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

December 21, 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: 806369**
AT&T Site ID: CT5131
439-455 Homestead Avenue, Hartford, CT 06105
Latitude: 41° 47' 1.61" / Longitude: -72° 42' 13.66"

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 119-foot level of the existing 145-foot monopole at 439-455 Homestead Avenue in Hartford, CT. The tower and property are owned by Crown Castle. AT&T now intends to replace three (3) RRUs with RRU32 B2s and add six (6) triplexers.

This facility was approved by the Connecticut Siting Council in Docket No. 126 on April 9, 1990. This approval included the conditions that:

1. The monopole tower including antennas and associated equipment shall not exceed a height of 153 feet above ground level, 215 AMSL.

2. The facility shall be constructed in accordance with the State of Connecticut Basic Building Code.

3. The tower shall be designed and constructed to withstand 125 mph winds with two-inch radial ice accumulation.

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 The Honorable Luke Bronin, Mayor, City of Hartford as well as the property owner, and Crown Castle is the tower owner.

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

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

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

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

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

6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

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

Attachments:

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

cc: The Honorable Luke Bronin, Mayor, City of Hartford
Office of the Mayor
550 Main Street Room 200
Hartford, CT 06103

DOCKET NO. 126 - AN APPLICATION OF METRO MOBILE CTS OF HARTFORD, INC., FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF A CELLULAR TELEPHONE TOWER AND ASSOCIATED EQUIPMENT IN THE CITY OF HARTFORD, CONNECTICUT.	:	Connecticut Siting Council
	:	April 9, 1990

D E C I S I O N A N D O R D E R

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council finds that the effects associated with the construction, operation, and maintenance of a cellular telephone facility at the proposed Hartford site, including effects on the natural environment; ecological integrity and balance; forests and parks; air and water purity; and fish and wildlife are not significant either alone or cumulatively with other effects, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application, and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by Section 16-50k of the General Statutes of Connecticut (CGS), be issued to Metro Mobile CTS of Hartford, Inc., for the construction, operation, and maintenance of a cellular telecommunications tower, associated equipment, and building at the proposed site in Hartford, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The monopole tower including antennas and associated equipment shall not exceed a height of 153 feet above ground level, 215 feet AMSL.

2. The facility shall be constructed in accordance with the State of Connecticut Basic Building Code.

3. The tower shall be designed and constructed to withstand 125 mph winds with two-inch radial ice accumulation.

4. The Certificate Holder shall prepare a Development and Management (D&M) plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of State Agencies. The D&M plan shall include detailed plans of the site preparation with a soil boring report; plans, design details, and specifications for the tower foundation; and a site plan with placement of the tower as far removed from abutting properties and structures as possible.

5. The Certificate Holder shall prepare the D&M plan in consultation with the City of Hartford, which may provide its comments to the Council within 20 days of submission to the City.

6. The Certificate Holder shall comply with existing and any future radio frequency (RF) standard promulgated by State or federal regulatory agencies. Upon the establishment of any new governmental RF standards, the facility granted in this Decision and Order shall be brought into compliance with such standards.

7. The Certificate Holder shall provide the Council a recalculated report of power density if and when additional channels over the proposed 90 channels, higher wattage over the proposed 100 watts per channel, or if other circumstances in operation cause a change in power density above the levels originally calculated in the application.

8. The Certificate Holder shall permit public or private entities to share space on the tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

9. If this facility does not initially provide, or permanently ceases to provide, cellular service following the completion of construction, this Decision and Order shall be void, and the tower and all associated equipment in this application shall be dismantled and removed or reapplication of any new use shall be made to the Council before any such new use is made.

10. Unless otherwise approved by the Council, this Decision and Order shall be void if construction authorized herein is not completed within three years of the effective date of this Decision and Order.

Pursuant to Section 16-50p of the CGS, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below. A notice of issuance shall be published in the Hartford Courant.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of State Agencies.

The parties or intervenors to this proceeding are:

(Applicant)

Metro Mobile CTS of
Hartford, Inc.
100 Corporate Drive
Windsor, CT 06095
Attn: Gary N. Schulman
Vice President and
General Manager

(Its Representative)

Robinson & Cole
One Commercial Plaza
Hartford, CT 06103-3597
Attn: Earl W. Phillips
Jr., Esq.

(Intervenor)

SNET Cellular, Inc.
227 Church Street
New Haven, CT 06506

(Its Representative)

Peter J. Tyrrell
Senior Attorney
SNET Cellular, Inc.
227 Church Street
Room 1021
New Haven, CT 06506

JAW

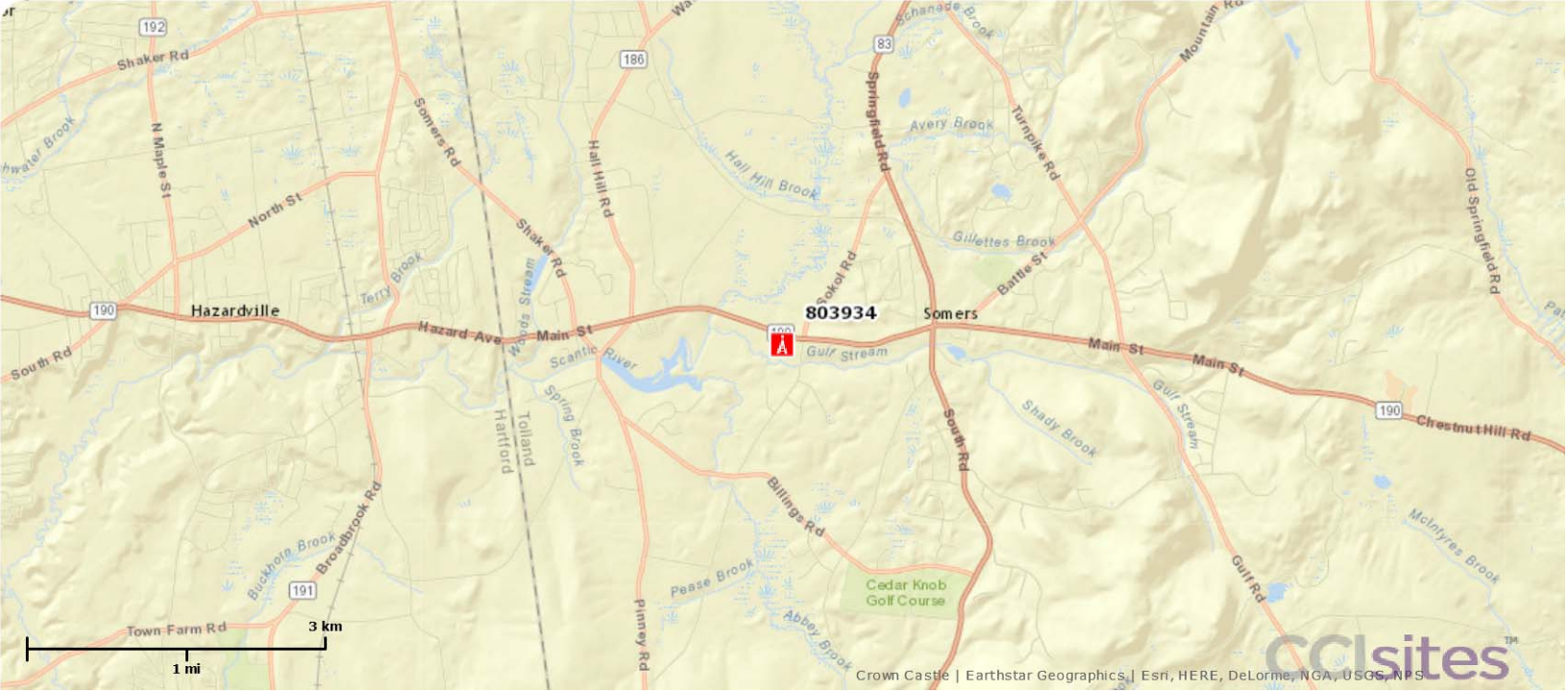
4248E

CERTIFICATION

The undersigned members of the Connecticut Siting Council hereby certify that they have heard this case in Docket No. 126 - An application of Metro Mobile CTS of Hartford, Inc., for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telephone tower and associated equipment in the City of Hartford, Connecticut, or read the record thereof, and that we voted as follows:

Dated at New Britain, Connecticut the 9th day of April, 1990.

Council Members	Vote Cast
Gloria Dibble Pond Gloria Dibble Pond Chairperson	Yes
Commissioner Peter Boucher Designee: Robert A. Pulito	Yes
Commissioner Leslie Carothers Designee: Brian Emerick	Yes
Harry E. Covey Harry E. Covey	Yes
Mortimer A. Gelston Mortimer A. Gelston	Yes
Daniel P. Lynch, Jr. Daniel P. Lynch, Jr.	Yes
Paulann H. Sheets Paulann H. Sheets	Abstain
William H. Smith William H. Smith	Yes
Colin C. Tait Colin C. Tait	Yes


803934
Somers
Hazardville
Shaker Rd
North St
N Maple St
Somers Rd
Hall Hill Rd
Springfield Rd
Turnpike Rd
Mountain Rd
Old Springfield Rd
Battle St
Sokol Rd
Gillettes Brook
Avery Brook
Hall Hill Brook
Schanade Brook
Terry Brook
Woods Stream
Hazard Ave
Main St
Scantic River
Gulf Stream
Chestnut Hill Rd
South Rd
Shady Brook
Spring Brook
Tolland
Hartford
Billings Rd
Broadbrook Rd
Buckhorn Brook
Pease Brook
Abbey Brook
McIntyres Brook
Pinney Rd
Cedar Knob
Golf Course
Town Farm Rd
3 km
1 mi
Crown Castle | Earthstar Geographics | Esri, HERE, DeLorme, NGA, USGS, NPS
CCIsites

WIRELESS COMMUNICATIONS FACILITY
CT5131 - LTE BWE
NW HARTFORD
CROWN CASTLE BU NO.: 806369
439-455 HOMESTEAD AVENUE
HARTFORD, CT 06101

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE, INCLUDING THE TIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2016 CONNECTICUT FIRE SAFETY CODE AND, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO "EXTRA" WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT

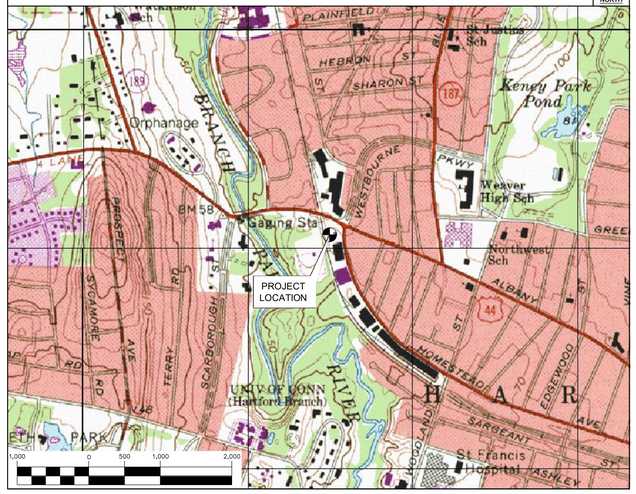
TO: 439-455 HOMESTEAD AVENUE, HARTFORD, CONNECTICUT

1.	GET ON I-91 N	1.1 MI
2.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.3 MI
3.	TURN LEFT ONTO CAPITAL BLVD	0.2 MI
4.	USE THE LEFT LANE TO TURN LEFT ONTO STATE HWY 411	0.2 MI
5.	TURN LEFT TO MERGE ONTO I-91 N	0.4 MI
6.	CONTINUE ON I-91 N TO HARTFORD. TAKE EXIT 48 FROM I-84	10.0 MI
7.	MERGE ONTO I-91 N	8.4 MI
8.	USE THE LEFT LANE TO TAKE EXIT 32A-32B FOR I-84 W TOWARD WATERBURY	0.9 MI
9.	USE THE RIGHT LANE TO MERGE ONTO I-84	0.6 MI
10.	TAKE EXIT 48 TOWARD ASYLUM STREET	472 FT
11.	DRIVE TO HOMESTEAD AVE	1.6 MI
12.	MERGE ONTO SPRING ST	125 FT
13.	TURN RIGHT ONTO GARDEN ST	0.5 MI
14.	TURN LEFT ONTO HOMESTEAD AVE	1.0 MI
15.	ARRIVE AT 439 HOMESTEAD AVENUE	

VICINITY MAP

SCALE: 1" = 1000'

NORTH



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   - A. REMOVE AND REPLACE (3) EXISTING RRUS-11 (1900 MHz) FOR PROPOSED RRUS-32 B2, TYP OF (3) TOTAL ON EXISTING PIPE MAST (POS 3).
   - B. RELOCATE EXISTING POSITION 3 ANTENNA TO POSITION 2, TYPICAL ALL SECTORS.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT5131
AT&T SITE NAME:	NW HARTFORD
SITE ADDRESS:	CROWN CASTLE BU NO.: 806369 439-455 HOMESTEAD AVENUE HARTFORD, CT 06101
LESSEE/APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-47'-0.10" N LONGITUDE: 72°-42'-15.12" W GROUND ELEVATION: ±64' AMSL GROUND ELEVATION REFERENCED FROM GOOGLE EARTH. COORDINATES REFERENCED FROM RFDS DOCUMENTS.

SHEET INDEX

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	12/20/16	CAG	HMR	CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
NW HARTFORD
CT5131 - LTE BWE
439-455 HOMESTEAD AVENUE
HARTFORD, CT 06101

DATE: 11/08/16
SCALE: AS NOTED
JOB NO. 16071.59

TITLE SHEET

T-1

NOTES AND SPECIFICATIONS

DESIGN BASIS:

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

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 90–105 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 97 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

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

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)–––ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)–––ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)–––ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)–––ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE–––ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS–––ASTM A325–N
   G. U–BOLTS–––ASTM A36
   H. ANCHOR RODS–––ASTM F 1554
   I. WELDING ELECTRODE–––ASTM E 70XX

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

PAINT NOTES

PAINTING SCHEDULE:

1. ANTENNA PANELS:

   A. SHERWIN WILLIAMS POLANE–B
   B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.

2. COAXIAL CABLES:

   A. ONE COAT OF DTM BONDING PRIMER (2–5 MILS. DRY FINISH)
   B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5–5 MILS. DRY FINISH)
   C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

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

CLEANING:

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

APPLICATION:

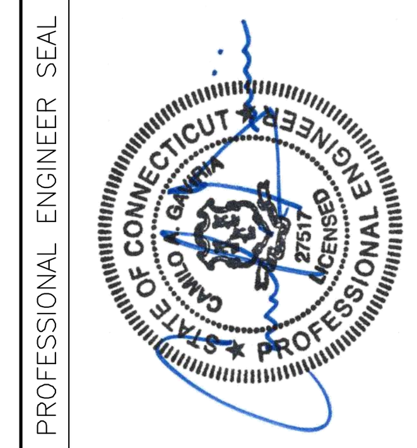
1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
3. APPLY EACH COAT TO UNIFORM FINISH.
4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED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

COMPLETED WORK:

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	12/20/16	CAG	HMR	CONSTRUCTION DOCUMENTS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL



at&t

EMPIRE telecom

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

AT&T MOBILITY

WIRELESS COMMUNICATIONS FACILITY

NW HARTFORD

CT5131 - LTE BWE

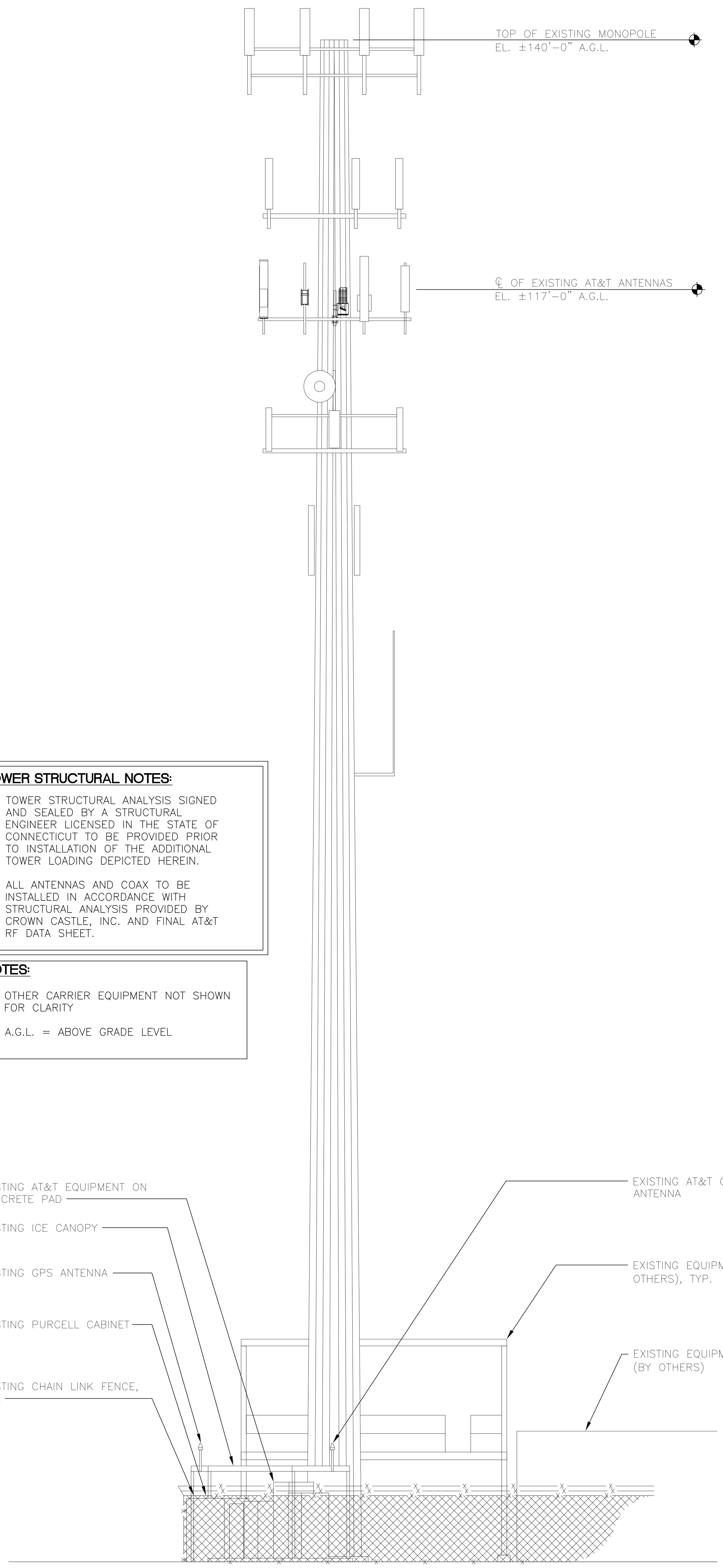
439–455 HOMESTEAD AVENUE
HARTFORD, CT 06101

DATE: 11/08/16
SCALE: AS NOTED
JOB NO. 16071.59

NOTES AND SPECIFICATIONS

N–1

Sheet No. 2 of 5



TOWER STRUCTURAL NOTES:

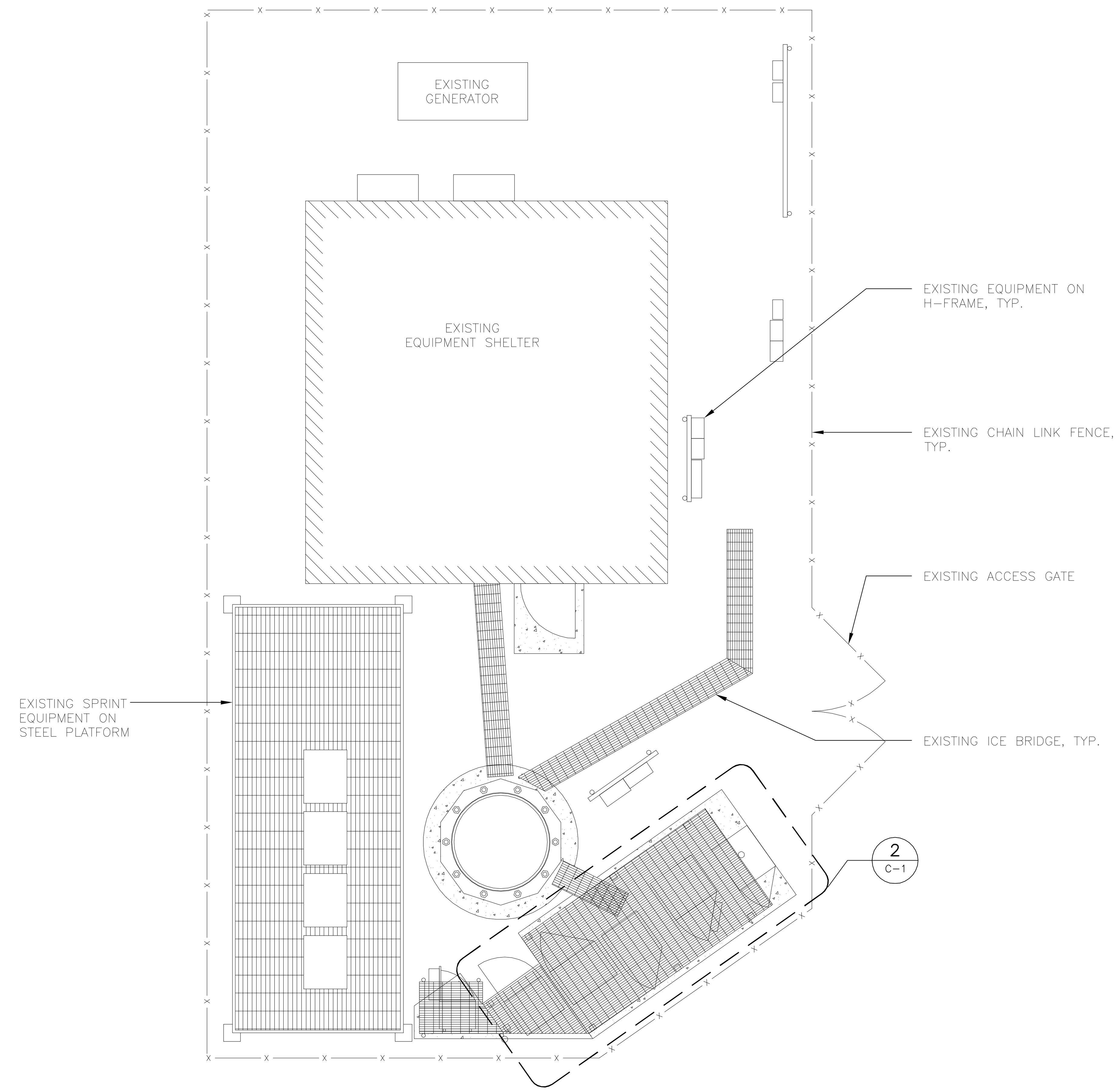
1. TOWER STRUCTURAL ANALYSIS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE,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

NOTES:

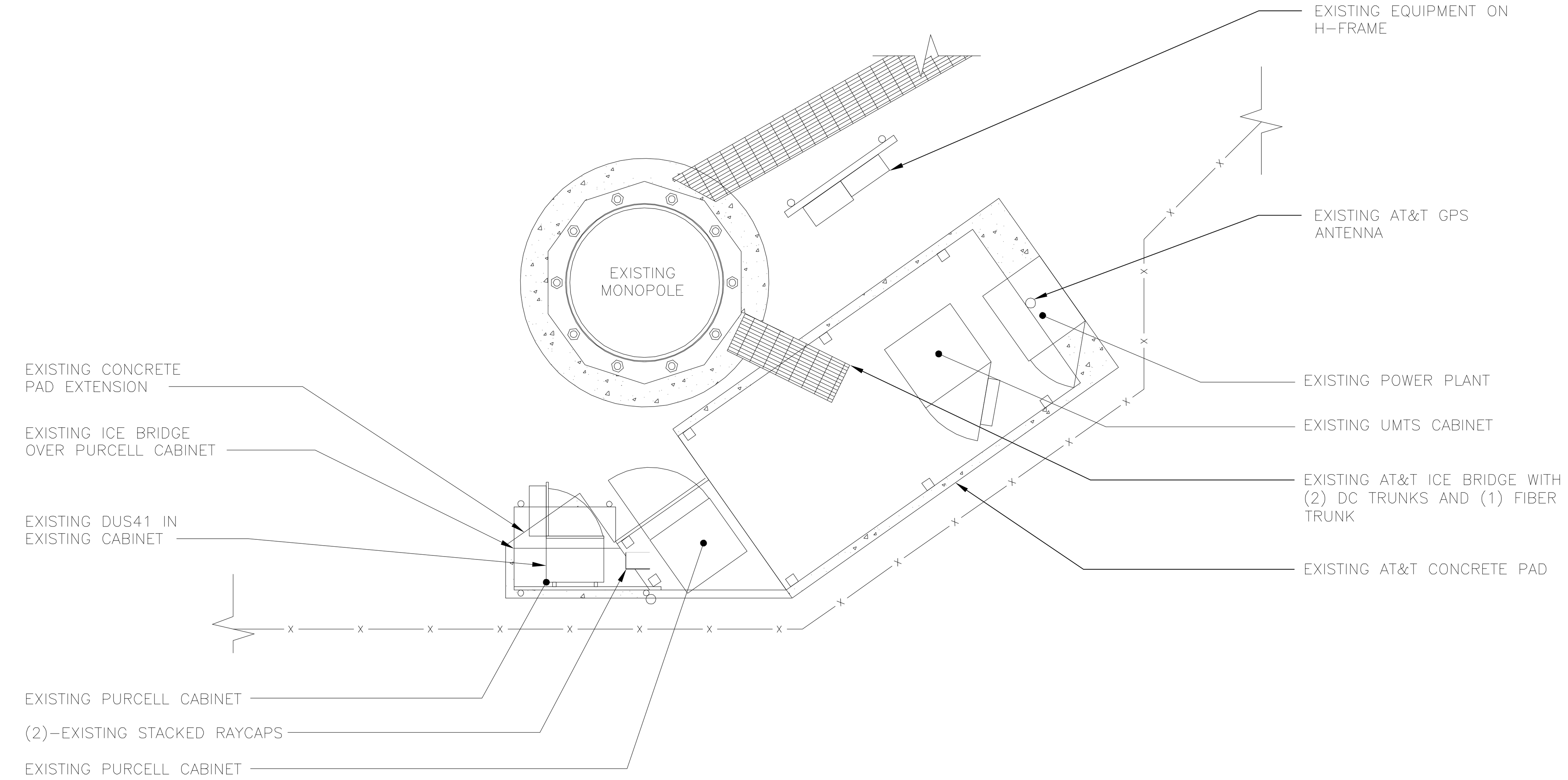
1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
2. A.G.L. = ABOVE GRADE LEVEL

3 / C-1 **TOWER ELEVATION**
SCALE: 1/16" = 1'-0"

GRAPHIC SCALE
16 0 8 16 32 64
(IN FEET)
1 inch = 16 ft.



1 / C-1 **COMPOUND PLAN**
SCALE: 3/16" = 1'-0"
TRUE NORTH



2 / C-1 **EQUIPMENT LAYOUT PLAN**
SCALE: 1/4" = 1'-0"
TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	12/20/16	CAG	HMR	CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

EMPIRE telecom

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

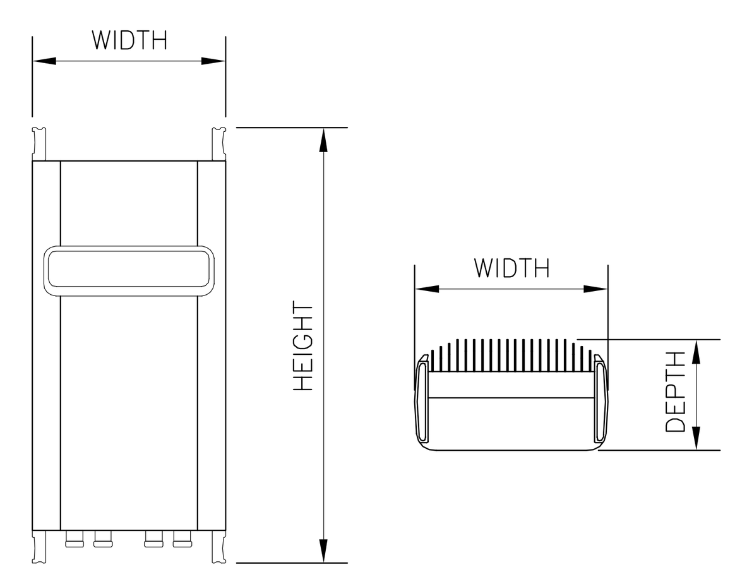
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
NW HARTFORD
CT5131 - LTE BWE
439-455 HOMESTEAD AVENUE
HARTFORD, CT 06101

DATE: 11/08/16
SCALE: AS NOTED
JOB NO. 16071.59

PLANS AND ELEVATION

C-1

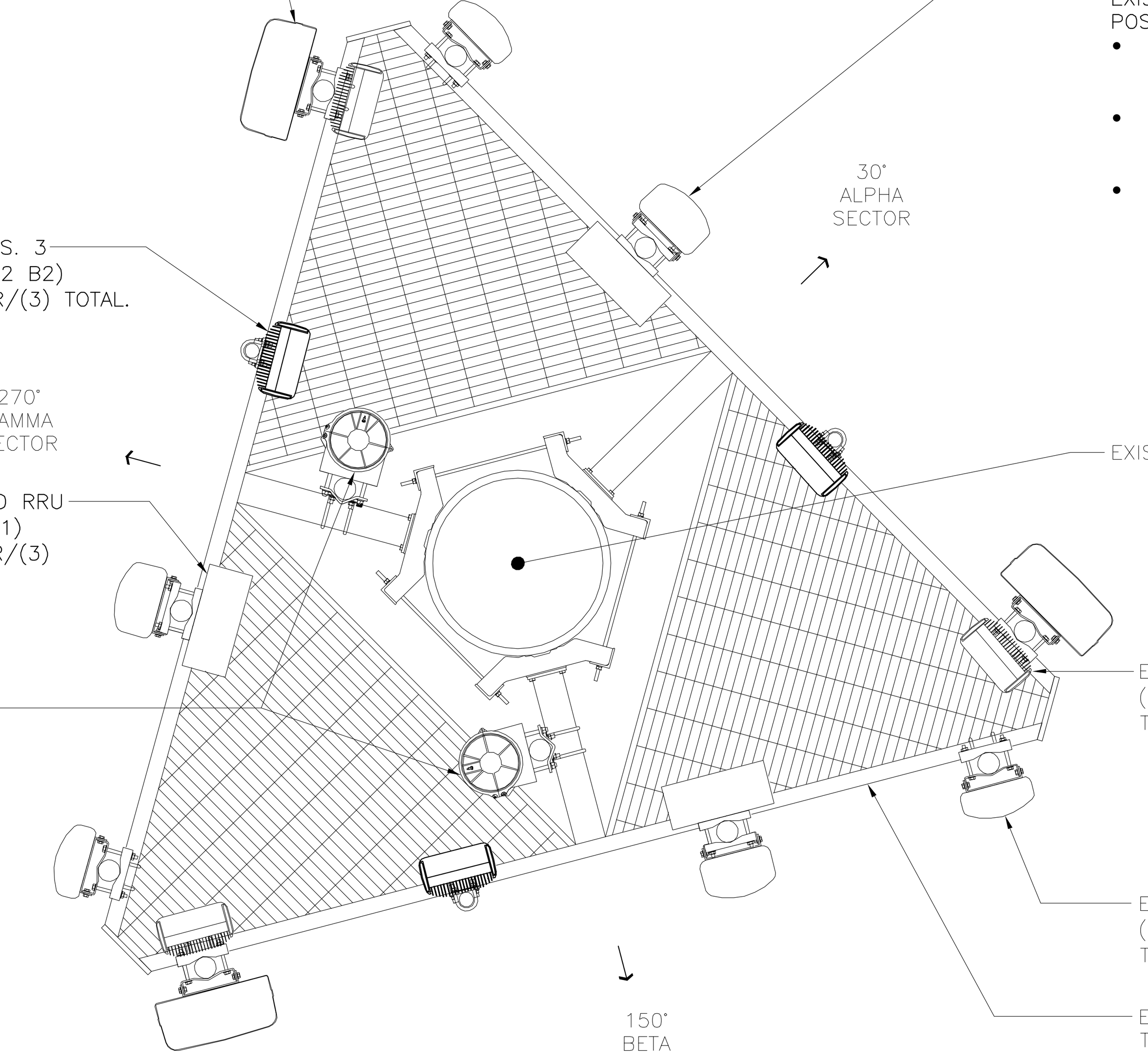
Sheet No. 3 of 5



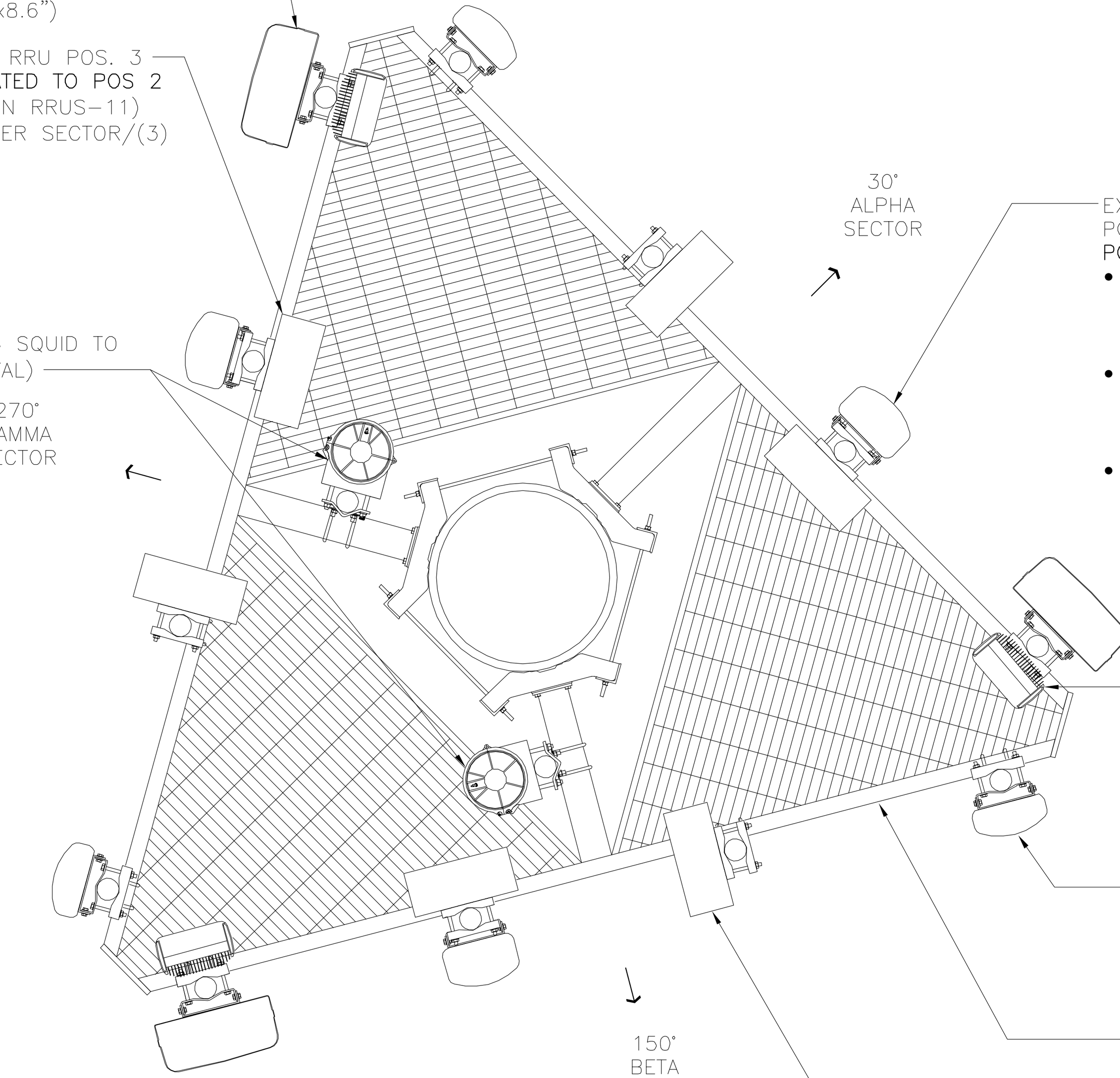
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 32	27.17"L x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

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

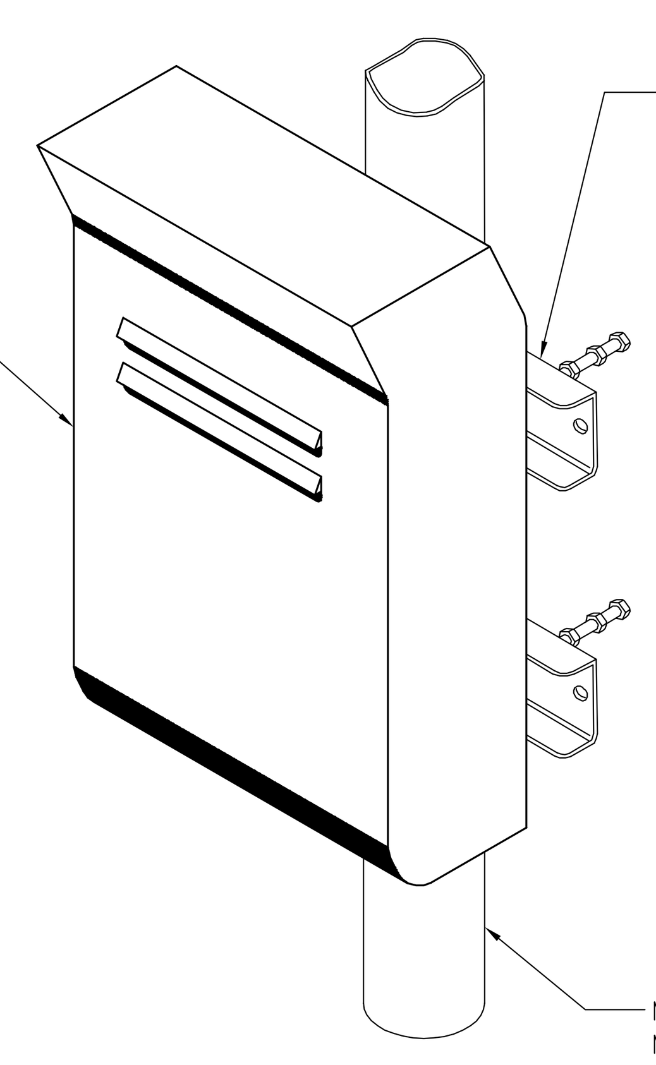
5 C-2 ERICSSON RRUS 32 DETAIL
SCALE: 1" = 1'-0"



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

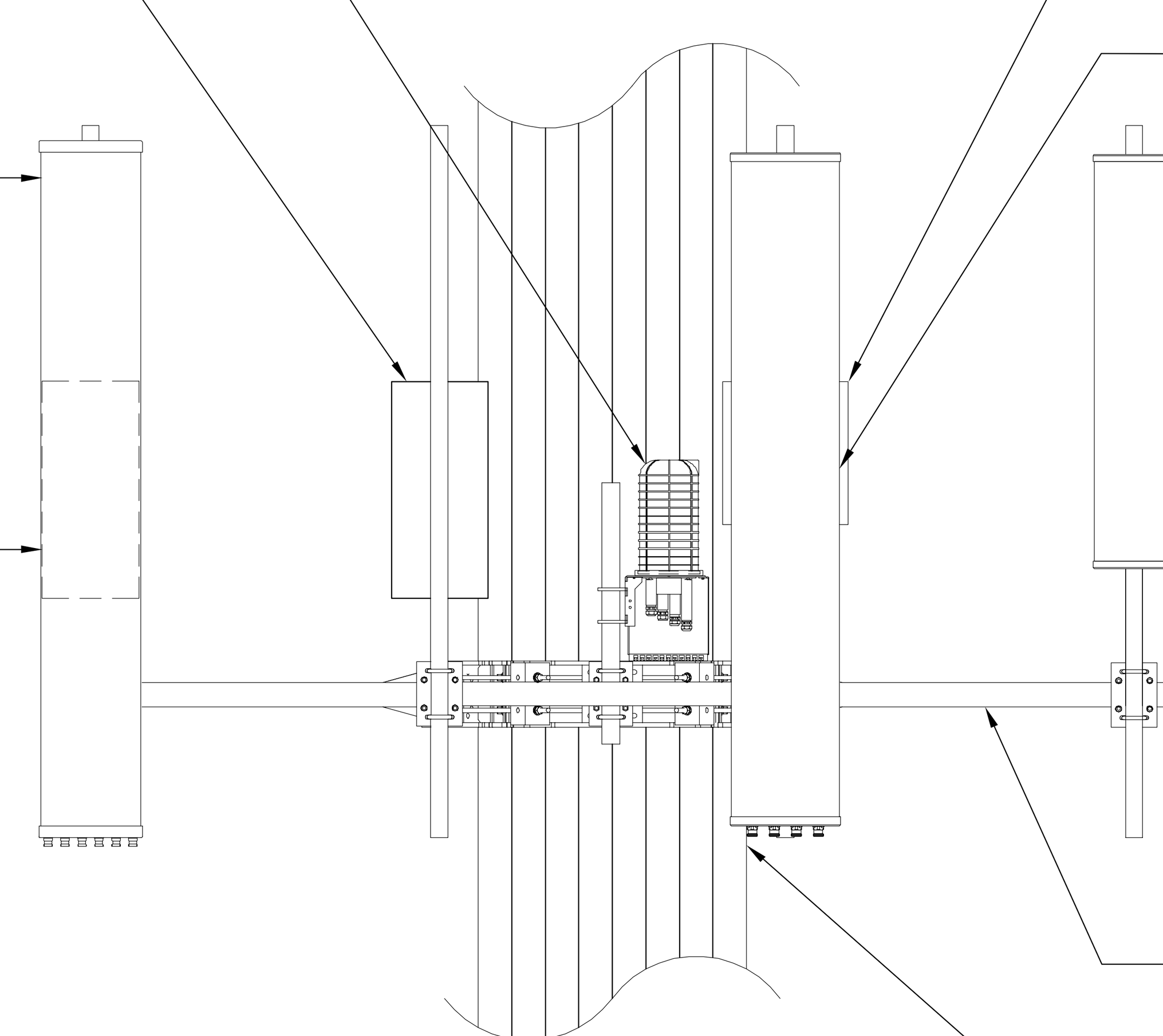


1 C-2 EXISTING ANTENNA PLAN
SCALE: 1/2" = 1'-0"
NORTH

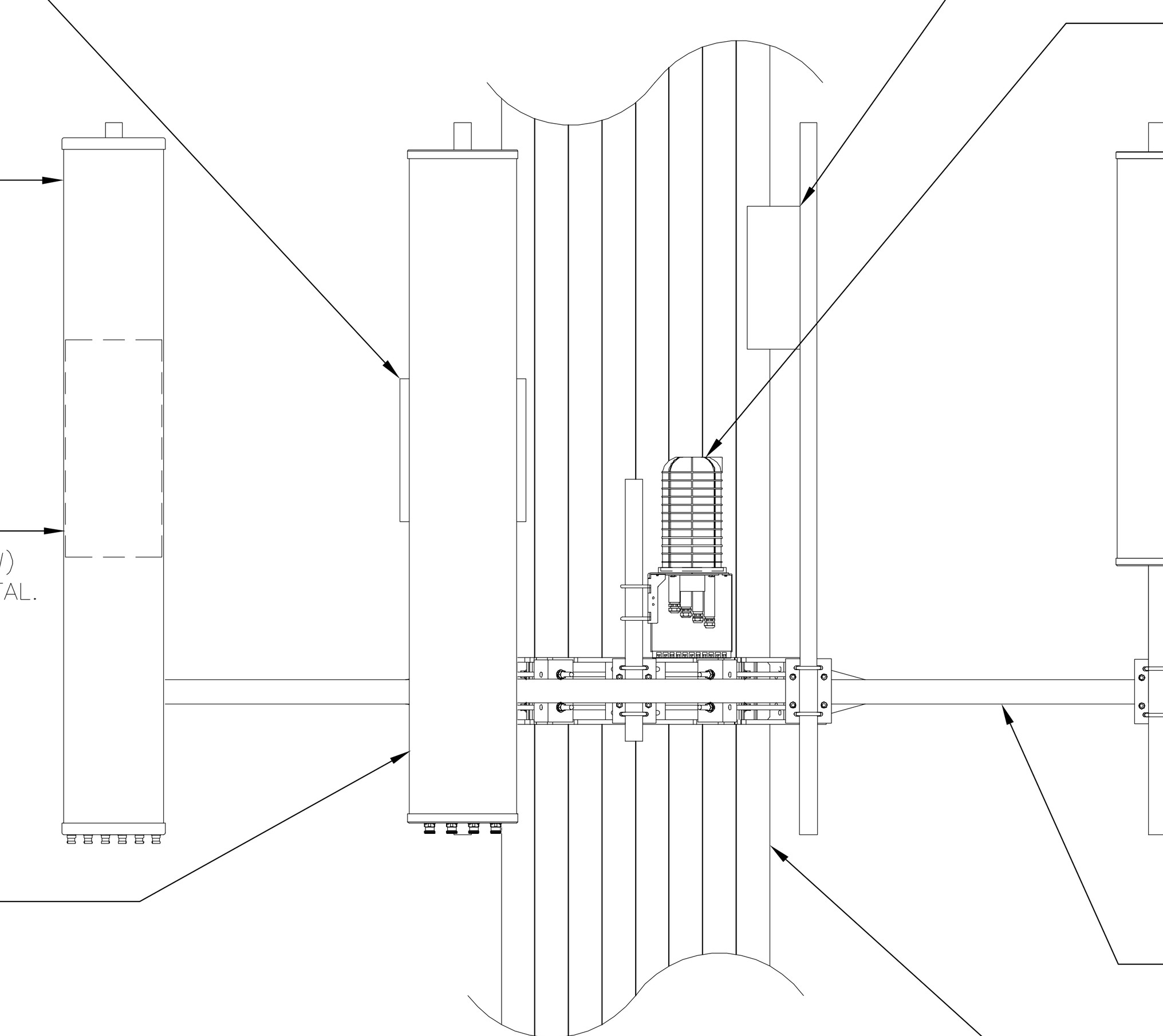


NOTES:
1. AT&T SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLYPOLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

6 C-2 TYPICAL RRUS MOUNTING DETAILS
SCALE: NTS



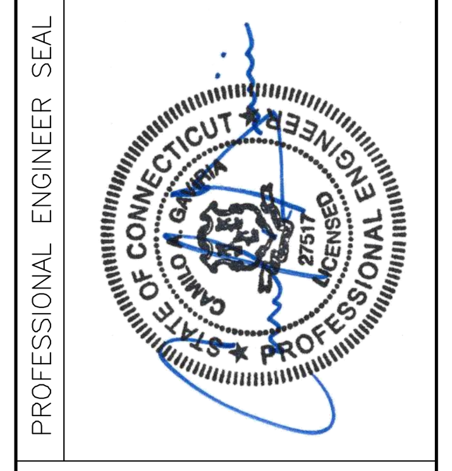
4 C-2 PROPOSED ANTENNA ELEVATION
SCALE: 1/2" = 1'-0"



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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	12/20/16	CAG	HMR	CONSTRUCTION DOCUMENTS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL



at&t

EMPIRE telecom

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

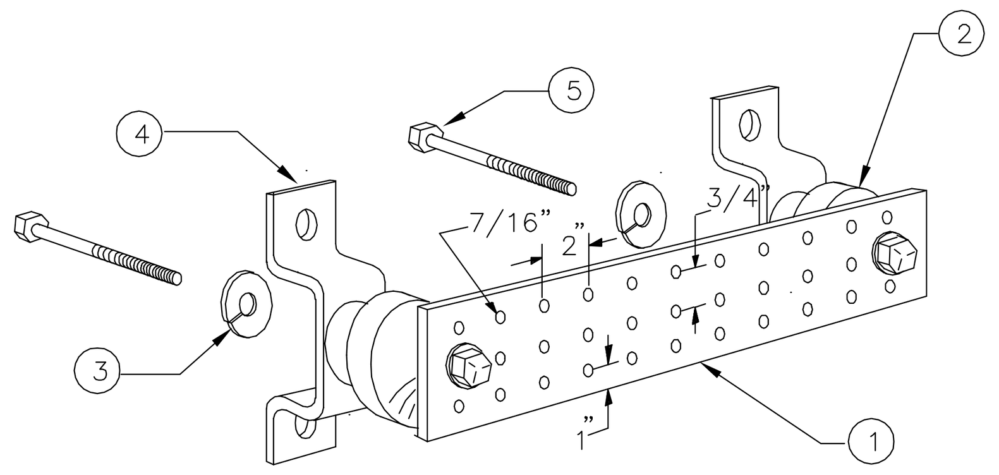
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
NW HARTFORD
CT5131 - LTE BWE
439-455 HOMESTEAD AVENUE
HARTFORD, CT 06101

DATE: 11/08/16
SCALE: AS NOTED
JOB NO. 16071.59

LTE BWE EQUIPMENT DETAILS

C-2

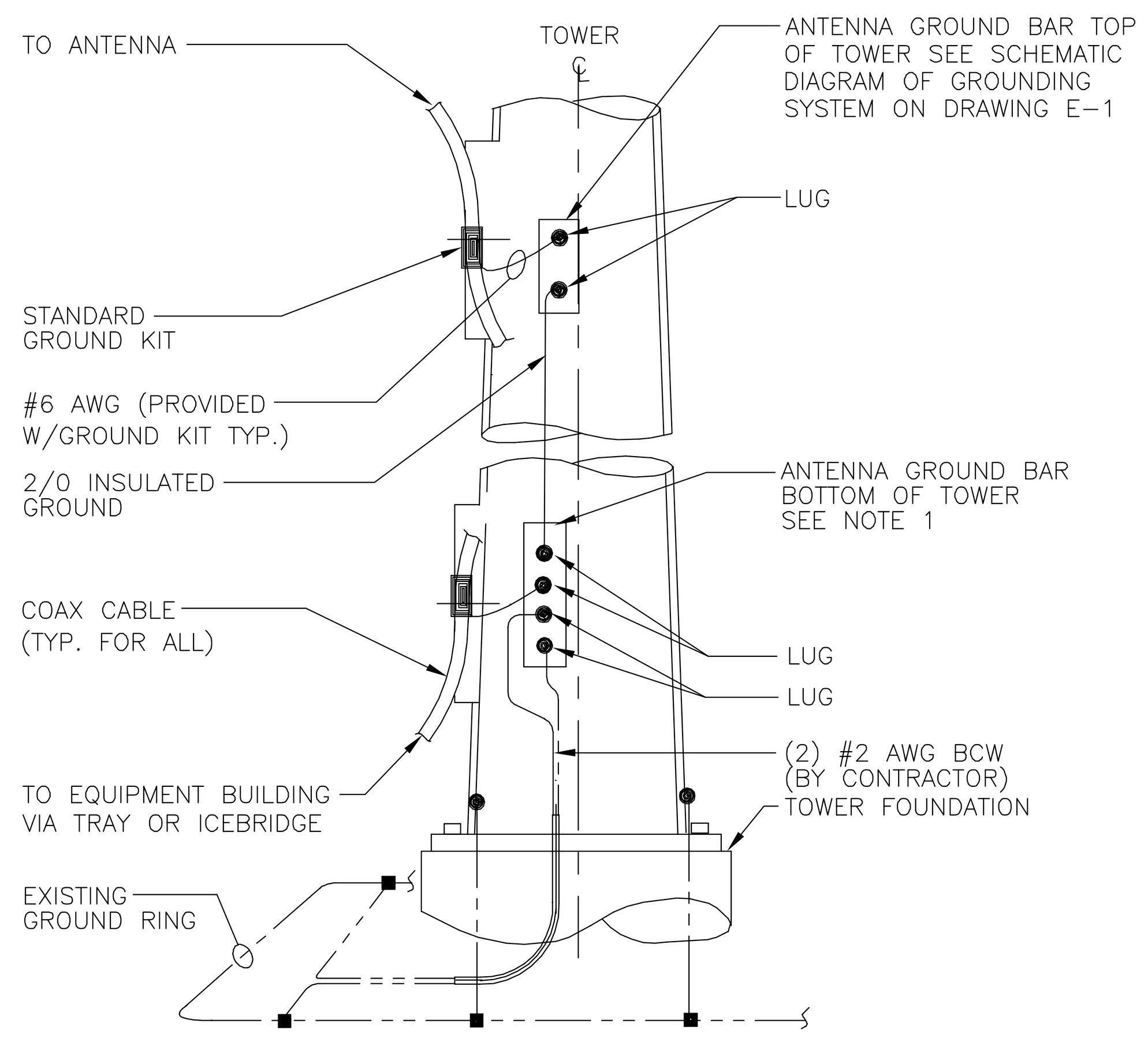
Sheet No. 4 of 5



LEGEND

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

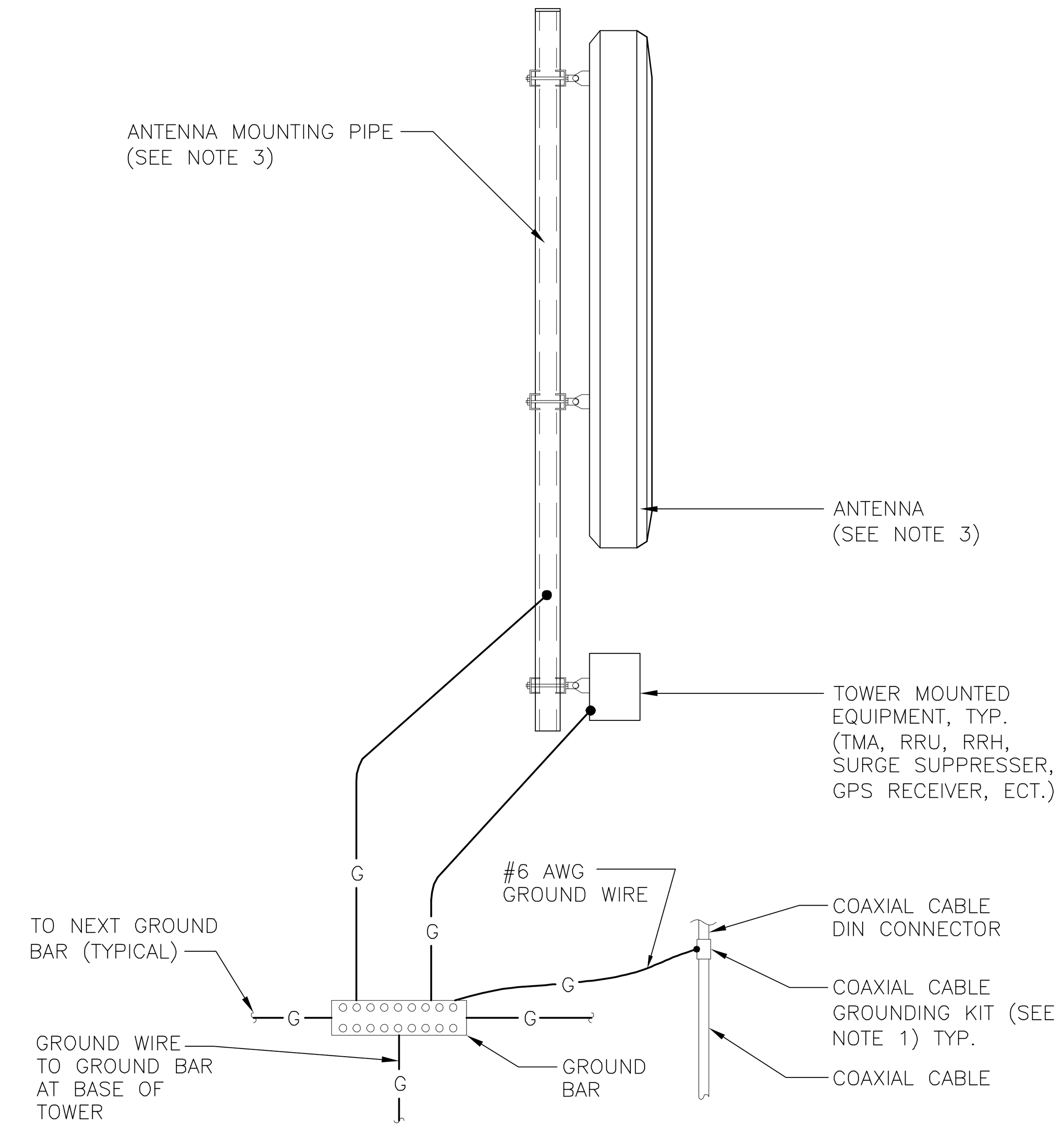
3 / E-1 **GROUND BAR DETAIL**
NOT TO SCALE



NOTES:

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

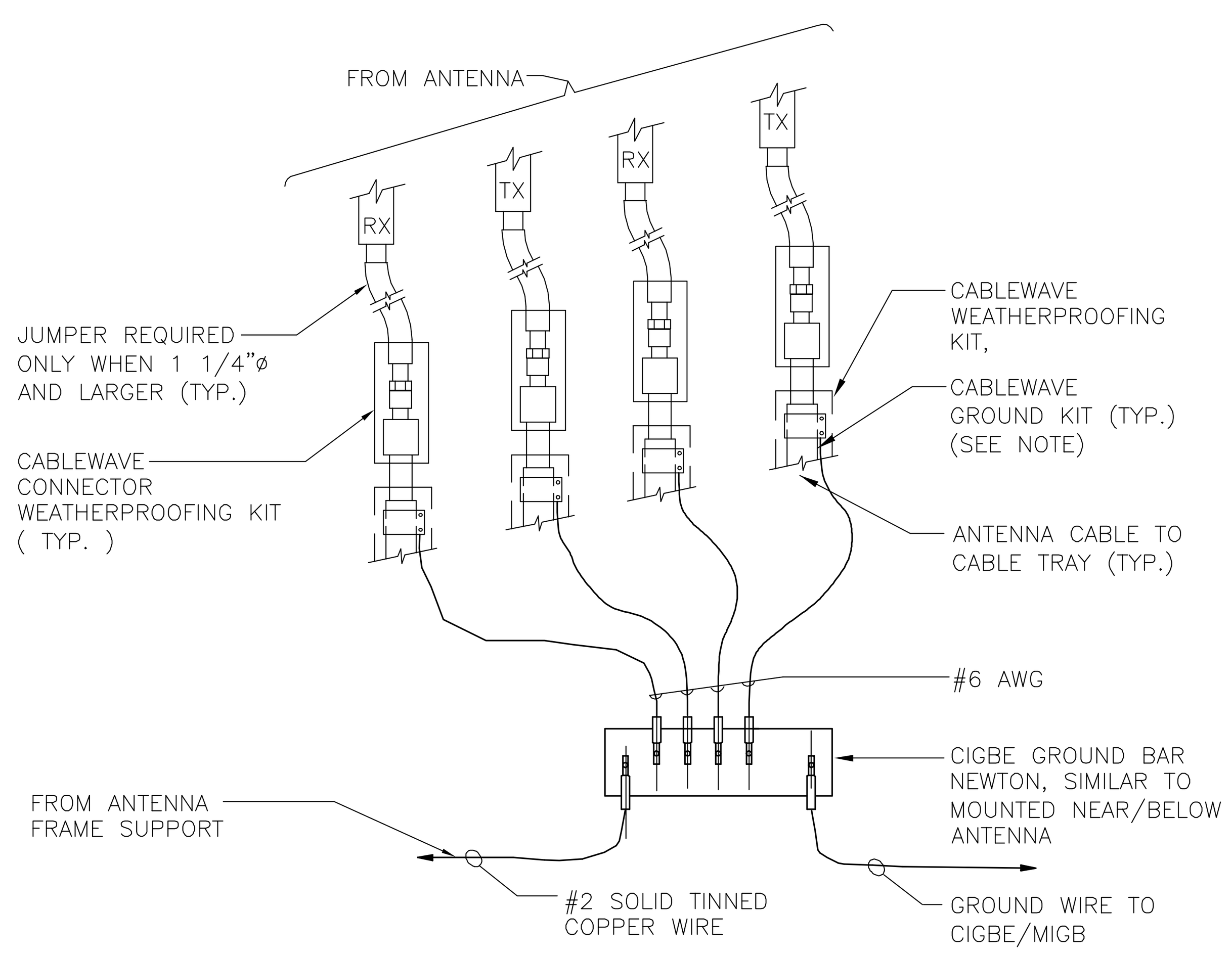
2 / E-1 **ANTENNA CABLE GROUNDING - TOWER**
NOT TO SCALE



NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

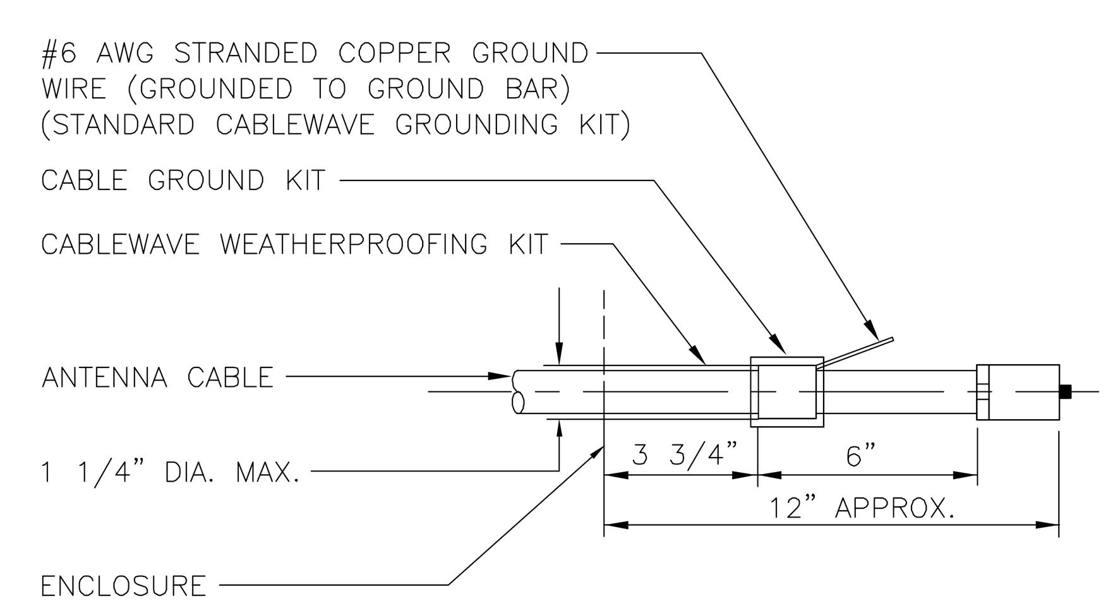
1 / E-1 **TYPICAL ANTENNA GROUNDING DETAIL**
NOT TO SCALE



NOTE:

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

5 / E-1 **CONNECTION OF GROUND WIRES TO GROUND BAR**
NOT TO SCALE



NOTE:

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

4 / E-1 **ANTENNA CABLE GROUNDING DETAIL**
NOT TO SCALE

ELECTRICAL NOTES

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

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

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

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

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

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

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

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

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	12/20/16	CAG	HMR	CONSTRUCTION DOCUMENTS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

EMPIRE telecom

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

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
NW HARTFORD
CT5131 - LTE BWE
439-455 HOMESTEAD AVENUE
HARTFORD, CT 06101

DATE: 11/08/16
SCALE: AS NOTED
JOB NO. 16071.59

ELECTRICAL DETAILS AND NOTES

E-1

Date: **November 30, 2016**

Charles Trask
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Black & Veatch Corp.
6800 W 115th St. Suite 2292
Overland Park, KS 66211
(913) 458-7245

Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT5131
	Carrier Site Name:	NW Hartford
Crown Castle Designation:	**Crown Castle BU Number:**	806369
	Crown Castle Site Name:	HRT 094 943225
	Crown Castle JDE Job Number:	407805
	Crown Castle Work Order Number:	1329310
	Crown Castle Application Number:	367933 Rev. 0
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	182896
Site Data:	**439-455 Homestead Ave, Hartford, Hartford County, CT** **Latitude *41° 47' 1.61"*, Longitude *-72° 42' 13.66"*** **140 Foot - Monopole Tower**	

Dear Charles Trask,

Black & Veatch Corp. 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 975086, in accordance with application 367933, revision 0.

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

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

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II was/were used in this analysis. Seismic forces have been evaluated based on Site Class D with spectral response factors S_S of 0.180g and S_1 of 0.064g.

We at *Black & Veatch Corp.* 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: Chariya Wannaklut/Changzhi Zang

Respectfully submitted by:

STATE OF CONNECTICUT
PING JIANG
30767
LICENSED
PROFESSIONAL ENGINEER

Ping Jiang, P.E.
Professional Engineer

11/30/2016

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 140 ft Monopole tower designed by Valmont Industries, Inc. in August of 1999. The tower was originally designed for a wind speed of 125 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas using a 3-second gust wind speed of 97 mph with no ice, 50 mph with 1 inch ice thickness and 60 mph under service loads, exposure category B with topographic category 1 and crest height of 0 feet. Seismic forces have been evaluated based on Site Class D with spectral response factors S_S of 0.180g and S_1 of 0.064g.

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
115.0	117.0	1	cci antennas	TPA-65R-LCUUUU-H8 w/ Mount Pipe	2 1	3/4 3/8	1
		2	cci antennas	TPX-070821			
		4	cci antennas	TPX-070821			
		3	ericsson	RRUS 32			
		3	ericsson	RRUS 32 B2			
		2	quintel technology	QS66512-3 w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			

Notes:
1) Refer Appendix B for detailed coax layout

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
142.0	142.0	3	alcatel lucent	RRH2x40-AWS	13	1-5/8	1
		3	amphenol	BXA-80063-4BF-EDIN-X w/ Mount Pipe			
		3	antel	BXA-171063-8BF-EDIN-2 w/ Mount Pipe			
		3	antel	BXA-171063/8CF-EDIN-2 w/ Mount Pipe			
		1	cci tower mounts	Platform Mount [LP 713-1]			
		3	css	X7C-FRO-660-V w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		6	rfs celwave	FD9R6004/2C-3L			
126.0	128.0	3	ericsson	AIR -32 B2A/B66AA w/ Mount Pipe	1	1-5/8	2
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	11 1	1-5/8 1-1/4	1
		3	ericsson	RRUS 11 B12			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	commscope	LNX-6515DS-VTM w/ Mount Pipe			
		3	rfs celwave	ATMAA1412D-1A20			
	126.0	1	cci tower mounts	Platform Mount [LP 713-1]			
115.0	117.0	1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe	12 2 1	1-5/8 3/4 3/8	1
		1	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		3	ericsson	RRUS-11			
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		3	ericsson	RRUS 12	-	-	3
	116.0	6	powerwave technologies	7020.00			
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	7020.00	-	-	4
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F			
	115.0	1	cci tower mounts	Platform Mount [LP 712-1]			1
103.0	104.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	-	-	1
	103.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	cci tower mounts	Pipe Mount [PM 601-3]			
	102.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER			
102.0	108.0	1	andrew	VHLP2-180	3 3 3 3 1	1-1/4 1/4 5/16 1/2 5/8	1
		1	andrew	VHLP2.5-11			
		2	dragonwave	Horizon Compact			
	104.0	3	alcatel lucent	TD-RRH8x20-25			
		3	argus panel antennas	LLPX310R-V1 w/ Mount Pipe			
		1	powerwave technologies	P40-16-XLPP-RR-A w/ Mount Pipe			
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	rfs celwave	IBC1900BB-1			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	rfs celwave	IBC1900HG-2A			
		3	samsung telecommunications	WIMAX DAP HEAD			
	102.0	1	cci tower mounts	Platform Mount [LP 713-1]			
94.0	94.0	1	cci tower mounts	Pipe Mount [PM 602-3]	6	1-5/8	1
		3	kathrein	742 213 w/ Mount Pipe			
74.0	80.0	1	antel	BCD-87010	1	7/8	1
	74.0	1	cci tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed; Not Considered in This Analysis
4) Equipment To be Relocated to Center Line Elevation 117.0 ft.

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)
137.0	137.0	12	swedcom	ALP 9212-N	-	-
124.0	124.0	6	rfs celwave	APN199015	-	-
114.0	114.0	9	allgon	7184.15	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Tower Engineering Professionals, Inc.	2294838	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Tower Engineering Professionals, Inc. (Mapped)	2294380	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Tower Engineering Professionals, Inc. (Mapped)	2294379	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Black & Veatch Corp.	6288420	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), 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) The existing base grout was not considered in this analysis.
5) This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, existing/proposed appurtenance loading, tower/foundation details, and geotechnical data. The existing/proposed loading on the structure is based on CAD level drawings and carrier applications provided by the owner. If any of this information is not current and correct, this report should be considered obsolete and further analysis will be required.

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

4) ANALYSIS RESULTS

4.1) Wind 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	140 - 86.8333	Pole	TP39.223x26.216x0.3125	1	-23.13	2455.17	38.9	Pass
L2	86.8333 - 38	Pole	TP50.56x37.2117x0.4063	2	-38.44	4134.18	52.3	Pass
L3	38 - 0	Pole	TP59.05x48.033x0.5	3	-59.21	6203.23	50.6	Pass
							Summary	
						Pole (L2)	52.3	Pass
						RATING =	**52.3**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	54.7	Pass
	Base Plate		23.7	Pass
1	Base Foundation	0	47.9	Pass

4.2) Seismic Results

Tower and foundation have been analyzed based on the seismic criteria outlined in section 2 of this report. Based on the analysis, seismic loading is not governing the tower and foundation stress. Wind loading is governing the tower and foundation stress.

Structure Rating (max from all components) =	**54.7%**

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

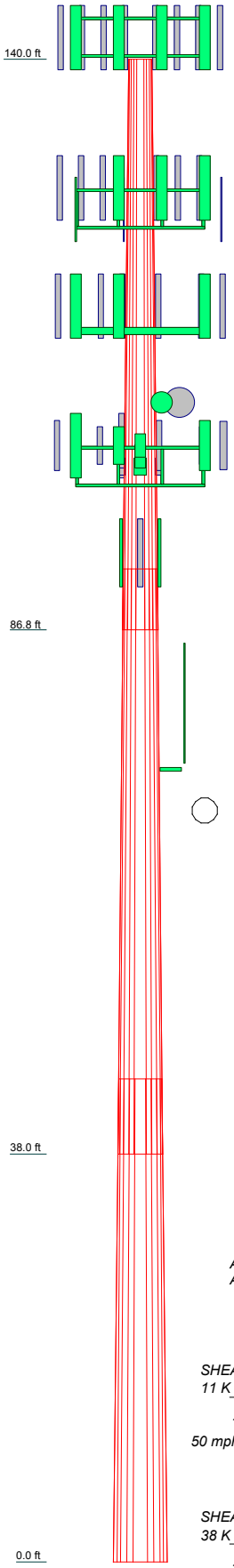
4.3) Recommendations

The tower, its base plate, anchor rods and foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	53.17	12	0.3125	5.67	26.2160	39.2230		5.9
2	54.50	12	0.4063	7.00	37.2117	50.5600	A572-65	10.5
3	45.00	12	0.5000		48.0330	59.0500		13.1
								29.5



ALL REACTIONS ARE FACTORED

AXIAL 129 K

SHEAR 11 K *MOMENT 1132 kip-ft*

TORQUE 0 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 59 K

SHEAR 38 K *MOMENT 3668 kip-ft*

TORQUE 1 kip-ft
REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-80063-4BF-EDIN-X w/ Mount Pipe	142	(2) 7020.00	115
BXA-80063-4BF-EDIN-X w/ Mount Pipe	142	(2) 7020.00	115
BXA-80063-4BF-EDIN-X w/ Mount Pipe	142	RRUS-11	115
X7C-FRO-660-V w/ Mount Pipe	142	RRUS-11	115
X7C-FRO-660-V w/ Mount Pipe	142	RRUS-11	115
X7C-FRO-660-V w/ Mount Pipe	142	RRUS 32 B2	115
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	142	RRUS 32 B2	115
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	142	RRUS 32 B2	115
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	142	RRUS 32	115
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	142	RRUS 32	115
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	142	RRUS 32	115
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	142	(2) TPX-070821	115
(2) FD9R6004/2C-3L	142	(2) TPX-070821	115
(2) FD9R6004/2C-3L	142	(2) TPX-070821	115
(2) FD9R6004/2C-3L	142	Platform Mount [LP 712-1]	115
RRH2x40-AWS	142	8'x2 1/2" Pipe Mount	115
RRH2x40-AWS	142	8'x2 1/2" Pipe Mount	115
RRH2x40-AWS	142	8'x2 1/2" Pipe Mount	115
DB-T1-6Z-8AB-0Z	142	800MHz 2X50W RRH W/FILTER	103
12' Hor x 4" x 4" Angle Mount	142	800MHz 2X50W RRH W/FILTER	103
12' Hor x 4" x 4" Angle Mount	142	800MHz 2X50W RRH W/FILTER	103
12' Hor x 4" x 4" Angle Mount	142	PCS 1900MHz 4x45W-65MHz	103
Platform Mount [LP 713-1]	142	PCS 1900MHz 4x45W-65MHz	103
LNX-6515DS-VTM w/ Mount Pipe	126	PCS 1900MHz 4x45W-65MHz	103
LNX-6515DS-VTM w/ Mount Pipe	126	PCS 1900MHz 4x45W-65MHz	103
LNX-6515DS-VTM w/ Mount Pipe	126	PCS 1900MHz 4x45W-65MHz	103
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	126	PCS 1900MHz 4x45W-65MHz	103
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	126	Pipe Mount [PM 601-3]	103
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	126	APXVTM14-C-120 w/ Mount Pipe	102
AIR -32 B2A/B66AA w/ Mount Pipe	126	APXVTM14-C-120 w/ Mount Pipe	102
AIR -32 B2A/B66AA w/ Mount Pipe	126	APXVTM14-C-120 w/ Mount Pipe	102
AIR -32 B2A/B66AA w/ Mount Pipe	126	LLPX310R-V1 w/ Mount Pipe	102
ATMAA1412D-1A20	126	LLPX310R-V1 w/ Mount Pipe	102
ATMAA1412D-1A20	126	LLPX310R-V1 w/ Mount Pipe	102
ATMAA1412D-1A20	126	APXVSPP18-C-A20 w/ Mount Pipe	102
RRUS 11 B12	126	APXVSPP18-C-A20 w/ Mount Pipe	102
RRUS 11 B12	126	P40-16-XLPP-RR-A w/ Mount Pipe	102
RRUS 11 B12	126	TD-RRH8x20-25	102
(2) 12' Hor x 4" x 4" Angle Mount	126	TD-RRH8x20-25	102
(2) 12' Hor x 4" x 4" Angle Mount	126	TD-RRH8x20-25	102
(2) 12' Hor x 4" x 4" Angle Mount	126	WIMAX DAP HEAD	102
Platform Mount [LP 713-1]	126	WIMAX DAP HEAD	102
6' x 2" Mount Pipe	126	WIMAX DAP HEAD	102
6' x 2" Mount Pipe	126	IBC1900BB-1	102
6' x 2" Mount Pipe	126	IBC1900BB-1	102
7770.00 w/ Mount Pipe	115	IBC1900BB-1	102
7770.00 w/ Mount Pipe	115	IBC1900HG-2A	102
7770.00 w/ Mount Pipe	115	IBC1900HG-2A	102
P65-17-XLH-RR w/ Mount Pipe	115	IBC1900HG-2A	102
P65-16-XLH-RR w/ Mount Pipe	115	Horizon Compact	102
AM-X-CD-16-65-00T-RET w/ Mount Pipe	115	Horizon Compact	102
TPA-65R-LCUUUU-H8 w/ Mount Pipe	115	Platform Mount [LP 713-1]	102
QS66512-3 w/ Mount Pipe	115	VHLP2-180	102
QS66512-3 w/ Mount Pipe	115	VHLP2.5-11	102
DC6-48-60-18-8F	115	742 213 w/ Mount Pipe	94
DC6-48-60-18-8F	115	Pipe Mount [PM 602-3]	94
(2) LGP21401	115	742 213 w/ Mount Pipe	94
(2) LGP21401	115	742 213 w/ Mount Pipe	94
(2) LGP21401	115	BCD-87010	74
(2) 7020.00	115	Side Arm Mount [SO 701-1]	74

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 52.3%

BLACK & VEATCH
Building a world of difference.

Black & Veatch Corp.
6800 W 115th St. Suite 2292
Overland Park, KS 66211
Phone: (913) 458-7245
FAX: (913) 458-8136

Job: *HRT 094 943225 (BU#806369)*			
Project: *182896 (806369.1329310)*			
Client: Crown Castle	Drawn by: zan86134	App'd:	
Code: TIA-222-G	Date: 11/30/16	Scale: NTS	
Path: C:\Users\zan86134\Desktop\806369.1329310\806369.1329310 - TSA\Structural\806369.1329310 Structural Analysis.eri		Dwg No. E-1	

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	140.00-86.83	53.17	5.67	12	26.2160	39.2230	0.3125	1.2500	A572-65 (65 ksi)
L2	86.83-38.00	54.50	7.00	12	37.2117	50.5600	0.4063	1.6250	A572-65 (65 ksi)
L3	38.00-0.00	45.00		12	48.0330	59.0500	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia.	Area	I	r	C	I/C	J	It/Q	w	w/t
	in	in^2	in^4	in	in	in^3	in^4	in^2	in	
L1	27.1408	26.0654	2232.3752	9.2735	13.5799	164.3883	4523.3974	12.8286	6.1884	19.803
	40.6066	39.1537	7566.4519	13.9300	20.3175	372.4103	15331.6830	19.2703	9.6743	30.958
L2	39.9612	48.1461	8324.7351	13.1763	19.2756	431.8785	16868.1703	23.6960	8.8840	21.868
	52.3436	65.6074	21064.2222	17.9550	26.1901	804.2825	42681.8251	32.2900	12.4613	30.674
L3	51.5017	76.5282	22069.8032	17.0168	24.8811	887.0103	44719.4048	37.6648	11.5329	23.066
	61.1331	94.2655	41247.0150	20.9609	30.5879	1348.4749	83577.6350	46.3946	14.4854	28.971

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft^2	in					in	in	in
L1 140.00-86.83				1	1	1			
L2 86.83-38.00				1	1	1			
L3 38.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement	Total Number	Number Per Row	Start/End Position	Width or Diameter	Perimeter	Weight
			ft				in	in	plf
Safety Line 3/8	A	Surface Ar (CaAa)	140.00 - 10.00	1	1	0.000 0.000	0.3750		0.22
***									
HB114-21U3M12-XXXF(1-1/4)	C	Surface Ar (CaAa)	126.00 - 6.00	1	1	-0.356 -0.322	1.5400		1.22
LCF158-50JA(1-5/8")	C	Surface Ar (CaAa)	126.00 - 6.00	3	3	-0.322 -0.190	2.0100		0.92
MLE Hybrid 9Power/18Fiber RL 2(1-5/8")	C	Surface Ar (CaAa)	126.00 - 6.00	1	1	-0.400 -0.356	1.6250		1.07
LCF158-50JA(1-5/8")	A	Surface Ar (CaAa)	126.00 - 6.00	2	2	-0.400 -0.312	2.0100		0.92
****									
2" Rigid Conduit	C	Surface Ar (CaAa)	102.00 - 6.00	2	2	0.318 0.400	2.0000		2.80
LDF1-50A(1/4")	C	Surface Ar (CaAa)	102.00 - 6.00	3	1	0.318 0.400	0.0000		0.06
ATCB-B01-005(5/16")	C	Surface Ar (CaAa)	102.00 - 6.00	1	1	0.318 0.400	0.0000		0.07
2 (1/2") + 2 (5/16")	C	Surface Ar (CaAa)	102.00 - 6.00	4	1	0.307 0.318	0.5200		0.14
LDF4.5-50(5/8")	C	Surface Ar (CaAa)	102.00 - 6.00	1	1	-0.018 0.000	0.8650		0.15
HB114-1-08U4-M5J(1-1/4")	C	Surface Ar (CaAa)	102.00 - 6.00	3	1	0.000 0.032	1.5400		1.08
***									
AVA7-50(1-5/8")	A	Surface Ar (CaAa)	94.00 - 6.00	6	6	-0.243 0.000	2.0100		0.70
***									
LDF5-50A(7/8")	A	Surface Ar (CaAa)	74.00 - 6.00	1	1	-0.270 -0.250	1.0900		0.33

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
*****								
LDF7-50A(1-5/8")	A	No	Inside Pole	140.00 - 6.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8")	A	No	Inside Pole	140.00 - 6.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
LCF158-50JA(1-5/8")	A	No	Inside Pole	126.00 - 6.00	6	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92
***								
LDF7-50A(1-5/8")	B	No	Inside Pole	115.00 - 6.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
FB-L98B-034-XXXXXX(3/8")	B	No	Inside Pole	115.00 - 6.00	1	No Ice	0.00	0.05
						1/2" Ice	0.00	0.05
						1" Ice	0.00	0.05
WR-VG86ST-BRD(3/4")	B	No	Inside Pole	115.00 - 6.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
FB-L98B-034-XXX(3/8")	B	No	Inside Pole	115.00 - 6.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4")	B	No	Inside Pole	115.00 - 6.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" Rigid Conduit	B	No	Inside Pole	115.00 - 6.00	2	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
FSJ4-50B(1/2")	C	No	Inside Pole	102.00 - 6.00	1	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	140.00-86.83	A	0.000	0.000	26.382	0.000	0.92
		B	0.000	0.000	0.000	0.000	0.50
		C	0.000	0.000	46.517	0.000	0.35
L2	86.83-38.00	A	0.000	0.000	84.279	0.000	1.13
		B	0.000	0.000	0.000	0.000	0.87
		C	0.000	0.000	78.719	0.000	0.73
L3	38.00-0.00	A	0.000	0.000	55.994	0.000	0.74
		B	0.000	0.000	0.000	0.000	0.57
		C	0.000	0.000	51.584	0.000	0.48

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	140.00-86.83	A	2.260	0.000	0.000	82.692	0.000	2.15
		B		0.000	0.000	0.000	0.000	0.50
		C		0.000	0.000	154.327	0.000	3.63
L2	86.83-38.00	A	2.130	0.000	0.000	197.443	0.000	4.11
		B		0.000	0.000	0.000	0.000	0.87
		C		0.000	0.000	300.669	0.000	8.16
L3	38.00-0.00	A	1.887	0.000	0.000	128.505	0.000	2.59
		B		0.000	0.000	0.000	0.000	0.57
		C		0.000	0.000	189.127	0.000	4.90

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	140.00-86.83	-0.2204	0.7924	-0.4214	1.1233
L2	86.83-38.00	-1.1788	0.8747	-1.3191	1.4647
L3	38.00-0.00	-1.1492	0.8421	-1.4466	1.5692

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	1	Safety Line 3/8	86.83 - 140.00	1.0000	1.0000
L1	6	HB114-21U3M12-XXXF(1-1/4)	86.83 - 126.00	1.0000	1.0000
L1	7	LCF158-50JA(1-5/8")	86.83 - 126.00	1.0000	1.0000
L1	9	MLE Hybrid 9Power/18Fiber RL 2(1-5/8")	86.83 - 126.00	1.0000	1.0000
L1	11	LCF158-50JA(1-5/8")	86.83 - 126.00	1.0000	1.0000
L1	20	2" Rigid Conduit	86.83 - 102.00	1.0000	1.0000
L1	21	LDF1-50A(1/4")	86.83 - 102.00	1.0000	1.0000
L1	22	ATCB-B01-005(5/16")	86.83 - 102.00	1.0000	1.0000
L1	26	2 (1/2") + 2 (5/16")	86.83 - 102.00	1.0000	1.0000
L1	27	LDF4.5-50(5/8")	86.83 - 102.00	1.0000	1.0000
L1	28	HB114-1-08U4-M5J(1-1/4")	86.83 - 102.00	1.0000	1.0000
L1	32	AVA7-50(1-5/8")	86.83 - 94.00	1.0000	1.0000
L1	34	LDF5-50A(7/8")	86.83 - 74.00	1.0000	1.0000
L2	1	Safety Line 3/8	38.00 - 86.83	1.0000	1.0000
L2	6	HB114-21U3M12-XXXF(1-1/4)	38.00 - 86.83	1.0000	1.0000
L2	7	LCF158-50JA(1-5/8")	38.00 - 86.83	1.0000	1.0000
L2	9	MLE Hybrid 9Power/18Fiber RL 2(1-5/8")	38.00 - 86.83	1.0000	1.0000
L2	11	LCF158-50JA(1-5/8")	38.00 - 86.83	1.0000	1.0000
L2	20	2" Rigid Conduit	38.00 - 86.83	1.0000	1.0000
L2	21	LDF1-50A(1/4")	38.00 - 86.83	1.0000	1.0000
L2	22	ATCB-B01-005(5/16")	38.00 - 86.83	1.0000	1.0000
L2	26	2 (1/2") + 2 (5/16")	38.00 - 86.83	1.0000	1.0000
L2	27	LDF4.5-50(5/8")	38.00 - 86.83	1.0000	1.0000
L2	28	HB114-1-08U4-M5J(1-1/4")	38.00 - 86.83	1.0000	1.0000
L2	32	AVA7-50(1-5/8")	38.00 - 86.83	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L2	34	LDF5-50A(7/8")	38.00 - 74.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-80063-4BF-EDIN-X w/ Mount Pipe	A	From Face	4.00 -6.00 0.00	30.0000	142.00	No Ice 1/2" Ice 1" Ice	4.62 4.99 5.36	3.47 4.04 4.63	0.03 0.07 0.12
BXA-80063-4BF-EDIN-X w/ Mount Pipe	B	From Face	4.00 -6.00 0.00	30.0000	142.00	No Ice 1/2" Ice 1" Ice	4.62 4.99 5.36	3.47 4.04 4.63	0.03 0.07 0.12
BXA-80063-4BF-EDIN-X w/ Mount Pipe	C	From Face	4.00 -6.00 0.00	25.0000	142.00	No Ice 1/2" Ice 1" Ice	4.62 4.99 5.36	3.47 4.04 4.63	0.03 0.07 0.12
X7C-FRO-660-V w/ Mount Pipe	A	From Face	4.00 -2.00 0.00	90.0000	142.00	No Ice 1/2" Ice 1" Ice	9.79 10.36 10.90	7.53 8.72 9.62	0.06 0.14 0.22
X7C-FRO-660-V w/ Mount Pipe	B	From Face	4.00 -2.00 0.00	90.0000	142.00	No Ice 1/2" Ice 1" Ice	9.79 10.36 10.90	7.53 8.72 9.62	0.06 0.14 0.22
X7C-FRO-660-V w/ Mount Pipe	C	From Face	4.00 -2.00 0.00	90.0000	142.00	No Ice 1/2" Ice 1" Ice	9.79 10.36 10.90	7.53 8.72 9.62	0.06 0.14 0.22
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	A	From Face	4.00 2.00 0.00	90.0000	142.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.93	3.35 3.97 4.60	0.03 0.06 0.10
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	B	From Face	4.00 2.00 0.00	90.0000	142.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.93	3.35 3.97 4.60	0.03 0.06 0.10
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	C	From Face	4.00 2.00 0.00	90.0000	142.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.93	3.35 3.97 4.60	0.03 0.06 0.10
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	A	From Face	4.00 6.00 0.00	30.0000	142.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.93	3.35 3.97 4.60	0.03 0.06 0.10
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	B	From Face	4.00 6.00 0.00	30.0000	142.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.93	3.35 3.97 4.60	0.03 0.06 0.10
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	C	From Face	4.00 6.00 0.00	25.0000	142.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.93	3.35 3.97 4.60	0.03 0.06 0.10
(2) FD9R6004/2C-3L	A	From Face	4.00 0.00 0.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) FD9R6004/2C-3L	B	From Face	4.00 0.00 0.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) FD9R6004/2C-3L	C	From Face	4.00 0.00	0.0000	142.00	No Ice 1/2" Ice	0.31 0.39	0.08 0.12	0.00 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	0.47	0.17	0.01
RRH2x40-AWS	A	From Face	4.00	0.0000	142.00	No Ice	2.16	1.42	0.04
			0.00			1/2" Ice	2.36	1.59	0.06
			0.00			1" Ice	2.57	1.77	0.08
RRH2x40-AWS	B	From Face	4.00	0.0000	142.00	No Ice	2.16	1.42	0.04
			0.00			1/2" Ice	2.36	1.59	0.06
			0.00			1" Ice	2.57	1.77	0.08
RRH2x40-AWS	C	From Face	4.00	0.0000	142.00	No Ice	2.16	1.42	0.04
			0.00			1/2" Ice	2.36	1.59	0.06
			0.00			1" Ice	2.57	1.77	0.08
DB-T1-6Z-8AB-0Z	A	From Face	4.00	0.0000	142.00	No Ice	4.80	2.00	0.04
			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
12' Hor x 4" x 4" Angle Mount	A	From Face	4.00	0.0000	142.00	No Ice	5.60	0.16	0.21
			0.00			1/2" Ice	6.56	0.21	0.25
			0.00			1" Ice	7.54	0.28	0.30
12' Hor x 4" x 4" Angle Mount	B	From Face	4.00	0.0000	142.00	No Ice	5.60	0.16	0.21
			0.00			1/2" Ice	6.56	0.21	0.25
			0.00			1" Ice	7.54	0.28	0.30
12' Hor x 4" x 4" Angle Mount	C	From Face	4.00	0.0000	142.00	No Ice	5.60	0.16	0.21
			0.00			1/2" Ice	6.56	0.21	0.25
			0.00			1" Ice	7.54	0.28	0.30
Platform Mount [LP 713-1]	C	None		0.0000	142.00	No Ice	31.27	31.27	1.51
						1/2" Ice	39.68	39.68	1.93
						1" Ice	48.09	48.09	2.35
***									
LNX-6515DS-VTM w/ Mount Pipe	A	From Face	4.00	30.0000	126.00	No Ice	11.68	9.84	0.08
			-2.00			1/2" Ice	12.40	11.37	0.17
			2.00			1" Ice	13.14	12.91	0.27
LNX-6515DS-VTM w/ Mount Pipe	B	From Face	4.00	10.0000	126.00	No Ice	11.68	9.84	0.08
			-2.00			1/2" Ice	12.40	11.37	0.17
			2.00			1" Ice	13.14	12.91	0.27
LNX-6515DS-VTM w/ Mount Pipe	C	From Face	4.00	30.0000	126.00	No Ice	11.68	9.84	0.08
			-2.00			1/2" Ice	12.40	11.37	0.17
			2.00			1" Ice	13.14	12.91	0.27
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.00	30.0000	126.00	No Ice	6.33	5.64	0.11
			2.00			1/2" Ice	6.78	6.43	0.17
			2.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.00	10.0000	126.00	No Ice	6.33	5.64	0.11
			2.00			1/2" Ice	6.78	6.43	0.17
			2.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.00	30.0000	126.00	No Ice	6.33	5.64	0.11
			2.00			1/2" Ice	6.78	6.43	0.17
			2.00			1" Ice	7.21	7.13	0.23
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Face	4.00	30.0000	126.00	No Ice	6.75	6.07	0.15
			-6.00			1/2" Ice	7.20	6.87	0.21
			2.00			1" Ice	7.65	7.58	0.28
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Face	4.00	10.0000	126.00	No Ice	6.75	6.07	0.15
			-6.00			1/2" Ice	7.20	6.87	0.21
			2.00			1" Ice	7.65	7.58	0.28
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Face	4.00	30.0000	126.00	No Ice	6.75	6.07	0.15
			-6.00			1/2" Ice	7.20	6.87	0.21
			2.00			1" Ice	7.65	7.58	0.28
ATMAA1412D-1A20	A	From Face	4.00	0.0000	126.00	No Ice	1.00	0.41	0.01
			0.00			1/2" Ice	1.13	0.50	0.02
			2.00			1" Ice	1.26	0.59	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ATMAA1412D-1A20	B	From Face	4.00	0.0000	126.00	No Ice	1.00	0.41	0.01
			0.00			1/2" Ice	1.13	0.50	0.02
			2.00			1" Ice	1.26	0.59	0.03
ATMAA1412D-1A20	C	From Face	4.00	0.0000	126.00	No Ice	1.00	0.41	0.01
			0.00			1/2" Ice	1.13	0.50	0.02
			2.00			1" Ice	1.26	0.59	0.03
RRUS 11 B12	A	From Face	4.00	0.0000	126.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			2.00			1" Ice	3.26	1.48	0.10
RRUS 11 B12	B	From Face	4.00	0.0000	126.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			2.00			1" Ice	3.26	1.48	0.10
RRUS 11 B12	C	From Face	4.00	0.0000	126.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			2.00			1" Ice	3.26	1.48	0.10
(2) 12' Hor x 4" x 4" Angle Mount	A	From Face	4.00	0.0000	126.00	No Ice	5.60	0.16	0.21
			0.00			1/2" Ice	6.56	0.21	0.25
			0.00			1" Ice	7.54	0.28	0.30
(2) 12' Hor x 4" x 4" Angle Mount	B	From Face	4.00	0.0000	126.00	No Ice	5.60	0.16	0.21
			0.00			1/2" Ice	6.56	0.21	0.25
			0.00			1" Ice	7.54	0.28	0.30
(2) 12' Hor x 4" x 4" Angle Mount	C	From Face	4.00	0.0000	126.00	No Ice	5.60	0.16	0.21
			0.00			1/2" Ice	6.56	0.21	0.25
			0.00			1" Ice	7.54	0.28	0.30
Platform Mount [LP 713-1]	C	None		0.0000	126.00	No Ice	31.27	31.27	1.51
						1/2" Ice	39.68	39.68	1.93
						1" Ice	48.09	48.09	2.35
6' x 2" Mount Pipe	A	From Face	4.00	0.0000	126.00	No Ice	1.43	1.43	0.02
			6.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
6' x 2" Mount Pipe	B	From Face	4.00	0.0000	126.00	No Ice	1.43	1.43	0.02
			6.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
6' x 2" Mount Pipe	C	From Face	4.00	0.0000	126.00	No Ice	1.43	1.43	0.02
			6.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
****									
7770.00 w/ Mount Pipe	A	From Face	4.00	30.0000	115.00	No Ice	5.75	4.25	0.06
			-6.00			1/2" Ice	6.18	5.01	0.10
			2.00			1" Ice	6.61	5.71	0.16
7770.00 w/ Mount Pipe	B	From Face	4.00	30.0000	115.00	No Ice	5.75	4.25	0.06
			-6.00			1/2" Ice	6.18	5.01	0.10
			2.00			1" Ice	6.61	5.71	0.16
7770.00 w/ Mount Pipe	C	From Face	4.00	30.0000	115.00	No Ice	5.75	4.25	0.06
			-6.00			1/2" Ice	6.18	5.01	0.10
			2.00			1" Ice	6.61	5.71	0.16
P65-17-XLH-RR w/ Mount Pipe	A	From Face	4.00	30.0000	115.00	No Ice	11.70	8.94	0.09
			2.00			1/2" Ice	12.42	10.45	0.18
			2.00			1" Ice	13.15	11.99	0.27
P65-16-XLH-RR w/ Mount Pipe	C	From Face	4.00	30.0000	115.00	No Ice	8.37	6.36	0.08
			2.00			1/2" Ice	8.93	7.54	0.14
			2.00			1" Ice	9.46	8.43	0.22
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Face	4.00	30.0000	115.00	No Ice	8.26	6.30	0.07
			2.00			1/2" Ice	8.82	7.48	0.14
			2.00			1" Ice	9.35	8.37	0.21
TPA-65R-LCUUUU-H8 w/	A	From Face	4.00	30.0000	115.00	No Ice	13.54	10.96	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			6.00			1/2" Ice	14.24	12.49	0.22
			2.00			1" Ice	14.95	14.04	0.33
QS66512-3 w/ Mount Pipe	B	From Face	4.00	30.0000	115.00	No Ice	8.37	8.46	0.13
			6.00			1/2" Ice	8.93	9.66	0.21
			2.00			1" Ice	9.46	10.55	0.29
QS66512-3 w/ Mount Pipe	C	From Face	4.00	30.0000	115.00	No Ice	8.37	8.46	0.13
			6.00			1/2" Ice	8.93	9.66	0.21
			2.00			1" Ice	9.46	10.55	0.29
DC6-48-60-18-8F	A	From Face	1.00	0.0000	115.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			2.00			1" Ice	1.64	1.64	0.06
DC6-48-60-18-8F	A	From Face	1.00	0.0000	115.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			2.00			1" Ice	1.64	1.64	0.06
(2) LGP21401	A	From Face	4.00	0.0000	115.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			2.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	B	From Face	4.00	0.0000	115.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			2.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	C	From Face	4.00	0.0000	115.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			2.00			1" Ice	1.38	0.54	0.03
(2) 7020.00	A	From Face	4.00	0.0000	115.00	No Ice	0.10	0.17	0.00
			0.00			1/2" Ice	0.15	0.24	0.01
			2.00			1" Ice	0.20	0.31	0.01
(2) 7020.00	B	From Face	4.00	0.0000	115.00	No Ice	0.10	0.17	0.00
			0.00			1/2" Ice	0.15	0.24	0.01
			2.00			1" Ice	0.20	0.31	0.01
(2) 7020.00	C	From Face	4.00	0.0000	115.00	No Ice	0.10	0.17	0.00
			0.00			1/2" Ice	0.15	0.24	0.01
			2.00			1" Ice	0.20	0.31	0.01
RRUS-11	A	From Face	4.00	0.0000	115.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			2.00			1" Ice	3.21	1.49	0.09
RRUS-11	B	From Face	4.00	0.0000	115.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			2.00			1" Ice	3.21	1.49	0.09
RRUS-11	C	From Face	4.00	0.0000	115.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			2.00			1" Ice	3.21	1.49	0.09
RRUS 32 B2	A	From Face	4.00	0.0000	115.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			2.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	B	From Face	4.00	0.0000	115.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			2.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	C	From Face	4.00	0.0000	115.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			2.00			1" Ice	3.18	2.05	0.10
RRUS 32	A	From Face	4.00	0.0000	115.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			2.00			1" Ice	3.32	2.17	0.10
RRUS 32	B	From Face	4.00	0.0000	115.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			2.00			1" Ice	3.32	2.17	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 32	C	From Face	4.00	0.0000	115.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			2.00			1" Ice	3.32	2.17	0.10
(2) TPX-070821	A	From Face	4.00	0.0000	115.00	No Ice	0.47	0.10	0.01
			0.00			1/2" Ice	0.56	0.15	0.01
			2.00			1" Ice	0.66	0.20	0.02
(2) TPX-070821	B	From Face	4.00	0.0000	115.00	No Ice	0.47	0.10	0.01
			0.00			1/2" Ice	0.56	0.15	0.01
			2.00			1" Ice	0.66	0.20	0.02
(2) TPX-070821	C	From Face	4.00	0.0000	115.00	No Ice	0.47	0.10	0.01
			0.00			1/2" Ice	0.56	0.15	0.01
			2.00			1" Ice	0.66	0.20	0.02
Platform Mount [LP 712-1]	C	None		0.0000	115.00	No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
8'x2 1/2" Pipe Mount	A	From Leg	4.00	0.0000	115.00	No Ice	2.30	2.30	0.04
			0.00			1/2" Ice	3.13	3.13	0.06
			2.00			1" Ice	3.62	3.62	0.08
8'x2 1/2" Pipe Mount	B	From Leg	4.00	0.0000	115.00	No Ice	2.30	2.30	0.04
			0.00			1/2" Ice	3.13	3.13	0.06
			2.00			1" Ice	3.62	3.62	0.08
8'x2 1/2" Pipe Mount	C	From Leg	4.00	0.0000	115.00	No Ice	2.30	2.30	0.04
			0.00			1/2" Ice	3.13	3.13	0.06
			2.00			1" Ice	3.62	3.62	0.08
****									
800MHz 2X50W RRH W/FILTER	A	From Face	0.50	30.0000	103.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			-1.00			1" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	B	From Face	0.50	-10.0000	103.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			-1.00			1" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	C	From Face	0.50	-10.0000	103.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			-1.00			1" Ice	2.43	2.29	0.11
PCS 1900MHz 4x45W-65MHz	A	From Face	0.50	30.0000	103.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			0.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	B	From Face	0.50	-10.0000	103.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			0.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	C	From Face	0.50	-10.0000	103.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			0.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	A	From Face	0.50	30.0000	103.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			1.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	B	From Face	0.50	-10.0000	103.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			1.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	C	From Face	0.50	-10.0000	103.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			1.00			1" Ice	2.74	2.65	0.11
Pipe Mount [PM 601-3]	C	None		0.0000	103.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28
****									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVTM14-C-120 w/ Mount Pipe	A	From Face	4.00 -6.00 2.00	10.0000	102.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Face	4.00 -6.00 2.00	-10.0000	102.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Face	4.00 -6.00 2.00	-10.0000	102.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
LLPX310R-V1 w/ Mount Pipe	A	From Face	4.00 2.00 2.00	30.0000	102.00	No Ice 1/2" Ice 1" Ice	4.57 4.93 5.29	3.01 3.55 4.11	0.04 0.08 0.13
LLPX310R-V1 w/ Mount Pipe	B	From Face	4.00 2.00 2.00	30.0000	102.00	No Ice 1/2" Ice 1" Ice	4.57 4.93 5.29	3.01 3.55 4.11	0.04 0.08 0.13
LLPX310R-V1 w/ Mount Pipe	C	From Face	4.00 2.00 2.00	30.0000	102.00	No Ice 1/2" Ice 1" Ice	4.57 4.93 5.29	3.01 3.55 4.11	0.04 0.08 0.13
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.00 6.00 2.00	10.0000	102.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.00 6.00 2.00	-10.0000	102.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.95 8.13 9.02	0.08 0.15 0.23
P40-16-XLPP-RR-A w/ Mount Pipe	B	From Face	4.00 6.00 2.00	-10.0000	102.00	No Ice 1/2" Ice 1" Ice	8.24 8.70 9.16	4.83 5.57 6.27	0.07 0.14 0.21
TD-RRH8x20-25	A	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	B	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	C	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
WIMAX DAP HEAD	A	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	1.55 1.70 1.87	0.68 0.80 0.92	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	1.55 1.70 1.87	0.68 0.80 0.92	0.03 0.04 0.06
WIMAX DAP HEAD	C	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	1.55 1.70 1.87	0.68 0.80 0.92	0.03 0.04 0.06
IBC1900BB-1	A	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900BB-1	B	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900BB-1	C	From Face	4.00 0.00 2.00	0.0000	102.00	No Ice 1/2" Ice 1" Ice	0.97 1.09 1.22	0.46 0.56 0.66	0.02 0.03 0.04
IBC1900HG-2A	A	From Face	4.00 0.00	0.0000	102.00	No Ice 1/2" Ice	0.97 1.09	0.46 0.56	0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			1" Ice	1.22	0.66	0.04
IBC1900HG-2A	B	From Face	4.00	0.0000	102.00	No Ice	0.97	0.46	0.02
			0.00			1/2" Ice	1.09	0.56	0.03
			2.00			1" Ice	1.22	0.66	0.04
IBC1900HG-2A	C	From Face	4.00	0.0000	102.00	No Ice	0.97	0.46	0.02
			0.00			1/2" Ice	1.09	0.56	0.03
			2.00			1" Ice	1.22	0.66	0.04
Horizon Compact	B	From Face	4.00	0.0000	102.00	No Ice	0.72	0.37	0.01
			0.00			1/2" Ice	0.83	0.45	0.02
			6.00			1" Ice	0.94	0.54	0.03
Horizon Compact	C	From Face	4.00	0.0000	102.00	No Ice	0.72	0.37	0.01
			0.00			1/2" Ice	0.83	0.45	0.02
			6.00			1" Ice	0.94	0.54	0.03
Platform Mount [LP 713-1]	C	None		0.0000	102.00	No Ice	31.27	31.27	1.51
						1/2" Ice	39.68	39.68	1.93
						1" Ice	48.09	48.09	2.35
****									
742 213 w/ Mount Pipe	A	From Leg	0.50	-30.0000	94.00	No Ice	5.37	4.62	0.05
			0.00			1/2" Ice	5.95	6.00	0.09
			0.00			1" Ice	6.50	6.98	0.15
742 213 w/ Mount Pipe	B	From Leg	0.50	-30.0000	94.00	No Ice	5.37	4.62	0.05
			0.00			1/2" Ice	5.95	6.00	0.09
			0.00			1" Ice	6.50	6.98	0.15
742 213 w/ Mount Pipe	C	From Leg	0.50	-30.0000	94.00	No Ice	5.37	4.62	0.05
			0.00			1/2" Ice	5.95	6.00	0.09
			0.00			1" Ice	6.50	6.98	0.15
Pipe Mount [PM 602-3]	C	None		0.0000	94.00	No Ice	7.68	7.68	0.28
						1/2" Ice	9.50	9.50	0.35
						1" Ice	11.32	11.32	0.43
****									
BCD-87010	B	From Leg	3.00	0.0000	74.00	No Ice	2.90	2.90	0.03
			0.00			1/2" Ice	4.05	4.05	0.05
			6.00			1" Ice	5.21	5.21	0.08
Side Arm Mount [SO 701-1]	B	From Leg	1.50	0.0000	74.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-180	C	Paraboloid w/Shroud (HP)	From Face	4.00	86.0000		102.00	2.00	No Ice	3.14	0.03
				-2.00					1/2" Ice	3.41	0.04
				6.00					1" Ice	3.68	0.06
VHLP2.5-11	B	Paraboloid w/Shroud (HP)	From Face	4.00	3.0000		102.00	2.92	No Ice	6.68	0.05
				-2.00					1/2" Ice	7.07	0.08
				6.00					1" Ice	7.46	0.12

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	140 - 86.8333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.72	3.25	-1.77
			Max. Mx	20	-23.13	711.27	0.41
			Max. My	14	-23.14	0.64	-708.98
			Max. Vy	20	-25.77	711.27	0.41
			Max. Vx	14	25.69	0.64	-708.98
			Max. Torque	20			-1.61
L2	86.8333 - 38	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-94.66	10.14	-14.48
			Max. Mx	20	-38.44	2092.26	-3.96
			Max. My	14	-38.45	7.86	-2079.97
			Max. Vy	20	-32.28	2092.26	-3.96
			Max. Vx	14	31.85	7.86	-2079.97
			Max. Torque	18			-1.43
L3	38 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-129.43	17.77	-25.55
			Max. Mx	20	-59.21	3667.83	-8.22
			Max. My	14	-59.21	15.27	-3634.04
			Max. Vy	20	-37.60	3667.83	-8.22
			Max. Vx	14	37.11	15.27	-3634.04
			Max. Torque	20			-0.89

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	34	129.43	5.39	-9.25
	Max. H_x	20	59.23	37.57	-0.07
	Max. H_z	2	59.23	-0.07	37.07
	Max. M_x	2	3626.62	-0.07	37.07
	Max. M_z	8	3660.75	-37.53	0.05
	Max. Torsion	8	0.54	-37.53	0.05
	Min. Vert	5	44.42	-18.65	32.07
	Min. H_x	8	59.23	-37.53	0.05
	Min. H_z	14	59.23	0.14	-37.08
	Min. M_x	14	-3634.04	0.14	-37.08
	Min. M_z	20	-3667.83	37.57	-0.07
	Min. Torsion	20	-0.89	37.57	-0.07

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	49.36	0.00	0.00	2.49	1.22	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	59.23	0.07	-37.07	-3626.62	-3.66	-0.12
0.9 Dead+1.6 Wind 0 deg - No Ice	44.42	0.07	-37.07	-3602.52	-4.02	-0.11
1.2 Dead+1.6 Wind 30 deg - No Ice	59.23	18.65	-32.07	-3135.00	-1824.51	-0.27
0.9 Dead+1.6 Wind 30 deg - No	44.42	18.65	-32.07	-3114.28	-1812.38	-0.26

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Ice						
1.2 Dead+1.6 Wind 60 deg - No Ice	59.23	32.40	-18.68	-1819.68	-3164.36	-0.42
0.9 Dead+1.6 Wind 60 deg - No Ice	44.42	32.40	-18.68	-1808.00	-3143.07	-0.42
1.2 Dead+1.6 Wind 90 deg - No Ice	59.23	37.53	-0.05	-0.09	-3660.75	-0.54
0.9 Dead+1.6 Wind 90 deg - No Ice	44.42	37.53	-0.05	-0.87	-3636.09	-0.54
1.2 Dead+1.6 Wind 120 deg - No Ice	59.23	32.47	18.62	1821.35	-3170.90	-0.53
0.9 Dead+1.6 Wind 120 deg - No Ice	44.42	32.47	18.62	1808.12	-3149.57	-0.53
1.2 Dead+1.6 Wind 150 deg - No Ice	59.23	18.61	32.06	3142.45	-1824.03	-0.35
0.9 Dead+1.6 Wind 150 deg - No Ice	44.42	18.61	32.06	3120.14	-1811.88	-0.35
1.2 Dead+1.6 Wind 180 deg - No Ice	59.23	-0.14	37.08	3634.04	15.27	0.29
0.9 Dead+1.6 Wind 180 deg - No Ice	44.42	-0.14	37.08	3608.37	14.81	0.28
1.2 Dead+1.6 Wind 210 deg - No Ice	59.23	-18.67	32.11	3146.39	1829.98	0.60
0.9 Dead+1.6 Wind 210 deg - No Ice	44.42	-18.67	32.11	3124.07	1817.07	0.59
1.2 Dead+1.6 Wind 240 deg - No Ice	59.23	-32.42	18.70	1828.34	3170.43	0.82
0.9 Dead+1.6 Wind 240 deg - No Ice	44.42	-32.42	18.70	1815.08	3148.36	0.82
1.2 Dead+1.6 Wind 270 deg - No Ice	59.23	-37.57	0.07	8.22	3667.83	0.89
0.9 Dead+1.6 Wind 270 deg - No Ice	44.42	-37.57	0.07	7.42	3642.38	0.89
1.2 Dead+1.6 Wind 300 deg - No Ice	59.23	-32.49	-18.57	-1810.12	3175.96	0.65
0.9 Dead+1.6 Wind 300 deg - No Ice	44.42	-32.49	-18.57	-1798.49	3153.85	0.65
1.2 Dead+1.6 Wind 330 deg - No Ice	59.23	-18.54	-32.09	-3139.65	1819.60	0.33
0.9 Dead+1.6 Wind 330 deg - No Ice	44.42	-18.54	-32.09	-3118.88	1806.74	0.34
1.2 Dead+1.0 Ice+1.0 Temp	129.43	-0.00	0.00	25.55	17.77	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	129.43	0.02	-9.82	-1005.18	16.42	0.04
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	129.43	5.38	-9.24	-923.91	-535.65	-0.05
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	129.43	9.01	-5.18	-518.40	-929.35	-0.15
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	129.43	9.91	-0.02	24.67	-1021.22	-0.23
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	129.43	8.95	5.12	547.77	-895.08	-0.24
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	129.43	4.94	8.51	918.12	-502.00	-0.18
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	129.43	-0.04	9.83	1056.82	21.23	-0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	129.43	-5.39	9.25	976.42	571.83	0.13
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	129.43	-9.01	5.19	570.29	965.66	0.24

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	129.43	-9.92	0.02	27.12	1057.75	0.30
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	129.43	-8.95	-5.11	-495.29	931.17	0.27
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	129.43	-4.93	-8.51	-867.52	536.04	0.19
Dead+Wind 0 deg - Service	49.36	0.01	-7.93	-770.83	0.14	-0.02
Dead+Wind 30 deg - Service	49.36	3.99	-6.86	-666.08	-387.82	-0.06
Dead+Wind 60 deg - Service	49.36	6.93	-4.00	-385.83	-673.31	-0.09
Dead+Wind 90 deg - Service	49.36	8.03	-0.01	1.87	-779.08	-0.12
Dead+Wind 120 deg - Service	49.36	6.95	3.98	389.96	-674.70	-0.11
Dead+Wind 150 deg - Service	49.36	3.98	6.86	671.45	-387.72	-0.07
Dead+Wind 180 deg - Service	49.36	-0.03	7.93	776.19	4.18	0.06
Dead+Wind 210 deg - Service	49.36	-3.99	6.87	672.29	390.84	0.13
Dead+Wind 240 deg - Service	49.36	-6.94	4.00	391.46	676.45	0.18
Dead+Wind 270 deg - Service	49.36	-8.04	0.01	3.64	782.43	0.19
Dead+Wind 300 deg - Service	49.36	-6.95	-3.97	-383.79	677.63	0.14
Dead+Wind 330 deg - Service	49.36	-3.97	-6.87	-667.07	388.62	0.07

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-49.36	0.00	0.00	49.36	0.00	0.000%
2	0.07	-59.23	-37.07	-0.07	59.23	37.07	0.000%
3	0.07	-44.42	-37.07	-0.07	44.42	37.07	0.000%
4	18.65	-59.23	-32.07	-18.65	59.23	32.07	0.000%
5	18.65	-44.42	-32.07	-18.65	44.42	32.07	0.000%
6	32.40	-59.23	-18.68	-32.40	59.23	18.68	0.000%
7	32.40	-44.42	-18.68	-32.40	44.42	18.68	0.000%
8	37.53	-59.23	-0.05	-37.53	59.23	0.05	0.000%
9	37.53	-44.42	-0.05	-37.53	44.42	0.05	0.000%
10	32.47	-59.23	18.62	-32.47	59.23	-18.62	0.000%
11	32.47	-44.42	18.62	-32.47	44.42	-18.62	0.000%
12	18.61	-59.23	32.06	-18.61	59.23	-32.06	0.000%
13	18.61	-44.42	32.06	-18.61	44.42	-32.06	0.000%
14	-0.14	-59.23	37.08	0.14	59.23	-37.08	0.000%
15	-0.14	-44.42	37.08	0.14	44.42	-37.08	0.000%
16	-18.67	-59.23	32.11	18.67	59.23	-32.11	0.000%
17	-18.67	-44.42	32.11	18.67	44.42	-32.11	0.000%
18	-32.42	-59.23	18.70	32.42	59.23	-18.70	0.000%
19	-32.42	-44.42	18.70	32.42	44.42	-18.70	0.000%
20	-37.57	-59.23	0.07	37.57	59.23	-0.07	0.000%
21	-37.57	-44.42	0.07	37.57	44.42	-0.07	0.000%
22	-32.49	-59.23	-18.57	32.49	59.23	18.57	0.000%
23	-32.49	-44.42	-18.57	32.49	44.42	18.57	0.000%
24	-18.54	-59.23	-32.09	18.54	59.23	32.09	0.000%
25	-18.54	-44.42	-32.09	18.54	44.42	32.09	0.000%
26	0.00	-129.43	0.00	0.00	129.43	-0.00	0.000%
27	0.02	-129.43	-9.82	-0.02	129.43	9.82	0.000%
28	5.38	-129.43	-9.24	-5.38	129.43	9.24	0.000%
29	9.01	-129.43	-5.18	-9.01	129.43	5.18	0.000%
30	9.91	-129.43	-0.02	-9.91	129.43	0.02	0.000%
31	8.95	-129.43	5.12	-8.95	129.43	-5.12	0.000%
32	4.94	-129.43	8.51	-4.94	129.43	-8.51	0.000%
33	-0.04	-129.43	9.83	0.04	129.43	-9.83	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
34	-5.39	-129.43	9.25	5.39	129.43	-9.25	0.000%
35	-9.01	-129.43	5.19	9.01	129.43	-5.19	0.000%
36	-9.92	-129.43	0.02	9.92	129.43	-0.02	0.000%
37	-8.95	-129.43	-5.11	8.95	129.43	5.11	0.000%
38	-4.93	-129.43	-8.51	4.93	129.43	8.51	0.000%
39	0.01	-49.36	-7.93	-0.01	49.36	7.93	0.000%
40	3.99	-49.36	-6.86	-3.99	49.36	6.86	0.000%
41	6.93	-49.36	-4.00	-6.93	49.36	4.00	0.000%
42	8.03	-49.36	-0.01	-8.03	49.36	0.01	0.000%
43	6.95	-49.36	3.98	-6.95	49.36	-3.98	0.000%
44	3.98	-49.36	6.86	-3.98	49.36	-6.86	0.000%
45	-0.03	-49.36	7.93	0.03	49.36	-7.93	0.000%
46	-3.99	-49.36	6.87	3.99	49.36	-6.87	0.000%
47	-6.94	-49.36	4.00	6.94	49.36	-4.00	0.000%
48	-8.04	-49.36	0.01	8.04	49.36	-0.01	0.000%
49	-6.95	-49.36	-3.97	6.95	49.36	3.97	0.000%
50	-3.97	-49.36	-6.87	3.97	49.36	6.87	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	0.00005942
3	Yes	4	0.00000001	0.00003197
4	Yes	5	0.00000001	0.00005592
5	Yes	5	0.00000001	0.00002624
6	Yes	5	0.00000001	0.00005793
7	Yes	5	0.00000001	0.00002720
8	Yes	4	0.00000001	0.00007523
9	Yes	4	0.00000001	0.00004462
10	Yes	5	0.00000001	0.00005652
11	Yes	5	0.00000001	0.00002646
12	Yes	5	0.00000001	0.00005738
13	Yes	5	0.00000001	0.00002693
14	Yes	4	0.00000001	0.00007714
15	Yes	4	0.00000001	0.00004510
16	Yes	5	0.00000001	0.00005842
17	Yes	5	0.00000001	0.00002742
18	Yes	5	0.00000001	0.00005593
19	Yes	5	0.00000001	0.00002616
20	Yes	4	0.00000001	0.00009018
21	Yes	4	0.00000001	0.00005543
22	Yes	5	0.00000001	0.00005792
23	Yes	5	0.00000001	0.00002718
24	Yes	5	0.00000001	0.00005663
25	Yes	5	0.00000001	0.00002657
26	Yes	4	0.00000001	0.00003243
27	Yes	5	0.00000001	0.00010195
28	Yes	5	0.00000001	0.00011659
29	Yes	5	0.00000001	0.00011656
30	Yes	5	0.00000001	0.00010315
31	Yes	5	0.00000001	0.00011409
32	Yes	5	0.00000001	0.00011397
33	Yes	5	0.00000001	0.00010642
34	Yes	5	0.00000001	0.00012432

35	Yes	5	0.00000001	0.00012359
36	Yes	5	0.00000001	0.00010676
37	Yes	5	0.00000001	0.00011425
38	Yes	5	0.00000001	0.00011220
39	Yes	4	0.00000001	0.00000946
40	Yes	4	0.00000001	0.00002303
41	Yes	4	0.00000001	0.00002503
42	Yes	4	0.00000001	0.00000979
43	Yes	4	0.00000001	0.00002350
44	Yes	4	0.00000001	0.00002435
45	Yes	4	0.00000001	0.00000969
46	Yes	4	0.00000001	0.00002571
47	Yes	4	0.00000001	0.00002312
48	Yes	4	0.00000001	0.00001019
49	Yes	4	0.00000001	0.00002501
50	Yes	4	0.00000001	0.00002364

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	140 - 86.8333	11.170	48	0.6709	0.0011
L2	92.5 - 38	5.014	48	0.5165	0.0004
L3	45 - 0	1.165	48	0.2341	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
142.00	BXA-80063-4BF-EDIN-X w/ Mount Pipe	48	11.170	0.6709	0.0011	98263
126.00	LNX-6515DS-VTM w/ Mount Pipe	48	9.238	0.6353	0.0009	35094
115.00	7770.00 w/ Mount Pipe	48	7.764	0.6036	0.0007	19652
108.00	VHLP2-180	48	6.863	0.5804	0.0006	15353
103.00	800MHz 2X50W RRH W/FILTER	48	6.241	0.5619	0.0005	13278
102.00	APXVTM14-C-120 w/ Mount Pipe	48	6.120	0.5580	0.0005	12929
94.00	742 213 w/ Mount Pipe	48	5.183	0.5236	0.0004	10728
74.00	BCD-87010	48	3.163	0.4145	0.0002	9310

Maximum Tower Deflections - Design Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	140 - 86.8333	52.415	20	3.1483	0.0052
L2	92.5 - 38	23.530	20	2.4253	0.0018
L3	45 - 0	5.463	20	1.0984	0.0004

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
142.00	BXA-80063-4BF-EDIN-X w/ Mount Pipe	20	52.415	3.1483	0.0052	21031
126.00	LNX-6515DS-VTM w/ Mount Pipe	20	43.351	2.9817	0.0040	7510
115.00	7770.00 w/ Mount Pipe	20	36.434	2.8335	0.0032	4204
108.00	VHLP2-180	20	32.203	2.7248	0.0027	3284
103.00	800MHz 2X50W RRH W/FILTER	20	29.289	2.6380	0.0024	2839
102.00	APXVTM14-C-120 w/ Mount Pipe	20	28.718	2.6196	0.0023	2764
94.00	742 213 w/ Mount Pipe	20	24.319	2.4585	0.0019	2293
74.00	BCD-87010	20	14.840	1.9458	0.0011	1987

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	53.17	0.00	0.0	37.7587	-23.13	2455.17	0.009
L2	86.8333 - 38 (2)	TP50.56x37.2117x0.4063	54.50	0.00	0.0	63.3646	-38.44	4134.18	0.009
L3	38 - 0 (3)	TP59.05x48.033x0.5	45.00	0.00	0.0	94.2655	-59.21	6203.23	0.010

Pole Bending Design Data

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		kip-ft	kip-ft		kip-ft	kip-ft	
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	711.56	1876.14	0.379	0.00	1876.14	0.000
L2	86.8333 - 38 (2)	TP50.56x37.2117x0.4063	2092.26	4077.88	0.513	0.00	4077.88	0.000
L3	38 - 0 (3)	TP59.05x48.033x0.5	3667.83	7394.81	0.496	0.00	7394.81	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V_u	ϕV_n	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u	ϕT_n	Ratio $\frac{T_u}{\phi T_n}$
	ft		K	K		kip-ft	kip-ft	
L1	140 - 86.8333 (1)	TP39.223x26.216x0.3125	25.73	1227.59	0.021	0.53	3804.23	0.000
L2	86.8333 - 38 (2)	TP50.56x37.2117x0.4063	32.28	2067.09	0.016	0.89	8268.67	0.000
L3	38 - 0 (3)	TP59.05x48.033x0.5	37.60	3101.62	0.012	0.89	14994.33	0.000

Pole Interaction Design Data

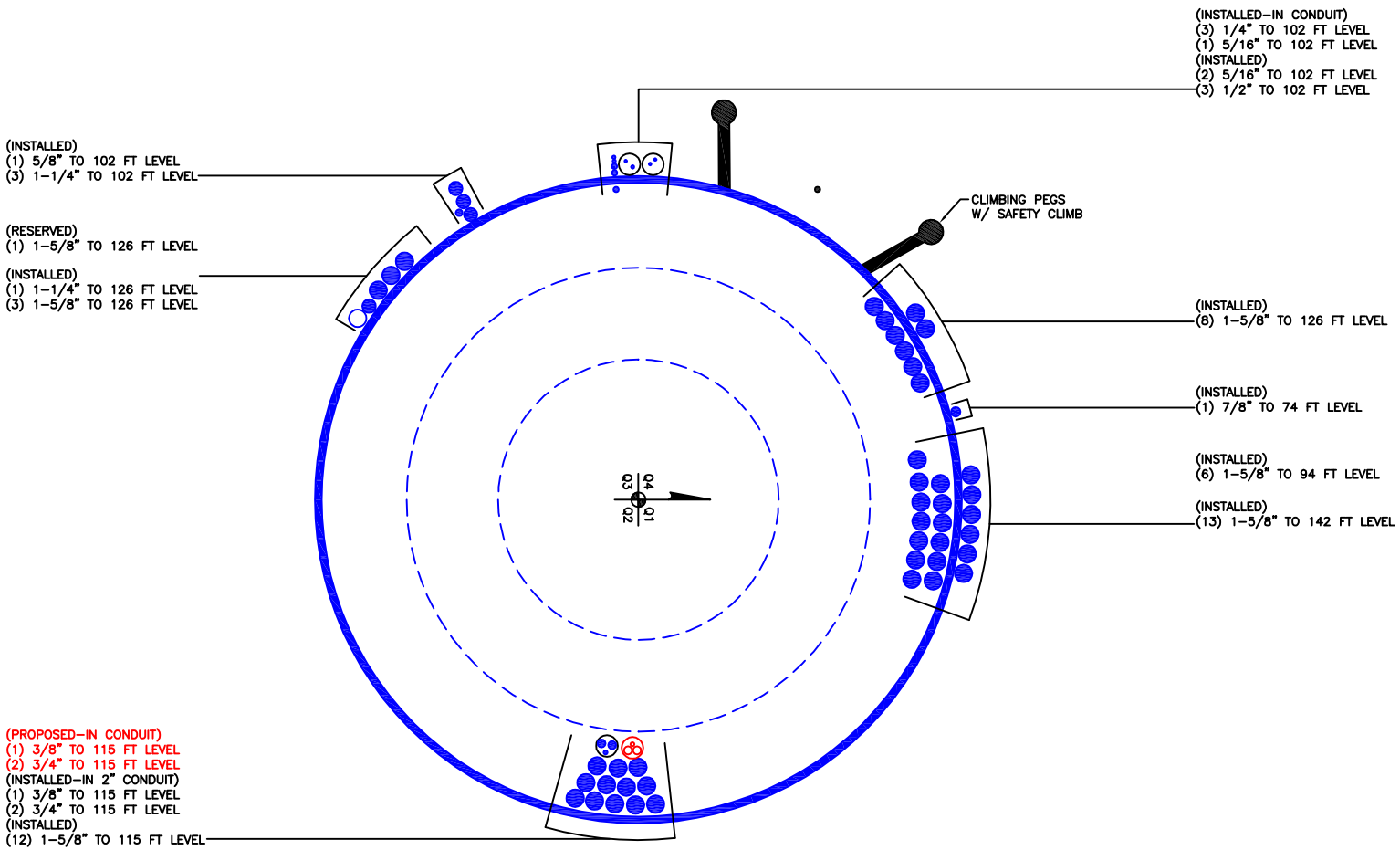
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 86.8333 (1)	0.009	0.379	0.000	0.021	0.000	0.389 ✔	1.000	4.8.2 ✔
L2	86.8333 - 38 (2)	0.009	0.513	0.000	0.016	0.000	0.523 ✔	1.000	4.8.2 ✔
L3	38 - 0 (3)	0.010	0.496	0.000	0.012	0.000	0.506 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	140 - 86.8333	Pole	TP39.223x26.216x0.3125	1	-23.13	2455.17	38.9	Pass
L2	86.8333 - 38	Pole	TP50.56x37.2117x0.4063	2	-38.44	4134.18	52.3	Pass
L3	38 - 0	Pole	TP59.05x48.033x0.5	3	-59.21	6203.23	50.6	Pass
							Summary	
						Pole (L2)	52.3	Pass
						RATING =	**52.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806369 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data	
BU#:	*806369*
Site Name:	*HRT 094 943225*
App #:	*367933 Rev 0*
Pole Manufacturer:	*Other*

Reactions		
Mu:	3668	ft-kips
Axial, Pu:	59	kips
Shear, Vu:	38	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	65.05	in

Anchor Rod Results

		Rigid
Max Rod (Cu+ Vu/ή):	142.1 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	54.7% **Pass**	

Plate Data		
Diam:	71.05	in
Thick:	3	in
Grade:	60	ksi
Single-Rod B-eff:	9.49	in

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	12.8 ksi	AISC LRFD
Allowable Plate Stress:	54.0 ksi	φ*Fy
Base Plate Stress Ratio:	23.7% **Pass**	Y.L. Length: 27.29

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

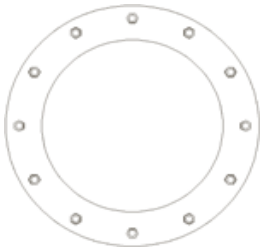
Stiffener Results

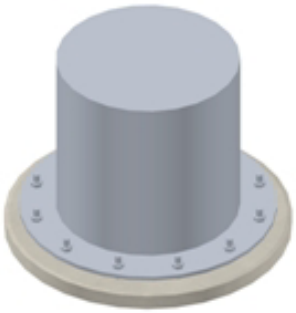
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	59.05	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None





* 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

LPile for Windows, Version 2016-09.007

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

This copy of LPile is being used by:

zan86134
Black&Veatch

Serial Number of Security Device: 291911506

This copy of LPile is licensed for exclusive use by:

Black & Veatch, Overland Park, K

Use of this program by any entity other than Black & Veatch, Overland Park, K
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Users\zan86134\Desktop\806369.1329310\806369.1329310 - TSA\Structural\FDN\

Name of input data file:
806369.1329310 Foundation Analysis.lp9d

Name of output report file:
806369.1329310 Foundation Analysis.lp9o

Name of plot output file:
806369.1329310 Foundation Analysis.lp9p

Name of runtime message file:
806369.1329310 Foundation Analysis.lp9r

Date and Time of Analysis

Date: November 30, 2016 Time: 8:42:30

Problem Title

Project Name: 182896

Job Number: 806369.1329310 Foundation Analysis

Client: Crown Castle

Engineer: Chariya Wannaklut/Changzhi Zang

Description: 806369.1329310 Foundation Analysis

Program Options and Settings

Computational Options:
 - Use unfactored loads in computations (conventional analysis)
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	1000
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
 - Static loading specified

 - Use of p-y modification factors for p-y curves not selected
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Analysis includes tip shear resistance for short pile or shaft
 - Computation of pile-head foundation stiffness matrix not selected
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Report only summary tables of pile-head deflection, maximum bending moment, and maximum shear force in output report file.
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined	=	1
Total length of pile	=	47.000 ft
Depth of ground surface below top of pile	=	0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	90.0000
2	47.000	90.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile

Length of section	=	47.000000 ft
Shaft Diameter	=	90.000000 in
Shear capacity of section	=	0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	0.0000 ft
Distance from top of pile to bottom of layer	=	2.000000 ft
Effective unit weight at top of layer	=	105.000000 pcf
Effective unit weight at bottom of layer	=	105.000000 pcf
Friction angle at top of layer	=	32.000000 deg.
Friction angle at bottom of layer	=	32.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer	=	2.000000 ft
Distance from top of pile to bottom of layer	=	10.000000 ft
Effective unit weight at top of layer	=	100.000000 pcf
Effective unit weight at bottom of layer	=	100.000000 pcf
Undrained cohesion at top of layer	=	500.000000 psf
Undrained cohesion at bottom of layer	=	500.000000 psf

Epsilon-50 at top of layer = 0.0000
Epsilon-50 at bottom of layer = 0.0000

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 10.000000 ft
Distance from top of pile to bottom of layer = 35.000000 ft
Effective unit weight at top of layer = 36.000000 pcf
Effective unit weight at bottom of layer = 36.000000 pcf
Undrained cohesion at top of layer = 100.000000 psf
Undrained cohesion at bottom of layer = 100.000000 psf
Epsilon-50 at top of layer = 0.0000
Epsilon-50 at bottom of layer = 0.0000

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 35.000000 ft
Distance from top of pile to bottom of layer = 45.000000 ft
Effective unit weight at top of layer = 41.000000 pcf
Effective unit weight at bottom of layer = 41.000000 pcf
Undrained cohesion at top of layer = 200.000000 psf
Undrained cohesion at bottom of layer = 200.000000 psf
Epsilon-50 at top of layer = 0.0000
Epsilon-50 at bottom of layer = 0.0000

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 5 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 45.000000 ft
Distance from top of pile to bottom of layer = 47.000000 ft
Effective unit weight at top of layer = 41.000000 pcf
Effective unit weight at bottom of layer = 41.000000 pcf
Friction angle at top of layer = 32.000000 deg.
Friction angle at bottom of layer = 32.000000 deg.
Subgrade k at top of layer = 0.0000 pci
Subgrade k at bottom of layer = 0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

(Depth of the lowest soil layer extends 0.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or kpy krm pci
1	Sand	0.00	105.0000	--	32.0000	

--	default					
	(Reese, et al.)	2.0000	105.0000	--		32.0000
--	default					
2	Stiff Clay	2.0000	100.0000	500.0000	--	
default	--					
	w/o Free Water	10.0000	100.0000	500.0000	--	
default	--					
3	Soft	10.0000	36.0000	100.0000	--	
default	--					
	Clay	35.0000	36.0000	100.0000	--	
default	--					
4	Soft	35.0000	41.0000	200.0000	--	
default	--					
	Clay	45.0000	41.0000	200.0000	--	
default	--					
5	Sand	45.0000	41.0000	--		32.0000
--	default					
	(Reese, et al.)	47.0000	41.0000	--		32.0000
--	default					

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 8000. lbs	M = 9388800. in-lbs	49400.	No
2	1	V = 38000. lbs	M = 44016000. in-lbs	59000.	No
3	1	V = 38000. lbs	M = 44016000. in-lbs	44250.	No
4	1	V = 50667. lbs	M = 58688000. in-lbs	78667.	No

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Shear Resistance Curve at Pile Tip

Point No.	Displacement in	Tip Shear Force lbs
1	0.000	0.000
2	0.120	60582.200
3	10.000	60582.200

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	47.000000 ft
Shaft Diameter	=	90.000000 in
Concrete Cover Thickness	=	4.000000 in
Number of Reinforcing Bars	=	52 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	6362. sq. in.
Total Area of Reinforcing Steel	=	66.040000 sq. in.
Area Ratio of Steel Reinforcement	=	1.04 percent
Edge-to-Edge Bar Spacing	=	3.604356 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	4.81
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	20016.397 kips
Tensile Load for Cracking of Concrete	=	-2501.255 kips
Nominal Axial Tensile Capacity	=	-3962.400 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.270000	1.270000	40.365000	0.00000
2	1.270000	1.270000	40.070694	4.865463
3	1.270000	1.270000	39.192066	9.659977
4	1.270000	1.270000	37.741931	14.313626
5	1.270000	1.270000	35.741432	18.758551
6	1.270000	1.270000	33.219744	22.929934
7	1.270000	1.270000	30.213636	26.766946
8	1.270000	1.270000	26.766946	30.213636
9	1.270000	1.270000	22.929934	33.219744
10	1.270000	1.270000	18.758551	35.741432

11	1.270000	1.270000	14.313626	37.741931
12	1.270000	1.270000	9.659977	39.192066
13	1.270000	1.270000	4.865463	40.070694
14	1.270000	1.270000	0.00000	40.365000
15	1.270000	1.270000	-4.865463	40.070694
16	1.270000	1.270000	-9.659977	39.192066
17	1.270000	1.270000	-14.313626	37.741931
18	1.270000	1.270000	-18.758551	35.741432
19	1.270000	1.270000	-22.929934	33.219744
20	1.270000	1.270000	-26.766946	30.213636
21	1.270000	1.270000	-30.213636	26.766946
22	1.270000	1.270000	-33.219744	22.929934
23	1.270000	1.270000	-35.741432	18.758551
24	1.270000	1.270000	-37.741931	14.313626
25	1.270000	1.270000	-39.192066	9.659977
26	1.270000	1.270000	-40.070694	4.865463
27	1.270000	1.270000	-40.365000	0.00000
28	1.270000	1.270000	-40.070694	-4.865463
29	1.270000	1.270000	-39.192066	-9.659977
30	1.270000	1.270000	-37.741931	-14.313626
31	1.270000	1.270000	-35.741432	-18.758551
32	1.270000	1.270000	-33.219744	-22.929934
33	1.270000	1.270000	-30.213636	-26.766946
34	1.270000	1.270000	-26.766946	-30.213636
35	1.270000	1.270000	-22.929934	-33.219744
36	1.270000	1.270000	-18.758551	-35.741432
37	1.270000	1.270000	-14.313626	-37.741931
38	1.270000	1.270000	-9.659977	-39.192066
39	1.270000	1.270000	-4.865463	-40.070694
40	1.270000	1.270000	0.00000	-40.365000
41	1.270000	1.270000	4.865463	-40.070694
42	1.270000	1.270000	9.659977	-39.192066
43	1.270000	1.270000	14.313626	-37.741931
44	1.270000	1.270000	18.758551	-35.741432
45	1.270000	1.270000	22.929934	-33.219744
46	1.270000	1.270000	26.766946	-30.213636
47	1.270000	1.270000	30.213636	-26.766946
48	1.270000	1.270000	33.219744	-22.929934
49	1.270000	1.270000	35.741432	-18.758551
50	1.270000	1.270000	37.741931	-14.313626
51	1.270000	1.270000	39.192066	-9.659977
52	1.270000	1.270000	40.070694	-4.865463

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 3.604 inches
between bars 44 and 45.

Ratio of bar spacing to maximum aggregate size = 4.81

Concrete Properties:

Compressive Strength of Concrete	=	3000. psi
Modulus of Elasticity of Concrete	=	3122019. psi
Modulus of Rupture of Concrete	=	-410.791918 psi
Compression Strain at Peak Stress	=	0.001634
Tensile Strain at Fracture of Concrete	=	-0.0001160
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 4

Number	Axial Thrust Force kips
1	44.250
2	49.400
3	59.000
4	78.667

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	44.250	141856.768	0.00300000
2	49.400	142001.287	0.00300000
3	59.000	142270.734	0.00300000
4	78.667	142822.935	0.00300000

Note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	141857.	28.762500	92207.	3.0064E+09
2	0.65	142001.	32.110000	92301.	3.0098E+09
3	0.65	142271.	38.350000	92476.	3.0162E+09
4	0.65	142823.	51.133336	92835.	3.0292E+09
1	0.70	141857.	30.975000	99300.	2.9956E+09
2	0.70	142001.	34.580000	99401.	2.9987E+09
3	0.70	142271.	41.300000	99590.	3.0045E+09
4	0.70	142823.	55.066669	99976.	3.0164E+09
1	0.75	141857.	33.187500	106393.	2.9321E+09
2	0.75	142001.	37.050000	106501.	2.9355E+09
3	0.75	142271.	44.250000	106703.	2.9418E+09
4	0.75	142823.	59.000002	107117.	2.9546E+09

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	No	0.00	14310.
2	2.0000	1.2050	No	No	14310.	136866.
3	10.0000	10.0000	No	No	151176.	169788.
4	35.0000	35.0000	Yes	No	320963.	134888.
5	45.0000	14.7437	No	No	455851.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

Summary of Pile-head Responses for Conventional Analyses

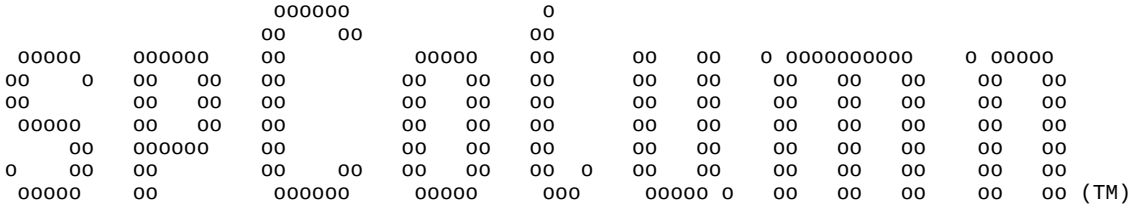
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	8000.	M, in-lb	9388800.	49400.	0.05485	-2.77E-04	-24698.	9684820.
2	V, lb	38000.	M, in-lb	4.40E+07	59000.	4.2405	-0.01080	-141438.	4.53E+07
3	V, lb	38000.	M, in-lb	4.40E+07	44250.	4.2268	-0.01080	-141211.	4.52E+07
4	V, lb	50667.	M, in-lb	5.87E+07	78667.	13.4043	-0.02911	-200389.	6.07E+07

Maximum pile-head deflection = 13.4042806588 inches
Maximum pile-head rotation = -0.0291109939 radians = -1.667937 deg.

The analysis ended normally.



General Information:
==========
File Name: c:\users\zan86134\desktop\806369.1329310\806369.1329310 - ...\806369.1329310 spcolumn.col
Project: 806369.1329310
Column: 182896 Engineer: CWT
Code: ACI 318-11 Units: English

Run Option: Investigation Slenderness: Not considered
Run Axis: X-axis Column Type: Structural

Material Properties:
==========
Concrete: Standard Steel: Standard
f'c = 3 ksi fy = 60 ksi
Ec = 3122.02 ksi Es = 29000 ksi
fc = 2.55 ksi Eps_yt = 0.00206897 in/in
Eps_u = 0.003 in/in
Beta1 = 0.85

Section:
========
Circular: Diameter = 90 in

Gross section area, Ag = 6361.73 in^2
Ix = 3.22062e+006 in^4 Iy = 3.22062e+006 in^4
rx = 22.5 in ry = 22.5 in
Xo = 0 in Yo = 0 in

Reinforcement:
==========
Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area: As = 66.04 in^2 at rho = 1.04%
Minimum clear spacing = 3.56 in

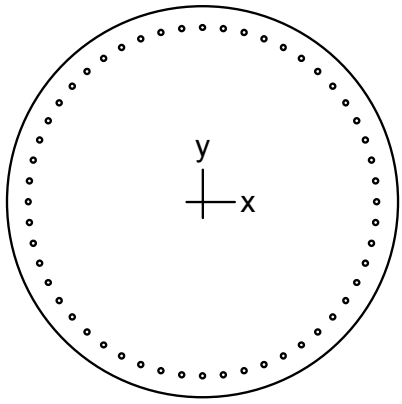
52 #10 Cover = 4 in

Factored Loads and Moments with Corresponding Capacities:
==========

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	49.40	807.07	10496.65	13.006	18.97	84.99	0.01044	0.900
2	59.00	3775.00	10518.41	2.786	19.01	84.99	0.01041	0.900
3	44.25	3766.67	10485.06	2.784	18.94	84.99	0.01046	0.900
4	78.67	5058.33	10562.96	2.088	19.10	84.99	0.01035	0.900

*** End of output ***

Stress Ratio = 1/2.088 = 47.9%



90 in diam.

Code: ACI 318-11

Units: English

Run axis: About X-axis

Run option: Investigation

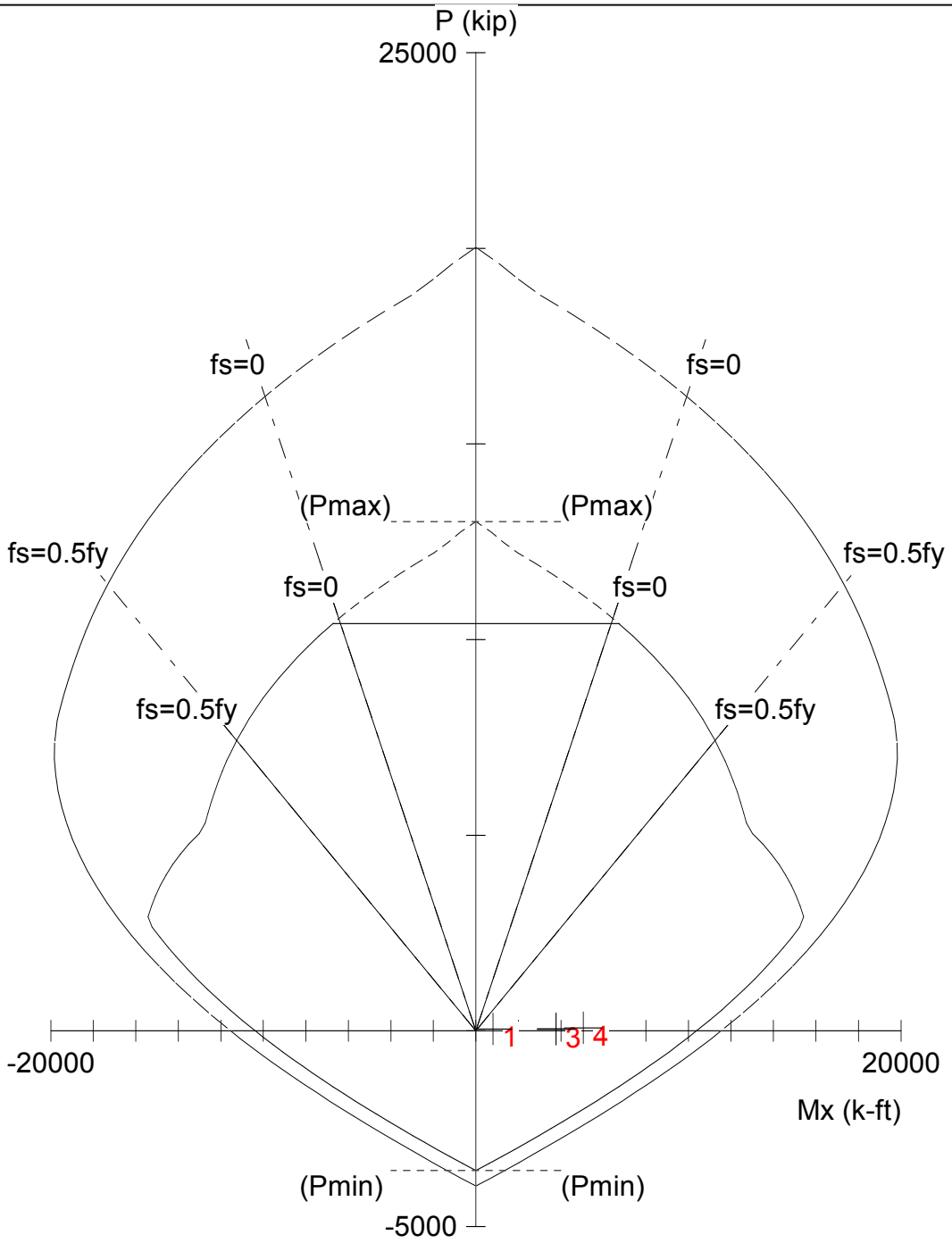
Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 11/30/16

Time: 09:08:46



File: c:\users\zan86134\desktop\806369.1329310\806369.1329310 - tsa\structural\fdn\806369.1329310 spcolumn.col

Project: 806369.1329310

Column: 182896

Engineer: CWT

f'c = 3 ksi	fy = 60 ksi	Ag = 6361.73 in^2	52 #10 bars
Ec = 3122 ksi	Es = 29000 ksi	As = 66.04 in^2	rho = 1.04%
fc = 2.55 ksi	e_yt = 0.00206897 in/in	Xo = 0.00 in	Ix = 3.22062e+006 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 3.22062e+006 in^4
Beta1 = 0.85		Min clear spacing = 3.56 in	Clear cover = 4.38 in

Confinement: Tied

phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

EBI Consulting
environmental | engineering | due diligence

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

AT&T Existing Facility

Site ID: CT5131

NW Hartford
439-455 Homestead Avenue
Hartford, CT 06101

December 5, 2016

EBI Project Number: 6216005595

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	15.07 %

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

EBI Consulting
environmental | engineering | due diligence

December 5, 2016

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

Emissions Analysis for Site: **CT5131 – NW Hartford**

EBI Consulting was directed to analyze the proposed AT&T facility located at **439-455 Homestead Avenue, Hartford, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **439-455 Homestead Avenue, Hartford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

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

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

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

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

5) 2 LTE channels (2300 MHz (WCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 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.

7) For the following calculations the sample point was the top of a 6-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.

8) The antennas used in this modeling are the **Powerwave 7770, Powerwave P65-17-XLH-RR, KMW AM-X-CD-16-65-00T-RET, Powerwave P65-16-XLH-RR, CCI TPA-65R-LCUUUU-H8 and the Quintel QS66512-3** for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS) and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerlines of the proposed antennas are **117 feet** above ground level (AGL) for **Sector A**, **117 feet** above ground level (AGL) for **Sector B** and **117 feet** above ground level (AGL) for Sector C.

10) 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 by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121
Gain:	11.45 / 14.35 dBd	Gain:	11.45 / 14.35 dBd	Gain:	11.45 / 14.35 dBd
Height (AGL):	**117 feet**	Height (AGL):	**117 feet**	Height (AGL):	**117 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts
ERP (W):	2,471.44	ERP (W):	2,471.44	ERP (W):	2,471.44
Antenna A1 MPE%	**0.91 %**	Antenna B1 MPE%	**0.91 %**	Antenna C1 MPE%	**0.91 %**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Powerwave P65-17-XLH-RR	Make / Model:	KMW AM-X-CD-16-65-00T-RET	Make / Model:	Powerwave P65-16-XLH-RR
Gain:	14.3 dBd	Gain:	13.35 dBd	Gain:	12.7 dBd
Height (AGL):	**117 feet**	Height (AGL):	**117 feet**	Height (AGL):	**117 feet**
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts
ERP (W):	3,229.84	ERP (W):	2,595.26	ERP (W):	2,234.50
Antenna A2 MPE%	**2.02 %**	Antenna B2 MPE%	**1.62 %**	Antenna C2 MPE%	**1.40 %**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	CCI TPA-65R-LCUUUU-H8	Make / Model:	Quintel QS66512-3	Make / Model:	Quintel QS66512-3
Gain:	13.75 / 14.45 dBd	Gain:	12.78 / 15.15 dBd	Gain:	12.78 / 15.15 dBd
Height (AGL):	**117 feet**	Height (AGL):	**117 feet**	Height (AGL):	**117 feet**
Frequency Bands	1900 MHz (PCS) / 2300 MHz (WCS)	Frequency Bands	1900 MHz (PCS) / 2300 MHz (WCS)	Frequency Bands	1900 MHz (PCS) / 2300 MHz (WCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts
ERP (W):	6,188.99	ERP (W):	6,204.14	ERP (W):	6,204.14
Antenna A3 MPE%	**1.81 %**	Antenna B3 MPE%	**1.81 %**	Antenna C3 MPE%	**1.81 %**

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max per sector	**4.73 %**
Sprint	1.06 %
Clearwire	0.19 %
Sensus (CL&P)	0.25 %
MetroPCS CDMA	1.57 %
T-Mobile	4.40 %
Verizon	2.87 %
Site Total MPE %:	**15.07 %**

AT&T Sector A Total:	4.73 %
AT&T Sector B Total:	4.34 %
AT&T Sector C Total:	4.11 %
Site Total:	15.07 %

AT&T _ Frequency Band / Technology Max Sector (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
AT&T 850 MHz UMTS	2	418.91	117	2.44	850 MHz	567	0.43%
AT&T 1900 MHz (PCS) UMTS	2	816.81	117	4.77	1900 MHz (PCS)	1000	0.48%
AT&T 700 MHz LTE	2	1,614.92	117	9.42	700 MHz	467	2.02%
AT&T 1900 MHz (PCS) LTE	2	1,422.82	117	8.30	1900 MHz (PCS)	1000	0.83%
AT&T 2300 MHz (WCS) LTE	2	1,671.67	117	9.76	2300 MHz (WCS)	1000	0.98%
						Total:	4.73%

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 A:	4.73 %
Sector B:	4.34 %
Sector C:	4.11 %
AT&T Maximum Total (per sector):	4.73 %
Site Total:	15.07 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **15.07 %** 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.