May 22, 2017

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

Regarding:	Notice of Exempt Modification – Radio Head Swap out & Add
Property Address:	482 Pigeon Hill Road Windsor, CT 06095
AT&T Site:	CT1144

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 160-foot self-support tower at the above-referenced address, latitude 41.8666311, longitude -72.6747769. Said self-support is owned by Cellco Partnership. The existing equipment shelter is 11'5" by 26'2", totaling approximately 300 square feet.

AT&T desires to modify its existing telecommunications facility by swapping three (3) remote radio heads ("RRH") and adding three (3) RRH. The centerline height of said antennas is and will remain at 169 feet. Antennas are mounted utilizing T-arm mounts.

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 Honorable Donald Trinks, Mayor of the Town of Windsor as well as to the Town Planner, Eric Barz, AICP. A copy of this letter is also being sent to the tower and property owner Cellco Partnership.

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). Specifically:

1. The planned modification will not result in an increase in the height of the existing structure. The antennas to be swapped will be installed at the existing height of 169 feet on the 160-foot self-support 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.

Sarah Snell • Empire Telecom USA, LLC • 16 Esquire Road Billerica, MA 01862 • 978-608-8416 • ssnell@empiretelecomm.com

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above Federal Communications Commission (FCC) safety standard. An RF emissions calculation (attached) for AT&T's modified facility is herein provided.

5. The proposed modifications will not case a change or alteration in the physical or environmental characteristics of the site.

6. The self-support tower and its foundation can support AT&T's proposed modifications (please see attached structural analysis completed by Centek Engineering dated April 20, 2017).

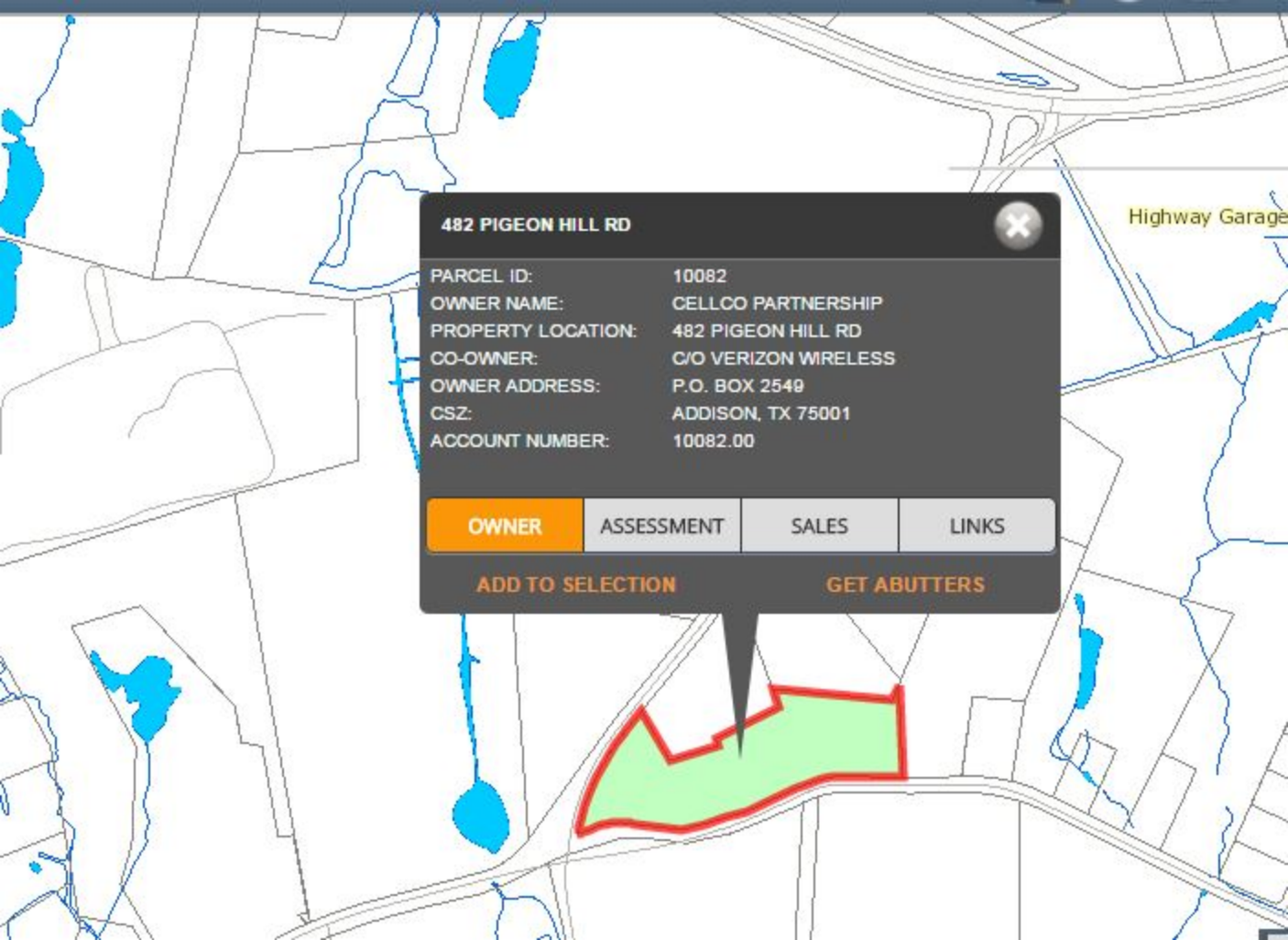
For the foregoing reasons, AT&T respectfully requests that the proposed RRH swap and add be allowed within the exempt modifications under R.C.S.A. §16-50j-72 (b)(2).

Sincerely,

Sarah Snell

Sarah Snell
Site Acquisition Specialist

cc: The Honorable Donald Trinks, Mayor of the Town of Windsor (municipality)
Eric Barz, AICP, Town Planner
Cellco Partnership (land and tower owner)


482 PIGEON HILL RD
PARCEL ID: 10082
OWNER NAME: CELLCO PARTNERSHIP
PROPERTY LOCATION: 482 PIGEON HILL RD
CO-OWNER: C/O VERIZON WIRELESS
OWNER ADDRESS: P.O. BOX 2549
CSZ: ADDISON, TX 75001
ACCOUNT NUMBER: 10082.00
OWNER
ASSESSMENT
SALES
LINKS
ADD TO SELECTION
GET ABUTTERS
Highway Garage

WIRELESS COMMUNICATIONS FACILITY

CT1144 - LTE BWE/700 BC
WINDSOR-PIGEON HILL
482 PIGEON HILL RD.
WINDSOR, CT 06095

GENERAL NOTES

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

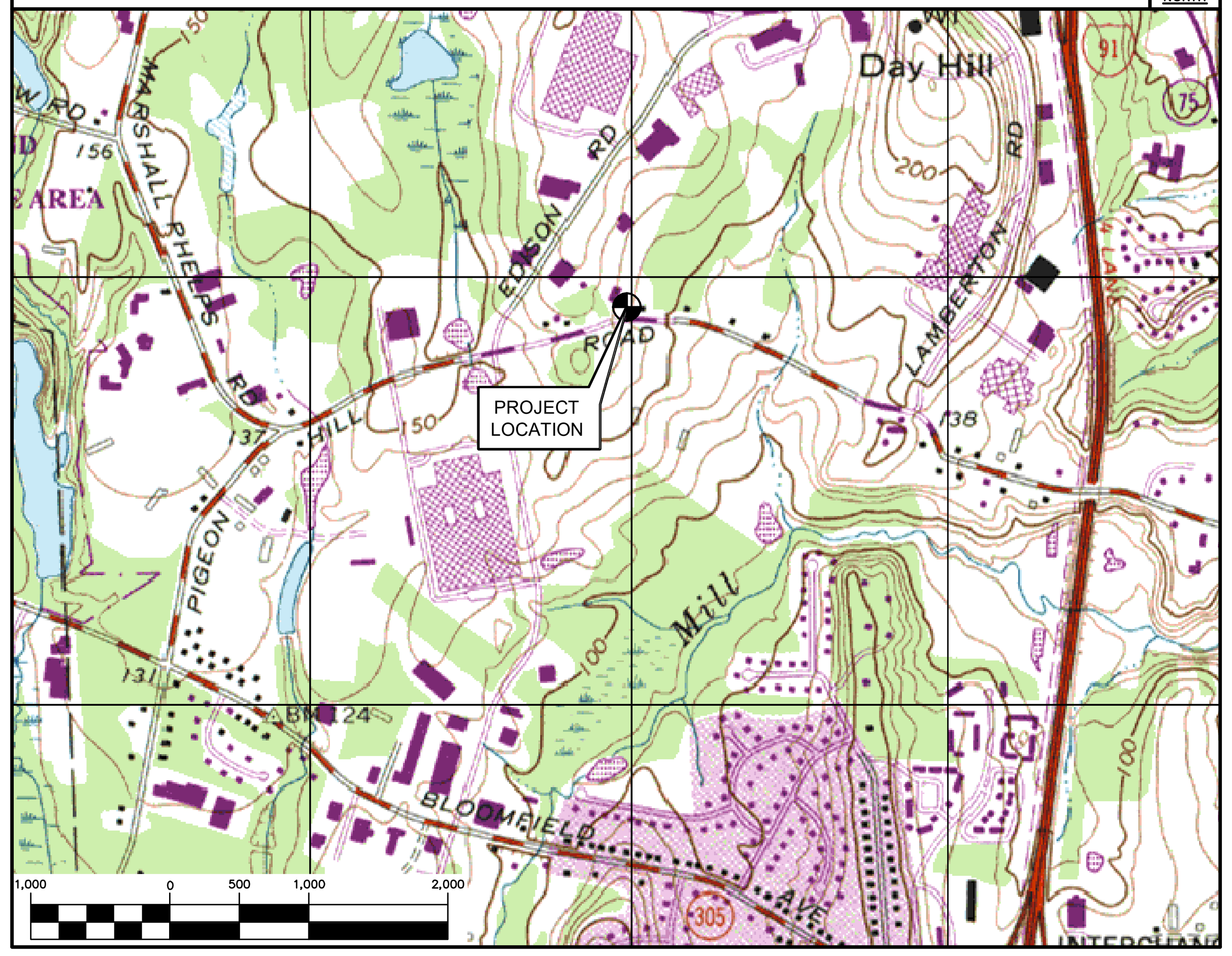
FROM: 500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT

TO: 482 PIGEON HILL RD.
WINDSOR, CONNECTICUT

1.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.31 MI
2.	TURN LEFT ONTO CAPITAL BLVD	0.27 MI
3.	TURN LEFT ONTO WEST ST	0.16 MI
4.	TURN LEFT TO MERGE ONTO I-91 S TOWARD HARTFORD	15.26 MI
5.	TAKE EXIT 37 TOWARD WINDSOR CENTER	0.24 MI
6.	TURN LEFT ONTO CT-305/BLOOMFIELD AVE	0.87 MI
7.	TURN RIGHT ONTO ADDISON RD.	0.67 MI
8.	TAKE THE 1ST RIGHT ONTO PIGEON HILL RD.	0.16 MI
9.	ARRIVE AT 482 PIGEON HILL RD.	

VICINITY MAP

SCALE: 1" = 1000'



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 (3) EXISTING RRUS-12+A2 BEHIND POSITION 2 ANTENNA.
   B. INSTALL (3) NEW RRUS-11 AT POSITION 3.
   C. INSTALL (3) NEW RRUS-32 B2 BEHIND POSITION 2 ANTENNA.
   D. ADD XMU IN EXISTING AT&T EQUIPMENT CABINET IN EXISTING EQUIPMENT SHELTER.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT1144
AT&T SITE NAME:	WINDSOR-PIGEON HILL
SITE ADDRESS:	482 PIGEON HILL RD. WINDSOR, CT 06095
LESSEE/APPLICANT:	NEW CINGULAR WIRELESS PCS, LLC 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°-51'-59.871" N LONGITUDE: 72°-40'-29.196" W GROUND ELEVATION: ±175' AMSL GROUND ELEVATION REFERENCED FROM GOOGLE EARTH. COORDINATES REFERENCED FROM RFDS DOCUMENTS.

SHEET INDEX

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

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT ★ PROFESSIONAL ENGINEER ★ LICENSED 27517 CARLO GAVIRIA

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
WINDSOR-PIGEON HILL
CTV1144 - LTE BWE/700 BC
482 PIGEON HILL RD.
WINDSOR, CT 06095

DATE: 04/17/17
SCALE: AS NOTED
JOB NO. 17004.20

TITLE SHEET

T-1

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:

   - 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): 97 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

- 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 CL&P 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	05/17/17	LGL	CAG	CONSTRUCTION DRAWINGS – 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

WINDSOR-PIGEON HILL

CTV1144 - LTE BWE/700 BC

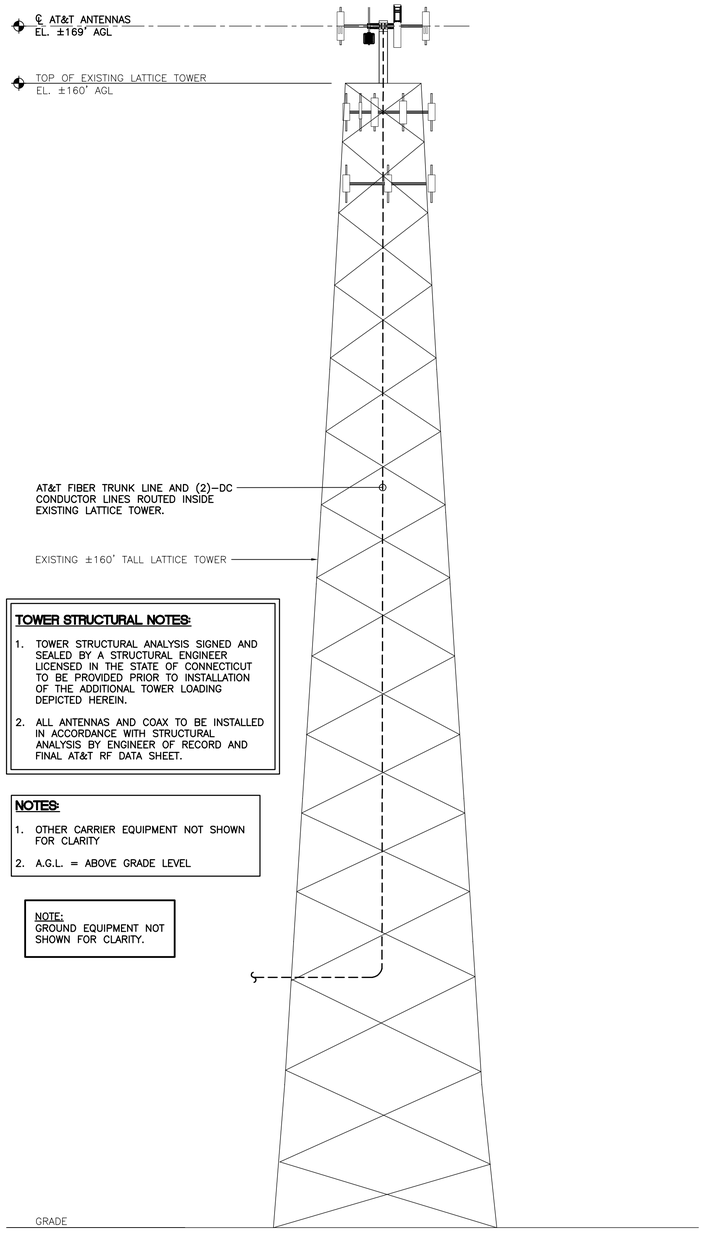
482 PIGEON HILL RD.
WINDSOR, CT 06095

DATE: 04/17/17
SCALE: AS NOTED
JOB NO. 17004.20

NOTES AND SPECIFICATIONS

N–1

Sheet No. 2 of 7



TOWER STRUCTURAL NOTES:

1. TOWER STRUCTURAL ANALYSIS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS BY ENGINEER OF RECORD AND FINAL AT&T RF DATA SHEET.

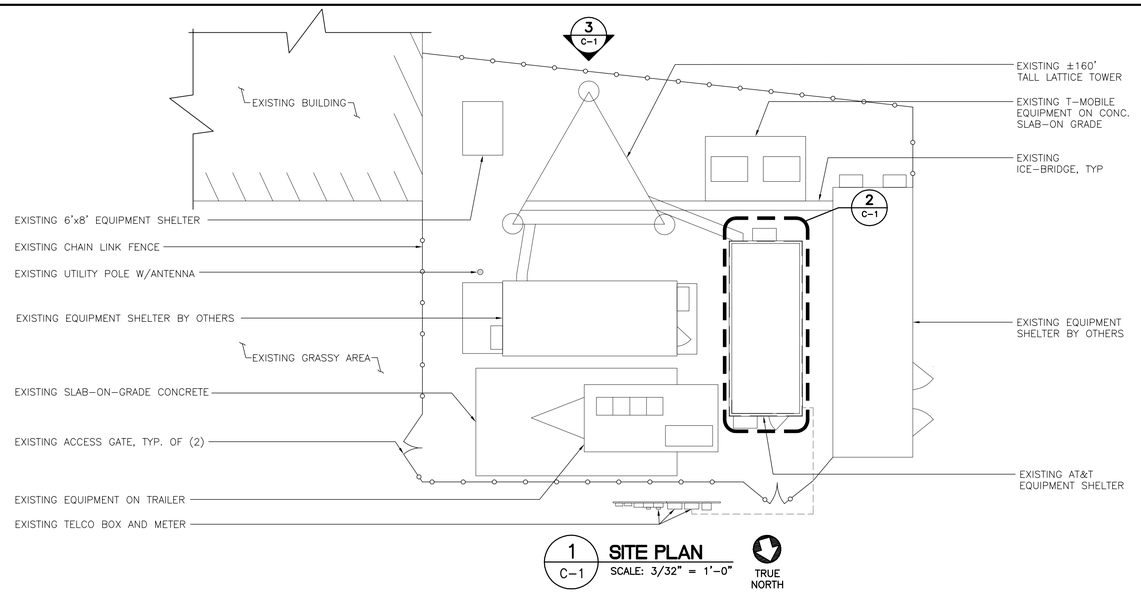
NOTES:

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

NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY.

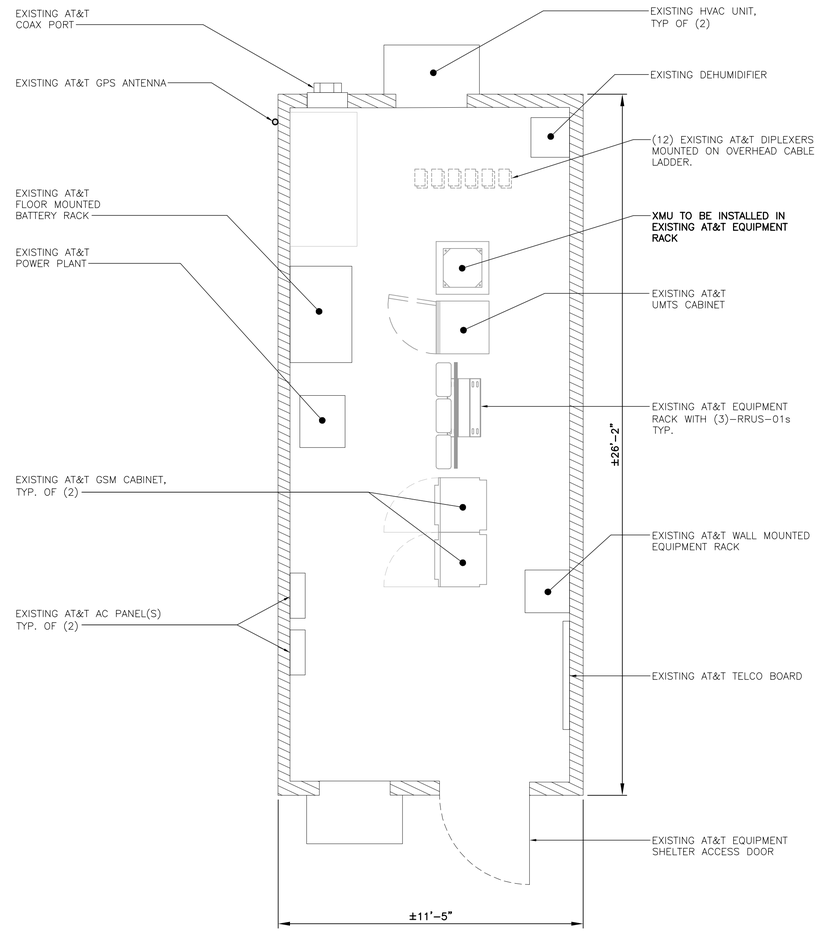
3 / C-1 **TOWER ELEVATION**
SCALE: 1" = 20'

GRAPHIC SCALE
20 0 10 20 40 60
(IN FEET)
1 inch = 20 ft.



1 / C-1 **SITE PLAN**
SCALE: 3/32" = 1'-0"

TRUE NORTH



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

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PLANS, ELEVATION AND DETAILS

C-1

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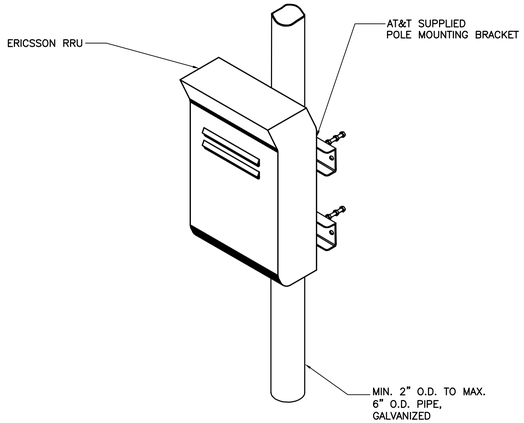


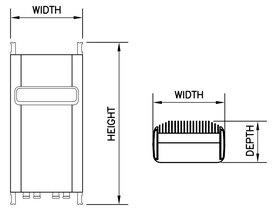
ISOMETRIC VIEW

NOTES:

1. AT&T SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

5 / C-2 TYPICAL RRUS MOUNTING DETAILS

SCALE: 1 1/2" = 1'-0"



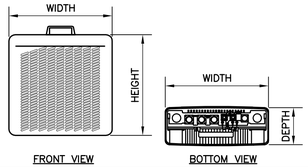
FRONT VIEW BOTTOM VIEW

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"



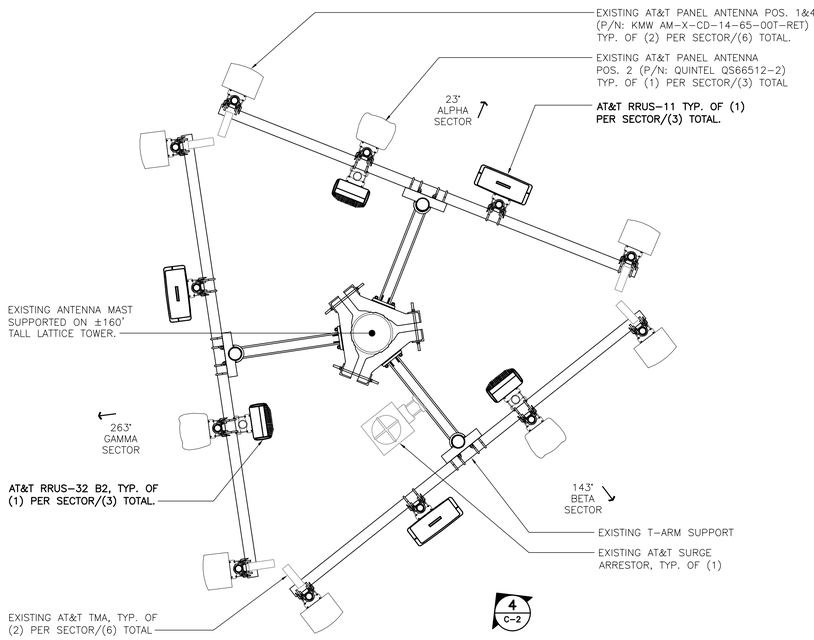
FRONT VIEW BOTTOM VIEW

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 11	17.8"H x 17.3"W x 7.2"D	50 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.

7 / C-2 ERICSSON RRUS 11 DETAIL

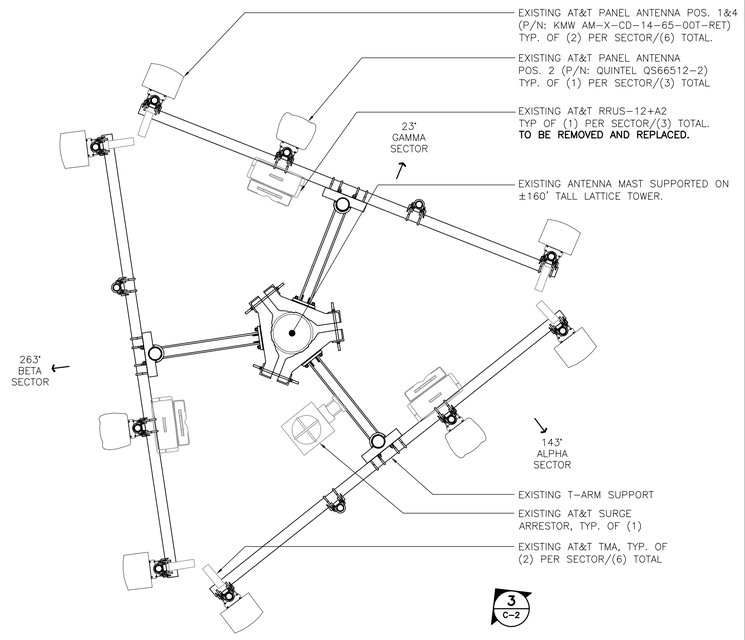
SCALE: 1" = 1'-0"



2 / C-2 PROPOSED ANTENNA PLAN

SCALE: 1/2" = 1'-0"

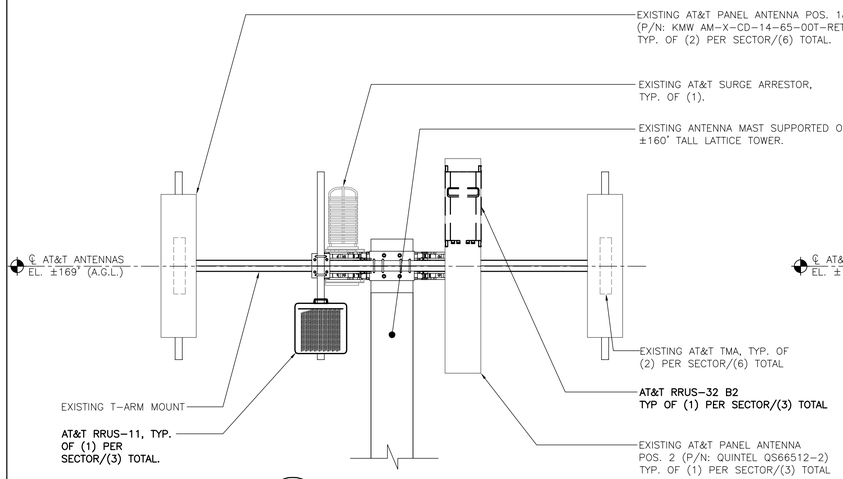
NORTH



1 / C-2 EXISTING ANTENNA PLAN

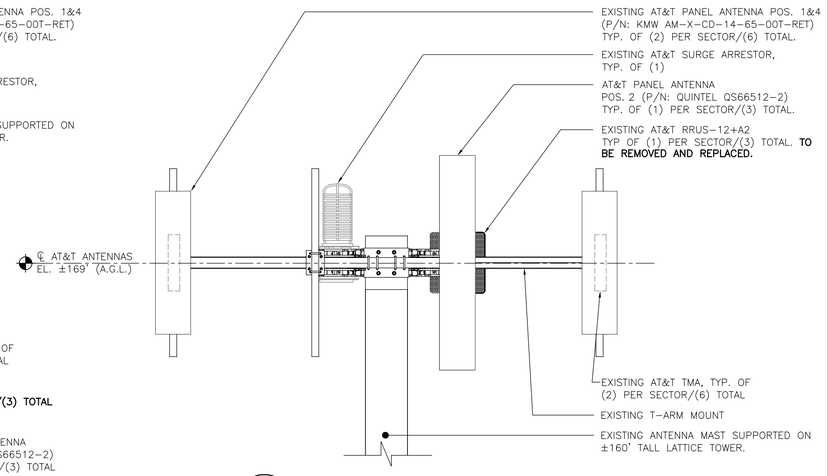
SCALE: 1/2" = 1'-0"

NORTH



4 / C-2 PROPOSED ANTENNA PLAN

SCALE: 1/2" = 1'-0"



3 / C-2 EXISTING ANTENNA PLAN

SCALE: 1/2" = 1'-0"

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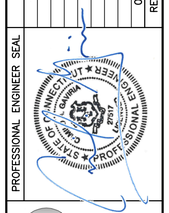

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LTE 1900
EQUIPMENT
DETAILS

C-2

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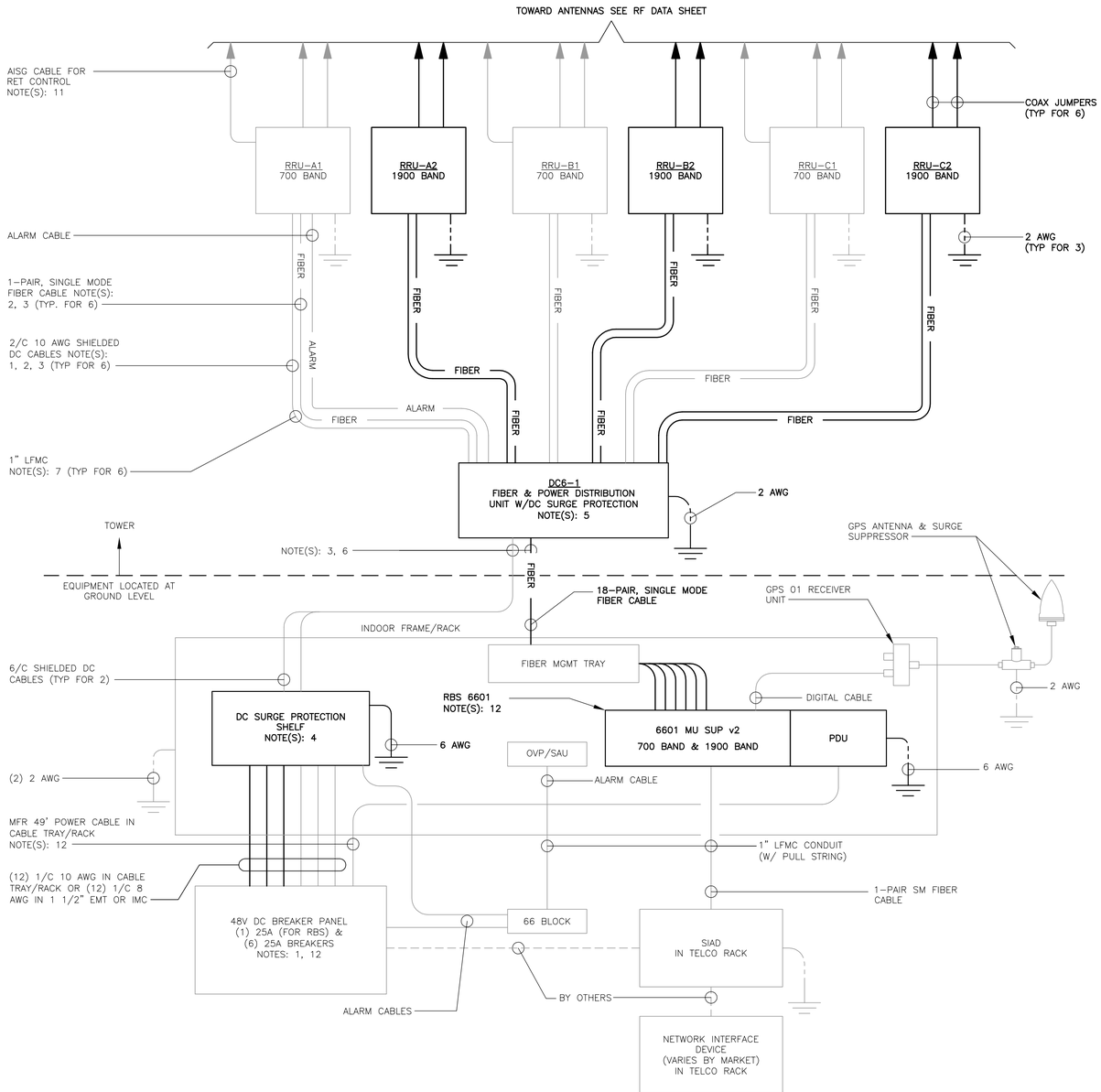

1 / E-1 LTE SCHEMATIC DIAGRAM

NOT TO SCALE

LTE SCHEMATIC DIAGRAM NOTES:

1. BREAKERS TO BE TAGGED AND LOCKED OUT. A 20A (MIN.) OR 30A (MAX.) BREAKER FOR RRUs MAY BE SUBSTITUTED FOR THE RECOMMENDED 25A BREAKER. SIZE 12 CONDUCTORS MAY BE USED ONLY WITH 20A BREAKERS.
2. LEAVE COILED AND PROTECTED UNTIL TERMINATED.
3. DC AND FIBER CABLE SHALL BE ROUTED WITH THE EXISTING COAX CABLE.
4. DC SURGE PROTECTION SHELF SHALL BE RAYCAP DCx-48-60-RM.
5. FIBER & DC DISTRIBUTION BOX W/DC SURGE PROTECTION SHALL BE RAYCAP DC6-48-60-18-8F.
6. SUPPORT FIBER & DC POWER CABLES WITH SNAP-IN HANGERS SPACED NO GREATER THAN 3 FEET APART ON TOWER. SUPPORT FIBER AND DC POWER CABLES INSIDE MONOPOLE WITH CABLE HOISTING GRIPS AT 250 FT MAXIMUM INTERVALS. DRESS CABLES TO PREVENT CONTACT WITH ENTRANCE AND EXIT OPENINGS.
7. CONDUIT TO BE USED ON A TOWER IF THE RRU IS MORE THAN 10' FROM THE DISTRIBUTION UNITS. MAX CABLE LENGTH IS 16 FEET.
8. SINGLE-CONDUCTOR DC POWER CABLES SHALL BE TELCOFLEX® OR KS24194™, COPPER, UL LISTED RHH NON-HALOGEN, LOW SMOKE WITH BRAIDED COVER, TYPE TC (1/0 AND LARGER). UNLESS OTHERWISE NOTED, STRANDING SHALL BE CLASS B (TYPE II) FOR CABLES SIZES 14, 12 & 10 AWG AND CLASS I (TYPE IV) FOR SIZES 8 AWG AND LARGER. CABLES SHALL BE COLOR CODED RED FOR +24V, BLUE FOR -48V AND GRAY FOR 24V AND 48V RETURN CONDUCTORS. MULTI-CONDUCTOR DC POWER CABLES SHALL BE COPPER, CLASS B STRANDING WITH FLAME RETARDANT PVC JACKET, TYPE TC, UL LISTED FOR 90°C DRY/ 75°C WET INSTALLATION.
9. GROUNDING WIRES SHALL BE COPPER, GREEN THHN/THWN UL LISTED FOR 90°C DRY/75°C WET INSTALLATION. MINIMUM SIZE IS 6 AWG UNLESS NOTED OTHERWISE.
10. FIBER OPTIC CABLES SHALL BE INSTALLED IN FLEXIBLE CONDUIT AS SCOPED BY MARKET.
11. RET CONTROL FROM THE RRU IS AN OPTIONAL METHOD OF CONNECTION. REFER TO RF DATA SHEET FOR APPLICABILITY.
12. RBS 6601 VARIANT 2 REQUIRES A 25A BREAKER AND 10 AWG (MIN.) CONDUCTORS. REPLACE EXISTING 15A OR 20A BREAKERS AND 12 AWG CONDUCTORS WHEN UPGRADING AN EXISTING RBS 6601 VARIANT 1.

ELECTRICAL NOTES

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

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

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

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

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

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

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

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

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

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LTE SCHEMATIC DIAGRAM AND NOTES

E-1

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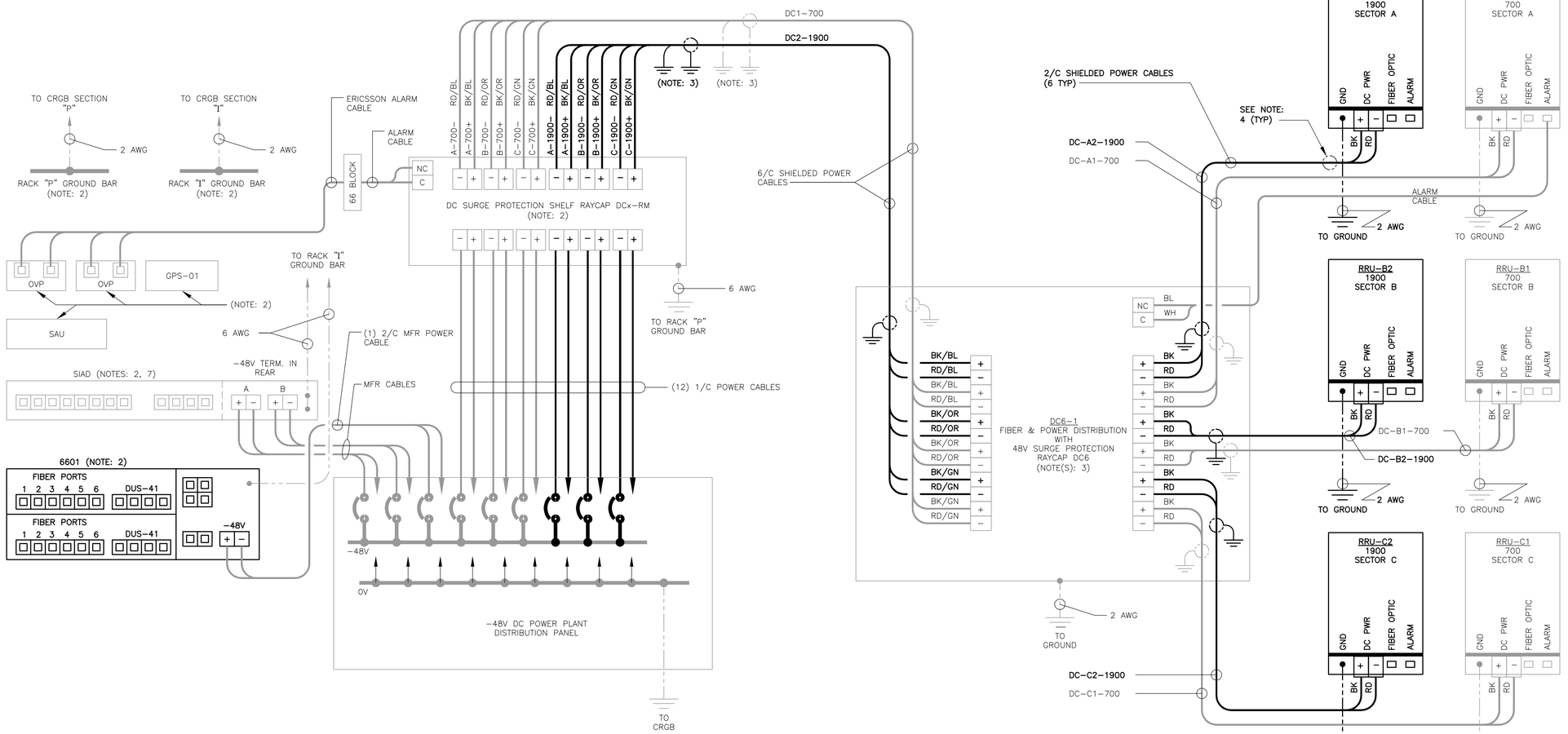

1 / E-2 LTE WIRING DIAGRAM

NOT TO SCALE

LTE WIRING DIAGRAM NOTES:

1. LABEL THE DC POWER CABLES AT BOTH ENDS OF EVERY WIRE AND IN ANY PULL BOX IF USED. LABEL SHALL BE DURABLE, SELF ADHESIVE, WRAPPED LONGITUDINALLY ALONG THE CABLE AND STATE THE SECTOR, FREQUENCY BAND AND POLARITY; I.E. "A-1900+". CABLE AND WIRE LABELS SHOWN ARE REPRESENTATIVE AND MAY BE MODIFIED AS DIRECTED BY AT&T.
2. INSTALL ON BASEBAND EQUIPMENT RACK.
3. THE BARE GROUND WIRE OF EACH MULTI-CONDUCTOR CABLE SHALL BE CONNECTED TO THE "P" GROUND BAR ON THE RACK. WHEN A SHIELDED CABLE IS USED, THE DRAIN WIRE ALSO SHALL BE CONNECTED TO THE "P" GROUND BAR.
4. CABLE GROUND WIRE AND SHIELD DRAIN WIRE TO BE LEFT UN-TERMINATED AT RRU AND DC POWER PLANT.
5. SEE LTE SCHEMATIC DIAGRAM DETAIL 1/E-1 FOR BREAKER RATING.

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LTE WIRING DIAGRAM

E-2

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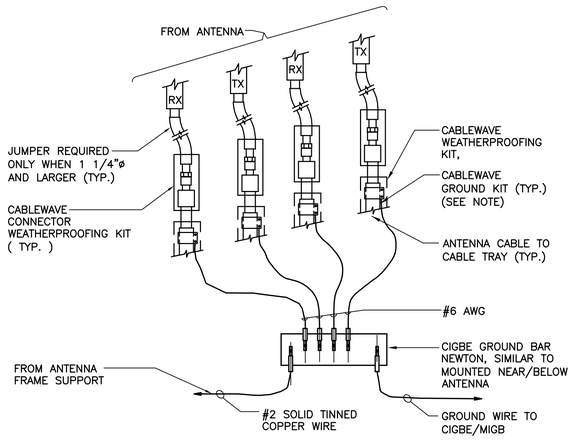
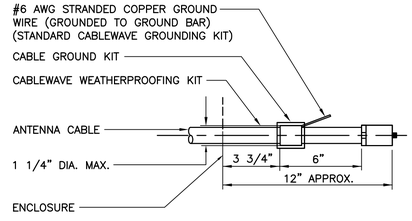


NOTE:

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

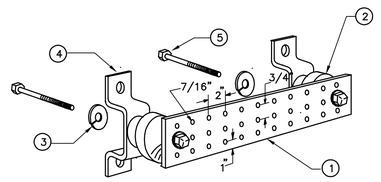
4 / E-3 **CONNECTION OF GROUND WIRES TO GROUND BAR**
NOT TO SCALE



NOTE:

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

3 / E-3 **ANTENNA CABLE GROUNDING DETAIL**
NOT TO SCALE

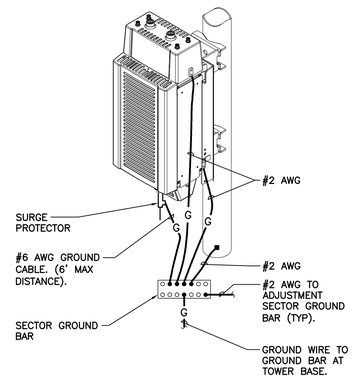


LEGEND

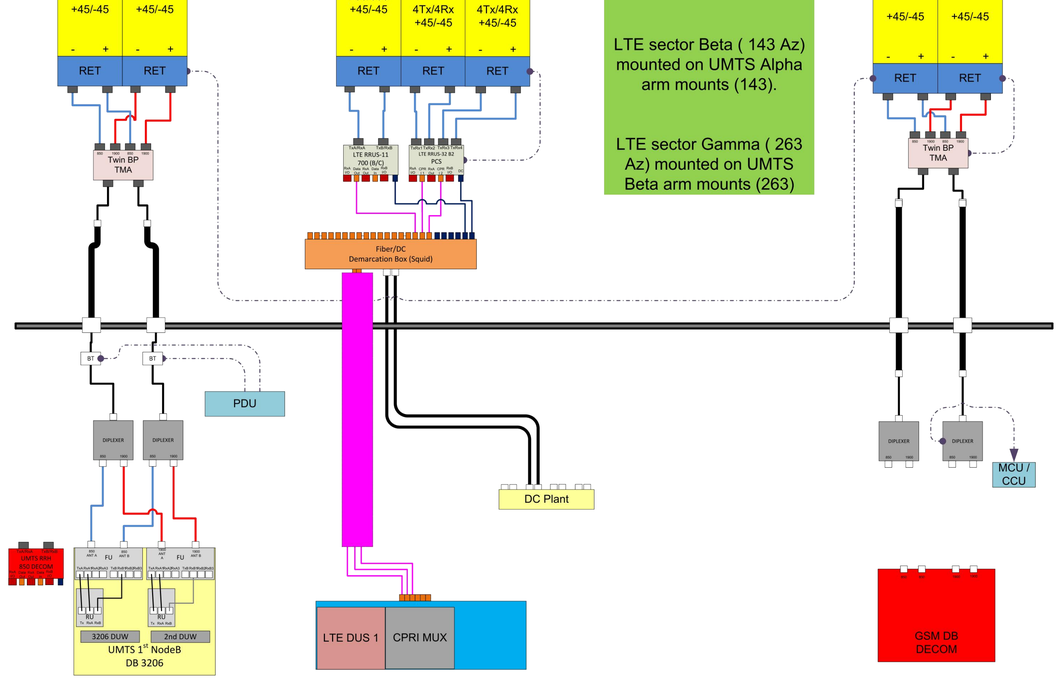
1. TINNED COPPER GROUND BAR, 1/4"x 4"x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG .
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 2. 3061-4.
3. 3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. 4. CAT NO. A-6056.
5. STAINLESS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

2 / E-3 **GROUND BAR DETAIL**
NOT TO SCALE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



1 / E-3 **RRU POLE MOUNT GROUNDING**
NOT TO SCALE



5 / E-3 **RF PLUMBING DIAGRAM**
NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-3

Sheet No. 7 of 7

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Structural Analysis Report

160-ft Existing ROHN Lattice Tower

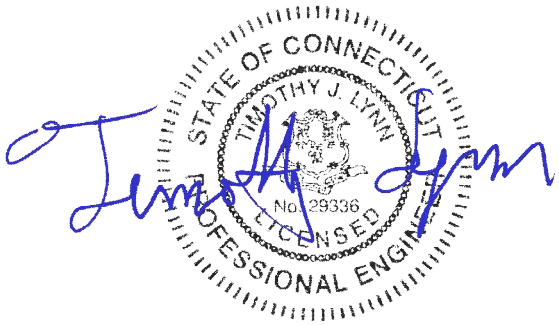
AT&T Mobility – LTE 2C

AT&T Site Ref: CT1144
Windsor – Pigeon Hill

482 Pigeon Hill Road
Windsor, CT

Centek Project No. 17004.20

Date: April 20, 2017



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Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by AT&T on the existing self-supporting lattice tower located in Windsor, Connecticut.

The host tower is a 160-ft, three legged, tapered steel lattice tower originally designed and manufactured by UNR-ROHN. The manufacturer's drawings and calculations were unavailable for use in this report. The existing tower geometry, structure member sizes and foundation information were obtained from a previous structural report prepared by Centek job no. 16071.20 dated December 12, 2016.

Antenna and appurtenance information were obtained from the aforementioned Centek structural report and an RF data sheet.

The tower consists of eight (8) tapered vertical sections consisting of structural steel pipe legs conforming to ASTM A572 Gr. 50. Diagonal lateral support bracing consists of structural steel angle shapes conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by welded and bolted gusset connections. The width of the tower face is 8.56-ft at the top and 22.85-ft at the base.

AT&T proposes the removal of three (3) remote radio heads and the installation of six (6) remote radio heads mounted on the existing T-Arms. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- UNKNOWN (EXISTING):
  Antenna: One (1) 15-ft ∅ Omni-directional (whip) antenna mounted with an elevation of ±167.5-ft above the tower base.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
  Antennas: Six (6) Antel LPA-80063-4CF panel antennas, two (2) Antel BXA-70040/6CF panel antennas, one (1) Antel BXA-70063/6CF panel antennas, six (6) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH4x30-B13 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads and three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads mounted on three (3) Valmont 15-ft T-Frames with a RAD center elevation of ±156.5-ft above the existing tower base.
  Misc Equipment: Two (2) RFS DB-T1-6Z-8AB-0Z main distribution boxes mounted to the leg of the existing tower with a RAD center elevation of 156.5-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and two (2) 1-5/8" ∅ fiber cable running on the face of the existing tower as specified in Section 3 of this report.

- T-MOBILE (Existing):
  Antenna: Three (3) Andrew LNX6515DS panel antennas, three (3) RFS APX16DWV-16DWVS-C-A20 panel antennas and six (6) TMA's mounted on three (3) 15-ft Wireless Frames with a RAD center elevation of ±145-ft above the existing tower base.
  Coax Cable: Eighteen (18) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 15-ft ∅ Omni-directional (whip) antenna on a 4-ft side mount standoff with an elevation of ±127.5-ft above the tower base.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower.
- UNKNOWN (Existing):
  Antenna: One (1) 16-ft ∅ Omni-directional (whip) antenna on a 4-ft side mount standoff with an elevation of ±108-ft above the tower base.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower.
- UNKNOWN (EXISTING):
  Antenna: One (1) empty 4-ft side mount standoff with an elevation of ±47-ft above the tower base.
- UNKNOWN (Existing):
  Antenna: One (1) 12-ft ∅ Omni-directional (whip) antenna on a 4-ft side mount standoff with an elevation of ±45.41-ft above the tower base.
  Coax Cable: One (1) 1/2-in ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing to Remain):
  Antennas: Six (6) KMW AM-X-CD-14-65-00T-RET panel antennas, three (3) Quintel QS66512-2 panel antennas, six (6) Powerwave TT19-08DB111 TMAs and one (1) Raycap DC-6-48-60-18-8F surge arrestor mounted on three (3) 10-ft-6in T-Arms connected to one (1) 8" SCH.40 x 18-ft long mast with a RAD center elevation of ±169-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables, one (1) fiber trunk and two (2) DC trunks running on the leg/face of the existing tower as specified within Section 3 of this report.
- AT&T (Existing to Remove):
  Antennas: Three (3) Ericsson RRUS-12 remote radio heads and three (3) Ericsson A2s mounted on three (3) 10-ft-6in T-Arms connected to one (1) 8" SCH.40 x 18-ft long mast with a RAD center elevation of ±169-ft above the existing tower base.
- **AT&T (Proposed):**
  Antennas: Three (3) Ericsson RRUS-11 and three (3) Ericsson RRUS-32 B2 remote radio heads mounted on three (3) 10-ft-6in T-Arms connected to one (1) 8" SCH.40 x 18-ft long mast with a RAD center elevation of ±169-ft above the existing tower base.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 1.00" radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford; v = 90-105 mph (3-second gust)	*[Annex B of TIA-222-G-2005]*
	Windsor; v = 97 mph (3 second gust)	*[Appendix N of the 2016 CT Building Code]*
Load Cases:	Load Case 1; 97 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2016 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

[1] The 2012 International Building Code as amended by the 2016 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **90.7%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T7)	20'-0"- 40'-0"	91.2%	**PASS**
Diagonal (T5)	60'-0"- 80'-0"	88.1%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 3-ft ∅ reinforced concrete piers on three (3) 8-ft square reinforced concrete pads subsequently reinforced with four (4) rock anchors per pad. The existing foundation locations and dimensions were taken from the aforementioned Centek structural analysis and reinforcement design documents. The sub-grade conditions used in the analysis of the existing foundation were obtained from a geo-technical soils study report prepared by Clarence Welti & Associates, Inc., dated September 20, 2010. The tower legs are connected to the three (3) reinforced concrete piers by means of six (6) 7/8" ∅, ASTM A354 Grade BC anchor bolts per leg, embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 1 of the proposed reinforced tower condition were used in the verification of the foundation and anchor bolts:

Leg Reactions	Vector	Proposed Tower Reactions
Leg	Shear	**26 kips**
	Compression	**217 kips**
	Uplift	**186 kips**
Base	Shear	**42 kips**
	Compression	**36 kips**
	Moment	**4061 kip-ft**

- The anchor bolts were found to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	71.0%	**PASS**

- The foundation was found to be within allowable limits.

Foundation Type	Design Limit	Allowable Limit/FS	Proposed Loading	Result
Rock Anchored Pad and Pier (x3)	Ultimate Bearing Pressure	24.00 ksf	6.6ksf	**PASS**
	Rock Mass Uplift Resistance	1.00 (1)	3.68	**PASS**

Note 1: Minimum required Factor of Safety (FS) of 1.0 required per TIA-222-G section 9.4

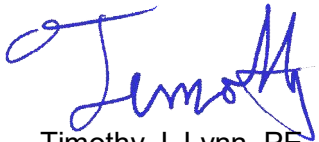
Conclusion

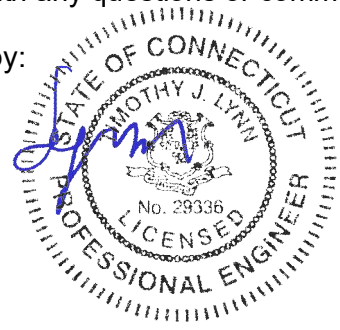
This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by 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:





Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are 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.

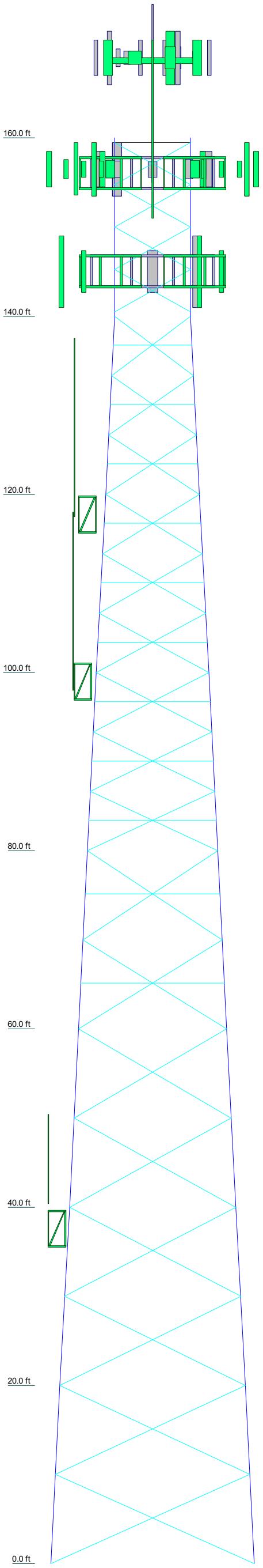
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

tnxTower Features:

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

	T1	T2	T3	T4	T5	T6	T7	T8
Section	ROHN 2.5 STD		ROHN 2.5 EH	ROHN 3 EH	ROHN 4 EH	ROHN 5 EH		ROHN 6 EHS
Legs	L1 3/4x1 3/4x1/4	L2x2x1/4	L2 1/2x2 1/2x3/16	L3x3x3/16	L3x3x1/4	L3 1/2x3 1/2x1/4		L4x4x1/4
Leg Grade	A572-50							
Diagonals	L2 1/2x2 1/2x3/8		L2 1/2x2 1/2x3/16					
Diagonal Grade	A36							
Top Girts	N.A.							
Sec. Horizontals	N.A.	L2x2x1/4	L2 1/2x2 1/2x3/16	L3x3x3/16	L3x3x1/4		N.A.	
Face Width (ft)	8.56		10.56	12.6	14.66	16.69	18.69	20.85
# Panels @ (ft)	4 @ 4.75		9 @ 6.66667			8 @ 10		
Weight (K)	1.1	1.3	1.5	2.1	2.5	2.7	2.8	3.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) AM-X-CD-14-65-00T-RET (ATI - Existing)	169	RRH4x45/2x90-AWS (Verizon)	156.5
(2) AM-X-CD-14-65-00T-RET (ATI - Existing)	169	RRH4x45/2x90-AWS (Verizon)	156.5
(2) AM-X-CD-14-65-00T-RET (ATI - Existing)	169	RRH4x45/2x90-AWS (Verizon)	156.5
(2) TT19-08BP111-001 TMA (ATI - Existing)	169	RRH2x60-PCS (Verizon)	156.5
(2) TT19-08BP111-001 TMA (ATI - Existing)	169	RRH2x60-PCS (Verizon)	156.5
(2) TT19-08BP111-001 TMA (ATI - Existing)	169	RRH2x60-PCS (Verizon)	156.5
QS66512-2 (ATI - Existing)	169	RRH4x30-B13 (Verizon)	156.5
QS66512-2 (ATI - Existing)	169	RRH4x30-B13 (Verizon)	156.5
QS66512-2 (ATI - Existing)	169	RRH4x30-B13 (Verizon)	156.5
RRUS-11 (ATI - Proposed)	169	DB-T1-6Z-8AB-0Z (Verizon)	156.5
RRUS-11 (ATI - Proposed)	169	DB-T1-6Z-8AB-0Z (Verizon)	156.5
RRUS-11 (ATI - Proposed)	169	LPA-80063-4CF (Verizon)	156.5
RRUS-32 (ATI - Proposed)	169	15' Frame (Verizon)	156
RRUS-32 (ATI - Proposed)	169	15' Frame (Verizon)	156
RRUS-32 (ATI - Proposed)	169	15' Frame (Verizon)	156
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	169	(2) TMA 10"x8"x3" (T-Mobile)	145
Valmont 10'-6" T-Armx 3 (Colo Kit P/N 802738) (ATI)	169	(2) TMA 10"x8"x3" (T-Mobile)	145
		APX16DWV-16DWVS-E-A20 (T-Mobile)	145
15' x 2" Dia Omni (Unknown)	165	APX16DWV-16DWVS-E-A20 (T-Mobile)	145
P8 x18-ft Pipe Mast (ATI)	161	APX16DWV-16DWVS-E-A20 (T-Mobile)	145
SBNHH-1D65B (Verizon)	156.5	LNX-6515DS (T-Mobile)	145
BXA-70040/6CF (Verizon)	156.5	LNX-6515DS (T-Mobile)	145
SBNHH-1D65B (Verizon)	156.5	LNX-6515DS (T-Mobile)	145
LPA-80063-4CF (Verizon)	156.5	15' Frame (T-Mobile)	145
LPA-80063-4CF (Verizon)	156.5	15' Frame (T-Mobile)	145
SBNHH-1D65B (Verizon)	156.5	15' Frame (T-Mobile)	145
BXA-70040/6CF (Verizon)	156.5	(2) TMA 10"x8"x3" (T-Mobile)	145
SBNHH-1D65B (Verizon)	156.5	15' x 2" Dia Omni (Unknown)	127.5
LPA-80063-4CF (Verizon)	156.5	4' Side Mount Standoff (Unknown)	117.75
LPA-80063-4CF (Verizon)	156.5	16' x 2" Dia Omni (Unknown)	108
SBNHH-1D65B (Verizon)	156.5	4' Side Mount Standoff (Unknown)	99
BXA-70063/6CF (Verizon)	156.5	4' Side Mount Standoff (Vacant) (Unknown)	47
SBNHH-1D65B (Verizon)	156.5	12' x 1-1/2" Dia Omni (Unknown)	45.41
LPA-80063-4CF (Verizon)	156.5	4' Side Mount Standoff (Unknown)	37.58

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10. Welds are fabricated with ER-70S-6 electrodes.
11. TOWER RATING: 91.2%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 217 K
SHEAR: 26 K

UPLIFT: -186 K
SHEAR: 23 K

AXIAL 151 K
SHEAR 13 K *MOMENT 1332 kip-ft*
TORQUE 2 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 36 K
SHEAR 42 K *MOMENT 4061 kip-ft*
TORQUE 11 kip-ft
REACTIONS - 97 mph WIND

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

Job: 17004.20 - CT1144			
Project: 160' Lattice Tower - 482 Pigeon Hill Road, Windsor, CT			
Client: AT&T Mobility	Drawn by: TJL	App'd:	
Code: TIA-222-G	Date: 04/20/17	Scale: NTS	
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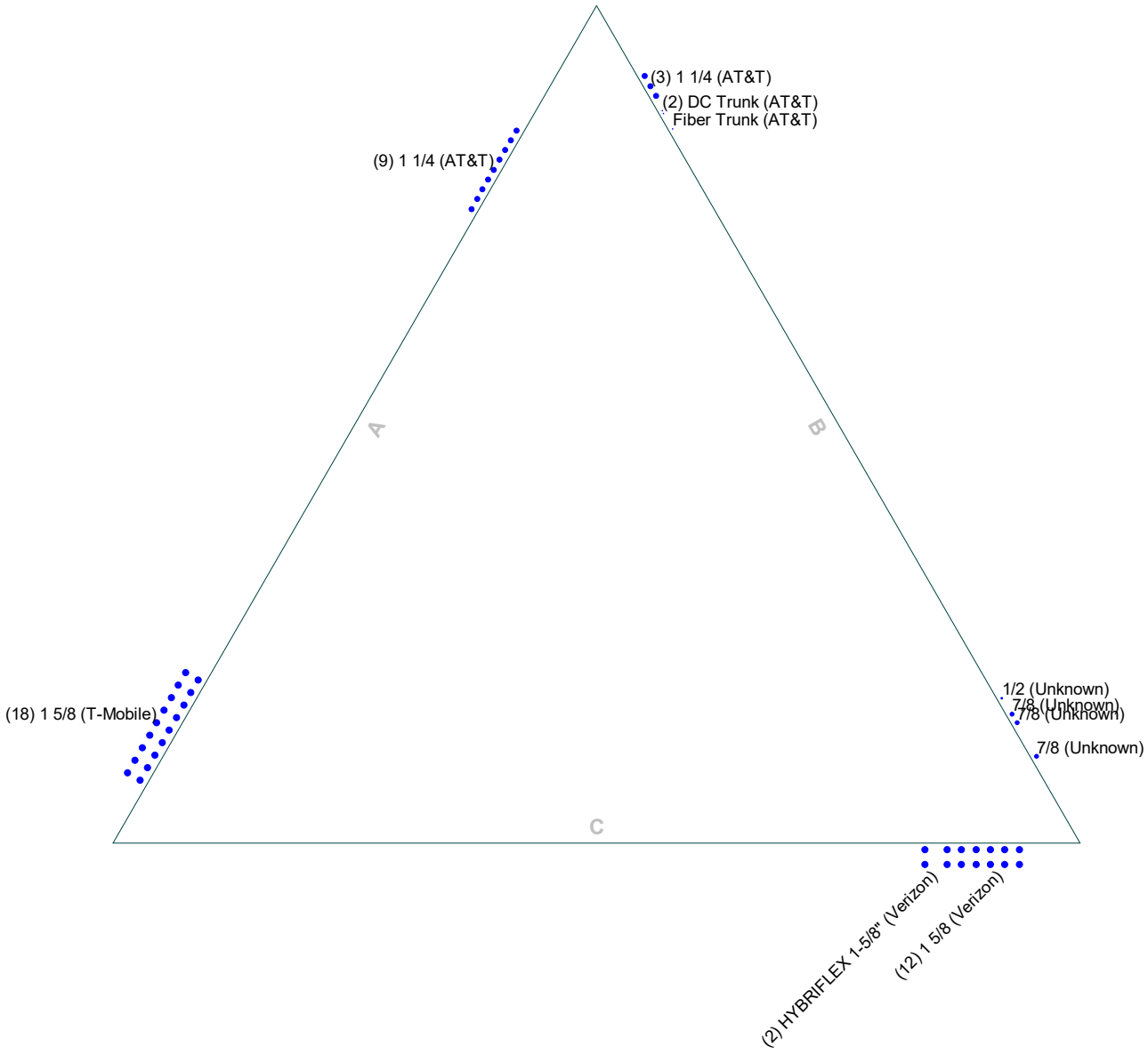
Feed Line Plan

Round Flat App In Face App Out Face



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63-2 North Branford Rd.
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FAX: (203) 488-8587

Job: **17004.20 - CT1144**		
Project: ***160' Lattice Tower - 482 Pigeon Hill Road, Windsor, CT***		
Client: AT&T Mobility	Drawn by: TJL	App'd:
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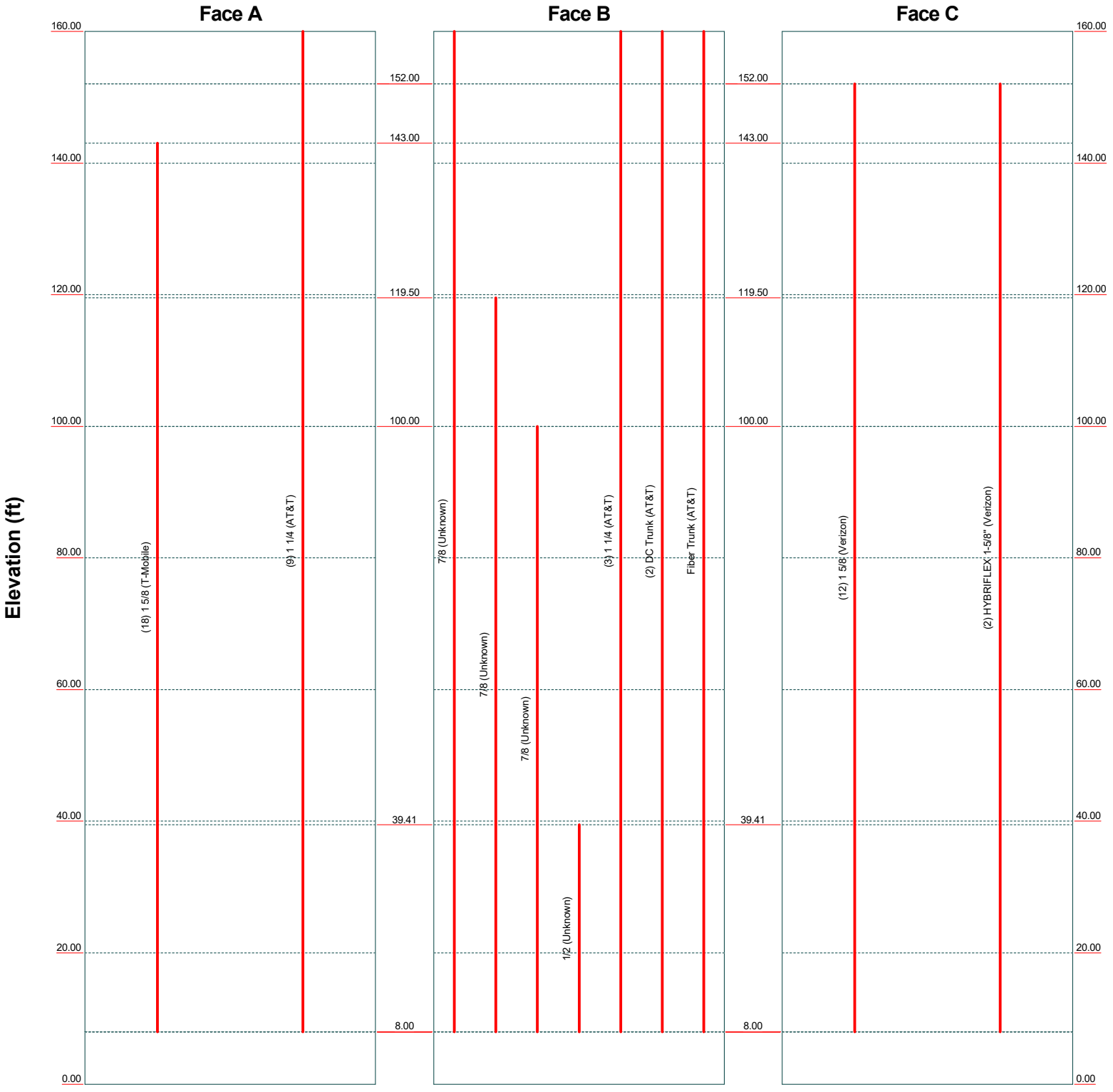
Feed Line Distribution Chart
0' - 160'

Round | Flat | App In Face | App Out Face | Truss Leg



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Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***17004.20 - CT1144***		
Project:	***160' Lattice Tower - 482 Pigeon Hill Road, Windsor, CT***		
Client: AT&T Mobility	Drawn by: TJL		App'd:
Code: TIA-222-G	Date: 04/20/17		Scale: NTS
Path: J:\Jobs\1700400.WI\20_Windsor-Pigeon Hill,CT1144\04_Structural\Tower\Backup Documentation\ERI Files\160' Lattice Windsor.eri			Dwg No. E-7

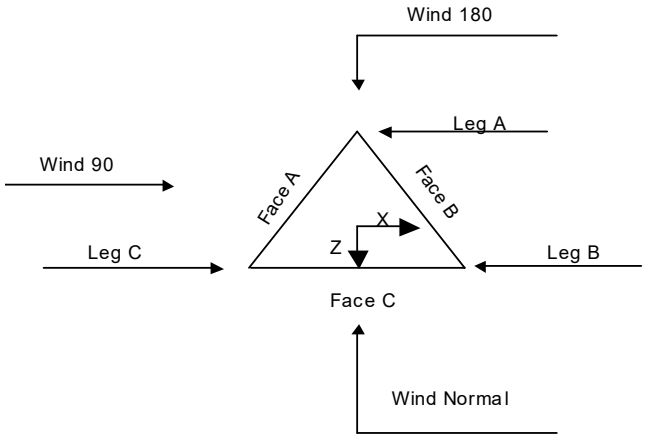
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 8.56 ft at the top and 22.85 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	√ SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	160.00-140.00			8.56	1	20.00
T2	140.00-120.00			8.56	1	20.00
T3	120.00-100.00			10.56	1	20.00
T4	100.00-80.00			12.60	1	20.00
T5	80.00-60.00			14.66	1	20.00
T6	60.00-40.00			16.69	1	20.00
T7	40.00-20.00			18.69	1	20.00
T8	20.00-0.00			20.85	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	160.00-140.00	4.75	X Brace	No	No	6.0000	6.0000
T2	140.00-120.00	6.67	X Brace	No	Yes	0.0000	0.0000
T3	120.00-100.00	6.67	X Brace	No	Yes	0.0000	0.0000
T4	100.00-80.00	6.67	X Brace	No	Yes	0.0000	0.0000
T5	80.00-60.00	10.00	X Brace	No	Yes	0.0000	0.0000
T6	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T8	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 160.00-140.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x1/4	A36 (36 ksi)
T2 140.00-120.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T3 120.00-100.00	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T5 80.00-60.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T6 60.00-40.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T7 40.00-20.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T8 20.00-0.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 160.00-140.00	Equal Angle	L2 1/2x2 1/2x3/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T2 140.00-120.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T3 120.00-100.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T4 100.00-80.00	Equal Angle	L3x3x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T5 80.00-60.00	Equal Angle	L3x3x1/4	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T8 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 160.00-140.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 140.00-120.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0
T3 120.00-100.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325X	2
T4 100.00-80.00	Flange	0.8750 A325N	4	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2
T5 80.00-60.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2
T6 60.00-40.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T7 40.00-20.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0
T8 20.00-0.00	Flange	0.8750 A354-BC	6	0.6250 A325X	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon)	C	No	Ar (CaAa)	152.00 - 8.00	1.0000	-0.4	12	6	1.9800	1.9800		1.04
7/8 (Unknown)	B	No	Ar (CaAa)	160.00 - 8.00	1.0000	0.4	1	1	1.1100	1.1100		0.54
7/8 (Unknown)	B	No	Ar (CaAa)	119.50 - 8.00	1.0000	0.36	1	1	1.1100	1.1100		0.54

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8 (Unknown)	B	No	Ar (CaAa)	100.00 - 8.00	1.0000	0.35	1	1	1.1100	1.1100		0.54
1/2 (Unknown)	B	No	Ar (CaAa)	39.41 - 8.00	1.0000	0.33	1	1	0.5800	0.5800		0.25
1 5/8 (T-Mobile)	A	No	Ar (CaAa)	143.00 - 8.00	1.0000	-0.37	18	9	1.9800	1.9800		1.04
1 1/4 (AT&T)	B	No	Ar (CaAa)	160.00 - 8.00	1.0000	-0.4	3	3	1.5500	1.5500		0.66
HYBRIFLEX 1-5/8" (Verizon)	C	No	Ar (CaAa)	152.00 - 8.00	1.0000	-0.34	2	1	1.9800	1.9800		1.90
1 1/4 (AT&T)	A	No	Ar (CaAa)	160.00 - 8.00	1.0000	0.3	9	9	1.5500	1.5500		0.66
DC Trunk (AT&T)	B	No	Ar (CaAa)	160.00 - 8.00	1.0000	-0.37	2	2	0.4000	0.4000		0.11
Fiber Trunk (AT&T)	B	No	Ar (CaAa)	160.00 - 8.00	1.0000	-0.35	1	1	0.4000	0.4000		1.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	160.00-140.00	A	0.000	0.000	38.592	0.000	0.17
		B	0.000	0.000	13.920	0.000	0.07
		C	0.000	0.000	33.264	0.000	0.20
T2	140.00-120.00	A	0.000	0.000	99.180	0.000	0.49
		B	0.000	0.000	13.920	0.000	0.07
		C	0.000	0.000	55.440	0.000	0.33
T3	120.00-100.00	A	0.000	0.000	99.180	0.000	0.49
		B	0.000	0.000	16.084	0.000	0.09
		C	0.000	0.000	55.440	0.000	0.33
T4	100.00-80.00	A	0.000	0.000	99.180	0.000	0.49
		B	0.000	0.000	18.360	0.000	0.10
		C	0.000	0.000	55.440	0.000	0.33
T5	80.00-60.00	A	0.000	0.000	99.180	0.000	0.49
		B	0.000	0.000	18.360	0.000	0.10
		C	0.000	0.000	55.440	0.000	0.33
T6	60.00-40.00	A	0.000	0.000	99.180	0.000	0.49
		B	0.000	0.000	18.360	0.000	0.10
		C	0.000	0.000	55.440	0.000	0.33
T7	40.00-20.00	A	0.000	0.000	99.180	0.000	0.49
		B	0.000	0.000	19.486	0.000	0.10
		C	0.000	0.000	55.440	0.000	0.33
T8	20.00-0.00	A	0.000	0.000	59.508	0.000	0.30
		B	0.000	0.000	11.712	0.000	0.06
		C	0.000	0.000	33.264	0.000	0.20

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	160.00-140.00	A	2.327	0.000	0.000	93.953	0.000	1.87

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	75.642	0.000	1.10
		C		0.000	0.000	61.466	0.000	1.58
T2	140.00-120.00	A	2.294	0.000	0.000	178.027	0.000	4.40
		B		0.000	0.000	74.923	0.000	1.08
		C		0.000	0.000	102.001	0.000	2.60
T3	120.00-100.00	A	2.256	0.000	0.000	177.571	0.000	4.36
		B		0.000	0.000	85.059	0.000	1.25
		C		0.000	0.000	101.492	0.000	2.57
T4	100.00-80.00	A	2.211	0.000	0.000	177.033	0.000	4.30
		B		0.000	0.000	95.250	0.000	1.41
		C		0.000	0.000	100.893	0.000	2.53
T5	80.00-60.00	A	2.156	0.000	0.000	176.375	0.000	4.23
		B		0.000	0.000	93.618	0.000	1.36
		C		0.000	0.000	100.159	0.000	2.49
T6	60.00-40.00	A	2.085	0.000	0.000	175.521	0.000	4.14
		B		0.000	0.000	91.498	0.000	1.30
		C		0.000	0.000	99.207	0.000	2.43
T7	40.00-20.00	A	1.981	0.000	0.000	174.281	0.000	4.02
		B		0.000	0.000	97.229	0.000	1.33
		C		0.000	0.000	97.822	0.000	2.35
T8	20.00-0.00	A	1.775	0.000	0.000	103.099	0.000	2.26
		B		0.000	0.000	54.333	0.000	0.69
		C		0.000	0.000	57.049	0.000	1.31

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	160.00-140.00	1.4949	-0.9660	1.0262	-1.6590
T2	140.00-120.00	-1.8311	1.7779	-0.5187	0.0661
T3	120.00-100.00	-1.8752	2.0843	-0.2026	0.1997
T4	100.00-80.00	-1.8248	2.3366	0.1921	0.3552
T5	80.00-60.00	-2.0914	2.7276	0.2075	0.4076
T6	60.00-40.00	-2.3117	3.0581	0.1925	0.4494
T7	40.00-20.00	-2.3844	3.3967	0.5997	0.6147
T8	20.00-0.00	-2.0526	2.9541	0.3332	0.4934

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	1 5/8	140.00 - 152.00	0.6000	0.6000
T1	4	7/8	140.00 - 160.00	0.6000	0.6000
T1	12	1 5/8	140.00 - 143.00	0.6000	0.6000
T1	13	1 1/4	140.00 - 160.00	0.6000	0.6000
T1	14	HYBRIFLEX 1-5/8"	140.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			152.00		
T1	15	1 1/4	140.00 - 160.00	0.6000	0.6000
T1	18	DC Trunk	140.00 - 160.00	0.6000	0.6000
T1	19	Fiber Trunk	140.00 - 160.00	0.6000	0.6000
T2	1	1 5/8	120.00 - 140.00	0.6000	0.6000
T2	4	7/8	120.00 - 140.00	0.6000	0.6000
T2	12	1 5/8	120.00 - 140.00	0.6000	0.6000
T2	13	1 1/4	120.00 - 140.00	0.6000	0.6000
T2	14	HYBRIFLEX 1-5/8"	120.00 - 140.00	0.6000	0.6000
T2	15	1 1/4	120.00 - 140.00	0.6000	0.6000
T2	18	DC Trunk	120.00 - 140.00	0.6000	0.6000
T2	19	Fiber Trunk	120.00 - 140.00	0.6000	0.6000
T3	1	1 5/8	100.00 - 120.00	0.6000	0.6000
T3	4	7/8	100.00 - 120.00	0.6000	0.6000
T3	8	7/8	100.00 - 119.50	0.6000	0.6000
T3	12	1 5/8	100.00 - 120.00	0.6000	0.6000
T3	13	1 1/4	100.00 - 120.00	0.6000	0.6000
T3	14	HYBRIFLEX 1-5/8"	100.00 - 120.00	0.6000	0.6000
T3	15	1 1/4	100.00 - 120.00	0.6000	0.6000
T3	18	DC Trunk	100.00 - 120.00	0.6000	0.6000
T3	19	Fiber Trunk	100.00 - 120.00	0.6000	0.6000
T4	1	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	4	7/8	80.00 - 100.00	0.6000	0.6000
T4	8	7/8	80.00 - 100.00	0.6000	0.6000
T4	9	7/8	80.00 - 100.00	0.6000	0.6000
T4	12	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	13	1 1/4	80.00 - 100.00	0.6000	0.6000
T4	14	HYBRIFLEX 1-5/8"	80.00 - 100.00	0.6000	0.6000
T4	15	1 1/4	80.00 - 100.00	0.6000	0.6000
T4	18	DC Trunk	80.00 - 100.00	0.6000	0.6000
T4	19	Fiber Trunk	80.00 - 100.00	0.6000	0.6000
T5	1	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	4	7/8	60.00 - 80.00	0.6000	0.6000
T5	8	7/8	60.00 - 80.00	0.6000	0.6000
T5	9	7/8	60.00 - 80.00	0.6000	0.6000
T5	12	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	13	1 1/4	60.00 - 80.00	0.6000	0.6000
T5	14	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.6000
T5	15	1 1/4	60.00 - 80.00	0.6000	0.6000
T5	18	DC Trunk	60.00 - 80.00	0.6000	0.6000
T5	19	Fiber Trunk	60.00 - 80.00	0.6000	0.6000
T6	1	1 5/8	40.00 - 60.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	4	7/8	40.00 - 60.00	0.6000	0.6000
T6	8	7/8	40.00 - 60.00	0.6000	0.6000
T6	9	7/8	40.00 - 60.00	0.6000	0.6000
T6	12	1 5/8	40.00 - 60.00	0.6000	0.6000
T6	13	1 1/4	40.00 - 60.00	0.6000	0.6000
T6	14	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T6	15	1 1/4	40.00 - 60.00	0.6000	0.6000
T6	18	DC Trunk	40.00 - 60.00	0.6000	0.6000
T6	19	Fiber Trunk	40.00 - 60.00	0.6000	0.6000
T7	1	1 5/8	20.00 - 40.00	0.6000	0.6000
T7	4	7/8	20.00 - 40.00	0.6000	0.6000
T7	8	7/8	20.00 - 40.00	0.6000	0.6000
T7	9	7/8	20.00 - 40.00	0.6000	0.6000
T7	11	1/2	20.00 - 39.41	0.6000	0.6000
T7	12	1 5/8	20.00 - 40.00	0.6000	0.6000
T7	13	1 1/4	20.00 - 40.00	0.6000	0.6000
T7	14	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T7	15	1 1/4	20.00 - 40.00	0.6000	0.6000
T7	18	DC Trunk	20.00 - 40.00	0.6000	0.6000
T7	19	Fiber Trunk	20.00 - 40.00	0.6000	0.6000
T8	1	1 5/8	8.00 - 20.00	0.6000	0.6000
T8	4	7/8	8.00 - 20.00	0.6000	0.6000
T8	8	7/8	8.00 - 20.00	0.6000	0.6000
T8	9	7/8	8.00 - 20.00	0.6000	0.6000
T8	11	1/2	8.00 - 20.00	0.6000	0.6000
T8	12	1 5/8	8.00 - 20.00	0.6000	0.6000
T8	13	1 1/4	8.00 - 20.00	0.6000	0.6000
T8	14	HYBRIFLEX 1-5/8"	8.00 - 20.00	0.6000	0.6000
T8	15	1 1/4	8.00 - 20.00	0.6000	0.6000
T8	18	DC Trunk	8.00 - 20.00	0.6000	0.6000
T8	19	Fiber Trunk	8.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2)	A	From Face	2.00	0.0000	169.00	No Ice	4.99	2.83	0.04
AM-X-CD-14-65-00T-RET			0.00			1/2" Ice	5.32	3.14	0.07
(AT&T - Existing)			0.00			1" Ice	5.65	3.45	0.11
(2)	B	From Face	2.00	0.0000	169.00	No Ice	4.99	2.83	0.04
AM-X-CD-14-65-00T-RET			0.00			1/2" Ice	5.32	3.14	0.07
(AT&T - Existing)			0.00			1" Ice	5.65	3.45	0.11
(2)	C	From Face	2.00	0.0000	169.00	No Ice	4.99	2.83	0.04
AM-X-CD-14-65-00T-RET			0.00			1/2" Ice	5.32	3.14	0.07
(AT&T - Existing)			0.00			1" Ice	5.65	3.45	0.11
(2) TT19-08BP111-001 TMA	A	From Face	2.00	0.0000	169.00	No Ice	0.00	0.52	0.02
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.62	0.02
			0.00			1" Ice	0.00	0.74	0.03
(2) TT19-08BP111-001 TMA	B	From Face	2.00	0.0000	169.00	No Ice	0.00	0.52	0.02
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.62	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	0.00	0.74	0.03
(2) TT19-08BP111-001 TMA	C	From Face	2.00	0.0000	169.00	No Ice	0.00	0.52	0.02
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.62	0.02
			0.00			1" Ice	0.00	0.74	0.03
QS66512-2	A	From Face	2.00	0.0000	169.00	No Ice	8.13	6.80	0.11
(AT&T - Existing)			-2.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
QS66512-2	B	From Face	2.00	0.0000	169.00	No Ice	8.13	6.80	0.11
(AT&T - Existing)			-2.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
QS66512-2	C	From Face	2.00	0.0000	169.00	No Ice	8.13	6.80	0.11
(AT&T - Existing)			-2.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
RRUS-11	A	From Face	2.00	0.0000	169.00	No Ice	2.57	1.07	0.05
(AT&T - Proposed)			2.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	B	From Face	2.00	0.0000	169.00	No Ice	2.57	1.07	0.05
(AT&T - Proposed)			2.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	C	From Face	2.00	0.0000	169.00	No Ice	2.57	1.07	0.05
(AT&T - Proposed)			2.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-32	A	From Face	2.00	0.0000	169.00	No Ice	3.31	2.42	0.08
(AT&T - Proposed)			-2.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	B	From Face	2.00	0.0000	169.00	No Ice	3.31	2.42	0.08
(AT&T - Proposed)			-2.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-32	C	From Face	2.00	0.0000	169.00	No Ice	3.31	2.42	0.08
(AT&T - Proposed)			-2.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
DC6-48-60-18-8F Surge	A	From Face	2.00	0.0000	169.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	2.29	2.29	0.06
P8 x18-ft Pipe Mast	C	From	0.00	0.0000	161.00	No Ice	7.76	7.76	0.51
(AT&T)		Centroid-Fa	0.00			1/2" Ice	16.61	16.61	0.62
		ce	0.00			1" Ice	17.70	17.70	0.73
Valmont 10'-6" T-Armx 3	C	From	0.00	0.0000	169.00	No Ice	14.00	12.00	0.47
(Colo Kit P/N 802738)		Centroid-Fa	0.00			1/2" Ice	17.00	14.00	0.59
(AT&T)		ce	0.00			1" Ice	20.00	16.00	0.72
LPA-80063-4CF	A	From Leg	5.00	0.0000	156.50	No Ice	6.14	5.39	0.02
(Verizon)			-6.00			1/2" Ice	6.48	5.72	0.07
			0.00			1" Ice	6.83	6.05	0.13
SBNHH-1D65B	A	From Leg	5.00	0.0000	156.50	No Ice	8.08	5.34	0.04
(Verizon)			-4.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
BXA-70040/6CF	A	From Leg	5.00	0.0000	156.50	No Ice	16.31	5.72	0.04
(Verizon)			0.00			1/2" Ice	16.93	6.17	0.12
			0.00			1" Ice	17.56	6.63	0.21
SBNHH-1D65B	A	From Leg	5.00	0.0000	156.50	No Ice	8.08	5.34	0.04
(Verizon)			-4.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
LPA-80063-4CF	A	From Leg	5.00	0.0000	156.50	No Ice	6.14	5.39	0.02
(Verizon)			6.00			1/2" Ice	6.48	5.72	0.07
			0.00			1" Ice	6.83	6.05	0.13
LPA-80063-4CF	B	From Leg	5.00	0.0000	156.50	No Ice	6.14	5.39	0.02
(Verizon)			-6.00			1/2" Ice	6.48	5.72	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	6.83	6.05	0.13
SBNHH-1D65B	B	From Leg	5.00	0.0000	156.50	No Ice	8.08	5.34	0.04
(Verizon)			-4.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
BXA-70040/6CF	B	From Leg	5.00	0.0000	156.50	No Ice	16.31	5.72	0.04
(Verizon)			0.00			1/2" Ice	16.93	6.17	0.12
			0.00			1" Ice	17.56	6.63	0.21
SBNHH-1D65B	B	From Leg	5.00	0.0000	156.50	No Ice	8.08	5.34	0.04
(Verizon)			-4.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
LPA-80063-4CF	B	From Leg	5.00	0.0000	156.50	No Ice	6.14	5.39	0.02
(Verizon)			6.00			1/2" Ice	6.48	5.72	0.07
			0.00			1" Ice	6.83	6.05	0.13
LPA-80063-4CF	C	From Leg	5.00	0.0000	156.50	No Ice	6.14	5.39	0.02
(Verizon)			-6.00			1/2" Ice	6.48	5.72	0.07
			0.00			1" Ice	6.83	6.05	0.13
SBNHH-1D65B	C	From Leg	5.00	0.0000	156.50	No Ice	8.08	5.34	0.04
(Verizon)			-4.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
BXA-70063/6CF	C	From Leg	5.00	0.0000	156.50	No Ice	7.57	4.16	0.01
(Verizon)			0.00			1/2" Ice	8.02	4.60	0.05
			0.00			1" Ice	8.47	5.04	0.10
SBNHH-1D65B	C	From Leg	5.00	0.0000	156.50	No Ice	8.08	5.34	0.04
(Verizon)			-4.00			1/2" Ice	8.53	5.79	0.09
			0.00			1" Ice	9.00	6.26	0.15
LPA-80063-4CF	C	From Leg	5.00	0.0000	156.50	No Ice	6.14	5.39	0.02
(Verizon)			6.00			1/2" Ice	6.48	5.72	0.07
			0.00			1" Ice	6.83	6.05	0.13
RRH4x45/2x90-AWS	A	From Leg	4.00	0.0000	156.50	No Ice	2.58	1.69	0.08
(Verizon)			4.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	B	From Leg	4.00	0.0000	156.50	No Ice	2.58	1.69	0.08
(Verizon)			4.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	C	From Leg	4.00	0.0000	156.50	No Ice	2.58	1.69	0.08
(Verizon)			4.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH2x60-PCS	A	From Leg	4.00	0.0000	156.50	No Ice	2.15	1.35	0.06
(Verizon)			-4.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	B	From Leg	4.00	0.0000	156.50	No Ice	2.15	1.35	0.06
(Verizon)			-4.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	C	From Leg	4.00	0.0000	156.50	No Ice	2.15	1.35	0.06
(Verizon)			-4.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH4x30-B13	A	From Leg	4.00	0.0000	156.50	No Ice	2.16	1.62	0.06
(Verizon)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
RRH4x30-B13	B	From Leg	4.00	0.0000	156.50	No Ice	2.16	1.62	0.06
(Verizon)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
RRH4x30-B13	C	From Leg	4.00	0.0000	156.50	No Ice	2.16	1.62	0.06
(Verizon)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
DB-T1-6Z-8AB-0Z	C	From Leg	0.50	0.0000	156.50	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	B	From Leg	0.50	0.0000	156.50	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
15' Frame	A	From Leg	0.50	0.0000	156.00	No Ice	12.00	5.70	0.35
(Verizon)			0.00			1/2" Ice	14.00	8.10	0.49
			0.00			1" Ice	16.00	10.50	0.63
15' Frame	B	From Leg	0.50	0.0000	156.00	No Ice	12.00	5.70	0.35
(Verizon)			0.00			1/2" Ice	14.00	8.10	0.49
			0.00			1" Ice	16.00	10.50	0.63
15' Frame	C	From Leg	0.50	0.0000	156.00	No Ice	12.00	5.70	0.35
(Verizon)			0.00			1/2" Ice	14.00	8.10	0.49
			0.00			1" Ice	16.00	10.50	0.63
(2) TMA 10"x8"x3"	A	From Leg	1.00	0.0000	145.00	No Ice	0.67	0.26	0.02
(T-Mobile)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
(2) TMA 10"x8"x3"	B	From Leg	1.00	0.0000	145.00	No Ice	0.67	0.26	0.02
(T-Mobile)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
(2) TMA 10"x8"x3"	C	From Leg	1.00	0.0000	145.00	No Ice	0.67	0.26	0.02
(T-Mobile)			0.00			1/2" Ice	0.77	0.33	0.02
			0.00			1" Ice	0.88	0.41	0.03
APX16DWV-16DWVS-E-A	A	From Leg	4.00	0.0000	145.00	No Ice	6.46	2.15	0.04
20			0.00			1/2" Ice	6.83	2.49	0.07
(T-Mobile)			0.00			1" Ice	7.21	2.84	0.11
APX16DWV-16DWVS-E-A	B	From Leg	4.00	0.0000	145.00	No Ice	6.46	2.15	0.04
20			0.00			1/2" Ice	6.83	2.49	0.07
(T-Mobile)			0.00			1" Ice	7.21	2.84	0.11
APX16DWV-16DWVS-E-A	C	From Leg	4.00	0.0000	145.00	No Ice	6.46	2.15	0.04
20			0.00			1/2" Ice	6.83	2.49	0.07
(T-Mobile)			0.00			1" Ice	7.21	2.84	0.11
LNX-6515DS	A	From Leg	4.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(T-Mobile)			5.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS	B	From Leg	4.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(T-Mobile)			5.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS	C	From Leg	4.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(T-Mobile)			5.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
15' Frame	A	From Leg	0.50	0.0000	145.00	No Ice	7.13	5.70	0.35
(T-Mobile)			0.00			1/2" Ice	9.71	8.10	0.49
			0.00			1" Ice	12.29	10.50	0.63
15' Frame	B	From Leg	0.50	0.0000	145.00	No Ice	7.13	5.70	0.35
(T-Mobile)			0.00			1/2" Ice	9.71	8.10	0.49
			0.00			1" Ice	12.29	10.50	0.63
15' Frame	C	From Leg	0.50	0.0000	145.00	No Ice	7.13	5.70	0.35
(T-Mobile)			0.00			1/2" Ice	9.71	8.10	0.49
			0.00			1" Ice	12.29	10.50	0.63
4' Side Mount Standoff	C	From Leg	1.75	0.0000	99.00	No Ice	2.72	2.72	0.05
(Unknown)			0.00			1/2" Ice	4.91	4.91	0.09
			0.00			1" Ice	7.10	7.10	0.13
16' x 2" Dia Omni	C	From Leg	3.50	0.0000	108.00	No Ice	3.20	3.20	0.04
(Unknown)			0.00			1/2" Ice	4.83	4.83	0.06
			0.00			1" Ice	6.47	6.47	0.10
4' Side Mount Standoff	C	From Leg	2.25	0.0000	117.75	No Ice	2.72	2.72	0.05
(Unknown)			0.00			1/2" Ice	4.91	4.91	0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	7.10	7.10	0.13
15' x 2" Dia Omni	C	From Leg	4.50	0.0000	127.50	No Ice	3.00	3.00	0.04
(Unknown)			0.00			1/2" Ice	4.53	4.53	0.06
			0.00			1" Ice	6.07	6.07	0.09
4' Side Mount Standoff	C	From Leg	1.50	0.0000	37.58	No Ice	2.72	2.72	0.05
(Unknown)			0.00			1/2" Ice	4.91	4.91	0.09
			0.00			1" Ice	7.10	7.10	0.13
12' x 1-1/2" Dia Omni	C	From Leg	3.00	0.0000	45.41	No Ice	1.80	1.80	0.03
(Unknown)			0.00			1/2" Ice	3.02	3.02	0.04
			0.00			1" Ice	4.26	4.26	0.07
15' x 2" Dia Omni	A	From Leg	0.75	0.0000	165.00	No Ice	3.00	3.00	0.04
(Unknown)			0.00			1/2" Ice	4.53	4.53	0.06
			0.00			1" Ice	6.07	6.07	0.09
4' Side Mount Standoff	A	From Leg	1.50	0.0000	47.00	No Ice	2.72	2.72	0.05
(Vacant)			0.00			1/2" Ice	4.91	4.91	0.09
(Unknown)			0.00			1" Ice	7.10	7.10	0.13

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	150.00	1.11	23	175.992	A	12.835	9.583	9.583	42.75	38.592	0.000
160.00-140.00					B	12.835	9.583		42.75	13.920	0.000
					C	12.835	9.583		42.75	33.264	0.000
T2	130.00	1.065	22	195.998	A	16.023	9.599	9.599	37.47	99.180	0.000
140.00-120.00					B	16.023	9.599		37.47	13.920	0.000
					C	16.023	9.599		37.47	55.440	0.000
T3	110.00	1.016	21	236.398	A	23.443	9.600	9.600	29.05	99.180	0.000
120.00-100.00					B	23.443	9.600		29.05	16.084	0.000
					C	23.443	9.600		29.05	55.440	0.000
T4	90.00	0.959	20	278.441	A	32.289	11.687	11.687	26.58	99.180	0.000
100.00-80.00					B	32.289	11.687		26.58	18.360	0.000
					C	32.289	11.687		26.58	55.440	0.000
T5 80.00-60.00	70.00	0.892	18	321.010	A	25.819	15.026	15.026	36.79	99.180	0.000
					B	25.819	15.026		36.79	18.360	0.000
					C	25.819	15.026		36.79	55.440	0.000
T6 60.00-40.00	50.00	0.811	17	363.083	A	23.120	18.574	18.574	44.55	99.180	0.000
					B	23.120	18.574		44.55	18.360	0.000
					C	23.120	18.574		44.55	55.440	0.000
T7 40.00-20.00	30.00	0.701	14	404.685	A	25.246	18.579	18.579	42.39	99.180	0.000
					B	25.246	18.579		42.39	19.486	0.000
					C	25.246	18.579		42.39	55.440	0.000
T8 20.00-0.00	10.00	0.7	14	448.055	A	31.266	22.120	22.120	41.43	59.508	0.000
					B	31.266	22.120		41.43	11.712	0.000
					C	31.266	22.120		41.43	33.264	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	150.00	1.11	6	2.3270	183.748	A	12.835	57.846	25.096	35.51	93.953	0.000
160.00-140.00						B	12.835	57.846		35.51	75.642	0.000
						C	12.835	57.846		35.51	61.466	0.000
T2	130.00	1.065	6	2.2939	203.654	A	16.023	61.672	24.917	32.07	178.027	0.000
140.00-120.00						B	16.023	61.672		32.07	74.923	0.000
						C	16.023	61.672		32.07	102.001	0.000
T3	110.00	1.016	6	2.2559	243.927	A	23.443	66.974	24.665	27.28	177.571	0.000
120.00-100.00						B	23.443	66.974		27.28	85.059	0.000
						C	23.443	66.974		27.28	101.492	0.000
T4 100.00-80.00	90.00	0.959	5	2.2111	285.821	A	32.289	74.050	26.454	24.88	177.033	0.000
						B	32.289	74.050		24.88	95.250	0.000
						C	32.289	74.050		24.88	100.893	0.000
T5 80.00-60.00	70.00	0.892	5	2.1562	328.206	A	25.819	66.539	29.425	31.86	176.375	0.000
						B	25.819	66.539		31.86	93.618	0.000
						C	25.819	66.539		31.86	100.159	0.000
T6 60.00-40.00	50.00	0.811	4	2.0849	370.041	A	23.120	60.041	32.496	39.08	175.521	0.000
						B	23.120	60.041		39.08	91.498	0.000
						C	23.120	60.041		39.08	99.207	0.000
T7 40.00-20.00	30.00	0.701	4	1.9810	411.298	A	25.246	60.390	31.812	37.15	174.281	0.000
						B	25.246	60.390		37.15	97.229	0.000
						C	25.246	60.390		37.15	97.822	0.000
T8 20.00-0.00	10.00	0.7	4	1.7749	453.979	A	31.266	61.720	33.973	36.54	103.099	0.000
						B	31.266	61.720		36.54	54.333	0.000
						C	31.266	61.720		36.54	57.049	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	150.00	1.11	9	175.992	A	12.835	9.583	9.583	42.75	38.592	0.000
160.00-140.00					B	12.835	9.583		42.75	13.920	0.000
					C	12.835	9.583		42.75	33.264	0.000
T2	130.00	1.065	8	195.998	A	16.023	9.599	9.599	37.47	99.180	0.000
140.00-120.00					B	16.023	9.599		37.47	13.920	0.000
					C	16.023	9.599		37.47	55.440	0.000
T3	110.00	1.016	8	236.398	A	23.443	9.600	9.600	29.05	99.180	0.000
120.00-100.00					B	23.443	9.600		29.05	16.084	0.000
					C	23.443	9.600		29.05	55.440	0.000
T4	90.00	0.959	8	278.441	A	32.289	11.687	11.687	26.58	99.180	0.000
100.00-80.00					B	32.289	11.687		26.58	18.360	0.000
					C	32.289	11.687		26.58	55.440	0.000
T5 80.00-60.00	70.00	0.892	7	321.010	A	25.819	15.026	15.026	36.79	99.180	0.000
					B	25.819	15.026		36.79	18.360	0.000
					C	25.819	15.026		36.79	55.440	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T6 60.00-40.00	50.00	0.811	6	363.083	A	23.120	18.574	18.574	44.55	99.180	0.000
					B	23.120	18.574		44.55	18.360	0.000
					C	23.120	18.574		44.55	55.440	0.000
T7 40.00-20.00	30.00	0.701	5	404.685	A	25.246	18.579	18.579	42.39	99.180	0.000
					B	25.246	18.579		42.39	19.486	0.000
					C	25.246	18.579		42.39	55.440	0.000
T8 20.00-0.00	10.00	0.7	5	448.055	A	31.266	22.120	22.120	41.43	59.508	0.000
					B	31.266	22.120		41.43	11.712	0.000
					C	31.266	22.120		41.43	33.264	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.45	1.15	A	0.127	2.856	23	1	1	18.256	1.84	92.12	A
160.00-140.00			B	0.127	2.856		1	1	18.256			
			C	0.127	2.856		1	1	18.256			
T2	0.89	1.29	A	0.131	2.844	22	1	1	21.454	2.75	137.61	A
140.00-120.00			B	0.131	2.844		1	1	21.454			
			C	0.131	2.844		1	1	21.454			
T3	0.90	1.52	A	0.14	2.809	21	1	1	28.883	3.00	150.14	A
120.00-100.00			B	0.14	2.809		1	1	28.883			
			C	0.14	2.809		1	1	28.883			
T4	0.92	2.08	A	0.158	2.743	20	1	1	38.932	3.29	164.29	A
100.00-80.00			B	0.158	2.743		1	1	38.932			
			C	0.158	2.743		1	1	38.932			
T5	0.92	2.46	A	0.127	2.857	18	1	1	34.142	2.91	145.74	A
80.00-60.00			B	0.127	2.857		1	1	34.142			
			C	0.127	2.857		1	1	34.142			
T6	0.92	2.65	A	0.115	2.905	17	1	1	32.809	2.62	130.81	A
60.00-40.00			B	0.115	2.905		1	1	32.809			
			C	0.115	2.905		1	1	32.809			
T7	0.92	2.78	A	0.108	2.931	14	1	1	35.193	2.36	118.23	A
40.00-20.00			B	0.108	2.931		1	1	35.193			
			C	0.108	2.931		1	1	35.193			
T8 20.00-0.00	0.55	3.28	A	0.119	2.888	14	1	1	42.338	2.15	107.67	A
			B	0.119	2.888		1	1	42.338			
			C	0.119	2.888		1	1	42.338			
Sum Weight:	6.46	17.21						OTM	1687.51 kip-ft	20.93		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.45	1.15	A	0.127	2.856	23	0.8	1	15.689	1.70	85.05	B
160.00-140.00			B	0.127	2.856		0.8	1	15.689			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.127	2.856		0.8	1	15.689			
T2	0.89	1.29	A	0.131	2.844	22	0.8	1	18.250	2.58	129.16	B
140.00-120.00			B	0.131	2.844		0.8	1	18.250			
			C	0.131	2.844		0.8	1	18.250			
T3	0.90	1.52	A	0.14	2.809	21	0.8	1	24.194	2.77	138.50	B
120.00-100.00			B	0.14	2.809		0.8	1	24.194			
			C	0.14	2.809		0.8	1	24.194			
T4	0.92	2.08	A	0.158	2.743	20	0.8	1	32.474	2.99	149.51	B
100.00-80.00			B	0.158	2.743		0.8	1	32.474			
			C	0.158	2.743		0.8	1	32.474			
T5	0.92	2.46	A	0.127	2.857	18	0.8	1	28.979	2.69	134.29	B
80.00-60.00			B	0.127	2.857		0.8	1	28.979			
			C	0.127	2.857		0.8	1	28.979			
T6	0.92	2.65	A	0.115	2.905	17	0.8	1	28.185	2.43	121.33	B
60.00-40.00			B	0.115	2.905		0.8	1	28.185			
			C	0.115	2.905		0.8	1	28.185			
T7	0.92	2.78	A	0.108	2.931	14	0.8	1	30.144	2.18	109.21	B
40.00-20.00			B	0.108	2.931		0.8	1	30.144			
			C	0.108	2.931		0.8	1	30.144			
T8 20.00-0.00	0.55	3.28	A	0.119	2.888	14	0.8	1	36.084	1.93	96.67	B
			B	0.119	2.888		0.8	1	36.084			
			C	0.119	2.888		0.8	1	36.084			
Sum Weight:	6.46	17.21						OTM	1558.98 kip-ft	19.27		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.45	1.15	A	0.127	2.856	23	0.85	1	16.330	1.87	93.31	B
160.00-140.00			B	0.127	2.856		0.85	1	16.330			
			C	0.127	2.856		0.85	1	16.330			
T2	0.89	1.29	A	0.131	2.844	22	0.85	1	19.051	2.80	139.81	B
140.00-120.00			B	0.131	2.844		0.85	1	19.051			
			C	0.131	2.844		0.85	1	19.051			
T3	0.90	1.52	A	0.14	2.809	21	0.85	1	25.366	2.99	149.54	B
120.00-100.00			B	0.14	2.809		0.85	1	25.366			
			C	0.14	2.809		0.85	1	25.366			
T4	0.92	2.08	A	0.158	2.743	20	0.85	1	34.089	3.22	160.89	B
100.00-80.00			B	0.158	2.743		0.85	1	34.089			
			C	0.158	2.743		0.85	1	34.089			
T5	0.92	2.46	A	0.127	2.857	18	0.85	1	30.270	2.89	144.30	B
80.00-60.00			B	0.127	2.857		0.85	1	30.270			
			C	0.127	2.857		0.85	1	30.270			
T6	0.92	2.65	A	0.115	2.905	17	0.85	1	29.341	2.60	130.20	B
60.00-40.00			B	0.115	2.905		0.85	1	29.341			
			C	0.115	2.905		0.85	1	29.341			
T7	0.92	2.78	A	0.108	2.931	14	0.85	1	31.406	2.34	117.08	B
40.00-20.00			B	0.108	2.931		0.85	1	31.406			
			C	0.108	2.931		0.85	1	31.406			
T8 20.00-0.00	0.55	3.28	A	0.119	2.888	14	0.85	1	37.648	2.06	102.79	B
			B	0.119	2.888		0.85	1	37.648			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	6.46	17.21	C	0.119	2.888		0.85	1 OTM	37.648 1685.05 kip-ft	20.76		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	4.55	5.67	A	0.385	2.095	6	1	1	49.263	1.17	58.51	A
160.00-140.00			B	0.385	2.095		1	1	49.263			
			C	0.385	2.095		1	1	49.263			
T2	8.09	6.41	A	0.382	2.102	6	1	1	54.779	1.50	74.92	A
140.00-120.00			B	0.382	2.102		1	1	54.779			
			C	0.382	2.102		1	1	54.779			
T3	8.18	7.87	A	0.371	2.125	6	1	1	65.238	1.57	78.25	A
120.00-100.00			B	0.371	2.125		1	1	65.238			
			C	0.371	2.125		1	1	65.238			
T4	8.24	9.91	A	0.372	2.122	5	1	1	78.540	1.63	81.33	A
100.00-80.00			B	0.372	2.122		1	1	78.540			
			C	0.372	2.122		1	1	78.540			
T5	8.08	8.85	A	0.281	2.347	5	1	1	65.301	1.45	72.58	A
80.00-60.00			B	0.281	2.347		1	1	65.301			
			C	0.281	2.347		1	1	65.301			
T6	7.87	8.19	A	0.225	2.515	4	1	1	57.899	1.28	64.09	A
60.00-40.00			B	0.225	2.515		1	1	57.899			
			C	0.225	2.515		1	1	57.899			
T7	7.70	8.34	A	0.208	2.569	4	1	1	60.028	1.14	57.11	A
40.00-20.00			B	0.208	2.569		1	1	60.028			
			C	0.208	2.569		1	1	60.028			
T8 20.00-0.00	4.26	9.02	A	0.205	2.58	4	1	1	66.776	0.93	46.49	A
			B	0.205	2.58		1	1	66.776			
			C	0.205	2.58		1	1	66.776			
Sum Weight:	56.97	64.27						OTM	898.12 kip-ft	10.67		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	4.55	5.67	A	0.385	2.095	6	0.8	1	46.696	1.14	57.13	B
160.00-140.00			B	0.385	2.095		0.8	1	46.696			
			C	0.385	2.095		0.8	1	46.696			
T2	8.09	6.41	A	0.382	2.102	6	0.8	1	51.574	1.47	73.26	B
140.00-120.00			B	0.382	2.102		0.8	1	51.574			
			C	0.382	2.102		0.8	1	51.574			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T3	8.18	7.87	A	0.371	2.125	6	0.8	1	60.550	1.52	75.91	B
120.00-100.00			B	0.371	2.125		0.8	1	60.550			
			C	0.371	2.125		0.8	1	60.550			
T4	8.24	9.91	A	0.372	2.122	5	0.8	1	72.082	1.57	78.29	B
100.00-80.00			B	0.372	2.122		0.8	1	72.082			
			C	0.372	2.122		0.8	1	72.082			
T5	8.08	8.85	A	0.281	2.347	5	0.8	1	60.137	1.40	70.08	B
80.00-60.00			B	0.281	2.347		0.8	1	60.137			
			C	0.281	2.347		0.8	1	60.137			
T6	7.87	8.19	A	0.225	2.515	4	0.8	1	53.275	1.24	61.91	B
60.00-40.00			B	0.225	2.515		0.8	1	53.275			
			C	0.225	2.515		0.8	1	53.275			
T7	7.70	8.34	A	0.208	2.569	4	0.8	1	54.979	1.10	55.00	B
40.00-20.00			B	0.208	2.569		0.8	1	54.979			
			C	0.208	2.569		0.8	1	54.979			
T8 20.00-0.00	4.26	9.02	A	0.205	2.58	4	0.8	1	60.523	0.88	43.88	B
			B	0.205	2.58		0.8	1	60.523			
			C	0.205	2.58		0.8	1	60.523			
Sum Weight:	56.97	64.27						OTM	871.59 kip-ft	10.31		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	4.55	5.67	A	0.385	2.095	6	0.85	1	47.338	1.13	56.52	B
160.00-140.00			B	0.385	2.095		0.85	1	47.338			
			C	0.385	2.095		0.85	1	47.338			
T2	8.09	6.41	A	0.382	2.102	6	0.85	1	52.376	1.43	71.75	B
140.00-120.00			B	0.382	2.102		0.85	1	52.376			
			C	0.382	2.102		0.85	1	52.376			
T3	8.18	7.87	A	0.371	2.125	6	0.85	1	61.722	1.49	74.66	B
120.00-100.00			B	0.371	2.125		0.85	1	61.722			
			C	0.371	2.125		0.85	1	61.722			
T4	8.24	9.91	A	0.372	2.122	5	0.85	1	73.697	1.55	77.32	B
100.00-80.00			B	0.372	2.122		0.85	1	73.697			
			C	0.372	2.122		0.85	1	73.697			
T5	8.08	8.85	A	0.281	2.347	5	0.85	1	61.428	1.38	69.09	B
80.00-60.00			B	0.281	2.347		0.85	1	61.428			
			C	0.281	2.347		0.85	1	61.428			
T6	7.87	8.19	A	0.225	2.515	4	0.85	1	54.431	1.22	60.99	B
60.00-40.00			B	0.225	2.515		0.85	1	54.431			
			C	0.225	2.515		0.85	1	54.431			
T7	7.70	8.34	A	0.208	2.569	4	0.85	1	56.242	1.09	54.26	B
40.00-20.00			B	0.208	2.569		0.85	1	56.242			
			C	0.208	2.569		0.85	1	56.242			
T8 20.00-0.00	4.26	9.02	A	0.205	2.58	4	0.85	1	62.086	0.88	43.77	B
			B	0.205	2.58		0.85	1	62.086			
			C	0.205	2.58		0.85	1	62.086			
Sum Weight:	56.97	64.27						OTM	858.56 kip-ft	10.17		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.45	1.15	A	0.127	2.856	9	1	1	18.256	0.70	35.25	A
160.00-140.00			B	0.127	2.856		1	1	18.256			
			C	0.127	2.856		1	1	18.256			
T2	0.89	1.29	A	0.131	2.844	8	1	1	21.454	1.05	52.65	A
140.00-120.00			B	0.131	2.844		1	1	21.454			
			C	0.131	2.844		1	1	21.454			
T3	0.90	1.52	A	0.14	2.809	8	1	1	28.883	1.15	57.44	A
120.00-100.00			B	0.14	2.809		1	1	28.883			
			C	0.14	2.809		1	1	28.883			
T4	0.92	2.08	A	0.158	2.743	8	1	1	38.932	1.26	62.86	A
100.00-80.00			B	0.158	2.743		1	1	38.932			
			C	0.158	2.743		1	1	38.932			
T5	0.92	2.46	A	0.127	2.857	7	1	1	34.142	1.12	55.76	A
80.00-60.00			B	0.127	2.857		1	1	34.142			
			C	0.127	2.857		1	1	34.142			
T6	0.92	2.65	A	0.115	2.905	6	1	1	32.809	1.00	50.05	A
60.00-40.00			B	0.115	2.905		1	1	32.809			
			C	0.115	2.905		1	1	32.809			
T7	0.92	2.78	A	0.108	2.931	5	1	1	35.193	0.90	45.24	A
40.00-20.00			B	0.108	2.931		1	1	35.193			
			C	0.108	2.931		1	1	35.193			
T8 20.00-0.00	0.55	3.28	A	0.119	2.888	5	1	1	42.338	0.82	41.20	A
			B	0.119	2.888		1	1	42.338			
			C	0.119	2.888		1	1	42.338			
Sum Weight:	6.46	17.21						OTM	645.66 kip-ft	8.01		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.45	1.15	A	0.127	2.856	9	0.8	1	15.689	0.65	32.54	B
160.00-140.00			B	0.127	2.856		0.8	1	15.689			
			C	0.127	2.856		0.8	1	15.689			
T2	0.89	1.29	A	0.131	2.844	8	0.8	1	18.250	0.99	49.42	B
140.00-120.00			B	0.131	2.844		0.8	1	18.250			
			C	0.131	2.844		0.8	1	18.250			
T3	0.90	1.52	A	0.14	2.809	8	0.8	1	24.194	1.06	52.99	B
120.00-100.00			B	0.14	2.809		0.8	1	24.194			
			C	0.14	2.809		0.8	1	24.194			
T4	0.92	2.08	A	0.158	2.743	8	0.8	1	32.474	1.14	57.21	B
100.00-80.00			B	0.158	2.743		0.8	1	32.474			
			C	0.158	2.743		0.8	1	32.474			
T5	0.92	2.46	A	0.127	2.857	7	0.8	1	28.979	1.03	51.38	B
80.00-60.00			B	0.127	2.857		0.8	1	28.979			
			C	0.127	2.857		0.8	1	28.979			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T6	0.92	2.65	A	0.115	2.905	6	0.8	1	28.185	0.93	46.42	B
60.00-40.00			B	0.115	2.905		0.8	1	28.185			
			C	0.115	2.905		0.8	1	28.185			
T7	0.92	2.78	A	0.108	2.931	5	0.8	1	30.144	0.84	41.79	B
40.00-20.00			B	0.108	2.931		0.8	1	30.144			
			C	0.108	2.931		0.8	1	30.144			
T8 20.00-0.00	0.55	3.28	A	0.119	2.888	5	0.8	1	36.084	0.74	36.99	B
			B	0.119	2.888		0.8	1	36.084			
			C	0.119	2.888		0.8	1	36.084			
Sum Weight:	6.46	17.21						OTM	596.48 kip-ft	7.37		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.45	1.15	A	0.127	2.856	9	0.85	1	16.330	0.71	35.70	B
160.00-140.00			B	0.127	2.856		0.85	1	16.330			
			C	0.127	2.856		0.85	1	16.330			
T2	0.89	1.29	A	0.131	2.844	8	0.85	1	19.051	1.07	53.49	B
140.00-120.00			B	0.131	2.844		0.85	1	19.051			
			C	0.131	2.844		0.85	1	19.051			
T3	0.90	1.52	A	0.14	2.809	8	0.85	1	25.366	1.14	57.22	B
120.00-100.00			B	0.14	2.809		0.85	1	25.366			
			C	0.14	2.809		0.85	1	25.366			
T4	0.92	2.08	A	0.158	2.743	8	0.85	1	34.089	1.23	61.56	B
100.00-80.00			B	0.158	2.743		0.85	1	34.089			
			C	0.158	2.743		0.85	1	34.089			
T5	0.92	2.46	A	0.127	2.857	7	0.85	1	30.270	1.10	55.21	B
80.00-60.00			B	0.127	2.857		0.85	1	30.270			
			C	0.127	2.857		0.85	1	30.270			
T6	0.92	2.65	A	0.115	2.905	6	0.85	1	29.341	1.00	49.82	B
60.00-40.00			B	0.115	2.905		0.85	1	29.341			
			C	0.115	2.905		0.85	1	29.341			
T7	0.92	2.78	A	0.108	2.931	5	0.85	1	31.406	0.90	44.80	B
40.00-20.00			B	0.108	2.931		0.85	1	31.406			
			C	0.108	2.931		0.85	1	31.406			
T8 20.00-0.00	0.55	3.28	A	0.119	2.888	5	0.85	1	37.648	0.79	39.33	B
			B	0.119	2.888		0.85	1	37.648			
			C	0.119	2.888		0.85	1	37.648			
Sum Weight:	6.46	17.21						OTM	644.72 kip-ft	7.94		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	6.55					
Bracing Weight	10.66					
Total Member Self-Weight	17.21			9.48	5.75	
Total Weight	29.75			9.48	5.75	
Wind 0 deg - No Ice		-0.05	-24.80	-2390.26	13.36	-5.08
Wind 30 deg - No Ice		10.50	-18.28	-1801.12	-1030.86	-2.19
Wind 60 deg - No Ice		18.63	-10.75	-1052.41	-1833.59	0.80
Wind 90 deg - No Ice		24.08	0.05	17.09	-2329.65	4.09
Wind 120 deg - No Ice		22.78	13.21	1276.89	-2174.33	6.57
Wind 150 deg - No Ice		13.09	22.68	2194.95	-1256.08	6.81
Wind 180 deg - No Ice		0.05	23.14	2280.68	-1.86	4.84
Wind 210 deg - No Ice		-10.50	18.28	1820.08	1042.36	2.19
Wind 240 deg - No Ice		-20.06	11.58	1135.64	1956.41	-0.95
Wind 270 deg - No Ice		-24.08	-0.05	1.87	2341.15	-4.09
Wind 300 deg - No Ice		-21.35	-12.38	-1193.66	2074.52	-6.17
Wind 330 deg - No Ice		-13.09	-22.68	-2175.99	1267.59	-6.81
Member Ice	47.06					
Total Weight Ice	145.34			40.70	29.06	
Wind 0 deg - Ice		-0.01	-11.91	-1121.15	31.27	-2.33
Wind 30 deg - Ice		5.41	-9.41	-889.83	-503.64	-1.68
Wind 60 deg - Ice		9.50	-5.50	-501.78	-907.11	-0.57
Wind 90 deg - Ice		12.07	0.01	42.91	-1145.70	0.71
Wind 120 deg - Ice		11.35	6.58	676.30	-1063.97	1.79
Wind 150 deg - Ice		6.31	10.96	1105.11	-583.50	2.37
Wind 180 deg - Ice		0.01	11.56	1176.01	26.84	2.34
Wind 210 deg - Ice		-5.41	9.41	971.23	561.75	1.68
Wind 240 deg - Ice		-9.81	5.67	596.44	988.20	0.56
Wind 270 deg - Ice		-12.07	-0.01	38.48	1203.81	-0.71
Wind 300 deg - Ice		-11.05	-6.41	-581.64	1099.10	-1.79
Wind 330 deg - Ice		-6.31	-10.96	-1023.72	641.61	-2.37
Total Weight	29.75			9.48	5.75	
Wind 0 deg - Service		-0.02	-9.49	-917.61	5.09	-1.94
Wind 30 deg - Service		4.02	-6.99	-692.19	-394.44	-0.84
Wind 60 deg - Service		7.13	-4.11	-405.73	-701.58	0.30
Wind 90 deg - Service		9.21	0.02	3.48	-891.38	1.56
Wind 120 deg - Service		8.72	5.05	485.49	-831.95	2.51
Wind 150 deg - Service		5.01	8.68	836.75	-480.62	2.61
Wind 180 deg - Service		0.02	8.85	869.55	-0.73	1.85
Wind 210 deg - Service		-4.02	6.99	693.32	398.80	0.84
Wind 240 deg - Service		-7.68	4.43	431.45	748.52	-0.36
Wind 270 deg - Service		-9.21	-0.02	-2.35	895.73	-1.56
Wind 300 deg - Service		-8.17	-4.74	-459.77	793.71	-2.36
Wind 330 deg - Service		-5.01	-8.68	-835.63	484.97	-2.61

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice

Comb. No.	Description
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	160 - 140	Leg	Max Tension	15	21.41	0.01	1.14
			Max. Compression	2	-26.82	0.01	1.70
			Max. Mx	10	-26.77	-1.47	-0.87
			Max. My	2	-26.82	0.01	1.70
			Max. Vy	10	5.06	-1.47	-0.87
			Max. Vx	2	-5.89	0.01	1.70
		Diagonal	Max Tension	24	4.47	0.00	0.00
			Max. Compression	12	-4.50	0.00	0.00
			Max. Mx	37	1.15	0.05	-0.00
			Max. My	12	-4.49	0.00	0.01
			Max. Vy	37	-0.05	0.05	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	12	0.00	0.00	0.00
		Top Girt	Max Tension	3	0.12	0.00	0.00
			Max. Compression	33	-0.26	0.00	0.00
			Max. Mx	26	-0.20	-0.22	0.00
			Max. My	12	0.02	0.00	0.00
			Max. Vy	26	0.10	0.00	0.00
			Max. Vx	12	-0.00	0.00	0.00
T2	140 - 120	Leg	Max Tension	15	41.19	0.11	-0.01
			Max. Compression	10	-48.31	-0.23	-0.01
			Max. Mx	10	-31.06	1.70	0.02
			Max. My	8	-2.74	0.02	0.61
			Max. Vy	2	0.62	1.70	-0.01
			Max. Vx	8	0.25	0.02	0.61
		Diagonal	Max Tension	13	4.48	0.00	0.00
			Max. Compression	4	-4.66	0.00	0.00
			Max. Mx	27	1.43	0.08	0.01
			Max. My	29	-1.58	0.06	0.01
			Max. Vy	37	0.06	0.07	-0.01
			Max. Vx	37	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	10	0.84	0.01	-0.00
			Max. Compression	10	-0.84	0.00	0.00
			Max. Mx	28	0.26	0.06	0.01
			Max. My	36	0.09	0.05	0.01
			Max. Vy	38	-0.06	0.05	0.01
			Max. Vx	34	-0.00	0.00	0.00
T3	120 - 100	Leg	Max Tension	15	64.96	0.17	-0.01
			Max. Compression	10	-74.90	-0.22	-0.01
			Max. Mx	10	-74.87	0.37	0.00
			Max. My	12	-4.57	-0.05	-0.28
			Max. Vy	2	-0.21	0.37	-0.00
			Max. Vx	12	0.16	-0.05	-0.28
		Diagonal	Max Tension	9	5.30	0.04	0.00
			Max. Compression	8	-5.43	0.00	0.00
			Max. Mx	35	1.57	0.13	0.01
			Max. My	33	1.57	0.12	-0.01
			Max. Vy	33	0.08	0.12	-0.01
			Max. Vx	33	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	10	1.30	0.02	-0.00
			Max. Compression	10	-1.30	0.00	0.00
			Max. Mx	32	0.39	0.11	0.01
			Max. My	36	0.06	0.10	0.02
			Max. Vy	38	-0.08	0.11	0.01
			Max. Vx	34	-0.00	0.00	0.00
T4	100 - 80	Leg	Max Tension	15	88.99	0.28	-0.00
			Max. Compression	10	-102.28	-0.44	-0.01
			Max. Mx	10	-102.23	0.62	-0.00
			Max. My	12	-6.24	-0.06	-0.49
			Max. Vy	10	0.33	0.62	-0.00
			Max. Vx	12	0.20	-0.06	-0.49
		Diagonal	Max Tension	9	6.17	0.05	-0.00
			Max. Compression	8	-6.40	0.00	0.00
			Max. Mx	35	1.66	0.17	0.02
			Max. My	33	-2.00	0.13	-0.02
			Max. Vy	33	0.10	0.15	-0.02
			Max. Vx	33	-0.01	0.00	0.00
		Secondary Horizontal	Max Tension	10	1.77	0.02	-0.00
			Max. Compression	10	-1.77	0.00	0.00
			Max. Mx	27	-0.24	0.14	0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	36	0.03	0.12	0.02
			Max. Vy	27	-0.10	0.14	0.02
			Max. Vx	34	-0.01	0.00	0.00
T5	80 - 60	Leg	Max Tension	15	111.15	0.55	-0.00
			Max. Compression	10	-128.04	-0.10	-0.01
			Max. Mx	10	-113.80	1.07	-0.00
			Max. My	12	-6.92	-0.09	-0.79
			Max. Vy	10	-0.40	1.02	-0.00
			Max. Vx	12	-0.24	-0.09	-0.79
		Diagonal	Max Tension	9	7.47	0.08	0.00
			Max. Compression	8	-7.78	0.00	0.00
			Max. Mx	35	2.11	0.22	-0.03
			Max. My	32	2.39	0.22	-0.03
			Max. Vy	33	0.12	0.22	0.02
			Max. Vx	33	0.01	0.00	0.00
		Secondary Horizontal	Max Tension	10	2.22	0.05	-0.00
			Max. Compression	10	-2.22	0.00	0.00
			Max. Mx	32	0.61	0.18	0.03
			Max. My	32	0.04	0.17	0.04
			Max. Vy	32	0.11	0.18	0.03
			Max. Vx	34	-0.01	0.00	0.00
T6	60 - 40	Leg	Max Tension	15	135.43	-0.52	-0.02
			Max. Compression	10	-156.49	0.56	-0.03
			Max. Mx	29	4.99	-0.93	0.01
			Max. My	12	-8.40	-0.03	-0.61
			Max. Vy	29	0.18	-0.93	0.01
			Max. Vx	12	-0.14	-0.03	-0.61
		Diagonal	Max Tension	8	8.14	0.00	0.00
			Max. Compression	8	-8.37	0.00	0.00
			Max. Mx	33	1.61	0.31	-0.04
			Max. My	27	0.02	0.28	0.04
			Max. Vy	33	0.14	0.29	0.04
			Max. Vx	27	0.01	0.00	0.00
T7	40 - 20	Leg	Max Tension	15	158.11	-0.33	-0.01
			Max. Compression	10	-183.51	0.70	-0.01
			Max. Mx	37	9.41	-1.49	-0.00
			Max. My	12	-9.97	-0.06	-0.77
			Max. Vy	29	0.26	-1.49	0.00
			Max. Vx	12	-0.14	-0.06	-0.77
		Diagonal	Max Tension	8	8.20	0.00	0.00
			Max. Compression	8	-8.42	0.00	0.00
			Max. Mx	33	1.17	0.36	-0.05
			Max. My	33	-2.39	0.32	-0.05
			Max. Vy	33	0.15	0.32	0.04
			Max. Vx	33	-0.01	0.00	0.00
T8	20 - 0	Leg	Max Tension	15	180.11	-0.62	-0.00
			Max. Compression	10	-209.85	0.00	-0.00
			Max. Mx	27	-103.76	1.66	-0.01
			Max. My	12	-11.53	-0.08	-1.42
			Max. Vy	29	-0.31	-1.49	0.00
			Max. Vx	12	-0.22	-0.08	-1.42
		Diagonal	Max Tension	8	9.01	0.00	0.00
			Max. Compression	8	-9.36	0.00	0.00
			Max. Mx	33	0.82	0.47	-0.05
			Max. My	33	-3.62	0.44	-0.06
			Max. Vy	33	0.17	0.47	-0.05
			Max. Vx	33	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	216.15	22.23	-12.78
	Max. H_x	18	216.15	22.23	-12.78
	Max. H_z	5	-166.65	-16.91	11.76
	Min. Vert	7	-183.67	-19.44	11.19
	Min. H_x	7	-183.67	-19.44	11.19
	Min. H_z	18	216.15	22.23	-12.78
Leg B	Max. Vert	10	216.62	-22.41	-12.62
	Max. H_x	23	-185.19	19.63	11.05
	Max. H_z	25	-168.35	17.18	11.50
	Min. Vert	23	-185.19	19.63	11.05
	Min. H_x	10	216.62	-22.41	-12.62
	Min. H_z	10	216.62	-22.41	-12.62
Leg A	Max. Vert	2	216.05	-0.21	25.71
	Max. H_x	21	9.11	3.12	0.74
	Max. H_z	2	216.05	-0.21	25.71
	Min. Vert	15	-185.61	0.19	-22.53
	Min. H_x	9	7.87	-3.13	0.64
	Min. H_z	15	-185.61	0.19	-22.53

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	29.75	0.00	0.00	9.48	5.75	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	35.69	-0.08	-42.13	-4039.90	19.20	-8.16
0.9 Dead+1.6 Wind 0 deg - No Ice	26.77	-0.08	-42.13	-4038.53	17.44	-8.15
1.2 Dead+1.6 Wind 30 deg - No Ice	35.69	20.82	-36.20	-3487.61	-1999.17	-3.51
0.9 Dead+1.6 Wind 30 deg - No Ice	26.77	20.82	-36.20	-3486.83	-1998.82	-3.51
1.2 Dead+1.6 Wind 60 deg - No Ice	35.69	34.08	-19.67	-1900.46	-3304.68	1.30
0.9 Dead+1.6 Wind 60 deg - No Ice	26.77	34.08	-19.67	-1901.31	-3302.94	1.30
1.2 Dead+1.6 Wind 90 deg - No Ice	35.69	41.77	0.08	23.68	-4026.49	6.60
0.9 Dead+1.6 Wind 90 deg - No Ice	26.77	41.77	0.08	20.80	-4024.02	6.58
1.2 Dead+1.6 Wind 120 deg - No Ice	35.69	36.45	21.13	2047.71	-3495.61	10.59
0.9 Dead+1.6 Wind 120 deg - No Ice	26.77	36.45	21.13	2042.71	-3493.70	10.56
1.2 Dead+1.6 Wind 150 deg - No Ice	35.69	20.95	36.28	3522.72	-2020.35	10.97
0.9 Dead+1.6 Wind 150 deg - No Ice	26.77	20.95	36.28	3516.18	-2019.98	10.95
1.2 Dead+1.6 Wind 180 deg - No Ice	35.69	0.08	39.48	3856.39	-5.29	7.78
0.9 Dead+1.6 Wind 180 deg - No Ice	26.77	0.08	39.48	3849.48	-7.01	7.77

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.6 Wind 210 deg - No Ice	35.69	-20.82	36.20	3510.45	2013.05	3.50
0.9 Dead+1.6 Wind 210 deg - No Ice	26.77	-20.82	36.20	3503.94	2009.22	3.51
1.2 Dead+1.6 Wind 240 deg - No Ice	35.69	-36.37	21.00	2026.48	3497.25	-1.56
0.9 Dead+1.6 Wind 240 deg - No Ice	26.77	-36.37	21.00	2021.52	3491.87	-1.55
1.2 Dead+1.6 Wind 270 deg - No Ice	35.69	-41.77	-0.08	-0.81	4040.36	-6.60
0.9 Dead+1.6 Wind 270 deg - No Ice	26.77	-41.77	-0.08	-3.65	4034.41	-6.59
1.2 Dead+1.6 Wind 300 deg - No Ice	35.69	-34.15	-19.81	-1921.64	3330.80	-9.94
0.9 Dead+1.6 Wind 300 deg - No Ice	26.77	-34.15	-19.81	-1922.47	3325.57	-9.93
1.2 Dead+1.6 Wind 330 deg - No Ice	35.69	-20.95	-36.28	-3499.84	2034.28	-10.97
0.9 Dead+1.6 Wind 330 deg - No Ice	26.77	-20.95	-36.28	-3499.03	2030.42	-10.94
1.2 Dead+1.0 Ice+1.0 Temp	151.29	0.00	0.00	43.23	30.75	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	151.29	-0.01	-13.14	-1247.14	33.06	-2.39
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	151.29	6.29	-10.94	-1038.34	-589.03	-1.70
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	151.29	11.03	-6.38	-586.50	-1056.50	-0.54
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	151.29	12.61	0.01	45.55	-1212.78	0.78
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	151.29	11.35	6.58	690.46	-1082.09	1.87
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	151.29	6.31	10.96	1127.17	-592.96	2.45
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	151.29	0.01	12.79	1306.77	28.52	2.39
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	151.29	-6.29	10.94	1124.90	650.60	1.70
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	151.29	-11.34	6.56	686.52	1141.40	0.53
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	151.29	-12.61	-0.01	41.01	1274.36	-0.78
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	151.29	-11.05	-6.41	-590.43	1120.35	-1.87
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	151.29	-6.31	-10.96	-1040.61	654.54	-2.45
Dead+Wind 0 deg - Service	29.75	-0.02	-10.07	-958.64	8.70	-1.95
Dead+Wind 30 deg - Service	29.75	4.98	-8.66	-826.66	-473.63	-0.84
Dead+Wind 60 deg - Service	29.75	8.15	-4.70	-447.37	-785.60	0.31
Dead+Wind 90 deg - Service	29.75	9.99	0.02	12.44	-958.10	1.58
Dead+Wind 120 deg - Service	29.75	8.72	5.05	496.12	-831.24	2.53
Dead+Wind 150 deg - Service	29.75	5.01	8.68	848.61	-478.70	2.62
Dead+Wind 180 deg - Service	29.75	0.02	9.44	928.34	2.85	1.86
Dead+Wind 210 deg - Service	29.75	-4.98	8.66	845.68	485.18	0.84
Dead+Wind 240 deg - Service	29.75	-8.70	5.02	491.06	839.86	-0.37
Dead+Wind 270 deg - Service	29.75	-9.99	-0.02	6.59	969.65	-1.58
Dead+Wind 300 deg - Service	29.75	-8.17	-4.74	-452.44	800.08	-2.38
Dead+Wind 330 deg - Service	29.75	-5.01	-8.68	-829.58	490.25	-2.62

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-29.75	0.00	0.00	29.75	0.00	0.000%
2	-0.08	-35.69	-42.13	0.08	35.69	42.13	0.000%
3	-0.08	-26.77	-42.13	0.08	26.77	42.13	0.003%
4	20.82	-35.69	-36.20	-20.82	35.69	36.20	0.000%
5	20.82	-26.77	-36.20	-20.82	26.77	36.20	0.000%
6	34.08	-35.69	-19.67	-34.08	35.69	19.67	0.000%
7	34.08	-26.77	-19.67	-34.08	26.77	19.67	0.000%
8	41.77	-35.69	0.08	-41.77	35.69	-0.08	0.000%
9	41.77	-26.77	0.08	-41.77	26.77	-0.08	0.002%
10	36.45	-35.69	21.13	-36.45	35.69	-21.13	0.000%
11	36.45	-26.77	21.13	-36.45	26.77	-21.13	0.001%
12	20.95	-35.69	36.28	-20.95	35.69	-36.28	0.000%
13	20.95	-26.77	36.28	-20.95	26.77	-36.28	0.000%
14	0.08	-35.69	39.48	-0.08	35.69	-39.48	0.000%
15	0.08	-26.77	39.48	-0.08	26.77	-39.48	0.000%
16	-20.82	-35.69	36.20	20.82	35.69	-36.20	0.000%
17	-20.82	-26.77	36.20	20.82	26.77	-36.20	0.000%
18	-36.37	-35.69	21.00	36.37	35.69	-21.00	0.000%
19	-36.37	-26.77	21.00	36.37	26.77	-21.00	0.003%
20	-41.77	-35.69	-0.08	41.77	35.69	0.08	0.000%
21	-41.77	-26.77	-0.08	41.77	26.77	0.08	0.002%
22	-34.15	-35.69	-19.81	34.15	35.69	19.81	0.000%
23	-34.15	-26.77	-19.81	34.15	26.77	19.81	0.000%
24	-20.95	-35.69	-36.28	20.95	35.69	36.28	0.000%
25	-20.95	-26.77	-36.28	20.95	26.77	36.28	0.000%
26	0.00	-151.29	0.00	-0.00	151.29	0.00	0.000%
27	-0.01	-151.29	-13.14	0.01	151.29	13.14	0.000%
28	6.29	-151.29	-10.94	-6.29	151.29	10.94	0.000%
29	11.03	-151.29	-6.38	-11.03	151.29	6.38	0.000%
30	12.61	-151.29	0.01	-12.61	151.29	-0.01	0.000%
31	11.35	-151.29	6.58	-11.35	151.29	-6.58	0.000%
32	6.31	-151.29	10.96	-6.31	151.29	-10.96	0.000%
33	0.01	-151.29	12.79	-0.01	151.29	-12.79	0.000%
34	-6.29	-151.29	10.94	6.29	151.29	-10.94	0.000%
35	-11.34	-151.29	6.56	11.34	151.29	-6.56	0.000%
36	-12.61	-151.29	-0.01	12.61	151.29	0.01	0.000%
37	-11.05	-151.29	-6.41	11.05	151.29	6.41	0.000%
38	-6.31	-151.29	-10.96	6.31	151.29	10.96	0.000%
39	-0.02	-29.75	-10.07	0.02	29.75	10.07	0.000%
40	4.98	-29.75	-8.66	-4.98	29.75	8.66	0.000%
41	8.15	-29.75	-4.70	-8.15	29.75	4.70	0.000%
42	9.99	-29.75	0.02	-9.99	29.75	-0.02	0.000%
43	8.72	-29.75	5.05	-8.72	29.75	-5.05	0.000%
44	5.01	-29.75	8.68	-5.01	29.75	-8.68	0.000%
45	0.02	-29.75	9.44	-0.02	29.75	-9.44	0.000%
46	-4.98	-29.75	8.66	4.98	29.75	-8.66	0.000%
47	-8.70	-29.75	5.02	8.70	29.75	-5.02	0.000%
48	-9.99	-29.75	-0.02	9.99	29.75	0.02	0.000%
49	-8.17	-29.75	-4.74	8.17	29.75	4.74	0.000%
50	-5.01	-29.75	-8.68	5.01	29.75	8.68	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000145
3	Yes	4	0.00000001	0.00000277
4	Yes	4	0.00000001	0.00000295
5	Yes	4	0.00000001	0.00000311
6	Yes	4	0.00000001	0.00000361
7	Yes	4	0.00000001	0.00000315
8	Yes	4	0.00000001	0.00000294
9	Yes	4	0.00000001	0.00000311
10	Yes	4	0.00000001	0.00000145
11	Yes	4	0.00000001	0.00000228
12	Yes	4	0.00000001	0.00000310
13	Yes	4	0.00000001	0.00000283
14	Yes	4	0.00000001	0.00000373
15	Yes	4	0.00000001	0.00000326
16	Yes	4	0.00000001	0.00000303
17	Yes	4	0.00000001	0.00000315
18	Yes	4	0.00000001	0.00000143
19	Yes	4	0.00000001	0.00000275
20	Yes	4	0.00000001	0.00000299
21	Yes	4	0.00000001	0.00000314
22	Yes	4	0.00000001	0.00000370
23	Yes	4	0.00000001	0.00000323
24	Yes	4	0.00000001	0.00000307
25	Yes	4	0.00000001	0.00000281
26	Yes	4	0.00000001	0.00000443
27	Yes	4	0.00000001	0.00001716
28	Yes	4	0.00000001	0.00001721
29	Yes	4	0.00000001	0.00001770
30	Yes	4	0.00000001	0.00001728
31	Yes	4	0.00000001	0.00001729
32	Yes	4	0.00000001	0.00001777
33	Yes	4	0.00000001	0.00001839
34	Yes	4	0.00000001	0.00001790
35	Yes	4	0.00000001	0.00001761
36	Yes	4	0.00000001	0.00001776
37	Yes	4	0.00000001	0.00001820
38	Yes	4	0.00000001	0.00001758
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	3.622	44	0.2133	0.0046

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T2	140 - 120	2.724	44	0.2000	0.0052
T3	120 - 100	1.936	44	0.1640	0.0053
T4	100 - 80	1.303	46	0.1259	0.0042
T5	80 - 60	0.820	46	0.0914	0.0029
T6	60 - 40	0.471	44	0.0646	0.0021
T7	40 - 20	0.224	44	0.0435	0.0014
T8	20 - 0	0.066	44	0.0212	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
169.00	(2) AM-X-CD-14-65-00T-RET	44	3.622	0.2133	0.0046	156807
165.00	15' x 2" Dia Omni	44	3.622	0.2133	0.0046	156807
161.00	P8 x18-ft Pipe Mast	44	3.622	0.2133	0.0046	156807
156.50	LPA-80063-4CF	44	3.461	0.2120	0.0047	156807
156.00	15' Frame	44	3.438	0.2118	0.0047	156807
145.00	(2) TMA 10"x8"x3"	44	2.942	0.2053	0.0051	52269
127.50	15' x 2" Dia Omni	44	2.215	0.1791	0.0053	32252
117.75	4' Side Mount Standoff	46	1.857	0.1595	0.0052	29512
108.00	16' x 2" Dia Omni	46	1.537	0.1407	0.0047	30892
99.00	4' Side Mount Standoff	46	1.275	0.1240	0.0042	32244
47.00	4' Side Mount Standoff (Vacant)	44	0.300	0.0508	0.0016	55549
45.41	12' x 1-1/2" Dia Omni	44	0.282	0.0492	0.0016	56332
37.58	4' Side Mount Standoff	44	0.200	0.0409	0.0013	55952

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	15.101	12	0.8897	0.0193
T2	140 - 120	11.358	12	0.8341	0.0217
T3	120 - 100	8.071	12	0.6834	0.0220
T4	100 - 80	5.431	12	0.5243	0.0178
T5	80 - 60	3.417	12	0.3806	0.0124
T6	60 - 40	1.965	12	0.2690	0.0087
T7	40 - 20	0.934	12	0.1811	0.0058
T8	20 - 0	0.276	10	0.0881	0.0026

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
169.00	(2) AM-X-CD-14-65-00T-RET	12	15.101	0.8897	0.0193	37560
165.00	15' x 2" Dia Omni	12	15.101	0.8897	0.0193	37560
161.00	P8 x18-ft Pipe Mast	12	15.101	0.8897	0.0193	37560

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
156.50	LPA-80063-4CF	12	14.431	0.8841	0.0198	37560
156.00	15' Frame	12	14.336	0.8833	0.0198	37560
145.00	(2) TMA 10"x8"x3"	12	12.266	0.8561	0.0212	12520
127.50	15' x 2" Dia Omni	12	9.233	0.7465	0.0224	7725
117.75	4' Side Mount Standoff	12	7.741	0.6646	0.0218	7076
108.00	16' x 2" Dia Omni	12	6.409	0.5862	0.0199	7411
99.00	4' Side Mount Standoff	12	5.316	0.5166	0.0175	7742
47.00	4' Side Mount Standoff (Vacant)	12	1.253	0.2115	0.0068	13345
45.41	12' x 1-1/2" Dia Omni	12	1.177	0.2047	0.0066	13535
37.58	4' Side Mount Standoff	12	0.834	0.1703	0.0054	13448

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	160	Leg	A325N	0.6250	4	5.35	20.71	0.259 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4.50	7.95	0.566 ✓	1	Bolt Shear
T2	140	Leg	A325N	0.6250	4	10.29	20.71	0.497 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4.66	7.95	0.586 ✓	1	Bolt Shear
T3	120	Leg	A325N	0.7500	4	16.23	29.82	0.544 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	5.43	7.95	0.683 ✓	1	Bolt Shear
		Secondary Horizontal	A325X	0.7500	2	0.65	13.21	0.049 ✓	1	Member Bearing
T4	100	Leg	A325N	0.8750	4	22.23	40.59	0.548 ✓	1	Bolt Tension
		Diagonal	A325X	0.5000	1	6.17	8.81	0.700 ✓	1	Member Bearing
		Secondary Horizontal	A325X	0.6250	2	0.89	10.44	0.085 ✓	1	Member Bearing
T5	80	Leg	A325N	1.0000	4	27.76	53.01	0.524 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.47	11.31	0.661 ✓	1	Member Bearing
		Secondary Horizontal	A325X	0.6250	2	1.11	13.92	0.080 ✓	1	Member Bearing
T6	60	Leg	A325N	1.0000	4	33.86	53.01	0.639 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	8.14	11.31	0.720 ✓	1	Member Bearing
T7	40	Leg	A325N	1.0000	6	26.35	53.01	0.497 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	8.20	11.31	0.725 ✓	1	Member Bearing
T8	20	Leg	A354-BC	0.8750	6	30.02	42.28	0.710 ✓	1	Bolt Tension
		Diagonal	A325X	0.6250	1	9.01	11.31	0.797 ✓	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.75	60.2 K=1.00	1.7040	-23.01	58.85	0.391 [1] ✔
T2	140 - 120	ROHN 2.5 STD	20.03	3.45	43.7 K=1.00	1.7040	-48.31	66.70	0.724 [1] ✔
T3	120 - 100	ROHN 2.5 EH	20.03	3.43	44.6 K=1.00	2.2535	-74.90	87.70	0.854 [1] ✔
T4	100 - 80	ROHN 3 EH	20.04	3.42	36.1 K=1.00	3.0159	-102.28	123.38	0.829 [1] ✔
T5	80 - 60	ROHN 4 EH	20.03	5.17	42.0 K=1.00	4.4074	-128.04	174.36	0.734 [1] ✔
T6	60 - 40	ROHN 5 EH	20.03	10.02	65.4 K=1.00	6.1120	-156.49	201.25	0.778 [1] ✔
T7	40 - 20	ROHN 5 EH	20.04	10.02	65.4 K=1.00	6.1120	-183.51	201.22	0.912 [1] ✔
T8	20 - 0	ROHN 6 EHS	20.03	10.02	54.0 K=1.00	6.7133	-209.85	244.06	0.860 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x1/4	9.79	4.63	162.9 K=1.00	0.8125	-4.50	6.92	0.651 [1] ✔
T2	140 - 120	L2x2x1/4	12.21	6.04	185.2 K=1.00	0.9380	-4.66	6.18	0.754 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	13.96	6.91	167.5 K=1.00	0.9020	-5.43	7.26	0.748 [1] ✔
T4	100 - 80	L3x3x3/16	15.79	7.80	157.1 K=1.00	1.0900	-6.40	9.98	0.641 [1] ✔
T5	80 - 60	L3x3x1/4	19.03	9.47	191.9 K=1.00	1.4400	-7.78	8.84	0.881 [1] ✔
T6	60 - 40	L3 1/2x3 1/2x1/4	20.76	10.28	177.7 K=1.00	1.6900	-8.37	12.09	0.692 [1] ✔
T7	40 - 20	L3 1/2x3 1/2x1/4	22.64	11.24	194.3 K=1.00	1.6900	-8.42	10.11	0.833 [1] ✔
T8	20 - 0	L4x4x1/4	24.49	12.09	182.5 K=1.00	1.9400	-9.36	13.16	0.711 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120	L2x2x1/4	10.22	9.98	167.1 K=0.85	0.9380	-0.84	7.59	0.110 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	12.25	11.53	155.6 K=0.87	0.9020	-1.30	8.42	0.154 [1] ✔
T4	100 - 80	L3x3x3/16	14.31	13.62	153.3 K=0.88	1.0900	-1.77	10.48	0.169 [1] ✔
T5	80 - 60	L3x3x1/4	16.17	15.40	168.4 K=0.85	1.4400	-2.22	11.48	0.194 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L2 1/2x2 1/2x3/8	8.56	8.32	172.3 K=0.84	1.7300	-0.26	13.17	0.020 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	ROHN 2.5 STD	20.00	0.50	6.3	1.7040	21.41	76.68	0.279 [1] ✔
T2	140 - 120	ROHN 2.5 STD	20.03	3.23	40.9	1.7040	41.19	76.68	0.537 [1] ✔
T3	120 - 100	ROHN 2.5 EH	20.03	3.25	42.2	2.2535	64.96	101.41	0.641 [1] ✔
T4	100 - 80	ROHN 3 EH	20.04	3.26	34.4	3.0159	88.99	135.72	0.656 [1] ✔
T5	80 - 60	ROHN 4 EH	20.03	4.85	39.4	4.4074	111.15	198.34	0.560 [1] ✔
T6	60 - 40	ROHN 5 EH	20.03	10.02	65.4	6.1120	135.43	275.04	0.492 [1] ✔
T7	40 - 20	ROHN 5 EH	20.04	10.02	65.4	6.1120	158.11	275.04	0.575 [1] ✔
T8	20 - 0	ROHN 6 EHS	20.03	10.02	54.0	6.7133	180.11	302.10	0.596 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x1/4	9.79	4.63	108.0	0.8125	4.47	26.32	0.170 [1] ✔
T2	140 - 120	L2x2x1/4	11.12	5.50	110.8	0.9380	4.48	30.39	0.147 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	13.96	6.91	108.5	0.9020	5.30	29.22	0.181 [1] ✔
T4	100 - 80	L3x3x3/16	15.79	7.80	101.3	1.0900	6.17	35.32	0.175 [1] ✔
T5	80 - 60	L3x3x1/4	19.03	9.47	123.7	1.4400	7.47	46.66	0.160 [1] ✔
T6	60 - 40	L3 1/2x3 1/2x1/4	20.76	10.28	114.5	1.6900	8.14	54.76	0.149 [1] ✔
T7	40 - 20	L3 1/2x3 1/2x1/4	22.64	11.24	125.1	1.6900	8.20	54.76	0.150 [1] ✔
T8	20 - 0	L4x4x1/4	24.49	12.09	117.3	1.9400	9.01	62.86	0.143 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120	L2x2x1/4	10.22	9.98	196.6	0.9380	0.84	30.39	0.028 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	12.25	11.53	185.3	0.9020	1.30	29.22	0.044 [1] ✔
T4	100 - 80	L3x3x3/16	14.31	13.62	179.1	1.0900	1.77	35.32	0.050 [1] ✔
T5	80 - 60	L3x3x1/4	16.17	15.40	203.8	1.4400	2.22	46.66	0.048 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L2 1/2x2 1/2x3/8	8.56	8.32	132.6	1.7300	0.12	56.05	0.002 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	3	-23.01	58.85	39.1	Pass
T2	140 - 120	Leg	ROHN 2.5 STD	32	-48.31	66.70	72.4	Pass
T3	120 - 100	Leg	ROHN 2.5 EH	62	-74.90	87.70	85.4	Pass
T4	100 - 80	Leg	ROHN 3 EH	92	-102.28	123.38	82.9	Pass
T5	80 - 60	Leg	ROHN 4 EH	122	-128.04	174.36	73.4	Pass
T6	60 - 40	Leg	ROHN 5 EH	143	-156.49	201.25	77.8	Pass
T7	40 - 20	Leg	ROHN 5 EH	158	-183.51	201.22	91.2	Pass
T8	20 - 0	Leg	ROHN 6 EHS	173	-209.85	244.06	86.0	Pass
T1	160 - 140	Diagonal	L1 3/4x1 3/4x1/4	9	-4.50	6.92	65.1	Pass
T2	140 - 120	Diagonal	L2x2x1/4	38	-4.66	6.18	75.4	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	65	-5.43	7.26	74.8	Pass
T4	100 - 80	Diagonal	L3x3x3/16	95	-6.40	9.98	64.1 70.0 (b)	Pass
T5	80 - 60	Diagonal	L3x3x1/4	125	-7.78	8.84	88.1	Pass
T6	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	146	-8.37	12.09	69.2 72.0 (b)	Pass
T7	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	161	-8.42	10.11	83.3	Pass
T8	20 - 0	Diagonal	L4x4x1/4	176	-9.36	13.16	71.1 79.7 (b)	Pass
T2	140 - 120	Secondary Horizontal	L2x2x1/4	40	-0.84	7.59	11.0	Pass
T3	120 - 100	Secondary Horizontal	L2 1/2x2 1/2x3/16	70	-1.30	8.42	15.4	Pass
T4	100 - 80	Secondary Horizontal	L3x3x3/16	100	-1.77	10.48	16.9	Pass
T5	80 - 60	Secondary Horizontal	L3x3x1/4	130	-2.22	11.48	19.4	Pass
T1	160 - 140	Top Girt	L2 1/2x2 1/2x3/8	4	-0.26	13.17	2.0	Pass
							Summary	
						Leg (T7)	91.2	Pass
						Diagonal (T5)	88.1	Pass
						Secondary Horizontal (T5)	19.4	Pass
						Top Girt (T1)	2.0	Pass
						Bolt Checks	79.7	Pass
						RATING =	**91.2**	**Pass**

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Subject:	FOUNDATION WITH ROCK ANCHORS
Location:	Windsor, CT
Rev. 0: 4/20/17	Prepared by: T.J.L. Checked by: C.F.C. Job No. 17004.20

Rock Anchor Foundation Analysis:

Input Data:

Max Pier Reactions:

Uplift =	Uplift := 186·kips	*user input*	
Shear =	Shear := 26·kips	*user input*	
Compression =	Axial := 217·kips	*user input*	

Structure:

Footing Width =	$B_{ftg} := 8.0ft$	*user input*	
Footing Length =	$L_{ftg} := 8.0ft$	*user input*	
Footing Thickness =	$T_{ftg} := 3.50ft$	*user input*	
Pier Length/Width =	$L_{pier} := 3.00ft$	*user input*	
Pier Height =	$T_{pier} := 9.50ft$	*user input*	
Pier Projection Above Grade =	$P_p := 2.00 \cdot ft$	*user input*	

Depths:

Depth to Bottom of Footing =	$D_{ftg} := 11.00ft$	*user input*	(from grade line)
Depth to Suitable Rock =	$D_{rock} := 12.00ft$	*user input*	(from grade line)
Depth to Suitable Earth =	$D_{earth} := 1.0ft$	*user input*	(from grade line)
Anchor Length =	$L_{anchor} := 30.00ft$	*user input*	(from grade line)
Depth to Top of Submerged Anchor =	$D_{anchortop} := 2.50ft$	*user input*	(from grade line)
Anchor Depth =	$D_{anchor} := D_{anchortop} + L_{anchor}$		(from grade line)
	$D_{anchor} = 32.5ft$		

Subgrade Properties:

Internal Friction Angle =	$\phi := 30deg$	*user input*	
Unit Weight of Earth =	$\gamma_{earth} := 110\frac{lb}{ft^3}$	*user input*	(Existing sub-grade conditions utilized in the analysis of the existing foundation system were obtained from a geo-technical soils study prepared by Clarence Welti & Assoc., P.E., P.C; dated September 20 2010.
Unit Weight of Rock =	$\gamma_{rock} := 165\frac{lb}{ft^3}$	*user input*	
Unit Weight of Conc =	$\gamma_{conc} := 150\frac{lb}{ft^3}$	*user input*	
Ultimate Bearing =	Bearing := 24000·psf	*user input*	

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Subject: FOUNDATION WITH ROCK ANCHORS

Location: Windsor, CT

Rev. 0: 4/20/17

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 17004.20

Rock Anchor Properties:

Number of Anchors =	$N_{anchor} := 4$	*user input*	
Hole Diameter =	$hole_d := 4.00in$	*user input*	
Allowable Bond Stress Between Rock and Grout =	$\sigma_{bond} := 50 \cdot psi$	*user input*	Working bond Strength based on Weathered Rock/Sandstone
Grout Allowable Compressive Stress =	$fc_g := 5000 \cdot psi$	*user input*	
Anchor Spacing* (along length) =	$S_{anchor} := 5.00ft$	*user input*	
Required Factor of Safety =	$F_S := 1.0$	*user input*	
Rock Anchor Ultimate Strength =	$Fu_{anchor} := 150.0ksi$	*user input*	Williams R71-11 1-3/8" dia. 150ksi
Rock Anchor Yield Strength =	$Fy_{anchor} := 127.7ksi$	*user input*	Per Recommendation of PTI For Prestressed Rock Anchors and Soil Anchors Section 6.6 Design Load Should not be more than 60% of Specified Minimum Tensile Strength.
Rock Anchor Diameter =	$d_{ra} := 1.250in$	*user input*	
Rock Anchor Area per Group =	$A_g := 1.250in^2$	*user input*	
Rock Anchor Ultimate Tensile Load =	$T_u := 188kips$		
Rock Anchor Allowable Tension =	$T_{all} := 0.60 \cdot T_u = 112.8 \cdot kips$		
Rock Anchor Maximum Working Load to Yield =	$T_y := 0.80 \cdot T_u = 150.4 \cdot kips$		
Rock Anchor Shear Capacity =	$Sh := 0.4 \cdot T_y = 60.16 \cdot kips$		
Total Volume of Concrete =	$V_{conc} := B_{ftg} \cdot L_{ftg} \cdot T_{ftg} + \frac{\pi \cdot L_{pier}^2}{4} \cdot T_{pier} = 291.2 \cdot ft^3$		
Weight of Pad =	$W_{pad} := \left(B_{ftg} \cdot L_{ftg} \cdot T_{ftg}\right) \cdot \gamma_{conc} = 33.6 \cdot kips$		
Weight of Pier =	$W_{pier} := \left(L_{pier}^2 \cdot T_{pier}\right) \cdot \gamma_{conc} = 12.83 \cdot kips$		
Total Weight of Concrete =	$W_{conc} := W_{pad} + W_{pier} = 46.4 \cdot kips$		

Rock Anchor Tension/Shear Check:

Actual Tension Force per Anchor = $T_a := \frac{Uplift - W_{conc}}{N_{anchor}} = 34.9 \cdot kips$

Design Shear Force per Anchor = $S_a := \frac{Shear}{N_{anchor}} = 6.5 \cdot kips$

Reduced Tension For Tension/Shear Combination = $T_{allr} := \left[1 - \left(\frac{S_a}{T_{all}}\right)^2\right] \cdot T_{all} = 112.43 \cdot kips$

Tension Check = $TensionCheck := if\left(T_{allr} \geq T_a, "OK", "IncreaseSize"\right) = "OK"$

Shear Check = $ShearCheck := if\left(Sh \geq S_a, "OK", "IncreaseSize"\right) = "OK"$

Provided Safety Factor = $\frac{T_{allr}}{T_a} = 3.22$

$SafetyFactor := if\left(\frac{T_{allr}}{T_a} \geq 1.0, "OK", "Overstressed"\right)$

SafetyFactor = "OK"

Rock Anchor Req'd Development Length in Rock:

Minimum Free Stress Length Required = $F_{stressreqd} := 10.0ft$ (Original Centek design free stress length)

Minimum Free Stress Length Provided = $F_{stressprov} := 10.0ft$

Controlling Free Stress Length: $L_f := if\left(F_{stressprov} > F_{stressreqd}, F_{stressprov}, F_{stressreqd}\right)$ $L_f = 10ft$

Required Rock Anchor Proof Load (1.33x Design Load) = $T_p := T_a \cdot 1.33 = 46.4 \cdot kips$

Provided Rock Anchor Proof Load (1.33x Design Load) = $T_{pp} := 40kips \cdot 1.33 \cdot F_S = 53.2 \cdot kips$ $T_{PLmax} := 0.80 \cdot T_u = 150.4 \cdot kips$

Required Release Lock Off Load (1.10x Design Load) = $T_L := T_a \cdot 1.10 = 38.4 \cdot kips$

Actual Release Lock Off Load (1.00x Design Load) = $T_{LL} := 40kips \cdot 1.00 \cdot F_S = 40 \cdot kips$ $T_{LLmax} := 0.70 \cdot T_u = 131.6 \cdot kips$

Rock Anchor/Grout Bond Length: $L_d := \frac{\left(\frac{0.04}{in} T_{LL}\right)}{\sqrt{fc_g \cdot psi}}$ $L_d = 1.89 \cdot ft$

Required Rock/Grout Bond Length: $L_b := \frac{T_{LL}}{\pi \cdot hole_d \cdot \sigma_{bond}} = 5.31ft$

Note:
Max Allowable Tensile Load = 60% of Ultimate Strength.
Max Lock Off Load = 70% of Ultimate Strength.
Max. Proof Load = 80% of Ultimate Strength.

Controlling Length: $L_a := if\left(L_b < L_d, L_d, L_b\right)$ $L_a = 5.31ft$

$L_{bprov} := D_{anchor} - L_f - D_{anchortop} = 20ft$

$Bond\_Length\_Check := if\left(\frac{L_a}{L_{bprov}} \leq 1.00, "OK", "Increase Length"\right)$

Bond_Length_Check = "OK"

Calculated Uplift Resistance:

Intermediate Dimension:

Suitable Earth Height = $H := D_{rock} - D_{earth} = 11\,ft$

Suitable Rock Height = $Z := \left(D_{anchor} - D_{rock}\right) = 20.5\,ft$

Total Anchor Width = $W := S_{anchor} = 5\,ft$

Volumes:

Base Area 1 of Resisting Pyramid = $B_1 := W^2 = 25\,ft^2$

Base Area 2 of Resisting Pyramid = $B_2 := [\tan(\phi)\cdot(Z\cdot 0.5)\cdot 2 + W]^2 = 283.4\,ft^2$

Note: Rock Cone Taken At Half Suitable Rock Height - See Rock Volume Calculations.

Base Area 3 of Resisting Pyramid = $B_3 := [\tan(\phi)\cdot(Z\cdot 0.5 + H)\cdot 2 + W]^2 = 872.5\,ft^2$

Total Volume of Resisting Material = $V_{tot} := \frac{\left[[H + (Z\cdot 0.5)]\cdot\left(B_1 + B_3 + \sqrt{B_1\cdot B_3}\right)\right]}{3} = 7403.1\cdot ft^3$

Volume of Rock = $V_{rock} := \frac{\left[(Z\cdot 0.5)\cdot\left(B_1 + B_2 + \sqrt{B_1\cdot B_2}\right)\right]}{3} = 1341.4\cdot ft^3$

Volume of Earth = $V_{earth} := V_{tot} - V_{rock} - V_{conc} = 5770.5\cdot ft^3$

Resisting Forces:

Resisting Rock Force = $W_{rock} := V_{rock}\cdot\gamma_{rock} = 221.3\cdot kips$

Resisting Earth Force = $W_{earth} := V_{earth}\cdot\gamma_{earth} = 634.8\cdot kips$

Total Resisting Force = $W_{total} := 0.75W_{rock} + 0.75\cdot W_{earth} + 0.9W_{conc} = 683.9\cdot kips$

Foundation Uplift Check:

Factor of Safety = $\frac{W_{total}}{Uplift} = 3.68$

$Uplift\_Check := if\left(\frac{W_{total}}{Uplift} \geq F_S, \text{"OK"}, \text{"Overstressed"}\right)$

Uplift_Check = "OK"

Rock Bearing Capacity Check:

Bearing Force = $MaxBearing := \left[\frac{\left(Axial + W_{conc}\right) + \left(N_{anchor}T_{LL}\right)}{B_{ftg}\cdot L_{ftg}}\right] = 6616\cdot psf$

$\frac{MaxBearing}{0.75Bearing} = 0.37$

$Rock\_Bearing\_Check := if\left(\frac{MaxBearing}{0.75Bearing} \leq 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Rock_Bearing_Check = "OK"

Section 1 - RFDS GENERAL INFORMATION

RFDS NAME:	CTV1144	**DATE:**	03/22/2017	**RF DESIGN ENG:**	Akmal Khan
ISSUE:	RRH ADD	**Approved? (Y/N):**	Yes	**RF DESIGN PHONE:**	510-809-6140
REVISION:	Preliminary	**RF MANAGER:**	John Benedetto	**RF DESIGN EMAIL:**	AK975U@US.ATT.COM
INITIATIVE /PROJECT:	LTE 2C 700 BC, 1900 A3-A4 & E BWE -DUS 41 + XMU with RRH ADD configuration. and PCS Retrofit Job to replace with RRUS-32 B2				

RF PERF ENG:		**RFDS PROGRAM TYPE:**	2017 LTE Next Carrier		
RF PERF PHONE:		**RFDS TECHNOLOGY:**	LTE 2C		
RF PERF EMAIL:		**STATE/STATUS:**	Final/RF Approval		
RFDS VERSION:	2.00	**RFDS ID:**	1400974		
GSM FREQUENCY:		**Created By:**	mm093q	**Updated By:**	dc5778
UMTS FREQUENCY:	850, 1900	**Date Created:**	9/20/2016 4:53:15 PM	**Date Updated:**	3/22/2017 2:42:23 PM
LTE FREQUENCY:	700, 1900				
I-PLAN JOB # 1:	NER-RCTB-16-00859	**IPLAN PRD GRP || SUB GRP #1:**	LTE Next Carrier || LTE 2C		
I-PLAN JOB # 2:	NER-RCTB-16-03414	**IPLAN PRD GRP || SUB GRP #2:**	LTE Multi Carrier || 1xXMU		
I-PLAN JOB # 3:	NER-RCTB-17-00645	**IPLAN PRD GRP || SUB GRP #3:**	Antenna Modifications || 4TXRX Antenna Retrofit		
I-PLAN JOB # 4:		**IPLAN PRD GRP || SUB GRP #4:**			
I-PLAN JOB # 5:		**IPLAN PRD GRP || SUB GRP #5:**			
I-PLAN JOB # 6:		**IPLAN PRD GRP || SUB GRP #6:**			
I-PLAN JOB # 7:		**IPLAN PRD GRP || SUB GRP #7:**			
I-PLAN JOB # 8:		**IPLAN PRD GRP || SUB GRP #8:**			

Section 2 - LOCATION INFORMATION

USID:	59388	**FA LOCATION CODE:**	10035288	**LOCATION NAME:**	WINDSOR-PIGEON HILL
REGION:	NORTHEAST	**MARKET CLUSTER:**	NEW ENGLAND	**MARKET:**	CONNECTICUT
ADDRESS:	482 PIGEON HILL ROAD	**CITY:**	WINDSOR	**STATE:**	CT
ZIP CODE:	06095	**COUNTY:**	HARTFORD	**LONG (DEC. DEG.):**	-72.6747769
LATITUDE (D-M-S):	41d 51m59.87196s	**LONGITUDE (D-M-S):**	-72d -40m-29.19684s	**LAT (DEC. DEG.):**	41.8666311
DIRECTIONS, ACCESS AND EQUIPMENT LOCATION:	RT 91 NORTH TO EXIT 38 RT 75, RIGHT AT LIGHT OFF EXIT RT 75 NORTH, RIGHT ON DAY HILL RD, 1ST LEFT AT LIGHT LAMBERTON RD, FOLLOW LAMBERTON TO STOP SIGN, RIGHT TURN ONTO PIEGON HILL RD, #482 RIGHT TURN INTO VERIZON SWITCH GROUND LEVEL SHELTER: METER:89-153-520 T-1 IN HOFFMAN BOX OUTSIDE OF SHELTER. NOKIA DHXV:238631: DHXV:238632 HCGS:736645 UMTS;ON FIBER 3G UMTS ALARMS ACTIVATED:7/29/14 CIPHER LOCK CHANGED: 07/17/15-MASTER CODE AND CONTRACTOR CODE-3534				

ORACLE PTN # 1:	2051A07R7V	**PACE JOB # 1:**	MRCTB020097		
ORACLE PTN # 2:	2051A07NED	**PACE JOB # 2:**	MRCTB020072		
ORACLE PTN # 3:	2051A09FXA	**PACE JOB # 3:**	MRCTB022136		
ORACLE PTN # 4:		**PACE JOB # 4:**			
ORACLE PTN # 5:		**PACE JOB # 5:**			
ORACLE PTN # 6:		**PACE JOB # 6:**			
ORACLE PTN # 7:		**PACE JOB # 7:**			
ORACLE PTN # 8:		**PACE JOB # 8:**			
BORDER CELL WITH CONTOUR COORD:		**SEARCH RING NAME:**			
AM STUDY REQ'D (Y/N):	No	**SEARCH_RING_ID:**			
FREQ COORD:		**BTA:**		**MSA / RSA:**	
OPS DISTRICT:	CT-North	**LAC(GSM):**	05005		
OPS ZONE:	NE_CT_WINDSOR_CS	**LAC(UMTS):**	05993		
RF DISTRICT:	NPO Triage	**BSC(GSM):**	BCT05		
RF ZONE:		**RNC(UMTS):**	MDTWCTNICR0R04		
PARENT NAME(GSM):	MIDDLETOWN-GSM MTSO-BSC-5	**MME POOL ID(LTE):**	FF01		
PARENT NAME(UMTS):	MIDDLETOWN RNC04				

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:	z_KNLB312,z_KNLB312,z_KNLB312

Section 4 - TOWER/REGULATORY INFORMATION

STRUCTURE AT&T OWNED?:	Yes	**GROUND ELEVATION (ft):**		**STRUCTURE TYPE:**	SELF SUPPORT
ADDITIONAL REGULATORY?:	Yes	**HEIGHT OVERALL (ft):**	0.00	**FCC ASR NUMBER:**	NR
SUB-LEASE RIGHTS?:	Yes	**STRUCTURE HEIGHT (ft):**			
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	CONNECTICUT STATE POLICE-H TROOP	1320		INTRADO		0				
SECTOR B	WINDSOR POLICE DEPARTMENT	1423		INTRADO		0				
SECTOR C	CONNECTICUT STATE POLICE-H TROOP	1320		INTRADO		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	CONNECTICUT STATE POLICE-H TROOP	1320		INTRADO		0				
SECTOR B	WINDSOR POLICE DEPARTMENT	1423		INTRADO		0				
SECTOR C	CONNECTICUT STATE POLICE-H TROOP	1320		INTRADO		0				
SECTOR D										
SECTOR E										
SECTOR F										
OMNI										

Section 6 - RBS GENERAL INFORMATION - existing

	GSM 1ST RBS	GSM 2ND RBS	UMTS 1ST RBS	UMTS 2ND RBS	LTE 1ST RBS							
RBS ID:	96516	96517	208892	300964	RFDS_19940143							
CTS COMMON ID:	184D1144_2	184D1144	CTV1144	CTU1144	CTL01144							
CELL ID / BCF:	032D1144	032D1144	CTV1144	CTV1144	CTL01144							
BTA/TID:	184G	184P	184U	184W	321L							
4-9 DIGIT SITE ID:	1144	1144	1144	1144	1144							
COW OR TOY?:	No	No	No	No	No							
CELL SITE TYPE:												
SITE TYPE:												
BTS LOCATION ID:												
BASE STATION TYPE:												
EQUIPMENT NAME:	WINDSOR-PIGEON HILL	WINDSOR-PIGEON HILL	WINDSOR-PIGEON HILL	WINDSOR-PIGEON HILL	WINDSOR-PIGEON HILL							
DISASTER PRIORITY:												

Section 6 - RBS GENERAL INFORMATION - final

	GSM 1ST RBS	GSM 2ND RBS	UMTS 1ST RBS	UMTS 2ND RBS	LTE 1ST RBS							
RBS ID:			208892	300964	RFDS_19940137							
CTS COMMON ID:			CTV1144	CTU1144	CTL01144							
CELL ID / BCF:			CTV1144	CTV1144	CTL01144							
BTA/TID:			184U	184W	321L							
4-9 DIGIT SITE ID:			1144	1144	1144							
COW OR TOY?:			No	No	No							
CELL SITE TYPE:			SECTORIZED	SECTORIZED	SECTORIZED							
SITE TYPE:			MACRO-CONVENTIONAL	MACRO-CONVENTIONAL	MACRO-CONVENTIONAL							
BTS LOCATION ID:			INTERNAL	INTERNAL	INTERNAL							
BASE STATION TYPE:			BASE	OVERLAY	BASE							
EQUIPMENT NAME:			WINDSOR-PIGEON HILL	WINDSOR-PIGEON HILL	WINDSOR-PIGEON HILL							
DISASTER PRIORITY:			0	3	3							

Section 7 - RBS SPECIFIC INFORMATION - existing

	GSM 1ST RBS	GSM 2ND RBS	UMTS 1ST RBS	UMTS 2ND RBS	LTE 1ST RBS							
RAC:												
EQUIPMENT VENDOR:												
EQUIPMENT TYPE:												
BASEBAND CONFIGURATION:												
LOCATION:												
CABINET LOCATION:												
MARKET STATE CODE:												
AGPS:	Yes	Yes	Yes	Yes	Yes							
NODE B NUMBER:	0	0	0	0	1144							

Section 7 - RBS SPECIFIC INFORMATION - final

	GSM 1ST RBS	GSM 2ND RBS	UMTS 1ST RBS	UMTS 2ND RBS	LTE 1ST RBS							
RAC:												
EQUIPMENT VENDOR:			ERICSSON	ERICSSON	ERICSSON							
EQUIPMENT TYPE:			3206 INDOOR	3206 INDOOR	6601 INDOOR MU							
BASEBAND CONFIGURATION:					1x6601 / 1xDUS41 / 1xXMU03							
LOCATION:												
CABINET LOCATION:												
MARKET STATE CODE:					CT							
AGPS:			Yes	Yes	Yes							
NODE B NUMBER:			0	0	1144							

Section 8 - RBS/SECTOR ASSOCIATION - existing

	GSM 1ST RBS	GSM 2ND RBS	UMTS 1ST RBS	UMTS 2ND RBS	LTE 1ST RBS														
CTS Common ID	184D1144_2	184D1144	CTV1144	CTU1144	CTL01144														
Soft Sector IDs	184G11441	184P11441	CTV11441	CTU11447	CTL01144_9A_1														
	184G11442	184P11442	CTV11442	CTU11448	CTL01144_9B_1														
	184G11443	184P11443	CTV11443	CTU11449	CTL01144_9C_1														
			CTV1144A																
			CTV1144B																
			CTV1144C																

Section 8 - RBS/SECTOR ASSOCIATION - final

	GSM 1ST RBS	GSM 2ND RBS	UMTS 1ST RBS	UMTS 2ND RBS	LTE 1ST RBS														
CTS Common ID			CTV1144	CTU1144	CTL01144														
Soft Sector IDs			CTV11441	CTU11447	CTL01144_7A_1														
			CTV11442	CTU11448	CTL01144_7B_1														
			CTV11443	CTU11449	CTL01144_7C_1														
					CTL01144_9A_1														
					CTL01144_9A_2														
					CTL01144_9B_1														
					CTL01144_9B_2														
					CTL01144_9C_1														
					CTL01144_9C_2														

Section 9 - SOFT SECTOR ID - existing

	GSM 1ST 850	GSM 1ST 1900	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900	LTE 2ND 1900
USEID (excluding Hard Sector)	59388.850.25G.1	59388.1900.25G.1	59388.850.3G.1	59388.1900.3G.2	59388.850.3G.2			
SECTOR A SOFT SECTOR ID	184G11441	184P11441	CTV11441	CTU11447	CTV1144A		CTL01144_9A_1$G	
SECTOR B	184G11442	184P11442	CTV11442	CTU11448	CTV1144B		CTL01144_9B_1$G	
SECTOR C	184G11443	184P11443	CTV11443	CTU11449	CTV1144C		CTL01144_9C_1$G	
SECTOR D								
SECTOR E								
SECTOR F								
OMNI								

Section 9 - SOFT SECTOR ID - final

	GSM 1ST 850	GSM 1ST 1900	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900	LTE 2ND 1900
USEID (excluding Hard Sector)			59388.850.3G.1	59388.1900.3G.2				
SECTOR A SOFT SECTOR ID			CTV11441	CTU11447		CTL01144_7A_1	CTL01144_9A_1	CTL01144_9A_2
SECTOR B			CTV11442	CTU11448		CTL01144_7B_1	CTL01144_9B_1	CTL01144_9B_2
SECTOR C			CTV11443	CTU11449		CTL01144_7C_1	CTL01144_9C_1	CTL01144_9C_2
SECTOR D								
SECTOR E								
SECTOR F								
OMNI								

Section 9 - Cell Number - existing

	GSM 1ST 850	GSM 1ST 1900	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900	LTE 2ND 1900																	
USEID (excluding Hard Sector)	59388.850.25G.1	59388.1900.25G.1	59388.850.3G.1	59388.1900.3G.2	59388.850.3G.2																				
SECTOR A **CELL NUMBER**	0	0	0	0	0		8$G																		
SECTOR B	0	0	0	0	0		9$G																		
SECTOR C	0	0	0	0	0		10$G																		
SECTOR D																									
SECTOR E																									
SECTOR F																									
OMNI																									

Section 9 - Cell Number - final

	GSM 1ST 850	GSM 1ST 1900	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900	LTE 2ND 1900																	
USEID (excluding Hard Sector)			59388.850.3G.1	59388.1900.3G.2																					
SECTOR A **CELL NUMBER**			0	0		15	8	178																	
SECTOR B			0	0		16	9	179																	
SECTOR C			0	0		17	10	180																	
SECTOR D																									
SECTOR E																									
SECTOR F																									
OMNI																									

Section 10 - CID/SAC - existing

		GSM 1ST 850	GSM 1ST 1900	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900	LTE 2ND 1900																			
SECTOR A	CID/SAC	11441	11441	11441	11447	01441																						
SECTOR B		11442	11442	11442	11448	01442																						
SECTOR C		11443	11443	11443	11449	01443																						
SECTOR D																												
SECTOR E																												
SECTOR F																												
OMNI																												

Section 10 - CID/SAC - final

		GSM 1ST 850	GSM 1ST 1900	UMTS 1ST 850	UMTS 1ST 1900	UMTS 2ND 850	LTE 1ST 700	LTE 1ST 1900	LTE 2ND 1900																			
SECTOR A	CID/SAC			11441	11447																							
SECTOR B				11442	11448																							
SECTOR C				11443	11449																							
SECTOR D																												
SECTOR E																												
SECTOR F																												
OMNI																												

Section 15A - CURRENT TOWER CONFIGURATION - SECTOR A (OR OMNI)

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	AM-X-CD-14-65-00T-RET		SBNHH-1D65A				AM-X-CD-14-65-00T-RET							
ANTENNA VENDOR	KMW		Andrew				KMW							
ANTENNA SIZE (H x W x D)	48X11.8X5.9		55X11.9X7.1				48X11.8X5.9							
ANTENNA WEIGHT	36.4		33.5				36.4							
AZIMUTH	143		23				143							
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	169		169				169							
ANTENNA TIP HEIGHT	171		172				171							
MECHANICAL DOWNTILT	1						1							
FEEDER AMOUNT	2						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)		Internal		Internal				Internal						
SURGE ARRESTOR (QTY/MODEL)			1	DC/Fiber Squid										
DIPLEXER (QTY/MODEL)	2	KMW / KDXCV0012017					2	KMW / KDXCV0012017						
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)				LTE RRH			1	KATHREIN 860-10006						
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)	1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)					1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)						
CURRENT INJECTORS FOR TMA (QTY/MODEL)	2	Polyphaser 1000860						AiSG Diplexer						
PDU FOR TMAS (QTY/MODEL)	1	LGP 12104 (1900 AND 850 Bypass TMA)												
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-12+RRUS-A2										
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		59388.A.850.3G.1	CTV11441	CTV11441		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121						323.59		1	
	PORT 2		59388.A.850.3G.1	CTV11441	CTV1144A		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	Bottom	RFS 1-1/4 (850)	200.05121						323.59		1	
	PORT 3		59388.A.1900.3G.2	CTU11447	CTU11447		UMTS 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (1900)	200.05121						378.44		2	
ANTENNA POSITION 2	PORT 4		59388.A.1900.4G.1	CTL01144_9A_2	CTL01144_9A_2		LTE 1900	SBNHH-1D65A_1930MHz_10DT	16		10	Top	Fiber	-9999						3664.3757		3	

ANTENNA POSITION 4	**PORT 1**		59388.A.850.25G.1	184G11441	184G11441		GSM 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121					11.22	169.82		7	
	PORT 3		59388.A.1900.25G.1	184P11441	184P11441		GSM 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (850)	200.05121					28.18	454.98		7	

Section 15B - CURRENT TOWER CONFIGURATION - SECTOR B

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	AM-X-CD-14-65-00T-RET		HPA-65R-BUU-H6				AM-X-CD-14-65-00T-RET							
ANTENNA VENDOR	KMW		CCI Products				KMW							
ANTENNA SIZE (H x W x D)	48X11.8X5.9		72X14.8X9				48X11.8X5.9							
ANTENNA WEIGHT	36.4		51				36.4							
AZIMUTH	263		143				263							
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	169		169				169							
ANTENNA TIP HEIGHT	171		172				171							
MECHANICAL DOWNTILT	0						0							
FEEDER AMOUNT	2						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)		Internal		Internal				Internal						
SURGE ARRESTOR (QTY/MODEL)														
DIPLEXER (QTY/MODEL)	2	KMW / KDXCV0012017					2	KMW / KDXCV0012017						
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)				LTE RRH										
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)	1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)					1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)						
CURRENT INJECTORS FOR TMA (QTY/MODEL)	2	Polyphaser 1000860						AiSG Diplexer						
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-12+RRUS-A2										
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		59388.B.850.3G.1	CTV11442	CTV11442		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121						323.59		9	
	PORT 2		59388.B.850.3G.1	CTV1144	CTV1144B		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	Bottom	RFS 1-1/4 (850)	200.05121						323.59		9	
	PORT 3		59388.B.1900.3G.2	CTU11448	CTU11448		UMTS 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (1900)	200.05121						378.44		10	
ANTENNA POSITION 2	PORT 4		59388.B.1900.4G.1	CTL01144_9B_2	CTL01144_9B_2		LTE 1900	HPA-65R-BUU-H6_1930MHz_07DT	16		7	Top	Fiber	-9999						3664.3757		11	
ANTENNA POSITION 4	PORT 1		59388.B.850.25G.1	184G11442	184G11442		GSM 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121					12.58	190.54		15	

	PORT 3		59388.B.1900.25G.1	184P11442	184P11442		GSM 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (850)	200.05121					28.18	454.98		15	

Section 15C - CURRENT TOWER CONFIGURATION - SECTOR C

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	AM-X-CD-14-65-00T-RET		HPA-65R-BUU-H6				AM-X-CD-14-65-00T-RET							
ANTENNA VENDOR	KMW		CCI Products				KMW							
ANTENNA SIZE (H x W x D)	48X11.8X5.9		72X14.8X9				48X11.8X5.9							
ANTENNA WEIGHT	36.4		51				36.4							
AZIMUTH	23		263				23							
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	169		169				169							
ANTENNA TIP HEIGHT	171		172				171							
MECHANICAL DOWNTILT	0						0							
FEEDER AMOUNT	2						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)		Internal		Internal				Internal						
SURGE ARRESTOR (QTY/MODEL)														
DIPLEXER (QTY/MODEL)	2	KMW / KDXCV0012017					2	KMW / KDXCV0012017						
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)				LTE RRH										
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)	1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)					1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)						
CURRENT INJECTORS FOR TMA (QTY/MODEL)	2	Polyphaser 1000860						AiSG Diplexer						
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-12+RRUS-A2										
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		59388.C.850.3G.1	CTV11443	CTV11443		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121						323.59		17	
	PORT 2		59388.C.850.3G.1	CTV11443	CTV1144C		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	Bottom	RFS 1-1/4 (850)	200.05121						323.59		17	
	PORT 3		59388.C.1900.3G.2	CTU11449	CTU11449		UMTS 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (1900)	200.05121						378.44		18	
ANTENNA POSITION 2	PORT 4		59388.C.1900.4G.1	CTL01144_9C_2	CTL01144_9C_2		LTE 1900	HPA-65R-BUU-H6_1930MHz_06DT	16		6	Top	Fiber	-9999						3664.3757		19	
ANTENNA POSITION 4	PORT 1		59388.C.850.25G.1	184G11443	184G11443		GSM 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121					22.38	338.84		23	

	PORT 3		59388.C.1900.25G.1	184P11443	184P11443		GSM 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (850)	200.05121					28.18	454.98		23	

Section 16A - PLANNED/PROPOSED TOWER CONFIGURATION - SECTOR A (OR OMNI)

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1	ANTENNA POSITION 2	ANTENNA POSITION 3	ANTENNA POSITION 4	ANTENNA POSITION 5	ANTENNA POSITION 6	ANTENNA POSITION 7
Existing Antenna?		Yes					
ANTENNA MAKE - MODEL							
ANTENNA VENDOR							
ANTENNA SIZE (H x W x D)							
ANTENNA WEIGHT							
AZIMUTH							
MAGNETIC DECLINATION							
RADIATION CENTER (feet)							
ANTENNA TIP HEIGHT							
MECHANICAL DOWNTILT							
FEEDER AMOUNT							
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)							
DIPLEXER (QTY/MODEL)							
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	LTE 2C-700 B/C will be 2C at the site w/ RRH Add config, LTE 1900 A3-A4 & E - BWE- Expansion + Retrofit job//Replace PCS RRUS-12+A2 with RRUS-32 B2, on existing LTE Antenna, Add XMU.						
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 2	PORT 1		59388.A.700.4G.1	CTL01144_7A_1	CTL01144_7A_1		LTE 700	SBNHH-1D65A_725MHz_10DT	15.3		10	Top	Fiber	0						1475.7065		3	
	PORT 3	59388.A.1900.4G.tmp1	59388.A.1900.4G.1	CTL01144_9A_1	CTL01144_9A_1		LTE 1900	SBNHH-1D65A_1930MHz_10DT	16		10	Top	Fiber	0						3664.3757		4	
	PORT 4			CTL01144_9A_2	CTL01144_9A_2		LTE 1900	SBNHH-1D65A_1930MHz_10DT	16		10	Top	Fiber	0						3664.3757		4	

Section 16B - PLANNED/PROPOSED TOWER CONFIGURATION - SECTOR B

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1	ANTENNA POSITION 2	ANTENNA POSITION 3	ANTENNA POSITION 4	ANTENNA POSITION 5	ANTENNA POSITION 6	ANTENNA POSITION 7
Existing Antenna?		Yes					
ANTENNA MAKE - MODEL							
ANTENNA VENDOR							
ANTENNA SIZE (H x W x D)							
ANTENNA WEIGHT							
AZIMUTH							
MAGNETIC DECLINATION							
RADIATION CENTER (feet)							
ANTENNA TIP HEIGHT							
MECHANICAL DOWNTILT							
FEEDER AMOUNT							
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)							
DIPLEXER (QTY/MODEL)							
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	LTE 2C-700 B/C will be 2C at the site w/ RRH Add config, LTE 1900 A3-A4 & E - BWE- Expansion + Retrofit job//Replace PCS RRUS-12+A2 with RRUS-32 B2, on existing LTE Antenna, Add XMU.						
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 2	PORT 1		59388.B.700.4G.1	CTL01144_7B_1	CTL01144_7B_1		LTE 700	HPA-65R-BUU-H6_725MHz_07DT	15.89		7	Top	Fiber	0						1475.7065		11	
	PORT 3	59388.B.1900.4G.tmp1	59388.B.1900.4G.1	CTL01144_9B_1	CTL01144_9B_1		LTE 1900	HPA-65R-BUU-H6_1930MHz_07DT	16		7	Top	Fiber	0						3664.3757		12	
	PORT 4			CTL01144_9B_2	CTL01144_9B_2		LTE 1900	HPA-65R-BUU-H6_1930MHz_07DT	16		7	Top	Fiber	0						3664.3757		12	

Section 16C - PLANNED/PROPOSED TOWER CONFIGURATION - SECTOR C

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1	ANTENNA POSITION 2	ANTENNA POSITION 3	ANTENNA POSITION 4	ANTENNA POSITION 5	ANTENNA POSITION 6	ANTENNA POSITION 7
Existing Antenna?		Yes					
ANTENNA MAKE - MODEL							
ANTENNA VENDOR							
ANTENNA SIZE (H x W x D)							
ANTENNA WEIGHT							
AZIMUTH							
MAGNETIC DECLINATION							
RADIATION CENTER (feet)							
ANTENNA TIP HEIGHT							
MECHANICAL DOWNTILT							
FEEDER AMOUNT							
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)							
DIPLEXER (QTY/MODEL)							
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	LTE 2C-700 B/C will be 2C at the site w/ RRH Add config, LTE 1900 A3-A4 & E - BWE- Expansion + Retrofit job//Replace PCS RRUS-12+A2 with RRUS-32 B2, on existing LTE Antenna, Add XMU.						
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 2	PORT 1		59388.C.700.4G.1	CTL01144_7C_1	CTL01144_7C_1		LTE 700	HPA-65R-BUU-H6_725MHz_06DT	15.89		6	Top	Fiber	0						1475.7065		19	
	PORT 3	59388.C.1900.4G.tmp1	59388.C.1900.4G.1	CTL01144_9C_1	CTL01144_9C_1		LTE 1900	HPA-65R-BUU-H6_1930MHz_06DT	16		6	Top	Fiber	0						3664.3757		20	
	PORT 4			CTL01144_9C_2	CTL01144_9C_2		LTE 1900	HPA-65R-BUU-H6_1930MHz_06DT	16		6	Top	Fiber	0						3664.3757		20	

Section 17A - FINAL TOWER CONFIGURATION - SECTOR A (OR OMNI)

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1		ANTENNA POSITION 2		ANTENNA POSITION 3		ANTENNA POSITION 4		ANTENNA POSITION 5		ANTENNA POSITION 6		ANTENNA POSITION 7	
ANTENNA MAKE - MODEL	AM-X-CD-14-65-00T-RET		SBNHH-1D65A				AM-X-CD-14-65-00T-RET							
ANTENNA VENDOR	KMW		Andrew				KMW							
ANTENNA SIZE (H x W x D)	48X11.8X5.9		55X11.9X7.1				48X11.8X5.9							
ANTENNA WEIGHT	36.4		33.5				36.4							
AZIMUTH	143		23				143							
MAGNETIC DECLINATION														
RADIATION CENTER (feet)	169		169				169							
ANTENNA TIP HEIGHT	171		172				171							
MECHANICAL DOWNTILT	1						1							
FEEDER AMOUNT	2						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)		Internal		Internal				Internal						
SURGE ARRESTOR (QTY/MODEL)			1	DC/Fiber Squid										
DIPLEXER (QTY/MODEL)	2	KMW / KDXCV0012017					2	KMW / KDXCV0012017						
DUPLEXER (QTY/MODEL)														
Antenna RET CONTROL UNIT (QTY/MODEL)				LTE RRH			1	KATHREIN 860-10006						
DC BLOCK (QTY/MODEL)														
TMA/LNA (QTY/MODEL)	1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)					1	Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)						
CURRENT INJECTORS FOR TMA (QTY/MODEL)	2	Polyphaser 1000860						AiSG Diplexer						
PDU FOR TMAS (QTY/MODEL)	1	LGP 12104 (1900 AND 850 Bypass TMA)												
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	LTE 2C-700 B/C will be 2C at the site w/ RRH Add config, LTE 1900 A3-A4 & E - BWE- Expansion + Retrofit job//Replace PCS RRUS-12+A2 with RRUS-32 B2, on existing LTE Antenna, Add XMU.													
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	59388.A.850.3G.1	59388.A.850.3G.1	CTV11441	CTV11441		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121						323.59		1	
	PORT 3	59388.A.1900.3G.2	59388.A.1900.3G.2	CTU11447	CTU11447		UMTS 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (1900)	200.05121						378.44		2	
ANTENNA POSITION 2	PORT 1	59388.A.700.4G.tmp1	59388.A.700.4G.1	CTL01144_7A_1	CTL01144_7A_1		LTE 700	SBNHH-1D65A_725MHz_10DT	15.3		10	Top	Fiber	0						1475.7065		3	
	PORT 3	59388.A.1900.4G.tmp1	59388.A.1900.4G.1	CTL01144_9A_1	CTL01144_9A_1		LTE 1900	SBNHH-1D65A_1930MHz_10DT	16		10	Top	Fiber	0						3664.3757		4	

	PORT 4	59388.A.1900.4G.tmp2		CTL01144_9A_2	CTL01144_9A_2		LTE 1900	SBNHH-1D65A_1930MHz_10DT	16		10	Top	Fiber	0						3664.3757		4	
ANTENNA POSITION 4	**PORT 3**		59388.A.1900.25G.1	184P11441	184P11441	Decom	GSM 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (850)	200.05121					28.18	454.98		8	

Section 17B - FINAL TOWER CONFIGURATION - SECTOR B

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1	ANTENNA POSITION 2	ANTENNA POSITION 3	ANTENNA POSITION 4	ANTENNA POSITION 5	ANTENNA POSITION 6	ANTENNA POSITION 7
ANTENNA MAKE - MODEL	AM-X-CD-14-65-00T-RET	HPA-65R-BUU-H6		AM-X-CD-14-65-00T-RET			
ANTENNA VENDOR	KMW	CCI Products		KMW			
ANTENNA SIZE (H x W x D)	48X11.8X5.9	72X14.8X9		48X11.8X5.9			
ANTENNA WEIGHT	36.4	51		36.4			
AZIMUTH	263	143		263			
MAGNETIC DECLINATION							
RADIATION CENTER (feet)	169	169		169			
ANTENNA TIP HEIGHT	171	172		171			
MECHANICAL DOWNTILT	0			0			
FEEDER AMOUNT	2			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)	Internal	Internal		Internal			
SURGE ARRESTOR (QTY/MODEL)							
DIPLEXER (QTY/MODEL)	2 KMW / KDXCV0012017			2 KMW / KDXCV0012017			
DUPLEXER (QTY/MODEL)							
Antenna RET CONTROL UNIT (QTY/MODEL)		LTE RRH					
DC BLOCK (QTY/MODEL)							
TMA/LNA (QTY/MODEL)	1 Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)			1 Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)			
CURRENT INJECTORS FOR TMA (QTY/MODEL)	2 Polyphaser 1000860			AiSG Diplexer			
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	LTE 2C-700 B/C will be 2C at the site w/ RRH Add config, LTE 1900 A3-A4 & E - BWE- Expansion + Retrofit job//Replace PCS RRUS-12+A2 with RRUS-32 B2, on existing LTE Antenna, Add XMU.						
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	59388.B.850.3G.1	59388.B.850.3G.1	CTV11442	CTV11442		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121						323.59		9	
	PORT 3	59388.B.1900.3G.2	59388.B.1900.3G.2	CTU11448	CTU11448		UMTS 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (1900)	200.05121						378.44		10	
ANTENNA POSITION 2	PORT 1	59388.B.700.4G.tmp1	59388.B.700.4G.1	CTL01144_7B_1	CTL01144_7B_1		LTE 700	HPA-65R-BUU-H6_725MHz_07DT	15.89		7	Top	Fiber	0						1475.7065		11	
	PORT 3	59388.B.1900.4G.tmp1	59388.B.1900.4G.1	CTL01144_9B_1	CTL01144_9B_1		LTE 1900	HPA-65R-BUU-H6_1930MHz_07DT	16		7	Top	Fiber	0						3664.3757		12	
	PORT 4	59388.B.1900.4G.tmp2		CTL01144_9B_2	CTL01144_9B_2		LTE 1900	HPA-65R-BUU-H6_1930MHz_07DT	16		7	Top	Fiber	0						3664.3757		12	

ANTENNA POSITION 4	**PORT 3**		59388.B.1900.25G.1	184P11442	184P11442	Decom	GSM 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (850)	200.05121					28.18	454.98		16	

Section 17C - FINAL TOWER CONFIGURATION - SECTOR C

ANTENNA POSITION is LEFT to RIGHT from BACK OF ANTENNA	ANTENNA POSITION 1	ANTENNA POSITION 2	ANTENNA POSITION 3	ANTENNA POSITION 4	ANTENNA POSITION 5	ANTENNA POSITION 6	ANTENNA POSITION 7
ANTENNA MAKE - MODEL	AM-X-CD-14-65-00T-RET	HPA-65R-BUU-H6		AM-X-CD-14-65-00T-RET			
ANTENNA VENDOR	KMW	CCI Products		KMW			
ANTENNA SIZE (H x W x D)	48X11.8X5.9	72X14.8X9		48X11.8X5.9			
ANTENNA WEIGHT	36.4	51		36.4			
AZIMUTH	23	263		23			
MAGNETIC DECLINATION							
RADIATION CENTER (feet)	169	169		169			
ANTENNA TIP HEIGHT	171	172		171			
MECHANICAL DOWNTILT	0			0			
FEEDER AMOUNT	2			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)	Internal	Internal		Internal			
SURGE ARRESTOR (QTY/MODEL)							
DIPLEXER (QTY/MODEL)	2 KMW / KDXCV0012017			2 KMW / KDXCV0012017			
DUPLEXER (QTY/MODEL)							
Antenna RET CONTROL UNIT (QTY/MODEL)		LTE RRH					
DC BLOCK (QTY/MODEL)							
TMA/LNA (QTY/MODEL)	1 Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)			1 Pwav TT19-08BP111-001 Twin 1900 w/ 850BP (1900)			
CURRENT INJECTORS FOR TMA (QTY/MODEL)	2 Polyphaser 1000860			AiSG Diplexer			
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	LTE 2C-700 B/C will be 2C at the site w/ RRH Add config, LTE 1900 A3-A4 & E - BWE- Expansion + Retrofit job//Replace PCS RRUS-12+A2 with RRUS-32 B2, on existing LTE Antenna, Add XMU.						
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	59388.C.850.3G.1	59388.C.850.3G.1	CTV11443	CTV11443		UMTS 850	AM-X-CD-14-65-00T-RET_850MHz_02DT	14.8		2	None	RFS 1-1/4 (850)	200.05121						323.59		17	
	PORT 3	59388.C.1900.3G.2	59388.C.1900.3G.2	CTU11449	CTU11449		UMTS 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (1900)	200.05121						378.44		18	
ANTENNA POSITION 2	PORT 1	59388.C.700.4G.tmp1	59388.C.700.4G.1	CTL01144_7C_1	CTL01144_7C_1		LTE 700	HPA-65R-BUU-H6_725MHz_06DT	15.89		6	Top	Fiber	0						1475.7065		19	
	PORT 3	59388.C.1900.4G.tmp1	59388.C.1900.4G.1	CTL01144_9C_1	CTL01144_9C_1		LTE 1900	HPA-65R-BUU-H6_1930MHz_06DT	16		6	Top	Fiber	0						3664.3757		20	
	PORT 4	59388.C.1900.4G.tmp2		CTL01144_9C_2	CTL01144_9C_2		LTE 1900	HPA-65R-BUU-H6_1930MHz_06DT	16		6	Top	Fiber	0						3664.3757		20	

ANTENNA POSITION 4	**PORT 3**		59388.C.1900.25G.1	184P11443	184P11443	Decom	GSM 1900	AM-X-CD-14-65-00T-RET_1920MHz_02DT	16.29		2	None	RFS 1-1/4 (850)	200.05121					28.18	454.98		24	

Diagram - Sector	A	Diagram File Name - CT1144_A_B_C_LTE2C__Rev2.vsd					
Atoll Site Name -	CTV1144	Location Name -	WINDSOR-PIGEON HILL	Market -	CONNECTICUT	Market Cluster -	NEW ENGLAND
Comments:							

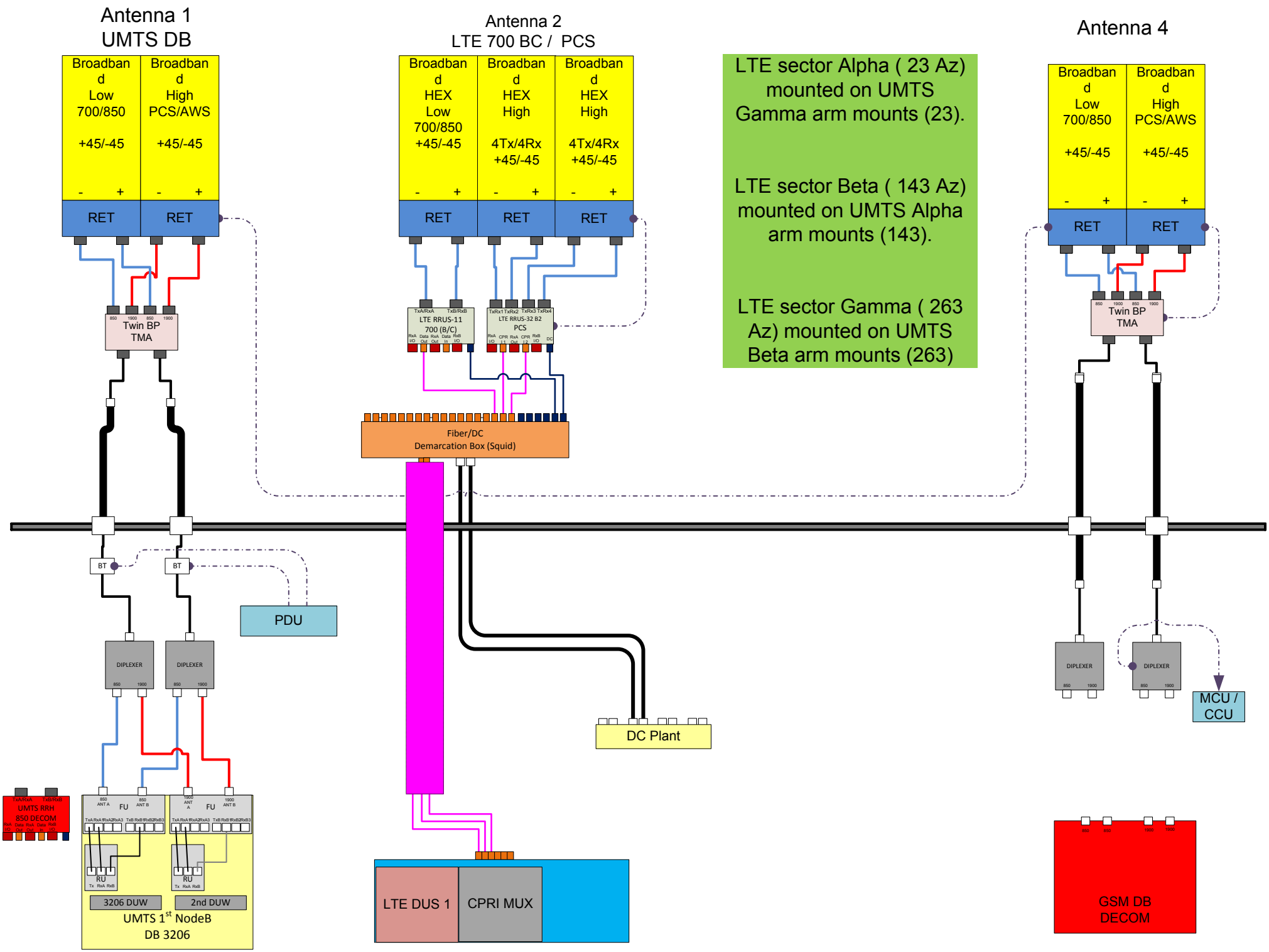


Diagram - Sector	B	Diagram File Name - CT1144_A_B_C_LTE2C__Rev2.vsd					
Atoll Site Name -	CTV1144	Location Name -	WINDSOR-PIGEON HILL	Market -	CONNECTICUT	Market Cluster -	NEW ENGLAND
Comments:							

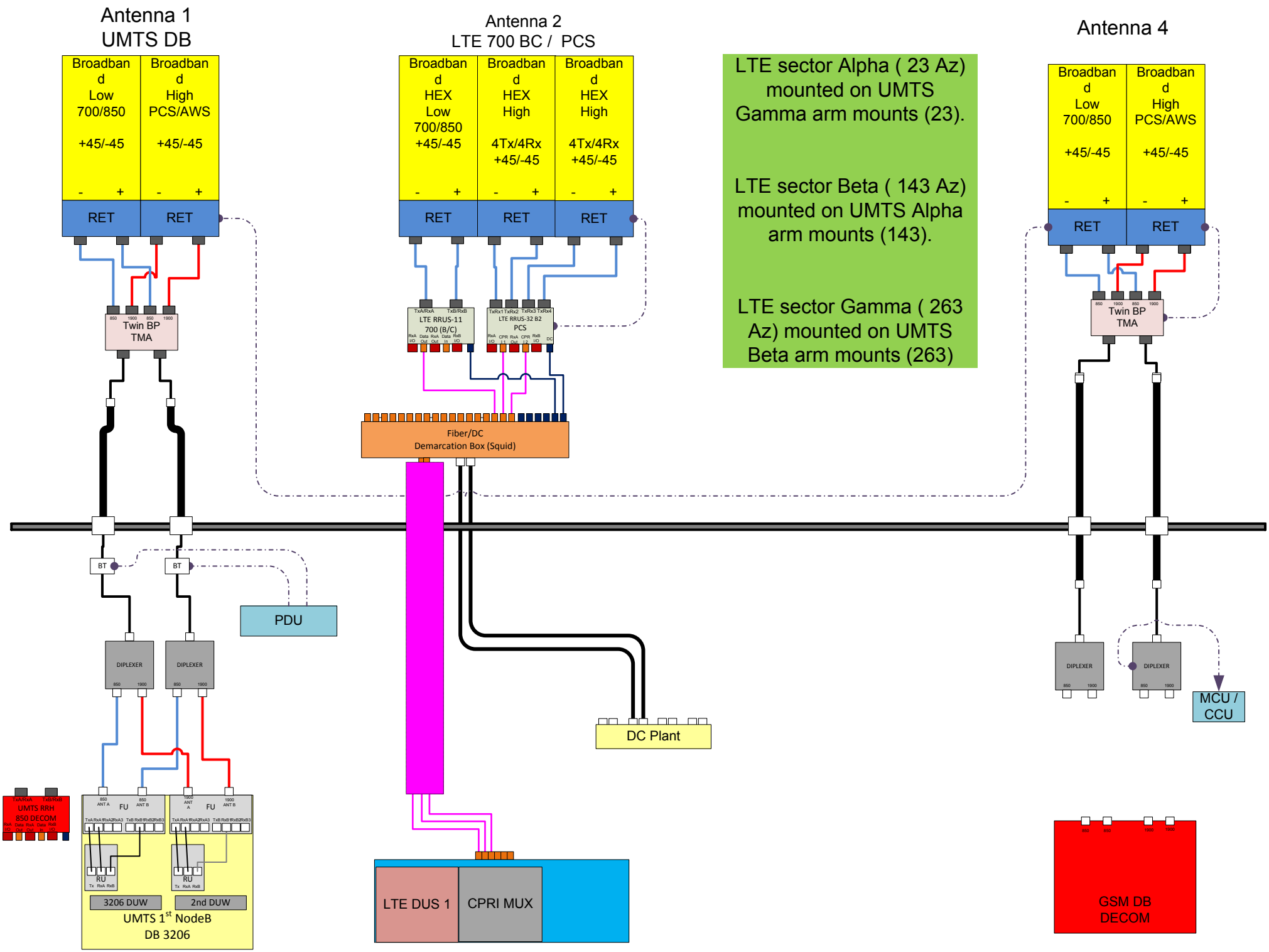
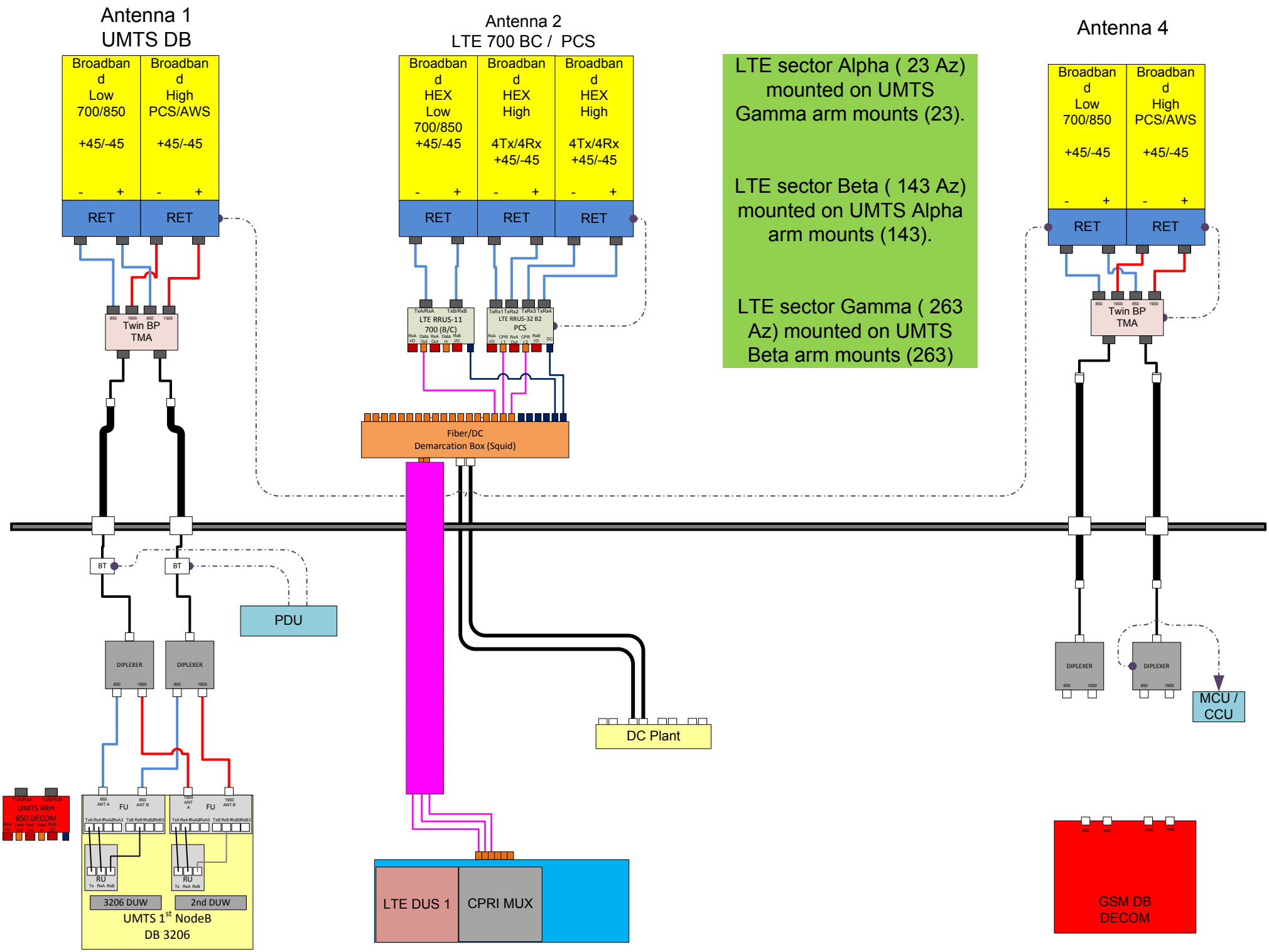


Diagram - Sector	C	Diagram File Name - CT1144_A_B_C_LTE2C__Rev2.vsd					
Atoll Site Name -	CTV1144	Location Name -	WINDSOR-PIGEON HILL	Market -	CONNECTICUT	Market Cluster -	NEW ENGLAND
Comments:							



NOTES			
Date Time (Central)	Version	ATTUID	Note
3/17/2017 10:45:26 AM	2.00	ak975u	RFDS VERSION incremented.
3/20/2017 1:22:29 PM	2.00	ak975u	RFDS updated to add retro fit scope to existing 2C & BWE RFDS

WORKFLOW SUMMARY							
Date	FROM State / Status	FROM ATTUID	TO State / Status	TO ATTUID	Operation	Comments	PACE Status
09/26/2016	Preliminary In Progress	mm093q	Preliminary Submitted for Approval	RC475S	Promote	LTE RFDS Preliminary, Added Additional iplan	
09/29/2016	Preliminary Submitted for Approval	RC475S	Preliminary Approved	BG144B	Promote		
01/18/2017	Preliminary Approved	BG144B	Preliminary Approved	DC5778	Reassign	Successfully Reassigned	
03/02/2017	Preliminary Approved	DC5778	Preliminary Modification Recommended	OM636A	Demote	demoting to add retro fit scope to existing RFDS	
03/16/2017	Preliminary Modification Recommended	OM636A	Preliminary Modification Recommended	AK975U	Reassign	Successfully Reassigned	
03/22/2017	Preliminary Modification Recommended	AK975U	Preliminary Submitted for Approval	RC475S	Promote	RFDS updated to add retro fit scope to existing 2C & BWE RFDS	
03/22/2017	Preliminary Submitted for Approval	RC475S	Preliminary Approved	DC5778	Promote		
03/30/2017	Preliminary Approved	DC5778	Final RF Approval	OM636A	Promote	Promoting per Regina email	

ERICSSON

RRUS 32 B30 Data Sheet

RRUS 32 B30

PRELIMINARY

- WCS A+B blocks
  - TX = 2350 – 2360 MHz
  - RX = 2305 – 2315 MHz
- RF output 4 x 25 Watts
- 4T4R FDD
- 10 MHz IBW for LTE
- CPRI 2 ports x 10 Gbps
- Dimensions (incl. feet and sunshield)
  - Height: 26.7” (678 mm)
  - Width: 12.1” (306 mm)
  - Depth: 6.7” (171 mm)
- Weight, excl. mounting hardware
  - 60 lbs (23 kg)

RRUS 11

Frequency (AT&T)
- ✓ Band 12 (Lower 700 MHz)
- ✓ Band 4 (AWS, 17/2100 MHz) — 2Q2011

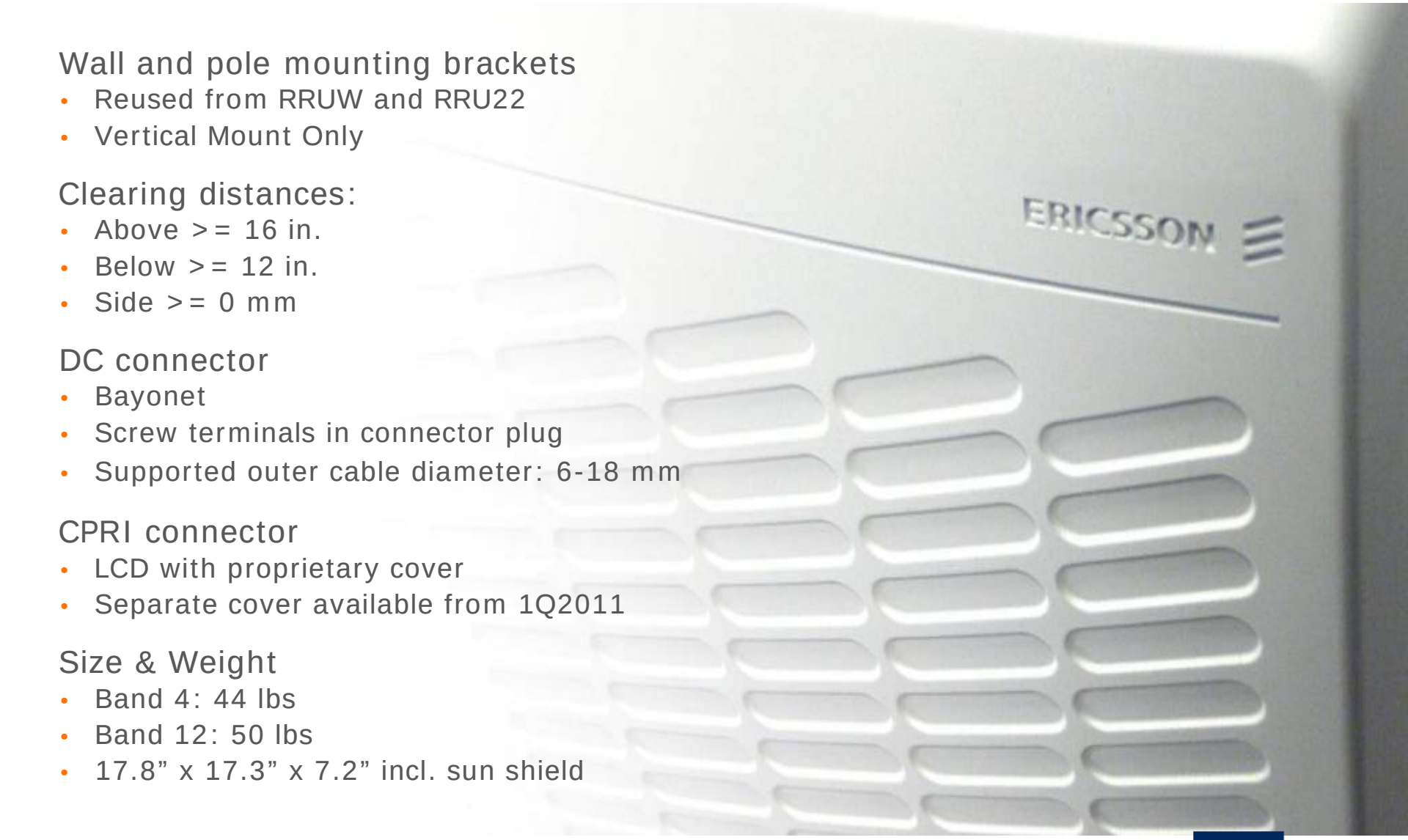
RF Characteristics
- ✓ Output power: 2x30 Watts
- ✓ 2x2 MIMO Capable
- ✓ IBW of 20 MHz
- ✓ Rx Sens.: Better than -105 dBm (5 MHz)

RET/TMA Support
- ✓ AISG 2.0 Compatible
- ✓ Via RET Port and Centre Conductor
- ✓ Cascading
- ✓ 30 VDC Bias

Environmental
- ✓ Self Convection
- ✓ Temperature -40 to 131 F

Power
- ✓ Input voltage: -48 VDC or AC (exemption)
- ✓ Fuse size: 13 – 32 A
  - Recommended: 25 A
- ✓ Power Consumption:
  - Typical 200 Watts
  - Max 310 Watts
  - Excl. RET and TMA load

RRUS 11 Mechanics



Wall and pole mounting brackets
- Reused from RRUW and RRU22
- Vertical Mount Only

Clearing distances:
- Above >= 16 in.
- Below >= 12 in.
- Side >= 0 mm

DC connector
- Bayonet
- Screw terminals in connector plug
- Supported outer cable diameter: 6-18 mm

CPRI connector
- LCD with proprietary cover
- Separate cover available from 1Q2011

Size & Weight
- Band 4: 44 lbs
- Band 12: 50 lbs
- 17.8” x 17.3” x 7.2” incl. sun shield

Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT1144

Windsor - Pigeon Hill
482 Pigeon Hill Road
Windsor, CT 6095

May 19, 2017

Centerline Communications Project Number: 950006-055

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**6.24 %**

May 19, 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: **CT1144 – Windsor - Pigeon Hill**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **482 Pigeon Hill Road, Windsor, 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.

General population/uncontrolled exposure 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 **482 Pigeon Hill Road, Windsor, 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	700 MHz	2	60
LTE	1900 MHz (PCS)	2	60
GSM (Decom)	1900 MHz (PCS)	2	Decommissioned

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	KMW AM-X-CD-14-65-00T-RET	169
A	2	Quintel QS66512-2	169
A	3	KMW AM-X-CD-14-65-00T-RET	169
B	1	KMW AM-X-CD-14-65-00T-RET	169
B	2	Quintel QS66512-2	169
B	3	KMW AM-X-CD-14-65-00T-RET	169
C	1	KMW AM-X-CD-14-65-00T-RET	169
C	2	Quintel QS66512-2	169
C	3	KMW AM-X-CD-14-65-00T-RET	169

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	KMW AM-X-CD-14-65-00T-RET	850 MHz / 1900 MHz (PCS)	12.65 / 14.15	4	120	2,664.56	0.47
Antenna A2	Quintel QS66512-2	700 MHz / 1900 MHz (PCS)	10.85 / 13.85	4	240	4,371.36	0.82
Antenna A3	KMW AM-X-CD-14-65-00T-RET	Spare – 1900 MHz GSM Decommissioned	NA	NA	NA	NA	NA
						Sector A Composite MPE%	**1.29**
Antenna B1	KMW AM-X-CD-14-65-00T-RET	850 MHz / 1900 MHz (PCS)	12.65 / 14.15	4	120	2,664.56	0.47
Antenna B2	Quintel QS66512-2	700 MHz / 1900 MHz (PCS)	10.85 / 13.85	4	240	4,371.36	0.82
Antenna B3	KMW AM-X-CD-14-65-00T-RET	Spare – 1900 MHz GSM Decommissioned	NA	NA	NA	NA	NA
						Sector B Composite MPE%	**1.29**
Antenna C1	KMW AM-X-CD-14-65-00T-RET	850 MHz / 1900 MHz (PCS)	12.65 / 14.15	4	120	2,664.56	0.47
Antenna C2	Quintel QS66512-2	700 MHz / 1900 MHz (PCS)	10.85 / 13.85	4	240	4,371.36	0.82
Antenna C3	KMW AM-X-CD-14-65-00T-RET	Spare – 1900 MHz GSM Decommissioned	NA	NA	NA	NA	NA
						Sector C Composite MPE%	**1.29**

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	**1.29 %**
T-Mobile	1.84 %
Verizon Wireless	2.93 %
Town of Windsor	0.18 %
Site Total MPE %:	**6.24 %**

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	1.29 %
AT&T Sector B Total:	1.29 %
AT&T Sector C Total:	1.29 %
Site Total:	6.24 %

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 ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
AT&T 850 MHz UMTS	2	552.23	169	1.49	850 MHz	567	0.26%
AT&T 1900 MHz (PCS) UMTS	2	780.05	169	2.11	1900 MHz (PCS)	1000	0.21%
AT&T 700 MHz LTE	2	729.71	169	1.97	700 MHz	467	0.42%
AT&T 1900 MHz (PCS) LTE	2	1,455.97	169	3.94	1900 MHz (PCS)	1000	0.39%
						Total:	**1.29%**

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:	1.29 %
Sector B:	1.29 %
Sector C:	1.29 %
AT&T Maximum Total (per sector):	1.29 %
Site Total:	6.24 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **6.24 %** 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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