Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

January 19, 2016

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

RE: **Notice of Exempt Modification for AT&T/ LTE 3C Crown Site BU: 876391**
AT&T Site ID: CT5861
14 Thompson Hill Road, Columbia, CT 06237
Latitude: 41° 43' 3.44" / Longitude: -72° 17' 59.09"

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 140-foot level of the existing 180-foot monopole at 14 Thompson Hill Road in Columbia, CT. The tower is owned by Crown Castle. The property is owned by Joshua Lanati. AT&T now intends to replace three (3) KMW antennas with three (3) CCI new 700 MHz antennas, as well as, install three (3) RRU32s, three (3) A2s, and remove three (3) RRUS-11s.

This facility was approved by the Columbia Planning and Zoning Commission on November 16, 1999. This approval included the conditions that:

1. The tower shall be structurally capable of supporting six users.
2. Prior to filing the final plan in the Land Record, a bond shall be posted to assure removal of the facility according to Section 52.7.15.5. The bond amount shall be proposed by the applicant and approved by the Town Engineer. Bond form all be cash or letter of credit.
3. The Town Planner shall be contacted on week prior to the start of any work associated with this approval, including site development and tree removal. At the Planner's request, a preconstruction meeting with the Planner, developer, and subcontractors shall be held prior to the start of work.
4. Any additional use of the site, including and not limited to additional antennas, cabinets, or other structures, and site work requires additional permitting by the Commission.
5. The location of the tower and associated compound and the proposed driveway shall be staked out by a licensed surveyor prior to excavation or construction. The tower and compound fence shall be shown on an as-built survey at the A2 level of accuracy prior to commencement use.
6. Clearcutting of timber shall be prohibited in a 100-foot ring around the lease area.
7. The text of this approval shall be placed on the final plan.

This modification complies with the aforementioned condition(s).

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 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.S.C.A. § 16-50j-73, a copy of this letter is being sent to Mr. Carmen L. Vance, First Selectman for the Town of Columbia, as well as the property owner, and Crown Castle is the tower owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

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 the proposed loading.

For the foregoing reasons, AT&T respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Jeffrey Barbadora.

Sincerely,

Jeffrey Barbadora
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
781-729-0053
Jeff.Barbadora@crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: Mr. Carmen L. Vance
Columbia Town Hall
323 Route 87
Columbia, CT 06237

Joshua Lanati
4 Concorde Way A6
Windsor Locks, CT 06096

WN OF COLUMBIA
Planning & Zoning Commission
P.O. Box 165
Columbia, Connecticut 06237

Telephone: (860) 228-0440
Fax: (860) 228-1952

CERTIFIED #:
November 30, 1999

Sprint Spectrum L.P.
9 Barnes Industrial Road
Wallingford, CT 06492

Dear Sirs,

At a meeting held on November 16, 1999, the Columbia Planning and Zoning Commission took the following action:

approved the application of Sprint Spectrum for a telecommunications facility at 14 Thompson Hill Road, property of Thomas R. Deojay, RA2 zone, based on the submitted application, including plans entitled: "Sprint PCS, Columbia, 14 Thompson Hill Road, Columbia, Connecticut CT33XC571" prepared by Goodkind & O'Dea, Inc., 59 Elm Street, Suite 101, New Haven, Connecticut 06510, consisting of 10 sheets labeled T1, S1, and Z1-Z8, with all sheets revised to 9/14/99 except sheet S1 revised 11/8/99, with the following conditions:

1. The tower shall be structurally capable of supporting six users.
2. Prior to filing the final plan in the Land Records, a bond shall be posted to assure removal of the facility according to Section 52.7.15.5. The bond amount shall be proposed by the applicant and approved by the Town Engineer. Bond form shall be cash or letter of credit.
3. The Town Planner shall be contacted one week prior to the start of any work associated with this approval, including site development and tree removal. At the Planner's request, a preconstruction meeting with the Planner, developer and subcontractors shall be held prior to the start of work.
4. Any additional use of the site, including and not limited to additional antennas, cabinets, or other structures, and site work, requires additional permitting by the Commission.
5. The location of the tower and associated compound and the proposed driveway shall be staked out by a licensed surveyor prior to excavation or construction. The tower and compound fence shall be shown on an as-built survey at the A2 level of accuracy prior to commencement of use.
6. Clearcutting of timber shall be prohibited in a 100-foot ring around the lease area.
7. The text of this approval shall be placed on the final plan.

Sprint
2 of 2

Technical Items

1. A signature block shall be placed on each sheet.
2. Plan sheets shall be numbered or otherwise indexed in the lower right corner.
3. Add to the sedimentation and erosion control notes on Z6:
    1. The Planner and Wetlands Agent may modify the erosion control requirements based on field conditions so as to minimize erosion and siltation on the site.
    2. Erosion controls shall be installed and inspected by the Planner prior to stump removal, grubbing, or other construction. The driveway shall be built per plan prior to development of the tower site.
    3. Prior to any work including tree removal, the Planner shall be provided with the name and phone number of a contact responsible for site work and erosion control who is on call 24 hours/day.

IN ORDER FOR THE APPROVAL TO BECOME FINAL, THE ABOVE CONDITIONS MUST BE FULFILLED.

Note that this action may be appealed for a fifteen day period following publication of notice of action in the Willimantic Chronicle. (Notice was published on or about November 22, 1999.) Do not hesitate to contact me at 228-0440 if you have any questions.

Sincerely,

Martha Fraenkel
Land Use Planner/Zoning Official

MF/ds

cc: Tom Regan

encl: procedures

CERTIFIED MAIL # Z 039 122 992

"SUMMARY RULING"
(APPROVAL WITH CONDITIONS)

As provided for in Connecticut General Statutes Section 22a-36 through 22a-45, as amended, and in Sections 5,6.6b, 9.1 through 9.10 of the Inland Wetlands.and Watercourse Regulations of the Town of Columbia, I move that the application No. AP9899-20 and described below be approved and a permit be granted with the conditions listed below in that the proposed activity does not have a significant impact on the wetlands or watercourses as defined in Section 2.20 in the Inland Wetlands Commission Regulations.

Applicant: Sprint PCS

Address: 9 Barnes Industrial Rd. Wallingford, CT 06492

Address of Activity: 14 Thompson Hill Rd

Property owned by: Thomas R. & Willie Jo Deojay

Maps Dated: 5/28/99

Application received on: 6/1/99

For the proposed activity: Upgrade existing gravel access drive by placing fill & 18" RCP - area of fill & disturbance in wetlands approximately 230 sq. ft.

Conditions:

1. The Inland Wetland Commission Agent is to be notified 48 hours before the commencement of any part of the activity approved above.

2. The granting of this permit does not relieve the applicant from obtaining additional permits and/or approvals required by other agencies, federal, state and local.

3. If an approval or permit is granted by another agency and contains conditions affecting the wetlands and/or watercourses and the area 75 feet from their flagged boundaries not addressed by this permit, the applicant must resubmit the application for further consideration by the Inland Wetlands Commission for a decision before work on the activity is to take place.

4. The duration of this permit is for five (5) years unless extended; by this Agency, and shall expire upon the completion of the activity approved herein or within one year of the start of the activity; whichever is sooner.

5. The applicant shall not assign or transfer this permit, or any part thereof, without the written permission of the Agency.

6. All activities for the prevention of soil erosion, such as silt fences and hay bales shall be under the direct supervision of the Inland Wetland Agent and if he deems it necessary, a certified engineer, who shall employ the best management practices, consistent with the terms and conditions of this permit, to control storm water discharges and to prevent erosion and sedimentation, to otherwise prevent pollution of wetlands or watercourses.

7. A copy of this motion and conditions listed, when approved by a majority vote of the IWC members present, shall constitute a permit for the activity described in the application and accompanying data when signed and dated by the Agent.

8. Diversion plan in place if work undertaken during streamflow. Plan to be approved by agent.

9. See additional conditions dated 7/6/99 attached.

Motion by: C. Robinson
Seconded by: C. Sanborn
Commission Action: Approved
Date: 7/6/99

John Valente, Agent

July 6, 1999
Additional conditions for Sprint PCS

Driveway Crossing
1. Engineer to meet with agent and contractor.
2. Engineer to flag crossing and set elevations.
3. All silt fence to be in place prior to any work within 100' of wetlands.
4. Engineer to be present during initial stage of culvert installation and provide as-built certifying correct implementation of plan.

Driveway Design Outside of the Upland Review Area
1. Design of driveway is to prevent concentrated flows.
2. Any flow pattern greater than 200' to be broken up by acceptable erosion and soil measures, leak offs, grade changes or culverting.
3. All disturbed areas to be mulched and seeded.
4. All excess fill material to be deposited greater than 100' from wetlands - graded, seeded and mulched.

Mitigation
1. Mitigation to be done under the direction of the soil scientist.
2. Soil scientist to provide report to Commission on implementation of plan.
3. Soil scientist to verify success of planting at the beginning and end of the following growing season and provide report to Commission.

CERTIFIED MAIL # Z 039 122 992

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(APPROVAL WITH CONDITIONS)

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July 6, 1999
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2. Soil scientist to provide report to Commission on implementation of plan.
3. Soil scientist to verify success of planting at the beginning and end of the following growing season and provide report to Commission.

8332

CROWN CASTLE - ETA PROPERTY
3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277

DATE 1/20/16 32-61-1110

PAY TO THE ORDER OF Connecticut Siting Council $ 625.00/100

Six Hundred Twenty Five 00/100 DOLLARS

Security Features Included Details on Back

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FOR 876391-CT5861-358364

Amanda Goodall MP

⑈008332⑈ ⑆111000614⑆ 464638118⑈

PROJECT INFORMATION

SCOPE OF WORK:
- AT&T ANTENNAS: (1) NEW ANTENNA PER SECTOR, FOR A TOTAL (3) NEW ANTENNAS. (2) EXISTING ANTENNAS PER SECTOR FOR 3 SECTORS, FOR A TOTAL OF (6) EXISTING ANTENNAS TO REMAIN. (1) EXISTING ANTENNA PER SECTOR FOR (3) SECTORS, FOR A TOTAL OF (3) EXISTING ANTENNAS TO BE REMOVED.
- AT&T RRUs: (1) NEW RRUs PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (3) NEW RRUs. (1) NEW A2 MODULE PER SECTOR FOR (3) SECTORS, FOR A TOTAL OF (3) NEW A2 MODULES. (1) EXISTING RRU PER SECTOR TO BE REUSED, FOR A TOTAL OF (3) EXISTING RRUs.
- AT&T SQUID: (1) EXISTING DC-6 SQUID TO REMAIN.

SITE ADDRESS:	14 THOMPSON HILL ROAD COLUMBIA, CT 06237
LATITUDE: LONGITUDE:	41.7176919 41° 43' 03.69084"N -72.2993989 -72° 17' 57.83604"W
USID:	26084
TOWER OWNER:	CROWN CASTLE 876391
TYPE OF SITE:	MONOPOLE/OUTDOOR EQUIPMENT
MONOPOLE HEIGHT:	180'-0"±
RAD CENTER:	140'-0"±
CURRENT USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY
PROPOSED USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY

DRAWING INDEX

		REV.
T-1	TITLE SHEET	0
GN-1	GROUNDING & GENERAL NOTES	0
A-1	COMPOUND LAYOUT	0
A-2	EQUIPMENT LAYOUTS	0
A-3	ANTENNA LAYOUTS & ELEVATIONS	0
A-4	DETAILS	0
G-1	GROUNDING, ONE-LINE DIAGRAM & DETAILS	0

APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE SUBCONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN, ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AMD MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

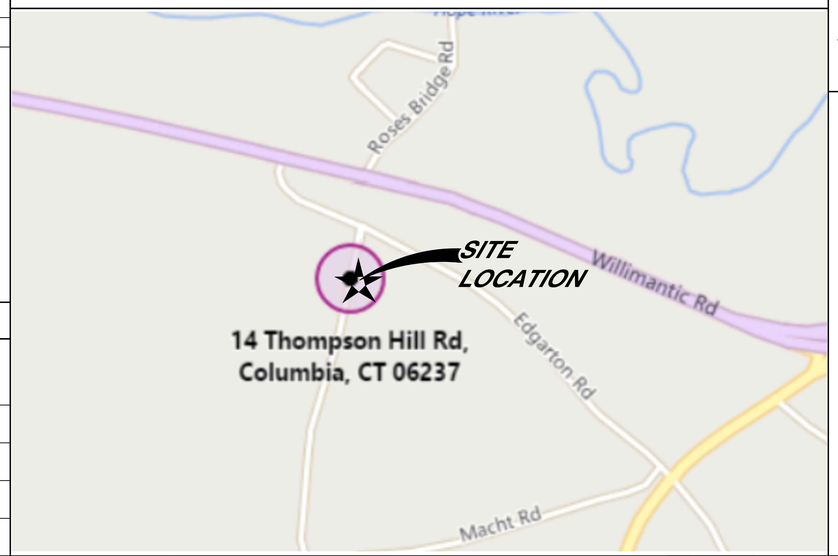
DISCIPLINE:	NAME:	
SITE ACQUISITION:		
CONSTRUCTION MANAGER:		
AT&T PROJECT MANAGER:		

at&t MOBILITY

FA CODE: 10070976
SITE NUMBER: CT5861
SITE NAME: COLUMBIA NORTH

VICINITY MAP

START OUT GOING NE ON ENTERPRISE DR TOWARD CAPITOL BLVD, TURN LEFT ONTO CAPITOL BLVD, TURN LEFT ONTO WEST ST, MERGE ONTO I-91 N VIA THE RAMP ON THE LEFT TOWARD HARTFORD, MERGE ONTO CT-15 N. VIA EXIT 29 TOWARD I-84 E/E HARTFORD/BOSTON, CT-15 N. BECOMES I-84 E./US-6 E. MERGE ONTO I-384 E. VIA EXIT 50 TOWARD PROVIDENCE, I-384 E. BECOMES US-6 E/US-44 E/BOLTON RD. TURN SLIGHT RIGHT ONTO HOPRIVER RD/US-6 E. STAY STRAIGHT TO GO ONTO HOPRIVER RD/US-6 E. CONTINUE TO FOLLOW US-6 E, TURN RIGHT ONTO EDGARTON RD. TAKE THE FIRST RIGHT ONTO THOMSON HILL RD, SIGHT WILL BE ON THE RIGHT.



PROJECT TEAM

CLIENT REPRESENTATIVE
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

SITE ACQUISITION:
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

ENGINEERING:
COMPANY: COM-EX CONSULTANTS, LLC
ADDRESS: 115 ROUTE 46, SUITE E39, MOUNTAIN LAKES, NJ 07046
CONTACT: NICHOLAS D. BARILE, P.E.
PHONE: 862-209-4300
EMAIL: nbarile@comexconsultants.com

RF ENGINEER:
COMPANY: AT&T MOBILITY - NEW ENGLAND
ADDRESS: 550 COCHITUATE ROAD, SUITE 550 13 & 14, FRAMINGHAM, MA 01701
CONTACT: CAMERON SYME
PHONE: 508-596-7146
EMAIL: cs6970@att.com

CONSTRUCTION MANAGEMENT:
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: GRZEGORZ "GREG" DORMAN
PHONE: 484-683-1750
EMAIL: gdorman@empiretelecomm.com

GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY, AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. 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.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CONNECTICUT ONE CALL SYSTEM, INC. 1-800-922-4455 STOP - CALL BEFORE YOU DIG!

CONNECTICUT LAW REQUIRES
TWO WORKING DAYS NOTICE PRIOR TO
ANY EARTH MOVING ACTIVITIES BY
CALLING 800-922-4455 OR DIAL 811

COM-EX Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5861
SITE NAME: COLUMBIA NORTH
14 THOMPSON HILL ROAD
COLUMBIA, CT 06237
TOLLAND COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	1/18/16	ISSUED AS FINAL	KCD	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL: STATE OF CONNECTICUT, NICHOLAS D. BARILE, 25643, PROFESSIONAL ENGINEER

AT&T

DRAWING TITLE: TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
15172-EMP	T-1	0

GROUNDING NOTES:

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.

2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH 25471-000-3PS-EG00-0001, DESIGN & TESTING OF FACILITY GROUNDING FOR CELL SITES.

4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.

6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED WITH STAINLESS STEEL HARDWARE TO THE BRIDGE AND THE TOWER GROUND BAR.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

11. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

12. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.

13. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV-G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE CHANGED FROM 2 AWG TO 2/0 AWG. IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FROM EIGHT FEET (8') TO TEN FEET (10').

14. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE ½" OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID TINNED COPPER GROUND WIRE, PER NEC 250.50.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – EMPIRE TELECOM
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T MOBILITY
   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 (EMPIRE TELECOM).

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 BE SCALED 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 SPACE 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. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR. ROUTING OF TRENCHING SHALL BE APPROVED BY CONTRACTOR

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 OFF 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.

12. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

13. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS UNLESS OTHERWISE SPECIFIED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

14. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy=36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

15. CONSTRUCTION SHALL COMPLY WITH SPECIFICATION 25741-000-3APS-A00Z-00002, "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."

16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

17. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK MAY NEED TO BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

18. SINCE THE CELL SITE MAY BE ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE REQUIRED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

19. SUBCONTRACTOR'S 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.
    - INTERNATIONAL BUILDING CODE: IBC 2009 WITH LOCAL & COUNTY AMENDMENTS
    - NATIONAL ELECTRICAL CODE: NEC 2011 WITH LOCAL & COUNTY AMENDMENTS
    - FIRE/LIFE SAFETY CODE: NFPA-101 2009 WITH LOCAL & COUNTY AMENDMENTS

20. 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, THIRTEENTH EDITION
    - AMERICAN SOCIETY OF TESTING OF MATERIALS, ASTM
    - TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA-222-G-1), STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
    - TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS
    - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, OSHA
    - INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVELY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT
    - TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

21. 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.

22. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS AT THE SITE PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA AND SUBMIT TO THE ENGINEER ANY DISCREPANCIES FROM THE DRAWINGS.

23. INFORMATION SHOWN ON THIS SET OF PLANS TAKEN FROM DRAWINGS PREPARED BY HUDSON DESIGN GROUP FOR A RECENT UPGRADE DATED 10/15/2012. CONTRACTOR TO NOTIFY DESIGN ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

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FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5861

SITE NAME: COLUMBIA NORTH

14 THOMPSON HILL ROAD
COLUMBIA, CT 06237
TOLLAND COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	1/18/16	ISSUED AS FINAL	KCD	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

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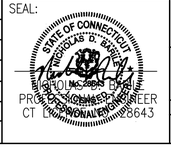
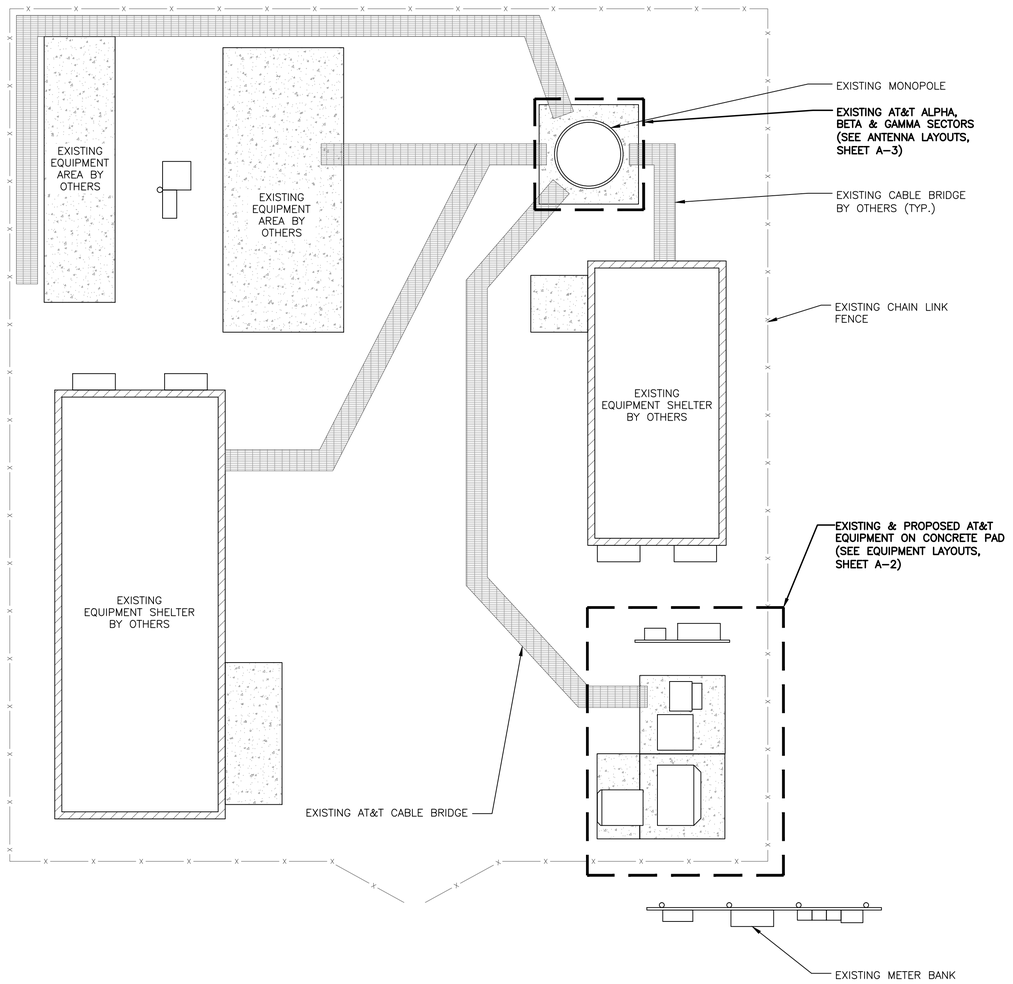


PRO. ENGINEER
CT LICENSE NO. 23643

AT&T

DRAWING TITLE:
GROUNDING & GENERAL NOTES

JOB NUMBER	DRAWING NUMBER	REV
15172-EMP	GN-1	0



NORTH

COMPOUND LAYOUT

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

0 2'-8" 5'-4" 10'-8"

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

NOTE:
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA AND SUBMIT TO THE ENGINEER ANY DISCREPANCIES FROM THE DRAWINGS.

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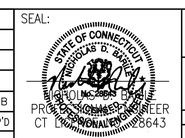
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL:

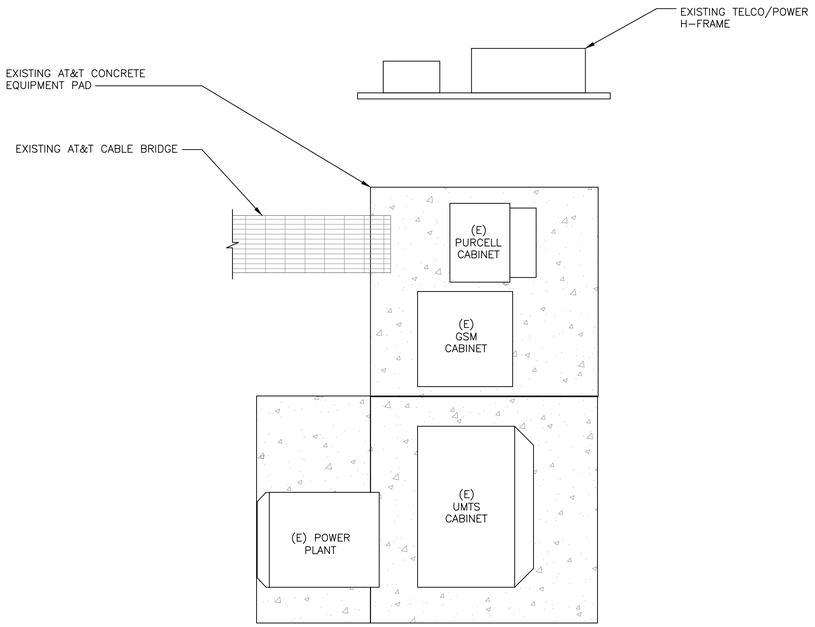


PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
COMPOUND LAYOUT

JOB NUMBER	DRAWING NUMBER	REV
15172-EMP	A-1	0

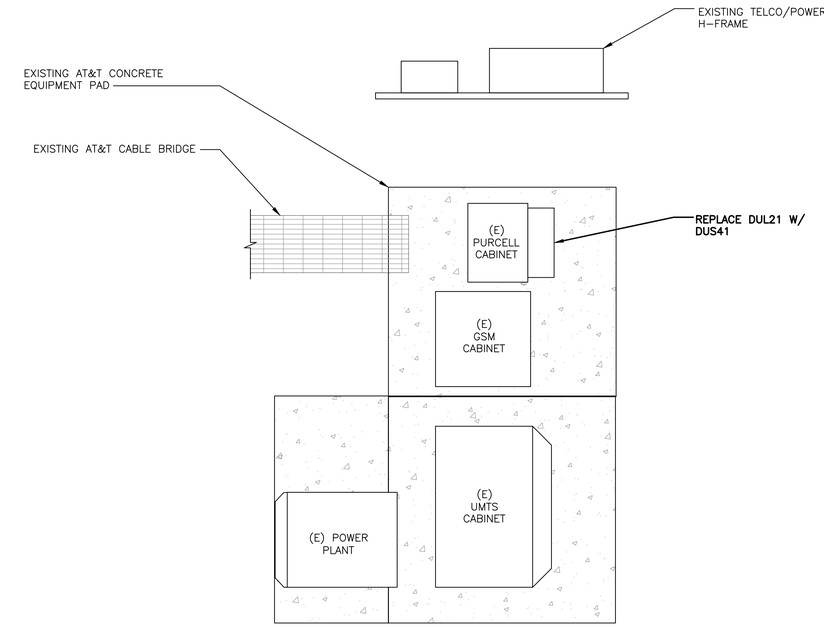


NORTH

EXISTING EQUIPMENT LAYOUT

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

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



NORTH

PROPOSED EQUIPMENT LAYOUT

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

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

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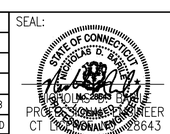
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL:

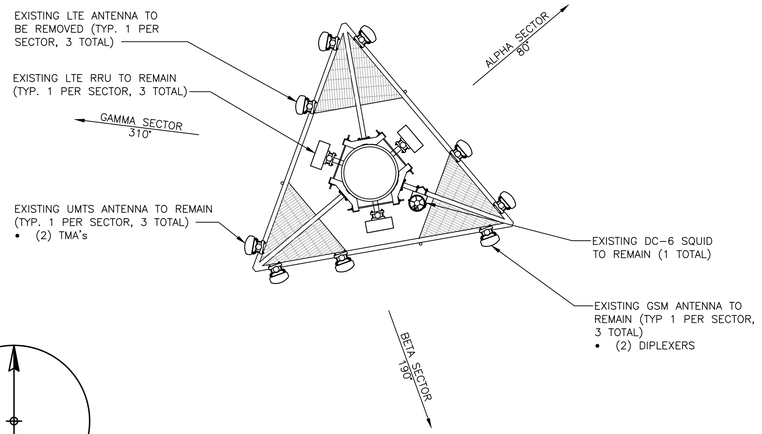


PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
EQUIPMENT LAYOUT

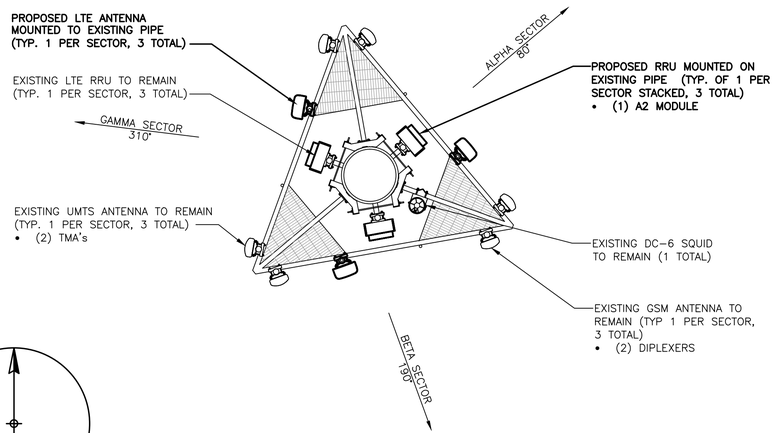
JOB NUMBER	DRAWING NUMBER	REV
15172-EMP	A-2	0



NORTH

EXISTING ANTENNA LAYOUT

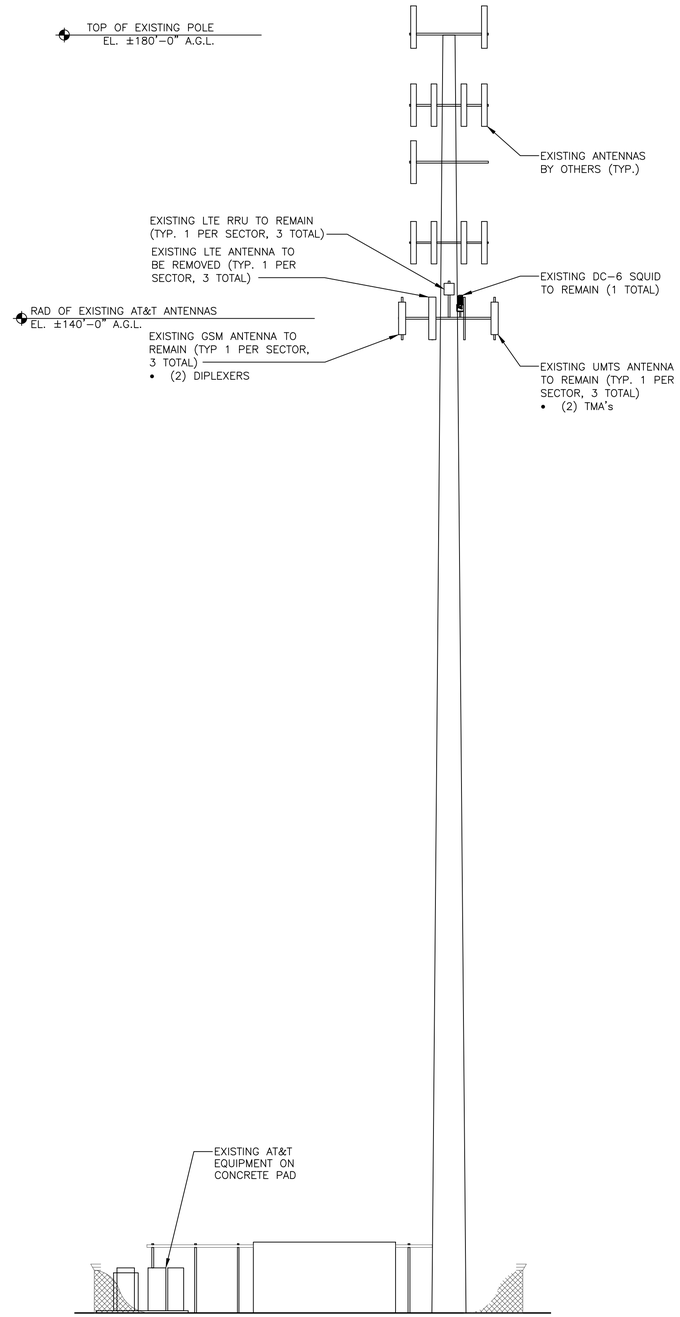
SCALE: N.T.S.



NORTH

PROPOSED ANTENNA LAYOUT

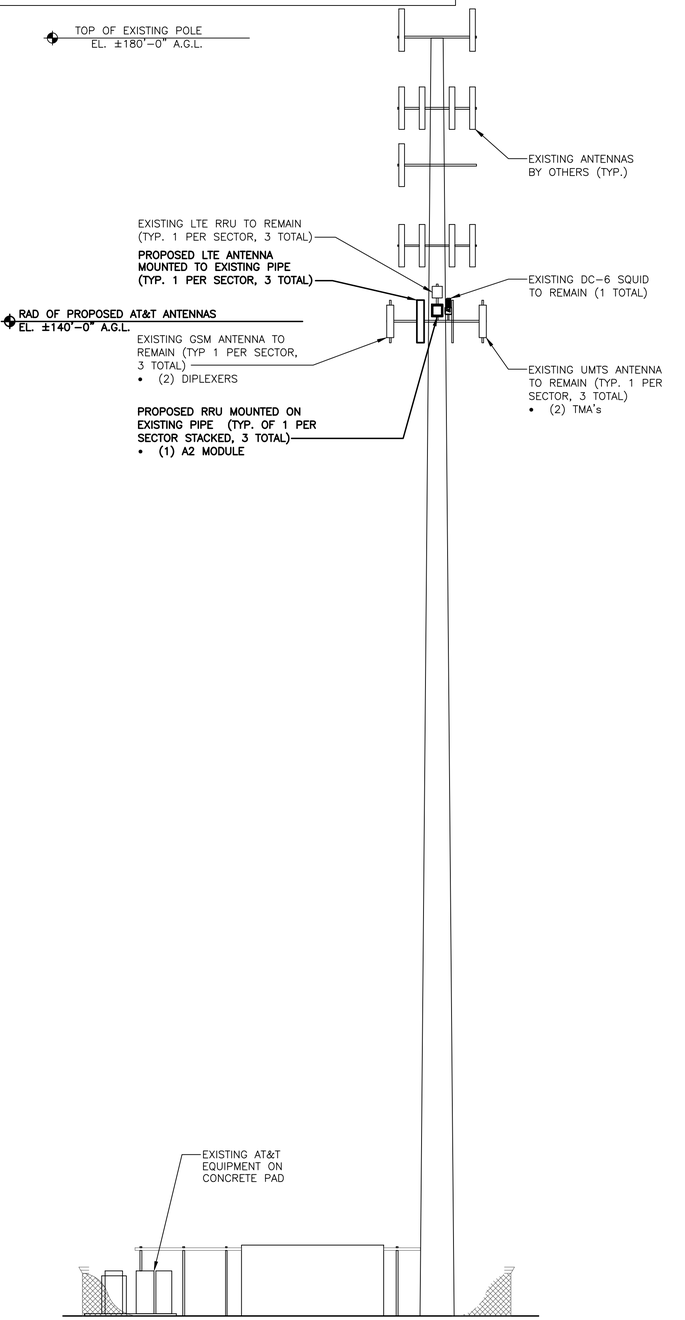
SCALE: N.T.S.



EXISTING TOWER ELEVATION

SCALE: NTS

PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING ANY REQUIRED STRUCTURAL MODIFICATIONS INTO THEIR SCOPE OF WORK.



PROPOSED TOWER ELEVATION

SCALE: NTS

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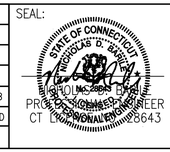
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

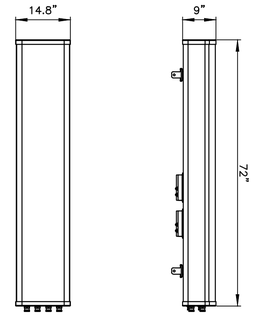
SEAL:



AT&T

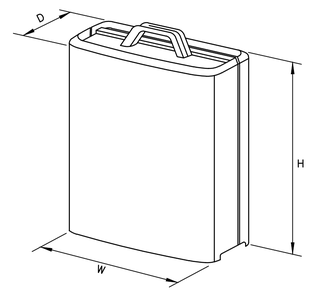
DRAWING TITLE:
ANTENNA LAYOUTS & ELEVATIONS

JOB NUMBER	DRAWING NUMBER	REV
15172-EMP	A-3	0



MANUFACTURER	CCI
MODEL	HPA-65R-BUU-H6
WEIGHT	51 LBS

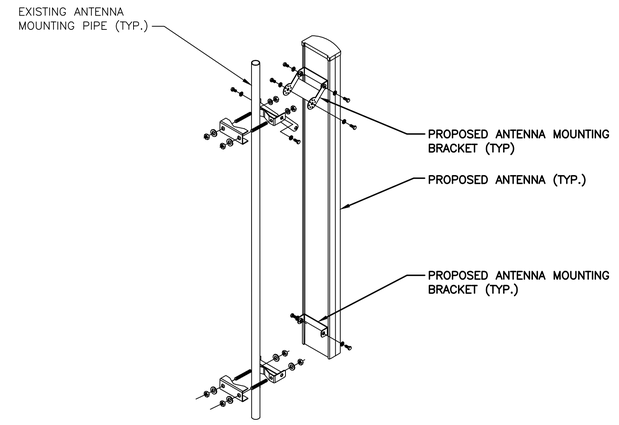
LTE ANTENNA DETAIL
SCALE: N.T.S.



MODEL	L x W x H	WEIGHT
*RRUS-11	19.69" x 16.97" x 7.17"	50.7 LBS
RRUS-12	20.4"x18.5"x7.5"	58 LBS
A2 MODULE	16.4" x 15.2" x 3.4"	22 LBS

*DENOTES EXISTING.

RRUS DETAIL
SCALE: N.T.S.



ANTENNA AND RRU MOUNTING DETAIL
SCALE: N.T.S.

EXISTING ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	–	–	–
	A3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	A4	POWERWAVE	7770	55"x11"x5"
BETA	B1	POWERWAVE	7770	55"x11"x5"
	B2	–	–	–
	B3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	B4	POWERWAVE	7770	55"x11"x5"
GAMMA	G1	POWERWAVE	7770	55"x11"x5"
	G2	–	–	–
	G3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	G4	POWERWAVE	7770	55"x11"x5"

FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	–	–	–
	A3	**CCI**	**HPA-65R-BUU-H6**	**72"x14.8"x9"**
	A4	POWERWAVE	7770	55"x11"x5"
BETA	B1	POWERWAVE	7770	55"x11"x5"
	B2	–	–	–
	B3	**CCI**	**HPA-65R-BUU-H6**	**72"x14.8"x9"**
	B4	POWERWAVE	7770	55"x11"x5"
GAMMA	G1	POWERWAVE	7770	55"x11"x5"
	G2	–	–	–
	G3	**CCI**	**HPA-65R-BUU-H6**	**72"x14.8"x9"**
	G4	POWERWAVE	7770	55"x11"x5"

PROPOSED RRU SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x9.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	–	–
	–	–	–		
BETA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x9.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	–	–
	–	–	–		
GAMMA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x9.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	–	–
	–	–	–		

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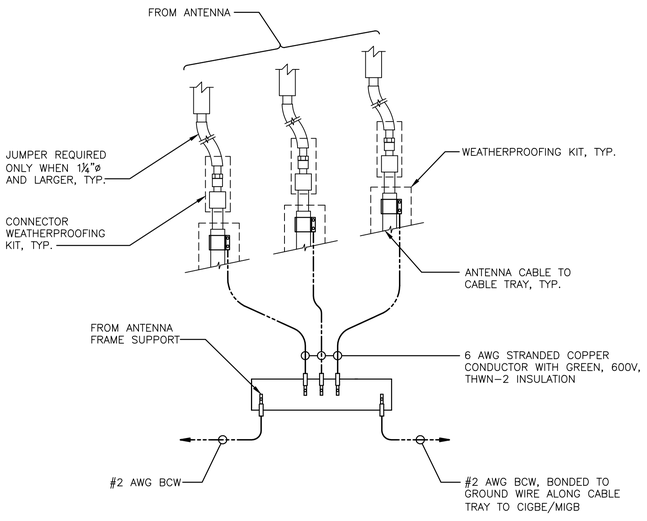
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BARTELT
LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

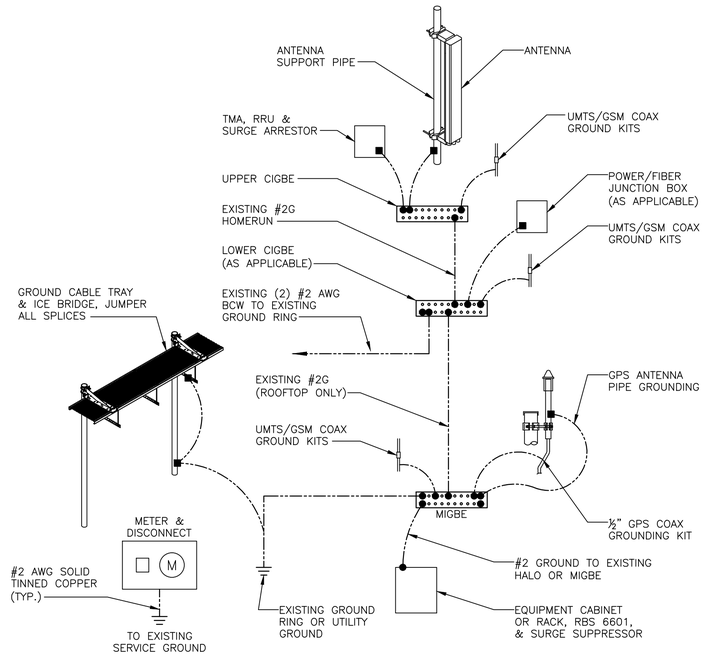
DRAWING TITLE:
DETAILS

JOB NUMBER	DRAWING NUMBER	REV
15172-EMP	A-4	0



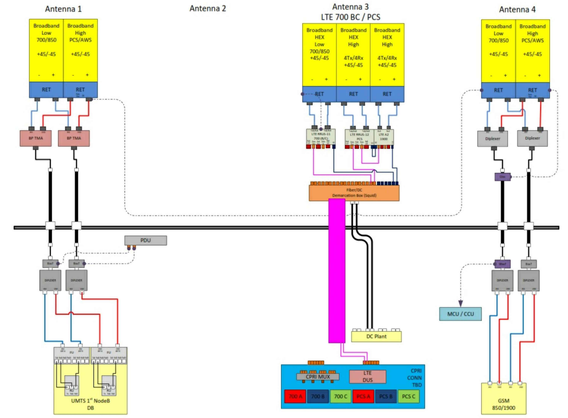
GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



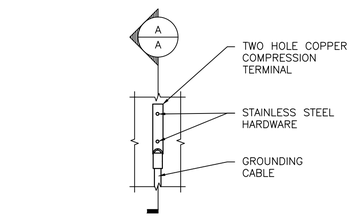
GROUNDING RISER DIAGRAM

SCALE: N.T.S.

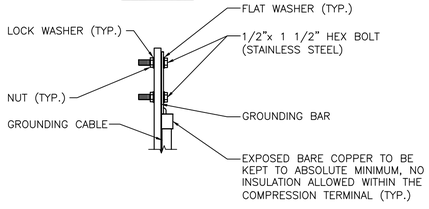


TYPICAL PLUMBING DIAGRAM (PER SECTOR)

SCALE: N.T.S.



ELEVATION



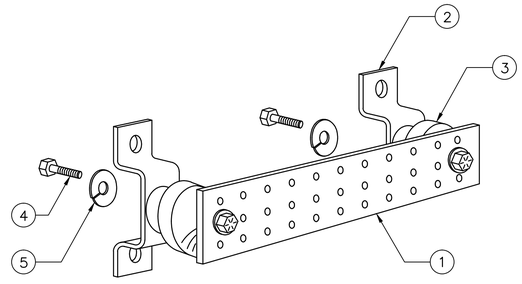
SECTION "A–A"

NOTE:

1. "DOUBLING UP" OR "STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x ¼")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	⅝"–11x1" H.H.C.S.
5	4	⅝" LOCK WASHER

GROUND BAR DETAIL

SCALE: N.T.S.

NOTES:

EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION

SECTION "P" – SURGE PRODUCERS
- CABLE ENTRY PORTS (HATCH PLATES) (#2)
- GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
- TELCO GROUND BAR
- COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
- +24V POWER SUPPLY RETURN BAR (#2)
- –48V POWER SUPPLY RETURN BAR (#2)
- RECTIFIER FRAMES

SECTION "A" – SURGE ABSORBERS
- INTERIOR GROUND RING (#2)
- EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
- METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
- BUILDING STEEL (IF AVAILABLE) (#2)

COM-EX Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5861

SITE NAME: COLUMBIA NORTH

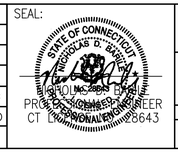
14 THOMPSON HILL ROAD
COLUMBIA, CT 06237
TOLLAND COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	1/18/16	ISSUED AS FINAL	KCD	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL:



AT&T

DRAWING TITLE:
GROUNDING, ONE-LINE DIAGRAM & DETAILS

JOB NUMBER	DRAWING NUMBER	REV
15172-EMP	G-1	0

Date: **December 10, 2015**

Rebecca Klein
Crown Castle
525 Alderman Lane
Fort Mill, SC 29715

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
(919) 755-1012

Subject: Structural Analysis Report

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT5861
	Carrier Site Name:	Columbia North
Crown Castle Designation:	**Crown Castle BU Number:**	876391
	Crown Castle Site Name:	COLUMBIA / DEOJAY
	Crown Castle JDE Job Number:	358364
	Crown Castle Work Order Number:	1162406
	Crown Castle Application Number:	323138 Rev. 0
Engineering Firm Designation:	**FDH Velocitel Project Number:**	15THAR1400
Site Data:	**14 Thompson Hill Rd, COLUMBIA, Tolland County, CT** **Latitude *41° 43' 3.44"*, Longitude *-72° 17' 59.09"*** **180 Foot - Monopole Tower**	

Dear Rebecca Klein,

FDH Velocitel is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 852608, in accordance with application 323138, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F and the 2005 Connecticut State Building Code based upon a wind speed of 85 mph fastest mile.

We at *FDH Velocitel* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Brian Apple, EI
Project Engineer I

Reviewed by:

Dennis D. Abel, PE
Director of Structural Engineering
CT PE License No. 23247

12-10-2015

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in December of 1999. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
140.0	140.0	3	cci antennas	HPA-65R-BUU-H6 w/ Mount Pipe	--	--	--
		3	ericsson	RRUS 12			
		3	ericsson	RRUS A2			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
180.0	181.0	2	decibel	950F65T2ZE-M w/ Mount Pipe	6	1-5/8	1
		4	decibel	DB980H90E-M w/ Mount Pipe			
	180.0	1	crown mounts	Platform Mount [LP 601-1]			
169.0	170.0	12	decibel	DB844H90E-XY w/ Mount Pipe	12	1-1/4	3
	169.0	1	crown mounts	Platform Mount [LP 303-1]			
161.0	162.0	3	ericsson	AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8	2
		3	ericsson	AIR 21 B2A B4P-B8P 4FT w/ Mount Pipe			
		3	ericsson	RRUS 11 B12			
	161.0	1	crown mounts	Platform Mount [LP 305-1]	--	--	1
147.0	150.0	3	alcatel lucent	RRH2x60-700	--	--	2
		6	andrew	LNX-6514DS-A1M w/ Mount Pipe	14 1	1-5/8 1/2	1
		6	andrew	HBXX-6517DS-A2M w/ Mount Pipe			
		1	lucent	KS24019-L112A			
		6	rfs / celwave	FD9R6004/1C-3L			
		2	rfs / celwave	DB-T1-6Z-8AB-0Z			
		3	alcatel lucent	RRH2X60-AWS			
		3	alcatel lucent	RRH2X60-PCS			
	147.0	1	crown mounts	Platform Mount [LP 712-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
141.0	138.0	3	ericsson	TME-RRUS 11 BAND 12	--	--	3
		3	ericsson	TME-RRUS 11 BAND 12	--	--	1
	141.0	1	crown mounts	T-Arm Mount [TA 702-3] w/ Pipe Mount [PM 601-3]			
140.0	140.0	3	kmw comm	AM-X-CD-16-65-00T-RET w/ Mount Pipe	1	3/8	3
		6	powerwave tech	7770.00 w/ Mount Pipe	12 2 1	1-5/8 7/16 2	1
		6	powerwave tech	LPG 17201			
		6	powerwave tech	LPG 13519			
		1	raycap	DC6-48-60-18-8F			
		1	crown mounts	Platform Mount [LP 303-1]			
83.0	84.0	2	kathrein	OG-860/1920/GPS-A	2	1/2	1
	83.0	2	crown mounts	Side Arm Mount [SO 701-1]			
78.0	79.0	1	kathrein	OG-860/1920/GPS-A	1	1/2	1
	78.0	1	crown mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment to be Removed, Not Considered in this Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
UNKNOWN						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	SPRINT SPECTRUM L.P.	1613526	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI	1613632	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI	1614546	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts, and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating winds loads as allowed by TIA/EIA-222-F.

This analysis may be affected if any assumptions are not valid or have been made in error. FDH Velocitel should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	180 - 131.915	Pole	TP31.375x21x0.25	1	-10.42	1244.61	56.6	Pass
L2	131.915 - 86.847	Pole	TP40.468x29.9211x0.375	2	-18.53	2407.57	82.7	Pass
L3	86.847 - 43.313	Pole	TP48.968x38.5337x0.4375	3	-30.15	3401.83	88.7	Pass
L4	43.313 - 0	Pole	TP57.25x46.6855x0.5	4	-48.03	4682.07	86.4	Pass
							Summary	
						Pole (L3)	88.7	Pass
						RATING =	**88.7**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	85.7	Pass
1	Base Plate	0	99.6	Pass
1	Base Foundation (Soil Interaction)	0	75.3	Pass
1	Base Foundation (Structural)	0	92.2	Pass

Structure Rating (max from all components) =	**99.6%**

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

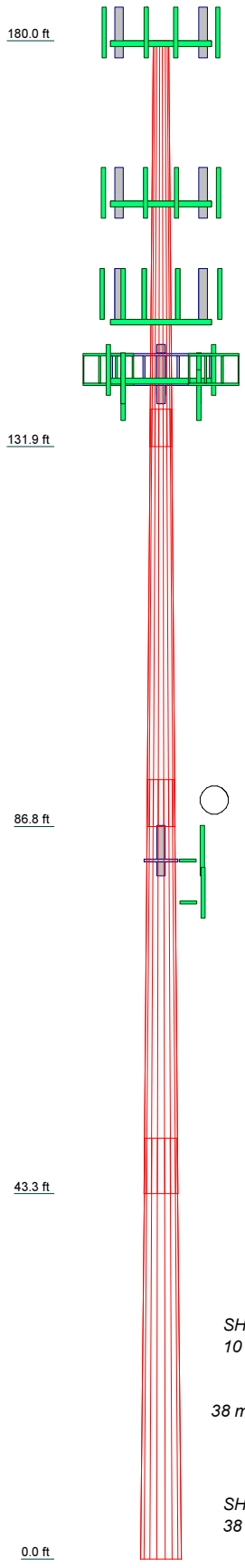
The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

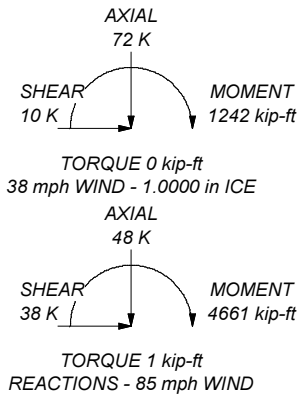
APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	48.0850	49.4890	49.0910	49.9350
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3750	0.4375	0.5000
Socket Length (ft)	4.4210	5.5570	6.6220	
Top Dia (in)	21.0000	29.9211	38.5337	46.6855
Bot Dia (in)	31.3750	40.4680	48.9680	57.2500
Grade	A572-65			
Weight (K)	3.4	7.0	10.0	13.9

34.3





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	180	DB-T1-6Z-8AB-0Z	147
(2) 950F65T2ZE-M w/ Mount Pipe	180	RRH2X60-AWS	147
(2) DB980H90E-M w/ Mount Pipe	180	RRH2X60-AWS	147
(2) DB980H90E-M w/ Mount Pipe	180	RRH2X60-AWS	147
(2) 6' x 2" Mount Pipe	180	RRH2X60-PCS	147
(2) 6' x 2" Mount Pipe	180	RRH2X60-PCS	147
(2) 6' x 2" Mount Pipe	180	RRH2X60-PCS	147
Platform Mount [LP 601-1]	180	Platform Mount [LP 712-1]	147
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	161	RRUS-11 BAND 12	141
		(2) RRUS-11 BAND 12	141
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	161	T-Arm Mount [TA 702-3]	141
		Pipe Mount [PM 601-3]	141
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	161	HPA-65R-BUU-H6 w/ Mount Pipe	140
		HPA-65R-BUU-H6 w/ Mount Pipe	140
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	161	HPA-65R-BUU-H6 w/ Mount Pipe	140
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	161	RRUS 12	140
		RRUS 12	140
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	161	RRUS 12	140
		RRUS A2	140
RRUS 11 B12	161	RRUS A2	140
RRUS 11 B12	161	RRUS A2	140
RRUS 11 B12	161	(2) 7770.00 w/ Mount Pipe	140
Platform Mount [LP 305-1]	161	(2) 7770.00 w/ Mount Pipe	140
RRH2x60-700	147	(2) 7770.00 w/ Mount Pipe	140
RRH2x60-700	147	(2) LGP 17201	140
RRH2x60-700	147	(2) LGP 17201	140
(2) LNX-6514DS-A1M w/ Mount Pipe	147	(2) LGP 17201	140
(2) LNX-6514DS-A1M w/ Mount Pipe	147	(2) LGP13519	140
(2) LNX-6514DS-A1M w/ Mount Pipe	147	(2) LGP13519	140
(2) HBXX-6517DS-A2M w/ Mount Pipe	147	(2) LGP13519	140
(2) HBXX-6517DS-A2M w/ Mount Pipe	147	DC6-48-60-18-8F Surge Arrestor	140
(2) HBXX-6517DS-A2M w/ Mount Pipe	147	Platform Mount [LP 303-1]	140
KS24019-L112A	147	OG-860/1920/GPS-A	83
(2) FD9R6004/1C-3L	147	OG-860/1920/GPS-A	83
(2) FD9R6004/1C-3L	147	Side Arm Mount [SO 701-1]	83
(2) FD9R6004/1C-3L	147	Side Arm Mount [SO 701-1]	83
DB-T1-6Z-8AB-0Z	147	OG-860/1920/GPS-A	78
		Side Arm Mount [SO 701-1]	78

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 88.7%

FDH VELOCITEL ENGINEERING INNOVATION
Tower Analysis

Velocitel Inc., d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Job: ***BU No. 876391 - COLUMBIA / DEOJAY***			
Project: ***15THAR1400***			
Client: Crown Castle	Drawn by: BApple		App'd:
Code: TIA/EIA-222-F	Date: 12/10/15		Scale: NTS
Path:			Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Tolland County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
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		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Calculate Redundant Bracing Forces
	Use Moment Magnification	√	Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios		Use Clear Spans For KL/r		SR Leg Bolts Resist Compression
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		All Leg Panels Have Same Allowable
√	Escalate Ice	√	Bypass Mast Stability Checks		Offset Girt At Foundation
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Include Angle Block Shear Check
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends	√	Include Shear-Torsion Interaction
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination		Use TIA-222-G Tension Splice Capacity Exemption		

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	180.0000-131.9150	48.0850	4.42	18	21.0000	31.3750	0.2500	1.0000	A572-65 (65 ksi)
L2	131.9150-86.8470	49.4890	5.56	18	29.9211	40.4680	0.3750	1.5000	A572-65 (65 ksi)
L3	86.8470-43.3130	49.0910	6.62	18	38.5337	48.9680	0.4375	1.7500	A572-65 (65 ksi)
L4	43.3130-0.0000	49.9350		18	46.6855	57.2500	0.5000	2.0000	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	21.3240	16.4651	895.6507	7.3663	10.6680	83.9568	1792.4800	8.2341	3.2560	13.024
	31.8590	24.6977	3022.8212	11.0494	15.9385	189.6553	6049.6199	12.3512	5.0820	20.328
L2	31.3394	35.1673	3878.6133	10.4889	15.1999	255.1732	7762.3302	17.5870	4.6061	12.283
	41.0923	47.7207	9691.2836	14.2330	20.5577	471.4177	19395.3192	23.8649	6.4624	17.233
L3	40.3275	52.9014	9699.9147	13.5242	19.5751	495.5224	19412.5929	26.4557	6.0119	13.742
	49.7234	67.3907	20052.4170	17.2283	24.8757	806.1032	40131.2195	33.7017	7.8484	17.939
L4	48.8283	73.2964	19752.9145	16.3959	23.7162	832.8859	39531.8205	36.6552	7.3366	14.673
	58.1332	90.0622	36644.7678	20.1462	29.0830	1260.0065	73337.7538	45.0397	9.1960	18.392

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
L1 180.0000-131.9150				1	1	1		
L2 131.9150-86.8470				1	1	1		
L3 86.8470-43.3130				1	1	1		
L4 43.3130-0.0000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***										
***										
***										
***										
***										
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	A	No	Inside Pole	180.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***								
***								
***								
***								
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	CaAa (Out Of Face)	161.0000 - 0.0000	1	No Ice	0.1625	1.07
						1/2" Ice	0.2625	2.37
						1" Ice	0.3625	4.28
						2" Ice	0.5625	9.93
						4" Ice	0.9625	28.56
***								
***								
LDF4-50A(1/2")	A	No	Inside Pole	147.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
						2" Ice	0.0000	0.15
						4" Ice	0.0000	0.15
LDF7-50A(1-5/8")	A	No	Inside Pole	147.0000 - 0.0000	12	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
HB158-1-08U8-S8J18(1-5/8)	A	No	CaAa (Out Of Face)	147.0000 - 0.0000	2	No Ice	0.1980	1.30
						1/2" Ice	0.2980	2.81
						1" Ice	0.3980	4.94
						2" Ice	0.5980	11.02
						4" Ice	0.9980	30.52
***								
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	140.0000 - 0.0000	12	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
						2" Ice	0.0000	0.82
						4" Ice	0.0000	0.82
WR-VG122ST-BRDA(7/ 16)	C	No	Inside Pole	140.0000 - 0.0000	2	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.14
						1" Ice	0.0000	0.14
						2" Ice	0.0000	0.14
						4" Ice	0.0000	0.14
ICE 200(2")	C	No	Inside Pole	140.0000 - 0.0000	1	No Ice	0.0000	0.23
						1/2" Ice	0.0000	0.23
						1" Ice	0.0000	0.23
						2" Ice	0.0000	0.23
						4" Ice	0.0000	0.23
***								
***								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	83.0000 - 0.0000	2	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.84
						1" Ice	0.0000	2.14
						2" Ice	0.0000	6.58
						4" Ice	0.0000	22.78
***								
***								
LDF4-50A(1/2")	B	No	CaAa (Out Of Face)	78.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.84
						1" Ice	0.0000	2.14
						2" Ice	0.0000	6.58
						4" Ice	0.0000	22.78

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	180.0000-131.915	A	0.000	0.000	0.000	5.974	0.43
	0	B	0.000	0.000	0.000	4.726	0.03
		C	0.000	0.000	0.000	0.000	0.08
L2	131.9150-86.8470	A	0.000	0.000	0.000	17.847	0.79
		B	0.000	0.000	0.000	7.324	0.05
		C	0.000	0.000	0.000	0.000	0.47
L3	86.8470-43.3130	A	0.000	0.000	0.000	17.239	0.76
		B	0.000	0.000	0.000	7.074	0.05
		C	0.000	0.000	0.000	0.000	0.46
L4	43.3130-0.0000	A	0.000	0.000	0.000	17.152	0.76
		B	0.000	0.000	0.000	7.039	0.05
		C	0.000	0.000	0.000	0.000	0.46

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	180.0000-131.915	A	1.204	0.000	0.000	0.000	13.236	0.57
	0	B		0.000	0.000	0.000	11.728	0.16
		C		0.000	0.000	0.000	0.000	0.08
L2	131.9150-86.8470	A	1.154	0.000	0.000	0.000	39.545	1.23
		B		0.000	0.000	0.000	18.172	0.24
		C		0.000	0.000	0.000	0.000	0.47
L3	86.8470-43.3130	A	1.084	0.000	0.000	0.000	37.331	1.16
		B		0.000	0.000	0.000	17.120	0.32
		C		0.000	0.000	0.000	0.000	0.67
L4	43.3130-0.0000	A	1.000	0.000	0.000	0.000	35.940	1.12
		B		0.000	0.000	0.000	16.432	0.31
		C		0.000	0.000	0.000	0.000	0.67

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	180.0000-131.9150	0.1249	-0.1200	0.2569	-0.2044
L2	131.9150-86.8470	0.1777	-0.3974	0.3496	-0.6766
L3	86.8470-43.3130	0.1834	-0.4101	0.3674	-0.7129
L4	43.3130-0.0000	0.1873	-0.4188	0.3743	-0.7292

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
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Lightning Rod	C	From Leg	1.0000 0.00 2.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2500 0.6635 0.9732 1.4936 2.6833	0.2500 0.6635 0.9732 1.4936 2.6833	0.03 0.03 0.04 0.06 0.14
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(2) 950F65T2ZE-M w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.2306 4.6953 5.1456 6.0948 8.3001	4.2028 5.0707 5.8149 7.3535 10.6306	0.03 0.07 0.12 0.23 0.58
(2) DB980H90E-M w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.0361 4.4987 4.9468 5.8700 8.0460	3.6194 4.4808 5.2186 6.7442 9.9954	0.03 0.07 0.11 0.22 0.55
(2) DB980H90E-M w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.0361 4.4987 4.9468 5.8700 8.0460	3.6194 4.4808 5.2186 6.7442 9.9954	0.03 0.07 0.11 0.22 0.55
(2) 6' x 2" Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.4963 1.5675 1.7100 1.9950	1.4250 1.4963 1.5675 1.7100 1.9950	0.02 0.03 0.04 0.05 0.07
(2) 6' x 2" Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.4963 1.5675 1.7100 1.9950	1.4250 1.4963 1.5675 1.7100 1.9950	0.02 0.03 0.04 0.05 0.07
(2) 6' x 2" Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.4963 1.5675 1.7100 1.9950	1.4250 1.4963 1.5675 1.7100 1.9950	0.02 0.03 0.04 0.05 0.07
Platform Mount [LP 601-1]	C	None		0.00	180.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.4700 33.5900 38.7100 48.9500 69.4300	28.4700 33.5900 38.7100 48.9500 69.4300	1.12 1.51 1.91 2.69 4.26
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ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.8253 7.3471 7.8631 8.9261 11.1755	5.6424 6.4800 7.2567 8.8640 12.2932	0.11 0.17 0.23 0.38 0.81
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4872 8.9747 9.4709 10.4900 12.6357	6.7584 7.5099 8.2794 9.8719 13.3572	0.15 0.22 0.30 0.48 0.95
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4872 8.9747 9.4709 10.4900 12.6357	6.7584 7.5099 8.2794 9.8719 13.3572	0.15 0.22 0.30 0.48 0.95
Ericsson Air 21 B4A B12P-B8P 4FT w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4872 8.9747 9.4709 10.4900 12.6357	6.7584 7.5099 8.2794 9.8719 13.3572	0.15 0.22 0.30 0.48 0.95
RRUS 11 B12	A	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.3056 3.5497 3.8025 4.3340 5.5006	1.3611 1.5404 1.7284 2.1302 3.0377	0.05 0.07 0.10 0.15 0.31
RRUS 11 B12	B	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.3056 3.5497 3.8025 4.3340 5.5006	1.3611 1.5404 1.7284 2.1302 3.0377	0.05 0.07 0.10 0.15 0.31
RRUS 11 B12	C	From Leg	4.0000 0.00 1.00	0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.3056 3.5497 3.8025 4.3340 5.5006	1.3611 1.5404 1.7284 2.1302 3.0377	0.05 0.07 0.10 0.15 0.31
Platform Mount [LP 305-1]	C	None		0.00	161.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	18.0100 23.3300 28.6500 39.2900 60.5700	18.0100 23.3300 28.6500 39.2900 60.5700	1.12 1.35 1.58 2.05 2.97
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RRH2x60-700	A	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.9569 4.2724 4.5965 5.2705 6.7224	1.8157 2.0752 2.3603 2.9566 4.2529	0.06 0.08 0.11 0.17 0.35
RRH2x60-700	B	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.9569 4.2724 4.5965 5.2705 6.7224	1.8157 2.0752 2.3603 2.9566 4.2529	0.06 0.08 0.11 0.17 0.35
RRH2x60-700	C	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.9569 4.2724 4.5965 5.2705	1.8157 2.0752 2.3603 2.9566	0.06 0.08 0.11 0.17

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
						4" Ice	6.7224	4.2529	0.35
(2) LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6485 9.3051 9.9298 11.2040 13.8719	7.0817 8.2729 9.1847 11.0232 15.0629	0.06 0.13 0.21 0.39 0.90
(2) LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6485 9.3051 9.9298 11.2040 13.8719	7.0817 8.2729 9.1847 11.0232 15.0629	0.06 0.13 0.21 0.39 0.90
(2) LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.6485 9.3051 9.9298 11.2040 13.8719	7.0817 8.2729 9.1847 11.0232 15.0629	0.06 0.13 0.21 0.39 0.90
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.9758 9.6473 10.2909 11.5946 14.3212	6.9629 8.1817 9.1436 11.0219 15.0267	0.07 0.14 0.21 0.40 0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.9758 9.6473 10.2909 11.5946 14.3212	6.9629 8.1817 9.1436 11.0219 15.0267	0.07 0.14 0.21 0.40 0.91
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.9758 9.6473 10.2909 11.5946 14.3212	6.9629 8.1817 9.1436 11.0219 15.0267	0.07 0.14 0.21 0.40 0.91
KS24019-L112A	C	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1556 0.2247 0.3025 0.4840 0.9506	0.1556 0.2247 0.3025 0.4840 0.9506	0.01 0.01 0.01 0.02 0.06
(2) FD9R6004/1C-3L	A	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.00 0.01 0.02 0.06
(2) FD9R6004/1C-3L	B	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.00 0.01 0.02 0.06
(2) FD9R6004/1C-3L	C	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.00 0.01 0.02 0.06
DB-T1-6Z-8AB-0Z	B	From Leg	4.0000 0.00 3.00	0.00	147.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.6000 5.9154 6.2395 6.9136 8.3654	2.3333 2.5580 2.7914 3.2840 4.3728	0.04 0.08 0.12 0.21 0.45
DB-T1-6Z-8AB-0Z	C	From Leg	4.0000	0.00	147.0000	No Ice	5.6000	2.3333	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	5.9154	2.5580	0.08
			3.00			1" Ice	6.2395	2.7914	0.12
						2" Ice	6.9136	3.2840	0.21
						4" Ice	8.3654	4.3728	0.45
RRH2X60-AWS	A	From Leg	4.0000	0.00	147.0000	No Ice	2.1904	1.4290	0.04
			0.00			1/2" Ice	2.3976	1.6109	0.06
			3.00			1" Ice	2.6134	1.8015	0.08
						2" Ice	3.0710	2.2085	0.13
						4" Ice	4.0899	3.1263	0.26
RRH2X60-AWS	B	From Leg	4.0000	0.00	147.0000	No Ice	2.1904	1.4290	0.04
			0.00			1/2" Ice	2.3976	1.6109	0.06
			3.00			1" Ice	2.6134	1.8015	0.08
						2" Ice	3.0710	2.2085	0.13
						4" Ice	4.0899	3.1263	0.26
RRH2X60-AWS	C	From Leg	4.0000	0.00	147.0000	No Ice	2.1904	1.4290	0.04
			0.00			1/2" Ice	2.3976	1.6109	0.06
			3.00			1" Ice	2.6134	1.8015	0.08
						2" Ice	3.0710	2.2085	0.13
						4" Ice	4.0899	3.1263	0.26
RRH2X60-PCS	A	From Leg	4.0000	0.00	147.0000	No Ice	2.5667	1.9250	0.05
			0.00			1/2" Ice	2.7914	2.1302	0.07
			3.00			1" Ice	3.0247	2.3441	0.09
						2" Ice	3.5173	2.7978	0.14
						4" Ice	4.6062	3.8090	0.30
RRH2X60-PCS	B	From Leg	4.0000	0.00	147.0000	No Ice	2.5667	1.9250	0.05
			0.00			1/2" Ice	2.7914	2.1302	0.07
			3.00			1" Ice	3.0247	2.3441	0.09
						2" Ice	3.5173	2.7978	0.14
						4" Ice	4.6062	3.8090	0.30
RRH2X60-PCS	C	From Leg	4.0000	0.00	147.0000	No Ice	2.5667	1.9250	0.05
			0.00			1/2" Ice	2.7914	2.1302	0.07
			3.00			1" Ice	3.0247	2.3441	0.09
						2" Ice	3.5173	2.7978	0.14
						4" Ice	4.6062	3.8090	0.30
Platform Mount [LP 712-1]	C	None		0.00	147.0000	No Ice	24.5300	24.5300	1.34
						1/2" Ice	29.9400	29.9400	1.65
						1" Ice	35.3500	35.3500	1.96
						2" Ice	46.1700	46.1700	2.58
						4" Ice	67.8100	67.8100	3.82
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RRUS-11 BAND 12	B	From Leg	4.0000	0.00	141.0000	No Ice	2.9939	1.2460	0.05
			0.00			1/2" Ice	3.2257	1.4124	0.07
			-3.00			1" Ice	3.4661	1.5874	0.09
						2" Ice	3.9730	1.9633	0.15
						4" Ice	5.0904	2.8188	0.30
(2) RRUS-11 BAND 12	C	From Leg	4.0000	0.00	141.0000	No Ice	2.9939	1.2460	0.05
			0.00			1/2" Ice	3.2257	1.4124	0.07
			-3.00			1" Ice	3.4661	1.5874	0.09
						2" Ice	3.9730	1.9633	0.15
						4" Ice	5.0904	2.8188	0.30
T-Arm Mount [TA 702-3]	C	None		0.00	141.0000	No Ice	5.6400	5.6400	0.34
						1/2" Ice	6.5500	6.5500	0.43
						1" Ice	7.4600	7.4600	0.52
						2" Ice	9.2800	9.2800	0.70
						4" Ice	12.9200	12.9200	1.06

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
Pipe Mount [PM 601-3]	C	None		0.00	141.0000	No Ice	4.3900	4.3900	0.20
						1/2" Ice	5.4800	5.4800	0.24
						1" Ice	6.5700	6.5700	0.28
						2" Ice	8.7500	8.7500	0.36
						4" Ice	13.1100	13.1100	0.53
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HPA-65R-BUU-H6 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	10.5975	8.1125	0.08
						1/2" Ice	11.2684	9.3041	0.16
						1" Ice	11.9061	10.2095	0.25
						2" Ice	13.2089	12.1748	0.46
						4" Ice	15.9341	16.3544	1.02
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	10.5975	8.1125	0.08
						1/2" Ice	11.2684	9.3041	0.16
						1" Ice	11.9061	10.2095	0.25
						2" Ice	13.2089	12.1748	0.46
						4" Ice	15.9341	16.3544	1.02
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	10.5975	8.1125	0.08
						1/2" Ice	11.2684	9.3041	0.16
						1" Ice	11.9061	10.2095	0.25
						2" Ice	13.2089	12.1748	0.46
						4" Ice	15.9341	16.3544	1.02
RRUS 12	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	3.6692	1.4875	0.06
						1/2" Ice	3.9256	1.6727	0.08
						1" Ice	4.1907	1.8665	0.11
						2" Ice	4.7468	2.2800	0.17
						4" Ice	5.9627	3.2107	0.34
RRUS 12	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	3.6692	1.4875	0.06
						1/2" Ice	3.9256	1.6727	0.08
						1" Ice	4.1907	1.8665	0.11
						2" Ice	4.7468	2.2800	0.17
						4" Ice	5.9627	3.2107	0.34
RRUS 12	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	3.6692	1.4875	0.06
						1/2" Ice	3.9256	1.6727	0.08
						1" Ice	4.1907	1.8665	0.11
						2" Ice	4.7468	2.2800	0.17
						4" Ice	5.9627	3.2107	0.34
RRUS A2	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	2.4107	0.5329	0.02
						1/2" Ice	2.6193	0.6652	0.03
						1" Ice	2.8366	0.8062	0.05
						2" Ice	3.2970	1.1140	0.09
						4" Ice	4.3216	1.8335	0.20
RRUS A2	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	2.4107	0.5329	0.02
						1/2" Ice	2.6193	0.6652	0.03
						1" Ice	2.8366	0.8062	0.05
						2" Ice	3.2970	1.1140	0.09
						4" Ice	4.3216	1.8335	0.20
RRUS A2	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	2.4107	0.5329	0.02
						1/2" Ice	2.6193	0.6652	0.03
						1" Ice	2.8366	0.8062	0.05
						2" Ice	3.2970	1.1140	0.09
						4" Ice	4.3216	1.8335	0.20
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice	6.1194	4.2543	0.06
						1/2" Ice	6.6258	5.0137	0.10
						1" Ice	7.1283	5.7109	0.16

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" Ice	8.1643	7.1553	0.29
						4" Ice	10.3599	10.4117	0.66
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
(2) LGP 17201	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.9460 2.1337 2.3301 2.7488 3.6900	0.5180 0.6396 0.7699 1.0564 1.7331	0.03 0.04 0.06 0.09 0.19
(2) LGP 17201	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.9460 2.1337 2.3301 2.7488 3.6900	0.5180 0.6396 0.7699 1.0564 1.7331	0.03 0.04 0.06 0.09 0.19
(2) LGP 17201	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.9460 2.1337 2.3301 2.7488 3.6900	0.5180 0.6396 0.7699 1.0564 1.7331	0.03 0.04 0.06 0.09 0.19
(2) LGP13519	A	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP13519	B	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP13519	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
DC6-48-60-18-8F Surge Arrestor	C	From Leg	4.0000 0.00 0.00	0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.5667 2.7978 3.0377 3.5432 4.6580	4.3167 4.5965 4.8849 5.4877 6.7969	0.02 0.05 0.09 0.17 0.38
Platform Mount [LP 303-1]	C	None		0.00	140.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.6600 18.8700 23.0800 31.5000 48.3400	14.6600 18.8700 23.0800 31.5000 48.3400	1.25 1.48 1.71 2.18 3.10
*** *** ***									
OG-860/1920/GPS-A	A	From Leg	4.0000 0.00	0.00	83.0000	No Ice 1/2" Ice	0.3286 0.4340	0.4044 0.5138	0.00 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.00			1" Ice	0.5481	0.6317	0.01
						2" Ice	0.8022	0.8936	0.02
						4" Ice	1.4140	1.5210	0.08
OG-860/1920/GPS-A	B	From Leg	4.0000	0.00	83.0000	No Ice	0.3286	0.4044	0.00
			0.00			1/2" Ice	0.4340	0.5138	0.01
			1.00			1" Ice	0.5481	0.6317	0.01
						2" Ice	0.8022	0.8936	0.02
						4" Ice	1.4140	1.5210	0.08
Side Arm Mount [SO 701-1]	A	From Leg	2.0000	0.00	83.0000	No Ice	0.8500	1.6700	0.07
			0.00			1/2" Ice	1.1400	2.3400	0.08
			0.00			1" Ice	1.4300	3.0100	0.09
						2" Ice	2.0100	4.3500	0.12
						4" Ice	3.1700	7.0300	0.18
Side Arm Mount [SO 701-1]	B	From Leg	2.0000	0.00	83.0000	No Ice	0.8500	1.6700	0.07
			0.00			1/2" Ice	1.1400	2.3400	0.08
			0.00			1" Ice	1.4300	3.0100	0.09
						2" Ice	2.0100	4.3500	0.12
						4" Ice	3.1700	7.0300	0.18
***									
***									
***									
OG-860/1920/GPS-A	B	From Leg	4.0000	0.00	78.0000	No Ice	0.3286	0.4044	0.00
			0.00			1/2" Ice	0.4340	0.5138	0.01
			1.00			1" Ice	0.5481	0.6317	0.01
						2" Ice	0.8022	0.8936	0.02
						4" Ice	1.4140	1.5210	0.08
Side Arm Mount [SO 701-1]	B	From Leg	2.0000	0.00	78.0000	No Ice	0.8500	1.6700	0.07
			0.00			1/2" Ice	1.1400	2.3400	0.08
			0.00			1" Ice	1.4300	3.0100	0.09
						2" Ice	2.0100	4.3500	0.12
						4" Ice	3.1700	7.0300	0.18

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	154.6321	1.555	28.72	104.935	A	0.000	104.935	104.935	100.00	0.000	5.974
180.0000-131.					B	0.000	104.935		100.00	0.000	4.726
9150					C	0.000	104.935		100.00	0.000	0.000
L2	108.7012	1.406	25.95	133.948	A	0.000	133.948	133.948	100.00	0.000	17.847
131.9150-86.8					B	0.000	133.948		100.00	0.000	7.324
470					C	0.000	133.948		100.00	0.000	0.000
L3	64.8480	1.213	22.32	160.863	A	0.000	160.863	160.863	100.00	0.000	17.239
86.8470-43.31					B	0.000	160.863		100.00	0.000	7.074
30					C	0.000	160.863		100.00	0.000	0.000
L4	21.0285	1	18.50	190.102	A	0.000	190.102	190.102	100.00	0.000	17.152

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
43.3130-0.000					B	0.000	190.102		100.00	0.000	7.039
0					C	0.000	190.102		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	154.6321	1.555	5.62	1.2036	114.582	A	0.000	114.582	114.582	100.00	0.000	13.236
180.0000-131.91						B	0.000	114.582		100.00	0.000	11.728
50						C	0.000	114.582		100.00	0.000	0.000
L2	108.7012	1.406	5.08	1.1538	142.989	A	0.000	142.989	142.989	100.00	0.000	39.545
131.9150-86.847						B	0.000	142.989		100.00	0.000	18.172
0						C	0.000	142.989		100.00	0.000	0.000
L3	64.8480	1.213	4.37	1.0844	169.235	A	0.000	169.235	169.235	100.00	0.000	37.331
86.8470-43.3130						B	0.000	169.235		100.00	0.000	17.120
						C	0.000	169.235		100.00	0.000	0.000
L4	21.0285	1	3.62	1.0000	197.930	A	0.000	197.930	197.930	100.00	0.000	35.940
43.3130-0.0000						B	0.000	197.930		100.00	0.000	16.432
						C	0.000	197.930		100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	154.6321	1.555	9.94	104.935	A	0.000	104.935	104.935	100.00	0.000	5.974
180.0000-131.					B	0.000	104.935		100.00	0.000	4.726
9150					C	0.000	104.935		100.00	0.000	0.000
L2	108.7012	1.406	8.98	133.948	A	0.000	133.948	133.948	100.00	0.000	17.847
131.9150-86.8					B	0.000	133.948		100.00	0.000	7.324
470					C	0.000	133.948		100.00	0.000	0.000
L3	64.8480	1.213	7.72	160.863	A	0.000	160.863	160.863	100.00	0.000	17.239
86.8470-43.31					B	0.000	160.863		100.00	0.000	7.074
30					C	0.000	160.863		100.00	0.000	0.000
L4	21.0285	1	6.40	190.102	A	0.000	190.102	190.102	100.00	0.000	17.152
43.3130-0.000					B	0.000	190.102		100.00	0.000	7.039
0					C	0.000	190.102		100.00	0.000	0.000

Load Combinations

Comb. No.	Description

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 131.915	Pole	Max Tension	14	0.00	0.00	0.00
			Max. Compression	14	-24.83	0.89	-1.63
			Max. Mx	11	-10.42	429.59	-0.51
			Max. My	8	-10.47	0.21	-425.76
			Max. Vy	11	-23.70	429.59	-0.51
			Max. Vx	8	23.42	0.21	-425.76
			Max. Torque	6			-1.76
L2	131.915 - 86.847	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.54	0.60	-1.05
			Max. Mx	11	-18.53	1574.94	-0.46
			Max. My	8	-18.56	0.19	-1558.32
			Max. Vy	5	28.51	-1574.33	-0.59
			Max. Vx	8	28.22	0.19	-1558.32
			Max. Torque	6			-1.75

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	86.847 - 43.313	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-50.25	-0.30	-0.60
			Max. Mx	5	-30.15	-2890.29	0.49
			Max. My	8	-30.17	0.70	-2861.22
			Max. Vy	5	33.20	-2890.29	0.49
			Max. Vx	8	32.91	0.70	-2861.22
			Max. Torque	6			-1.57
L4	43.313 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-71.76	-0.51	-0.09
			Max. Mx	5	-48.03	-4661.37	2.25
			Max. My	8	-48.03	2.19	-4617.79
			Max. Vy	5	37.62	-4661.37	2.25
			Max. Vx	8	37.34	2.19	-4617.79
			Max. Torque	6			-1.08

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	18	71.76	-9.62	0.01
	Max. H_x	11	48.05	37.58	-0.03
	Max. H_z	2	48.05	-0.03	37.30
	Max. M_x	2	4617.34	-0.03	37.30
	Max. M_z	5	4661.37	-37.58	0.03
	Max. Torsion	12	0.87	32.53	18.62
	Min. Vert	1	48.05	0.00	0.00
	Min. H_x	5	48.05	-37.58	0.03
	Min. H_z	8	48.05	0.03	-37.30
	Min. M_x	8	-4617.79	0.03	-37.30
	Min. M_z	11	-4660.81	37.58	-0.03
	Min. Torsion	6	-0.90	-32.53	-18.62

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	48.05	0.00	0.00	0.20	-0.28	0.00
Dead+Wind 0 deg - No Ice	48.05	0.03	-37.30	-4617.34	-2.76	-0.41
Dead+Wind 30 deg - No Ice	48.05	18.82	-32.32	-3999.91	-2333.03	0.03
Dead+Wind 60 deg - No Ice	48.05	32.56	-18.68	-2310.64	-4038.18	0.48
Dead+Wind 90 deg - No Ice	48.05	37.58	-0.03	-2.25	-4661.37	0.80
Dead+Wind 120 deg - No Ice	48.05	32.53	18.62	2306.80	-4035.72	0.90
Dead+Wind 150 deg - No Ice	48.05	18.76	32.29	3997.89	-2328.76	0.75
Dead+Wind 180 deg - No Ice	48.05	-0.03	37.30	4617.79	2.19	0.39
Dead+Wind 210 deg - No Ice	48.05	-18.82	32.32	4000.36	2332.47	-0.07
Dead+Wind 240 deg - No Ice	48.05	-32.56	18.68	2311.09	4037.62	-0.50
Dead+Wind 270 deg - No Ice	48.05	-37.58	0.03	2.69	4660.81	-0.78
Dead+Wind 300 deg - No Ice	48.05	-32.53	-18.62	-2306.37	4035.15	-0.87
Dead+Wind 330 deg - No Ice	48.05	-18.76	-32.29	-3997.44	2328.18	-0.73
Dead+Ice+Temp	71.76	0.00	0.00	0.09	-0.51	0.00

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 0 deg+Ice+Temp	71.76	0.01	-9.56	-1231.67	-1.50	0.02
Dead+Wind 30 deg+Ice+Temp	71.76	4.82	-8.29	-1067.13	-622.02	0.08
Dead+Wind 60 deg+Ice+Temp	71.76	8.34	-4.79	-616.61	-1076.00	0.11
Dead+Wind 90 deg+Ice+Temp	71.76	9.62	-0.01	-0.81	-1241.80	0.12
Dead+Wind 120 deg+Ice+Temp	71.76	8.32	4.77	615.26	-1075.00	0.09
Dead+Wind 150 deg+Ice+Temp	71.76	4.80	8.27	1066.52	-620.28	0.04
Dead+Wind 180 deg+Ice+Temp	71.76	-0.01	9.56	1232.06	0.50	-0.03
Dead+Wind 210 deg+Ice+Temp	71.76	-4.82	8.29	1067.52	621.03	-0.08
Dead+Wind 240 deg+Ice+Temp	71.76	-8.34	4.79	616.99	1075.01	-0.11
Dead+Wind 270 deg+Ice+Temp	71.76	-9.62	0.01	1.19	1240.81	-0.12
Dead+Wind 300 deg+Ice+Temp	71.76	-8.32	-4.77	-614.87	1074.01	-0.09
Dead+Wind 330 deg+Ice+Temp	71.76	-4.80	-8.27	-1066.13	619.29	-0.04
Dead+Wind 0 deg - Service	48.05	0.01	-12.91	-1599.99	-1.14	-0.14
Dead+Wind 30 deg - Service	48.05	6.51	-11.18	-1386.03	-808.71	0.02
Dead+Wind 60 deg - Service	48.05	11.27	-6.46	-800.62	-1399.66	0.17
Dead+Wind 90 deg - Service	48.05	13.00	-0.01	-0.63	-1615.64	0.28
Dead+Wind 120 deg - Service	48.05	11.26	6.44	799.60	-1398.80	0.31
Dead+Wind 150 deg - Service	48.05	6.49	11.17	1385.64	-807.22	0.26
Dead+Wind 180 deg - Service	48.05	-0.01	12.91	1600.45	0.58	0.14
Dead+Wind 210 deg - Service	48.05	-6.51	11.18	1386.50	808.15	-0.02
Dead+Wind 240 deg - Service	48.05	-11.27	6.46	801.08	1399.10	-0.17
Dead+Wind 270 deg - Service	48.05	-13.00	0.01	1.09	1615.08	-0.28
Dead+Wind 300 deg - Service	48.05	-11.26	-6.44	-799.14	1398.24	-0.31
Dead+Wind 330 deg - Service	48.05	-6.49	-11.17	-1385.18	806.66	-0.26

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-48.05	0.00	0.00	48.05	0.00	0.000%
2	0.03	-48.05	-37.30	-0.03	48.05	37.30	0.000%
3	18.82	-48.05	-32.32	-18.82	48.05	32.32	0.000%
4	32.56	-48.05	-18.68	-32.56	48.05	18.68	0.000%
5	37.58	-48.05	-0.03	-37.58	48.05	0.03	0.000%
6	32.53	-48.05	18.62	-32.53	48.05	-18.62	0.000%
7	18.76	-48.05	32.29	-18.76	48.05	-32.29	0.000%
8	-0.03	-48.05	37.30	0.03	48.05	-37.30	0.000%
9	-18.82	-48.05	32.32	18.82	48.05	-32.32	0.000%
10	-32.56	-48.05	18.68	32.56	48.05	-18.68	0.000%
11	-37.58	-48.05	0.03	37.58	48.05	-0.03	0.000%
12	-32.53	-48.05	-18.62	32.53	48.05	18.62	0.000%
13	-18.76	-48.05	-32.29	18.76	48.05	32.29	0.000%
14	0.00	-71.76	0.00	0.00	71.76	0.00	0.000%
15	0.01	-71.76	-9.56	-0.01	71.76	9.56	0.000%
16	4.82	-71.76	-8.29	-4.82	71.76	8.29	0.000%
17	8.34	-71.76	-4.79	-8.34	71.76	4.79	0.000%
18	9.62	-71.76	-0.01	-9.62	71.76	0.01	0.000%
19	8.32	-71.76	4.77	-8.32	71.76	-4.77	0.000%
20	4.80	-71.76	8.27	-4.80	71.76	-8.27	0.000%
21	-0.01	-71.76	9.56	0.01	71.76	-9.56	0.000%
22	-4.82	-71.76	8.29	4.82	71.76	-8.29	0.000%
23	-8.34	-71.76	4.79	8.34	71.76	-4.79	0.000%
24	-9.62	-71.76	0.01	9.62	71.76	-0.01	0.000%
25	-8.32	-71.76	-4.77	8.32	71.76	4.77	0.000%
26	-4.80	-71.76	-8.27	4.80	71.76	8.27	0.000%
27	0.01	-48.05	-12.91	-0.01	48.05	12.91	0.000%
28	6.51	-48.05	-11.18	-6.51	48.05	11.18	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
29	11.27	-48.05	-6.46	-11.27	48.05	6.46	0.000%
30	13.00	-48.05	-0.01	-13.00	48.05	0.01	0.000%
31	11.26	-48.05	6.44	-11.26	48.05	-6.44	0.000%
32	6.49	-48.05	11.17	-6.49	48.05	-11.17	0.000%
33	-0.01	-48.05	12.91	0.01	48.05	-12.91	0.000%
34	-6.51	-48.05	11.18	6.51	48.05	-11.18	0.000%
35	-11.27	-48.05	6.46	11.27	48.05	-6.46	0.000%
36	-13.00	-48.05	0.01	13.00	48.05	-0.01	0.000%
37	-11.26	-48.05	-6.44	11.26	48.05	6.44	0.000%
38	-6.49	-48.05	-11.17	6.49	48.05	11.17	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00034960
3	Yes	5	0.00000001	0.00070860
4	Yes	5	0.00000001	0.00070687
5	Yes	4	0.00000001	0.00042796
6	Yes	5	0.00000001	0.00072234
7	Yes	5	0.00000001	0.00070033
8	Yes	4	0.00000001	0.00036814
9	Yes	5	0.00000001	0.00071179
10	Yes	5	0.00000001	0.00071598
11	Yes	4	0.00000001	0.00044930
12	Yes	5	0.00000001	0.00070002
13	Yes	5	0.00000001	0.00071959
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00023806
16	Yes	5	0.00000001	0.00031640
17	Yes	5	0.00000001	0.00031670
18	Yes	5	0.00000001	0.00024032
19	Yes	5	0.00000001	0.00031923
20	Yes	5	0.00000001	0.00031639
21	Yes	5	0.00000001	0.00023891
22	Yes	5	0.00000001	0.00031789
23	Yes	5	0.00000001	0.00031927
24	Yes	5	0.00000001	0.00024052
25	Yes	5	0.00000001	0.00031609
26	Yes	5	0.00000001	0.00031723
27	Yes	4	0.00000001	0.00008868
28	Yes	5	0.00000001	0.00005836
29	Yes	5	0.00000001	0.00005810
30	Yes	4	0.00000001	0.00010089
31	Yes	5	0.00000001	0.00006104
32	Yes	5	0.00000001	0.00005701
33	Yes	4	0.00000001	0.00008970
34	Yes	5	0.00000001	0.00005903
35	Yes	5	0.00000001	0.00005985
36	Yes	4	0.00000001	0.00010201
37	Yes	5	0.00000001	0.00005694
38	Yes	5	0.00000001	0.00006040

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 131.915	46.33	36	2.22	0.00
L2	136.336 - 86.847	26.94	30	1.92	0.00
L3	92.404 - 43.313	11.99	30	1.26	0.00
L4	49.935 - 0	3.42	30	0.63	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.0000	Lightning Rod	36	46.33	2.22	0.00	38342
161.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	36	37.59	2.12	0.00	10089
147.0000	RRH2x60-700	36	31.39	2.02	0.00	5808
141.0000	RRUS-11 BAND 12	30	28.85	1.97	0.00	4913
140.0000	HPA-65R-BUU-H6 w/ Mount Pipe	30	28.44	1.96	0.00	4792
83.0000	OG-860/1920/GPS-A	30	9.56	1.11	0.00	3624
78.0000	OG-860/1920/GPS-A	30	8.40	1.04	0.00	3579

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 131.915	133.36	11	6.38	0.01
L2	136.336 - 86.847	77.61	5	5.54	0.01
L3	92.404 - 43.313	34.56	5	3.65	0.00
L4	49.935 - 0	9.85	5	1.81	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.0000	Lightning Rod	11	133.36	6.38	0.01	13623
161.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	11	108.22	6.11	0.01	3582
147.0000	RRH2x60-700	11	90.42	5.83	0.01	2059
141.0000	RRUS-11 BAND 12	5	83.12	5.68	0.01	1740
140.0000	HPA-65R-BUU-H6 w/ Mount Pipe	5	81.92	5.65	0.01	1697
83.0000	OG-860/1920/GPS-A	5	27.58	3.21	0.00	1266
78.0000	OG-860/1920/GPS-A	5	24.21	2.99	0.00	1249

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	180 - 131.915 (1)	TP31.375x21x0.25	48.0850	0.0000	0.0	39.00	23.9408	-10.42	933.69	0.011
L2	131.915 - 86.847 (2)	TP40.468x29.9211x0.375	49.4890	0.0000	0.0	39.00	46.3111	-18.53	1806.13	0.010
L3	86.847 - 43.313 (3)	TP48.968x38.5337x0.4375	49.0910	0.0000	0.0	39.00	65.4362	-30.15	2552.01	0.012
L4	43.313 - 0 (4)	TP57.25x46.6855x0.5	49.9350	0.0000	0.0	39.00	90.0622	-48.03	3512.43	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	180 - 131.915 (1)	TP31.375x21x0.25	429.59	28.93	39.00	0.742	0.00	0.00	39.00	0.000
L2	131.915 - 86.847 (2)	TP40.468x29.9211x0.375	1574.94	42.58	39.00	1.092	0.00	0.00	39.00	0.000
L3	86.847 - 43.313 (3)	TP48.968x38.5337x0.4375	2890.29	45.65	39.00	1.170	0.00	0.00	39.00	0.000
L4	43.313 - 0 (4)	TP57.25x46.6855x0.5	4661.37	44.39	39.00	1.138	0.00	0.00	39.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	180 - 131.915 (1)	TP31.375x21x0.25	23.70	0.99	26.00	0.076	1.29	0.04	26.00	0.002
L2	131.915 - 86.847 (2)	TP40.468x29.9211x0.375	28.51	0.62	26.00	0.047	1.15	0.02	26.00	0.001
L3	86.847 - 43.313 (3)	TP48.968x38.5337x0.4375	33.20	0.51	26.00	0.039	1.00	0.01	26.00	0.000
L4	43.313 - 0 (4)	TP57.25x46.6855x0.5	37.62	0.42	26.00	0.032	0.81	0.00	26.00	0.000

Pole Interaction Design Data

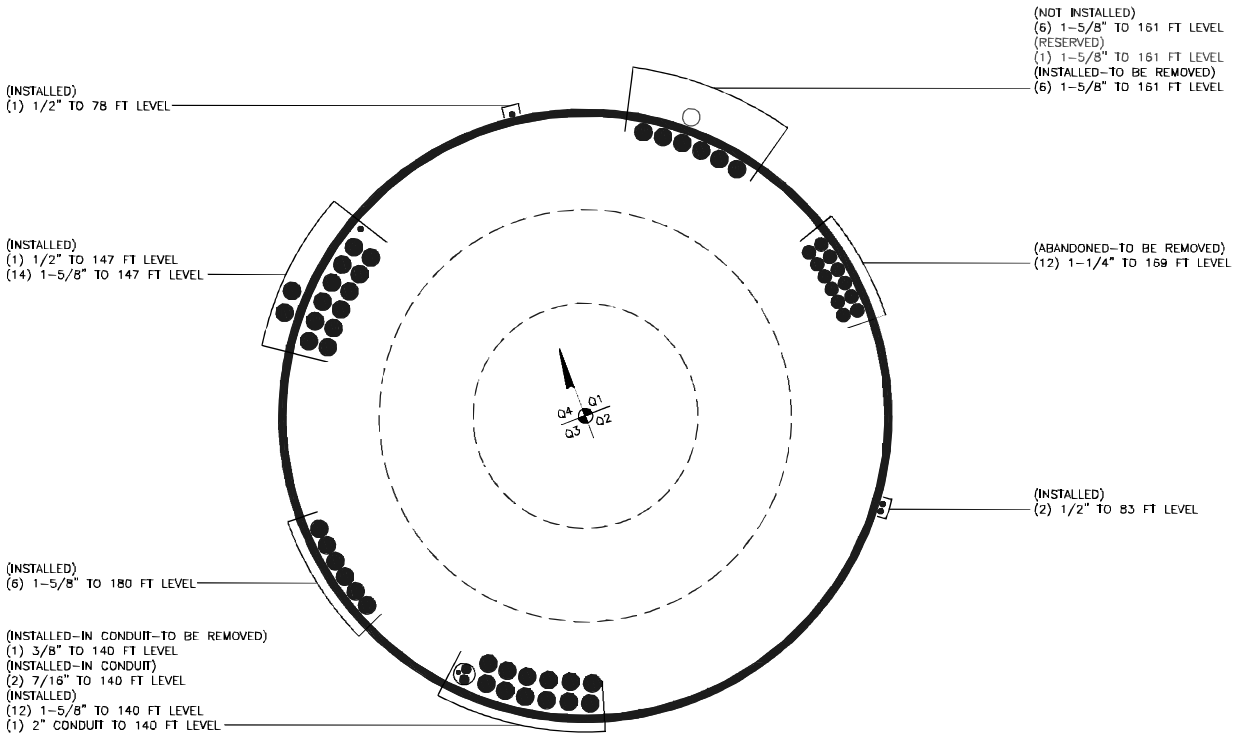
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 131.915 (1)	0.011	0.742	0.000	0.076	0.002	0.755 ✔	1.333	H1-3+VT ✔
L2	131.915 - 86.847 (2)	0.010	1.092	0.000	0.047	0.001	1.103 ✔	1.333	H1-3+VT ✔
L3	86.847 - 43.313 (3)	0.012	1.170	0.000	0.039	0.000	1.183 ✔	1.333	H1-3+VT ✔
L4	43.313 - 0 (4)	0.014	1.138	0.000	0.032	0.000	1.152 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	180 - 131.915	Pole	TP31.375x21x0.25	1	-10.42	1244.61	56.6	Pass
L2	131.915 - 86.847	Pole	TP40.468x29.9211x0.375	2	-18.53	2407.57	82.7	Pass
L3	86.847 - 43.313	Pole	TP48.968x38.5337x0.4375	3	-30.15	3401.83	88.7	Pass
L4	43.313 - 0	Pole	TP57.25x46.6855x0.5	4	-48.03	4682.07	86.4	Pass
							Summary	
						Pole (L3)	88.7	Pass
						RATING =	**88.7**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876391 TOWER ID: C_BASELEVEL

10/12/07	NEW BUILD PER WORK ORDER # 1085963	KGN
27/09/11	AS-BUILT INFORMATION ADDED PER WORK ORDER # 146609	PS
04/06/13	AS-BUILT INFORMATION ADDED PER WORK ORDER # 154613	KT
28/05/15	AS-BUILT INFORMATION ADDED PER WORK ORDER # 1043433	AGF
28/7/2015	UPDATED PER WORK ORDER 1086477, 1086462	BMT
3/11/2015	UPDATED PER WORK ORDER 1147167	GG
6/11/2015	UPDATED PER WORK ORDER 1149300	BMH

DRAWN BY: **KGN**
CHECKED BY: **JM**
DRAWING DATE: **10/12/07**

SITE NUMBER:
SITE NAME:

SITE NAME

COLUMBIA / DEOJAY

BUSINESS UNIT NUMBER

876391

SITE ADDRESS

14 THOMPSON HILL RD
COLUMBIA, CT 06237
TOLLAND COUNTY
USA

SHEET TITLE

BASE LEVEL

SHEET NUMBER

A1-0

BASE LEVEL DRAWING

SCALE: 1" = 1'-0" | 1

PLOT DATE: 12/7/2015 FILE NAME: 876391_BASELEVEL.DWG
Xref R:\TEMPLATES\TYPICAL BLOCKS FOR TEMPLATES\TITLE BLOCK STD-VER 3.1.dwg

APPENDIX C

ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

Project No. *15THAR1400*
Site Name: *COLUMBIA / DEOJAY*
Site BU # *876391*

Pole Manufacturer:	*Other*

Reactions		
Moment:	4661	ft-kips
Axial:	48	kips
Shear:	38	kips

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	66	in

Plate Data		
Diam:	72	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	9.09	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	57.25	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffened Cases

Anchor Rod Results

Maximum Rod Tension:	167.1	Kips	Rigid
Allowable Tension:	195.0	Kips	Service, ASD
Anchor Rod Stress Ratio:	85.7%	**Pass**	Fty*ASIF

Base Plate Results

	Flexural Check		Rigid
Base Plate Stress:	59.7	ksi	Service ASD
Allowable Plate Stress:	60.0	ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	99.6%	**Pass**	Y.L. Length: 32.84

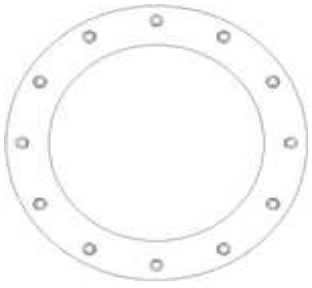
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *876391*
Site Name: *COLUMBIA / DEOJAY*
App #: *323138*

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	3	in
Pier Dist. Above Grade:	12	in
Pad Bearing Depth, D:	7	ft
Pad Thickness, T:	3	ft
Pad Width=Length, L:	26	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	7	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	49.00	ft^2
Pier Height:	5.00	ft
Soil (above pad) Height:	4.00	ft

Soil Parameters		
Unit Weight, γ:	135.0	pcf
Ultimate Gross Bearing Capacity, qn:	12.95	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	40.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Gross Bearing: ϕ*qn:	9.71	ksf
Passive Pres. Coeff., Kp	4.60	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	51.3	kips
Pad Force Location Above D:	1.36	ft
ϕ(Passive Pressure Moment):	69.95	ft-kips
Factored O.T. M(WL), "1.6W":	6715.6	ft-kips
Factored OT (MW-Msoil), M1	6645.62	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	3.36	ft
Sum of Soil Wedges Wt:	59.22	kips
Soil Wedges ecc, K1:	8.88	ft
Ftg+Soil above Pad wt:	679.5	kips
Unfactored (Total ftg-soil Wt):	738.75	kips
1.2D. **No Soil Wedges**.	873.04	kips
0.9D. **With Soil Wedges**	708.07	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	48	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	38	kips
Unfactored WL Moment, M:	4661	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	57.6	kips
0.90	0.9D+1.6W, Pu:	43.2	kips
1.35	Vu:	51.3	kips
	Mu:	6292.35	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	873.04	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	6645.62	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	7.61	ft
Orthogonal qu=	3.12	ksf
qu/ϕ*qn Ratio=	**32.10%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	5.38	ft
Diagonal qu=	3.76	ksf
qu/ϕ*qn Ratio=	**38.73%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	708.07	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	6172.38	ft-kips

Orthogonal ecc3 = M2/P2 =	8.72	ft
Ortho Non Bearing Length,NBL=	17.43	ft
Orthogonal qu=	3.18	ksf
Diagonal qu=	3.79	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	4661.00		
M Orthogonal:	6191.64	**75.28%**	**Pass**
M Diagonal:	6191.64	**75.28%**	**Pass**

FDH VELOCITEL
ENGINEERING INNOVATION

Version	1.0
Issue Date	11/4/2015

FDH Velocitel -- 6521 Meridien Drive, Raleigh, NC 27616 -- Ph. 919.755.1012 -- Fax 919.755.1031

LPILE 2015 Foundation Inputs

Project & Site Details	
Job Number:	15THAR1400
Site Name:	COLUMBIA / DEOJAY
Site ID:	876391
Code	TIA/EIA-222-F
Water Table Depth (ft)	99
Caisson Length (ft)	8
Ext. Above Grade (ft)	1
Total # of Soil Layers	2
Boring Log	B-1
Foundation Type	Monopole Caisson

TNX Reactions		
Moment	4661	k-ft
Compression	48	k
Shear (comp.)	38	k

LPILE Input Reactions		
Moment	**72,711,600**	lb-in
Vertical Load Down	**62,400**	lbs
Horizontal Load (comp.)	**49,400**	lbs

LPILE Nominal Capacities

Reaction	Maximum Reaction*	Unit	Nominal Capacity*	Unit	Factor	Capacity	Pass/Fail
Moment		lb-in		k-in	0.9	**#DIV/0!**	**#DIV/0!**
Axial	62.4	k		k	0.65	**#DIV/0!**	**#DIV/0!**

Soil Parameters per Geotechnical Investigation					Soil Parameters for LPILE INPUT					
Layer	Thickness (ft)	Unit Weight, g (pcf)	Phi Angle, Ø (°)	Cohesion (psf)	Soil Type	Top of Layer (ft)	Bottom of Layer (ft)	Effective Unit Weight, g_{eff} (pcf)	Phi Angle, Ø (°)	Cohesion (psf)
1	2	135	40	0	Sand (Reese)	1	3	135	40	0
2	2	135	40	0	Sand (Reese)	3	5	135	40	0

FDH VELOCITEL
ENGINEERING INNOVATION

Verision:	1.2
Version Date:	11/17/2015

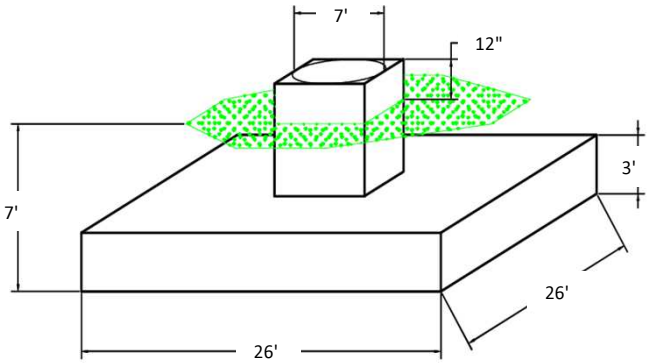
FDH Velocitel -- 6521 Meridien Drive, Raleigh, NC 27616 -- Ph. 919.755.1012 -- Fax 919.755.1031

MONOPOLE PAD AND PIER STEEL CHECKS

Project & Site Details			
Project No.	15THAR1400	Rev.	0
Project Name	COLUMBIA / DEOJAY		
Site ID	876391		
Date	Thursday, December 10, 2015		
Code	TIA/EIA-222-F		
Overstress Capacity	105%		

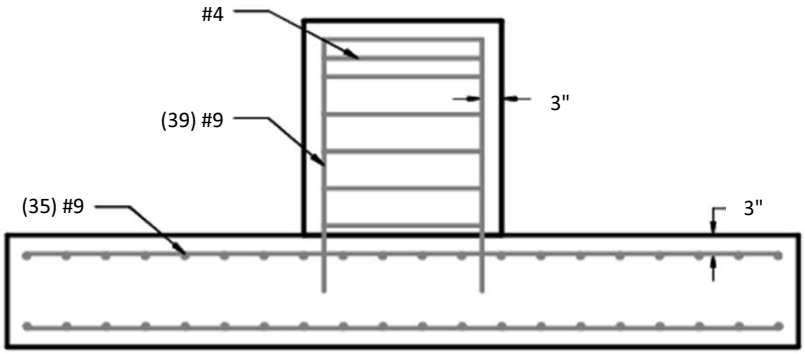
tnx Reactions		
Moment, M	4,661	kip-ft
Shear, V	38	k
Axial, P	48	k

Foundation Details		
Pier Above Grade, E	1.0	ft
Pad Depth Below Grade, D	7.0	ft
Pad Width, W	26.0	ft
Pad Thickness, T	3.0	ft
Pier Shape	Square	-
Pier Diameter, D_p	7.0	ft
Density of Soil, γ_s	0.135	kcf
Density of Concrete, γ_c	0.150	kcf



Pad Steel Details		
Horiz. Bar Size	#9	-
Pad Bar Diameter, d_b	1.128	in
Number of pad bars, n	35	-
Strength of Concrete, f_c'	4,000	psi
Clear Cover, cc	3.0	in
Yield Strength of Steel, F_y	60	ksi

Pier Steel Details		
Vertical Bar Size	#9	-
Pier Bar Diameter, d_v	1.128	in
Number of pier bars, n_v	39	-
Tie Size	#4	-
Tie Bar Diameter, d_t	0.5	in
Clear Cover, cc	3.0	in



Pad Steel Checks		
Pad Shear	66.8%	PASS
Two-Way Shear	86.6%	PASS
Pad Flexure	86.1%	PASS
Steel Yielding	OK	

Pier Steel Checks		
Pier Compression	0.5%	PASS
Applied Moment, Mu	6306.30	k-ft
LPILE Nominal Moment Capacity	91,212	k-in
Ø Mn	6840.88	k-ft
Pier Flexure	92.2%	PASS

EBI Consulting
environmental | engineering | due diligence

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

AT&T Existing Facility

Site ID: CT5861

Columbia North
14 Thompson Hill Road
Columbia, CT 06237

January 8, 2016

EBI Project Number: 6616000025

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	5.87 %

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

EBI Consulting
environmental | engineering | due diligence

January 8, 2016

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

Emissions Analysis for Site: **CT5861 – Columbia North**

EBI Consulting was directed to analyze the proposed AT&T facility located at **14 Thompson Hill Road, Columbia, 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 public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure 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 done for the proposed AT&T Wireless antenna facility located at **14 Thompson Hill Road, Columbia, 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.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 2 LTE channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 GSM channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

6) 2 GSM channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

8) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **CCI HPA-65R-BUU-H6 and the Powerwave 7770.00** for transmission in the 700 MHz, 850 MHz and1900 MHz (PCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is **140 feet** above ground level (AGL).

11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

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AT&T Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	140 feet	Height (AGL):	140 feet	Height (AGL):	140 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A1 MPE%	**0.56**	Antenna B1 MPE%	**0.56**	Antenna C1 MPE%	**0.56**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	CCI OPA-65R-BUU-H6	Make / Model:	CCI OPA-65R-BUU-H6	Make / Model:	CCI OPA-65R-BUU-H6
Gain:	11.95 / 14.75 dBd	Gain:	11.95 / 14.75 dBd	Gain:	11.95 / 14.75 dBd
Height (AGL):	140 feet	Height (AGL):	140 feet	Height (AGL):	140 feet
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	5,462.56	ERP (W):	5,462.56	ERP (W):	5,462.56
Antenna A2 MPE%	**1.52**	Antenna B2 MPE%	**1.52**	Antenna C2 MPE%	**1.52**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	140 feet	Height (AGL):	140 feet	Height (AGL):	140 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A3 MPE%	**0.56**	Antenna B3 MPE%	**0.56**	Antenna C3 MPE%	**0.56**

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max per sector	**2.63 %**
Sprint	0.12 %
Nextel	0.21 %
Verizon Wireless	2.61 %
T-Mobile	0.30 %
Site Total MPE %:	**5.87 %**

AT&T Sector 1 Total:	2.63 %
AT&T Sector 2 Total:	2.63 %
AT&T Sector 3 Total:	2.63 %
Site Total:	5.87 %

AT&T _ 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	2	414.12	140	1.66	850	567	0.29 %
AT&T 1900 MHz (PCS) UMTS	2	656.33	140	2.63	1900	1000	0.26 %
AT&T 850 MHz GSM	2	940.05	140	3.76	700	467	0.81 %
AT&T 1900 MHz (PCS) GSM	2	1791.23	140	7.17	1900	1000	0.72 %
AT&T 700 MHz LTE	2	414.12	140	1.66	850	567	0.29 %
AT&T 1900 MHz (PCS) LTE	2	656.33	140	2.63	1900	1000	0.26 %
						Total:	2.63 %

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Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public 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 public exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector 1:	2.63 %
Sector 2:	2.63 %
Sector 3 :	2.63 %
AT&T Maximum Total (per sector):	2.63 %
Site Total:	5.87 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **5.87%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

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