November 27, 2018

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

Regarding:	Notice of Exempt Modification – Antenna Modification
Property Address:	260 Beckley Road, Berlin, CT 06037 (the "Property")
Applicant:	SBC Tower Holdings LLC ("AT&T", Site # CT1014)

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 152-foot monopole at the above-referenced address, latitude 41.6316638888889°, longitude -72.7298666666667°. Said monopole is owned by American Tower Corporation and the underlying property owners are Elaine & John C. Matulis.

AT&T desires to modify its existing telecommunications facility by adding three (3) remote-radio heads ("RRHs"). The centerline height of the existing antennas is and will remain at 152 feet.

Please accept this application as notification pursuant to R.C.S.A. §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16-50j-72 (b)(2). In accordance with R.C.S.A. §16-50j-73, a copy of this letter is being sent to Mayor Mark Kaczynski and Jack Healy, Berlin Town Manager; Maureen Giusti, as Assistant Town Planner/Zoning Enforcement Officer with the Town of Berlin; Tower Owners, American Tower Corporation; and property owners, Elaine & John C. Matulis.

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 added antennas and accessory equipment along with equipment to be swapped will be installed at the existing height of 152 feet on the 152-foot monopole.

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 decibels or more, or to levels that exceed state and local criteria.

Julia Coughlin • Empire Telecom USA, LLC • 16 Esquire Road, Billerica, MA 01862 • 978-284-3376 • jcoughlin@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 (enclosed) for AT&T's modified facility is herein provided.

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

6. The existing structure and its foundation can support AT&T's proposed modifications (please see enclosed structural analysis completed by American Tower Corporation, dated November 1st, 2018; stamped on Nov 1, 2018).

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

Sincerely,

Julia Coughlin

Julia Coughlin
Site Acquisition Specialist

Enclosures: Exhibit 1 – Field Card and GIS Map
Exhibit 2 – Construction Drawings
Exhibit 3 – Structural Analysis
Exhibit 4 – RF Emissions Analysis Report Evaluation

cc:
Hon.Mark Kaczynski, Mayor; Town of Berlin; 240 Kensington Rd.; Berlin, CT 06037
Hon. Jack Healy, Berlin Town Manager, 240 Kensington Rd.; Berlin, CT 06037
Maureen Giusti; Assistant Town Planner/Zoning Enforcement Officer; 240 Kensington Rd.; Berlin, CT 06037
Frank Van Linter; Town Building Official; 240 Kensington Rd.; Berlin, CT 06037
Elaine & John C. Matulis; 260 Beckley Rd.; Berlin, CT 06037
American Tower Corporation; 10 Presidential Way; Woburn, MA 01801; ATTN: Ryan Tierney, Account Project Manager

Exhibit 1

Town of Berlin, CT

Property Listing Report

Map Block Lot **11-3-132-7-3877** Account **1040691**

Property Information

Property Location	260 BECKLEY RD
Owner	MATULIS ELAINE E & JOHN C JR
Co-Owner	
Mailing Address	260 BECKLEY RD BERLIN CT 06037
Land Use	4330 Rad/TV Twr
Land Class	I
Zoning Code	R-43
Census Tract	

Street Index	2030
Acreage	0.01
Utilities	
Lot Setting/Desc	
Additional Info	

Photo

No Photo Available

Sketch

Primary Construction Details

Year Built	
Stories	
Building Style	
Building Use	
Building Condition	
Interior Floors 1	
Interior Floors 2	
Whirlpool Tub	
Total Rooms	
Basement Garages	

Bedrooms	
Full Bathrooms	
Half Bathrooms	
Extra Fixtures	
Bath Style	
Kitchen Style	
Roof Style	
Roof Cover	
Fireplaces	
AC TYPE	

Exterior Walls	
Exterior Walls 2	
Interior Walls	
Interior Walls 2	
Heating Type	
Heating Fuel	
Fin Basement Area	
Fin BSMT Quality	
Fin BSMT Area 2	
Fin BSMT Quality 2	

Report Created On **11/27/2018**

Town of Berlin, CT

Property Listing Report | Map Block Lot **11-3-132-7-3877** | Account **1040691**

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	0	0
Extras	0	0
Improvements	0	0
Outbuildings	0	0
Land	600000	420000
Total	600000	420000

Outbuilding and Extra Features

Type	Description

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area		0

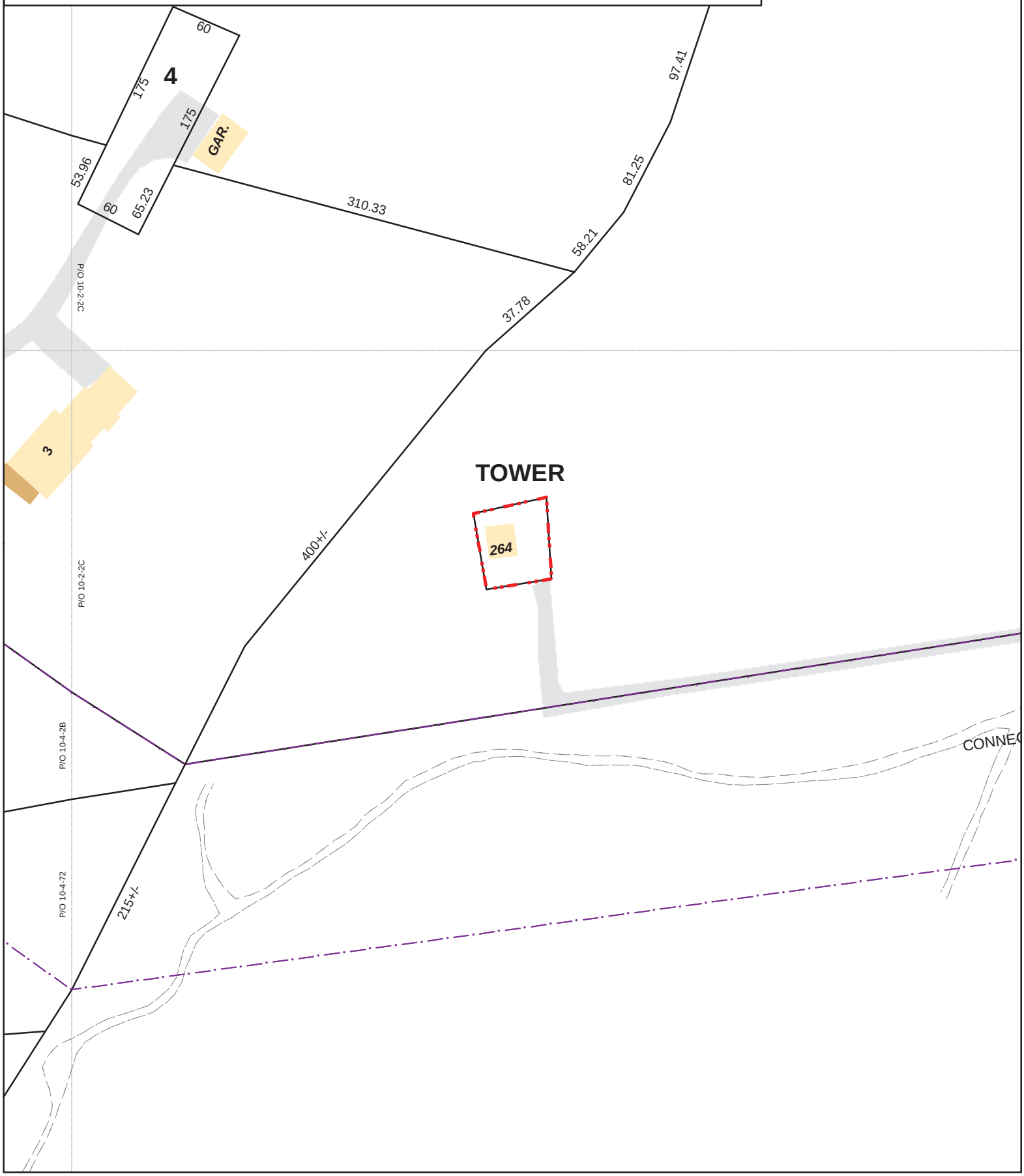
Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
MATULIS ELAINE E & JOHN C JR			

Report Created On **11/27/2018**

Town of Berlin, Connecticut - Assessment Parcel Map

Parcel: 11-3-132-7-3877 Address: 286 BECKLEY RD



N W E S

NEGEO New England Geosystems www.negeosystems.com 202 Main Street Extension - C2 Middletown, CT 06457 • (203) 404 - 7129

Approximate Scale: 1 inch = 100 feet

0 50 100 150 200 Feet

Map Produced: December 2017

Disclaimer: This map is for informational purposes only All information is subject to verification by any user. The Town of Berlin and its mapping contractors assume no legal responsibility for the information contained herein.

Exhibit 2

PROJECT INFORMATION

SCOPE OF WORK	UNMANNED COMMUNICATIONS FACILITY MODIFICATIONS INCLUDING: -(P) LTE700BC RRUS-11 UNITS TO BE CONNECTED TO PANEL POS #2 FROM POS #3 (1/SECT., 3 TOT.) -(P) LTEAWS RRUS-4426 ON NEW VALMONT UQLM-DCP MOUNT CONNECTED TO PANEL POS #3 (1/SECT., 3 TOT.) -(P) IN SHELTER: -REPLACE EXISTING LTE850 RRUS-12 RADIOS FOR NEW RRUS-4478b5 (3 TOT.) -ADD NEW LTE700b14 RRUS-4478b14 RADIOS ON EXISTING RRU RACK (2 TOT.) -ADD SECOND RBS5216 IN LTE RACK -ADD IDLe CABLE IN LTE RACK -ADD NEW RBS6630 IN LTE RACK -REMOVE AND REPLACE (E) POWER PLANT/CONVERTER SHELF FOR NEW NetSure7100 C/W BATTERY RACK -DECOMMISSION AND REMOVE NOKIA GSM CABINET (1)
SITE NUMBER:	CT1014
SITE NAME:	BERLIN - NE
SITE ADDRESS:	260 BECKLEY ROAD BERLIN, CT 06037
TOWER OWNER:	AMERICAN TOWER CORP 116 HUNTINHTON AVE. 11th FLOOR BOSTON, MA 02116
APPLICANT:	AT&T MOBILITY 550 COCHITUATE RD SUITES 13 & 14 FRAMINGHAM, MA 01701
NOC CONTACT:	TEL 866-915-5600
COORDINATES	LAT. N41° 37' 54.17" LONG. W72° 43' 47.69"
GROUND LEVEL:	±187'
DEED REFERENCE:	N/A
SITE PARCEL NO.:	N/A
CURRENT ZONING:	N/A
HORIZONTAL DATUM:	(NAD) 1983

at&t Mobility

SITE NUMBER: CT1014 FA: 10034969
SITE NAME: BERLIN NE
PROJECT: LTE 5C AWS MRTCB031370
LTE 6C 700d MRTCB031734
LTE 5G MRTCB032134

DRAWING INDEX

		REV
01	TITLE SHEET	0
02	NOTES	0
03	SITE PLAN & EQUIPMENT PLAN	0
04	ELEVATION VIEW & ANTENNA LAYOUT	0
05	GROUNDING DETAILS	0

ONE CALL 1-800-922-4455

AT LEAST 2 WORKING DAYS PRIOR TO DIGGING, THE CONTRACTOR IS REQUIRED TO CONNECTICUT ONE CALL SYSTEM AT 1-800-922-4455

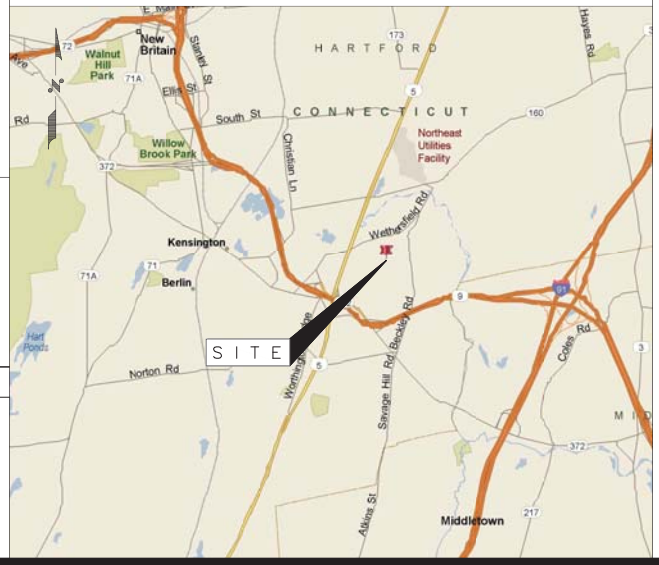
CONTACT & UTILITY INFORMATION

CONTACT	CONTACT	COMPANY	PHONE NO.
ENGINEERING:	MIGUEL NOBRE	VRG	(508) 981-9590
SITE ACQUISITION:	DAVID COOPER	EMPIRE	(484) 683-5349
CONSTRUCTION:	BILL DANIELS	EMPIRE	(484) 683-5349
UTILITIES			
POWER:	WORK REQUEST GROUP	NATIONAL GRID	(800) 375-7405
TELCO:	-	VERIZON	(800) 941-9900

LOCATION MAP

DIRECTIONS: FROM ROCKY HILL, TAKE I-91 SOUTH. TAKE I-91 SOUTH EXIT 22N TOWARDS RT-9 WEST. TAKE RT-9 WEST EXIT 21 TOWARDS MILL ST. AT END OF OFF RAMP TURN LEFT ONTO MILL ST. TURN LEFT ONTO BECKLEY ROAD. TURN LEFT ONTO GRAVEL DRIVE RIGHT AFTER PASSING UNDER POWER LINES. SITE IS AT END OF GRAVEL DRIVE.

SITE ACCESS: LOCKED GATE



APPLICABLE BUILDING CODES AND STANDARDS

SUBCONTRACTOR'S WORK SHALL COMPLY WITH PROJECT STANDARDS AND SPECIFICATIONS. SUBCONTRACTOR WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

BUILDING CODE:
CONNECTICUT STATE BUILDING CODE

ELECTRICAL CODE:
NATIONAL ELECTRICAL CODE LATEST EDITION
SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS.
AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION
AMERICAN NATIONAL STANDARDS INSTITUTE/TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA) 222-F OR G AS APPLICABLE, STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS

INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVITY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM
IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT

IEEE C62.41, RECOMMENDED PRACTICES ON SURGE VOLTAGES IN LOW VOLTAGE AC POWER CIRCUITS (FOR LOCATION CATEGORY "C3" AND "HIGH SYSTEM EXPOSURE")

TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

ANSI T1.311, FOR TELECOM - DC POWER SYSTEMS - TELECOM, ENVIRONMENTAL PROTECTION

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

VRG
VERTICAL RESOURCES GRP.
489 Washington Street
Auburn, MA 01501
Tel. (508) 981- 9590
Fax (508) 519 - 8939
mnobre@verticalresourcesgrp.com

EMPIRE telecom
EMPIRE TELECOM USA, LLC
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT1014
SITE NAME: BERLIN NE
PROJECT: LTE 5C6C5G
260 BECKLEY ROAD
BERLIN, CT 06037
HARTFORD COUNTY

at&t Mobility
550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
1	10/10/18	FOR CONSTRUCTION	E.L.P.	G.A.M.	

SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

JAMES E. PRUDE No. 8657 REGISTERED PROFESSIONAL ENGINEER

AT&T MOBILITY

TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
CT1014-LTE5C6C5G	01	0

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – PRIME CONTRACTOR
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T WIRELESS
   OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.

ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

4. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.

5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

6. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

7. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.

8. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. ROUTING OF CONDUIT FOR POWER AND TELCO SHALL BE APPROVED BY OWNER OF SITE.

9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

SITE WORK GENERAL NOTES

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING & EXCAVATION.

3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.

6. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.

7. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE OWNER SPECIFICATION FOR SITE SIGNAGE.

8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.

9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE DETAIL 303.

11. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.

12. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

13. ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123 (HOT-DIP) UNLESS NOTED OTHERWISE. STRUCTURAL STEEL SHALL BE ASTM-A-36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE PERFORMED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".

2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION". PAINTED SURFACES SHALL BE TOUCHED UP.

3. BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4"ø) CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. STEEL FASTENER HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 (HOT-DIP)

4. NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.

5. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD, HILTI OR APPROVED EQUAL.

6. ALL STRUCTURAL STEEL SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.

2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000 PSI) MAY BE USED.

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.

4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:

   #6 AND LARGER .....2 INCH
   #5 AND SMALLER & WWF.....1 1/2 INCH

   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:

   SLAB AND WALL .....3/4 INCH
   BEAMS AND COLUMNS.....1 1/2 INCH

5. A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD, HILTI OR APPROVED EQUAL.

7. CONCRETE CYLINDER TEST IS NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC 1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TESTS PERFORMED AT THE SUPPLIER'S PLANT,

   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.

   FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.

8. AS AN ALTERNATIVE TO ITEM 7, TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.

9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

10. ALL CONCRETE SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

SOIL COMPACTION NOTES FOR SLAB ON GRADE:

1. EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL, EXPOSE UNDISTURBED NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.

2. COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.

3. AS AN ALTERNATIVE TO INSPECTION AND WRITTEN CERTIFICATION, THE "UNDISTURBED SOIL" BASE SHALL BE COMPACTED WITH "COMPACTION EQUIPMENT", LISTED BELOW, TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM D 1557 METHOD C.

4. COMPACTED SUBBASE SHALL BE UNIFORM AND LEVELED. PROVIDE 6" MINIMUM CRUSHED STONE OR GRAVEL COMPACTED IN 3" LIFTS ABOVE COMPACTED SOIL. GRAVEL SHALL BE NATURAL OR CRUSHED WITH 100% PASSING 1" SIEVE.

5. AS AN ALTERNATIVE TO ITEMS 2 AND 3 PROOF ROLL THE SUBGRADE SOILS WITH 5 PASSES OF A MEDIUM SIZED VIBRATORY PLATE COMPACTOR (SUCH AS BOMAG BPR 30/38) OR HAND-OPERATED SINGLE DRUM VIBRATORY ROLLER (SUCH AS BOMAG BW 55E). ANY SOFT AREAS THAT ARE ENCOUNTERED SHOULD BE REMOVED AND REPLACED WITH A WELL-GRADED GRANULAR FILL, AND COMPACTED AS STATED ABOVE.

6. COMPACTION CRITERIA FOR OTHER FILL AREAS ON SITE SHALL MEET THE SAME REQUIREMENTS AS NOTED ABOVE.

7. SOIL COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

COMPACTION EQUIPMENT:

HAND OPERATED DOUBLE DRUM, VIBRATORY ROLLER, VIBRATORY PLATE COMPACTOR OR JUMPING JACK COMPACTOR.

ELECTRICAL INSTALLATION NOTES

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.

2. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.

3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.

4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.

5. CABLES SHALL NOT BE ROUTED THROUGH LADDER-STYLE CABLE TRAY RUNGS.

6. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA.

7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH PERMANENT LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S). NO HAND WRITTEN LABELS ALLOWED.

8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED. NO HAND WRITTEN LABELS ALLOWED.

9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.

10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

12. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.

13. ALL POWER AND POWER GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).

14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.

ELECTRICAL INSTALLATION NOTES (cont.)

15. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

16. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

17. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

18. RIGID NONMETALLIC CONDUIT (LE., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.

19. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

20. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.

21. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.

22. WIREWAYS SHALL BE EPOXY-COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

23. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS

24. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED, OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

25. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

26. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

27. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

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EMPIRE TELECOM USA, LLC
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT1014
SITE NAME: BERLIN NE
PROJECT: LTE 5C6C5G
260 BECKLEY ROAD
BERLIN, CT 06037
HARTFORD COUNTY

at&t Mobility
550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
1	10/10/18	FOR CONSTRUCTION	E.L.P.	G.A.M.	

SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

JAMES E. PROVOST No. 8657 REGISTERED PROFESSIONAL ENGINEER

AT&T MOBILITY

NOTES

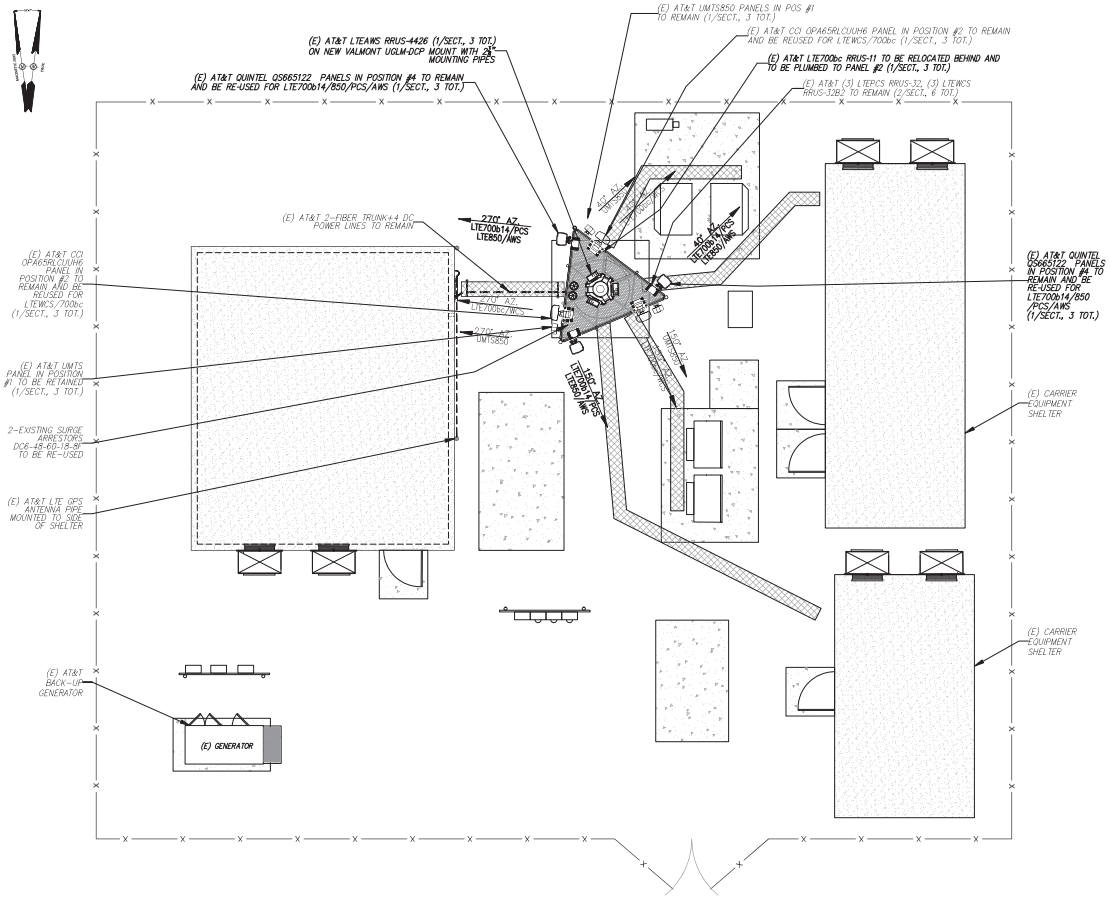
JOB NUMBER	DRAWING NUMBER	REV
CT1014-LTE5C6C5G	02	0

GENERAL NOTES

1. THE CELLULAR INSTALLATION IS AN UNMANNED PRIVATE AND SECURED COMPOUND. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
2. CONSTRUCTION, MAINTENANCE & OPERATION OF PROPOSED TOWER FACILITY WILL BE HELD IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE & FEDERAL REGULATIONS AND GUIDELINES.

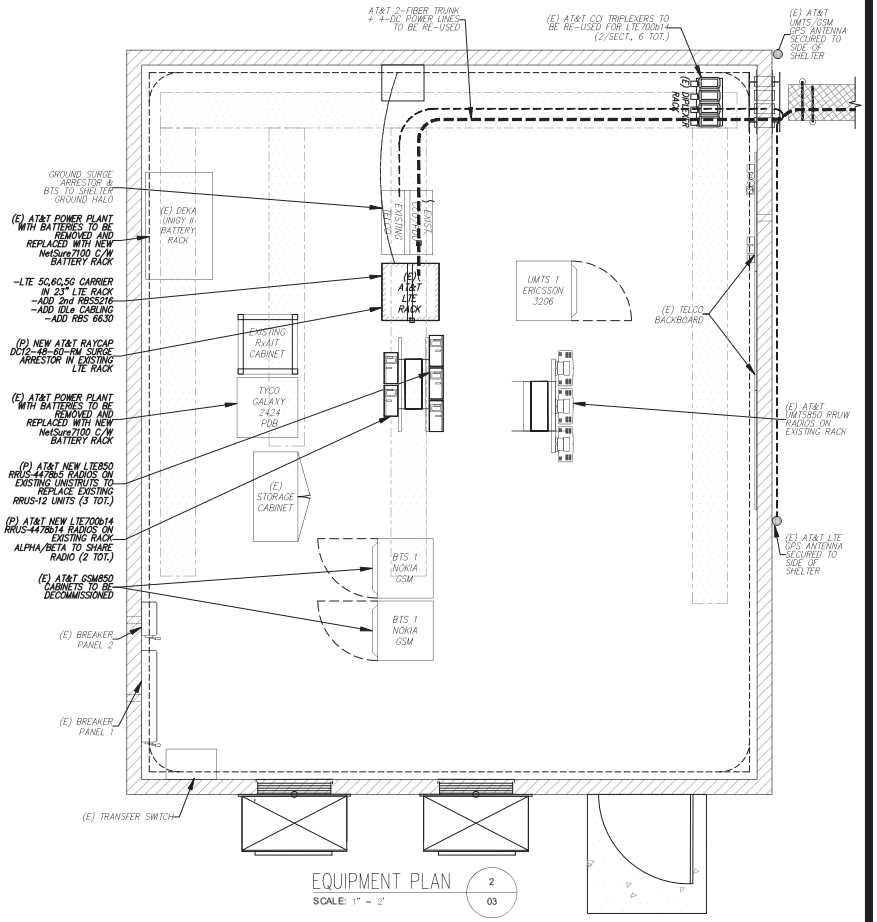
AT&T RF SYSTEM SCHEDULE

SECTOR	STATUS	BAND	ANTENNA MAKE	ANTENNA MODEL	SIZE(INCHES) (LxWxH)	RAD CTR. FT. AGL	AZIMUTH	TMA DIPLEXER	REMOTE RADIOS	SIZE(INCHES) (LxWxH)	FEEDER TYPE	FEEDER LENGTH	RAYCAP
A1	EXISTING	UMTS850	POWERWAVE	7770	55.0x11.0x5.0	±152'	150°	2- QB7481 2- RC-1858	---	---	(02) 1-1/4" LDW	(02) 175'	(E2) DC6-48-60-18-8F
A2	EXISTING	LTE700bc/WCS	CCI	OPA65R-LCUUH6	72.0x14.8x7.4	±152'	40°		(1) RRUS-32 (1) RRUS-4426 (1) RRUS-4478	22.2x12.1x7.0 19.1x11.4x6.2 19.1x11.4x6.2			
A3	EXISTING	LTE700b14/850/PCS/AWS	QUINTEL	QS665122	72.0x12.0x9.6	±152'	40°	2- TMA0821			(02) 1-1/4" LDW	(02) 175'	
A4													
B1	EXISTING	UMTS850	POWERWAVE	7770	55.0x11.0x5.0	±152'	270°	2- QB7481 2- RC-1858	---	---	(02) 1-1/4" LDW	(02) 175'	
B2	EXISTING	LTE700bc/WCS	CCI	OPA65R-LCUUH6	72.0x14.8x7.4	±152'	150°		(1) RRUS-32 (1) RRUS-4426 (1) RRUS-4478	22.2x12.1x7.0 19.1x11.4x6.2 19.1x11.4x6.2			
B3	EXISTING	LTE700b14/850/PCS/AWS	QUINTEL	QS665122	72.0x12.0x9.6	±152'	150°	2- TMA0821			(02) 1-1/4" LDW	(02) 175'	
B4													
C1	EXISTING	UMTS850	POWERWAVE	7770	55.0x11.0x5.0	±152'	40°	2- QB7481 2- RC-1858	---	---	(02) 1-1/4" LDW	(02) 175'	
C2	EXISTING	LTE700bc/WCS	CCI	OPA65R-LCUUH6	72.0x14.8x7.4	±152'	270°		(1) RRUS-32 (1) RRUS-4426 (1) RRUS-4478	22.2x12.1x7.0 19.1x11.4x6.2 19.1x11.4x6.2			
C3	EXISTING	LTE700b14/850/PCS/AWS	QUINTEL	QS665122	72.0x12.0x9.6	±152'	270°	2- TMA0821			(02) 1-1/4" LDW	(02) 175'	
C4													



COMPOUND PLAN 1/03
SCALE: 1" = 6'

GRAPHIC SCALE
6 0 3 6 12 24
(IN FEET)
1 inch = 6 ft.



EQUIPMENT PLAN 2/03
SCALE: 1" = 2'

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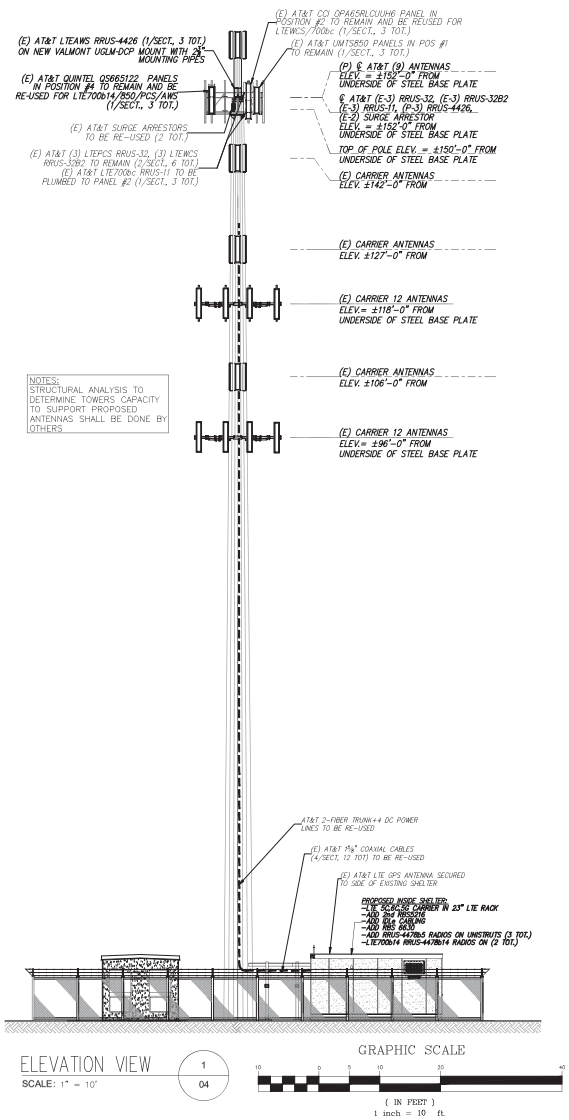
1	10/10/18	FOR CONSTRUCTION	E.L.P.	G.A.M.	
SCALE		DESIGNED BY: M.N.	DRAWN BY: G.A.M.		

JAMES E. PROVENCHER No. 8657 REGISTERED PROFESSIONAL ENGINEER

AT&T MOBILITY

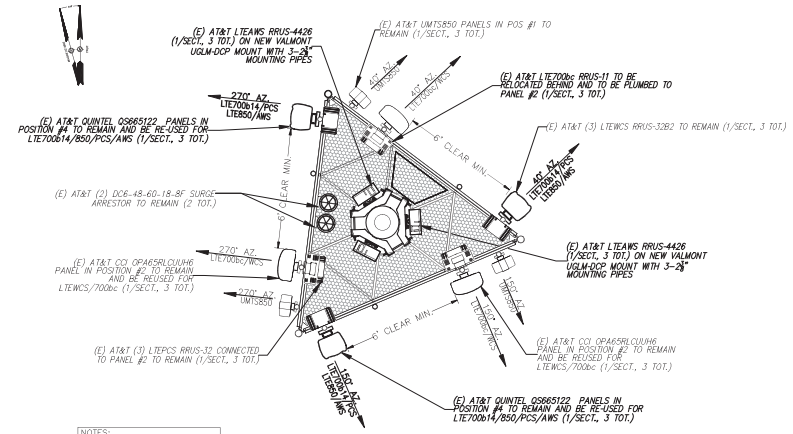
SITE PLAN & EQUIPMENT PLAN

JOB NUMBER	DRAWING NUMBER	REV
CT1014-LTE5C6C5G	03	0



ELEVATION VIEW
SCALE: 1" = 10'
1

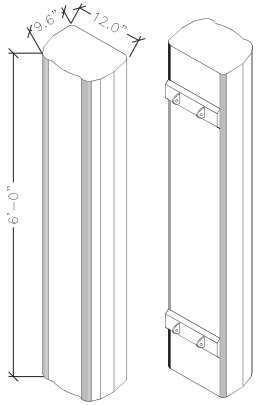
GRAPHIC SCALE
(IN FEET)
1 inch = 10 ft.



EXISTING

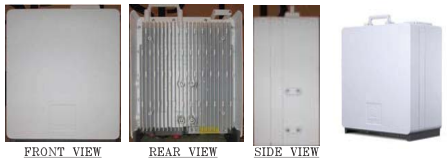
NOTES:
REFER TO FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS AND CONFIGURATIONS

ANTENNA MOUNTING PLAN VIEW
SCALE: N.T.S.
2



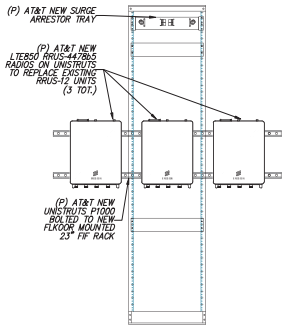
ISOMETRIC FRONT VIEW | ISOMETRIC REAR VIEW

(E) LTE700b14/850/PCS/AWS ANTENNA DETAIL
SCALE: N.T.S.
3

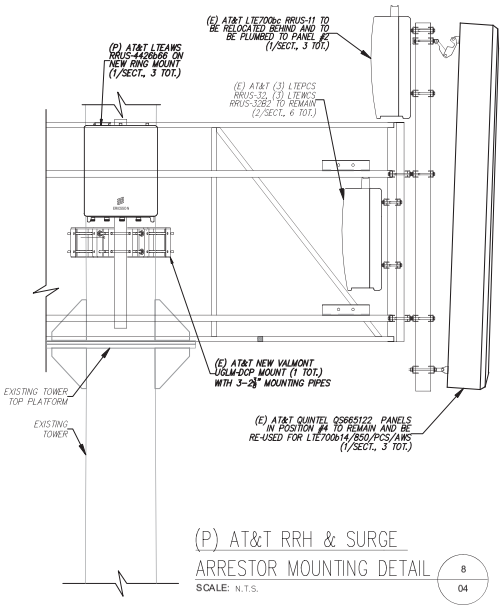


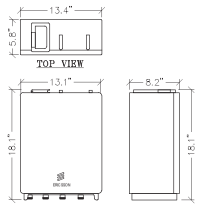
FRONT VIEW | REAR VIEW | SIDE VIEW

(P) AT&T LTE700B14 RRUS-4478 (B14)
SCALE: N.T.S.
4

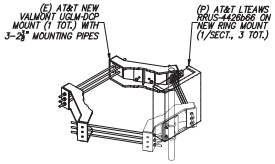


ELEVATION VIEW

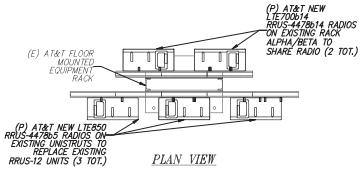




(P) AT&T LTEAWS RRUS-4426 B66
SCALE: N.T.S.
5



(P) LTEAWS RRU-4426 MOUNTING DETAIL
SCALE: N.T.S.
6



PLAN VIEW

(P) LTE850/700b14 EQUIPMENT RACK
SCALE: N.T.S.
7

(P) AT&T RRH & SURGE ARRESTOR MOUNTING DETAIL
SCALE: N.T.S.
8

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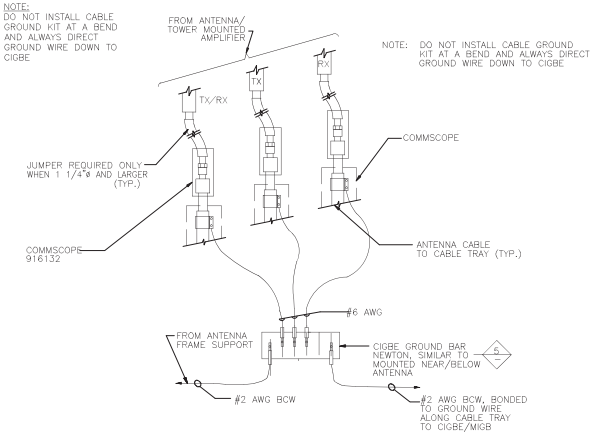
SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

JAMES CONNER PROSE No. 8657 REGISTERED PROFESSIONAL ENGINEER

AT&T MOBILITY

ELEVATION VIEW & ANTENNA LAYOUT

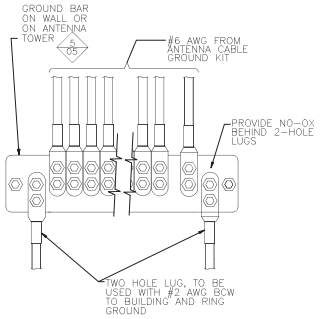
JOB NUMBER	DRAWING NUMBER	REV
CT1014-LTE5C6C5C	04	0



CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) 1/05

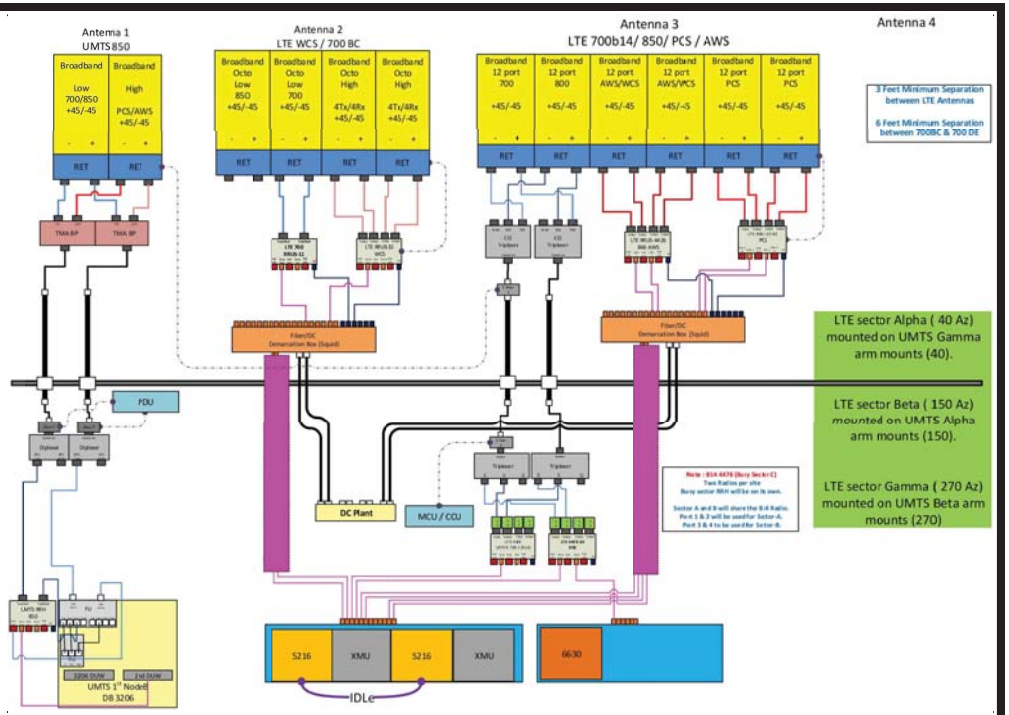
SCALE: N.T.S.

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



INSTALLATION OF GROUND WIRE TO GROUND BAR 2/05

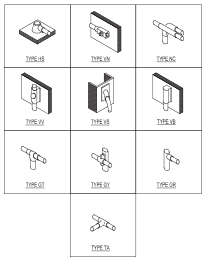
SCALE: N.T.S.



ALPHA/BETA/GAMMA PLUMBING DIAGRAM 3/05

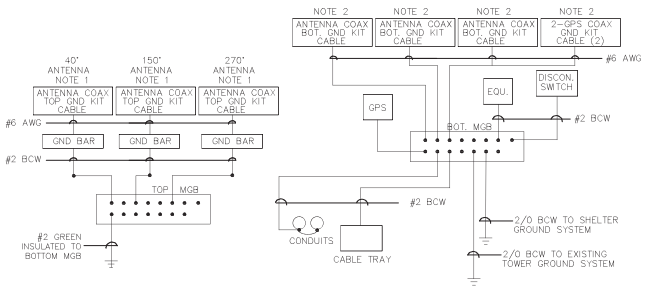
SCALE: N.T.S.

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



GROUNDING CONNECTION DETAIL 5/05

SCALE: N.T.S.



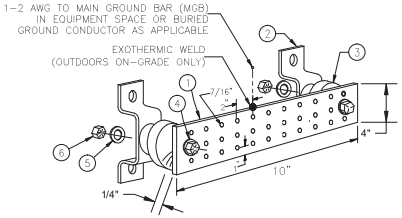
NOTE:
1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE

SCHEMATIC GROUNDING DIAGRAM 4/05

SCALE: N.T.S.

NEWTON INSTRUMENT COMPANY, INC.
BUTNER, N.C. OR APPROVED EQUAL

ITEM	REQ.	PART NO.	DESCRIPTION
1	1	1/4"x4"x12"	PRE DRILLED GND. BAR
2	2	A-6056	WALL MTG. BRKT.
3	2	3061-4	INSULATORS
4	2	3012-13	5/8"-11x4" H.H.C.S.
5	4	3015-8	5/8 LOCKWASHER
6	2	3014-8	5/8"-11 HEX NUT



GROUND BAR DETAIL 6/05

SCALE: N.T.S.

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SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

JAMES P. STRONE No. 8657 REGISTERED PROFESSIONAL ENGINEER

AT&T MOBILITY

GROUNDING DETAILS

JOB NUMBER	DRAWING NUMBER	REV
CT1014-LTE5C6C5G	05	0

Exhibit 3

AMERICAN TOWER®
CORPORATION

Structural Analysis Report

Structure	:	**151.5 ft Monopole (De-stacked from 174.5')**
ATC Site Name	:	**Brln - Berlin, CT**
ATC Site Number	:	**302483**
Engineering Number	:	**OAA741731_C3_01**
Proposed Carriers	:	**AT&T Mobility**
Carrier Site Name	:	**Berlin NE**
Carrier Site Number	:	**CT1014**
Site Location	:	**260 Beckley Road** **Kensington, CT 06037-2419** **41.631722,-72.729900**
County	:	**Hartford**
Date	:	**November 1, 2018**
Max Usage	:	**99%**
Result	:	**Pass***

Prepared By:
Travis J. Gatling
Structural Engineer I

Travis J. Gatling

STATE OF CONNECTICUT
ESHA KAUSHAL MODI
32598
LICENSED
PROFESSIONAL ENGINEER

Authorized by "EOR"
Nov 1 2018 4:24 PM
cosign

COA: D94317

AMERICAN TOWER CORPORATION

Table of Contents

Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 151.5 ft monopole to reflect the changes proposed by AT&T Mobility.

Supporting Documents

Tower Drawings	ITT Meyer Type "B", dated July 21, 2001 Mapping by Smith Cullum Acq. #CT-0019, dated July 21, 2001 Mapping by ATC Report #0682, dated January 7, 2016
Foundation Drawing	SpectraSite Project #CT-0019, dated May 29, 2003
Geotechnical Report	Daniel G. Loucks Project #CT-0019, dated December 21, 2001
Modifications	Scientel Project #Berlin-CT0019, dated July 30, 2002 ATC Project #11912109_P5_02, dated October 3, 2017*

*** The changes outlined by ATC Project #11912109_P5_02 must be completed for this analysis to be valid.**

Analysis

The tower was analyzed using tnxTower version 8.0.4.0 analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

Basic Wind Speed:	97 mph (3-Second Gust, V_{ASD}) / 125 mph (3-second Gust, V_{ULT})
Basic Wind Speed w/ Ice:	50 mph (3-Second Gust) w/ 1" radial ice concurrent
Code:	ANSI/TIA-222-G / 2012 IBC / 2016 Connecticut State Building Code
Structure Class:	II
Exposure Category:	B
Topographic Category:	1
Crest Height:	0 ft
Spectral Response:	Ss = 0.182, S_1 = 0.063
Site Class:	D - Stiff Soil

Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report. If the pending modifications cited in the Supporting Documents table are not completed prior to T-Mobile's installation, the results of this analysis are no longer valid, and T-Mobile should contact American Tower's Site Manager for further direction on how to proceed.

If you have any questions or require additional information, please contact American Tower via email at Engineering@americantower.com. Please include the American Tower site name, site number, and engineering number in the subject line for any questions.

Existing and Reserved Equipment

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
151.5	152.0	6	CCI TPX-070821	Platform w/ Handrails	(12) 1 1/4" Coax (4) 0.78" 8 AWG 6 (2) 0.39" Fiber Trunk (1) 3" conduit	AT&T Mobility
		6	Powerwave LGP21401			
		2	Raycap DC6-48-60-18-8F			
		3	Powerwave 7770.00			
		3	Quintel QS66512-2			
		3	CCI OPA-65R-LCUU-H6			
		3	Ericsson RRUS 11 (Band 12) (55 lb)			
		3	Ericsson RRUS 32			
		3	Ericsson RRUS 32 B2			
142.0	142.0	3	Ericsson KRY 112 144/2	Platform w/ Handrails	(12) 1 5/8" Coax (2) 1 1/4" Fiber (1) 1 5/8" Fiber	T-Mobile
		3	Ericsson KRY 112 489/2			
		3	Ericsson Radio 4449 B12,B71			
		3	Ericsson AIR32 B66Aa/B2a			
		3	RFS APXVAARR24_43-U-NA20			
127.0	127.0	3	RRH2x50-08	Platform w/ Handrails	(4) 1 1/4" Hybriflex	Sprint Nextel
		3	Alcatel-Lucent 800MHz 2X50W RRH w/ Filter			
		6	Alcatel-Lucent 4x40W RRH			
		3	Alcatel-Lucent TD-RRH8x20			
		2	RFS APXVSPP18-C-A20			
		1	RFS APXV9ERR18-C-A20			
		3	Commscope DT465B-2XR			
119.0	119.0	3	Nokia AirScale RRH 4T4R B5 160W AHCA	Low Profile Platform	(12) 1 5/8" Coax (2) 1 5/8" Fiber	Verizon
		3	Alcatel-Lucent RRH2X60-AWS			
		3	Alcatel-Lucent B25 RRH4x30			
		3	Alcatel-Lucent B13 RRH4x30-4R			
		2	RFS DB-T1-6Z-8AB-0Z			
		6	Commscope JAHH-65B-R3B			
		6	Antel LPA-80063-6CF-EDIN-X			

Equipment to be Removed

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
No loading considered as to be removed						

Proposed Equipment

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
151.5	152.0	3	Ericsson RRUS 4426 B66	Platform w/ Handrails	-	AT&T Mobility

[1]Mount elevation is defined as height above bottom of steel structure to the bottom of mount, RAD elevation is defined as center of antenna above ground level (AGL).

Structure Usages

Structural Component	Controlling Usage	Pass/Fail
Anchor Bolts	83%	Pass
Shaft	76%	Pass
Base Plate	49%	Pass

Foundations

Reaction Component	Analysis Reactions	% of Usage
Moment (Kips-Ft)	4,075.0	97%
Axial (Kips)	51.0	40%
Shear (Kips)	40.0	68%
Anchor Moment (Kips-Ft)	3,170.0	99%

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.

Deflection and Sway

Antenna Elevation (ft)	Antenna	Carrier	Deflection (ft)	Sway (Rotation) (°)
152.0	Ericsson RRUS 4426 B66	AT&T Mobility	8.974	5.982

***Deflection and Sway was evaluated considering a design wind speed of 60 mph (3-Second Gust) per ANSI/TIA-222-G**

AMERICAN TOWER®
CORPORATION

Standard Conditions

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

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

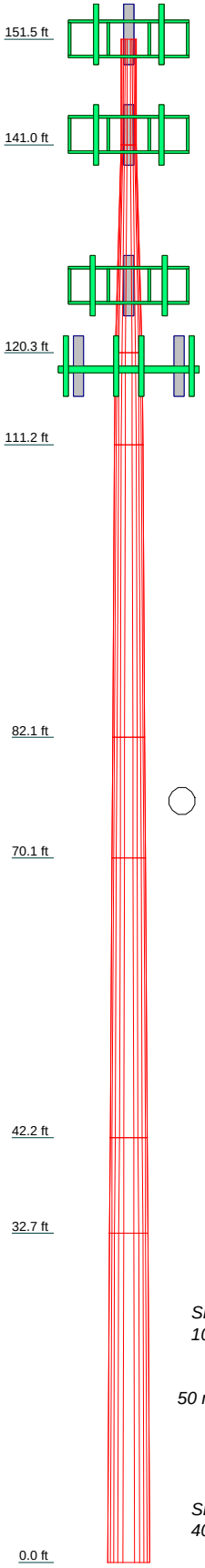
-- Information from drawings in the possession of American Tower Corporation, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC 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 that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and American Tower Corporation, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. 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.

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

Section	Length (ft)	Number of Sides	Thickness (in)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	10.50	12	0.2400	17.1872	17.7841	A572-65	0.5
2	20.67	12	0.3059	17.7841	31.5570		1.7
3	9.14	12	0.3063	31.5570	33.0280		1.0
4	29.11	12	0.3141	33.0280	38.3470		3.5
5	12.02	12	0.3804	38.3470	39.7110		1.9
6	27.82	12	0.4014	39.7110	43.9500		5.1
7	9.53	12	0.4706	43.9500	45.0640		2.2
8	32.71	12	0.4906	45.0640	49.5520		8.2
							24.1



ALL REACTIONS ARE FACTORED

AXIAL 113 K

SHEAR 10 K

MOMENT 1152

TORQUE 1 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 51 K

SHEAR 40 K

MOMENT 4075 kip-ft

TORQUE 3 kip-ft
REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) TPX-070821	151.5	APXVAARR24_43-U-NA20	142
(2) TPX-070821	151.5	APXVAARR24_43-U-NA20	142
(2) TPX-070821	151.5	Flat Platform w/ Handrails	142
(2) LGP21401	151.5	RRH2x50-08	127
(2) LGP21401	151.5	RRH2x50-08	127
(2) LGP21401	151.5	RRH2x50-08	127
DC6-48-60-18-8F(32.8 lbs)	151.5	800 MHz 2X50W RRH w/ Filter	127
DC6-48-60-18-8F(32.8 lbs)	151.5	800 MHz 2X50W RRH w/ Filter	127
RRUS 4426 B66	151.5	800 MHz 2X50W RRH w/ Filter	127
RRUS 4426 B66	151.5	(2) 4x40W RRH (88 lb)	127
RRUS 4426 B66	151.5	(2) 4x40W RRH (88 lb)	127
RRUS 11 (Band 12) (55 lb)	151.5	(2) 4x40W RRH (88 lb)	127
RRUS 11 (Band 12) (55 lb)	151.5	TD-RRH8x20	127
RRUS 11 (Band 12) (55 lb)	151.5	TD-RRH8x20	127
RRUS 32 (50.8 lbs)	151.5	TD-RRH8x20	127
RRUS 32 (50.8 lbs)	151.5	APXVSPP18-C-A20	127
RRUS 32 (50.8 lbs)	151.5	APXVSPP18-C-A20	127
RRUS 32 B2	151.5	APXV9ERR18-C-A20	127
RRUS 32 B2	151.5	DT465B-2XR	127
RRUS 32 B2	151.5	DT465B-2XR	127
7770.00	151.5	DT465B-2XR	127
7770.00	151.5	Round Platform w/ Handrails	127
7770.00	151.5	AirScale RRH 4T4R B5 160W AHCA	119
QS66512-2	151.5	AirScale RRH 4T4R B5 160W AHCA	119
QS66512-2	151.5	AirScale RRH 4T4R B5 160W AHCA	119
QS66512-2	151.5	RRH2X60-AWS	119
OPA-65R-LCUU-H6	151.5	RRH2X60-AWS	119
OPA-65R-LCUU-H6	151.5	RRH2X60-AWS	119
OPA-65R-LCUU-H6	151.5	B25 RRH4x30	119
Flat Platform w/ Handrails	151.5	B25 RRH4x30	119
KRY 112 144/2	142	B25 RRH4x30	119
KRY 112 144/2	142	B13 RRH4x30-4R	119
KRY 112 144/2	142	B13 RRH4x30-4R	119
KRY 112 489/2	142	B13 RRH4x30-4R	119
KRY 112 489/2	142	DB-T1-6Z-8AB-0Z	119
KRY 112 489/2	142	DB-T1-6Z-8AB-0Z	119
Radio 4449 B12,B71	142	(2) JAHH-65B-R3B	119
Radio 4449 B12,B71	142	(2) JAHH-65B-R3B	119
Radio 4449 B12,B71	142	(2) JAHH-65B-R3B	119
AIR32 B66Aa/B2a	142	(2) LPA-80063-6CF-EDIN-X	119
AIR32 B66Aa/B2a	142	(2) LPA-80063-6CF-EDIN-X	119
AIR32 B66Aa/B2a	142	(2) LPA-80063-6CF-EDIN-X	119
APXVAARR24_43-U-NA20	142	Round Low Profile Platform	119

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. Combined pole and wrap structure.
9. Sections modeled to have equivalent inertia to pole and wrap combined.
10. TOWER RATING: 75.9%

ATC_logo

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3500 Regency Parkway, Suite 100
Cary, NC 27518
Phone: (919) 466-5258
FAX:

Job: *Brln-Berlin (302483)*			
Project: *OAA741731_C3_01*			
Client: AT&T Mobility	Drawn by: travis.gatling	App'd:	
Code: TIA-222-G	Date: 11/01/18	Scale: NTS	
Path: C:\Users\travis.gatling\Desktop\TNX\Brln - Berlin_CT (302483)\OAA741731 AT&T MOBILITY\TNX Files\302483 Brln-Berlin_CT.eri		Dwg No. E-1	

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Tower is located in Hartford County, Connecticut.
- ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
- 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.
- Combined pole and wrap structure..
- Sections modeled to have equivalent inertia to pole and wrap combined..
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole 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		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	151.50-141.00	10.50	0.00	12	17.1872	17.7841	0.2400	0.9600	A572-65 (65 ksi)
L2	141.00-120.33	20.67	0.00	12	17.7841	31.5570	0.3059	2.0000	A572-65 (65 ksi)
L3	120.33-111.19	9.14	0.00	12	31.5570	33.0280	0.3063	2.0000	A572-65 (65 ksi)
L4	111.19-82.08	29.11	0.00	12	33.0280	38.3470	0.3141	2.2000	A572-65 (65 ksi)
L5	82.08-70.06	12.02	0.00	12	38.3470	39.7110	0.3804	2.4000	A572-65 (65 ksi)
L6	70.06-42.24	27.82	0.00	12	39.7110	43.9500	0.4014	2.6000	A572-65 (65 ksi)
L7	42.24-32.71	9.53	0.00	12	43.9500	45.0640	0.4706	2.8000	A572-65 (65 ksi)
L8	32.71-0.00	32.71		12	45.0640	49.5520	0.4906	3.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	17.7088	13.0968	480.1168	6.0671	8.9030	53.9277	972.8469	6.4458	3.9630	16.512
	18.3268	13.5581	532.6554	6.2808	9.2122	57.8209	1079.3043	6.6729	4.1229	17.179
L2	18.3035	17.2160	671.2919	6.2572	9.2122	72.8702	1360.2194	8.4732	3.9463	12.901
	32.5623	30.7823	3837.2246	11.1879	16.3465	234.7425	7775.2574	15.1501	7.6375	24.967
L3	32.5622	30.8221	3842.0947	11.1878	16.3465	235.0404	7785.1256	15.1697	7.6364	24.931
	34.0851	32.2730	4410.5870	11.7144	17.1085	257.8009	8937.0451	15.8838	8.0306	26.218
L4	34.0823	33.0869	4519.6700	11.7116	17.1085	264.1768	9158.0767	16.2844	8.0097	25.501
	39.5889	38.4666	7102.1213	13.6158	19.8637	357.5419	14390.8231	18.9321	9.4352	30.039
L5	39.5655	46.5048	8556.3285	13.5920	19.8637	430.7510	17337.4413	22.8883	9.2575	24.336
	40.9777	48.1756	9512.0483	14.0804	20.5703	462.4166	19273.9886	23.7106	9.6231	25.297
L6	40.9703	50.8080	10021.0923	14.0728	20.5703	487.1632	20305.4499	25.0061	9.5668	23.834
	45.3588	56.2869	13625.1654	15.5904	22.7661	598.4848	27608.2791	27.7027	10.7028	26.664
L7	45.3344	65.8857	15898.0688	15.5656	22.7661	698.3220	32213.7975	32.4270	10.5174	22.349
	46.4877	67.5738	17151.6341	15.9644	23.3432	734.7608	34753.8607	33.2578	10.8159	22.983
L8	46.4806	70.4140	17856.5130	15.9573	23.3432	764.9572	36182.1365	34.6556	10.7623	21.937
	51.1269	77.5039	23811.6328	17.5640	25.6679	927.6801	48248.8237	38.1450	11.9651	24.389

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
L1 151.50-141.00				1	1	1			
L2 141.00-120.33				1	1	1			
L3 120.33-111.19				1	1	1			
L4 111.19-82.08				1	1	1			
L5 82.08-70.06				1	1	1			
L6 70.06-42.24				1	1	1			
L7 42.24-32.71				1	1	1			

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
L8 32.71-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
***										
1 5/8" Coax	B	No	Surface Ar (CaAa)	119.00 - 5.00	12	6	0.300 0.500	1.9800		0.82
1 5/8" (1.63"-41.3mm) Fiber	C	No	Surface Ar (CaAa)	119.00 - 5.00	2	2	-0.490 -0.480	1.6300		1.61
***										
4" Wrap Seams	A	No	Surface Ar (CaAa)	141.00 - 5.00	1	1	0.000 0.000	4.0000		0.00
4" Wrap Seams	B	No	Surface Ar (CaAa)	141.00 - 5.00	1	1	0.000 0.000	4.0000		0.00
4" Wrap Seams	C	No	Surface Ar (CaAa)	141.00 - 5.00	1	1	0.000 0.000	4.0000		0.00

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 1/4" Coax	C	No	No	Inside Pole	151.50 - 5.00	12	No Ice	0.00	0.66
							1/2" Ice	0.00	0.66
							1" Ice	0.00	0.66
0.39" (10mm) Fiber Trunk	C	No	No	Inside Pole	151.50 - 5.00	2	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
0.78" (19.7mm) 8 AWG 6	C	No	No	Inside Pole	151.50 - 5.00	4	No Ice	0.00	0.59
							1/2" Ice	0.00	0.59
							1" Ice	0.00	0.59
3" conduit	C	No	No	Inside Pole	151.50 - 5.00	1	No Ice	0.00	1.78
							1/2" Ice	0.00	1.78
							1" Ice	0.00	1.78
***									
1 5/8" (1.63"-41.3mm) Fiber	C	No	No	Inside Pole	142.00 - 5.00	1	No Ice	0.00	1.61
							1/2" Ice	0.00	1.61
							1" Ice	0.00	1.61
1 1/4" (1.25"-31.8mm) Fiber	C	No	No	Inside Pole	142.00 - 5.00	2	No Ice	0.00	1.05
							1/2" Ice	0.00	1.05
							1" Ice	0.00	1.05
1 5/8" Coax	C	No	No	Inside Pole	142.00 - 5.00	12	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
***									
1 1/4" Hybriflex	C	No	No	Inside Pole	127.00 - 5.00	4	No Ice	0.00	0.66
							1/2" Ice	0.00	0.66

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
							1" Ice	0.00	0.66

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
L1	151.50-141.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.14
L2	141.00-120.33	A	0.000	0.000	7.937	0.000	0.00
		B	0.000	0.000	7.937	0.000	0.00
		C	0.000	0.000	7.937	0.000	0.55
L3	120.33-111.19	A	0.000	0.000	3.571	0.000	0.00
		B	0.000	0.000	12.849	0.000	0.08
		C	0.000	0.000	6.117	0.000	0.28
L4	111.19-82.08	A	0.000	0.000	11.644	0.000	0.00
		B	0.000	0.000	46.227	0.000	0.29
		C	0.000	0.000	21.134	0.000	0.92
L5	82.08-70.06	A	0.000	0.000	4.808	0.000	0.00
		B	0.000	0.000	19.088	0.000	0.12
		C	0.000	0.000	8.727	0.000	0.38
L6	70.06-42.24	A	0.000	0.000	11.128	0.000	0.00
		B	0.000	0.000	44.178	0.000	0.27
		C	0.000	0.000	20.197	0.000	0.88
L7	42.24-32.71	A	0.000	0.000	3.812	0.000	0.00
		B	0.000	0.000	15.134	0.000	0.09
		C	0.000	0.000	6.919	0.000	0.30
L8	32.71-0.00	A	0.000	0.000	11.084	0.000	0.00
		B	0.000	0.000	44.003	0.000	0.27
		C	0.000	0.000	20.117	0.000	0.88

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
L1	151.50-141.00	A	2.321	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.14
L2	141.00-120.33	A	2.293	0.000	0.000	17.749	0.000	0.36
		B		0.000	0.000	17.749	0.000	0.36
		C		0.000	0.000	17.749	0.000	0.91
L3	120.33-111.19	A	2.267	0.000	0.000	7.801	0.000	0.16
		B		0.000	0.000	23.826	0.000	0.52
		C		0.000	0.000	15.410	0.000	0.55
L4	111.19-82.08	A	2.226	0.000	0.000	24.604	0.000	0.49
		B		0.000	0.000	84.032	0.000	1.82
		C		0.000	0.000	52.666	0.000	1.81
L5	82.08-70.06	A	2.174	0.000	0.000	10.035	0.000	0.20
		B		0.000	0.000	34.417	0.000	0.73

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
		C		0.000	0.000	21.466	0.000	0.73
L6	70.06-42.24	A	2.108	0.000	0.000	22.859	0.000	0.44
		B		0.000	0.000	78.834	0.000	1.65
		C		0.000	0.000	48.858	0.000	1.66
L7	42.24-32.71	A	2.025	0.000	0.000	7.673	0.000	0.14
		B		0.000	0.000	26.650	0.000	0.54
		C		0.000	0.000	16.382	0.000	0.56
L8	32.71-0.00	A	1.861	0.000	0.000	21.400	0.000	0.37
		B		0.000	0.000	75.445	0.000	1.46
		C		0.000	0.000	45.587	0.000	1.54

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	151.50-141.00	0.0000	0.0000	0.0000	0.0000
L2	141.00-120.33	0.0000	0.0000	0.0000	0.0000
L3	120.33-111.19	3.8261	1.4539	4.1174	1.6832
L4	111.19-82.08	4.4232	1.6820	4.7869	1.9569
L5	82.08-70.06	4.6508	1.7695	5.0417	2.0604
L6	70.06-42.24	4.8305	1.8387	5.2400	2.1396
L7	42.24-32.71	4.9945	1.9017	5.4167	2.2088
L8	32.71-0.00	4.7241	1.7993	5.1291	2.0846

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L2	15	4" Wrap Seams	120.33 - 141.00	1.0000	1.0000
L2	16	4" Wrap Seams	120.33 - 141.00	1.0000	1.0000
L2	17	4" Wrap Seams	120.33 - 141.00	1.0000	1.0000
L3	12	1 5/8" Coax	111.19 - 119.00	1.0000	1.0000
L3	13	1 5/8" (1.63"-41.3mm) Fiber	111.19 - 119.00	1.0000	1.0000
L3	15	4" Wrap Seams	111.19 - 120.33	1.0000	1.0000
L3	16	4" Wrap Seams	111.19 - 120.33	1.0000	1.0000
L3	17	4" Wrap Seams	111.19 - 120.33	1.0000	1.0000
L4	12	1 5/8" Coax	82.08 - 111.19	1.0000	1.0000
L4	13	1 5/8" (1.63"-41.3mm) Fiber	82.08 - 111.19	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L4	15	4" Wrap Seams	82.08 - 111.19	1.0000	1.0000
L4	16	4" Wrap Seams	82.08 - 111.19	1.0000	1.0000
L4	17	4" Wrap Seams	82.08 - 111.19	1.0000	1.0000
L5	12	1 5/8" Coax	70.06 - 82.08	1.0000	1.0000
L5	13	1 5/8" (1.63"-41.3mm) Fiber	70.06 - 82.08	1.0000	1.0000
L5	15	4" Wrap Seams	70.06 - 82.08	1.0000	1.0000
L5	16	4" Wrap Seams	70.06 - 82.08	1.0000	1.0000
L5	17	4" Wrap Seams	70.06 - 82.08	1.0000	1.0000
L6	12	1 5/8" Coax	42.24 - 70.06	1.0000	1.0000
L6	13	1 5/8" (1.63"-41.3mm) Fiber	42.24 - 70.06	1.0000	1.0000
L6	15	4" Wrap Seams	42.24 - 70.06	1.0000	1.0000
L6	16	4" Wrap Seams	42.24 - 70.06	1.0000	1.0000
L6	17	4" Wrap Seams	42.24 - 70.06	1.0000	1.0000
L7	12	1 5/8" Coax	32.71 - 42.24	1.0000	1.0000
L7	13	1 5/8" (1.63"-41.3mm) Fiber	32.71 - 42.24	1.0000	1.0000
L7	15	4" Wrap Seams	32.71 - 42.24	1.0000	1.0000
L7	16	4" Wrap Seams	32.71 - 42.24	1.0000	1.0000
L7	17	4" Wrap Seams	32.71 - 42.24	1.0000	1.0000
L8	12	1 5/8" Coax	5.00 - 32.71	1.0000	1.0000
L8	13	1 5/8" (1.63"-41.3mm) Fiber	5.00 - 32.71	1.0000	1.0000
L8	15	4" Wrap Seams	5.00 - 32.71	1.0000	1.0000
L8	16	4" Wrap Seams	5.00 - 32.71	1.0000	1.0000
L8	17	4" Wrap Seams	5.00 - 32.71	1.0000	1.0000

Discrete Tower Loads

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
(2) TPX-070821	A	From Leg	3.00	0.0000	151.50	No Ice	0.55	0.18	0.01
			0.00			1/2" Ice	0.56	0.25	0.01
			0.50			1" Ice	0.66	0.32	0.02
(2) TPX-070821	B	From Leg	3.00	0.0000	151.50	No Ice	0.55	0.18	0.01
			0.00			1/2" Ice	0.56	0.25	0.01
			0.50			1" Ice	0.66	0.32	0.02
(2) TPX-070821	C	From Leg	3.00	0.0000	151.50	No Ice	0.55	0.18	0.01
			0.00			1/2" Ice	0.56	0.25	0.01
			0.50			1" Ice	0.66	0.32	0.02
(2) LGP21401	A	From Leg	3.00	0.0000	151.50	No Ice	0.00	0.36	0.01
			0.00			1/2" Ice	1.45	0.48	0.02
			0.50			1" Ice	1.61	0.60	0.03
(2) LGP21401	B	From Leg	3.00	0.0000	151.50	No Ice	0.00	0.36	0.01
			0.00			1/2" Ice	1.45	0.48	0.02
			0.50			1" Ice	1.61	0.60	0.03
(2) LGP21401	C	From Leg	3.00	0.0000	151.50	No Ice	0.00	0.36	0.01
			0.00			1/2" Ice	1.45	0.48	0.02
			0.50			1" Ice	1.61	0.60	0.03
DC6-48-60-18-8F(32.8 lbs)	B	From Leg	0.50	0.0000	151.50	No Ice	1.28	0.79	0.02
			0.00			1/2" Ice	1.27	1.27	0.04
			0.50			1" Ice	1.45	1.45	0.05
DC6-48-60-18-8F(32.8 lbs)	C	From Leg	0.50	0.0000	151.50	No Ice	1.28	0.79	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			1/2" Ice	1.27	1.27	0.04
			0.50			1" Ice	1.45	1.45	0.05
RRUS 4426 B66	A	From Leg	3.00	0.0000	151.50	No Ice	1.65	0.73	0.05
			0.00			1/2" Ice	1.81	0.84	0.06
			0.50			1" Ice	1.98	0.97	0.08
RRUS 4426 B66	B	From Leg	3.00	0.0000	151.50	No Ice	1.65	0.73	0.05
			0.00			1/2" Ice	1.81	0.84	0.06
			0.50			1" Ice	1.98	0.97	0.08
RRUS 4426 B66	C	From Leg	3.00	0.0000	151.50	No Ice	1.65	0.73	0.05
			0.00			1/2" Ice	1.81	0.84	0.06
			0.50			1" Ice	1.98	0.97	0.08
RRUS 11 (Band 12) (55 lb)	A	From Leg	3.00	0.0000	151.50	No Ice	0.00	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.50			1" Ice	2.92	1.36	0.10
RRUS 11 (Band 12) (55 lb)	B	From Leg	3.00	0.0000	151.50	No Ice	0.00	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.50			1" Ice	2.92	1.36	0.10
RRUS 11 (Band 12) (55 lb)	C	From Leg	3.00	0.0000	151.50	No Ice	0.00	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.50			1" Ice	2.92	1.36	0.10
RRUS 32 (50.8 lbs)	B	From Leg	3.00	0.0000	151.50	No Ice	0.00	2.42	0.08
			0.00			1/2" Ice	0.00	2.64	0.10
			0.50			1" Ice	0.00	2.86	0.14
RRUS 32 (50.8 lbs)	C	From Leg	3.00	0.0000	151.50	No Ice	0.00	2.42	0.08
			0.00			1/2" Ice	0.00	2.64	0.10
			0.50			1" Ice	0.00	2.86	0.14
RRUS 32 (50.8 lbs)	C	From Leg	3.00	0.0000	151.50	No Ice	0.00	2.42	0.08
			0.00			1/2" Ice	0.00	2.64	0.10
			0.50			1" Ice	0.00	2.86	0.14
RRUS 32 B2	A	From Leg	3.00	0.0000	151.50	No Ice	0.00	1.67	0.05
			0.00			1/2" Ice	0.00	1.86	0.07
			0.50			1" Ice	0.00	2.05	0.10
RRUS 32 B2	A	From Leg	3.00	0.0000	151.50	No Ice	0.00	1.67	0.05
			0.00			1/2" Ice	0.00	1.86	0.07
			0.50			1" Ice	0.00	2.05	0.10
RRUS 32 B2	C	From Leg	3.00	0.0000	151.50	No Ice	0.00	1.67	0.05
			0.00			1/2" Ice	0.00	1.86	0.07
			0.50			1" Ice	0.00	2.05	0.10
7770.00	A	From Leg	3.00	0.0000	151.50	No Ice	5.51	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
			0.50			1" Ice	6.75	3.63	0.11
7770.00	B	From Leg	3.00	0.0000	151.50	No Ice	5.51	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
			0.50			1" Ice	6.75	3.63	0.11
7770.00	C	From Leg	3.00	0.0000	151.50	No Ice	5.51	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
			0.50			1" Ice	6.75	3.63	0.11
QS66512-2	A	From Leg	3.00	0.0000	151.50	No Ice	8.13	5.00	0.11
			0.00			1/2" Ice	9.23	5.80	0.17
			0.50			1" Ice	10.33	6.60	0.23
QS66512-2	B	From Leg	3.00	0.0000	151.50	No Ice	8.13	5.00	0.11
			0.00			1/2" Ice	9.23	5.80	0.17
			0.50			1" Ice	10.33	6.60	0.23
QS66512-2	C	From Leg	3.00	0.0000	151.50	No Ice	8.13	5.00	0.11
			0.00			1/2" Ice	9.23	5.80	0.17
			0.50			1" Ice	10.33	6.60	0.23
OPA-65R-LCUU-H6	A	From Leg	3.00	0.0000	151.50	No Ice	9.66	5.52	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00					1/2" Ice	10.13	5.97	0.13
			0.50					1" Ice	10.61	6.43	0.20
OPA-65R-LCUU-H6	B	From Leg	3.00			0.0000	151.50	No Ice	9.66	5.52	0.07
			0.00					1/2" Ice	10.13	5.97	0.13
			0.50					1" Ice	10.61	6.43	0.20
OPA-65R-LCUU-H6	C	From Leg	3.00			0.0000	151.50	No Ice	9.66	5.52	0.07
			0.00					1/2" Ice	10.13	5.97	0.13
			0.50					1" Ice	10.61	6.43	0.20
Flat Platform w/ Handrails	C	None				0.0000	151.50	No Ice	42.40	42.40	2.00
								1/2" Ice	48.40	48.40	2.45
								1" Ice	54.40	54.40	2.90
***											
KRY 112 144/2	A	From Leg	3.00			0.0000	142.00	No Ice	0.00	0.23	0.01
			0.00					1/2" Ice	0.00	0.30	0.01
			0.00					1" Ice	0.00	0.38	0.02
KRY 112 144/2	B	From Leg	3.00			0.0000	142.00	No Ice	0.00	0.23	0.01
			0.00					1/2" Ice	0.00	0.30	0.01
			0.00					1" Ice	0.00	0.38	0.02
KRY 112 144/2	C	From Leg	3.00			0.0000	142.00	No Ice	0.00	0.23	0.01
			0.00					1/2" Ice	0.00	0.30	0.01
			0.00					1" Ice	0.00	0.38	0.02
KRY 112 489/2	A	From Leg	3.00			0.0000	142.00	No Ice	0.00	0.36	0.02
			0.00					1/2" Ice	0.00	0.44	0.02
			0.00					1" Ice	0.00	0.54	0.03
KRY 112 489/2	B	From Leg	3.00			0.0000	142.00	No Ice	0.00	0.36	0.02
			0.00					1/2" Ice	0.00	0.44	0.02
			0.00					1" Ice	0.00	0.54	0.03
KRY 112 489/2	C	From Leg	3.00			0.0000	142.00	No Ice	0.00	0.36	0.02
			0.00					1/2" Ice	0.00	0.44	0.02
			0.00					1" Ice	0.00	0.54	0.03
Radio 4449 B12,B71	A	From Leg	3.00			0.0000	142.00	No Ice	1.64	1.16	0.07
			0.00					1/2" Ice	2.20	1.55	0.90
			0.00					1" Ice	2.76	1.94	1.73
Radio 4449 B12,B71	B	From Leg	3.00			0.0000	142.00	No Ice	1.64	1.16	0.07
			0.00					1/2" Ice	2.20	1.55	0.90
			0.00					1" Ice	2.76	1.94	1.73
Radio 4449 B12,B71	C	From Leg	3.00			0.0000	142.00	No Ice	1.64	1.16	0.07
			0.00					1/2" Ice	2.20	1.55	0.90
			0.00					1" Ice	2.76	1.94	1.73
AIR32 B66Aa/B2a	A	From Leg	3.00			0.0000	142.00	No Ice	6.51	2.70	0.13
			0.00					1/2" Ice	7.78	3.22	0.18
			0.00					1" Ice	9.05	3.74	0.22
AIR32 B66Aa/B2a	B	From Leg	3.00			0.0000	142.00	No Ice	6.51	2.70	0.13
			0.00					1/2" Ice	7.78	3.22	0.18
			0.00					1" Ice	9.05	3.74	0.22
AIR32 B66Aa/B2a	C	From Leg	3.00			0.0000	142.00	No Ice	6.51	2.70	0.13
			0.00					1/2" Ice	7.78	3.22	0.18
			0.00					1" Ice	9.05	3.74	0.22
APXVAARR24_43-U-NA20	A	From Leg	3.00			0.0000	142.00	No Ice	20.24	5.15	0.13
			0.00					1/2" Ice	23.53	5.99	0.24
			0.00					1" Ice	26.82	6.83	0.35
APXVAARR24_43-U-NA20	B	From Leg	3.00			0.0000	142.00	No Ice	20.24	5.15	0.13
			0.00					1/2" Ice	23.53	5.99	0.24
			0.00					1" Ice	26.82	6.83	0.35
APXVAARR24_43-U-NA20	C	From Leg	3.00			0.0000	142.00	No Ice	20.24	5.15	0.13
			0.00					1/2" Ice	23.53	5.99	0.24
			0.00					1" Ice	26.82	6.83	0.35

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Flat Platform w/ Handrails	C	None			0.0000	142.00	No Ice	42.40	42.40	2.00
							1/2" Ice	48.40	48.40	2.45
							1" Ice	54.40	54.40	2.90
***										
RRH2x50-08	A	From Face	3.00	0.00	0.0000	127.00	No Ice	1.70	1.10	0.05
				0.00			1/2" Ice	2.27	1.80	0.07
							1" Ice	2.84	2.50	0.09
RRH2x50-08	B	From Face	3.00	0.00	0.0000	127.00	No Ice	1.70	1.10	0.05
				0.00			1/2" Ice	2.27	1.80	0.07
							1" Ice	2.84	2.50	0.09
RRH2x50-08	C	From Face	3.00	0.00	0.0000	127.00	No Ice	1.70	1.10	0.05
				0.00			1/2" Ice	2.27	1.80	0.07
							1" Ice	2.84	2.50	0.09
800 MHz 2X50W RRH w/ Filter	A	From Leg	3.00	0.00	0.0000	127.00	No Ice	0.00	1.93	0.06
				0.00			1/2" Ice	2.24	2.11	0.09
							1" Ice	2.43	2.29	0.11
800 MHz 2X50W RRH w/ Filter	B	From Leg	3.00	0.00	0.0000	127.00	No Ice	0.00	1.93	0.06
				0.00			1/2" Ice	2.24	2.11	0.09
							1" Ice	2.43	2.29	0.11
800 MHz 2X50W RRH w/ Filter	C	From Leg	3.00	0.00	0.0000	127.00	No Ice	0.00	1.93	0.06
				0.00			1/2" Ice	2.24	2.11	0.09
							1" Ice	2.43	2.29	0.11
(2) 4x40W RRH (88 lb)	A	From Leg	3.00	0.00	0.0000	127.00	No Ice	0.00	3.80	0.09
				0.00			1/2" Ice	0.00	4.06	0.12
							1" Ice	0.00	4.34	0.15
(2) 4x40W RRH (88 lb)	C	From Leg	3.00	0.00	0.0000	127.00	No Ice	0.00	3.80	0.09
				0.00			1/2" Ice	0.00	4.06	0.12
							1" Ice	0.00	4.34	0.15
(2) 4x40W RRH (88 lb)	B	From Leg	3.00	0.00	0.0000	127.00	No Ice	0.00	3.80	0.09
				0.00			1/2" Ice	0.00	4.06	0.12
							1" Ice	0.00	4.34	0.15
TD-RRH8x20	A	From Face	3.00	0.00	0.0000	127.00	No Ice	0.00	1.40	0.07
				0.00			1/2" Ice	4.59	1.61	0.09
							1" Ice	4.88	1.82	0.12
TD-RRH8x20	B	From Face	3.00	0.00	0.0000	127.00	No Ice	0.00	1.40	0.07
				0.00			1/2" Ice	4.59	1.61	0.09
							1" Ice	4.88	1.82	0.12
TD-RRH8x20	C	From Face	3.00	0.00	0.0000	127.00	No Ice	0.00	1.40	0.07
				0.00			1/2" Ice	4.59	1.61	0.09
							1" Ice	4.88	1.82	0.12
APXVSPP18-C-A20	A	From Leg	3.00	0.00	0.0000	127.00	No Ice	8.02	5.28	0.06
				0.00			1/2" Ice	8.48	5.74	0.11
							1" Ice	8.94	6.20	0.16
APXVSPP18-C-A20	B	From Leg	3.00	0.00	0.0000	127.00	No Ice	8.02	5.28	0.06
				0.00			1/2" Ice	8.48	5.74	0.11
							1" Ice	8.94	6.20	0.16
APXV9ERR18-C-A20	C	From Leg	3.00	0.00	0.0000	127.00	No Ice	8.02	5.81	0.06
				0.00			1/2" Ice	8.48	6.27	0.11
							1" Ice	8.94	6.73	0.17
DT465B-2XR	A	From Leg	3.00	0.00	0.0000	127.00	No Ice	9.10	5.97	0.06
				0.00			1/2" Ice	9.56	6.43	0.12
							1" Ice	10.04	6.90	0.18
DT465B-2XR	B	From Leg	3.00	0.00	0.0000	127.00	No Ice	9.10	5.97	0.06
				0.00			1/2" Ice	9.56	6.43	0.12
							1" Ice	10.04	6.90	0.18
DT465B-2XR	C	From Leg	3.00	0.00	0.0000	127.00	No Ice	9.10	5.97	0.06
				0.00			1/2" Ice	9.56	6.43	0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1" Ice	10.04	6.90	0.18
Round Platform w/ Handrails	C	None			0.0000	127.00	No Ice	27.20	27.20	2.00
							1/2" Ice	34.20	34.20	2.40
							1" Ice	41.20	41.20	2.80
***										
AirScale RRH 4T4R B5 160W AHCA	A	From Leg	3.00	0.00	0.0000	119.00	No Ice	1.29	0.65	0.04
			0.00				1/2" Ice	1.75	0.88	0.05
			0.00				1" Ice	2.21	1.11	0.06
AirScale RRH 4T4R B5 160W AHCA	B	From Leg	3.00	0.00	0.0000	119.00	No Ice	1.29	0.65	0.04
			0.00				1/2" Ice	1.75	0.88	0.05
			0.00				1" Ice	2.21	1.11	0.06
AirScale RRH 4T4R B5 160W AHCA	C	From Leg	3.00	0.00	0.0000	119.00	No Ice	1.29	0.65	0.04
			0.00				1/2" Ice	1.75	0.88	0.05
			0.00				1" Ice	2.21	1.11	0.06
RRH2X60-AWS	A	From Leg	3.00	0.00	0.0000	119.00	No Ice	0.00	1.49	0.04
			0.00				1/2" Ice	2.40	1.67	0.06
			0.00				1" Ice	2.61	1.86	0.08
RRH2X60-AWS	B	From Leg	3.00	0.00	0.0000	119.00	No Ice	0.00	1.49	0.04
			0.00				1/2" Ice	2.40	1.67	0.06
			0.00				1" Ice	2.61	1.86	0.08
RRH2X60-AWS	C	From Leg	3.00	0.00	0.0000	119.00	No Ice	0.00	1.49	0.04
			0.00				1/2" Ice	2.40	1.67	0.06
			0.00				1" Ice	2.61	1.86	0.08
B25 RRH4x30	A	From Leg	3.00	0.00	0.0000	119.00	No Ice	0.00	1.29	0.05
			0.00				1/2" Ice	2.31	1.45	0.07
			0.00				1" Ice	2.50	1.61	0.09
B25 RRH4x30	B	From Leg	3.00	0.00	0.0000	119.00	No Ice	0.00	1.29	0.05
			0.00				1/2" Ice	2.31	1.45	0.07
			0.00				1" Ice	2.50	1.61	0.09
B25 RRH4x30	C	From Leg	3.00	0.00	0.0000	119.00	No Ice	0.00	1.29	0.05
			0.00				1/2" Ice	2.31	1.45	0.07
			0.00				1" Ice	2.50	1.61	0.09
B13 RRH4x30-4R	A	From Leg	3.00	0.00	0.0000	119.00	No Ice	2.14	1.59	0.06
			0.00				1/2" Ice	2.33	1.76	0.08
			0.00				1" Ice	2.53	1.94	0.10
B13 RRH4x30-4R	B	From Leg	3.00	0.00	0.0000	119.00	No Ice	2.14	1.59	0.06
			0.00				1/2" Ice	2.33	1.76	0.08
			0.00				1" Ice	2.53	1.94	0.10
B13 RRH4x30-4R	C	From Leg	3.00	0.00	0.0000	119.00	No Ice	2.14	1.59	0.06
			0.00				1/2" Ice	2.33	1.76	0.08
			0.00				1" Ice	2.53	1.94	0.10
DB-T1-6Z-8AB-0Z	B	From Leg	0.50	0.00	0.0000	119.00	No Ice	4.80	2.00	0.04
			0.00				1/2" Ice	5.07	2.19	0.08
			0.00				1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	C	From Leg	0.50	0.00	0.0000	119.00	No Ice	4.80	2.00	0.04
			0.00				1/2" Ice	5.07	2.19	0.08
			0.00				1" Ice	5.35	2.39	0.12
(2) JAHH-65B-R3B	A	From Leg	3.00	0.00	0.0000	119.00	No Ice	9.11	5.98	0.06
			0.00				1/2" Ice	9.58	6.44	0.12
			0.00				1" Ice	10.05	6.91	0.18
(2) JAHH-65B-R3B	B	From Leg	3.00	0.00	0.0000	119.00	No Ice	9.11	5.98	0.06
			0.00				1/2" Ice	9.58	6.44	0.12
			0.00				1" Ice	10.05	6.91	0.18
(2) JAHH-65B-R3B	C	From Leg	3.00	0.00	0.0000	119.00	No Ice	9.11	5.98	0.06
			0.00				1/2" Ice	9.58	6.44	0.12
			0.00				1" Ice	10.05	6.91	0.18
(2) LPA-80063-6CF-EDIN-X	A	From Leg	3.00	0.00	0.0000	119.00	No Ice	9.73	9.06	0.03

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			1/2" Ice	11.07	9.61	0.10
			0.00			1" Ice	11.64	10.16	0.18
(2) LPA-80063-6CF-EDIN-X	B	From Leg	3.00	0.0000	119.00	No Ice	9.73	9.06	0.03
			0.00			1/2" Ice	11.07	9.61	0.10
			0.00			1" Ice	11.64	10.16	0.18
(2) LPA-80063-6CF-EDIN-X	C	From Leg	3.00	0.0000	119.00	No Ice	9.73	9.06	0.03
			0.00			1/2" Ice	11.07	9.61	0.10
			0.00			1" Ice	11.64	10.16	0.18
Round Low Profile Platform	C	None		0.0000	119.00	No Ice	21.70	21.70	1.50
						1/2" Ice	27.20	27.20	1.70
						1" Ice	32.70	32.70	1.90

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
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

Comb. No.	Description
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 Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection ft	Gov. Load Comb.	Tilt °	Twist °
L1	151.5 - 141	1.906	46	1.2704	0.0019
L2	141 - 120.33	1.677	40	1.2346	0.0012
L3	120.33 - 111.19	1.253	40	1.1239	0.0014
L4	111.19 - 82.08	1.077	40	1.0718	0.0014
L5	82.08 - 70.06	0.592	40	0.8186	0.0011
L6	70.06 - 42.24	0.432	40	0.7066	0.0010
L7	42.24 - 32.71	0.157	40	0.4198	0.0005
L8	32.71 - 0	0.095	40	0.3274	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection ft	Tilt °	Twist °	Radius of Curvature ft
151.50	(2) TPX-070821	46	1.906	1.2704	0.0019	19274
142.00	KRY 112 144/2	40	1.698	1.2387	0.0012	10688
127.00	RRH2x50-08	40	1.385	1.1620	0.0013	11150
119.00	AirScale RRH 4T4R B5 160W AHCA	40	1.227	1.1166	0.0014	11209

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection ft	Gov. Load Comb.	Tilt °	Twist °
L1	151.5 - 141	8.974	16	5.9815	0.0091
L2	141 - 120.33	7.892	4	5.8202	0.0055
L3	120.33 - 111.19	5.895	4	5.3019	0.0064
L4	111.19 - 82.08	5.070	4	5.0552	0.0065
L5	82.08 - 70.06	2.788	4	3.8576	0.0053

Section No.	Elevation ft	Horz. Deflection ft	Gov. Load Comb.	Tilt °	Twist °
L6	70.06 - 42.24	2.033	4	3.3289	0.0045
L7	42.24 - 32.71	0.738	4	1.9761	0.0025
L8	32.71 - 0	0.446	4	1.5409	0.0019

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection ft	Tilt °	Twist °	Radius of Curvature ft
151.50	(2) TPX-070821	16	8.974	5.9815	0.0091	4250
142.00	KRY 112 144/2	4	7.994	5.8387	0.0058	2355
127.00	RRH2x50-08	4	6.520	5.4813	0.0063	2411
119.00	AirScale RRH 4T4R B5 160W AHCA	4	5.773	5.2673	0.0064	2412

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	151.5 - 141 (1)	TP17.7841x17.1872x0.24	10.50	0.00	0.0	13.5581	-7.81	999.37	0.008
L2	141 - 120.33 (2)	TP31.557x17.7841x0.3059	20.67	0.00	0.0	30.7823	-14.21	2146.63	0.007
L3	120.33 - 111.19 (3)	TP33.028x31.557x0.3063	9.14	0.00	0.0	32.2730	-18.42	2210.95	0.008
L4	111.19 - 82.08 (4)	TP38.347x33.028x0.3141	29.11	0.00	0.0	38.4666	-24.18	2491.00	0.010
L5	82.08 - 70.06 (5)	TP39.711x38.347x0.3804	12.02	0.00	0.0	48.1756	-27.23	3343.96	0.008
L6	70.06 - 42.24 (6)	TP43.95x39.711x0.4014	27.82	0.00	0.0	56.2869	-35.21	3831.48	0.009
L7	42.24 - 32.71 (7)	TP45.064x43.95x0.4706	9.53	0.00	0.0	67.5738	-38.50	4843.91	0.008
L8	32.71 - 0 (8)	TP49.552x45.064x0.4906	32.71	0.00	0.0	77.5039	-50.72	5448.80	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	151.5 - 141 (1)	TP17.7841x17.1872x0.24	59.49	355.17	0.168	0.00	355.17	0.000
L2	141 - 120.33 (2)	TP31.557x17.7841x0.3059	303.76	1364.17	0.223	0.00	1364.17	0.000
L3	120.33 -	TP33.028x31.557x0.3063	492.32	1471.78	0.335	0.00	1471.78	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	111.19 (3)							
L4	111.19 - 82.08 (4)	TP38.347x33.028x0.3141	1224.79	1929.46	0.635	0.00	1929.46	0.000
L5	82.08 - 70.06 (5)	TP39.711x38.347x0.3804	1574.83	2674.77	0.589	0.00	2674.77	0.000
L6	70.06 - 42.24 (6)	TP43.95x39.711x0.4014	2483.06	3394.93	0.731	0.00	3394.93	0.000
L7	42.24 - 32.71 (7)	TP45.064x43.95x0.4706	2824.03	4389.17	0.643	0.00	4389.17	0.000
L8	32.71 - 0 (8)	TP49.552x45.064x0.4906	4075.49	5434.94	0.750	0.00	5434.94	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	151.5 - 141 (1)	TP17.7841x17.1872x0.24	9.59	499.68	0.019	0.41	723.49	0.001
L2	141 - 120.33 (2)	TP31.557x17.7841x0.3059	15.51	1073.31	0.014	0.59	2775.27	0.000
L3	120.33 - 111.19 (3)	TP33.028x31.557x0.3063	22.43	1105.48	0.020	0.02	2993.78	0.000
L4	111.19 - 82.08 (4)	TP38.347x33.028x0.3141	28.02	1245.50	0.022	1.24	3923.29	0.000
L5	82.08 - 70.06 (5)	TP39.711x38.347x0.3804	30.27	1671.98	0.018	1.74	5441.35	0.000
L6	70.06 - 42.24 (6)	TP43.95x39.711x0.4014	35.05	1915.74	0.018	2.90	6905.35	0.000
L7	42.24 - 32.71 (7)	TP45.064x43.95x0.4706	36.52	2421.95	0.015	3.27	8931.67	0.000
L8	32.71 - 0 (8)	TP49.552x45.064x0.4906	39.98	2724.40	0.015	3.27	11057.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	151.5 - 141 (1)	0.008	0.168	0.000	0.019	0.001	0.176 ✔	1.000	4.8.2 ✔
L2	141 - 120.33 (2)	0.007	0.223	0.000	0.014	0.000	0.230 ✔	1.000	4.8.2 ✔
L3	120.33 - 111.19 (3)	0.008	0.335	0.000	0.020	0.000	0.343 ✔	1.000	4.8.2 ✔
L4	111.19 - 82.08 (4)	0.010	0.635	0.000	0.022	0.000	0.645 ✔	1.000	4.8.2 ✔
L5	82.08 - 70.06 (5)	0.008	0.589	0.000	0.018	0.000	0.597 ✔	1.000	4.8.2 ✔
L6	70.06 - 42.24 (6)	0.009	0.731	0.000	0.018	0.000	0.741 ✔	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L7	42.24 - 32.71 (7)	0.008	0.643	0.000	0.015	0.000	0.652 ✔	1.000	4.8.2 ✔
L8	32.71 - 0 (8)	0.009	0.750	0.000	0.015	0.000	0.759 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	151.5 - 141	Pole	TP17.7841x17.1872x0.24	1	-7.81	999.37	17.6	Pass
L2	141 - 120.33	Pole	TP31.557x17.7841x0.3059	2	-14.21	2146.63	23.0	Pass
L3	120.33 - 111.19	Pole	TP33.028x31.557x0.3063	3	-18.42	2210.95	34.3	Pass
L4	111.19 - 82.08	Pole	TP38.347x33.028x0.3141	4	-24.18	2491.00	64.5	Pass
L5	82.08 - 70.06	Pole	TP39.711x38.347x0.3804	5	-27.23	3343.96	59.7	Pass
L6	70.06 - 42.24	Pole	TP43.95x39.711x0.4014	6	-35.21	3831.48	74.1	Pass
L7	42.24 - 32.71	Pole	TP45.064x43.95x0.4706	7	-38.50	4843.91	65.2	Pass
L8	32.71 - 0	Pole	TP49.552x45.064x0.4906	8	-50.72	5448.80	75.9	Pass
							Summary	
						Pole (L8)	75.9	Pass
						RATING =	**75.9**	**Pass**

Base Plate & Anchor Rod Analysis

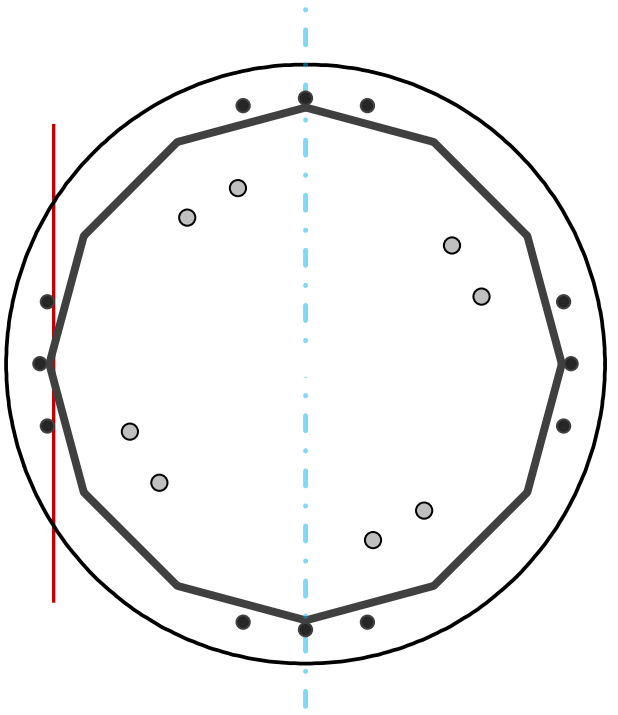
Pole Dimensions		
Number of Sides	12	-
Diameter	51	in
Thickness	0.75	in
Orientation Offset		°

Base Reactions		
Moment, Mu	4075	k-ft
Axial, Pu	51	k
Shear, Vu	40	k
Neutral Axis	90	°

Report Capacities		
Component	Capacity	Result
Base Plate	49%	Pass
Anchor Rods	83%	Pass
Dwyidag	-	-

Base Plate		
Shape	Round	-
Diameter, ø	62	in
Thickness	2	in
Grade	A572-60	-
Yield Strength, Fy	60	ksi
Tensile Strength, Fu	75	ksi
Clip	N/A	in
Orientation Offset		°
Anchor Rod Detail	c	η=0.55
Clear Distance	N/A	in
Applied Moment, Mu	766.0	k
Bending Stress, ϕMn	1563.2	k

Original Anchor Rods		
Arrangement	Cluster	-
Quantity	12	-
Diameter, ø	1 3/4	in
Bolt Circle	55	in
Grade	Other	
Yield Strength, Fy	127.7	ksi
Tensile Strength, Fu	150	ksi
Spacing	6.5	in
Orientation Offset	45	°
Applied Force, Pu	189.9	k
Anchor Rods, ϕPn	227.9	k



Additional Anchor Rods		
Quantity	8	-
Diameter, ø	2 1/4	in
Bolt Circle	39	in
Grade	A325	
Yield Strength, Fy	92	ksi
Tensile Strength, Fu	120	ksi
Bypass Base?	No	
Orientation Offset		°
Applied Force, Pu	214.0	k
Additional Rod, ϕPn	311.8	k

Calculations for Monopole Base Plate & Anchor Rod Analysis

Reaction Distribution

Reaction	Shear Vu	Moment Mu	Factor
-	k	k-ft	-
Base Forces	40.0	4075.0	1.00
Anchor Rod Forces	36.1	2589.5	0.64
Additional Bolt (Grp1) Forces	3.9	1485.5	0.36
Additional Bolt (Grp2) Forces	0.0	0.0	0.00
Dywidag Forces	0.0	0.0	0.00
Stiffener Forces	0.0	0.0	0.00

Geometric Properties

Section	Gross Area	Net Area	Individual Inertia	Threads per Inch	Moment of Inertia
-	in^2	in^2	in^4	#	in^4
Pole	117.0509	9.7542	1.8426		36967.22
Bolt	2.4053	1.8995	0.2871	5	8622.24
Bolt1	3.9761	3.2477	0.8393	4.5	4946.45
Bolt2	0.0000	0.0000	0.0000	0	0.00
Dywidag	0.0000	0.0000	0.0000		0.00
Stiffener	0.0000	0.0000	0.0000		0.00

Base Plate

Shape	Round	-
Diameter, D	62	in
Thickness, t	2	in
Yield Strength, Fy	60	ksi
Tensile Strength, Fu	75	ksi
Base Plate Chord	35.256	in
Detail Type	c	-
Detail Factor	0.55	-
Clear Distance	N/A	-

External Base Plate

Chord Length AA	24.949	in
Additional AA	4.000	in
Section Modulus, Z	28.949	in^3
Applied Moment, Mu	766.0	k-ft
Bending Capacity, ϕMn	1563.2	k-ft
Capacity, Mu/ϕMn	0.490	OK
Chord Length AB	20.829	in
Additional AB	4.000	in
Section Modulus, Z	24.829	in^3
Applied Moment, Mu	260.6	k-ft
Bending Capacity, ϕMn	1340.8	k-ft
Capacity, Mu/ϕMn	0.194	OK
Bend Line Length	0.000	in
Additional Bend Line	0.000	in
Section Modulus, Z	0.000	in^3
Applied Moment, Mu	0.0	k-ft
Bending Capacity, ϕMn	0.0	k-ft
Capacity, Mu/ϕMn		

Internal Base Plate

Arc Length	0.000	in
Section Modulus, Z	0.000	in^3
Moment Arm	0.000	in
Applied Moment, Mu	0.0	k-ft
Bending Capacity, ϕMn	0.0	k-ft
Capacity, Mu/ϕMn		

Anchor Rods

Anchor Rod Quantity, N	12	-
Rod Diameter, d	1.75	in
Bolt Circle, BC	55	in
Yield Strength, Fy	127.7	ksi
Tensile Strength, Fu	150	ksi
Applied Axial, Pu	189.9	k
Applied Shear, Vu	0.0	k
Compressive Capacity, ϕPn	227.9	k
Tensile Capacity, ϕRnt	0.833	OK
Interaction Capacity	0.833	OK

Additional Bolt Group 1

Bolt Quantity, N	8	-
Bolt Diameter, d	2.25	in
Bolt Circle, BC	39	in
Yield Strength, Fy	92	ksi
Tensile Strength, Fu	120	ksi
Applied Axial, Pu	214.0	k
Applied Shear, Vu	0.0	k
Compressive Capacity, ϕPn	311.8	k
Compressive Capacity, ϕPn	0.686	OK
Interaction Capacity	0.686	OK

Additional Bolt Group 2

Bolt Quantity, N	0	-
Bolt Diameter, d	0	in
Bolt Circle, BC	0	in
Yield Strength, Fy	0	ksi
Tensile Strength, Fu	0	ksi
Applied Axial, Pu	0.0	k
Applied Shear, Vu	0.0	k
Compressive Capacity, ϕPn	0.0	k
Compressive Capacity, ϕPn		
Interaction Capacity		

Dywidag Reinforcement

Dywidag Quantity, N	0	-
Dywidag Diameter, d	2.5	in
Bolt Circle, BC	57.88	in
Yield Strength, Fy	80	ksi
Tensile Strength, Fu	100	ksi
Applied Axial, Pu	0.0	k
Compressive Capacity, ϕPn	0.0	k
Capacity, Pu/ϕPn		

Base Plate Stiffeners

Applied Axial Force, Pu	0.0	k
Applied Horizontal Force, Vu	0.00	k

Vertical Weld

Vert.-to-Stiffener a=e_x/l	#DIV/0!	-
Spacing Ratio, k	#DIV/0!	-
Weld Coefficient, C	#DIV/0!	-
Compressive Capacity, ϕPn	#DIV/0!	k
Vert.-to-Plate a=e_x/l	#DIV/0!	-
Spacing Ratio, k	#DIV/0!	-
Weld Coefficient, C	#DIV/0!	-
Shear Capacity, ϕVn	#DIV/0!	k
$P_u/\phi_P P_n + V_u/\phi_V V_n$	-	

Horizontal Weld

Horz.-to-Stiffener a=e_x/l	#DIV/0!	-
Spacing Ratio, k	#DIV/0!	-
Weld Coefficient, C	#DIV/0!	-
Effective Fillet	0.000	in
Compressive Capacity, ϕPn	#DIV/0!	k
Horz.-to-Pole a=e_x/l	#DIV/0!	-
Spacing Ratio, k	#DIV/0!	-
Weld Coefficient, C	#DIV/0!	-
Shear Capacity, ϕVn	#DIV/0!	k
$P_u/\phi_P P_n + V_u/\phi_V V_n$	-	

Plate Tension

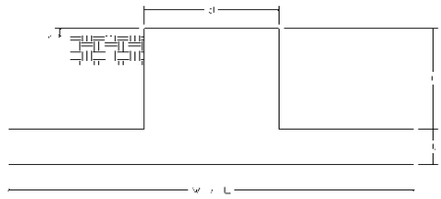
Gross Cross Section	0.000	in^2
Net Cross Section	0.000	in^2
Tensile Capacity, ϕTn	0.0	k
Capacity, Tu/ϕTn	-	

Plate Compression

Radius of Gyration	#DIV/0!	in^3
kl/r	#DIV/0!	-
4.71 $\sqrt{(E/Fy)}$	0.00	-
Buckling Stress(Fe)	0.0	-
Crit. Buckling Stress(Fcr)	0.0	ksi
Compressive Capacity, ϕPn	0.0	k
Capacity, Pu/ϕPn	-	

Site Name:	Brln-Berlin
Site Number:	302483
Engineering Number:	OAA731959
Engineer:	TJG
Date:	11/01/18
Tower Type:	MP

Program Last Updated: *5/13/2014*



Design Loads (Factored) - Analysis per TIA-222-G Standards

Design / Analysis / Mapping:	Mapping	
Compression/Leg:	**51**	
Total Shear:	**40**	k
Moment:	**4075**	k-ft
Tower + Appurtenance Weight:	**51**	k
Depth to Base of Foundation (l + t - h):	8	ft
Diameter of Pier (d):	7	ft
Height of Pier above Ground (h):	0.5	ft
Width of Pad (W):	11	ft
Length of Pad (L):	11	ft
Thickness of Pad (t):	2.6	ft
Tower Leg Center to Center:	0	ft
Number of Tower Legs:	1	(1 if MP or GT)
Tower Center from Mat Center:	0	ft
Depth Below Ground Surface to Water Table:	99	ft
Unit Weight of Concrete:	150	pcf
Unit Weight of Soil Above Water Table:	135	pcf
Unit Weight of Water:	62.4	pcf
Unit Weight of Soil Below Water Table:	72.6	pcf
Friction Angle of Uplift:	40	Degrees
Ultimate Coefficient of Shear Friction:	0.35	
Ultimate Compressive Bearing Pressure:	52000	psf
Ultimate Passive Pressure on Pad Face:	500	psf
Factored Moment Applied to Rock Anchors	**3170**	**k-ft**
$\phi_{Soil\ and\ Concrete\ Weight}$:	0.9	
ϕ_{Soil}:	0.75	

Rock Anchor Usage

Rock Anchor Resistance:	3360.0	k
Rock Anchor Tensile Resistance:	0.992	Result: OK

Overturning Moment Usage

Design OTM:	4415.0	k-ft
Weight of Soil and Concrete OTM Resistance:	141.4	k
OTM Resistance from Soil and Concrete:	777.6	k-ft
OTM Resistance from Tower:	233.8	k-ft
OTM Resistance from Soil Facture:	527.8	k-ft
OTM Resistance from Passive Pressure on Pad Face:	16.5	k-ft
OTM Resistance:	4570.1	k-ft
Design OTM / OTM Resistance:	0.966	Result: OK

Soil Bearing Pressure Usage

Total Weight (Foundation, Soil, Tower):	187.9	k
Factored Nominal Bearing Pressure:	39000	psf
Net Bearing Pressure/Factored Nominal Bearing Pressure:	0.40	Result: OK
Load Direction Controling Design Bearing Pressure:	Diagonal to Pad Edge	

Sliding Factor of Safety

Total Factored Sliding Resistance:	58.9	k
Sliding Design / Sliding Resistance:	0.68	Result: OK

Exhibit 4

Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT1014

FA#: 10034969

Berlin NE
260 Beckley Road
Berlin, CT 06037

November 26, 2018

Centerline Communications Project Number: 950006-146

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**14.11 %**

November 26, 2018

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

Emissions Analysis for Site: **CT1014 – Berlin NE**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **260 Beckley Road, Berlin, 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 **260 Beckley Road, Berlin, 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
LTE	700 MHz	2	40
LTE	2300 MHz (WCS)	4	30
LTE	850 MHz	2	40
LTE	700 MHz (Band 14)	2	40
LTE	1900 MHz (PCS)	4	40
5G	850 MHz	2	25
LTE	2100 MHz (AWS)	4	30

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) 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	Powerwave 7770	152
A	2	CCI OPA-65R-LCUU-H6	152
A	3	Quintel QS66512-2	152
B	1	Powerwave 7770	152
B	2	CCI OPA-65R-LCUU-H6	152
B	3	Quintel QS66512-2	152
C	1	Powerwave 7770	152
C	2	CCI OPA-65R-LCUU-H6	152
C	3	Quintel QS66512-2	152

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	Powerwave 7770	850 MHz	11.4	2	60	828.23	0.25
Antenna A2	CCI OPA-65R-LCUU-H6	700 MHz / 2300 MHz (WCS)	11.65 / 15.45	6	200	5,378.76	1.13
Antenna A3	Quintel QS66512-2	850 MHz / 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS)	11.35 / 10.85 / 13.85 / 14.35	12	530	10,383.20	2.26
						Sector A Composite MPE%	**3.64**
Antenna B1	Powerwave 7770	850 MHz	11.4	2	60	828.23	0.25
Antenna B2	CCI OPA-65R-LCUU-H6	700 MHz / 2300 MHz (WCS)	11.65 / 15.45	6	200	5,378.76	1.13
Antenna B3	Quintel QS66512-2	850 MHz / 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS)	11.35 / 10.85 / 13.85 / 14.35	12	530	10,383.20	2.26
						Sector B Composite MPE%	**3.64**
Antenna C1	Powerwave 7770	850 MHz	11.4	2	60	828.23	0.25
Antenna C2	CCI OPA-65R-LCUU-H6	700 MHz / 2300 MHz (WCS)	11.65 / 15.45	6	200	5,378.76	1.13
Antenna C3	Quintel QS66512-2	850 MHz / 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS)	11.35 / 10.85 / 13.85 / 14.35	12	530	10,383.20	2.26
						Sector C Composite MPE%	**3.64**

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	**3.64 %**
MetroPCS	0.66 %
Berlin FD	0.02 %
Verizon Wireless	7.17 %
T-Mobile	0.40 %
Sprint	1.14 %
Nextel	1.08 %
Site Total MPE %:	**14.11 %**

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	3.64 %
AT&T Sector B Total:	3.64 %
AT&T Sector C Total:	3.64 %
Site Total:	14.11 %

Table 5: Site MPE Summary

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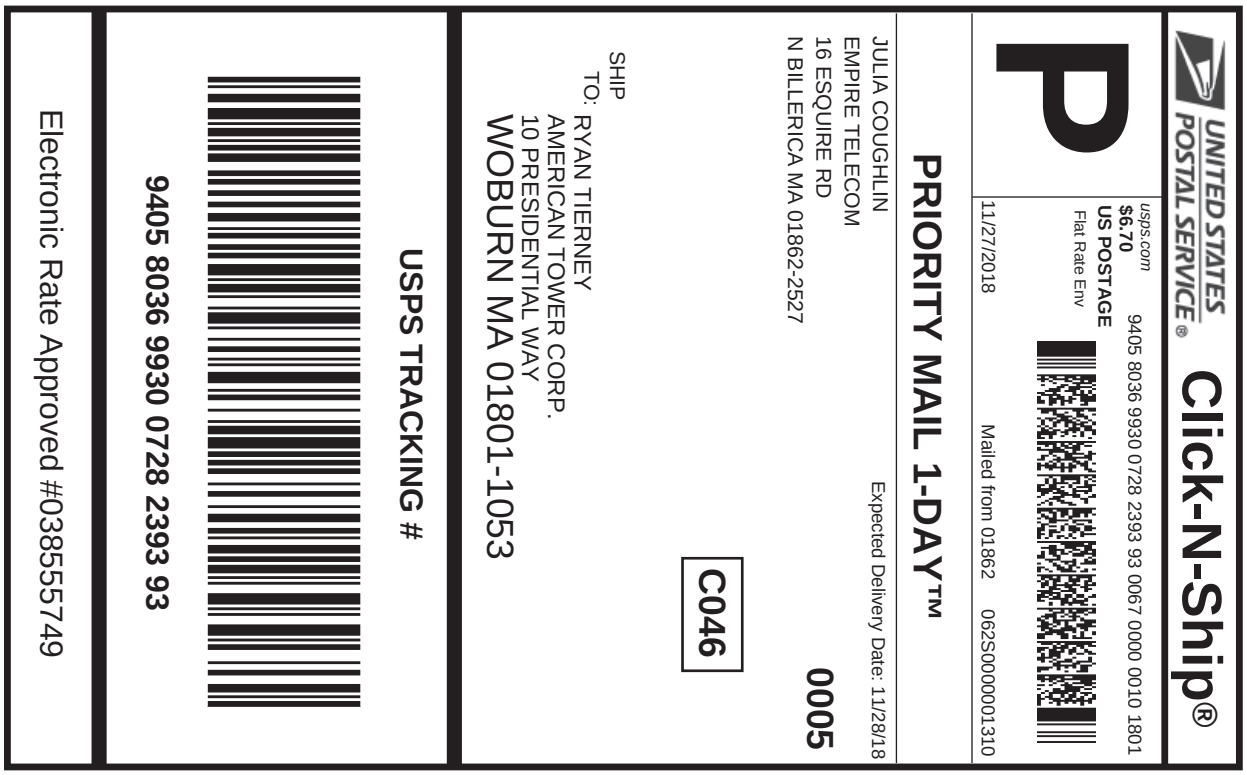

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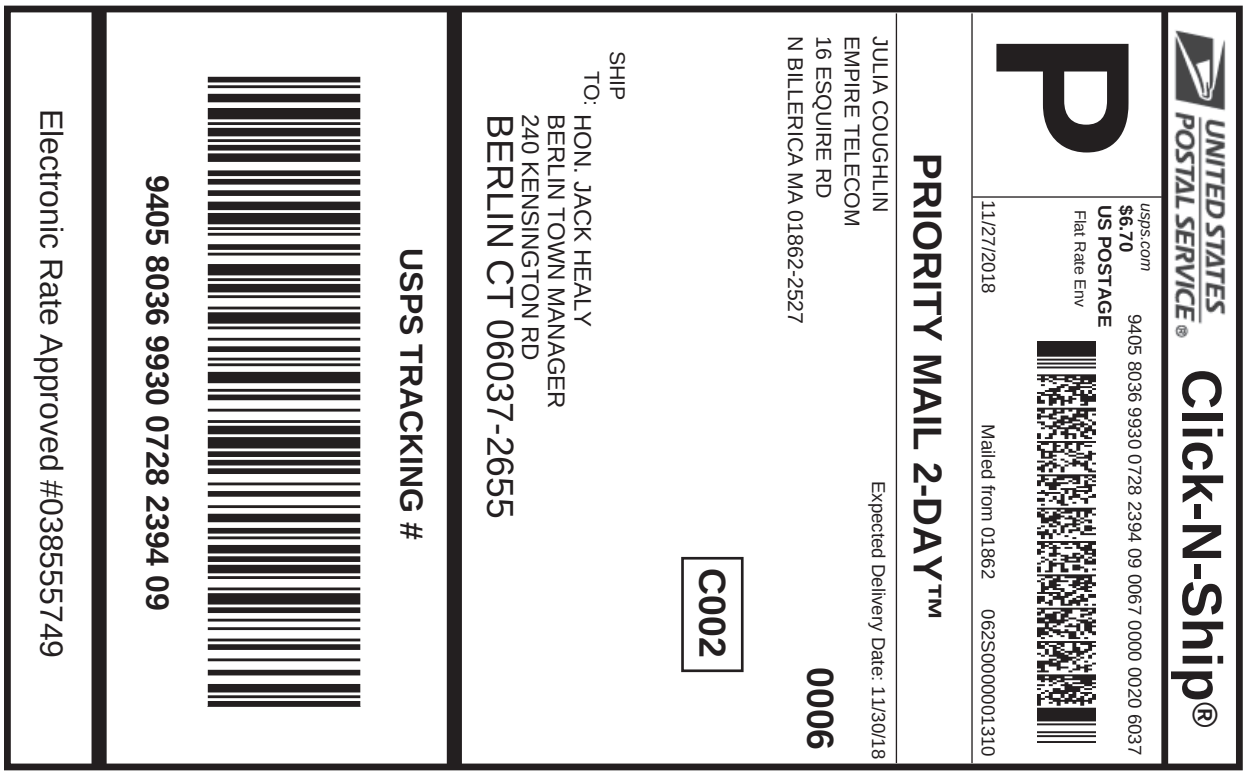

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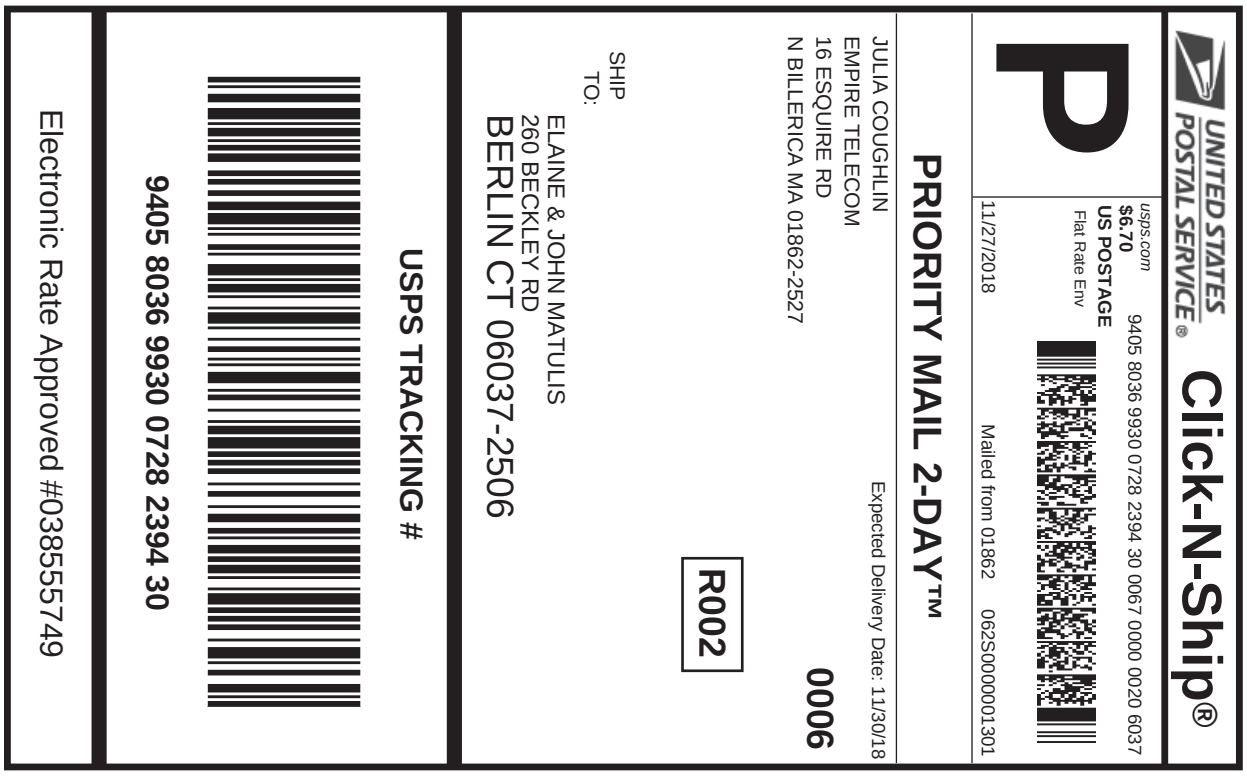
Check the status of your shipment on the USPS Tracking® page at usps.com



Cut on dotted line.

Instructions

1. **Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.**
2. **Place your label so it does not wrap around the edge of the package.**
3. **Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.**
4. **To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.**
5. **Mail your package on the "Ship Date" you selected when creating this label.**

Click-N-Ship® Label Record

USPS TRACKING # / Insurance Number:
9405 8036 9930 0728 2394 30

Trans. #:	449645149
Print Date:	11/27/2018
Ship Date:	11/27/2018
Expected Delivery Date:	11/30/2018
Insured Value:	$50.00

Priority Mail® Postage:	**$6.70**
Insurance Fee	**$0.00**
Total	**$6.70**

From: JULIA COUGHLIN
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA MA 01862-2527

To: ELAINE & JOHN MATULIS
260 BECKLEY RD
BERLIN CT 06037-2506

* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.

Thank you for shipping with the United States Postal Service!
Check the status of your shipment on the USPS Tracking® page at usps.com

UNITED STATES POSTAL SERVICE®

Shipment Confirmation Acceptance Notice

A. Mailer Action

Note To Mailer: The labels and volume associated to this form online, **must** match the labeled packages being presented to the USPS® employee with this form.

Shipment Date: 11/27/18

Shipped From:

JULIA COUGHLIN
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA MA 01862-2527

Type of Mail	Volume
Priority Mail®	6
Priority Mail Express™*	0
International Mail*	0
Other	0
Total Volume	6

*Start time for products with service guarantees will begin when mail arrives at the local Post Office™ and items receive individual processing and acceptance scans.

B. USPS Action

- USPS EMPLOYEE: Please scan upon pickup or receipt of mail. Leave form with customer or in customer's mail receptacle.
- Employee verifies the package volume count on the Package Pickup Carrier Manifest.
  - If the volume on the manifest matches the volume being collected from the customer, the employee should make the **1:YES** selection by pressing the number 1 on the keypad of the handheld scanner, or on the keyboard of the POS ONE terminal.
  - If the volume on the manifest does not match the volume being collected from the customer, the employee should make the **2:NO** selection**.** The mail should still be collected and dispatched as normal.

USPS SCAN

9475 7036 9930 0293 5393 33

ALERT: ALL USPS® RETAIL LOCATIONS WILL BE CLOSED ON WED., DEC. 5 TO HONOR PRES…

USPS Tracking®

FAQs > (https://www.usps.com/faqs/uspstracking-faqs.htm)

Track Another Package +

Tracking Number: 9405803699300728239430

Remove ×

Expected Delivery on

FRIDAY
30 NOVEMBER 2018 ⓘ

by
8:00pm ⓘ

Feedback

Delivered

November 30, 2018 at 3:02 pm
Delivered, In/At Mailbox
BERLIN, CT 06037

Get Updates ⌄

Text & Email Updates ⌄

Tracking History ⌄

Product Information ⌄

See Less ⌃

Remove ×

Tracking Number: 9405803699300728239386

Expected Delivery on

FRIDAY

30 NOVEMBER 2018 ⓘ

by **8:00pm** ⓘ

Delivered

November 30, 2018 at 10:08 am
Delivered, Front Desk/Reception/Mail Room
BERLIN, CT 06037

Get Updates ⌄

See More ⌄

Feedback

Remove ×

Tracking Number: 9405803699300728239423

Expected Delivery on

FRIDAY

30 NOVEMBER 2018 ⓘ

by **8:00pm** ⓘ

Delivered

November 30, 2018 at 10:08 am
Delivered, Front Desk/Reception/Mail Room
BERLIN, CT 06037

Get Updates ⌄

See More ⌄

Remove ×

Tracking Number: 9405803699300728239416

Expected Delivery on

FRIDAY

30 NOVEMBER 2018 ⓘ

by **8:00pm** ⓘ

Delivered

November 30, 2018 at 10:08 am
Delivered, Front Desk/Reception/Mail Room
BERLIN, CT 06037

Get Updates ⌄

See More ⌄

Feedback

Remove ×

Tracking Number: 9405803699300728239409

Expected Delivery on

FRIDAY

30 NOVEMBER 2018 ⓘ

by **8:00pm** ⓘ

Delivered

November 30, 2018 at 10:08 am
Delivered, Front Desk/Reception/Mail Room
BERLIN, CT 06037

Get Updates ⌄

See More ⌄

Remove ×

Tracking Number: 9405803699300728239393

Your item was delivered to the front desk, reception area, or mail room at 1:26 pm on November 30, 2018 in WOBURN, MA 01801.

Delivered

November 30, 2018 at 1:26 pm
Delivered, Front Desk/Reception/Mail Room
WOBURN, MA 01801

Get Updates

See More

Can’t find what you’re looking for?

Go to our FAQs section to find answers to your tracking questions.

FAQs (https://www.usps.com/faqs/uspstracking-faqs.htm)

Feedback

The easiest tracking number is the one you don't have to know.

With Informed Delivery®, you never have to type in another tracking number. Sign up to:

- See images* of incoming mail.
- Automatically track the packages you're expecting.
- Set up email and text alerts so you don't need to enter tracking numbers.
- Enter USPS Delivery Instructions™ for your mail carrier.

Sign Up

(https://reg.usps.com/entreg/RegistrationAction_input?app=UspsTools&appURL=https%3A%2F%2Ftools.usps.com%2Fgo

*NOTE: Black and white (grayscale) images show the outside, front of letter-sized envelopes and mailpieces that are processed through USPS automated equipment.

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 Max Power Values (Per Sector)	# 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 – Antenna 1	2	414.12	152	1.40	850 MHz	567	0.25%
AT&T 700 MHz LTE – Antenna 2	2	584.87	152	1.97	700 MHz	467	0.42%
AT&T 2300 MHz (WCS) LTE – Antenna 2	4	1,052.26	152	7.10	2300 MHz (WCS)	1000	0.71%
AT&T 850 MHz LTE – Antenna 3	2	545.83	152	1.84	850 MHz	567	0.32%
AT&T 700 MHz LTE – Antenna 3	2	729.71	152	2.46	700 MHz	467	0.53%
AT&T 1900 MHz (PCS) LTE – Antenna 3	4	970.64	152	6.55	1900 MHz (PCS)	1000	0.65%
AT&T 2100 MHz (AWS) LTE – Antenna 3	4	816.81	152	5.51	2100 MHz (AWS)	1000	0.55%
AT&T 850 MHz 5G – Antenna 3	2	341.15	152	1.15	850 MHz	567	0.20%
						Total:	**3.64%**

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:	3.64 %
Sector B:	3.64 %
Sector C:	3.64 %
AT&T Maximum Total (per sector):	3.64 %
Site Total:	14.11 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **14.11 %** 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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Raynham, MA 02767