE 2C 1900//Proposed UMTS1900 decom													
Local Market Note 2														
Local Market Note 3														

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 4		46002.C.1900.4G.111	CTL05013_9C_1	CTL05013_9C_1		LTE 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	270	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		18	

Section 17A - FINAL SECTOR/CELL INFORMATION - SECTOR A (OR OMNI)

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	HPA-65F-BUU-H2-K													
ANTENNA VENDOR	CCI													
ANTENNA SIZE (H x W x D)	21.4X14.4X7.3													
ANTENNA WEIGHT	13.8													
AZIMUTH	30													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT	2													
FEEDER AMOUNT	4													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	6	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	4	CCI Pentaplexer 5PX-0726-O												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)	2	K SBT 782-10253												
PDU FOR TMAS (QTY/MODEL)	1	KATHREIN 860-10006												
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)	1	RRUS-11												
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-32 B2												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1	Swap exsiting antenna to Hex//Add 2 new Coax per sector//Add 4 pentaplexer per sector//Add 2 Twin-TMA at top per sector// Replace RRUS-12 to RRUS32 B2// Add XMU to existing DUS41 for BWE on LTE 2C 1900.													
Local Market Note 2	PROPOSED UMTS1900 Decom													
Local Market Note 3	Baseband Config- 1 DUS + XMU DUS-1- 7A:7B:7C:X1P1:X1P2:_ XMU-1- PA:PA2A:_:_:PB:PA2B:PC:PA2C:_:_:_:_:_:_:D1E:D1D													

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 1	46002.A.850.3G.1	46002.A.850.3G.1	CTV50131	CTV50131		UMTS 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	30	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		1	
	PORT 2	46002.A.850.3G.2	46002.A.850.3G.2	CTV4013A	CTV4013A		UMTS 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	30	0	Bottom	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		1	
	PORT 3	46002.A.1900.3G.1	46002.A.1900.3G.1	CTU50137	CTU50137		UMTS 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	30	0	None	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC	NO		615		2	
	PORT 4	46002.A.1900.4G.tmp1	46002.A.1900.4G.111	CTL05013_9A_1	CTL05013_9A_1		LTE 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	30	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		2	
	PORT 5	46002.A.700.4G.1	46002.A.700.4G.1	CTL05013_7A_1	CTL05013_7A_1		LTE 700	HPA-65F-BUU-H2-K_725MHz_00DT	7.9	30	0	Bottom	Andrew 1-5/8	175				NO		827		1	

	PORT 6	46002.A.850.25G.2	46002.A.850.25G.1	321G50131	321G50131		GSM 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	30	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		140		1	

Section 17B - FINAL SECTOR/CELL INFORMATION - SECTOR B

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	HPA-65F-BUU-H2-K													
ANTENNA VENDOR	CCI													
ANTENNA SIZE (H x W x D)	21.4X14.4X7.3													
ANTENNA WEIGHT	13.8													
AZIMUTH	150													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT	0													
FEEDER AMOUNT	4													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	6	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	4	CCI Pentaplexer 5PX-0726-O												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)														
PDU FOR TMAS (QTY/MODEL)														
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)	1	RRUS-11												
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-32 B2												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1	Swap exsiting antenna to Hex//Add 2 new Coax per sector//Add 4 pentaplexer per sector//Add 2 Twin-TMA at top per sector// Replace RRUS-12 to RRUS32 B2// Add XMU to existing DUS41 for BWE on LTE 2C 1900.													
Local Market Note 2	PROPOSED UMTS1900 Decom													
Local Market Note 3	Baseband Config- 1 DUS + XMU DUS-1- 7A:7B:7C:X1P1:X1P2:_ XMU-1- PA:PA2A:_:_:PB:PA2B:PC:PA2C:_:_:_:_:_:_:D1E:D1D													

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/ Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 1	46002.B.850.3G.1	46002.B.850.3G.1	CTV50132	CTV50132		UMTS 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	150	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		9	
	PORT 2	46002.B.850.3G.2	46002.B.850.3G.2	CTV4013B	CTV4013B		UMTS 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	150	0	Bottom	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		9	
	PORT 3	46002.B.1900.3G.1	46002.B.1900.3G.1	CTU50138	CTU50138		UMTS 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	150	0	None	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC	NO		615		10	
	PORT 4	46002.B.1900.4G.tmp1	46002.B.1900.4G.111	CTL05013_9B_1	CTL05013_9B_1		LTE 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	150	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		10	
	PORT 5	46002.B.700.4G.1	46002.B.700.4G.1	CTL05013_7B_1	CTL05013_7B_1		LTE 700	HPA-65F-BUU-H2-K_725MHz_00DT	7.9	150	0	Bottom	Andrew 1-5/8	175				NO		827		9	

	PORT 6	46002.B.850.25G.2	46002.B.850.25G.1	321G50132	321G50132		GSM 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	150	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		140		9	

Section 17C - FINAL SECTOR/CELL INFORMATION - SECTOR C

ANTENNA COMMON FIELDS	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	HPA-65F-BUU-H2-K													
ANTENNA VENDOR	CCI													
ANTENNA SIZE (H x W x D)	21.4X14.4X7.3													
ANTENNA WEIGHT	13.8													
AZIMUTH	270													
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	103													
ANTENNA TIP HEIGHT	104													
MECHANICAL DOWNTILT	0													
FEEDER AMOUNT	4													
VERTICAL SEPARATION from ANTENNA ABOVE (TIP to TIP)														
VERTICAL SEPARATION from ANTENNA BELOW (TIP to TIP)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to LEFT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from CLOSEST ANTENNA to RIGHT (CENTERLINE to CENTERLINE)														
HORIZONTAL SEPARATION from ANOTHER ANTENNA (which antenna # / # of inches)														
Antenna RET Motor (QTY/MODEL)														
SURGE ARRESTOR (QTY/MODEL)	6	Andrew APTDC-BDFDM-DBW Broadband												
DIPLEXER (QTY/MODEL)	4	CCI Pentaplexer 5PX-0726-O												
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)														
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)														
CURRENT INJECTORS FOR TMA (QTY/MODEL)														
PDU FOR TMAS (QTY/MODEL)														
FILTER (QTY/MODEL)														
SQUID (QTY/MODEL)														
FIBER TRUNK (QTY/MODEL)														
DC TRUNK (QTY/MODEL)														
RRH - 700 band (QTY/MODEL)	1	RRUS-11												
RRH - 850 band (QTY/MODEL)														
RRH - 1900 band (QTY/MODEL)	1	RRUS-32 B2												
RRH - AWS band (QTY/MODEL)														
RRH - WCS band (QTY/MODEL)														
Additional RRH #1 - any band (QTY/MODEL)														
Additional RRH #2 - any band (QTY/MODEL)														
Additional Component 1 (QTY/MODEL)														
Additional Component 2 (QTY/MODEL)														
Additional Component 3 (QTY/MODEL)														
Local Market Note 1	Swap exsiting antenna to Hex//Add 2 new Coax per sector//Add 4 pentaplexer per sector//Add 2 Twin-TMA at top per sector// Replace RRUS-12 to RRUS32 B2// Add XMU to existing DUS41 for BWE on LTE 2C 1900.													
Local Market Note 2	PROPOSED UMTS1900 DECOM													
Local Market Note 3	Baseband Config- 1 DUS + XMU DUS-1- 7A:7B:7C:X1P1:X1P2:_ XMU-1- PA:PA2A:_:_:PB:PA2B:PC:PA2C:_:_:_:_:_:_:D1E:D1D													

PORT SPECIFIC FIELDS	PORT NUMBER	USEID (CSSng)	USEID (Atoll)	ATOLL TXID	ATOLL CELL ID	TX/RX ?	TECHNOLOGY/FREQUENCY	ANTENNA ATOLL	ANTENNA GAIN	ELECTRICAL AZIMUTH	ELECTRICAL TILT	RRH LOCATION (Top/Bottom/ Integrated/None)	FEEDERS TYPE	FEEDER LENGTH (feet)	RXAIT KIT MODULE?	TRIPLEXER or LLC (QTY)	TRIPLEXER or LLC (MODEL)	SCPA/MCPA MODULE?	HATCHPLATE POWER (Watts)	ERP (Watts)	Antenna RET Name	CABLE NUMBER	CABLE ID (CSSNG)
ANTENNA POSITION 1	PORT 1	46002.C.850.3G.1	46002.C.850.3G.1	CTV50133	CTV50133		UMTS 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	270	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		17	
	PORT 2	46002.C.850.3G.2	46002.C.850.3G.2	CTV4013C	CTV4013C		UMTS 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	270	0	Bottom	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		309		17	
	PORT 3	46002.C.1900.3G.1	46002.C.1900.3G.1	CTU50139	CTU50139		UMTS 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	270	0	None	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC	NO		615		18	
	PORT 4	46002.C.1900.4G.tmp1	46002.C.1900.4G.111	CTL05013_9C_1	CTL05013_9C_1		LTE 1900	HPA-65F-BUU-H2-K_1930MHz_00DT	12.8	270	0	BOTTOM	Andrew 1-5/8	175	RXAIT 1900	1	1900 LLC			3200		18	
	PORT 5	46002.C.700.4G.1	46002.C.700.4G.1	CTL05013_7C_1	CTL05013_7C_1		LTE 700	HPA-65F-BUU-H2-K_725MHz_00DT	7.9	270	0	Bottom	Andrew 1-5/8	175				NO		827		17	

	PORT 6	46002.C.850.25G.2	46002.C.850.25G.1	321G50133	321G50133		GSM 850	HPA-65F-BUU-H2-K_850MHz_00DT	8.4	270	0	None	Andrew 1-5/8	175	RXAIT 850	1	850 LLC	NO		140		17	

Diagram - Sector A | Diagram File Name - CT5013A_B_C-LTE2C_BWE_UMTS1900_REV1.vsd
Atoll Site Name - CT5013 | Location Name - ROWAYTON | Market - CONNECTICUT | Market Cluster - NEW ENGLAND
Comments:

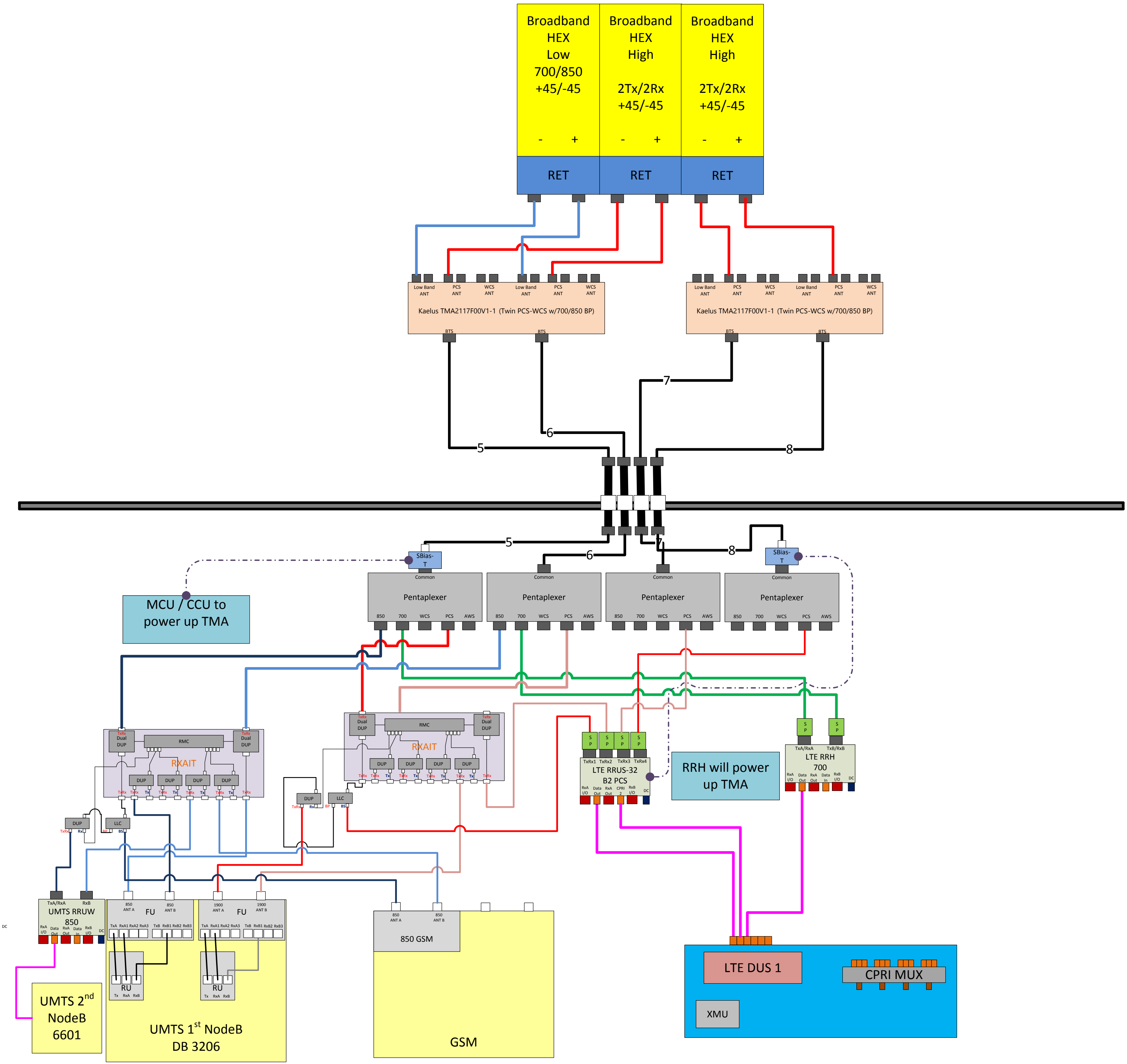


Diagram - Sector B
Diagram File Name - CT5013A_B_C-LTE2C_BWE_UMTS1900_REV1.vsd
Atoll Site Name - CT5013
Location Name - ROWAYTON
Market - CONNECTICUT
Market Cluster - NEW ENGLAND
Comments:

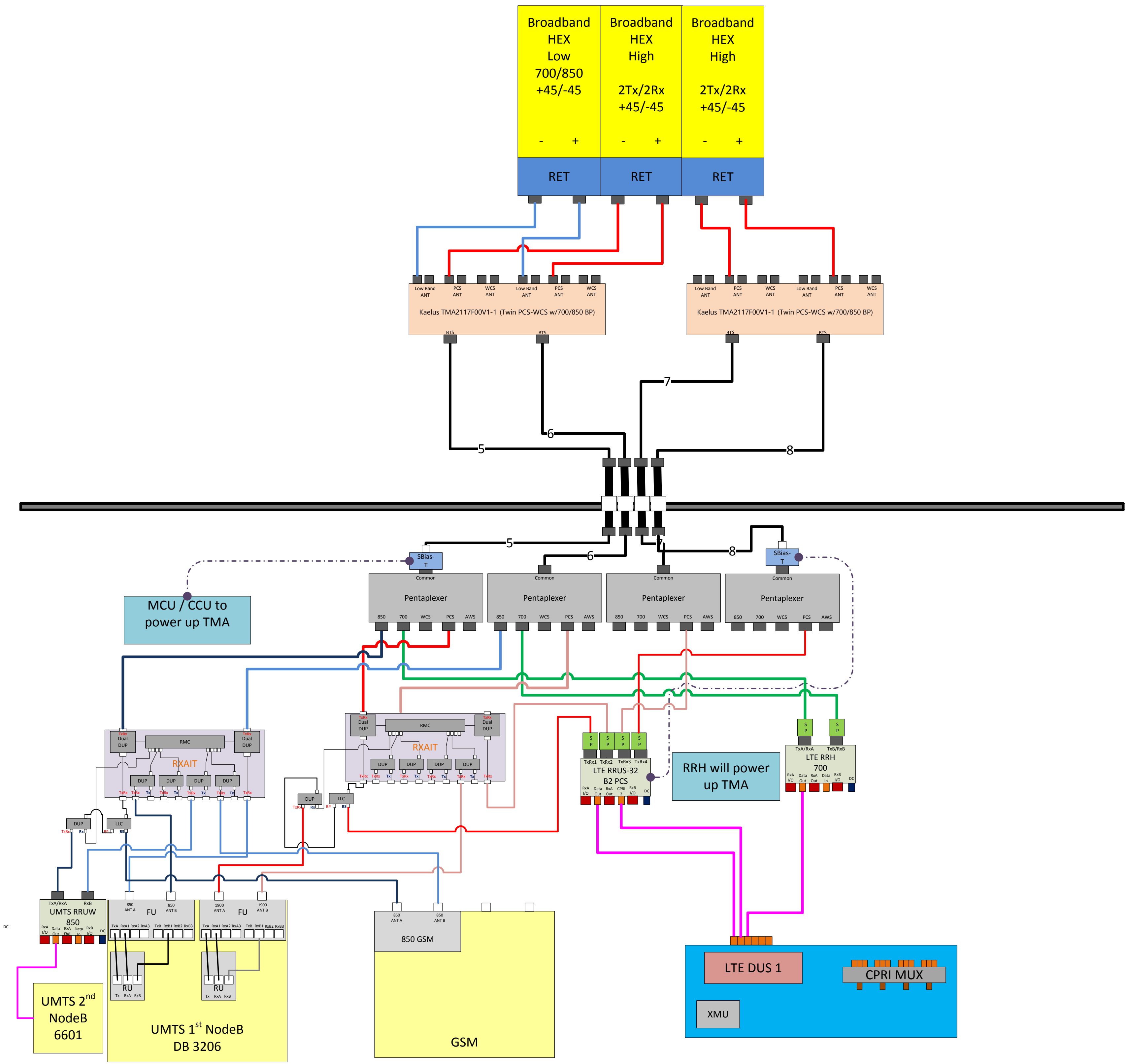
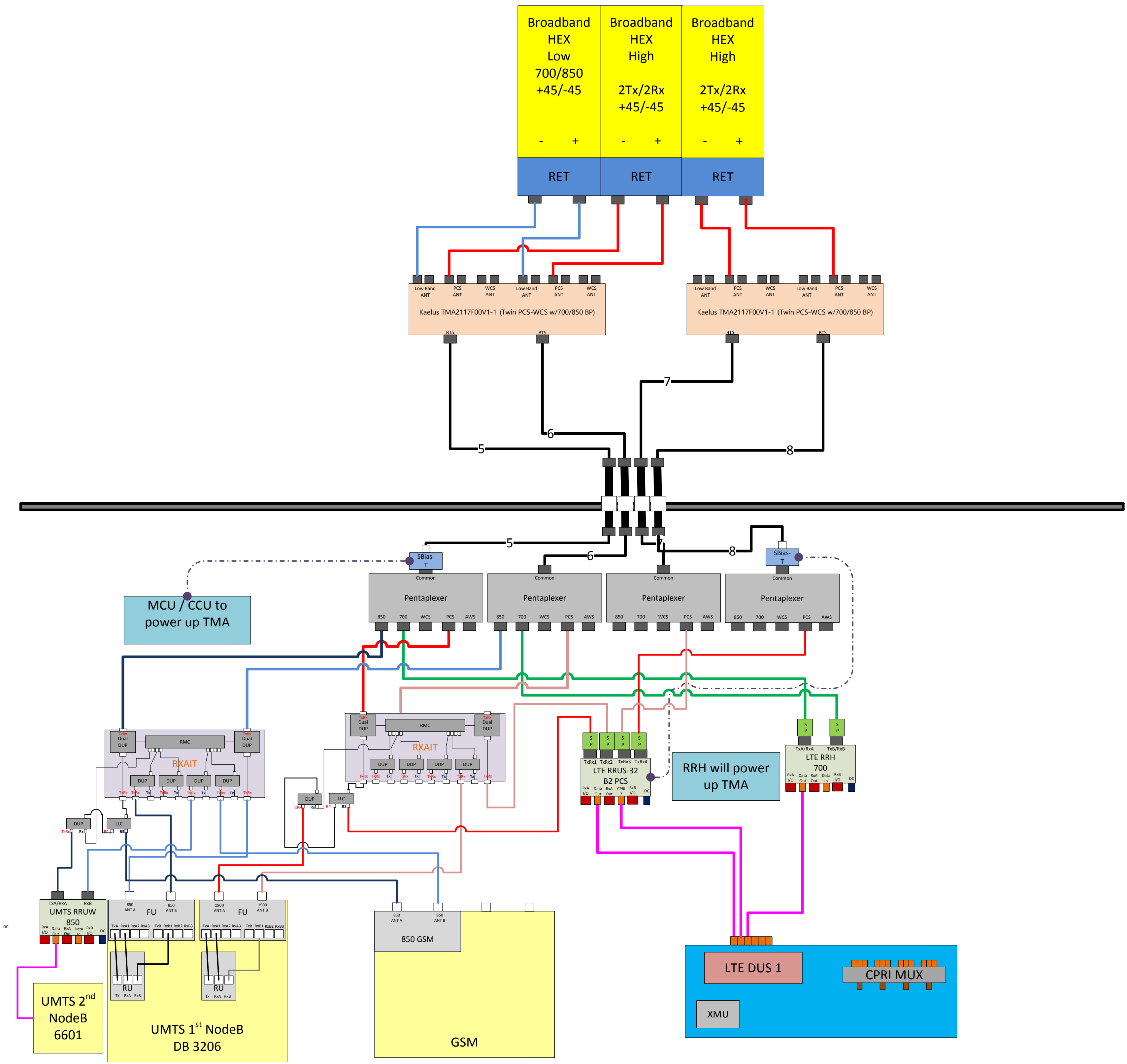


Diagram - Sector C Diagram File Name - CT5013A_B_C-LTE2C_BWE_UMTS1900_REV1.vsd

Atoll Site Name - CT5013 Location Name - ROWAYTON Market - CONNECTICUT Market Cluster - NEW ENGLAND

Comments:



NOTES			
Date Time (Central)	Version	ATTUID	Note
2/25/2016 3:26:14 PM	1.00	om636a	Added XMU to existing DUS, RRUS12 swapped to RRUS32, CPRI for RRUS added, Pentaplexer/TMA and Coax added, UMTS1900 decom proposed,DUS port assignments in section-17 local market note-3

WORKFLOW SUMMARY						
Date	FROM State / Status	FROM ATTUID	TO State / Status	TO ATTUID	Operation	Comments
02/25/2016	Preliminary / In Progress	om636a	Preliminary / Submitted for Approval	AB014M	Promote	LTE 2C BWE, XMU added, Dus port assignment, RRUS swap from RRUs-12 to RRUS32, Antenna swap to hex
06/06/2016	Preliminary / Submitted for Approval	AB014M	Preliminary / Approved	BG144B	Promote	
10/13/2016	Preliminary / Approved	BG144B	Final / RF Approval	OM636A	Promote	Needs final

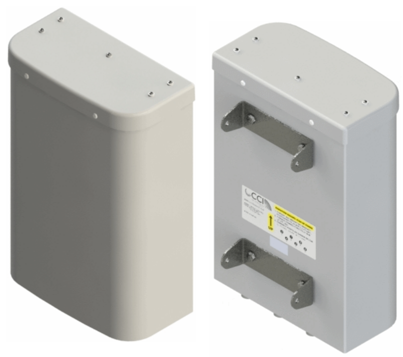
Antennas

MultiPort Series

DATA SHEET

HexPort Dual-Band Antenna

HPA-65F-BUU-H2



- High Band Ports include WCS Band
- Four High Band ports with two Low Band ports in one antenna
- Sharp elevation beam
- Excellent elevation side-lobe performance
- Excellent MIMO performance due to array spacing
- Excellent PIM Performance
- A multi-network solution in one radome
- Reduces tower loading
- Frees up space for tower mounted E-nodes
- Single radome with six ports

Overview

The CCI Hexport Multi-Band Antenna Array has four high band ports and two low band ports, our hexport antenna is ready for 4X4 high band MIMO. Modern networks demand high performance, consequently CCI has incorporated several new and innovative design techniques to provide an antenna with excellent side-lobe performance, sharp elevation beams, and high front to back ratio.
Multiple networks can now be connected to a single antenna, reducing tower loading and leasing expense, while decreasing deployment time and installation cost.
Full band capability for SMR800 and PCS 1900 MHz coverage in a single enclosure.

CCI antennas are designed and produced to ISO 9001 standards for reliability and quality in our state-of-the-art manufacturing facilities.

Applications

- 4x4 MIMO for the high band and 2x2 MIMO for the low band
- Adding additional capacity without adding additional antennas
- Adding WCS Band without increasing antenna count

CCI

MultiPort Series

SPECIFICATIONS

HexPort Dual-Band Antenna

HPA-65F-BUU-H2

Electrical

Ports	2 x Low Band Ports which cover the full range from 698-894 MHz		4 x High Band Ports which cover the full range from 1710-2360 MHz			
Frequency Range	698-806 MHz	824-894 MHz	1850-1990 MHz	1710-1755/2110-2170 MHz		2305-2360 MHz
Gain	10.0 dBi	10.5 dBi	12.8 dBi	12.6 dBi	13.6 dBi	14.0 dBi
Azimuth Beamwidth (-3dB)	65°	62°	64°	66°	60°	59°
Elevation Beamwidth (-3dB)	40.0°	35.8°	17.5°	17.8°	15.8°	14.3°
Electrical Downtilt	4°	4°	3°	3°	3°	3°
Elevation Sidelobes (1st Upper)	< -15 dB	< -13 dB	< -13 dB	< -17 dB	< -13 dB	< -17 dB
Front-to-Back Ratio @180°	> 28 dB	> 28 dB	> 30 dB	> 30 dB	> 30 dB	> 30 dB
Cross-Polar Port-to-Port Isolation	> 20 dB	> 20 dB	> 23 dB	> 23 dB	> 23 dB	> 23 dB
Voltage Standing Wave Ratio (VSWR)	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc
Input Power Continuous Wave (CW)	500 watts	500 watts	300 watts	300 watts	300 watts	300 watts
Polarization	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°
Input Impedance	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground

Mechanical

Dimensions (LxWxD)	21.4x14.4x7.3 in (544x366x185 mm)
Survival Wind Speed	> 150 mph (> 241 kph)
Front Wind Load	66 lbs (293 N) @ 100 mph (161 kph)
Side Wind Load	34 lbs (150 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	2.6 ft^2 (0.2 m^2)
Weight *	15.2 lbs (6.9 kg)
Connector	6 x 7-16 DIN female long neck
Mounting Pole	2 to 5 in (5 to 12 cm)

** Weight excludes mounting*

TMA2117F00V1-1

PCS / WCS Dual Band Twin TMA, with 700/850 bypass, AISG2.0

Designed to be deployed in co-located PCS & WCS systems with wideband antennas, the Kaelus TMA provides internal diplexing and gain in both bands while allowing 700/850 services to pass through to a separate antenna, thereby saving hardware costs.

PRODUCT FEATURES

- Improved base station sensitivity through gain in PCS and WCS bands
- Hardware and software configuration using AISG "Personality" upload
- High Linearity and low noise performance; Bypass provided for 700/850MHz services
- Fail safe bypass mode with lightning protection

TECHNICAL SPECIFICATIONS

Downlink Path, Band 1	PCS
Passband	1930 - 1990
Insertion Loss	0.5dB typ
Return Loss	18dB min
Max Average input power (W)	160
Max PEP Input Power (W)	2000
Intermodulation, 2 x 43dBm TX carriers (dBc)	-153dBc max
Uplink Path, Band 1	
Passband	1850 - 1910
Gain (dB)	3dB to 13dB in 1dB steps
Gain window	+/- 1dB max
Return Loss (Operating)	18dB min
Return Loss (Bypass)	12dB min
Noise Figure	1.4dB typ
Bypass Loss	2.5dB typ

Supply Current, alarm mode	320 +/- 30mA per port (programmable)

AISG MODE OF OPERATION (AUTO SELECTED ON VALID AISG 2.0 FRAMES)

AISG Version	2
AISG Supply Current	400mA @ 8.5V, 120mA @ 30V typical
AISG Connector	IEC60130-9, 8-pin female
AISG Connector Current rating	< 4A peak, 2A continuous, pin 6
Field firmware upgradable	Yes

ENVIRONMENTAL

Temperature range	-40ºC to +65ºC | -40º to +149ºF
Environmental sealing	IP67
Lightning protection	RF port: +/- 5kA max (8/20us), AISG port: +/- 2kA max (8/20us) IEC61312-1
MTBF	>1,000,000 hours
Compliance	EMC:EN301 489, Ingress ETSI EN 300 019 class 4.1, RoHS

MECHANICAL

Connectors	DIN 4.3-10 (F) x 8 long shank, AISG (F) x 1
Dimensions, H x D x W	216 x 300 x 107mm | 8.46 x 11.81 x 4.21in
Finish	Powder coated, light grey (RAL7035)
Weight	8 kg | 17.6lbs est
Mounting	Pole / wall bracket supplied with two metal clamps for 45-178 mm diameter poles

ELECTRICAL BLOCK DIAGRAM

Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT5013

Norwalk CT
310 Rowayton Avenue
Norwalk, CT 6853

February 16, 2017

Centerline Communications Project Number: 950006-034

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**2.42 %**

February 16, 2017

AT&T Mobility – New England
Attn: John Benedetto, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CT5013 – Norwalk CT**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **310 Rowayton Avenue, Norwalk, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

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

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

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

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed AT&T Wireless antenna facility located at **310 Rowayton Avenue, Norwalk, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	850 MHz	2	30
UMTS	1900 MHz (PCS)	2	30
LTE	1900 MHz (PCS)	2	60
LTE	700 MHz	2	60
GSM	850 MHz	2	30

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz and 1900 MHz (PCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	CCI HPA-65F-BUU-H2-K	103
B	1	CCI HPA-65F-BUU-H2-K	103
C	1	CCI HPA-65F-BUU-H2-K	103

Table 2: Antenna Data

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

RESULTS

Per the calculations completed for the proposed AT&T configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	CCI HPA-65F-BUU-H2-K	850 MHz / 1900 MHz (PCS) / 700 MHz	8.35 / 10.65/ 7.85	10	420	4,336.86	2.42
						Sector A Composite MPE%	**2.42**
Antenna B1	CCI HPA-65F-BUU-H2-K	850 MHz / 1900 MHz (PCS) / 700 MHz	8.35 / 10.65/ 7.85	10	420	4,336.86	2.42
						Sector B Composite MPE%	**2.42**
Antenna C1	CCI HPA-65F-BUU-H2-K	850 MHz / 1900 MHz (PCS) / 700 MHz	8.35 / 10.65/ 7.85	10	420	4,336.86	2.42
						Sector C Composite MPE%	**2.42**

Table 3: AT&T Emissions Levels

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum AT&T MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each AT&T Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max Sector Value	**2.42 %**
No Additional Carriers per CSC Active MPE Database	NA
Site Total MPE %:	**2.42 %**

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	2.42 %
AT&T Sector B Total:	2.42 %
AT&T Sector C Total:	2.42 %
Site Total:	2.42 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated AT&T sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

AT&T _ Frequency Band / Technology (All Sectors)	**# Channels**	**Watts ERP (Per Channel)**	**Height (feet)**	**Total Power Density (μW/cm^2)**	**Frequency (MHz)**	**Allowable MPE (μW/cm^2)**	**Calculated % MPE**
AT&T 850 MHz UMTS	2	205.17	103	1.57	850 MHz	567	0.28%
AT&T 1900 MHz (PCS) UMTS	2	348.43	103	2.66	1900 MHz (PCS)	1000	0.27%
AT&T 1900 MHz (PCS) LTE	2	696.87	103	5.33	1900 MHz (PCS)	1000	0.53%
AT&T 700 MHz LTE	2	365.72	103	2.79	700 MHz	467	0.60%
AT&T 850 MHz GSM	2	552.23	103	4.22	850 MHz	567	0.74%
						Total:	2.42%

Table 6: AT&T Maximum Sector MPE Power Values

Summary

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

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

AT&T Sector	Power Density Value (%)
Sector A:	2.42 %
Sector B:	2.42 %
Sector C:	2.42 %
AT&T Maximum Total (per sector):	2.42 %
Site Total:	2.42 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **2.42 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

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