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

November 10, 2016

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

RE: **Request of T-Mobile for an Order to Approve the Shared Use of an Existing Tower at 136 Bulls Bridge Road, South Kent, CT 06785**

Dear Ms. Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, T-Mobile hereby requests an order from the Connecticut Siting Council ("Council") to approve the shared use by T-Mobile of an existing telecommunication tower at 136 Bulls Bridge Road in South, Connecticut (the "Property"). The existing 179.67-foot monopole is owned by Crown Castle International Corp. ("Crown Castle"), the underlying property is owned by the South Kent School. T-Mobile requests that the Council find that the proposed shared use of the Crown Castle tower satisfies the criteria of C.G.S. §16-50aa and issue an order approving the proposed shared us. A copy of this filing is being sent to First Selectman Bruce K. Adams.

Background

The existing Crown Castle facility consists of a 179.67-foot monopole tower on a 90'x76' foot parcel (total lease area is 10,000 sq. ft.) along the northeast side of Bulls Bridge Rd. Sprint PCS maintains antennas at the 63-foot level and their associated equipment is located north east of the tower. AT&T maintains antennas at the 180-foot level and their associated equipment is located east of the tower. The Connecticut State Police maintain equipment at the 130-foot level and their associated equipment is located west of the tower. Verizon maintains antennas at the 160-foot level and their associated equipment is located west of the tower.

T-Mobile is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. T-Mobile and Crown Castle have agreed to the proposed shared use of the Wayside Lane tower pursuant to mutually acceptable terms and conditions. Likewise, T-Mobile and Crown Castle have agreed to the proposed installation of equipment cabinets on the ground on the west side of the tower. Crown Castle has authorized T-Mobile to apply for all necessary permits and approvals that may be required to share the existing tower. (See Owner's authorization letter).

T-Mobile proposes to install six (6) antennas, nine (9) remote radio units, and two (2) fiber cables installed at a height of 170 feet above ground level. T-Mobile will also install one (1) GPS with one (1) ½ inch line of coaxial cable at 50 feet above ground level. There will be four (4) equipment cabinets within

a 10'x16' equipment space area and a propane generator on an existing concrete pad. Included in the Construction Drawings are T-Mobile's project specifications for locations of all proposed site improvements.

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, "if the Council finds that het proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such a shared use." T-Mobile respectfully submits that the shared use of the tower satisfies these criteria.

A. Technical Feasibility. The existing Crown Castle tower is structurally capable of supporting T-Mobile's proposed improvements. The prosed shared use of this tower is, therefore, technically feasible. A Feasibility Structural Analysis Report ("Structural Report") prepared for this project confirms that this tower can support T-Mobile's proposed loading. A copy of the Structural Report has been included in this application.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue order approving the shared use of an existing tower such as the Crown Castle tower. This authority complements the Council's prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. In addition, § 16-50x(a) directs the Council to "give such consideration to the other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of existing tower facilities. Under the statutory authority vested in the Council, an order by the Council approving the requested shared use would permit the Applicant to obtain a building permit for the proposed installations.

C. Environmental Feasibility. The proposed shared use of the Crown Castle tower would have a minimal environmental effect for the following reasons:

1. The proposed installation of six (6) antennas, nine (9) remote radio units, and two (2) fiber cables installed at the 84 foot-level on the existing 170-foot tower would have no visual impact on the area of the tower. T-Mobile's cabinets and generator would be installed within the facility compound. T-Mobile's shared use of this tower therefore, does not cause any significant change or alteration in the physical or environmental characteristics of the existing site.

2. Operation of T-Mobile's antennas at this site would not exceed the RF emissions standard adopted by the Federal Communications Commission ("FCC"). Included in the EME report of this filing are the approximation tables that demonstrate that T-Mobile's proposed facility will operate well within the FCC RF emissions safety standards.

3. Under ordinary operating conditions, the proposed installation would not require the use of any water or sanitary facilities and would not generate air emissions or discharges to water bodies or sanitary facilities. After construction is complete the proposed installations would not generate any increased traffic to the Crown Castle facility other than periodic maintenance. The proposed shared use of the Crown Castle tower, would, therefore, have a minimal environmental effect, and is environmentally feasible.

D. Economic Feasibility. As previously mentioned, T-Mobile has entered into an agreement with Crown Castle for the shared use of the existing facility subject to mutually agreeable terms. The proposed tower sharing is, therefore, economically feasible. (Please see included authorization.)

E. Public Safety Concerns. As discussed above, the tower is structurally capable of supporting T-Mobile's full array of six (6) antennas, nine (9) remote radio units, and two (2) fiber cables and all related equipment. T-Mobile is not aware of any public safety concerns relative to the proposed sharing of the existing Crown Castle tower.

Conclusion

For the reasons discussed above, the proposed shared use of the existing Crown Castle tower at 136 Bulls Bridge Road satisfies the criteria state in C.G.S. §16-50aa and advances the General Assembly's and the Council's goal of preventing the unnecessary proliferation of towers in Connecticut. The Applicant, therefore, respectfully requests that the Council issue an order approving the prosed shared use.

Sincerely,

Amanda Goodall
Real Estate Specialist
12 Gill Street, Suite 5800,
Woburn, MA 01801
339-205-7017
Amanda.Goodall@crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 4: Exhibit-3: General Power Density Table report (RF Emissions Analysis Report)

Copies to:

First Selectman Bruce K. Adams
41 Kent Green Boulevard
PO Box 678
Kent, CT 06757

Crown Castle (Tower Owner)
12 Gill Street, Suite 5800
Woburn, Ma 01801

South Kent School (Property Owner)
40 Bulls Bridge Road
South Kent, CT 06785

8497

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

DATE 11/10/16 32-61-1110

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

Six Hundred Twenty Five 00/100 DOLLARS

Security Features Included Details on Back.

CHASE
JPMorgan Chase Bank, N.A.
www.Chase.com

VALID FOR 180 DAYS

FOR 841293-CTNH541A-397087

Andrew Goodell MP

⑈008497⑈ ⑆111000614⑆ 464638118⑈

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

Crown Castle, does hereby authorize **T-Mobile** and its authorized contractors/agents to act as "Applicant" in the processing of all applications, permits, research and other related activities associated with the processing, planning, design review, permitting, entitlement and construction of additional equipment, antennas and site improvements for the Crown Castle existing wireless communications facility described as follows:

Customer Site Name:	**CTNH541A**	**Crown Castle Site ID Number:**	**841293**
Site Address:	**136 Bulls Bridge Rd – Kent, CT 06785**	**Crown Castle Site Name:**	**KENT-BULLS BRIDGE ROAD**

This authorization is fully contingent upon **T-Mobile** authorized contractors/agents' compliance with the following conditions:

1. Crown Castle must review the application prior to submittal. Crown Castle must be provided all applications, narratives, drawings and attachments at least 72 hours in advance of their submittal to the locality. Use of email and electronic attachments is encouraged. A Crown Castle Zoning Subject Matter Expert (SME) will review and provide written comment to the customer within 48 hours of receipt of a complete set of application materials. If Crown Castle indicates that changes are required, submissions shall be altered in accordance with Crown Castle comments prior to submission to the locality. Verification of corrections should also be accomplished via emails and attachments.
2. In no event may **T-Mobile** encourage, suggest, participate in, or permit the imposition of any restrictions or additional obligations whatsoever on the tower site or Crown Castle's current or future use or ability to license space at the tower site as part of or in exchange for obtaining any approval, permit, exception or variance.
3. A copy of the final permit and/or a written summary of the zoning/entitlement decision rendered by the locality and any/all conditions placed on that decision shall be communicated in detail to Crown Castle well within the appeal period provided by the locality (typically 10-15 days).
4. All conditions of approval pertinent to the construction of the proposed project must be included in the construction drawings for the project. The conditions of approval pertinent to the construction of the project shall be copied verbatim from the zoning permit approval language, and shall be present in the drawings prior to submission for building permits and contractor bidding. Crown Castle shall verify the inclusion of appropriate conditions of approval in the construction drawing redline process.
5. Crown Castle will provide a Notice To Proceed (NTP) to construction to the customer upon receipt of the final approved zoning permit and the approved Building Permit.

By Crown Castle:

Signature: _____

Printed Name: Amanda Goodall

Title: Real Estate Specialist – East Area

Date: November 10, 2016

CROWN CASTLE

3530 Toringdon Way Suite 101
Charlotte, NC 28277

Phone: (704) 405-6623
Fax: (724) 416-4494
www.crowncastle.com

October 4, 2016

VIA FedEx
Tracking number:

SOUTH KENT SCHOOL
40 BULLS BRIDGE RD
SOUTH KENT, CT 06785

Re: BU 841293 / KENT-BULLS BRIDGE ROAD / 136 BULLS BRIDGE ROAD SOUTH KENT, CT 06785 ("Site")
Lease, dated June 1, 1993, as amended ("Lease")
Consent for sublease

Dear SOUTH KENT SCHOOL,

Pursuant to an agreement between NCWPCS MPL 24 - Years Sites Tower Holdings LLC ("AT&T") and CCATT LLC ("CCATT"), CCATT subleases and operates the tower site that is subject to the Lease on behalf of AT&T. CCATT is a Crown Castle company. CCATT and its affiliates and subsidiaries own, manage and operate shared wireless communication facilities.

In order to better serve the public and minimize the amount of towers in an area where the Site is located, CCATT plans to sublease to T-Mobile. The sublease will not alter the character or use of the site nor will it change the nature of CCATT's occupancy of the Site as lessee.

AT&T has authorized CCATT to contact you and request consent to sublease to T-Mobile. Pursuant to Paragraph 16 of the Lease, CCATT is required to obtain your consent. Under the Lease, Lessor's consent cannot be unreasonably withheld, conditioned or delayed. Therefore, CCATT respectfully requests your consent to this sublease.

As used in this letter, the term "sublease" may include any arrangement by which a third party can install and operate its equipment on the property subject to the Lease. CCATT will continue to be responsible for performing all of the obligations under the Lease.

Please indicate your consent by executing this letter where indicated below and return one original of same to the address indicated above. A prepaid envelope is included for your convenience.

Thank you for your continued cooperation with AT&T and CCATT. If you have any questions concerning this issue, please contact Sarah Brown at (704) 405-6623 or Sarah.Brown@crowncastle.com.

Sincerely,

Sarah Brown

Sarah Brown
Real Estate Specialist

Agreed and accepted 10/5/16
(Date)

(Lessor's signature)

DOCKET NO. 162 - An application of Springwich Cellular Limited Partnership for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telecommunications facility located on the grounds of South Kent School off Bulls Bridge Road in Kent, Connecticut. : Connecticut : Siting : Council : February 24, 1994

DECISION AND ORDER

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a cellular telecommunications tower at the proposed site in Kent, Connecticut, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, 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 Connecticut General Statutes (CGS), be issued to Springwich Cellular Limited Partnership (Springwich), for the construction, operation, and maintenance of a cellular telecommunications tower at the proposed site on property owned by the South Kent School, off Bulls Bridge Road, Kent, 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 self-supporting monopole tower shall be no taller than necessary to provide the proposed cellular communications service and in no event shall the tower structure exceed a total height of 197 feet above ground level with antennas and appurtenances.

2. Prior to the commencement of construction, 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 for the tower and tower foundation; the locations of all antennas to be attached to this tower to ensure maximum sharing of the tower; detailed plans for an accessway from a public roadway, including all improvements and gates installed in the accessway; utility line installation; equipment building plans including elevations; detailed plans for site clearing and tree trimming; detailed plans for erosion and sedimentation control; and plans for the installation of the security fence. The D&M Plan shall be submitted to the Council for approval prior to the commencement of tower construction.

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

4. The Certificate holder shall provide the Council a recalculated report of electromagnetic radio frequency power density if and when circumstances in operation cause a change in power density above the levels originally calculated and provided in the application.

5. The Certificate holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing. Should any agreement, including sharing of this tower, be reached prior to construction of the tower, detailed plans for the third party's equipment shall be included in the D&M Plan.

6. If the facility does not initially provide, or permanently ceases to provide, cellular or other services following completion of construction, this Decision and Order shall be void, and the tower and all associated equipment shall be dismantled and removed or re-application for any continued or new use shall be made to the Council before any such use is made.

7. Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within three years of the effective date of this Decision and Order or within three years after all appeals to this Decision and Order have been resolved.

Pursuant to CGS section 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in the Litchfield County Times, the Kent Good Times Dispatch, and the Waterbury Republican-American.

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 and intervenors to this proceeding are:

APPLICANT	ITS REPRESENTATIVE
Springwich Cellular Limited Partnership	Peter J. Tyrrell, Esq. Senior Attorney Springwich Cellular Limited Partnership 227 Church Street-Room 1021 New Haven, CT 06506 (203) 771-7381

PARTY	ITS REPRESENTATIVE
Litchfield County Cellular Inc.	Andrew N. Davis, Esq. John J. Russotto, Esq. Brown, Rudnick, Freed & Gesmer, P.C. 90 State House Square Hartford, CT 06103 (203) 525-8008

INTERVENOR	ITS REPRESENTATIVE
Bell Atlantic Metro Mobile	Steven R. Humphrey, Esq. Brian C.S. Freeman, Esq. Robinson & Cole One Commercial Plaza Hartford, CT 06103-3597 (203) 275-8200

CERTIFICATION

The undersigned members of the Connecticut Siting Council (Council) hereby certify that they have heard this case, or read the record thereof, in Docket No. 162, and voted as follows to approve the facility located on the grounds of South Kent School off Bulls Bridge Road in Kent, Connecticut:

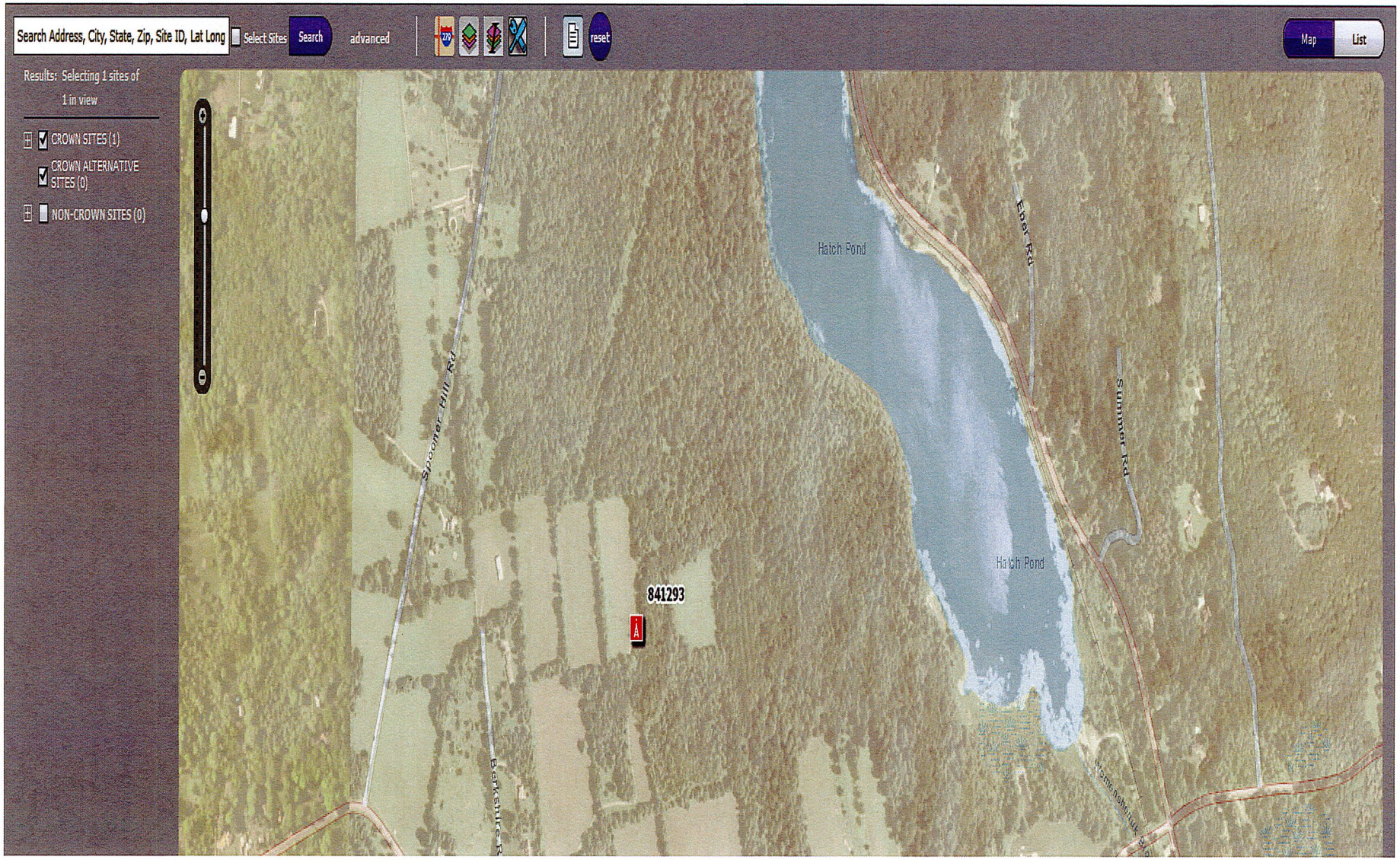
Council Members	Vote Cast
Mortimer A. Gelston Chairman	Yes
Commissioner Reginald J. Smith Designee: Richard G. Patterson	Abstain
Commissioner Timothy R.E. Keeney Designee: Brian Emerick	Absent
Harry E. Covey	Yes
Daniel P. Lynch, Jr.	Yes
Gloria Dibble Pond	Absent
William H. Smith	Absent
Colin C. Tait	Yes
Dana J. Wright	Yes

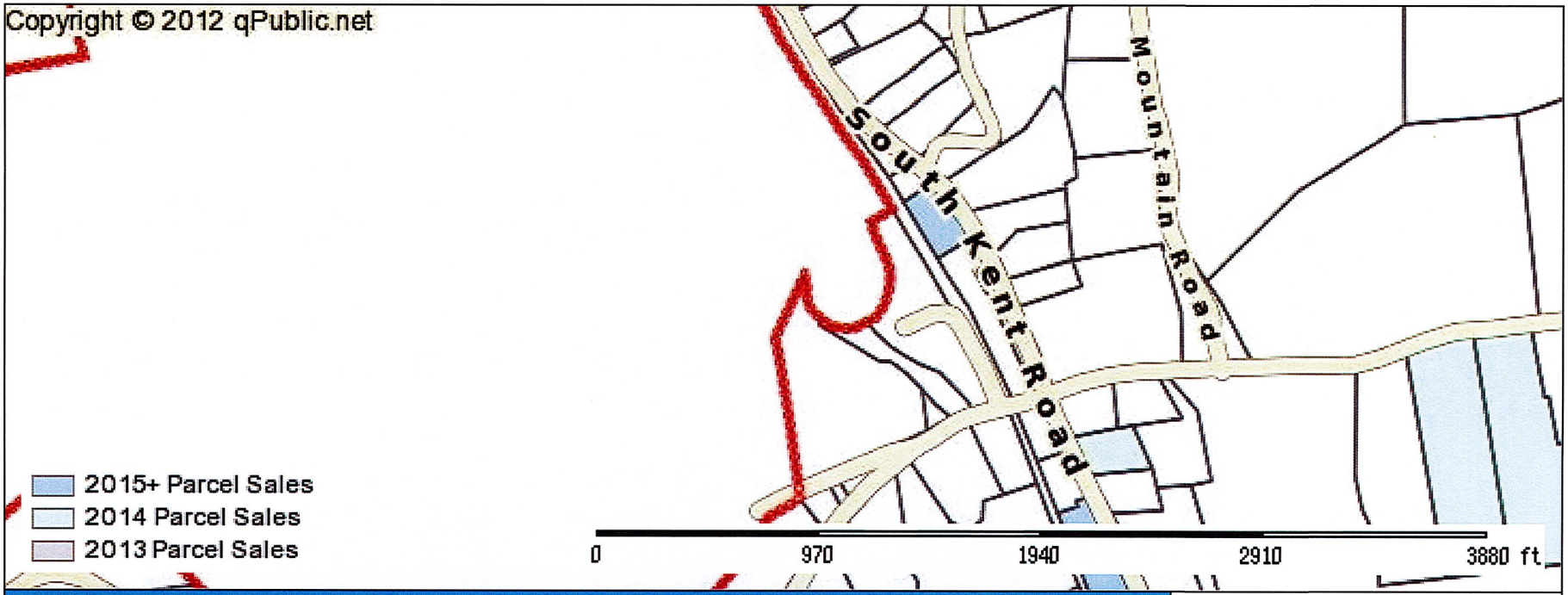
Dated at New Britain, Connecticut, February 24, 1994.

7666E-2
TEF:mmb

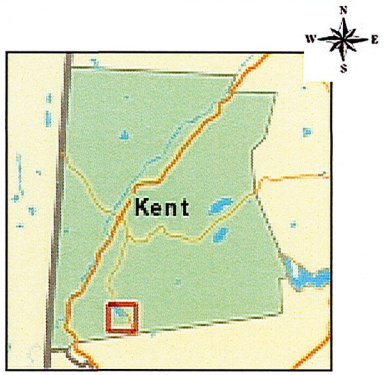
CCIsites™ report issue privacy terms of use help CROWN CASTLE

Home | Site Information | Application Tracking | Project Information | Operations Information | LRM | Real Estate | PMT





Town of Kent			
Parcel: 580 Acres: 117			
Name:	SOUTH KENT SCHOOL CORP	Land Value:	2211600
Site:	40 BULLS BRIDGE RD	Improvement Value:	11614000
Sale:	$0 on 0000-00-00 Reason= Qual=U	Accessory Value:	93500
Mail:	40 BULLS BRIDGE RD SOUTH KENT, CT 06785	Total Value:	14301800



The Town of Kent makes every effort to produce the most accurate information possible. No warranties, expressed or implied, are provided for the data herein, its use or interpretation. The assessment information is from the last certified taxroll. All data is subject to change before the next certified taxroll.
Date printed: 11/10/16 : 10:12:12

SITE NAME: CTNH541A

136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

T-MOBILE SITE NUMBER: CTNH541A

CROWN BU NUMBER: 841293

RF DESIGN GUIDELINE: 707C

T-MOBILE TECHNICIAN SITE SAFETY NOTES	
LOCATION	**SPECIAL RESTRICTIONS**
SECTOR A: ANTENNA/TMA/RRH	ACCESS NOT PERMITTED
SECTOR B: ANTENNA/TMA/RRH	ACCESS NOT PERMITTED
SECTOR C: ANTENNA/TMA/RRH	ACCESS NOT PERMITTED
GPS/LMU:	ACCESS NOT PERMITTED
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T DEMARC:	UNRESTRICTED
OTHER/SPECIAL:	NONE

GENERAL NOTES

THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF T-MOBILE. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.

THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE T-MOBILE NORTHEAST, LLC REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

SPECIAL STRUCTURAL NOTES

CONTRACTOR SCOPE OF WORK SHALL INCLUDE ALL REQUIRED STRUCTURAL MODIFICATIONS, RE-BUNDLING OF COAXIAL CABLES OR OTHER SPECIAL MODIFICATIONS AS OUTLINED THEREIN.

STRUCTURAL DESIGNS AND DETAILS FOR ANTENNA MOUNTS AND GLOBAL STRUCTURAL STABILITY ANALYSIS COMPLETED ON BEHALF OF T-MOBILE ARE INCLUSIVE OF THE ENTIRE SUPPORT STRUCTURE, EXISTING ANTENNA MOUNTS AND ALL OTHER ASPECTS OF THE STRUCTURE THAT WILL SUPPORT THE T-MOBILE G700 EQUIPMENT DEPLOYMENT AS DEPICTED HEREIN.

HUDSON DESIGN ASSUMES THAT THE EQUIPMENT IS PROPERLY CONSTRUCTED AND MAINTAINED. ALL STRUCTURAL MEMBERS AND THEIR CONNECTION ARE ASSUMED TO BE IN GOOD CONDITION AND ARE FREE FROM DEFECTS WITH NO DETERIORATION TO ITS MEMBER CAPACITIES

PROJECT SUMMARY

SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY T-MOBILE EQUIPMENT MODERNIZATION
ZONING JURISDICTION: (TOWN OF LITCHFIELD)	BASED ON INFORMATION PROVIDED BY T-MOBILE, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS AN ELIGIBLE FACILITY UNDER THE TAX RELIEF ACT OF 2012, 47 USC 1455(A), AND IS SUBJECT TO AN EXPEDITED ELIGIBLE FACILITIES REQUEST/REVIEW AND ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW).
SITE ADDRESS:	136 BULLS BRIDGE ROAD SOUTH KENT, CT 06785
LATITUDE:	41° 40' 53.85" NORTH
LONGITUDE:	73° 29' 11.80" WEST
JURISDICTION:	NATIONAL, STATE & LOCAL CODES OR ORDINANCES
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
CROWN CASTLE SITE NAME:	**KENT-BULLS BRIDGE ROAD**
CROWN CASTLE SITE ID:	**841293**

APPROVALS

PROJECT MANAGER	DATE
CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING / SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

72 HOURS

CALL
BEFORE YOU DIG
CALL TOLL FREE 1-800-962-7962
OR CALL 811

UNDERGROUND SERVICE ALERT

DRAWING INDEX

SHEET NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
GN-1	GENERAL NOTES	0
A-1	COMPOUND PLAN AND EQUIPMENT LAYOUT	0
A-2	ANTENNA LAYOUT & ELEVATION	0
A-3	TOWER EQUIPMENT DETAILS	0
A-4	GROUND EQUIPMENT DETAILS	0
A-5	GROUND EQUIPMENT DETAILS	0
A-6	OVERHEAD ICE CANOPY DETAILS	0
S-1	RAISED EQUIPMENT FRAME DETAILS	0
E-1	ELECTRICAL DETAILS AND NOTES	0
G-1	GROUNDING SCHEMATIC AND RISER DIAGRAM	0
G-2	GROUNDING DETAILS AND NOTES	0

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 29951
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

GROUNDING NOTES

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

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

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

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

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

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

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

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO GROUND BAR.

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

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

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

12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR – CENTERLINE COMMUNICATIONS
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T-MOBILE

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

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

4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

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

6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.

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

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

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.

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

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

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

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

14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

16. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF T-MOBILE SITES."

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

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

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

20. APPLICABLE BUILDING CODES:
    SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
    BUILDING CODE: IBC 2012 WITH 2016 CT STATE BUILDING CODE AMENDMENTS
    ELECTRICAL CODE: 2014 NEC

    SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

    AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

    AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

    MANUAL OF STEEL CONSTRUCTION, ASD, FOURTEENTH EDITION;

    TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G, STRUCTURAL STANDARDS FOR STEEL

    EQUIPMENT AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

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

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	EQ	EQUAL	REQ	REQUIRED
AWG	AMERICAN WIRE GAUGE	GC	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
BBU	BATTERY BACKUP UNIT	GRC	GALVANIZED RIGID CONDUIT	TBD	TO BE DETERMINED
BTCW	BARE TINNED SOLID COPPER WIRE	MGB	MASTER GROUND BAR	TBR	TO BE REMOVED
BGR	BURIED GROUND RING	MIN	MINIMUM	TBRR	TO BE REMOVED AND REPLACED
BTS	BASE TRANSCEIVER STATION	P	PROPOSED	TYP	TYPICAL
E	EXISTING	NTS	NOT TO SCALE	UG	UNDER GROUND
EGB	EQUIPMENT GROUND BAR	RAD	RADIATION CENTER LINE (ANTENNA)	VIF	VERIFY IN FIELD
EGR	EQUIPMENT GROUND RING	REF	REFERENCE		

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 28954
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

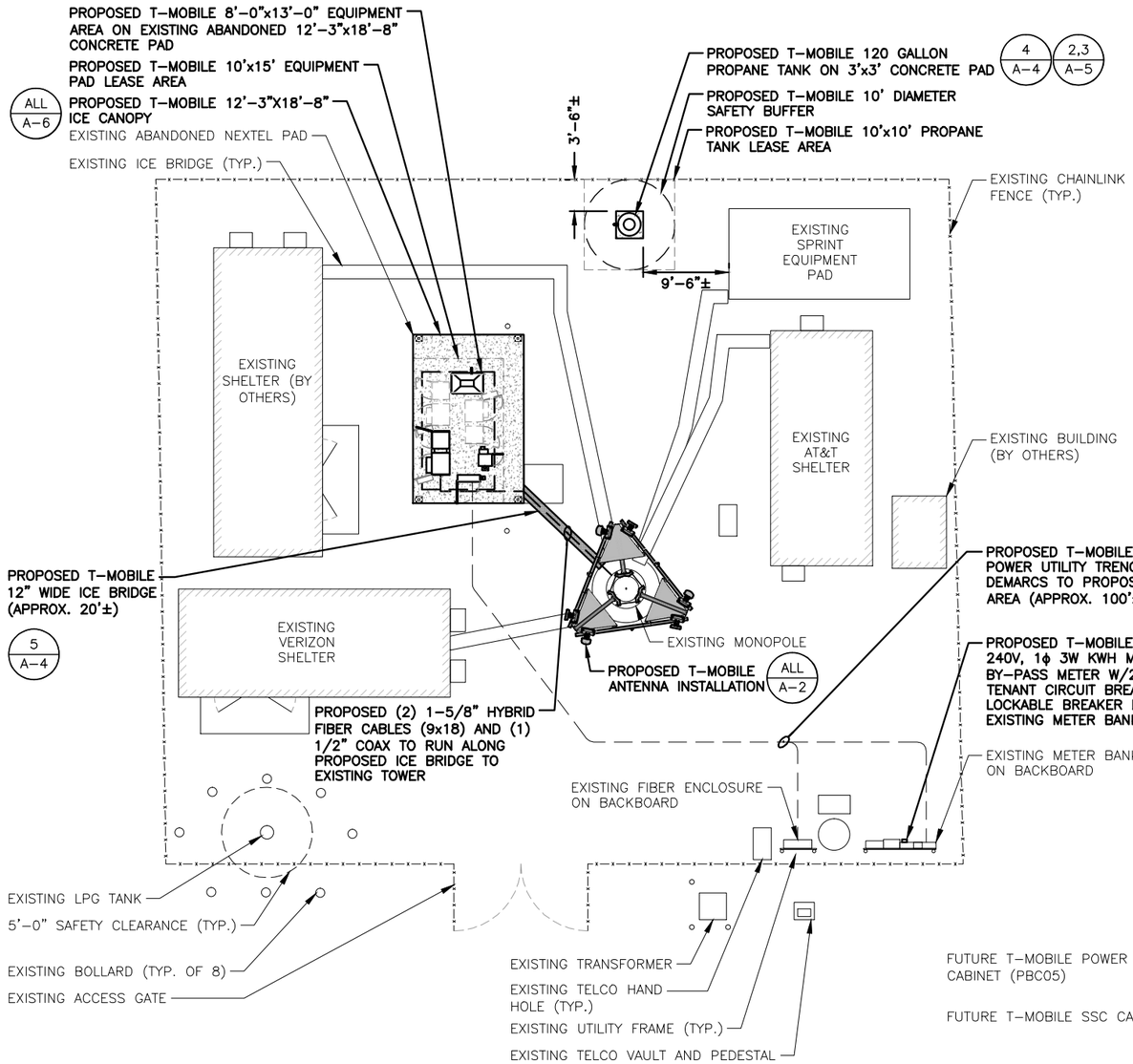
SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

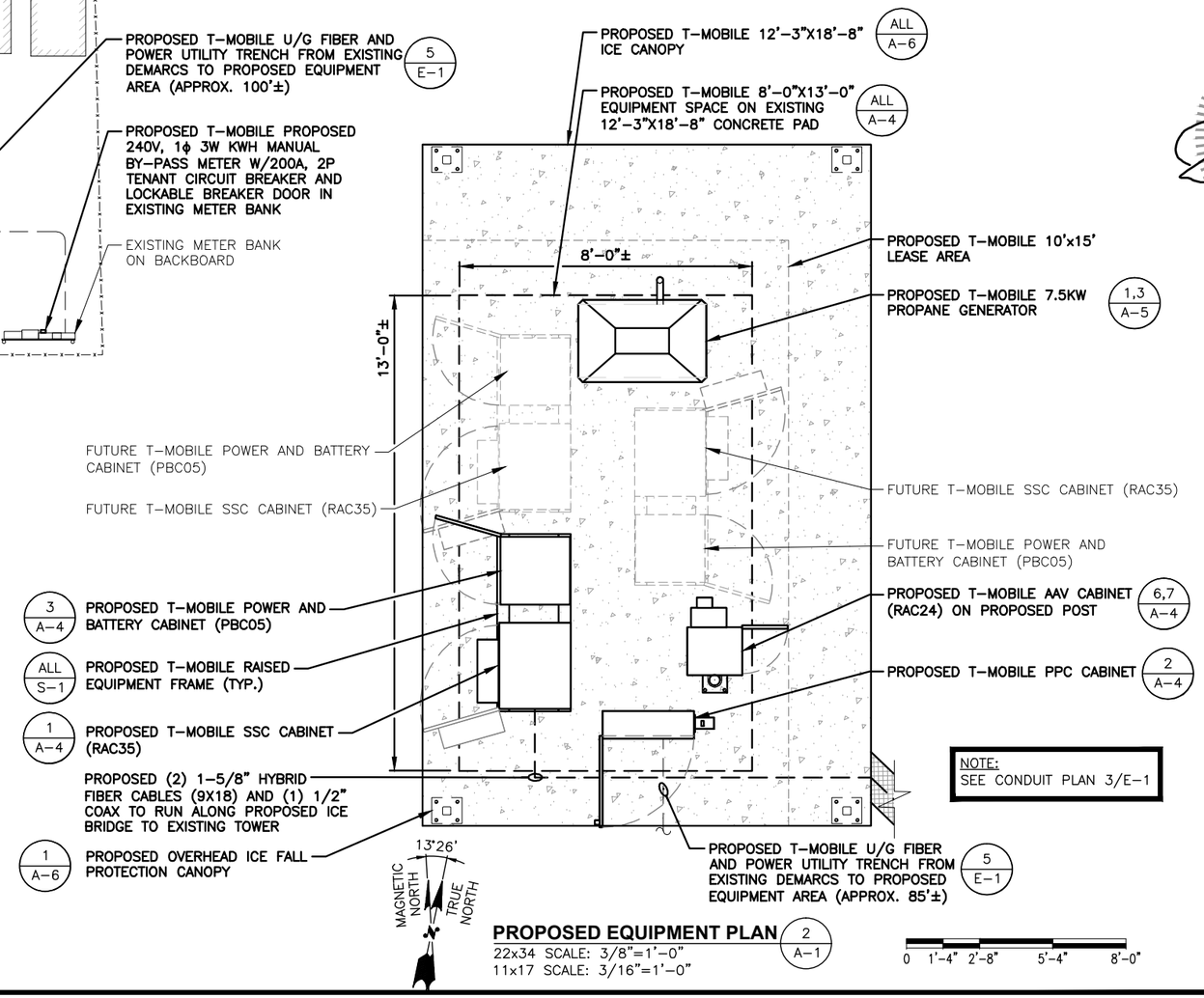
SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-1



COMPOUND PLAN 1 A-1
22x34 SCALE: 1/8"=1'-0"
11x17 SCALE: 1/16"=1'-0"



PROPOSED EQUIPMENT PLAN 2 A-1
22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"

NOTE:
REFER TO FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS

NOTE:
AN ANALYSIS OF THE CAPACITY OF THE EXISTING STRUCTURE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY GPD ENGINEERING AND ARCHITECTURE DATED: OCTOBER 26, 2016

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23054
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

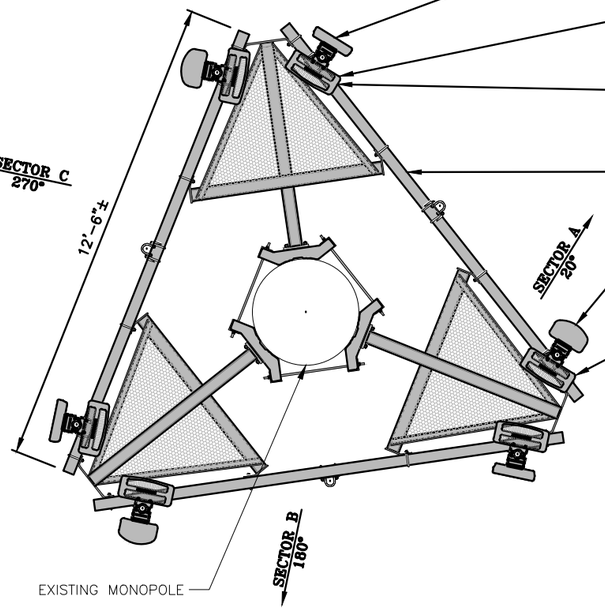
SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
COMPOUND & EQUIPMENT PLAN

SHEET NUMBER
A-1

NOTE:
AN ANALYSIS OF THE CAPACITY OF THE EXISTING STRUCTURE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY GPD ENGINEERING AND ARCHITECTURE DATED: OCTOBER 26, 2016

NOTE:
REFER TO FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS



PROPOSED T-MOBILE APX16DWV-16DWV-S-E-A20 ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) — 1,3 / A-3

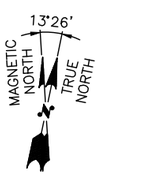
PROPOSED T-MOBILE RRUS11 B2 MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) — 5 / A-3

PROPOSED T-MOBILE RRUS11 B4 MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) (BELOW) — 5 / A-3

PROPOSED T-MOBILE LOW PROFILE CO-LOCATION PLATFORM SITEPRO-1/VALMONT PART #RMQP-396 (TOTAL OF 1) — 6 / A-3

PROPOSED T-MOBILE LNX-6515DS-A1M ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) — 2,3 / A-3

PROPOSED T-MOBILE RRUS11 B12 MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) — 5 / A-3



PROPOSED ANTENNA LAYOUT 1 / A-2
SCALE: N.T.S

TOP OF EXISTING WHIP ANTENNAS
ELEV. = 190'-0"± A.G.L

TOP OF EXISTING MONOPOLE
ELEV. = 180'-0"± A.G.L

℄ OF PROPOSED T-MOBILE ANTENNAS
ELEV. = 170'-0"± A.G.L

PROPOSED T-MOBILE RRUS11 B12 MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) (BEHIND) — 5 / A-3

PROPOSED T-MOBILE LNX-6515DS-A1M ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) — 2,3 / A-3

PROPOSED T-MOBILE APX16DWV-16DWV-S-E-A20 ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) — 1,3 / A-3

PROPOSED T-MOBILE RRUS11 B2 MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) (BEHIND) — 5 / A-3

PROPOSED T-MOBILE RRUS11 B4 MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3) (BEHIND) — 5 / A-3

PROPOSED T-MOBILE LOW PROFILE CO-LOCATION PLATFORM SITEPRO-1/VALMONT PART #RMQP-396 (TOTAL OF 1) — 6 / A-3

PROPOSED (2) 1-5/8" HYBRID FIBER CABLES (9X18) AND (1) 1/2" COAX TO RUN ALONG PROPOSED ICE BRIDGE TO EXISTING TOWER THEN UP TOWER ALONG PROPOSED VERTICAL LADDER

EXISTING MONOPOLE

℄ OF PROPOSED T-MOBILE GPS ANTENNA
ELEV. = 50'-0"± A.G.L

PROPOSED GPS ANTENNA BANDED TO MONOPOLE — 7 / A-3

GROUND LEVEL
ELEV. = 0.0'± A.G.L
ELEV - 783.0± AMSL

NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY

TOWER ELEVATION 2 / A-2
22x34 SCALE: 3/32"=1'-0"
11x17 SCALE: 3/64"=1'-0"

0 5'-4" 10'-8" 21'-4" 32'-0"

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 29057
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
ANTENNA LAYOUT & ELEVATION

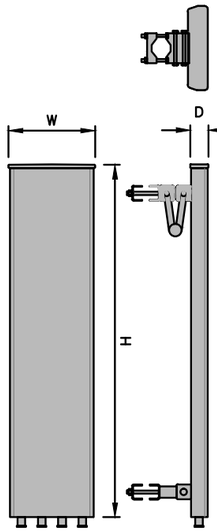
SHEET NUMBER
A-2

NOTE:
AN ANALYSIS OF THE CAPACITY OF THE EXISTING STRUCTURE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY GPD ENGINEERING AND ARCHITECTURE DATED: OCTOBER 26, 2016

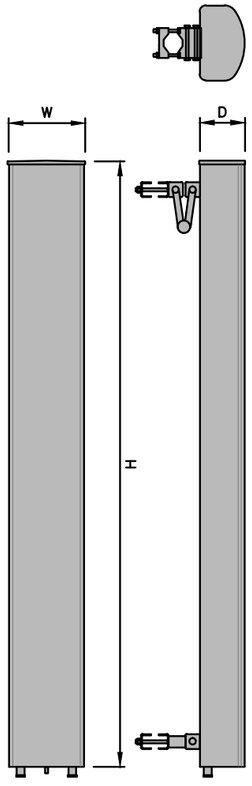
NOTE:
REFER TO FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS

U19/L21 ANTENNA DIMENSIONS	
MODEL #	**APX16DWV-16DWV-S-E-A20 (QUAD)**
MANUF.	RFS/CELLWAVE
HEIGHT	55.9"
WIDTH	13.0"
DEPTH	3.15"
WEIGHT	48.4 LBS

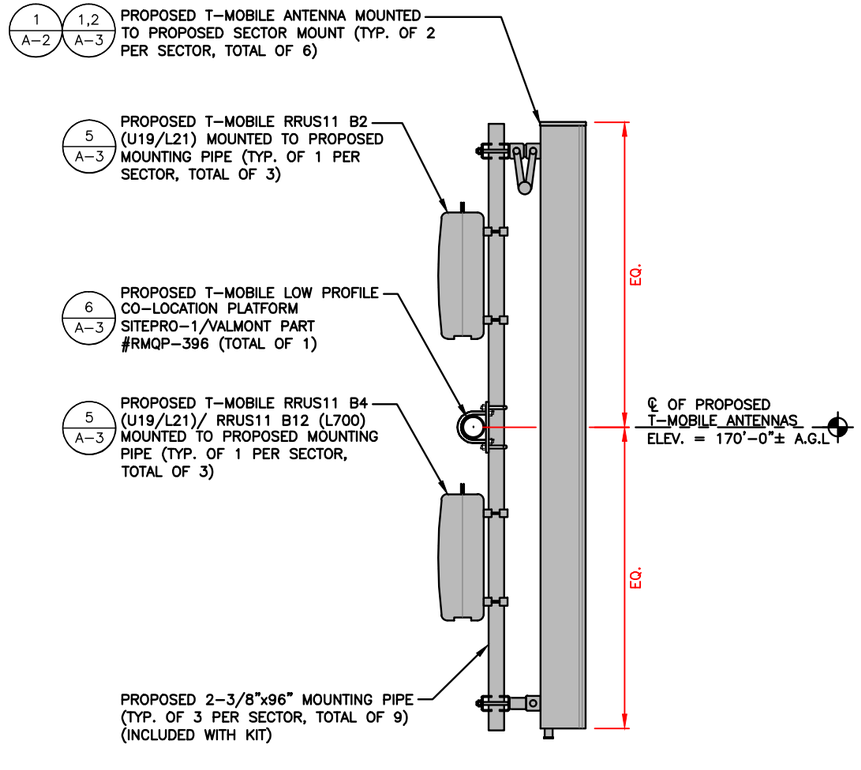
L700 ANTENNA DIMENSIONS	
MODEL #	**LNX-6515DS-A1M (DUAL)**
MANUF.	COMMSCOPE
HEIGHT	96.4"
WIDTH	11.9"
DEPTH	7.1"
WEIGHT	50.3 LBS



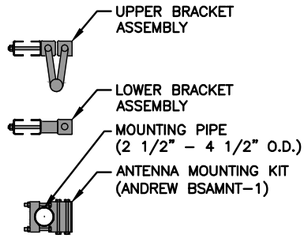
U19/L21 ANTENNA DETAIL 1/A-3
SCALE: N.T.S



L700 ANTENNA DETAIL 2/A-3
SCALE: N.T.S

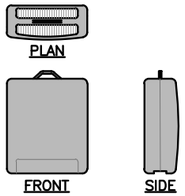


PROPOSED ANTENNA AND RRU MOUNTING DETAIL 3/A-3
SCALE: N.T.S

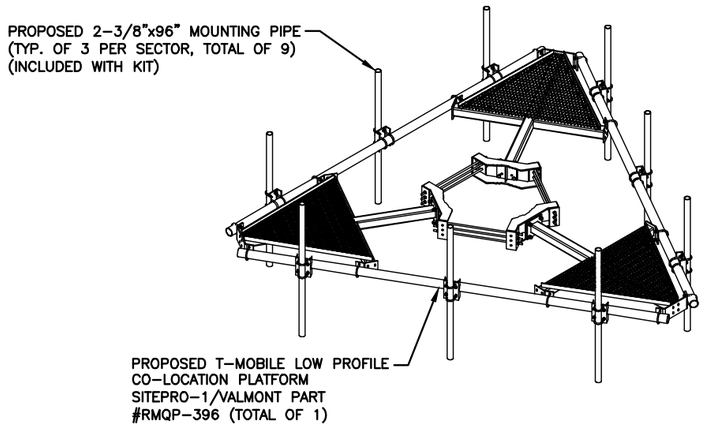


ANTENNA MOUNTING BRACKET 4/A-3
SCALE: N.T.S

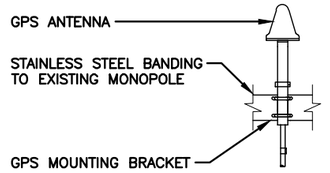
RRU DIMENSIONS	
MODEL #	**RRUS11 B2**
MODEL #	**RRUS11 B4**
MODEL #	**RRUS11 B12**
MANUF.	ERICSSON
WIDTH	17"
DEPTH	7"
HEIGHT	20"
WEIGHT	50.6 LBS



PROPOSED RRU DETAIL 5/A-3
SCALE: N.T.S



LOW PROFILE PLATFORM 6/A-3
SCALE: N.T.S



GPS DIMENSIONS	
MODEL #	**CCAH32ST03**
MANUF.	NAIS
HEIGHT	3.9"
WIDTH	3.5"

GPS ANTENNA MOUNTING DETAIL 7/A-3
SCALE: N.T.S

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23951
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

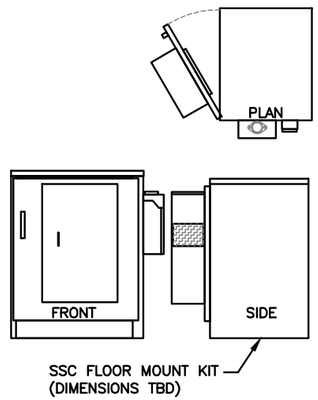
REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
TOWER EQUIPMENT DETAILS

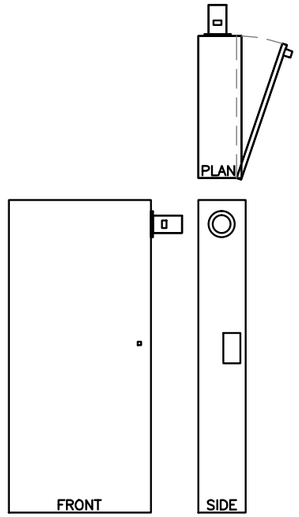
SHEET NUMBER
A-3

SSC DIMENSIONS	
MODEL #	**RAC35CR**
MANUF.	PURCELL
WIDTH	28.25"
DEPTH	23.31"
HEIGHT	37.72"
PLINTH	6.5"
WEIGHT (BASE CONFIGURATION)	DEPENDANT ON OPTIONS
NOTE: INSTALL CABINET ANCHORS AND FLOOR MOUNT KIT ANCHORS PER MANUFACTURER'S INSTALLATION GUIDELINES	



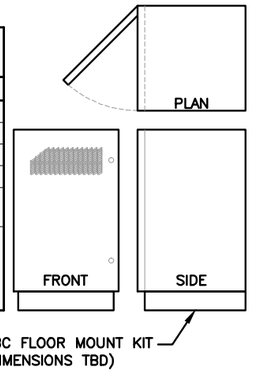
SITE SUPPORT CABINET (SSC) 1/A-4
SCALE: N.T.S

PPC DIMENSIONS	
MODEL #	**CS2S2-W736**
MANUF.	EMERSON
WIDTH	30"
DEPTH	10"
HEIGHT	66"
WEIGHT	150 LBS
NOTE: INSTALL CABINET ANCHORS PER MANUFACTURER'S INSTALLATION GUIDELINES	

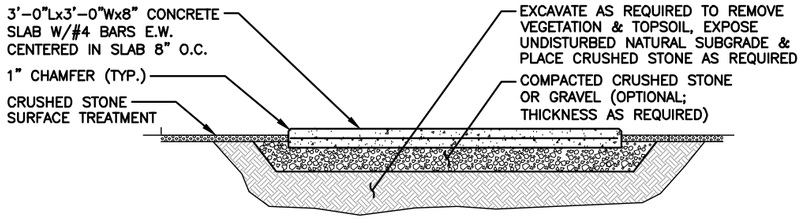


POWER PROTECTION CABINET (PPC) 2/A-4
SCALE: N.T.S

PBC DIMENSIONS	
MODEL #	**PBC-05**
MANUF.	ERICSSON
WIDTH	22.2"
DEPTH	22.8"
HEIGHT	34.1"
WEIGHT W/O BATTERIES	194 LBS
NOTE: INSTALL CABINET ANCHORS AND FLOOR MOUNT KIT ANCHORS PER MANUFACTURER'S INSTALLATION GUIDELINES	



POWER AND BATTERY CABINET (PBC) 3/A-4
SCALE: N.T.S

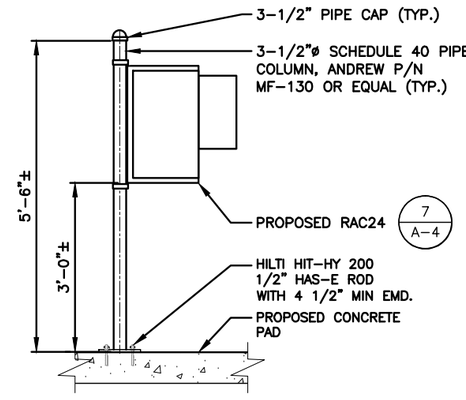


NEW CONC. PAD NOTES:
- REINF. W/ #4's @ 8" O.C. EA. WAY (MID-DEPTH).
- REINF. SHALL BE ASTM A615-GRADE 60. SECURE IN PLACE.
- REINFORCEMENT IN EQUIPMENT SLAB TO BE WELDED AND BONDED TO GROUND RING

CONCRETE PAD DETAIL 4/A-4
SCALE: N.T.S

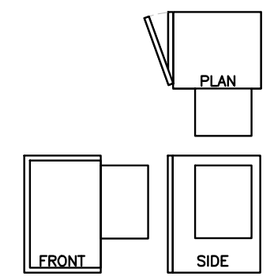
NOTE:
ALL STEEL IS GALVANIZED. ALL BOLTS TO BE FURNISHED W/ WASHERS AND NUTS.

COAX ICE BRIDGE DETAIL 5/A-4
SCALE: N.T.S



RAC24 MOUNTING DETAIL 6/A-4
SCALE: N.T.S

RAC24 DIMENSIONS	
MODEL #	**RAC24**
MANUF.	PURCELL
WIDTH	15.7"
DEPTH	20"
HEIGHT	24"
WEIGHT W/O BATTERIES	DEPENDANT ON OPTIONS
NOTE: INSTALL CABINET ANCHORS PER MANUFACTURER'S INSTALLATION GUIDELINES	



RAC24 CABINET 7/A-4
SCALE: N.T.S

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23951
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

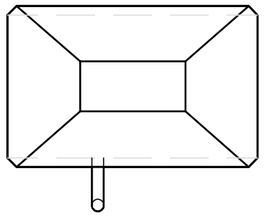
REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

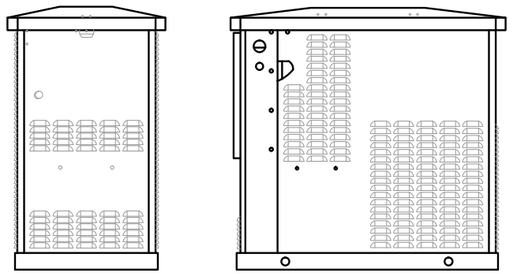
SHEET TITLE
GROUND EQUIPMENT DETAILS

SHEET NUMBER
A-4

PLAN



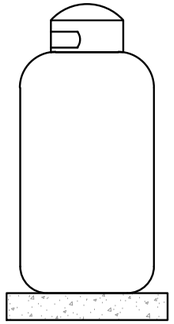
APU DIMENSIONS	
MODEL #	**APU POWERGEN 7500**
MANUF.	DELTA
HEIGHT	40"
WIDTH	42"
DEPTH	24"
NOTE: CLEARANCE REQUIREMENTS–APU: 5'–0" EXHAUST SIDE, 18" OTHERS	



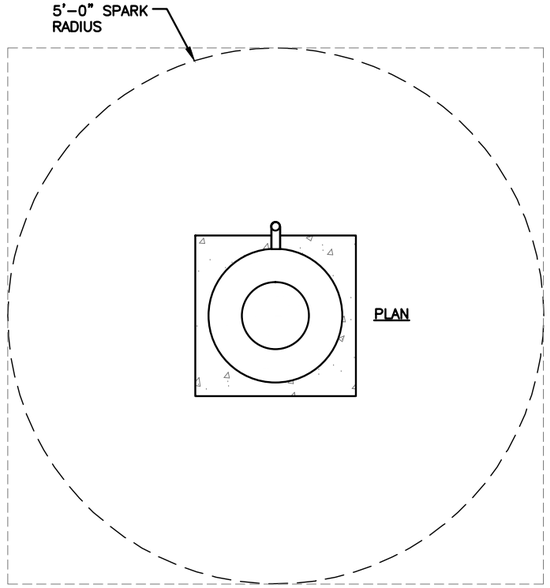
FRONT SIDE

APU GENERATOR DETAIL (1 / A–5)
SCALE: N.T.S

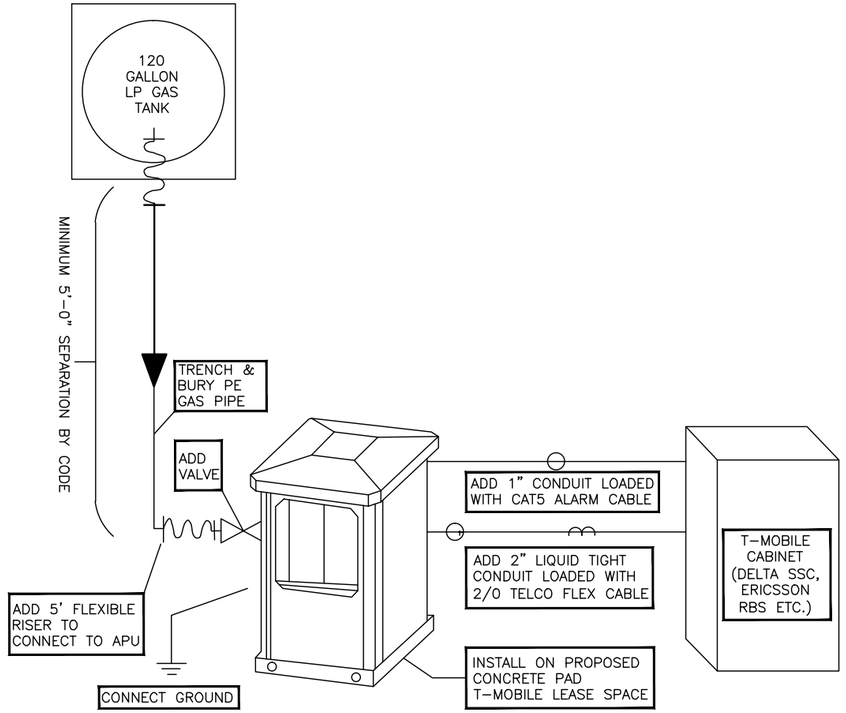
LP TANK DIMENSIONS	
HEIGHT	54"
DIAMETER	30"ø
WEIGHT	260 LBS.
NOTE: CLEARANCE REQUIREMENTS–LP TANK: 5'–0" SPARK RADIUS **WITH INTEGRAL MANUAL SHUT-OFF VALVE (REGO MODEL 750IL OR EQUAL)** 80 HOURS RUNTIME– AVERAGE 5Kw LOAD	



FRONT



LP PROPANE TANK DETAIL (2 / A–5)
SCALE: N.T.S



APU & LP TANK ONE-LINE DIAGRAM (3 / A–5)
SCALE: N.T.S

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23951
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

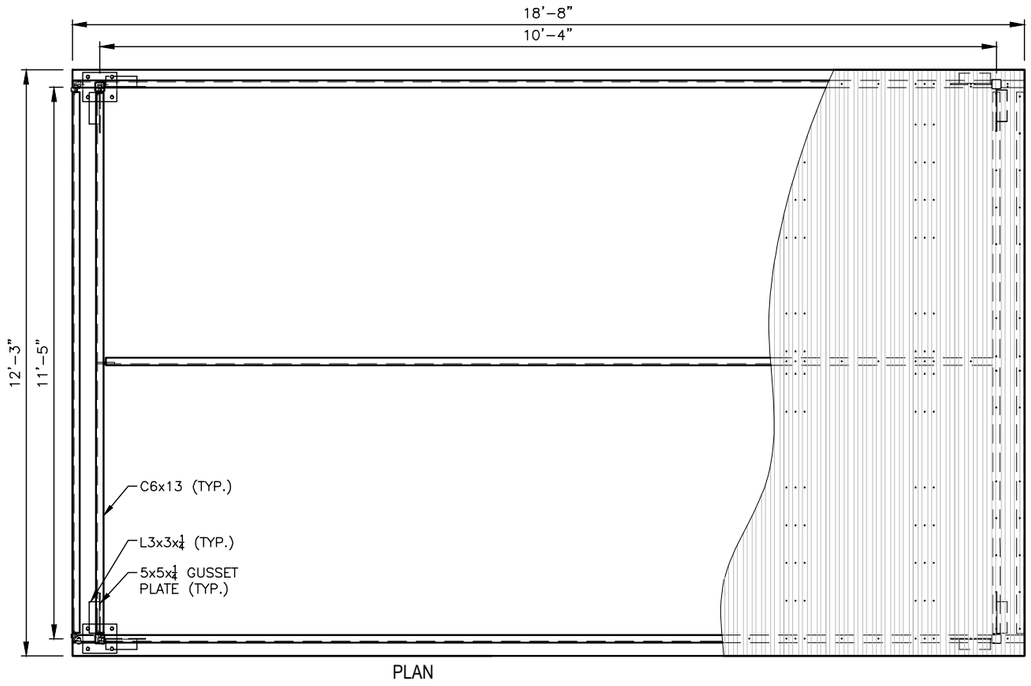
SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

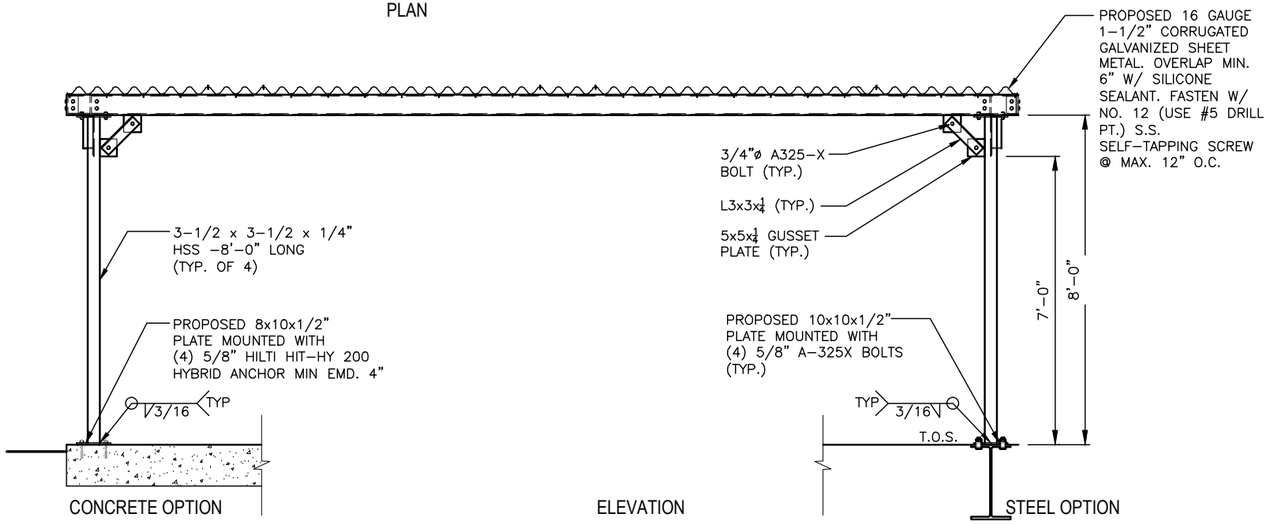
SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
GROUND EQUIPMENT DETAILS

SHEET NUMBER
A-5



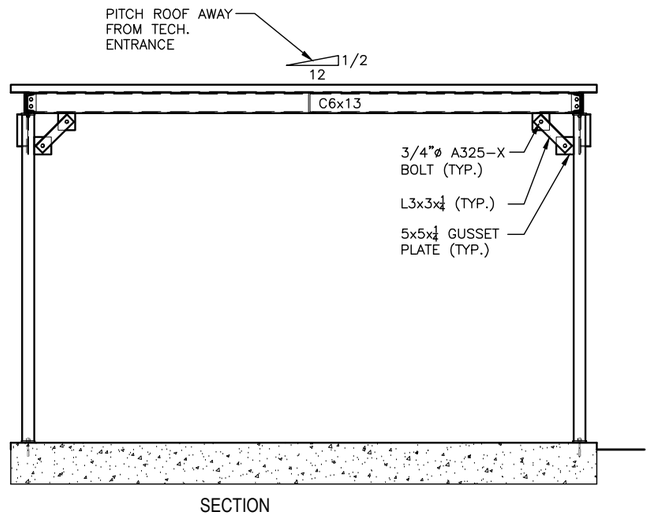
PLAN



CONCRETE OPTION

ELEVATION

STEEL OPTION



SECTION

ICE CANOPY DETAIL (1 / A-6)

SCALE: N.T.S

T-MOBILE NORTHEAST LLC

15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE

CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC

1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 29951
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

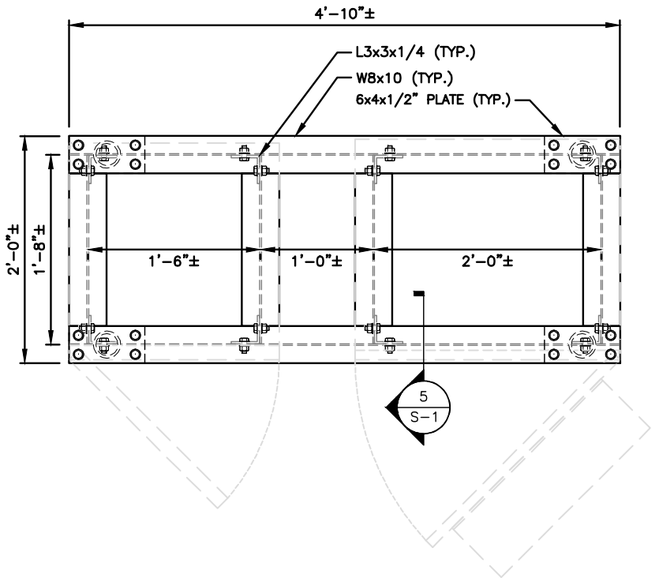
SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

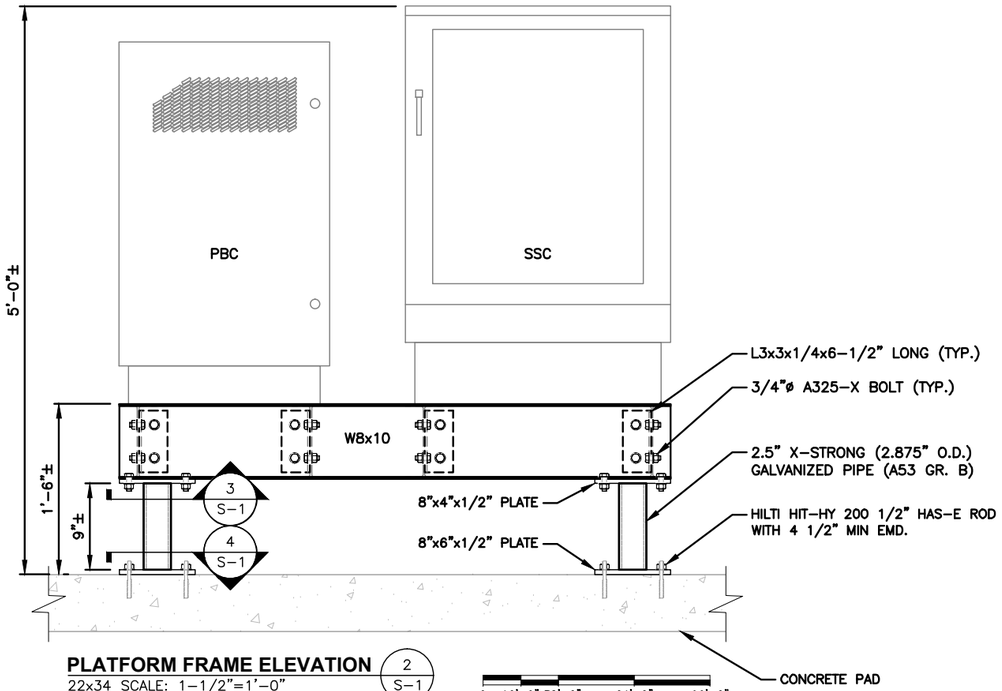
SHEET TITLE
OVERHEAD ICE CANOPY DETAILS

SHEET NUMBER
A-6



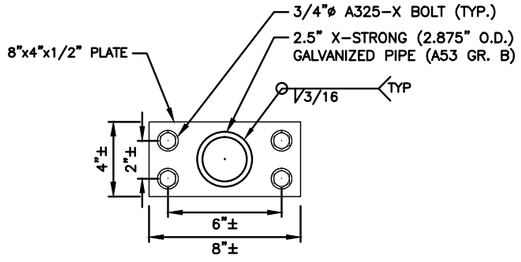
PLATFORM FRAME PLAN 1 / S-1
22x34 SCALE: 1-1/2"=1'-0"
11x17 SCALE: 3/4"=1'-0"

0 16'-0" 32'-0" 64'-0" 96'-0"



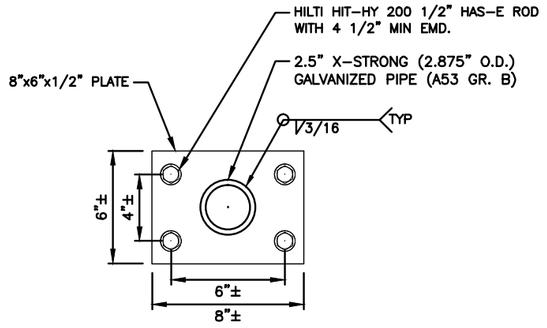
PLATFORM FRAME ELEVATION 2 / S-1
22x34 SCALE: 1-1/2"=1'-0"
11x17 SCALE: 3/4"=1'-0"

0 16'-0" 32'-0" 64'-0" 96'-0"



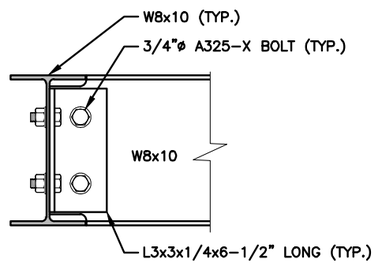
PLATFORM FRAME TOP PLATE DETAIL 3 / S-1
22x34 SCALE: 3"=1'-0"
11x17 SCALE: 1-1/2"=1'-0"

0 16'-0" 32'-0" 64'-0" 96'-0"



PLATFORM FRAME BOTTOM PLATE DETAIL 4 / S-1
22x34 SCALE: 3"=1'-0"
11x17 SCALE: 1-1/2"=1'-0"

0 16'-0" 32'-0" 64'-0" 96'-0"



PLATFORM FRAME SECTION DETAIL 5 / S-1
22x34 SCALE: 3"=1'-0"
11x17 SCALE: 1-1/2"=1'-0"

0 16'-0" 32'-0" 64'-0" 96'-0"

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 28954
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
RAISED EQUIPMENT FRAME DETAILS

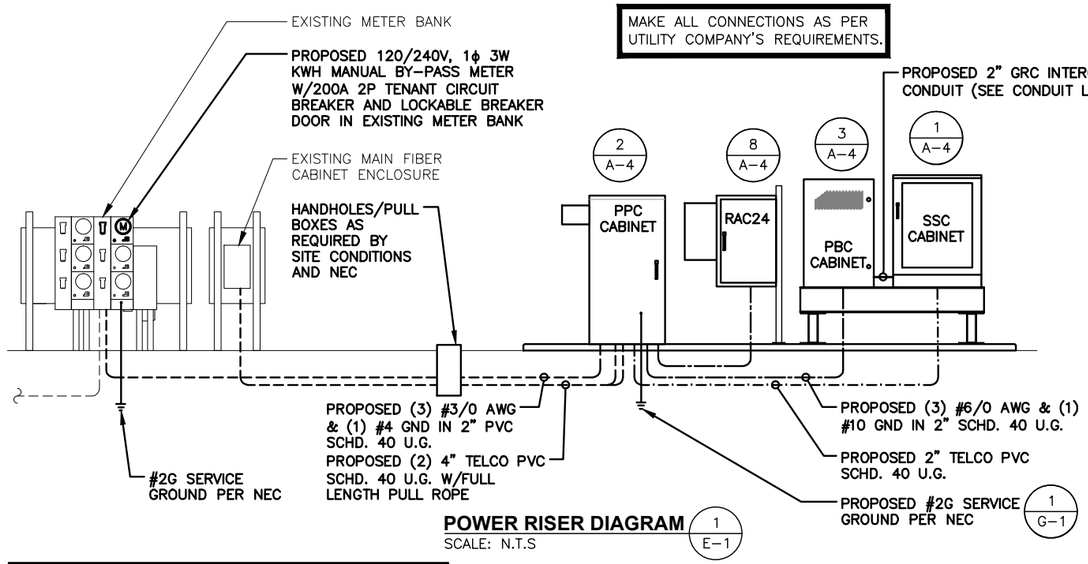
SHEET NUMBER
S-1

ELECTRICAL NOTES

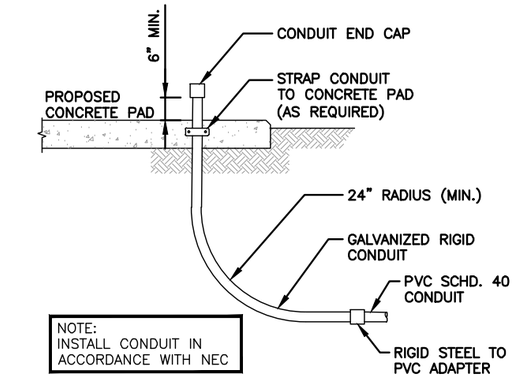
1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL METER BANK AND PROPOSED CELL SITE POWER PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON DRAWING A-3. PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.

LEGEND

A	AMPERE
V	VOLT
KWH	KILOWATT – HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
BGR	BURIED GROUND RING
BTCW	BARE TINNED SOLID COPPER WIRE
G	GROUND
⏚	GROUND
MGB	MASTER GROUND BAR
○	MECHANICAL CONNECTION
●	CADWELD CONNECTION
EGB	EQUIPMENT GROUND BAR
—G—	GROUND COPPER WIRE, SIZE AS NOTED
———	EXPOSED WIRING
———	#6G AWG INSULATED STRANDED
———	COAXIAL CABLE/HYBRID CABLE
⊙	5/8"x8' COPPER CLAD STAINLESS STEEL GROUND ROD
✱	GROUND ROD WITH TEST WELL
●—○	● EXOTHERMIC (CAD WELD) OR ○ MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
⊠	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL

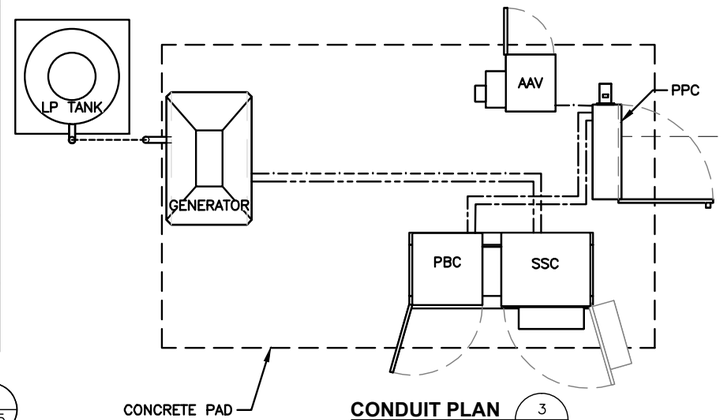


POWER RISER DIAGRAM 1 E-1
SCALE: N.T.S

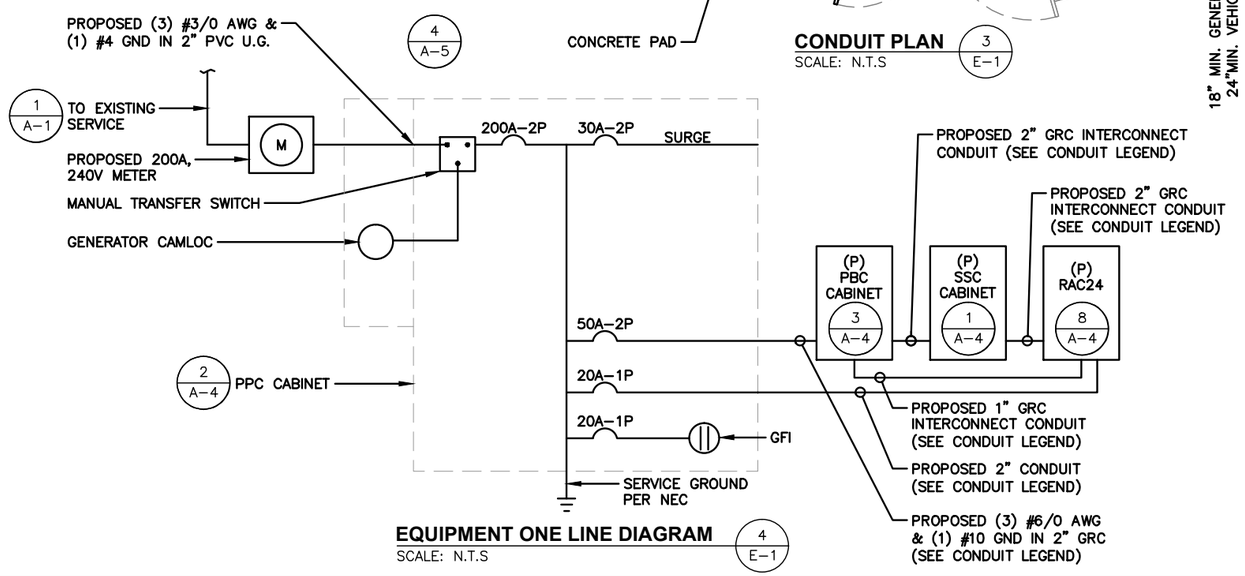


CONDUIT SWEEP DETAIL 2 E-1
SCALE: N.T.S

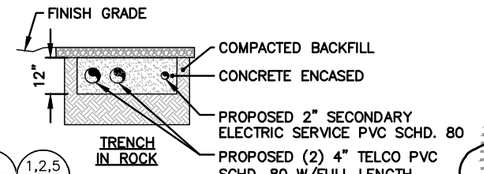
CONDUIT LEGEND	
———	2"ø GRC INTERCONNECT KIT, -48V DC, ON CONCRETE PAD, (1) CONDUIT PBC TO SSC AND (1) CONDUIT PBC TO FUTURE BBU, ANCHOR AT 3' INTERVALS , GROUNDING BOND AT EACH END
—·—·—	2"ø PVC SCHD. 40 CONDUIT, AC-POWER, BELOW CONCRETE PAD, (1) CONDUIT PPC TO PBC, (2) CONDUIT PPC TO FUTURE PBC
—··—	2"ø PVC SCHD. 40 CONDUIT, TELCO, BELOW CONCRETE PAD, (1) CONDUIT PPC TO SSC AND (1) CONDUIT SSC FOR DAISY CHAIN TO FUTURE SSC
—·—·—·—	1"ø CONDUIT, CAT 5 ALARM CABLE, ON CONCRETE PAD, (1) CONDUIT SSC TO GENERATOR
—··—··—	2"ø LIQUID TITE CONDUIT, 2/0 TELCO FLEX CABLE, ON CONCRETE PAD, (1) CONDUIT SSC TO GENERATOR



CONDUIT PLAN 3 E-1
SCALE: N.T.S



EQUIPMENT ONE LINE DIAGRAM 4 E-1
SCALE: N.T.S



1 A-1 1,2,5 E-1

SPECIAL WORK NOTE:
EXISTING UNDERGROUND UTILITY LOCATIONS ARE UNKNOWN. WHERE DIRECTED OR REQUIRED, HAND-EXCAVATE PROPOSED UTILITY TRENCHING

BURIED CONDUIT DETAIL 5 E-1
SCALE: N.T.S

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 29951
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
ELECTRICAL DETAILS AND NOTES

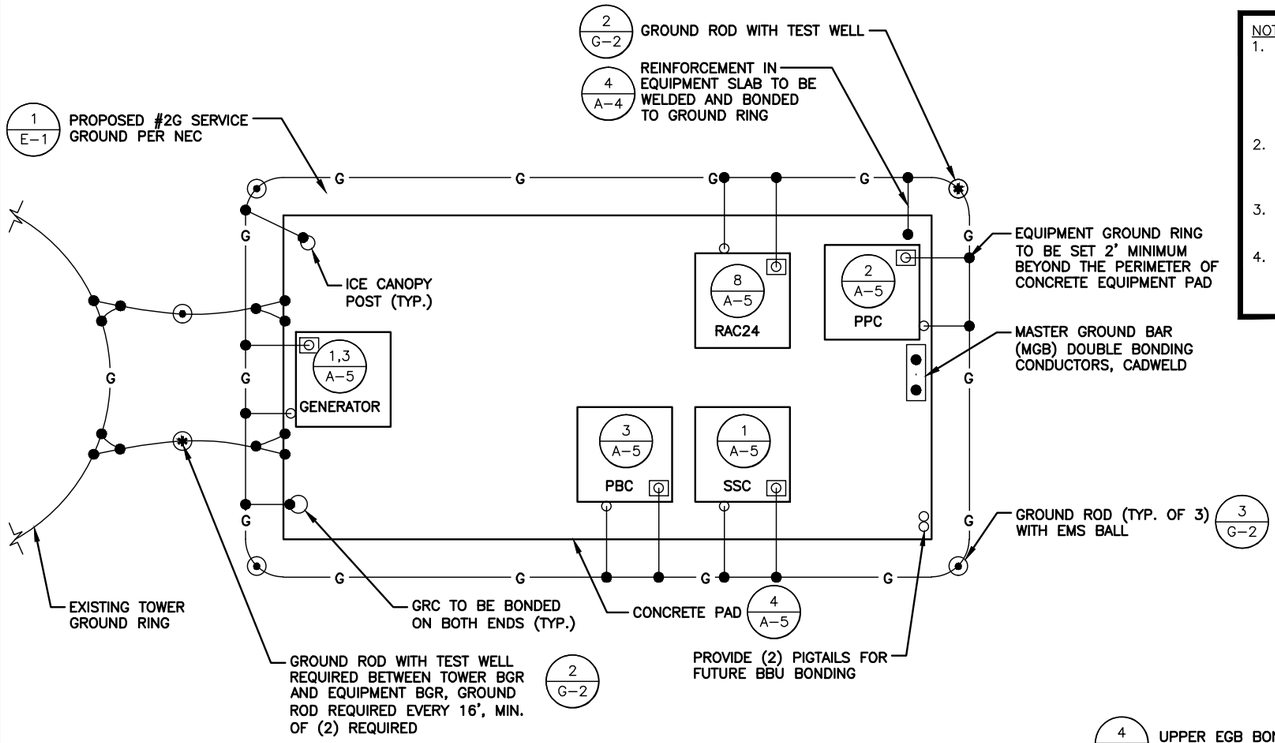
SHEET NUMBER
E-1

ELECTRICAL NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL METER BANK AND PROPOSED CELL SITE POWER PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON DRAWING A-3. PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.

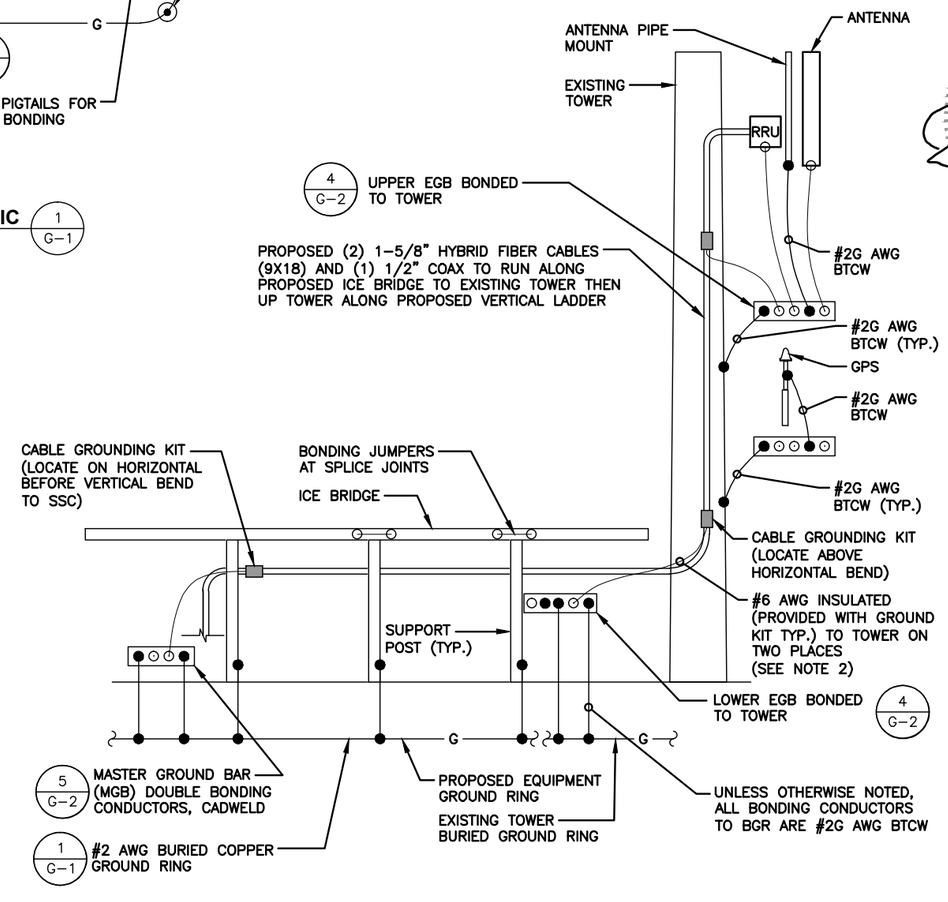
LEGEND

A	AMPERE
V	VOLT
KWH	KILOWATT – HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
BGR	BURIED GROUND RING
BTCW	BARE TINNED SOLID COPPER WIRE
G	GROUND
⏚	GROUND
MGB	MASTER GROUND BAR
	○ MECHANICAL CONNECTION
	● CADWELD CONNECTION
EGB	EQUIPMENT GROUND BAR
—G—	GROUND COPPER WIRE, SIZE AS NOTED
———	EXPOSED WIRING
———	#6G AWG INSULATED STRANDED
———	COAXIAL CABLE/HYBRID CABLE
⊙	5/8"x8' COPPER CLAD STAINLESS STEEL GROUND ROD
✱	GROUND ROD WITH TEST WELL
—○—●	● EXOTHERMIC (CAD WELD) OR
	○ MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
⊠	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL



EQUIPMENT PLAN GROUNDING RING SCHEMATIC 1 G-1
SCALE: N.T.S

NOTE:
1. BASE BID TO INCLUDE INSTALLATION OF A BURIED GROUND RING AND (6) GROUND RODS OR SINGLE XIT HORIZONTAL CHEMICAL ROD AS DETERMINED BY FIELD CONDITIONS. ADDITIONAL RODS AS REQUIRED TO ACHIEVE 5 OHMS RESISTANCE.
2. MAXIMUM VERTICAL/HORIZONTAL DISTANCE BETWEEN CABLE GROUNDING KITS SHALL NOT EXCEED 100 FEET. INSTALL ADDITIONAL KITS AS REQUIRED BY FIELD CONDITIONS.
3. ALL CONNECTIONS TO EQUIPMENT PER MANUFACTURER'S GUIDELINES.
4. ALL ABOVE-GRADE DOWNLEADS TO BGR SHALL BE INSTALLED IN 1" NON-METALLIC CONDUIT SECURED EVERY 2' WITH NON-METALLIC CLIPS.



GROUNDING RISER DIAGRAM 2 G-1
SCALE: N.T.S

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23951
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
GROUNDING SCHEMATIC AND RISER DIAGRAM

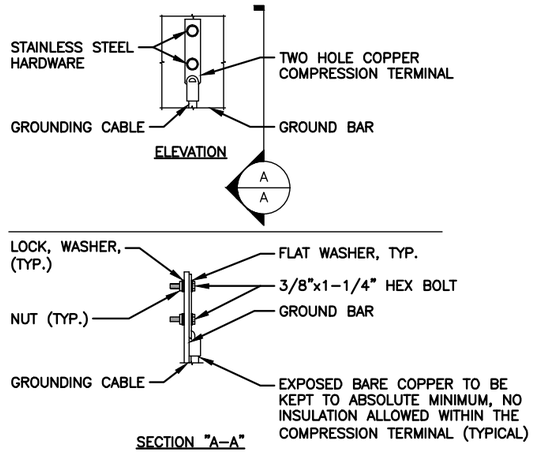
SHEET NUMBER
G-1

ELECTRICAL NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL METER BANK AND PROPOSED CELL SITE POWER PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON DRAWING A-3. PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.

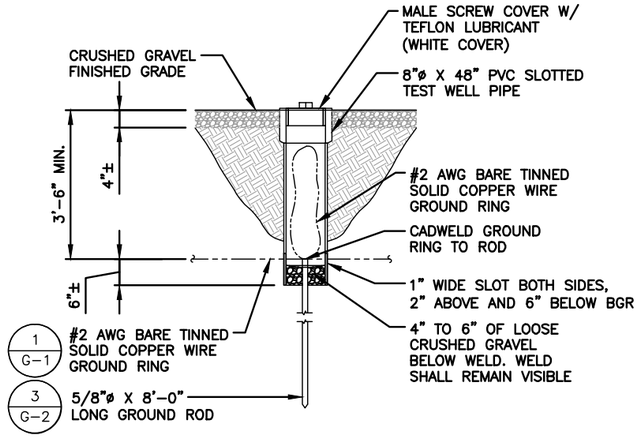
LEGEND

A	AMPERE
V	VOLT
KWH	KILOWATT – HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
BGR	BURIED GROUND RING
BTCW	BARE TINNED SOLID COPPER WIRE
G	GROUND
⏚	GROUND
MGB	MASTER GROUND BAR
	○ MECHANICAL CONNECTION
	● CADWELD CONNECTION
EGB	EQUIPMENT GROUND BAR
—G—	GROUND COPPER WIRE, SIZE AS NOTED
———	EXPOSED WIRING
———	#6G AWG INSULATED STRANDED
———	COAXIAL CABLE/HYBRID CABLE
⦿	5/8"x8' COPPER CLAD STAINLESS STEEL GROUND ROD
✱	GROUND ROD WITH TEST WELL
—o—●	● EXOTHERMIC (CAD WELD) OR
	○ MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
⊗	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL



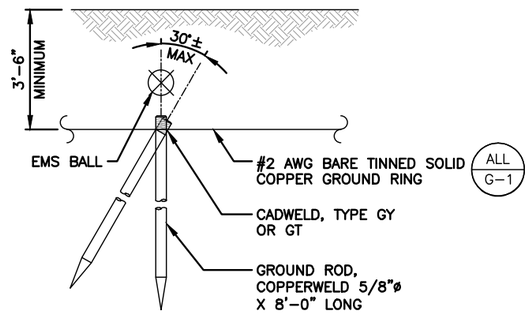
NOTE:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL 1 / G-2
SCALE: N.T.S



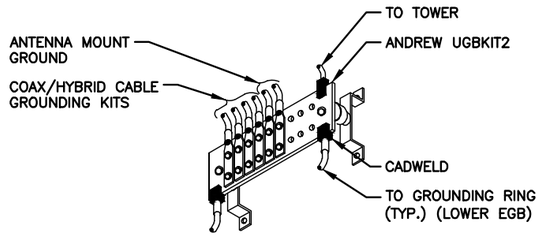
NOTE:
1. PROPOSED BGR TO BE INSTALLED 3'-6" MIN. BELOW GRADE OR BELOW LOCAL FROST DEPTH, WHICHEVER IS GREATER.
2. ONE TEST WELL SHALL BE PROVIDED BETWEEN THE TOWER GROUND LOOP AND TWO ON THE EQUIPMENT GROUND LOOP

GROUND ROD TEST WELL DETAIL 2 / G-2
SCALE: N.T.S

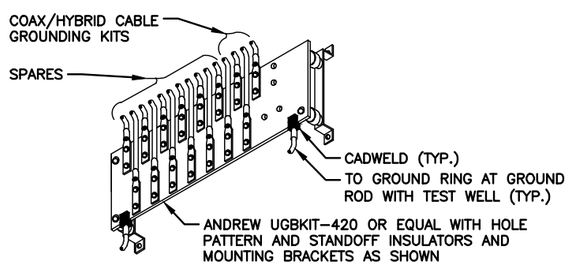


NOTE:
1. PROPOSED BGR TO BE INSTALLED 3'-6" MIN. BELOW GRADE OR BELOW LOCAL FROST DEPTH, WHICHEVER IS GREATER.
2. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 30 DEGREES FROM THE VERTICAL.

GROUND ROD DETAIL 3 / G-2
SCALE: N.T.S



EQUIPMENT GROUND BAR (EGB) 4 / G-2
SCALE: N.T.S



MASTER GROUND BAR (MGB) 5 / G-2
SCALE: N.T.S

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
OFFICE: (508) 286-2700
FAX: (508) 286-2893

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 3090
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23951
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	10/28/16	ISSUED FOR CONSTRUCTION	FM/DM

SITE NUMBER:
CTNH541A
CROWN BU NUMBER:
841293
SITE NAME:
CTNH541A
SITE ADDRESS:
136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY

SHEET TITLE
GROUNDING DETAILS AND NOTES

SHEET NUMBER
G-2

Date: **October 26, 2016**

GPD Engineering and Architecture
Professional Corporation

Timothy Howell
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(980) 209-8242

520 South Main Street, Suite 2531
Akron, OH 44311
(216) 927-8663
dpalkovic@gpdgroup.com

Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CTNH541A
	Carrier Site Name:	CTNH541A
Crown Castle Designation:	**Crown Castle BU Number:**	841293
	Crown Castle Site Name:	KENT-BULLS BRIDGE ROAD
	Crown Castle JDE Job Number:	397087
	Crown Castle Work Order Number:	1310346
	Crown Castle Application Number:	361773 Rev. 12
Engineering Firm Designation:	**GPD Project Number:**	2016777.841293.03
Site Data:	**136 BULLS BRIDGE ROAD, SOUTH KENT, Litchfield County, CT 06785**	
	Latitude *41° 40' 53.85"*, Longitude *-73° 29' 11.80"*	
	180 Foot – EEI Monopole Tower	

Dear Timothy Howell,

GPD 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 955791, in accordance with application 361773, Revision 11.

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: Structure w/ 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 115 mph converted to a nominal 3-second gust wind speed of 89 mph per Section 1609.3 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II was used in this analysis.

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

Respectfully submitted by:

Christopher J. Scheks, P.E.
Connecticut #: 0030026

10/26/2016

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
Table 1 - Proposed Antenna and Cable Information
Table 2 - Existing and Reserved Antenna and Cable Information
Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE
Table 4 - Documents Provided
3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
Table 5 - Section Capacity (Summary)
Table 6 - Tower Components vs. Capacity
4.1) Recommendations

5) DISCLAIMER OF WARRANTIES

6) APPENDIX A
tnxTower Output

7) APPENDIX B
Base Level Drawing

8) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 180-ft monopole tower originally designed by Engineered Endeavors Inc. in December of 2000 for a wind speed of 80 mph per TIA/EIA-222-F.

The tower has been modified per reinforcement drawings prepared by GPD (Project #: 2012882.39, dated: 12/13/2012). Reinforcement consists of installing new anchor rods and brackets to the existing tower.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building code based upon an ultimate 3-second gust wind speed of 115 mph converted to a nominal 3-second gust wind speed of 89 mph per Section 1609.3 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II was used in this analysis.

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
170.0	170.0	3	Commscope	LNX-6515DS-A1M	2	1-5/8	1
		3	Ericsson	RRUS 11 B12			
		3	Ericsson	RRUS 11 B2			
		3	Ericsson	RRUS 11 B4			
		3	RFS Celwave	APX16DWV-16DWV-S-E-A20			
		1		Sector Mount [SM 406-3]			
50.0	50.0	1	GPS	GPS_A	1	1/2	1
		1		Pipe Mount [PM 601-1]			

Notes:
1) See Appendix B for the proposed 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
180.0	185.0	3	Decibel	ASP-952	15 2 1	1-5/8 7/8 1/2	
	182.0	1	KMW	AM-X-CD-14-65-00T-RET			
		2	KMW	AM-X-CD-16-65-00T-RET			
		6	Powerwave	7770.00			
		6	Powerwave	LGP21401			
		6	Powerwave	LGP13519			
		6	Ericsson	RRUS 11			
		1	Raycap	DC6-48-60-18-8F			
	180.0	1		Platform Mount [LP 601-1]			
160.0	160.0	6	Commscope	SBNHH-1D65B	2	1-5/8	1
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Alcatel Lucent	RRH2x60-700			
		3	Alcatel Lucent	RRH2X60-AWS			
		1	RFS	DB-T1-6Z-8AB-0Z			
		6	Antel	LPA-80080-6CF-EDIN	12	1-5/8	
		1		Platform Mount [LP 601-1]			
134.0	144.0	2	Sinclair	SC442D-HF2LDF	2 2	1/2 1-5/8	1
	141.0	1	Bird	432E-83I-01-T			
		1	Sinclair	SC479-HF1LDF			
	139.0	2	Decibel	DB809DK-Y	4	1-5/8	
	134.0	1	Amphenol	WPA-700102-4CF-EDIN-9			1
		1		T-Arm Mount [TA 702-3]			
		1	TX RX	422-86A-99575-18BW			
124.0	124.0	3	RFS	APXVSPP18-C-A20	3	1-1/4	
		3	Alcatel Lucent	800MHZ RRH			
		1		Platform Mount [LP 601-1]			
120.0	120.0	1	ERI	100-1	1	7/8	
		1		Platform Mount [LP 601-1]			
80.0	80.0	2		Pipe Mount [PM 601-1]			2
63.0	63.0	1	GPS	GPS_A	1	1/2	
		1		Side Arm Mount [SO 701-1]			
10.0	12.0	1	RFS/Celwave	PD1121-6	1	1/2	
	10.0	1		Side Arm Mount [SO 309-1]			

Notes:
1) Reserved equipment.
2) Empty Mount

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)
180.0	180.0	12		7120.16		
		1		Low Profile Platform		
170.0	170.0	12		7120.16		
		1		Low Profile Platform		
160.0	160.0	12		7120.16		
		1		Low Profile Platform		
130.0	140.5	2		21' Omni		
	130.0	2		Side Arm		
124.5	124.5	9		7120.16		
		1		Low Profile Platform		
114.5	114.5	6		7120.16		
		1		Low Profile Platform		
104.5	104.5	12		7120.16		
		1		Low Profile Platform		
80.0	80.0	2		6' HP MW		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Tower Drawings	Engineered Endeavors, Inc. Job #: 7846, dated: 9/21/2001	4456613	CCISITES
Geotechnical Report	GPD Project #: 2012801.85, dated: 11/13/2012	4456627	CCISITES
Modification Drawings	GPD Project #: 2012882.39, dated: 12/13/2012	4456597	CCISITES
Post Modification Observation Report	GPD Project #: 2013707.52, dated: 8/28/2013	4456621	CCISITES
Foundation NDT	FDH Engineering, Inc. Project #: 1403061500, dated: 4/1/2014	4797649	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.7.0), 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.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_{allow} (K)	% Capacity	Pass / Fail
L1	180 - 133.237	Pole	TP25.5375x15x0.25	1	-8.82	1441.72	84.3	Pass
L2	133.237 - 87.636	Pole	TP35.1887x24.2053x0.375	2	-22.03	2982.06	87.5	Pass
L3	87.636 - 43.063	Pole	TP44.3577x33.3474x0.4375	3	-38.13	4392.38	85.5	Pass
L4	43.063 - 0	Pole	TP53x42.1375x0.5	4	-42.51	5126.07	78.5	Pass
							Summary	
						Pole (L2)	87.5	Pass
						RATING =	**87.5**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	67.6	Pass
1	Base Plate	0	79.7	Pass
1	Base Foundation	0	51.7	Pass
1	Base Foundation Soil Interaction	0	91.0	Pass

Structure Rating (max from all components) =	**91.0%**

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

4.1) Recommendations

The existing tower and its foundation are sufficient for the proposed loading and do not require modifications.

5) DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

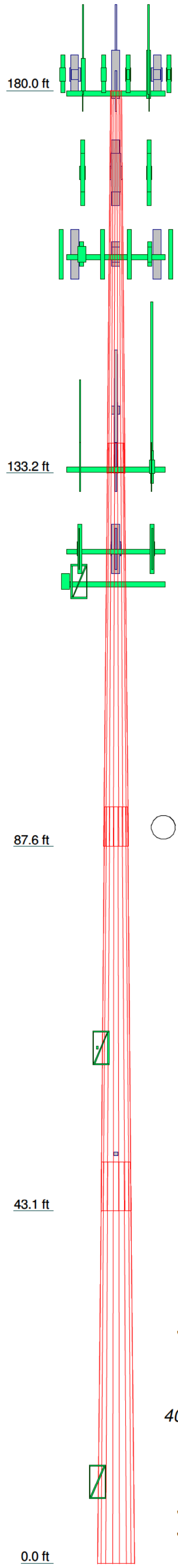
Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

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	46.76	18	0.2500	3.69	15.0000	25.5375	A572-65	2.5
2	49.29	18	0.3750	4.90	24.2053	35.1887		5.9
3	49.47	18	0.4375	6.04	33.3474	44.3577		9.0
4	49.11	18	0.5000		42.1375	53.0000		12.5
								29.8



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ASP-952	180	(2) SBNHH-1D65B w/ Mount Pipe	160
(2) RRUS 11	180	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	160
AM-X-CD-16-65-00T-RET w/ Mount Pipe	180	RRH2x60-700	160
(2) 7770.00 w/ Mount Pipe	180	RRH2X60-AWS	160
(2) LGP13519	180	RRH2X60-PCS	160
(2) LGP21401	180	(2) SBNHH-1D65B w/ Mount Pipe	160
DC6-48-60-18-8F Surge Suppression Unit	180	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	160
ASP-952	180	RRH2x60-700	160
(2) RRUS 11	180	RRH2X60-AWS	160
AM-X-CD-16-65-00T-RET w/ Mount Pipe	180	RRH2X60-PCS	160
(2) 7770.00 w/ Mount Pipe	180	(2) SBNHH-1D65B w/ Mount Pipe	160
(2) LGP13519	180	DB-T1-6Z-8AB-0Z	160
(2) LGP21401	180	Platform Mount [LP 601-1]	160
ASP-952	180	432E-83I-01-T	134
(2) RRUS 11	180	(2) SC442D-HF2LDF	134
AM-X-CD-14-65-00T-RET w/ Mount Pipe	180	SC479-HF1LDF	134
(2) 7770.00 w/ Mount Pipe	180	WPA-700102-4CF-EDIN-9 w/ Mount Pipe	134
(2) LGP13519	180	422-86A-99575-18BW	134
(2) LGP21401	180	(2) DB809DK-Y	134
Platform Mount [LP 601-1]	180	T-Arm Mount [TA 702-3]	134
(2) 5' x 2' Pipe Mount	180	(2) 6' x 2" Mount Pipe	134
(2) 5' x 2' Pipe Mount	180	6' x 2" Mount Pipe	134
(2) 5' x 2' Pipe Mount	180	(2) 6' x 2" Mount Pipe	134
LNX-6515DS-A1M w/ Mount Pipe	170	800MHZ RRH	124
RRUS 11 B12	170	APXVSPP18-C-A20 w/ Mount Pipe	124
RRUS 11 B2	170	800MHZ RRH	124
RRUS 11 B4	170	APXVSPP18-C-A20 w/ Mount Pipe	124
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	170	800MHZ RRH	124
LNX-6515DS-A1M w/ Mount Pipe	170	APXVSPP18-C-A20 w/ Mount Pipe	124
RRUS 11 B12	170	Platform Mount [LP 601-1]	124
RRUS 11 B2	170	(2) 5' x 2' Pipe Mount	124
RRUS 11 B4	170	(2) 5' x 2' Pipe Mount	124
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	170	(2) 5' x 2' Pipe Mount	124
LNX-6515DS-A1M w/ Mount Pipe	170	8-ft Ladder	124
RRUS 11 B12	170	100-1	120
RRUS 11 B2	170	Platform Mount [LP 601-1]	120
RRUS 11 B4	170	(2) 8' x 2" Sch 40 Pipe Mount	120
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	170	(2) 8' x 2" Sch 40 Pipe Mount	120
Sector Mount [SM 406-3]	170	(2) 8' x 2" Sch 40 Pipe Mount	120
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	160	(2) Side Arm Mount [SO 301-1]	120
RRH2x60-700	160	8-ft Ladder	120
RRH2X60-AWS	160	(2) Platform Mount [LP 601-1]	80
RRH2X60-PCS	160	GPS_A	63
		Side Arm Mount [SO 701-1]	63
		GPS_A	50
		Pipe Mount [PM 601-1]	50
		PD1121-6	10
		Side Arm Mount [SO 309-1]	10

MATERIAL STRENGTH

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

ALL REACTIONS ARE FACTORED

AXIAL 118 K

SHEAR 10 K

MOMENT 1558 kip-ft

TORQUE 1 kip-ft

40 mph WIND - 1.0000 in ICE

AXIAL 58 K

SHEAR 38 K

MOMENT 5063 kip-ft

TORQUE 5 kip-ft

REACTIONS - 89 mph WIND

TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 89 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 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: 87.5%

GPD Group
520 South Main Street Suite 2531
Akron, Ohio 44311
Phone: (330) 572.2100
FAX: (330) 572.2101

Job: KENT-BULLS BRIDGE ROAD / BU #: 841293		
Project: 2016777.841293.03		
Client: Crown Castle Inc.	Drawn by: mmoeller	App'd:
Code: TIA-222-G	Date: 10/26/16	Scale: NTS
Path: \\AKRN05.gpdco.com\TELECOM\Crown\841293\03 Mods\Rev 0\tnx\841293.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 Litchfield County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 89 mph.
Structure Class II.
Exposure Category C.
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 40 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* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	180.00-133.24	46.76	3.69	18	15.0000	25.5375	0.2500	1.0000	A572-65 (65 ksi)
L2	133.24-87.64	49.29	4.90	18	24.2053	35.1887	0.3750	1.5000	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	87.64-43.06	49.47	6.04	18	33.3474	44.3577	0.4375	1.7500	A572-65 (65 ksi)
L4	43.06-0.00	49.11		18	42.1375	53.0000	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	15.2314	11.7041	321.7069	5.2363	7.6200	42.2188	643.8372	5.8532	2.2000	8.8
	25.9315	20.0656	1621.0711	8.9771	12.9731	124.9568	3244.2753	10.0347	4.0546	16.218
L2	25.4143	28.3640	2035.0053	8.4598	12.2963	165.4973	4072.6882	14.1847	3.6001	9.6
	35.7315	41.4370	6344.9205	12.3589	17.8759	354.9435	12698.1899	20.7224	5.5332	14.755
L3	34.9687	45.6995	6253.1737	11.6830	16.9405	369.1266	12514.5755	22.8541	5.0991	11.655
	45.0420	60.9887	14863.3039	15.5917	22.5337	659.6030	29746.1653	30.5001	7.0370	16.084
L4	44.1451	66.0788	14473.3646	14.7813	21.4059	676.1400	28965.7737	33.0457	6.5362	13.072
	53.8176	83.3175	29012.9766	18.6375	26.9240	1077.5879	58064.1291	41.6667	8.4480	16.896

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 180.00-133.24				1	1	1			
L2 133.24-87.64				1	1	1			
L3 87.64-43.06				1	1	1			
L4 43.06-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
LDF7-50A(1-5/8")	A	Surface Ar (CaAa)	180.00 - 8.00	3	3	0.000 0.200	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	B	Surface Ar (CaAa)	170.00 - 8.00	2	2	0.150 0.450	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	A	Surface Ar (CaAa)	160.00 - 8.00	4	4	-0.300 -0.100	0.0000		0.82
LDF4-50A(1/2")	B	Surface Ar (CaAa)	50.00 - 8.00	1	1	0.150 0.450	0.0000		0.15
LDF4-50A(1/2")	C	Surface Ar (CaAa)	10.00 - 8.00	1	1	-0.200 -0.200	0.0000		0.15

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
LDF4-50A(1/2")	C	No	Inside Pole	180.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
LDF5-50A(7/8")	C	No	Inside Pole	180.00 - 8.00	2	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
LDF7-50A(1-5/8")	C	No	Inside Pole	180.00 - 8.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
2" (Nominal) Conduit	C	No	Inside Pole	180.00 - 8.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
LDF7-50A(1-5/8")	C	No	Inside Pole	160.00 - 8.00	10	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
AVA7-50(1-5/8")	C	No	Inside Pole	134.00 - 8.00	2	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
LDF4-50A(1/2")	C	No	Inside Pole	134.00 - 8.00	2	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
LDF7-50A(1-5/8")	C	No	Inside Pole	134.00 - 8.00	4	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
HB114-1-08U4-M5J(1-1/4")	C	No	Inside Pole	124.00 - 8.00	3	No Ice	0.00	1.08
						1/2" Ice	0.00	1.08
						1" Ice	0.00	1.08
LDF5-50A(7/8")	C	No	Inside Pole	120.00 - 8.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
LDF4-50A(1/2")	C	No	Inside Pole	63.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	180.00-133.24	A	0.000	0.000	27.777	0.000	0.20
		B	0.000	0.000	14.558	0.000	0.06
		C	0.000	0.000	0.000	0.000	0.75
L2	133.24-87.64	A	0.000	0.000	27.087	0.000	0.26
		B	0.000	0.000	18.058	0.000	0.07
		C	0.000	0.000	0.000	0.000	1.25
L3	87.64-43.06	A	0.000	0.000	26.476	0.000	0.26
		B	0.000	0.000	17.651	0.000	0.07
		C	0.000	0.000	0.000	0.000	1.26
L4	43.06-0.00	A	0.000	0.000	20.827	0.000	0.20
		B	0.000	0.000	13.885	0.000	0.06
		C	0.000	0.000	0.000	0.000	0.99

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	180.00-133.24	A	2.334	0.000	0.000	77.629	0.000	1.32
		B		0.000	0.000	39.651	0.000	0.66
		C		0.000	0.000	0.000	0.000	0.75
L2	133.24-87.64	A	2.255	0.000	0.000	87.081	0.000	1.48
		B		0.000	0.000	49.184	0.000	0.81
		C		0.000	0.000	0.000	0.000	1.25
L3	87.64-43.06	A	2.140	0.000	0.000	83.344	0.000	1.39
		B		0.000	0.000	50.316	0.000	0.81
		C		0.000	0.000	0.000	0.000	1.26
L4	43.06-0.00	A	1.918	0.000	0.000	63.546	0.000	1.03
		B		0.000	0.000	51.117	0.000	0.76
		C		0.000	0.000	0.575	0.000	1.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	180.00-133.24	-0.1285	-0.3903	-0.1932	-0.3631
L2	133.24-87.64	-0.0579	-0.4072	-0.2283	-0.4117
L3	87.64-43.06	-0.0601	-0.4288	-0.2232	-0.4751
L4	43.06-0.00	-0.0512	-0.3678	-0.0143	-0.4249

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	6	LDF7-50A(1-5/8")	133.24 - 180.00	1.0000	1.0000
L1	8	LDF7-50A (1-5/8 FOAM)	133.24 - 170.00	1.0000	1.0000
L1	10	LDF7-50A (1-5/8 FOAM)	133.24 - 160.00	1.0000	1.0000
L2	6	LDF7-50A(1-5/8")	87.64 - 133.24	1.0000	1.0000
L2	8	LDF7-50A (1-5/8 FOAM)	87.64 - 133.24	1.0000	1.0000
L2	10	LDF7-50A (1-5/8 FOAM)	87.64 - 133.24	1.0000	1.0000
L2	18	LDF4-50A(1/2")	87.64 - 50.00	1.0000	1.0000
L3	6	LDF7-50A(1-5/8")	43.06 - 87.64	1.0000	1.0000
L3	8	LDF7-50A (1-5/8 FOAM)	43.06 - 87.64	1.0000	1.0000
L3	10	LDF7-50A (1-5/8 FOAM)	43.06 - 87.64	1.0000	1.0000
L3	18	LDF4-50A(1/2")	43.06 - 50.00	1.0000	1.0000
L3	19	LDF4-50A(1/2")	43.06 - 10.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ASP-952	A	From Leg	4.00	0.0000	180.00	No Ice	3.02	3.02	0.02
			0.00			1/2" Ice	4.16	4.16	0.04
			5.00			1" Ice	5.30	5.30	0.07
(2) RRUS 11	A	From Leg	4.00	0.0000	180.00	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	0.10
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	180.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			2.00			1" Ice	9.35	8.37	0.21
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	180.00	No Ice	5.84	4.35	0.06
			0.00			1/2" Ice	6.32	5.20	0.11
			2.00			1" Ice	6.77	5.92	0.16
(2) LGP13519	A	From Leg	4.00	0.0000	180.00	No Ice	0.29	0.18	0.01
			0.00			1/2" Ice	0.36	0.24	0.01
			2.00			1" Ice	0.44	0.31	0.01
(2) LGP21401	A	From Leg	4.00	0.0000	180.00	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
DC6-48-60-18-8F Surge Suppression Unit	A	From Leg	4.00	0.0000	180.00	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
ASP-952	B	From Leg	4.00	0.0000	180.00	No Ice	3.02	3.02	0.02
			0.00			1/2" Ice	4.16	4.16	0.04
			5.00			1" Ice	5.30	5.30	0.07
(2) RRUS 11	B	From Leg	4.00	0.0000	180.00	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	0.10
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	180.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			2.00			1" Ice	9.35	8.37	0.21
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	180.00	No Ice	5.84	4.35	0.06
			0.00			1/2" Ice	6.32	5.20	0.11
			2.00			1" Ice	6.77	5.92	0.16
(2) LGP13519	B	From Leg	4.00	0.0000	180.00	No Ice	0.29	0.18	0.01
			0.00			1/2" Ice	0.36	0.24	0.01
			2.00			1" Ice	0.44	0.31	0.01
(2) LGP21401	B	From Leg	4.00	0.0000	180.00	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
ASP-952	C	From Leg	4.00	0.0000	180.00	No Ice	3.02	3.02	0.02
			0.00			1/2" Ice	4.16	4.16	0.04
			5.00			1" Ice	5.30	5.30	0.07
(2) RRUS 11	C	From Leg	4.00	0.0000	180.00	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	0.10
AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	180.00	No Ice	5.94	4.73	0.07
			0.00			1/2" Ice	6.68	5.87	0.12
			2.00			1" Ice	7.35	6.85	0.18
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	180.00	No Ice	5.84	4.35	0.06
			0.00			1/2" Ice	6.32	5.20	0.11
			2.00			1" Ice	6.77	5.92	0.16
(2) LGP13519	C	From Leg	4.00	0.0000	180.00	No Ice	0.29	0.18	0.01
			0.00			1/2" Ice	0.36	0.24	0.01
			2.00			1" Ice	0.44	0.31	0.01
(2) LGP21401	C	From Leg	4.00	0.0000	180.00	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

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Platform Mount [LP 601-1]	A	None		0.0000	180.00	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
(2) 5' x 2' Pipe Mount	A	From Leg	4.00 0.00	0.0000	180.00	No Ice 1/2" Ice	1.00 1.39	1.00 1.39	0.03 0.04
			0.00			1" Ice	1.70	1.70	0.05
(2) 5' x 2' Pipe Mount	B	From Leg	4.00 0.00	0.0000	180.00	No Ice 1/2" Ice	1.00 1.39	1.00 1.39	0.03 0.04
			0.00			1" Ice	1.70	1.70	0.05
(2) 5' x 2' Pipe Mount	C	From Leg	4.00 0.00	0.0000	180.00	No Ice 1/2" Ice	1.00 1.39	1.00 1.39	0.03 0.04
			0.00			1" Ice	1.70	1.70	0.05
****									
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	0.08 0.17
			0.00			1" Ice	13.14	12.91	0.27
RRUS 11 B12	A	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B2	A	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B4	A	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	A	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	7.14 7.76	3.81 4.88	0.07 0.12
			0.00			1" Ice	8.29	5.66	0.18
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	0.08 0.17
			0.00			1" Ice	13.14	12.91	0.27
RRUS 11 B12	B	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B2	B	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B4	B	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	B	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	7.14 7.76	3.81 4.88	0.07 0.12
			0.00			1" Ice	8.29	5.66	0.18
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	0.08 0.17
			0.00			1" Ice	13.14	12.91	0.27
RRUS 11 B12	C	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B2	C	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B4	C	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.83 3.04	1.18 1.33	0.05 0.07
			0.00			1" Ice	3.26	1.48	0.10
APX16DWV-16DWV-S-E-A 20 w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	7.14 7.76	3.81 4.88	0.07 0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
				0.00				1" Ice	8.29	5.66	0.18
Sector Mount [SM 406-3]	C	None				0.0000	170.00	No Ice	19.83	19.83	0.92
								1/2" Ice	29.41	29.41	1.33
								1" Ice	38.99	38.99	1.73
****											
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	4.56	10.27	0.05
								1/2" Ice	5.10	11.44	0.11
								1" Ice	5.61	12.32	0.19
RRH2x60-700	A	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	3.50	1.82	0.06
								1/2" Ice	3.76	2.05	0.08
								1" Ice	4.03	2.29	0.11
RRH2X60-AWS	A	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	3.50	2.10	0.06
								1/2" Ice	3.76	2.34	0.08
								1" Ice	4.03	2.58	0.11
RRH2X60-PCS	A	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	2.20	1.36	0.06
								1/2" Ice	2.39	1.52	0.07
								1" Ice	2.59	1.68	0.09
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	8.53	7.24	0.09
								1/2" Ice	9.19	8.52	0.16
								1" Ice	9.82	9.66	0.24
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	4.56	10.27	0.05
								1/2" Ice	5.10	11.44	0.11
								1" Ice	5.61	12.32	0.19
RRH2x60-700	B	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	3.50	1.82	0.06
								1/2" Ice	3.76	2.05	0.08
								1" Ice	4.03	2.29	0.11
RRH2X60-AWS	B	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	3.50	2.10	0.06
								1/2" Ice	3.76	2.34	0.08
								1" Ice	4.03	2.58	0.11
RRH2X60-PCS	B	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	2.20	1.36	0.06
								1/2" Ice	2.39	1.52	0.07
								1" Ice	2.59	1.68	0.09
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	8.53	7.24	0.09
								1/2" Ice	9.19	8.52	0.16
								1" Ice	9.82	9.66	0.24
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	4.56	10.27	0.05
								1/2" Ice	5.10	11.44	0.11
								1" Ice	5.61	12.32	0.19
RRH2x60-700	C	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	3.50	1.82	0.06
								1/2" Ice	3.76	2.05	0.08
								1" Ice	4.03	2.29	0.11
RRH2X60-AWS	C	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	3.50	2.10	0.06
								1/2" Ice	3.76	2.34	0.08
								1" Ice	4.03	2.58	0.11
RRH2X60-PCS	C	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	2.20	1.36	0.06
								1/2" Ice	2.39	1.52	0.07
								1" Ice	2.59	1.68	0.09
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	8.53	7.24	0.09
								1/2" Ice	9.19	8.52	0.16
								1" Ice	9.82	9.66	0.24
DB-T1-6Z-8AB-0Z	C	From Leg	4.00	0.00	0.00	0.0000	160.00	No Ice	4.80	2.00	0.04
								1/2" Ice	5.07	2.19	0.08
								1" Ice	5.35	2.39	0.12
Platform Mount [LP 601-1]	A	None				0.0000	160.00	No Ice	28.47	28.47	1.12
								1/2" Ice	33.59	33.59	1.51
								1" Ice	38.71	38.71	1.91
****											

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
432E-83I-01-T	A	From Leg	4.00 0.00 7.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	1.20 1.34 1.48	0.75 0.86 0.98	0.03 0.04 0.05
(2) SC442D-HF2LDF	B	From Leg	4.00 0.00 10.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	7.52 12.20 14.29	7.52 12.20 14.29	0.08 0.15 0.23
SC479-HF1LDF	A	From Leg	4.00 0.00 7.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	5.06 6.54 8.04	5.06 6.54 8.04	0.03 0.07 0.11
WPA-700102-4CF-EDIN-9 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	3.81 4.17 4.54	3.97 4.58 5.19	0.03 0.07 0.11
422-86A-99575-18BW	B	From Leg	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	2.67 2.87 3.08	1.03 1.17 1.32	0.05 0.07 0.09
(2) DB809DK-Y	C	From Leg	4.00 0.00 5.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	3.39 4.55 5.73	3.39 4.55 5.73	0.03 0.06 0.09
T-Arm Mount [TA 702-3]	A	None		0.0000	134.00	No Ice 1/2" Ice 1" Ice	5.64 6.55 7.46	5.64 6.55 7.46	0.34 0.43 0.52
(2) 6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
(2) 6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
****									
800MHZ RRH	A	From Leg	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	2.13 2.32 2.51	1.77 1.95 2.13	0.05 0.07 0.10
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	6.71 7.66 8.49	0.08 0.14 0.22
800MHZ RRH	B	From Leg	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	2.13 2.32 2.51	1.77 1.95 2.13	0.05 0.07 0.10
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	6.71 7.66 8.49	0.08 0.14 0.22
800MHZ RRH	C	From Leg	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	2.13 2.32 2.51	1.77 1.95 2.13	0.05 0.07 0.10
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	6.71 7.66 8.49	0.08 0.14 0.22
Platform Mount [LP 601-1]	A	None		0.0000	124.00	No Ice 1/2" Ice 1" Ice	28.47 33.59 38.71	28.47 33.59 38.71	1.12 1.51 1.91
(2) 5' x 2' Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	1.00 1.39 1.70	1.00 1.39 1.70	0.03 0.04 0.05
(2) 5' x 2' Pipe Mount	B	From Leg	4.00 0.00	0.0000	124.00	No Ice 1/2" Ice	1.00 1.39	1.00 1.39	0.03 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	1.70	1.70	0.05
(2) 5' x 2' Pipe Mount	C	From Leg	4.00	0.0000	124.00	No Ice	1.00	1.00	0.03
			0.00			1/2" Ice	1.39	1.39	0.04
			0.00			1" Ice	1.70	1.70	0.05
8-ft Ladder	C	None		0.0000	124.00	No Ice	7.07	7.07	0.04
						1/2" Ice	9.73	9.73	0.07
						1" Ice	11.19	11.19	0.08
****									
100-1	C	From Leg	6.00	0.0000	120.00	No Ice	4.80	6.00	0.02
			0.00			1/2" Ice	5.07	6.30	0.08
			0.00			1" Ice	5.35	6.61	0.16
Platform Mount [LP 601-1]	A	None		0.0000	120.00	No Ice	28.47	28.47	1.12
						1/2" Ice	33.59	33.59	1.51
						1" Ice	38.71	38.71	1.91
(2) 8' x 2" Sch 40 Pipe Mount	A	From Leg	4.00	0.0000	120.00	No Ice	1.90	1.90	0.03
			0.00			1/2" Ice	2.73	2.73	0.04
			0.00			1" Ice	3.40	3.40	0.06
(2) 8' x 2" Sch 40 Pipe Mount	B	From Leg	4.00	0.0000	120.00	No Ice	1.90	1.90	0.03
			0.00			1/2" Ice	2.73	2.73	0.04
			0.00			1" Ice	3.40	3.40	0.06
(2) 8' x 2" Sch 40 Pipe Mount	C	From Leg	4.00	0.0000	120.00	No Ice	1.90	1.90	0.03
			0.00			1/2" Ice	2.73	2.73	0.04
			0.00			1" Ice	3.40	3.40	0.06
(2) Side Arm Mount [SO 301-1]	C	From Leg	4.00	0.0000	120.00	No Ice	1.00	0.90	0.02
			0.00			1/2" Ice	1.39	1.42	0.03
			0.00			1" Ice	1.78	1.94	0.04
8-ft Ladder	C	None		0.0000	120.00	No Ice	7.07	7.07	0.04
						1/2" Ice	9.73	9.73	0.07
						1" Ice	11.19	11.19	0.08
(2) Platform Mount [LP 601-1]	C	From Leg	0.00	0.0000	80.00	No Ice	28.47	28.47	1.12
			0.00			1/2" Ice	33.59	33.59	1.51
			0.00			1" Ice	38.71	38.71	1.91
****									
GPS_A	C	From Leg	1.00	0.0000	63.00	No Ice	0.26	0.26	0.00
			0.00			1/2" Ice	0.32	0.32	0.00
			0.00			1" Ice	0.39	0.39	0.01
Side Arm Mount [SO 701-1]	C	From Leg	0.50	0.0000	63.00	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
****									
GPS_A	A	From Leg	1.00	0.0000	50.00	No Ice	0.26	0.26	0.00
			0.00			1/2" Ice	0.32	0.32	0.00
			0.00			1" Ice	0.39	0.39	0.01
Pipe Mount [PM 601-1]	A	From Face	0.50	0.0000	50.00	No Ice	3.00	0.90	0.07
			0.00			1/2" Ice	3.74	1.12	0.08
			0.00			1" Ice	4.48	1.34	0.09
****									
PD1121-6	C	From Leg	1.00	0.0000	10.00	No Ice	0.23	0.23	0.00
			0.00			1/2" Ice	0.41	0.41	0.00
			2.00			1" Ice	0.60	0.60	0.00
Side Arm Mount [SO 309-1]	C	From Leg	0.50	0.0000	10.00	No Ice	2.82	2.20	0.04
			0.00			1/2" Ice	4.07	3.16	0.06
			0.00			1" Ice	5.32	4.12	0.08

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	154.77	1.388	27	80.204	A	0.000	80.204	80.204	100.00	27.777	0.000
180.00-133.24					B	0.000	80.204		100.00	14.558	0.000
					C	0.000	80.204		100.00	0.000	0.000
L2	109.40	1.29	25	116.180	A	0.000	116.180	116.180	100.00	27.087	0.000
133.24-87.64					B	0.000	116.180		100.00	18.058	0.000
					C	0.000	116.180		100.00	0.000	0.000
L3 87.64-43.06	64.82	1.155	22	148.597	A	0.000	148.597	148.597	100.00	26.476	0.000
					B	0.000	148.597		100.00	17.651	0.000
					C	0.000	148.597		100.00	0.000	0.000
L4 43.06-0.00	21.68	0.917	18	175.774	A	0.000	175.774	175.774	100.00	20.827	0.000
					B	0.000	175.774		100.00	13.885	0.000
					C	0.000	175.774		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	154.77	1.388	5	2.3343	98.397	A	0.000	98.397	98.397	100.00	77.629	0.000
180.00-133.24						B	0.000	98.397		100.00	39.651	0.000
						C	0.000	98.397		100.00	0.000	0.000
L2 133.24-87.64	109.40	1.29	5	2.2547	133.920	A	0.000	133.920	133.920	100.00	87.081	0.000
						B	0.000	133.920		100.00	49.184	0.000
						C	0.000	133.920		100.00	0.000	0.000
L3 87.64-43.06	64.82	1.155	4	2.1397	165.346	A	0.000	165.346	165.346	100.00	83.344	0.000
						B	0.000	165.346		100.00	50.316	0.000
						C	0.000	165.346		100.00	0.000	0.000
L4 43.06-0.00	21.68	0.917	4	1.9177	191.131	A	0.000	191.131	191.131	100.00	63.546	0.000
						B	0.000	191.131		100.00	51.117	0.000
						C	0.000	191.131		100.00	0.575	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	154.77	1.388	11	80.204	A	0.000	80.204	80.204	100.00	27.777	0.000
180.00-133.24					B	0.000	80.204		100.00	14.558	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	80.204		100.00	0.000	0.000
L2	109.40	1.29	10	116.180	A	0.000	116.180	116.180	100.00	27.087	0.000
133.24-87.64					B	0.000	116.180		100.00	18.058	0.000
					C	0.000	116.180		100.00	0.000	0.000
L3 87.64-43.06	64.82	1.155	9	148.597	A	0.000	148.597	148.597	100.00	26.476	0.000
					B	0.000	148.597		100.00	17.651	0.000
					C	0.000	148.597		100.00	0.000	0.000
L4 43.06-0.00	21.68	0.917	7	175.774	A	0.000	175.774	175.774	100.00	20.827	0.000
					B	0.000	175.774		100.00	13.885	0.000
					C	0.000	175.774		100.00	0.000	0.000

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

Comb. No.	Description
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	180 - 133.237	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-37.36	1.46	0.20
			Max. Mx	20	-8.98	594.18	-0.50
			Max. My	2	-8.99	-0.01	593.45
			Max. Vy	20	-18.72	594.18	-0.50
			Max. Vx	14	18.69	0.70	-593.34
			Max. Torque	16			2.33
L2	133.237 - 87.636	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-66.10	0.93	-5.15
			Max. Mx	20	-22.17	1747.33	-1.11
			Max. My	14	-22.18	0.62	-1746.08
			Max. Vy	20	-29.29	1747.33	-1.11
			Max. Vx	14	29.26	0.62	-1746.08
			Max. Torque	17			2.56
L3	87.636 - 43.063	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-91.54	10.82	-9.33
			Max. Mx	20	-38.20	3168.28	-2.41
			Max. My	14	-38.21	4.06	-3163.63
			Max. Vy	20	-34.86	3168.28	-2.41
			Max. Vx	14	34.80	4.06	-3163.63
			Max. Torque	11			-4.90
L4	43.063 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-118.18	11.58	-8.59
			Max. Mx	20	-57.99	4947.13	0.33
			Max. My	14	-57.99	1.89	-4939.25
			Max. Vy	20	-37.33	4947.13	0.33
			Max. Vx	14	37.27	1.89	-4939.25
			Max. Torque	11			-5.02

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	118.18	-0.01	-10.01
	Max. H_x	20	58.02	37.28	0.05
	Max. H_z	2	58.02	0.05	37.22
	Max. M_x	2	4934.00	0.05	37.22
	Max. M_z	8	4937.58	-37.28	-0.05

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. Torsion	23	5.01	32.31	18.65
	Min. Vert	17	43.52	19.02	-32.93
	Min. H_x	8	58.02	-37.28	-0.05
	Min. H_z	14	58.02	-0.05	-37.22
	Min. M_x	14	-4939.25	-0.05	-37.22
	Min. M_z	20	-4947.13	37.28	0.05
	Min. Torsion	11	-5.02	-32.31	-18.65

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	48.35	-0.00	0.00	2.14	3.89	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	58.02	-0.05	-37.22	-4934.00	7.69	-2.81
0.9 Dead+1.6 Wind 0 deg - No Ice	43.52	-0.05	-37.22	-4849.81	6.42	-2.84
1.2 Dead+1.6 Wind 30 deg - No Ice	58.02	19.02	-32.93	-4377.59	-2525.31	-0.37
0.9 Dead+1.6 Wind 30 deg - No Ice	43.52	19.02	-32.93	-4303.03	-2483.09	-0.39
1.2 Dead+1.6 Wind 60 deg - No Ice	58.02	32.26	-18.57	-2463.21	-4273.97	2.17
0.9 Dead+1.6 Wind 60 deg - No Ice	43.52	32.26	-18.57	-2421.46	-4201.64	2.17
1.2 Dead+1.6 Wind 90 deg - No Ice	58.02	37.28	0.05	5.47	-4937.58	4.13
0.9 Dead+1.6 Wind 90 deg - No Ice	43.52	37.28	0.05	4.78	-4853.85	4.15
1.2 Dead+1.6 Wind 120 deg - No Ice	58.02	32.31	18.65	2473.40	-4276.92	4.98
0.9 Dead+1.6 Wind 120 deg - No Ice	43.52	32.31	18.65	2430.25	-4204.56	5.02
1.2 Dead+1.6 Wind 150 deg - No Ice	58.02	18.68	32.25	4279.31	-2468.95	4.49
0.9 Dead+1.6 Wind 150 deg - No Ice	43.52	18.68	32.25	4205.08	-2427.69	4.53
1.2 Dead+1.6 Wind 180 deg - No Ice	58.02	0.05	37.22	4939.25	1.89	2.80
0.9 Dead+1.6 Wind 180 deg - No Ice	43.52	0.05	37.22	4853.66	0.65	2.83
1.2 Dead+1.6 Wind 210 deg - No Ice	58.02	-19.02	32.93	4382.79	2534.93	0.36
0.9 Dead+1.6 Wind 210 deg - No Ice	43.52	-19.02	32.93	4306.84	2490.18	0.38
1.2 Dead+1.6 Wind 240 deg - No Ice	58.02	-32.26	18.57	2468.36	4283.57	-2.17
0.9 Dead+1.6 Wind 240 deg - No Ice	43.52	-32.26	18.57	2425.24	4208.72	-2.17
1.2 Dead+1.6 Wind 270 deg - No Ice	58.02	-37.28	-0.05	-0.33	4947.13	-4.11
0.9 Dead+1.6 Wind 270 deg - No Ice	43.52	-37.28	-0.05	-1.00	4860.90	-4.14
1.2 Dead+1.6 Wind 300 deg - No Ice	58.02	-32.31	-18.65	-2468.22	4286.43	-4.96
0.9 Dead+1.6 Wind 300 deg -	43.52	-32.31	-18.65	-2426.45	4211.58	-5.01

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
No Ice 1.2 Dead+1.6 Wind 330 deg -	58.02	-18.68	-32.25	-4274.07	2478.48	-4.49
No Ice 0.9 Dead+1.6 Wind 330 deg -	43.52	-18.68	-32.25	-4201.24	2434.73	-4.53
No Ice 1.2 Dead+1.0 Ice+1.0 Temp	118.18	-0.00	0.00	8.59	11.58	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	118.18	-0.01	-10.01	-1524.43	11.94	-0.36
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	118.18	5.03	-8.71	-1328.86	-760.78	0.29
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	118.18	8.25	-4.75	-720.16	-1251.57	0.86
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	118.18	9.54	0.01	8.89	-1446.89	1.20
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	118.18	8.26	4.77	737.89	-1251.82	1.22
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	118.18	4.78	8.26	1271.49	-717.92	0.91
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	118.18	0.01	10.01	1541.78	11.48	0.36
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	118.18	-5.03	8.71	1346.19	784.20	-0.29
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	118.18	-8.25	4.75	737.48	1274.99	-0.86
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	118.18	-9.54	-0.01	8.43	1470.28	-1.20
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	118.18	-8.26	-4.77	-720.55	1275.20	-1.22
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	118.18	-4.78	-8.26	-1254.14	741.32	-0.91
Dead+Wind 0 deg - Service	48.35	-0.01	-9.46	-1243.77	4.72	-0.72
Dead+Wind 30 deg - Service	48.35	4.83	-8.37	-1103.61	-634.76	-0.09
Dead+Wind 60 deg - Service	48.35	8.20	-4.72	-620.17	-1075.98	0.57
Dead+Wind 90 deg - Service	48.35	9.47	0.01	2.93	-1243.45	1.08
Dead+Wind 120 deg - Service	48.35	8.21	4.74	625.83	-1076.71	1.30
Dead+Wind 150 deg - Service	48.35	4.75	8.20	1081.62	-620.38	1.17
Dead+Wind 180 deg - Service	48.35	0.01	9.46	1248.16	3.25	0.72
Dead+Wind 210 deg - Service	48.35	-4.83	8.37	1108.00	642.72	0.09
Dead+Wind 240 deg - Service	48.35	-8.20	4.72	624.55	1083.94	-0.57
Dead+Wind 270 deg - Service	48.35	-9.47	-0.01	1.46	1251.41	-1.08
Dead+Wind 300 deg - Service	48.35	-8.21	-4.74	-621.44	1084.67	-1.29
Dead+Wind 330 deg - Service	48.35	-4.75	-8.20	-1077.23	628.34	-1.17

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	-48.35	0.00	0.00	48.35	-0.00	0.000%
2	-0.05	-58.02	-37.22	0.05	58.02	37.22	0.000%
3	-0.05	-43.52	-37.22	0.05	43.52	37.22	0.000%
4	19.02	-58.02	-32.93	-19.02	58.02	32.93	0.000%
5	19.02	-43.52	-32.93	-19.02	43.52	32.93	0.000%
6	32.26	-58.02	-18.57	-32.26	58.02	18.57	0.000%
7	32.26	-43.52	-18.57	-32.26	43.52	18.57	0.000%
8	37.28	-58.02	0.05	-37.28	58.02	-0.05	0.000%
9	37.28	-43.52	0.05	-37.28	43.52	-0.05	0.000%
10	32.31	-58.02	18.65	-32.31	58.02	-18.65	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
11	32.31	-43.52	18.65	-32.31	43.52	-18.65	0.000%
12	18.68	-58.02	32.25	-18.68	58.02	-32.25	0.000%
13	18.68	-43.52	32.25	-18.68	43.52	-32.25	0.000%
14	0.05	-58.02	37.22	-0.05	58.02	-37.22	0.000%
15	0.05	-43.52	37.22	-0.05	43.52	-37.22	0.000%
16	-19.02	-58.02	32.93	19.02	58.02	-32.93	0.000%
17	-19.02	-43.52	32.93	19.02	43.52	-32.93	0.000%
18	-32.26	-58.02	18.57	32.26	58.02	-18.57	0.000%
19	-32.26	-43.52	18.57	32.26	43.52	-18.57	0.000%
20	-37.28	-58.02	-0.05	37.28	58.02	0.05	0.000%
21	-37.28	-43.52	-0.05	37.28	43.52	0.05	0.000%
22	-32.31	-58.02	-18.65	32.31	58.02	18.65	0.000%
23	-32.31	-43.52	-18.65	32.31	43.52	18.65	0.000%
24	-18.68	-58.02	-32.25	18.68	58.02	32.25	0.000%
25	-18.68	-43.52	-32.25	18.68	43.52	32.25	0.000%
26	0.00	-118.18	0.00	0.00	118.18	-0.00	0.000%
27	-0.01	-118.18	-10.00	0.01	118.18	10.01	0.001%
28	5.03	-118.18	-8.71	-5.03	118.18	8.71	0.000%
29	8.25	-118.18	-4.75	-8.25	118.18	4.75	0.000%
30	9.53	-118.18	0.01	-9.54	118.18	-0.01	0.001%
31	8.26	-118.18	4.77	-8.26	118.18	-4.77	0.000%
32	4.78	-118.18	8.26	-4.78	118.18	-8.26	0.000%
33	0.01	-118.18	10.00	-0.01	118.18	-10.01	0.001%
34	-5.03	-118.18	8.71	5.03	118.18	-8.71	0.000%
35	-8.25	-118.18	4.75	8.25	118.18	-4.75	0.000%
36	-9.53	-118.18	-0.01	9.54	118.18	0.01	0.001%
37	-8.26	-118.18	-4.77	8.26	118.18	4.77	0.000%
38	-4.78	-118.18	-8.26	4.78	118.18	8.26	0.000%
39	-0.01	-48.35	-9.46	0.01	48.35	9.46	0.000%
40	4.83	-48.35	-8.37	-4.83	48.35	8.37	0.000%
41	8.20	-48.35	-4.72	-8.20	48.35	4.72	0.000%
42	9.47	-48.35	0.01	-9.47	48.35	-0.01	0.000%
43	8.21	-48.35	4.74	-8.21	48.35	-4.74	0.000%
44	4.75	-48.35	8.20	-4.75	48.35	-8.20	0.000%
45	0.01	-48.35	9.46	-0.01	48.35	-9.46	0.000%
46	-4.83	-48.35	8.37	4.83	48.35	-8.37	0.000%
47	-8.20	-48.35	4.72	8.20	48.35	-4.72	0.000%
48	-9.47	-48.35	-0.01	9.47	48.35	0.01	0.000%
49	-8.21	-48.35	-4.74	8.21	48.35	4.74	0.000%
50	-4.75	-48.35	-8.20	4.75	48.35	8.20	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	5	0.00000001	0.00013883
3	Yes	5	0.00000001	0.00005838
4	Yes	6	0.00000001	0.00051018
5	Yes	6	0.00000001	0.00013239
6	Yes	6	0.00000001	0.00048969
7	Yes	6	0.00000001	0.00012798
8	Yes	5	0.00000001	0.00030077
9	Yes	5	0.00000001	0.00012737
10	Yes	6	0.00000001	0.00051476
11	Yes	6	0.00000001	0.00013648

12	Yes	6	0.00000001	0.00049043
13	Yes	6	0.00000001	0.00012814
14	Yes	5	0.00000001	0.00013065
15	Yes	5	0.00000001	0.00005497
16	Yes	6	0.00000001	0.00050399
17	Yes	6	0.00000001	0.00012992
18	Yes	6	0.00000001	0.00051158
19	Yes	6	0.00000001	0.00013524
20	Yes	5	0.00000001	0.00029218
21	Yes	5	0.00000001	0.00012373
22	Yes	6	0.00000001	0.00048726
23	Yes	6	0.00000001	0.00012698
24	Yes	6	0.00000001	0.00051121
25	Yes	6	0.00000001	0.00013520
26	Yes	5	0.00000001	0.00003114
27	Yes	6	0.00025672	0.00079919
28	Yes	7	0.00006778	0.00052711
29	Yes	7	0.00006829	0.00045428
30	Yes	6	0.00025797	0.00077704
31	Yes	7	0.00006818	0.00048494
32	Yes	7	0.00006816	0.00046961
33	Yes	6	0.00025634	0.00081253
34	Yes	7	0.00006755	0.00054196
35	Yes	7	0.00006802	0.00049633
36	Yes	6	0.00025734	0.00078736
37	Yes	7	0.00006813	0.00046246
38	Yes	7	0.00006815	0.00047697
39	Yes	4	0.00000001	0.00042234
40	Yes	5	0.00000001	0.00022537
41	Yes	5	0.00000001	0.00019921
42	Yes	4	0.00000001	0.00053543
43	Yes	5	0.00000001	0.00022309
44	Yes	5	0.00000001	0.00020124
45	Yes	4	0.00000001	0.00042483
46	Yes	5	0.00000001	0.00022334
47	Yes	5	0.00000001	0.00022148
48	Yes	4	0.00000001	0.00053795
49	Yes	5	0.00000001	0.00019886
50	Yes	5	0.00000001	0.00021959

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 133.237	57.178	46	3.2115	0.0029
L2	136.93 - 87.636	30.958	46	2.3974	0.0045
L3	92.534 - 43.063	12.995	46	1.4300	0.0026
L4	49.107 - 0	3.427	46	0.6549	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	ASP-952	46	57.178	3.2115	0.0029	17182

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170.00	LNX-6515DS-A1M w/ Mount Pipe	46	50.680	3.0316	0.0033	8591
160.00	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	46	44.322	2.8486	0.0039	4294
134.00	432E-83I-01-T	46	29.455	2.3358	0.0045	2046
124.00	800MHZ RRH	46	24.695	2.1190	0.0042	2234
120.00	100-1	46	22.945	2.0304	0.0040	2321
80.00	(2) Platform Mount [LP 601-1]	46	9.484	1.1814	0.0021	3125
63.00	GPS_A	46	5.688	0.8771	0.0015	3058
50.00	GPS_A	46	3.550	0.6685	0.0011	3040
10.00	PD1121-6	46	0.385	0.1245	0.0002	14759

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 133.237	224.332	16	12.6777	0.0110
L2	136.93 - 87.636	121.940	16	9.4725	0.0176
L3	92.534 - 43.063	51.306	16	5.6528	0.0102
L4	49.107 - 0	13.548	16	2.5894	0.0040

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	ASP-952	16	224.332	12.6777	0.0110	4759
170.00	LNX-6515DS-A1M w/ Mount Pipe	16	198.983	11.9702	0.0128	2377
160.00	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	16	174.173	11.2501	0.0150	1184
134.00	432E-83I-01-T	16	116.048	9.2295	0.0175	553
124.00	800MHZ RRH	16	97.377	8.3739	0.0163	596
120.00	100-1	16	90.501	8.0241	0.0156	617
80.00	(2) Platform Mount [LP 601-1]	16	37.454	4.6701	0.0081	801
63.00	GPS_A	16	22.473	3.4680	0.0057	780
50.00	GPS_A	16	14.031	2.6432	0.0041	773
10.00	PD1121-6	16	1.523	0.4922	0.0007	3743

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	180 - 133.237	TP25.5375x15x0.25	46.76	0.00	0.0	19.4053	-8.82	1441.72	0.006

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L2	133.237 - 87.636 (2)	TP35.1887x24.2053x0.375	49.29	0.00	0.0	40.1380	-22.03	2982.06	0.007
L3	87.636 - 43.063 (3)	TP44.3577x33.3474x0.4375	49.47	0.00	0.0	59.1208	-38.13	4392.38	0.009
L4	43.063 - 0 (4)	TP53x42.1375x0.5	49.11	0.00	0.0	68.9961	-42.51	5126.07	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	180 - 133.237 (1)	TP25.5375x15x0.25	604.54	723.32	0.836	0.00	723.32	0.000
L2	133.237 - 87.636 (2)	TP35.1887x24.2053x0.375	1788.47	2061.22	0.868	0.00	2061.22	0.000
L3	87.636 - 43.063 (3)	TP44.3577x33.3474x0.4375	3246.29	3836.25	0.846	0.00	3836.25	0.000
L4	43.063 - 0 (4)	TP53x42.1375x0.5	3545.25	4566.23	0.776	0.00	4566.23	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	180 - 133.237 (1)	TP25.5375x15x0.25	19.24	720.86	0.027	0.12	1448.40	0.000
L2	133.237 - 87.636 (2)	TP35.1887x24.2053x0.375	30.12	1491.03	0.020	1.56	4127.48	0.000
L3	87.636 - 43.063 (3)	TP44.3577x33.3474x0.4375	35.65	2196.19	0.016	0.27	7681.88	0.000
L4	43.063 - 0 (4)	TP53x42.1375x0.5	36.44	2592.59	0.014	0.27	9143.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 133.237 (1)	0.006	0.836	0.000	0.027	0.000	0.843 ✔	1.000	4.8.2 ✔
L2	133.237 - 87.636 (2)	0.007	0.868	0.000	0.020	0.000	0.875 ✔	1.000	4.8.2 ✔
L3	87.636 - 43.063 (3)	0.009	0.846	0.000	0.016	0.000	0.855 ✔	1.000	4.8.2 ✔
L4	43.063 - 0 (4)	0.008	0.776	0.000	0.014	0.000	0.785 ✔	1.000	4.8.2 ✔

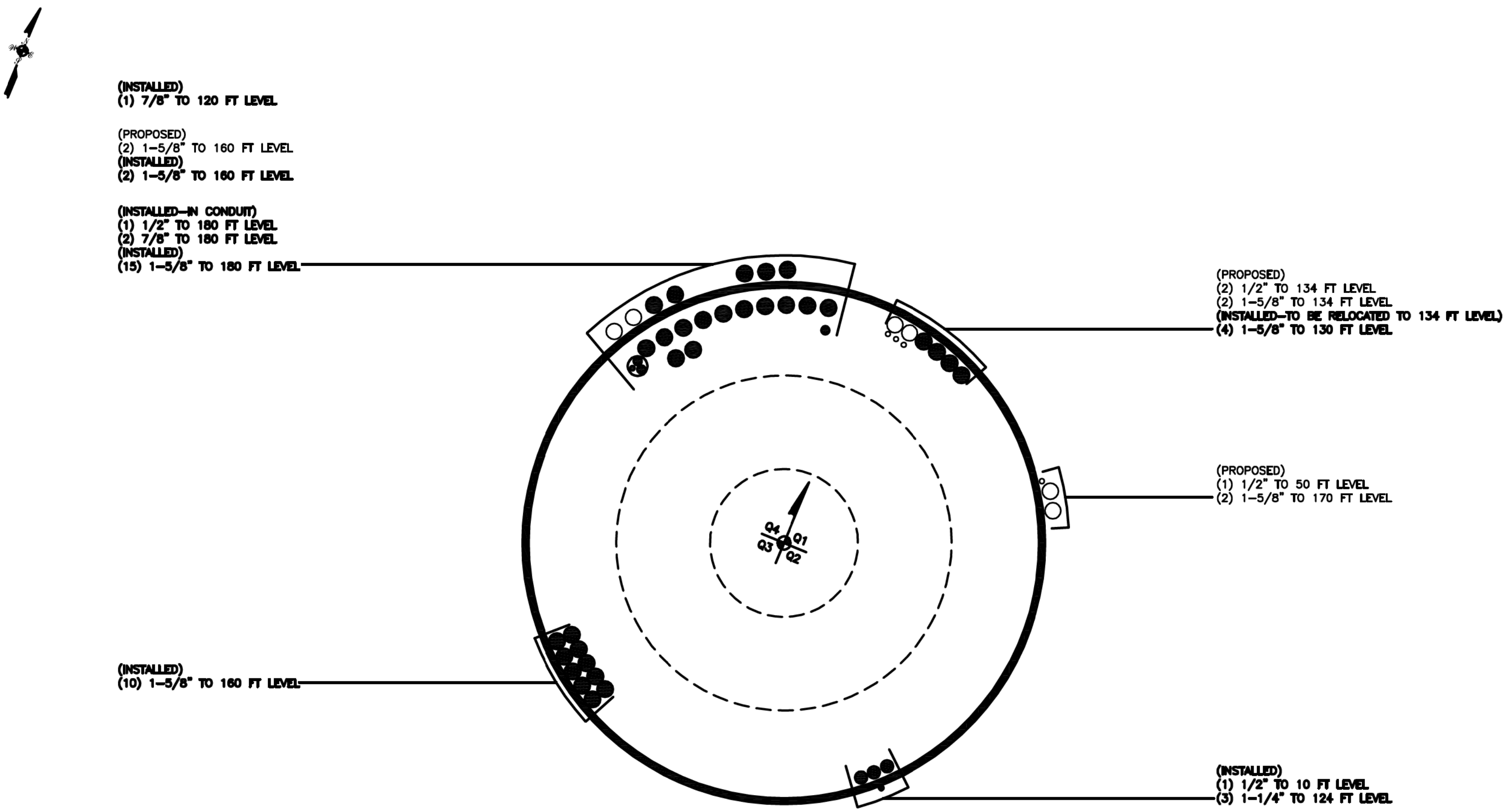
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
							✔		

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	180 - 133.237	Pole	TP25.5375x15x0.25	1	-8.82	1441.72	84.3	Pass
L2	133.237 - 87.636	Pole	TP35.1887x24.2053x0.375	2	-22.03	2982.06	87.5	Pass
L3	87.636 - 43.063	Pole	TP44.3577x33.3474x0.4375	3	-38.13	4392.38	85.5	Pass
L4	43.063 - 0	Pole	TP53x42.1375x0.5	4	-42.51	5126.07	78.5	Pass
							Summary	
						Pole (L2)	87.5	Pass
						RATING =	**87.5**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 841293 TOWER ID: C_BASELEVEL

CROWN REGION ADDRESS

USA

1	05/02/14	NEW BUILD PER WORK ORDER # 707308	SLS
2	28/02/14	UPDATED PER WORK ORDER # 715941	RW
3	04/03/14	APPLICATION ADDED PER WORK ORDER # 721194	KT
4	10/06/14	UPDATED PER WORK ORDER # 760050	CJH
5	16/06/14	UPDATED PER WORK ORDER # 740944	CJH
6	18/06/14	UPDATED PER WORK ORDER # 768148	TDG
7	31/07/15	UPDATED PER WORK ORDER # 1080685	AK
8	1/12/2015	UPDATED PER WORK ORDER 1134402 1155176	BRM
9	19/09/16	UPDATED PER WORK ORDER 1301468	CJK

DRAWN BY: SLS
CHECKED BY:
DRAWING DATE: 05-02-14

SITE NUMBER:
SITE NAME:

SITE NAME

KENT-BULLS BRIDGE ROAD

BUSINESS UNIT NUMBER

841293

SITE ADDRESS

136 BULLS BRIDGE ROAD
SOUTH KENT, CT 06785
LITCHFIELD COUNTY
USA

SHEET TITLE

BASE LEVEL

SHEET NUMBER

A1-0

BASE LEVEL DRAWING | 1" = 1'-0" | 1

PLOT DATE: 10/6/2016 FILE NAME: 841293_BASELEVEL.dwg

F:\R\TEMPLATES\TYPICAL BLOCKS FOR TEMPLATES\TITLE BLOCK SSD-NEW 8.1.dwg

APPENDIX C

ADDITIONAL CALCULATIONS

Anchor Rod Interaction, TIA-222-G
KENT-BULLS BRIDGE ROAD - BU #: 841293
2016777.841293.03

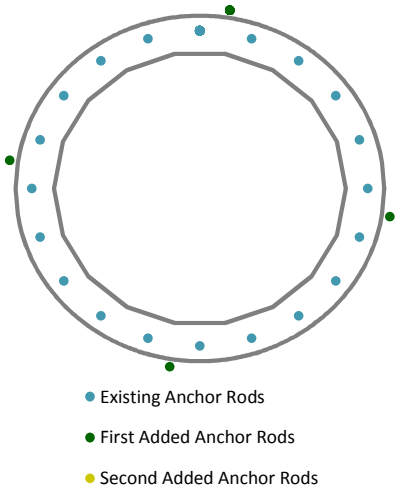
tnx Reactions		
Overturning Moment=	5063.00	k*ft
Axial Force =	58.00	k
Shear Force =	38.00	k

Existing Anchor Rods		
Number of Rods =	20	
Rod Circle =	62	in
Rod Diameter =	2.25	in
Est. Dist. b/w ea. Rod =	6	in
Plate Type =	Round	
Plate Diameter =	68	in

Pole		
Pole Diameter =	53	in
Number of Sides =	18	
Thickness =	0.5	in

First Added Anchor Rods		
Number of Rods =	4	
Rod Circle =	71.00	in
Rod Diameter =	1.75	in
Anchor Rod Grade =	F1554 GR 105	

Rod Number	Initial Angle
1	9
2	99
3	189
4	279



Second Added Anchor Rods		
Number of Rods =		
Rod Circle =		in
Rod Diameter =		in
Anchor Rod Grade =		

First Added Anchor Rods		
Max Rod Compression =	117.11	k
ϕRnt =	190.00	k
Anchor Rod Capacity =	61.64%	**OK**

Reactions in Existing Rods		
Overturning Moment=	**4369.91**	k*ft
Axial Force =	**58.00**	k
Shear Force =	**38.00**	k
Centroid Offset =	**0.00**	in

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#:	*841293*
Site Name:	*KENT_BULLS BRIDGE RC*
App #:	
Pole Manufacturer:	*Other*

Reactions		
Mu:	4369.9055	ft-kips
Axial, Pu:	58	kips
Shear, Vu:	38	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	62	in

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

Anchor Rod Results

		Rigid
Max Rod (Cu+ Vu/ή):	175.9 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	67.6% **Pass**	

Plate Data		
Diam:	68	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	8.41	in

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	43.0 ksi	AISC LRFD
Allowable Plate Stress:	54.0 ksi	φ*Fy
Base Plate Stress Ratio:	79.7% **Pass**	Y.L. Length: 32.17

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

n/a

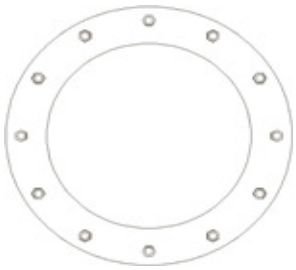
Stiffener Results

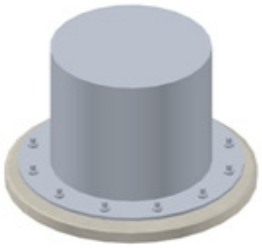
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	53	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"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

Site Number	841293
Site Name	KENT-BULLS BRIDGE ROAD

Caisson Analysis

Pier Properties		
Moment	5063	kip-ft
Shear	38	kip
Pier Diameter	7.5	ft
Height Above Grade	1.00	ft
Depth Below Grade	19.00	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	G	
Soil Safety Factor	1.33	
Water Table Depth	10.0	ft
Ignored Soil Depth	3.0	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	100%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	3	3.00	130		0
2	3.00	7	10.00	135		40
3	10.00	4	14.00	135		40
4	14.00	4	18.00	145		42
5	18.00	5	23.00	160		44
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	13.65	ft
Zero Shear	4.15	ft

Results		
Soil Capacity	91.0%	**OK**
Max Pier Moment	5238	kip-ft

Moment At User Defined Depths Below Grade			
	kip-ft		kip-ft
	kip-ft		kip-ft

V1.0

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *841293*
Site Name: *KENT-BULLS BRIDGE ROAD*
App #: *337631 Rev. (7)*

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	7.5	ft
Concrete Area =	6361.7	in^2

Reinforcement:

Clear Cover to **Tie**=	5.75	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.32	ft
Vert. Cage Diameter =	75.84	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	42	
As Total=	65.52	in^2
A s/ Aconc, Rho:	0.0103	1.03%

ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	1.03%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	10392.99	kips
at Mu=(ϕ=0.65)Mn=	6579.49	ft-kips
Max Tu, (φ=0.9) Tn =	3538.08	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	5238	ft-kips **(* Note)**
Max. Factored Shaft Pu:	58	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.00	Mu:	5238	ft-kips
1.00	Pu:	58	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2008

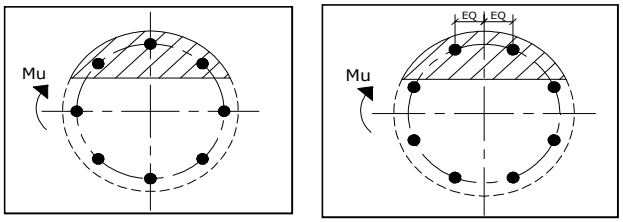
Seismic Properties

Seismic Design Category =	B
Seismic Risk =	**Low**

Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**19.62**	in
Extreme Steel Strain, εt:	**0.0097**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	58.00	kips
Drilled Shaft Moment Capacity, φMn:	**10128.53**	ft-kips
Drilled Shaft Superimposed Mu:	**5238.00**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**51.7%**

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTNH541A

CTNH541A_South Kent
136 Bulls Bridge Road
South Kent, CT 06785

November 4, 2016

EBI Project Number: 6216004958

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	11.20 %

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

EBI Consulting
environmental | engineering | due diligence

November 4, 2016

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CTNH541A – CTNH541A_South Kent**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **136 Bulls Bridge Road, South Kent, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile 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 limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) 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 T-Mobile Wireless antenna facility located at **136 Bulls Bridge Road, South Kent, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile 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 (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

3) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

4) 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.

5) 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.

6) The antennas used in this modeling are the **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APX16DWV-16DWVS-E-A20** has a maximum gain of **16.3 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe at 700 MHz. 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.

7) The antenna mounting height centerline of the proposed antennas is **170 feet** above ground level (AGL).

8) 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.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	170	Height (AGL):	170	Height (AGL):	170
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	7,678.43	ERP (W):	7,678.43	ERP (W):	7,678.43
Antenna A1 MPE%	1.03	Antenna B1 MPE%	1.03	Antenna C1 MPE%	1.03
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	170	Height (AGL):	170	Height (AGL):	170
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A2 MPE%	0.25	Antenna B2 MPE%	0.25	Antenna C2 MPE%	0.25

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**1.27 %**
AT&T	1.06 %
Nextel	1.41 %
CT State Police	4.03 %
WMNR	0.05 %
Sprint	0.89 %
Verizon Wireless	2.49 %
Site Total MPE %:	**11.20 %**

T-Mobile Sector A Total:	1.27 %
T-Mobile Sector B Total:	1.27 %
T-Mobile Sector C Total:	1.27 %
Site Total:	11.20 %

T-Mobile _per sector	**# Channels**	**Watts ERP (Per Channel)**	**Height (feet)**	**Total Power Density (μW/cm²)**	**Frequency (MHz)**	**Allowable MPE (μW/cm²)**	**Calculated % MPE**
T-Mobile PCS - 1950 MHz UMTS	2	1,279.74	170	3.42	PCS - 1950 MHz	1000	0.34%
T-Mobile AWS - 2100 MHz LTE	2	2,559.48	170	6.84	AWS - 2100 MHz	1000	0.68%
T-Mobile 700 MHz LTE	1	865.21	170	1.16	700 MHz	467	0.25%
						Total*:	**1.27%**

***NOTE: Totals may vary by 0.01% due to summing of remainders**

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 T-Mobile 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:

T-Mobile Sector	Power Density Value (%)
Sector A:	1.27 %
Sector B:	1.27 %
Sector C:	1.27 %
T-Mobile Per Sector Maximum:	1.27 %
Site Total:	11.20 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **11.20%** 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.