



April 9, 2021

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

RE: **Notice of Exempt Modification for T-Mobile  
Crown Site ID# 806387; T-Mobile Site ID# CTHA808A  
#14 Route 80, Killingworth, CT 06419  
Latitude: 41° 21' 26.43"/ Longitude: -72° 31' 11.83"**

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 140-foot mount on the existing 160-foot Self Support Tower located at 14 Route 80 in Killingworth. The property is owned by 14 Route 80 LLC and the Tower is owned by Crown Castle. T-Mobile now intends to replace six (6) existing antennas and add three (3) new antennas. This modification/proposal includes hardware that is both 4G(LTE) and 5G capable through remote software configuration and either or both services may be turned on or off at various times.

**Planned Modifications:  
Tower:**

Remove and Replace:

(3) RFS – APXVTMI4-ALU-I20 Antennas (**REMOVE**) - (3) RFS – APX16DWV-16DWV-S-E-A20 Antennas (**REPLACE**)

(3) Commscope – NNVV-65B-R4 Antennas (**REMOVE**) – (3) RFS – APXVAALL24\_43-U-NA20 Antennas (**REPLACE**)

Install New:

(3) AIR6449 B41 Antennas  
(3) Ericsson – Radio 4415 B66A  
(3) Ericsson – Radio 4449 B71+B85A  
(3) Ericsson – Radio 4424 B25  
(4) 6x24 HCS 4AWG 100m 1 5/8" feedlines

Remove:

(3) Alcatel Lucent 1900MHz 4x45W-65 MHz radio  
(3) Alcatel Lucent - TD-RRH8x20-25 radio  
(6) Alcatel Lucent – RRH2x50-800 radio

**Ground:**

Install New:

- (1) SSC 6160 cabinet
- (1) B160 battery cabinet
- (1) BB6648
- (3) BB6630
- (1) DUG20
- (1) PSU 4813 voltage booster
- (1) IXRe router

This facility was originally approved by the Siting Council in Docket #69. The approval was given with conditions which this proposal complies with.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Catherine Lino, First Selectwoman for the Town of Killingworth, as well as Cathie Jefferson, Zoning Enforcement Officer for the Town of Killingworth. A copy of this application will also be sent to the property owner.

1. The proposed modifications will not require the extension of the site boundary.
2. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
3. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.
4. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
5. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Melanie A. Bachman

Page 3

Sincerely,



Richard Zajac  
Site Acquisition Specialist  
4545 East River Road, Suite 320  
West Henrietta, NY  
(585) 445-5896  
[Richard.zajac@crowncastle.com](mailto:Richard.zajac@crowncastle.com)

cc:

The Honorable Catherine Iino, First Selectwoman (*via email only to [ciino@townofkillingworth.com](mailto:ciino@townofkillingworth.com)*)  
Town of Killingworth  
323 Route 81  
Killingworth, CT 06419

Cathie S. Jefferson, Zoning Enforcement Officer (*via email only to [cjefferson@townofkillingworth.com](mailto:cjefferson@townofkillingworth.com)*)  
Town of Killingworth  
323 Route 81  
Killingworth, CT 06419

14 Route 80 LLC  
93A Glenwood Road  
Clinton, CT 06413

## **Zajac, Richard**

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**From:** Zajac, Richard  
**Sent:** Friday, April 9, 2021 1:03 PM  
**To:** ciino@townofkillingworth.com  
**Subject:** Connecticut Siting Council exempt modification application notification  
**Attachments:** CSC Exempt Modification Application - 14 Route 80.pdf

Good afternoon,

Please see the attached application to the Connecticut Siting Council regarding antenna work on the existing cell tower located at 14 Route 80 in Killingworth.

Should you have any questions/comments/concerns regarding this application, please do not hesitate to contact me.

Thank you,

**RICH ZAJAC**

Site Acquisition Specialist

T: (585) 445-5896 M: (607) 346-7212

F: (724) 416-4461

**CROWN CASTLE**

4545 East River Road, Suite 320

West Henrietta, NY 14586



## **Zajac, Richard**

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**From:** Zajac, Richard  
**Sent:** Friday, April 9, 2021 1:04 PM  
**To:** cjefferson@townofkillingworth.com  
**Subject:** Connecticut Siting Council exempt modification application notification  
**Attachments:** CSC Exempt Modification Application - 14 Route 80.pdf

Good afternoon,

Please see the attached application to the Connecticut Siting Council regarding antenna work on the existing cell tower located at 14 Route 80 in Killingworth.

Should you have any questions/comments/concerns regarding this application, please do not hesitate to contact me.

Thank you,

**RICH ZAJAC**

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T: (585) 445-5896 M: (607) 346-7212

F: (724) 416-4461

**CROWN CASTLE**

4545 East River Road, Suite 320

West Henrietta, NY 14586

ORIGIN ID: ONHA (585) 445-5896  
RICHARD ZAJAC  
CROWN CASTLE  
629 KAYLEIGH DR

WEBSTER, NY 14580  
UNITED STATES US

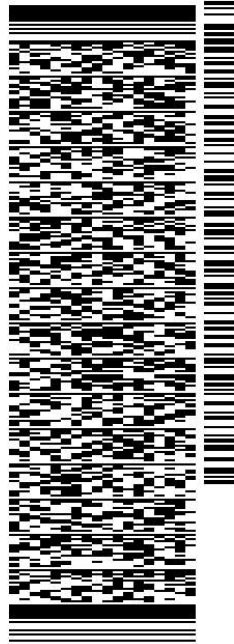
TO 14 ROUTE 80 LLC

SHIP DATE: 09APR21  
ACTWGT: 1.00 LB  
CAD: 112911364/NET4340  
BILL SENDER

93A GLENWOOD ROAD

CLINTON CT 06413

(585) 445-5896 REF: 799001 7680  
INV/ DEPT:  
PO:

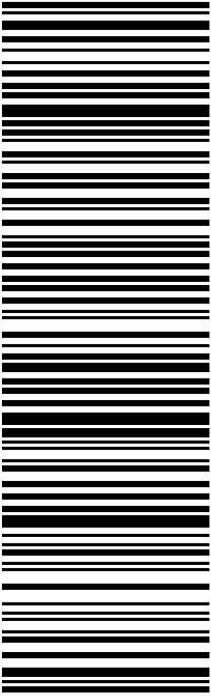


56DJ2/5EF2/FE4A

TRK# 7734 0288 7675  
0201

MON - 12 APR 4:30P  
STANDARD OVERNIGHT

XE RSPA 06413  
CT-US BDL



**After printing this label:**

1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning:** Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on [fedex.com](http://fedex.com). FedEx will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of \$100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is \$1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

# Exhibit A

## **Original Facility Approval**

AN APPLICATION OF METRO MOBILE CTS OF : CONNECTICUT SITING  
HARTFORD, INC., FOR A CERTIFICATE OF :  
ENVIRONMENTAL COMPATIBILITY AND PUBLIC : COUNCIL  
NEED FOR THE CONSTRUCTION, MAINTENANCE,  
AND OPERATION OF FACILITIES TO PROVIDE  
CELLULAR SERVICE IN THE TOWNS OF  
KILLINGWORTH, MIDDLETOWN, AND  
OLD SAYBROOK, CONNECTICUT. : February 18, 1987

D E C I S I O N   A N D   O R D E R

Pursuant to the foregoing opinion, the Connecticut Siting Council (Council) hereby directs that a Certificate of Environmental Compatibility and Public Need as provided by Section 16-50k of the General Statutes of Connecticut (CGS) be issued to Metro Mobile CTS of Hartford, Inc., for the construction, operation, and maintenance of a cellular mobile phone telecommunication tower and associated equipment in the town of Killingworth, Connecticut. The proposed Middletown and Old Saybrook sites are rejected without prejudice.

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

1. The tower, including antennas, shall be no taller than necessary to provide the proposed service, and in no event shall exceed 173 feet.
2. A fence not lower than eight feet shall surround the tower and its associated equipment building.
3. Unless necessary to comply with condition number four, below, no lights shall be installed on the tower.
4. The facility shall be constructed in accordance with all applicable federal, state, and municipal laws and regulations.

5. The certificate holder shall comply with sections 16-50j-75 through 16-50j-77 of the Regulations of State Agencies, providing for development and management (D&M) plans and reporting. The D&M plan shall provide plans for evergreen screening around the fenced perimeter.
6. No construction activities shall take place outside the hours of 7:00 A.M. to 7:00 P.M., Monday through Saturday.
7. The certificate holder or its successor shall notify the Council if and when directional antennas or any equipment other than that listed in the D&M plan is added to the facility.
8. The certificate holder or its successor shall permit public or private entities to share space on the tower, for due consideration received, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.
9. If the tower does not provide or permanently cease to provide cellular service following completion of construction, this Decision and Order shall be void and the tower and all associated equipment shall be dismantled and removed or reapplication for any new use shall be made to the Council before any such new use is made.
10. Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within three years of the issuance of this Decision and Order, or within three years of the completion of any appeal taken in this Decision.

11. The certificate holder shall comply with any future radiofrequency (RF) standards promulgated by state or federal regulatory agencies. Upon the establishment of any new governmental RF standards, the facilities granted in this Decision shall continue to be in compliance with such standards.

Pursuant to CGS section 16-50p, we hereby direct that a copy of the Decision and Order be served on each person listed below. A notice of the issuance shall be published in the Hartford Courant, the New Haven Register, the Middletown Press, and the Clinton Recorder.

C E R T I F I C A T I O N

The undersigned members of the Connecticut Siting Council hereby  
certify that they have heard this case or read the record thereof, and  
that we voted as follows:

Dated at New Britain, Connecticut, this 18th day of February 1987.

| <u>Council Members</u>   | <u>Vote Cast</u>  |                     |                     |
|--|-------------------|---------------------|---------------------|
|  | <u>Middletown</u> | <u>Killingworth</u> | <u>Old Saybrook</u> |
| <u>Gloria Dibble Pond</u> )<br>Gloria Dibble Pond<br>Chairperson                                 | No                | Yes                 | No                  |
| <u>Peter G. Boucher</u> )<br>Commissioner John Downey<br>Designee: Commissioner Peter G. Boucher | No                | Yes                 | Yes                 |
| <u>Brian J. Emerick</u> )<br>Commissioner Stanley Pac<br>Designee: Brian Emerick                 | No                | Yes                 | Yes                 |
| <u>Owen L. Clark 2/18/87</u> )<br>Owen L. Clark  | No                | Yes                 | Yes                 |
| <u>Fred J. Doocy</u> )<br>Fred J. Doocy  | No                | Yes                 | No                  |
| <u>Mortimer A. Gelston</u> )<br>Mortimer A. Gelston  | No                | Yes                 | No                  |
| <u>James G. Horsfall</u> )<br>James G. Horsfall  | No                | Yes                 | No                  |
| <u>William Smith</u> )<br>William Smith  |                   | Absent              |                     |
| <u>Colin C. Tait</u> )<br>Colin C. Tait  | No                | No                  | No                  |

STATE OF CONNECTICUT )  
COUNTY OF HARTFORD )

: ss. New Britain, February 18, 1987  
)

I hereby certify that the foregoing is a true and correct copy of the decision and order issued by the Connecticut Siting Council, State of Connecticut.

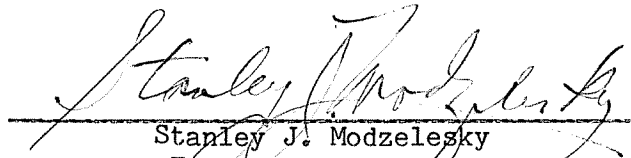
ATTEST:



John C. Kelly  
Executive Director  
Connecticut Siting Council

I certify that a copy of the opinion and decision and order have been forwarded by mail to all parties of record on 2-19-87.

ATTEST:



Stanley J. Modzelesky  
Executive Assistant  
Connecticut Siting Council



# Exhibit B

## **Property Card**

The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2016.



Information on the Property Records for the Municipality of Killingworth was last updated on 4/3/2021.

### Parcel Information

|                          |             |                   |            |                   |                  |
|--------------------------|-------------|-------------------|------------|-------------------|------------------|
| Location:                | 14 ROUTE 80 | Property Use:     | Industrial | Primary Use:      | Light Industrial |
| Unique ID:               | 00218500    | Map Block<br>Lot: | 34-36A     | Acres:            | 2.00             |
| 490 Acres:               | 0.00        | Zone:             | ID         | Volume /<br>Page: | 0225/0110        |
| Developers<br>Map / Lot: | DEV MP 312  | Census:           | 6401       |                   |                  |

### Value Information

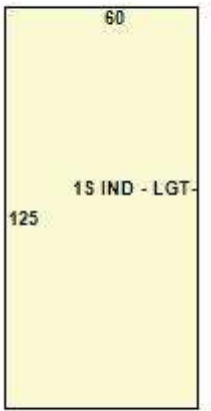
|                       | Appraised Value | Assessed Value |
|-----------------------|-----------------|----------------|
| Land                  | 200,000         | 140,000        |
| Buildings             | 252,719         | 176,900        |
| Detached Outbuildings | 251,459         | 176,020        |
| Total                 | 704,178         | 492,920        |

Owner's Information

Owner's Data

14 ROUTE 80 LLC  
93A GLENWOOD RD  
CLINTON, CT 06413

Building 1



|           |             |                |                  |                  |       |
|-----------|-------------|----------------|------------------|------------------|-------|
| Category: | Industrial  | Use:           | Light Industrial | GLA:             | 7,508 |
| Stories:  | 1.00        | Construction:  | Average          | Year Built:      | 1969  |
| Heating:  | Susp. Space | Fuel:          | Oil              | Cooling Percent: | 0%    |
| Siding:   | Metal       | Roof Material: | Arch Shingles    | Beds/Units:      | 0     |

## Special Features

## Attached Components

## Detached Outbuildings

| Type:                  | Year Built: | Length: | Width: | Area: |
|------------------------|-------------|---------|--------|-------|
| Fencing                | 1999        | 9       | 234    | 2,106 |
| Concrete/Masonry Patio | 1999        |         |        | 432   |
| Concrete/Masonry Patio | 1999        | 8       | 20     | 160   |
| Cell Tower             | 2000        |         |        | 1     |

## Owner History - Sales

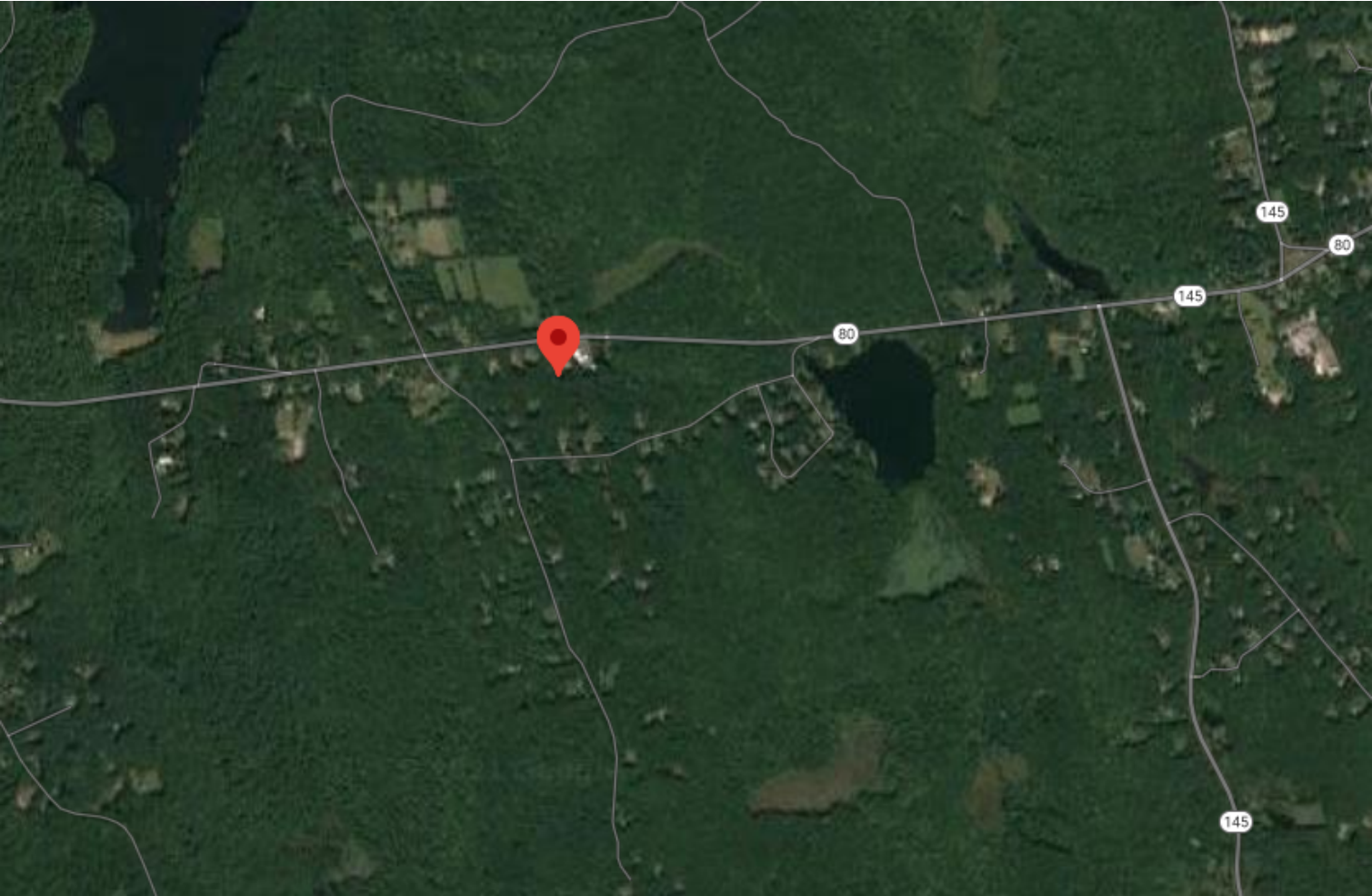
| Owner Name      | Volume | Page | Sale Date  | Deed Type  | Valid Sale | Sale Price |
|-----------------|--------|------|------------|------------|------------|------------|
| 14 ROUTE 80 LLC | 0225   | 0110 | 06/14/2007 | Quit Claim | No         | \$0        |

## Building Permits

| Permit Number | Permit Type      | Date Opened | Date Closed | Permit Status | Reason   |
|---------------|------------------|-------------|-------------|---------------|--|
| F18-192       | Comm Renovations | 10/15/2018  |             | Closed        | SPRINT TO REMOVE AND REPLACE SIX (6) ANTENNAS & ADD TWELVE (12) RRH'S. SEE ATTACHED PLANS FOR DETAI  |
| F18-147       | Commercial       | 09/24/2018  |             | Closed        | VERIZON WIRELESS TO REPLACE (6) EXISTING WITH (6) NEW ANTENNAS AND ASSOCIATED ANCILLARY EQUIPMENT. A |
| 12-410        | Commercial       | 04/12/2013  |             | Closed        | CELL TOWER MAINTENANCE   |
| 12-394        | Comm Renovations | 12/11/2012  |             | Closed        | CELL TOWER MAINTENANCE   |

| Permit Number | Permit Type    | Date Opened | Date Closed | Permit Status | Reason  |
|---------------|----------------|-------------|-------------|---------------|---|
| 11-C006       | Commercial     | 12/22/2011  |             | Closed        | ANTENNA REPLACEMENT   |
| 08-E018       | Electrical     | 04/13/2008  |             | Closed        | ELECTRICAL SERVICE PANEL INSTALLATION; ELECTRICAL SERVICE PANEL INSTALLATION; |
| 99-099        | Commercial New | 04/01/1999  |             | Closed        | TELECOMMUNICATIONS-UTILITY BLDG,TOWER;  |

Information Published With Permission From The Assessor



# Exhibit C

## **Construction Drawings**





IT IS A VIOLATION OF LAW FOR ANY PERSON,  
UNLESS THEY ARE ACTING UNDER THE DIRECTION  
OF A LICENSED PROFESSIONAL ENGINEER,  
TO ALTER THIS DOCUMENT.



CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED- NO WORK SHALL COMMENCE PRIOR TO CROWN CASTLE USA INC. WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN CASTLE USA INC. NOC AT 800-788-7011 & THE CROWN CASTLE USA INC. CONSTRUCTION MANAGER.
2. "LOOK UP" - CROWN CASTLE USA INC. SAFETY CLIMB REQUIREMENT: THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND CROWN CASTLE USA INC. STANDARD CED-STD-10253, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA-322 (LATEST EDITION).
5. ALL SITE WORK TO COMPLY WITH QAS-STD-10068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE USA INC. TOWER SITE," CED-STD-10294 "STANDARD FOR INSTALLATION OF MOUNTS AND APPURTENANCES," AND LATEST VERSION OF ANSI/TIA-1019-A-2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS." IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY CROWN CASTLE USA INC. PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR 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.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, TOWER OWNER, CROWN CASTLE USA INC., AND/OR LOCAL UTILITIES.
14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
20. CONTRACTOR 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.
21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GREENFIELD GROUNDING NOTES:

1. 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.
2. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
5. 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.
6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.
7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
15. APPROVED ANTIOXIDANT COATINGS (I.E. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
17. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
18. BOND ALL METALLIC OBJECTS WITHIN 6 ft. OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (I.E., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).
21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTOR SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY).

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:  
CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION  
CARRIER: T-MOBILE  
TOWER OWNER: CROWN CASTLE USA INC.
2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.
4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR 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 CROWN CASTLE.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR 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.
8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND CROWN CASTLE PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION AND IS TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.
12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF CROWN CASTLE USA INC.
13. CONTRACTOR 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.
14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.
2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.
4. CONCRETE EXPOSED TO FREEZE-THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER-TO-CEMENT RATIO (W/C) OF 0.45.
5. ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:  
#4 BARS AND SMALLER.....40 ksi  
#5 BARS AND LARGER.....60 ksi
6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:  
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH.....3"  
CONCRETE EXPOSED TO EARTH OR WEATHER:  
#6 BARS AND LARGER.....2"  
#5 BARS AND SMALLER.....1-1/2"  
CONCRETE NOT EXPOSED TO EARTH OR WEATHER:  
SLAB AND WALLS.....3/4"  
BEAMS AND COLUMNS.....1-1/2"
7. A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE; UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
  - 4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
  - 4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.
5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (I.E. PANEL BOARD AND CIRCUIT ID'S).
7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
8. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TO CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° F IF AVAILABLE).
14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEC AND NEC.
15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
16. ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
18. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEC AND THE NEC.
21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).
22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (I.E. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3R (OR BETTER) FOR EXTERIOR LOCATIONS.
25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR CROWN CASTLE USA INC. BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "T-MOBILE".
30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

| CONDUCTOR COLOR CODE |           |                  |
|----------------------|-----------|------------------|
| SYSTEM               | CONDUCTOR | COLOR            |
| 120/240V, 1Ø         | A PHASE   | BLACK            |
|                      | B PHASE   | RED              |
|                      | NEUTRAL   | WHITE            |
|                      | GROUND    | GREEN            |
| 120/208V, 3Ø         | A PHASE   | BLACK            |
|                      | B PHASE   | RED              |
|                      | C PHASE   | BLUE             |
|                      | NEUTRAL   | WHITE            |
| 277/480V, 3Ø         | GROUND    | GREEN            |
|                      | A PHASE   | BROWN            |
|                      | B PHASE   | ORANGE OR PURPLE |
|                      | C PHASE   | YELLOW           |
| DC VOLTAGE           | NEUTRAL   | GREY             |
|                      | GROUND    | GREEN            |
|                      | POS (+)   | RED**            |
|                      | NEG (-)   | BLACK**          |

\* SEE NEC 210.5(C)(1) AND (2)  
\*\* POLARITY MARKED AT TERMINATION

ABBREVIATIONS:

|      |  |
|------|--|
| ANT  | ANTENNA                                    |
| (E)  | EXISTING                                   |
| FIF  | FACILITY INTERFACE FRAME                   |
| GEN  | GENERATOR                                  |
| GPS  | GLOBAL POSITIONING SYSTEM                  |
| GSM  | GLOBAL SYSTEM FOR MOBILE                   |
| LTE  | LONG TERM EVOLUTION                        |
| MGB  | MASTER GROUND BAR                          |
| MW   | MICROWAVE                                  |
| (N)  | NEW  |
| NEC  | NATIONAL ELECTRIC CODE                     |
| (P)  | PROPOSED                                   |
| PP   | POWER PLANT                                |
| QTY  | QUANTITY                                   |
| RECT | RECTIFIER                                  |
| RBS  | RADIO BASE STATION                         |
| RET  | REMOTE ELECTRIC TILT                       |
| RFDS | RADIO FREQUENCY DATA SHEET                 |
| RRH  | REMOTE RADIO HEAD                          |
| RRU  | REMOTE RADIO UNIT                          |
| SIAD | SMART INTEGRATED DEVICE                    |
| TMA  | TOWER MOUNTED AMPLIFIER                    |
| TYP  | TYPICAL                                    |
| UMTS | UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM |
| W.P. | WORK POINT                                 |

APWA UNIFORM COLOR CODE:

|        |  |
|--------|--|
| WHITE  | PROPOSED EXCAVATION  |
| PINK   | TEMPORARY SURVEY MARKINGS  |
| RED    | ELECTRIC POWER LINES, CABLES, CONDUIT, AND LIGHTING CABLES                 |
| YELLOW | GAS, OIL, STEAM, PETROLEUM, OR GASEOUS MATERIALS                           |
| ORANGE | COMMUNICATION, ALARM OR SIGNAL LINES, CABLES, OR CONDUIT AND TRAFFIC LOOPS |
| BLUE   | POTABLE WATER  |
| PURPLE | RECLAIMED WATER, IRRIGATION, AND SLURRY LINES                              |
| GREEN  | SEWERS AND DRAIN LINES   |

T-Mobile

35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002

CROWN  
CASTLE

1200 MACARTHUR BLVD, SUITE 200  
MAHWAH, NJ 07430



TOWER  
ENGINEERING  
PROFESSIONALS

326 TRYON RD  
RALEIGH, NC 27603  
(919) 661-6351

TEP JOB #: 45443.498699

T-MOBILE SITE NUMBER:  
CTHA808A

BU #: 806387  
HRT 088 943629

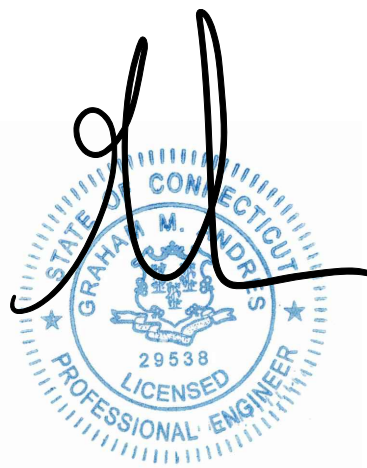
#14 ROUTE 80  
KILLINGWORTH, CT 06419

EXISTING 160'-0"  
SELF-SUPPORT

ISSUED FOR:

| REV | DATE     | DRWN | DESCRIPTION  | DES./QA |
|-----|----------|------|--------------|---------|
| A   | 03/02/21 | JW   | PRELIMINARY  | BSE     |
| 0   | 03/17/21 | JW   | CONSTRUCTION | BSE     |
|     |          |      |              |         |
|     |          |      |              |         |

SEAL:



03/17/21

IT IS A VIOLATION OF LAW FOR ANY PERSON,  
UNLESS THEY ARE ACTING UNDER THE DIRECTION  
OF A LICENSED PROFESSIONAL ENGINEER,  
TO ALTER THIS DOCUMENT.

SHEET NUMBER:

T-2

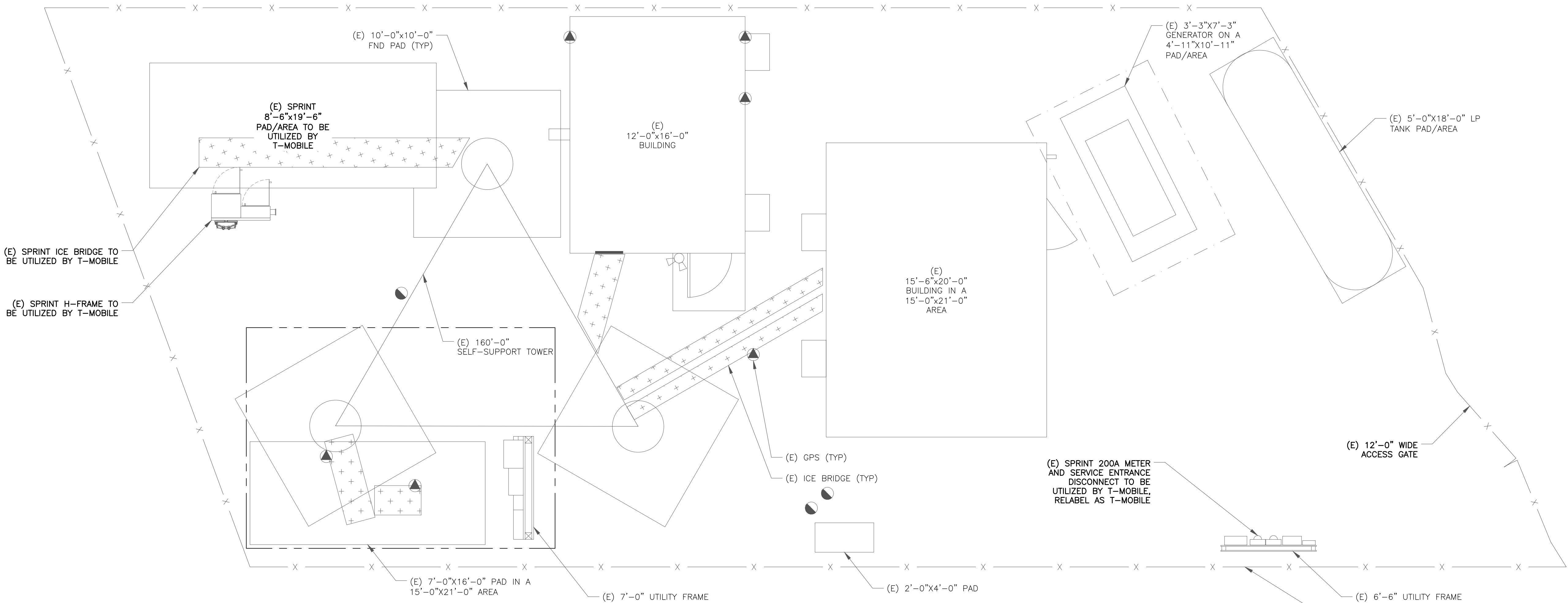
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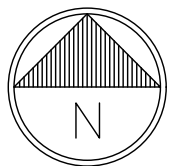


NOTE:  
SITE PLAN SHOWN BELOW WAS REPRODUCED FROM  
INFORMATION PROVIDED BY CROWN CASTLE AND SITE  
WALK CONDUCTED BY TEP. CONTRACTOR TO VERIFY ALL  
EXISTING INFORMATION IS AS INDICATED ON SITE PLAN.  
CONTRACTOR IS TO ESTABLISH THE EXISTENCE AND  
LOCATION OF ALL EXISTING UNDERGROUND AND  
OVERHEAD UTILITIES. IMMEDIATELY NOTIFY THE  
CONSTRUCTION MANAGER OF ANY DISCREPANCIES.

FLOODPLAIN NOTE:  
THE TOWER IS LOCATED IN ZONE "X" AREAS  
DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL  
CHANCE FLOODPLAIN ACCORDING TO FEMA COMMUNITY  
PANEL #09007C0310G, DATED 08/28/2008.



1 SITE PLAN  
SCALE: 1/2"=1'-0" (FULL SIZE)  
1/4"=1'-0" (11x17)



T-Mobile

35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002

CROWN  
CASTLE

1200 MACARTHUR BLVD, SUITE 200  
MAHWAH, NJ 07430



TOWER  
ENGINEERING  
PROFESSIONALS

326 TRYON RD  
RALEIGH, NC 27603  
(919) 661-6351

TEP JOB #: 45443.498699

T-MOBILE SITE NUMBER:  
**CTHA808A**

BU #: **806387**  
HRT **088 943629**

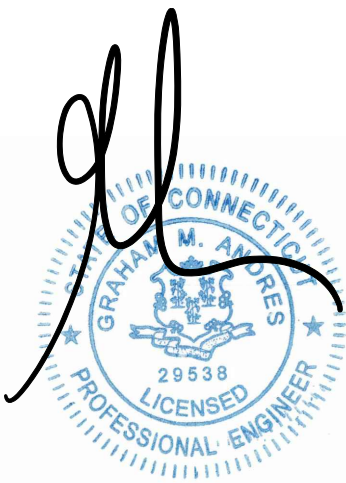
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|     |          |      |              |         |
|     |          |      |              |         |

SEAL:



03/17/21

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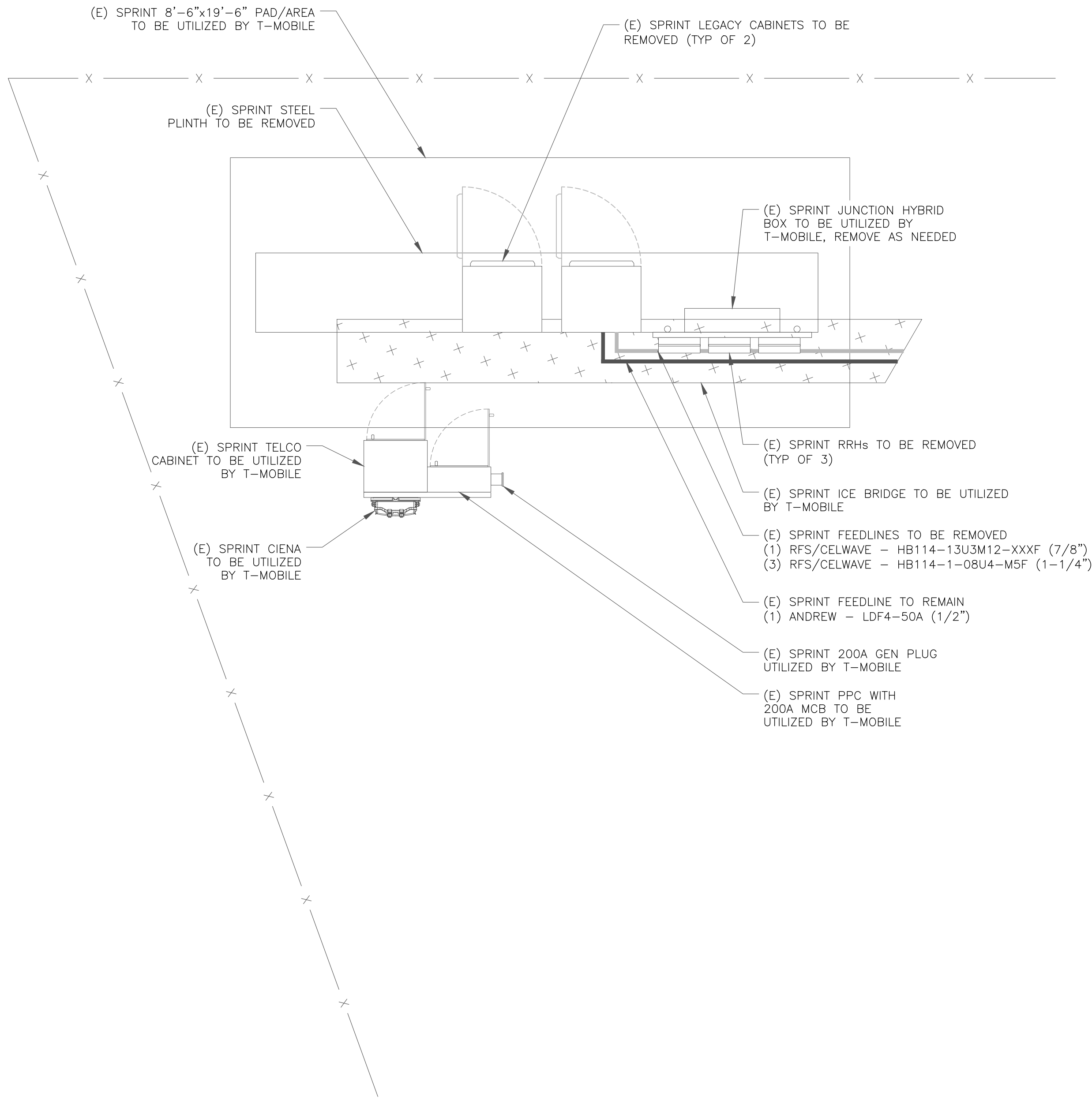
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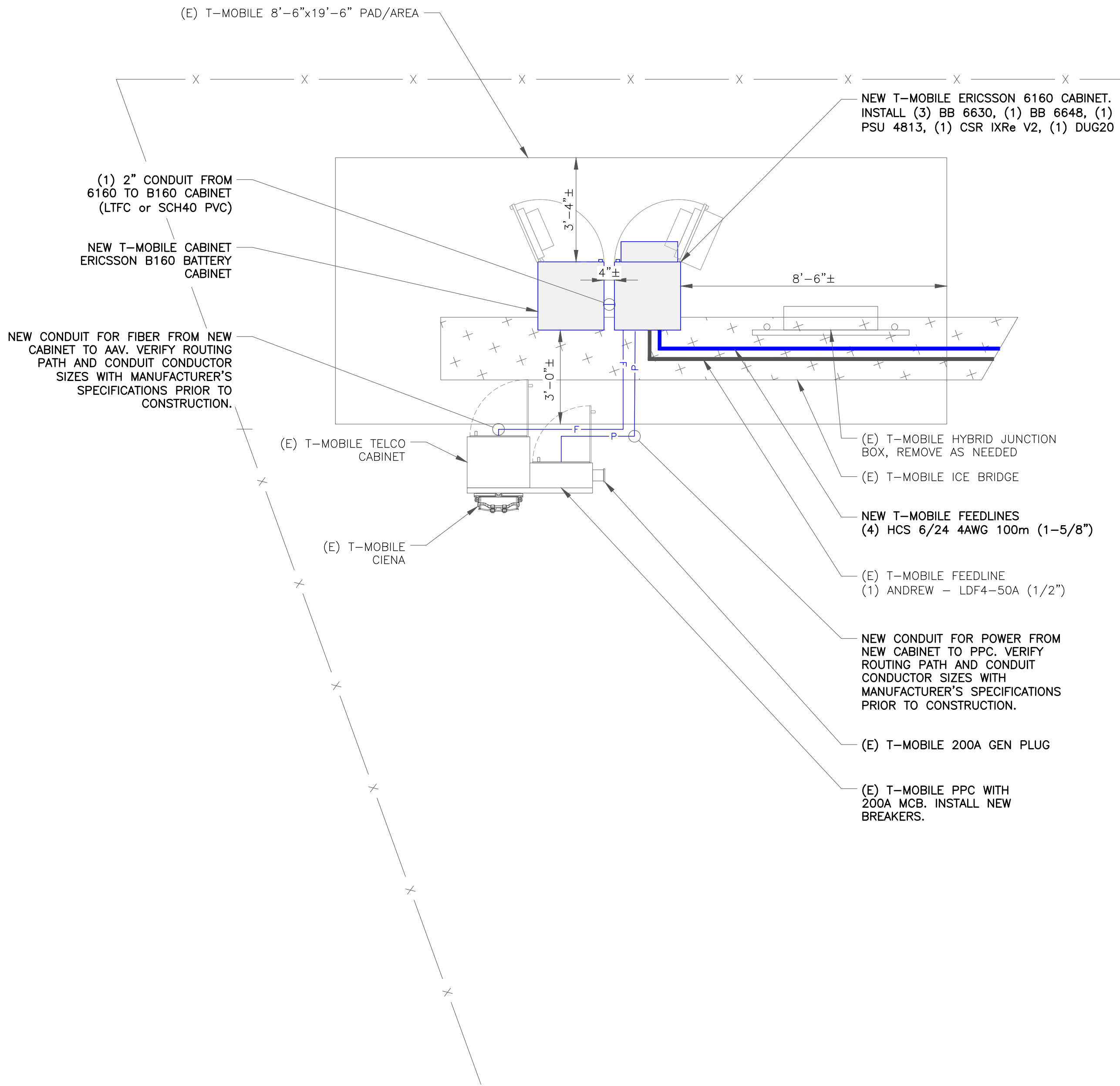
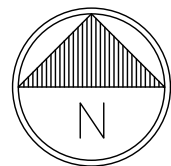
REVISION:

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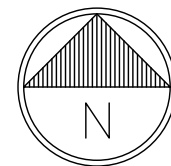
FLOODPLAIN NOTE:  
THE TOWER IS LOCATED IN ZONE "X" AREAS  
DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL  
CHANCE FLOODPLAIN ACCORDING TO FEMA COMMUNITY  
PANAL #09007C0310G, DATED 08/28/2008.



1 EXISTING EQUIPMENT PLAN  
SCALE: 3/8"=1'-0" (FULL SIZE)  
3/16"=1'-0" (11x17)



2 FINAL EQUIPMENT PLAN  
SCALE: 3/8"=1'-0" (FULL SIZE)  
3/16"=1'-0" (11x17)



T-Mobile

35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002

CROWN CASTLE

1200 MACARTHUR BLVD, SUITE 200  
MAHWAH, NJ 07430



TOWER  
ENGINEERING  
PROFESSIONALS

326 TRYON RD  
RALEIGH, NC 27603  
(919) 661-6351

TEP JOB #: 45443.498699

T-MOBILE SITE NUMBER:  
**CTHA808A**

BU #: 806387  
HRT 088 943629

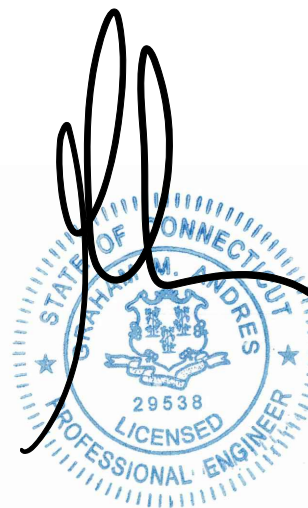
#14 ROUTE 80  
KILLINGWORTH, CT 06419

EXISTING 160'-0"  
SELF-SUPPORT

ISSUED FOR:

| REV | DATE     | DRWN | DESCRIPTION  | DES./QA |
|-----|----------|------|--------------|---------|
| A   | 03/02/21 | JW   | PRELIMINARY  | BSE     |
| 0   | 03/17/21 | JW   | CONSTRUCTION | BSE     |
|     |          |      |              |         |
|     |          |      |              |         |

SEAL:



03/17/21

IT IS A VIOLATION OF LAW FOR ANY PERSON,  
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OF A LICENSED PROFESSIONAL ENGINEER,  
TO ALTER THIS DOCUMENT.

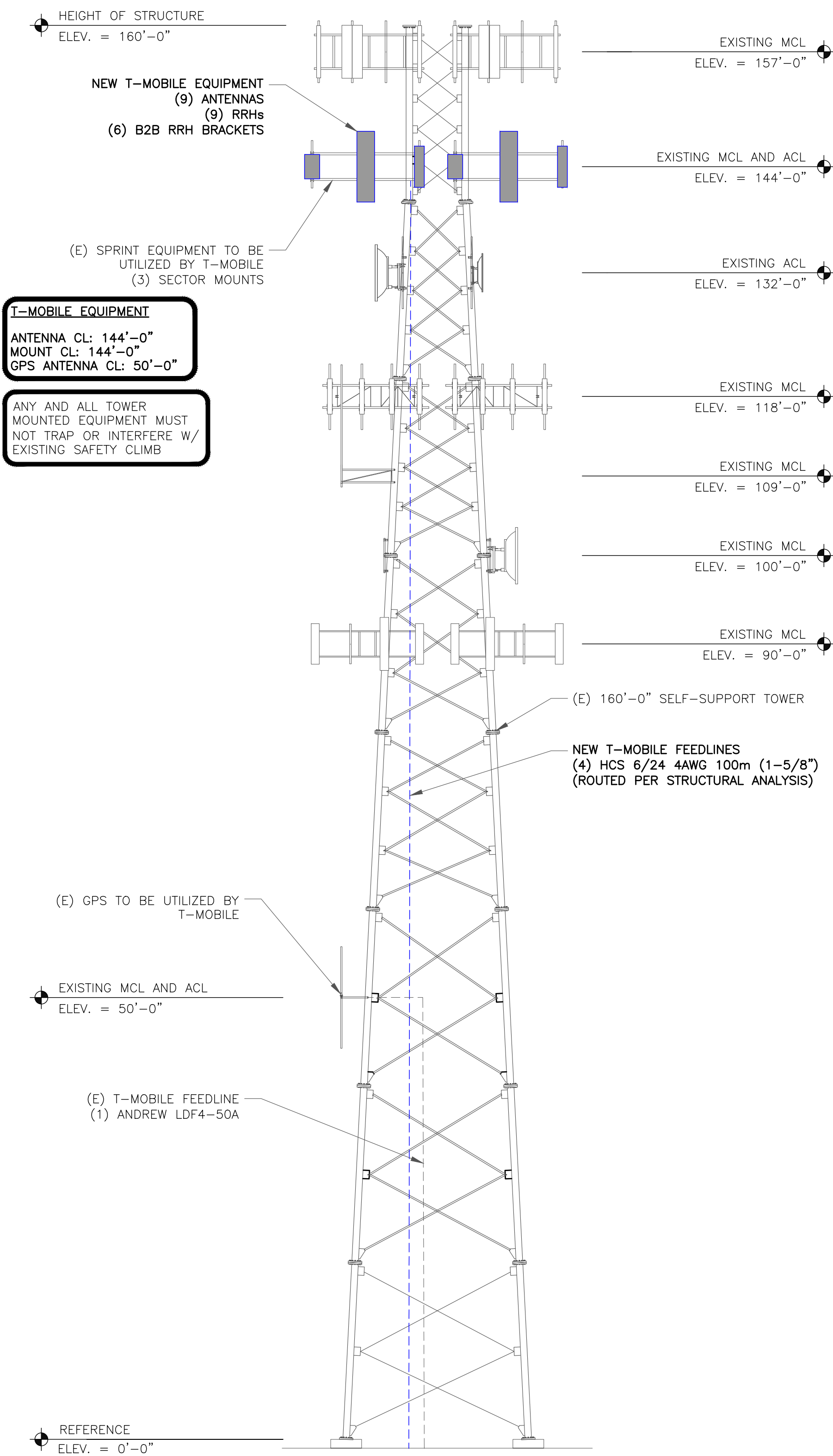
SHEET NUMBER:

C-1.2

REVISION:

0





1 FINAL ELEVATION  
SCALE: NOT TO SCALE

**INSTALLER NOTE:**  
EXISTING AND PROPOSED ANTENNA/  
EQUIPMENT POSITIONING SHOWN PER  
RFDS. FIELD CONDITIONS MAY VARY.

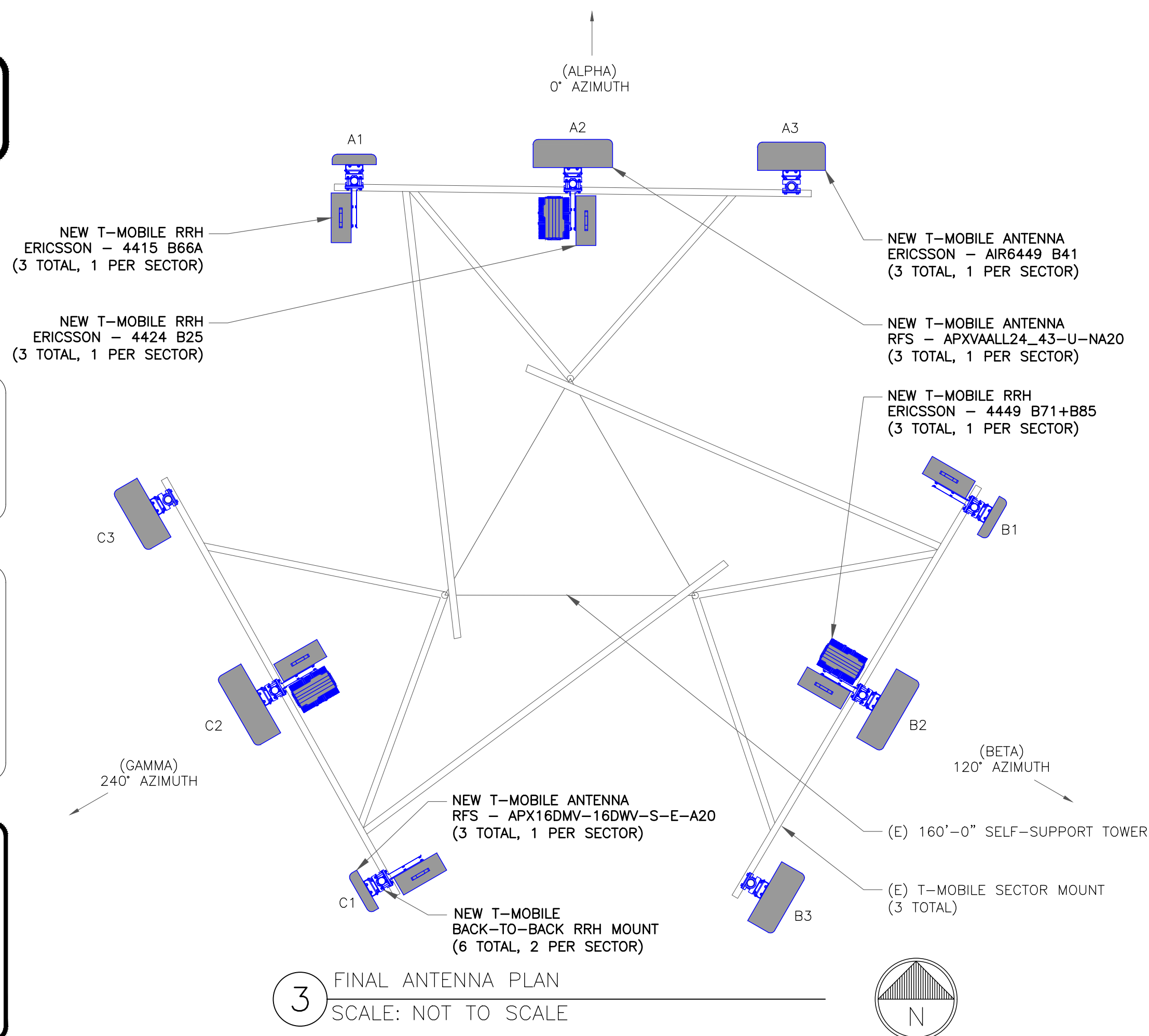
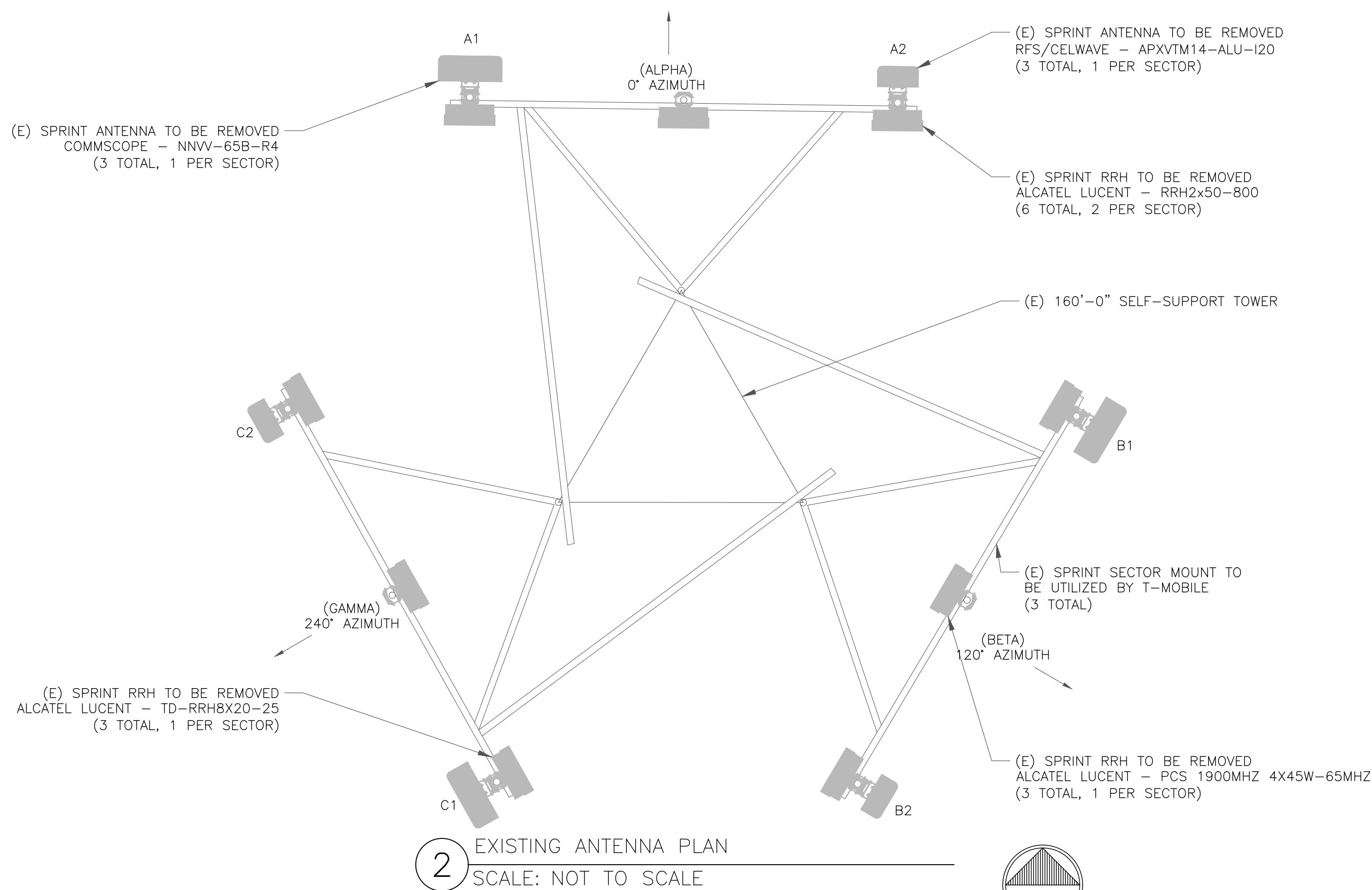
**TIE-BACK ARM NOTE:**  
TIE-BACK ARMS SHOWN ARE FOR REFERENCE  
PURPOSES ONLY. TIE-BACK ARMS TO BE  
INSTALLED PER MOUNT MANUFACTURERS  
SPECIFICATIONS, ALSO ADHERING TO CROWN  
CASTLE CED-STD-10294 STANDARD FOR  
INSTALLATION OF MOUNTS AND APPURTENANCES.

**TOWER ANALYSIS NOTES:**

1. THE DESIGN DEPICTED IN THESE DRAWINGS IS VALID WHEN ACCOMPANIED BY A CORRESPONDING PASSING TOWER ANALYSIS.
2. CONSTRUCTION MANAGER / GENERAL CONTRACTOR SHALL REVIEW THE TOWER ANALYSIS FOR ANY CONDITIONS PRIOR TO INSTALLATION.
3. ANY REQUIRED TOWER MODIFICATION DESIGN OR TOWER REPLACEMENT SHALL BE APPROVED BY EOR.

**MOUNT ANALYSIS NOTES:**

1. THE DESIGN DEPICTED IN THESE DRAWINGS IS VALID WHEN ACCOMPANIED BY A CORRESPONDING PASSING MOUNT ANALYSIS.
2. CONSTRUCTION MANAGER / GENERAL CONTRACTOR SHALL REVIEW THE MOUNT ANALYSIS FOR ANY CONDITIONS PRIOR TO INSTALLATION.
3. ANY REQUIRED MOUNT MODIFICATION DESIGN OR MOUNT REPLACEMENT SHALL BE APPROVED BY EOR.



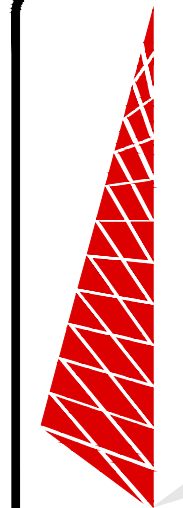
**RRH NOTE:**  
CONTRACTOR TO ENSURE RRHs  
ARE INSTALLED MIN 8" AWAY  
FROM ANTENNA

**T-Mobile**

35 GRIFFIN ROAD  
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**CROWN  
CASTLE**

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MAHWAH, NJ 07430



**TOWER  
ENGINEERING  
PROFESSIONALS**

326 TRYON RD  
RALEIGH, NC 27603  
(919) 661-6351

TEP JOB #: 45443.498699

**T-MOBILE SITE NUMBER:  
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**BU #: 806387  
HRT 088 943629**

**#14 ROUTE 80  
KILLINGWORTH, CT 06419**

**EXISTING 160'-0"  
SELF-SUPPORT**

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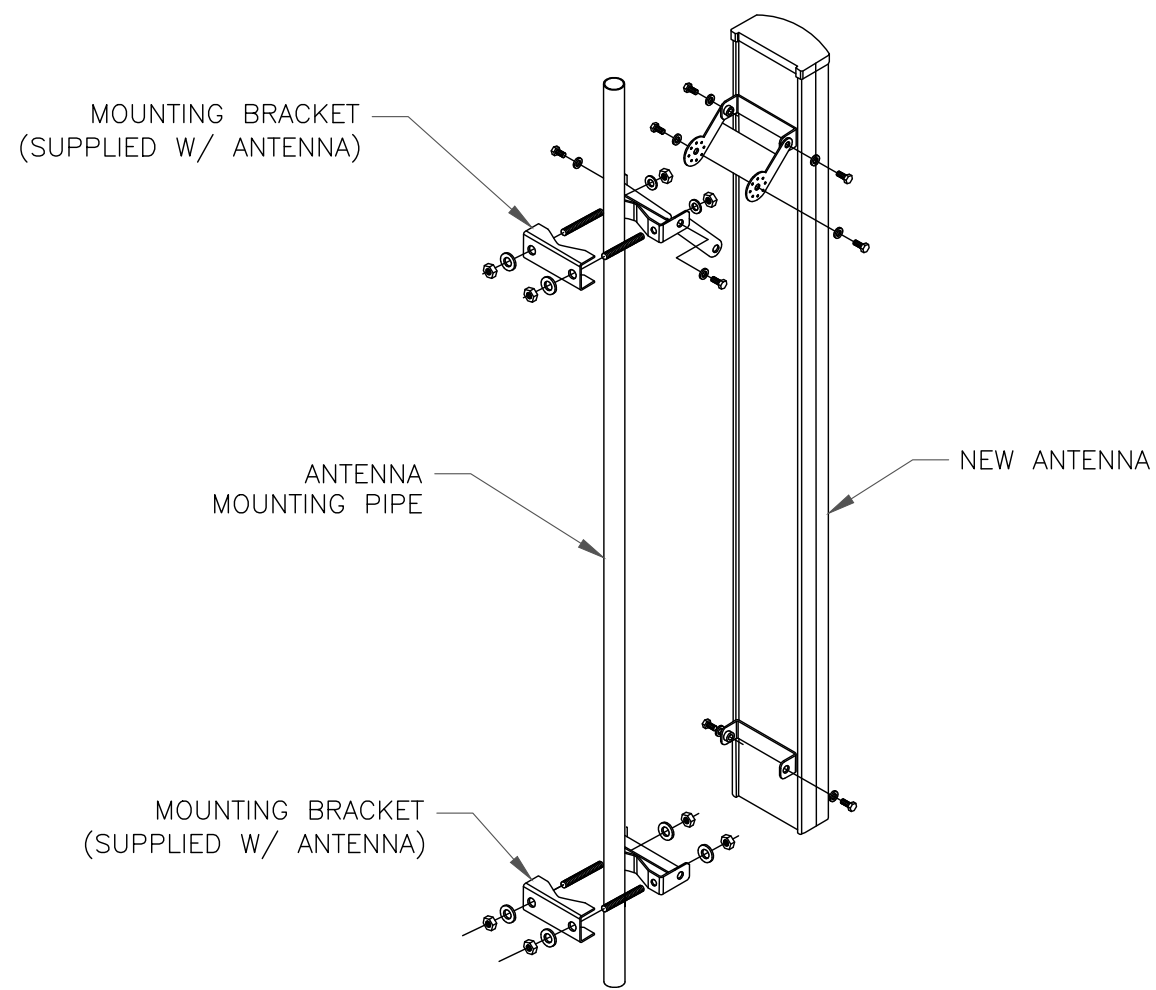
**C-2**

**REVISION:**

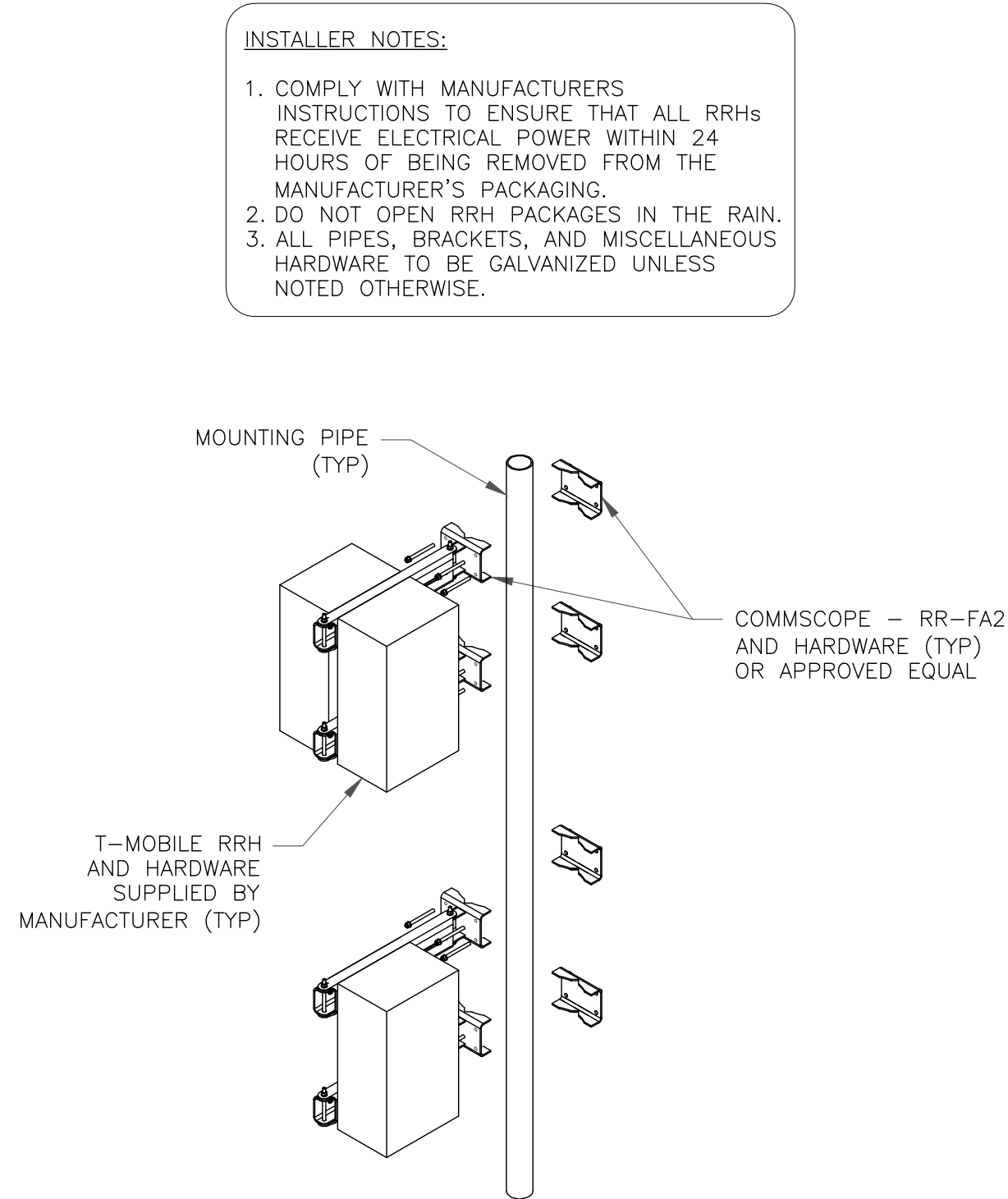
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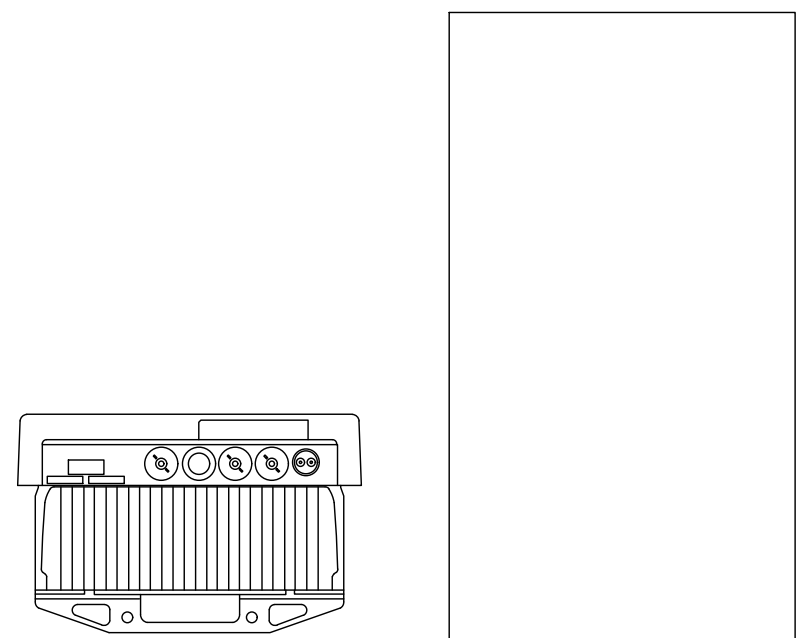




1 ANTENNA MOUNTING DETAIL  
SCALE: NOT TO SCALE

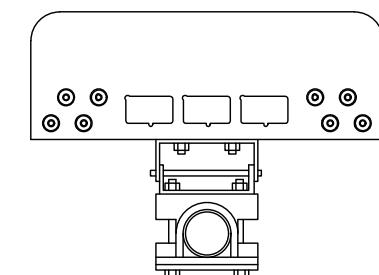


2 RRHs MOUNTING DETAIL  
SCALE: NOT TO SCALE



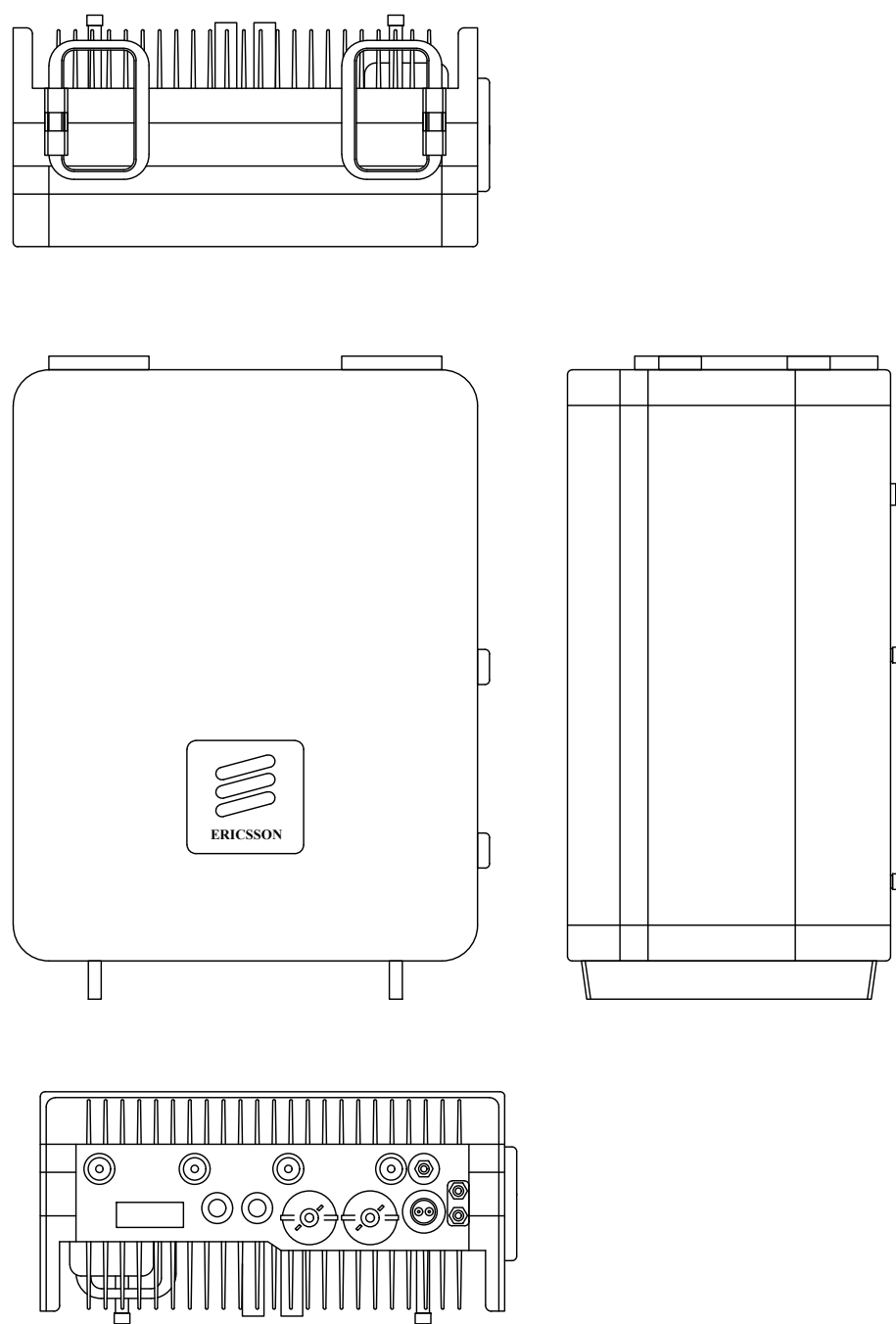
ERICSSON - AIR6449 B41  
WEIGHT: 114.63 LBS  
SIZE (HxWxD): 33.11x20.51x8.54 IN.

3 ERICSSON - AIR6449 B41  
SCALE: NOT TO SCALE



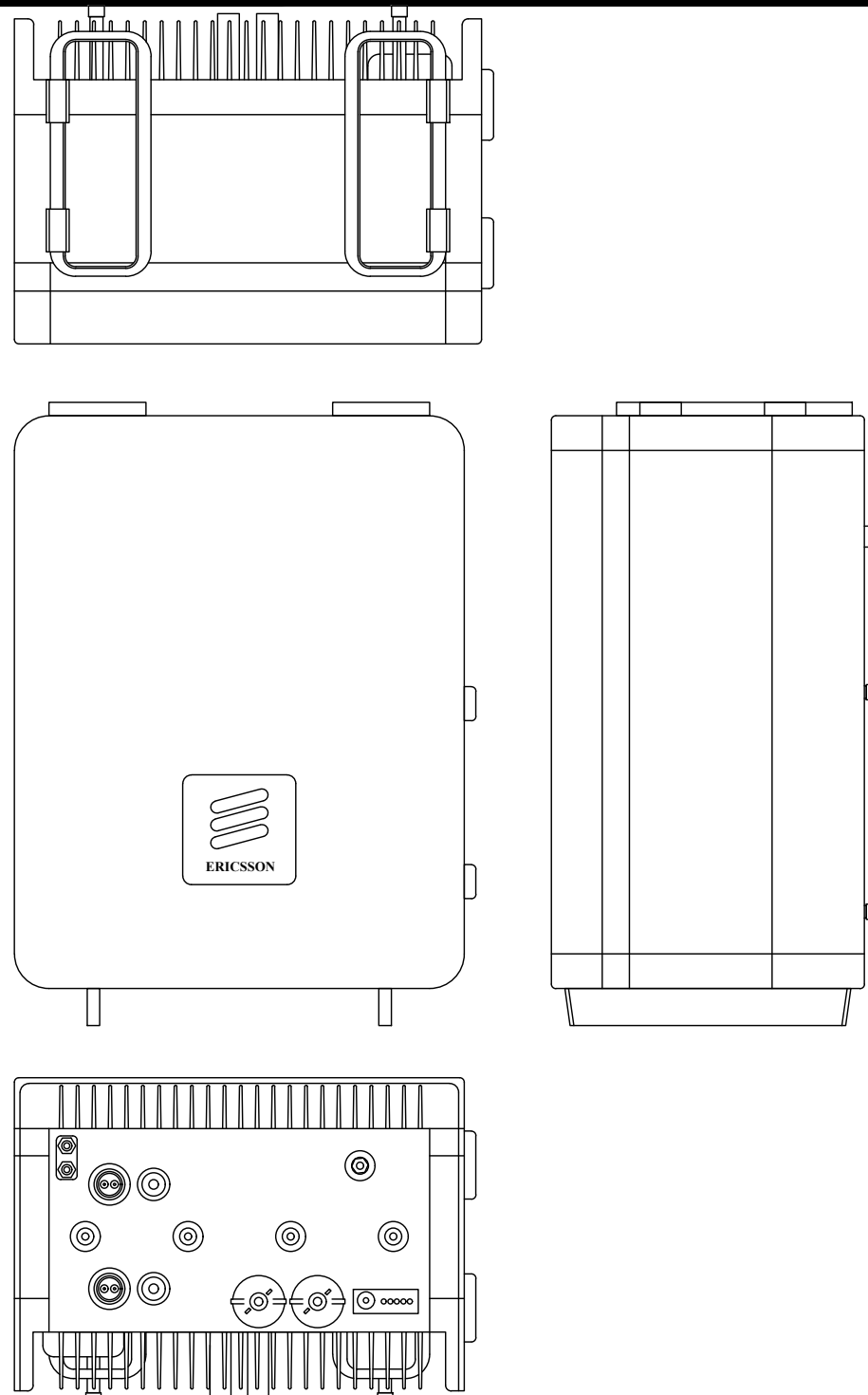
RFS/CELWAVE - APXVAALL24\_43-U-NA20  
WEIGHT (WITHOUT MOUNTING HARDWARE): 149.90 LBS  
SIZE (HxWxD): 95.9x24.0x8.5 IN.

4 RFS/CELWAVE - APXVAALL24\_43-U-NA20  
SCALE: NOT TO SCALE



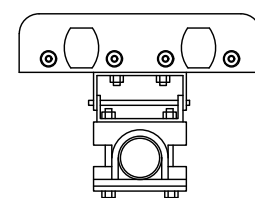
ERICSSON - RADIO 4415 B66A  
WEIGHT: 49.6 LBS  
SIZE (HxWxD): 16.50x13.50x6.30 IN.

5 ERICSSON - RADIO 4415 B66A  
SCALE: NOT TO SCALE



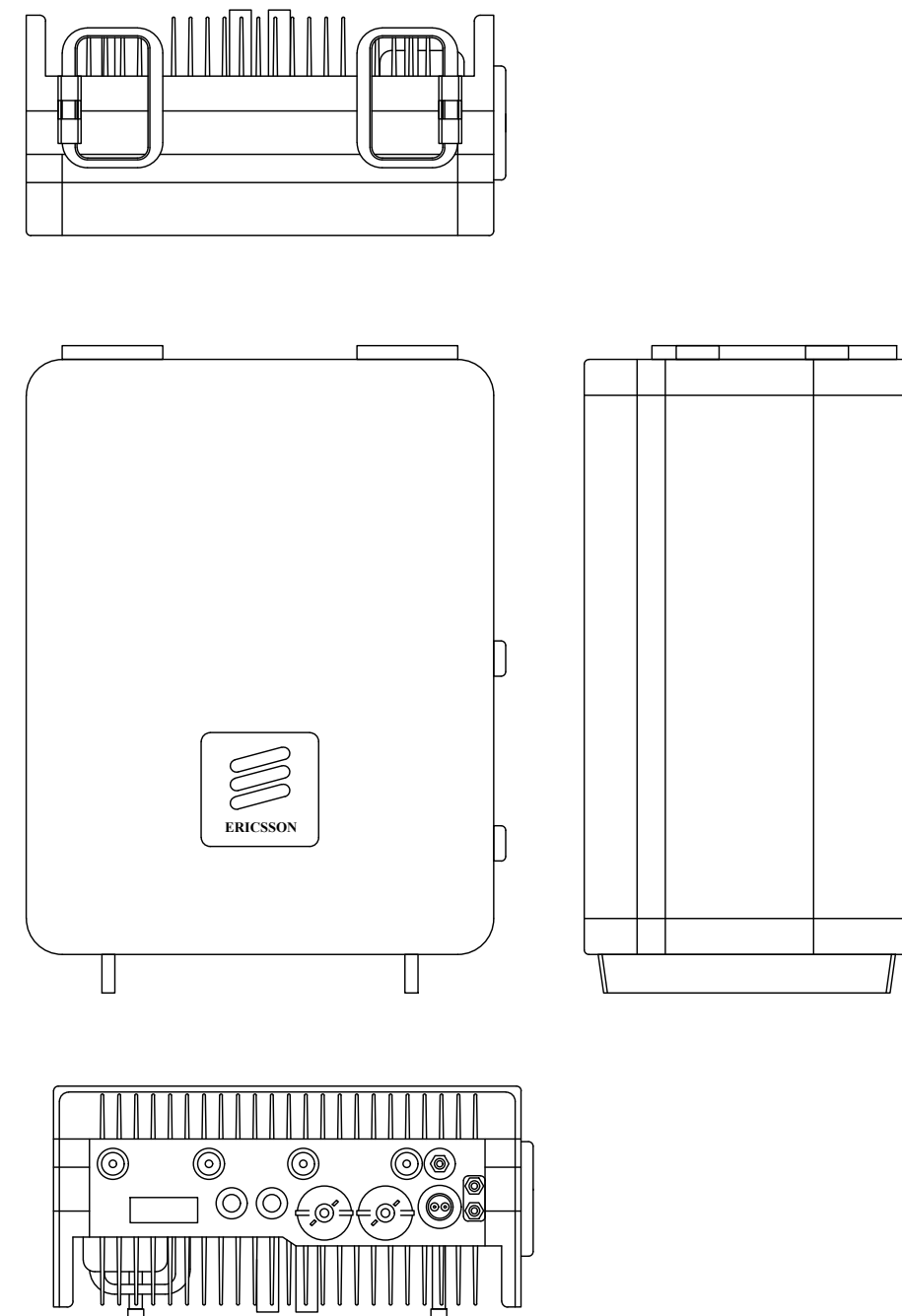
ERICSSON - RADIO 4449 B71/B85  
WEIGHT: 73.21 LBS  
SIZE (HxWxD): 17.91x13.20x10.63 IN.

6 ERICSSON - RADIO 4449 B71/B85  
SCALE: NOT TO SCALE



RFS - APX16DWV-16DWV-S-E-A20  
WEIGHT (WITHOUT MOUNTING HARDWARE): 40.7 LBS  
SIZE (HxWxD): 55.9x13.3x3.15 IN.

7 RFS - APX16DWV-16DWV-S-E-A20  
SCALE: NOT TO SCALE



ERICSSON - RADIO 4424 B25  
WEIGHT: 86.0 LBS  
SIZE (HxWxD): 17.1x14.4x11.3 IN.

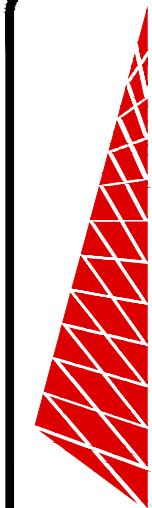
8 ERICSSON - RADIO 4424 B25  
SCALE: NOT TO SCALE

T-Mobile

35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002

CROWN  
CASTLE

1200 MACARTHUR BLVD, SUITE 200  
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TOWER  
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PROFESSIONALS

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(919) 661-6351

TEP JOB #: 45443.498699

T-MOBILE SITE NUMBER:  
**CTHA808A**

BU #: **806387**  
HRT **088 943629**

#14 ROUTE 80  
KILLINGWORTH, CT 06419

EXISTING 160'-0"  
SELF-SUPPORT

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|     |          |      |              |         |
|     |          |      |              |         |

SEAL:



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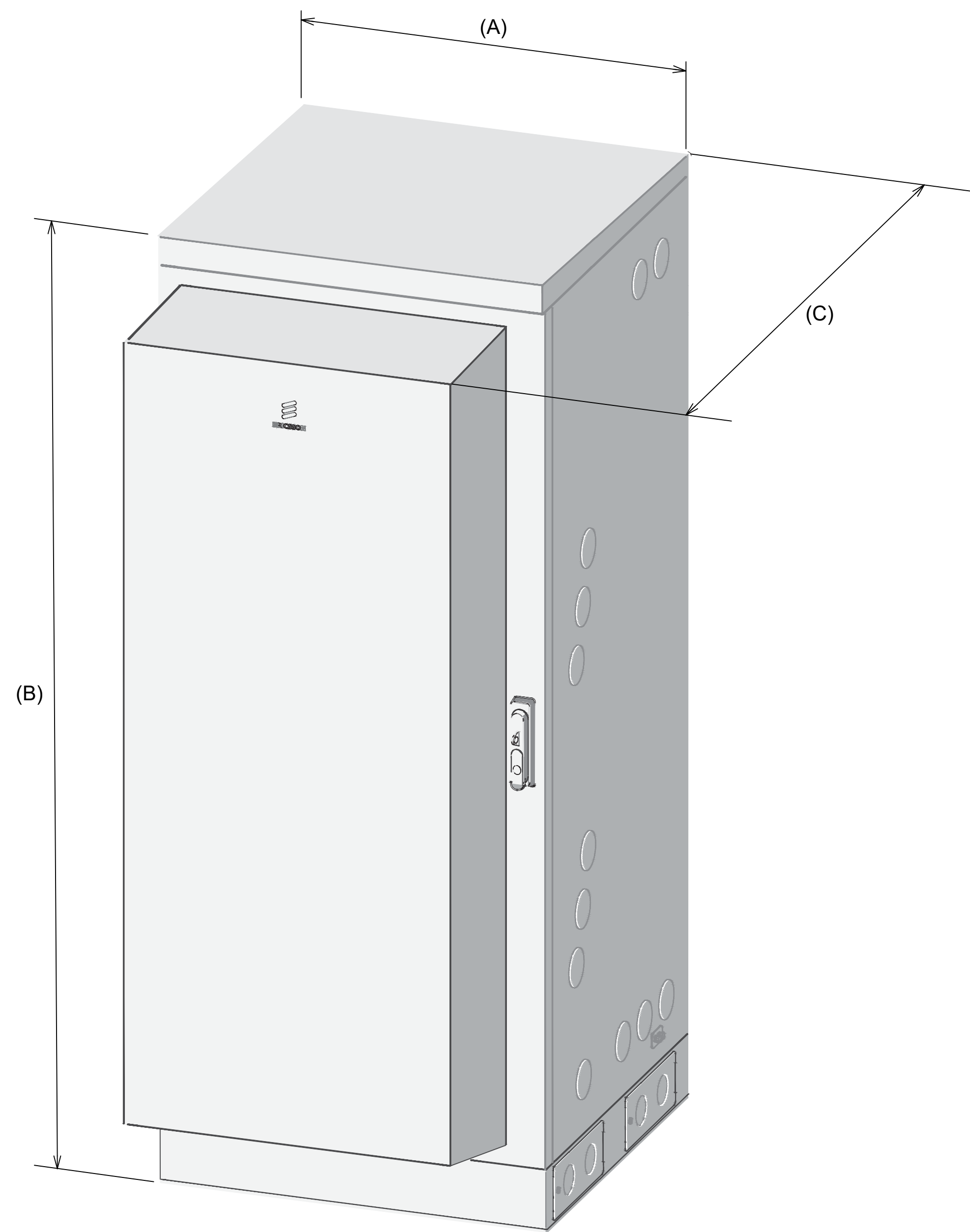
SHEET NUMBER:

C-4

REVISION:


0

- INSTALLER NOTES:
- 1. INFORMATION SHOWN PROVIDED BY T-MOBILE. CONTRACTOR TO REFERENCE CABINET MANUFACTURER'S SPECIFICATIONS FOR FURTHER DETAILS.
  - 2. CONTRACTOR TO FOLLOW THE LATEST VERSION OF T-MOBILE REGIONAL CONSTRUCTION STANDARDS. CONTACT T-MOBILE FOR DETAILS.




| Dimensions      |   |
|-----------------|---|
| Width (A)       | 650 mm / 25.5906 in   |
| Height (B)      | 1450 mm / 57.08661 in (without base frame)<br>1600 mm / 62.99213 in (with base frame) |
| Depth (C)       | 850 mm / 33.4646 in   |
| Weight          |   |
| Empty enclosure | 176 kg / 388.014 lb   |






35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002



1200 MACARTHUR BLVD, SUITE 200  
MAHWAH, NJ 07430



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TEP JOB #: 45443.498699

T-MOBILE SITE NUMBER:  
**CTHA808A**


BU #: **806387**  
HRT **088 943629**

#14 ROUTE 80  
KILLINGWORTH, CT 06419

EXISTING 160'-0"  
SELF-SUPPORT

| ISSUED FOR: |          |      |              |         |
|-------------|----------|------|--------------|---------|
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|             |          |      |              |         |
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SHEET NUMBER:  
**C-5**

REVISION:  
**0**



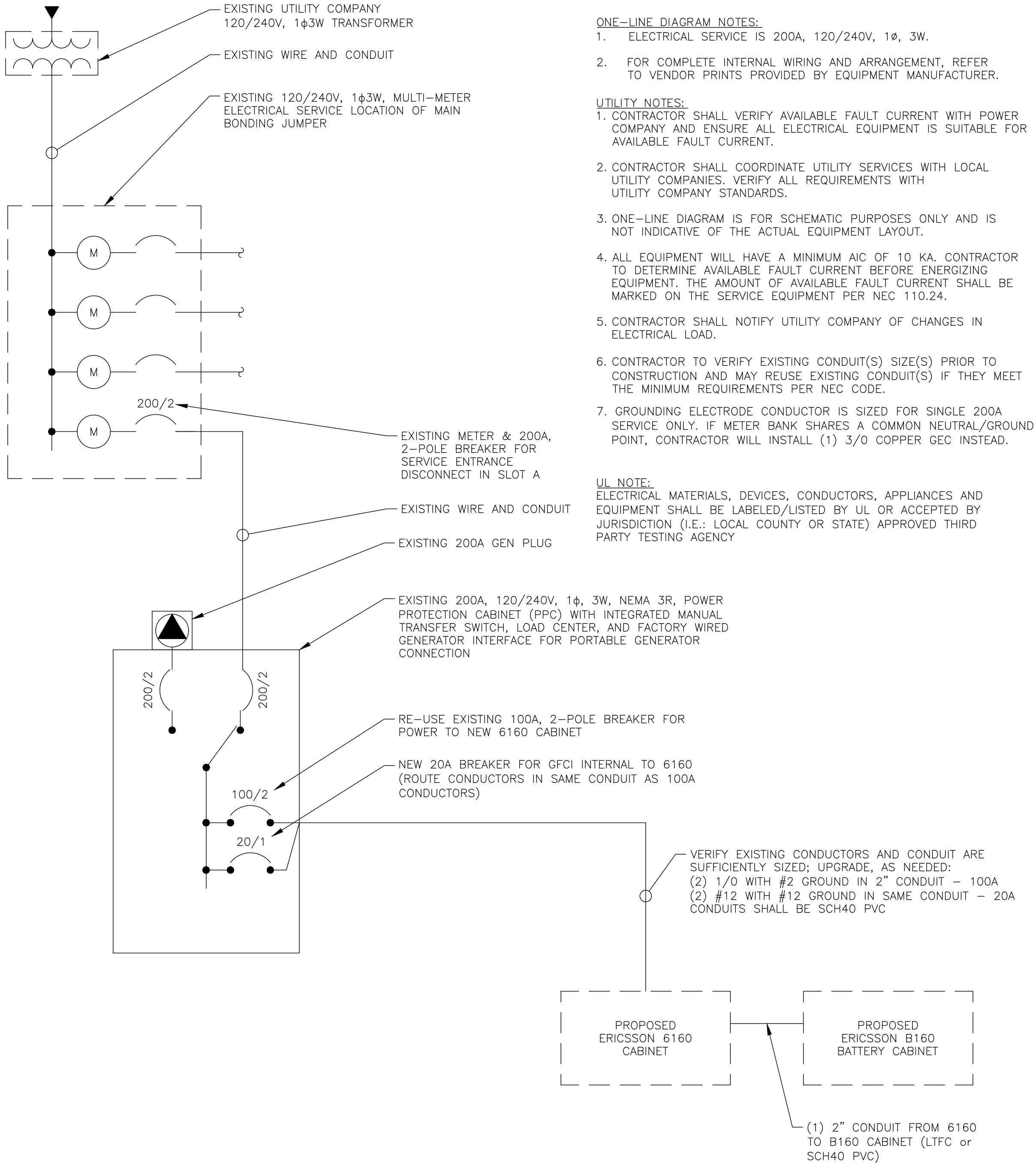
NOTE:  
LOAD CALCULATIONS TAKEN FROM  
INFORMATION PROVIDED BY CROWN  
CASTLE & BASED ON THE RFDS  
DATED 01/12/2021 V1.0.  
CONTRACTOR TO VERIFY LOADS  
WITH MANUFACTURER'S  
SPECIFICATIONS PRIOR TO  
CONSTRUCTION

| EXISTING 200A M.C.B, 240/120 VAC, 1Ø, 3W PANEL SCHEDULE |                      |      |       |       |       |                  |       |                 |                      |     |                |
|---|----------------------|------|-------|-------|-------|------------------|-------|-----------------|----------------------|-----|----------------|
| LOAD SERVED   | VOLT AMPERES (WATTS) |      | TRIP  | CKT # | PHASE |                  | CKT # | TRIP            | VOLT AMPERES (WATTS) |     | LOAD SERVED    |
|   | L1                   | L2   |       |       |       |                  |       |                 | L1                   | L2  |                |
| **POWER CABINET   | 9600                 |      | **100 | 1     | A     |                  | 2     | 60              | 100                  |     | SURGE ARRESTOR |
|   |                      | 9600 |       | 3     | B     |                  | 4     |                 |                      | 100 |                |
| SPARE   | —                    |      | —     | 5     | A     |                  | 6     | —               | —                    |     | SPARE          |
| SPARE   |                      | —    | —     | 7     | B     |                  | 8     | —               |                      | —   | SPARE          |
| SPARE   | —                    |      | —     | 9     | A     |                  | 10    | 15              | 180                  |     | GFI RECEPTACLE |
| *FAN (OFF)  |                      | —    | 10    | 11    | B     |                  | 12    | —               |                      | —   | SPARE          |
| VOLT AMPS   | 9600                 | 9600 |       |       |       |                  |       |                 | 280                  | 100 | VOLT AMPS      |
| L1 VOLT AMPERES   |                      |      |       | 9880  |       | 9700             |       | L2 VOLT AMPERES |                      |     |                |
|   |                      |      |       | 9880  |       | MAX VOLT AMPERES |       |                 |                      |     |                |
|   |                      |      |       | 82.3  |       | MAX AMPS         |       |                 |                      |     |                |
|   |                      |      |       | 102.9 |       | MAX AMPS x 125%  |       |                 |                      |     |                |

\*NOTE — EXISTING BREAKER TO BE REMOVED, NOTIFY TEP IF BREAKER IS TO REMAIN  
\*\*NOTE — REUSE BREAKER FOR NEW CABINET INSTALL, NOTIFY TEP IF BREAKER IS TO REMAIN

| PROPOSED 200A M.C.B, 240/120 VAC, 1Ø, 3W PANEL SCHEDULE |                      |      |       |       |       |                  |      |                      |     |                |
|---|----------------------|------|-------|-------|-------|------------------|------|----------------------|-----|----------------|
| LOAD SERVED   | VOLT AMPERES (WATTS) |      | TRIP  | CKT # | PHASE | CKT #            | TRIP | VOLT AMPERES (WATTS) |     | LOAD SERVED    |
|   | L1                   | L2   |       |       |       |                  |      | L1                   | L2  |                |
| 6160 ENLOSURE   | 7405                 |      | **100 | 1     | A     | 2                | 10   | 100                  |     | SURGE ARRESTOR |
|   |                      | 7405 |       | 3     | B     | 4                |      |                      | 100 |                |
| GFCI INTERNAL IN 6160                                   | 180                  |      | 20    | 5     | A     | 6                | —    | —                    |     | SPARE          |
| SPARE   |                      | —    | —     | 7     | B     | 8                | —    |                      | —   | SPARE          |
| SPARE   | —                    |      | —     | 9     | A     | 10               | 15   | 180                  |     | GFI RECEPTACLE |
| —   |                      | —    | —     | 11    | B     | 12               | —    |                      | —   | SPARE          |
| VOLT AMPS   | 7585                 | 7405 |       |       |       |                  |      | 280                  | 100 | VOLT AMPS      |
| L1 VOLT AMPERES   |                      |      |       | 7865  |       | 7505             |      | L2 VOLT AMPERES      |     |                |
|   |                      |      |       | 7865  |       | MAX VOLT AMPERES |      |                      |     |                |
|   |                      |      |       | 65.5  |       | MAX AMPS         |      |                      |     |                |
|   |                      |      |       | 81.9  |       | MAX AMPS x 125%  |      |                      |     |                |

PROPOSED BREAKERS & LOADS IN BOLD



GENERAL NOTES:

- ALL NEW CONDUCTORS TO BE INSTALLED SHALL BE COPPER. ALL CONDUCTORS SHALL BE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 UNLESS NOTED OTHERWISE.
- CONTRACTOR IS TO FIELD VERIFY ALL EXISTING ITEMS SHOWN ON THE ELECTRICAL ONE-LINE DIAGRAM AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
- ALL GROUNDING AND BONDING PER THE NEC.

ONE-LINE DIAGRAM NOTES:

- ELECTRICAL SERVICE IS 200A, 120/240V, 1ø, 3W.
- FOR COMPLETE INTERNAL WIRING AND ARRANGEMENT, REFER TO VENDOR PRINTS PROVIDED BY EQUIPMENT MANUFACTURER.

UTILITY NOTES:

- CONTRACTOR SHALL VERIFY AVAILABLE FAULT CURRENT WITH POWER COMPANY AND ENSURE ALL ELECTRICAL EQUIPMENT IS SUITABLE FOR AVAILABLE FAULT CURRENT.
- CONTRACTOR SHALL COORDINATE UTILITY SERVICES WITH LOCAL UTILITY COMPANIES. VERIFY ALL REQUIREMENTS WITH UTILITY COMPANY STANDARDS.
- ONE-LINE DIAGRAM IS FOR SCHEMATIC PURPOSES ONLY AND IS NOT INDICATIVE OF THE ACTUAL EQUIPMENT LAYOUT.
- ALL EQUIPMENT WILL HAVE A MINIMUM AIC OF 10 KA. CONTRACTOR TO DETERMINE AVAILABLE FAULT CURRENT BEFORE ENERGIZING EQUIPMENT. THE AMOUNT OF AVAILABLE FAULT CURRENT SHALL BE MARKED ON THE SERVICE EQUIPMENT PER NEC 110.24.
- CONTRACTOR SHALL NOTIFY UTILITY COMPANY OF CHANGES IN ELECTRICAL LOAD.
- CONTRACTOR TO VERIFY EXISTING CONDUIT(S) SIZE(S) PRIOR TO CONSTRUCTION AND MAY REUSE EXISTING CONDUIT(S) IF THEY MEET THE MINIMUM REQUIREMENTS PER NEC CODE.
- GROUNDING ELECTRODE CONDUCTOR IS SIZED FOR SINGLE 200A SERVICE ONLY. IF METER BANK SHARES A COMMON NEUTRAL/GROUND POINT, CONTRACTOR WILL INSTALL (1) 3/0 COPPER GEC INSTEAD.

UL NOTE:

ELECTRICAL MATERIALS, DEVICES, CONDUCTORS, APPLIANCES AND EQUIPMENT SHALL BE LABELED/LISTED BY UL OR ACCEPTED BY JURISDICTION (I.E.: LOCAL COUNTY OR STATE) APPROVED THIRD PARTY TESTING AGENCY

T-Mobile

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#14 ROUTE 80  
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EXISTING 160'-0"  
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|     |          |      |              |         |

SEAL:

Professional Engineer  
20538  
Professional Engineer

03/17/21

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TO ALTER THIS DOCUMENT.

SHEET NUMBER:

E-1

REVISION:

0

1 AC PANEL SCHEDULES  
SCALE: NOT TO SCALE

2 ONE LINE DIAGRAM  
SCALE: NOT TO SCALE



T-MOBILE GROUNDING NOTES:

ALL GROUNDS MUST ROUTE DOWNHILL FOR ENTIRE DURATION OF ROUTE

PROVIDE LABOR, MATERIALS, INSPECTION, AND TESTING TO PROVIDE CODE COMPLIANCE FOR ELECTRIC, TELEPHONE, AND GROUNDING/LIGHTNING SYSTEMS.

ICE BRIDGE/ EQUIPMENT POST:

#2 SOLID COPPER TINNED, EXOTHERMICALLY WELDED TO GROUND RING (BOTH ENDS), FINAL WELD COLD GALVANIZED, IN ½" NON-METALLIC SEAL TIGHT CONDUIT, SEALED WITH SILICONE, ANCHORED TO PAD/PLATFORM TO AVOID TRIP HAZARD USING HAMMER SET ANCHORS.

PEDESTALS, PLINTHS, SSC CABINET, FCOA CABINETS:

- #2 SOLID COPPER TINNED, 2 HOLE LUG WITH FLAT AND LOCK WASHER AT EQUIPMENT; EXOTHERMICALLY WELDED TO GROUND RING, FINAL WELD COLD GALVANIZED, IN ½" NON-METALLIC SEAL TIGHT CONDUIT, SEALED WITH SILICONE, ANCHORED TO PAD TO AVOID TRIP HAZARD USING HAMMER SET ANCHORS. EACH PART REQUIRES A SEPARATE DOWNLEAD, NO DAISY CHAINS.
- ALL COMPONENTS INSIDE FCOA CABINETS REQUIRE A DEDICATED GROUND.

#6 THHN STRANDED (GREEN JACKET), CONNECTED AT EQUIPMENT SIDE USING OVP TERMINAL BLOCK CONNECTION; MECHANICALLY CONNECTED TO GROUND REFERENCE AT MASTER BUSS BAR USING 2 HOLE LUG WITH FLAT AND LOCK WASHER, IN ½" NON-METALLIC SEAL TIGHT CONDUIT, SEALED WITH SILICONE, AND ANCHORED TO PAD/PLATFORM TO AVOID TRIP HAZARD.

ANTENNA/ COVP/ RRU MAST PIPES:

- ALL VERTICAL MAST PIPES: #2 SOLID COPPER TINNED, EXOTHERMICALLY WELDED TO TOP OF PIPE (PIPE, DOWN MOLD), FINAL WELD COLD GALVANIZED, BONDED TO TOP BUSS BAR WITH 2 HOLE COPPER COMPRESSION LUG, FLAT AND LOCK WASHER.
- EXISTING/REUSED PIPES: #2 SOLID COPPER TINNED, BONDED WITH COLD WATER CLAMP TO TOP OF PIPE, BONDED TO TOP BUSS WITH 2 HOLE COPPER COMPRESSION LUG, FLAT AND LOCK WASHER

AIR TERMINALS:

TO BE INSTALLED, ONLY IF REQUIRED

TMA's, DIPLEXERS AND TRIPLEXERS:

- #6 THHN, WITH PROPER COPPER COMPRESSION LUG, FLATS AND LOCK WASHERS
- ALL GROUND LUGS ON TMA MUST BE GROUNDED WITH SEPARATE DOWNLEAD TO BUSS BAR (NO DAISY CHAINS)

ELEVATED STEEL PLATFORMS WITH LUNAR FEET:

#2 SOLID COPPER TINNED, EXOTHERMICALLY WELDED (FLAT PLATE MOLD) TO OUTSIDE PERIMETER BEAMS IN FOUR (4) PLACES, FINAL WELD COLD GALVANIZED, BONDED DIRECTLY TO SUBGRADE GROUND RING.

STEEL CANOPY (STEEL PLATFORM OR CONCRETE PAD):

- #2 SOLID COPPER TINNED, EXOTHERMICALLY WELDED (PIPE, DOWN MOLD) TO BOTTOM OF ALL VERTICAL SUPPORT POSTS, TYPICALLY FOUR (4) PIPES, FINAL WELD COLD GALVANIZED, BONDED DIRECTLY TO SUBGRADE GROUND RING.
- #2 SOLID COPPER TINNED, EXOTHERMICALLY WELDED (PIPE, UP MOLD) TO TOP OF ALL VERTICAL SUPPORT POSTS, TYPICALLY FOUR (4) PIPES, FINAL WELD COLD GALVANIZED, BONDED UP TO CANOPY GRIP-STRUT USING 2 HOLE COPPER COMPRESSION LUG, FLAT AND LOCK WASHER.

#6 THHN, WITH PROPER COPPER COMPRESSION LUG, ANTI-OXIDANT TO SECTOR BUSS BAR

FSBE ALARM BOX:

#6 THHN WITH ONE HOLE LUG BONDED TO PREVIOUSLY GROUNDED FCOA, PLINTH OR BUSS BAR.

SURGE SUPPRESSORS:

#6 THHN TO PREVIOUSLY GROUNDED BUSS BAR USING PROPER LUGS

FYGA/FYGB BRACKET:

- #6 THHN TO PREVIOUSLY GROUNDED BUSS BAR USING PROPER LUGS
- THROUGH BOLTS WITH FLAT, LOCK ON BRACKET

- PLATFORM / PAD BUSS BAR SHOULD BE MINIMUM 12" TINNED COPPER WITH INSULATORS, AND SHOULD HAVE TWO (2) EXOTHERMICALLY WELDED DOWN LEADS DIRECTLY TO GROUND RING USING #2 SOLID COPPER TINNED WIRE.
- SECTOR BUSS BAR SHOULD BE PROPERLY SIZED TO ACCOMMODATE NECESSARY GROUNDING FOR EQUIPMENT ON EACH MOUNT, AND MAY BE SOLID COPPER (TINNED NOT REQUIRED). DO NOT USE INSULATORS ON SECTOR BUSS BARS ATTACH DIRECTLY TO TOWER MOUNT STEEL.

- NO GROUND KITS ON HYBRID TRUNKS (TOP OR BOTTOM)
- NO GROUND KITS ON MICROWAVE IF CABLES (TOP OR BOTTOM)
- MICROWAVE SURGE SUPPRESSORS ARE NOT TO BE INSTALLED UPSTAIRS ON TOWER, DOWNSTAIRS ONLY (BULKHEAD PREFERRED)
- MICROWAVE ODU MUST BE GROUNDED TO TOWER TOP SECTOR OR COLLECTOR BUSS BAR
- ALL TMA'S AND DIPLEXERS MUST BE GROUNDED TO BUSS BAR. NO DAISY CHAIN ON TWIN/DUAL TMA
- ALL LUGS SHOULD BE PROPERLY SIZED FOR CONDUCTOR, BURNDY TINNED COPPER COMPRESSION STYLE
  - INDOOR (OR INSIDE CABINET) SHOULD HAVE WINDOW
  - OUTDOOR SHOULD NOT HAVE WINDOW

- CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF EXISTING SITE GROUND SYSTEM.

- CONTRACTOR SHALL VERIFY THAT GROUNDING ELECTRODES SHALL BE CONNECTED IN A RING USING #2 AWG BARE TINNED COPPER WIRE. THE TOP OF THE GROUND RODS AND THE RING CONDUCTOR SHALL BE 30" BELOW FINISHED GRADE, OR TO FROST DEPTH, WHICHEVER IS GREATER. GROUNDING ELECTRODES SHALL BE DRIVEN ON 10'-0" CENTERS (PROVIDE AND INSTALL AS REQUIRED, REQUIRED PER PLAN BELOW).

- GROUNDING CONDUCTORS SHALL BE OF EQUAL LENGTH, MATERIAL, AND BONDING TECHNIQUE.

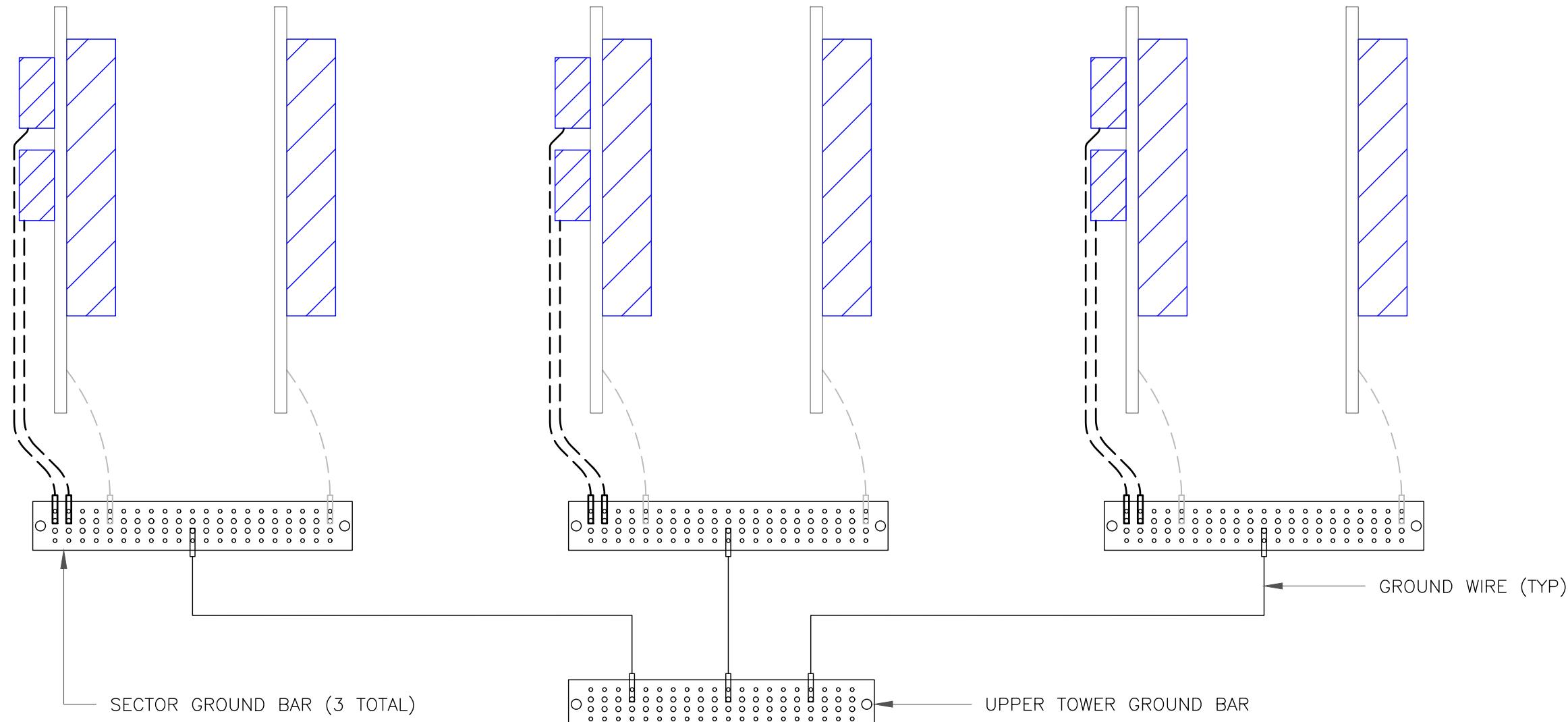
- CONTRACTOR SHALL ENSURE GROUND RING IS WITHIN 12 TO 36 INCHES OF THE EQUIPMENT PAD. PROVIDE AND INSTALL GROUNDING CONNECTIONS SHOWN BELOW AS NEEDED PER EXISTING SITE GROUNDING SYSTEM. CONTRACTOR SHALL VERIFY ALL EXISTING SITE GROUNDING CONDITIONS BEFORE STARTING WORK OR PURCHASING EQUIPMENT.

- ALL DOWN CONDUCTORS MUST GO DOWN.

ALPHA

BETA

GAMMA



NOTE:

ALL NEW GROUNDS TO BE #6 STRANDED COPPER WITH GREEN INSULATION UNLESS NOTED OTHERWISE.

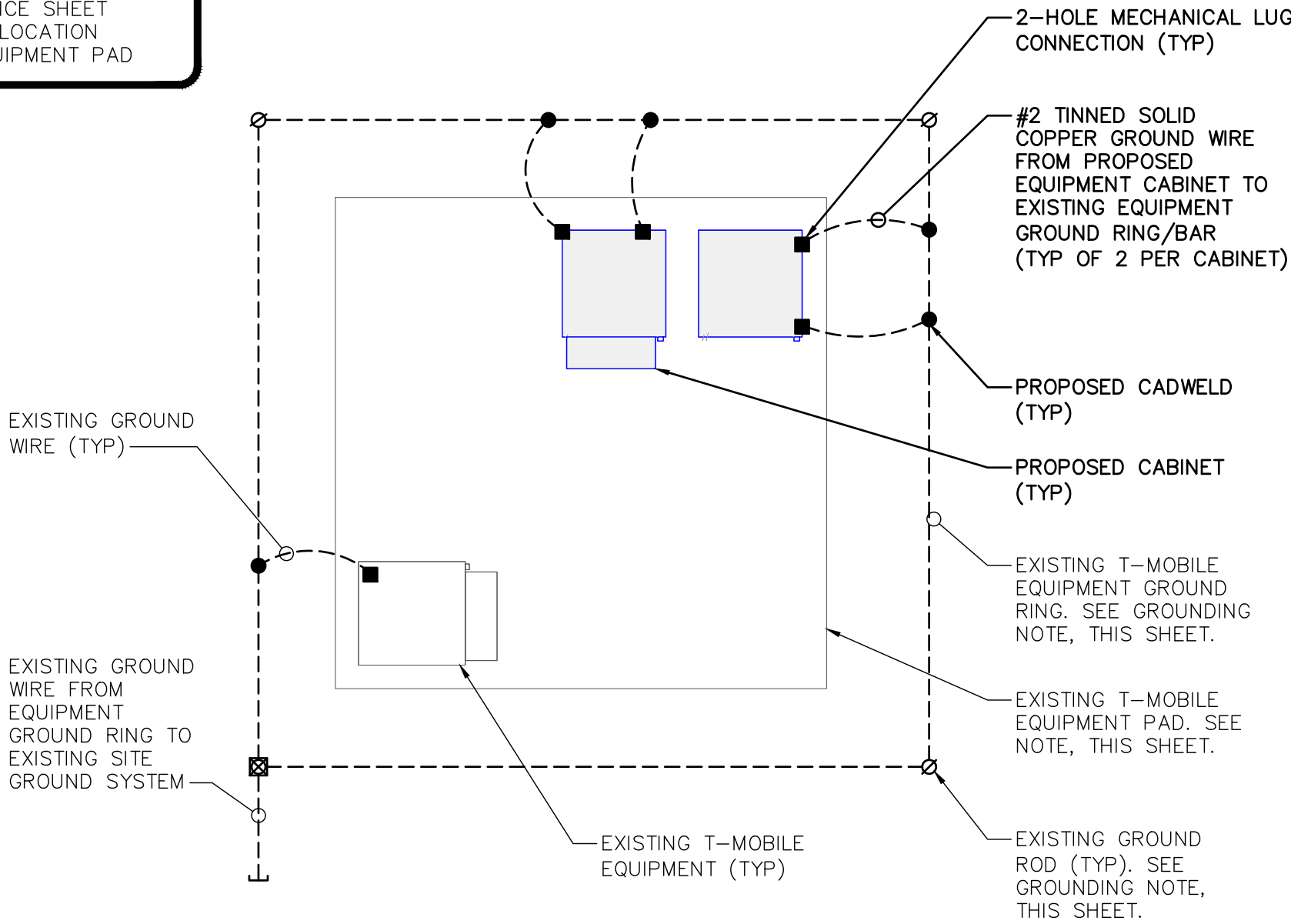
GROUNING SHOWN TYPICAL PER SECTOR.

1 TYPICAL ANTENNA GROUNDING DIAGRAM

SCALE: NOT TO SCALE

NOTE:

CONTRACTOR TO REFERENCE SHEET C-1.1 & 1.2 FOR EXACT LOCATION AND ORIENTATION OF EQUIPMENT PAD



2 TYPICAL CABINET GROUNDING DIAGRAM

SCALE: NOT TO SCALE

T-Mobile

35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002

CROWN  
CASTLE

1200 MACARTHUR BLVD, SUITE 200  
MAHWAH, NJ 07430

TOWER  
ENGINEERING  
PROFESSIONALS

326 TRYON RD  
RALEIGH, NC 27603  
(919) 661-6351

TEP JOB #: 45443.498699

T-MOBILE SITE NUMBER:  
CTHA808A

BU #: 806387  
HRT 088 943629

#14 ROUTE 80  
KILLINGWORTH, CT 06419

EXISTING 160'-0"  
SELF-SUPPORT

ISSUED FOR:

| REV | DATE     | DRWN | DESCRIPTION  | DES./QA |
|-----|----------|------|--------------|---------|
| A   | 03/02/21 | JW   | PRELIMINARY  | BSE     |
| 0   | 03/17/21 | JW   | CONSTRUCTION | BSE     |
|     |          |      |              |         |
|     |          |      |              |         |

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Professional Engineer Seal for John W. Andrews, State of Connecticut, License No. 29538.

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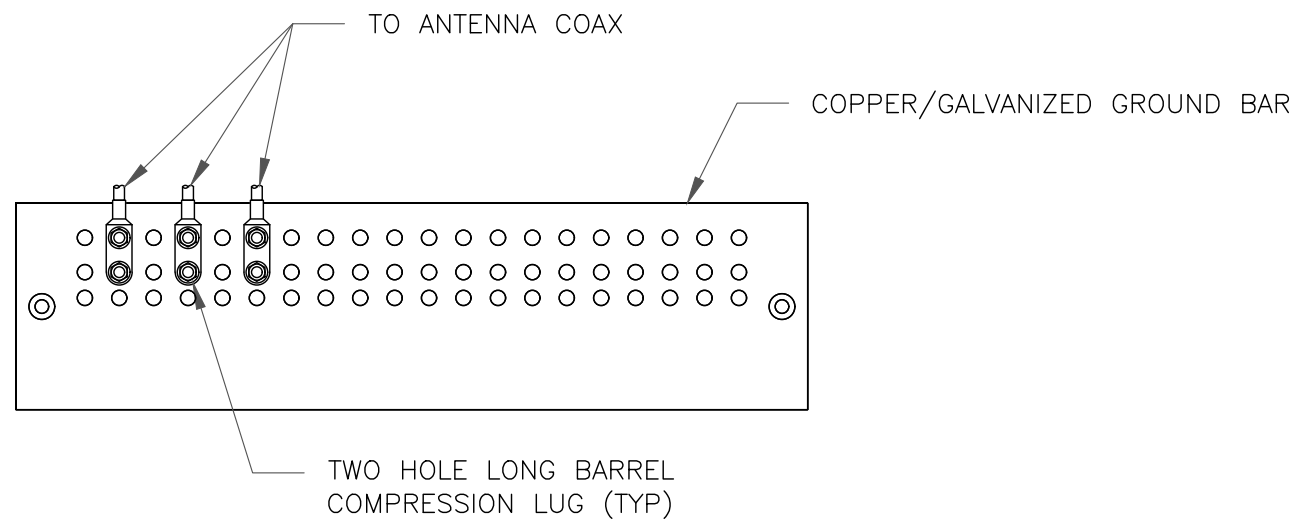
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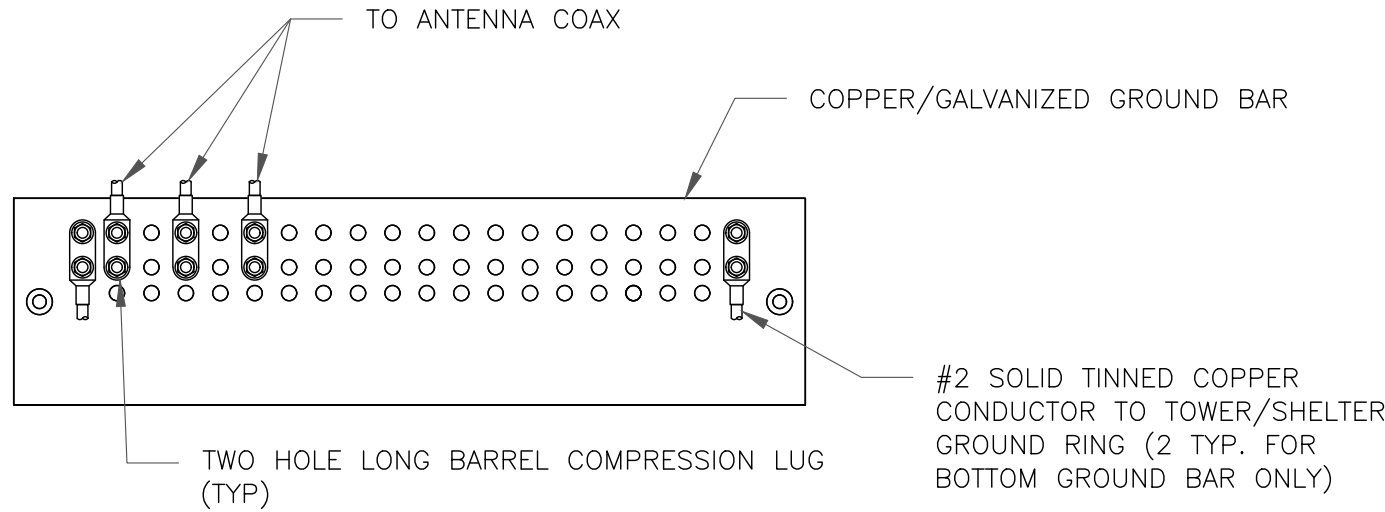


NOTES:

- DOUBLING UP "OR STACKING" OF CONNECTIONS IS NOT PERMITTED.
- EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
- GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO ANTENNA MOUNT STEEL.

1 ANTENNA SECTOR GROUND BAR DETAIL

SCALE: NOT TO SCALE

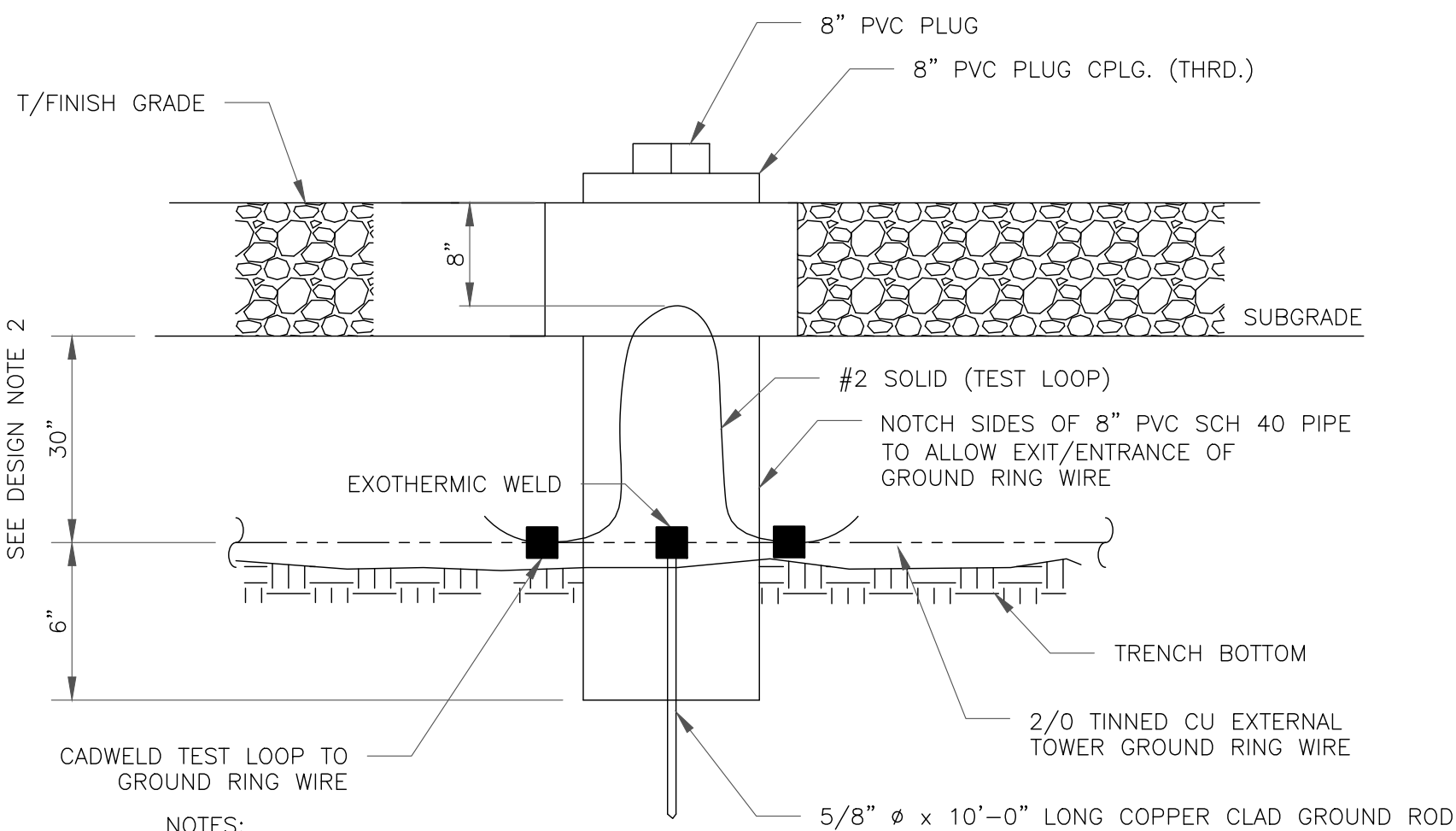


NOTES:

- EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
- GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL (TOWER ONLY).
- GROUND BAR SHALL BE ISOLATED FROM BUILDING OR SHELTER.

2 TOWER/SHELTER GROUND BAR DETAIL

SCALE: NOT TO SCALE

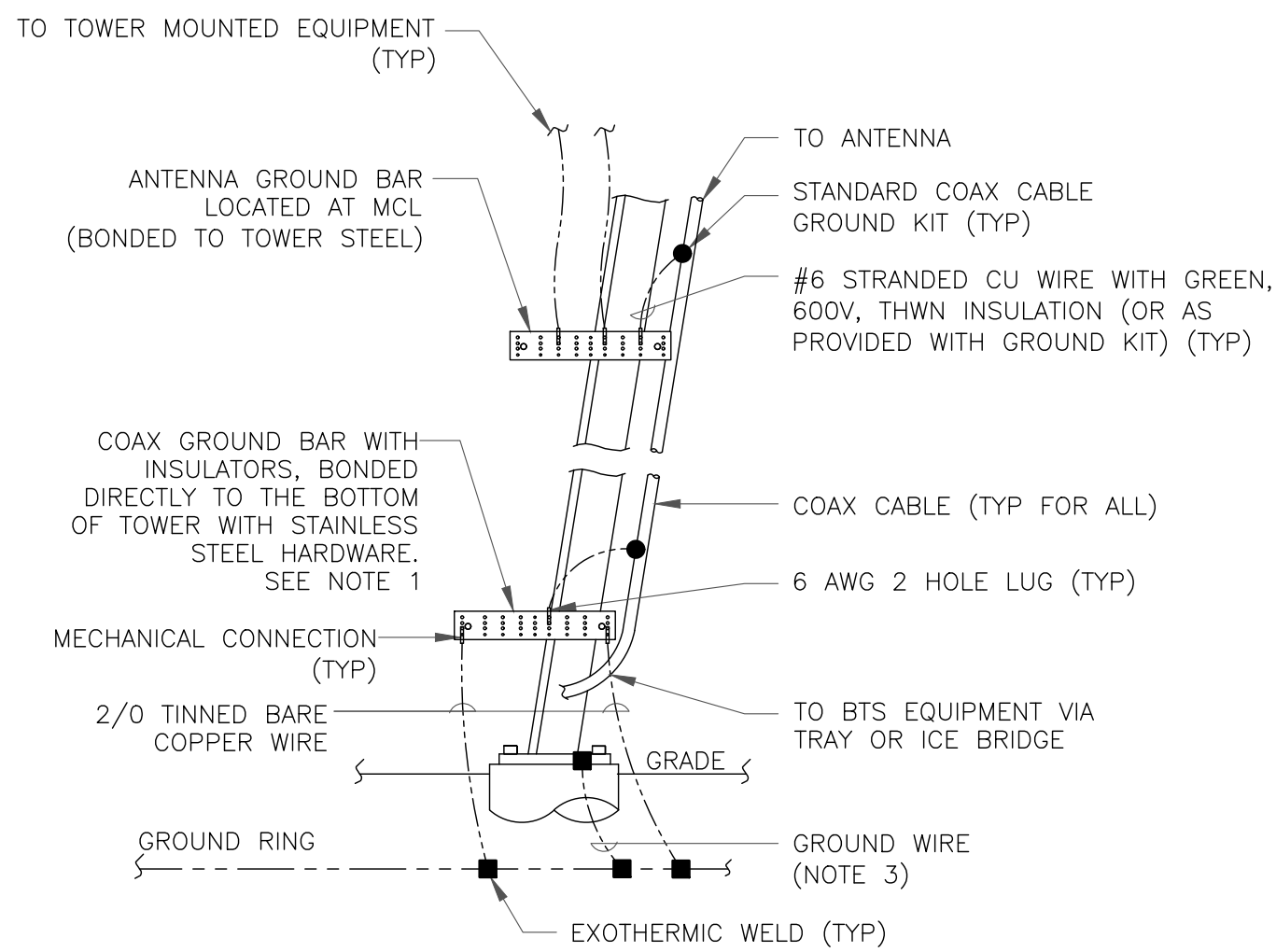


NOTES:

- GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL
- GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

3 INSPECTION WELL DETAIL

SCALE: NOT TO SCALE

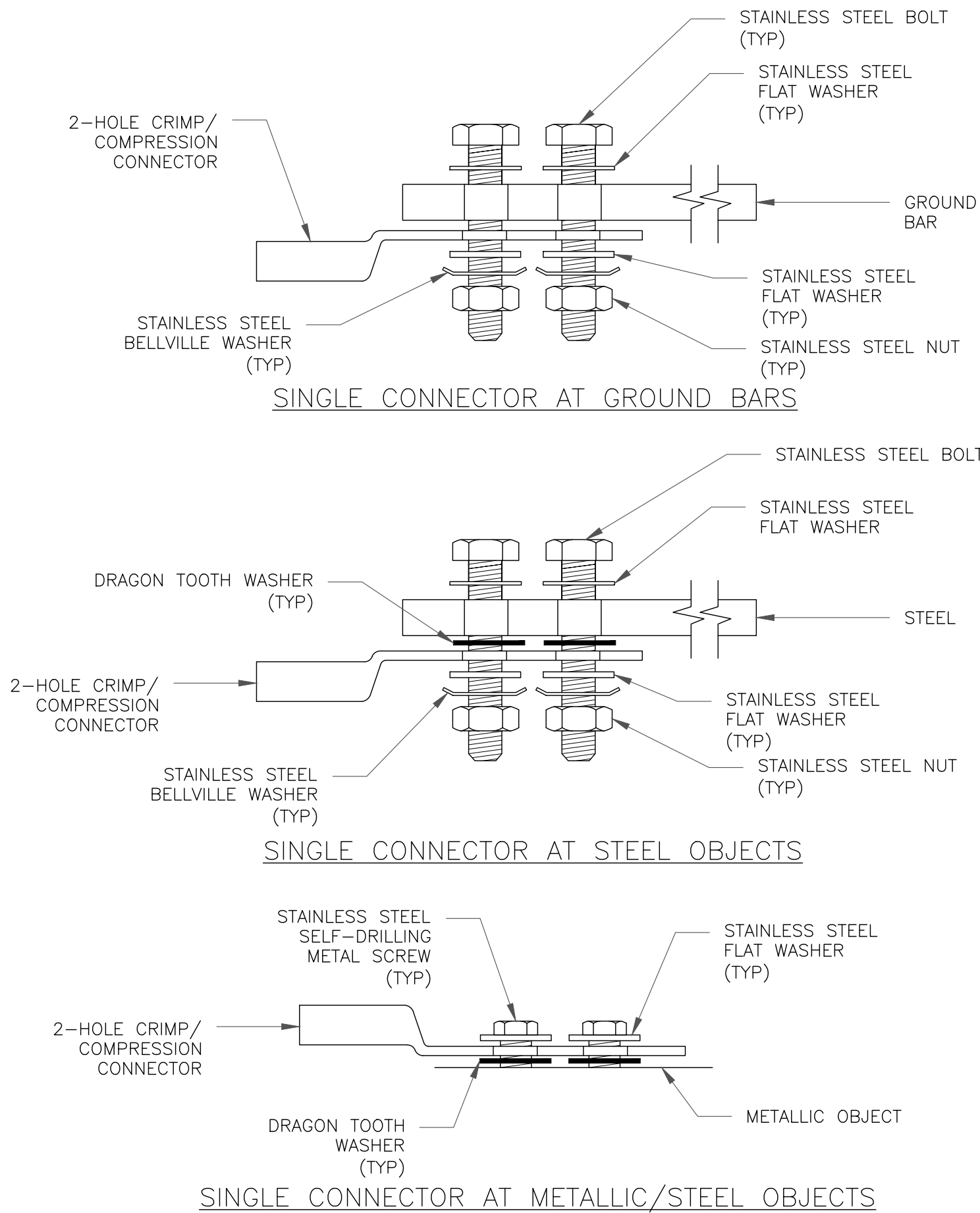


NOTES:

- NUMBER OF GROUNDING BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, ANTENNA LOCATIONS AND CONNECTION ORIENTATION. COAXIAL CABLES EXCEEDING 200 FEET ON THE TOWER SHALL HAVE GROUND KITS AT THE MIDPOINT. PROVIDE AS REQUIRED.
- ONLY MECHANICAL CONNECTIONS ARE ALLOWED TO BE MADE TO CROWN CASTLE USA INC. TOWERS. ALL MECHANICAL CONNECTIONS SHALL BE TREATED WITH AN ANTI-OXIDANT COATING.
- ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE RECOGNIZED EDITION OF ANSI/TIA 222 AND NFPA 780.

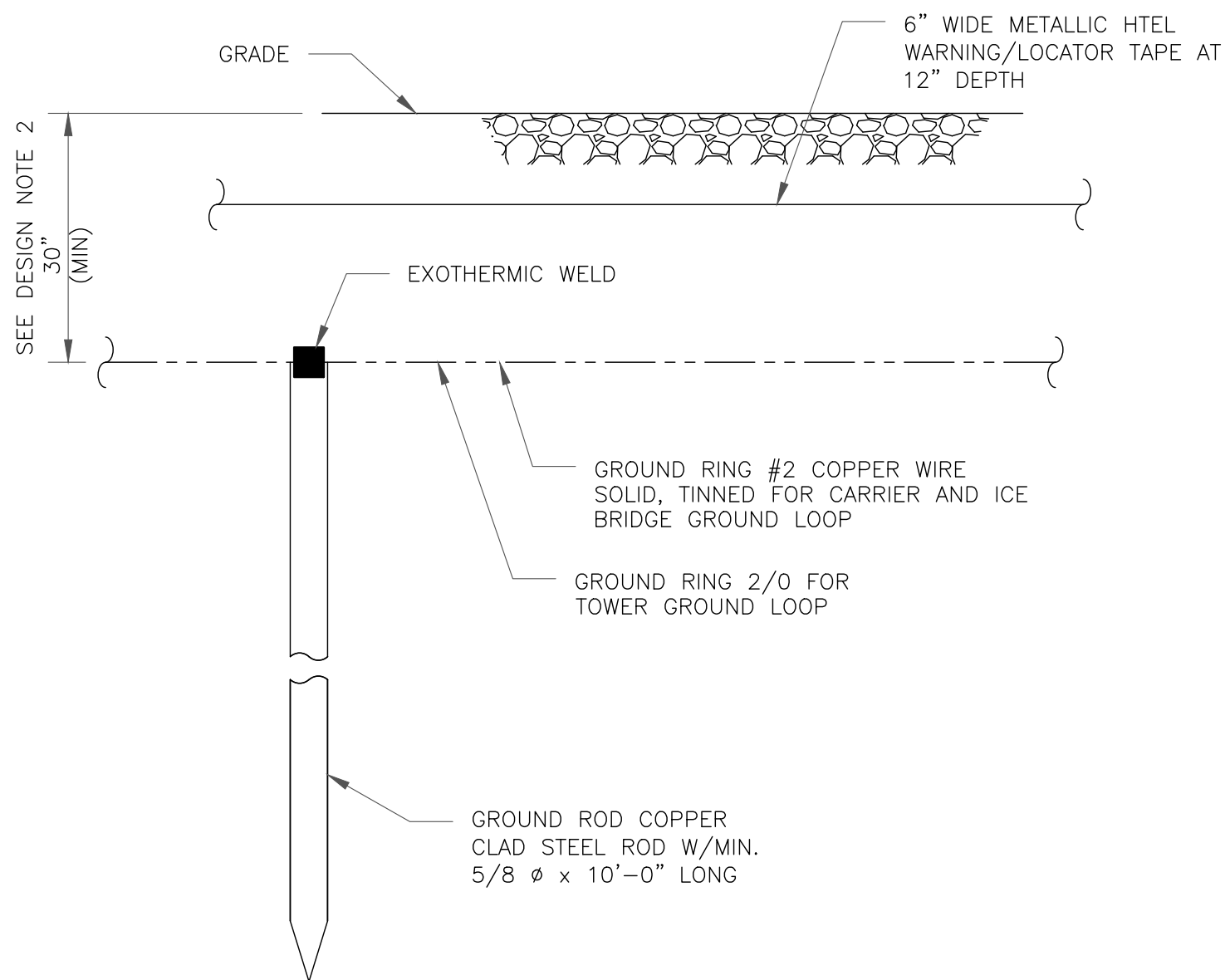
4 TYPICAL ANTENNA CABLE GROUNDING

SCALE: NOT TO SCALE



5 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS

SCALE: NOT TO SCALE



NOTES:

- GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL
- GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D)

6 GROUND ROD DETAIL

SCALE: NOT TO SCALE

T-Mobile

35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002

CROWN  
CASTLE

1200 MACARTHUR BLVD, SUITE 200  
MAHWAH, NJ 07430



TOWER  
ENGINEERING  
PROFESSIONALS

326 TRYON RD  
RALEIGH, NC 27603  
(919) 661-6351

TEP JOB #: 45443.498699

T-MOBILE SITE NUMBER:  
**CTHA808A**

BU #: **806387**  
HRT **088 943629**

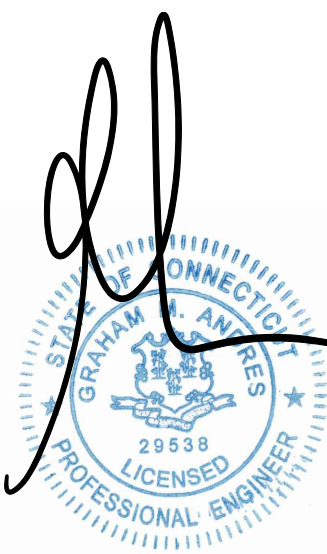
#14 ROUTE 80  
KILLINGWORTH, CT 06419

EXISTING 160'-0"  
SELF-SUPPORT

ISSUED FOR:

| REV | DATE     | DRWN | DESCRIPTION  | DES./QA |
|-----|----------|------|--------------|---------|
| A   | 03/02/21 | JW   | PRELIMINARY  | BSE     |
| 0   | 03/17/21 | JW   | CONSTRUCTION | BSE     |
|     |          |      |              |         |
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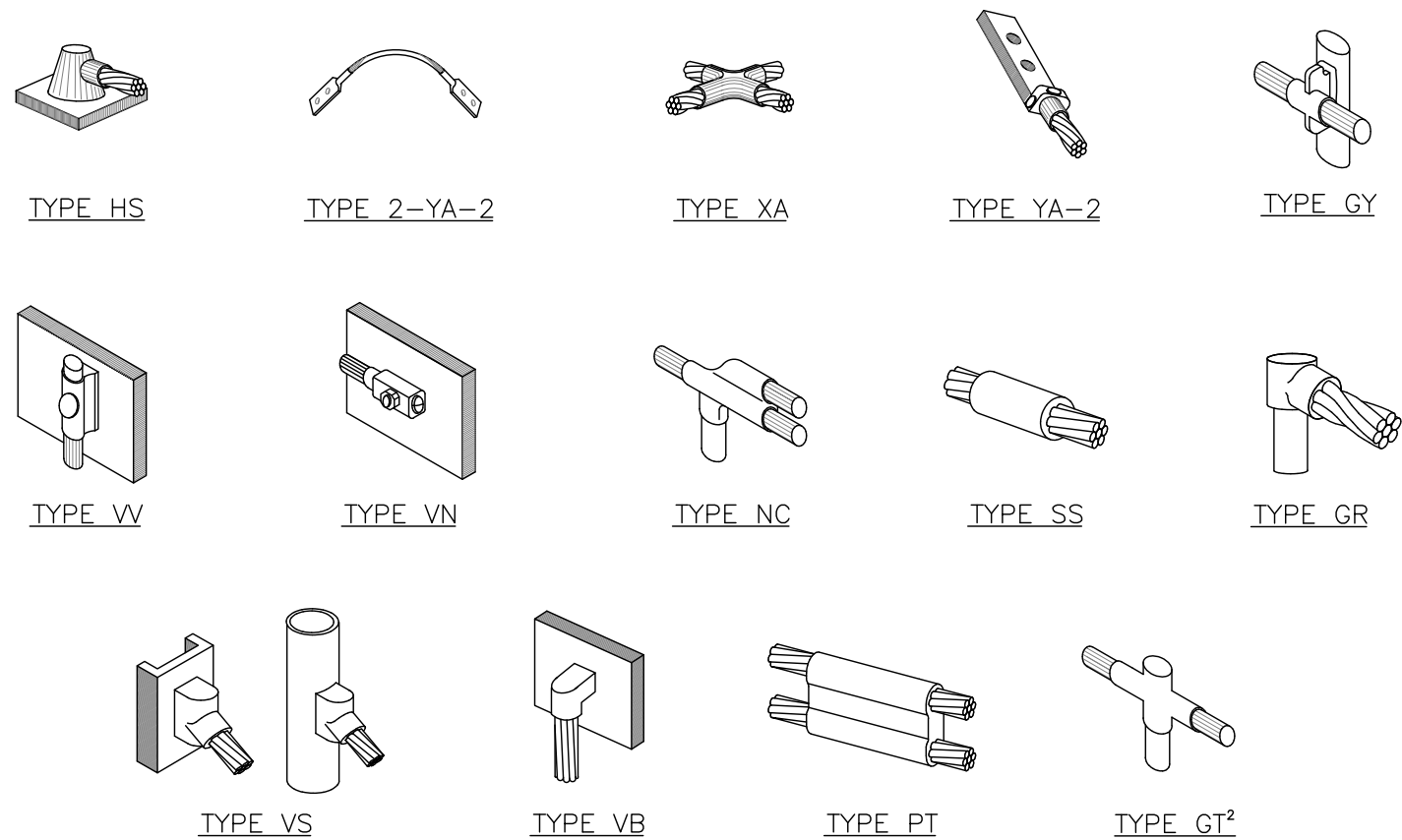
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REVISION:

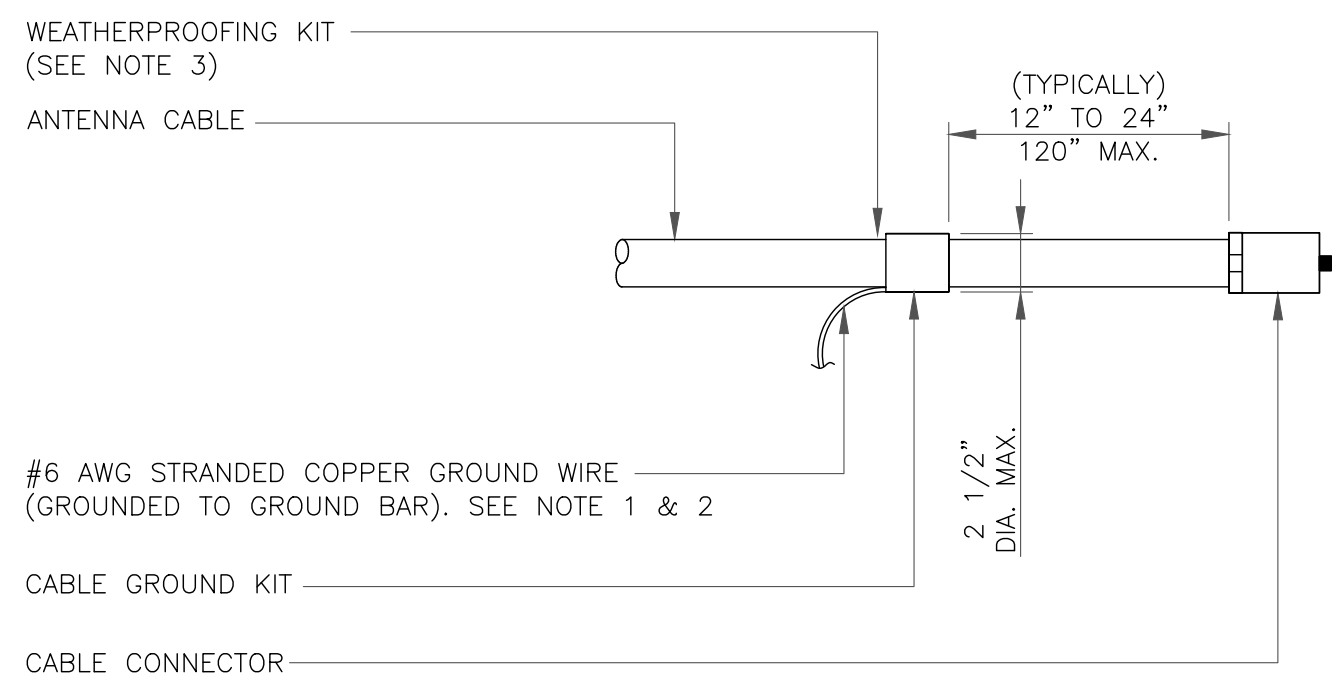
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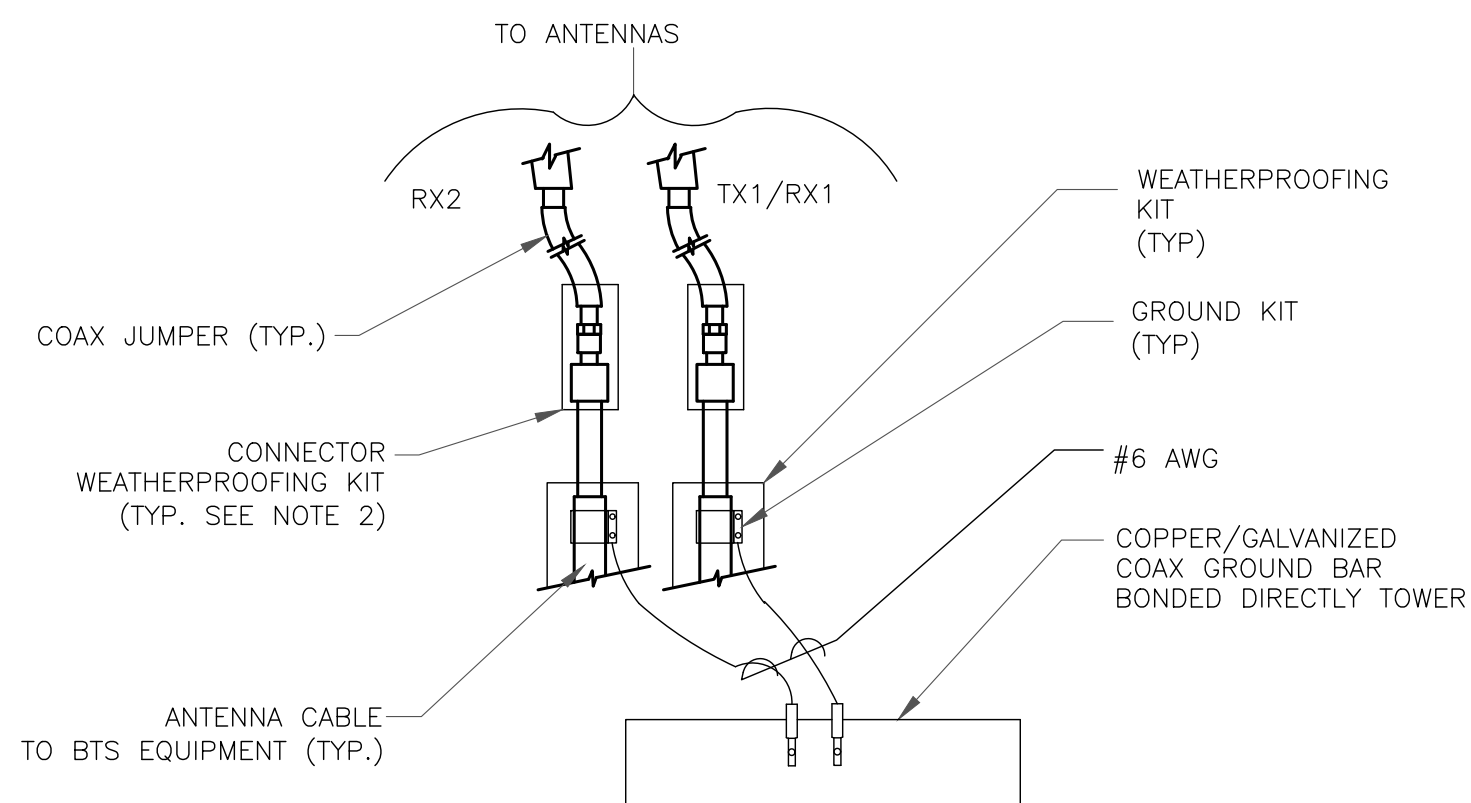
- NOTE:
1. ERICO EXOTHERMIC "MOLD TYPES" SHOWN HERE ARE EXAMPLES. CONSULT WITH CONSTRUCTION MANAGER FOR SPECIFIC MOLDS TO BE USED FOR THIS PROJECT.
  2. MOLD TYPE ONLY TO BE USED BELOW GRADE WHEN CONNECTING GROUND RING TO GROUND ROD.

### 1 CADWELD GROUNDING CONNECTIONS SCALE: NOT TO SCALE



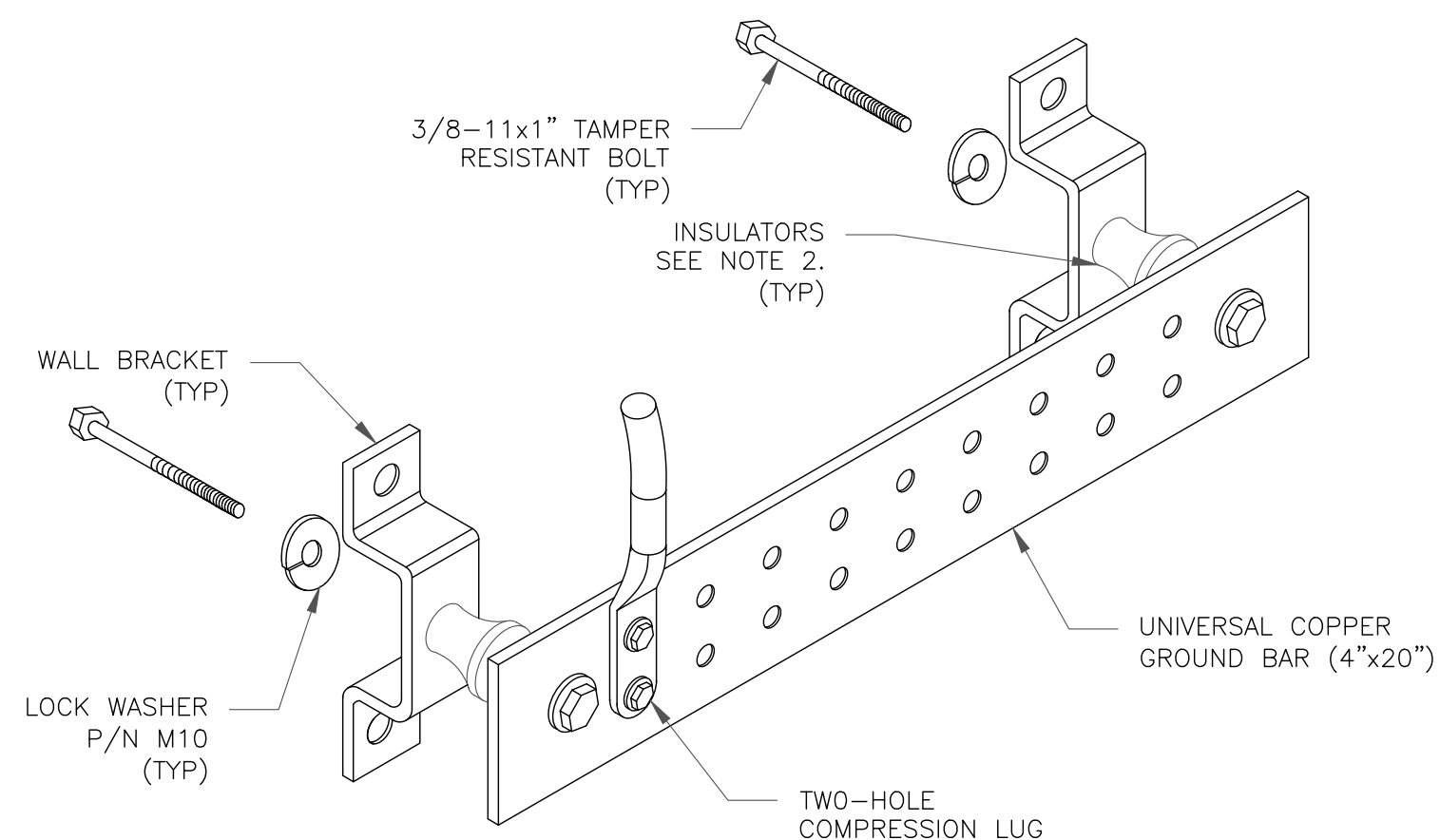
- NOTES:
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
  2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
  3. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

### 3 CABLE GROUND KIT CONNECTION SCALE: NOT TO SCALE



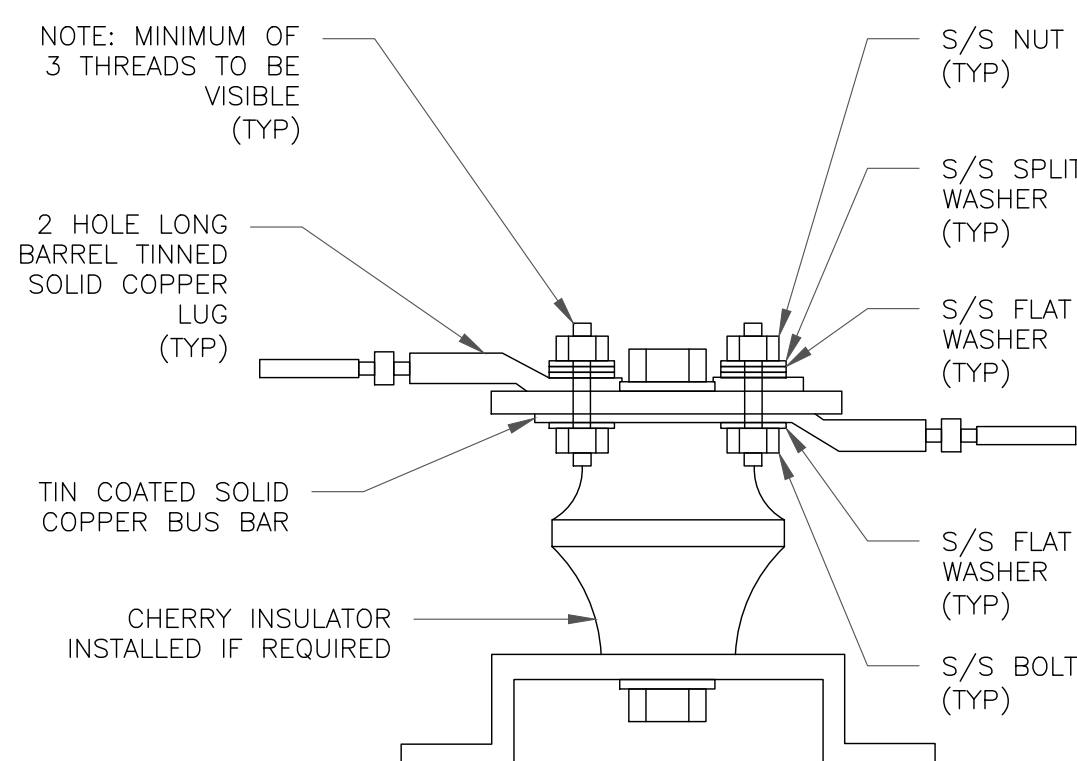
- NOTES:
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO ANTENNA GROUND BAR.
  2. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

### 4 GROUND CABLE CONNECTION SCALE: NOT TO SCALE



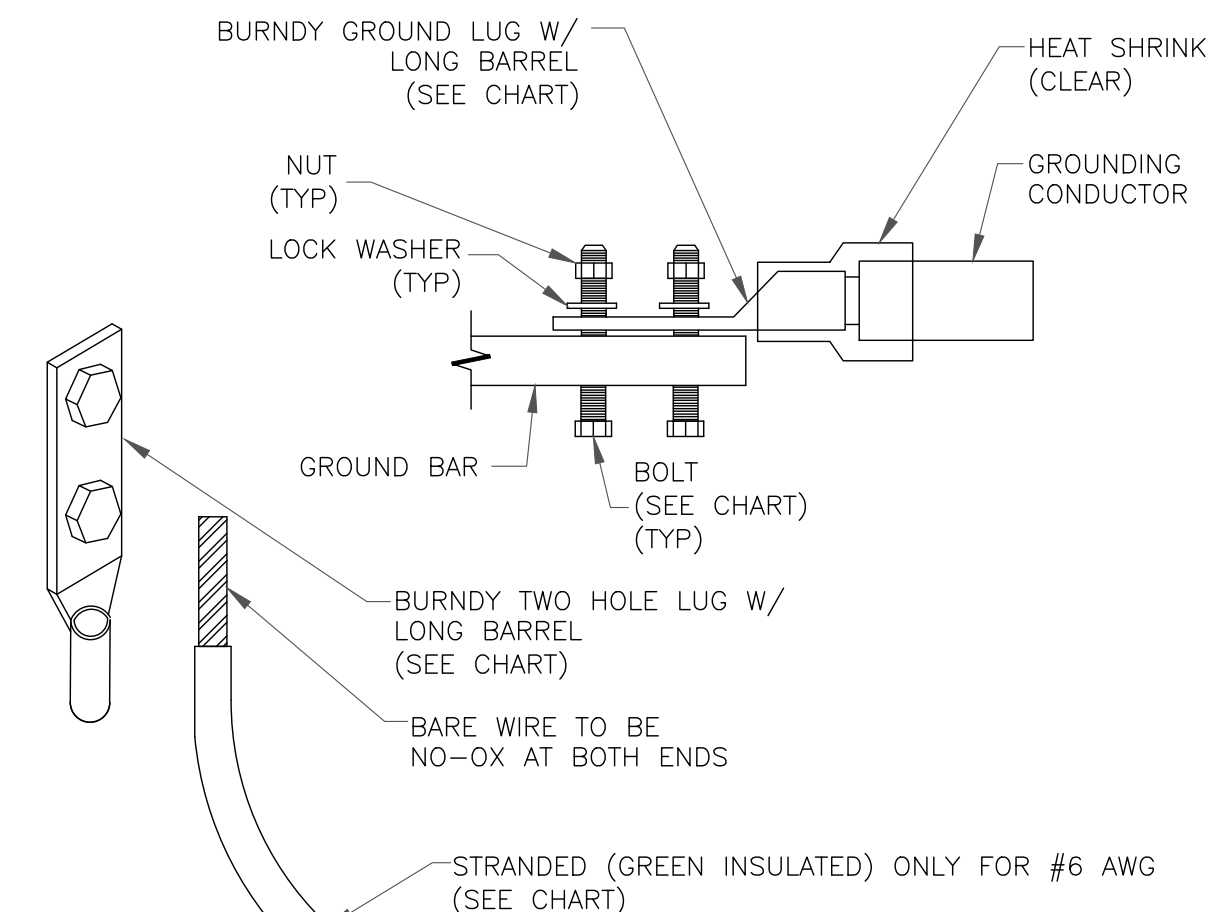
- NOTES:
1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE USA INC. TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, CAD-WELDING ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.
  2. OMIT INSULATOR WHEN MOUNTING TO TOWER STEEL OR PLATFORM STEEL. USE INSULATORS WHEN ATTACHING TO BUILDING OR SHELTERS.

### 6 GROUND BAR DETAIL SCALE: NOT TO SCALE



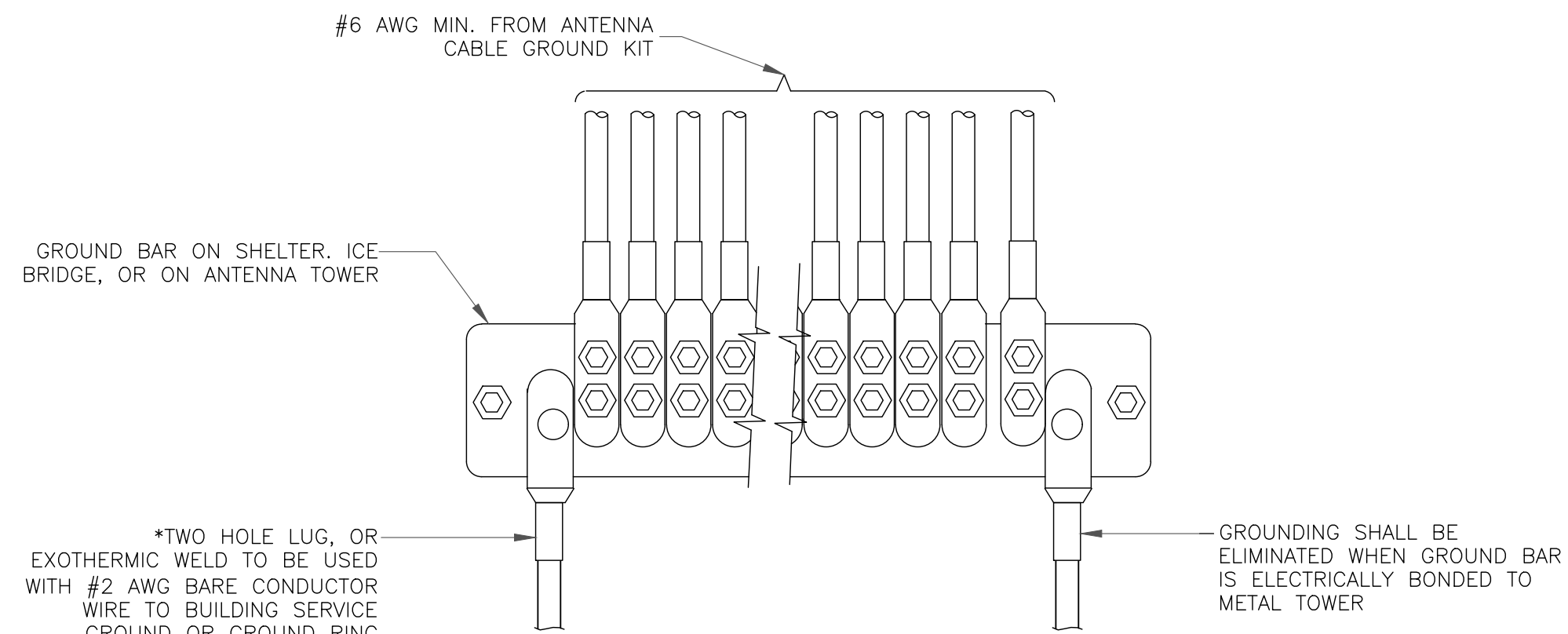
### 7 LUG DETAIL SCALE: NOT TO SCALE

| WIRE SIZE              | BURNDY LUG | BOLT SIZE             |
|------------------------|------------|-----------------------|
| #6 AWG GREEN INSULATED | YA6C-2TC38 | 3/8" - 16 NC S 2 BOLT |
| #2 AWG SOLID TINNED    | YA3C-2TC38 | 3/8" - 16 NC S 2 BOLT |
| #2 AWG STRANDED        | YA2C-2TC38 | 3/8" - 16 NC S 2 BOLT |
| #2/0 AWG STRANDED      | YA26-2TC38 | 3/8" - 16 NC S 2 BOLT |
| #4/0 AWG STRANDED      | YA28-2N    | 1/2" - 16 NC S 2 BOLT |

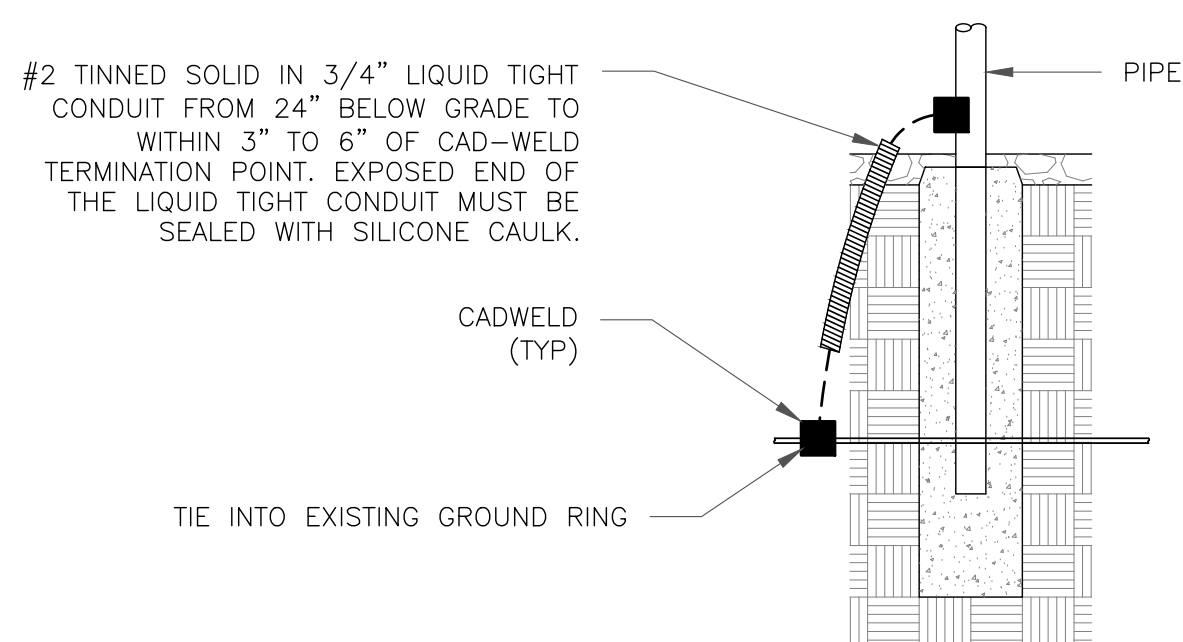


- NOTES:
1. ALL GROUNDING LUGS ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL HARDWARE BOLTS, NUTS, LOCK WASHERS SHALL BE STAINLESS STEEL. ALL HARDWARE ARE TO BE AS FOLLOWS: BOLT, FLAT WASHER, GROUND BAR, GROUND LUG, FLAT WASHER AND NUT.

### 2 MECHANICAL LUG CONNECTION SCALE: NOT TO SCALE



### 5 GROUNDWIRE INSTALLATION SCALE: NOT TO SCALE



### 8 TRANSITIONING GROUND DETAIL SCALE: NOT TO SCALE

T-Mobile

35 GRIFFIN ROAD  
BLOOMFIELD, CT 06002

CROWN  
CASTLE

1200 MACARTHUR BLVD, SUITE 200  
MAHWAH, NJ 07430



TOWER  
ENGINEERING  
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T-MOBILE SITE NUMBER:  
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BU #: 806387  
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#14 ROUTE 80  
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|     |          |      |              |         |
|     |          |      |              |         |

SEAL:



03/17/21

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REVISION:

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# Exhibit D

## **Structural Analysis Report**

Date: **February 8, 2021**



Tower Engineering Professionals  
326 Tryon Road  
Raleigh, NC 27603  
(919) 661-6351

**Subject: Structural Analysis Report**

|                                      |   |                |
|--------------------------------------|---|----------------|
| <b>Carrier Designation:</b>          | <b>Sprint PCS Co-Locate</b>                                   |                |
|                                      | <b>Site Number:</b>   | CTHA808A       |
|                                      | <b>Site Name:</b>   | CTHA808A       |
| <b>Crown Castle Designation:</b>     | <b>BU Number:</b>   | 806387         |
|                                      | <b>Site Name:</b>   | HRT 088 943629 |
|                                      | <b>JDE Job Number:</b>  | 628836         |
|                                      | <b>Work Order Number:</b>                                     | 1918901        |
|                                      | <b>Order Number:</b>  | 538771 Rev. 1  |
| <b>Engineering Firm Designation:</b> | <b>TEP Project Number:</b>                                    | 45443.495344   |
| <b>Site Data:</b>                    | <b>#14 Route 80, Killingworth, Middlesex County, CT 06419</b> |                |
|                                      | <b>Latitude 41° 21' 26.43", Longitude -72° 31' 11.83"</b>     |                |
|                                      | <b>160 Foot - Self-Supporting Tower</b>                       |                |

*Tower Engineering Professionals* is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above-mentioned tower.

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:

LC5: Proposed Equipment Configuration

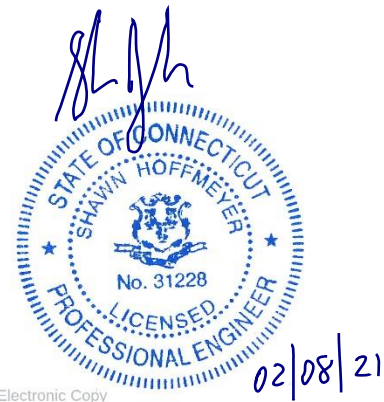
**Sufficient Capacity – 78.0%**

This analysis utilizes an ultimate 3-second gust wind speed of 130 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Andrew Nearing / SH

Respectfully submitted by:

Shawn Hoffmeyer, P.E.



Electronic Copy

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tnxTower Output

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Additional Calculations

## 1) INTRODUCTION

This tower is a 160-ft monopole tower designed by Rohn. The tower has been modified multiple times in the past to accommodate additional loading.

## 2) ANALYSIS CRITERIA

|                             |           |
|-----------------------------|-----------|
| <b>TIA-222 Revision:</b>    | TIA-222-H |
| <b>Risk Category:</b>       | II        |
| <b>Wind Speed:</b>          | 130 mph   |
| <b>Exposure Category:</b>   | B         |
| <b>Topographic Factor:</b>  | 1.0       |
| <b>Ice Thickness:</b>       | 1.5 in    |
| <b>Wind Speed with Ice:</b> | 50 mph    |
| <b>Service Wind Speed:</b>  | 60 mph    |

**Table 1 - Proposed Equipment Configuration**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model                          | Number of Feed Lines | Feed Line Size (in) |
|---------------------|----------------------------|--------------------|----------------------|--|----------------------|---------------------|
| 144.0               | 144.0                      | 3                  | RFS Celwave          | APX16DWV-16DWV-S-E-A20 w/ Mount Pipe   | 4                    | 1-5/8               |
|                     |                            | 3                  | RFS Celwave          | APXVAALL24_43-U-NA20_TMO w/ Mount Pipe |                      |                     |
|                     |                            | 3                  | Ericsson             | AIR6449 B41_T-MOBILE w/ Mount Pipe     |                      |                     |
|                     |                            | 3                  | Ericsson             | RADIO 4415 B66A_CCIV3                  |                      |                     |
|                     |                            | 3                  | Ericsson             | RADIO 4449 B71 B85A_T-MOBILE           |                      |                     |
|                     |                            | 3                  | Ericsson             | RADIO 4424 B25_TMO                     |                      |                     |
|                     |                            | 1                  | Tower Mounts         | Sector Mount [SM 506-3]                |                      |                     |
| 50.0                | 50.0                       | 1                  | Lucent               | KS24019-L112A                          | 1                    | 1/2                 |
|                     |                            | 1                  | Tower Mounts         | Side Arm Mount [SO 306-1]              |                      |                     |

**Table 2 - Other Considered Equipment**

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model               | Number of Feed Lines | Feed Line Size (in) |
|---------------------|----------------------------|--------------------|----------------------|-----------------------------|----------------------|---------------------|
| 157.0               | 157.0                      | 6                  | Antel                | LPA-80080/6CF w/ Mount Pipe | 1<br>8               | 1-5/8<br>7/8        |
|                     |                            | 6                  | Commscope            | JAHH-65B-R3B w/ Mount Pipe  |                      |                     |
|                     |                            | 3                  | Alcatel Lucent       | B66A RRRH4X45               |                      |                     |
|                     |                            | 3                  | Nokia                | AHCA                        |                      |                     |
|                     |                            | 1                  | Raycap               | RC3DC-3315-PF-48            |                      |                     |
|                     |                            | 3                  | Alcatel Lucent       | B13 RRRH 4X30               |                      |                     |
|                     |                            | 3                  | SitePro              | Sector Mount [VFA12-HD]     |                      |                     |

| Mounting Level (ft) | Center Line Elevation (ft) | Number of Antennas | Antenna Manufacturer   | Antenna Model                       | Number of Feed Lines | Feed Line Size (in) |
|---------------------|----------------------------|--------------------|------------------------|-------------------------------------|----------------------|---------------------|
| 118.0               | 118.0                      | 12                 | Decibel                | DB844H90E-XY w/ Mount Pipe          | --                   | --                  |
|                     |                            | 1                  | Tower Mounts           | Sector Mount [SM 201-3]             |                      |                     |
|                     |                            | 1                  | Tower Mounts           | Pipe Mount [PM 601-3]               |                      |                     |
| 109.0               | 115.0                      | 1                  | Celwave                | PD1110                              | 1                    | 1-1/4               |
|                     | 109.0                      | 1                  | Tower Mounts           | Side Arm Mount [SO 308-1]           |                      |                     |
| 90.0                | 90.0                       | 6                  | Powerwave Technologies | 7770.00 w/ Mount Pipe               | 12<br>2<br>1         | 7/8<br>7/16<br>3/8  |
|                     |                            | 2                  | KMW Comm.              | AM-X-CD-16-65-00T-RET w/ Mount Pipe |                      |                     |
|                     |                            | 1                  | Powerwave Technologies | P45-16-XLH-RR w/ Mount Pipe         |                      |                     |
|                     |                            | 12                 | Powerwave Technologies | LGP21401                            |                      |                     |
|                     |                            | 6                  | Ericsson               | RRUS-11                             |                      |                     |
|                     |                            | 1                  | Raycap                 | DC6-48-60-18-8F                     |                      |                     |
|                     |                            | 1                  | Tower Mounts           | Sector Mount [SM 104-3]             |                      |                     |

### 3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

| Document                     | Reference | Source   |
|------------------------------|-----------|----------|
| Geotechnical Report          | 1237256   | CCISites |
| Tower Foundation Drawings    | 821498    | CCISites |
| Tower Manufacturer Drawings  | 2281721   | CCISites |
| Tower Reinforcement Drawings | 2221086   | CCISites |
| Post-Modification Inspection | 1296500   | CCISites |
| Tower Reinforcement Drawings | 2340021   | CCISites |
| Post-Modification Inspection | 2450760   | CCISites |
| Tower Reinforcement Drawings | 7235023   | CCISites |
| Post-Modification Inspection | 8150390   | CCISites |

#### 3.1) Analysis Method

tnxTower (version 8.0.7.5), 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. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 Standard.

### 3.2) Assumptions

- 1) The tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2, and the referenced drawings.

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

## 4) ANALYSIS RESULTS

**Table 4 - Section Capacity (Summary)**

| Section No. | Elevation (ft) | Component Type | Size                             | Critical Element | P (kips) | $\Phi P_{allow}$ (kips) | % Capacity       | Pass / Fail |
|-------------|----------------|----------------|----------------------------------|------------------|----------|-------------------------|------------------|-------------|
| T1          | 160 - 156      | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 3                | -3.42    | 49.90                   | 6.9              | Pass        |
| T2          | 156 - 152      | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 15               | -4.23    | 52.40                   | 8.1              | Pass        |
| T3          | 152 - 148      | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 24               | -7.19    | 52.40                   | 13.7             | Pass        |
| T4          | 148 - 144      | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 33               | -10.33   | 52.40                   | 19.7             | Pass        |
| T5          | 144 - 140      | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 42               | -17.31   | 52.40                   | 33.0             | Pass        |
| T6          | 140 - 120      | Leg            | Rohn 2.875" x 0.276" (2.5 EH)    | 49               | -49.60   | 78.15                   | 63.5             | Pass        |
| T7          | 120 - 100      | Leg            | ROHN 3 EH                        | 79               | -77.30   | 99.06                   | 78.0             | Pass        |
| T8          | 100 - 80       | Leg            | Rohn 4" x 0.318" (3.5 EH) (GR)   | 100              | -104.94  | 155.70                  | 67.4             | Pass        |
| T9          | 80 - 60        | Leg            | ROHN 4 EH (GR)                   | 121              | -132.14  | 202.56                  | 65.2             | Pass        |
| T10         | 60 - 40        | Leg            | Rohn 5.563" x 0.375" (5 EH) (GR) | 142              | -155.68  | 259.31                  | 60.0             | Pass        |
| T11         | 40 - 20        | Leg            | Rohn 5.563" x 0.375" (5 EH) (GR) | 157              | -179.76  | 259.29                  | 69.3             | Pass        |
| T12         | 20 - 0         | Leg            | Rohn 6.625" x 0.432" (6 EH) (GR) | 172              | -203.21  | 400.17                  | 50.8             | Pass        |
| T1          | 160 - 156      | Diagonal       | L 1.5 x 1.5 x 1/8                | 9                | -0.64    | 5.80                    | 11.0<br>17.0 (b) | Pass        |
| T2          | 156 - 152      | Diagonal       | L 1.5 x 1.5 x 1/8                | 19               | -1.85    | 5.79                    | 32.0<br>51.2 (b) | Pass        |
| T3          | 152 - 148      | Diagonal       | L 1.5 x 1.5 x 1/8                | 27               | -1.81    | 5.78                    | 31.4<br>48.8 (b) | Pass        |
| T4          | 148 - 144      | Diagonal       | L 1.5 x 1.5 x 1/8                | 37               | -1.96    | 5.77                    | 34.1<br>54.9 (b) | Pass        |
| T5          | 144 - 140      | Diagonal       | L 2 x 2 x 1/4                    | 45               | -4.70    | 24.24                   | 19.4<br>58.2 (b) | Pass        |
| T6          | 140 - 120      | Diagonal       | 2L 1.5 x 1.5 x 1/8 (3/16)        | 57               | -3.72    | 14.33                   | 26.0<br>63.1 (b) | Pass        |
| T7          | 120 - 100      | Diagonal       | 2L 2 x 2 x 3/16 (3/16)           | 84               | -4.60    | 30.02                   | 15.3<br>58.8 (b) | Pass        |
| T8          | 100 - 80       | Diagonal       | 2L 2.5 x 2.5 x 3/16 (3/16)       | 103              | -5.56    | 40.83                   | 13.6<br>41.7 (b) | Pass        |
| T9          | 80 - 60        | Diagonal       | 2L 3 x 3 x 3/16 (1/4)            | 124              | -5.57    | 49.16                   | 11.3<br>42.1 (b) | Pass        |
| T10         | 60 - 40        | Diagonal       | 2L 3 x 3 x 3/16 (1/4)            | 145              | -6.52    | 37.89                   | 17.2<br>40.1 (b) | Pass        |
| T11         | 40 - 20        | Diagonal       | 2L 3 x 3 x 1/4 (1/4)             | 161              | -6.50    | 44.49                   | 14.6<br>40.0 (b) | Pass        |
| T12         | 20 - 0         | Diagonal       | 2L 3.5 x 3.5 x 1/4 (1/4)         | 175              | -7.27    | 57.93                   | 12.5<br>43.6 (b) | Pass        |
| T1          | 160 - 156      | Top Girt       | L 2 x 2 x 1/8                    | 4                | -0.28    | 4.27                    | 6.6              | Pass        |
| T6          | 140 - 120      | Top Girt       | L 2 x 2 x 1/8                    | 52               | -0.67    | 4.27                    | 15.6             | Pass        |



| Section No. | Elevation (ft) | Component Type | Size | Critical Element | P (kips) | $\phi P_{allow}$ (kips) | % Capacity  | Pass / Fail |
|-------------|----------------|----------------|------|------------------|----------|-------------------------|-------------|-------------|
|             |                |                |      |                  |          |                         | 17.1 (b)    |             |
|             |                |                |      |                  |          |                         | Summary     |             |
|             |                |                |      |                  |          | Leg (T7)                | 78.0        | Pass        |
|             |                |                |      |                  |          | Diagonal (T6)           | 63.1        | Pass        |
|             |                |                |      |                  |          | Top Girt (T6)           | 17.1        | Pass        |
|             |                |                |      |                  |          | Bolt Checks             | 63.1        | Pass        |
|             |                |                |      |                  |          | <b>RATING =</b>         | <b>78.0</b> | <b>Pass</b> |

**Table 5 - Tower Component Stresses vs. Capacity - LC5**

| Notes | Component                        | Elevation (ft) | % Capacity | Pass / Fail |
|-------|----------------------------------|----------------|------------|-------------|
| 1,2   | Anchor Rods                      | --             | 27.1       | Pass        |
| 1,2   | Base Foundation Soil Interaction | --             | 56.8       | Pass        |
| 1,2   | Base Foundation Structural       | --             | 30.4       | Pass        |

|   |              |
|---|--------------|
| <b>Structure Rating (max from all components) =</b> | <b>78.0%</b> |
|---|--------------|

Notes:

- 1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.
- 2) Rating per TIA-222-H Section 15.5

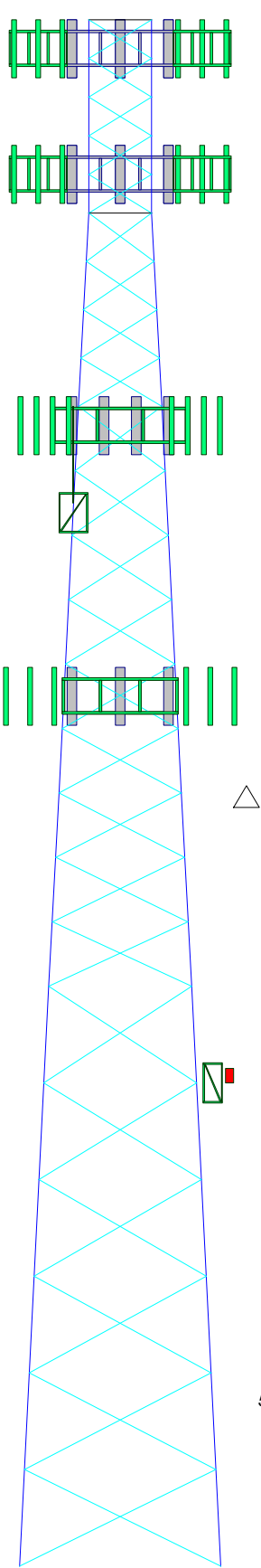
#### 4.1) Recommendations

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

## **APPENDIX A**

### **TNXTOWER OUTPUT**

|                 |                          |                                  |                       |                                |                        |                               |                             |        |        |        |        |        |
|-----------------|--------------------------|----------------------------------|-----------------------|--------------------------------|------------------------|-------------------------------|-----------------------------|--------|--------|--------|--------|--------|
| Section         | T12                      | T11                              | T10                   | T9                             | T8                     | T7                            | T6                          | T5     | T4     | T3     | T2     | T1     |
| Legs            | A                        | Rohn 5.563" x 0.375" (5 EH) (GR) | ROHN 4 EH (GR)        | Rohn 4" x 0.318" (3.5 EH) (GR) | ROHN 3 EH              | Rohn 2.875" x 0.276" (2.5 EH) | Rohn 2.375" x 0.218" (2 EH) |        |        |        |        |        |
| Leg Grade       |                          |                                  |                       |                                |                        |                               |                             |        |        |        |        |        |
| Diagonals       | 2L 3.5 x 3.5 x 1/4 (1/4) | 2L 3 x 3 x 1/4 (1/4)             | 2L 3 x 3 x 3/16 (1/4) | 2L 2.5 x 2.5 x 3/16 (3/16)     | 2L 2 x 2 x 3/16 (3/16) | 2L 1.5 x 1.5 x 1/8 (3/16)     | 2L 1.5 x 1.5 x 1/8          |        |        |        |        |        |
| Diagonal Grade  |                          |                                  |                       |                                |                        |                               |                             |        |        |        |        |        |
| Top Girts       |                          |                                  |                       |                                |                        |                               |                             |        |        |        |        |        |
| Face Width (ft) | 20.8646                  | 18.9542                          | 16.7708               | 14.7708                        | 12.6771                | 10.6354                       | 8.60417                     | 6.5625 | 5.5416 | 4.5833 | 3.5376 | 2.5297 |
| # Panels @ (ft) |                          | 6 @ 10                           |                       |                                |                        | 9 @ 6.66667                   |                             | 4 @ 5  |        | 5 @ 4  |        |        |
| Weight (K)      | 25.6                     | 6.6                              | 4.9                   | 4.2                            | 3.7                    | 2.8                           | 1.6                         | 1.0    | 0.2    | 0.1    | 0.1    | 0.2    |

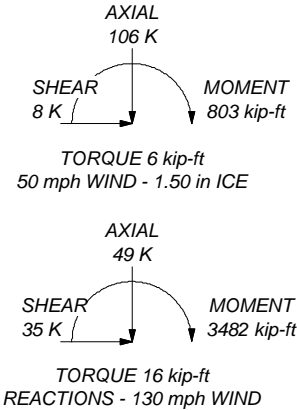


ALL REACTIONS  
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:

DOWN: 209 K  
SHEAR: 23 K

UPLIFT: -172 K  
SHEAR: 19 K



### SYMBOL LIST


| MARK | SIZE                             | MARK | SIZE          |
|------|----------------------------------|------|---------------|
| A    | Rohn 6.625" x 0.432" (6 EH) (GR) | C    | A529-50       |
| B    | L 2 x 2 x 1/4                    | D    | L 2 x 2 x 1/8 |

### MATERIAL STRENGTH

| GRADE   | Fy     | Fu     | GRADE   | Fy     | Fu     |
|---------|--------|--------|---------|--------|--------|
| A572-50 | 50 ksi | 65 ksi | A529-50 | 50 ksi | 65 ksi |
| A36     | 36 ksi | 58 ksi |         |        |        |

### TOWER DESIGN NOTES

- Tower is located in Middlesex County, Connecticut.
- Tower designed for Exposure B to the TIA-222-H Standard.
- Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
- Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
- Deflections are based upon a 60 mph wind.
- Tower Risk Category II.
- Topographic Category 1 with Crest Height of 0.00 ft
- Grouted pipe f'c is 7 ksi
- TOWER RATING: 78%



Tower Engineering Professionals

**Tower Engineering Professionals**

326 Tryon Road  
Raleigh, NC 27603  
Phone: (919) 661-6351  
FAX: (919) 661-6350

Job: **HRT 088 943629 (BU 806387)**

Project: **TEP No. 45443.495344**

|  |                |             |
|--|----------------|-------------|
| Client: Crown Castle   | Drawn by: AN   | App'd:      |
| Code: TIA-222-H  | Date: 02/08/21 | Scale: NTS  |
| Path: C:\tower\engineering\Drawings\45443P-251573_L-495344_806387_HRT 088 943629_Structural Analysis\DrawTower\806387_1918901_LC.dwg |                | Dwg No. E-1 |

|  |  |                                  |
|--|--|----------------------------------|
| <b>tnxTower</b><br><br><b>Tower Engineering Professionals</b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b><br>HRT 088 943629 (BU 806387) | <b>Page</b><br>1 of 20           |
|  | <b>Project</b><br>TEP No. 45443.495344   | <b>Date</b><br>13:07:16 02/08/21 |
|  | <b>Client</b><br>Crown Castle            | <b>Designed by</b><br>AN         |

## Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 6.52 ft at the top and 20.86 ft at the base.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

Tower is located in Middlesex County, Connecticut.

Tower base elevation above sea level: 417.00 ft.

Basic wind speed of 130 mph.

Risk Category II.

Exposure Category B.

Simplified Topographic Factor Procedure for wind speed-up calculations is used.

Topographic Category: 1.

Crest Height: 0.00 ft.

Nominal ice thickness of 1.50 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Deflections calculated using a wind speed of 60 mph.

A non-linear (P-delta) analysis was used.

Grouted pipe  $f'_c$  is 7 ksi.

Pressures are calculated at each section.

Tower analysis based on target reliabilities in accordance with Annex S.

Load Modification Factors used:  $K_{es}(F_w) = 0.95$ ,  $K_{es}(t_i) = 0.85$ .

Stress ratio used in tower member design is 1.05.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

|                                     |                                      |   |
|-------------------------------------|--------------------------------------|---|
| Consider Moments - Legs             | Distribute Leg Loads As Uniform      | Use ASCE 10 X-Brace Ly Rules              |
| Consider Moments - Horizontals      | Assume Legs Pinned                   | √ Calculate Redundant Bracing Forces      |
| Consider Moments - Diagonals        | √ Assume Rigid Index Plate           | Ignore Redundant Members in FEA           |
| Use Moment Magnification            | √ Use Clear Spans For Wind Area      | √ SR Leg Bolts Resist Compression         |
| Use Code Stress Ratios              | √ Use Clear Spans For KL/r           | All Leg Panels Have Same Allowable        |
| √ Use Code Safety Factors - Guys    | √ Retension Guys To Initial Tension  | Offset Girt At Foundation                 |
| Escalate Ice                        | √ Bypass Mast Stability Checks       | √ Consider Feed Line Torque               |
| Always Use Max Kz                   | √ Use Azimuth Dish Coefficients      | √ Include Angle Block Shear Check         |
| Use Special Wind Profile            | √ Project Wind Area of Appurt.       | Use TIA-222-H Bracing Resist. Exemption   |
| √ Include Bolts In Member Capacity  | Autocalc Torque Arm Areas            | Use TIA-222-H Tension Splice Exemption    |
| Leg Bolts Are At Top Of Section     | Add IBC .6D+W Combination            | Poles                                     |
| √ Secondary Horizontal Braces Leg   | √ Sort Capacity Reports By Component | Include Shear-Torsion Interaction         |
| Use Diamond Inner Bracing (4 Sided) | Triangulate Diamond Inner Bracing    | Always Use Sub-Critical Flow              |
| SR Members Have Cut Ends            | Treat Feed Line Bundles As Cylinder  | Use Top Mounted Sockets                   |
| SR Members Are Concentric           | Ignore KL/ry For 60 Deg. Angle Legs  | Pole Without Linear Attachments           |
|                                     |                                      | Pole With Shroud Or No Appurtenances      |
|                                     |                                      | Outside and Inside Corner Radii Are Known |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b>     | HRT 088 943629 (BU 806387) | <b>Page</b>        | 2 of 20           |
|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

### Tower Section Geometry

| <i>Tower Section</i> | <i>Tower Elevation</i> | <i>Assembly Database</i> | <i>Description</i> | <i>Section Width</i> | <i>Number of Sections</i> | <i>Section Length</i> |
|----------------------|------------------------|--------------------------|--------------------|----------------------|---------------------------|-----------------------|
|                      | <i>ft</i>              |                          |                    | <i>ft</i>            |                           | <i>ft</i>             |
| T1                   | 160.00-156.00          |                          |                    | 6.52                 | 1                         | 4.00                  |
| T2                   | 156.00-152.00          |                          |                    | 6.53                 | 1                         | 4.00                  |
| T3                   | 152.00-148.00          |                          |                    | 6.54                 | 1                         | 4.00                  |
| T4                   | 148.00-144.00          |                          |                    | 6.55                 | 1                         | 4.00                  |
| T5                   | 144.00-140.00          |                          |                    | 6.55                 | 1                         | 4.00                  |
| T6                   | 140.00-120.00          |                          |                    | 6.56                 | 1                         | 20.00                 |
| T7                   | 120.00-100.00          |                          |                    | 8.60                 | 1                         | 20.00                 |
| T8                   | 100.00-80.00           |                          |                    | 10.64                | 1                         | 20.00                 |
| T9                   | 80.00-60.00            |                          |                    | 12.68                | 1                         | 20.00                 |
| T10                  | 60.00-40.00            |                          |                    | 14.77                | 1                         | 20.00                 |
| T11                  | 40.00-20.00            |                          |                    | 16.77                | 1                         | 20.00                 |
| T12                  | 20.00-0.00             |                          |                    | 18.85                | 1                         | 20.00                 |

### Tower Section Geometry (cont'd)

| <i>Tower Section</i> | <i>Tower Elevation</i> | <i>Diagonal Spacing</i> | <i>Bracing Type</i> | <i>Has K Brace End Panels</i> | <i>Has Horizontals</i> | <i>Top Girt Offset</i> | <i>Bottom Girt Offset</i> |
|----------------------|------------------------|-------------------------|---------------------|-------------------------------|------------------------|------------------------|---------------------------|
|                      | <i>ft</i>              | <i>ft</i>               |                     |                               |                        | <i>in</i>              | <i>in</i>                 |
| T1                   | 160.00-156.00          | 4.00                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T2                   | 156.00-152.00          | 4.00                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T3                   | 152.00-148.00          | 4.00                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T4                   | 148.00-144.00          | 4.00                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T5                   | 144.00-140.00          | 4.00                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T6                   | 140.00-120.00          | 5.00                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T7                   | 120.00-100.00          | 6.67                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T8                   | 100.00-80.00           | 6.67                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T9                   | 80.00-60.00            | 6.67                    | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T10                  | 60.00-40.00            | 10.00                   | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T11                  | 40.00-20.00            | 10.00                   | X Brace             | No                            | No                     | 0.00                   | 0.00                      |
| T12                  | 20.00-0.00             | 10.00                   | X Brace             | No                            | No                     | 0.00                   | 0.00                      |

### Tower Section Geometry (cont'd)

| <i>Tower Elevation</i> | <i>Leg Type</i> | <i>Leg Size</i>               | <i>Leg Grade</i> | <i>Diagonal Type</i> | <i>Diagonal Size</i>      | <i>Diagonal Grade</i> |
|------------------------|-----------------|-------------------------------|------------------|----------------------|---------------------------|-----------------------|
| <i>ft</i>              |                 |                               |                  |                      |                           |                       |
| T1 160.00-156.00       | Pipe            | Rohn 2.375" x 0.218" (2 EH)   | A572-50 (50 ksi) | Single Angle         | L 1.5 x 1.5 x 1/8         | A36 (36 ksi)          |
| T2 156.00-152.00       | Pipe            | Rohn 2.375" x 0.218" (2 EH)   | A572-50 (50 ksi) | Single Angle         | L 1.5 x 1.5 x 1/8         | A36 (36 ksi)          |
| T3 152.00-148.00       | Pipe            | Rohn 2.375" x 0.218" (2 EH)   | A572-50 (50 ksi) | Single Angle         | L 1.5 x 1.5 x 1/8         | A36 (36 ksi)          |
| T4 148.00-144.00       | Pipe            | Rohn 2.375" x 0.218" (2 EH)   | A572-50 (50 ksi) | Single Angle         | L 1.5 x 1.5 x 1/8         | A36 (36 ksi)          |
| T5 144.00-140.00       | Pipe            | Rohn 2.375" x 0.218" (2 EH)   | A572-50 (50 ksi) | Single Angle         | L 2 x 2 x 1/4             | A529-50 (50 ksi)      |
| T6 140.00-120.00       | Pipe            | Rohn 2.875" x 0.276" (2.5 EH) | A572-50 (50 ksi) | Double Angle         | 2L 1.5 x 1.5 x 1/8 (3/16) | A36 (36 ksi)          |
| T7 120.00-100.00       | Pipe            | ROHN 3 EH                     | A572-50          | Double Angle         | 2L 2 x 2 x 3/16 (3/16)    | A36                   |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b>     | HRT 088 943629 (BU 806387) | <b>Page</b>        | 3 of 20           |
|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| <i>Tower Elevation<br/>ft</i> | <i>Leg Type</i> | <i>Leg Size</i>             | <i>Leg Grade</i>    | <i>Diagonal Type</i> | <i>Diagonal Size</i>       | <i>Diagonal Grade</i> |
|-------------------------------|-----------------|-----------------------------|---------------------|----------------------|----------------------------|-----------------------|
| T8 100.00-80.00               | Grouted Pipe    | Rohn 4" x 0.318" (3.5 EH)   | (50 ksi)<br>A572-50 | Double Angle         | 2L 2.5 x 2.5 x 3/16 (3/16) | (36 ksi)<br>A36       |
| T9 80.00-60.00                | Grouted Pipe    | ROHN 4 EH                   | (50 ksi)<br>A572-50 | Double Angle         | 2L 3 x 3 x 3/16 (1/4)      | (36 ksi)<br>A36       |
| T10 60.00-40.00               | Grouted Pipe    | Rohn 5.563" x 0.375" (5 EH) | (50 ksi)<br>A572-50 | Double Angle         | 2L 3 x 3 x 3/16 (1/4)      | (36 ksi)<br>A36       |
| T11 40.00-20.00               | Grouted Pipe    | Rohn 5.563" x 0.375" (5 EH) | (50 ksi)<br>A572-50 | Double Angle         | 2L 3 x 3 x 1/4 (1/4)       | (36 ksi)<br>A36       |
| T12 20.00-0.00                | Grouted Pipe    | Rohn 6.625" x 0.432" (6 EH) | (50 ksi)<br>A572-50 | Double Angle         | 2L 3.5 x 3.5 x 1/4 (1/4)   | (36 ksi)<br>A36       |

### Tower Section Geometry (cont'd)

| <i>Tower Elevation<br/>ft</i> | <i>Top Girt Type</i> | <i>Top Girt Size</i> | <i>Top Girt Grade</i> | <i>Bottom Girt Type</i> | <i>Bottom Girt Size</i> | <i>Bottom Girt Grade</i> |
|-------------------------------|----------------------|----------------------|-----------------------|-------------------------|-------------------------|--------------------------|
| T1 160.00-156.00              | Equal Angle          | L 2 x 2 x 1/8        | A36<br>(36 ksi)       | Single Angle            |                         | A36<br>(36 ksi)          |
| T6 140.00-120.00              | Equal Angle          | L 2 x 2 x 1/8        | A36<br>(36 ksi)       | Single Angle            |                         | A36<br>(36 ksi)          |

### Tower Section Geometry (cont'd)

| <i>Tower Elevation<br/>ft</i> | <i>Gusset Area<br/>(per face)<br/>ft<sup>2</sup></i> | <i>Gusset Thickness<br/>in</i> | <i>Gusset Grade</i> | <i>Adjust. Factor<br/>A<sub>f</sub></i> | <i>Adjust. Factor<br/>A<sub>r</sub></i> | <i>Weight Mult.</i> | <i>Double Angle<br/>Stitch Bolt<br/>Spacing<br/>Diagonals<br/>in</i> | <i>Double Angle<br/>Stitch Bolt<br/>Spacing<br/>Horizontals<br/>in</i> | <i>Double Angle<br/>Stitch Bolt<br/>Spacing<br/>Redundants<br/>in</i> |
|-------------------------------|--|--------------------------------|---------------------|---|---|---------------------|--|--|---|
| T1 160.00-156.00              | 0.00   | 0.19                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | 30.00  | 30.00  | 36.00   |
| T2 156.00-152.00              | 0.00   | 0.19                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | 30.00  | 30.00  | 36.00   |
| T3 152.00-148.00              | 0.00   | 0.19                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | 30.00  | 30.00  | 36.00   |
| T4 148.00-144.00              | 0.00   | 0.19                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | 30.00  | 30.00  | 36.00   |
| T5 144.00-140.00              | 0.00   | 0.19                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | 30.00  | 30.00  | 36.00   |
| T6 140.00-120.00              | 0.00   | 0.19                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | Mid-Pt   | 30.00  | 36.00   |
| T7 120.00-100.00              | 0.00   | 0.19                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | Mid-Pt   | 30.00  | 36.00   |
| T8 100.00-80.00               | 0.00   | 0.44                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | Mid-Pt   | 30.00  | 36.00   |
| T9 80.00-60.00                | 0.00   | 0.44                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | Mid-Pt   | 30.00  | 36.00   |
| T10 60.00-40.00               | 0.00   | 0.25                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | Mid-Pt   | 30.00  | 36.00   |
| T11 40.00-20.00               | 0.00   | 0.25                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | Mid-Pt   | 30.00  | 36.00   |
| T12 20.00-0.00                | 0.00   | 0.25                           | A36<br>(36 ksi)     | 1.03                                    | 1                                       | 1.05                | Mid-Pt   | 30.00  | 36.00   |







|  |  |                                      |
|--|--|--------------------------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b><br><br>HRT 088 943629 (BU 806387) | <b>Page</b><br><br>6 of 20           |
|  | <b>Project</b><br><br>TEP No. 45443.495344   | <b>Date</b><br><br>13:07:16 02/08/21 |
|  | <b>Client</b><br><br>Crown Castle            | <b>Designed by</b><br><br>AN         |

| Tower Elevation<br>ft | Leg Connection Type | Leg             |     | Diagonal        |     | Top Girt        |     | Bottom Girt     |     | Mid Girt        |     | Long Horizontal |     | Short Horizontal |     |
|-----------------------|---------------------|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|-----|------------------|-----|
|                       |                     | Bolt Size<br>in | No. | Bolt Size<br>in | No. | Bolt Size<br>in | No. | Bolt Size<br>in | No. | Bolt Size<br>in | No. | Bolt Size<br>in | No. | Bolt Size<br>in  | No. |
| T3<br>152.00-148.00   | Flange              | 0.63<br>A325N   | 0   | 0.50<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.00<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N    | 0   |
| T4<br>148.00-144.00   | Flange              | 0.63<br>A325N   | 0   | 0.50<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.00<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N    | 0   |
| T5<br>144.00-140.00   | Flange              | 0.63<br>A325N   | 0   | 0.50<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N    | 0   |
| T6<br>140.00-120.00   | Flange              | 0.63<br>A325N   | 4   | 0.50<br>A325N   | 1   | 0.50<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N    | 0   |
| T7<br>120.00-100.00   | Flange              | 0.75<br>A325N   | 4   | 0.50<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N    | 0   |
| T8<br>100.00-80.00    | Flange              | 0.88<br>A325N   | 4   | 0.50<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.50<br>A325N    | 1   |
| T9 80.00-60.00        | Flange              | 1.00<br>A325N   | 6   | 0.50<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.50<br>A325N    | 1   |
| T10<br>60.00-40.00    | Flange              | 1.00<br>A325N   | 6   | 0.63<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N    | 0   |
| T11<br>40.00-20.00    | Flange              | 1.00<br>A325N   | 6   | 0.63<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.50<br>A325N    | 1   |
| T12 20.00-0.00        | Flange              | 1.00<br>A449    | 6   | 0.63<br>A325N   | 1   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N   | 0   | 0.63<br>A325N    | 0   |

## Grouted Pipe Properties

| Size                                | F <sub>y</sub><br>ksi | A <sub>s</sub><br>in <sup>2</sup> | A <sub>c</sub><br>in <sup>2</sup> | Wt<br>plf | E <sub>c</sub><br>ksi | E <sub>m</sub><br>ksi | F <sub>ym</sub><br>ksi |
|-------------------------------------|-----------------------|-----------------------------------|-----------------------------------|-----------|-----------------------|-----------------------|------------------------|
| Rohn 4" x 0.318"<br>(3.5 EH) (GR)   | 50                    | 3.68                              | 8.89                              | 31        | 4769                  | 38218                 | 64                     |
| ROHN 4 EH (GR)                      | 50                    | 4.41                              | 11.50                             | 39        | 4769                  | 38952                 | 66                     |
| Rohn 5.563" x<br>0.375" (5 EH) (GR) | 50                    | 6.11                              | 18.19                             | 59        | 4769                  | 40357                 | 68                     |
| Rohn 6.625" x<br>0.432" (6 EH) (GR) | 50                    | 8.40                              | 26.07                             | 83        | 4769                  | 40832                 | 68                     |

## Feed Line/Linear Appurtenances - Entered As Round Or Flat

| Description                          | Face<br>or<br>Leg | Allow<br>Shield | Exclude<br>From<br>Torque<br>Calculation | Component<br>Type | Placement<br>ft  | Face<br>Offset<br>in | Lateral<br>Offset<br>(Frac FW) | # | #<br>Per<br>Row | Clear<br>Spacing<br>in | Width or<br>Diameter<br>in | Perimeter<br>in | Weight<br>plf |
|--------------------------------------|-------------------|-----------------|--|-------------------|------------------|----------------------|--------------------------------|---|-----------------|------------------------|----------------------------|-----------------|---------------|
| **FACE A**                           |                   |                 |  |                   |                  |                      |                                |   |                 |                        |                            |                 |               |
| HB158-21U6S<br>24-xxM_TMO<br>(1-5/8) | A                 | No              | No                                       | Ar (CaAa)         | 144.00 -<br>0.00 | 0.00                 | 0.4                            | 4 | 4               | 0.50                   | 2.00                       |                 | 3             |
| 1.5" flat Cable<br>Ladder Rail       | A                 | No              | No                                       | Af (CaAa)         | 150.00 -<br>0.00 | 0.00                 | 0.42                           | 1 | 1               | 12.00<br>1.50          | 1.50                       |                 | 2             |
| ***                                  |                   |                 |  |                   |                  |                      |                                |   |                 |                        |                            |                 |               |
| **FACE B**                           |                   |                 |  |                   |                  |                      |                                |   |                 |                        |                            |                 |               |
| LDF5-50A(7/<br>8)                    | B                 | No              | No                                       | Ar (CaAa)         | 157.00 -<br>0.00 | 0.00                 | 0.45                           | 8 | 8               | 0.50                   | 1.09                       |                 | 0             |
| HB158-1-08U<br>8-S8J18(1-5/8<br>)    | B                 | No              | No                                       | Ar (CaAa)         | 157.00 -<br>0.00 | 0.00                 | 0.4                            | 1 | 1               | 0.50                   | 1.98                       |                 | 1             |

|  |         |                            |             |                   |
|--|---------|----------------------------|-------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | Job     | HRT 088 943629 (BU 806387) | Page        | 7 of 20           |
|  | Project | TEP No. 45443.495344       | Date        | 13:07:16 02/08/21 |
|  | Client  | Crown Castle               | Designed by | AN                |

| Description                            | Face<br>or<br>Leg | Allow<br>Shield | Exclude<br>From<br>Torque<br>Calculation | Component<br>Type | Placement<br>ft  | Face<br>Offset<br>in | Lateral<br>Offset<br>(Frac FW) | #  | #<br>Per<br>Row | Clear<br>Spacing<br>in | Width or<br>Diameter<br>in | Perimeter<br>in | Weight<br>plf |
|--|-------------------|-----------------|--|-------------------|------------------|----------------------|--------------------------------|----|-----------------|------------------------|----------------------------|-----------------|---------------|
| 1.5" flat Cable<br>Ladder Rail<br>***  | B                 | No              | No                                       | Af (CaAa)         | 160.00 -<br>0.00 | 0.00                 | 0.42                           | 1  | 1               | 12.00<br>1.50          | 1.50                       |                 | 2             |
| **FACE C**                             |                   |                 |  |                   |                  |                      |                                |    |                 |                        |                            |                 |               |
| HB114-1-08U<br>4-M5F(1-1/4)            | C                 | No              | No                                       | Ar (CaAa)         | 109.00 -<br>0.00 | 0.00                 | -0.42                          | 1  | 1               | 1.54                   | 1.54                       |                 | 1             |
| LDF4-50A(1/<br>2)                      | C                 | No              | No                                       | Ar (CaAa)         | 50.00 - 0.00     | 0.00                 | -0.4                           | 1  | 1               | 0.63                   | 0.63                       |                 | 0             |
| 1.5" flat Cable<br>Ladder Rail<br>***  | C                 | No              | No                                       | Af (CaAa)         | 150.00 -<br>0.00 | 0.00                 | -0.4                           | 1  | 1               | 12.00<br>1.50          | 1.50                       |                 | 2             |
| **LEG C**                              |                   |                 |  |                   |                  |                      |                                |    |                 |                        |                            |                 |               |
| LDF5-50A(7/<br>8")                     | C                 | No              | No                                       | Ar (CaAa)         | 90.00 - 0.00     | -2.00                | 0.45                           | 12 | 4               | 0.50                   | 1.09                       |                 | 0             |
| 2" (Nominal)<br>Conduit                | C                 | No              | No                                       | Ar (CaAa)         | 90.00 - 0.00     | -2.00                | 0.45                           | 1  | 1               | 2.38                   | 2.38                       |                 | 1             |
| FB-L98B-002-<br>75000(3/8)             | C                 | No              | No                                       | Ar (CaAa)         | 90.00 - 0.00     | -2.00                | 0.45                           | 1  | 1               | 0.39                   | 0.39                       |                 | 0             |
| WR-VG122S<br>T-BRDA(7/16<br>)          | C                 | No              | No                                       | Ar (CaAa)         | 90.00 - 0.00     | -2.00                | 0.45                           | 2  | 2               | 0.46                   | 0.46                       |                 | 0             |
| T-Brackets<br>(Af)<br>***              | C                 | No              | No                                       | Af (CaAa)         | 90.00 - 0.00     | -2.00                | 0.45                           | 1  | 1               | 1.00                   | 1.00                       |                 | 8             |
| Safety Line<br>3/8                     | B                 | No              | No                                       | Ar (CaAa)         | 160.00 -<br>0.00 | 0.00                 | 0.5                            | 1  | 1               | 0.38                   | 0.38                       |                 | 0             |
| Step Peg<br>5/8"x8"x34"<br>step        | A                 | No              | No                                       | Ar (CaAa)         | 160.00 -<br>0.00 | 0.00                 | 0.5                            | 1  | 1               | 0.29                   | 0.29                       |                 | 0             |
| Step Peg<br>5/8"x8"x34"<br>step        | B                 | No              | No                                       | Ar (CaAa)         | 160.00 -<br>0.00 | 0.00                 | 0.5                            | 1  | 1               | 0.29                   | 0.29                       |                 | 0             |
| Step Peg<br>5/8"x8"x34"<br>step<br>*** | C                 | No              | No                                       | Ar (CaAa)         | 160.00 -<br>0.00 | 0.00                 | 0.5                            | 1  | 1               | 0.29                   | 0.29                       |                 | 0             |

## Discrete Tower Loads

| Description                        | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustment<br>° | Placement<br>ft |          | C <sub>A</sub> A <sub>A</sub><br>Front<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K |
|------------------------------------|-------------------|----------------|---|----------------------------|-----------------|----------|---|--|-------------|
| (2) LPA-80080/6CF w/<br>Mount Pipe | A                 | From Leg       | 4.00  | 0.00                       | 157.00          | No Ice   | 4.93  | 10.92  | 0.07        |
|                                    |                   |                | 0.00  |                            |                 | 1/2" Ice | 5.58  | 12.21  | 0.14        |
|                                    |                   |                | 0.00  |                            |                 | 1" Ice   | 6.16  | 13.16  | 0.22        |
|                                    |                   |                | 0.00  |                            |                 | 2" Ice   | 7.33  | 15.11  | 0.41        |
| (2) LPA-80080/6CF w/<br>Mount Pipe | B                 | From Leg       | 4.00  | 0.00                       | 157.00          | No Ice   | 4.93  | 10.92  | 0.07        |
|                                    |                   |                | 0.00  |                            |                 | 1/2" Ice | 5.58  | 12.21  | 0.14        |
|                                    |                   |                | 0.00  |                            |                 | 1" Ice   | 6.16  | 13.16  | 0.22        |
|                                    |                   |                | 0.00  |                            |                 | 2" Ice   | 7.33  | 15.11  | 0.41        |
| (2) LPA-80080/6CF w/<br>Mount Pipe | C                 | From Leg       | 4.00  | 0.00                       | 157.00          | No Ice   | 4.93  | 10.92  | 0.07        |
|                                    |                   |                | 0.00  |                            |                 | 1/2" Ice | 5.58  | 12.21  | 0.14        |
|                                    |                   |                | 0.00  |                            |                 | 1" Ice   | 6.16  | 13.16  | 0.22        |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b>     | HRT 088 943629 (BU 806387) | <b>Page</b>        | 8 of 20           |
|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| <i>Description</i>                | <i>Face or Leg</i> | <i>Offset Type</i> | <i>Offsets: Horz Lateral Vert</i><br><i>ft ft ft</i> | <i>Azimuth Adjustment</i><br><i>°</i> | <i>Placement</i><br><i>ft</i> | <i>C<sub>AA</sub> Front</i><br><i>ft<sup>2</sup></i>                      | <i>C<sub>AA</sub> Side</i><br><i>ft<sup>2</sup></i> | <i>Weight</i><br><i>K</i>            |
|-----------------------------------|--------------------|--------------------|--|---------------------------------------|-------------------------------|---|---|--------------------------------------|
| (2) JAHH-65B-R3B w/ Mount Pipe    | A                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 7.33<br>No Ice 5.50<br>1/2" Ice 5.97<br>1" Ice 6.45<br>2" Ice 7.44 | 15.11<br>4.38<br>4.84<br>5.30<br>6.26               | 0.41<br>0.10<br>0.17<br>0.25<br>0.46 |
| (2) JAHH-65B-R3B w/ Mount Pipe    | B                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 7.44<br>No Ice 5.50<br>1/2" Ice 5.97<br>1" Ice 6.45<br>2" Ice 7.44 | 6.26<br>4.38<br>4.84<br>5.30<br>6.26                | 0.46<br>0.10<br>0.17<br>0.25<br>0.46 |
| (2) JAHH-65B-R3B w/ Mount Pipe    | C                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 7.44<br>No Ice 5.50<br>1/2" Ice 5.97<br>1" Ice 6.45<br>2" Ice 7.44 | 6.26<br>4.38<br>4.84<br>5.30<br>6.26                | 0.46<br>0.10<br>0.17<br>0.25<br>0.46 |
| B66A RRH4X45                      | A                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 7.44<br>No Ice 2.54<br>1/2" Ice 2.75<br>1" Ice 2.97<br>2" Ice 3.43 | 6.26<br>1.61<br>1.79<br>1.98<br>2.37                | 0.46<br>0.06<br>0.08<br>0.10<br>0.16 |
| B66A RRH4X45                      | B                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 3.43<br>No Ice 2.54<br>1/2" Ice 2.75<br>1" Ice 2.97<br>2" Ice 3.43 | 2.37<br>1.61<br>1.79<br>1.98<br>2.37                | 0.16<br>0.06<br>0.08<br>0.10<br>0.16 |
| B66A RRH4X45                      | C                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 3.43<br>No Ice 2.54<br>1/2" Ice 2.75<br>1" Ice 2.97<br>2" Ice 3.43 | 2.37<br>1.61<br>1.79<br>1.98<br>2.37                | 0.16<br>0.06<br>0.08<br>0.10<br>0.16 |
| AHCA                              | A                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 3.43<br>No Ice 1.29<br>1/2" Ice 1.43<br>1" Ice 1.58<br>2" Ice 1.90 | 2.37<br>0.72<br>0.83<br>0.96<br>1.22                | 0.16<br>0.04<br>0.05<br>0.06<br>0.09 |
| AHCA                              | B                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 1.90<br>No Ice 1.29<br>1/2" Ice 1.43<br>1" Ice 1.58<br>2" Ice 1.90 | 1.22<br>0.72<br>0.83<br>0.96<br>1.22                | 0.09<br>0.04<br>0.05<br>0.06<br>0.09 |
| AHCA                              | C                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 1.90<br>No Ice 1.29<br>1/2" Ice 1.43<br>1" Ice 1.58<br>2" Ice 1.90 | 1.22<br>0.72<br>0.83<br>0.96<br>1.22                | 0.09<br>0.04<br>0.05<br>0.06<br>0.09 |
| RC3DC-3315-PF-48                  | A                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 1.90<br>No Ice 3.79<br>1/2" Ice 4.04<br>1" Ice 4.30<br>2" Ice 4.84 | 1.22<br>2.51<br>2.72<br>2.94<br>3.41                | 0.09<br>0.03<br>0.06<br>0.10<br>0.18 |
| B13 RRH 4X30                      | A                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 4.84<br>No Ice 2.06<br>1/2" Ice 2.24<br>1" Ice 2.43<br>2" Ice 2.84 | 3.41<br>1.32<br>1.48<br>1.64<br>2.00                | 0.18<br>0.06<br>0.07<br>0.09<br>0.14 |
| B13 RRH 4X30                      | B                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 2.84<br>No Ice 2.06<br>1/2" Ice 2.24<br>1" Ice 2.43<br>2" Ice 2.84 | 2.00<br>1.32<br>1.48<br>1.64<br>2.00                | 0.14<br>0.06<br>0.07<br>0.09<br>0.14 |
| B13 RRH 4X30                      | C                  | From Leg           | 4.00<br>0.00<br>0.00                                 | 0.00                                  | 157.00                        | 2" Ice 2.84<br>No Ice 2.06<br>1/2" Ice 2.24<br>1" Ice 2.43<br>2" Ice 2.84 | 2.00<br>1.32<br>1.48<br>1.64<br>2.00                | 0.14<br>0.06<br>0.07<br>0.09<br>0.14 |
| Sitepro VFA12-HD Sector Mount (3) | C                  | None               |  | 0.00                                  | 157.00                        | No Ice 25.20<br>1/2" Ice 38.36<br>1" Ice 51.52<br>2" Ice 77.84            | 25.20<br>38.36<br>51.52<br>77.84                    | 1.97<br>2.41<br>2.85<br>3.73         |

|  |         |                            |             |                   |
|--|---------|----------------------------|-------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | Job     | HRT 088 943629 (BU 806387) | Page        | 9 of 20           |
|  | Project | TEP No. 45443.495344       | Date        | 13:07:16 02/08/21 |
|  | Client  | Crown Castle               | Designed by | AN                |

| Description                                | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustment<br>° | Placement<br>ft |  | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K                  |
|--|-------------------|----------------|---|----------------------------|-----------------|--|---|--|------------------------------|
| 2.4" Dia. x 6-ft                           | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 157.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.43<br>1.92<br>2.29<br>3.06                | 1.43<br>1.92<br>2.29<br>3.06               | 0.02<br>0.03<br>0.05<br>0.09 |
| 2.4" Dia. x 6-ft                           | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 157.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.43<br>1.92<br>2.29<br>3.06                | 1.43<br>1.92<br>2.29<br>3.06               | 0.02<br>0.03<br>0.05<br>0.09 |
| 2.4" Dia. x 6-ft                           | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 157.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.43<br>1.92<br>2.29<br>3.06                | 1.43<br>1.92<br>2.29<br>3.06               | 0.02<br>0.03<br>0.05<br>0.09 |
| ***  |                   |                |   |                            |                 |  |   |  |                              |
| APX16DWV-16DWV-S-E-A<br>20 w/ Mount Pipe   | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 6.29<br>6.86<br>7.45<br>8.68                | 2.76<br>3.27<br>3.79<br>4.90               | 0.06<br>0.11<br>0.16<br>0.29 |
| APX16DWV-16DWV-S-E-A<br>20 w/ Mount Pipe   | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 6.29<br>6.86<br>7.45<br>8.68                | 2.76<br>3.27<br>3.79<br>4.90               | 0.06<br>0.11<br>0.16<br>0.29 |
| APX16DWV-16DWV-S-E-A<br>20 w/ Mount Pipe   | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 6.29<br>6.86<br>7.45<br>8.68                | 2.76<br>3.27<br>3.79<br>4.90               | 0.06<br>0.11<br>0.16<br>0.29 |
| APXVAALL24_43-U-NA20<br>_TMO w/ Mount Pipe | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 14.69<br>15.46<br>16.23<br>17.82            | 6.87<br>7.55<br>8.25<br>9.67               | 0.18<br>0.31<br>0.45<br>0.78 |
| APXVAALL24_43-U-NA20<br>_TMO w/ Mount Pipe | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 14.69<br>15.46<br>16.23<br>17.82            | 6.87<br>7.55<br>8.25<br>9.67               | 0.18<br>0.31<br>0.45<br>0.78 |
| APXVAALL24_43-U-NA20<br>_TMO w/ Mount Pipe | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 14.69<br>15.46<br>16.23<br>17.82            | 6.87<br>7.55<br>8.25<br>9.67               | 0.18<br>0.31<br>0.45<br>0.78 |
| AIR6449 B41_T-MOBILE<br>w/ Mount Pipe      | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 5.87<br>6.23<br>6.61<br>7.38                | 3.27<br>3.73<br>4.20<br>5.20               | 0.13<br>0.18<br>0.23<br>0.36 |
| AIR6449 B41_T-MOBILE<br>w/ Mount Pipe      | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 5.87<br>6.23<br>6.61<br>7.38                | 3.27<br>3.73<br>4.20<br>5.20               | 0.13<br>0.18<br>0.23<br>0.36 |
| AIR6449 B41_T-MOBILE<br>w/ Mount Pipe      | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 5.87<br>6.23<br>6.61<br>7.38                | 3.27<br>3.73<br>4.20<br>5.20               | 0.13<br>0.18<br>0.23<br>0.36 |
| RADIO 4415 B66A_CCIV3                      | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.64<br>1.80<br>1.97<br>2.32                | 0.68<br>0.79<br>0.91<br>1.18               | 0.05<br>0.06<br>0.07<br>0.11 |
| RADIO 4415 B66A_CCIV3                      | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.64<br>1.80<br>1.97<br>2.32                | 0.68<br>0.79<br>0.91<br>1.18               | 0.05<br>0.06<br>0.07<br>0.11 |

|  |         |                            |                           |
|--|---------|----------------------------|---------------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | Job     | HRT 088 943629 (BU 806387) | Page<br>10 of 20          |
|  | Project | TEP No. 45443.495344       | Date<br>13:07:16 02/08/21 |
|  | Client  | Crown Castle               | Designed by<br>AN         |

| Description                       | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustment<br>° | Placement<br>ft |  | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K                  |
|-----------------------------------|-------------------|----------------|---|----------------------------|-----------------|--|---|--|------------------------------|
| RADIO 4415 B66A_CCIV3             | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.64<br>1.80<br>1.97<br>2.32                | 0.68<br>0.79<br>0.91<br>1.18               | 0.05<br>0.06<br>0.07<br>0.11 |
| RADIO 4449 B71<br>B85A_T-MOBILE   | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.97<br>2.15<br>2.33<br>2.72                | 1.59<br>1.75<br>1.92<br>2.28               | 0.07<br>0.09<br>0.12<br>0.17 |
| RADIO 4449 B71<br>B85A_T-MOBILE   | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.97<br>2.15<br>2.33<br>2.72                | 1.59<br>1.75<br>1.92<br>2.28               | 0.07<br>0.09<br>0.12<br>0.17 |
| RADIO 4449 B71<br>B85A_T-MOBILE   | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.97<br>2.15<br>2.33<br>2.72                | 1.59<br>1.75<br>1.92<br>2.28               | 0.07<br>0.09<br>0.12<br>0.17 |
| RADIO 4424 B25_TMO                | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 2.05<br>2.23<br>2.42<br>2.81                | 1.61<br>1.77<br>1.94<br>2.30               | 0.09<br>0.11<br>0.13<br>0.19 |
| RADIO 4424 B25_TMO                | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 2.05<br>2.23<br>2.42<br>2.81                | 1.61<br>1.77<br>1.94<br>2.30               | 0.09<br>0.11<br>0.13<br>0.19 |
| RADIO 4424 B25_TMO                | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 2.05<br>2.23<br>2.42<br>2.81                | 1.61<br>1.77<br>1.94<br>2.30               | 0.09<br>0.11<br>0.13<br>0.19 |
| Sector Mount [SM 506-3]           | C                 | None           |   | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 32.27<br>45.45<br>58.44<br>84.07            | 32.27<br>45.45<br>58.44<br>84.07           | 1.74<br>2.39<br>3.23<br>5.54 |
| 2.4" Dia. x 6-ft                  | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.43<br>1.92<br>2.29<br>3.06                | 1.43<br>1.92<br>2.29<br>3.06               | 0.02<br>0.03<br>0.05<br>0.09 |
| 2.4" Dia. x 6-ft                  | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.43<br>1.92<br>2.29<br>3.06                | 1.43<br>1.92<br>2.29<br>3.06               | 0.02<br>0.03<br>0.05<br>0.09 |
| 2.4" Dia. x 6-ft                  | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 144.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 1.43<br>1.92<br>2.29<br>3.06                | 1.43<br>1.92<br>2.29<br>3.06               | 0.02<br>0.03<br>0.05<br>0.09 |
| ***                               |                   |                |   |                            |                 |  |   |  |                              |
| (4) DB844H90E-XY w/<br>Mount Pipe | A                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 118.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 2.24<br>2.61<br>2.99<br>3.78                | 3.34<br>3.73<br>4.13<br>4.97               | 0.04<br>0.08<br>0.12<br>0.23 |
| (4) DB844H90E-XY w/<br>Mount Pipe | B                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 118.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 2.24<br>2.61<br>2.99<br>3.78                | 3.34<br>3.73<br>4.13<br>4.97               | 0.04<br>0.08<br>0.12<br>0.23 |
| (4) DB844H90E-XY w/<br>Mount Pipe | C                 | From Leg       | 4.00<br>0.00<br>0.00                                  | 0.00                       | 118.00          | No Ice<br>1/2" Ice<br>1" Ice<br>2" Ice | 2.24<br>2.61<br>2.99<br>3.78                | 3.34<br>3.73<br>4.13<br>4.97               | 0.04<br>0.08<br>0.12<br>0.23 |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b>     | HRT 088 943629 (BU 806387) | <b>Page</b>        | 11 of 20          |
|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| <i>Description</i>                     | <i>Face<br/>or<br/>Leg</i> | <i>Offset<br/>Type</i> | <i>Offsets:<br/>Horz<br/>Lateral<br/>Vert<br/>ft<br/>ft<br/>ft</i> | <i>Azimuth<br/>Adjustment<br/><br/>°</i> | <i>Placement<br/><br/>ft</i> |          | <i>C<sub>AA</sub><br/>Front<br/><br/>ft<sup>2</sup></i> | <i>C<sub>AA</sub><br/>Side<br/><br/>ft<sup>2</sup></i> | <i>Weight<br/><br/>K</i> |
|--|----------------------------|------------------------|--|--|------------------------------|----------|---|--|--------------------------|
| Sector Mount [SM 201-3]                | C                          | None                   |  | 0.00                                     | 118.00                       | No Ice   | 24.76   | 24.76  | 1.08                     |
|  |                            |                        |  |  |                              | 1/2" Ice | 33.89   | 33.89  | 1.52                     |
|  |                            |                        |  |  |                              | 1" Ice   | 43.00   | 43.00  | 2.10                     |
|  |                            |                        |  |  |                              | 2" Ice   | 61.44   | 61.44  | 3.64                     |
| Pipe Mount [PM 601-3]                  | C                          | None                   |  | 0.00                                     | 118.00                       | No Ice   | 3.17  | 3.17   | 0.20                     |
|  |                            |                        |  |  |                              | 1/2" Ice | 3.79  | 3.79   | 0.23                     |
|  |                            |                        |  |  |                              | 1" Ice   | 4.42  | 4.42   | 0.28                     |
|  |                            |                        |  |  |                              | 2" Ice   | 5.76  | 5.76   | 0.40                     |
| ***                                    |                            |                        |  |  |                              |          |   |  |                          |
| PD1110                                 | C                          | From Leg               | 0.00   | 0.00                                     | 109.00                       | No Ice   | 2.50  | 2.50   | 0.02                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 3.84  | 3.84   | 0.04                     |
|  |                            |                        | 6.00   |  |                              | 1" Ice   | 5.20  | 5.20   | 0.07                     |
|  |                            |                        |  |  |                              | 2" Ice   | 7.97  | 7.97   | 0.15                     |
| Side Arm Mount [SO 308-1]              | C                          | From Leg               | 0.00   | 0.00                                     | 109.00                       | No Ice   | 0.41  | 3.06   | 0.05                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 0.81  | 5.10   | 0.08                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 1.23  | 7.20   | 0.12                     |
|  |                            |                        |  |  |                              | 2" Ice   | 2.09  | 11.96  | 0.25                     |
| ***                                    |                            |                        |  |  |                              |          |   |  |                          |
| (2) 7770.00 w/ Mount Pipe              | A                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 5.75  | 4.25   | 0.06                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 6.18  | 5.01   | 0.10                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 6.61  | 5.71   | 0.16                     |
|  |                            |                        |  |  |                              | 2" Ice   | 7.49  | 7.16   | 0.29                     |
| (2) 7770.00 w/ Mount Pipe              | B                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 5.75  | 4.25   | 0.06                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 6.18  | 5.01   | 0.10                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 6.61  | 5.71   | 0.16                     |
|  |                            |                        |  |  |                              | 2" Ice   | 7.49  | 7.16   | 0.29                     |
| (2) 7770.00 w/ Mount Pipe              | C                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 5.75  | 4.25   | 0.06                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 6.18  | 5.01   | 0.10                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 6.61  | 5.71   | 0.16                     |
|  |                            |                        |  |  |                              | 2" Ice   | 7.49  | 7.16   | 0.29                     |
| AM-X-CD-16-65-00T-RET<br>w/ Mount Pipe | A                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 4.63  | 3.27   | 0.07                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 5.06  | 3.69   | 0.13                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 5.51  | 4.12   | 0.20                     |
|  |                            |                        |  |  |                              | 2" Ice   | 6.43  | 5.00   | 0.38                     |
| AM-X-CD-16-65-00T-RET<br>w/ Mount Pipe | B                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 4.63  | 3.27   | 0.07                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 5.06  | 3.69   | 0.13                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 5.51  | 4.12   | 0.20                     |
|  |                            |                        |  |  |                              | 2" Ice   | 6.43  | 5.00   | 0.38                     |
| P45-16-XLH-RR w/ Mount<br>Pipe         | C                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 8.24  | 4.83   | 0.04                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 8.70  | 5.57   | 0.10                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 9.16  | 6.27   | 0.17                     |
|  |                            |                        |  |  |                              | 2" Ice   | 10.09   | 7.67   | 0.34                     |
| (4) LGP21401                           | A                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 1.10  | 0.21   | 0.01                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 1.24  | 0.27   | 0.02                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 1.38  | 0.35   | 0.03                     |
|  |                            |                        |  |  |                              | 2" Ice   | 1.69  | 0.52   | 0.05                     |
| (4) LGP21401                           | B                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 1.10  | 0.21   | 0.01                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 1.24  | 0.27   | 0.02                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 1.38  | 0.35   | 0.03                     |
|  |                            |                        |  |  |                              | 2" Ice   | 1.69  | 0.52   | 0.05                     |
| (4) LGP21401                           | C                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 1.10  | 0.21   | 0.01                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 1.24  | 0.27   | 0.02                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 1.38  | 0.35   | 0.03                     |
|  |                            |                        |  |  |                              | 2" Ice   | 1.69  | 0.52   | 0.05                     |
| (2) RRUS-11                            | A                          | From Leg               | 4.00   | 0.00                                     | 90.00                        | No Ice   | 2.79  | 1.19   | 0.05                     |
|  |                            |                        | 0.00   |  |                              | 1/2" Ice | 3.00  | 1.34   | 0.07                     |
|  |                            |                        | 0.00   |  |                              | 1" Ice   | 3.21  | 1.50   | 0.10                     |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b>     | HRT 088 943629 (BU 806387) | <b>Page</b>        | 12 of 20          |
|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| <i>Description</i>        | <i>Face<br/>or<br/>Leg</i> | <i>Offset<br/>Type</i> | <i>Offsets:<br/>Horz.<br/>Lateral<br/>Vert</i> | <i>Azimuth<br/>Adjustment</i> | <i>Placement</i> | <i>C<sub>AA</sub><br/>Front</i>                               | <i>C<sub>AA</sub><br/>Side</i>  | <i>Weight</i>                |
|---------------------------|----------------------------|------------------------|--|-------------------------------|------------------|---|---------------------------------|------------------------------|
|                           |                            |                        | <i>ft<br/>ft<br/>ft</i>                        | <i>°</i>                      | <i>ft</i>        | <i>ft<sup>2</sup></i>   | <i>ft<sup>2</sup></i>           | <i>K</i>                     |
| (2) RRUS-11               | B                          | From Leg               | 4.00<br>0.00<br>0.00                           | 0.00                          | 90.00            | 2" Ice 3.67<br>No Ice 2.79<br>1/2" Ice 3.00<br>1" Ice 3.21    | 1.84<br>1.19<br>1.34<br>1.50    | 0.15<br>0.05<br>0.07<br>0.10 |
| (2) RRUS-11               | C                          | From Leg               | 4.00<br>0.00<br>0.00                           | 0.00                          | 90.00            | 2" Ice 3.67<br>No Ice 2.79<br>1/2" Ice 3.00<br>1" Ice 3.21    | 1.84<br>1.19<br>1.34<br>1.50    | 0.15<br>0.05<br>0.07<br>0.10 |
| DC6-48-60-18-8F           | C                          | From Leg               | 4.00<br>0.00<br>0.00                           | 0.00                          | 90.00            | 2" Ice 3.67<br>No Ice 1.21<br>1/2" Ice 1.89<br>1" Ice 2.11    | 1.84<br>1.21<br>1.89<br>2.11    | 0.15<br>0.03<br>0.05<br>0.08 |
| Sector Mount [SM 104-3]   | C                          | None                   |  | 0.00                          | 90.00            | 2" Ice 2.57<br>No Ice 30.21<br>1/2" Ice 38.12<br>1" Ice 46.01 | 2.57<br>30.21<br>38.12<br>46.01 | 0.14<br>0.95<br>1.43<br>2.03 |
| ***                       |                            |                        |  |                               |                  | 2" Ice 62.03  | 62.03                           | 3.58                         |
| KS24019-L112A             | B                          | From Leg               | 4.00<br>0.00<br>0.00                           | 0.00                          | 50.00            | No Ice 0.08<br>1/2" Ice 0.13<br>1" Ice 0.19<br>2" Ice 0.35    | 0.08<br>0.13<br>0.19<br>0.35    | 0.01<br>0.01<br>0.01<br>0.02 |
| Side Arm Mount [SO 306-1] | B                          | From Leg               | 2.00<br>0.00<br>0.00                           | 0.00                          | 50.00            | No Ice 0.41<br>1/2" Ice 0.81<br>1" Ice 1.23<br>2" Ice 2.08    | 2.26<br>3.83<br>5.48<br>9.37    | 0.04<br>0.06<br>0.09<br>0.19 |
| ***                       |                            |                        |  |                               |                  |   |                                 |                              |

## Load Combinations

| <i>Comb.<br/>No.</i> | <i>Description</i>                 |
|----------------------|------------------------------------|
| 1                    | Dead Only                          |
| 2                    | 1.2 Dead+1.0 Wind 0 deg - No Ice   |
| 3                    | 0.9 Dead+1.0 Wind 0 deg - No Ice   |
| 4                    | 1.2 Dead+1.0 Wind 30 deg - No Ice  |
| 5                    | 0.9 Dead+1.0 Wind 30 deg - No Ice  |
| 6                    | 1.2 Dead+1.0 Wind 60 deg - No Ice  |
| 7                    | 0.9 Dead+1.0 Wind 60 deg - No Ice  |
| 8                    | 1.2 Dead+1.0 Wind 90 deg - No Ice  |
| 9                    | 0.9 Dead+1.0 Wind 90 deg - No Ice  |
| 10                   | 1.2 Dead+1.0 Wind 120 deg - No Ice |
| 11                   | 0.9 Dead+1.0 Wind 120 deg - No Ice |
| 12                   | 1.2 Dead+1.0 Wind 150 deg - No Ice |
| 13                   | 0.9 Dead+1.0 Wind 150 deg - No Ice |
| 14                   | 1.2 Dead+1.0 Wind 180 deg - No Ice |
| 15                   | 0.9 Dead+1.0 Wind 180 deg - No Ice |
| 16                   | 1.2 Dead+1.0 Wind 210 deg - No Ice |
| 17                   | 0.9 Dead+1.0 Wind 210 deg - No Ice |
| 18                   | 1.2 Dead+1.0 Wind 240 deg - No Ice |
| 19                   | 0.9 Dead+1.0 Wind 240 deg - No Ice |
| 20                   | 1.2 Dead+1.0 Wind 270 deg - No Ice |
| 21                   | 0.9 Dead+1.0 Wind 270 deg - No Ice |
| 22                   | 1.2 Dead+1.0 Wind 300 deg - No Ice |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b>     | HRT 088 943629 (BU 806387) | <b>Page</b>        | 13 of 20          |
|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| <i>Comb. No.</i> | <i>Description</i>                 |
|------------------|------------------------------------|
| 23               | 0.9 Dead+1.0 Wind 300 deg - No Ice |
| 24               | 1.2 Dead+1.0 Wind 330 deg - No Ice |
| 25               | 0.9 Dead+1.0 Wind 330 deg - No Ice |
| 26               | 1.2 Dead+1.0 Ice                   |
| 27               | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice    |
| 28               | 1.2 Dead+1.0 Wind 30 deg+1.0 Ice   |
| 29               | 1.2 Dead+1.0 Wind 60 deg+1.0 Ice   |
| 30               | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice   |
| 31               | 1.2 Dead+1.0 Wind 120 deg+1.0 Ice  |
| 32               | 1.2 Dead+1.0 Wind 150 deg+1.0 Ice  |
| 33               | 1.2 Dead+1.0 Wind 180 deg+1.0 Ice  |
| 34               | 1.2 Dead+1.0 Wind 210 deg+1.0 Ice  |
| 35               | 1.2 Dead+1.0 Wind 240 deg+1.0 Ice  |
| 36               | 1.2 Dead+1.0 Wind 270 deg+1.0 Ice  |
| 37               | 1.2 Dead+1.0 Wind 300 deg+1.0 Ice  |
| 38               | 1.2 Dead+1.0 Wind 330 deg+1.0 Ice  |
| 39               | Dead+Wind 0 deg - Service          |
| 40               | Dead+Wind 30 deg - Service         |
| 41               | Dead+Wind 60 deg - Service         |
| 42               | Dead+Wind 90 deg - Service         |
| 43               | Dead+Wind 120 deg - Service        |
| 44               | Dead+Wind 150 deg - Service        |
| 45               | Dead+Wind 180 deg - Service        |
| 46               | Dead+Wind 210 deg - Service        |
| 47               | Dead+Wind 240 deg - Service        |
| 48               | Dead+Wind 270 deg - Service        |
| 49               | Dead+Wind 300 deg - Service        |
| 50               | Dead+Wind 330 deg - Service        |

## Maximum Reactions

| <i>Location</i> | <i>Condition</i>    | <i>Gov. Load Comb.</i> | <i>Vertical K</i> | <i>Horizontal, X K</i> | <i>Horizontal, Z K</i> |
|-----------------|---------------------|------------------------|-------------------|------------------------|------------------------|
| Leg C           | Max. Vert           | 18                     | 209.13            | 19.77                  | -11.02                 |
|                 | Max. H <sub>x</sub> | 18                     | 209.13            | 19.77                  | -11.02                 |
|                 | Max. H <sub>z</sub> | 7                      | -172.22           | -16.63                 | 9.19                   |
|                 | Min. Vert           | 7                      | -172.22           | -16.63                 | 9.19                   |
|                 | Min. H <sub>x</sub> | 7                      | -172.22           | -16.63                 | 9.19                   |
|                 | Min. H <sub>z</sub> | 18                     | 209.13            | 19.77                  | -11.02                 |
| Leg B           | Max. Vert           | 10                     | 207.48            | -19.41                 | -11.30                 |
|                 | Max. H <sub>x</sub> | 23                     | -170.93           | 16.27                  | 9.49                   |
|                 | Max. H <sub>z</sub> | 23                     | -170.93           | 16.27                  | 9.49                   |
|                 | Min. Vert           | 23                     | -170.93           | 16.27                  | 9.49                   |
|                 | Min. H <sub>x</sub> | 10                     | 207.48            | -19.41                 | -11.30                 |
|                 | Min. H <sub>z</sub> | 10                     | 207.48            | -19.41                 | -11.30                 |
| Leg A           | Max. Vert           | 2                      | 205.52            | 0.14                   | 22.20                  |
|                 | Max. H <sub>x</sub> | 21                     | 12.47             | 2.07                   | 1.02                   |
|                 | Max. H <sub>z</sub> | 2                      | 205.52            | 0.14                   | 22.20                  |
|                 | Min. Vert           | 15                     | -168.48           | -0.15                  | -18.56                 |
|                 | Min. H <sub>x</sub> | 9                      | 12.36             | -2.07                  | 1.03                   |
|                 | Min. H <sub>z</sub> | 15                     | -168.48           | -0.15                  | -18.56                 |



|  |  |                                      |
|--|--|--------------------------------------|
| <b><i>tnxTower</i></b><br><br><b><i>Tower Engineering Professionals</i></b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b><br><br>HRT 088 943629 (BU 806387) | <b>Page</b><br><br>14 of 20          |
|  | <b>Project</b><br><br>TEP No. 45443.495344   | <b>Date</b><br><br>13:07:16 02/08/21 |
|  | <b>Client</b><br><br>Crown Castle            | <b>Designed by</b><br><br>AN         |

## Tower Mast Reaction Summary

| <i>Load Combination</i>            | <i>Vertical</i> | <i>Shear<sub>x</sub></i> | <i>Shear<sub>z</sub></i> | <i>Overturning Moment, M<sub>x</sub></i> | <i>Overturning Moment, M<sub>z</sub></i> | <i>Torque</i> |
|------------------------------------|-----------------|--------------------------|--------------------------|--|--|---------------|
|                                    | <i>K</i>        | <i>K</i>                 | <i>K</i>                 | <i>kip-ft</i>                            | <i>kip-ft</i>                            | <i>kip-ft</i> |
| Dead Only                          | 41.06           | -0.00                    | 0.00                     | -1.73                                    | 1.84                                     | -0.00         |
| 1.2 Dead+1.0 Wind 0 deg - No Ice   | 49.27           | 0.00                     | -34.40                   | -3416.79                                 | 3.12                                     | 5.31          |
| 0.9 Dead+1.0 Wind 0 deg - No Ice   | 36.95           | 0.00                     | -34.40                   | -3412.32                                 | 2.57                                     | 5.31          |
| 1.2 Dead+1.0 Wind 30 deg - No Ice  | 49.27           | 16.63                    | -28.86                   | -2899.91                                 | -1666.28                                 | 15.87         |
| 0.9 Dead+1.0 Wind 30 deg - No Ice  | 36.95           | 16.63                    | -28.86                   | -2896.02                                 | -1664.89                                 | 15.88         |
| 1.2 Dead+1.0 Wind 60 deg - No Ice  | 49.27           | 28.73                    | -16.62                   | -1674.35                                 | -2887.77                                 | 12.62         |
| 0.9 Dead+1.0 Wind 60 deg - No Ice  | 36.95           | 28.73                    | -16.62                   | -1671.88                                 | -2884.96                                 | 12.63         |
| 1.2 Dead+1.0 Wind 90 deg - No Ice  | 49.27           | 34.29                    | -0.00                    | -1.37                                    | -3423.24                                 | 2.73          |
| 0.9 Dead+1.0 Wind 90 deg - No Ice  | 36.95           | 34.29                    | -0.00                    | -0.83                                    | -3419.82                                 | 2.73          |
| 1.2 Dead+1.0 Wind 120 deg - No Ice | 49.27           | 30.18                    | 17.45                    | 1729.12                                  | -2988.02                                 | -2.96         |
| 0.9 Dead+1.0 Wind 120 deg - No Ice | 36.95           | 30.18                    | 17.46                    | 1727.66                                  | -2985.12                                 | -2.95         |
| 1.2 Dead+1.0 Wind 150 deg - No Ice | 49.27           | 16.32                    | 28.34                    | 2843.98                                  | -1637.05                                 | -1.11         |
| 0.9 Dead+1.0 Wind 150 deg - No Ice | 36.95           | 16.32                    | 28.34                    | 2841.21                                  | -1635.70                                 | -1.11         |
| 1.2 Dead+1.0 Wind 180 deg - No Ice | 49.27           | -0.00                    | 32.46                    | 3270.21                                  | 1.20                                     | -5.31         |
| 0.9 Dead+1.0 Wind 180 deg - No Ice | 36.95           | -0.00                    | 32.46                    | 3266.93                                  | 0.65                                     | -5.31         |
| 1.2 Dead+1.0 Wind 210 deg - No Ice | 49.27           | -16.63                   | 28.86                    | 2895.96                                  | 1670.22                                  | -15.87        |
| 0.9 Dead+1.0 Wind 210 deg - No Ice | 36.95           | -16.63                   | 28.86                    | 2893.12                                  | 1667.74                                  | -15.88        |
| 1.2 Dead+1.0 Wind 240 deg - No Ice | 49.27           | -30.41                   | 17.59                    | 1741.38                                  | 3015.42                                  | -12.62        |
| 0.9 Dead+1.0 Wind 240 deg - No Ice | 36.95           | -30.41                   | 17.59                    | 1739.90                                  | 3011.40                                  | -12.63        |
| 1.2 Dead+1.0 Wind 270 deg - No Ice | 49.27           | -34.29                   | 0.01                     | -3.29                                    | 3427.63                                  | -2.73         |
| 0.9 Dead+1.0 Wind 270 deg - No Ice | 36.95           | -34.29                   | 0.01                     | -2.76                                    | 3423.12                                  | -2.73         |
| 1.2 Dead+1.0 Wind 300 deg - No Ice | 49.27           | -28.49                   | -16.48                   | -1662.22                                 | 2869.08                                  | 2.96          |
| 0.9 Dead+1.0 Wind 300 deg - No Ice | 36.95           | -28.49                   | -16.48                   | -1659.75                                 | 2865.20                                  | 2.95          |
| 1.2 Dead+1.0 Wind 330 deg - No Ice | 49.27           | -16.32                   | -28.34                   | -2848.04                                 | 1641.72                                  | 1.11          |
| 0.9 Dead+1.0 Wind 330 deg - No Ice | 36.95           | -16.32                   | -28.34                   | -2844.20                                 | 1639.27                                  | 1.11          |
| 1.2 Dead+1.0 Ice                   | 105.64          | -0.00                    | 0.00                     | 11.94                                    | -11.83                                   | 0.00          |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice    | 105.64          | -0.00                    | -7.97                    | -758.78                                  | -11.05                                   | 3.08          |
| 1.2 Dead+1.0 Wind 30 deg+1.0 Ice   | 105.64          | 3.96                     | -6.89                    | -656.84                                  | -396.12                                  | 5.84          |
| 1.2 Dead+1.0 Wind 60 deg+1.0 Ice   | 105.64          | 6.97                     | -4.03                    | -379.48                                  | -688.54                                  | 5.65          |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice   | 105.64          | 8.13                     | 0.00                     | 13.01                                    | -798.94                                  | 1.93          |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
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|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| Load Combination                  | Vertical<br>K | Shear <sub>x</sub><br>K | Shear <sub>z</sub><br>K | Overturning<br>Moment, M <sub>x</sub><br>kip-ft | Overturning<br>Moment, M <sub>z</sub><br>kip-ft | Torque<br>kip-ft |
|-----------------------------------|---------------|-------------------------|-------------------------|---|---|------------------|
| 1.2 Dead+1.0 Wind 120 deg+1.0 Ice | 105.64        | 7.06                    | 4.09                    | 406.71  | -692.20   | -0.94            |
| 1.2 Dead+1.0 Wind 150 deg+1.0 Ice | 105.64        | 3.89                    | 6.76                    | 668.89  | -390.49   | -1.52            |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice | 105.64        | 0.00                    | 7.72                    | 764.76  | -13.12  | -3.08            |
| 1.2 Dead+1.0 Wind 210 deg+1.0 Ice | 105.64        | -3.96                   | 6.89                    | 680.75  | 371.96  | -5.84            |
| 1.2 Dead+1.0 Wind 240 deg+1.0 Ice | 105.64        | -7.18                   | 4.16                    | 412.37  | 679.89  | -5.65            |
| 1.2 Dead+1.0 Wind 270 deg+1.0 Ice | 105.64        | -8.13                   | -0.00                   | 10.94   | 774.77  | -1.93            |
| 1.2 Dead+1.0 Wind 300 deg+1.0 Ice | 105.64        | -6.84                   | -3.97                   | -373.83   | 652.50  | 0.94             |
| 1.2 Dead+1.0 Wind 330 deg+1.0 Ice | 105.64        | -3.89                   | -6.76                   | -644.99   | 366.29  | 1.52             |
| Dead+Wind 0 deg - Service         | 41.06         | 0.00                    | -7.71                   | -766.85   | 2.05  | 1.19             |
| Dead+Wind 30 deg - Service        | 41.06         | 3.73                    | -6.47                   | -651.07   | -371.96   | 3.56             |
| Dead+Wind 60 deg - Service        | 41.06         | 6.44                    | -3.73                   | -376.43   | -645.67   | 2.83             |
| Dead+Wind 90 deg - Service        | 41.06         | 7.69                    | -0.00                   | -1.54   | -765.68   | 0.61             |
| Dead+Wind 120 deg - Service       | 41.06         | 6.77                    | 3.91                    | 386.16  | -668.16   | -0.66            |
| Dead+Wind 150 deg - Service       | 41.06         | 3.66                    | 6.35                    | 635.93  | -365.49   | -0.25            |
| Dead+Wind 180 deg - Service       | 41.06         | -0.00                   | 7.28                    | 731.42  | 1.61  | -1.19            |
| Dead+Wind 210 deg - Service       | 41.06         | -3.73                   | 6.47                    | 647.56  | 375.62  | -3.56            |
| Dead+Wind 240 deg - Service       | 41.06         | -6.82                   | 3.95                    | 388.89  | 676.98  | -2.83            |
| Dead+Wind 270 deg - Service       | 41.06         | -7.69                   | 0.00                    | -1.97   | 769.34  | -0.61            |
| Dead+Wind 300 deg - Service       | 41.06         | -6.39                   | -3.70                   | -373.70   | 644.17  | 0.66             |
| Dead+Wind 330 deg - Service       | 41.06         | -3.66                   | -6.35                   | -639.43   | 369.15  | 0.25             |

### Maximum Tower Deflections - Service Wind

| Section No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|
| T1          | 160 - 156       | 2.88                      | 47                    | 0.17      | 0.01       |
| T2          | 156 - 152       | 2.74                      | 47                    | 0.17      | 0.01       |
| T3          | 152 - 148       | 2.59                      | 47                    | 0.17      | 0.01       |
| T4          | 148 - 144       | 2.45                      | 47                    | 0.17      | 0.01       |
| T5          | 144 - 140       | 2.30                      | 47                    | 0.17      | 0.01       |
| T6          | 140 - 120       | 2.17                      | 47                    | 0.16      | 0.01       |
| T7          | 120 - 100       | 1.51                      | 47                    | 0.13      | 0.00       |
| T8          | 100 - 80        | 0.99                      | 47                    | 0.10      | 0.00       |
| T9          | 80 - 60         | 0.60                      | 47                    | 0.08      | 0.00       |
| T10         | 60 - 40         | 0.33                      | 47                    | 0.05      | 0.00       |
| T11         | 40 - 20         | 0.14                      | 47                    | 0.03      | 0.00       |
| T12         | 20 - 0          | 0.04                      | 47                    | 0.01      | 0.00       |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
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|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

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

| <i>Elevation</i> | <i>Appurtenance</i>                  | <i>Gov. Load</i> | <i>Deflection</i> | <i>Tilt</i> | <i>Twist</i> | <i>Radius of Curvature</i> |
|------------------|--------------------------------------|------------------|-------------------|-------------|--------------|----------------------------|
| <i>ft</i>        |                                      | <i>Comb.</i>     | <i>in</i>         | <i>°</i>    | <i>°</i>     | <i>ft</i>                  |
| 157.00           | (2) LPA-80080/6CF w/ Mount Pipe      | 47               | 2.77              | 0.17        | 0.01         | 67191                      |
| 144.00           | APX16DWV-16DWV-S-E-A20 w/ Mount Pipe | 47               | 2.30              | 0.17        | 0.01         | 73012                      |
| 118.00           | (4) DB844H90E-XY w/ Mount Pipe       | 47               | 1.45              | 0.13        | 0.00         | 29254                      |
| 109.00           | PD1110                               | 47               | 1.20              | 0.12        | 0.00         | 32112                      |
| 90.00            | (2) 7770.00 w/ Mount Pipe            | 47               | 0.78              | 0.09        | 0.00         | 38869                      |
| 50.00            | KS24019-L112A                        | 47               | 0.23              | 0.04        | 0.00         | 59379                      |

### Bolt Design Data

| <i>Section No.</i> | <i>Elevation</i> | <i>Component Type</i> | <i>Bolt Grade</i> | <i>Bolt Size</i> | <i>Number Of Bolts</i> | <i>Maximum Load per Bolt K</i> | <i>Allowable Load per Bolt K</i> | <i>Ratio Load Allowable</i> | <i>Allowable Ratio</i> | <i>Criteria</i>    |
|--------------------|------------------|-----------------------|-------------------|------------------|------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------|--------------------|
|                    | <i>ft</i>        |                       |                   | <i>in</i>        |                        |                                |                                  |                             |                        |                    |
| T1                 | 160              | Leg                   | A325N             | 0.63             | 4                      | 0.29                           | 20.34                            | 0.014                       | 1                      | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.50             | 1                      | 0.62                           | 3.47                             | 0.178                       | 1.05                   | Member Block Shear |
| T2                 | 156              | Top Girt              | A325N             | 0.50             | 1                      | 0.29                           | 4.13                             | 0.069                       | 1.05                   | Member Bearing     |
|                    |                  | Diagonal              | A325N             | 0.50             | 1                      | 1.86                           | 3.47                             | 0.537                       | 1.05                   | Member Block Shear |
| T3                 | 152              | Diagonal              | A325N             | 0.50             | 1                      | 1.78                           | 3.47                             | 0.512                       | 1.05                   | Member Block Shear |
| T4                 | 148              | Diagonal              | A325N             | 0.50             | 1                      | 2.00                           | 3.47                             | 0.577                       | 1.05                   | Member Block Shear |
| T5                 | 144              | Diagonal              | A325N             | 0.50             | 1                      | 4.58                           | 7.50                             | 0.611                       | 1.05                   | Gusset Bearing     |
| T6                 | 140              | Leg                   | A325N             | 0.63             | 4                      | 10.62                          | 20.34                            | 0.522                       | 1.05                   | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.50             | 1                      | 4.14                           | 6.25                             | 0.662                       | 1.05                   | Member Block Shear |
| T7                 | 120              | Top Girt              | A325N             | 0.50             | 1                      | 0.74                           | 4.13                             | 0.180                       | 1.05                   | Member Bearing     |
|                    |                  | Leg                   | A325N             | 0.75             | 4                      | 16.73                          | 30.10                            | 0.556                       | 1.05                   | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.50             | 1                      | 4.64                           | 7.50                             | 0.618                       | 1.05                   | Gusset Bearing     |
| T8                 | 100              | Leg                   | A325N             | 0.88             | 4                      | 22.48                          | 41.56                            | 0.541                       | 1.05                   | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.50             | 1                      | 5.43                           | 12.40                            | 0.438                       | 1.05                   | Member Bearing     |
| T9                 | 80               | Leg                   | A325N             | 1.00             | 6                      | 18.80                          | 54.52                            | 0.345                       | 1.05                   | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.50             | 1                      | 5.48                           | 12.40                            | 0.442                       | 1.05                   | Member Bearing     |
| T10                | 60               | Leg                   | A325N             | 1.00             | 6                      | 22.02                          | 54.52                            | 0.404                       | 1.05                   | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.63             | 1                      | 6.22                           | 14.79                            | 0.421                       | 1.05                   | Gusset Bearing     |
| T11                | 40               | Leg                   | A325N             | 1.00             | 6                      | 25.15                          | 54.52                            | 0.461                       | 1.05                   | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.63             | 1                      | 6.21                           | 14.79                            | 0.420                       | 1.05                   | Gusset Bearing     |
| T12                | 20               | Leg                   | A449              | 1.00             | 6                      | 28.01                          | 54.52                            | 0.514                       | 1.05                   | Bolt Tension       |
|                    |                  | Diagonal              | A325N             | 0.63             | 1                      | 6.77                           | 14.79                            | 0.458                       | 1.05                   | Gusset Bearing     |

|  |         |                            |             |                   |
|--|---------|----------------------------|-------------|-------------------|
| <b>tnxTower</b><br><br><b>Tower Engineering Professionals</b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | Job     | HRT 088 943629 (BU 806387) | Page        | 17 of 20          |
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|  | Client  | Crown Castle               | Designed by | AN                |

## Compression Checks

### Leg Design Data (Compression)

| Section No. | Elevation<br>ft | Size                             | L<br>ft | L <sub>u</sub><br>ft | Kl/r           | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|----------------------------------|---------|----------------------|----------------|----------------------|---------------------|----------------------|---------------------------------|
| T1          | 160 - 156       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6<br>K=1.00 | 1.48                 | -3.42               | 49.90                | 0.069 <sup>1</sup>              |
| T2          | 156 - 152       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6<br>K=1.00 | 1.48                 | -4.23               | 49.90                | 0.085 <sup>1</sup>              |
| T3          | 152 - 148       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6<br>K=1.00 | 1.48                 | -7.19               | 49.90                | 0.144 <sup>1</sup>              |
| T4          | 148 - 144       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6<br>K=1.00 | 1.48                 | -10.33              | 49.90                | 0.207 <sup>1</sup>              |
| T5          | 144 - 140       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6<br>K=1.00 | 1.48                 | -17.31              | 49.90                | 0.347 <sup>1</sup>              |
| T6          | 140 - 120       | Rohn 2.875" x 0.276" (2.5 EH)    | 20.03   | 5.01                 | 65.0<br>K=1.00 | 2.25                 | -49.60              | 74.43                | 0.666 <sup>1</sup>              |
| T7          | 120 - 100       | ROHN 3 EH                        | 20.03   | 6.68                 | 70.5<br>K=1.00 | 3.02                 | -77.30              | 94.34                | 0.819 <sup>1</sup>              |
| T8          | 100 - 80        | Rohn 4" x 0.318" (3.5 EH) (GR)   | 20.03   | 6.68                 | 61.3<br>K=1.00 | 3.68                 | -104.94             | 148.29               | 0.708 <sup>1</sup>              |
| T9          | 80 - 60         | ROHN 4 EH (GR)                   | 20.04   | 6.68                 | 54.3<br>K=1.00 | 4.41                 | -132.14             | 192.91               | 0.685 <sup>1</sup>              |
| T10         | 60 - 40         | Rohn 5.563" x 0.375" (5 EH) (GR) | 20.03   | 10.02                | 65.4<br>K=1.00 | 6.11                 | -155.68             | 246.97               | 0.630 <sup>1</sup>              |
| T11         | 40 - 20         | Rohn 5.563" x 0.375" (5 EH) (GR) | 20.04   | 10.02                | 65.4<br>K=1.00 | 6.11                 | -179.76             | 246.94               | 0.728 <sup>1</sup>              |
| T12         | 20 - 0          | Rohn 6.625" x 0.432" (6 EH) (GR) | 20.03   | 10.02                | 54.8<br>K=1.00 | 8.40                 | -203.21             | 381.11               | 0.533 <sup>1</sup>              |

\* DL controls

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Diagonal Design Data (Compression)

| Section No. | Elevation<br>ft | Size   | L<br>ft | L <sub>u</sub><br>ft | Kl/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|--|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T1          | 160 - 156       | L 1.5 x 1.5 x 1/8                                    | 6.94    | 3.37                 | 136.4<br>K=1.00 | 0.36                 | -0.64               | 5.53                 | 0.115 <sup>1</sup>              |
| T2          | 156 - 152       | L 1.5 x 1.5 x 1/8                                    | 6.95    | 3.37                 | 136.6<br>K=1.00 | 0.36                 | -1.85               | 5.51                 | 0.336 <sup>1</sup>              |
| T3          | 152 - 148       | L 1.5 x 1.5 x 1/8                                    | 6.95    | 3.37                 | 136.7<br>K=1.00 | 0.36                 | -1.81               | 5.50                 | 0.330 <sup>1</sup>              |
| T4          | 148 - 144       | L 1.5 x 1.5 x 1/8                                    | 6.96    | 3.38                 | 136.9<br>K=1.00 | 0.36                 | -1.96               | 5.49                 | 0.358 <sup>1</sup>              |
| T5          | 144 - 140       | L 2 x 2 x 1/4  | 6.97    | 3.38                 | 107.8<br>K=1.04 | 0.94                 | -4.70               | 23.09                | 0.204 <sup>1</sup>              |
| T6          | 140 - 120       | 2L 1.5 x 1.5 x 1/8 (3/16)                            | 8.89    | 4.48                 | 119.2<br>K=1.00 | 0.72                 | -3.72               | 13.64                | 0.273 <sup>1</sup>              |
| T7          | 120 - 100       | 2L 'a' > 25.65 in - 57<br>2L 2 x 2 x 3/16 (3/16)     | 11.36   | 5.76                 | 116.3<br>K=1.00 | 1.43                 | -4.60               | 28.59                | 0.161 <sup>1</sup>              |
| T8          | 100 - 80        | 2L 'a' > 33.07 in - 84<br>2L 2.5 x 2.5 x 3/16 (3/16) | 13.11   | 6.63                 | 107.8<br>K=1.00 | 1.80                 | -5.56               | 38.88                | 0.143 <sup>1</sup>              |
|             |                 | 2L 'a' > 37.95 in - 103                              |         |                      |                 |                      |                     |                      |                                 |

|  |                |                            |                    |                   |
|--|----------------|----------------------------|--------------------|-------------------|
| <b>tnxTower</b><br><br><b>Tower Engineering Professionals</b><br>326 Tryon Road<br>Raleigh, NC 27603<br>Phone: (919) 661-6351<br>FAX: (919) 661-6350 | <b>Job</b>     | HRT 088 943629 (BU 806387) | <b>Page</b>        | 18 of 20          |
|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| Section No. | Elevation<br>ft | Size   | L<br>ft | L <sub>u</sub><br>ft | Kl/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|--|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T9          | 80 - 60         | 2L 3 x 3 x 3/16 (1/4)  | 14.99   | 7.57                 | 102.3<br>K=1.00 | 2.18                 | -5.57               | 46.82                | 0.119 <sup>1</sup>              |
| T10         | 60 - 40         | 2L 'a' > 43.26 in - 124<br>2L 3 x 3 x 3/16 (1/4)                                   | 18.13   | 9.22                 | 124.6<br>K=1.00 | 2.18                 | -6.52               | 36.09                | 0.181 <sup>1</sup>              |
| T11         | 40 - 20         | 2L 'a' > 52.70 in - 145<br>2L 3 x 3 x 1/4 (1/4)                                    | 19.90   | 10.11                | 136.6<br>K=1.00 | 2.88                 | -6.50               | 42.37                | 0.153 <sup>1</sup>              |
| T12         | 20 - 0          | 2L 'a' > 57.94 in - 161<br>2L 3.5 x 3.5 x 1/4 (1/4)<br><br>2L 'a' > 62.90 in - 175 | 21.70   | 11.00                | 127.9<br>K=1.00 | 3.38                 | -7.27               | 55.17                | 0.132 <sup>1</sup>              |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Compression)

| Section No. | Elevation<br>ft | Size          | L<br>ft | L <sub>u</sub><br>ft | Kl/r            | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|---------------|---------|----------------------|-----------------|----------------------|---------------------|----------------------|---------------------------------|
| T1          | 160 - 156       | L 2 x 2 x 1/8 | 6.52    | 6.11                 | 184.6<br>K=1.00 | 0.48                 | -0.28               | 4.07                 | 0.069 <sup>1</sup>              |
| T6          | 140 - 120       | L 2 x 2 x 1/8 | 6.56    | 6.11                 | 184.6<br>K=1.00 | 0.48                 | -0.67               | 4.07                 | 0.164 <sup>1</sup>              |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Tension Checks

### Leg Design Data (Tension)

| Section No. | Elevation<br>ft | Size                             | L<br>ft | L <sub>u</sub><br>ft | Kl/r | A<br>in <sup>2</sup> | P <sub>u</sub><br>K | φP <sub>n</sub><br>K | Ratio<br>$\frac{P_u}{\phi P_n}$ |
|-------------|-----------------|----------------------------------|---------|----------------------|------|----------------------|---------------------|----------------------|---------------------------------|
| T2          | 156 - 152       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6 | 1.48                 | 0.95                | 66.48                | 0.014 <sup>1</sup>              |
| T3          | 152 - 148       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6 | 1.48                 | 4.40                | 66.48                | 0.066 <sup>1</sup>              |
| T4          | 148 - 144       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6 | 1.48                 | 7.31                | 66.48                | 0.110 <sup>1</sup>              |
| T5          | 144 - 140       | Rohn 2.375" x 0.218" (2 EH)      | 4.00    | 4.00                 | 62.6 | 1.48                 | 11.67               | 66.48                | 0.176 <sup>1</sup>              |
| T6          | 140 - 120       | Rohn 2.875" x 0.276" (2.5 EH)    | 20.03   | 5.01                 | 65.0 | 2.25                 | 42.50               | 101.41               | 0.419 <sup>1</sup>              |
| T7          | 120 - 100       | ROHN 3 EH                        | 20.03   | 6.68                 | 70.5 | 3.02                 | 66.91               | 135.72               | 0.493 <sup>1</sup>              |
| T8          | 100 - 80        | Rohn 4" x 0.318" (3.5 EH) (GR)   | 20.03   | 6.68                 | 61.3 | 3.68                 | 89.93               | 165.53               | 0.543 <sup>1</sup>              |
| T9          | 80 - 60         | ROHN 4 EH (GR)                   | 20.04   | 6.68                 | 54.3 | 4.41                 | 112.82              | 198.34               | 0.569 <sup>1</sup>              |
| T10         | 60 - 40         | Rohn 5.563" x 0.375" (5 EH) (GR) | 20.03   | 10.02                | 65.4 | 6.11                 | 132.13              | 275.04               | 0.480 <sup>1</sup>              |
| T11         | 40 - 20         | Rohn 5.563" x 0.375" (5 EH) (GR) | 20.04   | 10.02                | 65.4 | 6.11                 | 150.92              | 275.04               | 0.549 <sup>1</sup>              |
| T12         | 20 - 0          | Rohn 6.625" x 0.432" (6 EH) (GR) | 20.03   | 10.02                | 54.8 | 8.40                 | 168.09              | 378.22               | 0.444 <sup>1</sup>              |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

|  |         |                            |             |                   |
|--|---------|----------------------------|-------------|-------------------|
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|  | Project | TEP No. 45443.495344       | Date        | 13:07:16 02/08/21 |
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### Diagonal Design Data (Tension)

| Section No. | Elevation | Size                       | L     | L <sub>u</sub> | Kl/r  | A               | P <sub>u</sub> | φP <sub>n</sub> | Ratio $\frac{P_u}{\phi P_n}$ |
|-------------|-----------|----------------------------|-------|----------------|-------|-----------------|----------------|-----------------|------------------------------|
|             | ft        |                            | ft    | ft             |       | in <sup>2</sup> | K              | K               |                              |
| T1          | 160 - 156 | L 1.5 x 1.5 x 1/8          | 6.94  | 3.37           | 89.6  | 0.21            | 0.62           | 9.18            | 0.067 <sup>1</sup>           |
| T2          | 156 - 152 | L 1.5 x 1.5 x 1/8          | 6.95  | 3.37           | 89.6  | 0.21            | 1.86           | 9.18            | 0.203 <sup>1</sup>           |
| T3          | 152 - 148 | L 1.5 x 1.5 x 1/8          | 6.95  | 3.37           | 89.7  | 0.21            | 1.78           | 9.18            | 0.194 <sup>1</sup>           |
| T4          | 148 - 144 | L 1.5 x 1.5 x 1/8          | 6.96  | 3.38           | 89.8  | 0.21            | 2.00           | 9.18            | 0.218 <sup>1</sup>           |
| T5          | 144 - 140 | L 2 x 2 x 1/4              | 6.97  | 3.38           | 68.7  | 0.59            | 4.58           | 28.58           | 0.160 <sup>1</sup>           |
| T6          | 140 - 120 | 2L 1.5 x 1.5 x 1/8 (3/16)  | 7.62  | 3.85           | 101.9 | 0.42            | 4.14           | 18.35           | 0.226 <sup>1</sup>           |
|             |           | 2L 'a' > 22.05 in - 76     |       |                |       |                 |                |                 |                              |
| T7          | 120 - 100 | 2L 2 x 2 x 3/16 (3/16)     | 10.80 | 5.48           | 108.6 | 0.90            | 4.64           | 39.00           | 0.119 <sup>1</sup>           |
|             |           | 2L 'a' > 31.49 in - 91     |       |                |       |                 |                |                 |                              |
| T8          | 100 - 80  | 2L 2.5 x 2.5 x 3/16 (3/16) | 13.11 | 6.63           | 103.8 | 1.18            | 5.43           | 51.23           | 0.106 <sup>1</sup>           |
|             |           | 2L 'a' > 37.95 in - 104    |       |                |       |                 |                |                 |                              |
| T9          | 80 - 60   | 2L 3 x 3 x 3/16 (1/4)      | 14.99 | 7.57           | 98.1  | 1.46            | 5.48           | 63.47           | 0.086 <sup>1</sup>           |
|             |           | 2L 'a' > 43.26 in - 125    |       |                |       |                 |                |                 |                              |
| T10         | 60 - 40   | 2L 3 x 3 x 3/16 (1/4)      | 18.13 | 9.22           | 119.4 | 1.42            | 6.22           | 61.94           | 0.100 <sup>1</sup>           |
|             |           | 2L 'a' > 52.70 in - 145    |       |                |       |                 |                |                 |                              |
| T11         | 40 - 20   | 2L 3 x 3 x 1/4 (1/4)       | 19.90 | 10.11          | 132.0 | 1.88            | 6.21           | 81.56           | 0.076 <sup>1</sup>           |
|             |           | 2L 'a' > 57.94 in - 160    |       |                |       |                 |                |                 |                              |
| T12         | 20 - 0    | 2L 3.5 x 3.5 x 1/4 (1/4)   | 21.70 | 11.00          | 122.2 | 2.25            | 6.77           | 97.88           | 0.069 <sup>1</sup>           |
|             |           | 2L 'a' > 62.90 in - 175    |       |                |       |                 |                |                 |                              |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Tension)

| Section No. | Elevation | Size          | L    | L <sub>u</sub> | Kl/r  | A               | P <sub>u</sub> | φP <sub>n</sub> | Ratio $\frac{P_u}{\phi P_n}$ |
|-------------|-----------|---------------|------|----------------|-------|-----------------|----------------|-----------------|------------------------------|
|             | ft        |               | ft   | ft             |       | in <sup>2</sup> | K              | K               |                              |
| T1          | 160 - 156 | L 2 x 2 x 1/8 | 6.52 | 6.11           | 121.2 | 0.30            | 0.29           | 13.25           | 0.022 <sup>1</sup>           |
| T6          | 140 - 120 | L 2 x 2 x 1/8 | 6.56 | 6.11           | 121.2 | 0.30            | 0.74           | 13.25           | 0.056 <sup>1</sup>           |

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Section Capacity Table

| Section No. | Elevation | Component Type | Size                             | Critical Element | P K     | φP <sub>allow</sub> K | % Capacity | Pass Fail |
|-------------|-----------|----------------|----------------------------------|------------------|---------|-----------------------|------------|-----------|
| T1          | 160 - 156 | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 3                | -3.42   | 49.90                 | 6.9        | Pass      |
| T2          | 156 - 152 | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 15               | -4.23   | 52.40                 | 8.1        | Pass      |
| T3          | 152 - 148 | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 24               | -7.19   | 52.40                 | 13.7       | Pass      |
| T4          | 148 - 144 | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 33               | -10.33  | 52.40                 | 19.7       | Pass      |
| T5          | 144 - 140 | Leg            | Rohn 2.375" x 0.218" (2 EH)      | 42               | -17.31  | 52.40                 | 33.0       | Pass      |
| T6          | 140 - 120 | Leg            | Rohn 2.875" x 0.276" (2.5 EH)    | 49               | -49.60  | 78.15                 | 63.5       | Pass      |
| T7          | 120 - 100 | Leg            | ROHN 3 EH                        | 79               | -77.30  | 99.06                 | 78.0       | Pass      |
| T8          | 100 - 80  | Leg            | Rohn 4" x 0.318" (3.5 EH) (GR)   | 100              | -104.94 | 155.70                | 67.4       | Pass      |
| T9          | 80 - 60   | Leg            | ROHN 4 EH (GR)                   | 121              | -132.14 | 202.56                | 65.2       | Pass      |
| T10         | 60 - 40   | Leg            | Rohn 5.563" x 0.375" (5 EH) (GR) | 142              | -155.68 | 259.31                | 60.0       | Pass      |
| T11         | 40 - 20   | Leg            | Rohn 5.563" x 0.375" (5 EH) (GR) | 157              | -179.76 | 259.29                | 69.3       | Pass      |
| T12         | 20 - 0    | Leg            | Rohn 6.625" x 0.432" (6 EH) (GR) | 172              | -203.21 | 400.17                | 50.8       | Pass      |

|  |                |                            |                    |                   |
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|  | <b>Project</b> | TEP No. 45443.495344       | <b>Date</b>        | 13:07:16 02/08/21 |
|  | <b>Client</b>  | Crown Castle               | <b>Designed by</b> | AN                |

| Section No. | Elevation ft | Component Type | Size                       | Critical Element | P K   | $\phi P_{allow}$ K | % Capacity           | Pass Fail   |
|-------------|--------------|----------------|----------------------------|------------------|-------|--------------------|----------------------|-------------|
| T1          | 160 - 156    | Diagonal       | L 1.5 x 1.5 x 1/8          | 9                | -0.64 | 5.80               | 11.0                 | Pass        |
| T2          | 156 - 152    | Diagonal       | L 1.5 x 1.5 x 1/8          | 19               | -1.85 | 5.79               | 17.0 (b)             | Pass        |
| T3          | 152 - 148    | Diagonal       | L 1.5 x 1.5 x 1/8          | 27               | -1.81 | 5.78               | 32.0                 | Pass        |
| T4          | 148 - 144    | Diagonal       | L 1.5 x 1.5 x 1/8          | 37               | -1.96 | 5.77               | 51.2 (b)             | Pass        |
| T5          | 144 - 140    | Diagonal       | L 2 x 2 x 1/4              | 45               | -4.70 | 24.24              | 31.4                 | Pass        |
| T6          | 140 - 120    | Diagonal       | 2L 1.5 x 1.5 x 1/8 (3/16)  | 57               | -3.72 | 14.33              | 48.8 (b)             | Pass        |
| T7          | 120 - 100    | Diagonal       | 2L 2 x 2 x 3/16 (3/16)     | 84               | -4.60 | 30.02              | 34.1                 | Pass        |
| T8          | 100 - 80     | Diagonal       | 2L 2.5 x 2.5 x 3/16 (3/16) | 103              | -5.56 | 40.83              | 54.9 (b)             | Pass        |
| T9          | 80 - 60      | Diagonal       | 2L 3 x 3 x 3/16 (1/4)      | 124              | -5.57 | 49.16              | 19.4                 | Pass        |
| T10         | 60 - 40      | Diagonal       | 2L 3 x 3 x 3/16 (1/4)      | 145              | -6.52 | 37.89              | 58.2 (b)             | Pass        |
| T11         | 40 - 20      | Diagonal       | 2L 3 x 3 x 1/4 (1/4)       | 161              | -6.50 | 44.49              | 26.0                 | Pass        |
| T12         | 20 - 0       | Diagonal       | 2L 3.5 x 3.5 x 1/4 (1/4)   | 175              | -7.27 | 57.93              | 63.1 (b)             | Pass        |
| T1          | 160 - 156    | Top Girt       | L 2 x 2 x 1/8              | 4                | -0.28 | 4.27               | 15.3                 | Pass        |
| T6          | 140 - 120    | Top Girt       | L 2 x 2 x 1/8              | 52               | -0.67 | 4.27               | 58.8 (b)             | Pass        |
|             |              |                |                            |                  |       |                    | 41.7 (b)             | Pass        |
|             |              |                |                            |                  |       |                    | 11.3                 | Pass        |
|             |              |                |                            |                  |       |                    | 42.1 (b)             | Pass        |
|             |              |                |                            |                  |       |                    | 17.2                 | Pass        |
|             |              |                |                            |                  |       |                    | 40.1 (b)             | Pass        |
|             |              |                |                            |                  |       |                    | 14.6                 | Pass        |
|             |              |                |                            |                  |       |                    | 40.0 (b)             | Pass        |
|             |              |                |                            |                  |       |                    | 12.5                 | Pass        |
|             |              |                |                            |                  |       |                    | 43.6 (b)             | Pass        |
|             |              |                |                            |                  |       |                    | Summary              |             |
|             |              |                |                            |                  |       |                    | Leg (T7)             | Pass        |
|             |              |                |                            |                  |       |                    | Diagonal (T6)        | Pass        |
|             |              |                |                            |                  |       |                    | Top Girt (T6)        | Pass        |
|             |              |                |                            |                  |       |                    | Bolt Checks          | Pass        |
|             |              |                |                            |                  |       |                    | <b>RATING = 78.0</b> | <b>Pass</b> |

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



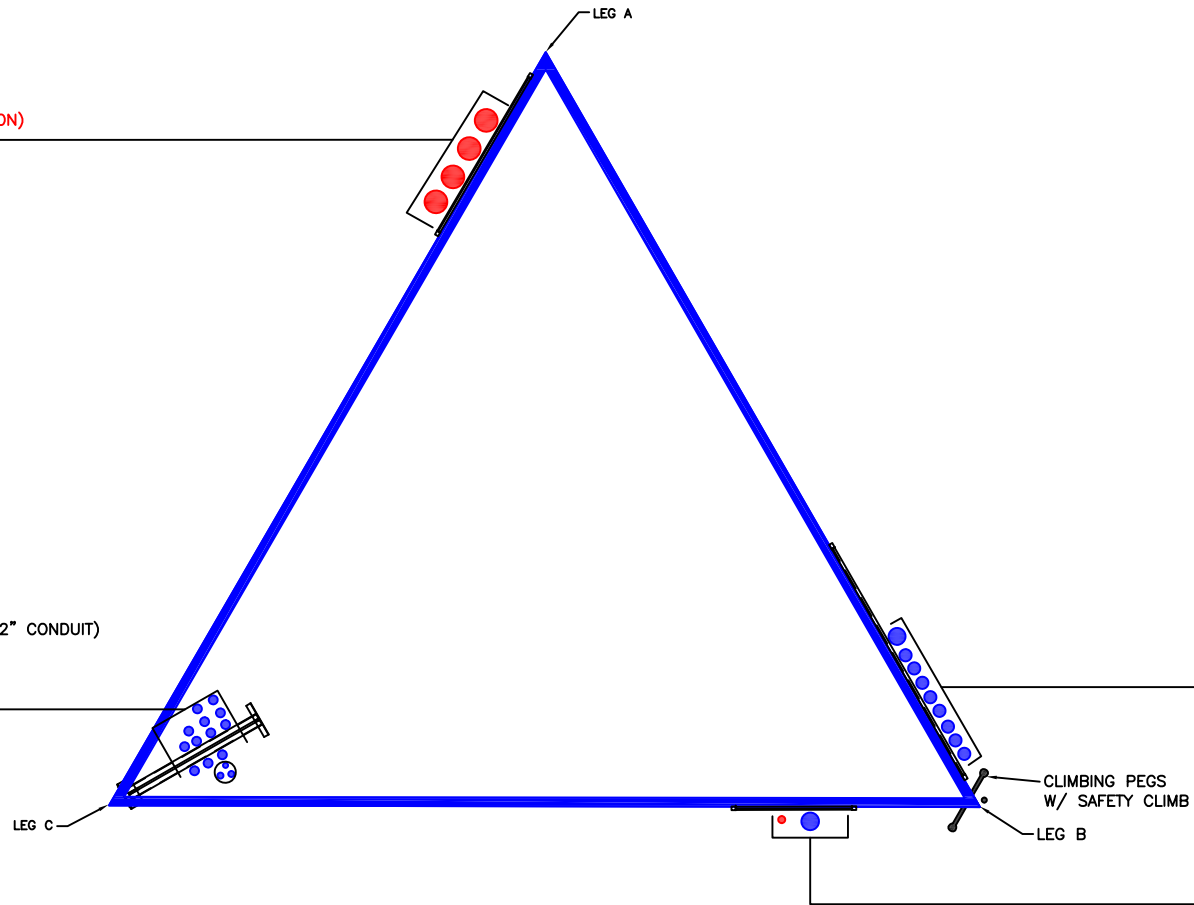


(PROPOSED EQUIPMENT CONFIGURATION)  
(4) 1-5/8" TO 144 FT LEVEL

(OTHER CONSIDERED EQUIPMENT—IN 2" CONDUIT)  
(1) 3/8" TO 90 FT LEVEL  
(2) 7/16" TO 90 FT LEVEL  
(OTHER CONSIDERED EQUIPMENT)  
(12) 7/8" TO 90 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)  
(8) 7/8" TO 157 FT LEVEL  
(1) 1-5/8" TO 157 FT LEVEL

(PROPOSED EQUIPMENT CONFIGURATION)  
(1) 1/2" TO 50 FT LEVEL  
(OTHER CONSIDERED EQUIPMENT)  
(1) 1-1/4" TO 109 FT LEVEL



## **APPENDIX C**

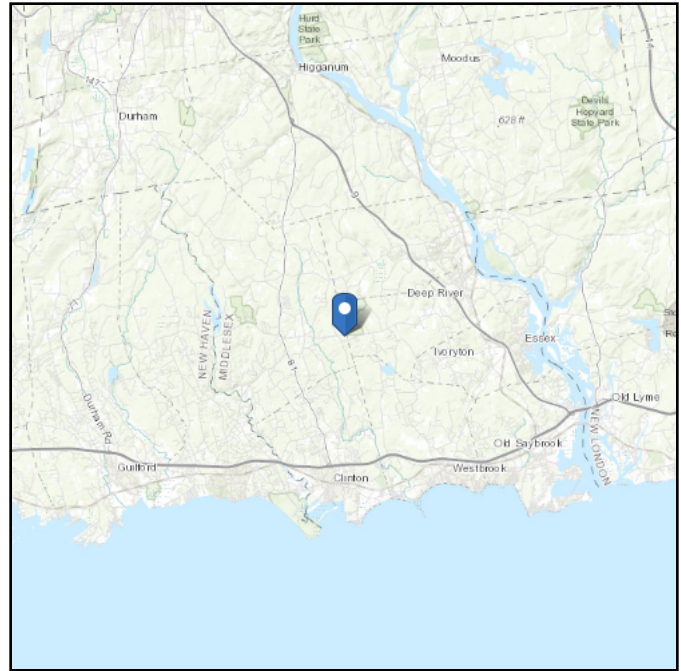
### **ADDITIONAL CALCULATIONS**

# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** II  
**Soil Class:** D - Stiff Soil

**Elevation:** 416.51 ft (NAVD 88)  
**Latitude:** 41.357342  
**Longitude:** -72.519953



## Wind

### Results:

|              |  |
|--------------|--|
| Wind Speed:  | Use 130mph per Municipality Design Requirements. |
| 10-year MRI  | 78 Vmph  |
| 25-year MRI  | 88 Vmph  |
| 50-year MRI  | 96 Vmph  |
| 100-year MRI | 106 Vmph   |

**Data Source:** ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

**Date Accessed:** Thu Feb 04 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

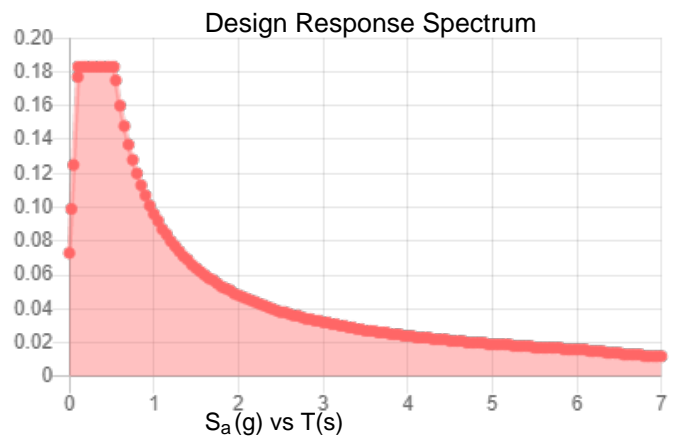
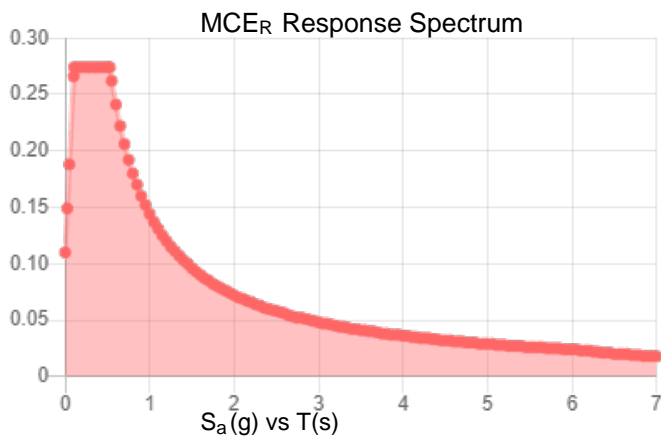
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

**Site Soil Class:** D - Stiff Soil

**Results:**

|            |       |             |       |
|------------|-------|-------------|-------|
| $S_S$ :    | 0.171 | $S_{DS}$ :  | 0.183 |
| $S_1$ :    | 0.06  | $S_{D1}$ :  | 0.096 |
| $F_a$ :    | 1.6   | $T_L$ :     | 6     |
| $F_v$ :    | 2.4   | PGA :       | 0.087 |
| $S_{MS}$ : | 0.274 | $PGA_M$ :   | 0.138 |
| $S_{M1}$ : | 0.144 | $F_{PGA}$ : | 1.6   |
|            |       | $I_e$ :     | 1     |

**Seismic Design Category** B



**Data Accessed:**

Thu Feb 04 2021

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

**Results:**

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

**Date Accessed:** Thu Feb 04 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

---

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

## Self Support Anchor Rod Capacity



| Site Info |                |  |
|-----------|----------------|--|
| BU #      | 806387         |  |
| Site Name | HRT 088 943629 |  |
| Order #   | 538771 Rev.1   |  |

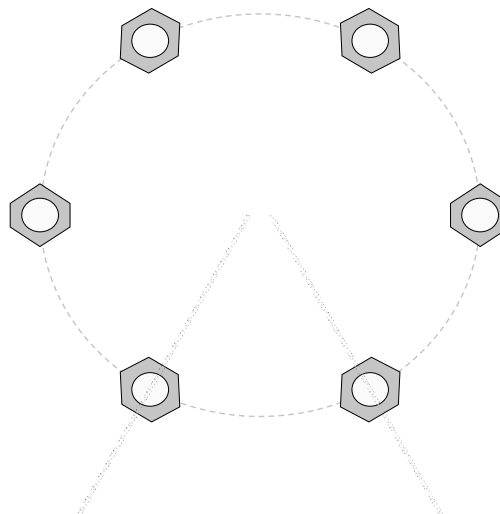
| Analysis Considerations |     |  |
|-------------------------|-----|--|
| TIA-222 Revision        | H   |  |
| Grout Considered:       | Yes |  |
| $l_{ar}$ (in)           | 2   |  |

| Applied Loads      |        |        |
|--------------------|--------|--------|
|                    | Comp.  | Uplift |
| Axial Force (kips) | 209.13 | 172.22 |
| Shear Force (kips) | 22.63  | 19.00  |

\*TIA-222-H Section 15.5 Applied

| Considered Eccentricity   |       |  |
|---------------------------|-------|--|
| Leg Mod Eccentricity (in) | 0.000 |  |
| Anchor Rod N.A Shift (in) | 0.000 |  |
| Total Eccentricity (in)   | 0.000 |  |

\*Anchor Rod Eccentricity Applied



### Connection Properties

### Analysis Results

#### Anchor Rod Data

(6) 1"  $\phi$  bolts (A449 N;  $F_y=92$  ksi,  $F_u=120$  ksi)  
 $l_{ar}$  (in): 2

#### Anchor Rod Summary

(units of kips, kip-in)

|               |                     |                      |
|---------------|---------------------|----------------------|
| $Pu_t = 28.7$ | $\phi Pn_t = 54.54$ | <b>Stress Rating</b> |
| $Vu = 3.17$   | $\phi Vn = 35.34$   | <b>27.1%</b>         |
| $Mu = n/a$    | $\phi Mn = n/a$     | <b>Pass</b>          |



# Pier and Pad Foundation



BU # : 806387  
 Site Name: HRT 088 943629  
 App. Number: 538771 Rev.1

TIA-222 Revision: H  
 Tower Type: Self Support

Top & Bot. Pad Rein. Different?: ☐  
 Block Foundation?: ☐  
 Rectangular Pad?: ☐

| Superstructure Analysis Reactions  |        |      |
|------------------------------------|--------|------|
| Compression, $P_{comp}$ :          | 209.13 | kips |
| Compression Shear, $V_{u\_comp}$ : | 22.63  | kips |
| Uplift, $P_{uplift}$ :             | 172.22 | kips |
| Uplift Shear, $V_{u\_uplift}$ :    | 19     | kips |
| Tower Height, $H$ :                | 160    | ft   |
| Base Face Width, $BW$ :            | 20.86  | ft   |
| BP Dist. Above Fdn, $bp_{dist}$ :  | 3      | in   |

| Pier Properties                  |          |    |
|----------------------------------|----------|----|
| Pier Shape:                      | Circular |    |
| Pier Diameter, $dpier$ :         | 3.5      | ft |
| Ext. Above Grade, $E$ :          | 0.5      | ft |
| Pier Rebar Size, $Sc$ :          | 8        |    |
| Pier Rebar Quantity, $mc$ :      | 16       |    |
| Pier Tie/Spiral Size, $St$ :     | 3        |    |
| Pier Tie/Spiral Quantity, $mt$ : | 10       |    |
| Pier Reinforcement Type:         | Tie      |    |
| Pier Clear Cover, $cc_{pier}$ :  | 3        | in |

| Pad Properties                               |     |    |
|--|-----|----|
| Depth, $D$ :                                 | 12  | ft |
| Pad Width, $W_1$ :                           | 9.4 | ft |
| Pad Thickness, $T$ :                         | 2   | ft |
| Pad Rebar Size (Bottom dir. 2), $Sp_2$ :     | 7   |    |
| Pad Rebar Quantity (Bottom dir. 2), $mp_2$ : | 11  |    |
| Pad Clear Cover, $cc_{pad}$ :                | 3   | in |

| Material Properties                     |     |     |
|---|-----|-----|
| Rebar Grade, $F_y$ :                    | 60  | ksi |
| Concrete Compressive Strength, $F'_c$ : | 3   | ksi |
| Dry Concrete Density, $\delta c$ :      | 150 | pcf |

| Soil Properties                    |        |         |
|------------------------------------|--------|---------|
| Total Soil Unit Weight, $\gamma$ : | 115    | pcf     |
| Ultimate Net Bearing, $Q_{net}$ :  | 16.000 | ksf     |
| Cohesion, $C_u$ :                  | 0.000  | ksf     |
| Friction Angle, $\phi$ :           | 35     | degrees |
| SPT Blow Count, $N_{blows}$ :      |        |         |
| Base Friction, $\mu$ :             |        |         |
| Neglected Depth, $N$ :             | 4.00   | ft      |
| Foundation Bearing on Rock?        | No     |         |
| Groundwater Depth, $gw$ :          | N/A    | ft      |

| Foundation Analysis Checks        |          |        |         |       |
|-----------------------------------|----------|--------|---------|-------|
|                                   | Capacity | Demand | Rating* | Check |
| Uplift (kips)                     | 288.91   | 172.22 | 56.8%   | Pass  |
| Lateral (Sliding) (kips)          | 112.61   | 19.00  | 16.1%   | Pass  |
| Bearing Pressure (ksf)            | 13.04    | 4.16   | 30.4%   | Pass  |
| Pier Flexure (Comp.) (kip*ft)     | 1086.60  | 237.62 | 20.8%   | Pass  |
| Pier Flexure (Tension) (kip*ft)   | 722.64   | 199.50 | 26.3%   | Pass  |
| Pier Compression (kip)            | 2214.70  | 227.31 | 9.8%    | Pass  |
| Pad Flexure (kip*ft)              | 564.27   | 99.08  | 16.7%   | Pass  |
| Pad Shear - 1-way (kips)          | 182.45   | 29.81  | 15.6%   | Pass  |
| Pad Shear - 2-way (Comp) (ksi)    | 0.164    | 0.044  | 25.5%   | Pass  |
| Flexural 2-way (Comp) (kip*ft)    | 1128.55  | 142.57 | 12.0%   | Pass  |
| Pad Shear - 2-way (Uplift) (ksi)  | 0.164    | 0.052  | 30.4%   | Pass  |
| Flexural 2-way (Tension) (kip*ft) | 1128.55  | 119.70 | 10.1%   | Pass  |

\*Rating per TIA-222-H Section 15.5

|                     |       |
|---------------------|-------|
| Soil Rating*:       | 56.8% |
| Structural Rating*: | 30.4% |

<--Toggle between Gross and Net

# Exhibit E

## **Mount Analysis**

Date: **January 31, 2021**

Darcy Tarr  
Crown Castle  
3530 Toringdon Way, Suite 300  
Charlotte, NC 28277  
(704) 405-6589

**INFINIGY**  
FROM ZERO TO INFINIGY  
the solutions are endless  
Infinigy Engineering, PLLC  
1033 Watervliet Shaker Road  
Albany, NY 12205  
518-690-0790  
structural@infinigy.com

**Subject:** **Mount Analysis Report**

**Carrier Designation:** **Sprint PCS Retain**  
**Carrier Site Number:** CTHA808A  
**Carrier Site Name:** CTHA808A

**Crown Castle Designation:** **Crown Castle BU Number:** 806387  
**Crown Castle Site Name:** HRT 088 943629  
**Crown Castle JDE Job Number:** 628836  
**Crown Castle Order Number:** 538771 Rev. 0

**Engineering Firm Designation:** **Infinigy Engineering, PLLC Report Designation:** 1039-Z0001-B

**Site Data:** **#14 Route 80, Killingworth, Middlesex County, CT, 06419**  
**Latitude 41°21'26.43", Longitude -72°31'11.83"**

**Structure Information:** **Tower Height & Type:** **160.0 ft Self Support**  
**Mount Elevation:** **144.0 ft**  
**Mount Type:** **16.0 ft Sector Frame**

Dear Darcy Tarr,

Infinigy Engineering, PLLC is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of Sprint PCS's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

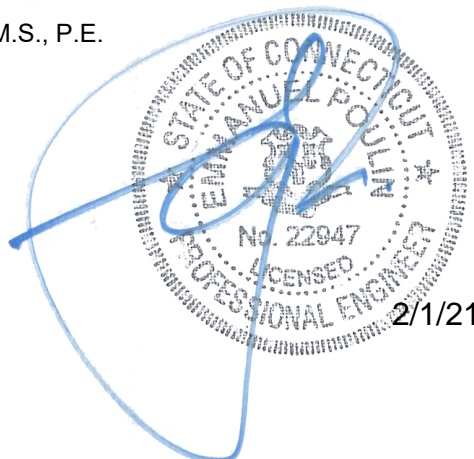
**Sector Frame**

**Sufficient - 40.6%**

This analysis has been performed in accordance with the 2018 Connecticut State Building Code and Appendix N based upon an ultimate 3-second gust wind speed of 130 mph. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: Jacques S. Grimaldi, M.S., P.E.

Respectfully Submitted by:  
Emmanuel Poulin, P.E.  
518-690-0790  
[structural@infinigy.com](mailto:structural@infinigy.com)  
CT PE License No. 22947



2/1/21

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Additional Calculations

## 1) INTRODUCTION

This is an existing 3 sector 16.0 ft Sector Frame, designed by Rohn.

## 2) ANALYSIS CRITERIA

|   |  |
|---|--|
| <b>Building Code:</b>                   | 2015 IBC / 2018 Connecticut State Building Code and Appendix N |
| <b>TIA-222 Revision:</b>                | TIA-222-H  |
| <b>Risk Category:</b>                   | II   |
| <b>Ultimate Wind Speed:</b>             | 130 mph  |
| <b>Exposure Category:</b>               | B  |
| <b>Topographic Factor at Base:</b>      | 1.0  |
| <b>Topographic Factor at Mount:</b>     | 1.0  |
| <b>Ice Thickness:</b>                   | 1.5 in   |
| <b>Wind Speed with Ice:</b>             | 50 mph   |
| <b>Seismic S<sub>s</sub>:</b>           | 0.173  |
| <b>Seismic S<sub>1</sub>:</b>           | 0.061  |
| <b>Live Loading Wind Speed:</b>         | 30 mph   |
| <b>Man Live Load at Mid/End-Points:</b> | 250 lb   |
| <b>Man Live Load at Mount Pipes:</b>    | 500 lb   |

**Table 1 - Proposed Equipment Configuration**

| Mount Centerline (ft) | Antenna Centerline (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model                 | Mount / Modification Details                                  |
|-----------------------|-------------------------|--------------------|----------------------|-------------------------------|---|
| 144.0                 | 144.0                   | 3                  | Ericsson             | AIR6449 B41 T-MOBILE          | 16.0 ft Sector Frame Addition of (1) 8' pipe mount per sector |
|                       |                         | 3                  | RFS/Celwave          | APX16DWV-16DWV-S-E-A20        |   |
|                       |                         | 3                  | RFS/Celwave          | APXVAALL24 43-U-NA20 TMO      |   |
|                       |                         | 3                  | Ericsson             | RADIO 4415 B66A CCIV3         |   |
|                       |                         | 3                  | Ericsson             | RADIO 4424 B25 TMO            |   |
|                       |                         | 3                  | Ericsson             | RADIO 4449 B71 B85A_ T-MOBILE |   |

## 3) ANALYSIS PROCEDURE

**Table 2 - Documents Provided**

| Document                | Remarks                | Reference       | Source    |
|-------------------------|------------------------|-----------------|-----------|
| Crown Application       | Sprint PCS Application | 538771 Rev. 0   | CCI Sites |
| Loading Document        | Sprint PCS             | RFDS Version: 1 | TSA       |
| Previous Mount Analysis | Infinigy Engineering   | 7575649         | CCI Sites |

### 3.1) Analysis Method

RISA-3D (Version 19.0.1), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

Infinigy Mount Analysis Tool V2.1.4, a tool internally developed by Infinigy, was used to calculate wind loading on all appurtenances, dishes and mount members for various loading cases. Selected output from the analysis is included in Appendix B "Software Input Calculations".

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

### 3.2) Assumptions

- 1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- 2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
- 3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
- 4) The analysis will be required to be revised if the existing conditions in the field differ from those shown in the above-referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.
- 5) Prior structural modifications to the tower mounting system are assumed to be installed as shown per available data.
- 6) Steel grades have been assumed as follows, unless noted otherwise:

|                                    |                     |
|------------------------------------|---------------------|
| Channel, Solid Round, Angle, Plate | ASTM A36 (GR 36)    |
| HSS (Rectangular)                  | ASTM A500 (GR B-46) |
| Pipe                               | ASTM A53 (GR 35)    |
| Connection Bolts                   | ASTM A307           |

This analysis may be affected if any assumptions are not valid or have been made in error. Infinigy Engineering, PLLC should be notified to determine the effect on the structural integrity of the antenna mounting system.



#### 4) ANALYSIS RESULTS

**Table 3 - Mount Component Stresses vs. Capacity (Sector Frame, All Sectors)**

| Notes | Component           | Critical Member | Centerline (ft) | % Capacity | Pass / Fail |
|-------|---------------------|-----------------|-----------------|------------|-------------|
| 1, 2  | Mount Pipe(s)       | MP2             | 144.0           | 40.6       | Pass        |
|       | Horizontal(s)       | M2              |                 | 31.6       | Pass        |
|       | Sidearms(s)         | M27             |                 | 31.5       | Pass        |
|       | Mount Connection(s) | -               |                 | 23.5       | Pass        |

|   |              |
|---|--------------|
| <b>Structure Rating (max from all components) =</b> | <b>40.6%</b> |
|---|--------------|

Notes:

- 1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
- 2) See additional documentation in "Appendix D - Additional Calculations" for detailed mount connection calculations.

**Table 4 - Tieback Connection Data Table**

| Tower Connection Node No. | Existing / Proposed | Resultant End Reaction (lb) | Connected Member Type | Connected Member Size      | Member Compressive Capacity (lb) | Notes |
|---------------------------|---------------------|-----------------------------|-----------------------|----------------------------|----------------------------------|-------|
| N55                       | Existing            | 1,276.9                     | Leg                   | Rohn 2.375" x 0.218" (2EH) | 2,495.0                          | 1, 2  |

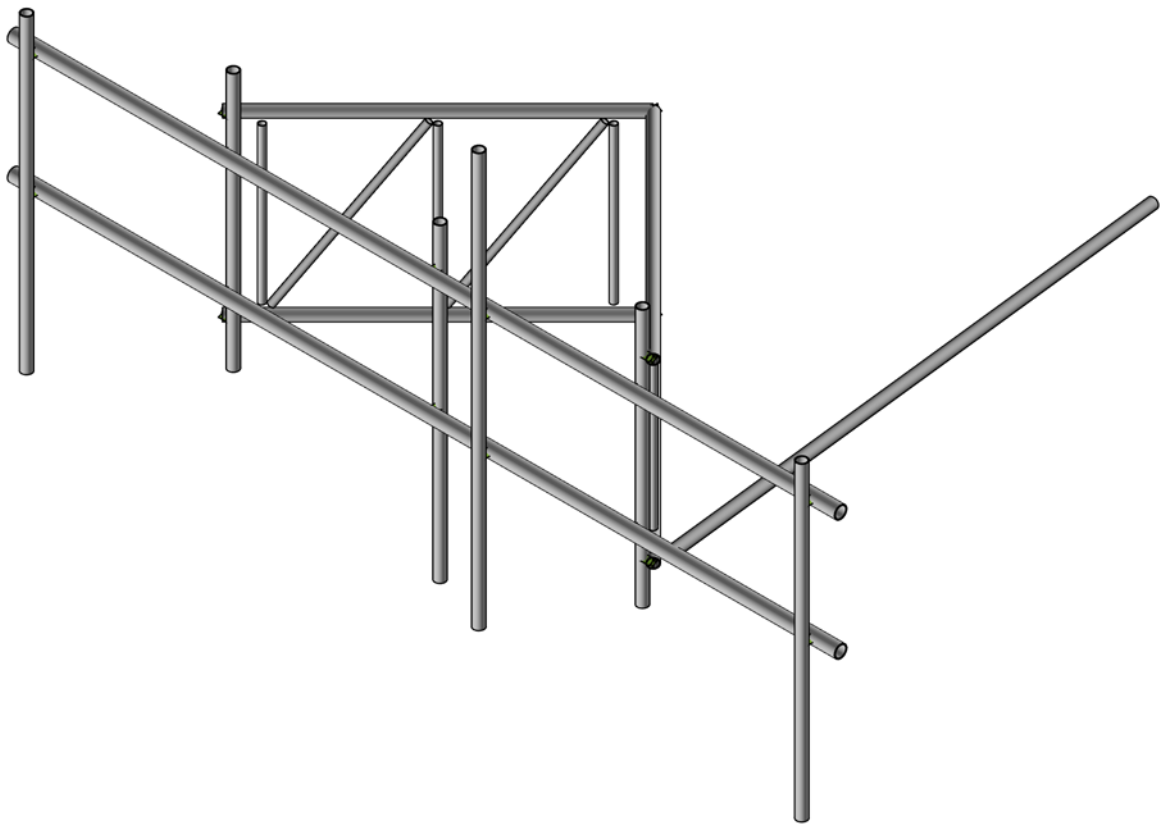
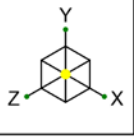
Notes:

- 1) Tieback connection point is within 25% of either end of the connected tower member
- 2) Reduced member compressive capacity according to CED-STD-10294 *Standard for Installation of Mounts and Appurtenances*

#### 4.1) Recommendations

The mount has sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

**APPENDIX A**  
**WIRE FRAME AND RENDERED MODELS**

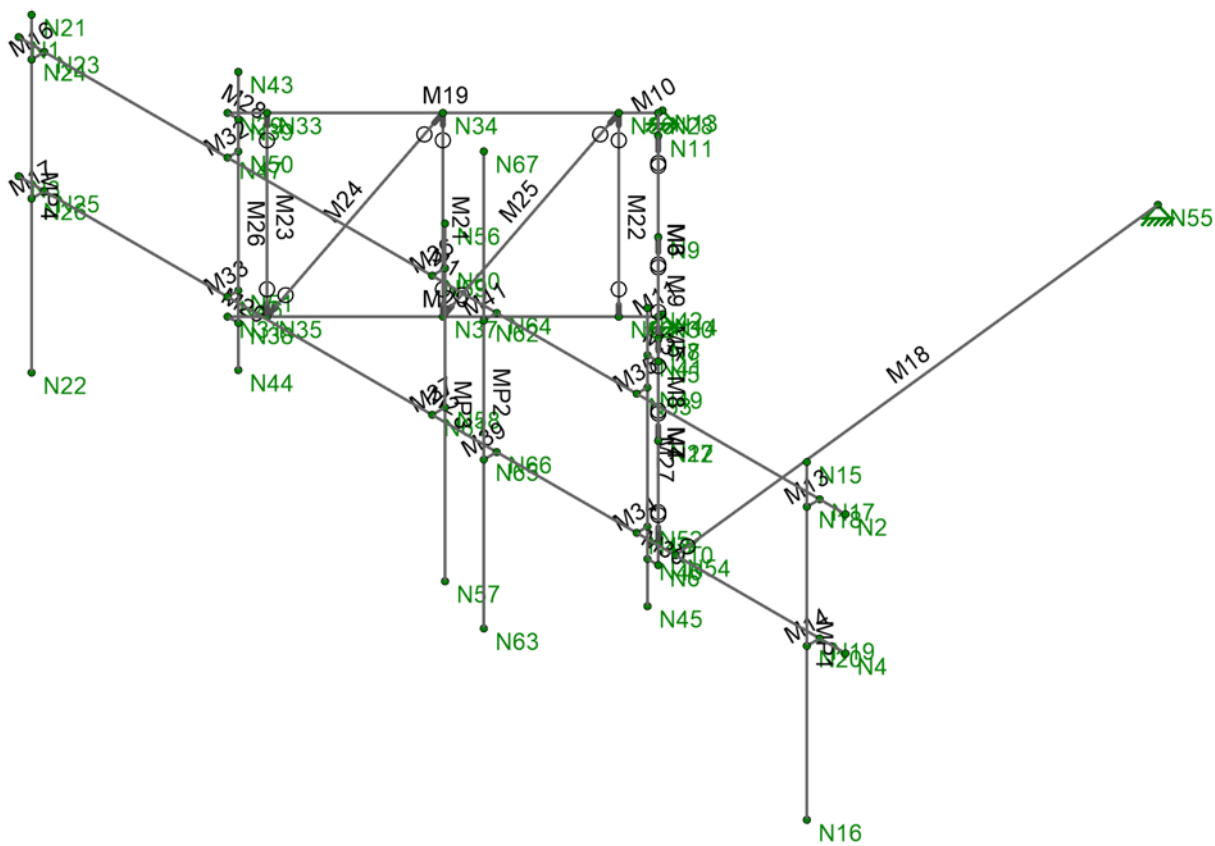


Loads: BLC 37, Maintenance Load 4

Infinigy Engineering, PLLC  
JG  
1039-Z0001-B

806387

Render  
Jan 31, 2021  
806387\_loaded.r3d



**APPENDIX B**  
**SOFTWARE INPUT CALCULATIONS**

## Program Inputs

| PROJECT INFORMATION |                  |  |
|---------------------|------------------|--|
| Client:             | Crown Castle     |  |
| Carrier:            | Sprint PCS       |  |
| Engineer:           | Jacques Grimaldi |  |

| SITE INFORMATION       |                      |           |
|------------------------|----------------------|-----------|
| Risk Category:         | II                   |           |
| Exposure Category:     | B                    |           |
| Topo Factor Procedure: | Method 1, Category 1 |           |
| Site Class:            | D - Stiff Soil       |           |
| Ground Elevation:      | 416.51               | ft *Rev H |

| MOUNT INFORMATION |              |    |
|-------------------|--------------|----|
| Mount Type:       | Sector Frame |    |
| Num Sectors:      | 3            |    |
| Centerline AGL:   | 144.0        | ft |
| Tower Height AGL: | 160.0        | ft |

| TOPOGRAPHIC DATA |     |    |
|------------------|-----|----|
| Topo Feature:    | N/A |    |
| Slope Distance:  | N/A | ft |
| Crest Distance:  | N/A | ft |
| Crest Height:    | N/A | ft |

| FACTORS                          |      |             |
|----------------------------------|------|-------------|
| Directionality Fact. ( $K_d$ ):  | 0.95 |             |
| Ground Ele. Factor ( $K_e$ ):    | 0.99 | *Rev H Only |
| Rooftop Speed-Up ( $K_s$ ):      | 1.00 | *Rev H Only |
| Topographic Factor ( $K_{zt}$ ): | 1.00 |             |
| Gust Effect Factor ( $G_h$ ):    | 1.0  |             |

| CODE STANDARDS |           |  |
|----------------|-----------|--|
| Building Code: | 2015 IBC  |  |
| TIA Standard:  | TIA-222-H |  |
| ASCE Standard: | ASCE 7-10 |  |

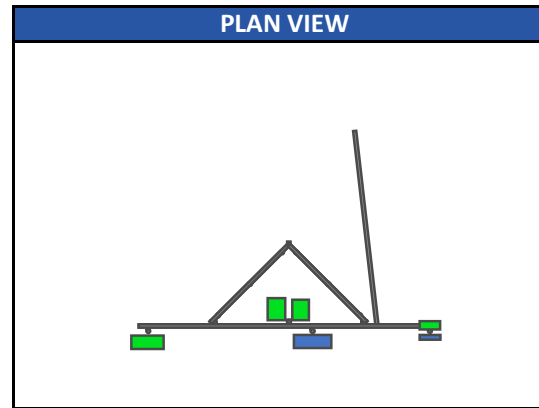
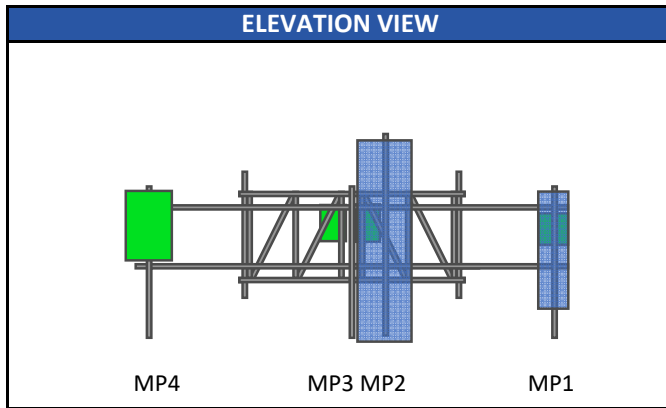
| WIND AND ICE DATA             |       |     |
|-------------------------------|-------|-----|
| Ultimate Wind ( $V_{ult}$ ):  | 130   | mph |
| Design Wind ( $V$ ):          | N/A   | mph |
| Ice Wind ( $V_{ice}$ ):       | 50    | mph |
| Base Ice Thickness ( $t_i$ ): | 1.5   | in  |
| Flat Pressure:                | 88.80 | psf |
| Round Pressure:               | 53.28 | psf |
| Ice Wind Pressure:            | 7.88  | psf |

| SEISMIC DATA                      |       |   |
|-----------------------------------|-------|---|
| Short-Period Accel. ( $S_s$ ):    | 0.173 | g |
| 1-Second Accel. ( $S_1$ ):        | 0.061 | g |
| Short-Period Design ( $S_{DS}$ ): | 0.18  |   |
| 1-Second Design ( $S_{D1}$ ):     | 0.10  |   |
| Short-Period Coeff. ( $F_a$ ):    | 1.60  |   |
| 1-Second Coeff. ( $F_v$ ):        | 2.40  |   |
| Amplification Factor ( $a_p$ ):   | 1.00  |   |
| Response Mod. ( $R_p$ ):          | 2.50  |   |
| Overstrength ( $\Omega_o$ ):      | 1.00  |   |



Infinigy Load Calculator V2.1.4

## Program Inputs

[illegible]



# ASCE 7 Hazards Report

**Address:**

No Address at This  
Location

**Standard:**

ASCE/SEI 7-10

**Risk Category:** II

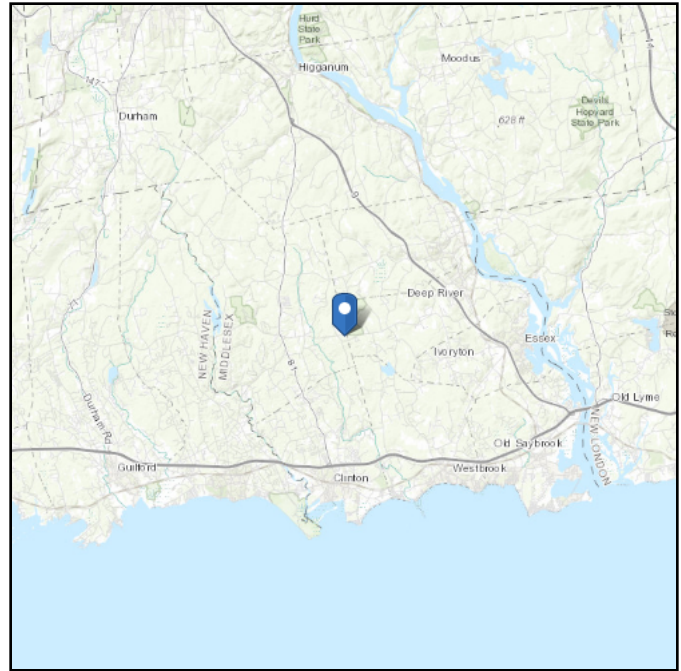
**Soil Class:**

D - Stiff Soil

**Elevation:** 416.51 ft (NAVD 88)

**Latitude:** 41.357342

**Longitude:** -72.519953



## Wind

**Results:**

Wind Speed:

10-year MRI

25-year MRI

50-year MRI

100-year MRI

**130 Vmph per 2018 Connecticut State Building Code and Appendix N**

78 Vmph

88 Vmph

96 Vmph

106 Vmph

**Data Source:**

ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

**Date Accessed:**

Sun Jan 31 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

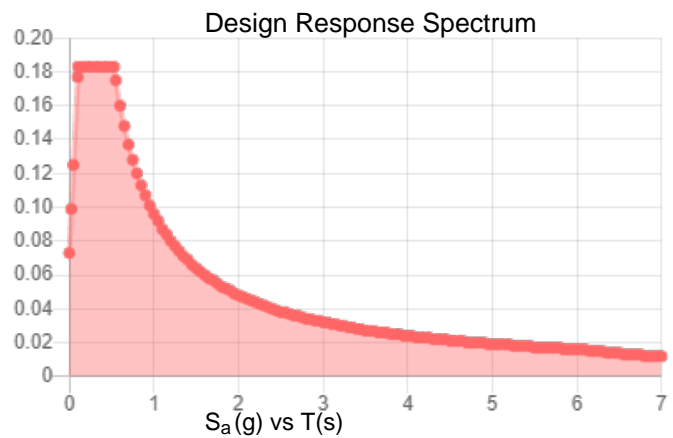
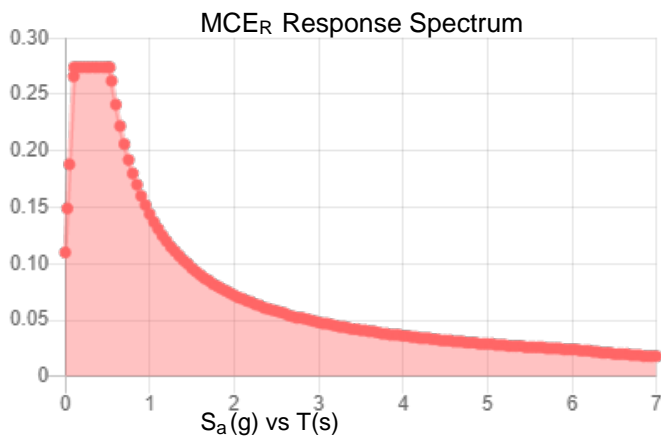
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

**Site Soil Class:** D - Stiff Soil

**Results:**

|            |       |                    |       |
|------------|-------|--------------------|-------|
| $S_S$ :    | 0.173 | $S_{DS}$ :         | 0.183 |
| $S_1$ :    | 0.061 | $S_{D1}$ :         | 0.096 |
| $F_a$ :    | 1.6   | $T_L$ :            | 6     |
| $F_v$ :    | 2.4   | PGA :              | 0.087 |
| $S_{MS}$ : | 0.274 | PGA <sub>M</sub> : | 0.138 |
| $S_{M1}$ : | 0.144 | $F_{PGA}$ :        | 1.6   |
|            |       | $I_e$ :            | 1     |

**Seismic Design Category** B



**Data Accessed:**

Sun Jan 31 2021

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

**Results:**

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

**Date Accessed:** Sun Jan 31 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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**APPENDIX C**  
**SOFTWARE ANALYSIS OUTPUT**

### Member Primary Data

|    | Label | I Node | J Node | Section/Shape | Type   | Design List | Material | Design Rule |
|----|-------|--------|--------|---------------|--------|-------------|----------|-------------|
| 1  | M1    | N1     | N2     | Frame Rail    | Beam   | HSS Pipe    | A53 Gr.B | Typical     |
| 2  | M2    | N3     | N4     | Frame Rail    | Beam   | HSS Pipe    | A53 Gr.B | Typical     |
| 3  | M3    | N28    | N5     | Sidearms      | Beam   | Pipe        | A53 Gr.B | Typical     |
| 4  | M4    | N30    | N6     | Sidearms      | Beam   | Pipe        | A53 Gr.B | Typical     |
| 5  | M5    | N9     | N12    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 6  | M6    | N11    | N7     | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 7  | M7    | N8     | N10    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 8  | M8    | N9     | N10    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 9  | M9    | N11    | N12    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 10 | M10   | N13    | N28    | RIGID         | None   | None        | RIGID    | Typical     |
| 11 | M11   | N14    | N30    | RIGID         | None   | None        | RIGID    | Typical     |
| 12 | MP1   | N15    | N16    | Mount Pipe    | Column | Pipe        | A53 Gr.B | Typical     |
| 13 | M13   | N17    | N18    | RIGID         | None   | None        | RIGID    | Typical     |
| 14 | M14   | N19    | N20    | RIGID         | None   | None        | RIGID    | Typical     |
| 15 | MP4   | N21    | N22    | Mount Pipe    | Column | Pipe        | A53 Gr.B | Typical     |
| 16 | M16   | N23    | N24    | RIGID         | None   | None        | RIGID    | Typical     |
| 17 | M17   | N25    | N26    | RIGID         | None   | None        | RIGID    | Typical     |
| 18 | M18   | N54    | N55    | TieBack       | HBrace | Pipe        | A53 Gr.B | Typical     |
| 19 | M19   | N28    | N29    | Sidearms      | Beam   | Pipe        | A53 Gr.B | Typical     |
| 20 | M20   | N30    | N31    | Sidearms      | Beam   | Pipe        | A53 Gr.B | Typical     |
| 21 | M21   | N34    | N37    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 22 | M22   | N36    | N32    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 23 | M23   | N33    | N35    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 24 | M24   | N34    | N35    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 25 | M25   | N36    | N37    | Diag Bracing  | VBrace | Pipe        | A53 Gr.B | Typical     |
| 26 | M26   | N43    | N44    | Vertical Pipe | Column | Pipe        | A53 Gr.B | Typical     |
| 27 | M27   | N42    | N45    | Vertical Pipe | Column | Pipe        | A53 Gr.B | Typical     |
| 28 | M28   | N39    | N29    | RIGID         | None   | None        | RIGID    | Typical     |
| 29 | M29   | N38    | N31    | RIGID         | None   | None        | RIGID    | Typical     |
| 30 | M30   | N40    | N6     | RIGID         | None   | None        | RIGID    | Typical     |
| 31 | M31   | N41    | N5     | RIGID         | None   | None        | RIGID    | Typical     |
| 32 | M32   | N50    | N47    | RIGID         | None   | None        | RIGID    | Typical     |
| 33 | M33   | N51    | N46    | RIGID         | None   | None        | RIGID    | Typical     |
| 34 | M34   | N52    | N48    | RIGID         | None   | None        | RIGID    | Typical     |
| 35 | M35   | N49    | N53    | RIGID         | None   | None        | RIGID    | Typical     |
| 36 | M36   | N59    | N60    | RIGID         | None   | None        | RIGID    | Typical     |
| 37 | M37   | N61    | N58    | RIGID         | None   | None        | RIGID    | Typical     |
| 38 | MP3   | N56    | N57    | Mount Pipe    | Column | Pipe        | A53 Gr.B | Typical     |
| 39 | M39   | N66    | N65    | RIGID         | None   | None        | RIGID    | Typical     |
| 40 | MP2   | N67    | N63    | Mount Pipe    | Column | Pipe        | A53 Gr.B | Typical     |
| 41 | M41   | N64    | N62    | RIGID         | None   | None        | RIGID    | Typical     |

### Material Take-Off

|   | Material        | Size | Pieces | Length[in] | Weight[LB] |
|---|-----------------|------|--------|------------|------------|
| 1 | General Members |      |        |            |            |
| 2 | RIGID           |      | 18     | 46         | 0          |
| 3 | Total General   |      | 18     | 46         | 0          |
| 4 |                 |      |        |            |            |

### Material Take-Off (Continued)

|   | Material         | Size           | Pieces | Length[in] | Weight[LB] |
|---|------------------|----------------|--------|------------|------------|
| 5 | Hot Rolled Steel |                |        |            |            |
| 6 | A53 Gr.B         | PIPE 2.0       | 11     | 842.2      | 243.586    |
| 7 | A53 Gr.B         | PIPE 2.5       | 2      | 384        | 175.311    |
| 8 | A53 Gr.B         | ROHN 1.5x0.067 | 10     | 396.6      | 33.921     |
| 9 | Total HR Steel   |                | 23     | 1622.8     | 452.818    |

### Basic Load Cases

|    | BLC Description        | Category | X Gravity | Y Gravity | Z Gravity | Nodal | Point | Distributed |
|----|------------------------|----------|-----------|-----------|-----------|-------|-------|-------------|
| 1  | Self Weight            | DL       |           | -1        |           |       | 12    |             |
| 2  | Wind Load AZI 0        | WLZ      |           |           |           |       | 24    |             |
| 3  | Wind Load AZI 30       | None     |           |           |           |       | 24    |             |
| 4  | Wind Load AZI 60       | None     |           |           |           |       | 24    |             |
| 5  | Wind Load AZI 90       | WLX      |           |           |           |       | 24    |             |
| 6  | Wind Load AZI 120      | None     |           |           |           |       | 24    |             |
| 7  | Wind Load AZI 150      | None     |           |           |           |       | 24    |             |
| 8  | Wind Load AZI 180      | None     |           |           |           |       | 24    |             |
| 9  | Wind Load AZI 210      | None     |           |           |           |       | 24    |             |
| 10 | Wind Load AZI 240      | None     |           |           |           |       | 24    |             |
| 11 | Wind Load AZI 270      | None     |           |           |           |       | 24    |             |
| 12 | Wind Load AZI 300      | None     |           |           |           |       | 24    |             |
| 13 | Wind Load AZI 330      | None     |           |           |           |       | 24    |             |
| 14 | Distr. Wind Load Z     | WLZ      |           |           |           |       |       | 41          |
| 15 | Distr. Wind Load X     | WLX      |           |           |           |       |       | 41          |
| 16 | Ice Weight             | OL1      |           |           |           |       | 12    | 41          |
| 17 | Ice Wind Load AZI 0    | OL2      |           |           |           |       | 24    |             |
| 18 | Ice Wind Load AZI 30   | None     |           |           |           |       | 24    |             |
| 19 | Ice Wind Load AZI 60   | None     |           |           |           |       | 24    |             |
| 20 | Ice Wind Load AZI 90   | OL3      |           |           |           |       | 24    |             |
| 21 | Ice Wind Load AZI 120  | None     |           |           |           |       | 24    |             |
| 22 | Ice Wind Load AZI 150  | None     |           |           |           |       | 24    |             |
| 23 | Ice Wind Load AZI 180  | None     |           |           |           |       | 24    |             |
| 24 | Ice Wind Load AZI 210  | None     |           |           |           |       | 24    |             |
| 25 | Ice Wind Load AZI 240  | None     |           |           |           |       | 24    |             |
| 26 | Ice Wind Load AZI 270  | None     |           |           |           |       | 24    |             |
| 27 | Ice Wind Load AZI 300  | None     |           |           |           |       | 24    |             |
| 28 | Ice Wind Load AZI 330  | None     |           |           |           |       | 24    |             |
| 29 | Distr. Ice Wind Load Z | OL2      |           |           |           |       |       | 41          |
| 30 | Distr. Ice Wind Load X | OL3      |           |           |           |       |       | 41          |
| 31 | Seismic Load Z         | ELZ      |           |           | -0.092    |       | 12    |             |
| 32 | Seismic Load X         | ELX      | -0.092    |           |           |       | 12    |             |
| 33 | Service Live Loads     | LL       |           |           |           | 1     |       |             |
| 34 | Maintenance Load 1     | LL       |           |           |           | 1     |       |             |
| 35 | Maintenance Load 2     | LL       |           |           |           | 1     |       |             |
| 36 | Maintenance Load 3     | LL       |           |           |           | 1     |       |             |
| 37 | Maintenance Load 4     | LL       |           |           |           | 1     |       |             |



### Load Combinations

|    | Description                     | Solve | PD | Delta | BLC   | Factor | BLC    | Factor | BLC    | Factor | BLC    | Factor | BLC    | Factor |
|----|---------------------------------|-------|----|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1  | 1.4DL                           | Yes   | Y  | 1     | 1.4   |        |        |        |        |        |        |        |        |        |
| 2  | 1.2DL + 1WL AZI 0               | Yes   | Y  | 1     | 1.2   | 2      | 1      | 14     | 1      | 15     |        |        |        |        |
| 3  | 1.2DL + 1WL AZI 30              | Yes   | Y  | 1     | 1.2   | 3      | 1      | 14     | 0.866  | 15     | 0.5    |        |        |        |
| 4  | 1.2DL + 1WL AZI 60              | Yes   | Y  | 1     | 1.2   | 4      | 1      | 14     | 0.5    | 15     | 0.866  |        |        |        |
| 5  | 1.2DL + 1WL AZI 90              | Yes   | Y  | 1     | 1.2   | 5      | 1      | 14     |        | 15     | 1      |        |        |        |
| 6  | 1.2DL + 1WL AZI 120             | Yes   | Y  | 1     | 1.2   | 6      | 1      | 14     | -0.5   | 15     | 0.866  |        |        |        |
| 7  | 1.2DL + 1WL AZI 150             | Yes   | Y  | 1     | 1.2   | 7      | 1      | 14     | -0.866 | 15     | 0.5    |        |        |        |
| 8  | 1.2DL + 1WL AZI 180             | Yes   | Y  | 1     | 1.2   | 8      | 1      | 14     | -1     | 15     |        |        |        |        |
| 9  | 1.2DL + 1WL AZI 210             | Yes   | Y  | 1     | 1.2   | 9      | 1      | 14     | -0.866 | 15     | -0.5   |        |        |        |
| 10 | 1.2DL + 1WL AZI 240             | Yes   | Y  | 1     | 1.2   | 10     | 1      | 14     | -0.5   | 15     | -0.866 |        |        |        |
| 11 | 1.2DL + 1WL AZI 270             | Yes   | Y  | 1     | 1.2   | 11     | 1      | 14     |        | 15     | -1     |        |        |        |
| 12 | 1.2DL + 1WL AZI 300             | Yes   | Y  | 1     | 1.2   | 12     | 1      | 14     | 0.5    | 15     | -0.866 |        |        |        |
| 13 | 1.2DL + 1WL AZI 330             | Yes   | Y  | 1     | 1.2   | 13     | 1      | 14     | 0.866  | 15     | -0.5   |        |        |        |
| 14 | 0.9DL + 1WL AZI 0               | Yes   | Y  | 1     | 0.9   | 2      | 1      | 14     | 1      | 15     |        |        |        |        |
| 15 | 0.9DL + 1WL AZI 30              | Yes   | Y  | 1     | 0.9   | 3      | 1      | 14     | 0.866  | 15     | 0.5    |        |        |        |
| 16 | 0.9DL + 1WL AZI 60              | Yes   | Y  | 1     | 0.9   | 4      | 1      | 14     | 0.5    | 15     | 0.866  |        |        |        |
| 17 | 0.9DL + 1WL AZI 90              | Yes   | Y  | 1     | 0.9   | 5      | 1      | 14     |        | 15     | 1      |        |        |        |
| 18 | 0.9DL + 1WL AZI 120             | Yes   | Y  | 1     | 0.9   | 6      | 1      | 14     | -0.5   | 15     | 0.866  |        |        |        |
| 19 | 0.9DL + 1WL AZI 150             | Yes   | Y  | 1     | 0.9   | 7      | 1      | 14     | -0.866 | 15     | 0.5    |        |        |        |
| 20 | 0.9DL + 1WL AZI 180             | Yes   | Y  | 1     | 0.9   | 8      | 1      | 14     | -1     | 15     |        |        |        |        |
| 21 | 0.9DL + 1WL AZI 210             | Yes   | Y  | 1     | 0.9   | 9      | 1      | 14     | -0.866 | 15     | -0.5   |        |        |        |
| 22 | 0.9DL + 1WL AZI 240             | Yes   | Y  | 1     | 0.9   | 10     | 1      | 14     | -0.5   | 15     | -0.866 |        |        |        |
| 23 | 0.9DL + 1WL AZI 270             | Yes   | Y  | 1     | 0.9   | 11     | 1      | 14     |        | 15     | -1     |        |        |        |
| 24 | 0.9DL + 1WL AZI 300             | Yes   | Y  | 1     | 0.9   | 12     | 1      | 14     | 0.5    | 15     | -0.866 |        |        |        |
| 25 | 0.9DL + 1WL AZI 330             | Yes   | Y  | 1     | 0.9   | 13     | 1      | 14     | 0.866  | 15     | -0.5   |        |        |        |
| 26 | 1.2D + 1.0Di                    | Yes   | Y  | 1     | 1.2   | 16     | 1      |        |        |        |        |        |        |        |
| 27 | 1.2D + 1.0Di + 1.0Wi AZI 0      | Yes   | Y  | 1     | 1.2   | 16     | 1      | 17     | 1      | 29     | 1      | 30     |        |        |
| 28 | 1.2D + 1.0Di + 1.0Wi AZI 30     | Yes   | Y  | 1     | 1.2   | 16     | 1      | 18     | 1      | 29     | 0.866  | 30     | 0.5    |        |
| 29 | 1.2D + 1.0Di + 1.0Wi AZI 60     | Yes   | Y  | 1     | 1.2   | 16     | 1      | 19     | 1      | 29     | 0.5    | 30     | 0.866  |        |
| 30 | 1.2D + 1.0Di + 1.0Wi AZI 90     | Yes   | Y  | 1     | 1.2   | 16     | 1      | 20     | 1      | 29     |        | 30     | 1      |        |
| 31 | 1.2D + 1.0Di + 1.0Wi AZI 120    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 21     | 1      | 29     | -0.5   | 30     | 0.866  |        |
| 32 | 1.2D + 1.0Di + 1.0Wi AZI 150    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 22     | 1      | 29     | -0.866 | 30     | 0.5    |        |
| 33 | 1.2D + 1.0Di + 1.0Wi AZI 180    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 23     | 1      | 29     | -1     | 30     |        |        |
| 34 | 1.2D + 1.0Di + 1.0Wi AZI 210    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 24     | 1      | 29     | -0.866 | 30     | -0.5   |        |
| 35 | 1.2D + 1.0Di + 1.0Wi AZI 240    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 25     | 1      | 29     | -0.5   | 30     | -0.866 |        |
| 36 | 1.2D + 1.0Di + 1.0Wi AZI 270    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 26     | 1      | 29     |        | 30     | -1     |        |
| 37 | 1.2D + 1.0Di + 1.0Wi AZI 300    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 27     | 1      | 29     | 0.5    | 30     | -0.866 |        |
| 38 | 1.2D + 1.0Di + 1.0Wi AZI 330    | Yes   | Y  | 1     | 1.2   | 16     | 1      | 28     | 1      | 29     | 0.866  | 30     | -0.5   |        |
| 39 | (1.2 + 0.2Sds)DL + 1.0E AZI 0   | Yes   | Y  | 1     | 1.237 | 31     | 1      | 32     |        |        |        |        |        |        |
| 40 | (1.2 + 0.2Sds)DL + 1.0E AZI 30  | Yes   | Y  | 1     | 1.237 | 31     | 0.866  | 32     | 0.5    |        |        |        |        |        |
| 41 | (1.2 + 0.2Sds)DL + 1.0E AZI 60  | Yes   | Y  | 1     | 1.237 | 31     | 0.5    | 32     | 0.866  |        |        |        |        |        |
| 42 | (1.2 + 0.2Sds)DL + 1.0E AZI 90  | Yes   | Y  | 1     | 1.237 | 31     |        | 32     | 1      |        |        |        |        |        |
| 43 | (1.2 + 0.2Sds)DL + 1.0E AZI 120 | Yes   | Y  | 1     | 1.237 | 31     | -0.5   | 32     | 0.866  |        |        |        |        |        |
| 44 | (1.2 + 0.2Sds)DL + 1.0E AZI 150 | Yes   | Y  | 1     | 1.237 | 31     | -0.866 | 32     | 0.5    |        |        |        |        |        |
| 45 | (1.2 + 0.2Sds)DL + 1.0E AZI 180 | Yes   | Y  | 1     | 1.237 | 31     | -1     | 32     |        |        |        |        |        |        |
| 46 | (1.2 + 0.2Sds)DL + 1.0E AZI 210 | Yes   | Y  | 1     | 1.237 | 31     | -0.866 | 32     | -0.5   |        |        |        |        |        |
| 47 | (1.2 + 0.2Sds)DL + 1.0E AZI 240 | Yes   | Y  | 1     | 1.237 | 31     | -0.5   | 32     | -0.866 |        |        |        |        |        |
| 48 | (1.2 + 0.2Sds)DL + 1.0E AZI 270 | Yes   | Y  | 1     | 1.237 | 31     |        | 32     | -1     |        |        |        |        |        |
| 49 | (1.2 + 0.2Sds)DL + 1.0E AZI 300 | Yes   | Y  | 1     | 1.237 | 31     | 0.5    | 32     | -0.866 |        |        |        |        |        |



### Load Combinations (Continued)

| Description                                  | Solve | P | Delta | B     | L  | C      | Factor | B      | L  | C      | Factor | B      | L | C | Factor | B | L | C | Factor | B  | L   | C | Factor |
|--|-------|---|-------|-------|----|--------|--------|--------|----|--------|--------|--------|---|---|--------|---|---|---|--------|----|-----|---|--------|
| 50 (1.2 + 0.2Sds)DL + 1.0E AZI 330           | Yes   | Y | 1     | 1.237 | 31 | 0.866  | 32     | -0.5   |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 51 (0.9 - 0.2Sds)DL + 1.0E AZI 0             | Yes   | Y | 1     | 0.863 | 31 | 1      | 32     |        |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 52 (0.9 - 0.2Sds)DL + 1.0E AZI 30            | Yes   | Y | 1     | 0.863 | 31 | 0.866  | 32     | 0.5    |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 53 (0.9 - 0.2Sds)DL + 1.0E AZI 60            | Yes   | Y | 1     | 0.863 | 31 | 0.5    | 32     | 0.866  |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 54 (0.9 - 0.2Sds)DL + 1.0E AZI 90            | Yes   | Y | 1     | 0.863 | 31 |        | 32     | 1      |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 55 (0.9 - 0.2Sds)DL + 1.0E AZI 120           | Yes   | Y | 1     | 0.863 | 31 | -0.5   | 32     | 0.866  |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 56 (0.9 - 0.2Sds)DL + 1.0E AZI 150           | Yes   | Y | 1     | 0.863 | 31 | -0.866 | 32     | 0.5    |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 57 (0.9 - 0.2Sds)DL + 1.0E AZI 180           | Yes   | Y | 1     | 0.863 | 31 | -1     | 32     |        |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 58 (0.9 - 0.2Sds)DL + 1.0E AZI 210           | Yes   | Y | 1     | 0.863 | 31 | -0.866 | 32     | -0.5   |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 59 (0.9 - 0.2Sds)DL + 1.0E AZI 240           | Yes   | Y | 1     | 0.863 | 31 | -0.5   | 32     | -0.866 |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 60 (0.9 - 0.2Sds)DL + 1.0E AZI 270           | Yes   | Y | 1     | 0.863 | 31 |        | 32     | -1     |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 61 (0.9 - 0.2Sds)DL + 1.0E AZI 300           | Yes   | Y | 1     | 0.863 | 31 | 0.5    | 32     | -0.866 |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 62 (0.9 - 0.2Sds)DL + 1.0E AZI 330           | Yes   | Y | 1     | 0.863 | 31 | 0.866  | 32     | -0.5   |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 63 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 0     | Yes   | Y | 1     | 1     | 2  | 0.213  | 14     | 0.213  | 15 |        |        |        |   |   |        |   |   |   |        | 33 | 1.5 |   |        |
| 64 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 30    | Yes   | Y | 1     | 1     | 3  | 0.213  | 14     | 0.184  | 15 | 0.107  | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 65 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 60    | Yes   | Y | 1     | 1     | 4  | 0.213  | 14     | 0.107  | 15 | 0.184  | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 66 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 90    | Yes   | Y | 1     | 1     | 5  | 0.213  | 14     |        | 15 | 0.213  | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 67 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 120   | Yes   | Y | 1     | 1     | 6  | 0.213  | 14     | -0.107 | 15 | 0.184  | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 68 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 150   | Yes   | Y | 1     | 1     | 7  | 0.213  | 14     | -0.184 | 15 | 0.107  | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 69 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 180   | Yes   | Y | 1     | 1     | 8  | 0.213  | 14     | -0.213 | 15 |        | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 70 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 210   | Yes   | Y | 1     | 1     | 9  | 0.213  | 14     | -0.184 | 15 | -0.107 | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 71 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 240   | Yes   | Y | 1     | 1     | 10 | 0.213  | 14     | -0.107 | 15 | -0.184 | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 72 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 270   | Yes   | Y | 1     | 1     | 11 | 0.213  | 14     |        | 15 | -0.213 | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 73 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 300   | Yes   | Y | 1     | 1     | 12 | 0.213  | 14     | 0.107  | 15 | -0.184 | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 74 1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 330   | Yes   | Y | 1     | 1     | 13 | 0.213  | 14     | 0.184  | 15 | -0.107 | 33     | 1.5    |   |   |        |   |   |   |        |    |     |   |        |
| 75 1.2DL + 1.5LL                             | Yes   | Y | 1     | 1.2   | 33 | 1.5    |        |        |    |        |        |        |   |   |        |   |   |   |        |    |     |   |        |
| 76 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 0   | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 2      | 0.053  | 14 | 0.053  | 15     |        |   |   |        |   |   |   |        |    |     |   |        |
| 77 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 30  | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 3      | 0.053  | 14 | 0.046  | 15     | 0.027  |   |   |        |   |   |   |        |    |     |   |        |
| 78 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 60  | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 4      | 0.053  | 14 | 0.027  | 15     | 0.046  |   |   |        |   |   |   |        |    |     |   |        |
| 79 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 90  | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 5      | 0.053  | 14 |        | 15     | 0.053  |   |   |        |   |   |   |        |    |     |   |        |
| 80 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 120 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 6      | 0.053  | 14 | -0.027 | 15     | 0.046  |   |   |        |   |   |   |        |    |     |   |        |
| 81 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 150 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 7      | 0.053  | 14 | -0.046 | 15     | 0.027  |   |   |        |   |   |   |        |    |     |   |        |
| 82 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 180 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 8      | 0.053  | 14 | -0.053 | 15     |        |   |   |        |   |   |   |        |    |     |   |        |
| 83 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 210 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 9      | 0.053  | 14 | -0.046 | 15     | -0.027 |   |   |        |   |   |   |        |    |     |   |        |
| 84 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 240 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 10     | 0.053  | 14 | -0.027 | 15     | -0.046 |   |   |        |   |   |   |        |    |     |   |        |
| 85 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 270 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 11     | 0.053  | 14 |        | 15     | -0.053 |   |   |        |   |   |   |        |    |     |   |        |
| 86 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 300 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 12     | 0.053  | 14 | 0.027  | 15     | -0.046 |   |   |        |   |   |   |        |    |     |   |        |
| 87 1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 330 | Yes   | Y | 1     | 1.2   | 34 | 1.5    | 13     | 0.053  | 14 | 0.046  | 15     | -0.027 |   |   |        |   |   |   |        |    |     |   |        |
| 88 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 0   | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 2      | 0.053  | 14 | 0.053  | 15     |        |   |   |        |   |   |   |        |    |     |   |        |
| 89 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 30  | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 3      | 0.053  | 14 | 0.046  | 15     | 0.027  |   |   |        |   |   |   |        |    |     |   |        |
| 90 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 60  | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 4      | 0.053  | 14 | 0.027  | 15     | 0.046  |   |   |        |   |   |   |        |    |     |   |        |
| 91 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 90  | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 5      | 0.053  | 14 |        | 15     | 0.053  |   |   |        |   |   |   |        |    |     |   |        |
| 92 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 120 | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 6      | 0.053  | 14 | -0.027 | 15     | 0.046  |   |   |        |   |   |   |        |    |     |   |        |
| 93 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 150 | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 7      | 0.053  | 14 | -0.046 | 15     | 0.027  |   |   |        |   |   |   |        |    |     |   |        |
| 94 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 180 | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 8      | 0.053  | 14 | -0.053 | 15     |        |   |   |        |   |   |   |        |    |     |   |        |
| 95 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 210 | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 9      | 0.053  | 14 | -0.046 | 15     | -0.027 |   |   |        |   |   |   |        |    |     |   |        |
| 96 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 240 | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 10     | 0.053  | 14 | -0.027 | 15     | -0.046 |   |   |        |   |   |   |        |    |     |   |        |
| 97 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 270 | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 11     | 0.053  | 14 |        | 15     | -0.053 |   |   |        |   |   |   |        |    |     |   |        |
| 98 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 300 | Yes   | Y | 1     | 1.2   | 35 | 1.5    | 12     | 0.053  | 14 | 0.027  | 15     | -0.046 |   |   |        |   |   |   |        |    |     |   |        |

### Load Combinations (Continued)

|     | Description                               | Solve | P | Delta | BLC | Factor | BLC | Factor | BLC   | Factor | BLC    | Factor | BLC    | Factor |
|-----|---|-------|---|-------|-----|--------|-----|--------|-------|--------|--------|--------|--------|--------|
| 99  | 1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 330 | Yes   | Y | 1     | 1.2 | 35     | 1.5 | 13     | 0.053 | 14     | 0.046  | 15     | -0.027 |        |
| 100 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 0   | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 2      | 0.053 | 14     | 0.053  | 15     |        |        |
| 101 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 30  | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 3      | 0.053 | 14     | 0.046  | 15     | 0.027  |        |
| 102 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 60  | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 4      | 0.053 | 14     | 0.027  | 15     | 0.046  |        |
| 103 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 90  | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 5      | 0.053 | 14     |        | 15     | 0.053  |        |
| 104 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 120 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 6      | 0.053 | 14     | -0.027 | 15     | 0.046  |        |
| 105 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 150 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 7      | 0.053 | 14     | -0.046 | 15     | 0.027  |        |
| 106 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 180 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 8      | 0.053 | 14     | -0.053 | 15     |        |        |
| 107 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 210 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 9      | 0.053 | 14     | -0.046 | 15     | -0.027 |        |
| 108 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 240 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 10     | 0.053 | 14     | -0.027 | 15     | -0.046 |        |
| 109 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 270 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 11     | 0.053 | 14     |        | 15     | -0.053 |        |
| 110 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 300 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 12     | 0.053 | 14     | 0.027  | 15     | -0.046 |        |
| 111 | 1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 330 | Yes   | Y | 1     | 1.2 | 36     | 1.5 | 13     | 0.053 | 14     | 0.046  | 15     | -0.027 |        |
| 112 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 0   | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 2      | 0.053 | 14     | 0.053  | 15     |        |        |
| 113 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 30  | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 3      | 0.053 | 14     | 0.046  | 15     | 0.027  |        |
| 114 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 60  | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 4      | 0.053 | 14     | 0.027  | 15     | 0.046  |        |
| 115 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 90  | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 5      | 0.053 | 14     |        | 15     | 0.053  |        |
| 116 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 120 | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 6      | 0.053 | 14     | -0.027 | 15     | 0.046  |        |
| 117 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 150 | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 7      | 0.053 | 14     | -0.046 | 15     | 0.027  |        |
| 118 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 180 | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 8      | 0.053 | 14     | -0.053 | 15     |        |        |
| 119 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 210 | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 9      | 0.053 | 14     | -0.046 | 15     | -0.027 |        |
| 120 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 240 | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 10     | 0.053 | 14     | -0.027 | 15     | -0.046 |        |
| 121 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 270 | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 11     | 0.053 | 14     |        | 15     | -0.053 |        |
| 122 | 1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 300 | Yes   | Y | 1     | 1.2 | 37     | 1.5 | 12     | 0.053 | 14     | 0.027  | 15     | -0.046 |        |

### Envelope Node Reactions

| Node Label    | X [lb]    | LC | Y [lb]   | LC | Z [lb]    | LC | MX [lb-ft] | LC  | MY [lb-ft] | LC  | MZ [lb-ft] | LC  |
|---------------|-----------|----|----------|----|-----------|----|------------|-----|------------|-----|------------|-----|
| 1 N13 max     | 1637.683  | 92 | 1683.685 | 27 | -130.51   | 14 | 0          | 122 | 0          | 122 | 0          | 122 |
| 2 min         | -1709.269 | 86 | 434.79   | 52 | -4015.569 | 33 | 0          | 1   | 0          | 1   | 0          | 1   |
| 3 N14 max     | 1726.126  | 80 | 1436.424 | 33 | 4157.581  | 29 | 0          | 122 | 0          | 122 | 0          | 122 |
| 4 min         | -1654.72  | 98 | 380.423  | 58 | -533.067  | 21 | 0          | 1   | 0          | 1   | 0          | 1   |
| 5 N55 max     | 105.156   | 25 | 68.716   | 30 | 1272.711  | 24 | 0          | 122 | 0          | 122 | 0          | 122 |
| 6 min         | -104.628  | 19 | 15.871   | 60 | -1273.236 | 18 | 0          | 1   | 0          | 1   | 0          | 1   |
| 7 Totals: max | 1232.825  | 5  | 3187.408 | 28 | 2305.386  | 2  |            |     |            |     |            |     |
| 8 min         | -1232.825 | 11 | 831.643  | 57 | -2305.383 | 20 |            |     |            |     |            |     |

### Envelope AISC 15TH (360-16): LRFD Member Steel Code Checks

| Member | Shape          | Code Check | Loc[in] | LC | Shear Check | Loc[in] | LC | phi*Pnc [lb] | phi*Pnt [lb] | phi*Mn y-y [lb-ft] | phi*Mn z-z [lb-ft] | Cb    | Eqn   |
|--------|----------------|------------|---------|----|-------------|---------|----|--------------|--------------|--------------------|--------------------|-------|-------|
| 1 MP2  | PIPE 2.0       | 0.406      | 34      | 8  | 0.04        | 34      | 8  | 14916.096    | 32130        | 1871.625           | 1871.625           | 3     | H1-1b |
| 2 MP4  | PIPE 2.0       | 0.387      | 9       | 95 | 0.067       | 36.75   | 95 | 20866.733    | 32130        | 1871.625           | 1871.625           | 1.717 | H1-1b |
| 3 MP1  | PIPE 2.0       | 0.378      | 9       | 85 | 0.067       | 36.75   | 81 | 20866.733    | 32130        | 1871.625           | 1871.625           | 1.722 | H1-1b |
| 4 M4   | PIPE 2.0       | 0.32       | 6.629   | 29 | 0.123       | 64.818  | 29 | 21188.88     | 32130        | 1871.625           | 1871.625           | 2.255 | H1-1b |
| 5 M2   | PIPE 2.5       | 0.316      | 144     | 3  | 0.123       | 144     | 4  | 8885.981     | 50715        | 3596.25            | 3596.25            | 1.019 | H1-1b |
| 6 M27  | PIPE 2.0       | 0.315      | 44.375  | 10 | 0.328       | 50      | 4  | 23808.54     | 32130        | 1871.625           | 1871.625           | 1.944 | H1-1b |
| 7 M3   | PIPE 2.0       | 0.297      | 5.893   | 35 | 0.13        | 0       | 37 | 21188.88     | 32130        | 1871.625           | 1871.625           | 2.346 | H1-1b |
| 8 M9   | ROHN 1.5x0.067 | 0.289      | 21.633  | 37 | 0.023       | 45.147  | 92 | 6333.703     | 9501.265     | 361.421            | 361.421            | 1.136 | H1-1a |
| 9 M20  | PIPE 2.0       | 0.28       | 6.629   | 89 | 0.113       | 64.818  | 27 | 21188.88     | 32130        | 1871.625           | 1871.625           | 2.195 | H1-1b |
| 10 M1  | PIPE 2.5       | 0.277      | 48      | 94 | 0.108       | 110     | 8  | 8885.981     | 50715        | 3596.25            | 3596.25            | 1.719 | H1-1b |

**Envelope AISC 15TH (360-16): LRFD Member Steel Code Checks (Continued)**

| Member | Shape | Code Check     | Loc[in] | LC     | Shear Check | Loc[in] | LC      | phi*Pnc [lb] | phi*Pnt [lb] | phi*Mn y-y [lb-ft] | phi*Mn z-z [lb-ft] | Cb    | Eqn    |
|--------|-------|----------------|---------|--------|-------------|---------|---------|--------------|--------------|--------------------|--------------------|-------|--------|
| 11     | M19   | PIPE 2.0       | 0.262   | 5.893  | 93          | 0.128   | 0       | 3021188.88   | 32130        | 1871.625           | 1871.625           | 2.32  | H1-1b  |
| 12     | M5    | ROHN 1.5x0.067 | 0.256   | 36     | 36          | 0.015   | 36      | 1167341.711  | 9501.265     | 361.421            | 361.421            | 1     | H1-1a  |
| 13     | M25   | ROHN 1.5x0.067 | 0.249   | 21.633 | 92          | 0.022   | 45.147  | 866333.703   | 9501.265     | 361.421            | 361.421            | 1.136 | H1-1a  |
| 14     | M21   | ROHN 1.5x0.067 | 0.235   | 36     | 92          | 0.012   | 36      | 927341.711   | 9501.265     | 361.421            | 361.421            | 1     | H1-1a  |
| 15     | M8    | ROHN 1.5x0.067 | 0.212   | 17.401 | 36          | 0.018   | 45.147  | 76333.703    | 9501.265     | 361.421            | 361.421            | 1.136 | H1-1a  |
| 16     | M26   | PIPE 2.0       | 0.197   | 43.75  | 96          | 0.147   | 50      | 223808.54    | 32130        | 1871.625           | 1871.625           | 2.187 | H1-1b  |
| 17     | M18   | PIPE 2.0       | 0.152   | 63.664 | 11          | 0.007   | 127.328 | 368736.901   | 32130        | 1871.625           | 1871.625           | 1.136 | H1-1b  |
| 18     | M6    | ROHN 1.5x0.067 | 0.137   | 36     | 37          | 0.033   | 36      | 927341.711   | 9501.265     | 361.421            | 361.421            | 1     | H1-1b* |
| 19     | MP3   | PIPE 2.0       | 0.134   | 9      | 90          | 0.054   | 36.75   | 9120866.733  | 32130        | 1871.625           | 1871.625           | 1.71  | H1-1b  |
| 20     | M22   | ROHN 1.5x0.067 | 0.12    | 36     | 90          | 0.033   | 36      | 927341.711   | 9501.265     | 361.421            | 361.421            | 1     | H1-1b* |
| 21     | M7    | ROHN 1.5x0.067 | 0.107   | 36     | 35          | 0.009   | 36      | 47341.711    | 9501.265     | 361.421            | 361.421            | 1.145 | H1-1b* |
| 22     | M24   | ROHN 1.5x0.067 | 0.1     | 22.103 | 92          | 0.013   | 45.147  | 346333.703   | 9501.265     | 361.421            | 361.421            | 1.136 | H1-1b  |
| 23     | M23   | ROHN 1.5x0.067 | 0.089   | 36     | 94          | 0.009   | 36      | 67341.711    | 9501.265     | 361.421            | 361.421            | 1     | H1-1b* |

**APPENDIX D**  
**ADDITIONAL CALCUATIONS**

### Bolt Calculation Tool, V1.4

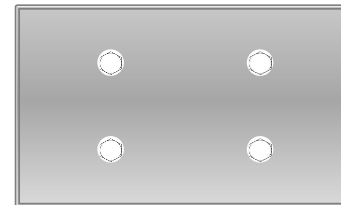
| PROJECT DATA            |                    |
|-------------------------|--------------------|
| Site Name:              | HRT 088 943629     |
| Site Number:            | 806387             |
| Job Code:               | 1039-Z0001-B       |
| Connection Description: | Frame to Tower Leg |

| APPLIED LOADS      |         |        |
|--------------------|---------|--------|
| Bolt Tension:      | 1003.89 | lbs    |
| Bolt Shear:        | 422.20  | lbs    |
| Sliding Force:     | 1649.12 | lbs    |
| Torsion About Leg: | 0.00    | lbs-ft |

| BOLT PROPERTIES   |        |    |
|-------------------|--------|----|
| Bolt Type:        | U-Bolt | -  |
| Bolt Diameter:    | 0.5    | in |
| Bolt Grade:       | A307   | -  |
| # of U-Bolts:     | 2      | -  |
| Leg Diameter:     | 2.375  | in |
| Threads Excluded? | No     | -  |

| BOLT CHECK        |         |              |
|-------------------|---------|--------------|
| Tensile Strength  | 6385.43 |              |
| Shear Strength    | 4417.86 |              |
| Tensile Usage     | 15.7%   |              |
| Shear Usage       | 9.6%    |              |
| Interaction Check | 0.03    | <b>≤1.05</b> |
| Result            | Pass    |              |

| SLIP CHECK           |         |              |
|----------------------|---------|--------------|
| Torsional Resistance | 694.24  |              |
| Sliding Resistance   | 7015.44 |              |
| Torsional Usage      | 0.0%    |              |
| Sliding Usage        | 23.5%   |              |
| Interaction Check    | 0.06    | <b>≤1.05</b> |
| Result               | Pass    |              |



# Exhibit F

## **Power Density/RF Emissions Report**



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

T-Mobile Existing Facility

Site ID: CTHA808A

14 Route 80  
Killingworth, Connecticut 06419

**March 23, 2021**

**EBI Project Number: 6221001355**

| Site Compliance Summary   |                  |
|---|------------------|
| Compliance Status:  | <b>COMPLIANT</b> |
| Site total MPE% of<br>FCC general<br>population<br>allowable limit: | <b>16.17%</b>    |





March 23, 2021

T-Mobile

Attn: Jason Overbey, RF Manager

35 Griffin Road South

Bloomfield, Connecticut 06002

## Emissions Analysis for Site: CTHA808A

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **14 Route 80 in Killingworth, Connecticut** 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 and 700 MHz frequency bands are approximately  $400 \mu\text{W}/\text{cm}^2$  and  $467 \mu\text{W}/\text{cm}^2$ , respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency 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 14 Route 80 in Killingworth, Connecticut 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 manufacturer's 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 power density calculations, the broadcast footprint of the AIR6449 antenna has been considered. Due to the beamforming nature of this antenna, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

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

- 1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.
- 3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 5) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.



- 6) 2 LTE 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.
- 7) 1 LTE channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.
- 8) 1 NR channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.
- 9) 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.
- 10) 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 manufacturer's 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.
- 11) The antennas used in this modeling are the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24\_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector A, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24\_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector B, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24\_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's 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.



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- 12) The antenna mounting height centerline of the proposed antennas is 144 feet above ground level (AGL).
- 13) 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.
- 14) 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:       | RFS APX16DWV-16DWV-S-E-A20                                | Make / Model:       | RFS APX16DWV-16DWV-S-E-A20                                | Make / Model:       | RFS APX16DWV-16DWV-S-E-A20                                |
| Frequency Bands:    | 2100 MHz  | Frequency Bands:    | 2100 MHz  | Frequency Bands:    | 2100 MHz  |
| Gain:               | 15.9 dBd  | Gain:               | 15.9 dBd  | Gain:               | 15.9 dBd  |
| Height (AGL):       | 144 feet  | Height (AGL):       | 144 feet  | Height (AGL):       | 144 feet  |
| Channel Count:      | 2   | Channel Count:      | 2   | Channel Count:      | 2   |
| Total TX Power (W): | 120 Watts   | Total TX Power (W): | 120 Watts   | Total TX Power (W): | 120 Watts   |
| ERP (W):            | 4,668.54  | ERP (W):            | 4,668.54  | ERP (W):            | 4,668.54  |
| Antenna AI MPE %:   | 0.88%   | Antenna BI MPE %:   | 0.88%   | Antenna CI MPE %:   | 0.88%   |
| Antenna #:          | 2   | Antenna #:          | 2   | Antenna #:          | 2   |
| Make / Model:       | RFS APXVAALL24_43-U-NA20                                  | Make / Model:       | RFS APXVAALL24_43-U-NA20                                  | Make / Model:       | RFS APXVAALL24_43-U-NA20                                  |
| Frequency Bands:    | 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz         | Frequency Bands:    | 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz         | Frequency Bands:    | 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz         |
| Gain:               | 12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd | Gain:               | 12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd | Gain:               | 12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd |
| Height (AGL):       | 144 feet  | Height (AGL):       | 144 feet  | Height (AGL):       | 144 feet  |
| Channel Count:      | 11  | Channel Count:      | 11  | Channel Count:      | 11  |
| Total TX Power (W): | 440 Watts   | Total TX Power (W): | 440 Watts   | Total TX Power (W): | 440 Watts   |
| ERP (W):            | 12,569.87   | ERP (W):            | 12,569.87   | ERP (W):            | 12,569.87   |
| Antenna A2 MPE %:   | 3.45%   | Antenna B2 MPE %:   | 3.45%   | Antenna C2 MPE %:   | 3.45%   |
| Antenna #:          | 3   | Antenna #:          | 3   | Antenna #:          | 3   |
| Make / Model:       | Ericsson AIR 6449   | Make / Model:       | Ericsson AIR 6449   | Make / Model:       | Ericsson AIR 6449   |
| Frequency Bands:    | 2500 MHz / 2500 MHz                                       | Frequency Bands:    | 2500 MHz / 2500 MHz                                       | Frequency Bands:    | 2500 MHz / 2500 MHz                                       |
| Gain:               | 17.3 dBd / 17.3 dBd                                       | Gain:               | 17.3 dBd / 17.3 dBd                                       | Gain:               | 17.3 dBd / 17.3 dBd                                       |
| Height (AGL):       | 144 feet  | Height (AGL):       | 144 feet  | Height (AGL):       | 144 feet  |
| Channel Count:      | 2   | Channel Count:      | 2   | Channel Count:      | 2   |
| Total TX Power (W): | 240 Watts   | Total TX Power (W): | 240 Watts   | Total TX Power (W): | 240 Watts   |
| ERP (W):            | 12,888.76   | ERP (W):            | 12,888.76   | ERP (W):            | 12,888.76   |
| Antenna A3 MPE %:   | 2.43%   | Antenna B3 MPE %:   | 2.43%   | Antenna C3 MPE %:   | 2.43%   |



| Site Composite MPE %        |        |
|-----------------------------|--------|
| Carrier                     | MPE %  |
| T-Mobile (Max at Sector A): | 6.77%  |
| AT&T                        | 4.56%  |
| Nextel                      | 0.44%  |
| Sprint                      | 2.9%   |
| Verizon                     | 1.5%   |
| Site Total MPE % :          | 16.17% |

| T-Mobile MPE % Per Sector |        |
|---------------------------|--------|
| T-Mobile Sector A Total:  | 6.77%  |
| T-Mobile Sector B Total:  | 6.77%  |
| T-Mobile Sector C Total:  | 6.77%  |
|                           |        |
| Site Total MPE % :        | 16.17% |

## T-Mobile Maximum MPE Power Values (Sector A)

| T-Mobile Frequency Band / Technology (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 2100 MHz LTE                           | 2          | 2334.27                 | 144.0         | 8.81  | 2100 MHz LTE    | 1000  | 0.88%            |
| T-Mobile 600 MHz LTE                            | 2          | 591.73                  | 144.0         | 2.23  | 600 MHz LTE     | 400   | 0.56%            |
| T-Mobile 600 MHz NR                             | 1          | 1577.94                 | 144.0         | 2.98  | 600 MHz NR      | 400   | 0.74%            |
| T-Mobile 700 MHz LTE                            | 2          | 695.22                  | 144.0         | 2.62  | 700 MHz LTE     | 467   | 0.56%            |
| T-Mobile 1900 MHz GSM                           | 4          | 1052.26                 | 144.0         | 7.95  | 1900 MHz GSM    | 1000  | 0.79%            |
| T-Mobile 1900 MHz LTE                           | 2          | 2104.51                 | 144.0         | 7.95  | 1900 MHz LTE    | 1000  | 0.79%            |
| T-Mobile 2500 MHz LTE                           | 1          | 6444.38                 | 144.0         | 12.17   | 2500 MHz LTE    | 1000  | 1.22%            |
| T-Mobile 2500 MHz NR                            | 1          | 6444.38                 | 144.0         | 12.17   | 2500 MHz NR     | 1000  | 1.22%            |
|   |            |                         |               |   |                 | <b>Total:</b>                               | <b>6.77%</b>     |

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.



## 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:                          | 6.77%                   |
| Sector B:                          | 6.77%                   |
| Sector C:                          | 6.77%                   |
| T-Mobile Maximum MPE % (Sector A): | 6.77%                   |
|                                    |                         |
| Site Total:                        | 16.17%                  |
|                                    |                         |
| Site Compliance Status:            | <b>COMPLIANT</b>        |

The anticipated composite MPE value for this site assuming all carriers present is **16.17%** 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.