



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

February 11, 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: 881536**  
**AT&T Site ID: CT5107**  
**120 Universal Drive, North Haven, CT 06473**  
**Latitude: 41° 20' 40.01"/ Longitude: -72° 52' 14.92"**

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 121-foot level of the existing 120-foot monopole at 120 Universal Drive in North Haven, CT. The tower is owned by Crown Castle. The property is owned by 120 Universal Drive Associates, LLC. AT&T now intends to replace three (3) antennas with three (3) new CCI 1.9 GHz antennas. These antennas would be installed at the 121-foot level of the tower. AT&T also intends to install three (3) RRUs and one (1) squid.

This facility was approved by the by the Town of North Haven Planning and Zoning Commission in Special Permit Application P2000-44 on November 13, 2000. This approval included the conditions that:

1. Submit three (3) revised plans which include:
  - a.) Revised plans must address/include all comments/conditions of this approval and the related site plan approval #P200-45.
  - b.) Live certification.

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. Michael J. Freda, First Selectman, Town of North Haven 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.

Melanie A. Bachman

February 11, 2016

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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](mailto:Jeff.Barbadora@crowncastle.com)

Attachments:

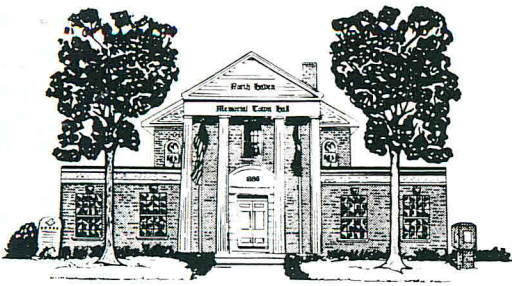
Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes

Tab 2: Exhibit-2: Structural Modification Report

Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: Mr. Michael Freda, First Selectman  
Town of North Haven  
18 Church Street  
North Haven, CT 06473

120 Universal Drive Associates, LLC  
120 Universal Drive  
North Haven, CT 06473



# TOWN OF NORTH HAVEN

MEMORIAL TOWN HALL / 18 CHURCH STREET

NORTH HAVEN, CONNECTICUT 06473



REPLY TO:

PLANNING & ZONING COMMISSION

Tel. (203) 239-5321

Fax (203) 234-2130

November 20, 2000

Mr. Stephen Longobardi  
Candid Communications of North Haven, II LLC  
110 Washington Avenue  
North Haven, CT 06473

Re: #P2000-44 Special Permit application, (as authorized by Section 3A.6.), of Candid Communications of North Haven, II LLC, relative to 120 Universal Drive South, (Map 11, Route 1). Plan Entitled: Candid Communications, LLC, Multi-User Wireless Communications Facility, North Haven Tower Site, Universal Drive, North Haven, Connecticut, Prepared By URS Greiner Woodward Clyde A-E-S, Dated 9-8-00, Rev. 11-1-00 Scale 1" = 30'. IL-30 Zoning District.

Dear Mr. Longobardi:

Please be advised that during the deliberation session of the Planning & Zoning Commission meeting held on Monday, November 13, 2000, the Commission unanimously voted to approve the above referenced application subject to the following conditions:

1. Submit three (3) revised plans which include:
  - a.) Revised plans must address/include all comments and conditions of this approval and the related Site Plan approval #P2000-45.
  - b.) Live certification.

In accordance with the Connecticut State Statutes, Section 8-3d, the Special Permit is not effective until a certified copy of the Commission's decision has been recorded on the Land Records, at the owner's expense. Accordingly, you must record this certified decision letter at the Town Clerk's Office, 18 Church Street, North Haven, CT. Immediately after filing with the Town Clerk, please submit a copy of the decision letter, stamped as recorded, to the Land Use Office, for our permanent record.

#P2000-44

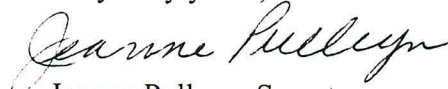
Page 2

Please note that one (1) set of revised drawings should be submitted for review after all outstanding issues (conditions of approval as set forth above), are adequately addressed. If there are any questions relative to the conditions of approval, please call the Town prior to submitting the revised plans. This will avoid costly and time consuming revisions and reviews, therefore expediting the process for you as the applicant.

This approval is subject to compliance with any and all Zoning Regulations of the Town of North Haven.

You may not proceed with this approval until you have received a signed plan from the Land Use Office.

Very truly yours,



Jeanne Pulleyn, Secretary  
Planning & Zoning Commission

JP/ts

cc: First Selectman

Engineering Dept.

Building Dept.

CERTIFIED MAIL R/R

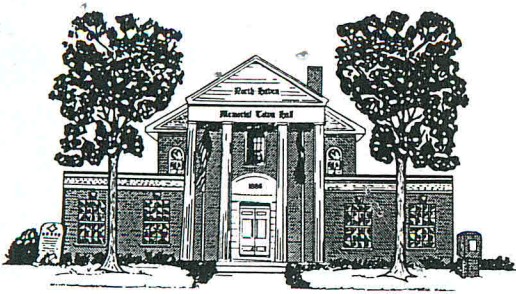
RECEIVED AND FILED  
TOWN CLERKS OFFICE  
NORTH HAVEN, CONN.

MAR 20 2001 @ 1:15 PM



TOWN CLERK





# TOWN OF NORTH HAVEN

MEMORIAL TOWN HALL / 18 CHURCH STREET

NORTH HAVEN, CONNECTICUT 06473



REPLY TO: PLANNING & ZONING COMMISSION

Tel. (203) 239-5321  
Fax (203) 234-2130

November 20, 2000

Mr. Stephen Longobardi  
Candid Communications of North Haven, II LLC  
110 Washington Avenue  
North Haven, CT 06473

Re: #P2000-45 Site Plan application of Candid Communications of North Haven, II LLC, relative to 120 Universal Drive South, (Map 11, Route 1). Plan Entitled: Candid Communications, LLC, Multi-User Wireless Communications Facility, North Haven Tower Site, Universal Drive, North Haven, Connecticut, Prepared By URS Greiner Woodward Clyde A-E-S, Dated 9-8-00, Rev. 11-1-00 Scale 1" = 30'. IL-30 Zoning District.

Dear Mr. Longobardi:

Please be advised that during the deliberation session of the Planning & Zoning Commission meeting held on Monday, November 13, 2000, the Commission unanimously voted to approve the above referenced application subject to the following conditions:

1. Submit eight (8) revised plans which include:
  - a.) The zoning table must reference the following:

Minimum lot area (sq ft)	30,000 (req'd column),	130,929 (existing column)
Minimum lot width (ft.)	100 (req'd column)	
Building height	12' (proposed column)	
Minimum side yard setback	30' (existing column),	52' (proposed column)
Minimum rear yard setback	27' (existing column)	
Minimum side yard tower setback	90' (proposed column)	
  - b.) Plans must be numbered to indicate a submission set of 5 sheets (1 of 5 through 5 of 5).
  - c.) The boundary/survey plan must be referenced in the sheet index on Sheet T-1.
  - d.) Provide all the information required by Section 3A.6. (b) (1) (iii) and (xi).
  - e.) Siltation control must be provided along the rear property line.
  - f.) The remaining access drive off the rear of the existing building must be marked as a fire lane.

- g.) The proposed parking area must be permanently marked with signage and curbing/islands so that the area does not remain open for use as spillover storage of vehicles, etc.
  - h.) Limits of green (lawn or non-impervious) areas need to be more clearly indicated. Note, said areas must be protected by curbing.
  - i.) The relocated scrap metal recycle dumpster must include respective enclosure and island protection with landscaping.
  - j.) Curbing and grass/landscaped areas along the rear property line must be provided in order to discourage continuance of unapproved outside storage activities.
2. The property owner and/or applicant must remove all outside storage (several trailer bodies, steel hoist, debris) located at the west side of the property as well as on the railroad property. All outside storage must be removed from the site. No building permit will be issued until the cleanup of this area occurs.
  3. Proposed contours and/or spot elevations must be provided.
  4. Parking spaces must be line striped.
  5. Proposed fencing must be reviewed by the Zoning Enforcement Officer prior to installation to insure zoning compliance.
  6. Soil and erosion controls must be inspected by the Zoning Enforcement Officer before work may commence.
  7. The property owner must maintain (repair/replace when necessary) the siltation control until all development activity is completed and all disturbed areas are permanently stabilized.
  8. Submit an as-built prior to bond release.
  9. Submit a bond in the amount of \$15,000.00 (forms are enclosed). Note, two separate bonds (for \$10,000.00 and \$5,000.00) are recommended, considering that the \$5,000.00 amount covering the required site cleanup work can be released prior to issuance of a building permit, contingent on completion and acceptance of said cleanup.

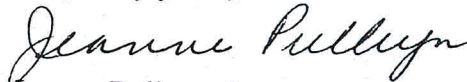
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Please note that one (1) set of revised drawings should be submitted for review after all outstanding issues (conditions of approval as set forth above), are adequately addressed. If there are any questions relative to the conditions of approval, please call the Town prior to submitting the revised plans. This will avoid costly and time consuming revisions and reviews, therefore expediting the process for you as the applicant.

This approval is subject to compliance with any and all Zoning Regulations of the Town of North Haven.

You may not proceed with this approval until you have received a signed plan from the Land Use Office.

Very truly yours,



Jeanne Pulleyn, Secretary  
Planning & Zoning Commission

JP/ts

cc: First Selectman  
Engineering Dept.  
Building Dept.

CERTIFIED MAIL R/R

Enclosures



**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; (2) EXISTING RRU PER SECTOR TO BE REUSED, FOR A TOTAL OF (6) EXISTING RRUS.
- AT&T SQUID: (1) NEW DC6 SURGE, FOR A TOTAL OF (1) NEW SQUID, (1) EXISTING DC-6 SURGE PROTECTOR, FOR A TOTAL OF (1) EXISTING SQUID TO REMAIN.

SITE ADDRESS: 120 UNIVERSAL DRIVE  
NORTH HAVEN, CT 06473

LATITUDE: 41.3441919 41°-20'-39.09084"N  
LONGITUDE: -72.8705989 72°-52'-14.1560"W

USID: 15207

TOWER OWNER: TBD

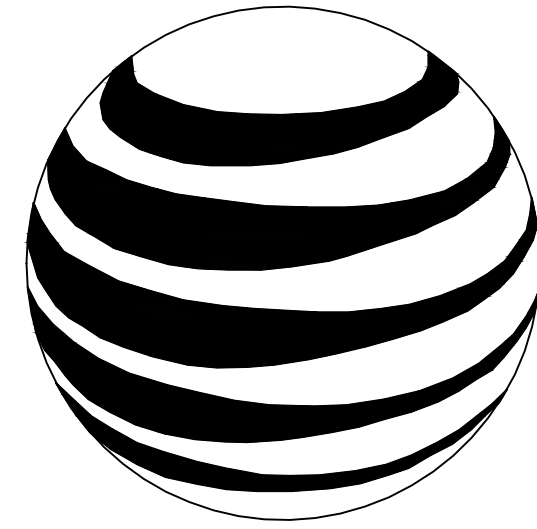
TYPE OF SITE: MONOPOLE/INDOOR EQUIPMENT

MONOPOLE HEIGHT: 120'-0"±

RAD CENTER: 121'-0"±

CURRENT USE: UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY

PROPOSED USE: UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY



**at&t**  
**MOBILITY**

**FA CODE: 10071172**

**SITE NUMBER: CTU5107**

**SITE NAME: NORTH HAVEN SOUTH**

**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

**ZONING:**

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

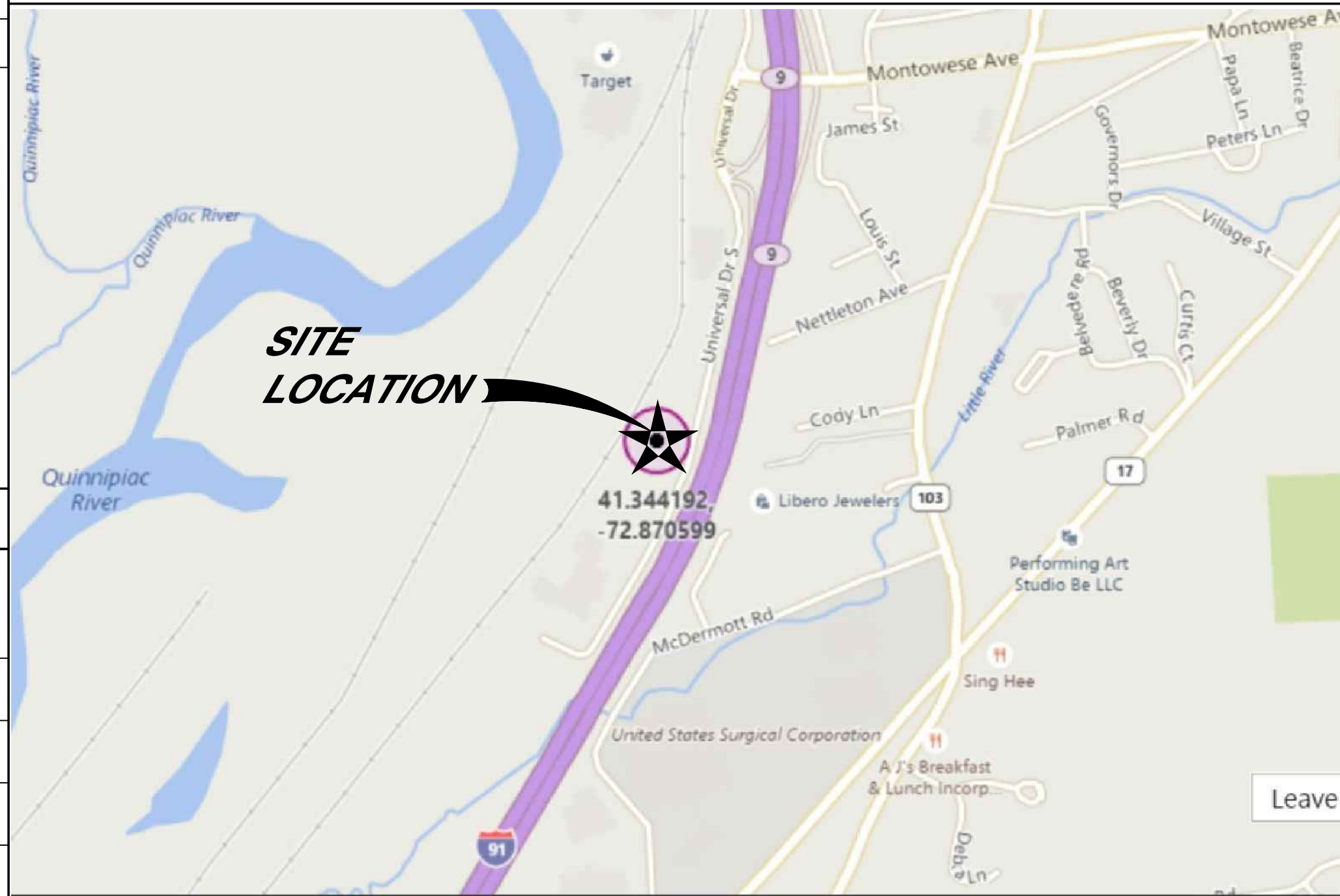
**DRAWING INDEX**

**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

**VICINITY MAP**

PROCEED EAST ON ENTERPRISE DR. TURN LEFT ON CAPITOL BLVD. TURN LEFT ON WEST ST. LEFT TURN HARTFORD/I-91 N. EXIT RIGHT FOLLOWING THE SIGN WINDSOR/BLOOMFIELD (EXIT 35A-35B). AT RAMP'S END, TAKE A LEFT TO PUTNAM HWY/CT-218. TURN RIGHT ON PINE LN. SITE WILL BE ON THE RIGHT.



**GENERAL NOTES**

- 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.
- 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.
- 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.

**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 AND MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

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



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



**SITE NUMBER: CTU5107**  
**SITE NAME: NORTH HAVEN SOUTH**  
120 UNIVERSAL DRIVE  
NORTH HAVEN, CT 06473  
NEW HAVEN COUNTY



0	02/01/16	ISSUED AS FINAL	NJM	NDB	NDB
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		

SEAL:

NICHOLAS D. BARILE  
PROFESSIONAL ENGINEER  
CT LICENSE NO. 28643

AT&T		
DRAWING TITLE: <b>TITLE SHEET</b>		
JOB NUMBER 15081-EMP	DRAWING NUMBER T-1	REV 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 1/2" 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.



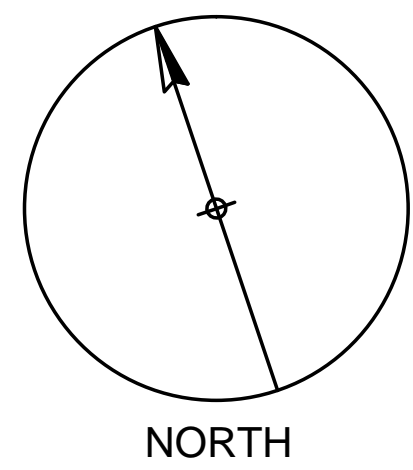
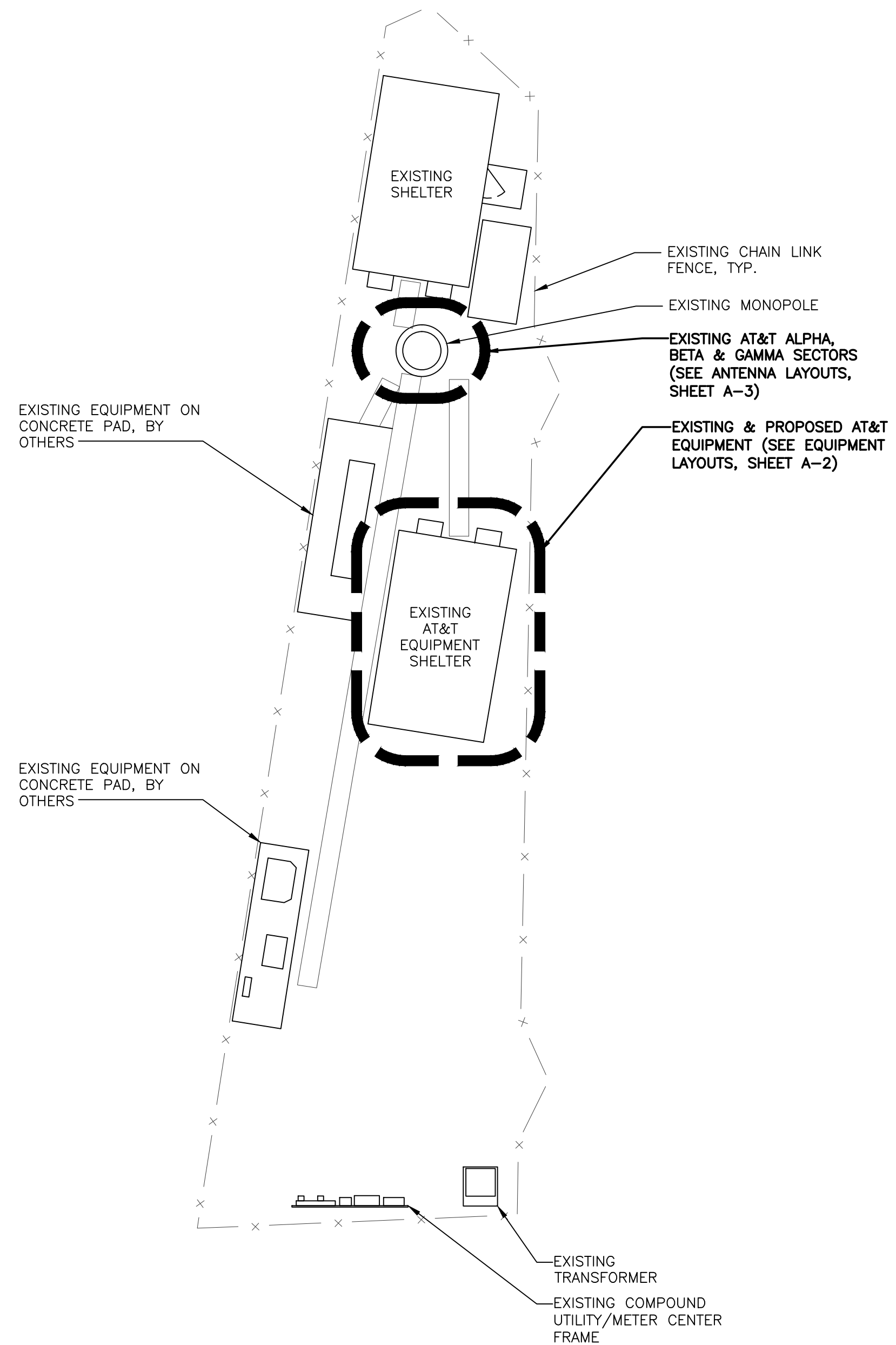
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**SITE NAME: NORTH HAVEN SOUTH**  
 120 UNIVERSAL DRIVE  
 NORTH HAVEN, CT 06473  
 NEW HAVEN COUNTY



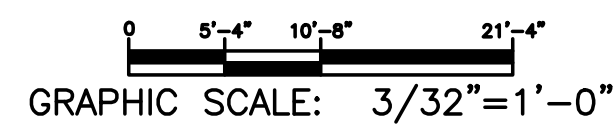
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NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		

SEAL:  
 NICHOLAS D. BARILE  
 PROFESSIONAL ENGINEER  
 CT LICENSE NO. 28643

AT&T		
DRAWING TITLE: <b>GROUNDING &amp; GENERAL NOTES</b>		
JOB NUMBER 15081-EMP	DRAWING NUMBER GN-1	REV 0



**COMPOUND LAYOUT**  
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.

**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: CTU5107**  
**SITE NAME: NORTH HAVEN SOUTH**  
120 UNIVERSAL DRIVE  
NORTH HAVEN, CT 06473  
NEW HAVEN COUNTY

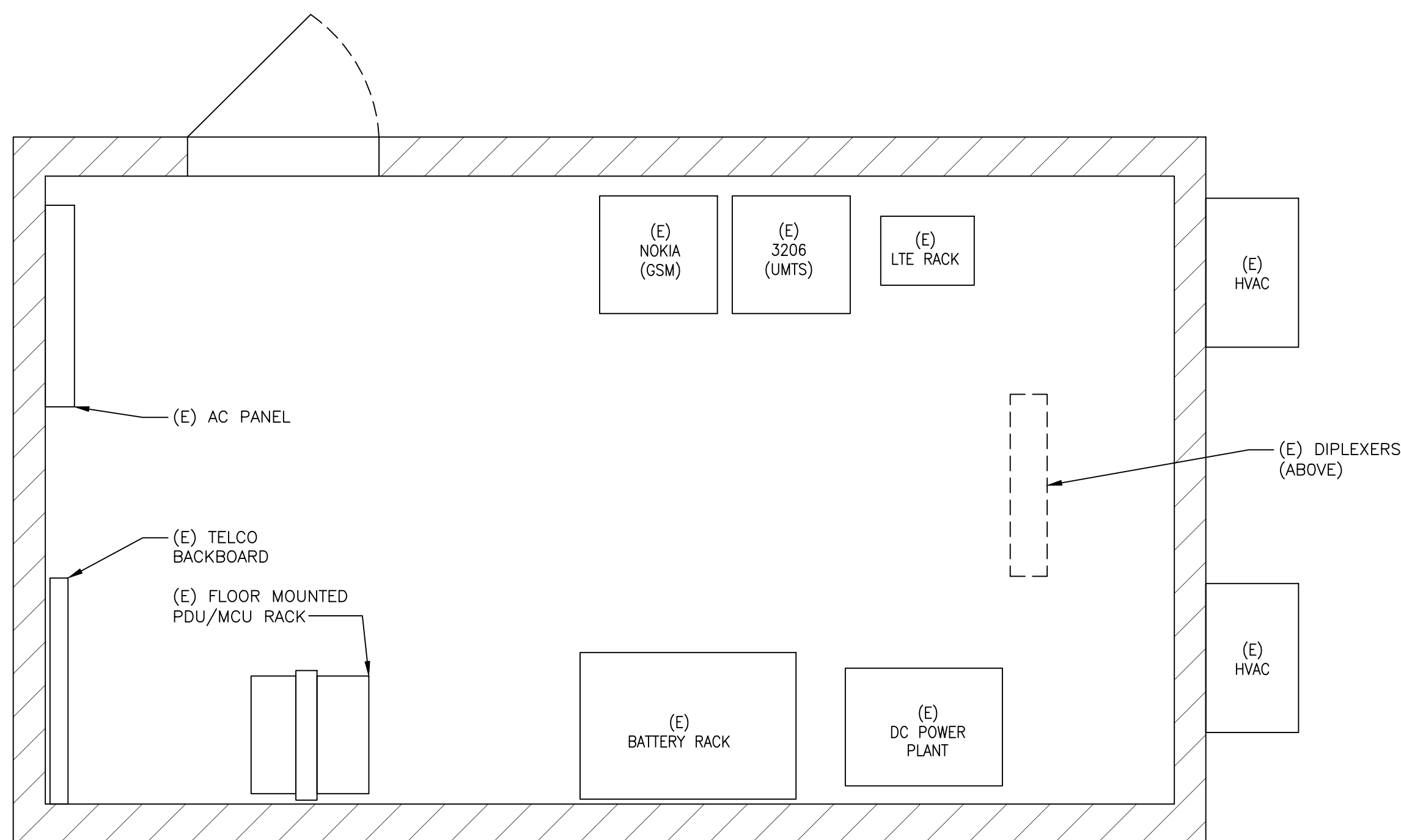
**at&t**  
MOBILITY  
550 COCHITUATE ROAD  
FRAMINGHAM, MA 01701

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NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		

SEAL:  
  
NICHOLAS D. BARILE  
PROFESSIONAL ENGINEER  
CT LICENSE NO. 28643

AT&T		
DRAWING TITLE: <b>COMPOUND LAYOUT</b>		
JOB NUMBER 15081-EMP	DRAWING NUMBER A-1	REV 0



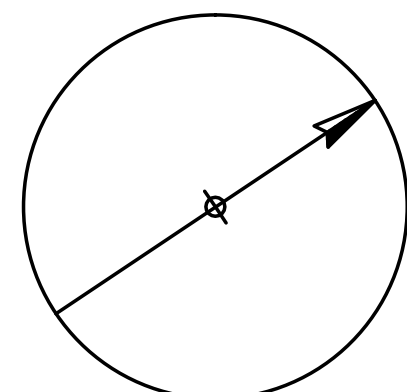


**EXISTING EQUIPMENT LAYOUT**

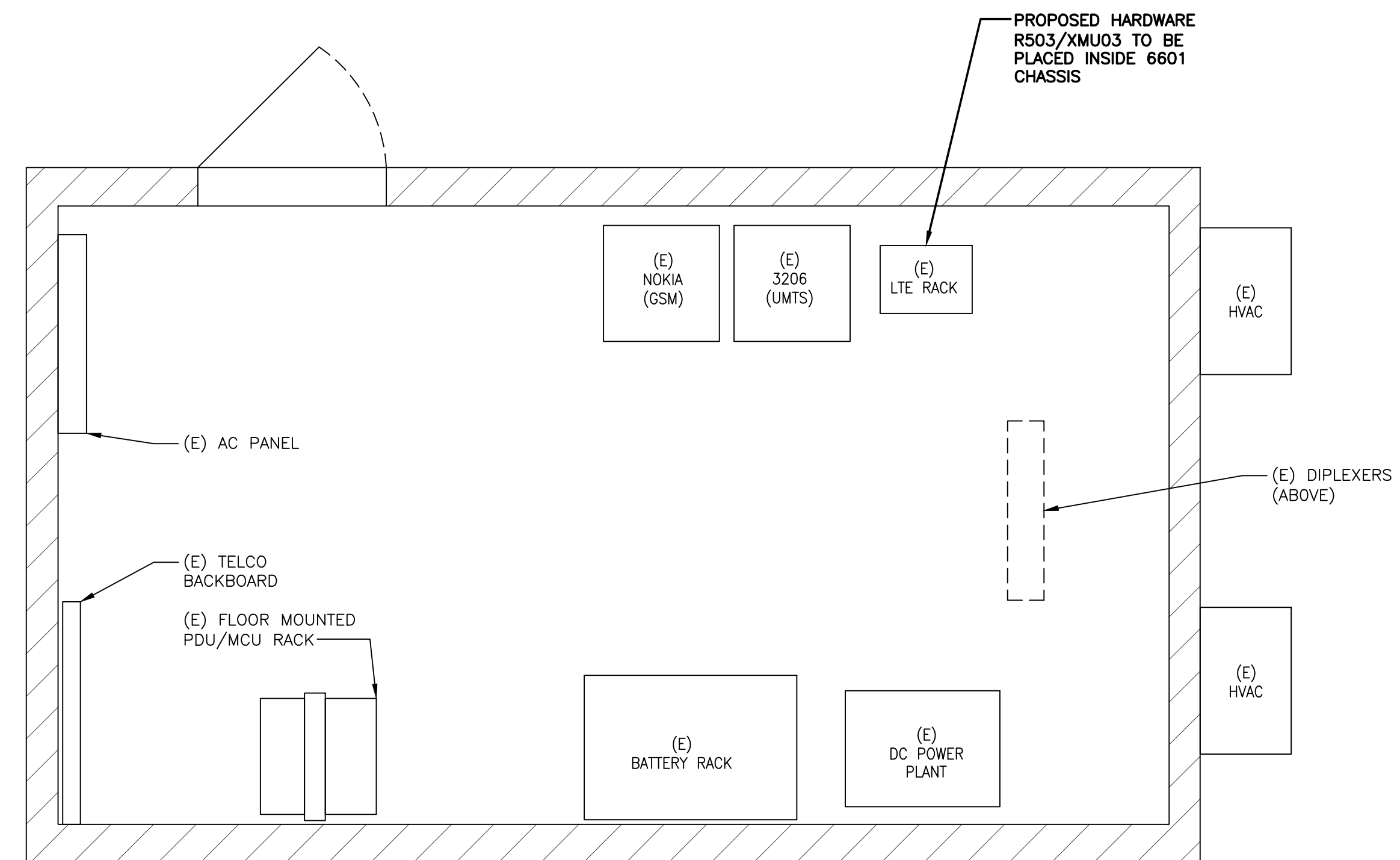
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( IN FEET )  
1/2 Inch = 1 Foot

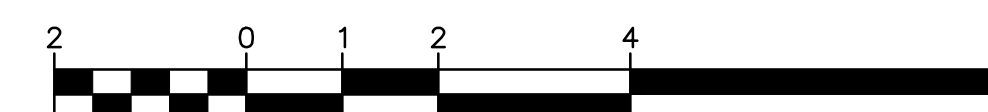


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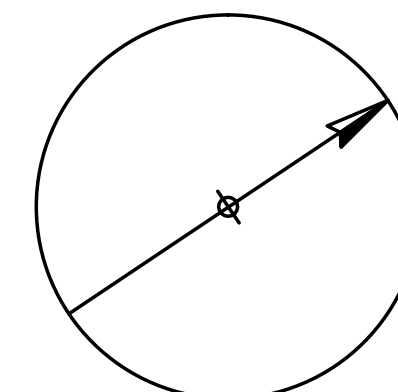


**PROPOSED EQUIPMENT LAYOUT**

SCALE: 1" = 2'-0"



( IN FEET )  
1/2 Inch = 1 Foot



NORTH

**COM-EX**  
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16 ESQUIRE ROAD  
BILLERICA, MA 01821

**SITE NUMBER: CTU5107**  
**SITE NAME: NORTH HAVEN SOUTH**

120 UNIVERSAL DRIVE  
NORTH HAVEN, CT 06473  
NEW HAVEN COUNTY

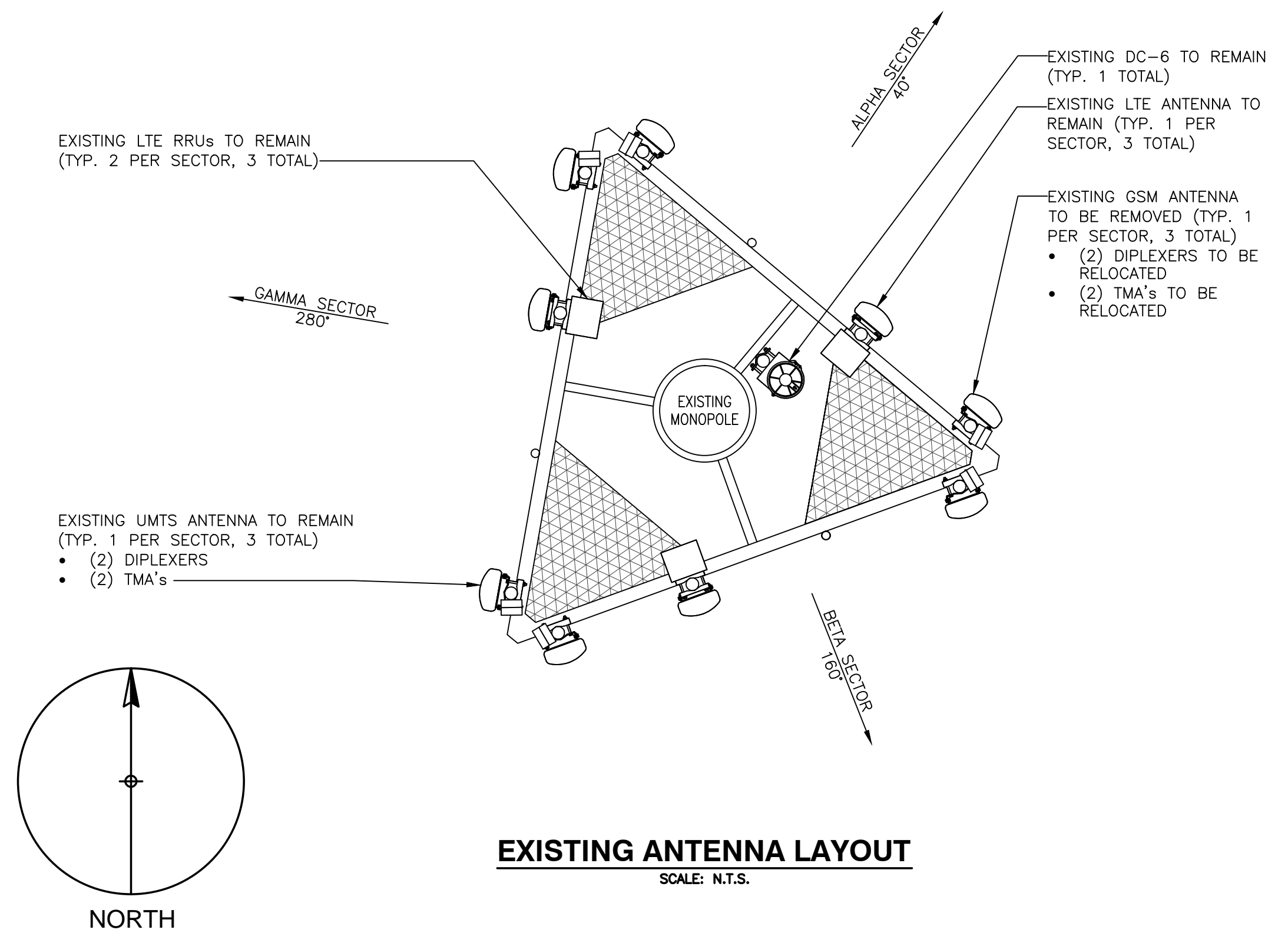
 **at&t**  
MOBILITY  
550 COCHITUATE ROAD  
FRAMINGHAM, MA 01701

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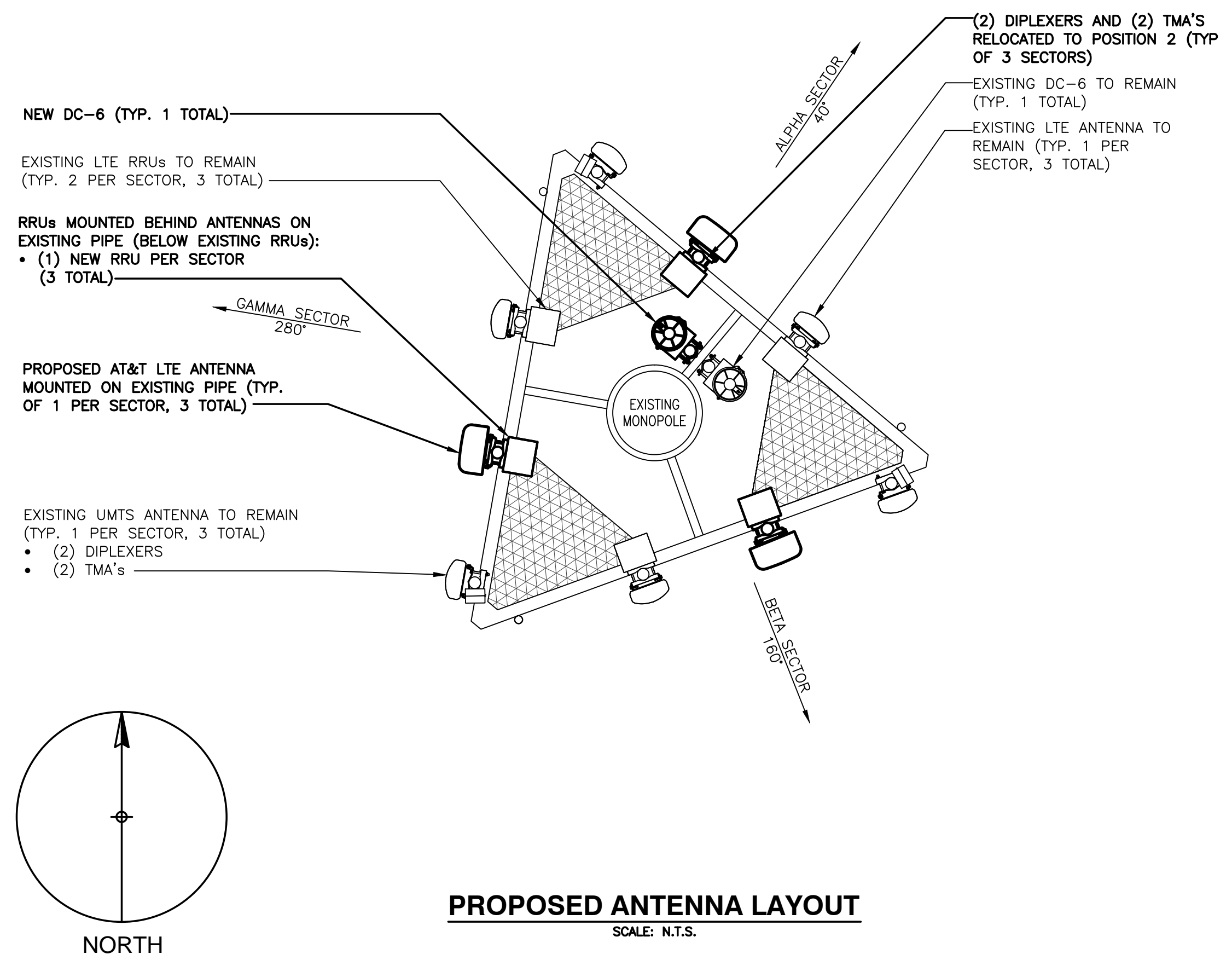
SEAL:  
  
NICHOLAS D. BARILE  
PROFESSIONAL ENGINEER  
CT LICENSE NO. 28643

AT&T		
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JOB NUMBER 15081-EMP	DRAWING NUMBER A-2	REV 0

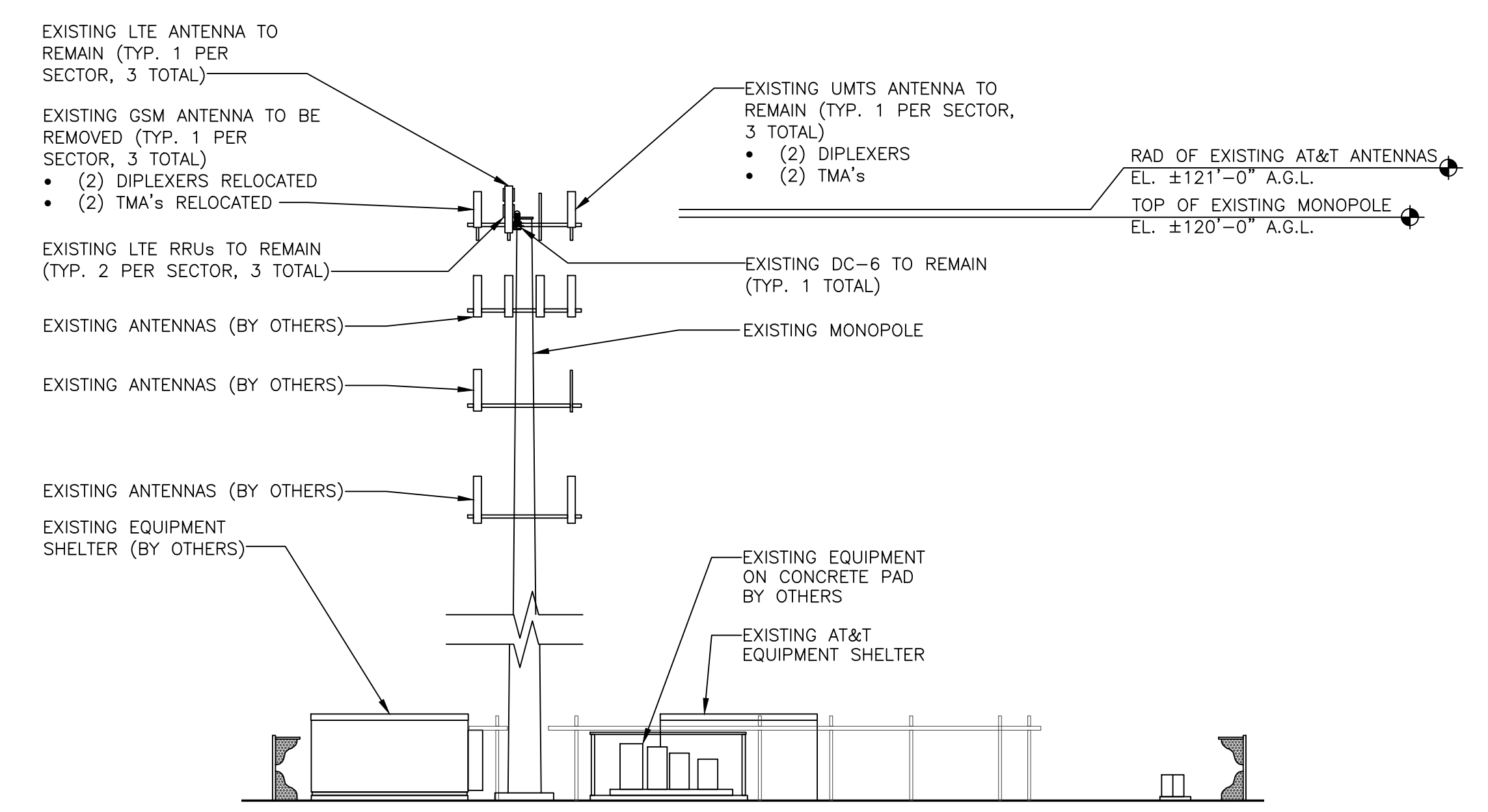




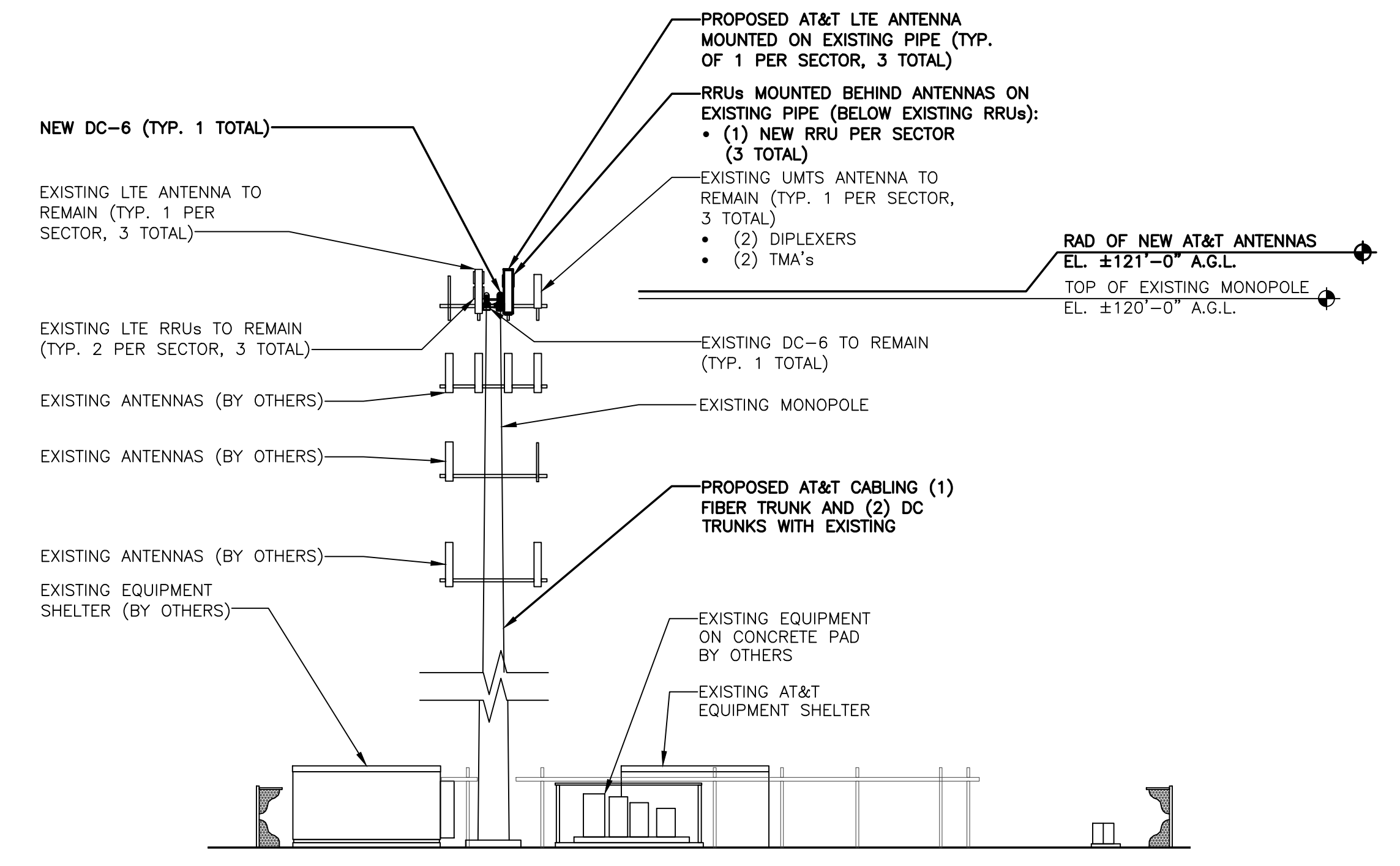
**EXISTING ANTENNA LAYOUT**  
SCALE: N.T.S.



**PROPOSED ANTENNA LAYOUT**  
SCALE: N.T.S.



**EXISTING TOWER ELEVATION**  
SCALE: NTS



**PROPOSED 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.

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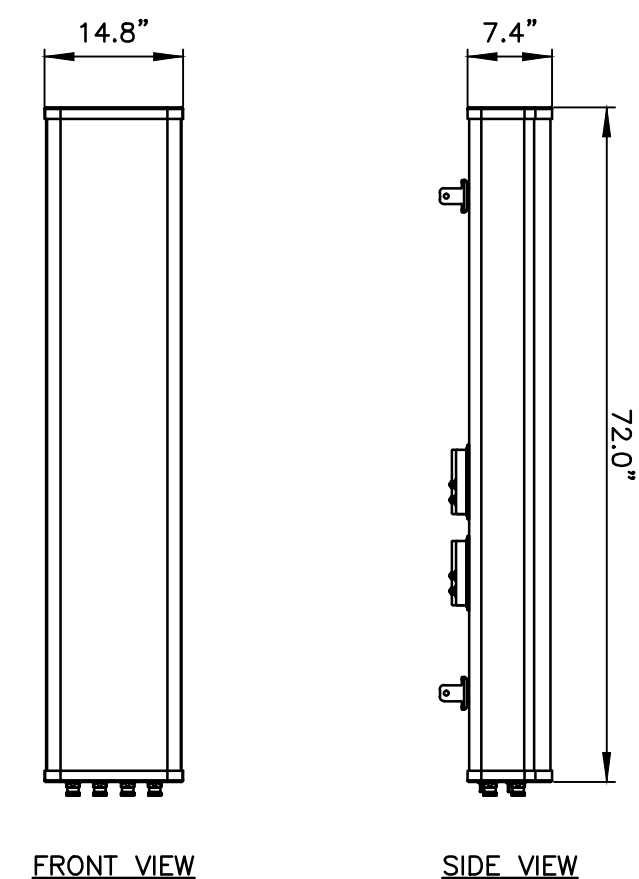
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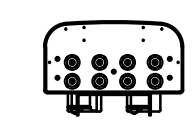
SEAL:  
NICHOLAS D. BARILE  
PROFESSIONAL ENGINEER  
CT LICENSE NO. 28643

<b>AT&amp;T</b>		
DRAWING TITLE: <b>ANTENNA LAYOUTS &amp; ELEVATIONS</b>		
JOB NUMBER 15081-EMP	DRAWING NUMBER A-3	REV 0



FRONT VIEW

SIDE VIEW

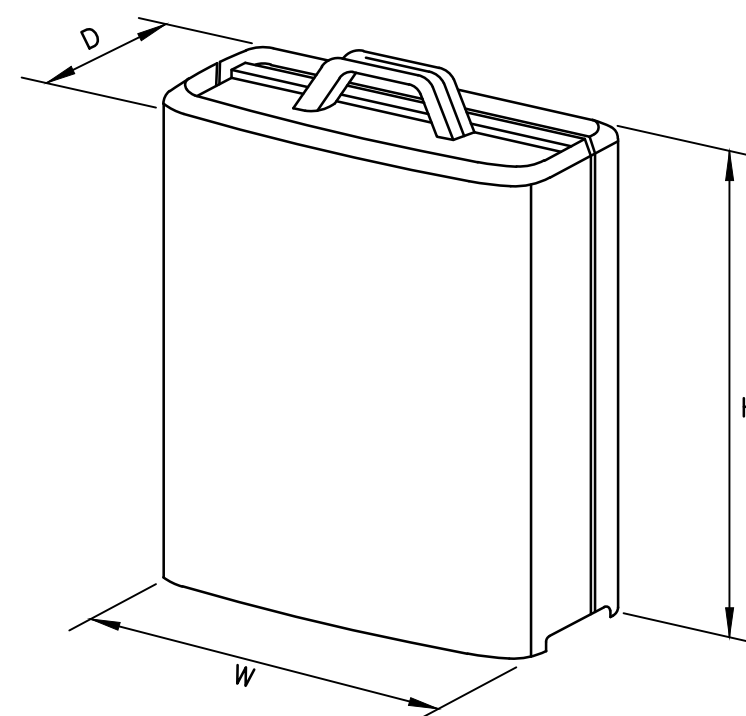


BOTTOM VIEW

MANUFACTURER	CCI
MODEL	OPA-65R-LCUU-H6
WEIGHT	73 LBS

**LTE ANTENNA DETAIL**

SCALE: N.T.S.

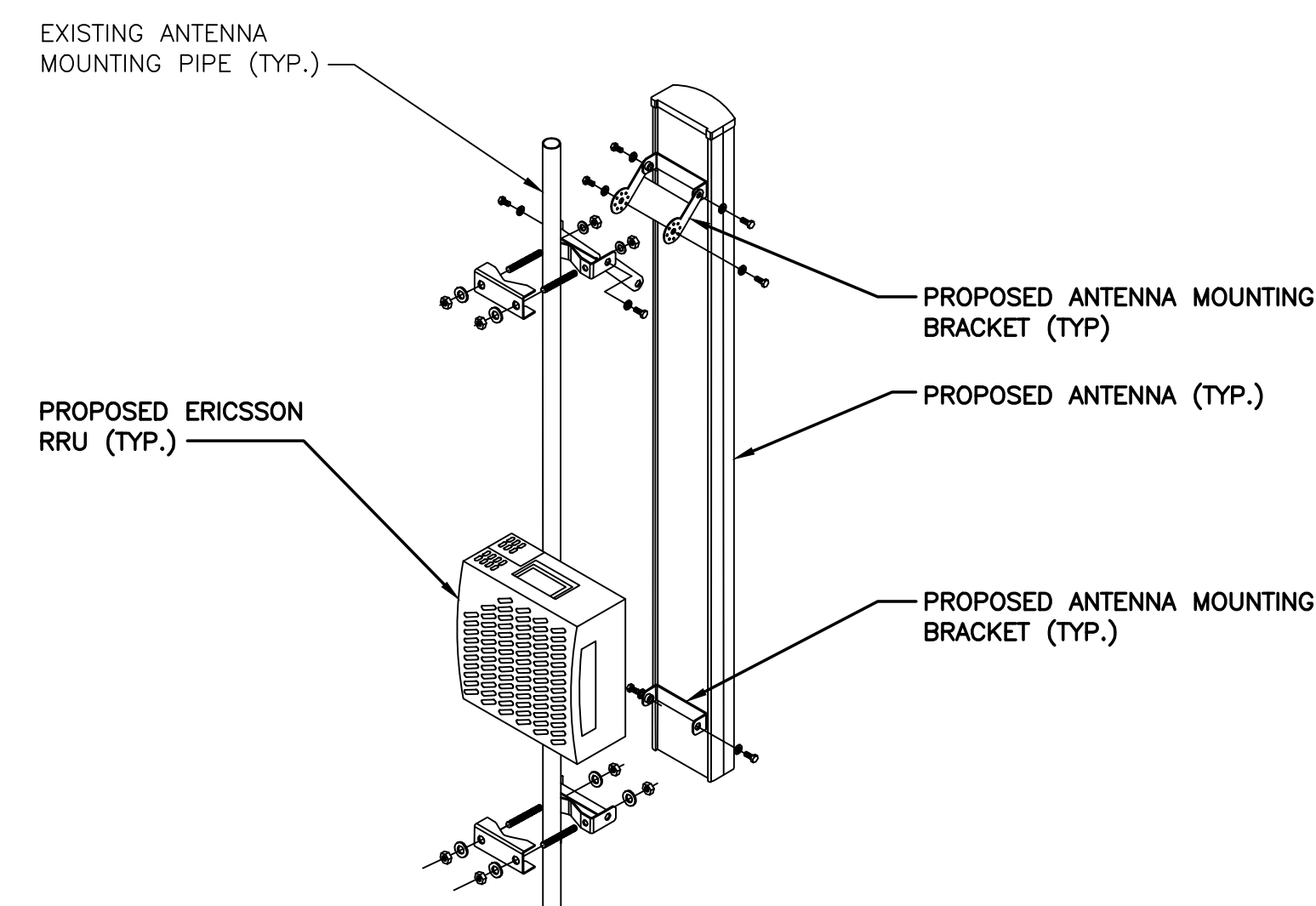


MODEL	L x W x H	WEIGHT
*RRUS-11	19.69" x 16.97" x 7.17"	50.7 LBS
RRUS-32	29.9" x 13.3" x 9.5"	77 LBS

\*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

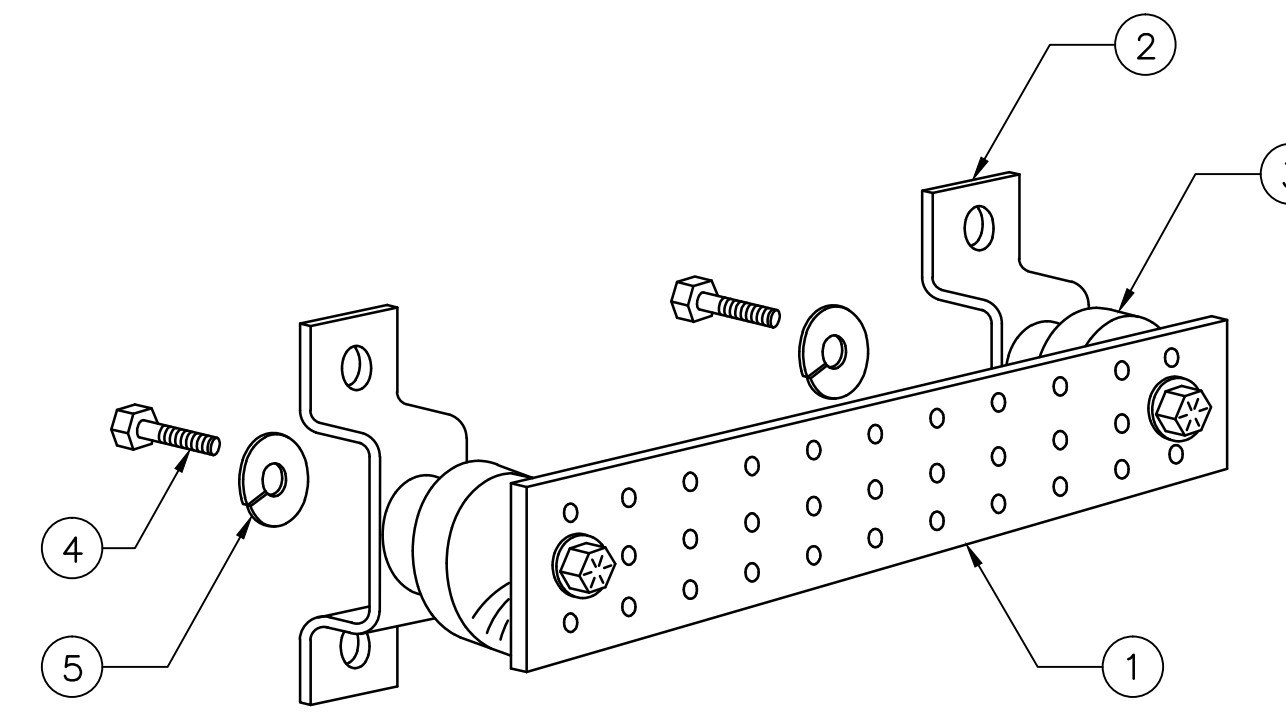
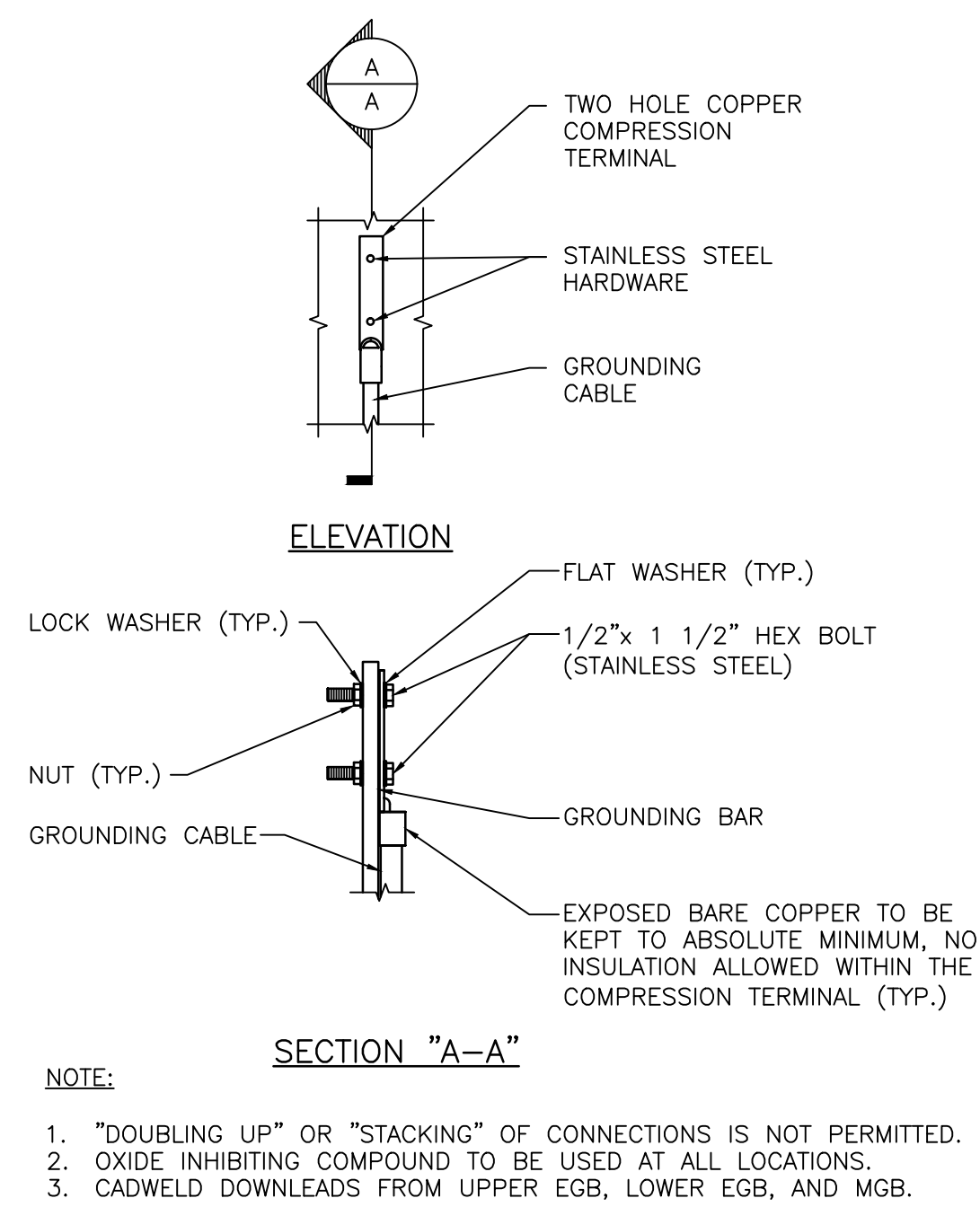
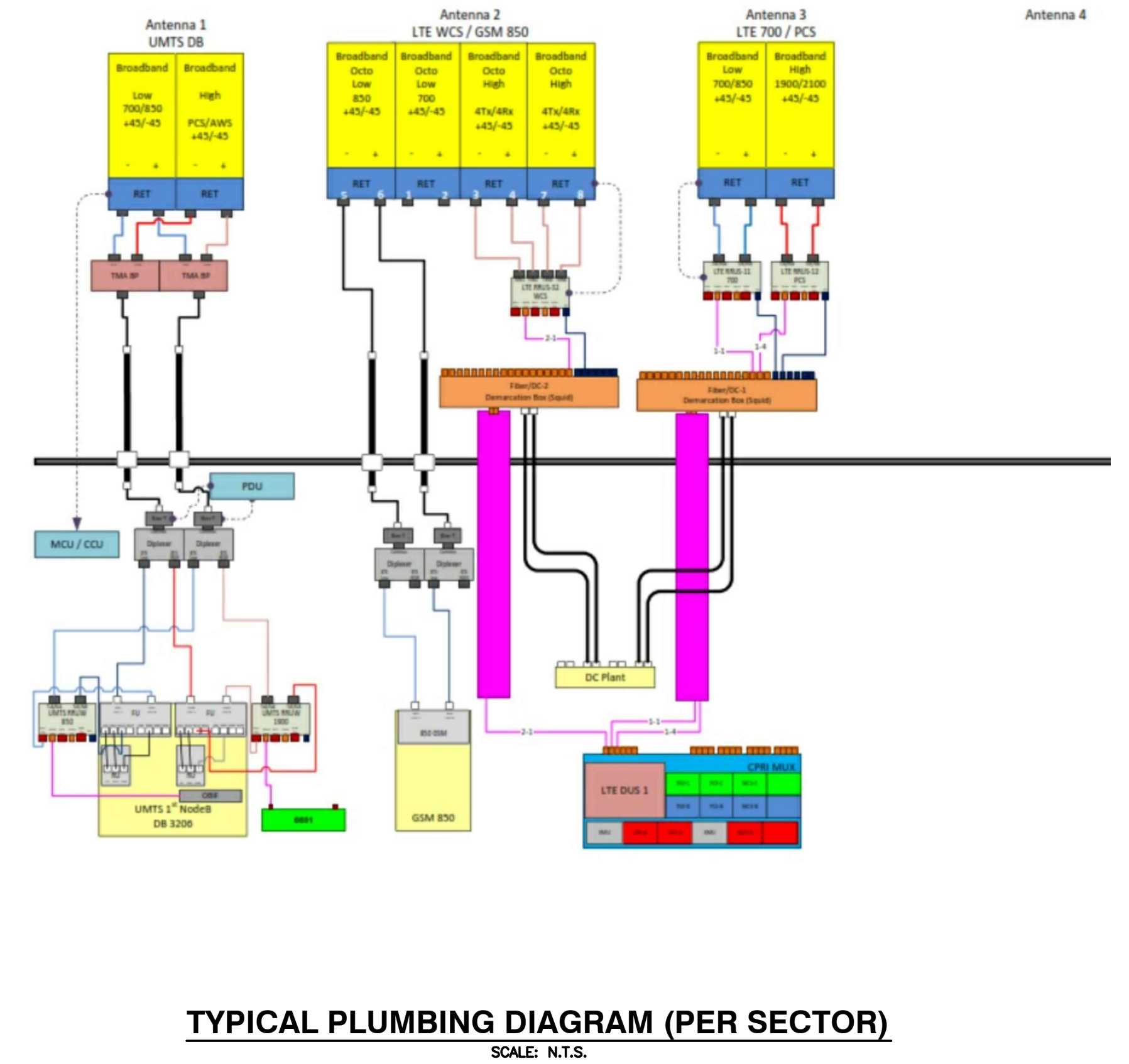
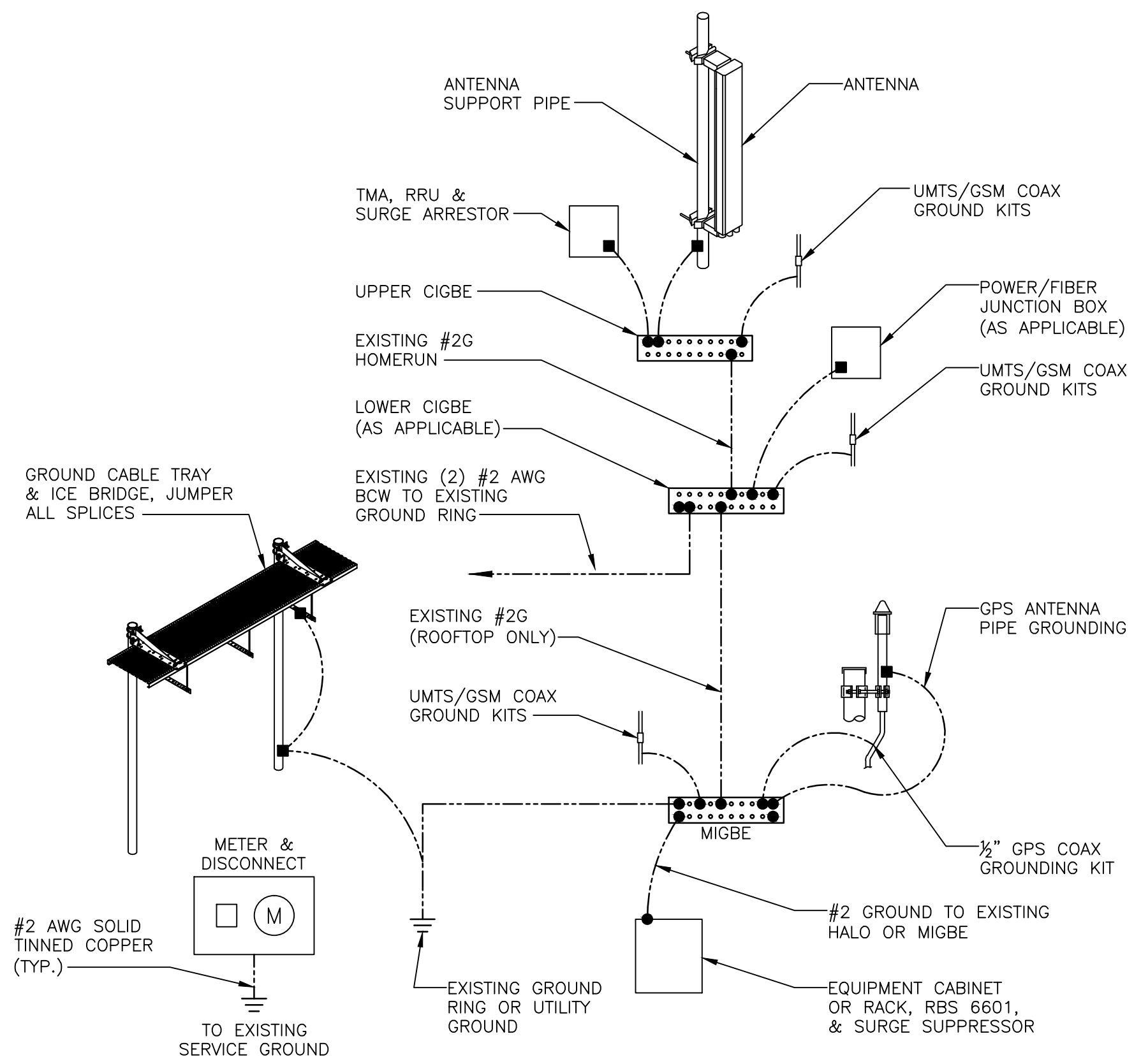
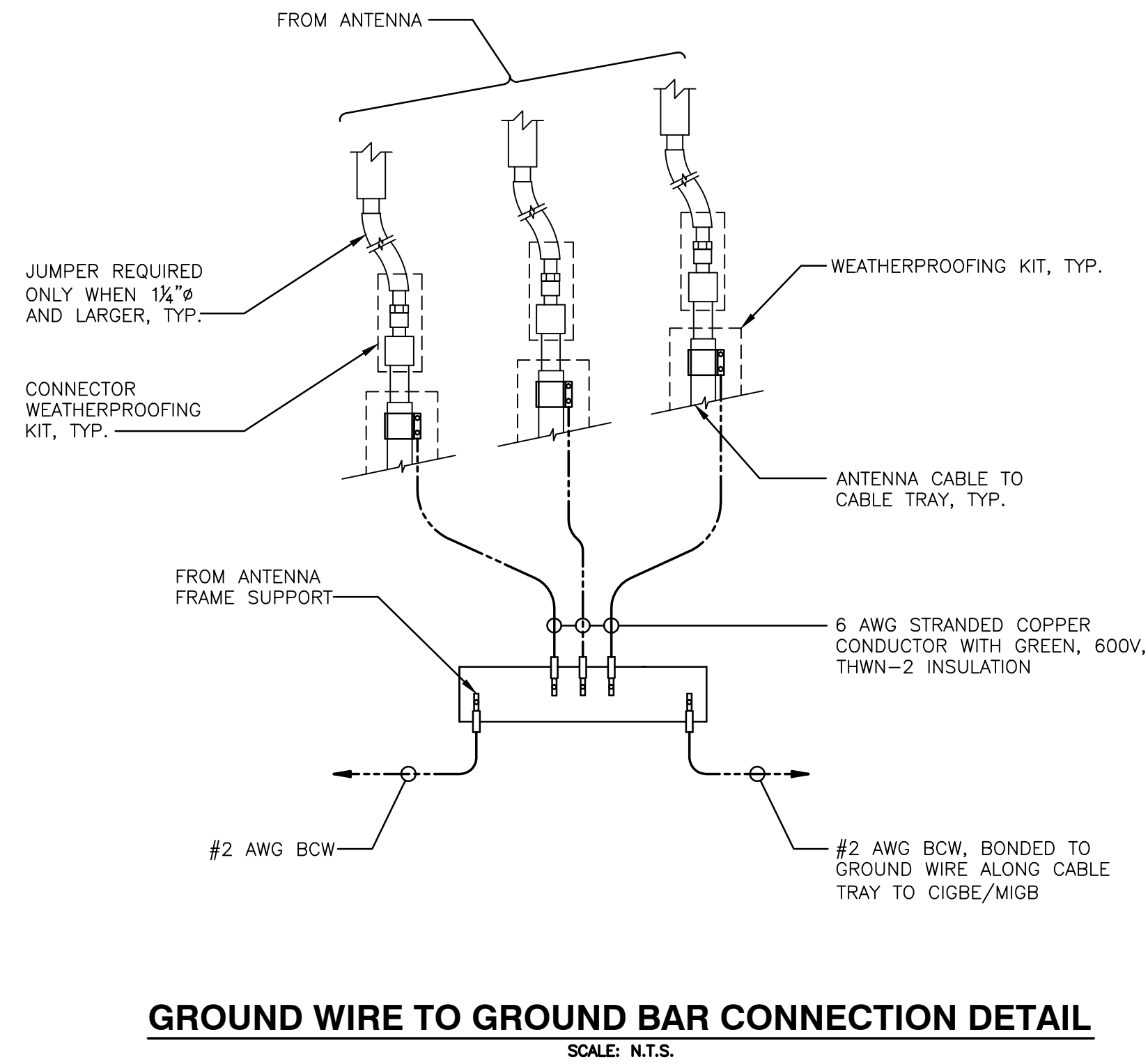
SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	A3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	A4	-	-	-
BETA	B1	POWERWAVE	7770	55"x11"x5"
	B2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	B3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	B4	-	-	-
GAMMA	G1	POWERWAVE	7770	55"x11"x5"
	G2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	G3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	G4	-	-	-

PROPOSED RRU SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	ERICSSON	RRUS-32	29.9"x13.3"x9.5"	-	-
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	-	-
	ERICSSON	RRUS-12 (EXISTING)	20.4"x18.5"x7.5"	-	-
BETA	ERICSSON	RRUS-32	29.9"x13.3"x9.5"	-	-
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	-	-
	ERICSSON	RRUS-12 (EXISTING)	20.4"x18.5"x7.5"	-	-
GAMMA	ERICSSON	RRUS-32	29.9"x13.3"x9.5"	-	-
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	-	-
	ERICSSON	RRUS-12 (EXISTING)	20.4"x18.5"x7.5"	-	-

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.





ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x 1/4")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	5/8"-11x1" H.H.C.S.
5	4	5/8" LOCK WASHER

**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)



Date: January 14, 2016

Brittany Richardson  
Crown Castle  
3530 Toringdon Way Suite 300  
Charlotte, NC 28277



Crown Castle  
2000 Corporate Drive  
Canonsburg, PA 15317  
(724) 416-2000

**Subject: Structural Analysis Report**

**Carrier Designation:** AT&T Mobility Co-Locate  
**Carrier Site Number:** CT5107  
**Carrier Site Name:** North Haven South

**Crown Castle Designation:** Crown Castle BU Number: 881536  
Crown Castle Site Name: NORTH HAVEN TOWER  
Crown Castle JDE Job Number: 362092  
Crown Castle Work Order Number: 1177434  
Crown Castle Application Number: 322788 Rev. 4

**Engineering Firm Designation:** Crown Castle Project Number: 1177434

**Site Data:** 120 Universal Drive, North Haven, New Haven County, CT  
Latitude 41° 20' 40.01", Longitude -72° 52' 14.92"  
120 Foot - Monopole Tower

Dear Brittany Richardson,

Crown Castle 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 1177434, in accordance with application 322788, revision 4.

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.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

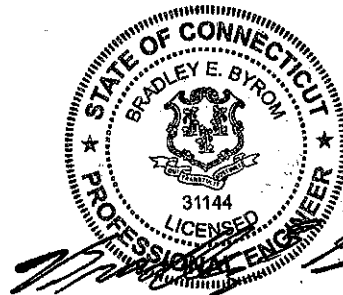
All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Crown Castle 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.

Structural analysis prepared by: Kibreab Gebremariam / AGH

Respectfully submitted by:

Bradley E. Byrom, P.E.  
Sr. Project Engineer



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### 4) ANALYSIS RESULTS

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### 7) APPENDIX C

Additional Calculations

## 1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in February of 2001. The tower was originally designed for a wind speed of 85 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 0.75 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
118.0	121.0	3	cci antennas	OPA-65R-LCUU-H6	2 1	3/4 3/8	-
		3	ericsson	RRUS 32			
		6	powerwave technologies	LGP21401			
		1	raycap	DC2-48-60-0-9E			
116.0	117.0	3	ericsson	RRUS-12	-	-	-

**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
118.0	121.0	3	kmw communications	AM-X-CD-16-65-00T-RET	12 2 1	1-5/8 3/4 3/8	1
		3	powerwave technologies	7770.00			
		2	powerwave technologies	LGP2140X			
	120.0	3	powerwave technologies	7770.00	-	-	2
		10	powerwave technologies	LGP2140X			
118.0	118.0	1	tower mounts	Platform Mount [LP 712-1]	-	-	1
116.0	117.0	3	ericsson	TME-RRUS-11	-	-	2
		3	ericsson	TME-RRUS-11			
	116.0	1	raycap	DC6-48-60-18-8F	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
108.0	110.0	12	decibel	844G65VTZASX	12	1-1/4	1
	108.0	1	tower mounts	Platform Mount [LP 303-1]			
100.0	100.0	3	alcatel lucent	1900MHz RRH (65MHz) w/Mount pipe	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
	99.0	3	alcatel lucent	TME-800MHZ RRH			



Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
97.0	98.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	3 1	1-1/4 1-5/8	1
		3	alcatel lucent	TD-RRH8x20-25			
		2	powerwave technologies	P40-16-XLPP-RR-A			
		9	rfs celwave	ACU-A20-N			
		1	rfs celwave	APXVSP18-C-A20			
	3	rfs celwave	APXVTM14-C-120				
	97.0	1	tower mounts	Platform Mount [LP 601-1]			
83.0	84.0	3	commscope	LNx-6515DS-A1M	-	-	3
		3	ericsson	RRUS 11 B12			
		3	ericsson	ERICSSON AIR 21 B2A B4P			
		3	ericsson	ERICSSON AIR 21 B4A B2P			
	3	rfs celwave	ATMAA1412D-1A20				
	83.0	1	cci tower mounts	Platform Mount [LP 303-1]			
51.0	51.0	1	cci tower mounts	Side Arm Mount [SO 701-1]	1	1/2	1
		1	lucent	KS24019-L112A			

- Notes:  
 1) Existing Equipment  
 2) To be Removed Equipment ;Not Considered in this analysis  
 3) Reserved equipment ; 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)
118.0	118.0	12	allgon	7120.16	-	-

**3) ANALYSIS PROCEDURE**

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C.	1405753	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineering Endeavors, Inc.	1405795	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineering Endeavors, Inc.	1405788	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 wind 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. Crown Castle 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	120 - 84.7161	Pole	TP32.5458x24.09x0.375	1	-10.54	1922.92	28.8	Pass
L2	84.7161 - 41.6224	Pole	TP42.0347x30.7011x0.4375	2	-22.15	2904.13	54.8	Pass
L3	41.6224 - 0	Pole	TP51x39.7912x0.5	3	-36.99	4166.42	60.0	Pass
							Summary	
						Pole (L3)	60.0	Pass
						Rating =	60.0	Pass

**Table 6 - Tower Component Stresses vs. Capacity – LC7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	51.4	Pass
1	Base Plate	0	67.3	Pass
1	Base Foundation (Structure)	0	53.6	Pass
1	Base Foundation (Soil Interaction)	0	19.3	Pass

<b>Structure Rating (max from all components) =</b>	<b>67.3%</b>
---	--------------

Notes:

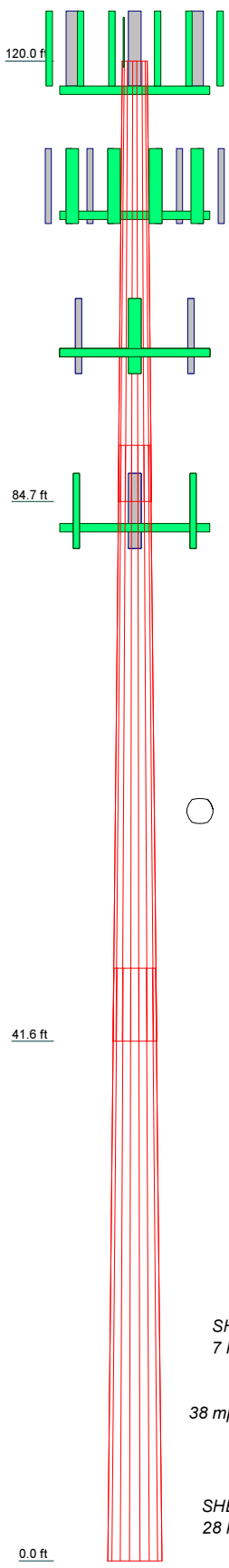
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

### 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
Length (ft)	35.28	47.66	47.38
Number of Sides	18	18	18
Thickness (in)	0.3750	0.4375	0.5000
Socket Length (ft)	4.57	5.76	39.7912
Top Dia (in)	24.0900	30.7011	51.0000
Bot Dia (in)	32.5458	42.0347	81.0000
Grade	A572-65	A572-65	A572-65
Weight (K)	4.0	8.1	11.5



### DESIGNED APPURTENANCE LOADING

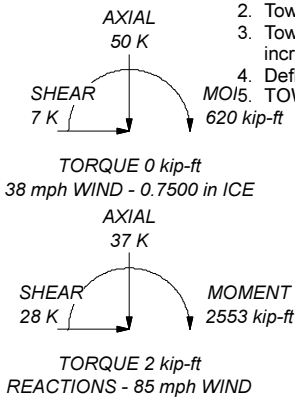
TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 3/4" x 3'	120	P40-16-XLPP-RR-A w/ Mount Pipe	97
7770.00 w/ Mount Pipe	118	APXVTM14-C-120 w/ Mount Pipe	97
7770.00 w/ Mount Pipe	118	APXVSPP18-C-A20 w/ Mount Pipe	97
7770.00 w/ Mount Pipe	118	APXVTM14-C-120 w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	P40-16-XLPP-RR-A w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	APXVTM14-C-120 w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	(3) ACU-A20-N	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	(3) ACU-A20-N	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	(3) ACU-A20-N	97
OPA-65R-LCUU-H6 w/ Mount Pipe	118	800 EXTERNAL NOTCH FILTER	97
OPA-65R-LCUU-H6 w/ Mount Pipe	118	800 EXTERNAL NOTCH FILTER	97
OPA-65R-LCUU-H6 w/ Mount Pipe	118	800 EXTERNAL NOTCH FILTER	97
(2) LGP2140X	118	TD-RRH8x20-25	97
RRUS 32	118	TD-RRH8x20-25	97
RRUS 32	118	TD-RRH8x20-25	97
RRUS 32	118	Transition Ladder	97
RRUS 32	118	6' x 2" Mount Pipe	97
(2) LGP21401	118	6' x 2" Mount Pipe	97
(2) LGP21401	118	6' x 2" Mount Pipe	97
(2) LGP21401	118	6' x 2" Mount Pipe	97
DC2-48-60-0-9E	118	Platform Mount [LP 601-1]	97
8'x2" Antenna Mount Pipe	118	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
8'x2" Antenna Mount Pipe	118	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
8'x2" Antenna Mount Pipe	118	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
Transition Ladder	118	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
Platform Mount [LP 712-1]	118	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
TME-RRUS-11	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
TME-RRUS-11	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
TME-RRUS-11	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
RRUS-12	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
RRUS-12	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
RRUS-12	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
DC6-48-60-18-8F	116	LNx-6515DS-A1M w/ Mount Pipe	83
(2) 4' x 2" Pipe Mount	116	LNx-6515DS-A1M w/ Mount Pipe	83
(2) 4' x 2" Pipe Mount	116	LNx-6515DS-A1M w/ Mount Pipe	83
(2) 4' x 2" Pipe Mount	116	ATMAA1412D-1A20	83
Side Arm Mount [SO 102-3]	116	ATMAA1412D-1A20	83
(4) 844G65VTZASX w/ Mount Pipe	108	ATMAA1412D-1A20	83
(4) 844G65VTZASX w/ Mount Pipe	108	RRUS 11 B12	83
(4) 844G65VTZASX w/ Mount Pipe	108	RRUS 11 B12	83
(4) 844G65VTZASX w/ Mount Pipe	108	RRUS 11 B12	83
Platform Mount [LP 303-1]	100	8'x2" Antenna Mount Pipe	83
TME-800MHZ RRH	100	8'x2" Antenna Mount Pipe	83
TME-800MHZ RRH	100	8'x2" Antenna Mount Pipe	83
TME-800MHZ RRH	100	Platform Mount [LP 303-1]	83
1900MHz RRH (65MHz) w/Mount pipe	100	KS24019-L112A	51
1900MHz RRH (65MHz) w/Mount pipe	100	Side Arm Mount [SO 701-1]	51
1900MHz RRH (65MHz) w/Mount pipe	100		
Side Arm Mount [SO 102-3]	100		


### MATERIAL STRENGTH

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

### TOWER DESIGN NOTES

1. Tower is located in New Haven 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 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.





**CROWN CASTLE**  
The Foundation for a wireless World

**Crown Castle**  
2000 Corporate Drive  
Canonsburg, PA 15317  
Phone: (724) 416-2000  
FAX: (724) 416-2254

Job: **BU# 881536**

Project: \_\_\_\_\_

Client: Crown Castle      Drawn by: Kibreab Gebremariam      App'd: \_\_\_\_\_

Code: TIA/EIA-222-F      Date: 01/14/16      Scale: NTS

Path: C:\Users\kgebremariam\Desktop\881536 WO 1177434\881536.eit      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:

- 1) Tower is located in New Haven County, Connecticut.
- 2) Basic wind speed of 85 mph.
- 3) Nominal ice thickness of 0.7500 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56 pcf.
- 6) A wind speed of 38 mph is used in combination with ice.
- 7) Temperature drops of 50 °F.
- 8) Deflections calculated using a wind speed of 50 mph.
- 9) A non-linear (P-delta) analysis was used.
- 10) Pressures are calculated at each section.
- 11) Stress ratio used in pole design is 1.333.
- 12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys ✓ Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption	Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feedline Torque Include Angle Block Shear Check <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
--	--	--

## 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	120.00-84.72	35.28	4.57	18	24.0900	32.5458	0.3750	1.5000	A572-65 (65 ksi)
L2	84.72-41.62	47.66	5.76	18	30.7011	42.0347	0.4375	1.7500	A572-65 (65 ksi)
L3	41.62-0.00	47.38		18	39.7912	51.0000	0.5000	2.0000	A572-65 (65 ksi)

## Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L1	24.4616	28.2268	2005.6033	8.4188	12.2377	163.8870	4013.8455	14.1161	3.5798	9.546
	33.0479	38.2913	5006.8113	11.4206	16.5333	302.8326	10020.210	19.1493	5.0681	13.515

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	I/Q in <sup>2</sup>	w in	w/t
L2	32.2777	42.0249	4862.7972	10.7436	15.5962	311.7941	9731.9930	21.0164	4.6334	10.591
	42.6832	57.7629	12627.422	14.7670	21.3536	591.3479	25271.461	28.8869	6.6281	15.15
L3	41.7876	62.3551	12161.823	13.9484	20.2139	601.6563	24339.649	31.1835	6.1232	12.246
	51.7868	80.1435	25821.918	17.9275	25.9080	996.6774	51677.814	40.0794	8.0960	16.192

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>r</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in
L1 120.00-84.72				1	1	1		
L2 84.72-41.62				1	1	1		
L3 41.62-0.00				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 r in	Perimeter r in	Weight plf
*****										

**Feed Line/Linear Appurtenances - Entered As Area**

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
LDF7-50A(1-5/8")	C	No	Inside Pole	118.00 - 0.00	12	No Ice	0.82
						1/2" Ice	0.82
						1" Ice	0.82
						2" Ice	0.82
						4" Ice	0.82
2" Rigid Conduit	C	No	Inside Pole	118.00 - 0.00	1	No Ice	2.80
						1/2" Ice	2.80
						1" Ice	2.80
						2" Ice	2.80
						4" Ice	2.80
FB-L98B-002-75000(3/8")	C	No	Inside Pole	118.00 - 0.00	1	No Ice	0.06
						1/2" Ice	0.06
						1" Ice	0.06
						2" Ice	0.06
						4" Ice	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	118.00 - 0.00	2	No Ice	0.59
						1/2" Ice	0.59
						1" Ice	0.59
						2" Ice	0.59
						4" Ice	0.59
FB-L98B-002-75000(3/8")	C	No	Inside Pole	118.00 - 0.00	1	No Ice	0.06
						1/2" Ice	0.06
						1" Ice	0.06
						2" Ice	0.06
						4" Ice	0.06
WR-VG86ST-BRD(3/4")	C	No	Inside Pole	118.00 - 0.00	2	No Ice	0.58
						1/2" Ice	0.58
						1" Ice	0.58
						2" Ice	0.58
						4" Ice	0.58

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
*****								
LDF6-50A(1-1/4")	B	No	Inside Pole	108.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
HB114-13U3M12-XXXF(1-1/4")	A	No	CaAa (Out Of Face)	97.00 - 0.00	1	No Ice	0.15	0.99
						1/2" Ice	0.25	2.24
						1" Ice	0.35	4.10
						2" Ice	0.55	9.64
						4" Ice	0.95	28.07
HYBRIFLEX RRH 1-SECTOR(1/2")	A	No	CaAa (Out Of Face)	97.00 - 0.00	3	No Ice	0.00	0.15
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	A	No	Inside Pole	83.00 - 0.00	1	No Ice	0.00	0.46
						1/2" Ice	0.00	0.46
						1" Ice	0.00	0.46
						2" Ice	0.00	0.46
						4" Ice	0.00	0.46
HCC 158-50J(1-5/8")	A	No	Inside Pole	83.00 - 0.00	12	No Ice	0.00	0.86
						1/2" Ice	0.00	0.86
						1" Ice	0.00	0.86
						2" Ice	0.00	0.86
						4" Ice	0.00	0.86
LDF1-50A(1/4")	A	No	Inside Pole	83.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
LDF4-50A(1/2")	A	No	CaAa (Out Of Face)	51.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
						2" Ice	0.00	6.58
						4" Ice	0.00	22.78
*****								

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	120.00-84.72	A	0.000	0.000	0.000	1.892	0.02
		B	0.000	0.000	0.000	0.000	0.18
		C	0.000	0.000	0.000	0.000	0.50
L2	84.72-41.62	A	0.000	0.000	0.000	6.636	0.51
		B	0.000	0.000	0.000	0.000	0.34
		C	0.000	0.000	0.000	0.000	0.65
L3	41.62-0.00	A	0.000	0.000	0.000	6.410	0.52
		B	0.000	0.000	0.000	0.000	0.33
		C	0.000	0.000	0.000	0.000	0.63

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	120.00-84.72	A	0.858	0.000	0.000	0.000	4.001	0.04
		B		0.000	0.000	0.000	0.000	0.18
		C		0.000	0.000	0.000	0.000	0.50
L2	84.72-41.62	A	0.810	0.000	0.000	0.000	14.035	0.62
		B		0.000	0.000	0.000	0.000	0.34

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L3	41.62-0.00	C	0.750	0.000	0.000	0.000	0.000	0.65
		A		0.000	0.000	0.000	13.153	0.66
		B		0.000	0.000	0.000	0.000	0.33
		C		0.000	0.000	0.000	0.000	0.63

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>x</sub> in	CP <sub>z</sub> in	CP <sub>x</sub> Ice in	CP <sub>z</sub> Ice in
L1	120.00-84.72	0.0000	-0.0863	0.0000	-0.1683
L2	84.72-41.62	0.0000	-0.2200	0.0000	-0.4239
L3	41.62-0.00	0.0000	-0.2221	0.0000	-0.4242

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight K	
Lighting Rod 3/4" x 3'	C	From Leg	0.00 0.00 1.50	0.0000	120.00	No Ice	0.23	0.23	0.03
						1/2" Ice	0.50	0.50	0.03
						Ice	0.69	0.69	0.04
						1" Ice	1.10	1.10	0.05
						2" Ice	2.14	2.14	0.12
						4" Ice			
*** 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						Ice	9.77	8.37	0.21
						1" Ice	11.03	10.18	0.38
						2" Ice	13.68	14.02	0.87
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						Ice	9.77	8.37	0.21
						1" Ice	11.03	10.18	0.38
						2" Ice	13.68	14.02	0.87
						4" Ice			
AM-X-CD-16-65-00T-RET	C	From Leg	4.00	0.0000	118.00	No Ice	8.50	6.30	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> <sub>Front</sub> ft <sup>2</sup>	C <sub>AA</sub> <sub>Side</sub> ft <sup>2</sup>	Weight K
w/ Mount Pipe			0.00 3.00			1/2" Ice 1" Ice 2" Ice 4" Ice	9.15 7.48 9.77 8.37 11.03 10.18 13.68 14.02	0.14 0.21 0.38 0.87
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 7.18 11.27 8.36 11.91 9.26 13.21 11.09 15.93 15.15	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 7.18 11.27 8.36 11.91 9.26 13.21 11.09 15.93 15.15	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 7.18 11.27 8.36 11.91 9.26 13.21 11.09 15.93 15.15	0.10 0.18 0.26 0.46 1.00
(2) LGP2140X	A	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 0.38 1.42 0.49 1.58 0.62 1.94 0.89 2.75 1.54	0.02 0.03 0.04 0.06 0.14
RRUS 32	A	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.33 1.98 3.60 2.21 3.87 2.45 4.44 2.96 5.68 4.07	0.06 0.08 0.10 0.16 0.34
RRUS 32	B	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.33 1.98 3.60 2.21 3.87 2.45 4.44 2.96 5.68 4.07	0.06 0.08 0.10 0.16 0.34
RRUS 32	C	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.33 1.98 3.60 2.21 3.87 2.45 4.44 2.96 5.68 4.07	0.06 0.08 0.10 0.16 0.34
(2) LGP21401	A	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 0.23 1.45 0.31 1.61 0.40 1.97 0.61 2.79 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 0.23 1.45 0.31 1.61 0.40 1.97 0.61 2.79 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Leg	4.00 0.00 3.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 0.23 1.45 0.31 1.61 0.40 1.97 0.61 2.79 1.12	0.01 0.02 0.03 0.05 0.14



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
DC2-48-60-0-9E	A	From Leg	4.00		0.0000	118.00	No Ice	1.08	0.66	0.02
			0.00				1/2"	1.23	0.77	0.02
			3.00				Ice	1.38	0.90	0.04
							1" Ice	1.70	1.17	0.06
							2" Ice	2.46	1.82	0.15
							4" Ice			
8'x2" Antenna Mount Pipe	A	From Leg	4.00		0.0000	118.00	No Ice	1.90	1.90	0.03
			0.00				1/2"	2.73	2.73	0.04
			0.00				Ice	3.40	3.40	0.06
							1" Ice	4.40	4.40	0.12
							2" Ice	6.50	6.50	0.30
							4" Ice			
8'x2" Antenna Mount Pipe	B	From Leg	4.00		0.0000	118.00	No Ice	1.90	1.90	0.03
			0.00				1/2"	2.73	2.73	0.04
			0.00				Ice	3.40	3.40	0.06
							1" Ice	4.40	4.40	0.12
							2" Ice	6.50	6.50	0.30
							4" Ice			
8'x2" Antenna Mount Pipe	C	From Leg	4.00		0.0000	118.00	No Ice	1.90	1.90	0.03
			0.00				1/2"	2.73	2.73	0.04
			0.00				Ice	3.40	3.40	0.06
							1" Ice	4.40	4.40	0.12
							2" Ice	6.50	6.50	0.30
							4" Ice			
Transition Ladder	B	From Leg	4.00		0.0000	118.00	No Ice	6.00	6.00	0.16
			0.00				1/2"	8.00	8.00	0.24
			-6.00				Ice	10.00	10.00	0.32
							1" Ice	14.00	14.00	0.48
							2" Ice	22.00	22.00	0.80
							4" Ice			
Platform Mount [LP 712-1]	A	None			0.0000	118.00	No Ice	24.53	24.53	1.34
							1/2"	29.94	29.94	1.65
							Ice	35.35	35.35	1.96
							1" Ice	46.17	46.17	2.58
							2" Ice	67.81	67.81	3.82
							4" Ice			
*** TME-RRUS-11	A	From Leg	1.00		0.0000	116.00	No Ice	3.42	1.85	0.06
			0.00				1/2"	3.72	2.19	0.08
			1.00				Ice	4.04	2.55	0.12
							1" Ice	4.72	3.38	0.19
							2" Ice	6.25	5.29	0.43
							4" Ice			
TME-RRUS-11	B	From Leg	1.00		0.0000	116.00	No Ice	3.42	1.85	0.06
			0.00				1/2"	3.72	2.19	0.08
			1.00				Ice	4.04	2.55	0.12
							1" Ice	4.72	3.38	0.19
							2" Ice	6.25	5.29	0.43
							4" Ice			
TME-RRUS-11	C	From Leg	1.00		0.0000	116.00	No Ice	3.42	1.85	0.06
			0.00				1/2"	3.72	2.19	0.08
			1.00				Ice	4.04	2.55	0.12
							1" Ice	4.72	3.38	0.19
							2" Ice	6.25	5.29	0.43
							4" Ice			
RRUS-12	A	From Leg	1.00		0.0000	116.00	No Ice	3.67	1.49	0.05
			0.00				1/2"	3.93	1.67	0.07
			1.00				Ice	4.19	1.87	0.10
							1" Ice	4.75	2.28	0.16
							2" Ice	5.96	3.21	0.34
							4" Ice			
RRUS-12	B	From Leg	1.00		0.0000	116.00	No Ice	3.67	1.49	0.05
			0.00				1/2"	3.93	1.67	0.07
			1.00				Ice	4.19	1.87	0.10
							1" Ice	4.75	2.28	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight K	
RRUS-12	C	From Leg	1.00 0.00 1.00	0.0000	116.00	2" Ice	5.96	3.21	0.34
						4" Ice			
						No Ice	3.67	1.49	0.05
						1/2" Ice	3.93	1.67	0.07
						1" Ice	4.19	1.87	0.10
DC6-48-60-18-8F	B	From Leg	1.00 0.00 0.00	0.0000	116.00	2" Ice	5.96	3.21	0.34
						4" Ice			
						No Ice	1.27	1.27	0.02
						1/2" Ice	1.46	1.46	0.04
						1" Ice	1.66	1.66	0.05
(2) 4' x 2" Pipe Mount	A	From Leg	1.00 0.00 0.00	0.0000	116.00	1" Ice	2.09	2.09	0.10
						2" Ice	3.10	3.10	0.21
						4" Ice			
						No Ice	0.79	0.79	0.03
						1/2" Ice	1.03	1.03	0.04
(2) 4' x 2" Pipe Mount	B	From Leg	1.00 0.00 0.00	0.0000	116.00	Ice	1.28	1.28	0.04
						1" Ice	1.81	1.81	0.07
						2" Ice	3.11	3.11	0.17
						4" Ice			
						No Ice	0.79	0.79	0.03
(2) 4' x 2" Pipe Mount	C	From Leg	1.00 0.00 0.00	0.0000	116.00	1/2" Ice	1.03	1.03	0.04
						Ice	1.28	1.28	0.04
						1" Ice	1.81	1.81	0.07
						2" Ice	3.11	3.11	0.17
						4" Ice			
Side Arm Mount [SO 102-3]	A	None	0.0000	116.00	No Ice	3.00	3.00	0.08	
					1/2" Ice	3.48	3.48	0.11	
					Ice	3.96	3.96	0.14	
					1" Ice	4.92	4.92	0.20	
					2" Ice	6.84	6.84	0.32	
(4) 844G65VTZASX w/ Mount Pipe	A	From Face	4.00 0.00 2.00	20.0000	108.00	4" Ice			
						No Ice	6.13	5.21	0.03
						1/2" Ice	6.59	5.89	0.09
						Ice	7.06	6.59	0.14
						1" Ice	8.04	8.04	0.28
(4) 844G65VTZASX w/ Mount Pipe	B	From Face	4.00 0.00 2.00	20.0000	108.00	2" Ice	10.12	11.19	0.67
						4" Ice			
						No Ice	6.13	5.21	0.03
						1/2" Ice	6.59	5.89	0.09
						Ice	7.06	6.59	0.14
(4) 844G65VTZASX w/ Mount Pipe	C	From Face	4.00 0.00 2.00	20.0000	108.00	1" Ice	8.04	8.04	0.28
						2" Ice	10.12	11.19	0.67
						4" Ice			
						No Ice	6.13	5.21	0.03
						1/2" Ice	6.59	5.89	0.09
Platform Mount [LP 303-1]	A	None	0.0000	108.00	No Ice	14.66	14.66	1.25	
					1/2" Ice	18.87	18.87	1.48	
					Ice	23.08	23.08	1.71	
					1" Ice	31.50	31.50	2.18	
					2" Ice	48.34	48.34	3.10	
					4" Ice				

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Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight
			Horz	Lateral	Vert					
			ft	ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
TME-800MHZ RRH	A	From Leg	1.00	0.0000	100.00		No Ice	2.49	2.07	0.05
			0.00				1/2"	2.71	2.27	0.07
			-1.00				Ice	2.93	2.48	0.10
							1" Ice	3.41	2.93	0.16
							2" Ice	4.46	3.93	0.32
							4" Ice			
TME-800MHZ RRH	B	From Leg	1.00	0.0000	100.00		No Ice	2.49	2.07	0.05
			0.00				1/2"	2.71	2.27	0.07
			-1.00				Ice	2.93	2.48	0.10
							1" Ice	3.41	2.93	0.16
							2" Ice	4.46	3.93	0.32
							4" Ice			
TME-800MHZ RRH	C	From Leg	1.00	0.0000	100.00		No Ice	2.49	2.07	0.05
			0.00				1/2"	2.71	2.27	0.07
			-1.00				Ice	2.93	2.48	0.10
							1" Ice	3.41	2.93	0.16
							2" Ice	4.46	3.93	0.32
							4" Ice			
1900MHz RRH (65MHz) w/Mount pipe	A	From Leg	1.00	0.0000	100.00		No Ice	2.70	2.93	0.06
			0.00				1/2"	2.94	3.25	0.09
			0.00				Ice	3.18	3.60	0.12
							1" Ice	3.70	4.35	0.20
							2" Ice	4.85	6.09	0.41
							4" Ice			
1900MHz RRH (65MHz) w/Mount pipe	B	From Leg	1.00	0.0000	100.00		No Ice	2.70	2.93	0.06
			0.00				1/2"	2.94	3.25	0.09
			0.00				Ice	3.18	3.60	0.12
							1" Ice	3.70	4.35	0.20
							2" Ice	4.85	6.09	0.41
							4" Ice			
1900MHz RRH (65MHz) w/Mount pipe	C	From Leg	1.00	0.0000	100.00		No Ice	2.70	2.93	0.06
			0.00				1/2"	2.94	3.25	0.09
			0.00				Ice	3.18	3.60	0.12
							1" Ice	3.70	4.35	0.20
							2" Ice	4.85	6.09	0.41
							4" Ice			
Side Arm Mount [SO 102-3]	A	None		0.0000	100.00		No Ice	3.00	3.00	0.08
							1/2"	3.48	3.48	0.11
							Ice	3.96	3.96	0.14
							1" Ice	4.92	4.92	0.20
							2" Ice	6.84	6.84	0.32
							4" Ice			
**** ***										
P40-16-XLPP-RR-A w/ Mount Pipe	A	From Face	4.00	0.0000	97.00		No Ice	10.74	4.83	0.07
			0.00				1/2"	11.29	5.57	0.14
			1.00				Ice	11.85	6.27	0.22
							1" Ice	12.99	7.80	0.39
							2" Ice	15.39	11.11	0.86
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	A	From Face	4.00	0.0000	97.00		No Ice	7.13	4.96	0.07
			0.00				1/2"	7.66	5.75	0.13
			1.00				Ice	8.18	6.47	0.19
							1" Ice	9.26	8.01	0.34
							2" Ice	11.53	11.41	0.75
							4" Ice			
APXVSP18-C-A20 w/ Mount Pipe	B	From Face	4.00	0.0000	97.00		No Ice	8.50	6.95	0.08
			0.00				1/2"	9.15	8.13	0.15
			1.00				Ice	9.77	9.02	0.23
							1" Ice	11.03	10.84	0.41
							2" Ice	13.68	14.85	0.91
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Face	4.00	0.0000	97.00		No Ice	7.13	4.96	0.07
			0.00				1/2"	7.66	5.75	0.13
			1.00				Ice	8.18	6.47	0.19

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight
			Horz	Lateral	Vert					
			ft	ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
							1" Ice	9.26	8.01	0.34
							2" Ice	11.53	11.41	0.75
							4" Ice			
P40-16-XLPP-RR-A w/ Mount Pipe	C	From Face	4.00	0.0000	97.00		No Ice	10.74	4.83	0.07
			0.00				1/2" Ice	11.29	5.57	0.14
			1.00				Ice	11.85	6.27	0.22
							1" Ice	12.99	7.80	0.39
							2" Ice	15.39	11.11	0.86
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	C	From Face	4.00	0.0000	97.00		No Ice	7.13	4.96	0.07
			0.00				1/2" Ice	7.66	5.75	0.13
			1.00				Ice	8.18	6.47	0.19
							1" Ice	9.26	8.01	0.34
							2" Ice	11.53	11.41	0.75
							4" Ice			
(3) ACU-A20-N	A	From Face	4.00	0.0000	97.00		No Ice	0.08	0.14	0.00
			0.00				1/2" Ice	0.12	0.19	0.00
			1.00				Ice	0.17	0.25	0.00
							1" Ice	0.30	0.40	0.01
							2" Ice	0.67	0.80	0.04
							4" Ice			
(3) ACU-A20-N	B	From Face	4.00	0.0000	97.00		No Ice	0.08	0.14	0.00
			0.00				1/2" Ice	0.12	0.19	0.00
			1.00				Ice	0.17	0.25	0.00
							1" Ice	0.30	0.40	0.01
							2" Ice	0.67	0.80	0.04
							4" Ice			
(3) ACU-A20-N	C	From Face	4.00	0.0000	97.00		No Ice	0.08	0.14	0.00
			0.00				1/2" Ice	0.12	0.19	0.00
			1.00				Ice	0.17	0.25	0.00
							1" Ice	0.30	0.40	0.01
							2" Ice	0.67	0.80	0.04
							4" Ice			
800 EXTERNAL NOTCH FILTER	A	From Face	4.00	0.0000	97.00		No Ice	0.77	0.37	0.01
			0.00				1/2" Ice	0.89	0.46	0.02
			1.00				Ice	1.02	0.56	0.02
							1" Ice	1.30	0.79	0.04
							2" Ice	1.97	1.34	0.11
							4" Ice			
800 EXTERNAL NOTCH FILTER	B	From Face	4.00	0.0000	97.00		No Ice	0.77	0.37	0.01
			0.00				1/2" Ice	0.89	0.46	0.02
			1.00				Ice	1.02	0.56	0.02
							1" Ice	1.30	0.79	0.04
							2" Ice	1.97	1.34	0.11
							4" Ice			
800 EXTERNAL NOTCH FILTER	C	From Face	4.00	0.0000	97.00		No Ice	0.77	0.37	0.01
			0.00				1/2" Ice	0.89	0.46	0.02
			1.00				Ice	1.02	0.56	0.02
							1" Ice	1.30	0.79	0.04
							2" Ice	1.97	1.34	0.11
							4" Ice			
TD-RRH8x20-25	A	From Face	4.00	0.0000	97.00		No Ice	4.72	1.70	0.07
			0.00				1/2" Ice	5.01	1.92	0.10
			1.00				Ice	5.32	2.15	0.13
							1" Ice	5.95	2.62	0.20
							2" Ice	7.31	3.68	0.40
							4" Ice			
TD-RRH8x20-25	B	From Face	4.00	0.0000	97.00		No Ice	4.72	1.70	0.07
			0.00				1/2" Ice	5.01	1.92	0.10
			1.00				Ice	5.32	2.15	0.13
							1" Ice	5.95	2.62	0.20
							2" Ice	7.31	3.68	0.40
							4" Ice			
TD-RRH8x20-25	C	From Face	2.00	0.0000	97.00		No Ice	4.72	1.70	0.07
			0.00				1/2" Ice	5.01	1.92	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
			1.00			Ice 5.32	2.15	0.13
						1" Ice 5.95	2.62	0.20
						2" Ice 7.31	3.68	0.40
						4" Ice		
Transition Ladder	A	From Face	4.00	0.0000	97.00	No Ice 6.00	6.00	0.16
			2.00			1/2" 8.00	8.00	0.24
			-6.00			Ice 10.00	10.00	0.32
						1" Ice 14.00	14.00	0.48
						2" Ice 22.00	22.00	0.80
						4" Ice		
6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	97.00	No Ice 1.43	1.43	0.02
			0.00			1/2" 1.92	1.92	0.03
			0.00			Ice 2.29	2.29	0.05
						1" Ice 3.06	3.06	0.09
						2" Ice 4.70	4.70	0.23
						4" Ice		
6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	97.00	No Ice 1.43	1.43	0.02
			0.00			1/2" 1.92	1.92	0.03
			0.00			Ice 2.29	2.29	0.05
						1" Ice 3.06	3.06	0.09
						2" Ice 4.70	4.70	0.23
						4" Ice		
6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	97.00	No Ice 1.43	1.43	0.02
			0.00			1/2" 1.92	1.92	0.03
			0.00			Ice 2.29	2.29	0.05
						1" Ice 3.06	3.06	0.09
						2" Ice 4.70	4.70	0.23
						4" Ice		
Platform Mount [LP 601-1]	A	None		0.0000	97.00	No Ice 28.47	28.47	1.12
						1/2" 33.59	33.59	1.51
						Ice 38.71	38.71	1.91
						1" Ice 48.95	48.95	2.69
						2" Ice 69.43	69.43	4.26
						4" Ice		
***								
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00	0.0000	83.00	No Ice 6.83	5.64	0.11
			0.00			1/2" 7.35	6.48	0.17
			1.00			Ice 7.86	7.26	0.23
						1" Ice 8.93	8.86	0.38
						2" Ice 11.18	12.29	0.81
						4" Ice		
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.0000	83.00	No Ice 6.83	5.64	0.11
			0.00			1/2" 7.35	6.48	0.17
			1.00			Ice 7.86	7.26	0.23
						1" Ice 8.93	8.86	0.38
						2" Ice 11.18	12.29	0.81
						4" Ice		
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.0000	83.00	No Ice 6.83	5.64	0.11
			0.00			1/2" 7.35	6.48	0.17
			1.00			Ice 7.86	7.26	0.23
						1" Ice 8.93	8.86	0.38
						2" Ice 11.18	12.29	0.81
						4" Ice		
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00	0.0000	83.00	No Ice 6.83	5.64	0.11
			0.00			1/2" 7.35	6.48	0.17
			1.00			Ice 7.86	7.26	0.23
						1" Ice 8.93	8.86	0.38
						2" Ice 11.18	12.29	0.81
						4" Ice		
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00	0.0000	83.00	No Ice 6.83	5.64	0.11
			0.00			1/2" 7.35	6.48	0.17
			1.00			Ice 7.86	7.26	0.23
						1" Ice 8.93	8.86	0.38
						2" Ice 11.18	12.29	0.81
						4" Ice		

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00		0.0000	83.00	No Ice	6.83	5.64	0.11
			0.00				1/2"	7.35	6.48	0.17
			1.00				Ice	7.86	7.26	0.23
							1" Ice	8.93	8.86	0.38
							2" Ice	11.18	12.29	0.81
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00		0.0000	83.00	No Ice	11.68	9.84	0.08
			0.00				1/2"	12.40	11.37	0.17
			1.00				Ice	13.14	12.91	0.27
							1" Ice	14.60	15.27	0.51
							2" Ice	17.87	20.14	1.15
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00		0.0000	83.00	No Ice	11.68	9.84	0.08
			0.00				1/2"	12.40	11.37	0.17
			1.00				Ice	13.14	12.91	0.27
							1" Ice	14.60	15.27	0.51
							2" Ice	17.87	20.14	1.15
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00		0.0000	83.00	No Ice	11.68	9.84	0.08
			0.00				1/2"	12.40	11.37	0.17
			1.00				Ice	13.14	12.91	0.27
							1" Ice	14.60	15.27	0.51
							2" Ice	17.87	20.14	1.15
ATMAA1412D-1A20	A	From Leg	4.00		0.0000	83.00	No Ice	0.47	1.17	0.01
			0.00				1/2"	0.57	1.31	0.02
			1.00				Ice	0.69	1.47	0.03
							1" Ice	0.95	1.81	0.06
							2" Ice	1.57	2.58	0.14
ATMAA1412D-1A20	B	From Leg	4.00		0.0000	83.00	No Ice	0.47	1.17	0.01
			0.00				1/2"	0.57	1.31	0.02
			1.00				Ice	0.69	1.47	0.03
							1" Ice	0.95	1.81	0.06
							2" Ice	1.57	2.58	0.14
ATMAA1412D-1A20	C	From Leg	4.00		0.0000	83.00	No Ice	0.47	1.17	0.01
			0.00				1/2"	0.57	1.31	0.02
			1.00				Ice	0.69	1.47	0.03
							1" Ice	0.95	1.81	0.06
							2" Ice	1.57	2.58	0.14
RRUS 11 B12	A	From Leg	4.00		0.0000	83.00	No Ice	3.31	1.36	0.05
			0.00				1/2"	3.55	1.54	0.07
			1.00				Ice	3.80	1.73	0.10
							1" Ice	4.33	2.13	0.15
							2" Ice	5.50	3.04	0.31
RRUS 11 B12	B	From Leg	4.00		0.0000	83.00	No Ice	3.31	1.36	0.05
			0.00				1/2"	3.55	1.54	0.07
			1.00				Ice	3.80	1.73	0.10
							1" Ice	4.33	2.13	0.15
							2" Ice	5.50	3.04	0.31
RRUS 11 B12	C	From Leg	4.00		0.0000	83.00	No Ice	3.31	1.36	0.05
			0.00				1/2"	3.55	1.54	0.07
			1.00				Ice	3.80	1.73	0.10
							1" Ice	4.33	2.13	0.15
							2" Ice	5.50	3.04	0.31
8'x2" Antenna Mount Pipe	A	From Leg	4.00		0.0000	83.00	No Ice	1.90	1.90	0.03
			0.00				1/2"	2.73	2.73	0.04
			0.00				Ice	3.40	3.40	0.06
							1" Ice	4.40	4.40	0.12
							2" Ice	6.50	6.50	0.30



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> <sub>Front</sub>	C <sub>AA</sub> <sub>Side</sub>	Weight	
			Horz	Lateral						ft
							ft <sup>2</sup>	ft <sup>2</sup>	K	
8'x2" Antenna Mount Pipe	B	From Leg	4.00	0.00	0.0000	83.00	4" Ice			
							No Ice	1.90	1.90	0.03
							1/2" Ice	2.73	2.73	0.04
							Ice	3.40	3.40	0.06
							1" Ice	4.40	4.40	0.12
8'x2" Antenna Mount Pipe	C	From Leg	4.00	0.00	0.0000	83.00	2" Ice	6.50	6.50	0.30
							4" Ice			
							No Ice	1.90	1.90	0.03
							1/2" Ice	2.73	2.73	0.04
							Ice	3.40	3.40	0.06
Platform Mount [LP 303-1]	A	None			0.0000	83.00	1" Ice	4.40	4.40	0.12
							2" Ice	6.50	6.50	0.30
							4" Ice			
							No Ice	14.66	14.66	1.25
							1/2" Ice	18.87	18.87	1.48
*** KS24019-L112A	B	From Face	2.00	0.00	0.0000	51.00	Ice	23.08	23.08	1.71
							1" Ice	31.50	31.50	2.18
							2" Ice	48.34	48.34	3.10
							4" Ice			
							No Ice	0.10	0.10	0.01
Side Arm Mount [SO 701-1]	B	From Face	0.00	0.00	0.0000	51.00	1/2" Ice	0.18	0.18	0.01
							Ice	0.26	0.26	0.01
							1" Ice	0.42	0.42	0.01
							2" Ice	0.74	0.74	0.02
							4" Ice			
No Ice	0.85	1.67	0.07							
1/2" Ice	1.14	2.34	0.08							
Ice	1.43	3.01	0.09							
1" Ice	2.01	4.35	0.12							
2" Ice	3.17	7.03	0.18							
4" Ice										

## Load Combinations

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

Comb. No.	Description
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	120 - 84.7161	Pole	Max Tension	15	0.00	0.00	-0.00
			Max. Compression	14	-18.43	-0.36	1.28
			Max. Mx	5	-10.56	-340.94	-0.00
			Max. My	2	-10.54	0.56	345.55
			Max. Vy	5	17.14	-340.94	-0.00
			Max. Vx	2	-17.34	0.56	345.55
			Max. Torque	6			1.31
L2	84.7161 - 41.6224	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.45	-0.51	1.60
			Max. Mx	5	-22.16	-1279.88	-3.32
			Max. My	2	-22.15	3.93	1292.87
			Max. Vy	5	24.62	-1279.88	-3.32
			Max. Vx	2	-24.83	3.93	1292.87
			Max. Torque	6			1.46
L3	41.6224 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-50.15	-0.51	2.04
			Max. Mx	5	-36.99	-2527.93	-7.63
			Max. My	2	-36.99	8.39	2551.00
			Max. Vy	5	28.05	-2527.93	-7.63
			Max. Vx	2	-28.26	8.39	2551.00
			Max. Torque	6			1.52

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	15	50.15	0.02	6.67
	Max. H <sub>x</sub>	11	37.01	28.03	0.09
	Max. H <sub>z</sub>	2	37.01	0.09	28.24
	Max. M <sub>x</sub>	2	2551.00	0.09	28.24
	Max. M <sub>z</sub>	5	2527.93	-28.03	-0.09
	Max. Torsion	6	1.52	-24.32	-14.20
	Min. Vert	1	37.01	0.00	0.00
	Min. H <sub>x</sub>	5	37.01	-28.03	-0.09
	Min. H <sub>z</sub>	8	37.01	-0.09	-28.24
	Min. M <sub>x</sub>	8	-2548.87	-0.09	-28.24
	Min. M <sub>z</sub>	11	-2527.33	28.03	0.09
	Min. Torsion	12	-1.52	24.32	14.20

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
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### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturing Moment, M <sub>x</sub> kip-ft	Overturing Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	37.01	0.00	0.00	-1.04	-0.29	0.00
Dead+Wind 0 deg - No Ice	37.01	-0.09	-28.24	-2551.00	8.39	0.86
Dead+Wind 30 deg - No Ice	37.01	13.93	-24.41	-2205.04	-1256.58	0.12
Dead+Wind 60 deg - No Ice	37.01	24.23	-14.04	-1268.51	-2184.95	-0.66
Dead+Wind 90 deg - No Ice	37.01	28.03	0.09	7.63	-2527.93	-1.26
Dead+Wind 120 deg - No Ice	37.01	24.32	14.20	1281.44	-2193.64	-1.52
Dead+Wind 150 deg - No Ice	37.01	14.10	24.50	2211.59	-1271.64	-1.38
Dead+Wind 180 deg - No Ice	37.01	0.09	28.24	2548.87	-9.00	-0.86
Dead+Wind 210 deg - No Ice	37.01	-13.93	24.41	2202.91	1255.98	-0.12
Dead+Wind 240 deg - No Ice	37.01	-24.23	14.04	1266.38	2184.34	0.66
Dead+Wind 270 deg - No Ice	37.01	-28.03	-0.09	-9.76	2527.33	1.26
Dead+Wind 300 deg - No Ice	37.01	-24.32	-14.20	-1283.57	2193.03	1.52
Dead+Wind 330 deg - No Ice	37.01	-14.10	-24.50	-2213.72	1271.03	1.38
Dead+Ice+Temp	50.15	0.00	0.00	-2.04	-0.51	0.00
Dead+Wind 0 deg+Ice+Temp	50.15	-0.02	-6.67	-619.96	1.44	0.24
Dead+Wind 30 deg+Ice+Temp	50.15	3.29	-5.76	-536.20	-305.28	0.02
Dead+Wind 60 deg+Ice+Temp	50.15	5.72	-3.32	-309.33	-530.34	-0.20
Dead+Wind 90 deg+Ice+Temp	50.15	6.62	0.02	-0.16	-613.44	-0.37
Dead+Wind 120 deg+Ice+Temp	50.15	5.75	3.35	308.49	-532.31	-0.44
Dead+Wind 150 deg+Ice+Temp	50.15	3.33	5.79	533.91	-308.70	-0.39
Dead+Wind 180 deg+Ice+Temp	50.15	0.02	6.67	615.70	-2.51	-0.24
Dead+Wind 210 deg+Ice+Temp	50.15	-3.29	5.76	531.94	304.21	-0.02
Dead+Wind 240 deg+Ice+Temp	50.15	-5.72	3.32	305.08	529.27	0.20
Dead+Wind 270 deg+Ice+Temp	50.15	-6.62	-0.02	-4.10	612.37	0.37
Dead+Wind 300 deg+Ice+Temp	50.15	-5.75	-3.35	-312.75	531.24	0.44
Dead+Wind 330 deg+Ice+Temp	50.15	-3.33	-5.79	-538.17	307.63	0.39
Dead+Wind 0 deg - Service	37.01	-0.03	-9.77	-883.72	2.71	0.30
Dead+Wind 30 deg - Service	37.01	4.82	-8.45	-763.96	-435.16	0.04
Dead+Wind 60 deg - Service	37.01	8.38	-4.86	-439.79	-756.51	-0.23
Dead+Wind 90 deg - Service	37.01	9.70	0.03	1.94	-875.23	-0.44
Dead+Wind 120 deg - Service	37.01	8.42	4.91	442.87	-759.52	-0.53
Dead+Wind 150 deg - Service	37.01	4.88	8.48	764.84	-440.37	-0.48
Dead+Wind 180 deg - Service	37.01	0.03	9.77	881.58	-3.31	-0.30
Dead+Wind 210 deg - Service	37.01	-4.82	8.45	761.83	434.55	-0.04
Dead+Wind 240 deg - Service	37.01	-8.38	4.86	437.65	755.90	0.23
Dead+Wind 270 deg - Service	37.01	-9.70	-0.03	-4.08	874.62	0.44
Dead+Wind 300 deg - Service	37.01	-8.42	-4.91	-445.00	758.91	0.53
Dead+Wind 330 deg - Service	37.01	-4.88	-8.48	-766.97	439.76	0.48

### Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-37.01	0.00	0.00	37.01	0.00	0.000%
2	-0.09	-37.01	-28.24	0.09	37.01	28.24	0.000%
3	13.93	-37.01	-24.41	-13.93	37.01	24.41	0.000%
4	24.23	-37.01	-14.04	-24.23	37.01	14.04	0.000%
5	28.03	-37.01	0.09	-28.03	37.01	-0.09	0.000%
6	24.32	-37.01	14.20	-24.32	37.01	-14.20	0.000%
7	14.10	-37.01	24.50	-14.10	37.01	-24.50	0.000%
8	0.09	-37.01	28.24	-0.09	37.01	-28.24	0.000%
9	-13.93	-37.01	24.41	13.93	37.01	-24.41	0.000%
10	-24.23	-37.01	14.04	24.23	37.01	-14.04	0.000%
11	-28.03	-37.01	-0.09	28.03	37.01	0.09	0.000%
12	-24.32	-37.01	-14.20	24.32	37.01	14.20	0.000%
13	-14.10	-37.01	-24.50	14.10	37.01	24.50	0.000%
14	0.00	-50.15	0.00	0.00	50.15	0.00	0.000%
15	-0.02	-50.15	-6.67	0.02	50.15	6.67	0.000%
16	3.29	-50.15	-5.76	-3.29	50.15	5.76	0.000%
17	5.72	-50.15	-3.32	-5.72	50.15	3.32	0.000%
18	6.62	-50.15	0.02	-6.62	50.15	-0.02	0.000%
19	5.75	-50.15	3.35	-5.75	50.15	-3.35	0.000%
20	3.33	-50.15	5.79	-3.33	50.15	-5.79	0.000%
21	0.02	-50.15	6.67	-0.02	50.15	-6.67	0.000%
22	-3.29	-50.15	5.76	3.29	50.15	-5.76	0.000%
23	-5.72	-50.15	3.32	5.72	50.15	-3.32	0.000%
24	-6.62	-50.15	-0.02	6.62	50.15	0.02	0.000%
25	-5.75	-50.15	-3.35	5.75	50.15	3.35	0.000%
26	-3.33	-50.15	-5.79	3.33	50.15	5.79	0.000%
27	-0.03	-37.01	-9.77	0.03	37.01	9.77	0.000%
28	4.82	-37.01	-8.45	-4.82	37.01	8.45	0.000%
29	8.38	-37.01	-4.86	-8.38	37.01	4.86	0.000%
30	9.70	-37.01	0.03	-9.70	37.01	-0.03	0.000%
31	8.42	-37.01	4.91	-8.42	37.01	-4.91	0.000%
32	4.88	-37.01	8.48	-4.88	37.01	-8.48	0.000%
33	0.03	-37.01	9.77	-0.03	37.01	-9.77	0.000%
34	-4.82	-37.01	8.45	4.82	37.01	-8.45	0.000%
35	-8.38	-37.01	4.86	8.38	37.01	-4.86	0.000%
36	-9.70	-37.01	-0.03	9.70	37.01	0.03	0.000%
37	-8.42	-37.01	-4.91	8.42	37.01	4.91	0.000%
38	-4.88	-37.01	-8.48	4.88	37.01	8.48	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	0.00009307
3	Yes	5	0.00000001	0.00003360
4	Yes	5	0.00000001	0.00003360
5	Yes	4	0.00000001	0.00009673
6	Yes	5	0.00000001	0.00003196
7	Yes	5	0.00000001	0.00003539
8	Yes	4	0.00000001	0.00011536
9	Yes	5	0.00000001	0.00003264
10	Yes	5	0.00000001	0.00003248
11	Yes	4	0.00000001	0.00011943
12	Yes	5	0.00000001	0.00003534
13	Yes	5	0.00000001	0.00003207
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00044915
16	Yes	4	0.00000001	0.00048930
17	Yes	4	0.00000001	0.00048739

18	Yes	4	0.0000001	0.00044399
19	Yes	4	0.0000001	0.00048555
20	Yes	4	0.0000001	0.00048918
21	Yes	4	0.0000001	0.00044462
22	Yes	4	0.0000001	0.00048267
23	Yes	4	0.0000001	0.00048118
24	Yes	4	0.0000001	0.00044249
25	Yes	4	0.0000001	0.00049023
26	Yes	4	0.0000001	0.00048996
27	Yes	4	0.0000001	0.00001885
28	Yes	4	0.0000001	0.00009598
29	Yes	4	0.0000001	0.00009613
30	Yes	4	0.0000001	0.00001930
31	Yes	4	0.0000001	0.00008523
32	Yes	4	0.0000001	0.00010700
33	Yes	4	0.0000001	0.00001996
34	Yes	4	0.0000001	0.00008947
35	Yes	4	0.0000001	0.00008856
36	Yes	4	0.0000001	0.00002048
37	Yes	4	0.0000001	0.00010694
38	Yes	4	0.0000001	0.00008585

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 84.7161	14.258	27	0.9656	0.0023
L2	89.2839 - 41.6224	8.290	38	0.8500	0.0014
L3	47.3776 - 0	2.364	38	0.4570	0.0005

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	Lighting Rod 3/4" x 3'	27	14.258	0.9656	0.0023	52961
118.00	7770.00 w/ Mount Pipe	27	13.855	0.9606	0.0023	52961
116.00	TME-RRUS-11	27	13.453	0.9555	0.0022	52961
108.00	(4) 844G65VTZASX w/ Mount Pipe	27	11.854	0.9333	0.0019	22067
100.00	TME-800MHZ RRH	27	10.290	0.9049	0.0016	13240
97.00	P40-16-XLPP-RR-A w/ Mount Pipe	27	9.717	0.8918	0.0015	11513
83.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	38	7.188	0.8060	0.0012	7522
51.00	KS24019-L112A	38	2.720	0.4950	0.0005	4563

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 84.7161	41.120	2	2.7850	0.0067
L2	89.2839 - 41.6224	23.920	13	2.4519	0.0039
L3	47.3776 - 0	6.825	13	1.3193	0.0014

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	Lighting Rod 3/4" x 3'	2	41.120	2.7850	0.0068	18473
118.00	7770.00 w/ Mount Pipe	2	39.959	2.7706	0.0066	18473
116.00	TME-RRUS-11	13	38.799	2.7559	0.0063	18473
108.00	(4) 844G65VTZASX w/ Mount Pipe	13	34.192	2.6916	0.0055	7696
100.00	TME-800MHZ RRH	13	29.685	2.6096	0.0046	4617
97.00	P40-16-XLPP-RR-A w/ Mount Pipe	13	28.034	2.5720	0.0044	4014
83.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	13	20.741	2.3251	0.0035	2619
51.00	KS24019-L112A	13	7.852	1.4289	0.0015	1583

### Compression Checks

#### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
L1	120 - 84.7161 (1)	TP32.5458x24.09x0.375	35.28	0.00	0.0	39.000	36.9884	-10.54	1442.55	0.007
L2	84.7161 - 41.6224 (2)	TP42.0347x30.7011x0.437 5	47.66	0.00	0.0	39.000	55.8625	-22.15	2178.64	0.010
L3	41.6224 - 0 (3)	TP51x39.7912x0.5	47.38	0.00	0.0	39.000	80.1435	-36.99	3125.60	0.012

#### Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M <sub>x</sub> kip-ft	Actual f <sub>bx</sub> ksi	Allow. F <sub>bx</sub> ksi	Ratio f <sub>bx</sub> F <sub>bx</sub>	Actual M <sub>y</sub> kip-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio f <sub>by</sub> F <sub>by</sub>
L1	120 - 84.7161 (1)	TP32.5458x24.09x0.375	345.55	14.680	39.000	0.376	0.00	0.000	39.000	0.000
L2	84.7161 - 41.6224 (2)	TP42.0347x30.7011x0.43 75	1293.1 7	28.067	39.000	0.720	0.00	0.000	39.000	0.000
L3	41.6224 - 0 (3)	TP51x39.7912x0.5	2552.6 7	30.734	39.000	0.788	0.00	0.000	39.000	0.000

#### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio f <sub>v</sub> F <sub>v</sub>	Actual T kip-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio f <sub>vt</sub> F <sub>vt</sub>
L1	120 - 84.7161 (1)	TP32.5458x24.09x0.375	17.34	0.469	26.000	0.036	0.77	0.016	26.000	0.001
L2	84.7161 - 41.6224 (2)	TP42.0347x30.7011x0.43 75	24.86	0.445	26.000	0.034	1.34	0.014	26.000	0.001
L3	41.6224 - 0 (3)	TP51x39.7912x0.5	28.29	0.353	26.000	0.027	1.38	0.008	26.000	0.000



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 $\frac{f_{vt}}{F_{vt}}$
-------------	-----------------	------	------------------	------------------------	------------------------	----------------------------	-----------------------	---------------------------	---------------------------	----------------------------------

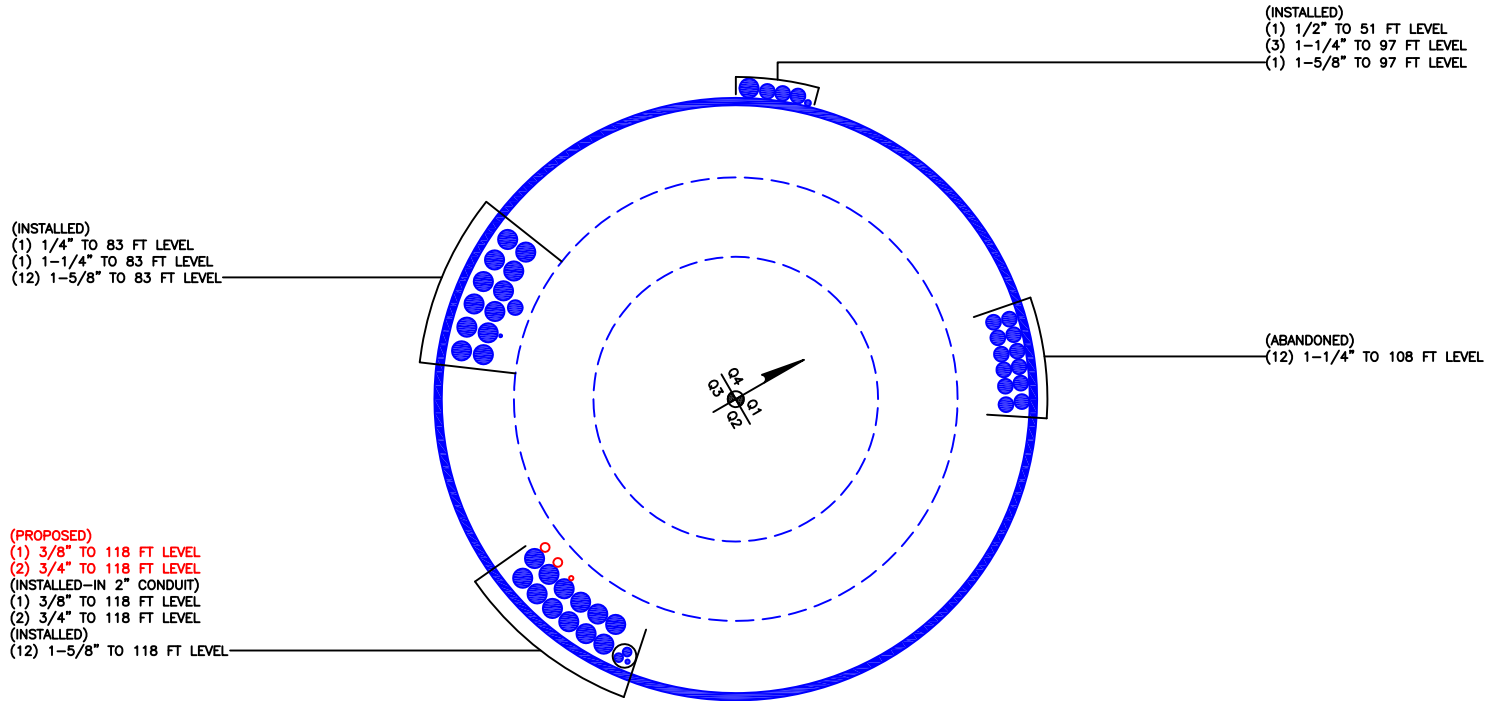
**Pole Interaction Design Data**

Section No.	Elevation ft	Ratio P $P_a$	Ratio $f_{bx}$ $F_{bx}$	Ratio $f_{by}$ $F_{by}$	Ratio $f_v$ $F_v$	Ratio $f_{vt}$ $F_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 84.7161 (1)	0.007	0.376	0.000	0.036	0.001	0.384 ✓	1.333	H1-3+VT ✓
L2	84.7161 - 41.6224 (2)	0.010	0.720	0.000	0.034	0.001	0.730 ✓	1.333	H1-3+VT ✓
L3	41.6224 - 0 (3)	0.012	0.788	0.000	0.027	0.000	0.800 ✓	1.333	H1-3+VT ✓

**Section Capacity Table**

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF \cdot P_{allow}$ K	% Capacity	Pass Fail	
L1	120 - 84.7161	Pole	TP32.5458x24.09x0.375	1	-10.54	1922.92	28.8	Pass	
L2	84.7161 - 41.6224	Pole	TP42.0347x30.7011x0.4375	2	-22.15	2904.13	54.8	Pass	
L3	41.6224 - 0	Pole	TP51x39.7912x0.5	3	-36.99	4166.42	60.0	Pass	
							Summary		
							Pole (L3)	60.0	Pass
							<b>RATING =</b>	<b>60.0</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**



**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

# Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

## TIA Rev F

### Site Data

BU#: 881536
Site Name: NORTH HAVEN TOWER
App #: 322788 Rev.4
Pole Manufacturer: Other

### Reactions

Moment:	2553	ft-kips
Axial:	37	kips
Shear:	28	kips

### Anchor Rod Data

Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	60	in

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

### Anchor Rod Results

Maximum Rod Tension:	100.3 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	51.4% <b>Pass</b>

Rigid
Service, ASD
Fty*ASIF

### Plate Data

Diam:	66	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	8.09	in

### Base Plate Results

Base Plate Stress:	40.4 ksi	Flexural Check
Allowable Plate Stress:	60.0 ksi	
Base Plate Stress Ratio:	67.3% <b>Pass</b>	

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
31.61

### Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

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

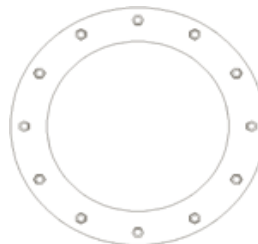
Pole Punching Shear Check:	n/a
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### Pole Data

Diam:	51	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
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\* 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

BU: 881536  
 Site Name: NORTH HAVEN TOWER  
 App Number: 322788 Rev.4  
 Work Order: 1177434



Monopole Drilled Pier

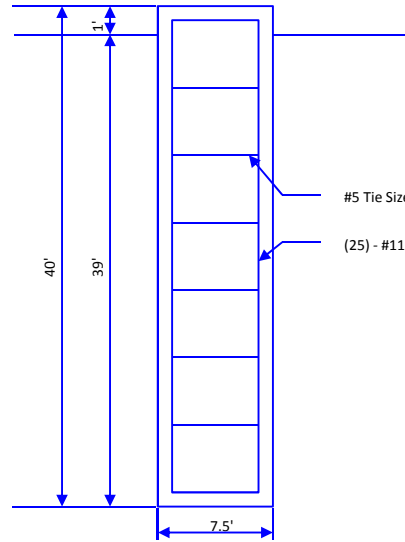
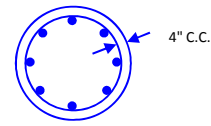
Input

**Criteria**  
 TIA Revision: F  
 ACI 318 Revision: 2002  
 Seismic Category: B

**Forces**  
 Compression: 37 kips  
 Shear: 28 kips  
 Moment: 2553 k-ft  
 Swelling Force: 0 kips

**Foundation Dimensions**  
 Pier Diameter: 7.5 ft  
 Ext. above grade: 1 ft  
 Depth below grade: 39 ft

**Material Properties**  
 Number of Rebar: 25  
 Rebar Size: #11  
 Tie Size: #5  
 Rebar tensile strength: 60 ksi  
 Concrete Strength: 4000 psi  
 Ultimate Concrete Strain: 0.003 in/in  
 Clear Cover to Ties: 4 in



Soil Profile: 1

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.75	0	3.75	120	0	0	0	0	0	
2	1.25	3.75	5	120	0	32	0	0	0	
3	2	5	7	120	0	32	1.4	1.4	0	
4	32	7	39	60	0	32	1.4	1.4	16	

Analysis Results

**Soil Lateral Capacity**  
 Depth to Zero Shear: 9.07 ft  
 Max Moment, Mu: 2780.75 k-ft  
 Soil Safety Factor: 10.37  
 Safety Factor Req'd: 2  
**RATING: 19.3%**

**Soil Axial Capacity**  
 Skin Friction (k): 560.77 kips  
 End Bearing (k): 353.43 kips  
 Comp. Capacity (k), φCn: 914.20 kips  
 Comp. (k), Cu: 48.10 kips  
**RATING: 5.3%**

**Concrete/Steel Check**  
 Mu (from soil analysis): 3614.97 k-ft  
 φMn: 6738.18 k-ft  
**RATING: 53.6%**

rho provided: 0.61  
 rho required: 0.33 OK

Rebar Spacing: 8.56  
 Spacing required: 22.56 OK

Dev. Length required: 29.60  
 Dev. Length provided: 53.51 OK

**Overall Foundation Rating: 53.6%**

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

AT&T Existing Facility

Site ID: CT5107

North Haven South  
120 Universal Drive  
North Haven, CT 06473

**November 6, 2015**

**EBI Project Number: 6215005560**

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general public allowable limit:	<b>10.18 %</b>

November 6, 2015

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

Emissions Analysis for Site: **CT5107 – North Haven South**

EBI Consulting was directed to analyze the proposed AT&T facility located at **120 Universal Drive, North Haven, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  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 ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 700 and 850 MHz Bands are approximately  $467 \mu\text{W}/\text{cm}^2$  and  $567 \mu\text{W}/\text{cm}^2$  respectively. The general population exposure limit for the PCS, AWS and WCS bands is  $1000 \mu\text{W}/\text{cm}^2$ . 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 **120 Universal Drive, North Haven, 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 GSM channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 4 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) 4 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 4) 2 LTE channels (WCS Band – 2300 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 5) 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.
- 6) 2 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 60 Watts

- 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 **Powerwave 7770** for 1900 MHz (PCS) and 850 MHz channels, the **CCI OPA-65R-LCUU-H6** for 850 MHz and 2300 MHz (WCS) and the **KMW AM-X-CD-16-65-00T-RET** for 1900 MHz (PCS) and 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Powerwave 7770** has a maximum gain of **11.4 dBd** at 850 MHz and **13.4 dBd** at 1900MHz at its main lobe. The **CCI OPA-65R-LCUU-H6** has a maximum gain of **12.5 dBd** at 850 MHz and **15.5 dBd** at 2300MHz at its main lobe. The **KMW AM-X-CD-16-65-00T-RET** has a maximum gain of **13.35 dBd at 700 MHz and 15.25 dBd at 1900 MHz** at its main lobe. 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 **121 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.

**AT&T Site Inventory and Power Data**

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770
Gain:	11.4 / 13.3 dBd	Gain:	11.4 / 13.3 dBd	Gain:	11.4 / 13.3 dBd
Height (AGL):	121 feet	Height (AGL):	121 feet	Height (AGL):	121 feet
Frequency Bands	8500 MHz / 1900 MHz (PCS)	Frequency Bands	8500 MHz / 1900 MHz (PCS)	Frequency Bands	8500 MHz / 1900 MHz (PCS)
Channel Count	8	Channel Count	8	# PCS Channels:	8
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	4,281.78	ERP (W):	4,281.78	ERP (W):	4,281.78
Antenna A1 MPE%	<b>1.51</b>	Antenna B1 MPE%	<b>1.51</b>	Antenna C1 MPE%	<b>1.51</b>
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	CCI OPA-65R-LCUU-H6	Make / Model:	CCI OPA-65R-LCUU-H6	Make / Model:	CCI OPA-65R-LCUU-H6
Gain:	12.5 / 15.5 dBd	Gain:	13.3 / 15.6 dBd	Gain:	13.3 / 15.6 dBd
Height (AGL):	121 feet	Height (AGL):	121 feet	Height (AGL):	121 feet
Frequency Bands	850 MHz / 2300 MHz (WCS)	Frequency Bands	850 MHz / 2300 MHz (WCS)	Frequency Bands	850 MHz / 2300 MHz (WCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	180	Total TX Power:	180	Total TX Power:	180
ERP (W):	5,324.73	ERP (W):	5,324.73	ERP (W):	5,324.73
Antenna A2 MPE%	<b>1.67</b>	Antenna B2 MPE%	<b>1.67</b>	Antenna C2 MPE%	<b>1.67</b>
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	KMW AM-X-CD-16-65-00T-RET	Make / Model:	KMW AM-X-CD-16-65-00T-RET	Make / Model:	KMW AM-X-CD-16-65-00T-RET
Gain:	13.35 / 15.25 dBd	Gain:	13.35 / 15.25 dBd	Gain:	13.35 / 15.25 dBd
Height (AGL):	121 feet	Height (AGL):	121 feet	Height (AGL):	121 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:	240	Total TX Power:	240	Total TX Power:	240
ERP (W):	6,614.85	ERP (W):	6,614.85	ERP (W):	6,614.85
Antenna A3 MPE%	<b>2.60</b>	Antenna B3 MPE%	<b>2.60</b>	Antenna C3 MPE%	<b>2.60</b>

Site Composite MPE%	
Carrier	MPE%
AT&T – Max per sector	<b>5.78</b>
MetroPCS	2.42 %
Sprint	1.30 %
Nextel	0.63 %
T-Mobile	0.05 %
<b>Site Total MPE %:</b>	<b>10.18 %</b>

AT&T Sector 1 Total:	5.78 %
AT&T Sector 2 Total:	5.78 %
AT&T Sector 3 Total:	5.78 %
<b>Site Total:</b>	<b>10.18 %</b>

AT&T _per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ( $\mu\text{W}/\text{cm}^2$ )	Frequency (MHz)	Allowable MPE ( $\mu\text{W}/\text{cm}^2$ )	Calculated % MPE
AT&T 850 MHz UMTS	4	414.12	121	4.50	850	567	0.79 %
AT&T 1900 MHz (PCS) UMTS	4	656.33	121	7.14	1900	1000	0.71 %
AT&T 850 MHz GSM	2	533.48	121	2.90	850	567	0.51 %
AT&T 2300 MHz (WCS) LTE	2	2128.88	121	11.57	2300	1000	1.16 %
AT&T 700 MHz LTE	2	1297.63	121	7.05	700	467	1.51 %
AT&T 1900 MHz (PCS) LTE	2	2009.79	121	10.93	1900	1000	1.09 %
						<b>Total:</b>	<b>5.78 %</b>

## 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:	5.78 %
Sector 2:	5.78 %
Sector 3 :	5.78 %
AT&T Maximum Total (per sector):	5.78 %
Site Total:	10.18 %
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **10.18%** 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.



Scott Heffernan  
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