



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

March 30, 2018

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 143 R Old Blue Hill Road, Durham, CT 06422

Dear Ms. Bachman:

Pursuant to Connecticut General Statutes (“C.G.S.”) §16-50aa, as amended, T-Mobile Northeast LLC (“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 143 R Old Blue Hill Road, Durham, Connecticut (the “Property”). The existing 120-foot monopole is owned by Crown Castle International Corp. (“Crown Castle”), the underlying property is owned by Francis Behrens and Marie Castano. Crown Castle also maintains an easement on this property. 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 use. A copy of this filing is being mailed to the land owner, First Selectman Laura Francis and Planning & Zoning Official Geoffrey L. Colegrove.

Background

The existing Crown Castle facility consists of a 120-foot monopole tower on a 2.75 acre parcel along the southeast side of Old Blue Hills Road. Sprint maintains antennas at the 40-foot level. Equipment associated with the Sprint antennas is located northwest, north, and north east of the tower. Verizon maintains antennas at the 98-foot level. Equipment associated with the Verizon antennas is located southwest of the tower. The Town of Durham maintains equipment at the 50, 107 and 119-foot level. AT&T maintains antennas at the 116-foot level. Equipment associated with the AT&T antennas is located southeast 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 143 R Old Blue Hill Road 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 southeast 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 nine (9) antennas at a height of 73 feet above ground level. T-Mobile will also install six (6) coaxial cables, four (4) hybrids, three (3) RRHs, three (3) TMAs, and one (1) MW with one (1) associated line. Mounting will be a SitePro1 – RMQP-496-HK. Proposed equipment on the ground will include four cabinets, one (1) diesel generator. 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 the 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 proposed 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 nine (9) antennas at a height of 73 feet above ground level. T-Mobile will also install six (6) coaxial cables, four (4) hybrids, three (3) RRHs, three (3) TMAs, and one (1) MW at a height of 75 feet above ground level, would have no visual impact on the area of the tower. T-Mobile's cabinets and generator will 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 nine (9) antennas at a height of 73 feet above ground level. T-Mobile will also install six (6) coaxial cables, four (4) hybrids, three (3) RRHs, three (3) TMAs, and one (1) MW 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 143 R Old Blue Hill 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 proposed shared use.

Sincerely,

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

Melanie A. Bachman

March 30, 2018

Page 4

Attachments:

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

Tab 2: Exhibit-2: Structural Modification Report

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

Copies to:

Laure Francis-First Selctman

30 Townhouse Road

P.O. Box 428

Durham, CT 06422

Geoffrey L. Colegrove- Planning & Zoning Official

30 Townhouse Road

P.O. Box 428

Durham, CT 06422

Crown Castle (Tower Owner)

12 Gill Street, Suite 5800

Worburn, MA 01801

Francis Behrens and Marie Castano

109 Old Blue Hill Road

East Hampton, CT 06424



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Locations

Support

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Ship date:
Tue 4/03/2018

Actual delivery:
Wed 4/04/2018 10:40 am

Crown Castle
Amanda Cornwall
Suite 5800
12 Gill St
Woburn, MA US 01801
339 205-7017

Delivered
Signature not required

Francis Behrens
108 Old Blue Hill Road
DURHAM, CT US 06422
339 205-7017

Travel History

Date/Time	Activity	Location
4/04/2018 - Wednesday		
10:40 am	Delivered	DURHAM, CT
	Left at side door Package delivered to recipient address - release authorized	
9:30 am	On FedEx vehicle for delivery	NORTH HAVEN, CT
8:00 am	At local FedEx facility	NORTH HAVEN, CT
3:45 am	Departed FedEx location	NEWARK, NJ
4/03/2018 - Tuesday		
11:49 pm	Arrived at FedEx location	NEWARK, NJ
8:05 pm	Left FedEx origin facility	WILMINGTON, MA
6:19 pm	Picked up	WILMINGTON, MA
11:28 am	Shipment information sent to FedEx	

Shipment Facts

Tracking Number	771900869343	Service	FedEx Priority Overnight
Reference	1766.6680	Weight	0.5 lbs / 0.23 kgs
Delivery attempts	1	Delivered To	Residence
Total pieces	1	Total shipment weight	0.5 lbs / 0.23 kgs
Terms	Not Available	Invoice number	907651
Shipper reference	1766.6680	Packaging	FedEx Envelope
Special handling section	Deliver Weekday, Residential Delivery	Standard transit	4/04/2018 by 10:30 am

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LANGUAGE

DOCKET NO. 161 - An application of Metro Mobile CTS of Hartford Inc., for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telecommunications facility. The proposed prime site is located off of Old Blue Hills Road approximately 2,000 feet from the end of the improved portion of the road in Durham, Connecticut. The proposed alternate sites are located at 199R Cherry Lane and 100 New Haven Road, Durham, Connecticut.

Connecticut

Siting

Council

March 11, 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 and equipment building at the proposed prime site in Durham, 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 Metro Mobile CTS of Hartford, Inc. (Metro Mobile), for the construction, operation, and maintenance of a cellular telecommunications tower, associated equipment, and building at the proposed prime site located off of Old Blue Hills Road, Durham, Connecticut. We find the effects on scenic resources and adjacent land uses of the alternative sites to be significant, and therefore deny certification of these sites.

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 communications service and the tower shall not exceed a total height of 113 feet above ground level (AGL), with antennas and appurtenances.
2. The road design and drainage system for improvements on approximately 1,600 feet of the Old Blue Hills Road right-of-way shall be subject to approval by the Town of Durham.

3. The Certificate Holder shall prepare a Development and Management (D&M) plan for this site in compliance with sections 16-50j-75 through 16-50j-77 of the Regulations of State Agencies. The D&M plan shall include detailed plans of the tower, antenna placement on the tower including entities sharing tower space, tower foundation, equipment building, access road, utility connection, security fence, and erosion and sedimentation controls consistent with the Connecticut Guidelines for Soil Erosion and Sedimentation Control (as amended).
4. The Certificate Holder shall make provision for a Phase I archaeological reconnaissance survey, subject to the consent of the landowner, at the Merwin Cave site, due within six months after the commencement of construction. A final report of this survey shall be provided to the Council upon completion. The Certificate Holder shall not be liable for any site protection, collection and exhibition of artifacts, or other actions beyond a Phase I reconnaissance survey.
5. 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.
6. 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.
7. 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.
8. 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 Certificate holder shall dismantle the tower and remove all associated equipment or reapplication for any continued or new use shall be made to the Council before any such use is made.
9. 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 Hartford Courant and Middletown Press.

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

Metro Mobile CTS of
Hartford, Inc.

ITS REPRESENTATIVES

Metro Mobile CTS of
Hartford, Inc.
20 Alexander Drive
Wallingford, CT 06492
Attn: David S. Malko, P.E.
Manager, Engineering and
Regulatory Services

Robinson & Cole
One Commercial Plaza
Hartford, CT 06103-3597
Attn: Brian C. S. Freeman, Esq.

PARTY

Town of Durham

ITS REPRESENTATIVE

Henry A. Robinson
First Selectman
30 Town House Road
P.O. Box 428
Durham, CT 06422

INTERVENOR

Springwich Cellular
Limited Partnership

ITS REPRESENTATIVE

Peter J. Tyrrell
Senior Attorney
Springwich Cellular
Limited Partnership
227 Church Street
New Haven, CT 06506

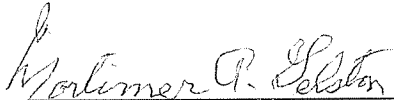
7695E

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. 161 - Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telecommunications facility, in Durham, Connecticut, and voted as follows to approve the proposed prime site located off of Old Blue Hills Road:

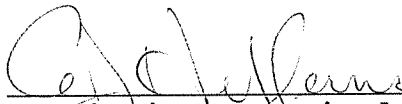
Council Members

Vote Cast



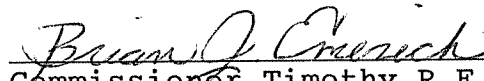
Mortimer A. Gelston
Chairman

YES



Commissioner Reginald J. Smith
Designee: Gerald J. Heffernan

YES

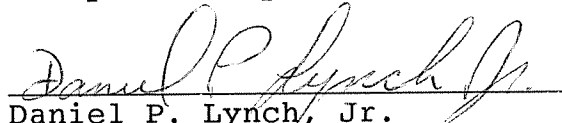


Commissioner Timothy R.E. Keeney
Designee: Brian Emerick

YES


Harry E. Covey

ABSENT



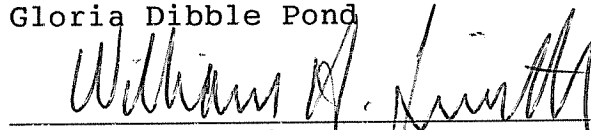
Daniel P. Lynch, Jr.

YES




Gloria Dibble Pond

YES



William H. Smith

YES



Colin C. Tait

YES

Dana J. Wright

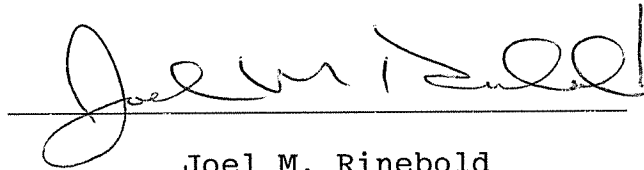
ABSENT

Dated at New Britain, Connecticut, March 11, 1994.
7697E

STATE OF CONNECTICUT)
 :
ss. New Britain, Connecticut
COUNTY OF HARTFORD)

I hereby certify that the foregoing is a true and correct copy of the Findings of Fact, Opinion, and Decision and Order issued by the Connecticut Siting Council, State of Connecticut.

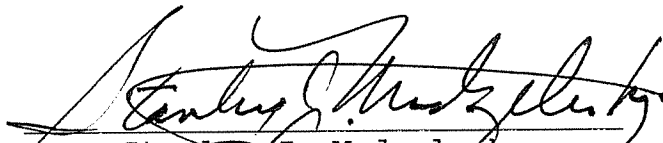
ATTEST:



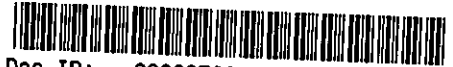
Joel M. Rinebold
Executive Director
Connecticut Siting Council

I certify that a copy of the Findings of Fact, Opinion, and Decision and Order in Docket 161 have been forwarded by Certified First Class Return Receipt Requested mail on March 11, 1994, to all parties and intervenors of record as listed on the attached service list, dated December 7, 1993.

ATTEST:



Stanley J. Modzelesky
Executive Assistant
Connecticut Siting Council



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Recording requested by and when
recorded mail to: Tiffany Meadows
Stewart Title Guaranty - NTS
1980 Post Oak Blvd. #610
Houston, TX 77056
NTS# 08334251

GRANT OF EASEMENT AND ASSIGNMENT OF LEASE

Facilities: 806364
Street Address: 109R OLD BLUE HILLS ROAD
City: DURHAM
County: MIDDLESEX
State: CONNECTICUT

between

**GLOBAL SIGNAL ACQUISITIONS IV LLC,
a Delaware limited liability company ("GSA IV"),**

and

**FRANCIS E. BEHRENS, JR. AND MARIE CASTANO (f/k/a Marie C. Behrens),
tenants in common (collectively, "Grantor")**

CONVEYANCE TAX PAID

STATE \$6,700.00 LOCAL \$1675.00

Kim Garvis
TOWN CLERK OF DURHAM

**GRANT OF EASEMENT AND
ASSIGNMENT OF LEASE**

THIS GRANT OF EASEMENT AND ASSIGNMENT OF LEASE (the "Easement") is made this 29 day of April, 2009, by and between **FRANCIS E. BEHRENS, JR. AND MARIE CASTANO (f/k/a Marie C. Behrens)**, tenants in common, having a mailing address of 109R Old Blue Hills Road, Durham, Connecticut 06422 (collectively, "Grantor"), and **GLOBAL SIGNAL ACQUISITIONS IV LLC**, a Delaware limited liability company ("GSA IV"), with its national headquarters located at 2000 Corporate Drive, Canonsburg, Pennsylvania 15317 ("GSA IV").

1. Description of Grantor's Property. Grantor is the owner of that certain land and premises in Durham, Middlesex County, Connecticut, by grant or conveyance described in the Durham Land Records, Middlesex County, Connecticut ("Land Records"), in Volume 100, Page 255, the description of said property is attached hereto as Exhibit "A" (hereinafter "Grantor's Property"). It is a purpose of this instrument to impose on Grantor's Property an Easement Area (as defined in Section 2 immediately below).

2. Description of Easement. For good and valuable consideration, the actual consideration paid or to be paid in connection with this Easement being Ten Dollars (\$10.00) and other valuable consideration, the receipt and sufficiency of which the parties hereby acknowledge, Grantor grants and conveys unto GSA IV, its successors and assigns, forever, an exclusive, perpetual easement for the use of a portion of Grantor's Property, that portion being described as a 100 feet by 100 feet

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parcel within Grantor's Property (the "Easement Area"), as such Easement Area is more particularly described as the "100 x 100' Tower Site" by metes and bounds in Exhibit "B" attached hereto. The Grantor also grants to GSA IV, its successors and assigns, as part of this Easement, a non-exclusive, perpetual right-of-way for ingress and egress, seven days per week, twenty-four hours per day, on foot or motor vehicle, including trucks, along a twenty (20) foot right-of-way extending from the nearest public right-of-way (the "Access Easement"), as is more particularly described as the "20' Wide Access Easement" by metes and bounds in Exhibit "B"; together with a non-exclusive perpetual right-of-way for the installation, replacement, and maintenance of utility wires, poles, cables, conduits and pipes (the "Utility Easement") as is more particularly described as the "5' Wide Utility Easement" by metes and bounds in Exhibit "B" (hereinafter the term "Easement Area" shall be deemed to also include the Access Easement and Utility Easement unless stated to the contrary). In the event GSA IV or any public utility is unable or unwilling to use the above-described Utility Easement, Grantor hereby agrees to grant an additional right-of-way, in form satisfactory to Grantor and GSA IV, to GSA IV or at GSA IV's request, directly to a public utility, at no cost and in a location acceptable to GSA IV (the "Additional Utility Easement"). For any such Additional Utility Easement to be effective, such easement shall be recorded in the Land Records.

3. Easement Area. The Easement Area shall be used for constructing, maintaining and operating communications facilities, including without limitation, tower structures, antenna support structures, cabinets, meter boards, buildings, antennas, cables, equipment and uses incidental

thereto for GSA IV's use and the use of its lessees, licensees, and/or sub-easement holders (the "Permitted Use"). It is the intent of the parties that GSA IV's communications facilities shall not constitute a fixture. Grantor acknowledges that Grantor has no right to object to or approve any improvements to be constructed by GSA IV on the Easement Area other than an additional tower. If requested by GSA IV, Grantor will execute, at GSA IV's sole cost and expense, all documents required by any governmental authority in connection with any development of, or construction on, the Easement Area, including documents necessary to petition the appropriate public bodies for certificates, permits, licenses and other approvals deemed necessary by GSA IV in GSA IV's absolute discretion to utilize the Easement Area for the Permitted Use. Grantor agrees to be named applicant if requested by GSA IV. In furtherance of the foregoing, Grantor hereby agrees to cooperate with GSA IV in the execution of all land use applications, permits, licenses and other approvals on Grantor's behalf if related to the Permitted Use. Grantor shall be entitled to no further consideration with respect to any of the foregoing matters. Grantor shall take no action that would adversely affect the status of the Easement Area with respect to the Permitted Use. Grantor's cooperation in any of the foregoing matters shall not be unreasonably withheld or delayed.

4. Perpetual Easement. This Easement and GSA IV's rights and privileges hereunder shall be perpetual and may be terminated only as provided for herein.

5. GSA IV's Right to Terminate. GSA IV shall have the unilateral right to terminate this Easement for any reason. Said termination shall be effective upon the

thirtieth (30th) day following GSA IV providing written notice of termination to Grantor, unless otherwise provided for in such notice. Upon termination of this Easement, this Easement shall become null and void and all of the parties shall have no further obligations to each other. Upon termination of this Easement, GSA IV shall, within a reasonable time, remove its building(s), tower and above ground property and restore the surface of the Easement Area to its original condition, reasonable wear and tear excepted.

6. Hazardous Materials.

(a) GSA IV shall not (either with or without negligence) cause or permit the use, storage, generation, escape, disposal or release of any Hazardous Materials in any manner not sanctioned by law. In all events, GSA IV shall indemnify and hold Grantor harmless from any and all claims, damages, fines, judgments, penalties, costs, liabilities or losses (including, without limitation, any and all sums paid for settlement of claims, attorneys' fees, and consultants' and experts' fees) from the presence or release of any Hazardous Materials on the Easement Area if caused by GSA IV or persons acting under GSA IV. GSA IV shall execute such affidavits, representations and the like from time to time as Grantor may reasonably request concerning GSA IV's best knowledge and belief as to the presence of Hazardous Materials within the Easement Area.

(b) Grantor shall not (either with or without negligence) cause or permit the use, storage, generation, escape, disposal or release of any Hazardous Materials in any manner not sanctioned by law. In all events, Grantor shall indemnify and hold GSA IV harmless from any and all claims, damages, fines, judgments, penalties, costs, liabilities or

losses (including, without limitation, any and all sums paid for settlement of claims, attorneys' fees, and consultants' and experts' fees) from the presence or release of any Hazardous Materials on Grantor's Property if caused by Grantor or persons acting under Grantor. Grantor shall execute such affidavits, representations and the like from time to time as GSA IV may reasonably request concerning Grantor's best knowledge and belief as to the presence of Hazardous Materials on Grantor's Property.

(c) For purposes of this Easement, the term "Hazardous Materials" shall be defined as any substance which is (i) designated, defined, classified or regulated as a hazardous substance, hazardous material, hazardous waste, pollutant or contaminant under any Environmental Law, as currently in effect or as hereafter amended or enacted, (ii) a petroleum hydrocarbon, including crude oil or any fraction thereof and all petroleum products, (iii) PCBs, (iv) lead, (v) asbestos, (vi) flammable explosives, (vii) infectious materials, or (viii) radioactive materials. "Environmental Law(s)" means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. Sections 9601, et seq., the Resource Conservation and Recovery Act of 1976, 42 U.S.C. Sections 6901, et seq., the Toxic Substances Control Act, 15 U.S.C. Sections 2601, et seq., the Hazardous Materials Transportation Act, 49 U.S.C. 5101, et seq., and the Clean Water Act, 33 U.S.C. Sections 1251, et seq., as said laws have been supplemented or amended to date, the regulations promulgated pursuant to said laws and any other federal, state or local law, statute, rule, regulation or ordinance which regulates or proscribes the use, storage, disposal, presence, clean-up, transportation or release or threatened release into the environment of Hazardous Materials.

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7. Insurance. At all times, GSA IV, at its sole expense, shall obtain and keep in force insurance which may be required by any federal, state or local statute or ordinance of any governmental body having jurisdiction in connection with the operation of GSA IV's business upon the Easement Area. GSA IV shall provide evidence of such insurance upon request, and such evidence shall name Grantor as an additional insured.

8. Security of GSA IV's Communications Facilities. GSA IV may construct a chain link or comparable fence around the perimeter of GSA IV's communications facilities consistent with local zoning and land use regulations and with any applicable regulation established by the Connecticut Siting Council; provided, however, that the fence shall not be constructed along the perimeter of the Easement Area.

9. Removal of Obstructions. GSA IV has the right to remove obstructions, including but not limited to vegetation, which may encroach upon, interfere with or present a hazard to GSA IV's use of the Easement Area. GSA IV shall be responsible for disposing of any materials related to the removal of obstructions.

10. Assignment of Lease Agreement. The parties hereby acknowledge that certain Option and Lease Agreement dated January 7, 1993, by and between Metro Mobile CTS of Hartford, Inc., as lessee, and Grantor, as lessor (as assigned, the "Lease Agreement"), a memorandum of which is recorded in the Land Records in Volume 135, Page 812. Grantor hereby assigns to GSA IV all of Grantor's right, title and interest in the Lease Agreement, including but not limited to, the right to amend the Lease Agreement: (i) to

extend the term length; (ii) to increase the size of the leased premises within the Easement Area; and/or (iii) in any other manner deemed necessary by GSA IV.

11. Right of First Refusal. If Grantor elects to sell all or any portion of the Easement Area, whether separate or as part of a larger parcel of property, GSA IV shall have the right of first refusal to meet any bona fide offer of sale on the same terms and conditions of such offer. If GSA IV fails to meet such bona fide offer within thirty days after written notice thereof from Grantor, Grantor may sell that property or portion thereof to such third person in accordance with the terms and conditions of the offer, which sale shall be under and subject to this Easement and GSA IV's rights hereunder. If GSA IV fails or declines to exercise its right of first refusal as hereinabove provided, then this Easement shall continue in full force and effect, and GSA IV's right of first refusal shall survive any such sale and conveyance and shall remain effective with respect to any subsequent offer to purchase the Easement Area, whether separate or as part of a larger parcel of property. Notwithstanding the foregoing, Grantor does not have to provide to GSA IV offers to purchase that Grantor may receive from Grantor's parents, grandparents, siblings, children or grandchildren, and such transactions are specifically excluded from the requirements of this section.

12. Real Estate Taxes.

(a) Grantor and GSA IV shall make a good faith effort to have the Easement Area separately assessed for tax purposes and to direct the applicable tax authority to submit the appropriate bill directly to GSA IV. Grantor agrees to sign any documents and provide any other cooperation necessary to

accomplish such separate tax assessment and direct billing. If the Easement Area is separately assessed and GSA IV is billed directly, GSA IV shall be responsible to pay such bill, however GSA IV reserves the right to challenge any such assessment, and Grantor agrees to cooperate with GSA IV in connection with any such challenge.

(b) If the Easement Area is not separately assessed by the taxing authority as described in subsection (a) immediately above, then GSA IV agrees to reimburse Grantor for any documented increase in real estate taxes levied against Grantor's Property that is directly attributable to the presence of wireless communications facilities within the Easement Area. Grantor agrees to provide GSA IV any documentation evidencing the increase and how such increase is attributable to GSA IV's use. GSA IV reserves the right to challenge any such assessment, and Grantor agrees to cooperate with GSA IV in connection with any such challenge. In the event that Grantor fails to pay all real estate taxes on Grantor's Property prior to such taxes becoming delinquent, GSA IV may, at its option, pay such real estate taxes (the "Delinquent Taxes") and GSA IV shall have the right to collect the Delinquent Taxes from Grantor together with interest on the Delinquent Taxes at the rate of 12% per annum (calculated from the date GSA IV pays the Delinquent Taxes until Grantor repays such sums due to GSA IV) and shall have a lien against Grantor's Property with respect thereto.

13. Waiver of Subrogation. The parties hereby waive any and all rights of action for negligence against the other which may hereafter arise on account of damage to the Easement Area or any other portion of Grantor's Property, including improvements and personal property located thereon,

resulting from any fire or other casualty of the kind covered by property insurance policies with extended coverage regardless of whether or not, or in what amount, such insurance is now or hereafter carried by the parties.

14. Enforcement.

(a) In the event Grantor fails to cure any violation of the terms of this Easement within ten (10) days after written notice from GSA IV, GSA IV shall have the right to injunctive relief, to require specific performance of this Easement, to collect damages from Grantor, and to take such actions as may be necessary in GSA IV's discretion to cure such violation and charge Grantor with all reasonable costs and expenses incurred by GSA IV as a result of such violation (including, without limitation, GSA IV's reasonable attorneys' fees). All rights and remedies provided under this Easement are cumulative and may be pursued singularly, in any combination, and in any order. The failure to enforce any of the terms and provisions contained herein shall in no event be deemed to be a waiver of the right to thereafter strictly enforce the terms and provisions hereof.

(b) In the event GSA IV fails to cure any violation of the terms of this Easement within thirty (30) days after written notice from Grantor, Grantor shall have the right to injunctive relief, to require specific performance of this Easement, and to pursue an action for damages (including, without limitation, Grantor's reasonable attorneys fees and all reasonable costs and expenses incurred by Grantor as a result of such violations). All rights and remedies provided under this Easement are cumulative and may be pursued singularly, in any combination, and in any order. The failure to enforce any of the terms and

provisions contained herein shall in no event be deemed to be a waiver of the right to thereafter strictly enforce the terms and provisions hereof. Notwithstanding anything to the contrary in this Easement, in no event may Grantor terminate this Easement as a result of GSA IV's failure to cure any violation of the terms contained herein; however, such violation remaining uncured beyond any applicable cure period shall entitle Grantor to any monetary damages allowed by law.

15. Limitation on Damages. In no event shall GSA IV be liable to Grantor for consequential, indirect, speculative or punitive damages in connection with or arising from this Easement, the Permitted Use or the Easement Area.

16. Recording. Grantor acknowledges that GSA IV intends to record this Easement with the appropriate recording officer upon execution of this Easement.

17. Hold Harmless. Grantor hereby indemnifies, holds harmless, and agrees to defend GSA IV against all damages asserted against or incurred by GSA IV by reason of, or resulting from: (i) the breach by Grantor of, any representation, warranty, or covenant of Grantor contained herein or (ii) any negligent act or omission of Grantor, excepting however such damages as may be due to or caused by the acts of GSA IV or its agents. GSA IV hereby indemnifies, holds harmless, and agrees to defend Grantor against all damages asserted against or incurred by Grantor by reason of, or resulting from: (i) the breach by GSA IV of any representation, warranty, or covenant of GSA IV contained herein or (ii) any negligent act or omission of GSA IV, excepting however such damages as may be due to or caused by the acts of Grantor or its agents.

18. Grantor's Covenant of Title.

Grantor covenants: (a) Grantor is seized of fee simple title to the Grantor's Property of which the Easement Area is a part and has the right and authority to grant this Easement; (b) that this Easement is and shall be free and clear of all liens, claims, encumbrances and rights of third parties of any kind whatsoever unless subordinated in a manner acceptable to GSA IV in its sole discretion; (c) subject to the terms and conditions of this Easement, GSA IV shall have quiet possession, use and enjoyment of the Easement Area; (d) there are no aspects of title that might interfere with or be adverse to GSA IV's interests in and intended use of the Easement Area; and (e) that Grantor shall execute such further assurances thereof as may be required.

19. Non-Interference. From and after the date hereof and continuing until this Easement is terminated (if ever), GSA IV and its lessees, licensees and/or sub-easement holders shall have the exclusive right to construct, install and operate communications facilities that emit radio frequencies on Grantor's Property. Grantor shall not permit (i) the construction, installation or operation of any communications facilities that emit radio frequencies on Grantor's Property within a 0.5 mile radius of the Easement Area other than communications facilities constructed, installed and/or operated on the Easement Area pursuant to this Easement or the Lease Agreement or (ii) any condition on Grantor's Property which interferes with GSA IV's Permitted Use. Each of the covenants made by Grantor in this Section 19 is a covenant running with the land for the benefit of the Easement Area and shall be binding upon Grantor and each successive owner of any portion of Grantor's Property and upon each person having any interest therein derived through any owner thereof.

20. Eminent Domain. If the whole or any part of the Easement Area shall be taken by right of eminent domain or any similar authority of law, the entire award for the value of the improvements so taken shall belong to the GSA IV. Any portion of an award for the value of the land shall be shared by GSA IV and Grantor in proportion to the amount of the Easement Area and Grantor's Property (other than the Easement Area) so taken, respectively.

21. Grantor's Property. Grantor shall not do or permit anything that will interfere with or negate any special use permit or approval pertaining to the Easement Area or cause any communications facilities on the Easement Area to be in nonconformance with applicable local, state, or federal laws. Grantor covenants and agrees that it shall not subdivide the Grantor's Property if any such subdivision will adversely affect the Easement Area's compliance (including any improvements located thereon) with applicable laws, rules, ordinances and/or zoning, or otherwise adversely affects GSA IV's ability to utilize the Easement Area for its intended purposes. Grantor shall not initiate or consent to any change in the zoning of Grantor's Property or any property of Grantor contiguous to, surrounding, or within a 0.5 mile radius of the Easement Area, or impose or consent to any other restriction that would prevent or limit GSA IV from using the Easement Area for the uses intended by GSA IV, unless GSA IV provides its written consent in its reasonable discretion.

22. Entire Agreement. Grantor and GSA IV agree that this Easement contains all of the agreements, promises and understandings between Grantor and GSA IV. No verbal or oral agreements, promises or understandings shall be binding upon

either Grantor or GSA IV in any dispute, controversy or proceeding at law. Any addition, variation or modification to this Easement shall be void and ineffective unless made in writing and signed by the parties hereto.

23. Construction of Document.

Grantor and GSA IV acknowledge that this document shall not be construed in favor of or against the drafter and that this document shall not be construed as an offer until such time as it is executed by one of the parties and then tendered to the other party.

24. Applicable Law. This Easement and the performance thereof shall be governed, interpreted, construed and regulated by the laws of the State where the Easement is located. The parties agree that the venue for any litigation regarding this Easement shall be Middlesex County, State of Connecticut.

25. Notices. All notices hereunder shall be in writing and shall be given by (i) established express delivery service which maintains delivery records, (ii) hand delivery, or (iii) certified or registered mail, postage prepaid, return receipt requested. Notices may also be given by facsimile transmission, provided that the notice is concurrently given by one of the above methods. Notices are effective upon receipt, or upon attempted delivery if delivery is refused or if delivery is impossible because of failure to provide reasonable means for accomplishing delivery. The notices shall be sent to the parties at the following addresses:

Grantor:
Francis E. Behrens, Jr. and
Marie Castano
109R Old Blue Hills Road
Durham, CT 06422

GSA IV:

Global Signal Acquisitions IV LLC
c/o Crown Castle USA Inc.
E. Blake Hawk, General Counsel
Attn: Real Estate Department
2000 Corporate Drive
Canonsburg, PA 15317

26. Assignment. The parties hereto expressly intend that the easements granted herein shall be easements in gross, and as such, are transferable, assignable, inheritable, divisible and apportionable. GSA IV has the right, within its sole discretion, to sell, assign, lease, convey, license or encumber any of its interest in the Easement Area without consent as long as related to the Permitted Use. In addition, GSA IV has the right, within its sole discretion, to grant sub-easements over any portion of the Easement Area without consent. Any such sale, assignment, lease, license, conveyance, sub-easement or encumbrance shall be binding upon the successors, assigns, heirs and legal representatives of the respective parties hereto. An assignment of this Easement shall be effective upon GSA IV sending written notice thereof to Grantor at Grantor's mailing address stated above and shall relieve GSA IV from any further liability or obligation accruing hereunder on or after the date of the assignment. GSA IV shall record any such assignment in the Land Records.

27. Partial Invalidity. If any term of this Easement is found to be void or invalid, then such invalidity shall not affect the remaining terms of this Easement, which shall continue in full force and effect.

28. Mortgages. This Easement shall be subordinate to any mortgage given by Grantor which currently encumbers Grantor's Property including the Easement Area, provided that any mortgagee holding

such a mortgage shall recognize the validity of this Easement in the event of foreclosure of Grantor's interest and GSA IV's rights under this Easement. In the event that the Easement Area is or shall be encumbered by such a mortgage, Grantor shall obtain and furnish to GSA IV a non-disturbance agreement for each such mortgage, in recordable form.

29. Successors and Assigns. The terms of this Easement shall constitute a covenant running with the Grantor's Property for the benefit of GSA IV and its successors and assigns and shall extend to and bind the heirs, personal representatives, successors and assigns of the parties hereto and upon each person having any interest therein derived through any owner thereof. Any sale, mortgage, lease or other conveyance of Grantor's Property shall be under and subject to this Easement and GSA IV's rights hereunder.

30. Construction of Easement. The captions preceding the Sections of this Easement are intended only for convenience of reference and in no way define, limit or describe the scope of this Easement or the intent of any provision hereof. Whenever the singular is used, the same shall include the plural and vice versa and words of any gender shall include the other gender. As used herein, "including" shall mean "including, without limitation." This document may be executed in multiple counterparts, each of which shall be deemed a fully executed original.

TO HAVE AND TO HOLD the aforesaid Easement Area with all rights, privileges and appurtenances thereto belonging unto GSA IV, its successors and assigns, forever.

[Remainder of Page Intentionally Blank]

DURHAM, CONN.
VOL 100 PAGE 256

To Have and to Hold, the premises unto then the said Releasee
and to their heirs and assigns, to the only use and behoof of the said
heirs and assigns forever, so that neither I the said Releasee
nor any person or persons in my name and behalf, shall or will hereafter claim
or demand any right or title to the premises or any part thereof, but they and everyone of
them shall by these presents be excluded and forever barred.

IN WITNESS WHEREOF, I

do hereunto set my hand this 23rd day of August 1984
Signed and Delivered in the presence of

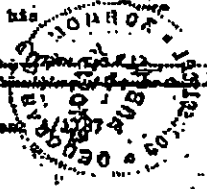
A. Thomas White, Jr.
A. Thomas White, Jr.
Deborah B. Monroe
Deborah B. Monroe

Myron Connors
Myron Connors

STATE OF CONNECTICUT, } ss. Middlesex August 23 1984
COUNTY OF MIDDLESEX

Personally Appeared MYRON CONNORS,
Signer(s) of the foregoing Instrument, and acknowledged the same to be his
free act and deed, before me.

Deborah B. Monroe
Deborah B. Monroe,
My Commission Expires 8/1/87



STATE OF CONNECTICUT, } ss.
COUNTY OF

Personally Appeared _____,
as aforesaid, Signer of the foregoing Instrument, and
acknowledged the same to be _____
free act and deed as such
and the free act and deed of said corporation/partnership, before me.

Grantee's Address: _____
Notary Public / J. of Peace / Commissioner of Superior Court

REC'D Sept 27 1984 AT 10:25 AM
TOWN CLERK

EXHIBIT B

EASEMENT AREA AND ACCESS EASEMENT

100 X 100' TOWER SITE

A certain tract being part of land described in Deed Book 100, Page 255, situated southerly of Old Blue Hills Road, in the town of Durham, Middlesex County, Connecticut, containing 10,000 square feet (0.23 acres) of land and being described as:

Commencing at the southernmost corner of land of Christopher J & Tracey A Pollitt described in Deed Book 162, Page 526 and being Lot 36 on Assessors Map 69; thence S76° 43' 23"E 54.80 feet to the Point of Beginning 1; thence N47° 57' 14"E 100.00 feet to a point; thence S42° 02' 46"E 100.00 feet to a point; thence S47° 57' 14"W 100.00 to a point; thence N42° 02' 46"W 100.00 feet to the point of beginning.

Together with:

20' WIDE ACCESS EASEMENT

An Access Easement being part of land described in Deed Book 100, Page 255, situated southerly of Old Blue Hills Road, in the town of Durham, Middlesex County, Connecticut, containing 3,280 square feet (0.08 acres) of land and being described as:

Commencing at the southernmost corner of land of Christopher J & Tracey A Pollitt described in Deed Book 162, Page 526 and being Lot 36 on Assessors Map 69; thence S89° 52' 22"E 177.00 feet to a point in the northeasterly sideline of the Tower Site, being the Point of Beginning 3; thence N50° 17' 44"E 41.20 feet to a point; thence turning left along a curve with a radius of 70.00 feet, a distance of 67.82 feet to a point; thence N05° 14' 45"W 53 feet, more or less, to the southerly sideline of Old Blue Hills Road; thence southeasterly along the southerly sideline of Old Blue Hills Road, 24 feet, more or less, to a point; thence S05° 14' 45"E 39 feet, more or less, to a point; thence turning right along a curve with a radius of 90.00 feet, a distance of 87.19 feet to a point; thence S50° 15' 44"W 40.39 feet to the northeasterly sideline of the Tower Site; thence N42° 02' 46"W, along the northeasterly sideline of the Tower Site, 20.02 feet to the point of beginning.

Together with:

5' WIDE UTILITY EASEMENT

A Utility Easement being part of land described in Deed Book 100, Page 255, situated southerly of Old Blue Hills Road, in the town of Durham, Middlesex County, Connecticut, containing 916 square feet (0.02 acres) of land and being described as:

Commencing at the southernmost corner of land of Christopher J & Tracey A Pollitt described in Deed Book 162, Page 526 and being Lot 36 on Assessors Map 69; thence N88° 38' 20"E 172.99 feet to a point in the northeasterly sideline of the Tower Site, being the Point of Beginning 2, at the centerline of said easement; thence, continuing along the centerline of said easement, N71° 17' 52"E 80.61 feet to a point; thence N05° 06' 55"W 102 feet, more or less, to the southerly sideline of Old Blue Hills Road.

Property Address: 143R Old Blue Hills Road
Durham, CT 06422

Tax Parcel ID: Map 69, Lot 12

HRT 106(B) 943202
BU806364

PPAB 1460764v3

Received
9:30 am
MAY 12 2009
Kim Garvis
Office of the Town Clerk
Durham, Connecticut

Received 5.12.09

At 9:30 A M. and Recorded in

DURHAM LAND RECORDS

Vol. 237 Page 772

Attest: Alg. Willett

2008 Town Clerk

90
30
3

123.00
2.00

125.00

Durham, CT : Residential Property Record Card

[[Back to Search Results](#)]

[[Start a New Search](#)] [[Help with Printing](#)]

Search For Properties

Parcel ID <input type="text"/>	Name <input type="text"/>	Street Name <input type="text" value="OLD BLUE HILLS RD"/>	<input type="button" value="Search"/> <input type="button" value="Reset"/>
--	-------------------------------------	--	--

Parcel ID	Card	Routing No	Location	Zoning	State Class	Acres
B0016900	1	69 12	143R OLD BLUE HILLS RD	FR	130 - Developable Land	6.310
Living Units						
0						

Owner Information

Behrens Francis E Jr Castano Marie C
 109 Old Blue Hills Rd
 Durham CT 06422-3005

Property Picture



Deed Information

Book/Page: 100/255
Deed Date: 1984/08/24

Dwelling Information

Style:
Story Height: 0
Attic:
Basement:
Year Built: 0
Ground Flr Area: 0
Tot Living Area: 0
Rooms: 0
Bedrooms: 0
Full Baths: 0
Half Baths: 0

Valuation

Land: \$126,400
Building: \$0
Total: \$2,900
Net Assessment: \$2,030

Sales History

Book/Page	Date	Price	Type	Validity
-----------	------	-------	------	----------

Out Building Information

Type	Qty	Year	Size1	Size2	Grade	Cond
------	-----	------	-------	-------	-------	------

Building Sketch

SITE NAME: CTHA375A

143 R OLD BLUE HILL ROAD

DURHAM, CT 06422

MIDDLESEX COUNTY

T-MOBILE SITE NUMBER: CTHA375A

CROWN BU NUMBER: 806364

RF DESIGN GUIDELINE: NSD 67D92DB

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

T-MOBILE NORTHEAST LLC

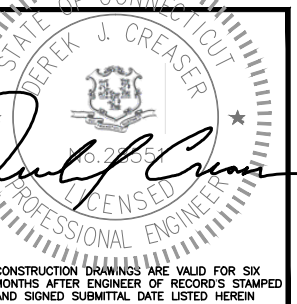
103 MONARCH DRIVE
LIVERPOOL, NY 13088
(315) 265-1882



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



45 BEECHWOOD DRIVE TEL: (978) 557-5553
N. ANDOVER, MA 01845 FAX: (978) 336-5586



CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	03/28/18	CONSTRUCTION REVISED	DJM
1	03/26/18	CONSTRUCTION REVISED	GA
0	03/19/18	ISSUED FOR CONSTRUCTION	SF/DM

SITE NUMBER:

CTHA375A

CROWN BU NUMBER:

806364

SITE NAME:

CTHA375A

SITE ADDRESS:

143 R OLD BLUE HILL ROAD
DURHAM, CT 06422
MIDDLESEX COUNTY

SHEET TITLE

TITLE SHEET

(G700-NSD)

SHEET NUMBER

T-1

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 DURHAM) 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: 143 R OLD BLUE HILL ROAD
DURHAM, CT 06422

LATITUDE: 41° 27' 33.67" N

LONGITUDE: 72° 39' 45.83" W

JURISDICTION: NATIONAL, STATE & LOCAL CODES OR ORDINANCES

CURRENT USE: TELECOMMUNICATIONS FACILITY

PROPOSED USE: TELECOMMUNICATIONS FACILITY

CROWN CASTLE SITE NAME: HRT 106(B) 943202

CROWN CASTLE SITE ID: 806364

DRAWING INDEX

SHEET NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	2
GN-1	GENERAL NOTES	2
A-1	COMPOUND AND EQUIPMENT PLAN	2
A-2	ANTENNA LAYOUT & ELEVATION	2
A-3	ANTENNA AND COAX SCHEDULE	2
A-4	TOWER EQUIPMENT DETAILS	2
A-5	GROUND EQUIPMENT DETAILS	2
S-1	EQUIPMENT MOUNTING ELEVATION	2
E-1	ELECTRICAL DETAILS AND NOTES	2
G-1	GROUNDING SCHEMATIC AND RISER DIAGRAM	2
G-2	GROUNDING DETAILS AND NOTES	2

APPROVALS

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



CALL TOLL FREE 1-800-962-7962 OR DIAL 811

UNDERGROUND SERVICE ALERT

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 – CROWN CASTLE INTERNATIONAL
 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: REFER TO ELECTRICAL DRAWINGS

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**

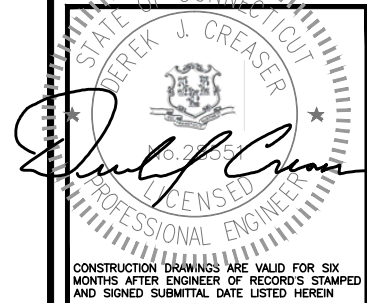
103 MONARCH DRIVE
LIVERPOOL, NY 13088
(315) 265-1882



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



45 BEECHWOOD DRIVE TEL: (978) 557-5553
N. ANDOVER, MA 01845 FAX: (978) 336-5586



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CHECKED BY: BB

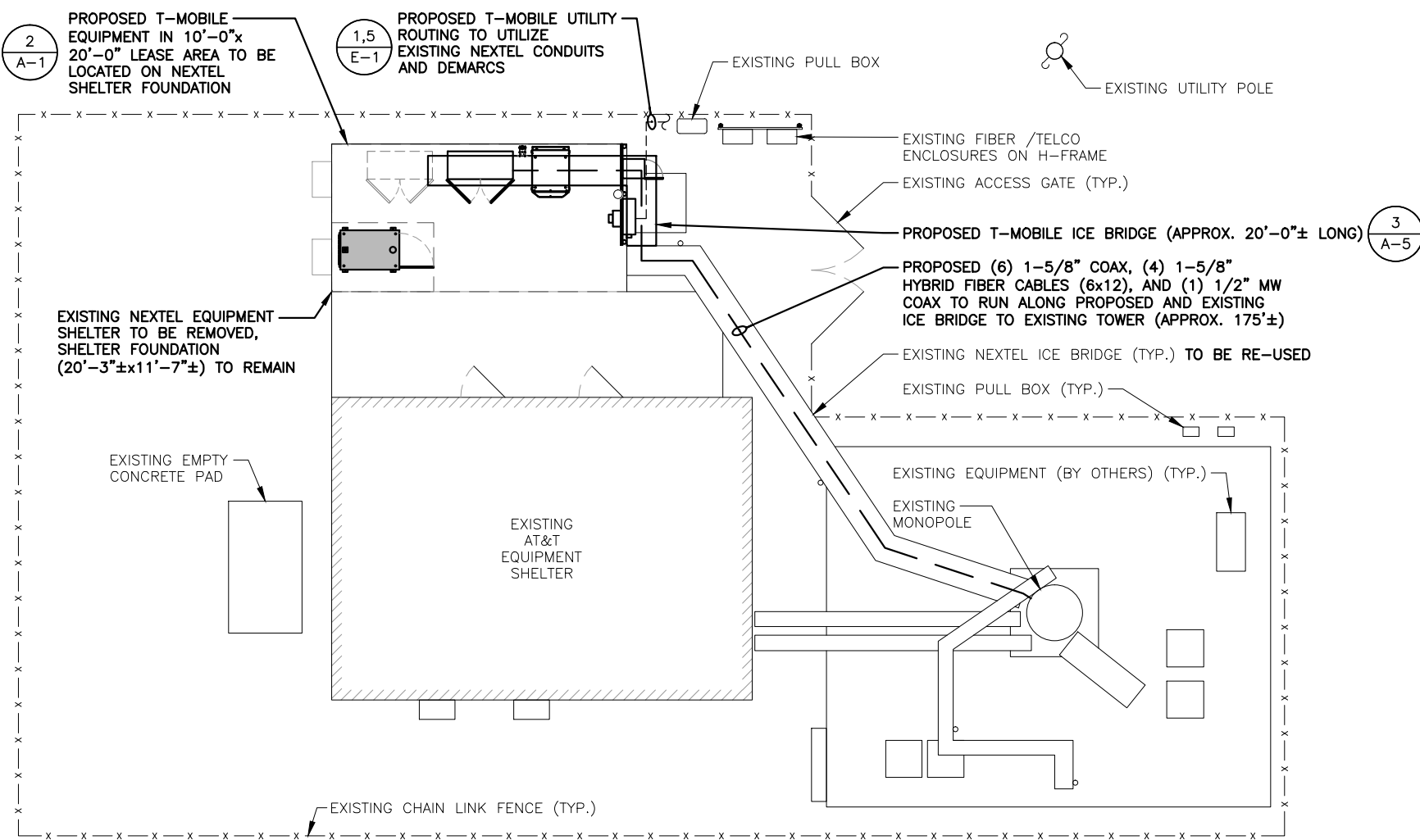
APPROVED BY: DJC

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
2	03/28/18	CONSTRUCTION REVISED	DJM
1	03/26/18	CONSTRUCTION REVISED	GA
0	03/19/18	ISSUED FOR CONSTRUCTION	SF/DM

SITE NUMBER:
CTHA375A
CROWN BU NUMBER:
806364
SITE NAME:
CTHA375A
SITE ADDRESS:
143 R OLD BLUE HILL ROAD
DURHAM, CT 06422
MIDDLESEX COUNTY

SHEET TITLE
GENERAL NOTES
(G700-NSD)

SHEET NUMBER
GN-1



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

STRUCTURAL NOTE:
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO STRUCTURAL ANALYSIS PROVIDED BY: CROWN CASTLE DATED: 02/15/18 TO DETERMINE IF THERE ANY SUPPLEMENTAL OR SPECIAL INSTALLATION REQUIREMENTS, OR RELOCATION ARRANGEMENTS.

T-MOBILE NORTHEAST LLC

103 MONARCH DRIVE
LIVERPOOL, NY 13088
(315) 265-1882

CROWN CASTLE

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

HDG HUDSON Design Group LLC

45 BEECHWOOD DRIVE TEL: (978) 557-5553
N. ANDOVER, MA 01845 FAX: (978) 336-5586

STATE OF CONNECTICUT
Derek J. Creaser
16,285
LICENSED PROFESSIONAL ENGINEER

CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMP AND SIGNED SUBMITTAL DATE LISTED HEREIN

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APPROVED BY: DJC

SUBMITTALS

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SITE NUMBER:
CTHA375A

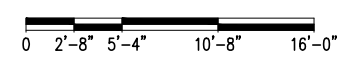
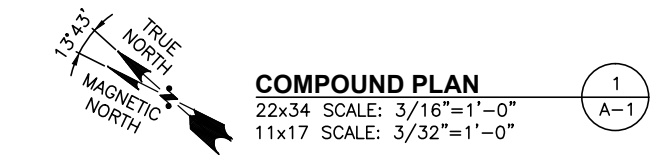
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806364

SITE NAME:
CTHA375A

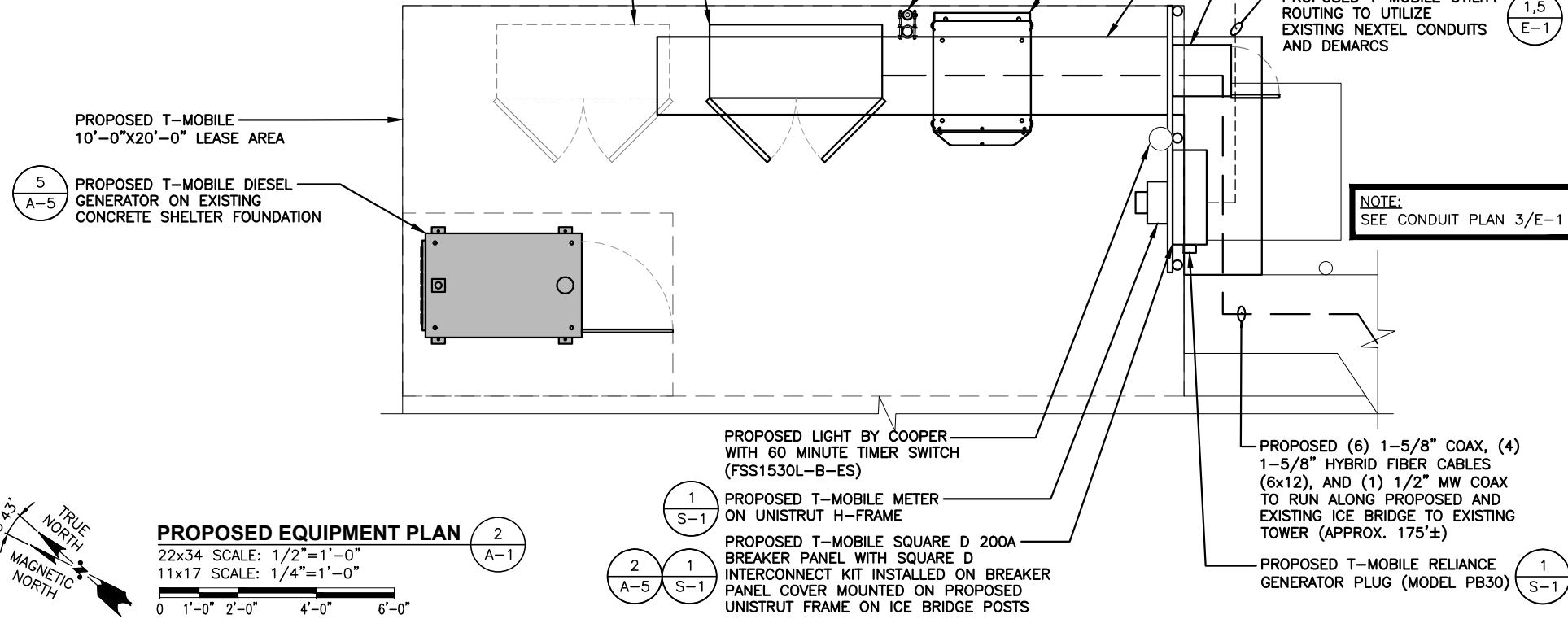
SITE ADDRESS:
143 R OLD BLUE HILL ROAD
DURHAM, CT 06422
MIDDLESEX COUNTY

SHEET TITLE
COMPOUND & EQUIPMENT PLAN
(G700-NSD)

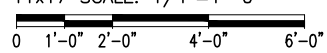
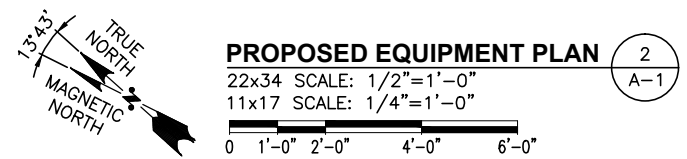
SHEET NUMBER
A-1



- 1 A-5 PROPOSED T-MOBILE MUAC 6102 CABINET
- 3 A-5 FUTURE EXPANSION: FUTURE RAN EQUIPMENT CABINETS (TYP.)



NOTE:
SEE CONDUIT PLAN 3/E-1



- 1 S-1 PROPOSED T-MOBILE METER ON UNISTRUT H-FRAME
- 2 A-5 PROPOSED T-MOBILE MUAC 6102 CABINET
- 1 S-1 PROPOSED T-MOBILE SQUARE D 200A BREAKER PANEL WITH SQUARE D INTERCONNECT KIT INSTALLED ON BREAKER PANEL COVER MOUNTED ON PROPOSED UNISTRUT FRAME ON ICE BRIDGE POSTS

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

T-MOBILE NORTHEAST LLC
 103 MONARCH DRIVE
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 (315) 265-1882

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

HG HUDSON Design Group LLC
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 N. ANDOVER, MA 01845 FAX: (978) 336-5586

STATE OF CONNECTICUT
 DEREK J. CREASER
 LICENSED PROFESSIONAL ENGINEER
 No. 28355
 CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN

CHECKED BY: BB

APPROVED BY: DJC

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SITE NUMBER:
 CTHA375A
 CROWN BU NUMBER:
 806364
 SITE NAME:
 CTHA375A
 SITE ADDRESS:
 143 R OLD BLUE HILL ROAD
 DURHAM, CT 06422
 MIDDLESEX COUNTY

SHEET TITLE
 ANTENNA LAYOUT
 & ELEVATION
 (G700-NSD)

SHEET NUMBER
A-2

TOP OF HIGHEST APPURTENANCE
 ELEV. = 132'-0"± (A.G.L.)

TOP OF EXISTING MONOPOLE
 ELEV. = 120'-0"± (A.G.L.)

8
 A-4
 PROPOSED T-MOBILE LOW PROFILE PLATFORM (SITEPRO-1 PART# RMQP-496HK) (EXISTING PLATFORM TO BE REMOVED PER STRUCTURAL ANALYSIS)

3
 A-4
 PROPOSED T-MOBILE (APXVAA24 43-U-A20) ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3)

9
 A-4
 PROPOSED T-MOBILE 2" MW DISH (MODEL# SHP2-13) ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE

6
 A-4
 PROPOSED T-MOBILE (RADIO 4449) RRH MOUNTED TO PROPOSED MOUNTING PIPE BEHIND ANTENNA (TYP. OF 1 PER SECTOR, TOTAL OF 3)

9
 A-4
 PROPOSED T-MOBILE 2" MW DISH (MODEL# SHP2-13) ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE

3
 A-4
 PROPOSED T-MOBILE (APXVAA24 43-U-A20) ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3)

6
 A-4
 PROPOSED T-MOBILE (RADIO 4449) RRH MOUNTED TO PROPOSED MOUNTING PIPE BEHIND ANTENNA (TYP. OF 1 PER SECTOR, TOTAL OF 3)

3
 A-4
 PROPOSED T-MOBILE (APXVAA24 43-U-A20) ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3)

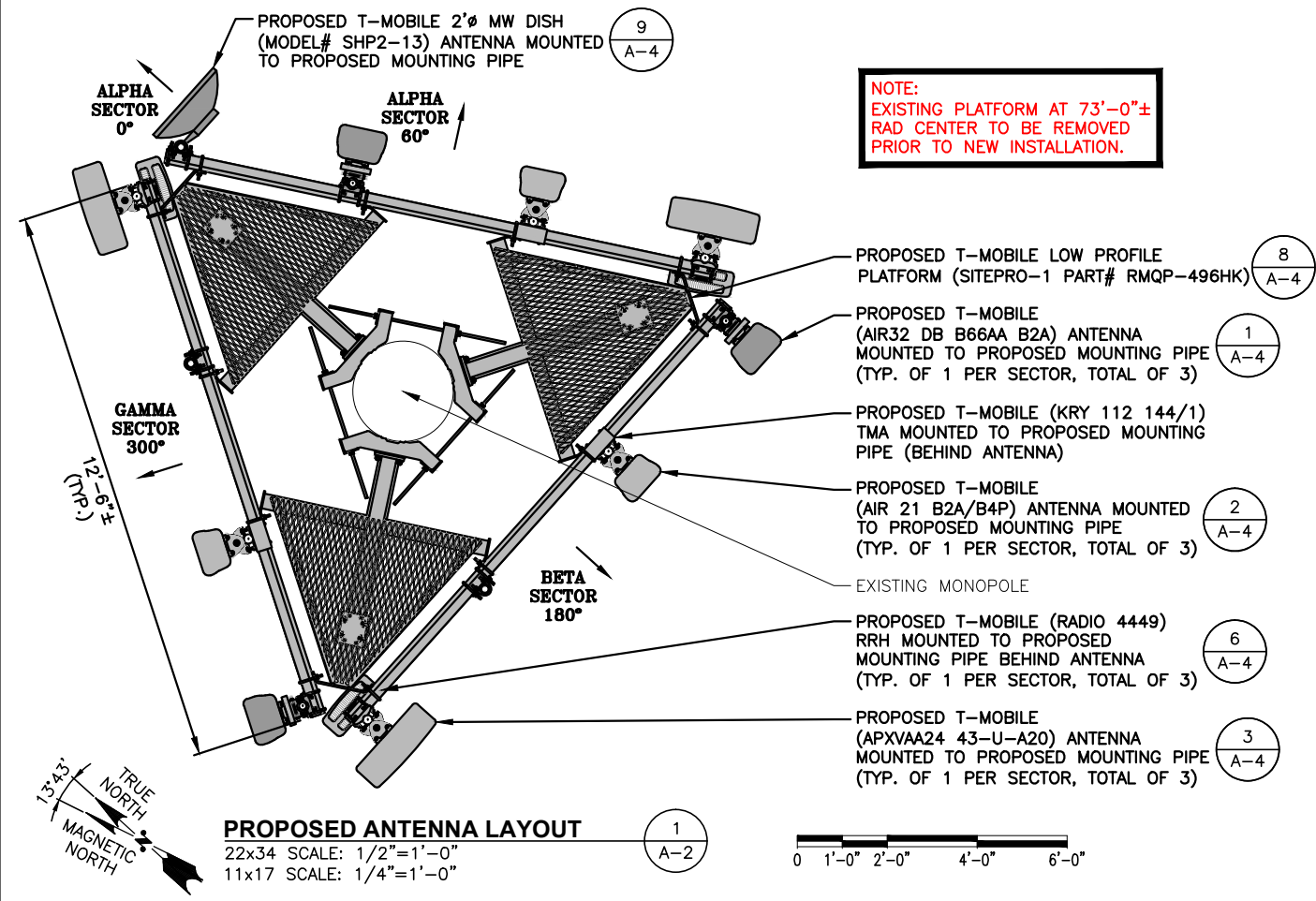
PROPOSED (6) 1-5/8" COAX, (4) 1-5/8" HYBRID FIBER CABLES (6x12), AND (1) 1/2" MW COAX TO RUN ALONG PROPOSED AND EXISTING ICE BRIDGE TO EXISTING TOWER (APPROX. 175'±)

NOTE:
 GROUND EQUIPMENT NOT SHOWN FOR CLARITY.

GROUND LEVEL
 ELEV. = 0'-0"± (A.G.L.)

TOWER ELEVATION
 22x34 SCALE: 1/8"=1'-0"
 11x17 SCALE: 1/16"=1'-0"

NOTE:
 EXISTING PLATFORM AT 73'-0"± RAD CENTER TO BE REMOVED PRIOR TO NEW INSTALLATION.



EXISTING WHIP ANTENNA (BY OTHERS) (TYP.)

EXISTING ANTENNA (BY OTHERS) (TYP.)

EXISTING DISH ANTENNA (BY OTHERS)

2
 A-4
 PROPOSED T-MOBILE (AIR 21 B2A/B4P) ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3)

1
 A-4
 PROPOSED T-MOBILE (AIR32 DB B66AA B2A) ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3)

1
 A-4
 PROPOSED T-MOBILE (KRY 112 144/1) TMA MOUNTED TO PROPOSED MOUNTING PIPE (BEHIND ANTENNA)

EXISTING WHIP ANTENNA (BY OTHERS) (TYP.)

EXISTING GPS ANTENNA

EXISTING MONOPOLE

0 4'-0" 8'-0" 16'-0" 24'-0"

**T-MOBILE
NORTHEAST LLC**

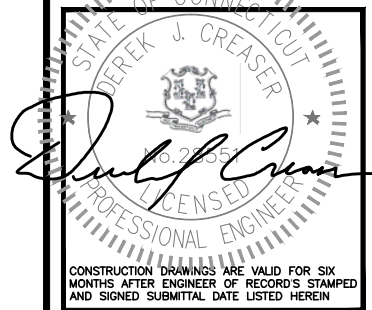
103 MONARCH DRIVE
LIVERPOOL, NY 13088
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CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801



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N. ANDOVER, MA 01845 FAX: (978) 336-5586



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CHECKED BY: BB

APPROVED BY: DJC

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SITE NUMBER:

CTHA375A

CROWN BU NUMBER:

806364

SITE NAME:

CTHA375A

SITE ADDRESS:

143 R OLD BLUE HILL ROAD
DURHAM, CT 06422
MIDDLESEX COUNTY

SHEET TITLE

ANTENNA & COAX
SCHEDULE

(G700-NSD)

SHEET NUMBER

A-3

ANTENNA AND COAXIAL CABLE SCHEDULE

SECTOR MARK	ANTENNA MODEL	AZIMUTH	E-TILT	M-TILT	ANTENNA CENTERLINE	SECTOR	TMA/SBiasT/RRU/ODU	TX/RX	CABLE FEED LINES	JUMPER TYPE	CABLE LENGTH
A-1	COMMSCOPE SHP2-13 (24.0x24.0x18.8)	0°	0	0	73'-0"	LEFT ALPHA	0/0/0/1	TX-RX-1	(1) (P) 1/2" MW COAX	-	175'
								TX-RX-2			
A-2	ERICSSON AIR32 DB B66AA B2A (56.6x12.9x8.7)	60°	2	0	73'-0"	CENTER ALPHA	0/0/0/0	TX-RX-1	(1) (P) 1-5/8" FIBER (SEE NOTE)	-	175'
								TX-RX-2			
A-3	ERICSSON AIR 21 B2A/B4P (55.0x12.0x7.9)	60°	2	0	73'-0"	CENTER ALPHA	1/0/0/0	TX-RX-1	(2) (P) 1-5/8" COAX	-	175'
								TX-RX-2			
A-4	RFS APXVAA24 43-U-A20 (96.0x24.0x8.5)	60°	2	0	73'-0"	RIGHT ALPHA	0/0/1/0	TX-RX-1	(1) (P) 1-5/8" FIBER (SEE NOTE)	-	175'
								TX-RX-2			
B-1	ERICSSON AIR32 DB B66AA B2A (56.6x12.9x8.7)	180°	2	0	73'-0"	LEFT BETA	0/0/0/0	TX-RX-1	(1) (P) 1-5/8" FIBER (SEE NOTE)	-	175'
								TX-RX-2			
B-2	ERICSSON AIR 21 B2A/B4P (55.0x12.0x7.9)	180°	2	0	73'-0"	CENTER ALPHA	1/0/0/0	TX-RX-1	(2) (P) 1-5/8" COAX	-	175'
								TX-RX-2			
B-4	RFS APXVAA24 43-U-A20 (96.0x24.0x8.5)	180°	2	0	73'-0"	RIGHT BETA	0/0/1/0	TX-RX-1	(1) (P) 1-5/8" FIBER (SEE NOTE)	-	175'
								TX-RX-2			
C-1	ERICSSON AIR32 DB B66AA B2A (56.6x12.9x8.7)	300°	2	0	73'-0"	LEFT GAMMA	0/0/0/0	TX-RX-1	(1) (P) 1-5/8" FIBER (SEE NOTE)	-	175'
								TX-RX-2			
C-2	ERICSSON AIR 21 B2A/B4P (55.0x12.0x7.9)	300°	2	0	73'-0"	CENTER ALPHA	1/0/0/0	TX-RX-1	(2) (P) 1-5/8" COAX	-	175'
								TX-RX-2			
C-4	RFS APXVAA24 43-U-A20 (96.0x24.0x8.5)	300°	2	0	73'-0"	CENTER GAMMA	0/0/1/0	TX-RX-1	(1) (P) 1-5/8" FIBER (SEE NOTE)	-	175'
								TX-RX-2			

NOTES:
INFORMATION BASED ON CROWN CASTLE APPLICATION VERSION 1.0 DATED: 02/02/2018. CHECK WITH RF ENGINEER FOR LATEST RFDS.

NOTE:
TOTAL OF (6) 1-5/8" COAX AND (4) 1-5/8" FIBER TRUNKS TO BE INSTALLED. FIBER TRUNKS TO BE SPLIT TO AIR32 AND APX ANTENNAS AT TOWER TOP.

ANTENNA AND COAXIAL CABLE SCHEDULE
SCALE: N.T.S

1
A-3

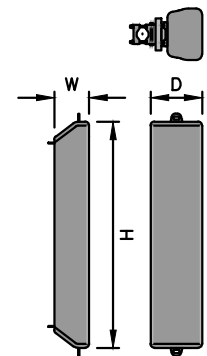
STRUCTURAL NOTE:
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO STRUCTURAL ANALYSIS PROVIDED BY: CROWN CASTLE DATED: 02/15/18 TO DETERMINE IF THERE ANY SUPPLEMENTAL OR SPECIAL INSTALLATION REQUIREMENTS, OR RELOCATION ARRANGEMENTS.

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

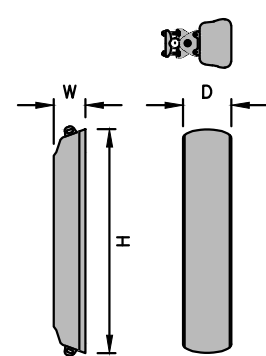
ANTENNA DIMENSIONS	
MODEL #	APXVAA24 43-U-A20
MANUF.	RFS
HEIGHT	96.0"
WIDTH	24.0"
DEPTH	8.5"
WEIGHT	101.4 LBS

ANTENNA DIMENSIONS	
MODEL #	AIR32 DB B66AA B2A
MANUF.	ERICSSON
HEIGHT	56.6"
WIDTH	12.9"
DEPTH	8.7"
WEIGHT	105.8 LBS

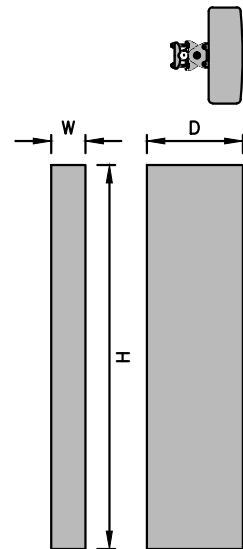
ANTENNA DIMENSIONS	
MODEL #	AIR 21 B2A/B4P
MANUF.	ERICSSON
HEIGHT	55.0"
WIDTH	12.0"
DEPTH	7.9"
WEIGHT	83.0 LBS



ANTENNA DETAIL 1
SCALE: N.T.S.



ANTENNA DETAIL 2
SCALE: N.T.S.



ANTENNA DETAIL 3
SCALE: N.T.S.

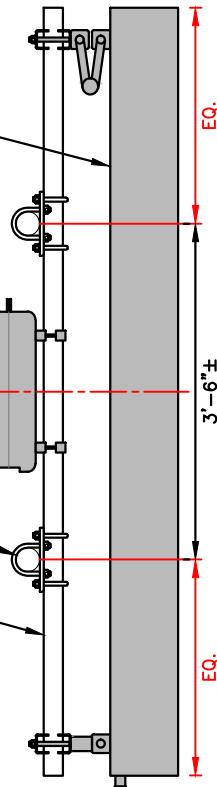
1 A-2 1-3 A-4 PROPOSED T-MOBILE ANTENNA MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 3 PER SECTOR, TOTAL OF 9)

6 A-4 PROPOSED T-MOBILE RRUS MOUNTED TO PROPOSED MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3)

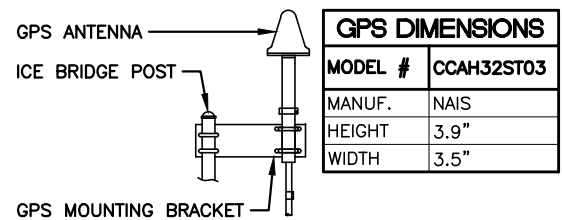
ANTENNA INSTALLATION SPECIAL WORK NOTE:
ANTENNA INSTALLATION WORKING POINT IS THE VERTICAL CENTERLINE BETWEEN THE EXISTING FACE FRAME UPPER AND LOWER HORIZONTAL MEMBERS. UNLESS NOTED OTHERWISE, VERTICALLY CENTER ALL PIPE MASTS AND ALL ANTENNAS BETWEEN THESE WORKING POINTS.

8 A-4 PROPOSED T-MOBILE LOW PROFILE PLATFORM (SITEPRO-1 PART# RMQP-496HK)

PROPOSED 2-3/8"x96" MOUNTING PIPES (TYP. OF 4 PER SECTOR, TOTAL OF 12) (INCLUDED WITH KIT)



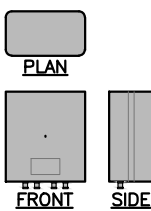
PROPOSED ANTENNA AND RRU MOUNTING DETAIL 5
SCALE: N.T.S.



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

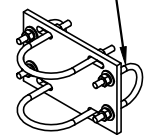
GPS ANTENNA MOUNTING DETAIL 4
SCALE: N.T.S.

RRUS DIMENSIONS	
MODEL #	RRUS 4449
MANUF.	ERICSSON
HEIGHT	14.9"
WIDTH	13.1"
DEPTH	9.2"
WEIGHT	74 LBS



RRUS DETAIL 5
SCALE: N.T.S.

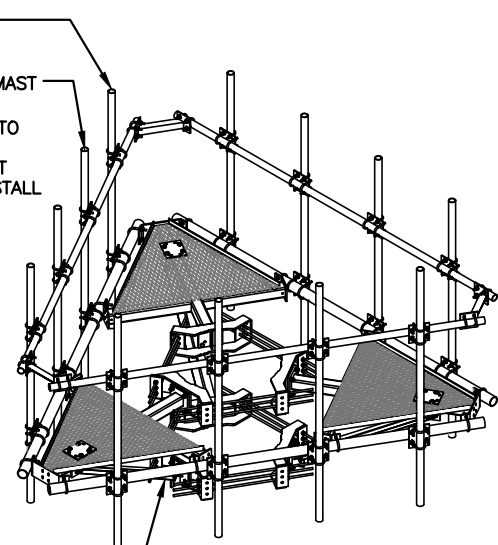
PROPOSED T-MOBILE PIPE MOUNT SITEPRO-1/VALMONT PART #SCX6-K (TOTAL OF 2)



CROSSOVER PLATE KIT 7
SCALE: N.T.S.

(11) 2-3/8"x96" MOUNTING PIPES (INCLUDED WITH KIT)

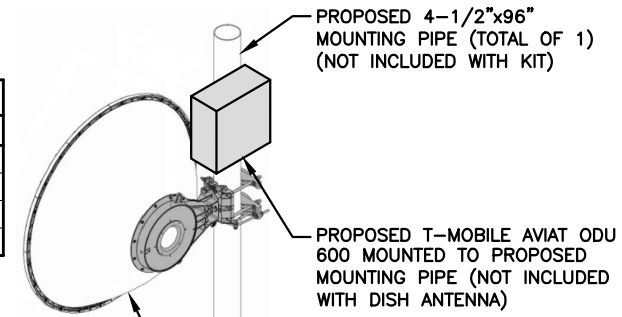
7 A-4 PROPOSED T-MOBILE 4-1/2"Ø MAST (TOTAL OF 1) WITH PROPOSED CROSSOVER PLATE (TYP. OF 2) TO REPLACE MAST AND CROSSOVER PLATES FROM SECTOR MOUNT KIT AND BE USED FOR MW DISH INSTALL



PROPOSED T-MOBILE LOW PROFILE PLATFORM (SITEPRO-1 PART# RMQP-496HK)

ANTENNA MOUNTING KIT 8
SCALE: N.T.S.

MW ANTENNA DIMENSIONS	
MODEL #	SHP2-13
MANUF.	COMMSCOPE
HEIGHT	24.0"Ø
DEPTH	18.8"
WEIGHT	24 LBS



MW DISH ANTENNA DETAIL 9
SCALE: N.T.S.

T-MOBILE NORTHEAST LLC
103 MONARCH DRIVE
LIVERPOOL, NY 13088
(315) 265-1882

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

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5886

STATE OF CONNECTICUT
Derek J. Creaser
16.2855
LICENSED PROFESSIONAL ENGINEER
CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN

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APPROVED BY: DJC

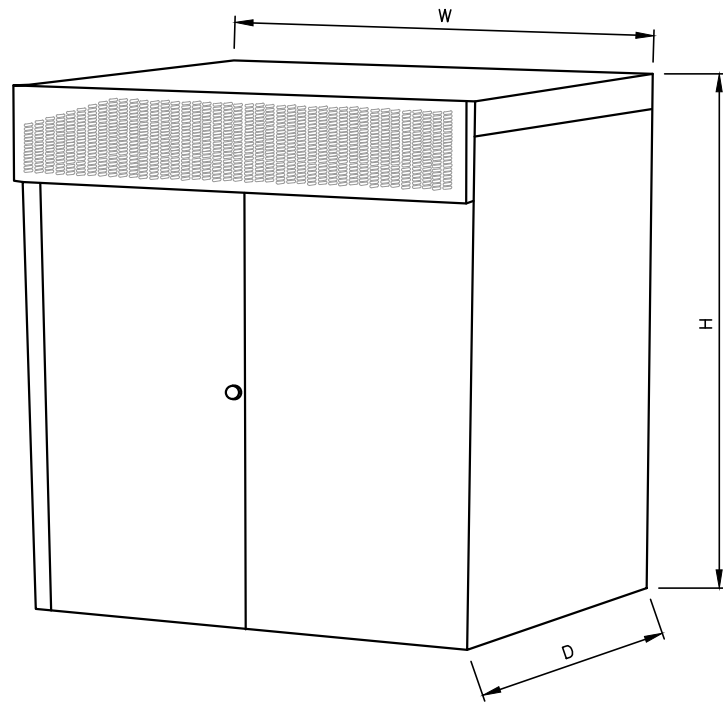
SUBMITTALS			
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CROWN BU NUMBER:
806364
SITE NAME:
CTHA375A
SITE ADDRESS:
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DURHAM, CT 06422
MIDDLESEX COUNTY

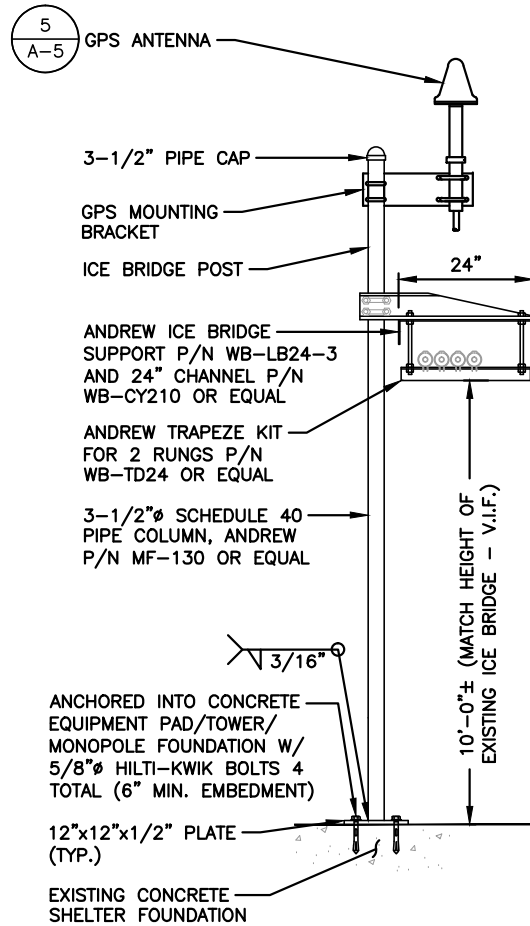
SHEET TITLE
TOWER EQUIPMENT DETAILS
(G700-NSD)

SHEET NUMBER
A-4

CABINET DIMENSIONS	
MODEL #	MUAC 6102
MANUF.	ERICSSON
WIDTH	51.2"
DEPTH	27.6"
HEIGHT	57.1"
WEIGHT (W/O BACKUP BATTERIES)	728 LBS
CABINET CAN BE MOUNTED DIRECTLY TO SITE GROUND (INSTALL PER MANUFACTURER'S INSTALLATION GUIDELINES)	

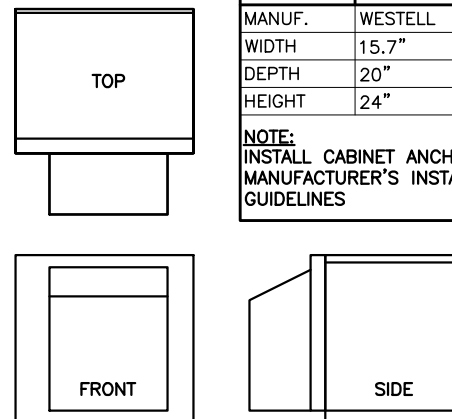


PROPOSED 6102 EQUIPMENT CABINET 1
SCALE: N.T.S. A-5



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

COAX ICE BRIDGE DETAIL 3
SCALE: N.T.S. A-5



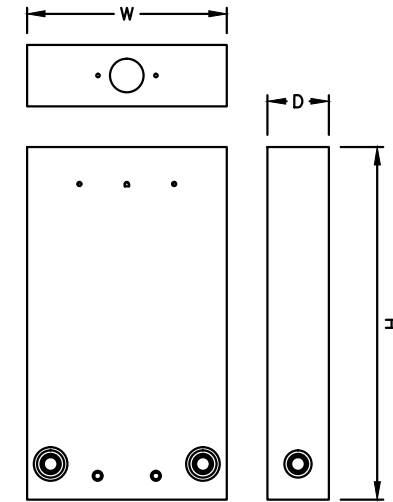
AAV CABINET DIMENSIONS	
MODEL #	BXM-10N-HE3-20A
MANUF.	WESTELL
WIDTH	15.7"
DEPTH	20"
HEIGHT	24"
NOTE: INSTALL CABINET ANCHORS PER MANUFACTURER'S INSTALLATION GUIDELINES	

AAV CABINET 4
SCALE: N.T.S. A-5

CONTRACTOR TO SUPPLY AND INSTALL THE FOLLOWING:

- SQUARE D MODEL Q012040M200RB 200AMP 20 SPACE OUTDOOR MAIN BREAKER LOAD PANEL
- SQUARE D GENERATOR INTERLOCK KIT MODEL SD-100-00
- RELIANCE 30AMP GENERATOR PLUG MODEL P830

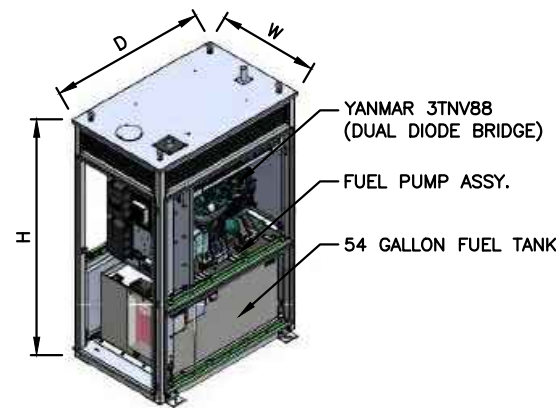
SQUARE D 200A DIMENSIONS	
MODEL #	Q012040M200RB
MANUF.	SQUARE D CO.
WIDTH	14.8"
DEPTH	4.5"
HEIGHT	26"
NOTE: INSTALL CABINET ANCHORS PER MANUFACTURER'S INSTALLATION GUIDELINES	



- NOTES:
- METER SOCKET BY THIS CONTRACT. METER TO BE SUPPLIED BY LOCAL UTILITY COMPANY.
 - AC POWER ENCLOSURE.
 - ALL EQUIPMENT SHALL BE GROUNDED PER LATEST EDITION OF NEC AND AS INDICATED.
 - ELECTRICAL EQUIPMENT SHALL BE MIN. 3'-0" FROM ANY STRUCTURE AND AS REQUIRED BY LOCAL UTILITY COMPANIES AND AHJ.
 - CONTRACTOR MUST LABEL ALIKE BREAKERS IN POWER CABINET.
 - REFER TO ACTUAL EQUIPMENT DRAWINGS.

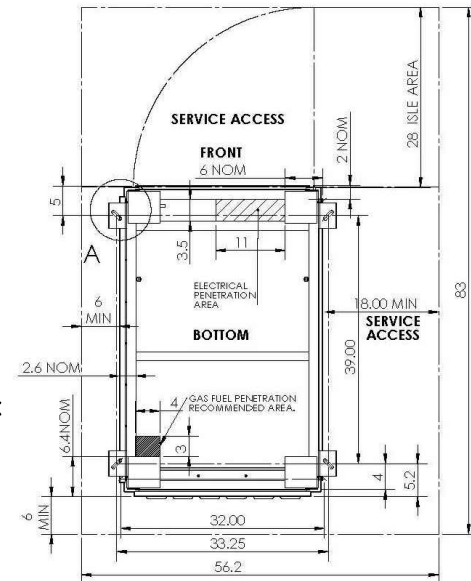
POWER PANEL DETAIL 2
SCALE: N.T.S. A-5

DIESEL FUELED BACKUP POWER GENERATOR	
MODEL #	8220Y-3TNV88-101
MANUF.	POLAR POWER
HEIGHT	76.1"
WIDTH	31"
DEPTH	~48"
FUEL TANK CAPACITY	54 GAL.
NOTE: * CLEARANCE REQUIREMENTS: 56.2" WIDE x 83" DEEP * CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING	



DIESEL GENERATOR DETAIL 5
SCALE: N.T.S. A-5

INSTALLATION FOOTPRINT, BOTTOM VIEW



T-MOBILE NORTHEAST LLC

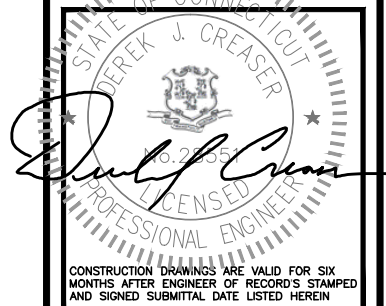
103 MONARCH DRIVE
LIVERPOOL, NY 13088
(315) 265-1882

CROWN CASTLE

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12 GILL STREET, SUITE 5800
WOBURN, MA 01801

HG HUDSON Design Group LLC

45 BEECHWOOD DRIVE TEL: (978) 557-5553
N. ANDOVER, MA 01845 FAX: (978) 336-5586



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MIDDLESEX COUNTY

SHEET TITLE
GROUND EQUIPMENT DETAILS
(G700-NSD)

SHEET NUMBER
A-5

**T-MOBILE
NORTHEAST LLC**

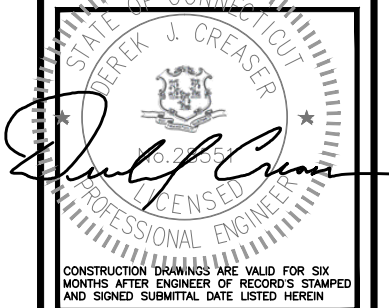
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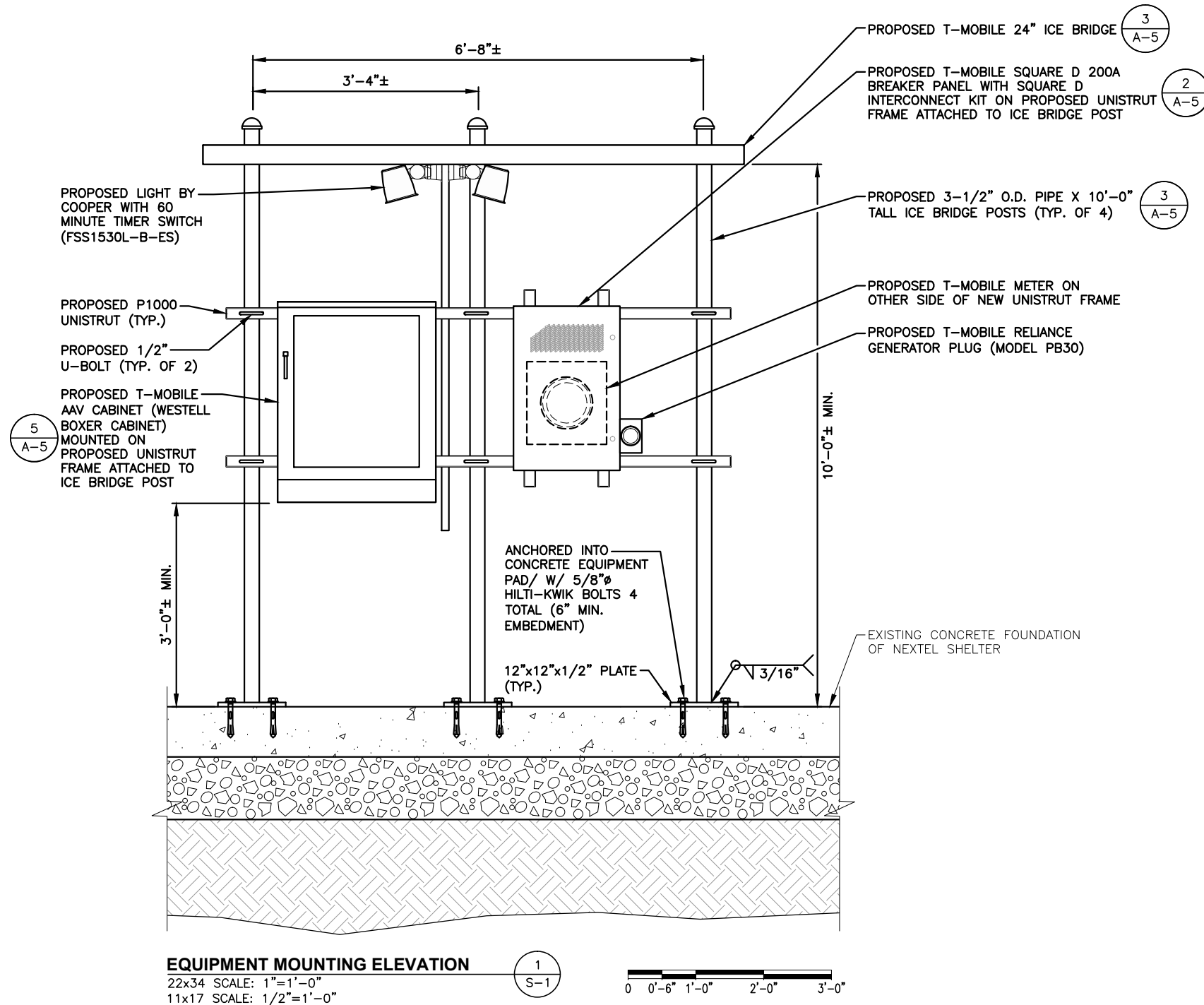
143 R OLD BLUE HILL ROAD
DURHAM, CT 06422
MIDDLESEX COUNTY

SHEET TITLE

EQUIPMENT
MOUNTING ELEVATION
(G700-NSD)

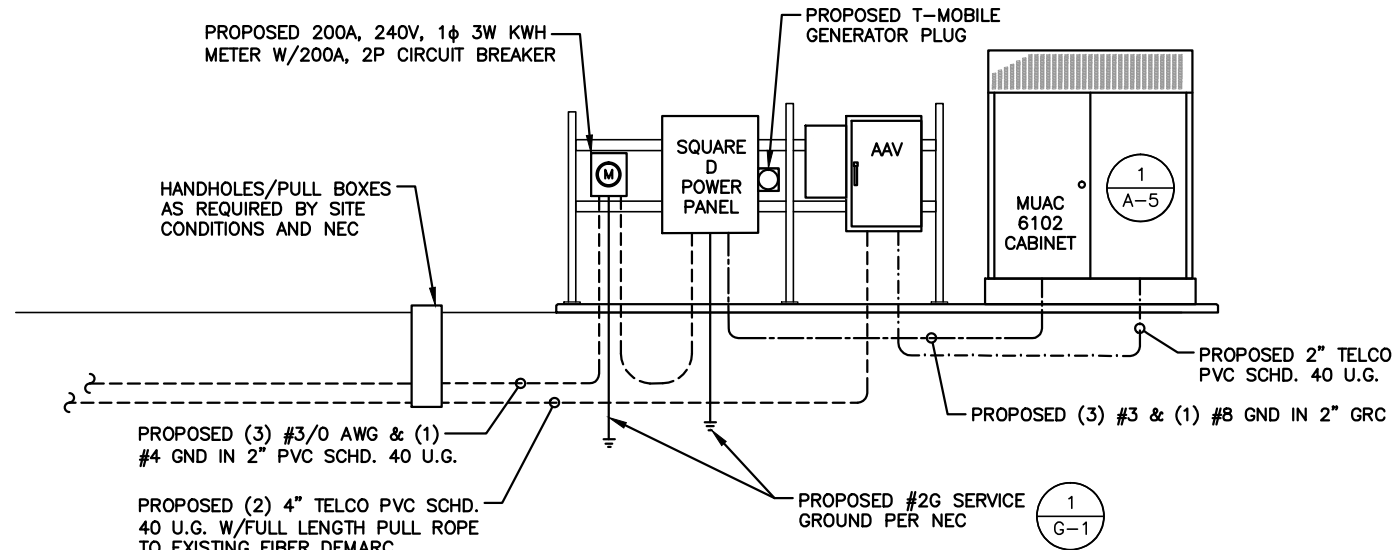
SHEET NUMBER

S-1



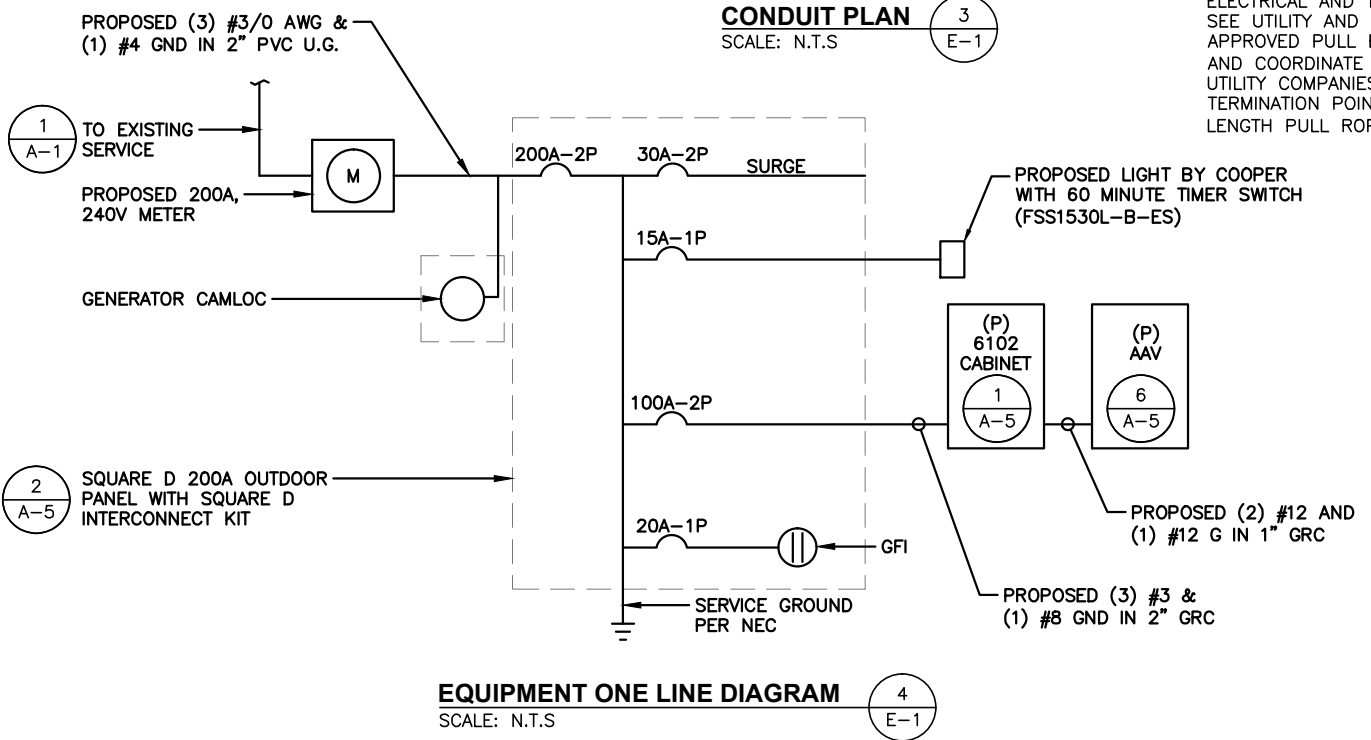
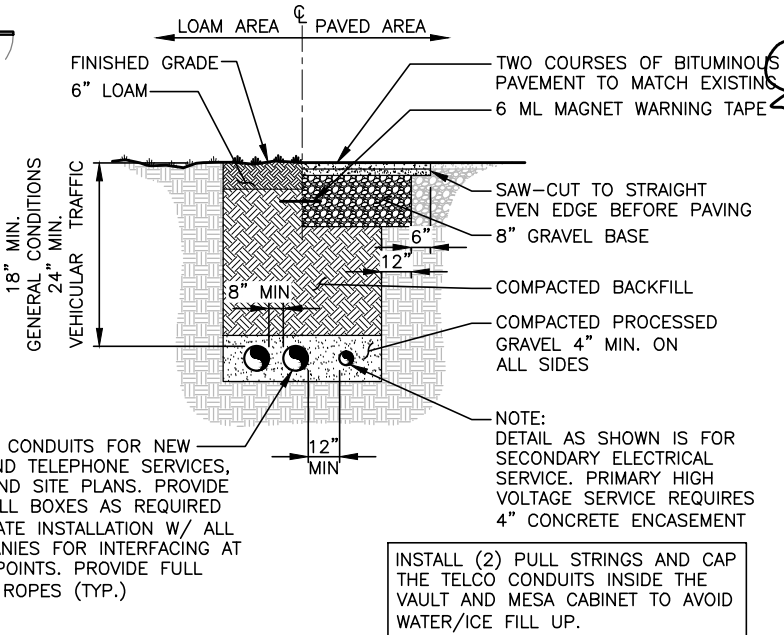
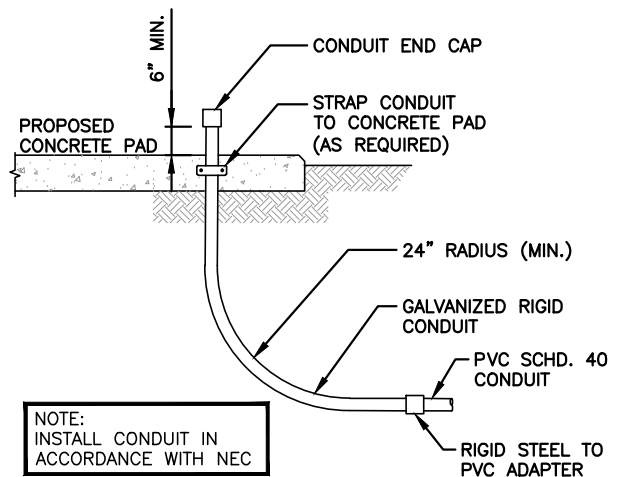
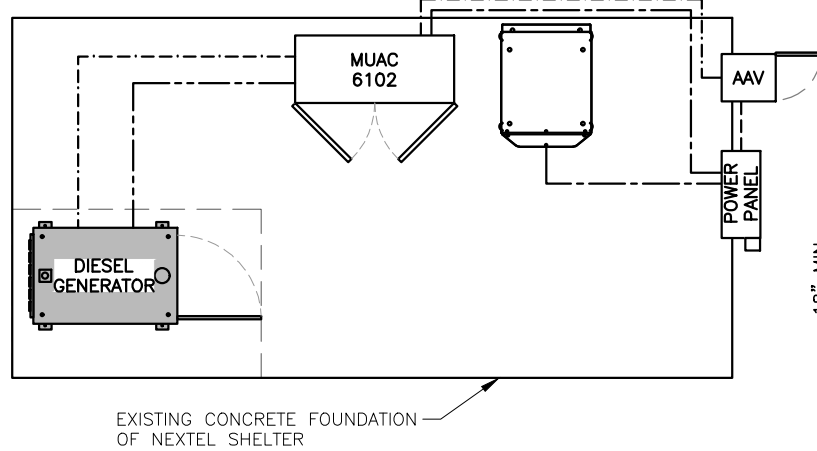
ELECTRICAL NOTES

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- ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.



CONDUIT LEGEND

---	2"Ø PVC SCHD. 40 CONDUIT, AC-POWER, BELOW CONCRETE PAD, (1) CONDUIT PPC TO MUAC 6102, (2) CONDUIT PPC TO FUTURE PBC
---	2"Ø PVC SCHD. 40 CONDUIT, TELCO, BELOW CONCRETE PAD, (1) CONDUIT PPC TO MUAC 6102 AND (1) CONDUIT MUAC 6102 FOR DAISY CHAIN TO FUTURE MUAC 6102
---	1"Ø CONDUIT, CAT 5 ALARM CABLE, ON CONCRETE PAD, (1) CONDUIT MUAC 6102 TO GENERATOR
---	2-1/2"Ø RGS ABOVE CONCRETE PAD FROM MUAC 6102 TO GENERATOR (CONDUCTOR TO BE 2 500MCM TELCO FLEX11 OUTDOOR RATED BLACK JACKETED WIRE)



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

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

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Professional Engineer
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16.2855
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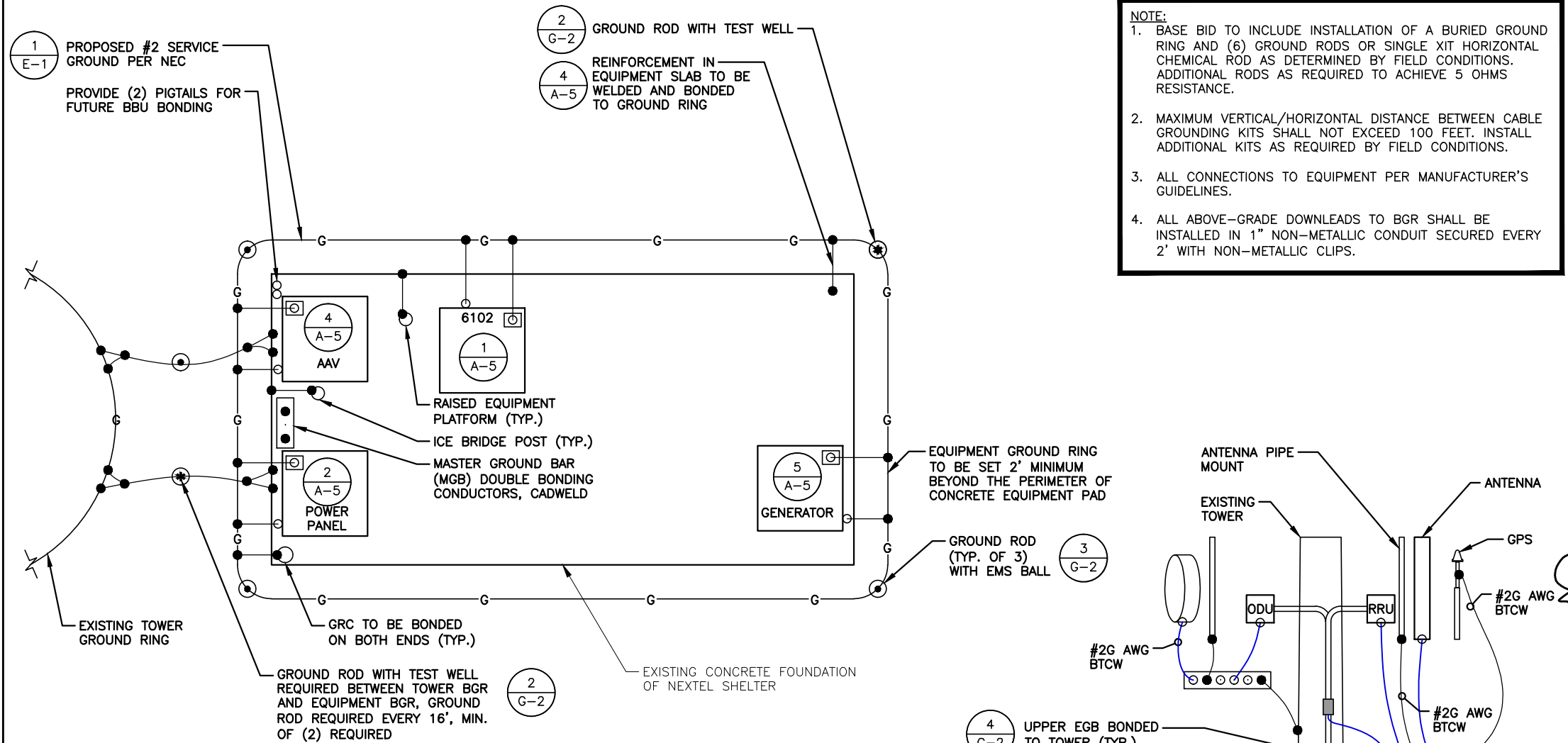
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MIDDLESEX COUNTY

SHEET TITLE
ELECTRICAL DETAILS AND NOTES
(G700-NSD)

SHEET NUMBER
E-1

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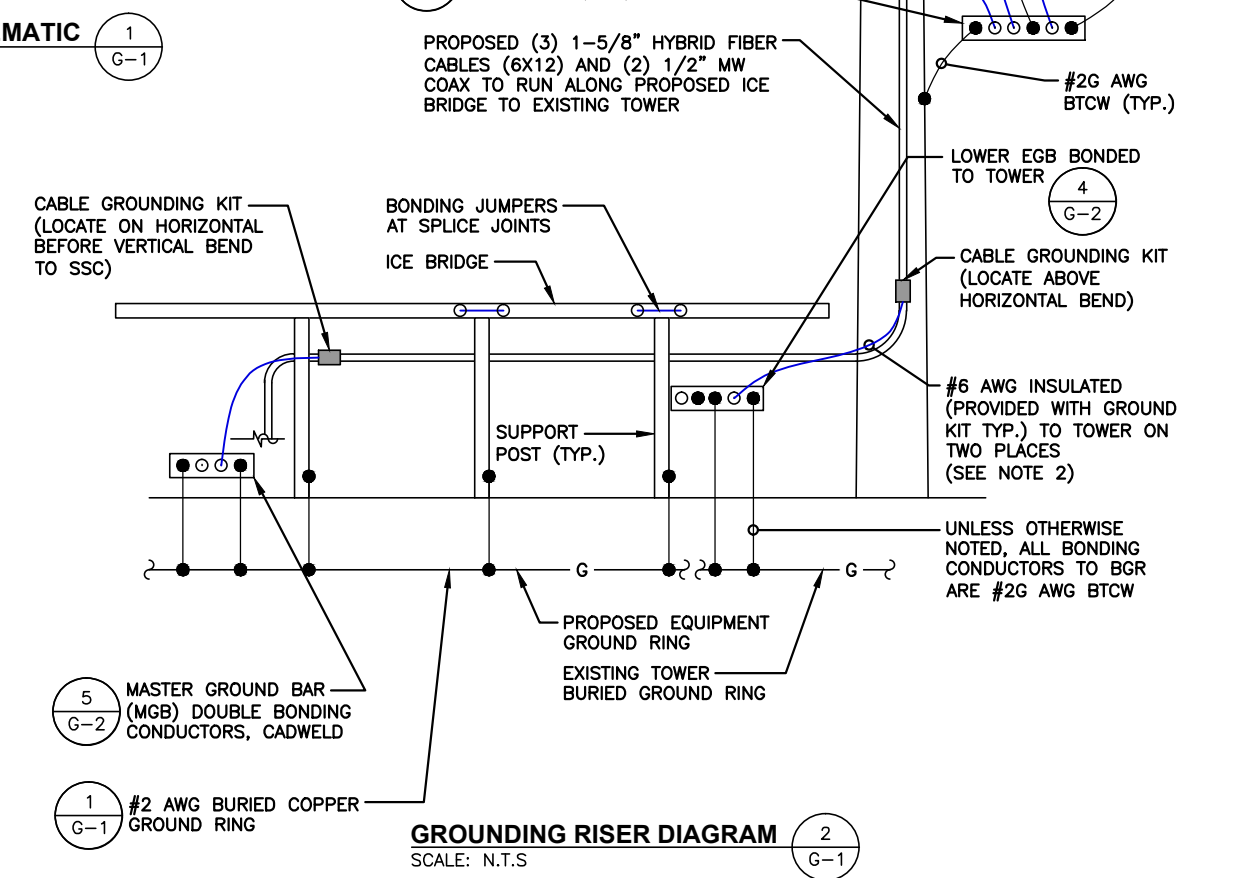


NOTE:

- 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.
- MAXIMUM VERTICAL/HORIZONTAL DISTANCE BETWEEN CABLE GROUNDING KITS SHALL NOT EXCEED 100 FEET. INSTALL ADDITIONAL KITS AS REQUIRED BY FIELD CONDITIONS.
- ALL CONNECTIONS TO EQUIPMENT PER MANUFACTURER'S GUIDELINES.
- ALL ABOVE-GRADE DOWNLEADS TO BGR SHALL BE INSTALLED IN 1" NON-METALLIC CONDUIT SECURED EVERY 2' WITH NON-METALLIC CLIPS.

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
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ERIK J. CREASER
16.2855
LICENSED PROFESSIONAL ENGINEER

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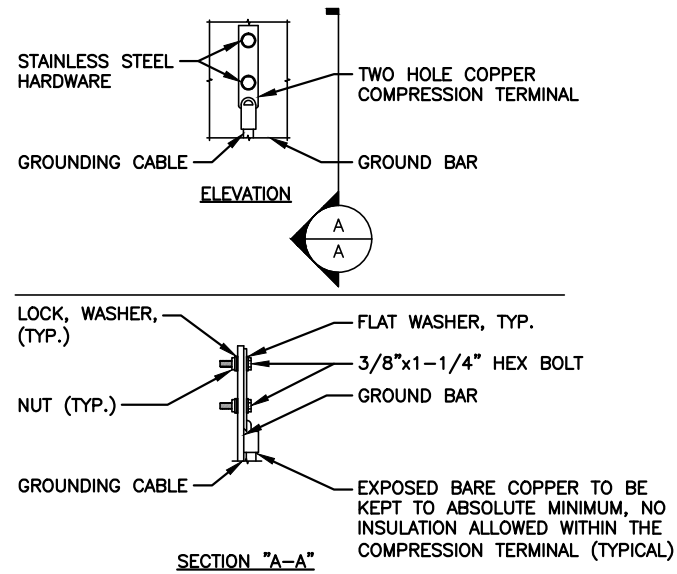
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MIDDLESEX COUNTY

SHEET TITLE
GROUNDING SCHEMATIC AND RISER DIAGRAM
(G700-NSD)

SHEET NUMBER
G-1

ELECTRICAL NOTES

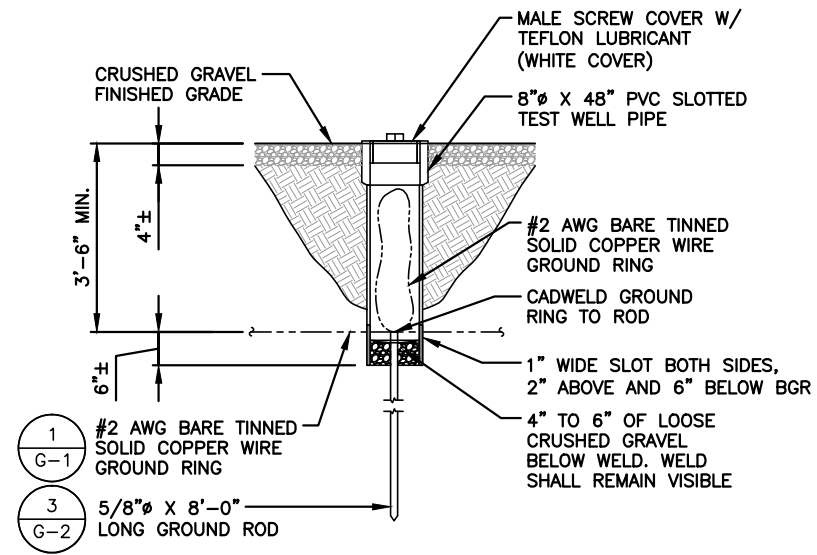
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- ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.



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

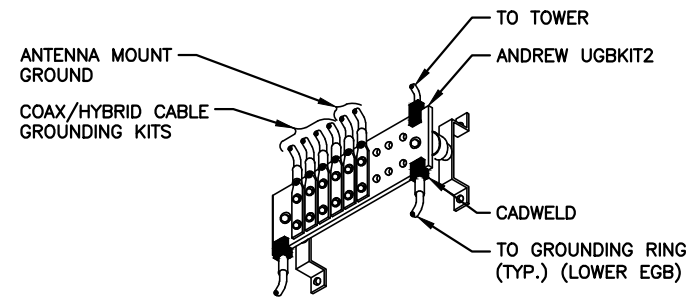
SCALE: N.T.S. (1) G-2



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

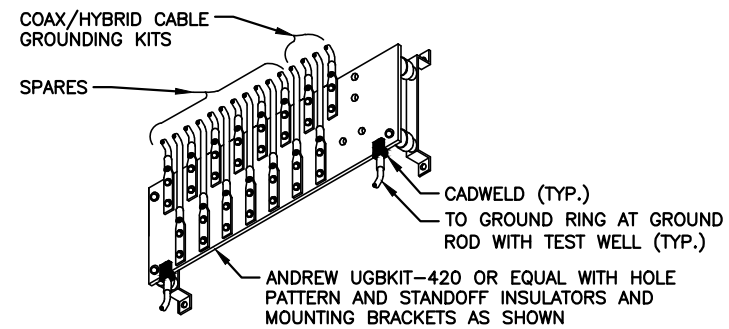
GROUND ROD TEST WELL DETAIL

SCALE: N.T.S. (2) G-2



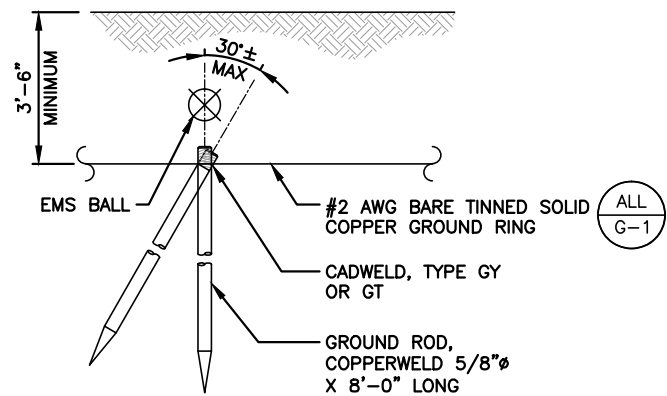
EQUIPMENT GROUND BAR (EGB)

SCALE: N.T.S. (4) G-2



MASTER GROUND BAR (MGB)

SCALE: N.T.S. (5) G-2



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

SCALE: N.T.S. (3) G-2

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

T-MOBILE NORTHEAST LLC

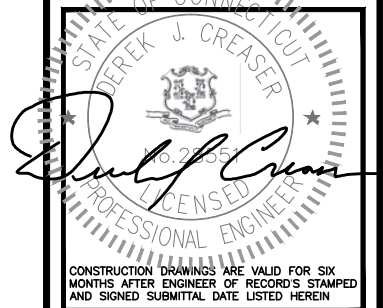
103 MONARCH DRIVE
 LIVERPOOL, NY 13088
 (315) 265-1882

CROWN CASTLE

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

HUDSON Design Group LLC

45 BEECHWOOD DRIVE
 N. ANDOVER, MA 01845
 TEL: (978) 557-5553
 FAX: (978) 336-5586



CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	03/28/18	CONSTRUCTION REVISED	DJM
1	03/26/18	CONSTRUCTION REVISED	GA
0	03/19/18	ISSUED FOR CONSTRUCTION	SF/DM

SITE NUMBER:

CTHA375A

CROWN BU NUMBER:

806364

SITE NAME:

CTHA375A

SITE ADDRESS:

143 R OLD BLUE HILL ROAD
 DURHAM, CT 06422
 MIDDLESEX COUNTY

SHEET TITLE

GROUNDING DETAILS AND NOTES

(G700-NSD)

SHEET NUMBER

G-2



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

Date: **March 07, 2018**

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

Subject: **Structural Analysis Report**

Carrier Designation: **T-Mobile Co-Locate**
Carrier Site Number: CTHA375A
Carrier Site Name: CTHA375A

Crown Castle Designation: **Crown Castle BU Number:** 806364
Crown Castle Site Name: HRT 106(B) 943202
Crown Castle JDE Job Number: 482768
Crown Castle Work Order Number: 1534197
Crown Castle Application Number: 424351 Rev. 2

Engineering Firm Designation: **Crown Castle Project Number:** 1534197

Site Data: **143 R Old Blue Hill Road, DURHAM, Middlesex County, CT**
Latitude 41° 27' 33.67", Longitude -72° 39' 45.83"
120 Foot - Monopole Tower

Dear Charles McGuirt,

Crown Castle is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural ‘Statement of Work’ and the terms of Crown Castle Purchase Order Number 1534197, in accordance with application 424351, revision 2.

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

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

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 130 mph converted to a nominal 3-second gust wind speed of 101 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

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

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

Structural analysis prepared by: Emma McCarty / SM

Respectfully submitted by:

Maham Barimani, P.E.
 Senior Project Engineer

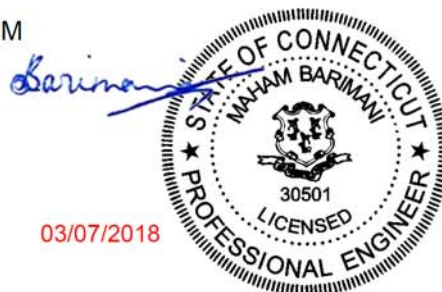


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1) INTRODUCTION

This tower is a 100 ft Monopole tower designed by VALMONT in March of 1994, and later 20 ft. extension was designed by Valmont in May of 2004. The new tower height to be 120 ft. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 101 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B.

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
73.0	73.0	3	ericsson	AIR 21 B2A/B4P	10	1/2 1-5/8	-
		3	ericsson	AIR32 DB B66Aa B2a			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RADIO 4449			
		3	rfs celwave	APXVAA24_43-U-A20			
		1	commscope	SHP2-13			
		1	Site pro1	RMQP-496-HK Mount			

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	
119.0	125.0	1	decibel	DB809MT3-XT	2	7/8	1	
	123.0	1	decibel	DB201-A				
	119.0	2	tower mounts	Side Arm Mount [SO 701-1]				
116.0	116.0	9	andrew	SBNHH-1D65A w/ Mount Pipe	12	3/8 3/4 7/8	2	
		3	ericsson	RRUS 11				
		3	ericsson	RRUS 32				
		3	ericsson	RRUS 32 B2				
		1	tower mounts	Miscellaneous [NA 507-1]				
		1	tower mounts	Platform Mount [LP 601-1]				
	110.0	110.0	1	tower mounts				Side Arm Mount [SO 102-3]
			3	ericsson				RRUS 32 B2
			1	raycap				DC6-48-60-18-8C
107.0	107.0	1	raycap	DC6-48-60-18-8F	1	7/8	1	
		1	gabriel electronics	GLF6-450				
		1	tower mounts	Pipe Mount [PM 601-1]				
98.0	100.0	3	alcatel lucent	B13 RRH4X30-4R	1	1/2	1	
		3	alcatel lucent	B25 RRH4X30	2	1-5/8		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
	98.0	3	alcatel lucent	B66A RRH4X45	12	7/8	
		6	andrew	SBNHH-1D65B w/ Mount Pipe			
		6	antel	LPA-80080/6CF w/ Mount Pipe			
		2	raycap	RXXDC-3315-PF-48			
		1	tower mounts	Platform Mount [LP 602-1]			
87.0	87.0	3	alcatel lucent	PCS 1900MHZ 4X45W-65MHZ	1 3	7/8 1-1/4	2
		6	alcatel lucent	RRH2X50-800			
		3	alcatel lucent	TD-RRH8X20-25			
		3	kmw communications	ETCR-654L12H6 w/ Mount Pipe			
		1	Site pro1	PRK-1245			
		1	tower mounts	Platform Mount [LP 602-1]			
73.0	79.0	1	decibel	DB636-C	1	7/8	1
	73.0	1	tower mounts	Platform Mount [LP 1201-1]	-	-	3
50.0	57.0	1	rfs celwave	PD1142-1	1 3	1/2 7/8	1
	54.0	1	decibel	ASP-655			
	53.0	1	rfs celwave	PD1121-6			
	50.0	1	decibel	DB492A			
		1	tower mounts	Side Arm Mount [SO 701-3]			
40.0	41.0	1	tekelec systemes	EPSILON GPS ANTENNA 35 DB	1	1/2	1
	40.0	1	tower mounts	Side Arm Mount [SO 701-1]			

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
97	97	12	-	8RL41OC4R105	-	-
87	87	9	-	8RL41OC4R105	-	-
75	75	1	-	ASP710	-	-
		1	Telewave	450F6 Antenna		
50	50	1	-	ASP701	-	-
		1	-	ASP710		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Assoc., Inc.	262150	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering, Inc.	297341	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	262153	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Valmont Microflex (20' extension design)	942187	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) The existing base plate grout was not considered in this analysis.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 100	Pole	TP20.263x15.403x0.1875	1	-4.02	829.59	32.7	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-20.53	1920.74	91.6	Pass
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-34.79	3477.10	87.0	Pass
							Summary	
						Pole (L2)	91.6	Pass
						Rating =	91.6	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Bolts	100	48.3	Pass
1	Flange Plates	100	13.1	Pass
1	Anchor Rods	0	81.6	Pass
1	Base Plate	0	44.2	Pass
1	Base Foundation Structure	0	10.2	Pass
1	Base Foundation Soil Interaction	0	39.7	Pass

Structure Rating (max from all components) =	91.6%
---	--------------

Notes:

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

4.1) Recommendations

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

The results of the tilt and twist values for a 60 mph 3-second gust service wind speed per the TIA-222-G Standard are given below:

Critical Deflections and Radius of Curvature - Service Wind

<i>Elevation</i>	<i>Appurtenance</i>	<i>Gov. Load Comb.</i>	<i>Deflection</i>	<i>Tilt</i>	<i>Twist</i>	<i>Radius of Curvature</i>
<i>ft</i>			<i>in</i>	<i>°</i>	<i>°</i>	<i>ft</i>
73.00	SHP2-13	43	7.11	0.96	0.00	4043

APPENDIX A
TNXTOWER OUTPUT

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB809MT3-XT	119	(4) 4' x 2" Pipe Mount	98
DB201-A	119	Platform Mount [LP 602-1]	98
6' x 2" Mount Pipe	119	(2) SBNHH-1D65B w/ Mount Pipe	98
6' x 2" Mount Pipe	119	ETCR-654L12H6 w/ Mount Pipe	87
Side Arm Mount [SO 102-3]	119	ETCR-654L12H6 w/ Mount Pipe	87
Side Arm Mount [SO 701-1]	119	PCS 1900MHZ 4X45W-65MHZ	87
Side Arm Mount [SO 701-1]	119	PCS 1900MHZ 4X45W-65MHZ	87
(3) SBNHH-1D65A w/ Mount Pipe	116	PCS 1900MHZ 4X45W-65MHZ	87
(3) SBNHH-1D65A w/ Mount Pipe	116	(2) RRH2X50-800	87
(3) SBNHH-1D65A w/ Mount Pipe	116	(2) RRH2X50-800	87
RRUS 11	116	(2) RRH2X50-800	87
RRUS 11	116	TD-RRH8X20-25	87
RRUS 11	116	TD-RRH8X20-25	87
RRUS 32	116	TD-RRH8X20-25	87
RRUS 32	116	6' x 2" Mount Pipe	87
RRUS 32	116	6' x 2" Mount Pipe	87
RRUS 32 B2	116	6' x 2" Mount Pipe	87
RRUS 32 B2	116	Miscellaneous [NA 509-3]	87
RRUS 32 B2	116	Platform Mount [LP 602-1]	87
RRUS 32 B2	116	ETCR-654L12H6 w/ Mount Pipe	87
RRUS 32 B2	116	AIR 21 B2A/B4P	73
RRUS 32 B2	116	AIR 21 B2A/B4P	73
DC6-48-60-18-8F	116	AIR 21 B2A/B4P	73
DC6-48-60-18-8C	116	AIR32 DB B66Aa B2a	73
Miscellaneous [NA 507-1]	116	AIR32 DB B66Aa B2a	73
Side Arm Mount [SO 102-3]	116	AIR32 DB B66Aa B2a	73
Platform Mount [LP 601-1]	116	APXVAA24_43-U-A20	73
Pipe Mount [PM 601-1]	107	APXVAA24_43-U-A20	73
GLF6-450	107	APXVAA24_43-U-A20	73
(2) SBNHH-1D65B w/ Mount Pipe	98	KRY 112 144/1	73
(2) SBNHH-1D65B w/ Mount Pipe	98	KRY 112 144/1	73
(2) LPA-80080/6CF w/ Mount Pipe	98	KRY 112 144/1	73
(2) LPA-80080/6CF w/ Mount Pipe	98	RADIO 4449	73
(2) LPA-80080/6CF w/ Mount Pipe	98	RADIO 4449	73
(2) LPA-80080/6CF w/ Mount Pipe	98	RADIO 4449	73
B13 RRH4X30-4R	98	RADIO 4449	73
B13 RRH4X30-4R	98	Platform Mount [LP 1301-1]	73
B13 RRH4X30-4R	98	DB636-C	73
B25 RRH4X30	98	2 FT DISH	73
B25 RRH4X30	98	ASP-655	50
B25 RRH4X30	98	PD1121-6	50
B66A RRH4X45	98	Side Arm Mount [SO 701-3]	50
B66A RRH4X45	98	PD1142-1	50
B66A RRH4X45	98	DB492A	50
(2) RXXDC-3315-PF-48	98	EPSILON GPS ANTENNA 35 DB	40
(4) 4' x 2" Pipe Mount	98	Side Arm Mount [SO 701-1]	40
(4) 4' x 2" Pipe Mount	98		

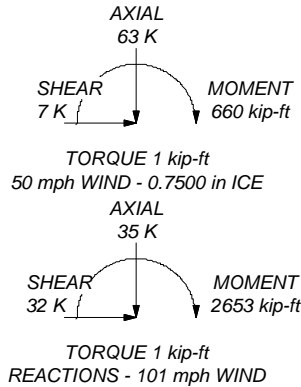
MATERIAL STRENGTH

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

TOWER DESIGN NOTES

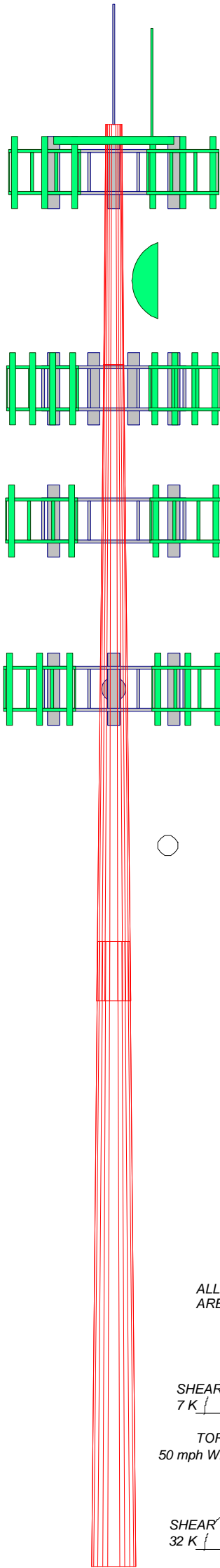
1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in 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: 91.6%

ALL REACTIONS ARE FACTORED



Section	1	2	3
Length (ft)	20.00	52.92	52.00
Number of Sides	12	12	12
Thickness (in)	0.1875	0.2813	0.3750
Socket Length (ft)		4.92	
Top Dia (in)	15.4030	20.2630	31.3720
Bot Dia (in)	20.2630	33.1300	44.0000
Grade		A572-65	
Weight (K)	0.7	4.3	8.0

120.0 ft
100.0 ft
47.1 ft
0.0 ft



REACTIONS - 101 mph WIND

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
The Pathway to Possible Phone: 724-416-2000 FAX: -

Job: **BU# 806364**
Project: **WO 1534197**
Client: Crown Castle Drawn by: SMandal App'd:
Code: TIA-222-G Date: 03/07/18 Scale: NTS
Path: R:\SA Models - Letters\Work Area\EMcCarty\WIP\806364 WO1534197\QA-SM\806364.dwg 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:

- 1) Tower is located in Middlesex County, Connecticut.
- 2) Basic wind speed of 101 mph.
- 3) Structure Class II.
- 4) Exposure Category B.
- 5) Topographic Category 1.
- 6) Crest Height 0.00 ft.
- 7) Nominal ice thickness of 0.7500 in.
- 8) Ice thickness is considered to increase with height.
- 9) Ice density of 56.00 pcf.
- 10) A wind speed of 50 mph is used in combination with ice.
- 11) Temperature drop of 50 °F.
- 12) Deflections calculated using a wind speed of 60 mph.
- 13) A non-linear (P-delta) analysis was used.
- 14) Pressures are calculated at each section.
- 15) Stress ratio used in pole design is 1.
- 16) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-100.00	20.00	0.00	12	15.4030	20.2630	0.1875	0.7500	A572-65 (65 ksi)
L2	100.00-47.08	52.92	4.92	12	20.2630	33.1300	0.2813	1.1250	A572-65 (65 ksi)
L3	47.08-0.00	52.00		12	31.3720	44.0000	0.3750	1.5000	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	15.9464	9.1864	271.4575	5.4471	7.9788	34.0225	550.0464	4.5212	3.6255	19.336	
	20.9778	12.1206	623.5083	7.1870	10.4962	59.4030	1263.3968	5.9654	4.9280	26.283	
L2	20.9778	18.0960	922.2208	7.1535	10.4962	87.8621	1868.6694	8.9063	4.6767	16.628	
	34.2987	29.7486	4097.2352	11.7599	17.1613	238.7480	8302.1094	14.6414	8.1251	28.889	
L3	33.7148	37.4288	4590.1944	11.0969	16.2507	282.4616	9300.9782	18.4213	7.4027	19.741	
	45.5522	52.6772	12796.152	15.6177	22.7920	561.4318	25928.474	25.9261	10.7870	28.765	
				6					3		

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 120.00-100.00				1	1	1			
L2 100.00-47.08				1	1	1			
L3 47.08-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Section	Component Type	Placement	Total Number	Number Per Row	Start/End Position	Width or Diameter	Perimeter	Weight
			ft				in	in	klf
2" Rigid Conduit	C	Surface Ar (CaAa)	40.00 - 0.00	1	1	0.130 0.160	2.0000		0.00

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	CAAA	Weight
				ft		ft ² /ft	klf
119 LDF5-50A(7/8)	C	No	Inside Pole	119.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
116 LDF5-50A(7/8)	A	No	Inside Pole	116.00 - 0.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
FB-L98B-034-XXX(3/8)	A	No	Inside Pole	116.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
WR-VG86ST-BRD(3/4)	A	No	Inside Pole	116.00 - 0.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
107 LDF5-50A(7/8)	C	No	Inside Pole	107.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
98 LDF4-50A(1/2)	A	No	Inside Pole	98.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
LDF5-50A(7/8)	A	No	Inside Pole	98.00 - 0.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
HB158-1-08U8-	A	No	Inside Pole	98.00 - 0.00	2	No Ice	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight klf
S8J18(1-5/8)						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
87								
HB114-08U3M12-XXXF(7/8)	C	No	Inside Pole	87.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
HB114-1-08U4-M5F(1-1/4)	C	No	Inside Pole	87.00 - 0.00	3	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
73								
VXL5-50(7/8)	A	No	Inside Pole	73.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF4-75A(1/2)	B	No	Inside Pole	73.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF7-50A(1-5/8)	B	No	Inside Pole	73.00 - 0.00	6	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
HCS 6X12 4AWG(1-5/8)	B	No	Inside Pole	73.00 - 0.00	4	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
50								
LDF4-50A(1/2)	C	No	Inside Pole	50.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF5-50A(7/8)	C	No	Inside Pole	50.00 - 0.00	3	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
40								
LDF4-50A(1/2)	C	No	Inside Pole	40.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	0.10
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.01
L2	100.00-47.08	A	0.000	0.000	0.000	0.000	0.69
		B	0.000	0.000	0.000	0.000	0.38
		C	0.000	0.000	0.000	0.000	0.24
L3	47.08-0.00	A	0.000	0.000	0.000	0.000	0.63
		B	0.000	0.000	0.000	0.000	0.69
		C	0.000	0.000	8.000	0.000	0.43

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} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	120.00-100.00	A	1.691	0.000	0.000	0.000	0.000	0.10
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.01
L2	100.00-47.08	A	1.622	0.000	0.000	0.000	0.000	0.69
		B		0.000	0.000	0.000	0.000	0.38
		C		0.000	0.000	0.000	0.000	0.24
L3	47.08-0.00	A	1.444	0.000	0.000	0.000	0.000	0.63
		B		0.000	0.000	0.000	0.000	0.69
		C		0.000	0.000	20.975	0.000	0.72

Feed Line Center of Pressure

Section	Elevation	CP _x	CP _z	CP _x Ice	CP _z Ice
	ft	in	in	in	in
L1	120.00-100.00	0.0000	0.0000	0.0000	0.0000
L2	100.00-47.08	0.0000	0.0000	0.0000	0.0000
L3	47.08-0.00	-0.0752	0.2401	-0.1705	0.5440

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L2	31	2" Rigid Conduit	47.08 - 40.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
119									
DB809MT3-XT	A	From Leg	3.00	0.00	119.00	No Ice	2.84	2.84	0.03
			0.00			1/2"	4.29	4.29	0.05
			6.00			Ice	5.75	5.75	0.08
DB201-A	B	From Leg	3.00	0.00	119.00	No Ice	1.10	1.10	0.03
			0.00			1/2"	1.98	1.98	0.03
			4.00			Ice	2.86	2.86	0.04
6' x 2" Mount Pipe	A	From Leg	3.00	0.00	119.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
6' x 2" Mount Pipe	B	From Leg	3.00	0.00	119.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
Side Arm Mount [SO 102-3]	B	None		0.00	119.00	No Ice	3.00	3.00	0.08
						1/2"	3.48	3.48	0.11
						Ice	3.96	3.96	0.14
Side Arm Mount [SO 701-1]	A	From Leg	0.00	0.00	119.00	No Ice	0.85	1.67	0.07
			0.00			1/2"	1.14	2.34	0.08
			0.00			Ice	1.43	3.01	0.09
Side Arm Mount [SO 701-1]	B	From Leg	0.00	0.00	119.00	No Ice	0.85	1.67	0.07
			0.00			1/2"	1.14	2.34	0.08
			0.00			Ice	1.43	3.01	0.09
116									
(3) SBNHH-1D65A w/ Mount Pipe	A	From Leg	4.00	0.00	116.00	No Ice	5.95	5.19	0.06
			0.00			1/2"	6.39	5.96	0.11
			0.00			Ice	6.82	6.66	0.17
(3) SBNHH-1D65A w/ Mount Pipe	B	From Leg	4.00	0.00	116.00	No Ice	5.95	5.19	0.06
			0.00			1/2"	6.39	5.96	0.11
			0.00			Ice	6.82	6.66	0.17
(3) SBNHH-1D65A w/ Mount Pipe	C	From Leg	4.00	0.00	116.00	No Ice	5.95	5.19	0.06
			0.00			1/2"	6.39	5.96	0.11
			0.00			Ice	6.82	6.66	0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Platform Mount [LP 601-1]	A	None		0.00	116.00	No Ice	28.47	28.47	1.12
						1/2"	33.59	33.59	1.51
						Ice	38.71	38.71	1.91
						1" Ice			
107 Pipe Mount [PM 601-1]	B	None		0.00	107.00	No Ice	3.00	0.90	0.07
						1/2"	3.74	1.12	0.08
						Ice	4.48	1.34	0.09
						1" Ice			
98 (2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	8.39	7.08	0.08
						1/2"	8.95	8.28	0.15
						Ice	9.48	9.19	0.22
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	8.39	7.08	0.08
						1/2"	8.95	8.28	0.15
						Ice	9.48	9.19	0.22
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	8.39	7.08	0.08
						1/2"	8.95	8.28	0.15
						Ice	9.48	9.19	0.22
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	4.56	10.26	0.05
						1/2"	5.11	11.43	0.11
						Ice	5.61	12.31	0.19
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	4.56	10.26	0.05
						1/2"	5.11	11.43	0.11
						Ice	5.61	12.31	0.19
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	4.56	10.26	0.05
						1/2"	5.11	11.43	0.11
						Ice	5.61	12.31	0.19
						1" Ice			
B13 RRH4X30-4R	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.16	1.62	0.06
						1/2"	2.35	1.79	0.08
						Ice	2.55	1.97	0.10
						1" Ice			
B13 RRH4X30-4R	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.16	1.62	0.06
						1/2"	2.35	1.79	0.08
						Ice	2.55	1.97	0.10
						1" Ice			
B13 RRH4X30-4R	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.16	1.62	0.06
						1/2"	2.35	1.79	0.08
						Ice	2.55	1.97	0.10
						1" Ice			
B25 RRH4X30	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.20	1.74	0.06
						1/2"	2.39	1.92	0.08
						Ice	2.59	2.11	0.10
						1" Ice			
B25 RRH4X30	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.20	1.74	0.06
						1/2"	2.39	1.92	0.08
						Ice	2.59	2.11	0.10
						1" Ice			
B25 RRH4X30	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.20	1.74	0.06
						1/2"	2.39	1.92	0.08
						Ice	2.59	2.11	0.10
						1" Ice			
B66A RRH4X45	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.58	1.63	0.07
						1/2"	2.79	1.81	0.09
						Ice	3.01	2.00	0.11
						1" Ice			
B66A RRH4X45	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.58	1.63	0.07
						1/2"	2.79	1.81	0.09
						Ice	3.01	2.00	0.11

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral	Vert						ft
			ft	ft	ft	°	ft	ft ²	ft ²	K	
B66A RRH4X45	C	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	2.58	1.63	0.07
			2.00					1/2" Ice	2.79	1.81	0.09
(2) RXXDC-3315-PF-48	C	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	3.01	1.96	0.02
			2.00					1/2" Ice	3.23	2.15	0.05
(4) 4' x 2" Pipe Mount	A	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	0.79	0.79	0.03
			0.00					1/2" Ice	1.03	1.03	0.04
(4) 4' x 2" Pipe Mount	B	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	0.79	0.79	0.03
			0.00					1/2" Ice	1.03	1.03	0.04
(4) 4' x 2" Pipe Mount	C	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	0.79	0.79	0.03
			0.00					1/2" Ice	1.03	1.03	0.04
Platform Mount [LP 602-1]	C	None				0.00	98.00	1" Ice			
								No Ice	32.03	32.03	1.34
								1/2" Ice	38.71	38.71	1.80
								Ice	45.39	45.39	2.26
87 ETCR-654L12H6 w/ Mount Pipe	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	13.27	6.54	0.10
			0.00					1/2" Ice	13.88	7.71	0.19
ETCR-654L12H6 w/ Mount Pipe	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	13.27	6.54	0.10
			0.00					1/2" Ice	13.88	7.71	0.19
ETCR-654L12H6 w/ Mount Pipe	C	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	13.27	6.54	0.10
			0.00					1/2" Ice	13.88	7.71	0.19
PCS 1900MHZ 4X45W-65MHZ	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.32	2.24	0.06
			0.00					1/2" Ice	2.53	2.44	0.08
PCS 1900MHZ 4X45W-65MHZ	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.32	2.24	0.06
			0.00					1/2" Ice	2.53	2.44	0.08
PCS 1900MHZ 4X45W-65MHZ	C	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.32	2.24	0.06
			0.00					1/2" Ice	2.53	2.44	0.08
(2) RRH2X50-800	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	1.70	1.28	0.05
			0.00					1/2" Ice	1.86	1.43	0.07
(2) RRH2X50-800	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	1.70	1.28	0.05
			0.00					1/2" Ice	1.86	1.43	0.07
(2) RRH2X50-800	C	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	1.70	1.28	0.05
			0.00					1/2" Ice	1.86	1.43	0.07
TD-RRH8X20-25	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	4.05	1.53	0.07
			0.00					1/2" Ice	4.30	1.71	0.10
							Ice	4.56	1.90	0.13	

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral	Vert						ft
			ft	ft	ft	°	ft	ft ²	ft ²	K	
TD-RRH8X20-25	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00			0.00		No Ice	4.05	1.53	0.07
			0.00			0.00		1/2"	4.30	1.71	0.10
TD-RRH8X20-25	C	From Leg	4.00			0.00	87.00	Ice	4.56	1.90	0.13
			0.00			0.00		1" Ice			
			0.00			0.00		No Ice	4.05	1.53	0.07
6' x 2" Mount Pipe	A	From Leg	4.00			0.00	87.00	1/2"	4.30	1.71	0.10
			0.00			0.00		Ice	4.56	1.90	0.13
			0.00			0.00		No Ice	1.43	1.43	0.02
6' x 2" Mount Pipe	B	From Leg	4.00			0.00	87.00	1/2"	1.92	1.92	0.03
			0.00			0.00		Ice	2.29	2.29	0.05
			0.00			0.00		No Ice	1.43	1.43	0.02
6' x 2" Mount Pipe	C	From Leg	4.00			0.00	87.00	1/2"	1.92	1.92	0.03
			0.00			0.00		Ice	2.29	2.29	0.05
			0.00			0.00		No Ice	1.43	1.43	0.02
Miscellaneous [NA 509-3]	C	None				0.00	87.00	1" Ice			
						0.00		No Ice	11.84	11.84	0.28
						0.00		1/2"	16.96	16.96	0.30
Platform Mount [LP 602-1]	C	None				0.00	87.00	Ice	22.08	22.08	0.32
						0.00		1" Ice			
						0.00		No Ice	32.03	32.03	1.34
****73*** DB636-C	A	From Leg	4.00			0.00	73.00	1/2"	38.71	38.71	1.80
			0.00			0.00		Ice	45.39	45.39	2.26
			6.00			0.00		1" Ice			
AIR 21 B2A/B4P	A	From Leg	4.00			0.00	73.00	No Ice	2.51	2.51	0.03
			0.00			0.00		1/2"	3.59	3.59	0.05
			0.00			0.00		Ice	4.68	4.68	0.07
AIR 21 B2A/B4P	B	From Leg	4.00			0.00	73.00	1" Ice			
			0.00			0.00		No Ice	5.92	4.22	0.08
			0.00			0.00		1/2"	6.29	4.56	0.12
AIR 21 B2A/B4P	C	From Leg	4.00			0.00	73.00	Ice	6.66	4.91	0.17
			0.00			0.00		1" Ice			
			0.00			0.00		No Ice	5.92	4.22	0.08
AIR32 DB B66Aa B2a	A	From Leg	4.00			0.00	73.00	1/2"	6.29	4.56	0.12
			0.00			0.00		Ice	6.66	4.91	0.17
			0.00			0.00		No Ice	5.92	4.22	0.08
AIR32 DB B66Aa B2a	B	From Leg	4.00			0.00	73.00	1" Ice			
			0.00			0.00		No Ice	6.51	4.71	0.11
			0.00			0.00		1/2"	6.89	5.07	0.15
AIR32 DB B66Aa B2a	C	From Leg	4.00			0.00	73.00	Ice	7.27	5.43	0.20
			0.00			0.00		1" Ice			
			0.00			0.00		No Ice	6.51	4.71	0.11
APXVAA24_43-U-A20	A	From Leg	4.00			0.00	73.00	1/2"	6.89	5.07	0.15
			0.00			0.00		Ice	7.27	5.43	0.20
			0.00			0.00		No Ice	6.51	4.71	0.11
APXVAA24_43-U-A20	B	From Leg	4.00			0.00	73.00	1" Ice			
			0.00			0.00		No Ice	20.27	8.74	0.10
			0.00			0.00		1/2"	20.91	9.34	0.21
APXVAA24_43-U-A20	B	From Leg	4.00			0.00	73.00	Ice	21.57	9.95	0.33
			0.00			0.00		No Ice	20.27	8.74	0.10
			0.00			0.00		1/2"	20.91	9.34	0.21
APXVAA24_43-U-A20	B	From Leg	4.00			0.00	73.00	Ice	21.57	9.95	0.33
			0.00			0.00		No Ice	20.27	8.74	0.10
			0.00			0.00		1/2"	20.91	9.34	0.21

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
APXVAA24_43-U-A20	C	From Leg	4.00	0.00	73.00	1" Ice	20.27	8.74	0.10
			0.00			No Ice			
			0.00			1/2" Ice			
KRY 112 144/1	A	From Leg	4.00	0.00	73.00	1" Ice	21.57	9.95	0.33
			0.00			No Ice			
			0.00			1/2" Ice			
KRY 112 144/1	B	From Leg	4.00	0.00	73.00	1" Ice	0.43	0.23	0.01
			0.00			No Ice			
			0.00			1/2" Ice			
KRY 112 144/1	C	From Leg	4.00	0.00	73.00	1" Ice	0.43	0.23	0.01
			0.00			No Ice			
			0.00			1/2" Ice			
RADIO 4449	A	From Leg	4.00	0.00	73.00	1" Ice	0.51	0.30	0.02
			0.00			No Ice			
			0.00			1/2" Ice			
RADIO 4449	B	From Leg	4.00	0.00	73.00	1" Ice	3.74	2.57	0.11
			0.00			No Ice			
			0.00			1/2" Ice			
RADIO 4449	C	From Leg	4.00	0.00	73.00	1" Ice	3.99	2.78	0.15
			0.00			No Ice			
			0.00			1/2" Ice			
Platform Mount [LP 1301-1]	C	None		0.00	73.00	1" Ice	51.70	51.70	2.26
						No Ice			
						1/2" Ice			
50 PD1142-1	A	From Leg	4.00	0.00	50.00	1" Ice	73.70	73.70	3.61
			0.00			No Ice			
			7.00			1/2" Ice			
DB492A	A	From Leg	4.00	0.00	50.00	1" Ice	5.12	5.12	0.05
			0.00			No Ice			
			0.00			1/2" Ice			
ASP-655	A	From Leg	4.00	0.00	50.00	1" Ice	1.98	1.98	0.01
			0.00			No Ice			
			4.00			1/2" Ice			
PD1121-6	C	From Leg	4.00	0.00	50.00	1" Ice	2.86	2.86	0.01
			0.00			No Ice			
			3.00			1/2" Ice			
Side Arm Mount [SO 701-3]	C	None		0.00	50.00	1" Ice	1.02	1.02	0.01
						No Ice			
						1/2" Ice			
40 EPSILON GPS ANTENNA 35 DB	A	From Leg	4.00	0.00	40.00	1" Ice	1.30	1.30	0.01
			0.00			No Ice			
			1.00			1/2" Ice			
Side Arm Mount [SO 701-1]	A	None		0.00	40.00	1" Ice	0.41	0.41	0.00
						No Ice			
						1/2" Ice			
***				0.00	40.00	1" Ice	0.60	0.60	0.00
						No Ice			
						1/2" Ice			
				0.00	40.00	1" Ice	3.92	3.92	0.24
						No Ice			
						1/2" Ice			
				0.00	40.00	1" Ice	5.01	5.01	0.28
						No Ice			
						1/2" Ice			
				0.00	40.00	1" Ice	0.21	0.21	0.00
						No Ice			
						1/2" Ice			
				0.00	40.00	1" Ice	0.85	1.67	0.07
						No Ice			
						1/2" Ice			
				0.00	40.00	1" Ice	1.14	2.34	0.08
						No Ice			
						1/2" Ice			
				0.00	40.00	1" Ice	1.43	3.01	0.09
						No Ice			
						1/2" Ice			

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
107										
GLF6-450	B	Grid	From Leg	1.00 0.00 0.00	0.00		107.00	6.40	No Ice 1/2" Ice 1" Ice	0.20 0.37 0.54

2 FT DISH	A	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 0.00	0.00		73.00	2.00	No Ice 1/2" Ice 1" Ice	0.10 0.13 0.17

Load Combinations

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

Comb. No.	Description
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	120 - 100	Pole	Max Tension	8	0.00	0.00	0.00
			Max. Compression	26	-11.52	-1.21	-0.00
			Max. Mx	8	-4.03	-108.74	-0.32
			Max. My	14	-4.07	-0.95	-106.51
			Max. Vy	8	7.81	-108.74	-0.32
			Max. Vx	14	7.58	-0.95	-106.51
			Max. Torque	2			-1.24
L2	100 - 47.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-46.14	-0.13	1.18
			Max. Mx	8	-20.54	-1115.77	-1.41
			Max. My	14	-20.57	-5.04	-1101.91
			Max. Vy	8	27.07	-1115.77	-1.41
			Max. Vx	14	26.88	-5.04	-1101.91
			Max. Torque	2			-1.24
L3	47.0833 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.49	0.12	1.28
			Max. Mx	8	-34.79	-2645.64	-3.01
			Max. My	14	-34.80	-9.36	-2622.48
			Max. Vy	20	-31.50	2645.33	1.19
			Max. Vx	14	31.33	-9.36	-2622.48
			Max. Torque	24			-1.10

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	37	63.49	6.26	3.61
	Max. H _x	20	34.84	31.46	0.01
	Max. H _z	3	26.13	0.04	31.23
	Max. M _x	2	2619.38	0.04	31.23
	Max. M _z	8	2645.64	-31.46	-0.03
	Max. Torsion	12	1.03	-15.75	-27.21
	Min. Vert	5	26.13	-15.62	26.90
	Min. H _x	8	34.84	-31.46	-0.03
	Min. H _z	14	34.84	-0.08	-31.28
	Min. M _x	14	-2622.48	-0.08	-31.28
	Min. M _z	20	-2645.33	31.46	0.01
	Min. Torsion	24	-1.10	15.71	27.20

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overtuning Moment, M _x kip-ft	Overtuning Moment, M _z kip-ft	Torque kip-ft
Dead Only	29.03	0.00	0.00	-0.44	-0.12	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	34.84	-0.04	-31.23	-2619.38	4.43	0.63
0.9 Dead+1.6 Wind 0 deg - No Ice	26.13	-0.04	-31.23	-2591.06	4.42	0.61

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
1.2 Dead+1.6 Wind 30 deg - No Ice	34.84	15.62	-26.90	-2251.63	-1311.72	-0.13
0.9 Dead+1.6 Wind 30 deg - No Ice	26.13	15.62	-26.90	-2227.30	-1297.55	-0.15
1.2 Dead+1.6 Wind 60 deg - No Ice	34.84	27.14	-15.58	-1304.85	-2280.82	-0.34
0.9 Dead+1.6 Wind 60 deg - No Ice	26.13	27.14	-15.58	-1290.69	-2256.21	-0.35
1.2 Dead+1.6 Wind 90 deg - No Ice	34.84	31.46	0.03	3.01	-2645.64	-0.64
0.9 Dead+1.6 Wind 90 deg - No Ice	26.13	31.46	0.03	3.11	-2617.10	-0.65
1.2 Dead+1.6 Wind 120 deg - No Ice	34.84	27.29	15.79	1326.74	-2297.84	-0.87
0.9 Dead+1.6 Wind 120 deg - No Ice	26.13	27.29	15.79	1312.60	-2273.02	-0.87
1.2 Dead+1.6 Wind 150 deg - No Ice	34.84	15.75	27.21	2283.90	-1326.18	-1.03
0.9 Dead+1.6 Wind 150 deg - No Ice	26.13	15.75	27.21	2259.47	-1311.84	-1.02
1.2 Dead+1.6 Wind 180 deg - No Ice	34.84	0.08	31.28	2622.48	-9.36	-0.60
0.9 Dead+1.6 Wind 180 deg - No Ice	26.13	0.08	31.28	2594.42	-9.20	-0.59
1.2 Dead+1.6 Wind 210 deg - No Ice	34.84	-15.51	27.00	2260.93	1297.97	0.14
0.9 Dead+1.6 Wind 210 deg - No Ice	26.13	-15.51	27.00	2236.77	1284.07	0.16
1.2 Dead+1.6 Wind 240 deg - No Ice	34.84	-27.10	15.64	1308.93	2275.86	0.25
0.9 Dead+1.6 Wind 240 deg - No Ice	26.13	-27.10	15.64	1295.01	2251.39	0.26
1.2 Dead+1.6 Wind 270 deg - No Ice	34.84	-31.46	-0.01	-1.19	2645.33	0.56
0.9 Dead+1.6 Wind 270 deg - No Ice	26.13	-31.46	-0.01	-1.04	2616.88	0.57
1.2 Dead+1.6 Wind 300 deg - No Ice	34.84	-27.23	-15.72	-1321.05	2290.15	0.94
0.9 Dead+1.6 Wind 300 deg - No Ice	26.13	-27.23	-15.72	-1306.69	2265.52	0.94
1.2 Dead+1.6 Wind 330 deg - No Ice	34.84	-15.71	-27.20	-2285.17	1320.99	1.10
0.9 Dead+1.6 Wind 330 deg - No Ice	26.13	-15.71	-27.20	-2260.43	1306.80	1.09
1.2 Dead+1.0 Ice+1.0 Temp	63.49	0.00	0.00	-1.28	0.12	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	63.49	-0.30	-7.11	-646.92	35.49	-0.04
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	63.49	3.49	-6.03	-544.31	-314.62	-0.01
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	63.49	6.10	-3.49	-315.99	-552.54	-0.20
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	63.49	7.08	-0.00	-1.77	-641.49	-0.38
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	63.49	6.16	3.56	321.11	-559.11	-0.58
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	63.49	3.54	6.12	552.59	-320.48	-0.66
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	63.49	0.03	7.02	632.87	-3.17	-0.40
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	63.49	-3.48	6.04	542.15	314.36	0.01
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	63.49	-6.32	3.31	291.42	578.66	0.63
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	63.49	-7.19	-0.18	-22.93	654.82	0.79
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	63.49	-6.26	-3.61	-330.63	571.55	0.60
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	63.49	-3.74	-6.12	-555.79	345.59	0.25

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 0 deg - Service	29.03	-0.01	-6.16	-514.54	0.76	0.12
Dead+Wind 30 deg - Service	29.03	3.08	-5.31	-442.34	-257.59	-0.03
Dead+Wind 60 deg - Service	29.03	5.36	-3.07	-256.50	-447.83	-0.07
Dead+Wind 90 deg - Service	29.03	6.21	0.01	0.23	-519.47	-0.13
Dead+Wind 120 deg - Service	29.03	5.39	3.12	260.09	-451.19	-0.17
Dead+Wind 150 deg - Service	29.03	3.11	5.37	447.98	-260.44	-0.20
Dead+Wind 180 deg - Service	29.03	0.02	6.17	514.43	-1.94	-0.12
Dead+Wind 210 deg - Service	29.03	-3.06	5.33	443.45	254.68	0.03
Dead+Wind 240 deg - Service	29.03	-5.35	3.09	256.59	446.64	0.05
Dead+Wind 270 deg - Service	29.03	-6.21	-0.00	-0.59	519.19	0.11
Dead+Wind 300 deg - Service	29.03	-5.37	-3.10	-259.69	449.46	0.19
Dead+Wind 330 deg - Service	29.03	-3.10	-5.37	-448.95	259.21	0.22

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-29.03	0.00	0.00	29.03	0.00	0.000%
2	-0.04	-34.84	-31.23	0.04	34.84	31.23	0.000%
3	-0.04	-26.13	-31.23	0.04	26.13	31.23	0.000%
4	15.62	-34.84	-26.90	-15.62	34.84	26.90	0.000%
5	15.62	-26.13	-26.90	-15.62	26.13	26.90	0.000%
6	27.14	-34.84	-15.58	-27.14	34.84	15.58	0.000%
7	27.14	-26.13	-15.58	-27.14	26.13	15.58	0.000%
8	31.46	-34.84	0.03	-31.46	34.84	-0.03	0.000%
9	31.46	-26.13	0.03	-31.46	26.13	-0.03	0.000%
10	27.29	-34.84	15.79	-27.29	34.84	-15.79	0.000%
11	27.29	-26.13	15.79	-27.29	26.13	-15.79	0.000%
12	15.75	-34.84	27.21	-15.75	34.84	-27.21	0.000%
13	15.75	-26.13	27.21	-15.75	26.13	-27.21	0.000%
14	0.08	-34.84	31.28	-0.08	34.84	-31.28	0.000%
15	0.08	-26.13	31.28	-0.08	26.13	-31.28	0.000%
16	-15.51	-34.84	27.00	15.51	34.84	-27.00	0.000%
17	-15.51	-26.13	27.00	15.51	26.13	-27.00	0.000%
18	-27.10	-34.84	15.64	27.10	34.84	-15.64	0.000%
19	-27.10	-26.13	15.64	27.10	26.13	-15.64	0.000%
20	-31.46	-34.84	-0.01	31.46	34.84	0.01	0.000%
21	-31.46	-26.13	-0.01	31.46	26.13	0.01	0.000%
22	-27.23	-34.84	-15.72	27.23	34.84	15.72	0.000%
23	-27.23	-26.13	-15.72	27.23	26.13	15.72	0.000%
24	-15.71	-34.84	-27.20	15.71	34.84	27.20	0.000%
25	-15.71	-26.13	-27.20	15.71	26.13	27.20	0.000%
26	0.00	-63.49	0.00	0.00	63.49	0.00	0.000%
27	-0.30	-63.49	-7.11	0.30	63.49	7.11	0.000%
28	3.49	-63.49	-6.03	-3.49	63.49	6.03	0.000%
29	6.10	-63.49	-3.49	-6.10	63.49	3.49	0.000%
30	7.08	-63.49	-0.00	-7.08	63.49	0.00	0.000%
31	6.16	-63.49	3.56	-6.16	63.49	-3.56	0.000%
32	3.54	-63.49	6.12	-3.54	63.49	-6.12	0.000%
33	0.03	-63.49	7.02	-0.03	63.49	-7.02	0.000%
34	-3.48	-63.49	6.03	3.48	63.49	-6.04	0.000%
35	-6.32	-63.49	3.31	6.32	63.49	-3.31	0.000%
36	-7.19	-63.49	-0.18	7.19	63.49	0.18	0.000%
37	-6.26	-63.49	-3.61	6.26	63.49	3.61	0.000%
38	-3.74	-63.49	-6.12	3.74	63.49	6.12	0.000%
39	-0.01	-29.03	-6.16	0.01	29.03	6.16	0.000%
40	3.08	-29.03	-5.31	-3.08	29.03	5.31	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
41	5.36	-29.03	-3.07	-5.36	29.03	3.07	0.000%
42	6.21	-29.03	0.01	-6.21	29.03	-0.01	0.000%
43	5.39	-29.03	3.12	-5.39	29.03	-3.12	0.000%
44	3.11	-29.03	5.37	-3.11	29.03	-5.37	0.000%
45	0.02	-29.03	6.17	-0.02	29.03	-6.17	0.000%
46	-3.06	-29.03	5.33	3.06	29.03	-5.33	0.000%
47	-5.35	-29.03	3.09	5.35	29.03	-3.09	0.000%
48	-6.21	-29.03	-0.00	6.21	29.03	0.00	0.000%
49	-5.37	-29.03	-3.10	5.37	29.03	3.10	0.000%
50	-3.10	-29.03	-5.37	3.10	29.03	5.37	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	0.00007354
3	Yes	4	0.00000001	0.00088715
4	Yes	6	0.00000001	0.00009321
5	Yes	5	0.00000001	0.00077863
6	Yes	6	0.00000001	0.00009146
7	Yes	5	0.00000001	0.00076280
8	Yes	4	0.00000001	0.00080532
9	Yes	4	0.00000001	0.00041054
10	Yes	6	0.00000001	0.00009342
11	Yes	5	0.00000001	0.00077857
12	Yes	6	0.00000001	0.00009636
13	Yes	5	0.00000001	0.00080476
14	Yes	5	0.00000001	0.00010285
15	Yes	5	0.00000001	0.00004395
16	Yes	6	0.00000001	0.00009026
17	Yes	5	0.00000001	0.00075389
18	Yes	6	0.00000001	0.00009431
19	Yes	5	0.00000001	0.00078819
20	Yes	4	0.00000001	0.00077813
21	Yes	4	0.00000001	0.00039410
22	Yes	6	0.00000001	0.00009489
23	Yes	5	0.00000001	0.00079212
24	Yes	6	0.00000001	0.00009078
25	Yes	5	0.00000001	0.00075636
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00035868
28	Yes	5	0.00000001	0.00064421
29	Yes	5	0.00000001	0.00063442
30	Yes	5	0.00000001	0.00034593
31	Yes	5	0.00000001	0.00064849
32	Yes	5	0.00000001	0.00069307
33	Yes	5	0.00000001	0.00035724
34	Yes	5	0.00000001	0.00060830
35	Yes	5	0.00000001	0.00061101
36	Yes	5	0.00000001	0.00037853
37	Yes	5	0.00000001	0.00072392
38	Yes	5	0.00000001	0.00070138
39	Yes	4	0.00000001	0.00009009
40	Yes	4	0.00000001	0.00048998
41	Yes	4	0.00000001	0.00045664
42	Yes	4	0.00000001	0.00003822
43	Yes	4	0.00000001	0.00047922
44	Yes	4	0.00000001	0.00053485
45	Yes	4	0.00000001	0.00009371
46	Yes	4	0.00000001	0.00044052
47	Yes	4	0.00000001	0.00050003
48	Yes	4	0.00000001	0.00004248
49	Yes	4	0.00000001	0.00050632
50	Yes	4	0.00000001	0.00044685

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	19.26	43	1.38	0.00
L2	100 - 47.0833	13.60	43	1.29	0.00
L3	52 - 0	3.52	43	0.64	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	DB809MT3-XT	43	18.97	1.38	0.00	25586
116.00	(3) SBNHH-1D65A w/ Mount Pipe	43	18.10	1.37	0.00	25586
107.00	GLF6-450	43	15.53	1.33	0.00	9840
98.00	(2) SBNHH-1D65B w/ Mount Pipe	43	13.06	1.27	0.00	6162
87.00	ETCR-654L12H6 w/ Mount Pipe	43	10.25	1.15	0.00	4996
73.00	2 FT DISH	43	7.11	0.96	0.00	4043
50.00	PD1142-1	43	3.26	0.61	0.00	3288
40.00	EPSILON GPS ANTENNA 35 DB	43	2.17	0.47	0.00	4086

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	97.95	10	7.03	0.02
L2	100 - 47.0833	69.22	10	6.56	0.01
L3	52 - 0	17.93	10	3.25	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	DB809MT3-XT	10	96.48	7.01	0.02	5218
116.00	(3) SBNHH-1D65A w/ Mount Pipe	10	92.08	6.96	0.02	5218
107.00	GLF6-450	10	79.04	6.78	0.01	2005
98.00	(2) SBNHH-1D65B w/ Mount Pipe	10	66.49	6.48	0.01	1251
87.00	ETCR-654L12H6 w/ Mount Pipe	10	52.22	5.89	0.01	1006
73.00	2 FT DISH	10	36.22	4.90	0.00	807
50.00	PD1142-1	10	16.61	3.11	0.00	648
40.00	EPSILON GPS ANTENNA 35 DB	10	11.04	2.40	0.00	804

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 100 (1)	TP20.263x15.403x0.1875	20.00	0.00	0.0	12.120	-4.02	829.59	0.005
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	52.92	0.00	0.0	28.666 0	-20.53	1920.74	0.011
L3	47.0833 - 0 (3)	TP44x31.372x0.375	52.00	0.00	0.0	52.677 2	-34.79	3477.10	0.010

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	120 - 100 (1)	TP20.263x15.403x0.1875	109.16	338.82	0.322	0.00	338.82	0.000
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	1119.24	1237.43	0.904	0.00	1237.43	0.000
L3	47.0833 - 0 (3)	TP44x31.372x0.375	2653.36	3088.23	0.859	0.00	3088.23	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	120 - 100 (1)	TP20.263x15.403x0.1875	7.90	414.80	0.019	0.40	687.02	0.001
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	27.15	960.37	0.028	0.40	2509.12	0.000
L3	47.0833 - 0 (3)	TP44x31.372x0.375	31.58	1738.55	0.018	0.87	6261.97	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P _u	Ratio M _{ux}	Ratio M _{uy}	Ratio V _u	Ratio T _u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		φP _n	φM _{nx}	φM _{ny}	φV _n	φT _n			
L1	120 - 100 (1)	0.005	0.322	0.000	0.019	0.001	0.327	1.000	4.8.2
L2	100 - 47.0833 (2)	0.011	0.904	0.000	0.028	0.000	0.916	1.000	4.8.2
L3	47.0833 - 0 (3)	0.010	0.859	0.000	0.018	0.000	0.870	1.000	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
L1	120 - 100	Pole	TP20.263x15.403x0.1875	1	-4.02	829.59	32.7	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-20.53	1920.74	91.6	Pass
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-34.79	3477.10	87.0	Pass
Summary								
Pole (L2)							91.6	Pass
RATING =							91.6	Pass

APPENDIX B
BASE LEVEL DRAWING

APPENDIX C
ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: 806364
 Site Name: HRT 106(B) 943202
 App #: 424351 Rev. 2

Reactions		
Mu	109.16	ft-kips
Axial, Pu:	4.02	kips
Shear, Vu:	7.90	kips
Elevation:	100	feet

Bolt Threads:
X-Excluded
$\phi V_n = \phi(0.55 A_b F_u)$
$\phi = 0.75, \phi V_n$ (kips):
38.88

Pole Manufacturer:	Other
--------------------	-------

If No stiffeners, Criteria: TIA G <-Only Applicable to Unstiffened Cases

Bolt Data			
Qty:	8		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	24.41		

Flange Bolt Results
 Bolt Tension Capacity, $\phi^*T_n, B1$: 54.54 kips
 Adjusted ϕ^*T_n (due to $V_u = V_u/Q_t$), **B**: 54.52 kips
 Max Bolt directly applied T_u : 26.33 Kips
 Min. PL "tc" for **B** cap. **w/o Pry**: 0.799 in
 Min PL "treq" for actual **T w/ Pry**: 0.406 in
 Min PL "t1" for actual **T w/o Pry**: 0.555 in
 T allowable w/o Prying: 54.54 kips
 Prying Force, q: 0.00 kips
 Total Bolt Tension= $T_u + q$: 26.33 kips
 Non-Prying Bolt Stress Ratio, T_u/B : 48.3% Pass

Rigid
ϕ^*T_n
$\phi T_n [1 - (V_u / \phi V_n)^2]^{0.5}$

Plate Data		
Diam:	26.91	in
Thick, t:	1.5	in
Grade (Fy):	60	ksi
Strength, Fu:	75	ksi
Single-Rod B-eff:	8.14	in

Exterior Flange Plate Results Flexural Check
 Compression Side Plate Stress: 7.0 ksi
 Allowable Plate Stress: 54.0 ksi
 Compression Plate Stress Ratio: 13.1% Pass
No Prying
 Tension Side Stress Ratio, $(t_{req}/t)^2$: 7.3% Pass

$\alpha' < 0$ case

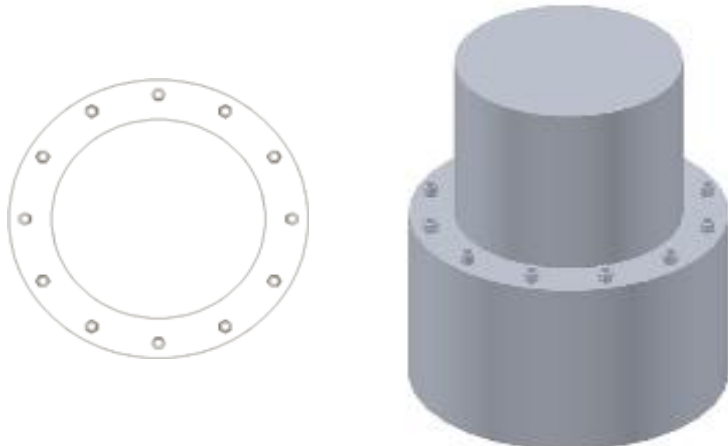
Rigid
TIA G
ϕ^*F_y
Comp. Y.L. Length:
13.61

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

n/a
Stiffener Results
 Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: n/a
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results
 Pole Punching Shear Check: n/a

Pole Data		
Diam:	20.263	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
 ** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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#: 806364
Site Name: HRT 106(B) 943202
App #: 424351 Rev. 2
Pole Manufacturer: Other

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	52.05	in

Plate Data

Diam:	58.05	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.79	in

Stiffener Data (Welding at both sides)

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

Pole Data

Diam:	44	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions

Mu:	2653	ft-kips
Axial, Pu:	35	kips
Shear, Vu:	32	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Results

Max Rod (Cu+ Vu/η): 212.1 Kips
 Allowable Axial, Φ*Fu*Anet: 260.0 Kips
 Anchor Rod Stress Ratio: 81.6% **Pass**

Rigid
AISC LRFD
φ*Tn

Base Plate Results

Base Plate Stress: 23.9 ksi
 Allowable Plate Stress: 54.0 ksi
 Base Plate Stress Ratio: 44.2% **Pass**

Flexural Check

Rigid
AISC LRFD
φ*Fy
Y.L. Length:
27.81

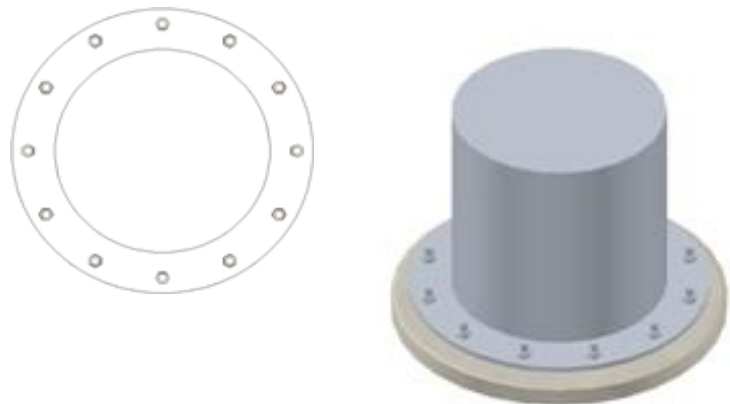
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a



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

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

Pier and Pad Foundation



BU #: 806364
Site Name: HRT 106(B) 94320
App. Number: 424351 Rev. 2

TIA-222 Revision: G
Tower Type: Monopole

Block Foundation?:

Superstructure Analysis Reactions		
Compression, P_{comp} :	35	kips
Base Shear, Vu_{comp} :	32	kips
Moment, M_u :	2653	ft-kips
Tower Height, H :	120	ft
BP Dist. Above Fdn, bp_{dist} :	2.25	in
Bolt Circle / Bearing Plate Width, BC :	52.05	in

Foundation Analysis Checks				
	Capacity	Demand	Rating	Check
<i>Lateral (Sliding) (kips)</i>	304.69	32.00	10.5%	Pass
<i>Bearing Pressure (ksf)</i>	6.00	1.74	28.9%	Pass
<i>Overturning (kip*ft)</i>	7181.00	2851.00	39.7%	Pass
<i>Pad Flexure (kip*ft)</i>	11458.68	1168.17	10.2%	Pass
<i>Pad Shear - 1-way (kips)</i>	1963.65	117.39	6.0%	Pass
<i>Pad Shear - 2-way (ksi)</i>	0.19	0.00	0.6%	Pass

Soil Rating: 39.7%
Structural Rating: 10.2%

Pad Properties		
Depth, D :	6.0	ft
Pad Width, W :	27.0	ft
Pad Thickness, T :	6.0	ft
Pad Rebar Size, Sp :	11	
Pad Rebar Quantity, mp :	26	
Pad Clear Cover, cc_{pad} :	6	in

Material Properties		
Rebar Grade, F_y :	60000	psi
Concrete Compressive Strength, F'_c :	4000	psi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	125	pcf
Ultimate Gross Bearing, Q_{ult} :	8.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	34	degrees
SPT Blow Count, N_{blows} :	24	
Base Friction, μ :		
Neglected Depth, N :	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	N/A	ft

<--Toggle between Gross and Net

CCISeismic - Design Category

Per 2012/2015 IBC

Site BU: 806364
 Work Order: 1534197
 Application: 424351 Rev. 2



	Degrees	Minutes	Seconds	
Site Latitude =	41	27	33.67	41.4594 degrees
Site Longitude =	-72	39	45.83	-72.6627 degrees
Ground Supported Structure =	Yes			
Structure Class =	II			(Table 2-1)
Site Class =	D - Stiff Soil			(Table 2-11)
Spectral response acceleration short periods, S_s =	0.179			USGS Seismic Tool
Spectral response acceleration 1 s period, S_1 =	0.062			
Importance Factor, I =	1.0			(Table 2-3)
Acceleration-based site coefficient, F_a =	1.6			(Table 2-12)
Velocity-based site coefficient, F_v =	2.4			(Table 2-13)
Design spectral response acceleration short period, S_{DS} =	0.191			(2.7.6)
Design spectral response acceleration 1 s period, S_{D1} =	0.099			(2.7.6)
Seismic Design Category - Short Period Response =	B			ASCE 7-05 Table 11.6-1
Seismic Design Category - 1s Period Response =	B			ASCE 7-05 Table 11.6-2
Worst Case Seismic Design Category =	B			ASCE 7-05 Tables 11.6-1 and 6-2



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

T-Mobile Existing Facility

Site ID: CTHA375A

Crown Castle Durham (806364)
143R Old Blue Hills Road
Durham, CT 06422

March 23, 2018

EBI Project Number: 6218001413

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	31.69%



March 23, 2018

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

Emissions Analysis for Site: **CTHA375A – Crown Castle Durham (806364)**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **143R Old Blue Hills Road, Durham, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limits for the 600 MHz & 700 MHz Bands are approximately $467 \mu\text{W}/\text{cm}^2$ and $467 \mu\text{W}/\text{cm}^2$ respectively, and the general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 13 GHz bands is $1000 \mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.



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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **143R Old Blue Hills Road, Durham, 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 for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 3) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 4) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel
- 5) 1 LTE channel (600 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.
- 6) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.



- 7) 1 microwave backhaul radio (13 GHz band) was considered for this facility. This channel has a transmit power of 1 watt
- 8) 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.
- 9) 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 for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.
- 10) The antennas used in this modeling are the **Ericsson AIR32 B66AA/B2A & Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **RFS APXVAA24-43-U-A20** for 600 MHz and 700 MHz channels. The **Commscope SHP2-13** microwave dish was modeled for the 13 GHz backhaul link. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR32 B66AA/B2A** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **RFS APXVAA24-43-U-A20** has a maximum gain of **13.15 dBd** at its main lobe at 600 MHz and a maximum gain of **13.55 dBd** at its main lobe at 700 MHz. The **Commscope SHP2-13** has a maximum gain of **33.85 dBd** at its main lobe at 13 GHz The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.
- 11) The antenna mounting height centerline of the proposed panel and microwave antennas is **73 feet** above ground level (AGL).
- 12) 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.
- 13) All calculations were done with respect to uncontrolled / general population threshold limits.



T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR32 B66AA/B2A	Make / Model:	Ericsson AIR32 B66AA/B2A	Make / Model:	Ericsson AIR32 B66AA/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	73	Height (AGL):	73	Height (AGL):	73
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):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	7.48	Antenna B1 MPE%	7.48	Antenna C1 MPE%	7.48
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	73	Height (AGL):	73	Height (AGL):	73
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):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A2 MPE%	3.74	Antenna B2 MPE%	3.74	Antenna C2 MPE%	3.74
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	RFS APXVAA24-43-U- A20	Make / Model:	RFS APXVAA24-43-U- A20	Make / Model:	RFS APXVAA24-43-U- A20
Gain:	13.15 / 13.55 dBd	Gain:	13.15 / 13.55 dBd	Gain:	13.15 / 13.55 dBd
Height (AGL):	73	Height (AGL):	73	Height (AGL):	73
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	60	Total TX Power(W):	60	Total TX Power(W):	60
ERP (W):	1,299.01	ERP (W):	1,299.01	ERP (W):	1,299.01
Antenna A3 MPE%	2.41	Antenna B3 MPE%	2.41	Antenna C3 MPE%	2.41

Microwave Backhaul Data

Make / Model:	Gain	Height (AGL):	Frequency Bands	Channel Count	Total TX Power(W)	ERP (W)	MPE %	Sector
Commscope SHP2-13	33.85 dBd	73	13 GHz	1	1	2,426.61	0.19	A

Site Composite MPE%	
Carrier	MPE%
T-Mobile (Sector A)	13.81%
AT&T	3.76 %
Verizon Wireless	8.10 %
Nextel	0.59 %
Town	4.03 %
Sprint	1.40 %
Site Total MPE %:	31.69%

T-Mobile Sector A Total:	13.81%
T-Mobile Sector B Total:	13.62 %
T-Mobile Sector C Total:	13.62 %
Site Total:	31.69%



T-Mobile Max Power Values Per Sector

T-Mobile _Max Power Values (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	73	37.39	AWS - 2100 MHz	1000	3.74%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	73	37.39	PCS - 1900 MHz	1000	3.74%
T-Mobile AWS - 2100 MHz UMTS	2	1,167.14	73	18.69	AWS - 2100 MHz	1000	1.87%
T-Mobile PCS - 1900 MHz UMTS	2	1,167.14	73	18.69	PCS - 1900 MHz	1000	1.87%
T-Mobile 600 MHz LTE	1	619.61	73	4.96	600 MHz	400	1.24%
T-Mobile 700 MHz LTE	1	679.39	73	5.44	700 MHz	467	1.17%
T-Mobile 13 GHz microwave	1	2,426.61	73	1.94	13 GHz	1000	0.19%
						Total:	13.81%



Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	13.81%
Sector B:	13.62 %
Sector C:	13.62 %
T-Mobile Per Sector Maximum (Sector A):	13.81%
Site Total:	31.69%
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **31.69%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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