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

March 1, 2019

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

RE: **Notice of Exempt Modification for Crown Site BU: 857011**
AT&T Site ID: CT2265
1102 Horse Hill Road, Westbrook, CT 06498
Latitude: 41° 19′ 25.71″/ Longitude: -72° 29′ 28.10″

Dear Ms. Bachman:

AT&T currently maintains (9) antennas at the 159-foot level of the existing 159-foot monopole at 1102 Horse Hill Road in Westbrook, Connecticut. The tower is owned by Crown Castle. The property is owned by Norwich Diocesan Cemetary. AT&T intends to replace (6) antennas, replace (3) RRUs, add (6) RRUs, add (2) DC6s, add (4) DC power cables and add (1) fiber line.

The facility was approved by the Connecticut Siting Council in Docket No. 289 on August 26, 2004. This approval was given with conditions. AT&T's proposed modification complies with all conditions as stated in the Council's Decision and Order.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to Noel Bishop, First Selectman, Town of Westbrook, Marilyn Ozols, Planning Commission Chair for the Town of Westbrook, as well as the property owner and Crown Castle is the tower owner.

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

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

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

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

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

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

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

Sincerely,

Anne Marie Zsamba, Esq.
Real Estate Specialist
3 Corporate Park Drive, Suite 101, Clifton Park, NY 12065
(201) 236-9224
annemarie.zsamba@crowncastle.com

Attachments:

Exhibit-A: Compound Plan and Elevation Depicting the Planned Changes
Exhibit-B: Structural Modification Report
Exhibit-C: General Power Density Table Report (RF Emissions Analysis Report)

cc: Noel Bishop, First Selectman
Town of Westbrook
866 Boston Post Road
Westbrook, CT 06498
860-399-3040

Marilyn Ozols, Planning Commission Chair
Town of Westbrook
866 Boston Post Road
Westbrook, CT 06498
860-399-3040

Norwich RC Diocesan Corp
815 Boswell Avenue
Norwich, CT 06360

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on 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 ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

ORIGIN ID:GFLA (518) 373-3523
WILL STONE
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 01MAR19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **NOEL BISHOP, FIRST SELECTMAN**

TOWN OF WESTBROOK
866 BOSTON POST ROAD
WESTBROOK CT 06498
(860) 399-3040

REF: 1734.7680
INV:
PO:
DEPT:

565J2/0E3D/23AD

J191019010701uv

FedEx Express

MON - 04 MAR 12:00P
PRIORITY OVERNIGHT

TRK# 0201 **7745 9697 3619**

SE RSPA

06498
BDL
CT-US

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CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 01MAR19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **MARILYN OZOLS, PLANNING COMMISSION**

TOWN OF WESTBROOK
866 BOSTON POST ROAD
WESTBROOK CT 06498
(860) 399-3040

REF: 1734.7680
INV:
PO:
DEPT:

565J2/0E3D/23AD

J191019010701uv

FedEx Express

MON - 04 MAR 12:00P
PRIORITY OVERNIGHT

TRK# 0201 **7745 9699 5186**

SE RSPA

06498
BDL
CT-US

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WILL STONE
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 01MAR19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **NORWICH RC DIOCESAN CORP**

815 BOSWELL AVENUE

NORWICH CT 06360

(201) 236-9224

REF: 1734.7680

INV:

PO:

DEPT:

FedEx Express

J191019010701uv

565J2/0E3D/23AD

MON - 04 MAR 10:30A

PRIORITY OVERNIGHT

TRK# 0201 **7745 9701 5136**

SE SKKA

06360

BDL

CT-US

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DOCKET NO. 289 – AT&T Wireless PCS, LLC d/b/a AT&T Wireless application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of a telecommunications facility in the Town of Westbrook, Connecticut.	} } }	Connecticut Siting Council August 26, 2004

Decision and Order

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a telecommunications facility including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes **§** 16-50k, be issued to AT&T Wireless PCS, LLC d/b/a AT&T Wireless for the construction, maintenance and operation of a wireless telecommunications facility at Horse Hill Road (State Route 145), Westbrook, Connecticut.

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

1. The tower shall be designed as a monopole and shall be constructed no taller than 160 feet above ground level to provide telecommunications services to both public and private entities. The overall height of such tower shall not exceed 163 feet with all appurtenances attached thereto.

2. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be served on all parties and intervenors, as listed in the service list, and submitted to and approved by the Council prior to the commencement of facility construction and shall include:

    a. a final site plan(s) of site development to include specifications for the tower, tower foundation, antennas, equipment building, access road, utility line, and landscaping; and

        b) construction plans for site clearing, water drainage, and erosion and sedimentation control consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

3. The Certificate Holder shall, prior to the commencement of operation, provide the Council worst-case modeling of electromagnetic radio frequency power density of all proposed entities' antennas at the closest point of uncontrolled access to the tower base,
consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin No. 65, August 1997. The Certificate Holder shall ensure a recalculated report of electromagnetic radio frequency power density is submitted to the Council in the event other carriers locate at this facility or if circumstances in operation cause a change in power density above the levels calculated and provided pursuant to this Decision and Order.

4. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

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

reasons precluding such tower sharing.

6. The Certificate Holder shall provide reasonable space on the tower for no compensation for any municipal antennas, provided such antennas are compatible with the structural integrity of the tower.

7. If the facility does not initially provide wireless services within one year of completion of construction or ceases to provide wireless services for a period of one year, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.

8. Any antenna that becomes obsolete and ceases to function shall be removed within 60 days after such antennas become obsolete and cease to function.

9. Unless otherwise approved by the Council, this Decision and Order shall be void if the facility authorized herein is not operational within one year of the effective date of this Decision and Order or within one year after all appeals to this Decision and Order have been resolved. Any request for extensions of the period shall be filed with the Council not later than sixty days prior to expiration date of the Certificate and shall be served on all parties and intervenors, as listed in the service list. Any proposed modifications to this Decision and Order shall likewise be so served.

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

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

The parties and intervenors to this proceeding are:

Applicant	**Its Representative**
AT&T Wireless PCS, LLC d/b/a AT&T Wireless	Christopher B. Fisher, Esq. Cuddy & Feder LLP 90 Maple Avenue White Plains, NY 10601 (914) 761-1300 (914) 761-6405 - fax

1102 HORSE HILL RD

Location	1102 HORSE HILL RD	**Mblu**	126/ / 013/ /
Acct#	N0513301	**Owner**	NORWICH RC DIOCESAN CORP
Assessment	$247,830	**Appraisal**	$728,650
PID	2749	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$185,450	$543,200	$728,650
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$129,820	$118,010	$247,830

Owner of Record

Owner	NORWICH RC DIOCESAN CORP	**Sale Price**	$0
Co-Owner	RESURRECTION CEMETARY	**Certificate**	
Address	815 BOSWELL AVE NORWICH, CT 06360	**Book & Page**	52/ 301
		Sale Date	01/01/1901
		Instrument	25

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
NORWICH RC DIOCESAN CORP	$0		52/ 301	25	01/01/1901

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
Building Percent Good:
Replacement Cost Less Depreciation: $0

Building Attributes

Field	Description
Style	Outbuildings
Model	
Grade:	
Stories	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Full Bthrms:	
Half Baths:	
Extra Fixtures	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Extra Kitchens	
Fireplace(s)	
Gas Fireplace(s)	
Stacks	
Bsmt Garage(s)	
Callback	
Fin Bsmnt	
Bsmt Heat	
Int Vs Ext	

Building Photo

(http://images.vgsi.com/photos2/WestbrookCTPhotos//default.jp

Building Layout

Building Layout
(http://images.vgsi.com/photos2/WestbrookCTPhotos//Sketches/

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	610
Description	Forest
Zone	RR
Neighborhood	0040
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	58
Depth	
Assessed Value	$118,010
Appraised Value	$543,200

Special Land			
Land Use Code	**Land Use Description**	**Units**	**Unit Type**
610	Forest	30	AC

Outbuildings

Outbuildings							Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**	**Comment**
TCS	Telecomm Site			209 UNITS	$80,470	1	
TCM	Telecomm			0 S.F.&HGT	$25,000	1	
TCM	Telecomm			1 S.F.&HGT	$5,000	1	ADD TO EXIS CELL TOWER
TCS	Telecomm Site			147 UNITS	$74,980	1	10X20 PLATFORM-ANTENNAS-CABI

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$185,450	$543,200	$728,650
2017	$105,470	$543,200	$648,670
2016	$105,470	$543,200	$648,670

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$129,820	$118,010	$247,830
2017	$73,830	$118,010	$191,840
2016	$73,830	$118,010	$191,840

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Google Maps 1102 Horse Hill Rd

Map data ©2019 Google 200 ft

1102 Horse Hill Rd

Westbrook, CT 06498

8GG5+G6 Westbrook, CT

Photos

PROJECT INFORMATION

SCOPE OF WORK:

ITEMS TO BE MOUNTED ON THE EXISTING TOWER:

- REMOVE (6) EXISTING ANTENNAS, (3) RRH's, (12) DIPLEXER's

- INSTALL AT&T ANTENNA (800-10991K) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T ANTENNA (800-10965) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 4415 B25 (PCS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 4449 B5/B12 (850/700)(TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 8843 B2/B66A (PCS/AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL SURGE ARRESTOR (DC6-48-60-18-8F) (TOTAL OF 2).
- INSTALL (4) DC TRUNK CABLES & (1) FIBER TRUNK CABLE.

ITEMS TO BE MOUNTED INSIDE EXISTING SHELTER:

- SWAP DUS WITH 6630
- INSTALL (1) NEW 6630 FOR 5G

ITEMS TO REMAIN:

- (3) ANTENNAS, (6) TMAS, (6) DIPLEXERS, (1) SURGE SUPPRESSOR, (12) COAX CABLES, (1) FIBER TRUNK CABLE & (2) DC TRUNK CABLES.

SITE ADDRESS:	1102 HORSE HILL ROAD WESTBROOK, CT 06498
LATITUDE (NAD 83):	N 41° 19' 25.71"
LONGITUDE (NAD 83):	W 72° 29' 28.10"
LANDLORD:	CROWN CASTLE INTERNATIONAL 500 W. CUMMINGS PARK, STE 3600 WOBURN, MA 01801
TYPE OF SITE:	MONOPOLE/INDOOR
TOWER HEIGHT:	159'
RAD CENTER:	163'
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY

DRAWING INDEX

SHEET NO:	SHEET TITLE
T-1	TITLE SHEET
GN-1	GENERAL NOTES I
GN-2	GENERAL NOTES II
C-1	SITE PLAN
C-2	EQUIPMENT LAYOUT & PROPOSED TOWER ELEVATION
C-3	EXISTING & PROPOSED ANTENNA LAYOUT
C-4	EQUIPMENT DETAILS
RF-1	ANTENNA CHART & RF EQUIPMENT SCHEMATIC
G-1	GROUNDING DETAILS

CROWN CASTLE SITE ID #: 857011
CROWN CASTLE SITE NAME: WESTBROOK NORTH HORSE HILL ROAD

ENGINEERING

2018 CONNECTICUT STATE BUILDING CODE
2018 AMENDMENT WITH 2015 INTERNATIONAL BUILDING CODE
2009 ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
2015 INTERNATIONAL MECHANICAL CODE
2015 INTERNATIONAL ENERGY CONSERVATION CODE
2017 NATIONAL ELECTRICAL CODE (NFPA 70 2017)
ANSI/TIA-222-G

SITE NUMBER: CT2265

FA LOCATION CODE: 10105800

SITE NAME: WESTBROOK NORTH HORSE HILL ROAD

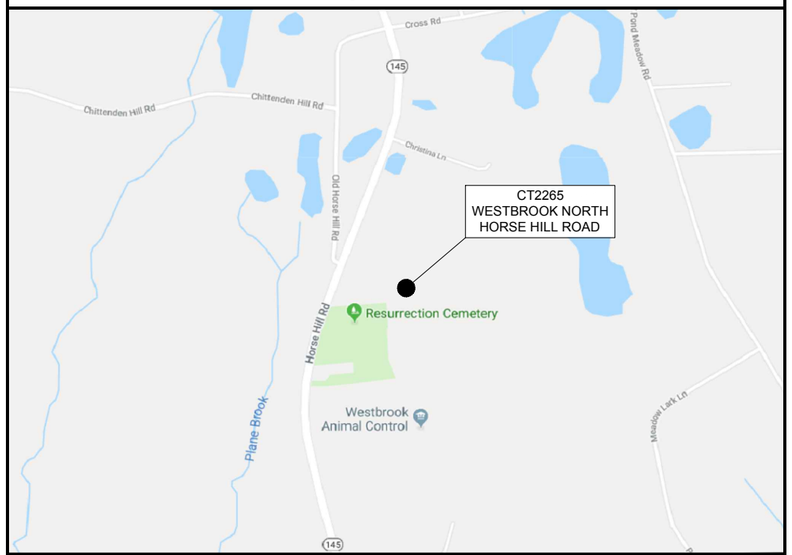
CROWN SITE NAME: WESTBROOK NORTH HORSE HILL ROAD

PROJECT: LTE 2C/LTE4C/LTE3C/4TX4RX SOFTWARE RETROFIT

PACE ID: MRCTB035206, MRCTB035179, MRCTB035242, MRCTB035322

BU#: 857011

VICINITY MAP



FROM I-95 SOUTH: 9. TAKE EXIT 64 FOR CT-145/(?)HORSE HILL RD TOWARD CLINTON 0.2 MI 10. TURN RIGHT ONTO CT-145 N/(?)HORSE HILL RD DESTINATION WILL BE ON THE RIGHT

GENERAL NOTES

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

2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

UNDERGROUND SERVICE ALERT

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

NOTE:

ALL CONSTRUCTION ACTIVITIES ARE TO BE COMPLETED DIRECTLY THROUGH CROWN. CONTRACTOR MUST HAVE CONSTRUCTION PO AND NTP FROM CROWN DIRECT IN ORDER TO BEGIN. PRE-APPROVAL TO ENTER THE PROPERTY MUST BE OBTAINED. FOR ACCESS AUTHORIZATION, PLEASE CONTACT CROWN.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

COMMONWEALTH OF MASSACHUSETTS
DANIEL J. CORNING
CIVIL
No. 53767
REGISTERED PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: JB

CHECKED BY: CAT

SUBMITTALS

0	02/21/19	ISSUED FOR PERMITTING

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

FA# 10105800
SITE# CT2265
WESTBROOK NORTH
HORSE HILL ROAD
1102 HORSE HILL ROAD
WESTBROOK, CT 06498

TITLE SHEET

T-1

PART 1 - GENERAL

1.1 GENERAL CONDITIONS:

A. CONTRACTOR SHALL INSPECT THE EXISTING SITE CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.

B. THE CONTRACTOR SHALL OBTAIN PERMITS, LICENSES, MAKE ALL DEPOSITS, AND PAY ALL FEES REQUIRED FOR THE CONSTRUCTION PERFORMANCE FOR THE WORK UNDER THIS SECTION.

C. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL SYSTEMS AND COMPONENTS COVERED UNDER THIS SECTION. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS. DRAWING SHALL NOT BE SCALED TO DETERMINE DIMENSIONS.

1.2 LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES.

A. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, AND ALL APPLICABLE LOCAL LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES. CONDUIT BENDS SHALL BE THE RADIUS BEND FOR THE TRADE SIZE OF CONDUIT IN COMPLIANCE WITH THE LATEST EDITIONS OF NEC.

1.3 REFERENCES:

A. THE PUBLICATIONS LISTED BELOW ARE PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE. THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION UNLESS OTHERWISE NOTED. EXCEPT AS MODIFIED BY THE REQUIREMENT SPECIFIED HEREIN OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISION OF THESE PUBLICATIONS.

1. ANSI/IEEE (AMERICAN NATIONAL STANDARDS INSTITUTE)
2. ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
3. ICEA (INSULATED CABLE ENGINEERS ASSOCIATION)
4. NEMA (NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION)
5. NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)
6. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
7. UL (UNDERWRITERS LABORATORIES INC.)
8. AT&T GROUNDING AND BONDING STANDARDS TP-76416

1.4 SCOPE OF WORK

A. WORK UNDER THIS SECTION SHALL CONSIST OF FURNISHING ALL LABOR, MATERIAL, AND ASSOCIATED SERVICES REQUIRED TO COMPLETE REQUIRED CONSTRUCTION AND BE OPERATIONAL.

B. ALL ELECTRICAL EQUIPMENT UNDER THIS CONTRACT SHALL BE PROPERLY TESTED, ADJUSTED, AND ALIGNED BY THE CONTRACTOR.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATING, DRAINING, TRENCHES, BACKFILLING, AND REMOVAL OF EXCESS DIRT.

D. THE CONTRACTOR SHALL FURNISH TO THE OWNER WITH CERTIFICATES OF A FINAL INSPECTION AND APPROVAL FROM THE INSPECTION AUTHORITIES HAVING JURISDICTION.

E. THE CONTRACTOR SHALL PREPARE A COMPLETE SET OF AS-BUILT DRAWINGS, DOCUMENT ALL WIRING EQUIPMENT CONDITIONS, AND CHANGES WHILE COMPLETING THIS CONTRACT. THE AS-BUILT DRAWINGS SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT.

PART 2 - PRODUCTS

2.1 GENERAL:

A. ALL MATERIALS AND EQUIPMENT SHALL BE UL LISTED, NEW, AND FREE FROM DEFECTS.

B. ALL ITEMS OF MATERIALS AND EQUIPMENT SHALL BE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION AS SUITABLE FOR THE USE INTENDED.

C. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

D. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 10,000 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 PER THE GOVERNING JURISDICTION.

2.2 MATERIALS AND EQUIPMENT:

A. CONDUIT:

1. RIGID METAL CONDUIT (RMC) SHALL BE HOT-DIPPED GALVANIZED INSIDE AND OUTSIDE INCLUDING ENDS AND THREADS AND ENAMELED OR LACQUERED INSIDE IN ADDITION TO GALVANIZING.
2. LIQUIDTIGHT FLEXIBLE METAL CONDUIT SHALL BE UL LISTED.
3. CONDUIT CLAMPS, STRAPS AND SUPPORTS SHALL BE STEEL OR MALLEABLE IRON. ALL FITTINGS SHALL BE COMPRESSION AND CONCRETE TIGHT TYPE. GROUNDING BUSHINGS WITH INSULATED THROATS SHALL BE INSTALLED ON ALL CONDUIT TERMINATIONS.
4. NONMETALLIC CONDUIT AND FITTINGS SHALL BE SCHEDULE 40 PVC. INSTALL USING SOLVENT-CEMENT-TYPE JOINTS AS RECOMMENDED BY THE MANUFACTURER.

B. CONDUCTORS AND CABLE:

1. CONDUCTORS AND CABLE SHALL BE FLAME-RETARDANT, MOISTURE AND HEAT RESISTANT THERMOPLASTIC, SINGLE CONDUCTOR, COPPER, TYPE THHN/THWN-2, 600 VOLT, SIZE AS INDICATED, #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR USED.
2. #10 AWG AND SMALLER CONDUCTOR SHALL BE SOLID OR STRANDED AND #8 AWG AND LARGER CONDUCTORS SHALL BE STRANDED.
3. SOLDERLESS, COMPRESSION-TYPE CONNECTORS SHALL BE USED FOR TERMINATION OF ALL STRANDED CONDUCTORS.
4. STRAIN-RELIEF SUPPORTS GRIPS SHALL BE HUBBELL KELLEMS OR APPROVED EQUAL. CABLES SHALL BE SUPPORTED IN ACCORDANCE WITH THE NEC AND CABLE MANUFACTURER'S RECOMMENDATIONS.
5. ALL CONDUCTORS SHALL BE TAGGED AT BOTH ENDS OF THE CONDUCTOR, AT ALL PULL BOXES, J-BOXES, EQUIPMENT AND CABINETS AND SHALL BE IDENTIFIED WITH APPROVED PLASTIC TAGS (ACTION CRAFT, BRADY, OR APPROVED EQUAL).

C. DISCONNECT SWITCHES:

1. DISCONNECT SWITCHES SHALL BE HEAVY DUTY, DEAD-FRONT, QUICK-MAKE, QUICK-BREAK, EXTERNALLY OPERABLE, HANDLE LOCKABLE AND INTERLOCK WITH COVER IN CLOSED POSITION, RATING AS INDICATED, UL LABELED FURNISHED IN NEMA 3R ENCLOSURE, SQUARE-D OR ENGINEER APPROVED EQUAL.

D. CHEMICAL ELECTROLYTIC GROUNDING SYSTEM:

1. INSTALL CHEMICAL GROUNDING AS REQUIRED. THE SYSTEM SHALL BE ELECTROLYTIC MAINTENANCE FREE ELECTRODE CONSISTING OF RODS WITH A MINIMUM #2 AWG CU EXOTHERMICALLY WELDED PIGTAIL, PROTECTIVE BOXES, AND BACKFILL MATERIAL. MANUFACTURER SHALL BE LYNCOLE XIT GROUNDING ROD TYPES K2-(*)CS OR K2L-(*)CS (*) LENGTH AS REQUIRED.
2. GROUND ACCESS BOX SHALL BE A POLYPLASTIC BOX FOR NON-TRAFFIC APPLICATIONS, INCLUDING BOLT DOWN FLUSH COVER WITH "BREATHER" HOLES, XIT MODEL #XB-22. ALL DISCONNECT SWITCHES AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS ID NUMBERING, AND THE ELECTRICAL POWER SOURCE.
3. BACKFILL MATERIAL SHALL BE LYNCONITE AND LYNCOLE GROUNDING GRAVEL.

E. SYSTEM GROUNDING:

1. ALL GROUNDING COMPONENTS SHALL BE TINNED AND GROUNDING CONDUCTOR SHALL BE #2 AWG BARE, SOLID, TINNED, COPPER. ABOVE GRADE GROUNDING CONDUCTORS SHALL BE INSULATED WHERE NOTED.
2. GROUNDING BUSES SHALL BE BARE, TINNED, ANNEALED COPPER BARS OF RECTANGULAR CROSS SECTION. STANDARD BUS BARS MGB, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. THEY SHALL NOT BE FABRICATED OR MODIFIED IN THE FIELD. ALL GROUNDING BUSES SHALL BE IDENTIFIED WITH MINIMUM 3/4" LETTERS BY WAY OF STENCILING OR DESIGNATION PLATE.
3. CONNECTORS SHALL BE HIGH-CONDUCTIVITY, HEAVY DUTY, LISTED AND LABELED AS GROUNDING CONNECTORS FOR THE MATERIALS USED. USE TWO-HOLE COMPRESSION LUGS WITH HEAT SHRINK FOR MECHANICAL CONNECTIONS. INTERIOR CONNECTIONS USE TWO-HOLE COMPRESSION LUGS WITH INSPECTION WINDOW AND CLEAR HEAT SHRINK.
4. EXOTHERMIC WELDED CONNECTIONS SHALL BE PROVIDED IN KIT FORM AND SELECTED FOR THE SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS TO BE CONNECTED.
5. GROUND RODS SHALL BE COPPER-CLAD STEEL WITH HIGH-STRENGTH STEEL CORE AND ELECTROLYTIC-GRADE COPPER OUTER SHEATH, MOLTEN WELDED TO CORE, 5/8"x10'-0". ALL GROUNDING RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES.
6. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS IN COMPLIANCE WITH THE AT&T SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULLBOXES, DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS.

F. OTHER MATERIALS:

6. THE CONTRACTOR SHALL PROVIDE OTHER MATERIALS, THOUGH NOT SPECIFICALLY DESCRIBED, WHICH ARE REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM AND PROPER INSTALLATION OF THE WORK.
7. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.

G. PANELS AND LOAD CENTERS:

1. ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN.

PART 3 - EXECUTION

3.1 GENERAL:

A. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. EQUIPMENT SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT OR WATER, AND AGAINST CHEMICAL OR MECHANICAL INJURY DURING INSTALLATION AND CONSTRUCTION PERIODS.

3.2 LABOR AND WORKMANSHIP:

A. ALL LABOR FOR THE INSTALLATION OF MATERIALS AND EQUIPMENT FURNISHED FOR THE ELECTRICAL SYSTEM SHALL BE INSTALLED BY EXPERIENCED WIREMEN, IN A NEAT AND WORKMAN-LIKE MANNER.

B. ALL ELECTRICAL EQUIPMENT SHALL BE ADJUSTED, ALIGNED AND TESTED BY THE CONTRACTOR AS REQUIRED TO PRODUCE THE INTENDED PERFORMANCE.

C. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT, REMOVE ALL LABELS AND ANY DEBRIS, CRATING OR CARTONS AND LEAVE THE INSTALLATION FINISHED AND READY FOR OPERATION.

3.3 COORDINATION:

A. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ELECTRICAL ITEMS WITH THE OWNER-FURNISHED EQUIPMENT DELIVERY SCHEDULE TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

3.4 INSTALLATION:

A. CONDUIT:

1. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT AS SPECIFIED. NO CONDUIT OR TUBING OF LESS THAN 3/4 INCH TRADE SIZE.
2. PROVIDE RIGID PVC SCHEDULE 80 CONDUITS FOR ALL RISERS, RMC OTHERWISE NOTED. EMT MAY BE INSTALLED FOR EXTERIOR CONDUITS WHERE NOT SUBJECT TO PHYSICAL DAMAGE.
3. INSTALL SCHEDULE 40 PVC CONDUIT WITH A MINIMUM COVER OF 24" UNDER ROADWAYS, PARKING LOTS, STREETS, AND ALLEYS. CONDUIT SHALL HAVE A MINIMUM COVER OF 18" IN ALL OTHER NON-TRAFFIC APPLICATIONS (REFER TO 2017 NEC, TABLE 300.5).
4. USE GALVANIZED FLEXIBLE STEEL CONDUIT WHERE DIRECT CONNECTION TO EQUIPMENT WITH MOVEMENT, VIBRATION, OR FOR EASE OF MAINTENANCE. USE LIQUID TIGHT, FLEXIBLE METAL CONDUIT FOR OUTDOOR APPLICATIONS. INSTALL GALVANIZED FLEXIBLE STEEL CONDUIT AT ALL POINTS OF CONNECTION TO EQUIPMENT MOUNTED ON SUPPORT TO ALLOW FOR EXPANSION AND CONTRACTION.
5. A RUN OF CONDUIT BETWEEN BOXES OR EQUIPMENT SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF THREE QUARTER-BENDS. CONDUIT BEND SHALL BE MADE WITH THE UL LISTED BENDER OR FACTORY 90 DEGREE ELBOWS MAY BE USED.
6. FIELD FABRICATED CONDUITS SHALL BE CUT SQUARE WITH A CONDUIT CUTTING TOOL AND REAMED TO PROVIDE A SMOOTH INSIDE SURFACE.
7. PROVIDE INSULATED GROUNDING BUSHING FOR ALL CONDUITS.
8. CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL CONDUITS DURING CONSTRUCTION. TEMPORARY OPENINGS IN THE CONDUIT SYSTEM SHALL BE PLUGGED OR CAPPED TO PREVENT ENTRANCE OF MOISTURE OR FOREIGN MATTER. CONTRACTOR SHALL REPLACE ANY CONDUITS CONTAINING FOREIGN MATERIALS THAT CANNOT BE REMOVED.
9. ALL CONDUITS SHALL BE SWABBED CLEAN BY PULLING AN APPROPRIATE SIZE MANDREL THROUGH THE CONDUIT BEFORE INSTALLATION OF CONDUCTORS OR CABLES. CONDUIT SHALL BE FREE OF DIRT AND DEBRIS.
10. INSTALL PULL STRINGS IN ALL CLEAN EMPTY CONDUITS. IDENTIFY PULL STRINGS AT EACH END.
11. INSTALL 2" HIGHLY VISIBLE AND DETECTABLE TAPE 12" ABOVE ALL UNDERGROUND CONDUITS AND CONDUCTORS.
12. CONDUITS SHALL BE INSTALLED IN SUCH A MANNER AS TO INSURE AGAINST COLLECTION OF TRAPPED CONDENSATION.
13. PROVIDE CORE DRILLING AS NECESSARY FOR PENETRATIONS TO ALLOW FOR RACEWAYS AND CABLES TO BE ROUTED THROUGH THE BUILDING. DO NOT PENETRATE STRUCTURAL MEMBERS. SLEEVES AND/OR PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE EFFECTIVELY SEALED WITH FIRE RATED MATERIAL WHICH SHALL MAINTAIN THE FIRE RATING OF THE WALL OR STRUCTURE. FIRE STOPS AT FLOOR PENETRATIONS SHALL PREVENT PASSAGE OF WATER, SMOKE, FIRE, AND FUMES. ALL MATERIAL SHALL BE UL APPROVED FOR THIS PURPOSE.

B. CONDUCTORS AND CABLE:

1. ALL POWER WIRING SHALL BE COLOR CODED AS FOLLOWS:

DESCRIPTION	208/240/120 VOLT SYSTEMS
PHASE A	BLACK
PHASE B	RED
PHASE C	BLUE
NEUTRAL	WHITE
GROUNDING	GREEN

2. SPLICES SHALL BE MADE ONLY AT OUTLETS, JUNCTION BOXES, OR ACCESSIBLE RACEWAY CONDUITS APPROVED FOR THIS PURPOSE.
3. PULLING LUBRICANTS SHALL BE UL APPROVED. CONTRACTOR SHALL USE NYLON OR HEMP ROPE FOR PULLING CONDUCTOR OR CABLES INTO THE CONDUIT.
4. CABLES SHALL BE NEATLY TRAINED, WITHOUT INTERLACING, AND BE OF SUFFICIENT LENGTH IN ALL BOXES & EQUIPMENT TO PERMIT MAKING A NEAT ARRANGEMENT. CABLES SHALL BE SECURED IN A MANNER TO AVOID TENSION ON CONDUCTORS OR TERMINALS. CONDUCTORS SHALL BE PROTECTED FROM MECHANICAL INJURY AND MOISTURE. SHARP BENDS OVER CONDUIT BUSHINGS IS PROHIBITED. DAMAGED CABLES SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

C. DISCONNECT SWITCHES:

1. INSTALL DISCONNECT SWITCHES LEVEL AND PLUMB. CONNECT TO WIRING SYSTEM AND GROUNDING SYSTEM AS INDICATED.

D. GROUNDING:

1. ALL METALLIC PARTS OF ELECTRICAL EQUIPMENT WHICH DO NOT CARRY CURRENT SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING MANUFACTURER, AT&T GROUNDING AND BONDING STANDARDS TP-76416, ND-00135, AND THE NATIONAL ELECTRICAL CODE.
2. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM INDICATED WITH ASSEMBLY OF MATERIALS, INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.
3. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUNDING CONDUCTORS SHALL NOT BE LOOPED OR SHARPLY BENT. ROUTE GROUNDING CONNECTIONS AND CONDUCTORS TO GROUND IN THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES.
4. BUILDINGS AND/OR NEW TOWERS GREATER THAN 75 FEET IN HEIGHT AND 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 CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 AWG 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). SEE STANDARD 6.3.2.2.
5. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT AVAILABLE, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
6. CONTRACTOR SHALL VERIFY THE LOCATIONS OF GROUNDING TIE-IN-POINTS TO THE EXISTING GROUNDING SYSTEM. ALL UNDERGROUND GROUNDING CONNECTIONS SHALL BE MADE BY THE EXOTHERMIC WELD PROCESS AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. ALL GROUNDING CONNECTIONS SHALL BE INSPECTED FOR TIGHTNESS. EXOTHERMIC WELDED CONNECTIONS SHALL BE APPROVED BY THE INSPECTOR HAVING JURISDICTION BEFORE BEING PERMANENTLY CONCEALED.
8. APPLY CORROSION-RESISTANT FINISH TO FIELD CONNECTIONS AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATINGS HAVE BEEN DESTROYED. USE KOPR-SHIELD ANTI-OXIDATION COMPOUND ON ALL COMPRESSION GROUNDING CONNECTIONS.
9. A SEPARATE, CONTINUOUS, INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN ALL FEEDER AND BRANCH CIRCUITS.
10. BOND ALL INSULATED GROUNDING BUSHINGS WITH A BARE #6 AWG GROUNDING CONDUCTOR TO A GROUND BUS.
11. DIRECT BURIED GROUNDING CONDUCTORS SHALL BE INSTALLED AT A NOMINAL DEPTH OF 36" MINIMUM BELOW GRADE, OR 6" BELOW THE FROST LINE, USE THE GREATER OF THE TWO DISTANCES.
12. ALL GROUNDING CONDUCTORS EMBEDDED IN OR PENETRATING CONCRETE SHALL BE INSTALLED IN SCHEDULE 40 PVC CONDUIT.
13. THE INSTALLATION OF CHEMICAL ELECTROLYTIC GROUNDING SYSTEM IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. REMOVE SEALING TAPE FROM LEACHING AND BREATHER HOLES. INSTALL PROTECTIVE BOX FLUSH WITH GRADE.
14. DRIVE GROUND RODS UNTIL TOPS ARE A MINIMUM DISTANCE OF 36" DEPTH OR 6" BELOW FROST LINE, USING THE GREATER OF THE TWO DISTANCES.
15. IF COAX ON THE ICE BRIDGE IS MORE THAN 6 FT. FROM THE GROUNDING BAR AT THE BASE OF THE TOWER, A SECOND GROUNDING BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE, TO GROUND THE COAX CABLE GROUNDING KITS AND IN-LINE ARRESTORS.
16. CONTRACTOR SHALL REPAIR, AND/OR REPLACE, EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.

3.5 ACCEPTANCE TESTING:

A. CERTIFIED PERSONNEL USING CERTIFIED EQUIPMENT SHALL PERFORM REQUIRED TESTS AND SUBMIT WRITTEN TEST REPORTS UPON COMPLETION.

B. WHEN MATERIAL AND/OR WORKMANSHIP IS FOUND NOT TO COMPLY WITH THE SPECIFIED REQUIREMENTS, THE NON-COMPLYING ITEMS SHALL BE REMOVED FROM THE PROJECT SITE AND REPLACED WITH ITEMS COMPLYING WITH THE SPECIFIED REQUIREMENTS PROMPTLY AFTER RECEIPT OF NOTICE FOR NON-COMPLIANCE.

C. TEST PROCEDURES:

1. ALL FEEDERS SHALL HAVE INSULATION TESTED AFTER INSTALLATION, BEFORE CONNECTION TO DEVICES. THE CONDUCTORS SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS. TESTING SHALL BE FOR ONE MINUTE USING 1000V DC. PROVIDE WRITTEN DOCUMENTATION FOR ALL TEST RESULTS.
2. PRIOR TO ENERGIZING CIRCUITRY, TEST WIRING DEVICES FOR ELECTRICAL CONTINUITY AND PROPER POLARITY CONNECTIONS.
3. MEASURE AND RECORD VOLTAGES BETWEEN PHASES AND BETWEEN PHASE CONDUCTORS AND NEUTRALS. SUBMIT A REPORT OF MAXIMUM AND MINIMUM VOLTAGES.
4. PERFORM GROUNDING TEST TO MEASURE GROUNDING RESISTANCE OF GROUNDING SYSTEM USING THE IEEE STANDARD 3-POINT "FALL-OF-POTENTIAL" METHOD. PROVIDE PLOTTED TEST VALUES AND LOCATION SKETCH. NOTIFY THE ENGINEER IMMEDIATELY IF MEASURED VALUE IS OVER 5 OHMS.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

COMMONWEALTH OF MASSACHUSETTS
DANIEL J. CORNING
CIVIL
No. 53767
REGISTERED PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: JB

CHECKED BY: CAT

SUBMITTALS

0	02/21/19	ISSUED FOR PERMITTING

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FA# 10105800
SITE# CT2265
WESTBROOK NORTH
HORSE HILL ROAD
1102 HORSE HILL ROAD
WESTBROOK, CT 06498

GENERAL NOTES I

GN-1

ANTENNA MOUNTING

1. DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/TIA-222 OR APPLICABLE LOCAL CODES.
2. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS NOTED OTHERWISE.
3. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC-COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS NOTED OTHERWISE.
4. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.
5. ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK NUTS, DOUBLE NUTS AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.
6. CONTRACTOR SHALL INSTALL ANTENNA PER MANUFACTURER'S RECOMMENDATION FOR INSTALLATION AND GROUNDING.
7. ALL UNUSED PORTS ON ANY ANTENNAS SHALL BE TERMINATED WITH A 50-OHM LOAD TO ENSURE ANTENNAS PERFORM AS DESIGNED.
8. PRIOR TO SETTING ANTENNA AZIMUTHS AND DOWNTILTS, ANTENNA CONTRACTOR SHALL CHECK THE ANTENNA MOUNT FOR TIGHTNESS AND ENSURE THAT THEY ARE PLUMB. ANTENNA AZIMUTHS SHALL BE SET FROM TRUE NORTH AND BE ORIENTED WITHIN +/- 5% AS DEFINED BY THE RFDS. ANTENNA DOWNTILTS SHALL BE WITHIN +/- 0.5% AS DEFINED BY THE RFDS. REFER TO ND-00246.
9. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATION'S IN EACH SECTOR.
10. CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE INFORMATION TO AT&T.
11. TMA'S SHALL BE MOUNTED ON PIPE DIRECTLY BEHIND ANTENNAS AS CLOSE TO ANTENNA AS FEASIBLE IN A VERTICAL POSITION.

TORQUE REQUIREMENTS

12. ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.
13. ALL RF CONNECTIONS, GROUNDING HARDWARE AND ANTENNA HARDWARE SHALL HAVE A TORQUE MARK INSTALLED IN A CONTINUOUS STRAIGHT LINE FROM BOTH SIDES OF THE CONNECTION.
    A. RF CONNECTION BOTH SIDES OF THE CONNECTOR.
    B. GROUNDING AND ANTENNA HARDWARE ON THE NUT SIDE STARTING FROM THE THREADS TO THE SOLID SURFACE. EXAMPLE OF SOLID SURFACE: GROUND BAR, ANTENNA BRACKET METAL.
    C. ALL 8M ANTENNA HARDWARE SHALL BE TIGHTENED TO 9 LB-FT (12 NM).
14. ALL 12M ANTENNA HARDWARE SHALL BE TIGHTENED TO 43 LB-FT (58 NM).
15. ALL GROUNDING HARDWARE SHALL BE TIGHTENED UNTIL THE LOCK WASHER COLLAPSES AND THE GROUNDING HARDWARE IS NO LONGER LOOSE.
16. ALL DIN TYPE CONNECTIONS SHALL BE TIGHTENED TO 18-22 LB-FT (24.4 - 29.8 NM).
17. ALL N TYPE CONNECTIONS SHALL BE TIGHTENED TO 15-20 LB-IN (1.7 - 2.3 NM).

FIBER & POWER CABLE MOUNTING

18. THE FIBER OPTIC TRUNK CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY. WHEN INSTALLING FIBER OPTIC TRUNK CABLES INTO A CABLE TRAY SYSTEM, THEY SHALL BE INSTALLED INTO AN INTER DUCT AND A PARTITION BARRIER SHALL BE INSTALLED BETWEEN THE 600 VOLT CABLES AND THE INTER DUCT IN ORDER TO SEGREGATE CABLE TYPES. OPTIC FIBER TRUNK CABLES SHALL HAVE APPROVED CABLE RESTRAINTS EVERY (60) SIXTY FEET AND SECURELY FASTENED TO THE CABLE TRAY SYSTEM. NFPA 70 (NEC) ARTICLE 770 RULES SHALL APPLY.
19. THE TYPE TC-ER CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY AND SHALL BE SECURED AT INTERVALS NOT EXCEEDING (6) SIX FEET. AN EXCEPTION; WHERE TYPE TC-ER CABLES ARE NOT SUBJECT TO PHYSICAL DAMAGE, CABLES SHALL BE PERMITTED TO MAKE A TRANSITION BETWEEN CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY WHICH ARE SERVING UTILIZATION EQUIPMENT OR DEVICES, A DISTANCE (6) SIX FEET SHALL NOT BE EXCEEDED WITHOUT CONTINUOUS SUPPORTING. NFPA 70 (NEC) ARTICLES 336 AND 392 RULES SHALL APPLY.
20. WHEN INSTALLING OPTIC FIBER TRUNK CABLES OR TYPE TC-ER CABLES INTO CONDUITS, NFPA 70 (NEC) ARTICLE 300 RULES SHALL APPLY.

COAXIAL CABLE NOTES

21. TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.
22. CONTRACTOR SHALL VERIFY THE DOWN-TILT OF EACH ANTENNA WITH A DIGITAL LEVEL.
23. CONTRACTOR SHALL CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION. REFER TO "ANTENNA SYSTEM LABELING STANDARD" ND-00027 LATEST VERSION.
24. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE SHALL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'-0".
25. ALL COAXIAL CABLE SHALL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'-0" O.C.
26. CONTRACTOR SHALL FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.
27. CONTRACTOR SHALL WEATHERPROOF ALL ANTENNA CONNECTORS WITH SELF AMALGAMATING TAPE. WEATHERPROOFING SHALL BE COMPLETED IN STRICT ACCORDANCE WITH AT&T STANDARDS.
28. CONTRACTOR SHALL GROUND ALL EQUIPMENT. INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.
29. CONTRACTOR SHALL PROVIDE STRAIN-RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN-RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
30. CONTRACTOR TO VERIFY THAT EXISTING COAX HANGERS ARE STACKABLE SNAP IN HANGERS. IF EXISTING HANGERS ARE NOT STACKABLE SNAP IN HANGERS THE CONTRACTOR SHALL REPLACE EXISTING HANGERS WITH NEW SNAP IN HANGERS IF APPLICABLE.

GENERAL CABLE AND EQUIPMENT NOTES

31. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ANTENNA, TMAS, DIPLEXERS, AND COAX CONFIGURATION, MAKE AND MODELS PRIOR TO INSTALLATION.
32. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S RECOMMENDATIONS.
33. CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.
34. ALL OUTDOOR RF CONNECTORS/CONNECTIONS SHALL BE WEATHERPROOFED, EXCEPT THE RET CONNECTORS, USING BUTYL TAPE AFTER INSTALLATION AND FINAL CONNECTIONS ARE MADE. BUTYL TAPE SHALL HAVE A MINIMUM OF ONE-HALF TAPE WIDTH OVERLAP ON EACH TURN AND EACH LAYER SHALL BE WRAPPED THREE TIMES. WEATHERPROOFING SHALL BE SMOOTH WITHOUT BUCKLING. BUTYL BLEEDING IS NOT ALLOWED.
35. IF REQUIRED TO PAINT ANTENNAS AND/OR COAX:
    A. TEMPERATURE SHALL BE ABOVE 50° F.
    B. PAINT COLOR MUST BE APPROVED BY BUILDING OWNER/LANDLORD.
    C. FOR REGULATED TOWERS, FAA/FCC APPROVED PAINT IS REQUIRED.
    D. DO NOT PAINT OVER COLOR CODING OR ON EQUIPMENT MODEL NUMBERS.
36. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUND KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
    A. GROUNDING AT THE ANTENNA LEVEL.
    B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200'-0", ADDITIONAL CABLE GROUNDING REQUIRED.
    C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
    E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
37. ALL PROPOSED GROUND BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUND
38. BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUND BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.
39. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ANTENNA AND THE COAX CONFIGURATION IS THE CORRECT MAKE AND MODELS, PRIOR TO INSTALLATION.
40. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S SPECIFICATION & RECOMMENDATIONS.
41. ANTENNA CONTRACTOR SHALL FURNISH AND INSTALL A 12'-0" T-BOOM SECTOR ANTENNA MOUNT, IF APPLICABLE, INCLUDING ALL HARDWARE.

GROUNDING NOTES

42. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
43. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND AT&T GROUNDING AND BONDING REQUIREMENTS (ATT-TP-76416) AND MANUFACTURER'S SPECIFICATIONS.
44. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.
45. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUNDING KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
    A. GROUNDING AT THE ANTENNA LEVEL.
    B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200', ADDITIONAL CABLE GROUNDING REQUIRED.
    C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
    E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
46. ALL PROPOSED GROUNDING BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUNDING BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUNDING BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.

EXOTHERMIC CONNECTION
MECHANICAL CONNECTION
CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM (T)
EXOTHERMIC WITH INSPECTION SLEEVE
GROUNDING BAR
SHELTER GROUNDING BAR
GROUND ROD
TEST GROUND ROD WITH INSPECTION SLEEVE (T)
SINGLE POLE SWITCH ($)
DUPLEX RECEPTACLE
DUPLEX GFCI RECEPTACLE (GFCI)
FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48-T8 (F)
EXISTING SMOKE DETECTION (DC) (SD)
EXISTING EMERGENCY LIGHTING (DC)
SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED-1-25A400/51K-SR4-120-PE-DDBTXD
EXISTING UTILITY POLE

CALLOUT REFERENCE (X)
REVISION REFERENCE (1)
WORKPOINT (W.P.)
SECTION REFERENCE (XX / X-X)
DETAIL REFERENCE (XX / X-X)
ELEVATION REFERENCE (X / X)

EXISTING CHAIN LINK FENCE — X — X — X — X —
EXISTING WOOD/WROUGHT IRON FENCE
EXISTING WALL STRUCTURE
LEASE AREA
PROPERTY LINE (PL)
SETBACKS
PROPOSED/EXISTING ICE BRIDGE
PROPOSED/EXISTING CABLE TRAY
EXISTING WATER LINE
PROPOSED UNDERGROUND POWER — W — W — W — W — W —
PROPOSED UNDERGROUND TELCO — UGP — UGP — UGP — UGP —
PROPOSED OVERHEAD POWER — UGT — UGT — UGT — UGT —
PROPOSED OVERHEAD TELCO — OHP — OHP — OHP — OHP —
PROPOSED OVERHEAD UTILITIES — OHT — OHT — OHT — OHT — OHT —
PROPOSED ABOVE GROUND POWER — OHT — OHT — OHT — OHT — OHT —
PROPOSED ABOVE GROUND TELCO — AGP — AGP — AGP — AGP — AGP —
— AGT — AGT — AGT — AGT — AGT —

THESE DOCUMENTS ARE IN COMPLIANCE WITH AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FOLLOW CODES AND STANDARDS AS APPLICABLE: 2018 CONNECTICUT STATE BUILDING CODE. 2017 NATIONAL ELECTRIC CODE OR LATEST EDITION.

AB	ANCHOR BOLT	COL	COLUMN	FIN	FINISH(ED)	MAS	MASONRY	QTY	QUANTITY	TOF	TOP OF FOUNDATION
ABV	ABOVE	COMM	COMMON	FLR	FLOOR	MAX	MAXIMUM	RAD	RADIUS	TOP	TOP OF PLATE (PARAPET)
AC	ALTERNATING CURRENT	CONC	CONCRETE	FDN	FOUNDATION	MB	MACHINE BOLT	RECT	RECTIFIER	TOS	TOP OF STEEL
ADDL	ADDITIONAL	CONSTR	CONSTRUCTION	FOC	FACE OF CONCRETE	MECH	MECHANICAL	REF	REFERENCE	TOW	TOP OF WALL
AFF	ABOVE FINISHED FLOOR	DBL	DOUBLE	FOM	FACE OF MASONRY	MFR	MANUFACTURER	REINF	REINFORCEMENT	TVSS	TRANSIENT VOLTAGE SUPPRESSION
AFG	ABOVE FINISHED GRADE	DC	DIRECT CURRENT	FOS	FACE OF STUD	MGB	MASTER GROUND BAR	REQ'D	REQUIRED		SYSTEM
AIC	AMPERAGE INTERRUPTION CAPACITY	DEPT	DEPARTMENT	FOW	FACE OF WALL	MIN	MINIMUM	RET	REMOTE ELECTRIC TILT	TYP	TYPICAL
ALUM	ALUMINUM	DF	DOUGLAS FIR	FS	FINISH SURFACE	MISC	MISCELLANEOUS	RMC	RIGID METALLIC CONDUIT	UG	UNDERGROUND
ALT	ALTERNATE	DIA	DIAMETER	FT	FOOT	MTL	METAL	RRH	REMOTE RADIO HEAD	UL	UNDERWRITERS LABORATORY
ANT	ANTENNA	DIAG	DIAGONAL	FTG	FOOTING	MTS	MANUAL TRANSFER SWITCH	RRU	REMOTE RADIO UNIT	UNO	UNLESS NOTED OTHERWISE
APPROX	APPROXIMATE	DIM	DIMENSION	GA	GAUGE	MW	MICROWAVE	RWY	RACEWAY	UMTS	UNIVERSAL MOBILE
ARCH	ARCHITECTURAL	DWG	DRAWING	GEN	GENERATOR	(N)	NEW	SCH	SCHEDULE		TELECOMMUNICATIONS SYSTEM
ATS	AUTOMATIC TRANSFER SWITCH	DWL	DOWEL	GFCI	GROUND FAULT CIRCUIT INTERRUPTER	NEC	NATIONAL ELECTRIC CODE	SHT	SHEET	UPS	UNINTERRUPTIBLE POWER SYSTEM
AWG	AMERICAN WIRE GAUGE	(E)	EXISTING	GLB	GLUE LAMINATED BEAM	NO.(#)	NUMBER	SIAD	SMART INTEGRATED DEVICE		(DC POWER PLANT)
BATT	BATTERY	EA	EACH	GLV	GALVANIZED	NTS	NOT TO SCALE	SIM	SIMILAR	VIF	VERIFIED IN FIELD
BLDG	BUILDING	EC	ELECTRICAL CONDUCTOR	GPS	GLOBAL POSITIONING SYSTEM	OC	ON CENTER	SPEC	SPECIFICATION	W	WIDE
BLK	BLOCK	EL	ELEVATION	GND	GROUND	OPNG	OPENING	SQ	SQUARE	W/	WITH
BLKG	BLOCKING	ELEC	ELECTRICAL	GSM	GLOBAL SYSTEM FOR MOBILE	(P)	PROPOSED	SS	STAINLESS STEEL	WD	WOOD
BM	BEAM	EMT	ELECTRICAL METALLIC TUBING	HDR	HEADER	P/C	PRECAST CONCRETE	STD	STANDARD	W.P.	WORK POINT
BTC	BARE TINNED COPPER CONDUCTOR	ENG	ENGINEER	HGR	HANGER	PCS	PERSONAL COMMUNICATION SERVICES	STL	STEEL	WP	WEATHERPROOF
BOF	BOTTOM OF FOOTING	EQ	EQUAL	HVAC	HEAT/VENTILATION/AIR CONDITIONING	PCU	PRIMARY CONTROL UNIT	STRUCT	STRUCTURAL	WT	WEIGHT
CAB	CABINET	EXP	EXPANSION	HT	HEIGHT	PRC	PRIMARY RADIO CABINET	TEMP	TEMPORARY		
CANT	CANTILEVERED	EXT	EXTERIOR	IGR	INTERIOR GROUND RING	PP	POLARIZING PRESERVING	THK	THICKNESS		
CEC	CALIFORNIA ELECTRIC CODE	FAB	FABRICATION	IN	INCH	PSF	POUNDS PER SQUARE FOOT	TMA	TOWER MOUNTED AMPLIFIER		
CHG	CHARGING	FF	FINISH FLOOR	INT	INTERIOR	PSI	POUNDS PER SQUARE INCH	TN	TOE NAIL		
CLG	CEILING	FG	FINISH GRADE	LB(S)	POUND(S)	PT	PRESSURE TREATED	TOA	TOP OF ANTENNA		
CLR	CLEAR	FIF	FACILITY INTERFACE FRAME	LF	LINEAR FEET	PWR	POWER CABINET	TOC	TOP OF CURB		

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JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

COMMONWEALTH OF MASSACHUSETTS
DANIEL J. CORNING
CIVIL
No. 53767
REGISTERED PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: JB

CHECKED BY: CAT

SUBMITTALS

0	02/21/19	ISSUED FOR PERMITTING

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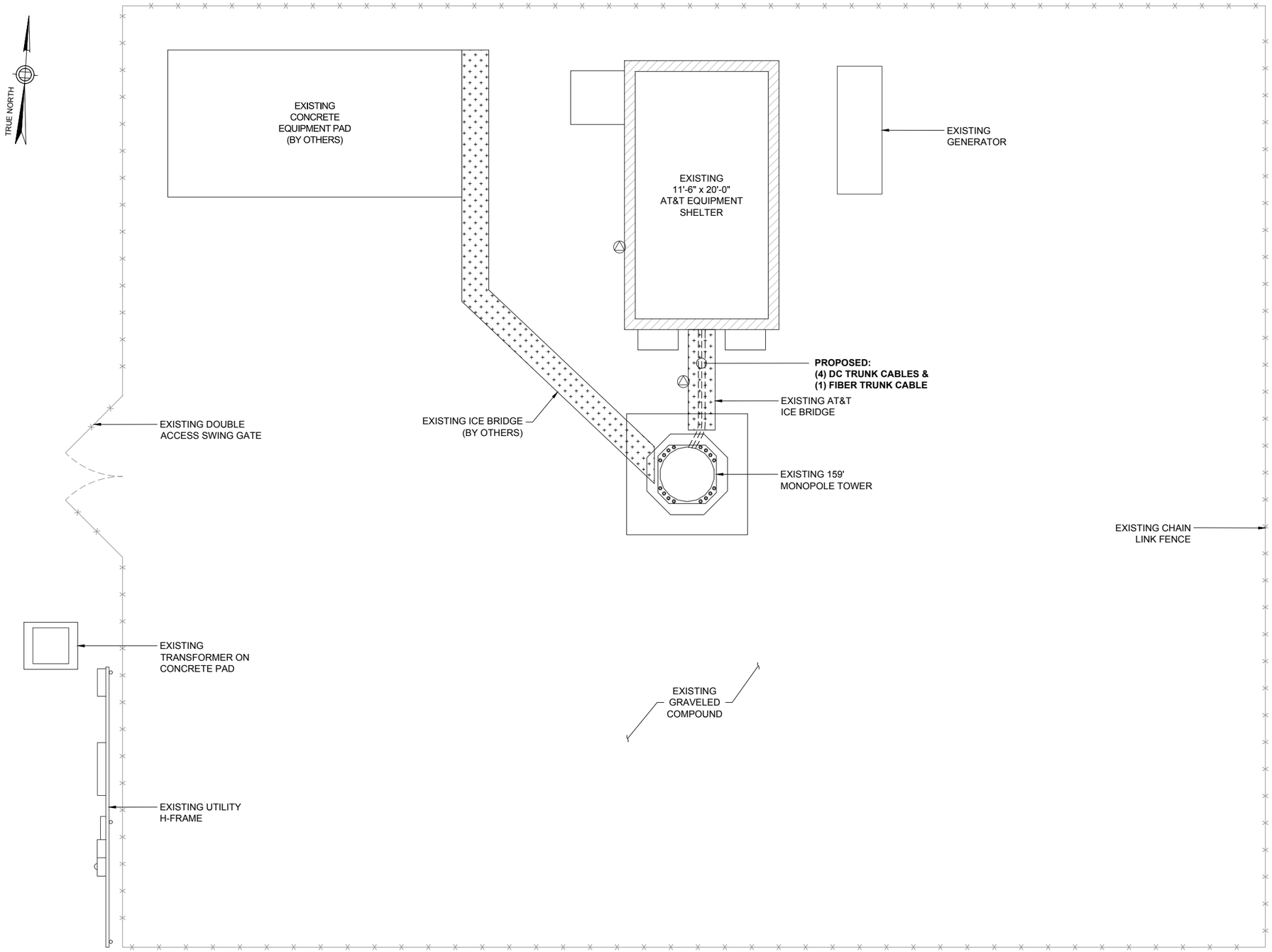
FA# 10105800
SITE# CT2265
WESTBROOK NORTH
HORSE HILL ROAD
1102 HORSE HILL ROAD
WESTBROOK, CT 06498

GENERAL NOTES II

GN-2



NOTES:

1. PLAN BASED ON AS-BUILT DRAWINGS ISSUED BY HUDSON ENGINEERING GROUP ON 12/21/2012. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING EQUIPMENT.

1 SITE PLAN

SCALE: 1/4" = 1'-0"

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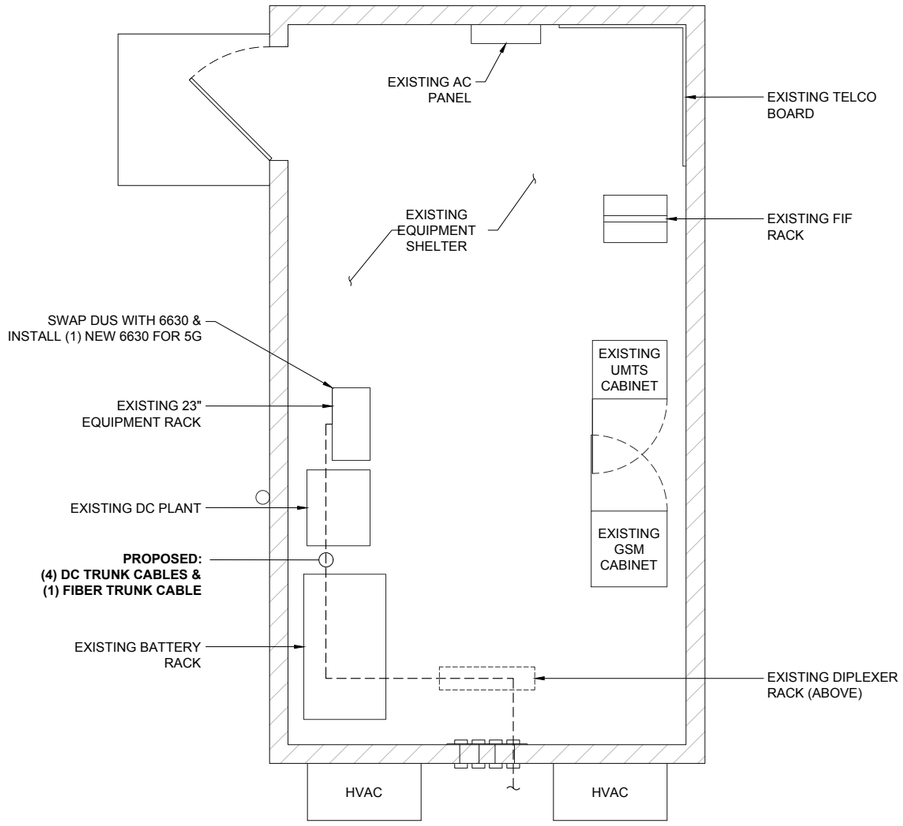
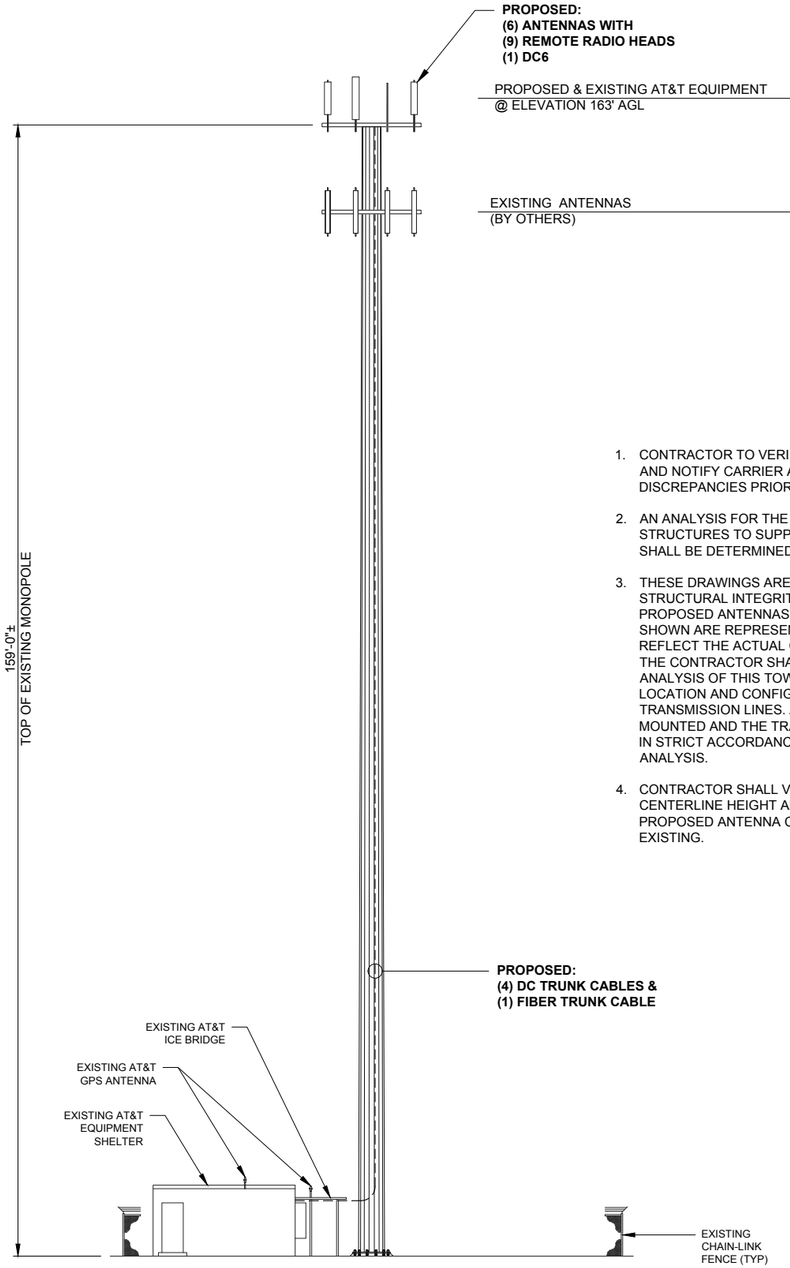
SITE PLAN

C-1



1 EQUIPMENT LAYOUT SCALE: 1/2" = 1'-0"



2 TOWER ELEVATION SCALE: 3/32" = 1'-0"

1. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
2. AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.
3. THESE DRAWINGS ARE NOT INTENDED TO REFLECT THE STRUCTURAL INTEGRITY OF THE TOWER. THE PROPOSED ANTENNAS AND TRANSMISSION LINES SHOWN ARE REPRESENTATIVE IN NATURE AND DO NOT REFLECT THE ACTUAL CONFIGURATIONS REQUIRED. THE CONTRACTOR SHALL REFER TO THE STRUCTURAL ANALYSIS OF THIS TOWER SITE FOR THE APPROVED LOCATION AND CONFIGURATION OF ALL ANTENNAS AND TRANSMISSION LINES. ALL ANTENNAS MUST BE MOUNTED AND THE TRANSMISSION LINES CONFIGURED IN STRICT ACCORDANCE WITH THE STRUCTURAL ANALYSIS.
4. CONTRACTOR SHALL VERIFY THE EXISTING ANTENNA CENTERLINE HEIGHT ABOVE GROUND LEVEL. PROPOSED ANTENNA CENTERLINE SHALL MATCH EXISTING.

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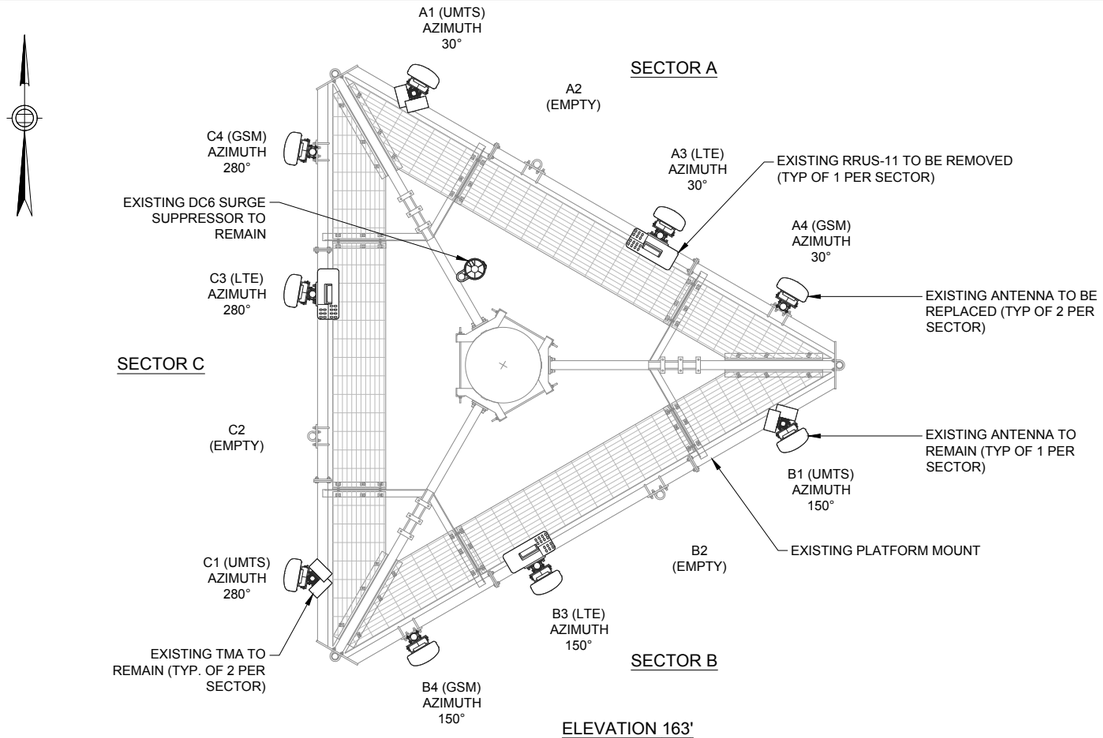
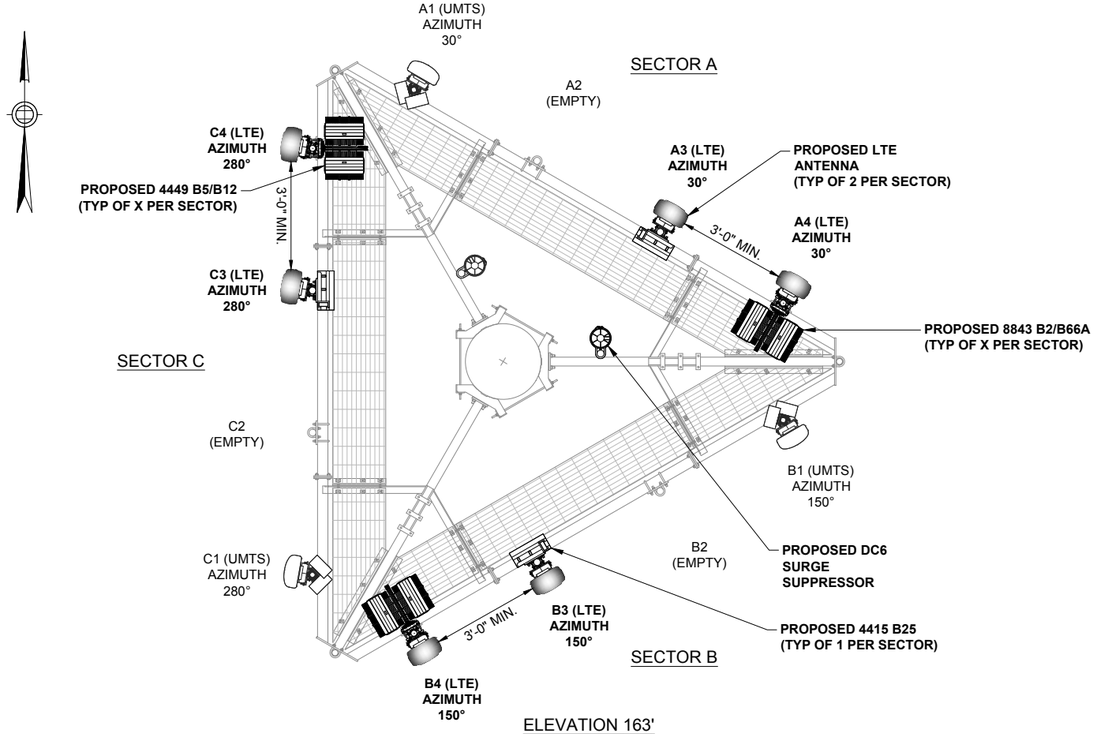
EQUIPMENT LAYOUT & PROPOSED TOWER ELEVATION

C-2



1 EXISTING ANTENNA LAYOUT

SCALE: N.T.S.



1 PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.

NOTES:

1. CONTRACTOR SHALL REFER TO THE MOUNT MODIFICATION REPORT; SITE NUMBER: CT2265; SITE NAME: WESTBROOK NORTH HORSE HILL ROAD; FA LOCATION: 10105800; CROWN BU NUMBER: 857011; CROWN SITE NAME: WESTBROOK NORTH HORSE HILL ROAD; CROWN ORDER NUMBER: 475297; ISSUED BY INFINIGY. DATED ON 02/11/2019. THE MOUNT MODIFICATIONS MUST BE PERFORMED PRIOR TO THE INSTALLATION OF THE EQUIPMENT SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE ISNTALLED PROPERLY AS DESCRIBED IN THIS REPORT.
2. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
3. CONTRACTOR SHALL NOT EXCEED MOUNTING MORE THAN (2) RRHS PER ANTENNA MOUNTING PIPE - RELOCATE TO AN ADJACENT ANTENNA MOUNTING PIPE AS NEEDED.
4. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.

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PROJECT NO:	ERCC0004
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FA# 10105800
SITE# CT2265
WESTBROOK NORTH
HORSE HILL ROAD
1102 HORSE HILL ROAD
WESTBROOK, CT 06498

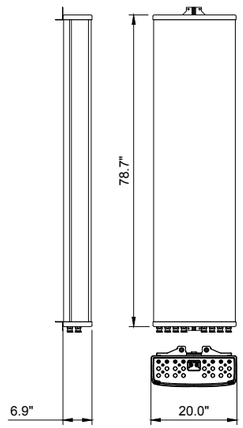
EXISTING & PROPOSED
ANTENNA LAYOUT

C-3

1 ANTENNA SPECIFICATIONS

SCALE: N.T.S.

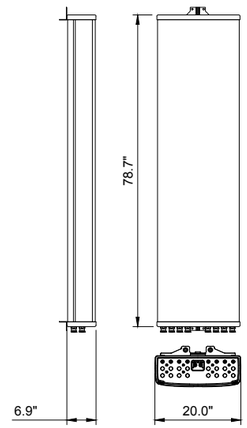
MANUFACTURER:	KATHREIN
MODEL NO.:	80010965
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	78.7" x 20.0" x 6.9" 1999mm x 508mm x 175mm
WEIGHT (lbs):	97.6
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	254 LBF @ 93 MPH 1130 N @ 150 KM/H
SIDE WIND LOAD:	256 LBF @ 93 MPH 1140 N @ 150 KM/H
WIND SPEED MAX.:	>150 MPH (>241 KM/H)



2 ANTENNA SPECIFICATIONS

SCALE: N.T.S.

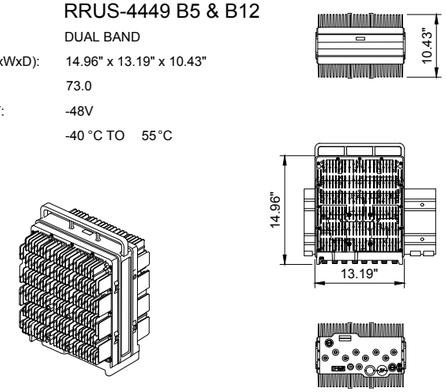
MANUFACTURER:	KATHREIN
MODEL NO.:	80010991K
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	78.7" x 20.0" x 6.9" 1999mm x 508mm x 175mm
WEIGHT (lbs):	100.9
CONNECTOR:	12 x 4.3-10 FEMALE
FRONT WIND LOAD:	254 LBF @ 93 MPH 1130 N @ 150 KM/H
SIDE WIND LOAD:	256 LBF @ 93 MPH 1140 N @ 150 KM/H
WIND SPEED MAX.:	>150 MPH (>241 KM/H)



3 RRUS SPECIFICATIONS

SCALE: N.T.S.

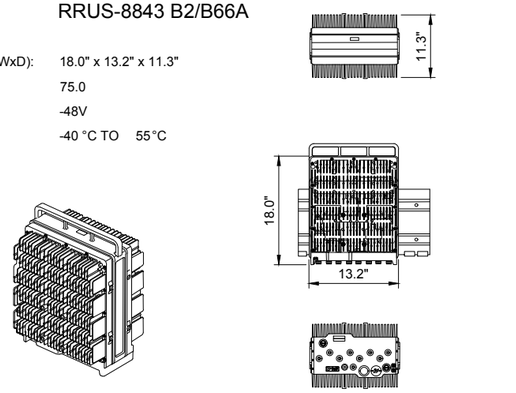
MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4449 B5 & B12
TECHNOLOGY:	DUAL BAND
DIMENSIONS (HxWxD):	14.96" x 13.19" x 10.43"
WEIGHT (lbs):	73.0
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C



4 RRUS SPECIFICATIONS

SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-8843 B2/B66A
DIMENSIONS (HxWxD):	18.0" x 13.2" x 11.3"
WEIGHT (lbs):	75.0
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C

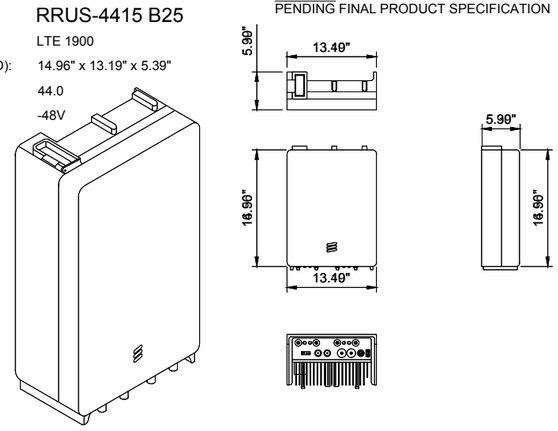


5 RRUS SPECIFICATIONS

SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4415 B25
TECHNOLOGY:	LTE 1900
DIMENSIONS (HxWxD):	14.96" x 13.19" x 5.39"
WEIGHT (lbs):	44.0
POWER SUPPLY:	-48V

NOTE:
PENDING FINAL PRODUCT SPECIFICATION

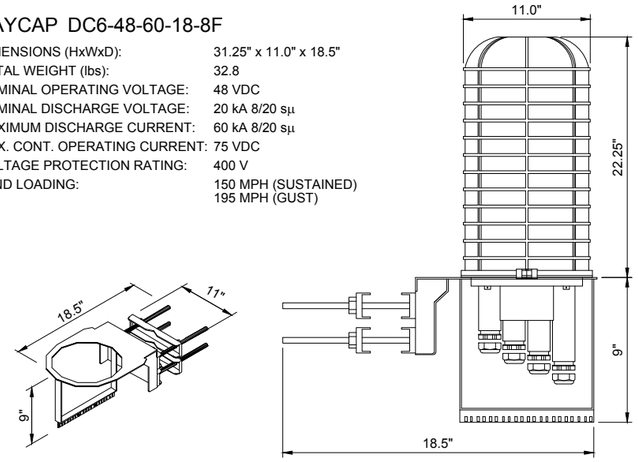


6 DC SURGE PROTECTION SPECIFICATIONS

SCALE: N.T.S.

RAYCAP DC6-48-60-18-8F

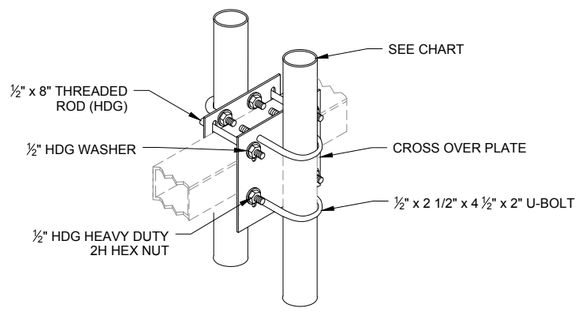
DIMENSIONS (HxWxD):	31.25" x 11.0" x 18.5"
TOTAL WEIGHT (lbs):	32.8
NOMINAL OPERATING VOLTAGE:	48 VDC
NOMINAL DISCHARGE VOLTAGE:	20 kA 8/20 sμ
MAXIMUM DISCHARGE CURRENT:	60 kA 8/20 sμ
MAX. CONT. OPERATING CURRENT:	75 VDC
VOLTAGE PROTECTION RATING:	400 V
WIND LOADING:	150 MPH (SUSTAINED) 195 MPH (GUST)



7 DC6 MOUNTING DETAIL

SCALE: N.T.S.

PART #	PIPE SIZE	STAND-OFF ARM
BBPM-K1	2-3/8"	3-1/2" - 4-1/2"
BBPM-K2	2-7/8"	3-1/2" - 4-1/2"
BBPM-K3	2-3/8"	3-1/2" - 6"
BBPM-U	2-3/8" - 4-1/2"	2-3/8" - 4-1/2"



8 RRU MOUNTING DETAIL

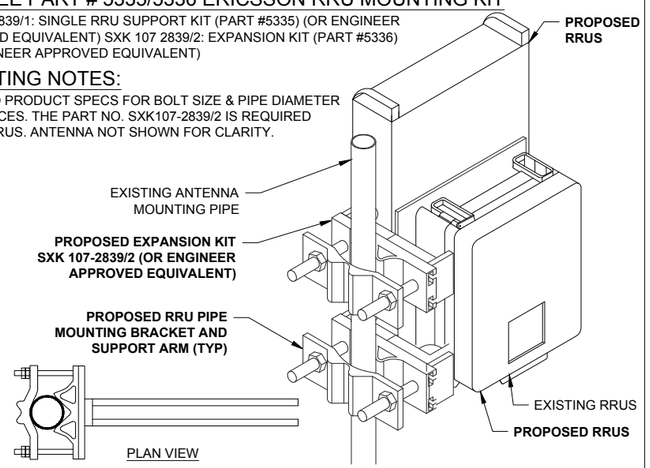
SCALE: N.T.S.

CUE DEE PART # 5335/5336 ERICSSON RRU MOUNTING KIT

SXK 107 2839/1: SINGLE RRU SUPPORT KIT (PART #5335) (OR ENGINEER APPROVED EQUIVALENT) SXK 107 2839/2: EXPANSION KIT (PART #5336) (OR ENGINEER APPROVED EQUIVALENT)

MOUNTING NOTES:

REFER TO PRODUCT SPECS FOR BOLT SIZE & PIPE DIAMETER TOLERANCES. THE PART NO. SXK107-2839/2 IS REQUIRED FOR (2) RRUS. ANTENNA NOT SHOWN FOR CLARITY.

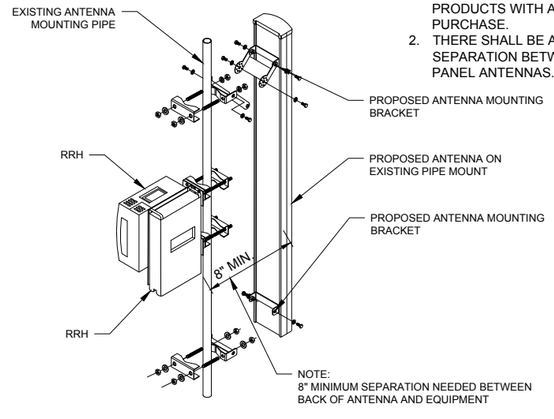


9 ANTENNA MOUNTING DETAIL

SCALE: N.T.S.

NOTES:

1. MOUNTING OPTIONS ARE INCLUDED PRODUCTS WITH ANTENNA PURCHASE.
2. THERE SHALL BE A MINIMUM 3'-0" SEPARATION BETWEEN ALL LTE PANEL ANTENNAS.



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COMMONWEALTH OF MASSACHUSETTS
DANIEL J. CORNING
CIVIL
No. 53767
REGISTERED PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	JB
CHECKED BY:	CAT

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FA# 10105800
SITE# CT2265
WESTBROOK NORTH
HORSE HILL ROAD
1102 HORSE HILL ROAD
WESTBROOK, CT 06498

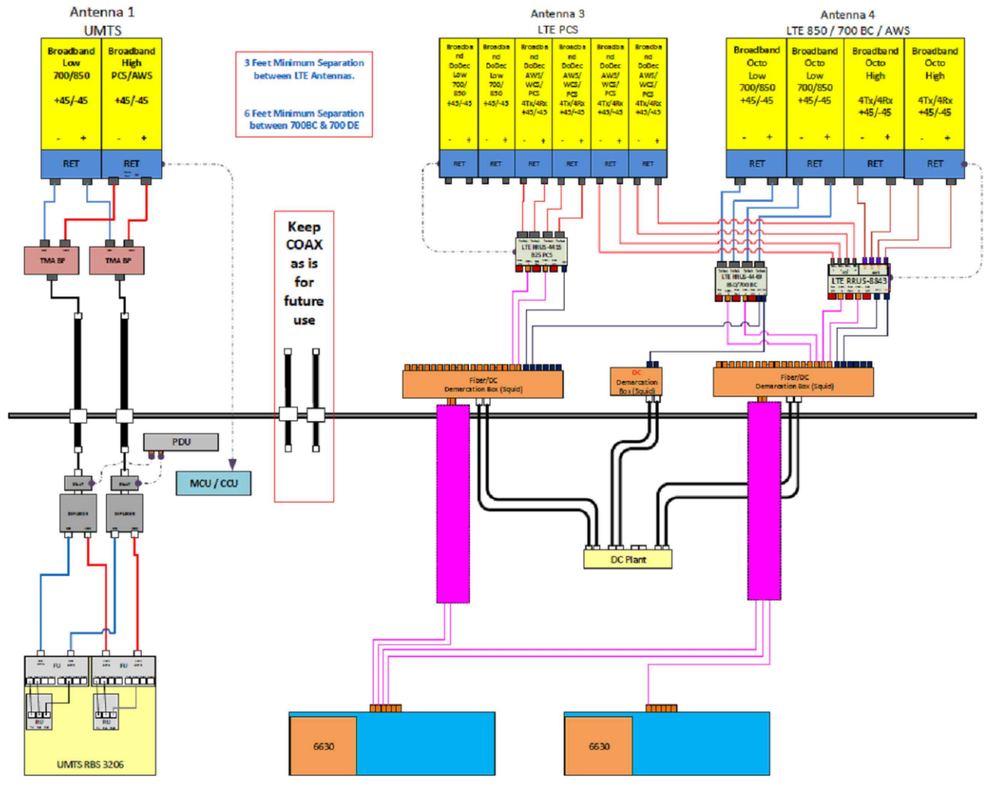
EQUIPMENT DETAILS

C-4

ANTENNA NUMBER	ANTENNA MODEL	ANTENNA BAND	AZIMUTH	ANTENNA CENTERLINE FROM GROUND	TMA's	RRH's	FEEDER	RAYCAP
A1	7770 (55"x11"x5")	UMTS	30°	163'	(1) LGP 21401	-	(4) 1-5/8" EXISTING (LENGTH @ 155')	**(1) RAYCAP DC6-48-60-18-8F**
A2	-	-	-	-	-	-	**(1) FIBER (4) DC (LENGTH @ 155')**	
A3	**800-10991K (78.7"x20"x6.9")**	**LTE**	**30°**	**163'**	-	**(1) 4415 B25 (PCS)**	(1) FIBER (2) DC EXISTING (LENGTH @ 155')	(1) RAYCAP DC6-48-60-18-8F
A4	**800-10965 (78.7"x20"x6.9")**	**LTE**	**30°**	**163'**	-	**(1) 4449 B5/B12 (850/700) (1) 8843 B2/B66A (PCS/AWS)**	-	
B1	7770 (55"x11"x5")	UMTS	150°	163'	(1) LGP 21401	-	(4) 1-5/8" EXISTING (LENGTH @ 155')	
B2	-	-	-	-	-	-	-	
B3	**800-10991K (78.7"x20"x6.9")**	**LTE**	**150°**	**163'**	-	**(1) 4415 B25 (PCS)**	-	
B4	**800-10965 (78.7"x20"x6.9")**	**LTE**	**150°**	**163'**	-	**(1) 4449 B5/B12 (850/700) (1) 8843 B2/B66A (PCS/AWS)**	-	
G1	7770 (55"x11"x5")	UMTS	280°	163'	(1) LGP 21401	-	(4) 1-5/8" EXISTING (LENGTH @ 155')	
G2	-	-	-	-	-	-	-	
G3	**800-10991K (78.7"x20"x6.9")**	**LTE**	280°	163'	-	**(1) 4415 B25 (PCS)**	-	
G4	**800-10965 (78.7"x20"x6.9")**	**LTE**	280°	163'	-	**(1) 4449 B5/B12 (850/700) (1) 8843 B2/B66A (PCS/AWS)**	-	

*EQUIPMENT LISTED IN **BOLD**, DELINEATES THAT THE EQUIPMENT IS PROPOSED

1 ANTENNA INFORMATION CHART — SCALE: NONE



2 RF EQUIPMENT SCHEMATIC — SCALE: NONE

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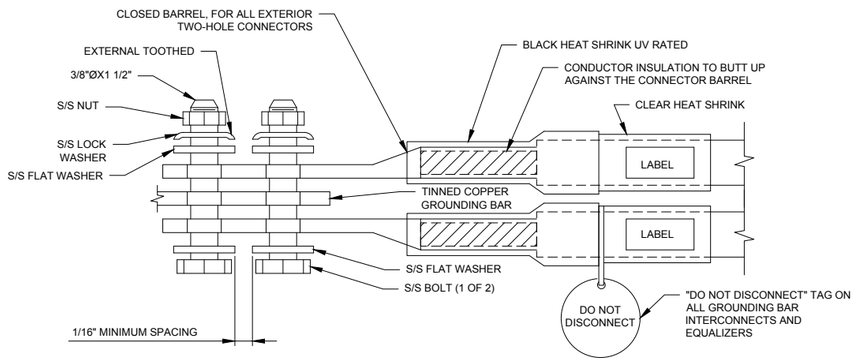
ANTENNA CHART & RF EQUIPMENT SCHEMATIC

RF-1

NOTES:

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUNDING BAR. ROUTE CONDUCTORS TO BURIED GROUNDING RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL GROUNDING BARS SHALL BE STAMPED IN TO THE METAL "IF STOLEN DO NOT RECYCLE." THE CONTRACTOR SHALL USE PERMANENT MARKER TO DRAW THE LINES BETWEEN EACH SECTION AND LABEL EACH SECTION ("P", "A", "N", "I") WITH 1" HIGH LETTERS.
3. ALL HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. FOR GROUND BOND TO STEEL ONLY: INSERT A CADMIUM FLAT WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
5. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUNDING CONDUCTOR DOWN TO GROUNDING BUS.
6. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUNDING BAR AND BOLTED ON THE BACK SIDE. INSTALL BLACK HEAT-SHRINKING TUBE, 600 VOLT INSULATION, ON ALL GROUNDING TERMINATIONS. THE INTENT IS TO WEATHERPROOF THE COMPRESSION CONNECTION.
7. SUPPLIED AND INSTALLED BY CONTRACTOR.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUNDING BAR AS REQUIRED, PROVIDING 50% SPARE CONNECTION POINTS.
9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).



1 EXTERIOR TWO HOLE LUG DETAIL — SCALE: NONE

GENERAL NOTES:

1. CONTRACTOR SHALL HAVE A COMPLETE UNDERSTANDING OF THE CONTENTS OF AT&T STANDARD TP-76416.
2. ALL INSTALLATIONS SHALL BE FIELD VERIFIED.
3. ALL GROUND CONNECTIONS FOR ALL RELOCATED EQUIPMENT SHALL BE RE-ESTABLISHED BY THE CONTRACTOR. CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.

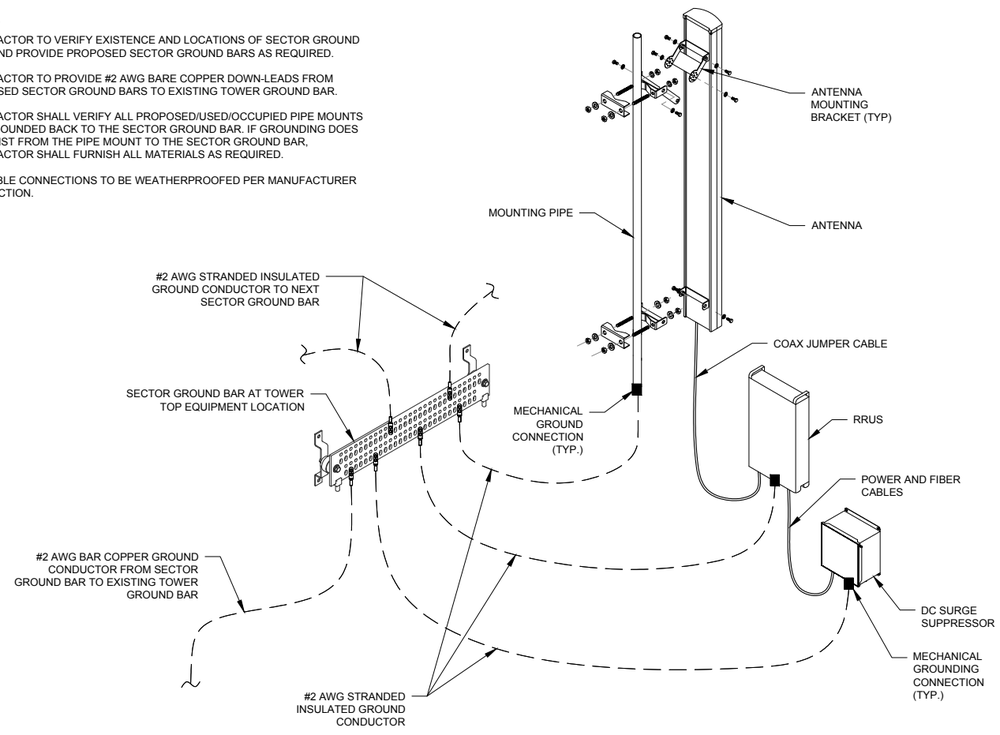
GROUNDING NOTES:

1. TOWER GROUNDING BAR: EXTEND (2) #2 AWG TINNED CU WIRE FROM BURIED GROUND RING UP TO THE TOWER GROUND BAR AND MAKE A MECHANICAL CONNECTION. SECURE GROUND BAR DIRECTLY TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
2. ANTENNA GROUNDING BAR: ANDREW CORPORATION PART #UGBKIT-0424-T MOUNT GROUND BAR DIRECTLY TO TOWER. SECURE TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
3. GROUNDING BAR: LOCATED CLOSE TO GRADE LOCK BOX TESSCO PART #351546: INSTALL PER MANUFACTURER GUIDELINES.
4. EXOTHERMIC OR COMPRESSION CONNECTION FOR PIPE MOUNT TO ANTENNA ROUTE CONDUCTOR TO NEAREST GROUNDING BAR SO THE GROUNDING CONDUCTORS PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND. USE #2 AWG SOLID TINNED COPPER CONDUCTOR. GROUNDING CONNECTION SHALL BE LOCATED AT THE TOP 2" OF PIPE.
5. ALL GROUNDING CONDUCTORS SHALL BE #2 AWG COPPER TINNED UNLESS NOTED OTHERWISE.
6. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
7. KOPR-SHIELD ANTI-OXIDATION COMPOUND SHALL BE USED ON ALL COMPRESSION GROUNDING CONNECTIONS.
8. ALL EXOTHERMIC CONNECTIONS SHALL BE INSTALLED UTILIZING THE PROPER CONNECTION/MOLD AND MATERIALS FOR THE PARTICULAR APPLICATION.
9. ALL BOLTED GROUNDING CONNECTIONS SHALL BE INSTALLED WITH AN EXTERNAL TOOTHED LOCK WASHER. GROUNDING BUS BARS MAY HAVE PRE-PUNCHED HOLES OR TAPPED HOLES. ALL HARDWARE SHALL BE SECURITY TORQUE HARDWARE 3/8" STAINLESS STEEL.
10. EXTERNAL GROUNDING CONDUCTOR SHALL NOT BE INSTALLED OR ROUTED THROUGH HOLES IN ANY METAL OBJECTS, CONDUITS, OR SUPPORTS TO PRECLUDE ESTABLISHING A MAGNETIC CHOKE POINT.
11. PLASTIC CLIPS SHALL BE USED TO FASTEN AND SUPPORT GROUNDING CONDUCTORS. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL NOT BE USED.
12. IF COAX ON ICE BRIDGE IS MORE THAT 6' FROM THE GROUND BAR AT THE BASE OF THE TOWER, A SECOND GROUND BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE RUN TO GROUND THE COAX GROUND KIT AND THE IN-LINE SURGE ARRESTORS (SURGE ARRESTORS INSTALLED BY LUCENT ONLY HAVE 6' GROUND TAILS).
13. CONTRACTOR SHALL REPAIR/PLACE EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.
14. DO NOT ALLOW THE COPPER CONDUCTOR TO TOUCH THE GALVANIZED GUY WIRE AT THE CONNECTION POINT OR AT ANY OTHER POINT. NO EXOTHERMICALLY WELDED CONNECTION SHALL BE MADE TO THE GUY WIRE.
15. CONTRACTOR SHALL VERIFY EXISTING SECTOR GROUNDING CONDITION AND GROUND THE PROPOSED EQUIPMENT IN THE SAME MANNER. A PROPOSED SECTOR GROUND BAR SHALL BE INSTALLED IF REQUIRED.

2 GROUNDING BAR DETAIL — SCALE: NONE

NOTES:

1. CONTRACTOR TO VERIFY EXISTENCE AND LOCATIONS OF SECTOR GROUND BARS AND PROVIDE PROPOSED SECTOR GROUND BARS AS REQUIRED.
2. CONTRACTOR TO PROVIDE #2 AWG BARE COPPER DOWN-LEADS FROM PROPOSED SECTOR GROUND BARS TO EXISTING TOWER GROUND BAR.
3. CONTRACTOR SHALL VERIFY ALL PROPOSED/USED/OCCUPIED PIPE MOUNTS ARE GROUNDED BACK TO THE SECTOR GROUND BAR. IF GROUNDING DOES NOT EXIST FROM THE PIPE MOUNT TO THE SECTOR GROUND BAR, CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.
4. ALL CABLE CONNECTIONS TO BE WEATHERPROOFED PER MANUFACTURER INSTRUCTION.



3 TYPICAL ANTENNA GROUNDING SCHEMATIC — SCALE: NONE

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FA# 10105800
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WESTBROOK NORTH
HORSE HILL ROAD
1102 HORSE HILL ROAD
WESTBROOK, CT 06498

GROUNDING DETAILS

G-1

Date: **January 23, 2019**

Rebecca Klein
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

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

Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	10105800
	Carrier Site Name:	CT2265
Crown Castle Designation:	**Crown Castle BU Number:**	857011
	Crown Castle Site Name:	WESTBROOK NORTH HORSE HILL ROA
	Crown Castle JDE Job Number:	553394
	Crown Castle Work Order Number:	1683888
	Crown Castle Order Number:	475297 Rev. 0
Engineering Firm Designation:	**Crown Castle Project Number:**	1683888
Site Data:	**1102 HORSE HILL ROAD, WESTBROOK, Middlesex County, CT**	
	Latitude *41° 19' 25.71"*, Longitude *-72° 29' 28.1"*	
	159.08 Foot - Monopole Tower	

Dear Rebecca Klein,

Crown Castle 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:

LC7: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 135 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: Daniel Chen / SM

Respectfully submitted by:

Maham Barimani, P.E.
Senior Project Engineer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 159.08 ft. Monopole tower designed by UNKNOWN.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	135 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	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)
159.0	163.0	3	ericsson	RRUS 4415 B25	2 4 2 12 2	3/8 3/4 7/8 1-5/8 2” conduit
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 8843 B2/B66A		
		3	kathrein	80010965 w/ Mount Pipe		
		3	kathrein	80010991 w/ Mount Pipe		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		6	powerwave technologies	LGP21402		
		2	raycap	DC6-48-60-18-8F		
	159.0	1	raycap	DC6-48-60-18-8F		
		1	tower mounts	Platform Mount [LP 714-1]		

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)
147.0	147.0	3	alcatel lucent	B13 RRH 4X30	2	1-5/8
		3	alcatel lucent	B25 RRH4X30		
		3	alcatel lucent	B66A RRH4X45		
		3	amphenol	QUAD656C0000X w/ Mount Pipe		
		9	commscope	SBNHH-1D65B w/ Mount Pipe		
		2	rfs celwave	DB-T1-6Z-8AB-0Z		
		1	tower mounts	Sector Mount [SM 801-3]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	GPD Group	4306672	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	GPD Group (Mapping)	4723512	CCISITES
4-TOWER MANUFACTURER DRAWINGS	GPD Group (Mapping)	5177796	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built and have been maintained in accordance with the manufacturer's specifications.
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. Crown Castle 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 (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	159.08 - 139.33	Pole	TP24.1x18.43x0.188	1	-7.04	842.55	41.1	Pass
L2	139.33 - 91.24	Pole	TP40.49x22.861x0.313	2	-14.42	2341.50	45.4	Pass
L3	91.24 - 44.66	Pole	TP54.61x38.119x0.375	3	-26.51	3805.71	43.2	Pass
L4	44.66 - 0	Pole	TP69.47x51.679x0.375	4	-45.15	4980.67	48.4	Pass
							Summary	
						Pole (L4)	48.4	Pass
						Rating =	48.4	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	43.3	Pass
1	Base Plate	0	35.3	Pass
1	Base Foundation Structure	0	53.2	Pass
1	Base Foundation Soil Interaction	0	31.3	Pass

Structure Rating (max from all components) =	53.2%

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

4.1) Recommendations

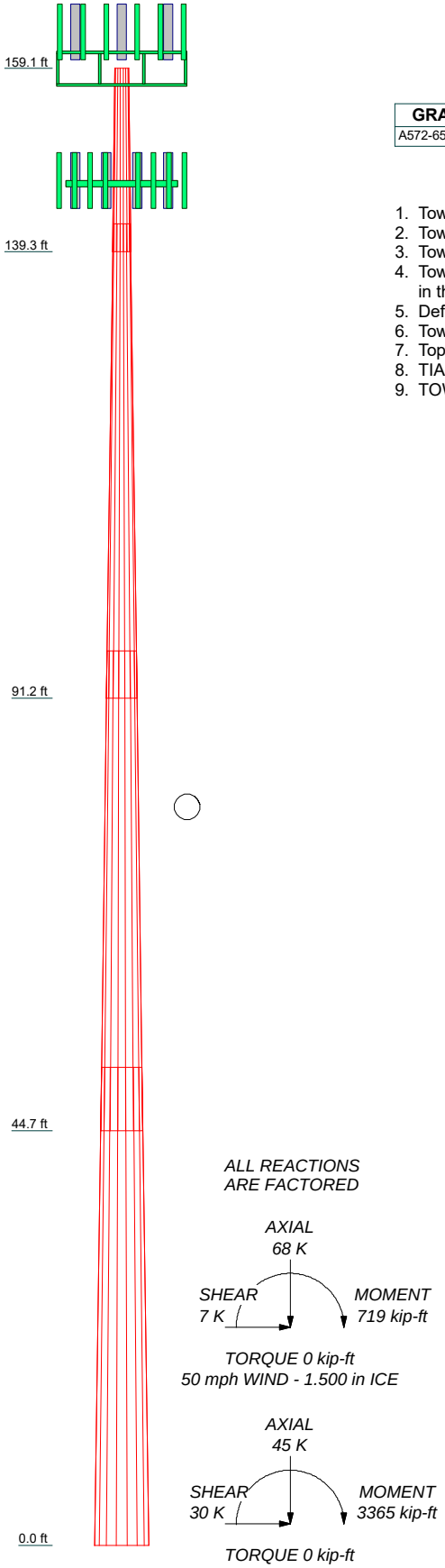
The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	19.75	51.10	51.64	51.49
Number of Sides	18	18	18	18
Thickness (in)	0.188	0.313	0.375	0.375
Socket Length (ft)	3.01	5.06	6.83	
Top Dia (in)	18.430	22.861	38.119	51.679
Bot Dia (in)	24.100	40.490	54.610	69.470
Grade	A572-65			
Weight (K)	0.8	5.4	9.6	12.6

28.4



MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 135 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TIA-222-H Annex S
9. TOWER RATING: 48.4%

CROWN CASTLE
The Pathway to Possible

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: 724-416-2000
FAX: -

Job: ***BU# 857011***			
Project:			
Client: Crown Castle	Drawn by: SMandal		App'd:
Code: TIA-222-H	Date: 01/23/19		Scale: NTS
Path: R:\SA Models - Letters\Work Area\DChen\WIP\857011 WO 1683888\QA-SM\857011.eri			Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

1) Tower is located in Middlesex County, Connecticut.
2) Tower base elevation above sea level: 236.00 ft.
3) Basic wind speed of 135 mph.
4) Risk Category II.
5) Exposure Category B.
6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7) Topographic Category: 1.
8) Crest Height: 0.00 ft.
9) Nominal ice thickness of 1.500 in.
10) Ice thickness is considered to increase with height.
11) Ice density of 56.00 pcf.
12) A wind speed of 50 mph is used in combination with ice.
13) Temperature drop of 50 °F.
14) Deflections calculated using a wind speed of 60 mph.
15) TIA-222-H Annex S.
16) A non-linear (P-delta) analysis was used.
17) Pressures are calculated at each section.
18) Stress ratio used in pole design is 1.05.
19) Tower analysis based on target reliabilities in accordance with Annex S.
20) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
21) 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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	159.08-139.33	19.75	3.01	18	18.430	24.100	0.188	0.750	A572-65 (65 ksi)
L2	139.33-91.24	51.10	5.06	18	22.861	40.490	0.313	1.250	A572-65

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	91.24-44.66	51.64	6.83	18	38.119	54.610	0.375	1.500	(65 ksi) A572-65 (65 ksi)
L4	44.66-0.00	51.49		18	51.679	69.470	0.375	1.500	(65 ksi) A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.685	10.857	456.456	6.476	9.362	48.754	913.512	5.429	2.914	15.54
	24.443	14.231	1028.065	8.489	12.243	83.973	2057.483	7.117	3.912	20.862
L2	24.220	22.365	1436.612	8.005	11.613	123.704	2875.114	11.185	3.474	11.115
	41.066	39.851	8127.241	14.263	20.569	395.122	16265.175	19.929	6.576	21.044
L3	40.290	44.925	8085.949	13.399	19.365	417.563	16182.538	22.467	6.049	16.131
	55.395	64.553	23989.134	19.253	27.742	864.726	48009.834	32.283	8.951	23.87
L4	54.815	61.064	20306.130	18.213	26.253	773.482	40638.979	30.538	8.435	22.495
	70.484	82.240	49603.864	24.529	35.291	1405.577	99272.997	41.128	11.567	30.845

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 159.08-139.33				1	1	1			
L2 139.33-91.24				1	1	1			
L3 91.24-44.66				1	1	1			
L4 44.66-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
****											

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Level 159									
LDF7-50A(1-5/8)	A	No	No	Inside Pole	159.00 - 0.00	12	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
FB-L98B-034-XXX(3/8)	A	No	No	Inside Pole	159.00 - 0.00	2	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	A	No	No	Inside Pole	159.00 - 0.00	4	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
WR-VG86ST-BRDA(7/8)	A	No	No	Inside Pole	159.00 - 0.00	2	No Ice	0.00	0.68
							1/2" Ice	0.00	0.68
							1" Ice	0.00	0.68
							2" Ice	0.00	0.68
2" Rigid Conduit	A	No	No	Inside Pole	159.00 - 0.00	2	No Ice	0.00	2.80
							1/2" Ice	0.00	2.80
							1" Ice	0.00	2.80
							2" Ice	0.00	2.80
Level 147									
HB158-1-08U8-S8J18(1-5/8)	B	No	No	Inside Pole	147.00 - 0.00	2	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
****									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	159.08-139.33	A	0.000	0.000	0.000	0.000	0.38
		B	0.000	0.000	0.000	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.00
L2	139.33-91.24	A	0.000	0.000	0.000	0.000	0.93
		B	0.000	0.000	0.000	0.000	0.13
		C	0.000	0.000	0.000	0.000	0.00
L3	91.24-44.66	A	0.000	0.000	0.000	0.000	0.90
		B	0.000	0.000	0.000	0.000	0.12
		C	0.000	0.000	0.000	0.000	0.00
L4	44.66-0.00	A	0.000	0.000	0.000	0.000	0.86
		B	0.000	0.000	0.000	0.000	0.12
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	159.08-139.33	A	1.482	0.000	0.000	0.000	0.000	0.38
		B		0.000	0.000	0.000	0.000	0.02
		C		0.000	0.000	0.000	0.000	0.00
L2	139.33-91.24	A	1.443	0.000	0.000	0.000	0.000	0.93
		B		0.000	0.000	0.000	0.000	0.13
		C		0.000	0.000	0.000	0.000	0.00
L3	91.24-44.66	A	1.369	0.000	0.000	0.000	0.000	0.90
		B		0.000	0.000	0.000	0.000	0.12
		C		0.000	0.000	0.000	0.000	0.00
L4	44.66-0.00	A	1.222	0.000	0.000	0.000	0.000	0.86
		B		0.000	0.000	0.000	0.000	0.12
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	159.08-139.33	0.000	0.000	0.000	0.000
L2	139.33-91.24	0.000	0.000	0.000	0.000
L3	91.24-44.66	0.000	0.000	0.000	0.000
L4	44.66-0.00	0.000	0.000	0.000	0.000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Level 159									
Platform Mount [LP 714-1]	C	None		0.000	159.00	No Ice	37.47	37.47	1.60
						1/2" Ice	44.23	44.23	2.04
						1" Ice	50.99	50.99	2.48
						2" Ice	64.51	64.51	3.36
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	5.75	4.25	0.06
						1/2" Ice	6.18	5.01	0.10
						1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	5.75	4.25	0.06
						1/2" Ice	6.18	5.01	0.10
						1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	5.75	4.25	0.06
						1/2" Ice	6.18	5.01	0.10
						1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
80010991 w/ Mount Pipe	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	14.05	7.63	0.13
						1/2" Ice	14.69	8.90	0.22
						1" Ice	15.30	9.96	0.33
						2" Ice	16.53	11.92	0.57
80010991 w/ Mount Pipe	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	14.05	7.63	0.13
						1/2" Ice	14.69	8.90	0.22
						1" Ice	15.30	9.96	0.33
						2" Ice	16.53	11.92	0.57
80010991 w/ Mount Pipe	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	14.05	7.63	0.13
						1/2" Ice	14.69	8.90	0.22
						1" Ice	15.30	9.96	0.33
						2" Ice	16.53	11.92	0.57
80010965 w/ Mount Pipe	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice	14.05	7.63	0.13
						1/2" Ice	14.69	8.90	0.22
						1" Ice	15.30	9.96	0.33
						2" Ice	16.53	11.92	0.57

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
80010965 w/ Mount Pipe	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
80010965 w/ Mount Pipe	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
(2) LGP21402	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.05 1.18 1.32 1.62	0.23 0.30 0.37 0.55	0.01 0.02 0.03 0.05
(2) LGP21402	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.05 1.18 1.32 1.62	0.23 0.30 0.37 0.55	0.01 0.02 0.03 0.05
(2) LGP21402	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.05 1.18 1.32 1.62	0.23 0.30 0.37 0.55	0.01 0.02 0.03 0.05
DC6-48-60-18-8F	A	From Leg	4.00 0.00 0.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.27 1.45 1.83	0.79 1.27 1.45 1.83	0.02 0.04 0.05 0.10
RRUS 4415 B25	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.68 0.79 0.91 1.18	0.04 0.06 0.07 0.11
RRUS 4415 B25	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.68 0.79 0.91 1.18	0.04 0.06 0.07 0.11
RRUS 4415 B25	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.68 0.79 0.91 1.18	0.04 0.06 0.07 0.11
RRUS 4449 B5/B12	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
RRUS 8843 B2/B66A	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	C	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16
DC6-48-60-18-8F	A	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.27 1.45 1.83	0.79 1.27 1.45 1.83	0.02 0.04 0.05 0.10
DC6-48-60-18-8F	B	From Leg	4.00 0.00 4.00	0.000	159.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.79 1.27 1.45 1.83	0.79 1.27 1.45 1.83	0.02 0.04 0.05 0.10
Level 147 Sector Mount [SM 801-3]	C	None		0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.40 26.30 32.20 44.00	20.40 26.30 32.20 44.00	0.88 1.25 1.63 2.39
QUAD656C0000X w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.48 14.10 14.68 15.87	7.33 8.55 9.50 11.38	0.08 0.17 0.28 0.51
QUAD656C0000X w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.48 14.10 14.68 15.87	7.33 8.55 9.50 11.38	0.08 0.17 0.28 0.51
QUAD656C0000X w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.48 14.10 14.68 15.87	7.33 8.55 9.50 11.38	0.08 0.17 0.28 0.51
(3) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.39 8.95 9.48 10.56	7.08 8.28 9.19 11.03	0.08 0.15 0.22 0.40
(3) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.39 8.95 9.48 10.56	7.08 8.28 9.19 11.03	0.08 0.15 0.22 0.40
(3) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.39 8.95 9.48 10.56	7.08 8.28 9.19 11.03	0.08 0.15 0.22 0.40
B66A RRH4X45	A	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.58 2.79 3.01 3.48	1.63 1.81 2.00 2.40	0.07 0.09 0.11 0.17
B66A RRH4X45	B	From Leg	4.00 0.00 0.00	0.000	147.00	No Ice 1/2" Ice Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.07 0.09 0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	3.48	2.40	0.17
						2" Ice			
B66A RRH4X45	C	From Leg	4.00	0.000	147.00	No Ice	2.58	1.63	0.07
			0.00			1/2"	2.79	1.81	0.09
			0.00			Ice	3.01	2.00	0.11
						1" Ice	3.48	2.40	0.17
						2" Ice			
B13 RRH 4X30	A	From Leg	4.00	0.000	147.00	No Ice	2.06	1.32	0.06
			0.00			1/2"	2.24	1.48	0.07
			0.00			Ice	2.43	1.64	0.09
						1" Ice	2.84	2.00	0.14
						2" Ice			
B13 RRH 4X30	B	From Leg	4.00	0.000	147.00	No Ice	2.06	1.32	0.06
			0.00			1/2"	2.24	1.48	0.07
			0.00			Ice	2.43	1.64	0.09
						1" Ice	2.84	2.00	0.14
						2" Ice			
B13 RRH 4X30	C	From Leg	4.00	0.000	147.00	No Ice	2.06	1.32	0.06
			0.00			1/2"	2.24	1.48	0.07
			0.00			Ice	2.43	1.64	0.09
						1" Ice	2.84	2.00	0.14
						2" Ice			
B25 RRH4X30	A	From Leg	4.00	0.000	147.00	No Ice	2.20	1.74	0.06
			0.00			1/2"	2.39	1.92	0.08
			0.00			Ice	2.59	2.11	0.10
						1" Ice	3.01	2.50	0.16
						2" Ice			
B25 RRH4X30	B	From Leg	4.00	0.000	147.00	No Ice	2.20	1.74	0.06
			0.00			1/2"	2.39	1.92	0.08
			0.00			Ice	2.59	2.11	0.10
						1" Ice	3.01	2.50	0.16
						2" Ice			
B25 RRH4X30	C	From Leg	4.00	0.000	147.00	No Ice	2.20	1.74	0.06
			0.00			1/2"	2.39	1.92	0.08
			0.00			Ice	2.59	2.11	0.10
						1" Ice	3.01	2.50	0.16
						2" Ice			
DB-T1-6Z-8AB-0Z	B	From Leg	4.00	0.000	147.00	No Ice	4.80	2.00	0.04
			0.00			1/2"	5.07	2.19	0.08
			0.00			Ice	5.35	2.39	0.12
						1" Ice	5.93	2.81	0.21
						2" Ice			
DB-T1-6Z-8AB-0Z	C	From Leg	4.00	0.000	147.00	No Ice	4.80	2.00	0.04
			0.00			1/2"	5.07	2.19	0.08
			0.00			Ice	5.35	2.39	0.12
						1" Ice	5.93	2.81	0.21
						2" Ice			
****									

Load Combinations

Comb. No.	Description
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

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	159.08 - 139.33	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-18.56	-0.32	-0.29
			Max. Mx	8	-7.04	-187.97	-0.06
			Max. My	14	-7.06	-0.09	-187.38
			Max. Vy	8	15.16	-187.97	-0.06
			Max. Vx	14	15.05	-0.09	-187.38
			Max. Torque	22			-0.33
L2	139.33 - 91.24	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-28.50	-0.32	-0.29
			Max. Mx	8	-14.42	-977.12	-0.06
			Max. My	14	-14.43	-0.10	-971.15
			Max. Vy	8	19.36	-977.12	-0.06
			Max. Vx	14	19.24	-0.10	-971.15
			Max. Torque	17			0.21
L3	91.24 - 44.66	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-44.24	-0.32	-0.29
			Max. Mx	8	-26.51	-1956.99	-0.07

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	14	-26.51	-0.10	-1945.78
			Max. Vy	8	24.42	-1956.99	-0.07
			Max. Vx	14	24.31	-0.10	-1945.78
			Max. Torque	17			0.21
L4	44.66 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-67.87	-0.32	-0.29
			Max. Mx	8	-45.15	-3365.20	-0.07
			Max. My	14	-45.15	-0.10	-3348.07
			Max. Vy	8	30.33	-3365.20	-0.07
			Max. Vx	14	30.22	-0.10	-3348.07
			Max. Torque	17			0.21

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	67.87	0.00	0.00
	Max. H_x	20	45.16	30.31	0.00
	Max. H_z	2	45.16	0.00	30.20
	Max. M_x	2	3347.94	0.00	30.20
	Max. M_z	8	3365.20	-30.31	0.00
	Max. Torsion	17	0.21	15.16	-26.15
	Min. Vert	17	33.87	15.16	-26.15
	Min. H_x	8	45.16	-30.31	0.00
	Min. H_z	14	45.16	0.00	-30.20
	Min. M_x	14	-3348.07	0.00	-30.20
	Min. M_z	20	-3364.99	30.31	0.00
	Min. Torsion	5	-0.20	-15.16	26.15

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	37.63	0.00	0.00	0.05	-0.08	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	45.16	0.00	-30.20	-3347.94	-0.10	0.17
0.9 Dead+1.0 Wind 0 deg - No Ice	33.87	0.00	-30.20	-3327.25	-0.08	0.17
1.2 Dead+1.0 Wind 30 deg - No Ice	45.16	15.16	-26.15	-2899.39	-1682.66	0.20
0.9 Dead+1.0 Wind 30 deg - No Ice	33.87	15.16	-26.15	-2881.47	-1672.23	0.20
1.2 Dead+1.0 Wind 60 deg - No Ice	45.16	26.25	-15.10	-1673.93	-2914.37	0.18
0.9 Dead+1.0 Wind 60 deg - No Ice	33.87	26.25	-15.10	-1663.59	-2896.31	0.18
1.2 Dead+1.0 Wind 90 deg - No Ice	45.16	30.31	0.00	0.07	-3365.20	0.11
0.9 Dead+1.0 Wind 90 deg - No Ice	33.87	30.31	0.00	0.05	-3344.36	0.11
1.2 Dead+1.0 Wind 120 deg - No Ice	45.16	26.25	15.10	1674.06	-2914.37	0.01
0.9 Dead+1.0 Wind 120 deg - No Ice	33.87	26.25	15.10	1663.69	-2896.31	0.01
1.2 Dead+1.0 Wind 150 deg - No Ice	45.16	15.16	26.15	2899.52	-1682.66	-0.10
0.9 Dead+1.0 Wind 150 deg - No Ice	33.87	15.16	26.15	2881.57	-1672.23	-0.09
1.2 Dead+1.0 Wind 180 deg	45.16	0.00	30.20	3348.07	-0.10	-0.17

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
- No Ice 0.9 Dead+1.0 Wind 180 deg	33.87	0.00	30.20	3327.35	-0.08	-0.17
- No Ice 1.2 Dead+1.0 Wind 210 deg	45.16	-15.16	26.15	2899.52	1682.46	-0.21
- No Ice 0.9 Dead+1.0 Wind 210 deg	33.87	-15.16	26.15	2881.57	1672.07	-0.21
- No Ice 1.2 Dead+1.0 Wind 240 deg	45.16	-26.25	15.10	1674.06	2914.16	-0.18
- No Ice 0.9 Dead+1.0 Wind 240 deg	33.87	-26.25	15.10	1663.69	2896.16	-0.18
- No Ice 1.2 Dead+1.0 Wind 270 deg	45.16	-30.31	0.00	0.07	3364.99	-0.11
- No Ice 0.9 Dead+1.0 Wind 270 deg	33.87	-30.31	0.00	0.05	3344.20	-0.11
- No Ice 1.2 Dead+1.0 Wind 300 deg	45.16	-26.25	-15.10	-1673.93	2914.16	-0.00
- No Ice 0.9 Dead+1.0 Wind 300 deg	33.87	-26.25	-15.10	-1663.59	2896.16	-0.01
- No Ice 1.2 Dead+1.0 Wind 330 deg	45.16	-15.16	-26.15	-2899.38	1682.46	0.10
- No Ice 0.9 Dead+1.0 Wind 330 deg	33.87	-15.16	-26.15	-2881.47	1672.07	0.10
- No Ice 1.2 Dead+1.0 Ice+1.0 Temp	67.87	0.00	0.00	0.29	-0.32	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	67.87	0.00	-6.58	-715.42	-0.36	0.05
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	67.87	3.30	-5.70	-619.54	-359.54	0.03
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	67.87	5.72	-3.29	-357.55	-622.48	0.01
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	67.87	6.60	0.00	0.32	-718.71	-0.02
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	67.87	5.72	3.29	358.20	-622.48	-0.04
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	67.87	3.30	5.70	620.19	-359.54	-0.05
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	67.87	0.00	6.58	716.07	-0.36	-0.05
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	67.87	-3.30	5.70	620.19	358.82	-0.04
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	67.87	-5.72	3.29	358.20	621.76	-0.01
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	67.87	-6.60	0.00	0.32	717.99	0.02
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	67.87	-5.72	-3.29	-357.55	621.76	0.04
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	67.87	-3.30	-5.70	-619.54	358.82	0.05
Dead+Wind 0 deg - Service	37.63	0.00	-5.62	-620.66	-0.09	0.03
Dead+Wind 30 deg - Service	37.63	2.82	-4.87	-537.50	-312.03	0.04
Dead+Wind 60 deg - Service	37.63	4.88	-2.81	-310.30	-540.39	0.03
Dead+Wind 90 deg - Service	37.63	5.64	0.00	0.06	-623.97	0.02
Dead+Wind 120 deg - Service	37.63	4.88	2.81	310.41	-540.39	0.00
Dead+Wind 150 deg - Service	37.63	2.82	4.87	537.61	-312.03	-0.02
Dead+Wind 180 deg - Service	37.63	0.00	5.62	620.77	-0.09	-0.03
Dead+Wind 210 deg - Service	37.63	-2.82	4.87	537.61	311.86	-0.04
Dead+Wind 240 deg - Service	37.63	-4.88	2.81	310.41	540.22	-0.03
Dead+Wind 270 deg - Service	37.63	-5.64	0.00	0.06	623.80	-0.02
Dead+Wind 300 deg - Service	37.63	-4.88	-2.81	-310.30	540.22	-0.00
Dead+Wind 330 deg - Service	37.63	-2.82	-4.87	-537.50	311.86	0.02

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-37.63	0.00	0.00	37.63	0.00	0.000%
2	0.00	-45.16	-30.20	0.00	45.16	30.20	0.000%
3	0.00	-33.87	-30.20	0.00	33.87	30.20	0.000%
4	15.16	-45.16	-26.15	-15.16	45.16	26.15	0.000%
5	15.16	-33.87	-26.15	-15.16	33.87	26.15	0.000%
6	26.25	-45.16	-15.10	-26.25	45.16	15.10	0.000%
7	26.25	-33.87	-15.10	-26.25	33.87	15.10	0.000%
8	30.31	-45.16	0.00	-30.31	45.16	0.00	0.000%
9	30.31	-33.87	0.00	-30.31	33.87	0.00	0.000%
10	26.25	-45.16	15.10	-26.25	45.16	-15.10	0.000%
11	26.25	-33.87	15.10	-26.25	33.87	-15.10	0.000%
12	15.16	-45.16	26.15	-15.16	45.16	-26.15	0.000%
13	15.16	-33.87	26.15	-15.16	33.87	-26.15	0.000%
14	0.00	-45.16	30.20	0.00	45.16	-30.20	0.000%
15	0.00	-33.87	30.20	0.00	33.87	-30.20	0.000%
16	-15.16	-45.16	26.15	15.16	45.16	-26.15	0.000%
17	-15.16	-33.87	26.15	15.16	33.87	-26.15	0.000%
18	-26.25	-45.16	15.10	26.25	45.16	-15.10	0.000%
19	-26.25	-33.87	15.10	26.25	33.87	-15.10	0.000%
20	-30.31	-45.16	0.00	30.31	45.16	0.00	0.000%
21	-30.31	-33.87	0.00	30.31	33.87	0.00	0.000%
22	-26.25	-45.16	-15.10	26.25	45.16	15.10	0.000%
23	-26.25	-33.87	-15.10	26.25	33.87	15.10	0.000%
24	-15.16	-45.16	-26.15	15.16	45.16	26.15	0.000%
25	-15.16	-33.87	-26.15	15.16	33.87	26.15	0.000%
26	0.00	-67.87	0.00	0.00	67.87	0.00	0.000%
27	0.00	-67.87	-6.58	-0.00	67.87	6.58	0.000%
28	3.30	-67.87	-5.70	-3.30	67.87	5.70	0.000%
29	5.72	-67.87	-3.29	-5.72	67.87	3.29	0.000%
30	6.60	-67.87	0.00	-6.60	67.87	-0.00	0.000%
31	5.72	-67.87	3.29	-5.72	67.87	-3.29	0.000%
32	3.30	-67.87	5.70	-3.30	67.87	-5.70	0.000%
33	0.00	-67.87	6.58	-0.00	67.87	-6.58	0.000%
34	-3.30	-67.87	5.70	3.30	67.87	-5.70	0.000%
35	-5.72	-67.87	3.29	5.72	67.87	-3.29	0.000%
36	-6.60	-67.87	0.00	6.60	67.87	-0.00	0.000%
37	-5.72	-67.87	-3.29	5.72	67.87	3.29	0.000%
38	-3.30	-67.87	-5.70	3.30	67.87	5.70	0.000%
39	0.00	-37.63	-5.62	0.00	37.63	5.62	0.000%
40	2.82	-37.63	-4.87	-2.82	37.63	4.87	0.000%
41	4.88	-37.63	-2.81	-4.88	37.63	2.81	0.000%
42	5.64	-37.63	0.00	-5.64	37.63	0.00	0.000%
43	4.88	-37.63	2.81	-4.88	37.63	-2.81	0.000%
44	2.82	-37.63	4.87	-2.82	37.63	-4.87	0.000%
45	0.00	-37.63	5.62	0.00	37.63	-5.62	0.000%
46	-2.82	-37.63	4.87	2.82	37.63	-4.87	0.000%
47	-4.88	-37.63	2.81	4.88	37.63	-2.81	0.000%
48	-5.64	-37.63	0.00	5.64	37.63	0.00	0.000%
49	-4.88	-37.63	-2.81	4.88	37.63	2.81	0.000%
50	-2.82	-37.63	-4.87	2.82	37.63	4.87	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00007762
3	Yes	4	0.00000001	0.00004460
4	Yes	5	0.00000001	0.00015522
5	Yes	5	0.00000001	0.00006681
6	Yes	5	0.00000001	0.00015357
7	Yes	5	0.00000001	0.00006597
8	Yes	4	0.00000001	0.00005125
9	Yes	4	0.00000001	0.00002627

10	Yes	5	0.00000001	0.00015404
11	Yes	5	0.00000001	0.00006621
12	Yes	5	0.00000001	0.00015493
13	Yes	5	0.00000001	0.00006666
14	Yes	4	0.00000001	0.00007760
15	Yes	4	0.00000001	0.00004460
16	Yes	5	0.00000001	0.00015304
17	Yes	5	0.00000001	0.00006576
18	Yes	5	0.00000001	0.00015504
19	Yes	5	0.00000001	0.00006670
20	Yes	4	0.00000001	0.00005124
21	Yes	4	0.00000001	0.00002627
22	Yes	5	0.00000001	0.00015457
23	Yes	5	0.00000001	0.00006646
24	Yes	5	0.00000001	0.00015331
25	Yes	5	0.00000001	0.00006591
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00091866
28	Yes	5	0.00000001	0.00007047
29	Yes	5	0.00000001	0.00007056
30	Yes	4	0.00000001	0.00092482
31	Yes	5	0.00000001	0.00007062
32	Yes	5	0.00000001	0.00007067
33	Yes	4	0.00000001	0.00092073
34	Yes	5	0.00000001	0.00007032
35	Yes	5	0.00000001	0.00007046
36	Yes	4	0.00000001	0.00092194
37	Yes	5	0.00000001	0.00007041
38	Yes	5	0.00000001	0.00007013
39	Yes	4	0.00000001	0.00000866
40	Yes	4	0.00000001	0.00004992
41	Yes	4	0.00000001	0.00004800
42	Yes	4	0.00000001	0.00000836
43	Yes	4	0.00000001	0.00004856
44	Yes	4	0.00000001	0.00004963
45	Yes	4	0.00000001	0.00000866
46	Yes	4	0.00000001	0.00004754
47	Yes	4	0.00000001	0.00004962
48	Yes	4	0.00000001	0.00000835
49	Yes	4	0.00000001	0.00004903
50	Yes	4	0.00000001	0.00004779

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	159.08 - 139.33	13.09	42	0.909	0.001
L2	142.34 - 91.24	10.07	42	0.794	0.000
L3	96.3 - 44.66	4.11	42	0.437	0.000
L4	51.49 - 0	1.10	42	0.202	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
159.00	Platform Mount [LP 714-1]	42	13.08	0.908	0.001	20400
147.00	Sector Mount [SM 801-3]	42	10.88	0.827	0.000	8444

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	159.08 - 139.33	70.61	8	4.900	0.003
L2	142.34 - 91.24	54.33	8	4.286	0.001
L3	96.3 - 44.66	22.17	8	2.360	0.000
L4	51.49 - 0	5.94	8	1.089	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
159.00	Platform Mount [LP 714-1]	8	70.53	4.897	0.003	3836
147.00	Sector Mount [SM 801-3]	8	58.69	4.464	0.002	1587

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	159.08 - 139.33 (1)	TP24.1x18.43x0.188	19.75	0.00	0.0	13.717	-7.04	802.42	0.009
L2	139.33 - 91.24 (2)	TP40.49x22.861x0.313	51.10	0.00	0.0	38.120	-14.42	2230.00	0.006
L3	91.24 - 44.66 (3)	TP54.61x38.119x0.375	51.64	0.00	0.0	61.957	-26.51	3624.49	0.007
L4	44.66 - 0 (4)	TP69.47x51.679x0.375	51.49	0.00	0.0	82.240	-45.15	4743.50	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	159.08 - 139.33 (1)	TP24.1x18.43x0.188	187.97	449.12	0.419	0.00	449.12	0.000
L2	139.33 - 91.24 (2)	TP40.49x22.861x0.313	977.12	2080.90	0.470	0.00	2080.90	0.000
L3	91.24 - 44.66 (3)	TP54.61x38.119x0.375	1956.98	4389.49	0.446	0.00	4389.49	0.000
L4	44.66 - 0 (4)	TP69.47x51.679x0.375	3365.20	6755.96	0.498	0.00	6755.96	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	159.08 -	TP24.1x18.43x0.188	15.16	240.73	0.063	0.11	485.90	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L2	139.33 (1) 139.33 - 91.24 (2)	TP40.49x22.861x0.313	19.36	669.00	0.029	0.11	2251.63	0.000
L3	91.24 - 44.66 (3)	TP54.61x38.119x0.375	24.42	1087.35	0.022	0.11	4956.81	0.000
L4	44.66 - 0 (4)	TP69.47x51.679x0.375	30.33	1443.32	0.021	0.11	8733.50	0.000

Pole Interaction Design Data

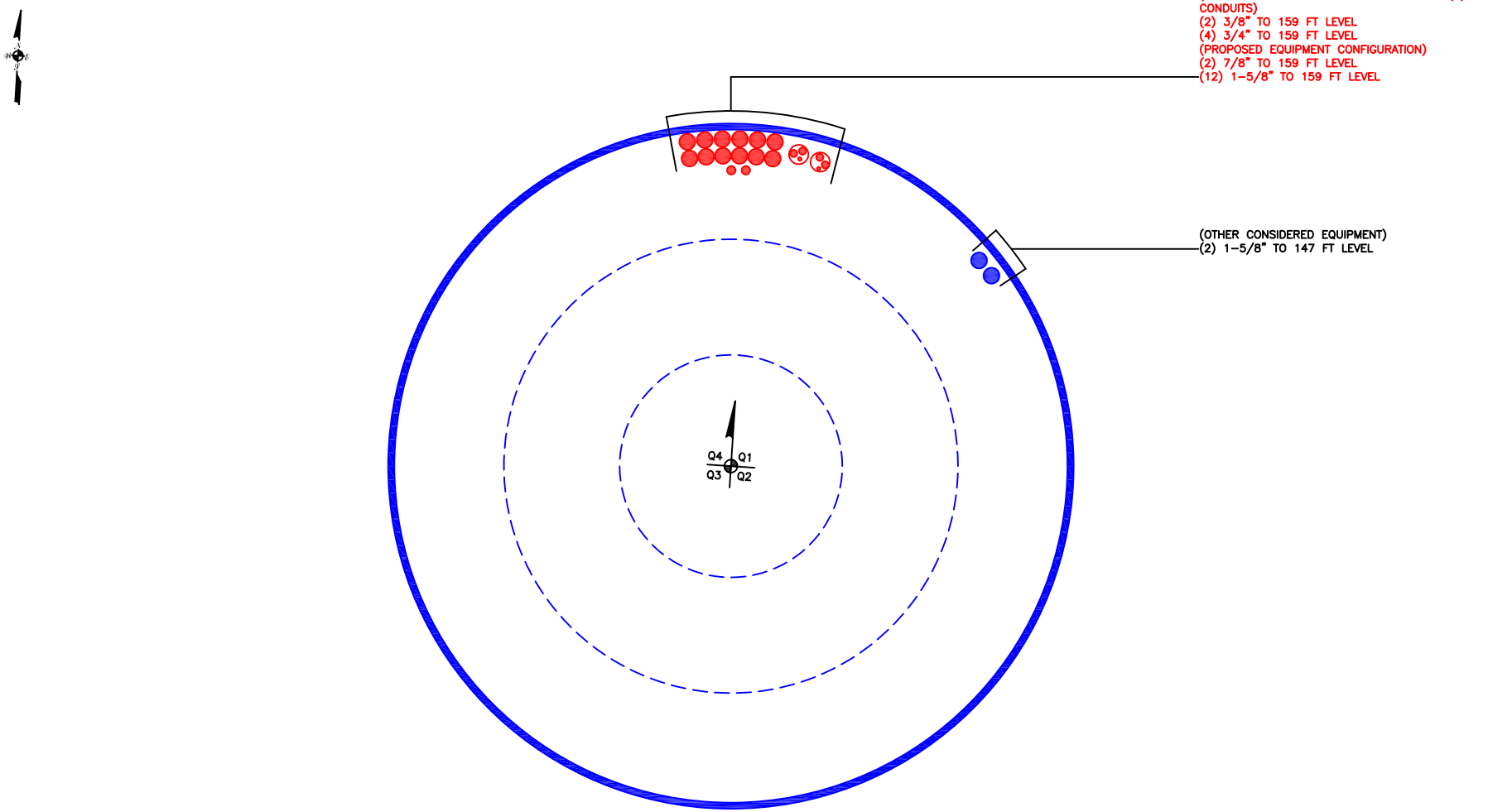
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	159.08 - 139.33 (1)	0.009	0.419	0.000	0.063	0.000	0.431	1.050	4.8.2
L2	139.33 - 91.24 (2)	0.006	0.470	0.000	0.029	0.000	0.477	1.050	4.8.2
L3	91.24 - 44.66 (3)	0.007	0.446	0.000	0.022	0.000	0.454	1.050	4.8.2
L4	44.66 - 0 (4)	0.010	0.498	0.000	0.021	0.000	0.508	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	159.08 - 139.33	Pole	TP24.1x18.43x0.188	1	-7.04	842.55	41.1	Pass
L2	139.33 - 91.24	Pole	TP40.49x22.861x0.313	2	-14.42	2341.50	45.4	Pass
L3	91.24 - 44.66	Pole	TP54.61x38.119x0.375	3	-26.51	3805.71	43.2	Pass
L4	44.66 - 0	Pole	TP69.47x51.679x0.375	4	-45.15	4980.67	48.4	Pass
							Summary	
						Pole (L4)	48.4	Pass
						RATING =	**48.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 857011 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

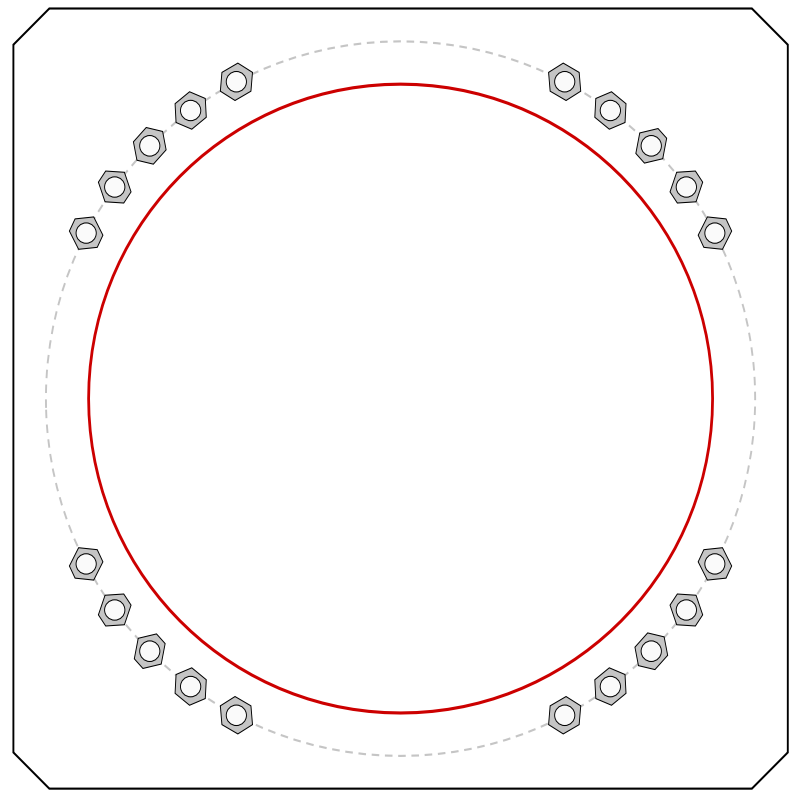
Monopole Base Plate Connection

Site Info	
BU #	857011
Site Name	brook North Horse Hill
Order #	475297 Rev 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2.5

Applied Loads	
Moment (kip-ft)	3365.20
Axial Force (kips)	45.15
Shear Force (kips)	30.33

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(20) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 78.97" BC

Base Plate Data

86.21" OD x 3" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

69.47" x 0.375" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 104.5	ϕPn_c = 243.75	**Stress Rating**
Vu = 1.52	ϕVn = 73.13	**43.3%**
Mu = 2.46	ϕMn = 94.7	**Pass**

Base Plate Summary

Max Stress (ksi):	16.69	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	**35.3%**	**Pass**

Pier and Pad Foundation

BU # :	857011
Site Name:	Westbrook North H
App. Number:	475297 Rev 0

TIA-222 Revision:	H
Tower Type:	Monopole

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

Superstructure Analysis Reactions

Compression, P_{comp}:	45	kips
Base Shear, Vu_comp:	30	kips
Moment, M_u:	3365	ft-kips
Tower Height, **H**:	159	ft
BP Dist. Above Fdn, bp_{dist}:	4.75	in

Pier Properties

Pier Shape:	Square	
Pier Diameter, **dpier**:	9	ft
Ext. Above Grade, **E**:	0.5	ft
Pier Rebar Size, **Sc**:	8	
Pier Rebar Quantity, **mc**:	74	
Pier Tie/Spiral Size, **St**:	3	
Pier Tie/Spiral Quantity, **mt**:	6	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	8	ft
Pad Width, **W**:	28	ft
Pad Thickness, **T**:	3	ft
Pad Rebar Size (Bottom), **Sp**:	9	
Pad Rebar Quantity (Bottom), **mp**:	22	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	3000	psi
Dry Concrete Density, δc:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	130	pcf
Ultimate Gross Bearing, Qult:	12.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	38	degrees
SPT Blow Count, N_{blows}:	35	
Base Friction, μ:	0.35	
Neglected Depth, **N**:	5.00	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	N/A	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	439.74	30.00	**6.5%**	**Pass**
Bearing Pressure (ksf)	9.00	2.10	**22.2%**	**Pass**
*Overturning (kip*ft)*	11600.20	3631.88	**31.3%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	11967.50	3530.00	**28.1%**	**Pass**
Pier Compression (kip)	38666.16	125.19	**0.3%**	**Pass**
*Pad Flexure (kip*ft)*	3023.23	1070.48	**33.7%**	**Pass**
Pad Shear - 1-way (kips)	864.26	159.66	**17.6%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.164	0.027	**15.7%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	3793.12	2118.00	**53.2%**	**Pass**

**Rating per TIA-222-H Section 15.5*

Soil Rating*:	**31.3%**
Structural Rating*:	**53.2%**

BU:	857011	Structure:	A
WO:	1683888		
Order:	475297	Rev:	0

Location

	Decimal Degrees		Deg	Min	Sec
Lat:	41.323808	+	41	19	25.71
Long:	-72.491139	-	72	29	28.10

Code and Site Parameters

Seismic Design Code:	TIA-222-H*	
Site Soil:	D	Dense Soil/Soft Rock
Risk Category:	II	

USGS Seismic Reference			
	S_S:	0.1670	g
	S_1:	0.0590	g
	T_L:	6	s

Seismic Design Category Determination

Importance Factor, I_e:	1
Acceleration-based site coefficient, F_a:	1.6000
Velocity-based site coefficient, F_v:	2.4000

Design spectral response acceleration short period, S_{DS}:	0.1781	g
Design spectral response acceleration 1 s period, S_{D1}:	0.0944	g

Seismic Design Category Based on S_{DS}:	B
Seismic Design Category Based on S_{D1}:	B
Seismic Design Category Based on S_1:	N/A
Controlling Seismic Design Category:	B

*Using ASCE 7-10 Seismic Parameters

Date: **February 11, 2019**

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

Charles McGuirt
Crown Castle
3 Corporate Dr., St 101
Clifton Park, NY 12065

Subject:	**Mount Modification Report**	
Carrier Designation:	**AT&T Equipment Change Out**	
	Carrier Site Number:	10105800
	Carrier Site Name:	CT2265
Crown Castle Designation:	**Crown Castle BU Number:**	857011
	Crown Castle Site Name:	Westbrook North Horse Hill Roa
	Crown Castle JDE Job Number:	553394
	Crown Castle Order Number:	475297, Rev. 0
Engineering Firm Designation:	**Infinigy Report Designation:**	1039-A0002-B
Site Data:	**1102 Horse Hill Road, Westbrook, CT, 06498** **Latitude 41°19'25.71" Longitude -72°29'28.10"**	
Structure Information:	**Tower Height & Type:**	**159.0 ft Monopole**
	Mount Elevation:	**159.0 ft**
	Mount Type:	**18.0 ft Platform**

Dear Charles McGuirt,

Infinigy is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of AT&T'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:

Platform (typical) **Sufficient**

The analysis has been performed in accordance with the TIA 222 H Standard. This analysis utilizes an ultimate 3-second gust wind speed of 135 mph from the 2015 International Building Code. Exposure Category B with a maximum topographic factor, Kzt, of 1.0 and Risk Category II was/were used in this analysis.

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

Mount analysis prepared by: Ishan Patel, E.I.T
Respectfully Submitted by:

Joe Johnston, P.E.
VP Structural Engineering / Principal

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a existing 18.0 ft Platform.This mount is installed at the 159.0 ft elevation on 3 sector(s) of the 159.0 ft Monopole.

2) ANALYSIS CRITERIA

Building Code:	2015 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	135 mph
Exposure Category:	B
Topographic Factor at Base:	1.0
Topographic Factor at Mount:	1.0
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Modification Details
159.0	163.0	3	Kathrein	80010965	Platform MOD
		3	Kathrein	80010991	
		3	Powerwave	7770.00	
		3	Ericsson	RRUS 4415 B25	
		3	Ericsson	RRUS 4449 B5/B12	
		3	Ericsson	RRUS 8843 B2/B66A	
		6	Powerwave	LGP21401	
		2	Raycap	DC6-48-60-18-8F	
	159.0	1	Raycap	DC6-48-60-18-8F	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	AT&T Application	475297, Rev. 0	CCI Sites
Tower Drawings	857011	5177796	CCI Sites
Photos	--	857011	CCI Sites

3.1) Analysis Method

RISA-3D (Version 17.0.2), 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.

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) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A53 (GR 35)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Infinigy 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 (Platform, Typical)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,2	Horizontal	M1	159.0	65.7	Pass
	Standoff	M4		53.1	Pass
	Mount Pipe	MP2		66.8	Pass
	Bolt Check	--		54.5	Pass

Structure Rating (max from all components) =	66.8%

Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) All sectors are typical

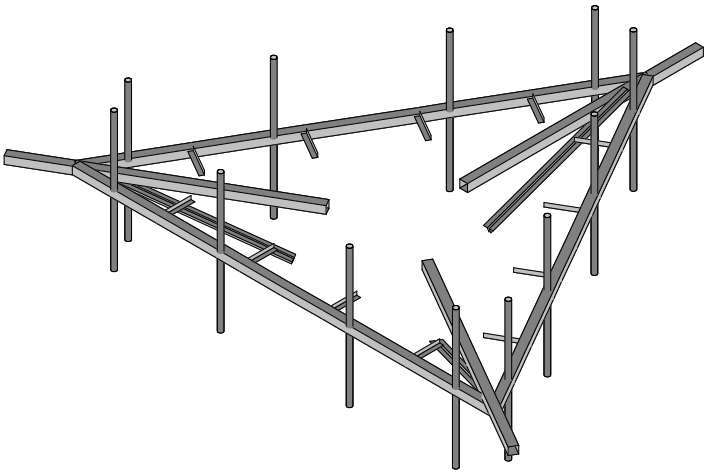
4.1) Recommendations

The Mount Platform has sufficient capacity to support the proposed loading after the following modifications are installed:

- Install (1) Site Pro 1 PRK-1245L reinforcement kit as per the manufactures specifications.

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

Infinigy Engineering, PLLC	857011	Propsoed Configuration
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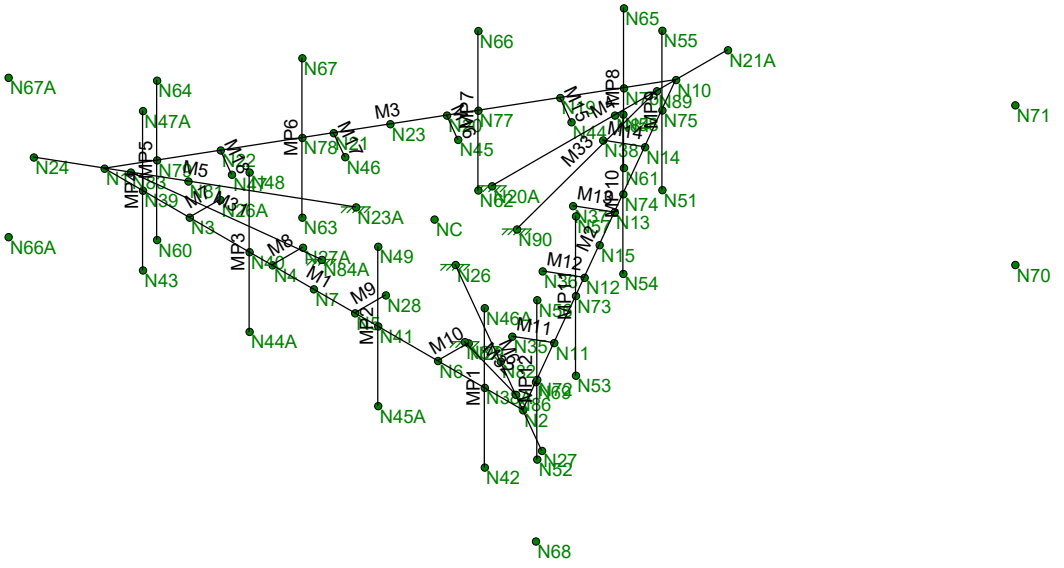
1039-A0002-B		857011.r3d



Envelope Only Solution

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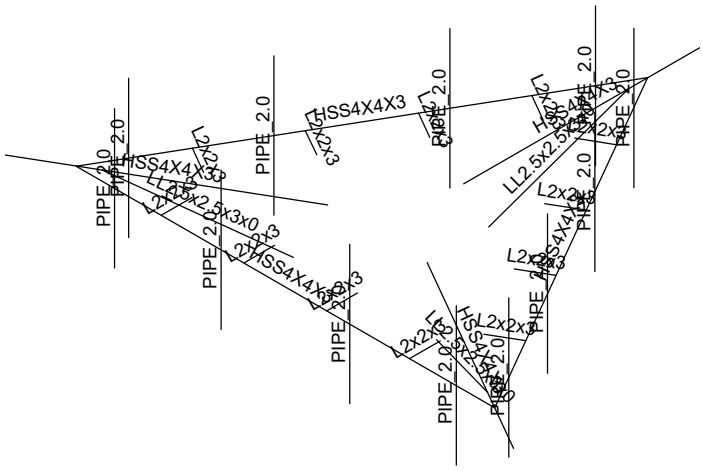

Envelope Only Solution

Infinigy Engineering, PLLC	857011	Member Shapes
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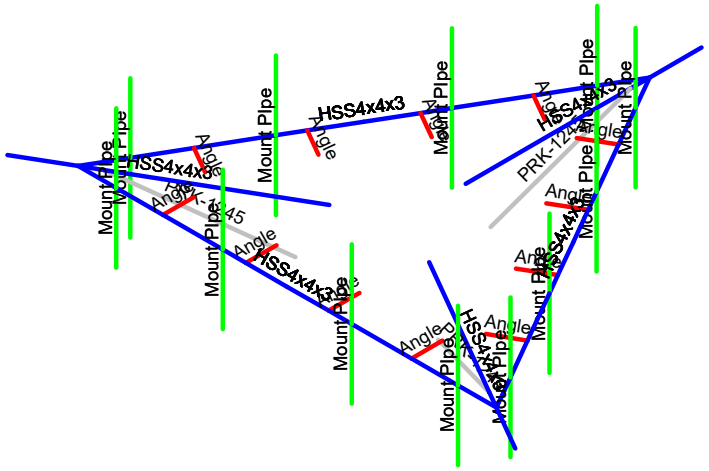
1039-A0002-B		857011.r3d



Envelope Only Solution

Infinigy Engineering, PLLC	857011	Section Sets
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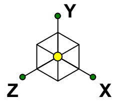
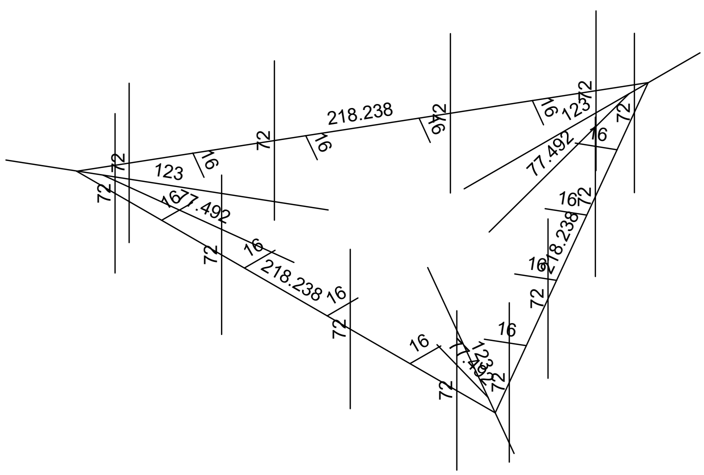
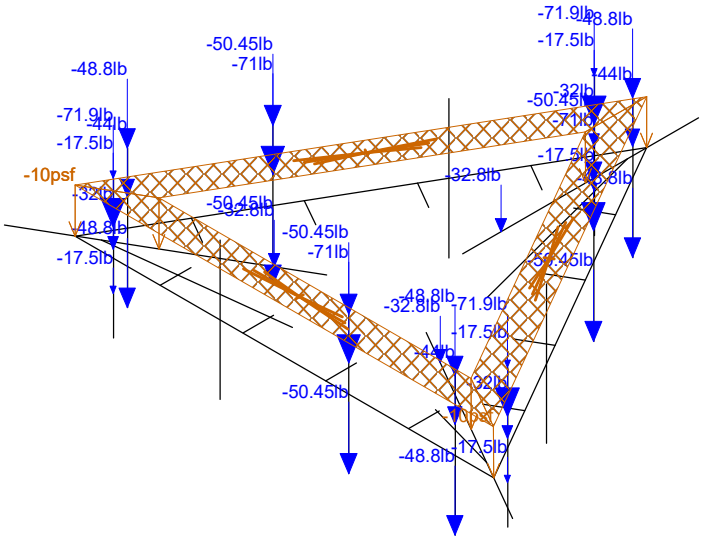




Member Length (in) Displayed
Envelope Only Solution

Infinigy Engineering, PLLC	857011	Member Lengths
IP		Feb 6, 2019 at 11:25 AM
1039-A0002-B		857011.r3d



Loads: BLC 1, Self Weight
Envelope Only Solution

Infinigy Engineering, PLLC	857011	Dead Load
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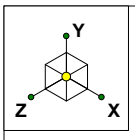
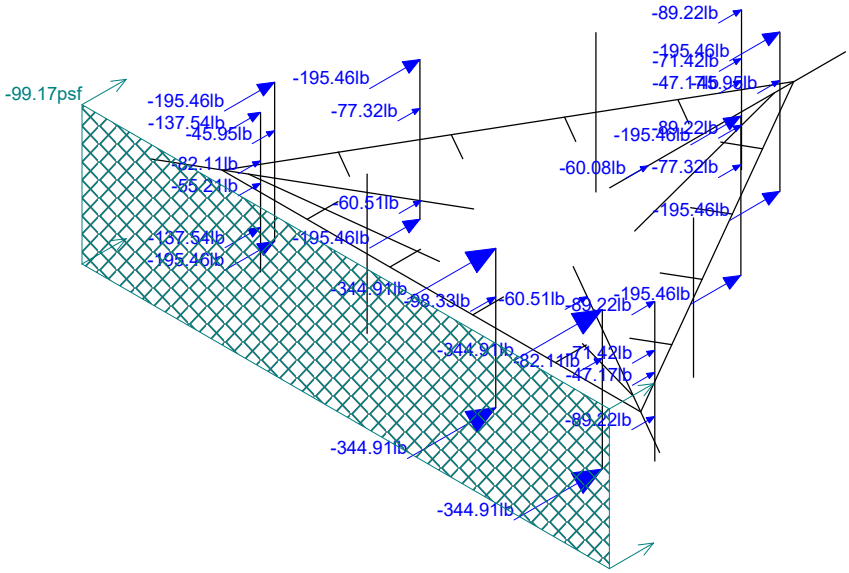
1039-A0002-B		857011.r3d





Loads: BLC 2, Wind Load AZI 000
Envelope Only Solution

Infinigy Engineering, PLLC	857011	Wind Load 0
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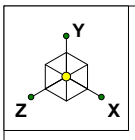
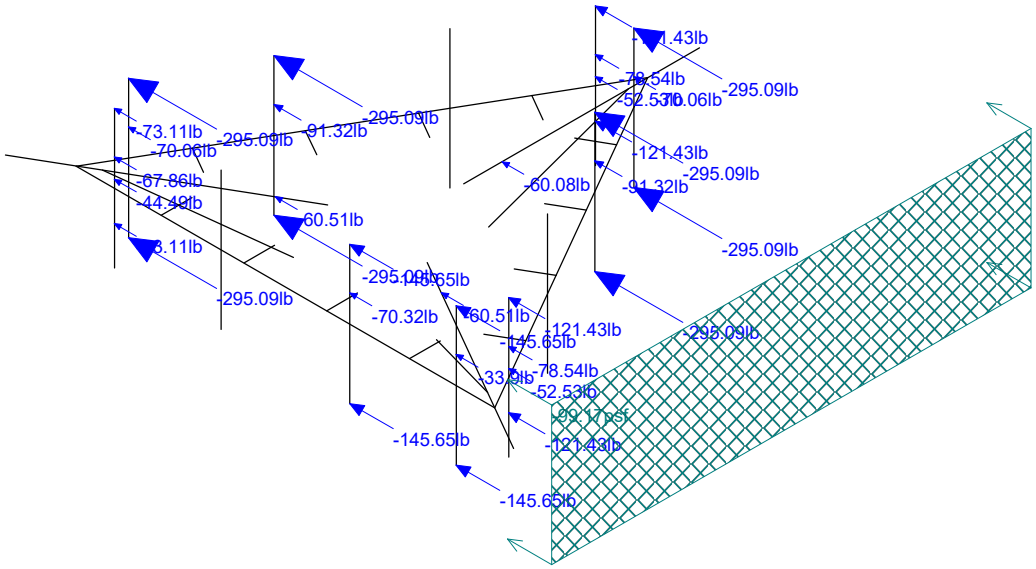
1039-A0002-B		857011.r3d





Loads: BLC 3, Wind Load AZI 090
Envelope Only Solution

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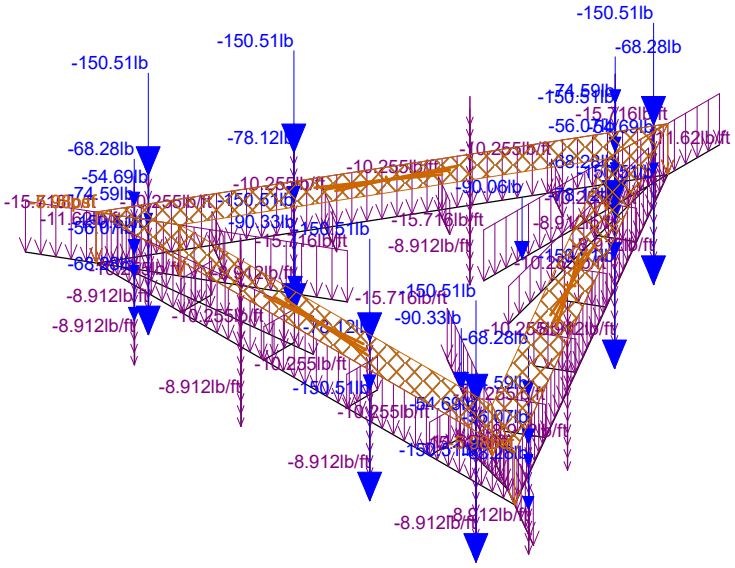

Loads: BLC 4, Ice Weight
Envelope Only Solution

Infinigy Engineering, PLLC	857011	Ice Load
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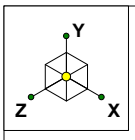
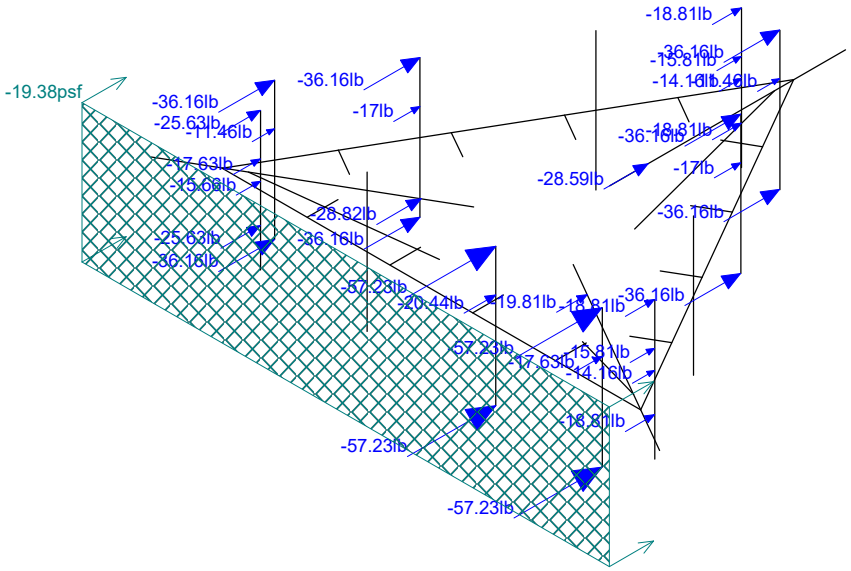
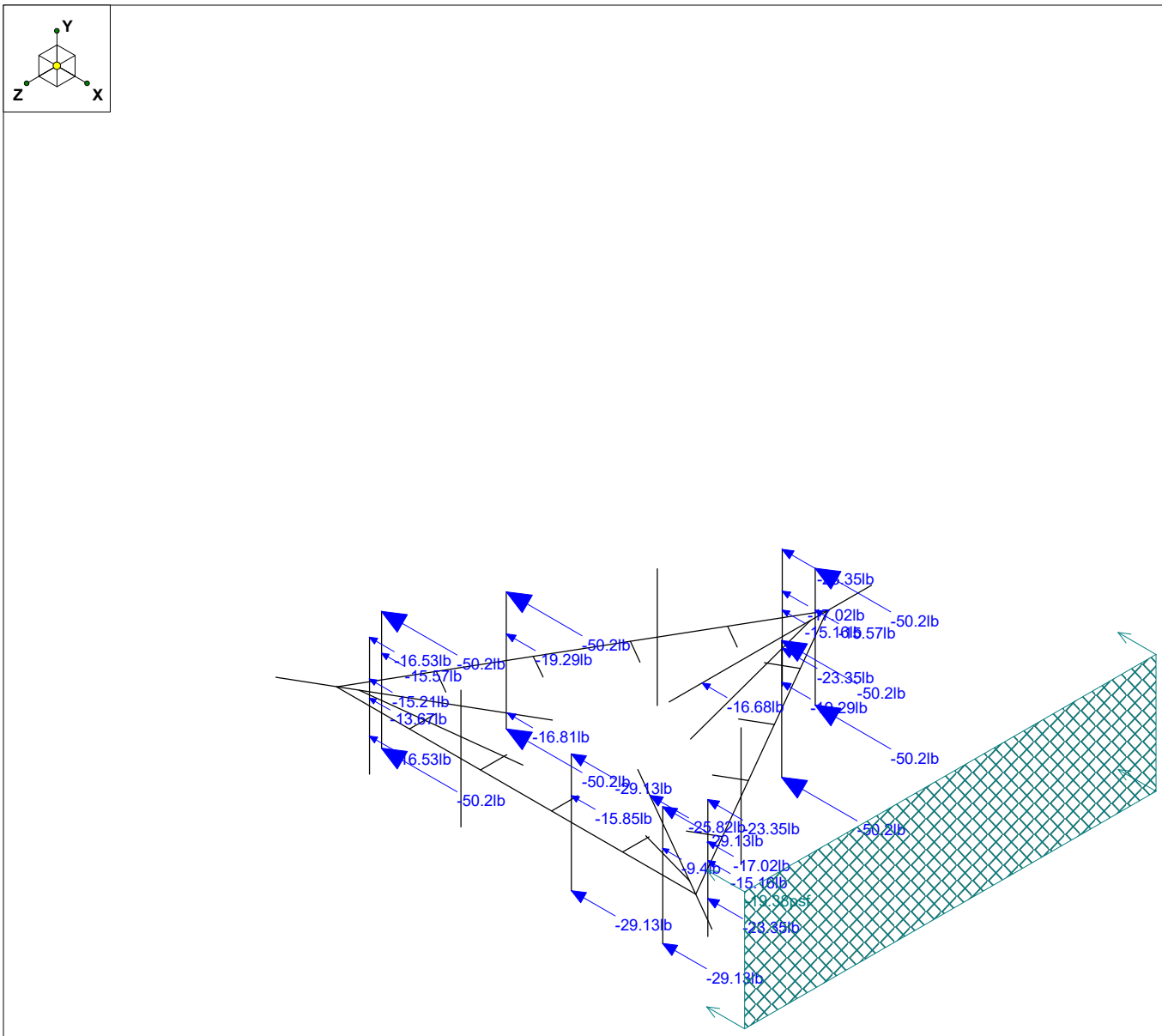




Loads: BLC 5, Wind + Ice Load AZI 000
Envelope Only Solution

Infinigy Engineering, PLLC	857011	Wind + Ice Load 0
IP		Feb 6, 2019 at 11:26 AM
1039-A0002-B		857011.r3d



Loads: BLC 6, Wind + Ice Load AZI 090
Envelope Only Solution

Infinigy Engineering, PLLC	857011	Wind + Ice Load 90
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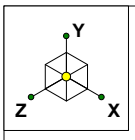
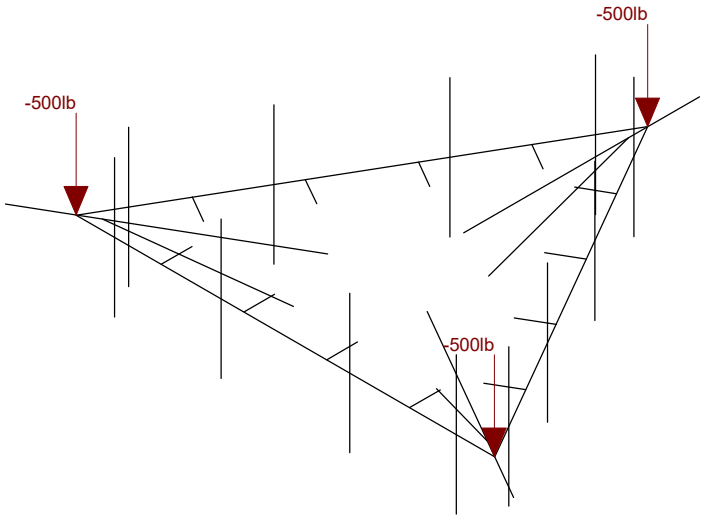
1039-A0002-B		857011.r3d





Loads: BLC 7, Service Live 1
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Infinigy Engineering, PLLC	857011	Service Load
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APPENDIX B

SOFTWARE INPUT CALCULATIONS

Site Name:	857011
Client:	Crown Castle
Carrier:	AT&T
Engineer:	IP
Date:	2/6/2019

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INFINIGY WIND LOAD CALCULATOR 3.0.2

Site Information Inputs:

Adopted Building Code:	2015 IBC
Structure Load Standard:	TIA-222-H
Antenna Load Standard:	TIA-222-H
Structure Risk Category:	II
Structure Type:	Mount - Platform
Number of Sectors:	3
Structure Shape 1:	Flat

Rooftop Inputs:

Rooftop Wind Speed-Up?:	No

Wind Loading Inputs:

Design Wind Velocity:	135	mph (ultimate 3-second gust)
Wind Centerline 1 (z_1):	159.0	ft
Side Face Angle (θ):	60	degrees
Exposure Category:	B	
Topographic Category:	1	

Wind with No Ice		
q_z (psf)	Gh	F_{ST} (psf)
49.58	1.00	**99.17**

Wind with Ice		
q_z (psf)	Gh	F_{ST} (psf)
6.80	1.00	**19.38**

Ice Loading Inputs:

Is Ice Loading Needed?:	Yes	
Ice Wind Velocity:	50	mph (ultimate 3-second gust)
Base Ice Thickness:	1.50	in

Input Appurtenance Information and Load Placements:

Appurtenance Name	Elevation (ft)	Total Quantity	Ka	Front Shape	Side Shape	q_z (psf)	EPA (ft^2)	Fz (lbs)	Fx (lbs)	Fz(60) (lbs)	Fx(30) (lbs)
Kathrein 80010965	163.0	3	1.00	Flat	Flat	49.94	13.81	689.82	291.29	390.92	590.19
Kathrein 80010991	163.0	3	1.00	Flat	Flat	49.94	13.81	689.82	291.29	390.92	590.19
Powerwave 7770	163.0	3	1.00	Flat	Flat	49.94	5.51	275.08	146.23	178.44	242.86
Ericsson RRUS 4415 B25	163.0	3	1.00	Flat	Flat	49.94	1.64	82.11	33.90	45.95	70.06
Ericsson RRUS 4449 B5/B12	163.0	3	1.00	Flat	Flat	49.94	1.97	98.33	70.32	77.32	91.32
Ericsson RRUS 8843 B2/B66A	163.0	3	1.00	Flat	Flat	49.94	1.64	82.11	67.86	71.42	78.54
Powerwave LGP21401	163.0	6	1.00	Flat	Flat	49.94	0.55	27.60	22.25	23.59	26.26
Raycap DC6-48-60-18-8F	163.0	2	1.00	Round	Round	49.94	1.21	60.51	60.51	60.51	60.51
Raycap DC6-48-60-18-8F	159.0	1	1.00	Round	Round	49.58	1.21	60.08	60.08	60.08	60.08

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			HSS4x4x3	Beam	SquareTube	A500 Gr.B...	Typical
2	M2	N2	N10			HSS4x4x3	Beam	SquareTube	A500 Gr.B...	Typical
3	M3	N10	N1			HSS4x4x3	Beam	SquareTube	A500 Gr.B...	Typical
4	M4	N20A	N21A			HSS4x4x3	Beam	SquareTube	A500 Gr.B...	Typical
5	M5	N23A	N24			HSS4x4x3	Beam	SquareTube	A500 Gr.B...	Typical
6	M6	N26	N27			HSS4x4x3	Beam	SquareTube	A500 Gr.B...	Typical
7	M7	N3	N26A			Angle	Beam	Single Angle	A36 Gr.36	Typical
8	M8	N4	N27A			Angle	Beam	Single Angle	A36 Gr.36	Typical
9	M9	N5	N28			Angle	Beam	Single Angle	A36 Gr.36	Typical
10	M10	N6	N29			Angle	Beam	Single Angle	A36 Gr.36	Typical
11	M11	N11	N35			Angle	Beam	Single Angle	A36 Gr.36	Typical
12	M12	N12	N36			Angle	Beam	Single Angle	A36 Gr.36	Typical
13	M13	N13	N37			Angle	Beam	Single Angle	A36 Gr.36	Typical
14	M14	N14	N38			Angle	Beam	Single Angle	A36 Gr.36	Typical
15	M15	N19	N44			Angle	Beam	Single Angle	A36 Gr.36	Typical
16	M16	N20	N45			Angle	Beam	Single Angle	A36 Gr.36	Typical
17	M17	N21	N46			Angle	Beam	Single Angle	A36 Gr.36	Typical
18	M18	N22	N47			Angle	Beam	Single Angle	A36 Gr.36	Typical
19	MP4	N43	N47A			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
20	MP3	N44A	N48			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
21	MP2	N45A	N49			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
22	MP1	N42	N46A			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
23	MP12	N52	N56			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
24	MP11	N53	N57			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
25	MP10	N54	N58			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
26	MP9	N51	N55			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
27	MP8	N61	N65			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
28	MP7	N62	N66			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
29	MP6	N63	N67			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
30	MP5	N60	N64			Mount Pipe	Beam	Pipe	A53 Gr.B	Typical
31	M31	N83	N84A			PRK-1245	Beam	Double Angle (...	A36 Gr.36	Typical
32	M32	N86	N87			PRK-1245	Beam	Double Angle (...	A36 Gr.36	Typical
33	M33	N89	N90			PRK-1245	Beam	Double Angle (...	A36 Gr.36	Typical

Material Takeoff

	Material	Size	Pieces	Length[in]	Weight[K]
1	Hot Rolled Steel				
2	A36 Gr.36	L2x2x3	12	192	0
3	A36 Gr.36	LL2.5x2.5x3x0	3	232.5	.1
4	A500 Gr.B Rect	HSS4X4X3	6	1023.7	.8
5	A53 Gr.B	PIPE 2.0	12	864	.2
6	Total HR Steel		33	2312.2	1.2

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
1	Self Weight	DL		-1			33		3	
2	Wind Load AZI 000	WLZ					33		1	
3	Wind Load AZI 090	WLX					33		1	
4	Ice Weight	OL1					33	33	3	
5	Wind + Ice Load AZI 000	OL2					33		1	
6	Wind + Ice Load AZI 090	OL3					33		1	
7	Service Live 1	LL				3				
8	BLC 1 Transient Area Loads	None						45		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
9	BLC 2 Transient Area Loads	None						28		
10	BLC 3 Transient Area Loads	None						32		
11	BLC 4 Transient Area Loads	None						45		
12	BLC 5 Transient Area Loads	None						28		
13	BLC 6 Transient Area Loads	None						32		

Load Combinations

	Description	Solve	PDelta	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Fa...
1	1.4D	Yes	Y		DL	1.4						
2	1.2D + 1W AZI 000	Yes	Y		DL	1.2	WLZ	1				
3	1.2D + 1W AZI 030	Yes	Y		DL	1.2	WLZ	.866	WLX	.5		
4	1.2D + 1W AZI 060	Yes	Y		DL	1.2	WLZ	.5	WLX	.866		
5	1.2D + 1W AZI 090	Yes	Y		DL	1.2			WLX	1		
6	1.2D + 1W AZI 120	Yes	Y		DL	1.2	WLZ	-.5	WLX	.866		
7	1.2D + 1W AZI 150	Yes	Y		DL	1.2	WLZ	-.866	WLX	.5		
8	1.2D + 1W AZI 180	Yes	Y		DL	1.2	WLZ	-1				
9	1.2D + 1W AZI 210	Yes	Y		DL	1.2	WLZ	-.866	WLX	-.5		
10	1.2D + 1W AZI 240	Yes	Y		DL	1.2	WLZ	-.5	WLX	-.866		
11	1.2D + 1W AZI 270	Yes	Y		DL	1.2			WLX	-1		
12	1.2D + 1W AZI 300	Yes	Y		DL	1.2	WLZ	.5	WLX	-.866		
13	1.2D + 1W AZI 330	Yes	Y		DL	1.2	WLZ	.866	WLX	-.5		
14	0.9D + 1W AZI 000	Yes	Y		DL	.9	WLZ	1				
15	0.9D + 1W AZI 030	Yes	Y		DL	.9	WLZ	.866	WLX	.5		
16	0.9D + 1W AZI 060	Yes	Y		DL	.9	WLZ	.5	WLX	.866		
17	0.9D + 1W AZI 090	Yes	Y		DL	.9			WLX	1		
18	0.9D + 1W AZI 120	Yes	Y		DL	.9	WLZ	-.5	WLX	.866		
19	0.9D + 1W AZI 150	Yes	Y		DL	.9	WLZ	-.866	WLX	.5		
20	0.9D + 1W AZI 180	Yes	Y		DL	.9	WLZ	-1				
21	0.9D + 1W AZI 210	Yes	Y		DL	.9	WLZ	-.866	WLX	-.5		
22	0.9D + 1W AZI 240	Yes	Y		DL	.9	WLZ	-.5	WLX	-.866		
23	0.9D + 1W AZI 270	Yes	Y		DL	.9			WLX	-1		
24	0.9D + 1W AZI 300	Yes	Y		DL	.9	WLZ	.5	WLX	-.866		
25	0.9D + 1W AZI 330	Yes	Y		DL	.9	WLZ	.866	WLX	-.5		
26	1.2D + 1.0Di	Yes	Y		DL	1.2	OL1	1				
27	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	1		
28	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	.5
29	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	.866
30	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1			OL3	1
31	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	.866
32	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	.5
33	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-1		
34	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	-.5
35	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	-.8...
36	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1			OL3	-1
37	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	-.8...
38	1.2D + 1.0Di + 1.0Wi AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	-.5
39	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.049		
40	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.043	WLX	.025
41	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.025	WLX	.043
42	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5			WLX	.049
43	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.025	WLX	.043
44	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.043	WLX	.025
45	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.049		
46	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.043	WLX	-.0...
47	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.025	WLX	-.0...

Load Combinations (Continued)

	Description	Solve	PDelta	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Fa..... ... .
48	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5			WLX	-.0...
49	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.025	WLX	-.0...
50	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.043	WLX	-.0...

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N20A	max	1025.299	5	816.655	27	5705.181	2	1845.506	27	3193.665	11	382.877	11
2		min	-1030.823	11	235.497	20	-3497.289	20	479.75	20	-3177.936	17	-325.395	17
3	N23A	max	5070.849	6	816.188	31	1939.536	24	-2.316	15	1205.198	14	-331.548	22
4		min	-3163.901	24	238.073	23	-3051.721	6	-885.055	34	-1210.491	20	-1670.221	29
5	N26	max	3028.161	16	815.952	35	2101.389	15	-28.95	25	2141.116	8	1568.728	37
6		min	-4924.269	10	240.988	16	-3232.817	9	-1059.841	32	-2113.886	14	319.518	18
7	N84A	max	-1487.849	25	2531.733	31	3283.764	28	67.1	25	343.549	25	-63.569	20
8		min	-5688.736	32	672.705	24	803.634	21	-216.797	32	-357.351	7	-329.001	27
9	N87	max	5684.576	34	2531.97	35	3308.819	38	173.855	15	686.79	21	343.309	27
10		min	1439.864	15	670.396	16	746.853	19	-307.606	9	-691.283	3	4.703	20
11	N90	max	371.41	17	2530.902	27	-1783.952	20	382.223	27	1033.156	23	368.965	23
12		min	-366.723	23	676.229	20	-6550.662	27	76.836	20	-1041.496	5	-371.807	5
13	Totals:	max	8210.621	17	9993.16	38	8278.339	14						
14		min	-8210.621	11	2973.649	14	-8278.339	8						

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[i...	Dir	LC	phi*Pnc...	phi*Pnt ...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	MP2	PIPE_2.0	.668	36	2	.052	36		2	20866.7...	32130	1871.625	1871.625	1...	H1-1b
2	MP1	PIPE_2.0	.657	36	2	.051	36		2	20866.7...	32130	1871.625	1871.625	1...	H1-1b
3	MP6	PIPE_2.0	.584	36	11	.046	36		11	20866.7...	32130	1871.625	1871.625	1...	H1-1b
4	MP10	PIPE_2.0	.583	36	5	.046	36		5	20866.7...	32130	1871.625	1871.625	1...	H1-1b
5	MP5	PIPE_2.0	.569	36	11	.044	36		11	20866.7...	32130	1871.625	1871.625	1...	H1-1b
6	MP9	PIPE_2.0	.569	36	11	.044	36		11	20866.7...	32130	1871.625	1871.625	1...	H1-1b
7	M4	HSS4X4X3	.531	94.813	5	.107	87.1...	y	37	69983.4...	106812	12661.5	12661.5	1...	H1-1b
8	M6	HSS4X4X3	.485	94.813	2	.108	87.1...	y	32	69983.4...	106812	12661.5	12661.5	1...	H1-1b
9	M33	LL2.5x2.5x3x0	.472	77.492	5	.025	77.4...	z	11	34265.4...	58320	3300.48	1593.491	2...	H1-1b
10	M1	HSS4X4X3	.472	218.238	9	.086	218....	z	2	29455.6...	106812	12661.5	12661.5	1...	H1-1b
11	M5	HSS4X4X3	.471	94.813	34	.108	87.1...	y	29	69983.4...	106812	12661.5	12661.5	1...	H1-1b
12	M32	LL2.5x2.5x3x0	.447	77.492	27	.019	77.4...	z	8	34265.4...	58320	3300.48	1593.491	2...	H1-1a
13	M31	LL2.5x2.5x3x0	.442	77.492	32	.015	77.4...	z	3	34265.4...	58320	3300.48	1593.491	2...	H1-1a
14	M3	HSS4X4X3	.407	218.238	5	.074	218....	z	11	29455.6...	106812	12661.5	12661.5	1...	H1-1b
15	M2	HSS4X4X3	.398	218.238	6	.072	218....	z	6	29455.6...	106812	12661.5	12661.5	2...	H1-1b
16	MP4	PIPE_2.0	.334	36	2	.035	36		2	20866.7...	32130	1871.625	1871.625	1...	H1-1b
17	MP12	PIPE_2.0	.305	36	5	.032	36		5	20866.7...	32130	1871.625	1871.625	1...	H1-1b
18	MP8	PIPE_2.0	.305	36	5	.032	36		5	20866.7...	32130	1871.625	1871.625	1...	H1-1b
19	M8	L2x2x3	.076	0	30	.008	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
20	M9	L2x2x3	.076	0	30	.008	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
21	M16	L2x2x3	.076	0	27	.008	0	y	28	21399.4...	23392.8	557.717	1239.29	2...	H2-1
22	M17	L2x2x3	.076	0	27	.008	0	y	28	21399.4...	23392.8	557.717	1239.29	2...	H2-1
23	M13	L2x2x3	.076	0	34	.008	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
24	M12	L2x2x3	.076	0	34	.008	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
25	M10	L2x2x3	.060	0	30	.006	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
26	M7	L2x2x3	.060	0	30	.006	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
27	M18	L2x2x3	.060	0	27	.006	0	y	29	21399.4...	23392.8	557.717	1239.29	2...	H2-1
28	M11	L2x2x3	.060	0	34	.006	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
29	M15	L2x2x3	.060	0	27	.006	0	y	28	21399.4...	23392.8	557.717	1239.29	2...	H2-1
30	M14	L2x2x3	.060	0	34	.006	0	y	38	21399.4...	23392.8	557.717	1239.29	2...	H2-1
31	MP3	PIPE_2.0	.047	36	2	.006	36		2	20866.7...	32130	1871.625	1871.625	1...	H1-1b

Envelope AISC 14th(360-10): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[i...	Dir	LC	phi*Pnc...	phi*Pnt ...	phi*Mn ...	phi*Mn ...	Cb	Eqn
32	MP11	PIPE_2.0	.047	36	5	.006	36		5	20866.7...	32130	1871.625	1871.625	1...	H1-1b
33	MP7	PIPE_2.0	.047	36	10	.006	36		10	20866.7...	32130	1871.625	1871.625	1...	H1-1b

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	HSS4x4x3	HSS4X4X3	Beam	SquareTube	A500 Gr.B Rect	Typical	2.58	6.21	6.21	10
2	Mount PIpe	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	Angle	L2x2x3	Beam	Single Angle	A36 Gr.36	Typical	.722	.271	.271	.009
4	PRK-1245	LL2.5x2.5x3x0	Beam	Double Angle (No Gap)	A36 Gr.36	Typical	1.8	1.91	1.07	.023

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N20A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N23A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N26	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N84A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N87	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N90	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	M1						Yes				None
2	M2						Yes				None
3	M3						Yes				None
4	M4						Yes				None
5	M5						Yes				None
6	M6						Yes				None
7	M7						Yes				None
8	M8						Yes				None
9	M9						Yes				None
10	M10						Yes				None
11	M11						Yes				None
12	M12						Yes				None
13	M13						Yes				None
14	M14						Yes				None
15	M15						Yes				None
16	M16						Yes				None
17	M17						Yes				None
18	M18						Yes				None
19	MP4						Yes				None
20	MP3						Yes				None
21	MP2						Yes				None
22	MP1						Yes				None
23	MP12						Yes				None
24	MP11						Yes				None
25	MP10						Yes				None
26	MP9						Yes				None
27	MP8						Yes				None
28	MP7						Yes				None
29	MP6						Yes				None
30	MP5						Yes				None
31	M31						Yes				None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
32	M32						Yes				None
33	M33						Yes				None

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[k/ft...	Yield[psi]	Ry	Fu[psi]	Rt
1	A992	29000	11154	.3	.65	.49	50000	1.1	65000	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36000	1.5	58000	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50000	1.1	65000	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42000	1.4	58000	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46000	1.4	58000	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35000	1.6	60000	1.2
7	A1085	29000	11154	.3	.65	.49	50000	1.4	65000	1.3

Joint Loads and Enforced Displacements (BLC 7 : Service Live 1)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2...
1	N1	L	Y	-500
2	N10	L	Y	-500
3	N2	L	Y	-500

Member Point Loads (BLC 1 : Self Weight)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Y	-48.8	0
2	MP2	Y	-50.45	0
3	MP4	Y	-17.5	20
4	MP1	Y	-44	50
5	MP2	Y	-71	50
6	MP4	Y	-71.9	50
7	MP4	Y	-32	40
8	M5	Y	-32.8	20
9	M4	Y	-32.8	20
10	MP1	Y	-48.8	72
11	MP2	Y	-50.45	72
12	MP4	Y	-17.5	72
13	MP5	Y	-48.8	0
14	MP6	Y	-50.45	0
15	MP8	Y	-17.5	20
16	MP5	Y	-44	50
17	MP6	Y	-71	50
18	MP8	Y	-71.9	50
19	MP8	Y	-32	40
20	M6	Y	-32.8	20
21	MP5	Y	-48.8	72
22	MP6	Y	-50.45	72
23	MP8	Y	-17.5	72
24	MP9	Y	-48.8	0
25	MP10	Y	-50.45	0
26	MP12	Y	-17.5	20
27	MP9	Y	-44	50
28	MP10	Y	-71	50
29	MP12	Y	-71.9	50
30	MP12	Y	-32	40
31	MP9	Y	-48.8	72

Member Point Loads (BLC 1 : Self Weight) (Continued)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
32	MP10	Y	-50.45	72
33	MP12	Y	-17.5	72

Member Point Loads (BLC 2 : Wind Load AZI 000)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Z	-344.91	0
2	MP2	Z	-344.91	0
3	MP4	Z	-137.54	20
4	MP1	Z	-82.11	50
5	MP2	Z	-98.33	50
6	MP4	Z	-82.11	50
7	MP4	Z	-55.21	40
8	M5	Z	-60.51	20
9	M4	Z	-60.08	20
10	MP1	Z	-344.91	72
11	MP2	Z	-344.91	72
12	MP4	Z	-137.54	72
13	MP5	Z	-195.46	0
14	MP6	Z	-195.46	0
15	MP8	Z	-89.22	20
16	MP5	Z	-45.95	50
17	MP6	Z	-77.32	50
18	MP8	Z	-71.42	50
19	MP8	Z	-47.17	40
20	M6	Z	-60.51	20
21	MP5	Z	-195.46	72
22	MP6	Z	-195.46	72
23	MP8	Z	-89.22	72
24	MP9	Z	-195.46	0
25	MP10	Z	-195.46	0
26	MP12	Z	-89.22	20
27	MP9	Z	-45.95	50
28	MP10	Z	-77.32	50
29	MP12	Z	-71.42	50
30	MP12	Z	-47.17	40
31	MP9	Z	-195.46	72
32	MP10	Z	-195.46	72
33	MP12	Z	-89.22	72

Member Point Loads (BLC 3 : Wind Load AZI 090)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	X	-145.65	0
2	MP2	X	-145.65	0
3	MP4	X	-73.11	20
4	MP1	X	-33.9	50
5	MP2	X	-70.32	50
6	MP4	X	-67.86	50
7	MP4	X	-44.49	40
8	M5	X	-60.51	20
9	M4	X	-60.08	20
10	MP1	X	-145.65	72
11	MP2	X	-145.65	72
12	MP4	X	-73.11	72
13	MP5	X	-295.09	0
14	MP6	X	-295.09	0
15	MP8	X	-121.43	20

Member Point Loads (BLC 3 : Wind Load AZI 090) (Continued)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
16	MP5	X	-70.06	50
17	MP6	X	-91.32	50
18	MP8	X	-78.54	50
19	MP8	X	-52.53	40
20	M6	X	-60.51	20
21	MP5	X	-295.09	72
22	MP6	X	-295.09	72
23	MP8	X	-121.43	72
24	MP9	X	-295.09	0
25	MP10	X	-295.09	0
26	MP12	X	-121.43	20
27	MP9	X	-70.06	50
28	MP10	X	-91.32	50
29	MP12	X	-78.54	50
30	MP12	X	-52.53	40
31	MP9	X	-295.09	72
32	MP10	X	-295.09	72
33	MP12	X	-121.43	72

Member Point Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Y	-150.51	0
2	MP2	Y	-150.51	0
3	MP4	Y	-68.28	20
4	MP1	Y	-54.69	50
5	MP2	Y	-78.12	50
6	MP4	Y	-74.59	50
7	MP4	Y	-56.07	40
8	M5	Y	-90.33	20
9	M4	Y	-90.06	20
10	MP1	Y	-150.51	72
11	MP2	Y	-150.51	72
12	MP4	Y	-68.28	72
13	MP5	Y	-150.51	0
14	MP6	Y	-150.51	0
15	MP8	Y	-68.28	20
16	MP5	Y	-54.69	50
17	MP6	Y	-78.12	50
18	MP8	Y	-74.59	50
19	MP8	Y	-56.07	40
20	M6	Y	-90.33	20
21	MP5	Y	-150.51	72
22	MP6	Y	-150.51	72
23	MP8	Y	-68.28	72
24	MP9	Y	-150.51	0
25	MP10	Y	-150.51	0
26	MP12	Y	-68.28	20
27	MP9	Y	-54.69	50
28	MP10	Y	-78.12	50
29	MP12	Y	-74.59	50
30	MP12	Y	-56.07	40
31	MP9	Y	-150.51	72
32	MP10	Y	-150.51	72
33	MP12	Y	-68.28	72

Member Point Loads (BLC 5 : Wind + Ice Load AZI 000)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Z	-57.23	0
2	MP2	Z	-57.23	0
3	MP4	Z	-25.63	20
4	MP1	Z	-17.63	50
5	MP2	Z	-20.44	50
6	MP4	Z	-17.63	50
7	MP4	Z	-15.66	40
8	M5	Z	-28.82	20
9	M4	Z	-28.59	20
10	MP1	Z	-57.23	72
11	MP2	Z	-57.23	72
12	MP4	Z	-25.63	72
13	MP5	Z	-36.16	0
14	MP6	Z	-36.16	0
15	MP8	Z	-18.81	20
16	MP5	Z	-11.46	50
17	MP6	Z	-17	50
18	MP8	Z	-15.81	50
19	MP8	Z	-14.16	40
20	M6	Z	-19.81	20
21	MP5	Z	-36.16	72
22	MP6	Z	-36.16	72
23	MP8	Z	-18.81	72
24	MP9	Z	-36.16	0
25	MP10	Z	-36.16	0
26	MP12	Z	-18.81	20
27	MP9	Z	-11.46	50
28	MP10	Z	-17	50
29	MP12	Z	-15.81	50
30	MP12	Z	-14.16	40
31	MP9	Z	-36.16	72
32	MP10	Z	-36.16	72
33	MP12	Z	-18.81	72

Member Point Loads (BLC 6 : Wind + Ice Load AZI 090)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	X	-29.13	0
2	MP2	X	-29.13	0
3	MP4	X	-16.53	20
4	MP1	X	-9.4	50
5	MP2	X	-15.85	50
6	MP4	X	-15.21	50
7	MP4	X	-13.67	40
8	M5	X	-16.81	20
9	M4	X	-16.68	20
10	MP1	X	-29.13	72
11	MP2	X	-29.13	72
12	MP4	X	-16.53	72
13	MP5	X	-50.2	0
14	MP6	X	-50.2	0
15	MP8	X	-23.35	20
16	MP5	X	-15.57	50
17	MP6	X	-19.29	50
18	MP8	X	-17.02	50
19	MP8	X	-15.16	40
20	M6	X	-25.82	20

Member Point Loads (BLC 6 : Wind + Ice Load AZI 090) (Continued)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
21	MP5	X	-50.2	72
22	MP6	X	-50.2	72
23	MP8	X	-23.35	72
24	MP9	X	-50.2	0
25	MP10	X	-50.2	0
26	MP12	X	-23.35	20
27	MP9	X	-15.57	50
28	MP10	X	-19.29	50
29	MP12	X	-17.02	50
30	MP12	X	-15.16	40
31	MP9	X	-50.2	72
32	MP10	X	-50.2	72
33	MP12	X	-23.35	72

Member Distributed Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	Y	-15.716	-15.716	0	%100
2	M2	Y	-15.716	-15.716	0	%100
3	M3	Y	-15.716	-15.716	0	%100
4	M4	Y	-15.716	-15.716	0	%100
5	M5	Y	-15.716	-15.716	0	%100
6	M6	Y	-15.716	-15.716	0	%100
7	M7	Y	-10.255	-10.255	0	%100
8	M8	Y	-10.255	-10.255	0	%100
9	M9	Y	-10.255	-10.255	0	%100
10	M10	Y	-10.255	-10.255	0	%100
11	M11	Y	-10.255	-10.255	0	%100
12	M12	Y	-10.255	-10.255	0	%100
13	M13	Y	-10.255	-10.255	0	%100
14	M14	Y	-10.255	-10.255	0	%100
15	M15	Y	-10.255	-10.255	0	%100
16	M16	Y	-10.255	-10.255	0	%100
17	M17	Y	-10.255	-10.255	0	%100
18	M18	Y	-10.255	-10.255	0	%100
19	MP4	Y	-8.912	-8.912	0	%100
20	MP3	Y	-8.912	-8.912	0	%100
21	MP2	Y	-8.912	-8.912	0	%100
22	MP1	Y	-8.912	-8.912	0	%100
23	MP12	Y	-8.912	-8.912	0	%100
24	MP11	Y	-8.912	-8.912	0	%100
25	MP10	Y	-8.912	-8.912	0	%100
26	MP9	Y	-8.912	-8.912	0	%100
27	MP8	Y	-8.912	-8.912	0	%100
28	MP7	Y	-8.912	-8.912	0	%100
29	MP6	Y	-8.912	-8.912	0	%100
30	MP5	Y	-8.912	-8.912	0	%100
31	M31	Y	-11.62	-11.62	0	%100
32	M32	Y	-11.62	-11.62	0	%100
33	M33	Y	-11.62	-11.62	0	%100

Member Distributed Loads (BLC 8 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M3	Y	-.202	-4.091	0	24.249
2	M3	Y	-4.091	-8.131	24.249	48.497
3	M3	Y	-8.131	-6.14	48.497	72.746

Member Distributed Loads (BLC 8 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
4	M3	Y	-6.14	-7.13	72.746	96.995
5	M3	Y	-7.13	-7.13	96.995	121.244
6	M3	Y	-7.13	-6.14	121.244	145.492
7	M3	Y	-6.14	-8.131	145.492	169.741
8	M3	Y	-8.131	-4.091	169.741	193.99
9	M3	Y	-4.091	-.202	193.99	218.238
10	M4	Y	-9.951	-6.589	49.2	73.8
11	M4	Y	-6.589	-3.227	73.8	98.4
12	M5	Y	-9.951	-6.589	49.2	73.8
13	M5	Y	-6.589	-3.227	73.8	98.4
14	M15	Y	-12.503	-12.503	.012	15.965
15	M16	Y	-18	-18	0	16
16	M17	Y	-18	-18	2.351e-12	16
17	M18	Y	-12.467	-12.467	1.274e-12	16
18	M1	Y	-.202	-4.091	0	24.249
19	M1	Y	-4.091	-8.131	24.249	48.497
20	M1	Y	-8.131	-6.14	48.497	72.746
21	M1	Y	-6.14	-7.13	72.746	96.995
22	M1	Y	-7.13	-7.13	96.995	121.244
23	M1	Y	-7.13	-6.14	121.244	145.492
24	M1	Y	-6.14	-8.131	145.492	169.741
25	M1	Y	-8.131	-4.091	169.741	193.99
26	M1	Y	-4.091	-.202	193.99	218.238
27	M6	Y	-9.951	-6.589	49.2	73.8
28	M6	Y	-6.589	-3.227	73.8	98.4
29	M7	Y	-12.503	-12.503	.012	15.965
30	M8	Y	-18	-18	4.441e-16	16
31	M9	Y	-18	-18	8.882e-16	16
32	M10	Y	-12.467	-12.467	8.882e-16	16
33	M2	Y	-.202	-4.091	0	24.249
34	M2	Y	-4.091	-8.131	24.249	48.497
35	M2	Y	-8.131	-6.14	48.497	72.746
36	M2	Y	-6.14	-7.13	72.746	96.995
37	M2	Y	-7.13	-7.13	96.995	121.244
38	M2	Y	-7.13	-6.14	121.244	145.492
39	M2	Y	-6.14	-8.131	145.492	169.741
40	M2	Y	-8.131	-4.091	169.741	193.99
41	M2	Y	-4.091	-.202	193.99	218.238
42	M11	Y	-12.467	-12.467	1.105e-11	16
43	M12	Y	-18	-18	5.352e-12	16
44	M13	Y	-18	-18	0	16
45	M14	Y	-12.503	-12.503	.012	15.965

Member Distributed Loads (BLC 9 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	Z	-33.057	-33.057	0	218.238
2	M2	Z	-16.528	-16.528	0	218.238
3	M3	Z	-16.528	-16.528	0	218.238
4	M5	Z	-28.628	-28.628	0	123
5	M6	Z	-28.628	-28.628	0	123
6	M11	Z	-14.314	-14.314	0	16
7	M12	Z	-14.314	-14.314	0	16
8	M13	Z	-14.314	-14.314	0	16
9	M14	Z	-14.314	-14.314	0	16
10	M15	Z	-14.314	-14.314	0	16
11	M16	Z	-14.314	-14.314	0	16

Member Distributed Loads (BLC 9 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
12	M17	Z	-14.314	-14.314	0	16
13	M18	Z	-14.314	-14.314	0	16
14	MP4	Z	-19.627	-19.627	0	72
15	MP3	Z	-19.627	-19.627	0	72
16	MP2	Z	-19.627	-19.627	0	72
17	MP1	Z	-19.627	-19.627	0	72
18	MP12	Z	-19.627	-19.627	0	72
19	MP11	Z	-19.627	-19.627	0	72
20	MP10	Z	-19.627	-19.627	0	72
21	MP9	Z	-19.627	-19.627	0	72
22	MP8	Z	-19.627	-19.627	0	72
23	MP7	Z	-19.627	-19.627	0	72
24	MP6	Z	-19.627	-19.627	0	72
25	MP5	Z	-19.627	-19.627	0	72
26	M31	Z	-21.358	-21.358	0	77.492
27	M32	Z	-21.358	-21.358	0	77.492
28	M33	Z	-13.864	-13.864	0	77.492

Member Distributed Loads (BLC 10 : BLC 3 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M2	X	-28.628	-28.628	0	218.238
2	M3	X	-28.628	-28.628	0	218.238
3	M4	X	-33.057	-33.057	0	123
4	M5	X	-16.528	-16.528	0	123
5	M6	X	-16.528	-16.528	0	123
6	M7	X	-16.528	-16.528	0	16
7	M8	X	-16.528	-16.528	0	16
8	M9	X	-16.528	-16.528	0	16
9	M10	X	-16.528	-16.528	0	16
10	M11	X	-8.264	-8.264	0	16
11	M12	X	-8.264	-8.264	0	16
12	M13	X	-8.264	-8.264	0	16
13	M14	X	-8.264	-8.264	0	16
14	M15	X	-8.264	-8.264	0	16
15	M16	X	-8.264	-8.264	0	16
16	M17	X	-8.264	-8.264	0	16
17	M18	X	-8.264	-8.264	0	16
18	MP4	X	-19.627	-19.627	0	72
19	MP3	X	-19.627	-19.627	0	72
20	MP2	X	-19.627	-19.627	0	72
21	MP1	X	-19.627	-19.627	0	72
22	MP12	X	-19.627	-19.627	0	72
23	MP11	X	-19.627	-19.627	0	72
24	MP10	X	-19.627	-19.627	0	72
25	MP9	X	-19.627	-19.627	0	72
26	MP8	X	-19.627	-19.627	0	72
27	MP7	X	-19.627	-19.627	0	72
28	MP6	X	-19.627	-19.627	0	72
29	MP5	X	-19.627	-19.627	0	72
30	M31	X	-16.333	-16.333	0	77.492
31	M32	X	-16.333	-16.333	0	77.492
32	M33	X	-20.66	-20.66	0	77.492

Member Distributed Loads (BLC 11 : BLC 4 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M3	Y	-.121	-2.447	0	24.249

Member Distributed Loads (BLC 11 : BLC 4 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
2	M3	Y	-2.447	-4.862	24.249	48.497
3	M3	Y	-4.862	-3.672	48.497	72.746
4	M3	Y	-3.672	-4.264	72.746	96.995
5	M3	Y	-4.264	-4.264	96.995	121.244
6	M3	Y	-4.264	-3.672	121.244	145.492
7	M3	Y	-3.672	-4.862	145.492	169.741
8	M3	Y	-4.862	-2.447	169.741	193.99
9	M3	Y	-2.447	-.121	193.99	218.238
10	M4	Y	-5.95	-3.94	49.2	73.8
11	M4	Y	-3.94	-1.93	73.8	98.4
12	M5	Y	-5.95	-3.94	49.2	73.8
13	M5	Y	-3.94	-1.93	73.8	98.4
14	M15	Y	-7.477	-7.477	.012	15.965
15	M16	Y	-10.764	-10.764	0	16
16	M17	Y	-10.764	-10.764	2.351e-12	16
17	M18	Y	-7.455	-7.455	1.274e-12	16
18	M1	Y	-.121	-2.447	0	24.249
19	M1	Y	-2.447	-4.862	24.249	48.497
20	M1	Y	-4.862	-3.672	48.497	72.746
21	M1	Y	-3.672	-4.264	72.746	96.995
22	M1	Y	-4.264	-4.264	96.995	121.244
23	M1	Y	-4.264	-3.672	121.244	145.492
24	M1	Y	-3.672	-4.862	145.492	169.741
25	M1	Y	-4.862	-2.447	169.741	193.99
26	M1	Y	-2.447	-.121	193.99	218.238
27	M6	Y	-5.95	-3.94	49.2	73.8
28	M6	Y	-3.94	-1.93	73.8	98.4
29	M7	Y	-7.477	-7.477	.012	15.965
30	M8	Y	-10.764	-10.764	4.441e-16	16
31	M9	Y	-10.764	-10.764	8.882e-16	16
32	M10	Y	-7.455	-7.455	8.882e-16	16
33	M2	Y	-.121	-2.447	0	24.249
34	M2	Y	-2.447	-4.862	24.249	48.497
35	M2	Y	-4.862	-3.672	48.497	72.746
36	M2	Y	-3.672	-4.264	72.746	96.995
37	M2	Y	-4.264	-4.264	96.995	121.244
38	M2	Y	-4.264	-3.672	121.244	145.492
39	M2	Y	-3.672	-4.862	145.492	169.741
40	M2	Y	-4.862	-2.447	169.741	193.99
41	M2	Y	-2.447	-.121	193.99	218.238
42	M11	Y	-7.455	-7.455	1.105e-11	16
43	M12	Y	-10.764	-10.764	5.352e-12	16
44	M13	Y	-10.764	-10.764	0	16
45	M14	Y	-7.477	-7.477	.012	15.965

Member Distributed Loads (BLC 12 : BLC 5 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	Z	-6.46	-6.46	0	218.238
2	M2	Z	-3.23	-3.23	0	218.238
3	M3	Z	-3.23	-3.23	0	218.238
4	M5	Z	-5.595	-5.595	0	123
5	M6	Z	-5.595	-5.595	0	123
6	M11	Z	-2.797	-2.797	0	16
7	M12	Z	-2.797	-2.797	0	16
8	M13	Z	-2.797	-2.797	0	16
9	M14	Z	-2.797	-2.797	0	16

Member Distributed Loads (BLC 12 : BLC 5 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
10	M15	Z	-2.797	-2.797	0	16
11	M16	Z	-2.797	-2.797	0	16
12	M17	Z	-2.797	-2.797	0	16
13	M18	Z	-2.797	-2.797	0	16
14	MP4	Z	-3.836	-3.836	0	72
15	MP3	Z	-3.836	-3.836	0	72
16	MP2	Z	-3.836	-3.836	0	72
17	MP1	Z	-3.836	-3.836	0	72
18	MP12	Z	-3.836	-3.836	0	72
19	MP11	Z	-3.836	-3.836	0	72
20	MP10	Z	-3.836	-3.836	0	72
21	MP9	Z	-3.836	-3.836	0	72
22	MP8	Z	-3.836	-3.836	0	72
23	MP7	Z	-3.836	-3.836	0	72
24	MP6	Z	-3.836	-3.836	0	72
25	MP5	Z	-3.836	-3.836	0	72
26	M31	Z	-4.174	-4.174	0	77.492
27	M32	Z	-4.174	-4.174	0	77.492
28	M33	Z	-2.709	-2.709	0	77.492

Member Distributed Loads (BLC 13 : BLC 6 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M2	X	-5.595	-5.595	0	218.238
2	M3	X	-5.595	-5.595	0	218.238
3	M4	X	-6.46	-6.46	0	123
4	M5	X	-3.23	-3.23	0	123
5	M6	X	-3.23	-3.23	0	123
6	M7	X	-3.23	-3.23	0	16
7	M8	X	-3.23	-3.23	0	16
8	M9	X	-3.23	-3.23	0	16
9	M10	X	-3.23	-3.23	0	16
10	M11	X	-1.615	-1.615	0	16
11	M12	X	-1.615	-1.615	0	16
12	M13	X	-1.615	-1.615	0	16
13	M14	X	-1.615	-1.615	0	16
14	M15	X	-1.615	-1.615	0	16
15	M16	X	-1.615	-1.615	0	16
16	M17	X	-1.615	-1.615	0	16
17	M18	X	-1.615	-1.615	0	16
18	MP4	X	-3.836	-3.836	0	72
19	MP3	X	-3.836	-3.836	0	72
20	MP2	X	-3.836	-3.836	0	72
21	MP1	X	-3.836	-3.836	0	72
22	MP12	X	-3.836	-3.836	0	72
23	MP11	X	-3.836	-3.836	0	72
24	MP10	X	-3.836	-3.836	0	72
25	MP9	X	-3.836	-3.836	0	72
26	MP8	X	-3.836	-3.836	0	72
27	MP7	X	-3.836	-3.836	0	72
28	MP6	X	-3.836	-3.836	0	72
29	MP5	X	-3.836	-3.836	0	72
30	M31	X	-3.192	-3.192	0	77.492
31	M32	X	-3.192	-3.192	0	77.492
32	M33	X	-4.037	-4.037	0	77.492

APPENDIX D

ADDITIONAL CALCUATIONS

Date:	2/6/2019
Client	Crown Castle
Carrier	AT&T
Engineer:	IP
Site:	857011
Job #:	1039-A0002-B

Code:	LRFD	
Axial:	2531.97	lbs
Shear:	6550.60	lbs

Bolt Capacity (5/8" A307 Through Bolts)				
	Ult Load / Bolt	Factored Load (ϕ=0.75)	# of Bolts	Factor Joint Capacity
Axial (lb)	13106.7	9830.0	2	19660
Shear(lb)	8013.3	6010.0	2	12020

Interaction Check	
T /ϕT_n	12.9%
V /ϕVn	54.5%
≤1.0	31.4%
	OK

APPENDIX E

MOUNT MODIFICATION DESIGN DRAWINGS

GENERAL NOTES:

1. THESE DOCUMENTS WERE DESIGNED IN ACCORDANCE WITH THE LATEST VERSION OF APPLICABLE LOCAL/STATE/COUNTY/CITY BUILDING CODES, AS WELL AS ANSI/TIA-222 STANDARD, AWWA-D100 STANDARD, NDS, NEC, MSJC, AND/OR THE LATEST VERSION OF THE INTERNATIONAL BUILDING CODE, UNLESS NOTED OTHERWISE IN THE CORRESPONDING STRUCTURAL REPORT.
2. ALL CONSTRUCTION METHODS SHOULD FOLLOW STANDARDS OF GOOD CONSTRUCTION PRACTICE.
3. ALL WORK INDICATED ON THESE DRAWINGS SHALL BE PERFORMED BY QUALIFIED CONTRACTORS EXPERIENCED IN SIMILAR CONSTRUCTION.
4. ALL NEW WORK SHALL ACCOMMODATE EXISTING CONDITIONS. IF OBSTRUCTIONS ARE FOUND, CONTRACTOR SHALL NOTIFY ENGINEER OF RECORD PRIOR TO CONTINUING WORK.
5. ANY CHANGES OR ADDITIONS MUST CONFORM TO THE REQUIREMENTS OF THESE NOTES AND SPECIFICATIONS, AND SHOULD BE SIMILAR TO THOSE SHOWN. ALL CHANGES OR ADDITIONS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO FABRICATION AND/OR CONSTRUCTION.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND EXECUTION OF ALL MISCELLANEOUS SHORING, BRACING, TEMPORARY SUPPORTS, ETC. NECESSARY TO PROVIDE A COMPLETE AND STABLE STRUCTURE DURING CONSTRUCTION. TIA-1019-A-2011 IS AN APPROPRIATE REFERENCE FOR THOSE DESIGNS MEETING TIA STANDARDS. THE ENGINEER OF RECORD MAY PROVIDE FORMAL RIGGING PLANS AT THE REQUEST AND EXPENSE OF THE CONTRACTOR.
7. INSTALLATION SHALL NOT INTERFERE NOR DENY ADEQUATE ACCESS TO OR FROM ANY EXISTING OR PROPOSED OPERATIONAL AND SAFETY EQUIPMENT.
8. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO ANY FABRICATION. CONTACT INFINIGY ENGINEERING IF ANY DISCREPANCIES EXIST.

STEEL CONSTRUCTION NOTES:

1. STRUCTURAL STEEL SHALL CONFORM TO THE AISC MANUAL OF STEEL CONSTRUCTION 14TH EDITION, FOR THE DESIGN AND FABRICATION OF STEEL COMPONENTS.
2. ALL FIELD CUT SURFACES, FIELD DRILLED HOLES, AND GROUND SURFACES WHERE EXISTING PAINT OR GALVANIZATION REMOVAL WAS REQUIRED SHALL BE REPAIRED WITH (2) BRUSHED COATS OF ZRC GALVILITE COLD GALVANIZING COMPOUND PER ASTM A780 AND MANUFACTURERS' RECOMMENDATIONS.
3. ALL FIELD DRILLED HOLES TO BE USED FOR FIELD BOLTING INSTALLATION SHALL BE STANDARD HOLES, AS DEFINED BY AISC, UNLESS NOTED OTHERWISE.
4. ALL EXTERIOR STEEL WORK SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.
5. ALL STEEL MEMBERS AND CONNECTIONS SHALL MEET THE FOLLOWING GRADES:
   - ANGLES, CHANNELS, PLATES AND BARS TO BE A36. Fy=36 KSI, U.N.O.
   - W SHAPES TO BE A992. Fy=50 KSI, U.N.O.
   - RECTANGULAR HSS TO BE A500, GRADE B. FY=46 KSI, U.N.O.
   - ROUND HSS TO BE A500, GRADE B. FY=42 KSI, U.N.O.
   - STEEL PIPE TO BE A53, GRADE B. Fy=35 KSI, U.N.O.
   - BOLTS TO BE A325-X. Fu=120 KSI, U.N.O.
   - U-BOLTS AND LAG SCREWS TO BE A307 GR A. Fu=60 KSI, U.N.O.
6. ALL WELDING SHALL BE DONE USING E70XX ELECTRODES, U.N.O.
7. ALL WELDING SHALL CONFORM TO AISC AND AWS D1.1 LATEST EDITION.
8. ALL HILTI ANCHORS TO BE CARBON STEEL, U.N.O.
   - MECHANICAL ANCHORS: KWIK BOLT-TZ, U.N.O.
   - CMU BLOCK ANCHORS: ADHESIVE – HY120, U.N.O.
   - CONCRETE ANCHORS: ADHESIVE – HY150, U.N.O.
   - CONCRETE REBAR: ADHESIVE – RE500, U.N.O.
9. ALL STUDS TO BE NELSON CAPACITOR DISCHARGE 1/4"-20 LOW CARBON STEEL COPPER-FLASH AT 55 KSI ULT/50 KSI YIELD, U.N.O.
10. BOLTS SHALL BE TIGHTENED TO A "SNUG TIGHT" CONDITION AS DEFINED BY AISC.
11. MINIMUM EDGE DISTANCES SHALL CONFORM TO AISC TABLE J3.4.

CONCRETE CONSTRUCTION NOTES:

1. CONCRETE TO BE 4000 PSI @ 28 DAYS. REINFORCING BAR TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS. CONCRETE INSTALLATION TO CONFORM TO ACI-318 BUILDING REQUIREMENTS FOR REINFORCED CONCRETE. ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH FREE OF WATER AND ALL FOREIGN OBJECTS AND MATERIALS. A MINIMUM OF THREE INCHES OF CONCRETE SHALL COVER ALL REINFORCEMENT. WELDING OF REBAR IS NOT PERMITTED.
2. EXISTING CONCRETE SURFACES THAT ARE TO BE IN CONTACT WITH NEW PROPOSED CONCRETE SHOULD BE WIRE BRUSHED CLEAN AND TREATED WITH APPROPRIATE MECHANICAL SCRATCH COAT AND REPAIR MATERIALS OR APPROPRIATE CHEMICAL METHODS SUCH AS THE APPLICATION OF A BONDING AGENT, EX. SAKRETE OR EQUIVALENT, TO ENSURE A QUALITY BOND BETWEEN EXISTING AND PROPOSED CONCRETE SURFACES.

FIBER REINFORCED POLYMER (FRP) NOTES:

1. FRP PLATES, SHAPES, BOLTS AND NUTS (STUD/NUT ASSEMBLIES) SHALL CONFORM TO ASTM D638, 695, 790. PLATES AND SHAPES TO BE FY = 5.35 KSI LW (SAFETY FACTOR OF 8), .945 KSI CW (SAFETY FACTOR OF 8) MIN.
2. IF FIELD FABRICATION IS REQUIRED, ALL CUT EDGES AND DRILLED HOLES TO BE SEALED USING VINYL ESTER SEALING KIT SUPPLIED BY THE MANUFACTURER.
3. ALL FASTENERS TO BE 1/2" DIA FRP THREADED ROD WITH FIBER REINFORCED THERMOPLASTIC NUT, SPACED AT 12 INCHES ON CENTER MAXIMUM, U.N.O., FOR PANELS AND AS DESIGNED FOR STRUCTURAL MEMBERS.
4. THE COLOR AND SURFACE PATTERN OF EXPOSED FRP PANELS SHALL MATCH THE EXTERIOR OF THE EXISTING BUILDING, U.N.O.
5. STUD/NUT ASSEMBLIES SHOULD BE LUBRICATED FOR INSTALLATION
6. ENSURE BEARING SURFACES OF THE NUTS ARE PARALLEL TO THE SURFACES BEING FASTENED.
7. TORQUE BOLTS ACCORDING TO THE FOLLOWING TABLE:

INSTALLATION TORQUE TABLE

SIZE	ULTIMATE TORQUE STRENGTH	RECOMMENDED MAXIMUM INSTALLATION TORQUE
3/8-16 UNC	8 FT-LBS	4 FT-LBS
1/2-13 UNC	18 FT-LBS	8 FT-LBS
5/8-11 UNC	35 FT-LBS	16 FT-LBS
3/4-10 UNC	50 FT-LBS	24 FT-LBS
1-8 UNC	110 FT-LBS	50 FT-LBS

8. WHEN TIGHTENING FRP STUD/NUT ASSEMBLIES, WRENCHES MUST MAKE FULL CONTACT WITH ALL NUT EDGES. A STANDARD SIX POINT SOCKET IS RECOMMENDED.
9. STUD/NUT ASSEMBLIES SHOULD BE BONDED BY APPLYING BONDING AGENT TO ENTIRE NUT AND EXPOSED STUD.
10. ALL FRP MATERIALS TO BE PROVIDED BY FIBERGRATE COMPOSITE STRUCTURES, DALLAS TX, OR APPROVED EQUAL.
11. ALL FRP SHAPES TO BE DYNAFORM PULTRUDED STRUCTURAL SHAPES.
12. ALL FRP PLATES TO BE FIBERPLATE MOLDED FRP PLATE.
13. ALL FRP PANELS TO BE FIBERPLATE CLADDING PANEL.
14. EACH FRP PANEL TO BE IDENTIFIED WITH LARR#25536 AND FIBERGRATE COMPOSITE STRUCTURAL LABEL.
15. FRP MATERIAL TO BE CLASSIFIED AS CC1 OR BETTER, AND HAVE MAXIMUM FLAME SPREAD OF 50.
16. ALL DESIGN AND CONSTRUCTION TO BE COMPLETED IN ACCORDANCE WITH LOS ANGELES RESEARCH REPORT RR25536, DATED FEBRUARY 1, 2016.
17. SPECIAL INSPECTIONS MUST BE PROVIDED FOR ALL FRP INSTALLMENTS. SEE SPECIAL INSPECTION SECTION, THIS SHEET.

RATIO OF EDGE DISTANCE TO FRP FASTENER DIAMETER

	RANGE	RECOMMENDED
EDGE DISTANCE – CL* BOLT TO END	2.0-4.0	3.0
EDGE DISTANCE – CL* BOLT TO SIDE	1.5-3.5	2.5
BOLT PITCH – CL* TO CL*	4.0-5.0	5.0

WOOD CONSTRUCTION NOTES:

1. ALL EXISTING WOOD SHAPES ARE ASSUMED TO BE DOUGLAS FIR-LARCH WITH A REFERENCE DESIGN BENDING VALUE OF 1000 PSI MIN.
2. ALL PROPOSED WOOD SHAPES ARE TO BE DOUGLAS FIR-LARCH WITH A REFERENCE DESIGN BENDING VALUE OF 1000 PSI MIN. U.N.O.
3. ALL EXISTING AND PROPOSED GLUED LAMINATED TIMBERS ARE TO BE 24F-1.8C DOUGLAS FIR BALANCED WITH A REFERENCE DESIGN BENDING VALUE OF 2400 PSI MIN. U.N.O.

MASONRY CONSTRUCTION NOTES:

1. ALL BRICK TO BE 1500 PSI MIN. REINFORCING BAR (IF APPLICABLE) TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS. ALL MORTAR TO BE 2000 PSI MIN.
   - FOR INTERIOR/ABOVE GRADE APPLICATIONS TYPE N MORTAR HAVING MINIMUM MODULUS OF RUPTURE OF 100 PSI SHALL BE USED. FOR EXTERIOR/BELOW GRADE APPLICATIONS TYPE M OR S MORTAR HAVING A MINIMUM MODULUS OF RUPTURE OF 133 PSI.
   - BRICK AND MORTAR INSTALLATION TO CONFORM TO MSJC BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES.
2. ALL CMU TO BE 1500 PSI MIN. REINFORCING BAR (IF APPLICABLE) TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS. ALL MORTAR TO BE 2000 PSI MIN.
   - FOR INTERIOR/ABOVE GRADE APPLICATIONS, TYPE N MORTAR HAVING MINIMUM MODULUS OF RUPTURE OF 64 PSI SHALL BE USED FOR UNGROUTED BLOCKS, AND 158 PSI FOR FULLY GROUTED BLOCKS.
   - FOR EXTERIOR/BELOW GRADE APPLICATIONS TYPE M OR S MORTAR HAVING A MINIMUM MODULUS OF RUPTURE OF 84 PSI SHALL BE USED FOR UNGROUTED BLOCKS, AND 163 PSI FOR FULLY GROUTED BLOCKS.
   - BRICK AND MORTAR INSTALLATION TO CONFORM TO MSJC BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES.

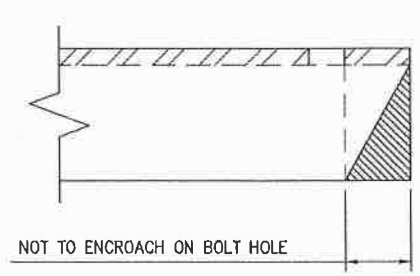
TOWER PLUMB & TENSION NOTES:

1. PLUMB AND TENSION TOWER UPON COMPLETION OF STRUCTURAL MODIFICATIONS DETAILED IN THESE DRAWINGS.
2. RETENSIONING OF EXISTING GUY WIRES SHALL BE PERFORMED AT A TIME WHEN THE WIND VELOCITY IS LESS THAN 10 MPH AT GROUND LEVEL AND WITH NO ICE ON THE STRUCTURE AND GUY WIRES.
3. PLUMB THE TOWER WHILE RETENSIONING THE EXISTING GUY WIRES. THE HORIZONTAL DISTANCE BETWEEN THE VERTICAL CENTERLINES AT ANY TWO ELEVATIONS SHALL NOT EXCEED 0.25% OF THE VERTICAL DISTANCE BETWEEN TWO ELEVATIONS FOR LATTICED STRUCTURES.
4. THE TWIST BETWEEN ANY TWO ELEVATIONS THROUGHOUT THE HEIGHT OF A LATTICE STRUCTURE SHALL NOT EXCEED 0.5 DEGREES IN 10 FEET. THE MAXIMUM TWIST OVER THE LATTICE STRUCTURE HEIGHT SHALL NOT EXCEED 5 DEGREES.

SPECIAL INSPECTIONS NOTES:

1. A QUALIFIED INDEPENDENT TESTING LABORATORY, EMPLOYED BY THE OWNER AND APPROVED BY THE JURISDICTION, SHALL PERFORM INSPECTION AND TESTING IN ACCORDANCE WITH THE THE GOVERNING BUILDING CODE, APPLICABLE SECTION(S) AS REQUIRED BY PROJECT SPECIFICATIONS FOR THE FOLLOWING CONSTRUCTION WORK:
   a. STRUCTURAL WELDING (CONTINUOUS INSPECTION OF FIELD WELDS ONLY).
   b. HIGH STRENGTH BOLTS (PERIODIC INSPECTION OF A325 AND/OR A490 BOLTS) TO BE TIGHTENED PER "TURN-OF-THE-NUT" METHOD.
   c. MECHANICAL AND EPOXIED ANCHORAGES.
   d. FIBER REINFORCED POLYMER.
      - THE SPECIAL INSPECTOR MUST VERIFY THAT THE FRP MATERIAL SPECIFIED ON THE APPROVED DESIGN DOCUMENTS IS BEING INSTALLED.
      - THE SPECIAL INSPECTOR MUST VERIFY THAT ALL CUT EDGES AND DRILLED HOLES ARE PROPERLY SEALED USING A VINYL ESTER SEALING KIT SUPPLIED BY THE MANUFACTURER.
      - THE SPECIAL INSPECTOR MUST VERIFY THAT THE STRUCTURE IS BUILT IN ACCORDANCE WITH THE APPROVED DESIGN DOCUMENTS.
2. THE INSPECTION AGENCY SHALL SUBMIT INSPECTION AND TEST REPORTS TO THE BUILDING DEPARTMENT, THE ENGINEER OF RECORD, AND THE OWNER UNLESS THE FABRICATOR IS APPROVED BY THE BUILDING OFFICIAL TO PERFORM WORK WITHOUT THE SPECIAL INSPECTIONS.

MAXIMUM ALLOWABLE ANGLE CLIP



INFINIGY
1033 Watervliet Shaker Rd
Albany, NY 12205
Office # (518) 690-0790
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at&t

STATE OF CONNECTICUT — JOSEPH R. JOHNSTON — 29460 — LICENSED PROFESSIONAL ENGINEER — FEB 11 2019

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No.	Submittal / Revision	App'd	Date
0	ISSUED FOR REVIEW	TAG	02/09/19

Drawn: TAG Date: 02/09/19
Designed: IP Date: 02/09/19
Checked: AE Date: 02/09/19

Project Number: 1039-A0002-B

Project Title: BU# 857011

WESTBROOK

1102 HORSE HILL ROAD
WESTBROOK, CT06498

Prepared For:

CROWN CASTLE
3 Corporate Park, Suite 101
Clifton Park, NY 12065

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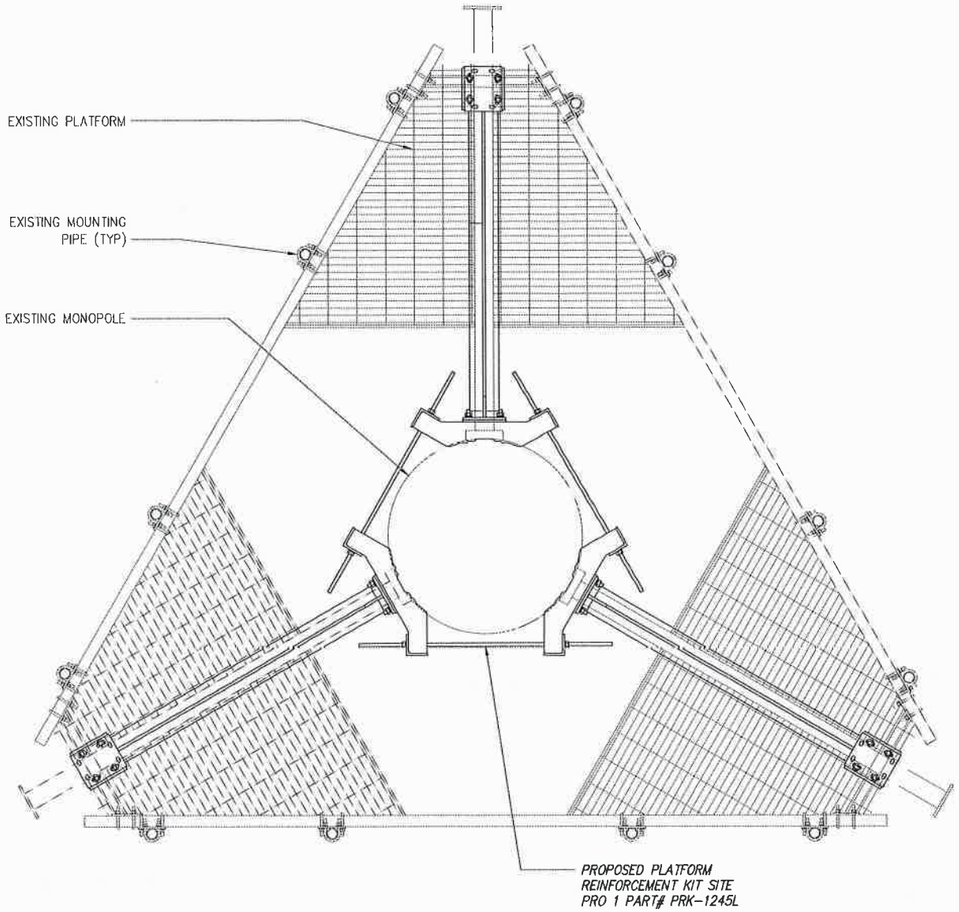
Drawing Scale: AS NOTED

Date: 02/09/19

Drawing Title: **GENERAL NOTES**

Drawing Number: **S1**



1 PLAN VIEW
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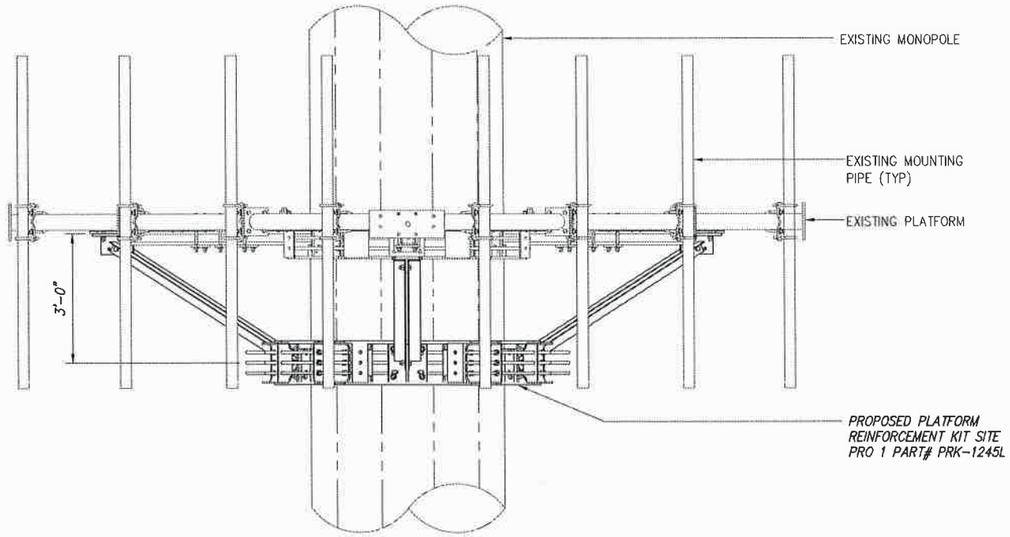

2 ELEVATION VIEW
SCALE: NOT TO SCALE

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FEB 11 2019

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Drawing Scale:
AS NOTED

Date:
02/09/19

Drawing Title
MOUNT DETAILS

Drawing Number
S2

RF EMISSIONS COMPLIANCE REPORT

Crown Castle on behalf of AT&T Mobility, LLC

Crown Castle Site Name: WESTBROOK NORTH HORSE HILL ROA
Crown Castle Site BU: 857011
AT&T Mobility, LLC Site FA #: 10105800
1102 HORSE HILL ROAD
WESTBROOK, CT
2/26/2019

Report Status:

AT&T Mobility, LLC Is Compliant

sealed 27feb2019 mike@h2dc.com
H2DC PLLC CT CoA#: 0001714

Prepared By:

Sitesafe, LLC

8618 Westwood Center Drive,
Suite 315

Vienna, VA 22182

Voice 703-276-1100
Fax 703-276-1169

Engineering Statement in Re:
Electromagnetic Energy Analysis
Crown Castle
WESTBROOK, CT

My signature on the cover of this document indicates:

That I, Michael A McGuire, am currently and actively licensed to provide (in this state/jurisdiction as indicated within the professional electrical engineering seal on the cover of this document) professional electrical engineering services, as an employee of Hurricane Hill Development Company, PLLC , a duly authorized/registered engineering firm (in this state, as applicable) on behalf of SiteSafe, LLC; and

That I am thoroughly familiar with the Rules and Regulations of the Federal Communications Commission ("the FCC" and "the FCC Rules") both in general and specifically as they apply to the FCC's Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; and

That the technical information serving as the basis for this report was supplied by Crown Castle (See attached Site Summary and Carrier documents), and that AT&T Mobility, LLC's installations involve communications equipment, antennas and associated technical equipment at a location referred to as the "WESTBROOK NORTH HORSE HILL ROA" ("the site"); and

That AT&T Mobility, LLC proposes to operate at the site with transmit antennas listed in the carrier summary and with a maximum effective radiated power as specified by AT&T Mobility, LLC and shown on the worksheet, and that worst-case 100% duty cycle have been assumed; and

That this analysis has been performed with the assumption that the ground immediately surrounding the tower is primarily flat or falling; and

That at this time, the FCC requires that certain licensees address specific levels of radio-frequency energy to which workers or members of the public might possibly be exposed (at §1.1307(b) of the FCC Rules); and

That such consideration of possible exposure of humans to radio-frequency radiation must utilize the standards set by the FCC, which is the Federal Agency having jurisdiction over communications facilities; and

That the FCC rules define two tiers of permissible exposure guidelines: 1) "uncontrolled environments," defined as situations in which persons may not be aware of (the "general public"), or may not be able to control their exposure to a transmission facility; and (2) "controlled environments," which defines situations in which persons are aware of their potential for exposure (industry personnel); and

That this statement specifically addresses the uncontrolled environment (which is more conservative than the controlled environment) and the limit set forth in the FCC rules for licensees of AT&T Mobility, LLC's operating frequency as shown on the attached antenna worksheet; and

That when applying the uncontrolled environment standards, the predicted Maximum Power Density at two meters above ground level from the proposed AT&T Mobility, LLC operation is no more than 1.674% of the maximum in any accessible area on the ground and

That it is understood per FCC Guidelines and OET65 Appendix A, that regardless of the existent radio-frequency environment, only those licenses whose contributions exceed five percent of the exposure limit pertinent to their operation(s) bear any responsibility for bringing any non-compliant area(s) into compliance; and

That when applying the uncontrolled environment standards, the cumulative predicted energy density from the proposed operation is no more than 3.124% of the maximum in any accessible area up to two meters above the ground per OET-65; and

That the calculations provided in this report are based on data provided by the client and antenna pattern data supplied by the antenna manufacturer, in accordance with FCC guidelines listed in OET-65. Horizontal and vertical antenna patterns are combined for modeling purposes to accurately reflect the energy two meters above ground level where on-axis energy refers to maximum energy two meters above the ground along the azimuth of the antenna and where area energy refers to the maximum energy anywhere two meters above the ground regardless of the antenna azimuth, accounting for cumulative energy from multiple antennas for the carrier and frequency range indicated; and

That the Occupational Safety and Health Administration has policies in place which address worker safety in and around communications sites, thus individual companies will be responsible for their employees' training regarding Radio Frequency Safety.

In summary, it is stated here that the proposed operation at the site would not result in exposure of the Public to excessive levels of radio-frequency energy as defined in the FCC Rules and Regulations, specifically 47 CFR 1.1307 and that AT&T Mobility, LLC's proposed operation is completely compliant.

Finally, it is stated that access to the tower should be restricted to communication industry professionals, and approved contractor personnel trained in radio-frequency safety; and that the instant analysis addresses exposure levels at two meters above ground level and does not address exposure levels on the tower, or in the immediate proximity of the antennas.

Crown Castle
WESTBROOK NORTH HORSE HILL ROA
Site Summary

Carrier	Area Maximum Percentage MPE
AT&T Mobility, LLC	0.147 %
AT&T Mobility, LLC (Proposed)	0.3 %
AT&T Mobility, LLC (Proposed)	0.274 %
AT&T Mobility, LLC (Proposed)	0.259 %
AT&T Mobility, LLC (Proposed)	0.138 %
AT&T Mobility, LLC (Proposed)	0.556 %
Verizon Wireless	0.494 %
Verizon Wireless	0.477 %
Verizon Wireless	0.262 %
Verizon Wireless	0.216 %
Composite Site MPE:	3.124 %

AT&T Mobility, LLC
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	0.83158	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.14675	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Powerwave	7770	163	30	1094	0.3944	0.0696	0.606555	0.107039
Powerwave	7770	163	150	1094	0.393897	0.069511	0.606555	0.107039
Powerwave	7770	163	280	1094	0.3944	0.0696	0.606555	0.107039

AT&T Mobility, LLC (Proposed)
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	3.00358	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.30036	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10965	163	30	7114	1.15505	0.115505	2.735982	0.273598
Kathrein-Scala	800-10965	163	150	7114	1.127131	0.112713	2.735982	0.273598
Kathrein-Scala	800-10965	163	280	7114	1.127131	0.112713	2.735982	0.273598

AT&T Mobility, LLC (Proposed)
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.73651	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.27365	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10965	163	30	6168	1.01692	0.101692	2.122356	0.212236
Kathrein-Scala	800-10965	163	150	6168	1.018087	0.101809	2.122356	0.212236
Kathrein-Scala	800-10965	163	280	6168	1.01692	0.101692	2.122355	0.212236

AT&T Mobility, LLC (Proposed)
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	737	MHz
Maximum Permissible Exposure (MPE):	491.33	µW/cm^2
Maximum power density at ground level:	1.27437	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.25937	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10965	163	30	2959	0.870043	0.177078	1.105438	0.224987
Kathrein-Scala	800-10965	163	150	2959	0.874489	0.177983	1.105438	0.224987
Kathrein-Scala	800-10965	163	280	2959	0.870043	0.177078	1.105438	0.224987

AT&T Mobility, LLC (Proposed)
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	2300	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	1.38248	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.13825	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10891	163	30	2404	0.777841	0.077784	1.303227	0.130323
Kathrein-Scala	800-10891	163	150	2404	0.778474	0.077847	1.303227	0.130323
Kathrein-Scala	800-10891	163	280	2404	0.778474	0.077847	1.303226	0.130323

AT&T Mobility, LLC (Proposed)
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	3.1519	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.55622	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10891	163	30	3429	2.467854	0.435504	3.086075	0.544602
Kathrein-Scala	800-10891	163	150	3429	2.492824	0.43991	3.086075	0.544602
Kathrein-Scala	800-10891	163	280	3429	2.467854	0.435504	3.086075	0.544602

Verizon Wireless
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	4.94326	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.49433	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	SBNHH-1D65B	147	0	7732	3.148934	0.314893	4.71946	0.471946
ANDREW	SBNHH-1D65B	147	120	7732	3.153042	0.315304	4.71946	0.471946
ANDREW	SBNHH-1D65B	147	240	7732	3.148934	0.314893	4.71946	0.471946

Verizon Wireless
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	4.77317	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.47732	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	SBNHH-1D65B	147	0	4583	3.721555	0.372156	4.713563	0.471356
ANDREW	SBNHH-1D65B	147	120	4583	3.668308	0.366831	4.713563	0.471356
ANDREW	SBNHH-1D65B	147	240	4583	3.721555	0.372156	4.713564	0.471356

Verizon Wireless
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	751	MHz
Maximum Permissible Exposure (MPE):	500.67	µW/cm^2
Maximum power density at ground level:	1.31114	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.26188	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
ANDREW	SBNHH-1D65B	147	0	2043	0.671044	0.13403	1.107548	0.221215
ANDREW	SBNHH-1D65B	147	120	2043	0.670121	0.133846	1.107548	0.221215
ANDREW	SBNHH-1D65B	147	240	2043	0.671044	0.13403	1.107548	0.221215

Verizon Wireless
WESTBROOK NORTH HORSE HILL ROA
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	1.2217	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.21559	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Amphenol	QUAD656C0000x	147	0	3120	1.129918	0.199397	1.173954	0.207168
Amphenol	QUAD656C0000x	147	120	3120	1.125607	0.198637	1.173954	0.207168
Amphenol	QUAD656C0000x	147	240	3120	1.129918	0.199397	1.173954	0.207168