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

February 21, 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: 881536**
AT&T Site ID: CTL05107
120 Universal Drive, North Haven, CT 06473
Latitude: 41° 20′ 40.01″/ Longitude: -72° 52′ 14.92″

Dear Ms. Bachman:

AT&T currently maintains (9) antennas at the 118-foot level of the existing 120-foot monopole at 120 Universal Drive in North Haven, Connecticut. The tower is owned by Crown Castle. The property is owned by 120 Universal Drive Associates LLC. AT&T intends to replace (3) antennas, add (3) antennas, remove (6) TMAs, swap (6) RRUs, add (3) RRUs, add (1) DC6 and (2) DC power cables.

The facility was approved by the Town of North Haven Planning and Zoning Commission in Special Permit Application P2000-44 on November 13, 2000. This approval was granted with conditions and this modification complies with those conditions.

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 Michael J. Freda, First Selectman, Town of North Haven, Alan Fredricksen, Land Use Administrator, 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: Michael Freda, First Selectman
Town of North Haven
18 Church Street
North Haven, CT 06473

Alan Fredricksen, Land Use Administrator
18 Church Street
North Haven, CT 06473

120 Universal Drive Associates, LLC
120 Universal Drive
North Haven, CT 06473

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
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Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.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: 21FEB19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **MICHAEL FRED, FIRST SELECTMAN**
TOWN OF NORTH HAVEN
18 CHURCH STREET
NORTH HAVEN CT 06473
(201) 236-9224

REF: 1734.7680
INV:
PO:
DEPT:

565J2/0E3D/23AD

J191019010701uv

FedEx Express

FRI - 22 FEB 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7745 2842 6443**

EB HVNA

06473
BDL
CT-US

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

SHIP DATE: 21FEB19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **ALAN FREDRICKSEN, LAND USE ADMINIST**
TOWN OF NORTH HAVEN
18 CHURCH STREET

NORTH HAVEN CT 06473
(201) 236-9224
INV:
PO:
REF: 1734.7680
DEPT:

565J2/0E3D/23AD

J191019010701uv

FedEx Express

FRI - 22 FEB 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7745 2845 1444**

EB HVNA

06473
BDL
CT-US

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TOWN OF NORTH HAVEN
MEMORIAL TOWN HALL / 18 CHURCH STREET
NORTH HAVEN, CONNECTICUT 06473

REPLY TO:
PLANNING & ZONING COMMISSION

Tel. (203) 239-5321
Fax (203) 234-2130

November 20, 2000

Mr. Stephen Longobardi
Candid Communications of North Haven, II LLC
110 Washington Avenue
North Haven, CT 06473

Re: #P2000-44 Special Permit application, (as authorized by Section 3A.6.), of Candid Communications of North Haven, II LLC, relative to 120 Universal Drive South, (Map 11, Route 1). Plan Entitled: Candid Communications, LLC, Multi-User Wireless Communications Facility, North Haven Tower Site, Universal Drive, North Haven, Connecticut, Prepared By URS Greiner Woodward Clyde A-E-S, Dated 9-8-00, Rev. 11-1-00 Scale l" = 30'. IL-30 Zoning District.

Dear Mr. Longobardi:

Please be advised that during the deliberation session of the Planning & Zoning Commission meeting held on Monday, November 13, 2000, the Commission unanimously voted to approve the above referenced application subject to the following conditions:

1. Submit three (3) revised plans which include:
   a.) Revised plans must address/include all comments and conditions of this approval and the related Site Plan approval #P2000-45.
   b.) Live certification.

In accordance with the Connecticut State Statutes, Section 8-3d, the Special Permit is not effective until a certified copy of the Commission's decision has been recorded on the Land Records, at the owner's expense. Accordingly, you must record this certified decision letter at the Town Clerk's Office, 18 Church Street, North Haven, CT. Immediately after filing with the Town Clerk, please submit a copy of the decision letter, stamped as recorded, to the Land Use Office, for our permanent record.

Please note that one (1) set of revised drawings should be submitted for review after <u>all</u> outstanding issues (conditions of approval as set forth above), are adequately addressed. If there are any questions relative to the conditions of approval, please call the Town prior to submitting the revised plans. This will avoid costly and time consuming revisions and reviews, therefore expediting the process for you as the applicant.

This approval is subject to compliance with any and all Zoning Regulations of the Town of North Haven.

You may not proceed with this approval until you have received a signed plan from the Land Use Office.

Very truly yours,

Jeanne Pulleyn

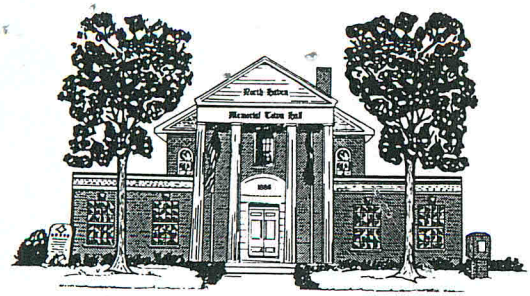
Jeanne Pulleyn, Secretary
Planning & Zoning Commission

JP/ts
cc: First Selectman
Engineering Dept.
Building Dept.
CERTIFIED MAIL R/R

RECEIVED AND FILED
TOWN CLERKS OFFICE
NORTH HAVEN, CONN.
MAR 20 2001 @ 1:15 PM

Elaine C. Rullo

TOWN CLERK



TOWN OF NORTH HAVEN

MEMORIAL TOWN HALL / 18 CHURCH STREET

NORTH HAVEN, CONNECTICUT 06473

REPLY TO: PLANNING & ZONING COMMISSION

Tel. (203) 239-5321
Fax (203) 234-2130

November 20, 2000

Mr. Stephen Longobardi
Candid Communications of North Haven, II LLC
110 Washington Avenue
North Haven, CT 06473

Re: #P2000-45 Site Plan application of Candid Communications of North Haven, II LLC, relative to 120 Universal Drive South, (Map 11, Route 1). Plan Entitled: Candid Communications, LLC, Multi-User Wireless Communications Facility, North Haven Tower Site, Universal Drive, North Haven, Connecticut, Prepared By URS Greiner Woodward Clyde A-E-S, Dated 9-8-00, Rev. 11-1-00 Scale l" = 30'. IL-30 Zoning District.

Dear Mr. Longobardi:

Please be advised that during the deliberation session of the Planning & Zoning Commission meeting held on Monday, November 13, 2000, the Commission unanimously voted to approve the above referenced application subject to the following conditions:

1. Submit eight (8) revised plans which include:
   a.) The zoning table must reference the following:

Minimum lot area (sq ft)	30,000	(req'd column),	130,929 (existing column)
Minimum lot width (ft.)	100	(req'd column)	
Building height	12'	(proposed column)	
Minimum side yard setback	30'	(existing column),	52' (proposed column)
Minimum rear yard setback	27'	(existing column)	
Minimum side yard tower setback	90'	(proposed column)	

   b.) Plans must be numbered to indicate a submission set of 5 sheets (1 of 5 through 5 of 5).
   c.) The boundary/survey plan must be referenced in the sheet index on Sheet T-1.
   d.) Provide all the information required by Section 3A.6. (b) (1) (iii) and (xi).
   e.) Siltation control must be provided along the rear property line.
   f.) The remaining access drive off the rear of the existing building must be marked as a fire lane.

g.) The proposed parking area must be permanently marked with signage and curbing/islands so that the area does not remain open for use as spillover storage of vehicles, etc.

h.) Limits of green (lawn or non-impervious) areas need to be more clearly indicated. Note, said areas must be protected by curbing.

i.) The relocated scrap metal recycle dumpster must include respective enclosure and island protection with landscaping.

j.) Curbing and grass/landscaped areas along the rear property line must be provided in order to discourage continuance of unapproved outside storage activities.

2. The property owner and/or applicant must remove all outside storage (several trailer bodies, steel hoist, debris) located at the west side of the property as well as on the railroad property. All outside storage must be removed from the site. No building permit will be issued until the cleanup of this area occurs.

3. Proposed contours and/or spot elevations must be provided.

4. Parking spaces must be line striped.

5. Proposed fencing must be reviewed by the Zoning Enforcement Officer prior to installation to insure zoning compliance.

6. Soil and erosion controls must be inspected by the Zoning Enforcement Officer before work may commence.

7. The property owner must maintain (repair/replace when necessary) the siltation control until all development activity is completed and all disturbed areas are permanently stabilized.

8. Submit an as-built prior to bond release.

9. Submit a bond in the amount of $15,000.00 (forms are enclosed). Note, two separate bonds (for $10,000.00 and $5,000.00) are recommended, considering that the $5,000.00 amount covering the required site cleanup work can be released prior to issuance of a building permit, contingent on completion and acceptance of said cleanup.

Please note that one (1) set of revised drawings should be submitted for review after <u>all</u> outstanding issues (conditions of approval as set forth above), are adequately addressed. If there are any questions relative to the conditions of approval, please call the Town prior to submitting the revised plans. This will avoid costly and time consuming revisions and reviews, therefore expediting the process for you as the applicant.

This approval is subject to compliance with any and all Zoning Regulations of the Town of North Haven.

You may not proceed with this approval until you have received a signed plan from the Land Use Office.

Very truly yours,

Jeanne Pulleyn

Jeanne Pulleyn, Secretary
Planning & Zoning Commission

JP/ts
cc: First Selectman
Engineering Dept.
Building Dept.
CERTIFIED MAIL R/R
Enclosures

120 UNIVERSAL DR

Location	120 UNIVERSAL DR	**Mblu**	011/ / 001/ /
Acct#	027540	**Owner**	120 UNIVERSAL DRIVE ASSOCIATES LLC
Assessment	$996,030	**Appraisal**	$1,422,900
PID	8457	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$1,025,400	$397,500	$1,422,900

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$717,780	$278,250	$996,030

Owner of Record

Owner	120 UNIVERSAL DRIVE ASSOCIATES LLC	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	120 UNIVERSAL DR NORTH HAVEN, CT 06473	**Book & Page**	799/ 46
		Sale Date	10/28/2008

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
120 UNIVERSAL DRIVE ASSOCIATES LLC	$0		799/ 46	10/28/2008
BERLUTI MARIO	$0	1	482/ 458	07/18/1995
BERLUTI, MARIO & HELEN	$0	3		09/01/1990
BERLUTI MARIO & HELEN & SURV	$0	4	305/ 427	12/06/1978

Building Information

Building 1 : Section 1

Year Built:	1985
Living Area:	19,180
Replacement Cost:	$1,089,079
Building Percent Good:	78
Replacement Cost Less Depreciation:	$849,500

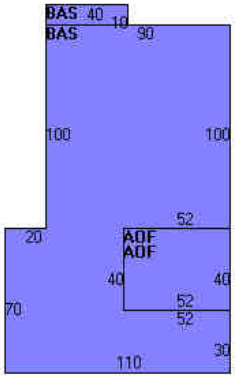
Building Attributes

Building Photo

Field	Description
STYLE	Service Shop
MODEL	Comm/Ind
Grade	C +
Stories:	1
Occupancy	1
Exterior Wall 1	Metal
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Metal/Tin
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Average
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	AUTO REPAIR
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	NONE
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	SUS-CEIL/MN WL
Rooms/Prtns	AVERAGE
Wall Height	20
% Comn Wall	

(http://images.vgsi.com/photos/NorthHavenCTPhotos//\00\01\26/42.jpg)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	15,020	15,020
AOF	Office	4,160	4,160
		19,180	19,180

Extra Features

Extra Features				Legend
Code	Description	Size	Value	Bldg #
A/C	AIR CONDITION	6612 S.F.	$10,300	1
SPR1	SPRINKLERS-WET	19220 S.F.	$13,500	1
MEZ1	MEZZANINE-UNF	2500 S.F.	$17,600	1

Land

Land Use

Use Code 3320
Description AUTO REPAIR
Zone IL30
Neighborhood 305

Land Line Valuation

Size (Acres) 3
Frontage
Depth
Assessed Value $278,250

Alt Land Appr Category No

Appraised Value $397,500

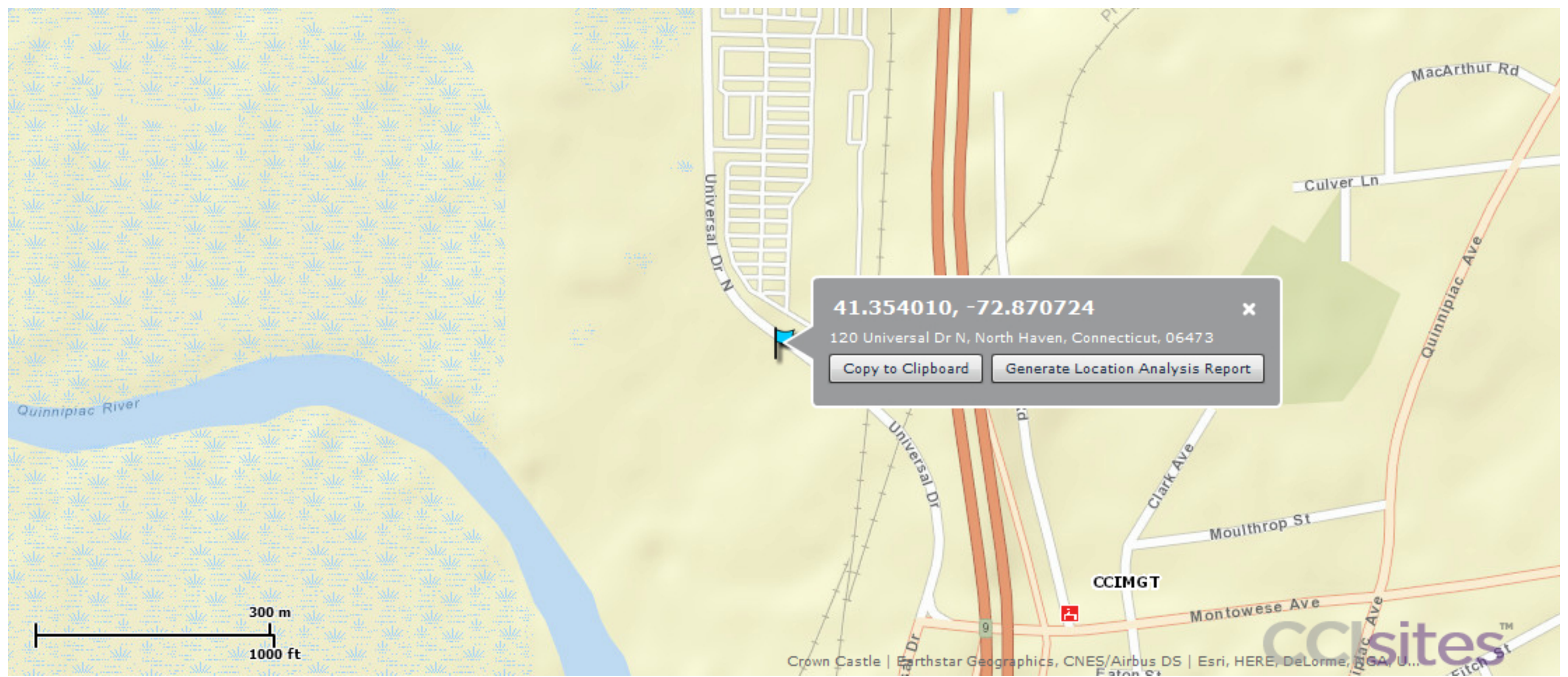
Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
FN3	FENCE-6' CHAIN			640 L.F.	$2,900	1
PAV1	PAVING-ASPHALT			52000 S.F.	$35,100	1
SHD7	COMM GOOD			240 S.F.	$9,900	1
TWR1	COMMU-TOWER			1 UNITS	$112,500	1
SHD7	COMM GOOD			240 S.F.	$9,900	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$1,238,100	$450,000	$1,688,100
2008	$733,900	$450,000	$1,183,900
2007		$315,000	$828,730

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$866,670	$315,000	$1,181,670
2008	$513,730	$315,000	$828,730
2007		$315,000	$828,730


41.354010, -72.870724
120 Universal Dr N, North Haven, Connecticut, 06473
Copy to Clipboard
Generate Location Analysis Report
MacArthur Rd
Culver Ln
Universal Dr N
Quinnipiac River
Quinnipiac Ave
Universal Dr
Clark Ave
Moulthrop St
CCIMGT
Montowese Ave
300 m
1000 ft
Crown Castle | Earthstar Geographics, CNES/Airbus DS | Esri, HERE, DeLorme, GA, U...
ccisites™

PROJECT INFORMATION

SCOPE OF WORK:

ITEMS TO BE MOUNTED ON THE EXISTING TOWER:

- REMOVE (3) ANTENNAS & (3) RRH's

- INSTALL AT&T ANTENNA (80010966)(TYP. OF 2 PER SECTOR, TOTAL OF 6).
- INSTALL AT&T 8843 B2/B66A (PCS/AWS)(TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 4478 B14 (700) (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 HANDRAIL KIT(SITEPRO 1 HRK-12-3HD)(TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL MOUNTING PIPE (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL SURGE ARRESTOR (DC6-48-60-0-8F) (TOTAL OF 1).
- INSTALL (2) DC TRUNKS CABLES.

ITEMS TO BE MOUNTED INSIDE EXISTING SHELTER:

- SWAP BBU WITH (2) 6630 W/ (1) NEW IDLE CABLE
- ADD 6630 FOR 5G

ITEMS TO REMAIN:

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

SITE ADDRESS:	120 UNIVERSAL DRIVE NORTH HAVEN, CT 06473
LATITUDE (NAD 83):	N 41° 20' 40.01"
LONGITUDE (NAD 83):	W 72° 52' 14.92"
LANDLORD:	CROWN CASTLE INTERNATIONAL 500 W. CUMMINGS PARK, STE 3600 WOBURN, MA 01801
TYPE OF SITE:	MONOPOLE/INDOOR
TOWER HEIGHT:	120'
RAD CENTER:	121'
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY

SITE NUMBER: CTL05107

FA LOCATION CODE: 10071172

SITE NAME: NORTH HAVEN SOUTH

CROWN SITE NAME: NORTH HAVEN TOWER

PROJECT:LTE 6C/7C/5G NR UPGRADE/4TX4RX SOFTWARE RETROFIT/4TW4RX SOFTWARE RETROFIT

PACE ID: MRCTB034951, MRCTB035013, MRCTB034969, MRCTB034995, MRCTB034999

BU#: 881536

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

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED
PROFESSIONAL ENGINEER

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

SUBMITTALS

2	02/21/19	ISSUED FOR CONSTRUCTION
1	02/05/19	ISSUED FOR CONSTRUCTION
0	12/28/18	ISSUED FOR PERMITTING

FA# 10071172
SITE# CTL05107
NORTH HAVEN SOUTH

120 UNIVERSAL DRIVE
NORTH HAVEN, CT 06473

TITLE SHEET

T-1

DRAWING INDEX

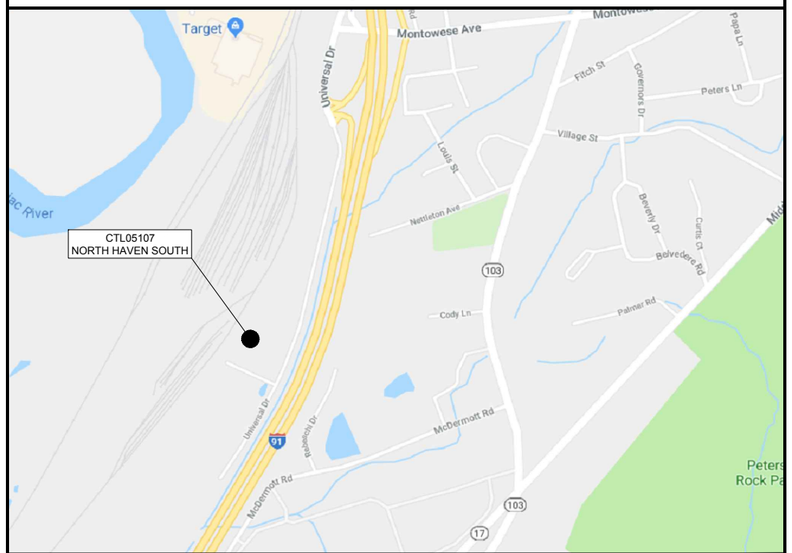
SHEET NO:	SHEET TITLE
T-1	TITLE SHEET
GN-1	GENERAL NOTES I
GN-2	GENERAL NOTES II
C-1	SITE PLAN
C-2	EQUIPMENT LAYOUT & PROPOSED TOWER ELEVATION
C-3	EXISTING & PROPOSED ANTENNA LAYOUT
C-4	EQUIPMENT DETAILS
C-5	MOUNT MODIFICATION DETAIL
RF-1	ANTENNA CHART & RF EQUIPMENT SCHEMATIC
G-1	GROUNDING DETAILS

CROWN CASTLE SITE ID #: 881536
CROWN CASTLE SITE NAME: NORTH HAVEN TOWER

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

VICINITY MAP



DEPART 550 COCHITUATE ROAD, FRAMINGHAM, MA 01701, THEN TAKE NORTH HAVEN-SOUTH CT-107I-95 NORTH TO EXIT 48 IN NEW HAVEN THIS WILL PUT YOU ON TO I-91 NORTH STAY ON I-91 NORTH UNTIL YOU GET TO EXIT 9,MONTOWESE AVENUE EXIT,TAKE THIS EXIT,TAKE A LEFT OFF THE EXIT,AT THE LIGHT TAKE A LEFT ONTO UNIVERSAL DRIVE,FOLLOW THIS FOR ABOUT ONE MILE,TAKE A RIGHT INTO THE DRIVEWAY FOR GRAINGER,FOLLOW TO THE BACK,THIS IS WHERE OUR SHELTER IS LOCATED

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.

CONNECTICUT ONE CALL SYSTEM, INC.
1-800-922-4455
STOP - CALL BEFORE YOU DIG!

UNDERGROUND SERVICE ALERT

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

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

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: JB

CHECKED BY: CAT

SUBMITTALS

2	02/21/19	ISSUED FOR CONSTRUCTION
1	02/05/19	ISSUED FOR CONSTRUCTION
0	12/28/18	ISSUED FOR PERMITTING

FA# 10071172
SITE# CTL05107
NORTH HAVEN SOUTH

120 UNIVERSAL DRIVE
NORTH HAVEN, CT 06473

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		

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

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: JB

CHECKED BY: CAT

SUBMITTALS

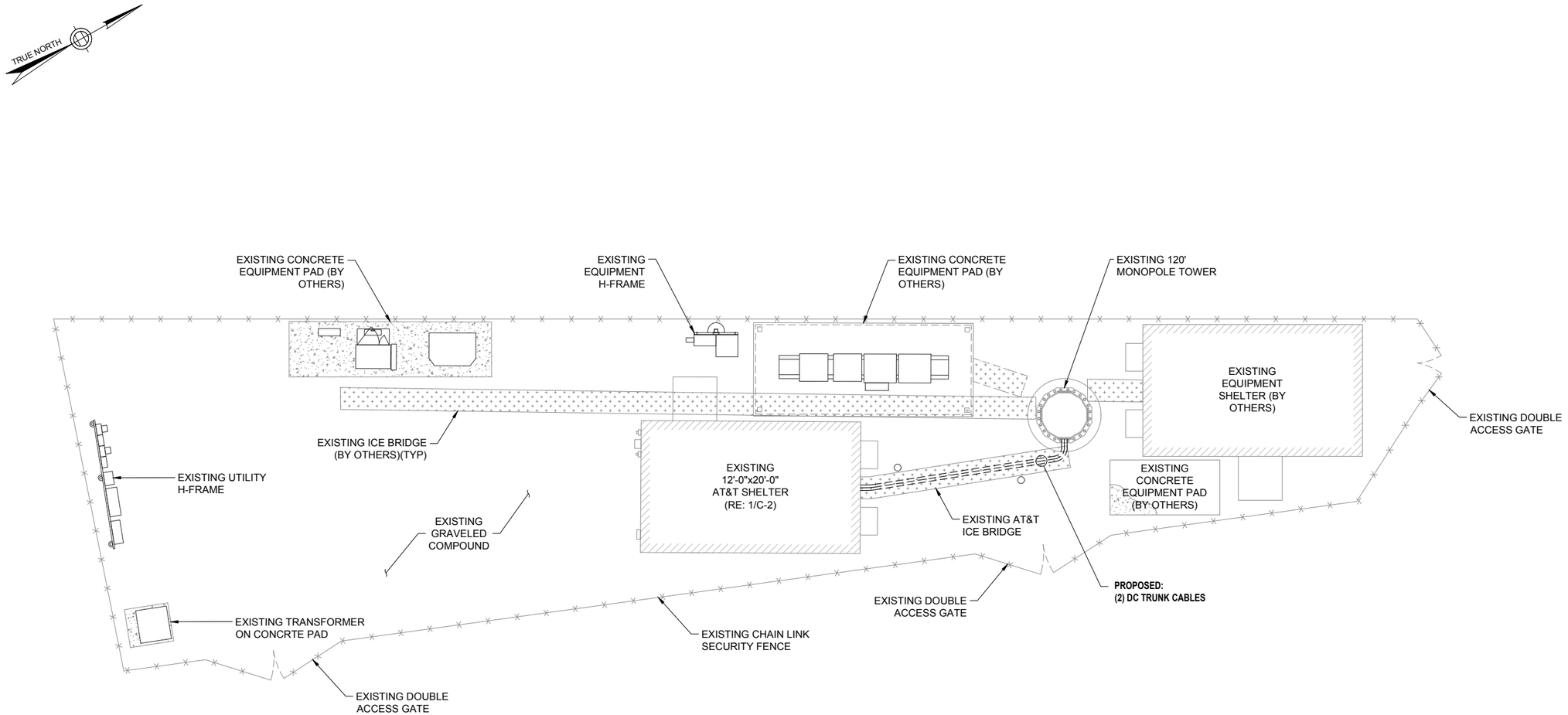
2	02/21/19	ISSUED FOR CONSTRUCTION
1	02/05/19	ISSUED FOR CONSTRUCTION
0	12/28/18	ISSUED FOR PERMITTING

FA# 10071172
SITE# CTL05107
NORTH HAVEN SOUTH

120 UNIVERSAL DRIVE
NORTH HAVEN, CT 06473

GENERAL NOTES II

GN-2



NOTES:

1. PLAN BASED ON CONSTRUCTION DRAWINGS ISSUED BY CENTEK ENGINEERING ON 02/23/17. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING EQUIPMENT.

1 SITE PLAN

SCALE: 3/16" = 1'-0"

at&t
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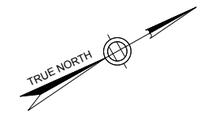
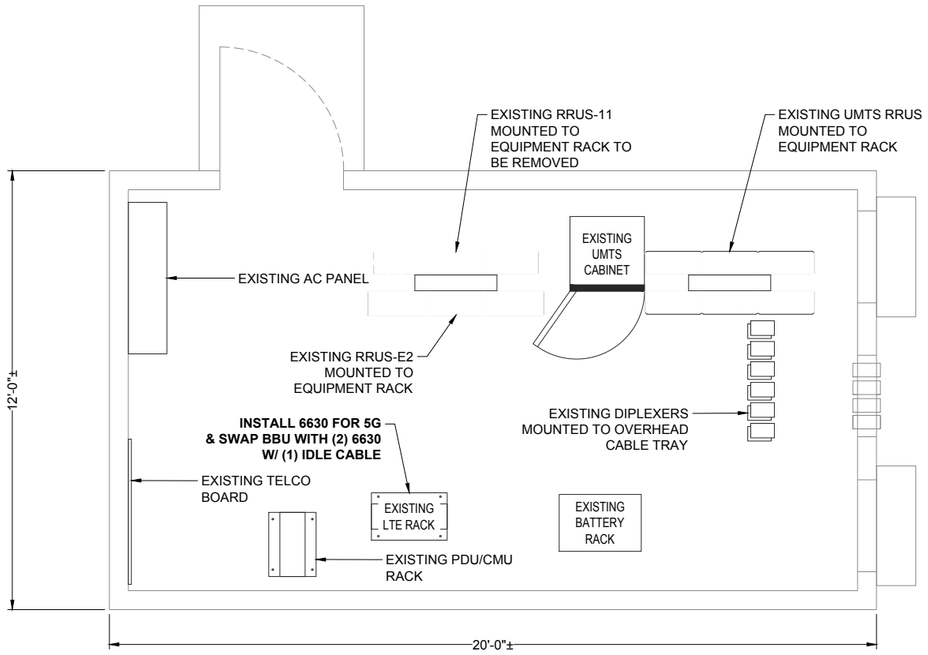
SITE PLAN

C-1

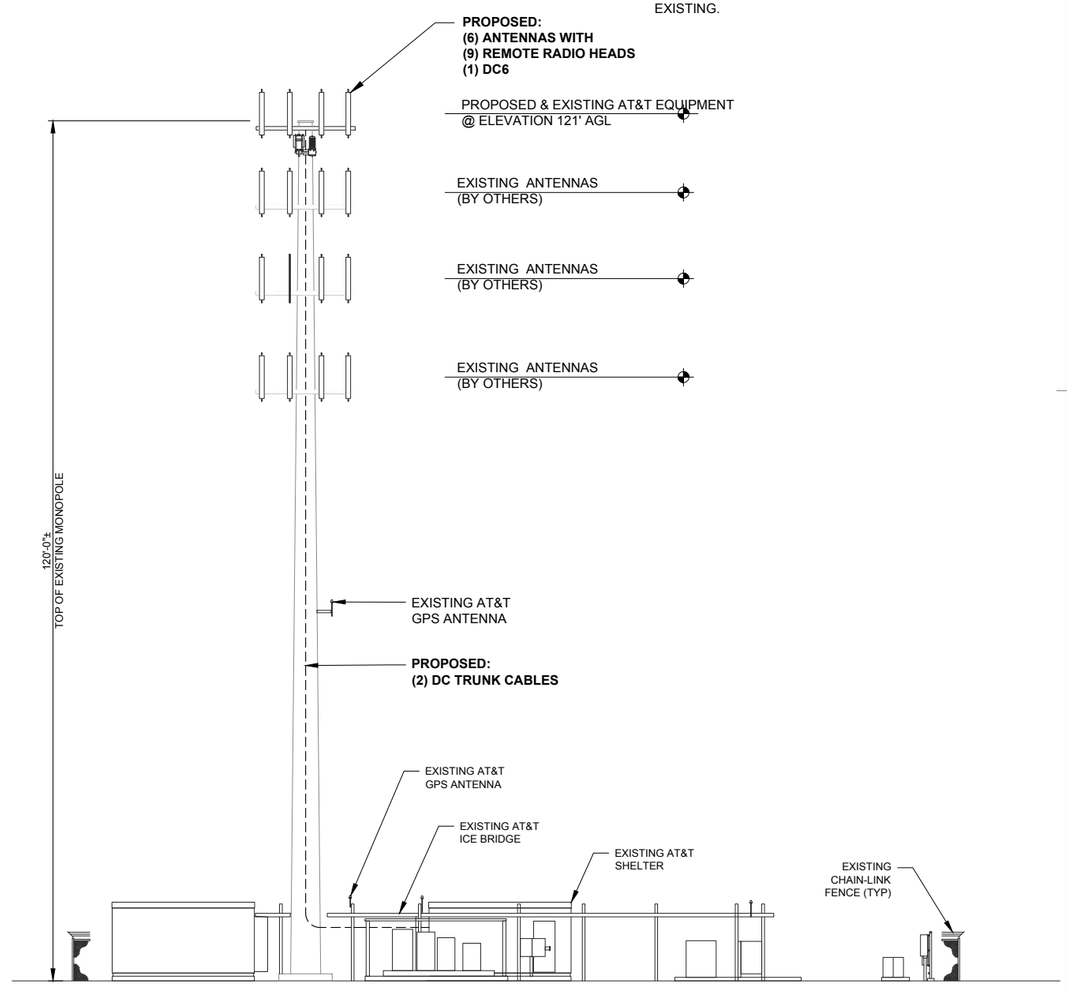




1 EQUIPMENT LAYOUT SCALE: 1/2" = 1'-0"

NOTES:

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.



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

at&t
5841 BRIDGE STREET
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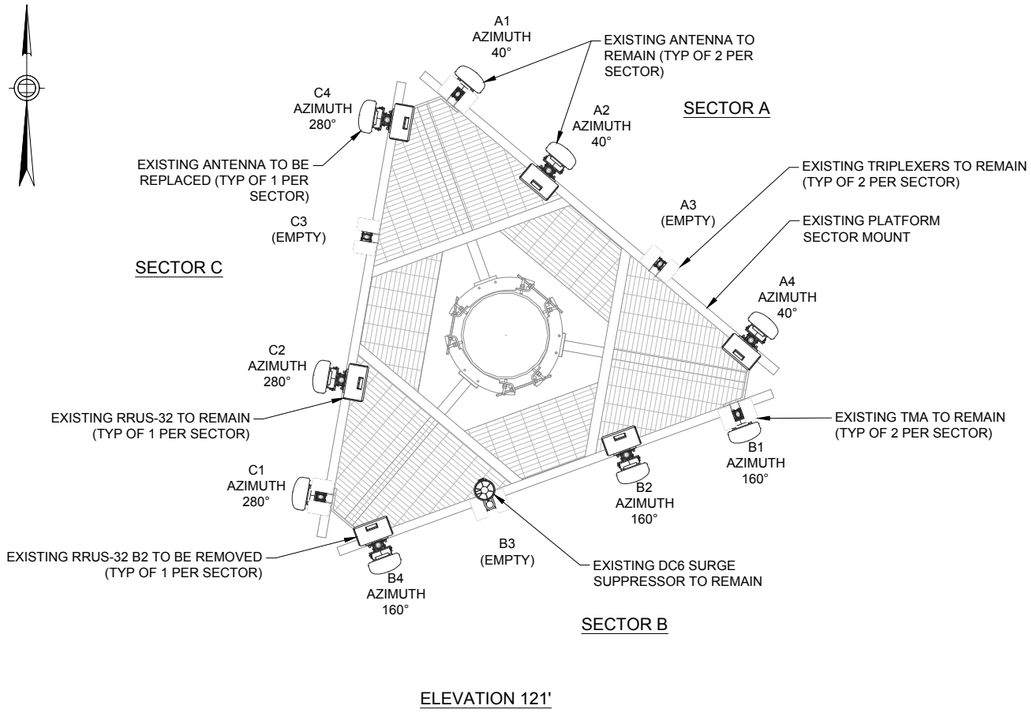
NORTH HAVEN, CT 06473

EQUIPMENT LAYOUT &
PROPOSED TOWER
ELEVATION

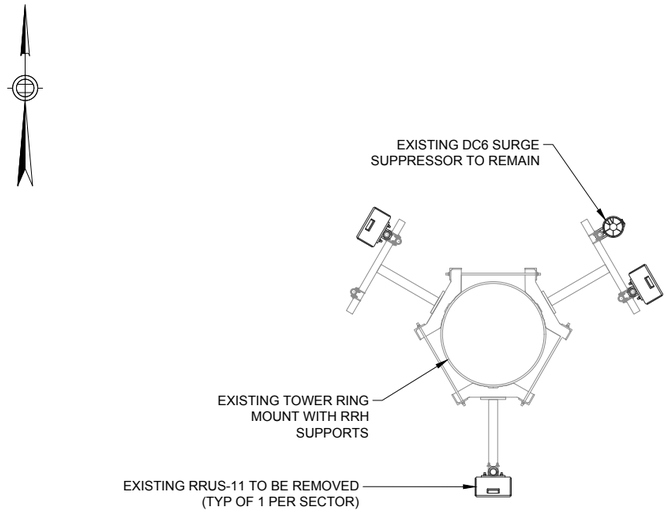
C-2



ELEVATION 121'

1 EXISTING ANTENNA LAYOUT

SCALE: N.T.S.

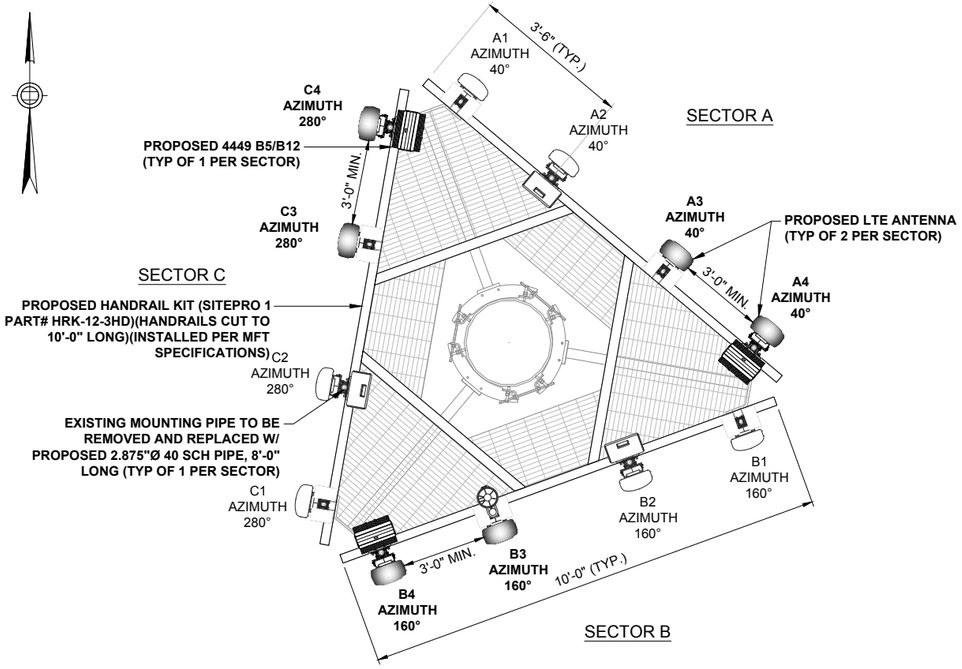


2 EXISTING RING MOUNT LAYOUT

SCALE: N.T.S.

NOTES:

1. CONTRACTOR SHALL REFER TO THE MOUNT MODIFICATION REPORT; SITE NUMBER: CTL05107; SITE NAME: NORTH HAVEN SOUTH; FA LOCATION: 10071172; CROWN BU NUMBER: 881536; CROWN SITE NAME: NORTH HAVEN TOWER; CROWN ORDER NUMBER: ##########; ISSUED BY INFINIGY. DATED ON 01/30/2019. 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.

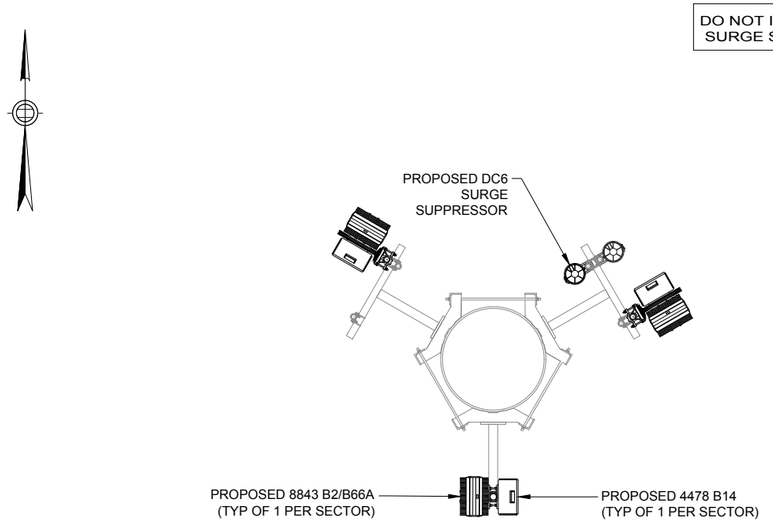


ELEVATION 121'

3 PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.

DO NOT INSTALL PROPOSED SQUID OR SURGE SUPPRESSOR ON TOWER LEG



4 PROPOSED RING MOUNT LAYOUT

SCALE: N.T.S.

at&t
5841 BRIDGE STREET
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NORTH HAVEN, CT 06473

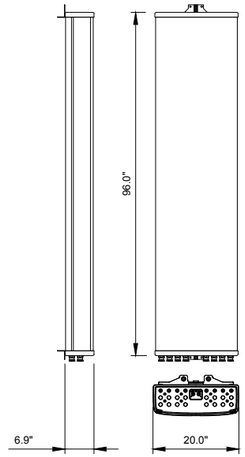
EXISTING & PROPOSED
ANTENNA LAYOUT

C-3

1 ANTENNA SPECIFICATIONS

SCALE: N.T.S.

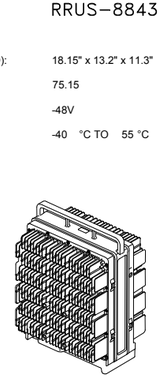
MANUFACTURER:	KATHREIN
MODEL NO.:	80010966
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	96.0" x 20.0" x 6.9" 2438mm x 508mm x 175mm
WEIGHT (lbs):	114.6
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	315 LBF @ 93 MPH 1400 N @ 150 KM/H
SIDE WIND LOAD:	316 LBF @ 93 MPH 1405 N @ 150 KM/H
WIND SPEED MAX.:	>150 MPH (>241 KM/H)



2 RRUS SPECIFICATIONS

SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-8843 B2/B66A
DIMENSIONS (HxWxD):	18.15" x 13.2" x 11.3"
WEIGHT (lbs):	75.15
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C

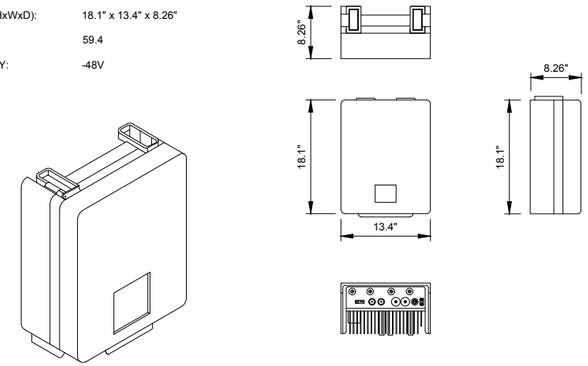


3 RRUS SPECIFICATIONS

SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4478 B14
TECHNOLOGY:	LTE 700
DIMENSIONS (HxWxD):	18.1" x 13.4" x 8.26"
WEIGHT (lbs):	59.4
POWER SUPPLY:	-48V

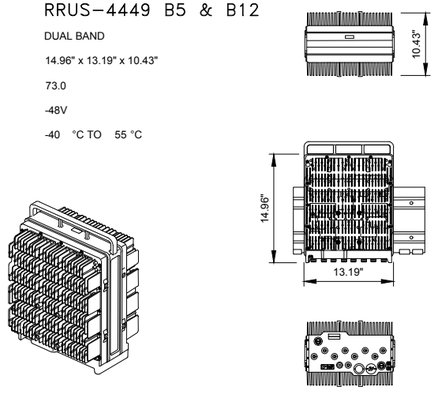
NOTE:
PENDING FINAL PRODUCT SPECIFICATION



4 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

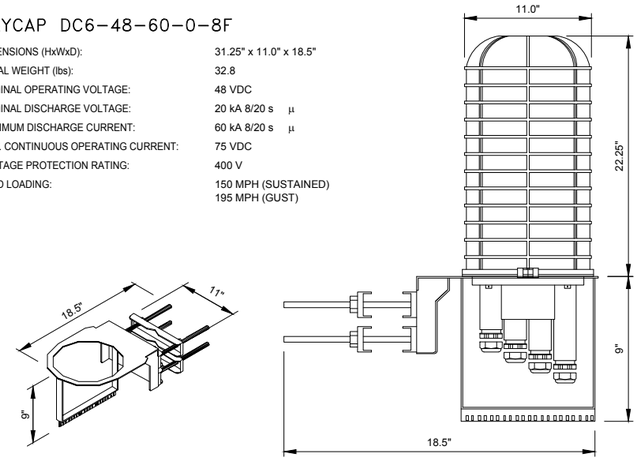


5 DC SURGE PROTECTION SPECIFICATIONS

SCALE: N.T.S.

RAYCAP DC6-48-60-0-8F

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 s μ
MAXIMUM DISCHARGE CURRENT:	60 kA 8/20 s μ
MAX. CONTINUOUS OPERATING CURRENT:	75 VDC
VOLTAGE PROTECTION RATING:	400 V
WIND LOADING:	150 MPH (SUSTAINED) 195 MPH (GUST)



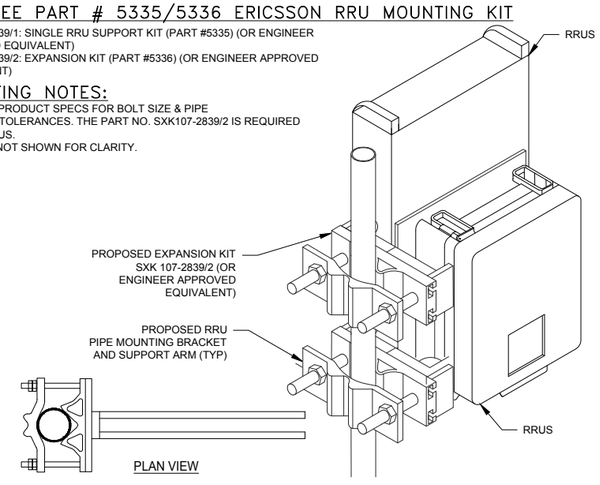
RRU MOUNTING DETAIL

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)

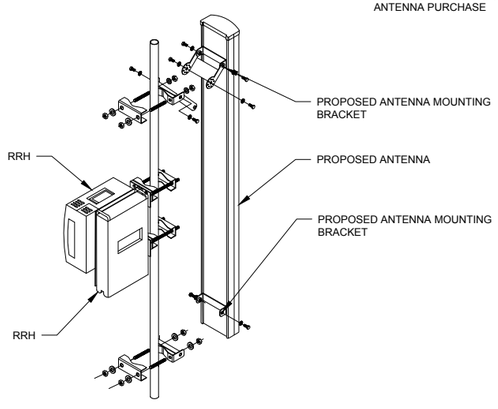
MOUNTING NOTES:
REFER TO PRODUCT SPECS FOR BOLT SIZE & PIPE DIAMETER TOLERANCES. THE PART NO. SXK107-2839/2 IS REQUIRED FOR (2) RRUS.
ANTENNA NOT SHOWN FOR CLARITY.



7 ANTENNA MOUNTING DETAIL

SCALE: N.T.S.

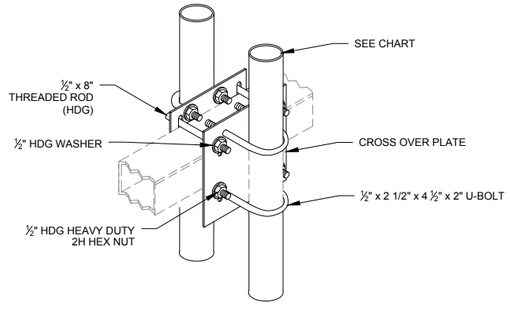
NOTE
MOUNTING OPTIONS ARE INCLUDED PRODUCTS WITH ANTENNA PURCHASE



8 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"



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STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED
PROFESSIONAL ENGINEER

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

SUBMITTALS

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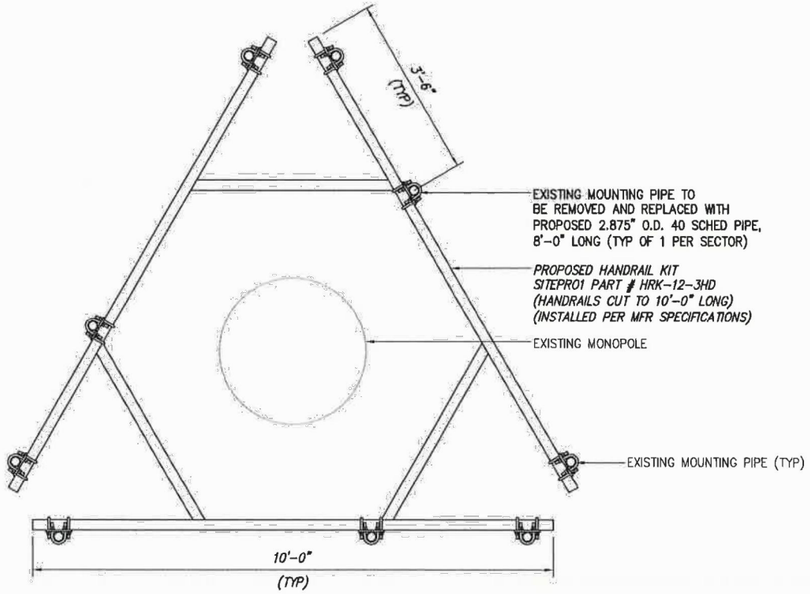
1	02/05/19	ISSUED FOR CONSTRUCTION
0	12/28/18	ISSUED FOR PERMITTING

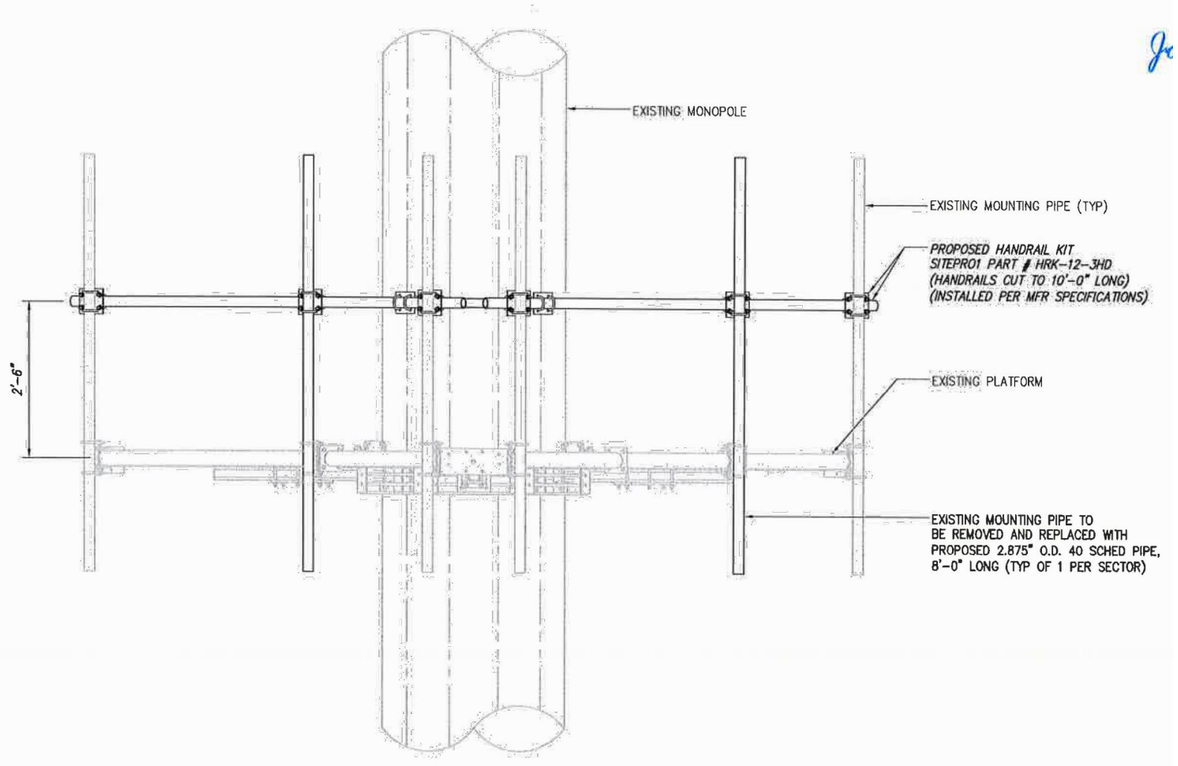
FA# 10071172
SITE# CTL05107
NORTH HAVEN SOUTH
120 UNIVERSAL DRIVE
NORTH HAVEN, CT 06473

EQUIPMENT DETAILS

C-4



1 PLAN VIEW
SCALE: NOT TO SCALE



2 ELEVATION VIEW
SCALE: NOT TO SCALE

1 MOUNT MODIFICATION DETAIL — SCALE: N.T.S.

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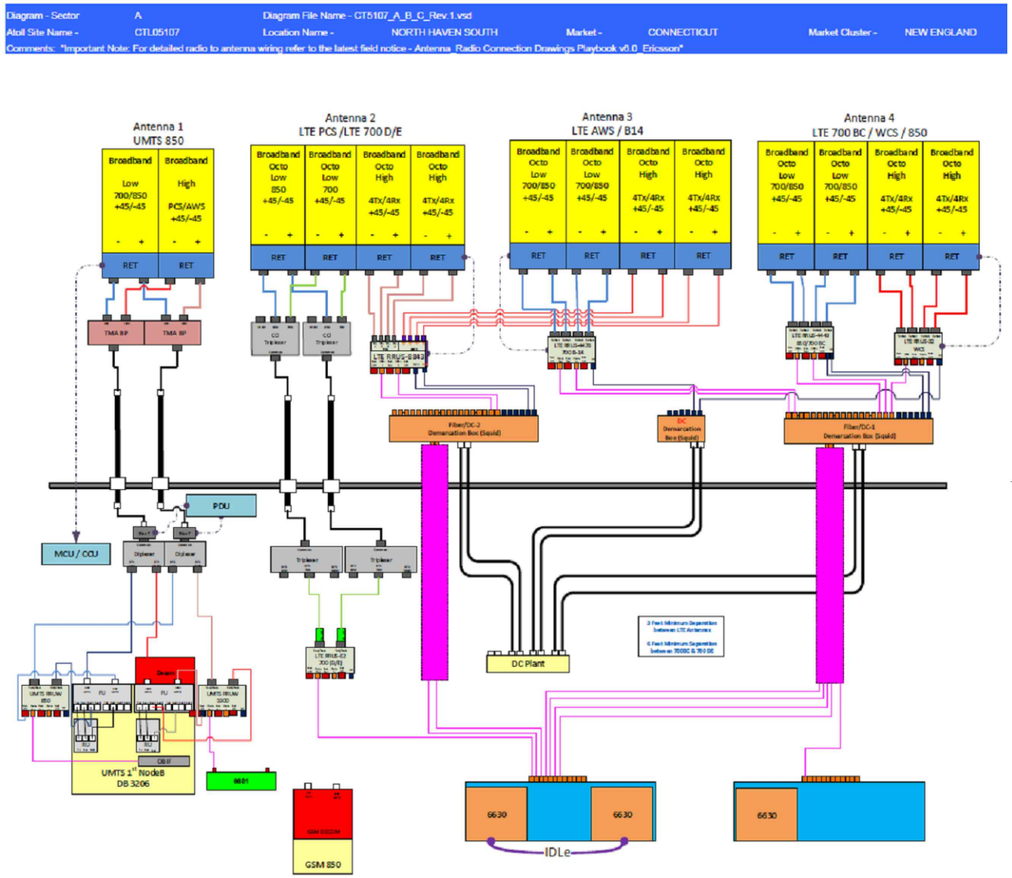
MOUNT MOFICATION DETAIL

C-5

ANTENNA NUMBER	ANTENNA MODEL	ANTENNA BAND	AZIMUTH	ANTENNA CENTERLINE FROM GROUND	TMA's & DIPLEXERS	RRH's	FEEDER	RAYCAP
A1	7770 (55"x11"x5")	UMTS	40°	121'	(2) LGP 21401 (2) TPX-070821	-	(2) 1-5/8" EXISTING (LENGTH @ 140')	**(1) RAYCAP DC6-48-60-0-8F**
A2	OPA-65R-LCUU-H6 (72.3"x14.4"x7.3")	LTE	40°	121'	-	**(1) 8843 B2/B66A (AWS/PCS)**	(2) 1-5/8" EXISTING (1) FIBER (2) DC (LENGTH @ 140')	
A3	**800-10966 (96"x20"x6.9")**	**LTE**	**40°**	**121'**	-	**(1) 4478 B14 (700)**	(1) FIBER (E) (2) DC (E) (LENGTH @ 140')	(2) RAYCAP DC6-48-60-18-8C
A4	**800-10966 (96"x20"x6.9")**	**LTE**	**40°**	**121'**	-	**(1) 4449 B5/B12 (850/700)** (1) RRUS-32 (WCS)	**(2) DC (LENGTH @ 140')**	
B1	7770 (55"x11"x5")	UMTS	160°	121'	(2) LGP 21401 (2) TPX-070821	-	(2) 1-5/8" EXISTING (LENGTH @ 140')	
B2	OPA-65R-LCUU-H6 (72.3"x14.4"x7.3")	LTE	160°	121'	-	**(1) 8843 B2/B66A (AWS/PCS)**	(2) 1-5/8" EXISTING (LENGTH @ 140')	
B3	**800-10966 (96"x20"x6.9")**	**LTE**	**160°**	**121'**	-	**(1) 4478 B14 (700)**	-	
B4	**800-10966 (96"x20"x6.9")**	**LTE**	**160°**	**121'**	-	**(1) 4449 B5/B12 (850/700)** (1) RRUS-32 (WCS)	-	
C1	7770 (55"x11"x5")	UMTS	280°	121'	(2) LGP 21401 (2) TPX-070821	-	(2) 1-5/8" EXISTING (LENGTH @ 140')	
C2	OPA-65R-LCUU-H6 (72.3"x14.4"x7.3")	LTE	280°	121'	-	**(1) 8843 B2/B66A (AWS/PCS)**	(2) 1-5/8" EXISTING (LENGTH @ 140')	
C3	**800-10966 (96"x20"x6.9")**	**LTE**	**280°**	**121'**	-	**(1) 4478 B14 (700)**	-	
C4	**800-10966 (96"x20"x6.9")**	**LTE**	**280°**	**121'**	-	**(1) 4449 B5/B12 (850/700)** (1) RRUS-32 (WCS)	-	

*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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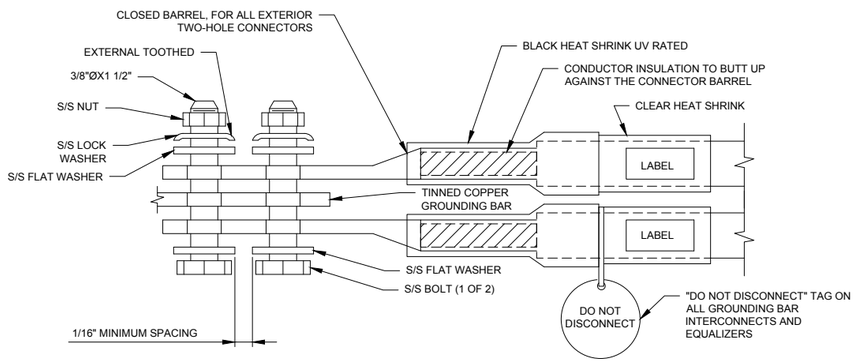
ANTENNA CHART & RF EQUIPMENT SCHEMATIC

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.

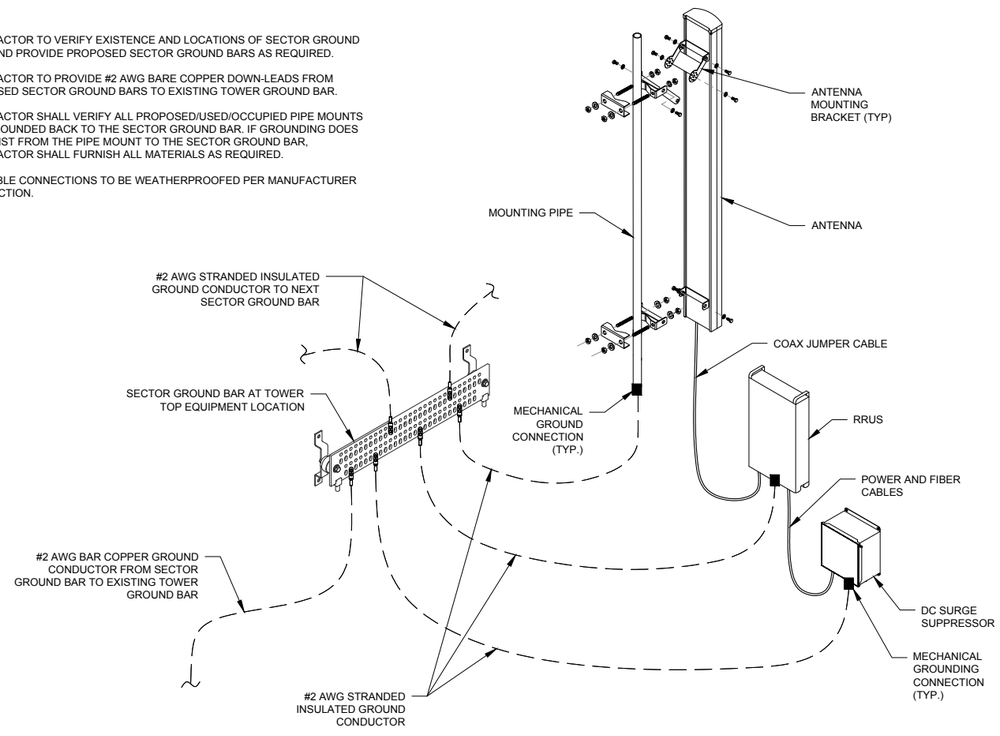
GROUNDING NOTES:

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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STATE OF CONNECTICUT CRAIG A. THOMAS No. 0029052 LICENSED PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: JB

CHECKED BY: CAT

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SITE# CTL05107
NORTH HAVEN SOUTH

120 UNIVERSAL DRIVE
NORTH HAVEN, CT 06473

GROUNDING DETAILS

G-1

Date: **February 08, 2019**

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

Jacobs Engineering Group, Inc.
5449 Bells Ferry Road
Acworth, GA 30102
(770) 701-2500

Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	10071172
	Carrier Site Name:	CTL05107
Crown Castle Designation:	**Crown Castle BU Number:**	881536
	Crown Castle Site Name:	NORTH HAVEN TOWER
	Crown Castle JDE Job Number:	548523
	Crown Castle Work Order Number:	1692564
	Crown Castle Order Number:	471644 Rev. 0
Engineering Firm Designation:	**Jacobs Engineering Group, Inc. Project Number:**	1692564
Site Data:	**120 Universal Drive, North Haven, New Haven County, CT** **Latitude *41° 20' 40.01"*, Longitude *-72° 52' 14.92"*** **120 Foot - Monopole Tower**	

Dear Heather Simeone,

Jacobs Engineering Group, Inc. 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 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Questions regarding this analysis can be directed to CCISites@jacobs.com

Structural analysis prepared by:

Ankit Gupta
Engineering Associate

Engineer of Record:

STATE OF CONNECTICUT
PAUL L MUCCI
24103
LICENSED
PROFESSIONAL ENGINEER

2019-02-12
T17:10:51-05:00

Paul L. Mucci, P. E.
Senior Project Engineer
CT PE No. 24103

tnxTower Report - version 8.0.5.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	C
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)
118.0	121.0	3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe	2 6 12	3/8 3/4 1-5/8
		6	cci antennas	TPX-070821		
		3	ericsson	RRUS 32		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 4478 B14		
		3	ericsson	RRUS 8843 B2/B66A		
		6	kathrein	80010966 w/ Mount Pipe		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		6	powerwave technologies	LGP21401		
		3	raycap	DC6-48-60-18-8F		
	118.0	1	Sitepro1	HRK-12-3HD		
		1	tower mounts (crown)	Platform Mount [LP 712-1]		
116.0	117.0	3	ericsson	TME-RRUS-11	-	-
		3	ericsson	TME-RRUS-12		
		1	raycap	DC6-48-60-18-8F		
	116.0	2	tower mounts (crown)	Pipe Mount [PM 601-3]		

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)
108.0	110.0	12	decibel	844G65VTZASX w/ Mount Pipe	12	1-1/4
	108.0	1	tower mounts (crown)	Platform Mount [LP 303-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
100.0	100.0	3	alcatel lucent	TME-1900MHz RRH (65 MHz)	-	-
		1	tower mounts (crown)	Pipe Mount [PM 601-3]		
		1	tower mounts (crown)	Side Arm Mount [SO 102-3]		
	99.0	3	alcatel lucent	TME-800MHZ RRH		
97.0	98.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	3 1	1-1/4 1-5/8
		3	alcatel lucent	TD-RRH8x20-25		
		2	powerwave technologies	P40-16-XLPP-RR-A w/ Mount Pipe		
		9	rfs celwave	ACU-A20-N		
		1	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe		
	97.0	1	tower mounts (crown)	Platform Mount [LP 712-1]		
83.0	84.0	3	ericsson	AIR -32 B2A/B66AA w/ Mount Pipe	2 1 10	1-1/4 1-3/8 1-5/8
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe		
		3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
	83.0	3	rfs celwave	ATMAA1412D-1A20		
		1	tower mounts (crown)	Platform Mount [LP 303-1]		
51.0	51.0	1	lucent	KS24019-L112A	1	1/2
		1	tower mounts (crown)	Side Arm Mount [SO 301-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Associates, Inc.	1405753	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors, Inc.	1405795	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors, Inc.	1405788	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 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. Jacobs Engineering Group, Inc. 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	120 - 84.71	Pole	TP32.56x24.09x0.375	1	-14.57	2272.66	28.3	Pass
L2	84.71 - 41.583	Pole	TP42.03x30.71x0.438	2	-29.20	3429.64	48.2	Pass
L3	41.583 - 0	Pole	TP51x39.771x0.5	3	-47.44	4922.82	52.4	Pass
							Summary	
						Pole (L3)	52.4	Pass
						Rating =	52.4	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	55.6	Pass
1	Base Plate	0	60.9	Pass
1	Base Foundation Structural	0	49.2	Pass
1	Base Foundation Soil Interaction	0	27.4	Pass

Structure Rating (max from all components) =	60.9%

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 loading configuration. No modifications are required at this time.

APPENDIX A

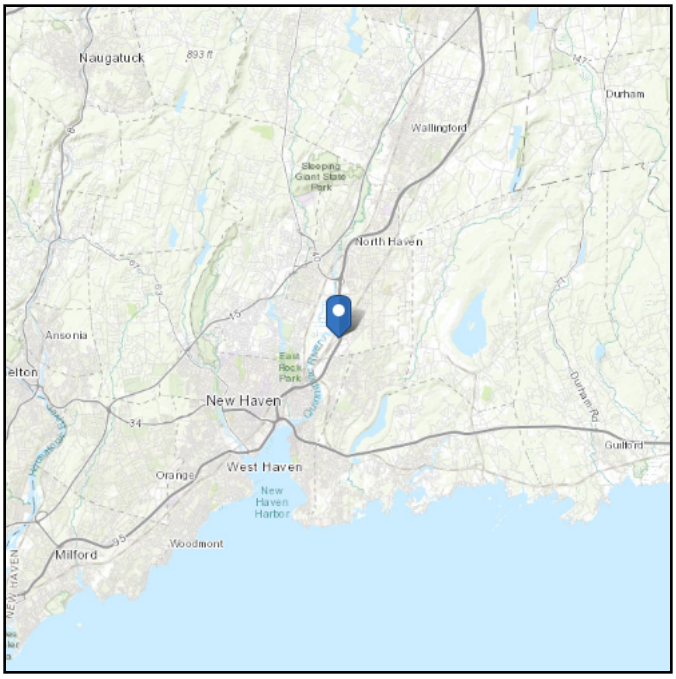
TNXTOWER OUTPUT

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 18.13 ft (NAVD 88)
Latitude: 41.344447
Longitude: -72.870811



Wind

Results:	**77 Vmph**
Wind Speed:	125 Vmph
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	94 Vmph
100-year MRI	102 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Mon Dec 03 2018

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

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

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

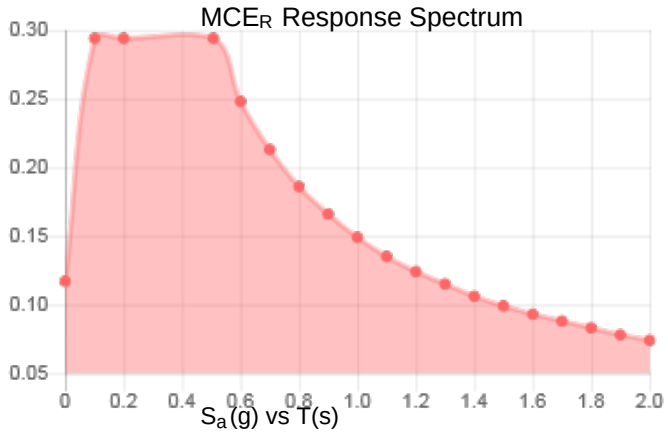
Seismic

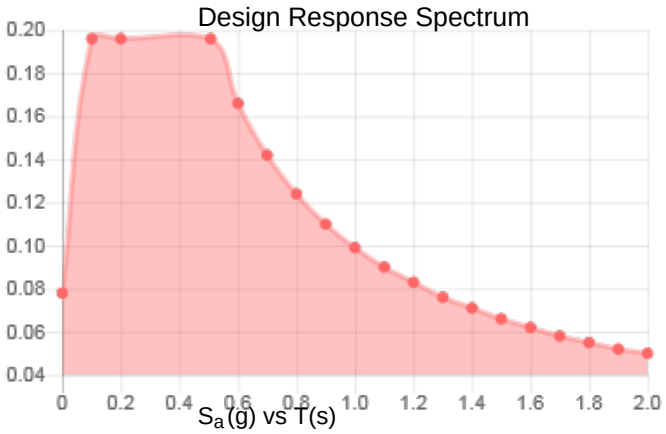
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.184	S_{DS} :	0.196
S_1 :	0.062	S_{D1} :	0.099
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.095
S_{MS} :	0.294	PGA_M :	0.152
S_{M1} :	0.149	F_{PGA} :	1.600
		I_e :	1

Seismic Design Category B





Data Accessed: Mon Dec 03 2018

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

Ice

Results:

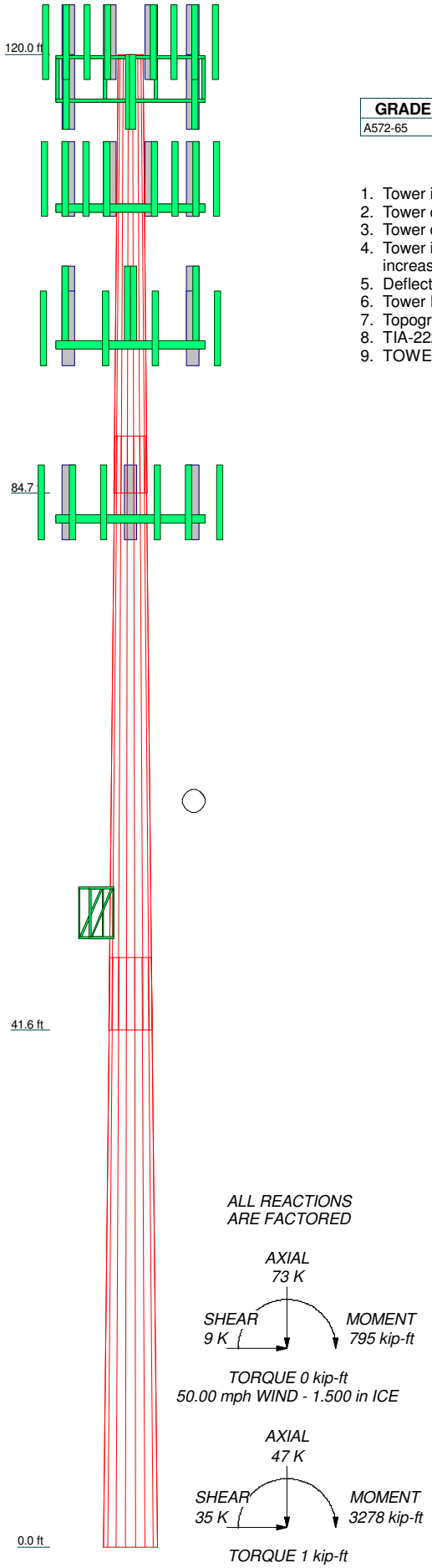
Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Mon Dec 03 2018

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

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

Section	1	2	3
Length (ft)	35.29	47.71	47.42
Number of Sides	18	18	18
Thickness (in)	0.375	0.438	0.500
Socket Length (ft)	4.58	5.83	
Top Dia (in)	24.090	30.710	39.771
Bot Dia (in)	32.560	42.030	51.000
Grade	A572-65		
Weight (K)	4.0	8.1	11.5

23.6



MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125.00 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50.00 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 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: 52.4%

JACOBS

Jacobs Engineering Group, Inc.

Jacobs Engineering Group, Inc.
5449 Bells Ferry Road
Acworth, GA 30102
Phone: (770) 701-2500
FAX: (770) 701-2501

Job: ***NORTH HAVEN TOWER***		
Project: ***BU881536_WO1669064***		
Client: Crown Castle	Drawn by: Ankit Gupta	App'd:
Code: TIA-222-H	Date: 02/08/19	Scale: NTS
Path: C:\Users\guptaa5\Desktop\WO 1692564\Analysis\Models\BU881536_WO1692564_LC7_20190208.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:

3) Tower is located in New Haven County, Connecticut.
4) Tower base elevation above sea level: 18.13 ft.
5) Basic wind speed of 125.00 mph.
6) Risk Category II.
7) Exposure Category C.
8) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
9) Topographic Category: 1.
10) Crest Height: 0.00 ft.
11) Nominal ice thickness of 1.500 in.
12) Ice thickness is considered to increase with height.
13) Ice density of 56.00 pcf.
14) A wind speed of 50.00 mph is used in combination with ice.
15) Temperature drop of 50.00 °F.
16) Deflections calculated using a wind speed of 60.00 mph.
17) TIA-222-H Annex S.
18) A non-linear (P-delta) analysis was used.
19) Pressures are calculated at each section.
20) Stress ratio used in pole design is 1.05.
21) Tower analysis based on target reliabilities in accordance with Annex S.
22) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
23) 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 ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-84.71	35.29	4.58	18	24.090	32.560	0.375	1.500	A572-65 (65 ksi)
L2	84.71-41.58	47.71	5.83	18	30.710	42.030	0.438	1.750	A572-65 (65 ksi)
L3	41.58-0.00	47.42		18	39.771	51.000	0.500	2.000	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	24.404	28.227	2005.603	8.419	12.238	163.887	4013.846	14.116	3.580	9.546
	33.004	38.308	5013.444	11.426	16.540	303.101	10033.485	19.158	5.071	13.521
L2	32.220	42.037	4867.080	10.747	15.601	311.978	9740.565	21.023	4.635	10.594
	42.611	57.756	12623.143	14.765	21.351	591.214	25262.896	28.884	6.627	15.148
L3	41.710	62.323	12143.143	13.941	20.204	601.036	24302.265	31.167	6.120	12.239
	51.710	80.144	25821.919	17.927	25.908	996.677	51677.815	40.079	8.096	16.192

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 120.00-84.71				1	1	1			
L2 84.71-41.58				1	1	1			
L3 41.58-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
***										
LDF4-50A(1/2)	A	No	Surface Ar (CaAa)	51.00 - 0.00	1	1	0.100 0.100	0.625		0.15
***										
Safety Line 3/8	B	No	Surface Ar (CaAa)	120.00 - 0.00	1	1	0.400 0.400	0.375		0.22
***										

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
LDF7-50A(1-5/8)	C	No	No	Inside Pole	118.00 - 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-002-75000(3/8)	C	No	No	Inside Pole	118.00 - 0.00	1	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

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-BRD(3/4)	C	No	No	Inside Pole	118.00 - 0.00	2	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
FB-L98B-002-75000(3/8)	C	No	No	Inside Pole	118.00 - 0.00	1	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)	C	No	No	Inside Pole	118.00 - 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
2" (Nominal) Conduit	C	No	No	Inside Pole	118.00 - 0.00	1	No Ice	0.00	0.72
							1/2" Ice	0.00	0.72
							1" Ice	0.00	0.72
							2" Ice	0.00	0.72
***									
LDF6-50A(1-1/4)	B	No	No	Inside Pole	108.00 - 0.00	12	No Ice	0.00	0.60
							1/2" Ice	0.00	0.60
							1" Ice	0.00	0.60
							2" Ice	0.00	0.60
***									
HB114-1-0813U4-M5F(1-1/4)	A	No	No	Inside Pole	97.00 - 0.00	3	No Ice	0.00	1.20
							1/2" Ice	0.00	1.20
							1" Ice	0.00	1.20
							2" Ice	0.00	1.20
HB158-1-08U8-S8F18(1-5/8)	A	No	No	Inside Pole	97.00 - 0.00	1	No Ice	0.00	1.70
							1/2" Ice	0.00	1.70
							1" Ice	0.00	1.70
							2" Ice	0.00	1.70
****									
MLE HYBRID 3POWER/6FIBER RL 2 10AWG(1-1/4)	C	No	No	Inside Pole	83.00 - 0.00	2	No Ice	0.00	0.46
							1/2" Ice	0.00	0.46
							1" Ice	0.00	0.46
							2" Ice	0.00	0.46
HCC 158-50J(1-5/8)	C	No	No	Inside Pole	83.00 - 0.00	10	No Ice	0.00	0.86
							1/2" Ice	0.00	0.86
							1" Ice	0.00	0.86
							2" Ice	0.00	0.86
HCS 6X12 6AWG(1-3/8)	C	No	No	Inside Pole	83.00 - 0.00	1	No Ice	0.00	1.70
							1/2" Ice	0.00	1.70
							1" Ice	0.00	1.70
							2" Ice	0.00	1.70
***									

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	120.00-84.71	A	0.000	0.000	0.000	0.000	0.07
		B	0.000	0.000	1.323	0.000	0.18
		C	0.000	0.000	0.000	0.000	0.47
L2	84.71-41.58	A	0.000	0.000	0.589	0.000	0.23
		B	0.000	0.000	1.617	0.000	0.32
		C	0.000	0.000	0.000	0.000	1.08
L3	41.58-0.00	A	0.000	0.000	2.599	0.000	0.23
		B	0.000	0.000	1.559	0.000	0.31
		C	0.000	0.000	0.000	0.000	1.06

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	120.00-84.71	A	1.427	0.000	0.000	0.000	0.000	0.07
		B		0.000	0.000	11.394	0.000	0.29
		C		0.000	0.000	0.000	0.000	0.47
L2	84.71-41.58	A	1.359	0.000	0.000	3.276	0.000	0.26
		B		0.000	0.000	13.924	0.000	0.46
		C		0.000	0.000	0.000	0.000	1.08
L3	41.58-0.00	A	1.218	0.000	0.000	13.903	0.000	0.36
		B		0.000	0.000	12.863	0.000	0.43
		C		0.000	0.000	0.000	0.000	1.06

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	120.00-84.71	0.287	0.093	1.267	0.412
L2	84.71-41.58	0.195	0.011	1.029	0.182
L3	41.58-0.00	-0.087	-0.240	0.185	-0.538

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
L1	20	Safety Line 3/8	84.71 - 120.00	1.0000	1.0000
L1	18	LDF4-50A(1/2)	84.71 - 51.00	1.0000	1.0000
L2	18	LDF4-50A(1/2)	41.58 - 51.00	1.0000	1.0000
L2	20	Safety Line 3/8	41.58 - 84.71	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LC8									
118									
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00	0.000	118.00	No Ice	5.75 6.18	4.25 5.01	0.06 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			3.00			1/2" Ice	6.61 7.49	5.71 7.16	0.16 0.29
						1" Ice 2" Ice			
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.90 10.47 11.01 12.11	7.18 8.36 9.26 11.09	0.10 0.18 0.26 0.46
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.90 10.47 11.01 12.11	7.18 8.36 9.26 11.09	0.10 0.18 0.26 0.46
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.90 10.47 11.01 12.11	7.18 8.36 9.26 11.09	0.10 0.18 0.26 0.46
(2) 80010966 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.60 18.33 19.07 20.49	9.64 11.15 12.70 15.03	0.15 0.26 0.39 0.68
(2) 80010966 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.60 18.33 19.07 20.49	9.64 11.15 12.70 15.03	0.15 0.26 0.39 0.68
(2) 80010966 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.60 18.33 19.07 20.49	9.64 11.15 12.70 15.03	0.15 0.26 0.39 0.68
(2) LGP21401	A	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
(2) LGP21401	B	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
(2) LGP21401	C	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
(2) DC6-48-60-18-8F	B	From Leg	4.00 0.00 3.00	0.000	118.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.92 1.46 1.64 2.04	0.92 1.46 1.64 2.04	0.03 0.05 0.07 0.12
DC6-48-60-18-8F	C	From Leg	4.00	0.000	118.00	No Ice	0.92	0.92	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	1.46	1.46	0.05
			3.00			Ice	1.64	1.64	0.07
						1" Ice	2.04	2.04	0.12
						2" Ice			
RRUS 8843 B2/B66A	A	From Leg	4.00	0.000	118.00	No Ice	1.64	1.35	0.07
			0.00			1/2"	1.80	1.50	0.09
			3.00			Ice	1.97	1.65	0.11
						1" Ice	2.32	1.99	0.16
						2" Ice			
RRUS 8843 B2/B66A	B	From Leg	4.00	0.000	118.00	No Ice	1.64	1.35	0.07
			0.00			1/2"	1.80	1.50	0.09
			3.00			Ice	1.97	1.65	0.11
						1" Ice	2.32	1.99	0.16
						2" Ice			
RRUS 8843 B2/B66A	C	From Leg	4.00	0.000	118.00	No Ice	1.64	1.35	0.07
			0.00			1/2"	1.80	1.50	0.09
			3.00			Ice	1.97	1.65	0.11
						1" Ice	2.32	1.99	0.16
						2" Ice			
(2) TPX-070821	A	From Leg	4.00	0.000	118.00	No Ice	0.47	0.10	0.01
			0.00			1/2"	0.56	0.15	0.01
			3.00			Ice	0.66	0.20	0.02
						1" Ice	0.87	0.33	0.03
						2" Ice			
(2) TPX-070821	B	From Leg	4.00	0.000	118.00	No Ice	0.47	0.10	0.01
			0.00			1/2"	0.56	0.15	0.01
			3.00			Ice	0.66	0.20	0.02
						1" Ice	0.87	0.33	0.03
						2" Ice			
(2) TPX-070821	C	From Leg	4.00	0.000	118.00	No Ice	0.47	0.10	0.01
			0.00			1/2"	0.56	0.15	0.01
			3.00			Ice	0.66	0.20	0.02
						1" Ice	0.87	0.33	0.03
						2" Ice			
RRUS 32	A	From Leg	4.00	0.000	118.00	No Ice	2.86	1.78	0.06
			0.00			1/2"	3.08	1.97	0.08
			3.00			Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS 32	B	From Leg	4.00	0.000	118.00	No Ice	2.86	1.78	0.06
			0.00			1/2"	3.08	1.97	0.08
			3.00			Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS 32	C	From Leg	4.00	0.000	118.00	No Ice	2.86	1.78	0.06
			0.00			1/2"	3.08	1.97	0.08
			3.00			Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS 4478 B14	A	From Leg	4.00	0.000	118.00	No Ice	1.84	1.06	0.06
			0.00			1/2"	2.01	1.20	0.08
			3.00			Ice	2.19	1.34	0.09
						1" Ice	2.57	1.66	0.14
						2" Ice			
RRUS 4478 B14	B	From Leg	4.00	0.000	118.00	No Ice	1.84	1.06	0.06
			0.00			1/2"	2.01	1.20	0.08
			3.00			Ice	2.19	1.34	0.09
						1" Ice	2.57	1.66	0.14
						2" Ice			
RRUS 4478 B14	C	From Leg	4.00	0.000	118.00	No Ice	1.84	1.06	0.06
			0.00			1/2"	2.01	1.20	0.08
			3.00			Ice	2.19	1.34	0.09
						1" Ice	2.57	1.66	0.14
						2" Ice			
RRUS 4449 B5/B12	A	From Leg	4.00	0.000	118.00	No Ice	1.97	1.41	0.07

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *K*
			0.00			1/2"	2.14	1.56	0.09
			3.00			Ice	2.33	1.73	0.11
						1" Ice	2.72	2.07	0.16
						2" Ice			
RRUS 4449 B5/B12	B	From Leg	4.00	0.000	118.00	No Ice	1.97	1.41	0.07
			0.00			1/2"	2.14	1.56	0.09
			3.00			Ice	2.33	1.73	0.11
						1" Ice	2.72	2.07	0.16
						2" Ice			
RRUS 4449 B5/B12	C	From Leg	4.00	0.000	118.00	No Ice	1.97	1.41	0.07
			0.00			1/2"	2.14	1.56	0.09
			3.00			Ice	2.33	1.73	0.11
						1" Ice	2.72	2.07	0.16
						2" Ice			
Miscellaneous [NA 507-1]	C	None		0.000	118.00	No Ice	4.80	4.80	0.25
						1/2"	6.70	6.70	0.29
						Ice	8.60	8.60	0.34
						1" Ice	12.40	12.40	0.44
						2" Ice			
Platform Mount [LP 712-1]	C	None		0.000	118.00	No Ice	24.53	24.53	1.34
						1/2"	29.94	29.94	1.65
						Ice	35.35	35.35	1.96
						1" Ice	46.17	46.17	2.58
						2" Ice			
8'x2" Antenna Mount Pipe	A	From Leg	4.00	0.000	118.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
8'x2" Antenna Mount Pipe	B	From Leg	4.00	0.000	118.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
8'x2" Antenna Mount Pipe	C	From Leg	4.00	0.000	118.00	No Ice	1.90	1.90	0.03
			0.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice			
8-ft Ladder	C	None		0.000	118.00	No Ice	7.07	7.07	0.04
						1/2"	9.73	9.73	0.07
						Ice	11.19	11.19	0.08
						1" Ice	13.98	13.98	0.11
						2" Ice			
116									
TME-RRUS-11	A	From Leg	2.00	0.000	116.00	No Ice	2.85	1.53	0.05
			0.00			1/2"	3.08	1.81	0.08
			1.00			Ice	3.32	2.10	0.11
						1" Ice	3.82	2.75	0.19
						2" Ice			
TME-RRUS-11	B	From Leg	2.00	0.000	116.00	No Ice	2.85	1.53	0.05
			0.00			1/2"	3.08	1.81	0.08
			1.00			Ice	3.32	2.10	0.11
						1" Ice	3.82	2.75	0.19
						2" Ice			
TME-RRUS-11	C	From Leg	2.00	0.000	116.00	No Ice	2.85	1.53	0.05
			0.00			1/2"	3.08	1.81	0.08
			1.00			Ice	3.32	2.10	0.11
						1" Ice	3.82	2.75	0.19
						2" Ice			
DC6-48-60-18-8F	C	From Leg	2.00	0.000	116.00	No Ice	0.92	0.92	0.03
			0.00			1/2"	1.46	1.46	0.05
			1.00			Ice	1.64	1.64	0.07
						1" Ice	2.04	2.04	0.12
						2" Ice			

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
TME-RRUS-12	A	From Leg	2.00 0.00 1.00	0.000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.67 3.93 4.19 4.75	1.49 1.67 1.87 2.28	0.06 0.08 0.11 0.17
TME-RRUS-12	B	From Leg	2.00 0.00 1.00	0.000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.67 3.93 4.19 4.75	1.49 1.67 1.87 2.28	0.06 0.08 0.11 0.17
TME-RRUS-12	C	From Leg	2.00 0.00 1.00	0.000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.67 3.93 4.19 4.75	1.49 1.67 1.87 2.28	0.06 0.08 0.11 0.17
Pipe Mount [PM 601-3]	C	None		0.000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.39 5.48 6.57 8.75	4.39 5.48 6.57 8.75	0.20 0.24 0.28 0.36
Pipe Mount [PM 601-3]	C	None		0.000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.39 5.48 6.57 8.75	4.39 5.48 6.57 8.75	0.20 0.24 0.28 0.36
108									
(4) 844G65VTZASX w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	108.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.55 5.94 6.34 7.17	5.04 5.67 6.30 7.61	0.03 0.09 0.14 0.28
(4) 844G65VTZASX w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	108.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.55 5.94 6.34 7.17	5.04 5.67 6.30 7.61	0.03 0.09 0.14 0.28
(4) 844G65VTZASX w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	108.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.55 5.94 6.34 7.17	5.04 5.67 6.30 7.61	0.03 0.09 0.14 0.28
Platform Mount [LP 303-1]	C	None		0.000	108.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.66 18.87 23.08 31.50	14.66 18.87 23.08 31.50	1.25 1.48 1.71 2.18
100									
TME-1900MHz RRH (65 MHz)	A	From Leg	2.00 0.00 0.00	0.000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.70 2.94 3.18 3.70	2.77 3.01 3.26 3.78	0.06 0.08 0.11 0.18
TME-1900MHz RRH (65 MHz)	B	From Leg	2.00 0.00 0.00	0.000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.70 2.94 3.18 3.70	2.77 3.01 3.26 3.78	0.06 0.08 0.11 0.18
TME-1900MHz RRH (65 MHz)	C	From Leg	2.00 0.00 0.00	0.000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.70 2.94 3.18 3.70	2.77 3.01 3.26 3.78	0.06 0.08 0.11 0.18
TME-800MHZ RRH	A	From Leg	2.00 0.00 -1.00	0.000	100.00	No Ice 1/2" Ice	2.13 2.32 2.51	1.77 1.95 2.13	0.05 0.07 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	2.92	2.51	0.16
						2" Ice			
TME-800MHZ RRH	B	From Leg	2.00 0.00 -1.00	0.000	100.00	No Ice	2.13	1.77	0.05
						1/2" Ice	2.32	1.95	0.07
							2.51	2.13	0.10
						1" Ice	2.92	2.51	0.16
						2" Ice			
TME-800MHZ RRH	C	From Leg	2.00 0.00 -1.00	0.000	100.00	No Ice	2.13	1.77	0.05
						1/2" Ice	2.32	1.95	0.07
							2.51	2.13	0.10
						1" Ice	2.92	2.51	0.16
						2" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	100.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
							6.57	6.57	0.28
						1" Ice	8.75	8.75	0.36
						2" Ice			
Side Arm Mount [SO 102-3]	C	None		0.000	100.00	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
							3.96	3.96	0.14
						1" Ice	4.92	4.92	0.20
						2" Ice			
97*									
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	6.58	4.96	0.08
						1/2" Ice	7.03	5.75	0.13
							7.47	6.47	0.19
						1" Ice	8.38	7.94	0.34
						2" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	6.58	4.96	0.08
						1/2" Ice	7.03	5.75	0.13
							7.47	6.47	0.19
						1" Ice	8.38	7.94	0.34
						2" Ice			
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	6.58	4.96	0.08
						1/2" Ice	7.03	5.75	0.13
							7.47	6.47	0.19
						1" Ice	8.38	7.94	0.34
						2" Ice			
P40-16-XLPP-RR-A w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	8.24	4.83	0.07
						1/2" Ice	8.70	5.57	0.14
							9.16	6.27	0.21
						1" Ice	10.09	7.67	0.37
						2" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	8.26	6.95	0.08
						1/2" Ice	8.82	8.13	0.15
							9.35	9.02	0.23
						1" Ice	10.42	10.84	0.41
						2" Ice			
P40-16-XLPP-RR-A w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	8.24	4.83	0.07
						1/2" Ice	8.70	5.57	0.14
							9.16	6.27	0.21
						1" Ice	10.09	7.67	0.37
						2" Ice			
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	0.66	0.32	0.01
						1/2" Ice	0.76	0.40	0.02
							0.87	0.48	0.02
						1" Ice	1.11	0.67	0.04
						2" Ice			
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice	0.66	0.32	0.01
						1/2" Ice	0.76	0.40	0.02
							0.87	0.48	0.02
						1" Ice	1.11	0.67	0.04
						2" Ice			
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00 0.00	0.000	97.00	No Ice	0.66 0.76	0.32 0.40	0.01 0.02

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
			1.00			1/2" Ice	0.87 1.11	0.48 0.67	0.02 0.04
						1" Ice 2" Ice			
TD-RRH8x20-25	A	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.29	0.07 0.10 0.13 0.20
TD-RRH8x20-25	B	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.29	0.07 0.10 0.13 0.20
TD-RRH8x20-25	C	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.29	0.07 0.10 0.13 0.20
(3) ACU-A20-N	A	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.07 0.10 0.15 0.26	0.12 0.16 0.21 0.34	0.00 0.00 0.00 0.01
(3) ACU-A20-N	B	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.07 0.10 0.15 0.26	0.12 0.16 0.21 0.34	0.00 0.00 0.00 0.01
(3) ACU-A20-N	C	From Leg	4.00 0.00 1.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.07 0.10 0.15 0.26	0.12 0.16 0.21 0.34	0.00 0.00 0.00 0.01
Platform Mount [LP 712-1]	C	None		0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	24.53 29.94 35.35 46.17	24.53 29.94 35.35 46.17	1.34 1.65 1.96 2.58
8'x2" Antenna Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
8'x2" Antenna Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
8'x2" Antenna Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
83 APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	0.16 0.30 0.44 0.78
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	0.16 0.30 0.44 0.78

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
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	0.16 0.30 0.44 0.78
RADIO 4449 B12/B71	A	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	B	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	C	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.75 7.20 7.65 8.57	6.07 6.87 7.58 9.06	0.15 0.21 0.28 0.44
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.75 7.20 7.65 8.57	6.07 6.87 7.58 9.06	0.15 0.21 0.28 0.44
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.75 7.20 7.65 8.57	6.07 6.87 7.58 9.06	0.15 0.21 0.28 0.44
ATMAA1412D-1A20	A	From Leg	4.00 0.00 0.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.26 1.55	0.41 0.50 0.59 0.81	0.01 0.02 0.03 0.06
ATMAA1412D-1A20	B	From Leg	4.00 0.00 0.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.26 1.55	0.41 0.50 0.59 0.81	0.01 0.02 0.03 0.06
ATMAA1412D-1A20	C	From Leg	4.00 0.00 0.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.26 1.55	0.41 0.50 0.59 0.81	0.01 0.02 0.03 0.06

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
Platform Mount [LP 303-1]	C	None		0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.66 18.87 23.08 31.50	14.66 18.87 23.08 31.50	1.25 1.48 1.71 2.18
8'x2" Antenna Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
8'x2" Antenna Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
8'x2" Antenna Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	83.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
51 KS24019-L112A	C	From Leg	2.00 0.00 0.00	0.000	51.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.14 0.20 0.26 0.41	0.14 0.20 0.26 0.41	0.01 0.01 0.01 0.02
Side Arm Mount [SO 301-1] ******	C	From Leg	1.00 0.00 0.00	0.000	51.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.39 1.78 2.56	0.90 1.42 1.94 2.98	0.02 0.03 0.04 0.06

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
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

Comb. No.	Description
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	120 - 84.71	Pole	Max Tension	14	0.00	0.00	0.00
			Max. Compression	26	-30.32	-0.42	-0.91
			Max. Mx	8	-14.58	-504.60	-0.00
			Max. My	14	-14.58	0.23	-505.22
			Max. Vy	8	22.33	-504.60	-0.00
			Max. Vx	14	22.37	0.23	-505.22
			Max. Torque	7			-0.80
L2	84.71 - 41.583	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-51.21	-0.39	-0.87
			Max. Mx	8	-29.20	-1694.62	1.51
			Max. My	14	-29.20	1.86	-1697.15
			Max. Vy	8	31.11	-1694.62	1.51
			Max. Vx	14	31.15	1.86	-1697.15
			Max. Torque	7			-0.80
L3	41.583 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-72.56	-0.39	-0.58
			Max. Mx	8	-47.44	-3271.48	3.37
			Max. My	14	-47.43	3.70	-3275.91
			Max. Vy	8	35.18	-3271.48	3.37
			Max. Vx	14	35.22	3.70	-3275.91
			Max. Torque	7			-0.80

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	72.56	0.01	-8.59

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H_x	20	47.46	35.14	-0.04
	Max. H_z	2	47.46	-0.04	35.18
	Max. M_x	2	3275.14	-0.04	35.18
	Max. M_z	8	3271.48	-35.14	0.04
	Max. Torsion	19	0.80	30.46	-17.63
	Min. Vert	11	35.59	-30.42	-17.56
	Min. H_x	8	47.46	-35.14	0.04
	Min. H_z	14	47.46	0.04	-35.18
	Min. M_x	14	-3275.91	0.04	-35.18
	Min. M_z	20	-3271.35	35.14	-0.04
	Min. Torsion	7	-0.80	-30.46	17.63

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	39.55	0.00	0.00	0.31	-0.05	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	47.46	0.04	-35.18	-3275.14	-3.83	0.38
0.9 Dead+1.0 Wind 0 deg - No Ice	35.59	0.04	-35.18	-3252.45	-3.78	0.38
1.2 Dead+1.0 Wind 30 deg - No Ice	47.46	17.61	-30.49	-2838.18	-1639.02	0.68
0.9 Dead+1.0 Wind 30 deg - No Ice	35.59	17.61	-30.49	-2818.53	-1627.61	0.68
1.2 Dead+1.0 Wind 60 deg - No Ice	47.46	30.46	-17.63	-1640.63	-2835.07	0.80
0.9 Dead+1.0 Wind 60 deg - No Ice	35.59	30.46	-17.63	-1629.32	-2815.33	0.80
1.2 Dead+1.0 Wind 90 deg - No Ice	47.46	35.14	-0.04	-3.37	-3271.48	0.70
0.9 Dead+1.0 Wind 90 deg - No Ice	35.59	35.14	-0.04	-3.45	-3248.70	0.70
1.2 Dead+1.0 Wind 120 deg - No Ice	47.46	30.42	17.56	1634.90	-2831.32	0.41
0.9 Dead+1.0 Wind 120 deg - No Ice	35.59	30.42	17.56	1623.43	-2811.60	0.41
1.2 Dead+1.0 Wind 150 deg - No Ice	47.46	17.54	30.45	2835.20	-1632.52	0.01
0.9 Dead+1.0 Wind 150 deg - No Ice	35.59	17.54	30.45	2815.38	-1621.14	0.02
1.2 Dead+1.0 Wind 180 deg - No Ice	47.46	-0.04	35.18	3275.91	3.70	-0.39
0.9 Dead+1.0 Wind 180 deg - No Ice	35.59	-0.04	35.18	3253.02	3.69	-0.38
1.2 Dead+1.0 Wind 210 deg - No Ice	47.46	-17.61	30.49	2838.95	1638.90	-0.68
0.9 Dead+1.0 Wind 210 deg - No Ice	35.59	-17.61	30.49	2819.11	1627.51	-0.68
1.2 Dead+1.0 Wind 240 deg - No Ice	47.46	-30.46	17.63	1641.41	2834.94	-0.80
0.9 Dead+1.0 Wind 240 deg - No Ice	35.59	-30.46	17.63	1629.89	2815.23	-0.80
1.2 Dead+1.0 Wind 270 deg - No Ice	47.46	-35.14	0.04	4.15	3271.35	-0.70
0.9 Dead+1.0 Wind 270 deg - No Ice	35.59	-35.14	0.04	4.02	3248.61	-0.70
1.2 Dead+1.0 Wind 300 deg - No Ice	47.46	-30.42	-17.56	-1634.12	2831.19	-0.41
0.9 Dead+1.0 Wind 300 deg - No Ice	35.59	-30.42	-17.56	-1622.85	2811.50	-0.41
1.2 Dead+1.0 Wind 330 deg - No Ice	47.46	-17.54	-30.45	-2834.43	1632.39	-0.01

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.0 Wind 330 deg - No Ice	35.59	-17.54	-30.45	-2814.80	1621.04	-0.02
1.2 Dead+1.0 Ice+1.0 Temp	72.56	0.00	0.00	0.58	-0.39	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	72.56	0.01	-8.59	-794.00	-1.16	0.08
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	72.56	4.30	-7.44	-687.90	-397.92	0.17
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	72.56	7.43	-4.30	-397.30	-688.18	0.22
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	72.56	8.58	-0.01	-0.07	-794.16	0.20
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	72.56	7.43	4.29	397.36	-687.46	0.14
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	72.56	4.28	7.44	688.49	-396.67	0.03
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	72.56	-0.01	8.59	795.32	0.30	-0.08
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	72.56	-4.30	7.44	689.22	397.06	-0.17
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	72.56	-7.43	4.30	398.62	687.32	-0.22
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	72.56	-8.58	0.01	1.39	793.30	-0.20
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	72.56	-7.43	-4.29	-396.04	686.60	-0.14
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	72.56	-4.28	-7.44	-687.17	395.80	-0.03
Dead+Wind 0 deg - Service	39.55	0.01	-7.63	-707.65	-0.87	0.08
Dead+Wind 30 deg - Service	39.55	3.82	-6.62	-613.21	-354.30	0.15
Dead+Wind 60 deg - Service	39.55	6.61	-3.82	-354.37	-612.81	0.17
Dead+Wind 90 deg - Service	39.55	7.63	-0.01	-0.49	-707.14	0.15
Dead+Wind 120 deg - Service	39.55	6.60	3.81	353.60	-612.00	0.09
Dead+Wind 150 deg - Service	39.55	3.81	6.61	613.04	-352.89	0.00
Dead+Wind 180 deg - Service	39.55	-0.01	7.63	708.30	0.76	-0.08
Dead+Wind 210 deg - Service	39.55	-3.82	6.62	613.85	354.19	-0.15
Dead+Wind 240 deg - Service	39.55	-6.61	3.82	355.01	612.70	-0.17
Dead+Wind 270 deg - Service	39.55	-7.63	0.01	1.14	707.03	-0.15
Dead+Wind 300 deg - Service	39.55	-6.60	-3.81	-352.96	611.89	-0.09
Dead+Wind 330 deg - Service	39.55	-3.81	-6.61	-612.39	352.78	-0.00

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-39.55	0.00	0.00	39.55	0.00	0.000%
2	0.04	-47.46	-35.18	-0.04	47.46	35.18	0.000%
3	0.04	-35.59	-35.18	-0.04	35.59	35.18	0.000%
4	17.61	-47.46	-30.49	-17.61	47.46	30.49	0.000%
5	17.61	-35.59	-30.49	-17.61	35.59	30.49	0.000%
6	30.46	-47.46	-17.63	-30.46	47.46	17.63	0.000%
7	30.46	-35.59	-17.63	-30.46	35.59	17.63	0.000%
8	35.14	-47.46	-0.04	-35.14	47.46	0.04	0.000%
9	35.14	-35.59	-0.04	-35.14	35.59	0.04	0.000%
10	30.42	-47.46	17.56	-30.42	47.46	-17.56	0.000%
11	30.42	-35.59	17.56	-30.42	35.59	-17.56	0.000%
12	17.54	-47.46	30.45	-17.54	47.46	-30.45	0.000%
13	17.54	-35.59	30.45	-17.54	35.59	-30.45	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
14	-0.04	-47.46	35.18	0.04	47.46	-35.18	0.000%
15	-0.04	-35.59	35.18	0.04	35.59	-35.18	0.000%
16	-17.61	-47.46	30.49	17.61	47.46	-30.49	0.000%
17	-17.61	-35.59	30.49	17.61	35.59	-30.49	0.000%
18	-30.46	-47.46	17.63	30.46	47.46	-17.63	0.000%
19	-30.46	-35.59	17.63	30.46	35.59	-17.63	0.000%
20	-35.14	-47.46	0.04	35.14	47.46	-0.04	0.000%
21	-35.14	-35.59	0.04	35.14	35.59	-0.04	0.000%
22	-30.42	-47.46	-17.56	30.42	47.46	17.56	0.000%
23	-30.42	-35.59	-17.56	30.42	35.59	17.56	0.000%
24	-17.54	-47.46	-30.45	17.54	47.46	30.45	0.000%
25	-17.54	-35.59	-30.45	17.54	35.59	30.45	0.000%
26	0.00	-72.56	0.00	0.00	72.56	0.00	0.000%
27	0.01	-72.56	-8.59	-0.01	72.56	8.59	0.000%
28	4.30	-72.56	-7.44	-4.30	72.56	7.44	0.000%
29	7.43	-72.56	-4.30	-7.43	72.56	4.30	0.000%
30	8.58	-72.56	-0.01	-8.58	72.56	0.01	0.000%
31	7.43	-72.56	4.29	-7.43	72.56	-4.29	0.000%
32	4.28	-72.56	7.44	-4.28	72.56	-7.44	0.000%
33	-0.01	-72.56	8.59	0.01	72.56	-8.59	0.000%
34	-4.30	-72.56	7.44	4.30	72.56	-7.44	0.000%
35	-7.43	-72.56	4.30	7.43	72.56	-4.30	0.000%
36	-8.58	-72.56	0.01	8.58	72.56	-0.01	0.000%
37	-7.43	-72.56	-4.29	7.43	72.56	4.29	0.000%
38	-4.28	-72.56	-7.44	4.28	72.56	7.44	0.000%
39	0.01	-39.55	-7.63	-0.01	39.55	7.63	0.000%
40	3.82	-39.55	-6.62	-3.82	39.55	6.62	0.000%
41	6.61	-39.55	-3.82	-6.61	39.55	3.82	0.000%
42	7.63	-39.55	-0.01	-7.63	39.55	0.01	0.000%
43	6.60	-39.55	3.81	-6.60	39.55	-3.81	0.000%
44	3.81	-39.55	6.61	-3.81	39.55	-6.61	0.000%
45	-0.01	-39.55	7.63	0.01	39.55	-7.63	0.000%
46	-3.82	-39.55	6.62	3.82	39.55	-6.62	0.000%
47	-6.61	-39.55	3.82	6.61	39.55	-3.82	0.000%
48	-7.63	-39.55	0.01	7.63	39.55	-0.01	0.000%
49	-6.60	-39.55	-3.81	6.60	39.55	3.81	0.000%
50	-3.81	-39.55	-6.61	3.81	39.55	6.61	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	0.00011429
3	Yes	4	0.00000001	0.00006847
4	Yes	5	0.00000001	0.00015893
5	Yes	5	0.00000001	0.00007004
6	Yes	5	0.00000001	0.00015363
7	Yes	5	0.00000001	0.00006753
8	Yes	4	0.00000001	0.00013578
9	Yes	4	0.00000001	0.00008269
10	Yes	5	0.00000001	0.00015703
11	Yes	5	0.00000001	0.00006919
12	Yes	5	0.00000001	0.00015591
13	Yes	5	0.00000001	0.00006864
14	Yes	4	0.00000001	0.00009026
15	Yes	4	0.00000001	0.00005274
16	Yes	5	0.00000001	0.00015404
17	Yes	5	0.00000001	0.00006769
18	Yes	5	0.00000001	0.00015932
19	Yes	5	0.00000001	0.00007021
20	Yes	4	0.00000001	0.00016151
21	Yes	4	0.00000001	0.00009902
22	Yes	5	0.00000001	0.00015429
23	Yes	5	0.00000001	0.00006792
24	Yes	5	0.00000001	0.00015543
25	Yes	5	0.00000001	0.00006845
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00006375
28	Yes	5	0.00000001	0.00007460
29	Yes	5	0.00000001	0.00007427
30	Yes	5	0.00000001	0.00006393
31	Yes	5	0.00000001	0.00007468
32	Yes	5	0.00000001	0.00007461
33	Yes	5	0.00000001	0.00006405
34	Yes	5	0.00000001	0.00007448
35	Yes	5	0.00000001	0.00007477
36	Yes	5	0.00000001	0.00006378
37	Yes	5	0.00000001	0.00007398
38	Yes	5	0.00000001	0.00007410
39	Yes	4	0.00000001	0.00001149
40	Yes	4	0.00000001	0.00007538
41	Yes	4	0.00000001	0.00006746
42	Yes	4	0.00000001	0.00001287
43	Yes	4	0.00000001	0.00007309
44	Yes	4	0.00000001	0.00007130
45	Yes	4	0.00000001	0.00001136
46	Yes	4	0.00000001	0.00006805
47	Yes	4	0.00000001	0.00007612
48	Yes	4	0.00000001	0.00001307
49	Yes	4	0.00000001	0.00006882
50	Yes	4	0.00000001	0.00007048

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 84.71	11.74	46	0.818	0.001
L2	89.293 - 41.583	6.74	46	0.701	0.000
L3	47.416 - 0	1.91	46	0.370	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt ‹	Twist ‹	Radius of Curvature ft
118.00	7770.00 w/ Mount Pipe	46	11.40	0.812	0.001	56079
116.00	TME-RRUS-11	46	11.06	0.807	0.001	56079
108.00	(4) 844G65VTZASX w/ Mount Pipe	46	9.72	0.782	0.001	23366
100.00	TME-1900MHz RRH (65 MHz)	46	8.41	0.752	0.001	14019
97.00	APXVTM14-C-120 w/ Mount Pipe	46	7.93	0.740	0.001	12191
83.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	46	5.83	0.662	0.000	8276
51.00	KS24019-L112A	46	2.19	0.400	0.000	5607

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt ‹	Twist ‹
L1	120 - 84.71	54.29	16	3.784	0.004
L2	89.293 - 41.583	31.20	16	3.244	0.002
L3	47.416 - 0	8.83	16	1.710	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt ‹	Twist ‹	Radius of Curvature ft
118.00	7770.00 w/ Mount Pipe	16	52.73	3.758	0.004	12245
116.00	TME-RRUS-11	16	51.16	3.731	0.004	12245
108.00	(4) 844G65VTZASX w/ Mount Pipe	16	44.95	3.617	0.003	5101
100.00	TME-1900MHz RRH (65 MHz)	16	38.89	3.482	0.003	3059
97.00	APXVTM14-C-120 w/ Mount Pipe	16	36.68	3.423	0.003	2660
83.00	APXVAARR24_43-U-NA20 w/ Mount Pipe	16	26.98	3.062	0.002	1802
51.00	KS24019-L112A	16	10.15	1.853	0.001	1214

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	120 - 84.71 (1)	TP32.56x24.09x0.375	35.29	0.00	0.0	36.999	-14.57	2164.44	0.007
L2	84.71 - 41.583 (2)	TP42.03x30.71x0.438	47.71	0.00	0.0	55.835	-29.20	3266.32	0.009
L3	41.583 - 0 (3)	TP51x39.771x0.5	47.42	0.00	0.0	80.144	-47.44	4688.40	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	120 - 84.71 (1)	TP32.56x24.09x0.375	505.30	1749.78	0.289	0.00	1749.78	0.000
L2	84.71 - 41.583 (2)	TP42.03x30.71x0.438	1698.18	3419.58	0.497	0.00	3419.58	0.000
L3	41.583 - 0 (3)	TP51x39.771x0.5	3278.06	6078.80	0.539	0.00	6078.80	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	120 - 84.71 (1)	TP32.56x24.09x0.375	22.39	649.33	0.034	0.75	1767.66	0.000
L2	84.71 - 41.583 (2)	TP42.03x30.71x0.438	31.18	979.90	0.032	0.68	3450.47	0.000
L3	41.583 - 0 (3)	TP51x39.771x0.5	35.24	1406.52	0.025	0.68	6220.37	0.000

Pole Interaction Design Data

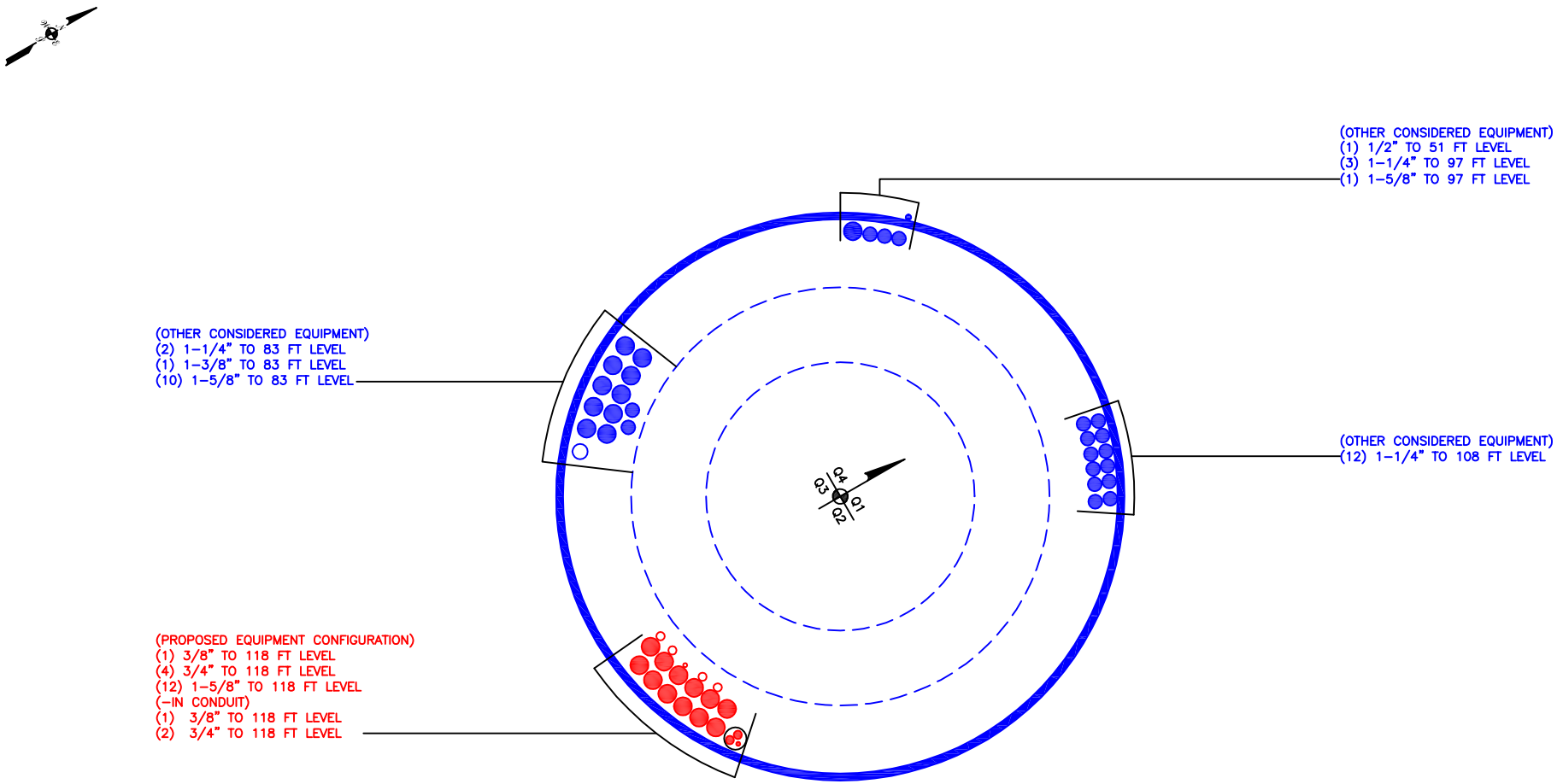
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 84.71 (1)	0.007	0.289	0.000	0.034	0.000	0.297	1.050	4.8.2
L2	84.71 - 41.583 (2)	0.009	0.497	0.000	0.032	0.000	0.507	1.050	4.8.2
L3	41.583 - 0 (3)	0.010	0.539	0.000	0.025	0.000	0.550	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	120 - 84.71	Pole	TP32.56x24.09x0.375	1	-14.57	2272.66	28.3	Pass
L2	84.71 - 41.583	Pole	TP42.03x30.71x0.438	2	-29.20	3429.64	48.2	Pass
L3	41.583 - 0	Pole	TP51x39.771x0.5	3	-47.44	4922.82	52.4	Pass
							Summary	
						Pole (L3)	52.4	Pass
						RATING =	**52.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 881536 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

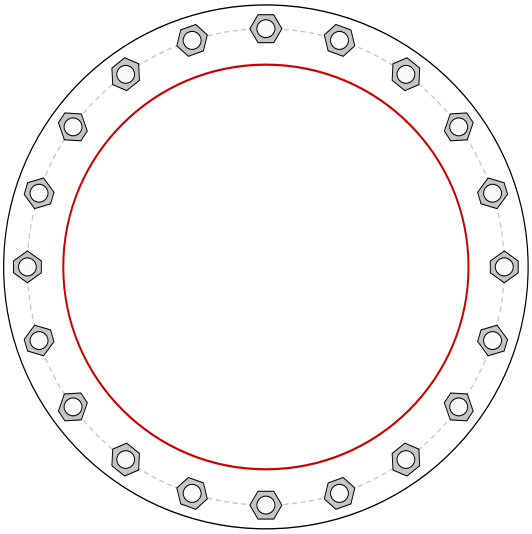
Monopole Base Plate Connection

Site Info	
BU #	881536
Site Name	NORTH HAVEN TOWER
Order #	471644 Rev#0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	3

Applied Loads	
Moment (kip-ft)	3278.06
Axial Force (kips)	47.43
Shear Force (kips)	35.24

**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 60" BC

Base Plate Data

66" OD x 2.25" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

51" x 0.5" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_c = 133.42	ϕPn_c = 243.75	**Stress Rating**
Vu = 1.76	ϕVn = 73.13	**55.6%**
Mu = 3.44	ϕMn = 94.7	**Pass**

Base Plate Summary

Max Stress (ksi):	34.55	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**60.9%**	**Pass**

Drilled Pier Foundation

BU # :	881536
Site Name:	NORTH HAVEN TOWI
Order Number:	471644 Rev#0

TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads	Comp.	Uplift
Moment (kip-ft)	3278	
Axial Force (kips)	47	
Shear Force (kips)	35	

Material Properties		
Concrete Strength, f'c:	4	ksi
Rebar Strength, Fy:	60	ksi

Pier Design Data		
Depth	39	ft
Ext. Above Grade	1	ft
Pier Section 1		
From 1' above grade to 39' below grade		
Pier Diameter	7.5	ft
Rebar Quantity	25	
Rebar Size	11	
Clear Cover to Ties	4	in
Tie Size	5	

Analysis Results		
Soil Lateral Capacity	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	8.18	-
Soil Safety Factor	4.63	-
Max Moment (kip-ft)	3513.98	-
Rating*	*27.4%*	-
Soil Vertical Capacity	*Compression*	*Uplift*
Skin Friction (kips)	596.43	-
End Bearing (kips)	530.14	-
Weight of Concrete (kips)	212.23	-
Total Capacity (kips)	1126.58	-
Axial (kips)	259.23	-
Rating*	*21.9%*	-
Reinforced Concrete Capacity	*Compression*	*Uplift*
Critical Depth (ft from TOC)	8.38	-
Critical Moment (kip-ft)	3513.70	-
Critical Moment Capacity	6795.89	-
Rating*	*49.2%*	-

Soil Interaction Rating*	**27.4%**
Structural Foundation Rating*	**49.2%**

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☑

Soil Profile

Groundwater Depth	7	ft	# of Layers: 8

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.75	3.75	120	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	3.75	7	3.25	120	150	0	32	0.000	0.000	1.40	1.40			Cohesionless
3	7	20	13	60	87.6	0	32	0.000	0.000	1.40	1.40			Cohesionless
4	20	25	5	60	87.6	0	30	1.014	1.014				10	Cohesionless
5	25	28	3	60	87.6	0	29	0.647	0.647				6	Cohesionless
6	28	30	2	60	87.6	0.75	0	0.413	0.413					Cohesive
7	30	35	5	60	87.6	0.75	0	0.41	0.41					Cohesive
8	35	39	4	60	87.6	0.5	0	0.28	0.28			16		Cohesive

Date: **January 30, 2019**

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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 Mount Modification**	
	Carrier Site Number:	11071172
	Carrier Site Name:	CTL05107
Crown Castle Designation:	**Crown Castle BU Number:**	881536
	Crown Castle Site Name:	North Haven Tower
	Crown Castle JDE Job Number:	548523
	Crown Castle Order Number:	471644, Rev. 0
Engineering Firm Designation:	**Infinigy Report Designation:**	1039-A0002-B
Site Data:	**120 Universal Drive, North Haven, CT, 06473** **Latitude 41°20'40.01" Longitude -72°52'14.92"**	
Structure Information:	**Tower Height & Type:**	**120 ft Monopole**
	Mount Elevation:	**118 ft**
	Mount Type:	**10 ft Platfrom**

Dear Charles McGuirt,

Infinigy is pleased to submit this **"Mount Modification 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:

Platfrom (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 125 mph from the 2015 International Building Code and the 2018 Connecticut State Building Code. Exposure Category C 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: Christopher Kudlacik
Respectfully Submitted by:

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

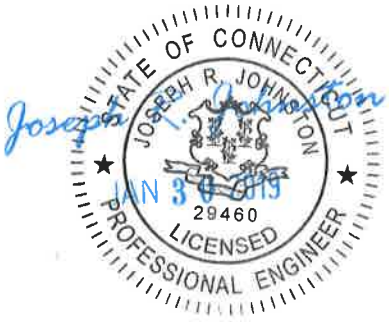


TABLE OF CONTENTS

1) INTRODUCTION

This mount is a existing 10 ft Platfrom designed by Engineered Endeavors, Inc.This mount is installed at the 118 ft elevation on 3 sector(s) of the 120 ft monopole**.**

2) ANALYSIS CRITERIA

Building Code:	2015 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	125 mph
Exposure Category:	C
Topographic Factor at Base:	1.0
Topographic Factor at Mount:	1.0
Ice Thickness:	1.28 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 - Final Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
118.0	121.0	3	CCI	OPA-65R-LCUU-H6	Platform
		6	Kathrein	80010966	
		3	Powerwave	7770.00	
		6	CCI	TPX-070821	
		3	Ericsson	RRUS 32	
		3	Ericsson	RRUS 4449 B5/B12	
		3	Ericsson	RRUS 4478 B14	
		3	Ericsson	RRUS 8843 B2/B66A	
		6	Powerwave	LGP21401	
		3	Raycap	DC6-48-60-18-8F	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
AT&T Application	Crown Application	471644, Rev 0	CCI Sites
Tower Manufacturer Drawings	August 31, 2007	881536	CCI Sites
Site Photos	April 26, 2018	881536	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 (Platfrom, Typical)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,2	Mount Pipe	MP2	118.0	53.5	Pass
	Main Horizontal	M8		73.6	Pass
	Standoff	M57		72.8	Pass
	Bolt Check	--		16.7	Pass

Structure Rating (max from all components) =	73.6%

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

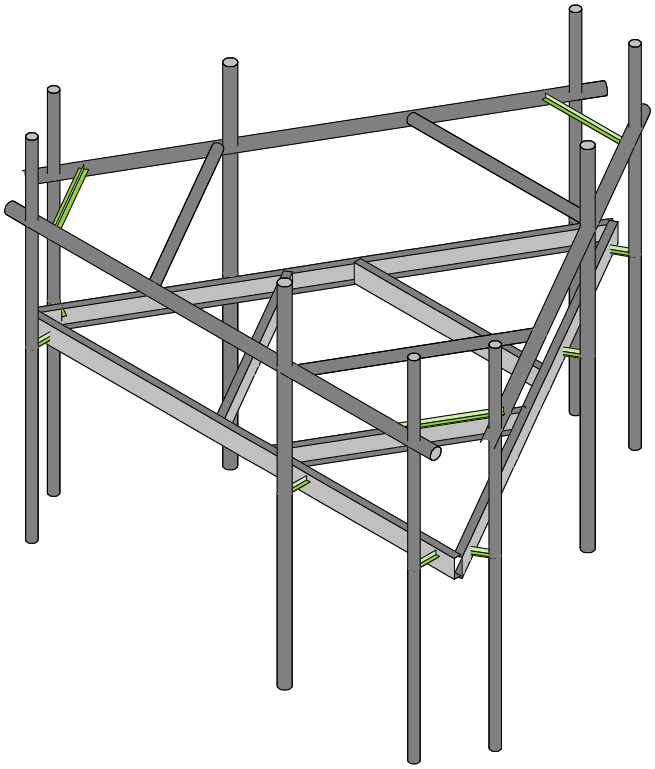
4.1) Recommendations

The Sector Frame Mount has sufficient capacity to support the proposed loading after the following is installed:

- Install (1) Sitepro1 HRK-12-3HD 2’-6” above the existing platform

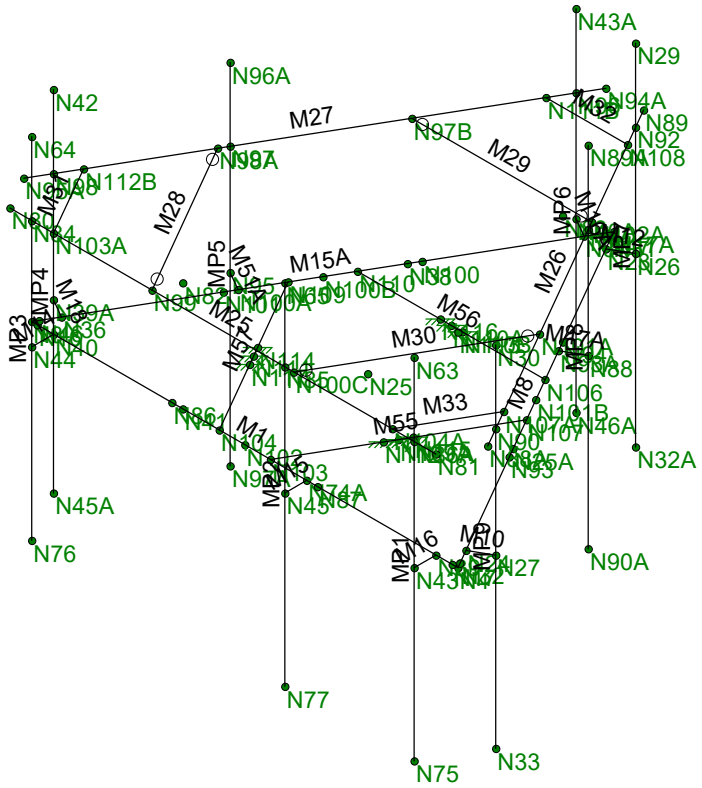
APPENDIX A

WIRE FRAME AND RENDERED MODELS



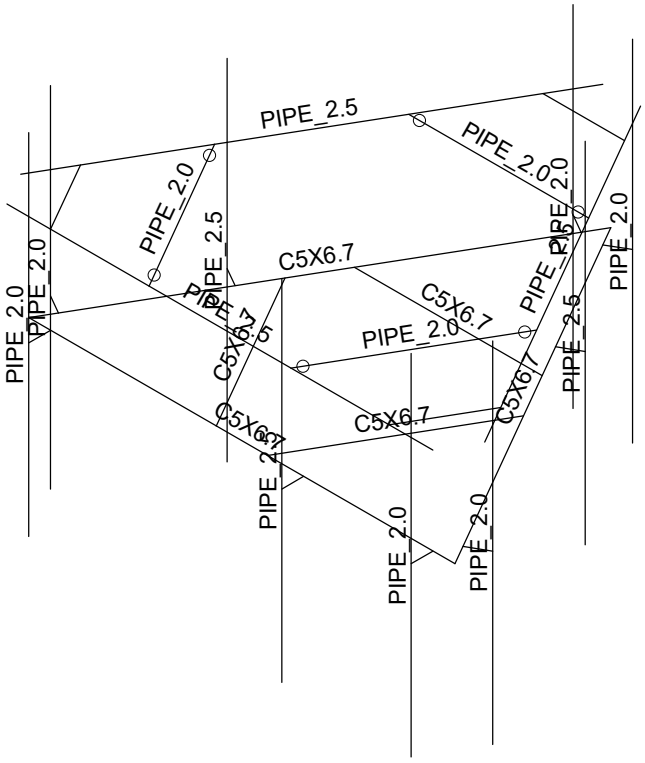
Envelope Only Solution

Infinigy Engineering PLLC	881536	Final Configuration
CLK		Jan 23, 2019 at 12:01 PM
1039-A0002-B		MOD_881536_EEI 12' low profile p...



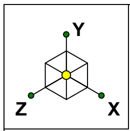
Envelope Only Solution

Infinigy Engineering PLLC	881536	Wireframe
CLK		Jan 23, 2019 at 11:56 AM
1039-A0002-B		MOD_881536_EEI 12' low profile p...



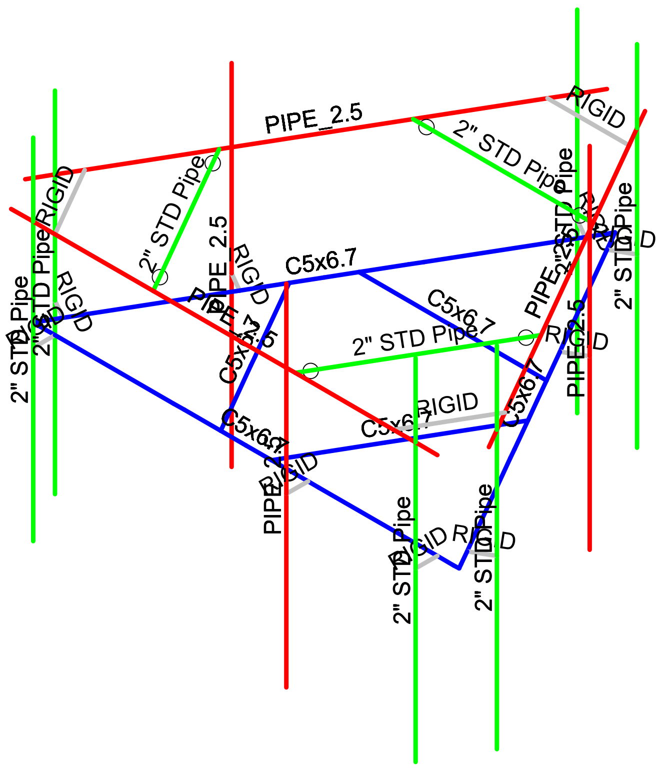
Envelope Only Solution

Infinigy Engineering PLLC	881536	member Shapes
CLK		Jan 23, 2019 at 11:56 AM
1039-A0002-B		MOD_881536_EEI 12' low profile p...



Section Sets

- C5x6.7
- 2" STD Pipe
- PIPE_2.5
- RIGID



Envelope Only Solution

Infinigy Engineering PLLC	881536	Section Sets
CLK		Jan 23, 2019 at 11:57 AM
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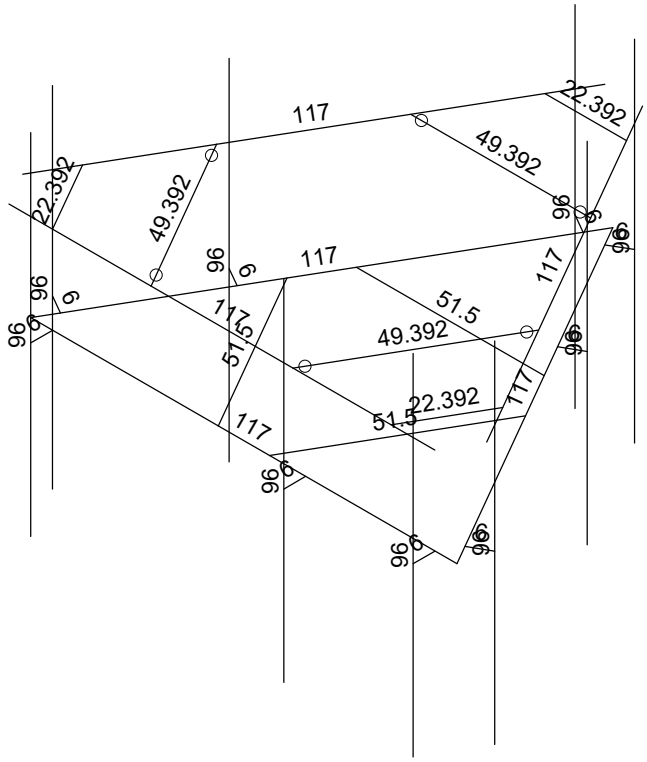
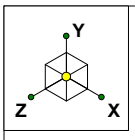
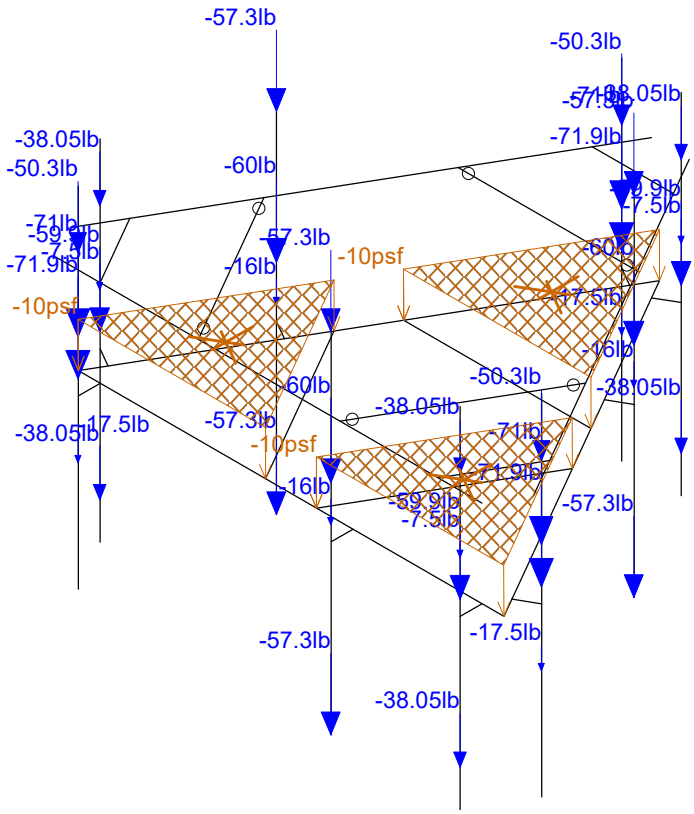


Member Length (in) Displayed
Envelope Only Solution

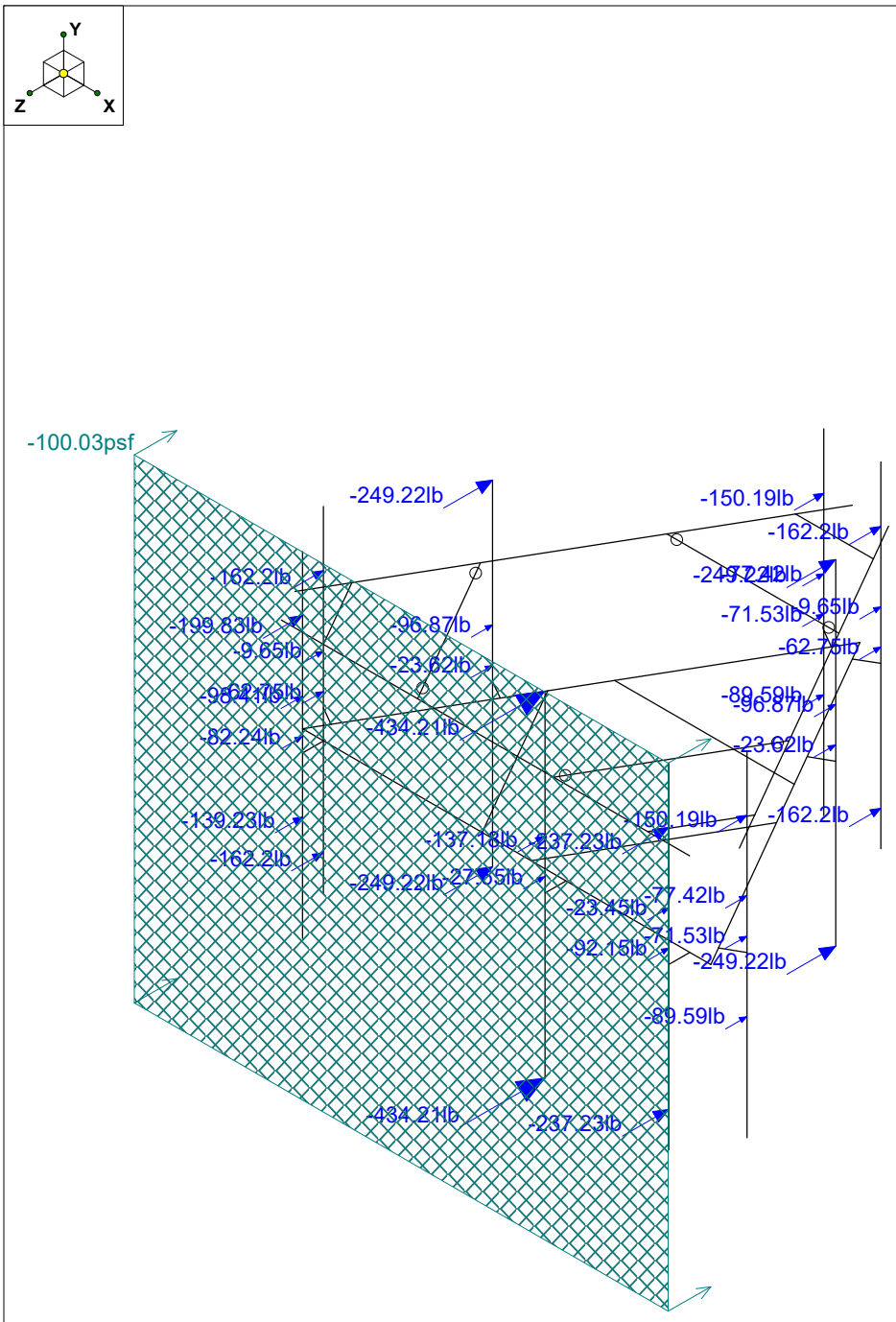
Infinigy Engineering PLLC	881536	member Lengths
CLK		Jan 23, 2019 at 11:57 AM
1039-A0002-B		MOD_881536_EEI 12' low profile p...





Loads: BLC 1, Self Weight
Envelope Only Solution

Infinigy Engineering PLLC	881536	Dead Load
CLK		Jan 23, 2019 at 12:01 PM
1039-A0002-B		MOD_881536_EEI 12' low profile p...



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

Infinigy Engineering PLLC	881536	Wind load 000
CLK		Jan 23, 2019 at 12:02 PM
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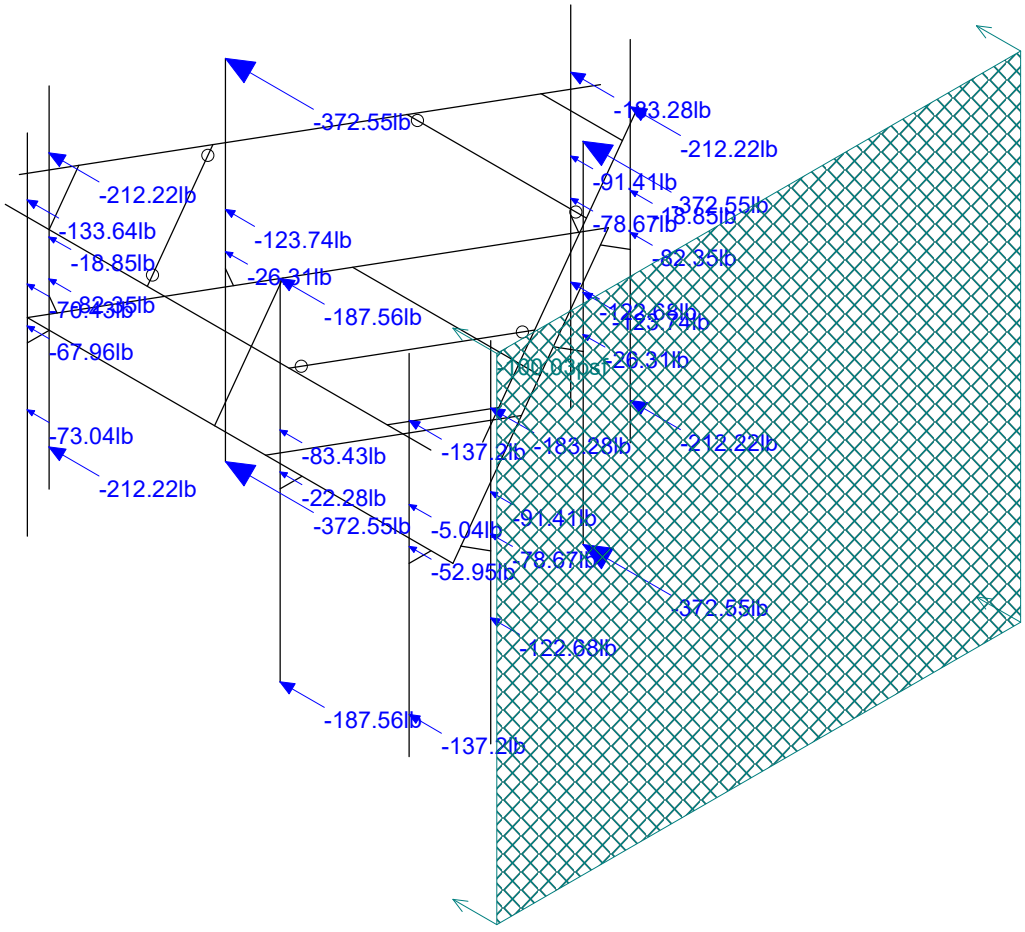

Loads: BLC 3, Wind Load AZI 090
Envelope Only Solution

Infinigy Engineering PLLC	881536	Wind load 090
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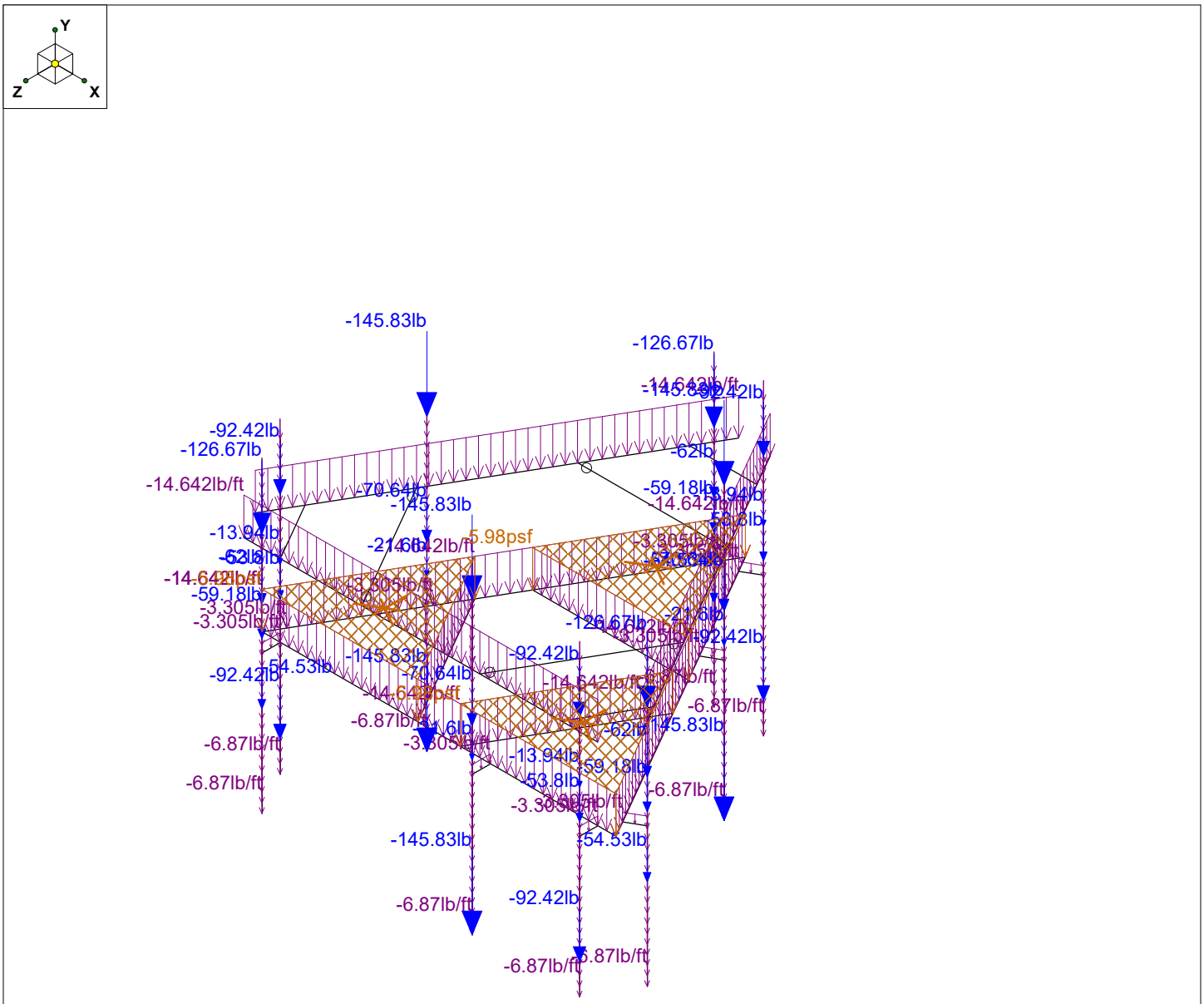
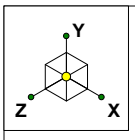
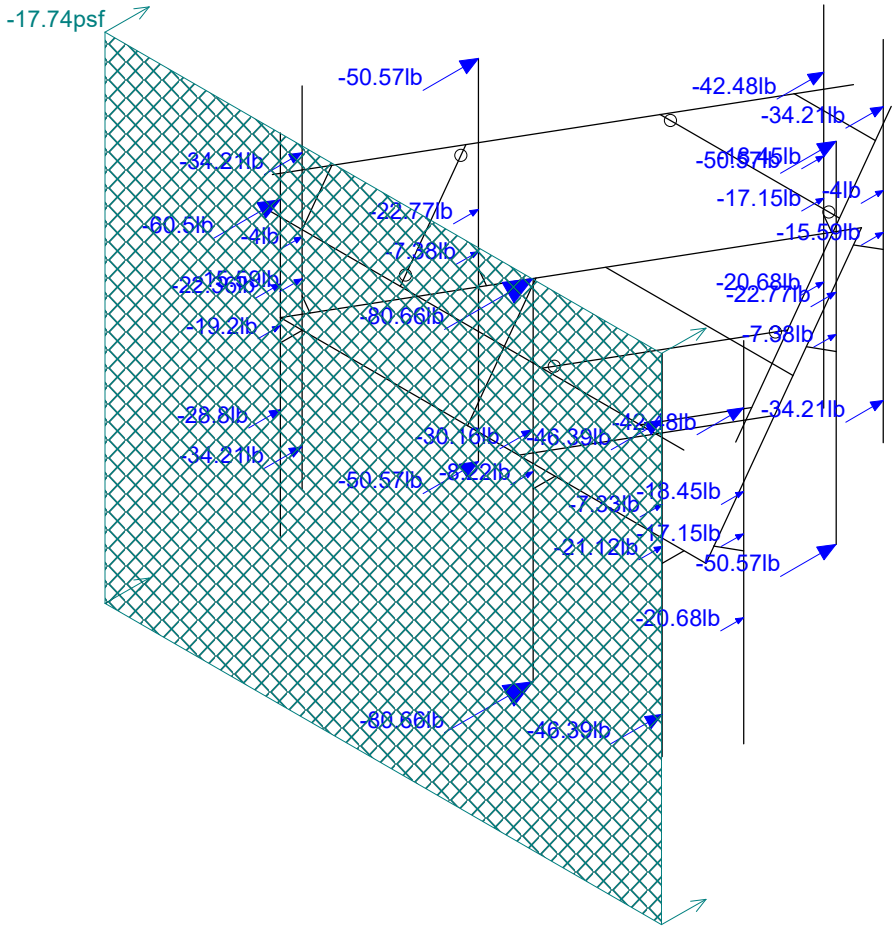
1039-A0002-B		MOD_881536_EEI 12' low profile p...



Loads: BLC 4, Ice Weight
Envelope Only Solution

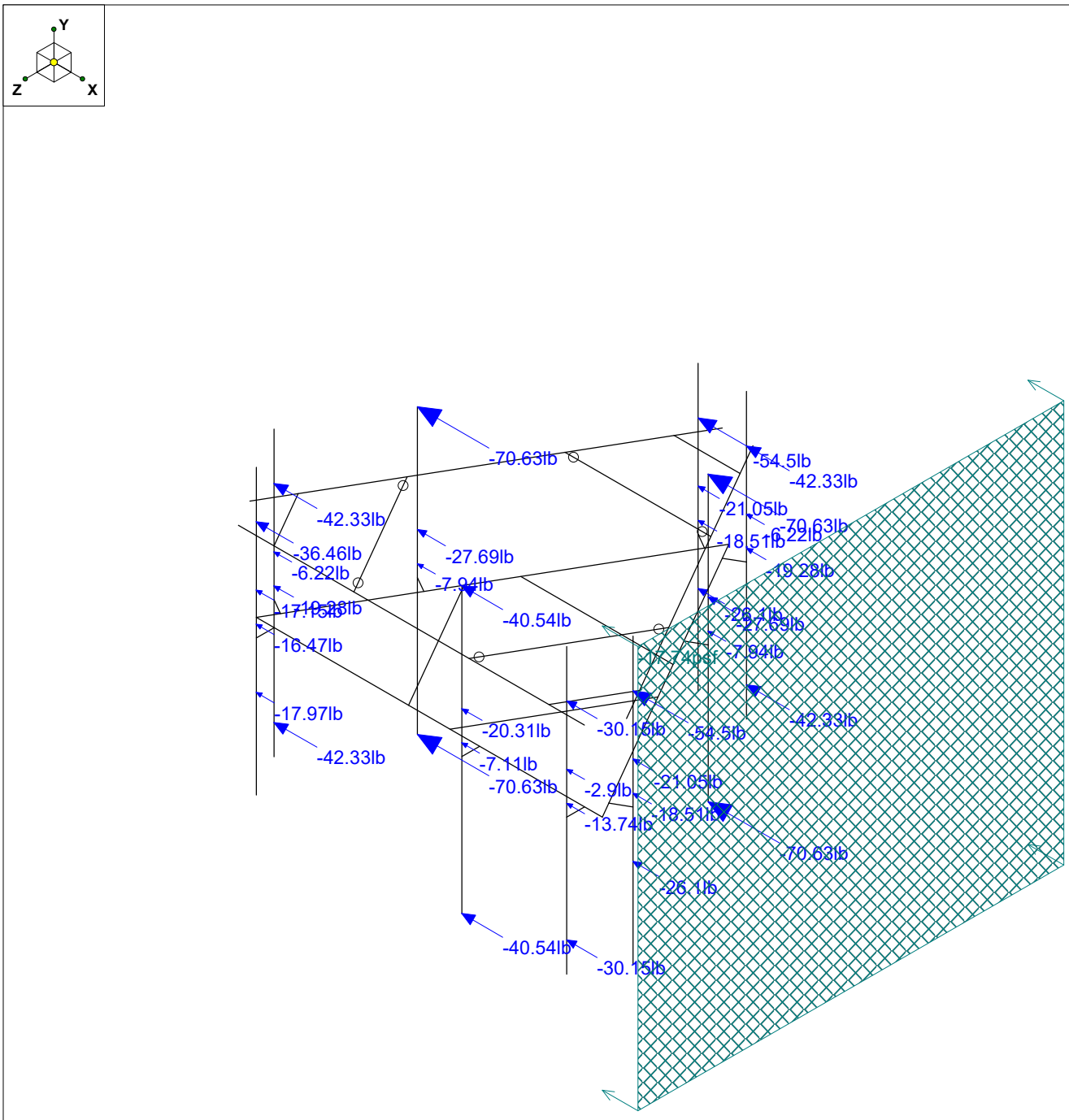
Infinigy Engineering PLLC	881536	Ice Load
CLK		Jan 23, 2019 at 12:02 PM
1039-A0002-B		MOD_881536_EEI 12' low profile p...





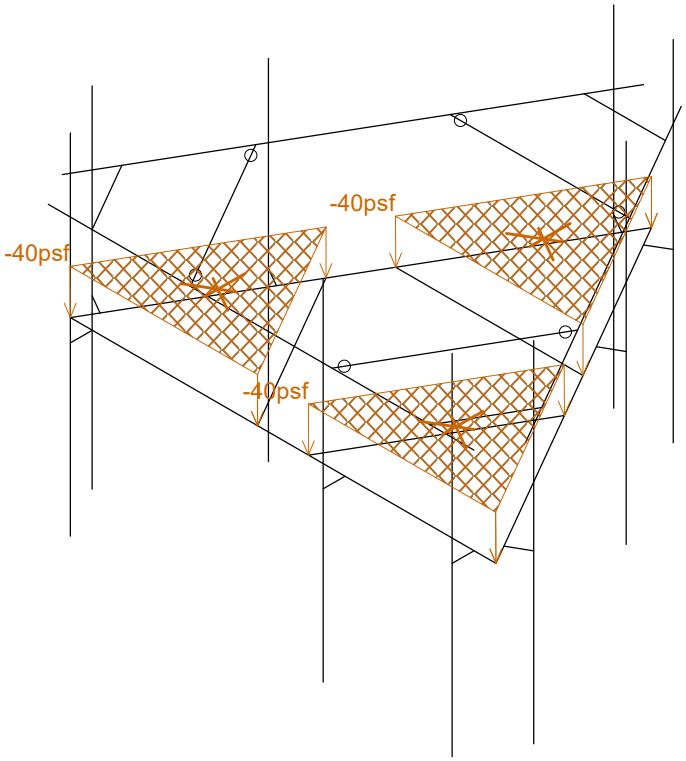
Loads: BLC 5, Wind + Ice Load AZI 000
Envelope Only Solution

Infinigy Engineering PLLC	881536	Wind + Ice Load 000
CLK		Jan 23, 2019 at 12:02 PM
1039-A0002-B		MOD_881536_EEI 12' low profile p...



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

Infinigy Engineering PLLC	881536	Wind + Ice Load 090
CLK		Jan 23, 2019 at 12:03 PM
1039-A0002-B		MOD_881536_EEI 12' low profile p...



Loads: BLC 7, Service Live 1
Envelope Only Solution

Infinigy Engineering PLLC	881536	Service Load
CLK		Jan 23, 2019 at 12:04 PM
1039-A0002-B		MOD_881536_EEI 12' low profile p...

APPENDIX B

SOFTWARE INPUT CALCULATIONS

Site Name:	881536
Client:	Crown Castle
Carrier:	AT&T
Engineer:	CLK
Date:	1/29/2019

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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:	125	mph (ultimate 3-second gust)
Wind Centerline 1 (z_1):	121.0	ft
Side Face Angle (θ):	60	degrees
Exposure Category:	C	
Topographic Category:	1	

Wind with No Ice		
q_z (psf)	Gh	F_{ST} (psf)
50.02	1.00	**100.03**

Wind with Ice		
q_z (psf)	Gh	F_{ST} (psf)
8.00	1.00	**17.74**

Ice Loading Inputs:

Is Ice Loading Needed?:	Yes	
Ice Wind Velocity:	50	mph (ultimate 3-second gust)
Base Ice Thickness:	1.28	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)
CCI OPA-65R-LCUU-H6	121.0	3	1.00	Flat	Flat	50.02	9.49	474.45	274.39	324.41	424.44
Kathrein 80010966	121.0	3	1.00	Flat	Flat	50.02	17.36	868.42	375.12	498.44	745.09
Powerwave 7770.00	121.0	2	1.00	Flat	Flat	50.02	5.57	278.45	146.08	179.17	245.36
CCI TPX-070821	121.0	3	1.00	Flat	Flat	50.02	0.47	23.45	5.04	9.65	18.85
Ericsson RRUS 32	121.0	3	1.00	Flat	Flat	50.02	2.74	137.18	83.43	96.87	123.74
Ericsson RRUS 4449 B5/B12	121.0	3	1.00	Flat	Flat	50.02	1.97	98.41	70.43	77.42	91.41
Ericsson RRUS 4478 B14	121.0	0	1.00	Flat	Flat	50.02	1.84	92.15	52.95	62.75	82.35
Ericsson RRUS 8843 B2/B66A	121.0	0	1.00	Flat	Flat	50.02	1.64	82.24	67.96	71.53	78.67
Powerwave LGP21401	121.0	0	1.00	Flat	Flat	50.02	0.55	27.65	22.28	23.62	26.31
Raycap DC6-48-60-18-8F	121.0	0	1.00	Round	Round	50.02	1.21	60.60	60.60	60.60	60.60

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	N3	N4		180	C5x6.7	Beam	Channel	A36 Gr.36	Typical
2	M14	N40	N44			RIGID	None	None	RIGID	Typical
3	M15	N74A	N45			RIGID	None	None	RIGID	Typical
4	M16	N39	N43			RIGID	None	None	RIGID	Typical
5	MP3	N76	N64			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
6	MP2	N77	N65			PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical
7	MP1	N75	N63			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
8	M8	N17A	N4			C5x6.7	Beam	Channel	A36 Gr.36	Typical
9	M15A	N3	N17A			C5x6.7	Beam	Channel	A36 Gr.36	Typical
10	M10	N24	N27			RIGID	None	None	RIGID	Typical
11	M12	N23	N26			RIGID	None	None	RIGID	Typical
12	MP9	N33	N30			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
13	MP7	N32A	N29			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
14	M16A	N37	N40A			RIGID	None	None	RIGID	Typical
15	M18	N36	N39A			RIGID	None	None	RIGID	Typical
16	MP6	N46A	N43A			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
17	MP4	N45A	N42			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
18	M47A	N93A	N88			RIGID	None	None	RIGID	Typical
19	MP8	N90A	N89A			PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical
20	M51A	N100A	N95			RIGID	None	None	RIGID	Typical
21	MP5	N97A	N96A			PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical
22	M55	N103	N107			C5x6.7	Beam	Channel	A36 Gr.36	Typical
23	M56	N106	N110			C5x6.7	Beam	Channel	A36 Gr.36	Typical
24	M57	N109	N104			C5x6.7	Beam	Channel	A36 Gr.36	Typical
25	M25	N80	N81		180	PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical
26	M26	N88A	N89		180	PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical
27	M27	N94A	N95A		180	PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical
28	M28	N99	N98A			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
29	M29	N97B	N102A			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
30	M30	N100C	N101A			2" STD Pipe	Beam	Pipe	A53 Gr. B	Typical
31	M31	N103A	N112B			RIGID	None	None	RIGID	Typical
32	M32	N111B	N108			RIGID	None	None	RIGID	Typical
33	M33	N104A	N107A			RIGID	None	None	RIGID	Typical

Material Takeoff

	Material	Size	Pieces	Length[in]	Weight[LB]
1	General				
2	RIGID		12	121.2	0
3	Total General		12	121.2	0
4					
5	Hot Rolled Steel				
6	A36 Gr.36	C5X6.7	6	505.5	282.4
7	A53 Gr. B	PIPE_2.0	9	724.2	209.5
8	A53 Gr. B	PIPE_2.5	6	639	291.7
9	Total HR Steel		21	1868.7	783.6

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Self Weight	DL		-1			39		3	
2	Wind Load AZI 000	WLZ					39		1	
3	Wind Load AZI 090	WLX					39		1	
4	Ice Weight	OL1					39	27	3	
5	Wind + Ice Load AZI ...	OL2					39		1	

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
6	Wind + Ice Load AZI ...	OL3					39		1	
7	Service Live 1	LL							3	
8	Seismic Load AZI 000	ELZ								
9	Seismic Load AZI 090	ELX								
10	BLC 1 Transient Area...	None						63		
11	BLC 2 Transient Area...	None						30		
12	BLC 3 Transient Area...	None						28		
13	BLC 4 Transient Area...	None						63		
14	BLC 5 Transient Area...	None						30		
15	BLC 6 Transient Area...	None						28		
16	BLC 7 Transient Area...	None						63		

Load Combinations

	Description	S...	PD...	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	F...	B...	Fa...	F...	F...	F...	F...
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 000	Yes	Y		DL	1.2	OL1	1	OL2	1								
28	1.2D + 1.0Di + 1.0Wi AZI 030	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	.5						
29	1.2D + 1.0Di + 1.0Wi AZI 060	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	.8...						
30	1.2D + 1.0Di + 1.0Wi AZI 090	Yes	Y		DL	1.2	OL1	1			OL3	1						
31	1.2D + 1.0Di + 1.0Wi AZI 120	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	.8...						
32	1.2D + 1.0Di + 1.0Wi AZI 150	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	.5						
33	1.2D + 1.0Di + 1.0Wi AZI 180	Yes	Y		DL	1.2	OL1	1	OL2	-1								
34	1.2D + 1.0Di + 1.0Wi AZI 210	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	-.5						
35	1.2D + 1.0Di + 1.0Wi AZI 240	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	-....						
36	1.2D + 1.0Di + 1.0Wi AZI 270	Yes	Y		DL	1.2	OL1	1			OL3	-1						
37	1.2D + 1.0Di + 1.0Wi AZI 300	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	-....						
38	1.2D + 1.0Di + 1.0Wi AZI 330	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	-.5						
39	1.2D + 1.5L + 1.0WL (30 mph) AZI 000	Yes	Y		DL	1.2	LL	1.5	WLZ	.058								
40	1.2D + 1.5L + 1.0WL (30 mph) AZI 030	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	W...	.0...						
41	1.2D + 1.5L + 1.0WL (30 mph) AZI 060	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	W...	.05						

Load Combinations (Continued)

	Description	S...	PD...	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	F...	B...	Fa...	F...	F...	F...	F...
42	1.2D + 1.5L + 1.0WL (30 mph) AZI 090	Yes	Y		DL	1.2	LL	1.5			W...	.0...						
43	1.2D + 1.5L + 1.0WL (30 mph) AZI 120	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	W...	.05						
44	1.2D + 1.5L + 1.0WL (30 mph) AZI 150	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	W...	.0...						
45	1.2D + 1.5L + 1.0WL (30 mph) AZI 180	Yes	Y		DL	1.2	LL	1.5	WLZ	-.058								
46	1.2D + 1.5L + 1.0WL (30 mph) AZI 210	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	W...	-....						
47	1.2D + 1.5L + 1.0WL (30 mph) AZI 240	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	W...	-.05						
48	1.2D + 1.5L + 1.0WL (30 mph) AZI 270	Yes	Y		DL	1.2	LL	1.5			W...	-....						
49	1.2D + 1.5L + 1.0WL (30 mph) AZI 300	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	W...	-.05						
50	1.2D + 1.5L + 1.0WL (30 mph) AZI 330	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	W...	-....						

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	N117	max	1784.824	5	1266.201	32	1579.694	5	198.167	25	646.883	5	1158.606	32
2		min	-1738.557	23	-108.394	25	-1502.8	23	-2020.687	32	-632.011	23	-110.79	25
3	N111	max	9.024	17	15.506	50	5.21	14	-.001	25	0	50	.001	1
4		min	-9.024	11	3.11	14	-5.21	8	-.002	1	0	1	0	14
5	N114	max	907.037	15	1524.622	30	2490.329	25	2426.182	30	868.694	12	80.96	23
6		min	-1028.834	9	-84.023	23	-2567.136	7	-135.15	23	-821.552	18	-1413.444	30
7	N112	max	1659.216	17	1529.091	34	2033.27	12	184.613	15	721.448	4	103.149	15
8		min	-1665.486	11	-107.487	15	-1882.671	18	-2430.134	34	-675.098	22	-1390.453	34
9	N109A	max	9.024	17	13.979	50	5.21	14	.008	50	0	50	.005	50
10		min	-9.024	11	2.477	14	-5.21	8	0	1	0	1	0	1
11	N115	max	588.812	9	1260.57	35	2755.796	15	1992.667	36	783.027	9	1158.561	35
12		min	-541.791	15	-84.301	17	-2830.24	9	-160.888	17	-768.306	15	-96.315	17
13	N116	max	2644.45	19	1269.808	27	923.985	13	9.11	2	794.933	13	263.288	21
14		min	-2732.192	13	-124.624	21	-927.078	19	-5.047	20	-779.611	19	-2326.564	28
15	N110A	max	0	50	13.979	50	10.42	14	0	50	0	50	.009	50
16		min	0	1	2.477	14	-10.42	8	0	1	0	1	0	1
17	N113	max	3004.456	4	1527.816	38	871.726	14	11.28	27	777.575	8	2795.13	38
18		min	-2867.957	22	-110.723	19	-940.859	8	-4.401	20	-731.589	14	-227.894	19
19	Totals:	max	8036.941	5	7702.923	37	8278.19	2						
20		min	-8036.941	23	2391.508	18	-8278.19	20						

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

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc....		LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
1	M8	C5X6.7	.736	52.406	3	.129	52....	z	3	24375.292	63828	1603.7...	7950.94	1	H1-1b
2	M57	C5X6.7	.728	22.531	6	.117	22....	y	31	35550.358	63828	1603.7...	9585	2...	H1-1b
3	M15A	C5X6.7	.726	64.594	13	.141	51....	y	6	24375.292	63828	1603.7...	7950.94	1	H1-1b
4	M56	C5X6.7	.682	28.969	13	.116	22....	y	27	35550.358	63828	1603.7...	9585	2...	H1-1b
5	M55	C5X6.7	.669	28.969	9	.116	22....	y	35	35550.358	63828	1603.7...	9585	2...	H1-1b
6	M1	C5X6.7	.610	64.594	11	.126	65....	y	9	24375.292	63828	1603.7...	7950.94	1	H1-1b
7	MP2	PIPE_2.5	.535	46	2	.151	46		13	30038.461	50715	3596.25	3596.25	1...	H1-1b
8	MP1	PIPE_2.0	.504	46	8	.100	46		2	14916.096	32130	1871.6...	1871.6...	1...	H1-1b
9	MP5	PIPE_2.5	.482	46	11	.131	46		9	30038.461	50715	3596.25	3596.25	1...	H1-1b
10	MP4	PIPE_2.0	.464	46	4	.092	46		12	14916.096	32130	1871.6...	1871.6...	2...	H1-1b
11	MP8	PIPE_2.5	.462	46	11	.145	46		5	30038.461	50715	3596.25	3596.25	1...	H1-1b
12	MP7	PIPE_2.0	.436	46	11	.090	46		6	14916.096	32130	1871.6...	1871.6...	1...	H1-1b
13	MP9	PIPE_2.0	.394	46	28	.082	46		3	14916.096	32130	1871.6...	1871.6...	1...	H1-1b
14	MP6	PIPE_2.0	.393	46	32	.082	46		7	14916.096	32130	1871.6...	1871.6...	1...	H1-1b
15	MP3	PIPE_2.0	.390	46	36	.075	46		11	14916.096	32130	1871.6...	1871.6...	1...	H1-1b
16	M26	PIPE_2.5	.245	75.563	10	.181	110...		6	39593.749	50715	3596.25	3596.25	1	H1-1b
17	M27	PIPE_2.5	.236	74.344	6	.173	106...		10	39593.749	50715	3596.25	3596.25	1	H1-1b
18	M25	PIPE_2.5	.210	75.563	6	.190	106...		2	39593.749	50715	3596.25	3596.25	1	H1-1b
19	M29	PIPE_2.0	.026	24.696	2	.076	0		6	26223.67	32130	1871.6...	1871.6...	1...	H1-1b

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

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc....		LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
20	M28	PIPE_2.0	.021	24.696	6	.074	0		10	26223.67	32130	1871.6..	1871.6..	1...	H1-1b
21	M30	PIPE_2.0	.021	24.696	10	.077	0		2	26223.67	32130	1871.6..	1871.6..	1...	H1-1b

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	C5x6.7	C5X6.7	Beam	Channel	A36 Gr.36	Typical	1.97	.47	7.48	.055
2	2" STD Pipe	PIPE_2.0	Beam	Pipe	A53 Gr. B	Typical	1.02	.627	.627	1.25
3	L3"x3"x1/4"	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	.031
4	L1.75"x1.75"x3/...	L1.75x1.7...	Beam	Single Angle	A36 Gr.36	Typical	.621	.179	.179	.007
5	PIPE_2.5	PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical	1.61	1.45	1.45	2.89

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	N117	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N111	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N114	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N112	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N109A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N115	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N116	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
8	N110A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
9	N113	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	M14						Yes	** NA **			None
3	M15						Yes	** NA **			None
4	M16						Yes	** NA **			None
5	MP3						Yes				None
6	MP2						Yes				None
7	MP1						Yes				None
8	M8						Yes				None
9	M15A						Yes				None
10	M10						Yes	** NA **			None
11	M12						Yes	** NA **			None
12	MP9						Yes				None
13	MP7						Yes				None
14	M16A						Yes	** NA **			None
15	M18						Yes	** NA **			None
16	MP6						Yes				None
17	MP4						Yes				None
18	M47A						Yes	** NA **			None
19	MP8						Yes				None
20	M51A						Yes	** NA **			None
21	MP5						Yes				None
22	M55						Yes				None
23	M56						Yes				None
24	M57						Yes				None
25	M25						Yes				None
26	M26						Yes				None
27	M27						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...
28	M28	BenPIN	BenPIN				Yes				None
29	M29	BenPIN	BenPIN				Yes				None
30	M30	BenPIN	BenPIN				Yes				None
31	M31						Yes	** NA **			None
32	M32						Yes	** NA **			None
33	M33						Yes	** NA **			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	C5x6.7	117	66	66	66	66					Lateral
2	MP3	2" STD Pipe	96			Lbyy						Lateral
3	MP2	PIPE_2.5	96			Lbyy						Lateral
4	MP1	2" STD Pipe	96			Lbyy						Lateral
5	M8	C5x6.7	117	66	66	66	66					Lateral
6	M15A	C5x6.7	117	66	66	66	66					Lateral
7	MP9	2" STD Pipe	96			Lbyy						Lateral
8	MP7	2" STD Pipe	96			Lbyy						Lateral
9	MP6	2" STD Pipe	96			Lbyy						Lateral
10	MP4	2" STD Pipe	96			Lbyy						Lateral
11	MP8	PIPE_2.5	96			Lbyy						Lateral
12	MP5	PIPE_2.5	96			Lbyy						Lateral
13	M55	C5x6.7	51.5			Lbyy						Lateral
14	M56	C5x6.7	51.5			Lbyy						Lateral
15	M57	C5x6.7	51.5			Lbyy						Lateral
16	M25	PIPE_2.5	117	66	66	66	66					Lateral
17	M26	PIPE_2.5	117	66	66	66	66					Lateral
18	M27	PIPE_2.5	117	66	66	66	66					Lateral
19	M28	2" STD Pipe	49.392			Lbyy						Lateral
20	M29	2" STD Pipe	49.392			Lbyy						Lateral
21	M30	2" STD Pipe	49.392			Lbyy						Lateral

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2...
No Data to Print ...			

Member Point Loads (BLC 1 : Self Weight)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Y	-38.05	10
2	MP2	Y	-57.3	0
3	MP3	Y	-17.5	30
4	MP1	Y	-7.5	60
5	MP2	Y	-60	60
6	MP3	Y	-71	60
7	MP1	Y	-59.9	50
8	MP3	Y	-71.9	50
9	MP2	Y	-16	50
10	MP3	Y	-32.8	80
11	MP1	Y	-38.05	80
12	MP2	Y	-57.3	96
13	MP3	Y	-17.5	80
14	MP4	Y	-38.05	10
15	MP5	Y	-57.3	0

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
16	MP6	Y	-17.5	30
17	MP4	Y	-7.5	60
18	MP5	Y	-60	60
19	MP6	Y	-71	60
20	MP4	Y	-59.9	50
21	MP6	Y	-71.9	50
22	MP5	Y	-16	50
23	MP6	Y	-32.8	80
24	MP4	Y	-38.05	80
25	MP5	Y	-57.3	96
26	MP6	Y	-17.5	80
27	MP7	Y	-38.05	10
28	MP8	Y	-57.3	0
29	MP9	Y	-17.5	30
30	MP7	Y	-7.5	60
31	MP8	Y	-60	60
32	MP9	Y	-71	60
33	MP7	Y	-59.9	50
34	MP9	Y	-71.9	50
35	MP8	Y	-16	50
36	MP9	Y	-32.8	80
37	MP7	Y	-38.05	80
38	MP8	Y	-57.3	96
39	MP9	Y	-17.5	80

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Z	-237.23	10
2	MP2	Z	-434.21	0
3	MP3	Z	-139.23	30
4	MP1	Z	-23.45	60
5	MP2	Z	-137.18	60
6	MP3	Z	-98.41	60
7	MP1	Z	-92.15	50
8	MP3	Z	-82.24	50
9	MP2	Z	-27.65	50
10	MP3	Z	-60.6	80
11	MP1	Z	-237.23	80
12	MP2	Z	-434.21	96
13	MP3	Z	-139.23	80
14	MP4	Z	-162.2	10
15	MP5	Z	-249.22	0
16	MP6	Z	-89.59	30
17	MP4	Z	-9.65	60
18	MP5	Z	-96.87	60
19	MP6	Z	-77.42	60
20	MP4	Z	-62.75	50
21	MP6	Z	-71.53	50
22	MP5	Z	-23.62	50
23	MP6	Z	-60.6	80
24	MP4	Z	-162.2	80
25	MP5	Z	-249.22	96
26	MP6	Z	-89.59	80
27	MP7	Z	-162.2	10
28	MP8	Z	-249.22	0
29	MP9	Z	-89.59	30

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
30	MP7	Z	-9.65	60
31	MP8	Z	-96.87	60
32	MP9	Z	-77.42	60
33	MP7	Z	-62.75	50
34	MP9	Z	-71.53	50
35	MP8	Z	-23.62	50
36	MP9	Z	-60.6	80
37	MP7	Z	-162.2	80
38	MP8	Z	-249.22	96
39	MP9	Z	-89.59	80

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	X	-137.2	10
2	MP2	X	-187.56	0
3	MP3	X	-73.04	30
4	MP1	X	-5.04	60
5	MP2	X	-83.43	60
6	MP3	X	-70.43	60
7	MP1	X	-52.95	50
8	MP3	X	-67.96	50
9	MP2	X	-22.28	50
10	MP3	X	-60.6	80
11	MP1	X	-137.2	80
12	MP2	X	-187.56	96
13	MP3	X	-73.04	80
14	MP4	X	-212.22	10
15	MP5	X	-372.55	0
16	MP6	X	-122.68	30
17	MP4	X	-18.85	60
18	MP5	X	-123.74	60
19	MP6	X	-91.41	60
20	MP4	X	-82.35	50
21	MP6	X	-78.67	50
22	MP5	X	-26.31	50
23	MP6	X	-60.6	80
24	MP4	X	-212.22	80
25	MP5	X	-372.55	96
26	MP6	X	-122.68	80
27	MP7	X	-212.22	10
28	MP8	X	-372.55	0
29	MP9	X	-122.68	30
30	MP7	X	-18.85	60
31	MP8	X	-123.74	60
32	MP9	X	-91.41	60
33	MP7	X	-82.35	50
34	MP9	X	-78.67	50
35	MP8	X	-26.31	50
36	MP9	X	-60.6	80
37	MP7	X	-212.22	80
38	MP8	X	-372.55	96
39	MP9	X	-122.68	80

Member Point Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Y	-92.42	10

Member Point Loads (BLC 4 : Ice Weight) (Continued)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
2	MP2	Y	-145.83	0
3	MP3	Y	-54.53	30
4	MP1	Y	-13.94	60
5	MP2	Y	-70.64	60
6	MP3	Y	-62	60
7	MP1	Y	-53.8	50
8	MP3	Y	-59.18	50
9	MP2	Y	-21.6	50
10	MP3	Y	-72.14	80
11	MP1	Y	-92.42	80
12	MP2	Y	-145.83	96
13	MP3	Y	-54.53	80
14	MP4	Y	-92.42	10
15	MP5	Y	-145.83	0
16	MP6	Y	-54.53	30
17	MP4	Y	-13.94	60
18	MP5	Y	-70.64	60
19	MP6	Y	-62	60
20	MP4	Y	-53.8	50
21	MP6	Y	-59.18	50
22	MP5	Y	-21.6	50
23	MP6	Y	-72.14	80
24	MP4	Y	-92.42	80
25	MP5	Y	-145.83	96
26	MP6	Y	-54.53	80
27	MP7	Y	-92.42	10
28	MP8	Y	-145.83	0
29	MP9	Y	-54.53	30
30	MP7	Y	-13.94	60
31	MP8	Y	-70.64	60
32	MP9	Y	-62	60
33	MP7	Y	-53.8	50
34	MP9	Y	-59.18	50
35	MP8	Y	-21.6	50
36	MP9	Y	-72.14	80
37	MP7	Y	-92.42	80
38	MP8	Y	-145.83	96
39	MP9	Y	-54.53	80

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Z	-46.39	10
2	MP2	Z	-80.66	0
3	MP3	Z	-28.8	30
4	MP1	Z	-7.33	60
5	MP2	Z	-30.16	60
6	MP3	Z	-22.36	60
7	MP1	Z	-21.12	50
8	MP3	Z	-19.2	50
9	MP2	Z	-8.22	50
10	MP3	Z	-31.7	80
11	MP1	Z	-46.39	80
12	MP2	Z	-80.66	96
13	MP3	Z	-28.8	80
14	MP4	Z	-34.21	10
15	MP5	Z	-50.57	0

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
16	MP6	Z	-20.68	30
17	MP4	Z	-4	60
18	MP5	Z	-22.77	60
19	MP6	Z	-18.45	60
20	MP4	Z	-15.59	50
21	MP6	Z	-17.15	50
22	MP5	Z	-7.38	50
23	MP6	Z	-21.8	80
24	MP4	Z	-34.21	80
25	MP5	Z	-50.57	96
26	MP6	Z	-20.68	80
27	MP7	Z	-34.21	10
28	MP8	Z	-50.57	0
29	MP9	Z	-20.68	30
30	MP7	Z	-4	60
31	MP8	Z	-22.77	60
32	MP9	Z	-18.45	60
33	MP7	Z	-15.59	50
34	MP9	Z	-17.15	50
35	MP8	Z	-7.38	50
36	MP9	Z	-21.8	80
37	MP7	Z	-34.21	80
38	MP8	Z	-50.57	96
39	MP9	Z	-20.68	80

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	X	-30.15	10
2	MP2	X	-40.54	0
3	MP3	X	-17.97	30
4	MP1	X	-2.9	60
5	MP2	X	-20.31	60
6	MP3	X	-17.15	60
7	MP1	X	-13.74	50
8	MP3	X	-16.47	50
9	MP2	X	-7.11	50
10	MP3	X	-18.49	80
11	MP1	X	-30.15	80
12	MP2	X	-40.54	96
13	MP3	X	-17.97	80
14	MP4	X	-42.33	10
15	MP5	X	-70.63	0
16	MP6	X	-26.1	30
17	MP4	X	-6.22	60
18	MP5	X	-27.69	60
19	MP6	X	-21.05	60
20	MP4	X	-19.28	50
21	MP6	X	-18.51	50
22	MP5	X	-7.94	50
23	MP6	X	-28.4	80
24	MP4	X	-42.33	80
25	MP5	X	-70.63	96
26	MP6	X	-26.1	80
27	MP7	X	-42.33	10
28	MP8	X	-70.63	0
29	MP9	X	-26.1	30

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

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
30	MP7	X	-6.22	60
31	MP8	X	-27.69	60
32	MP9	X	-21.05	60
33	MP7	X	-19.28	50
34	MP9	X	-18.51	50
35	MP8	X	-7.94	50
36	MP9	X	-28.4	80
37	MP7	X	-42.33	80
38	MP8	X	-70.63	96
39	MP9	X	-26.1	80

Member Distributed Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M1	Y	-14.642	-14.642	0	%100
2	M14	Y	-3.305	-3.305	0	%100
3	M15	Y	-3.305	-3.305	0	%100
4	M16	Y	-3.305	-3.305	0	%100
5	MP3	Y	-6.87	-6.87	0	%100
6	MP2	Y	-6.87	-6.87	0	%100
7	MP1	Y	-6.87	-6.87	0	%100
8	M8	Y	-14.642	-14.642	0	%100
9	M15A	Y	-14.642	-14.642	0	%100
10	M10	Y	-3.305	-3.305	0	%100
11	M12	Y	-3.305	-3.305	0	%100
12	MP9	Y	-6.87	-6.87	0	%100
13	MP7	Y	-6.87	-6.87	0	%100
14	M16A	Y	-3.305	-3.305	0	%100
15	M18	Y	-3.305	-3.305	0	%100
16	MP6	Y	-6.87	-6.87	0	%100
17	MP4	Y	-6.87	-6.87	0	%100
18	M47A	Y	-3.305	-3.305	0	%100
19	MP8	Y	-6.87	-6.87	0	%100
20	M51A	Y	-3.305	-3.305	0	%100
21	MP5	Y	-6.87	-6.87	0	%100
22	M55	Y	-14.642	-14.642	0	%100
23	M56	Y	-14.642	-14.642	0	%100
24	M57	Y	-14.642	-14.642	0	%100
25	M25	Y	-14.642	-14.642	0	%100
26	M26	Y	-14.642	-14.642	0	%100
27	M27	Y	-14.642	-14.642	0	%100

Member Distributed Loads (BLC 10 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M1	Y	-7.573	-7.573	14.552	36.945
2	M15A	Y	-74.819	-23.999	7.947	9.925
3	M15A	Y	-23.999	1.411	9.925	11.903
4	M15A	Y	1.411	1.411	11.903	13.881
5	M15A	Y	1.411	1.411	13.881	15.86
6	M15A	Y	1.411	1.411	15.86	17.838
7	M15A	Y	1.411	-19.996	17.838	19.816
8	M15A	Y	-19.996	-32.385	19.816	21.794
9	M15A	Y	-32.385	-10.977	21.794	23.773
10	M15A	Y	-10.977	1.411	23.773	25.751
11	M15A	Y	1.411	-10.976	25.751	27.729
12	M15A	Y	-10.976	-32.377	27.729	29.707

Member Distributed Loads (BLC 10 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
13	M15A	Y	-32.377	-19.99	29.707	31.686
14	M15A	Y	-19.99	1.411	31.686	33.664
15	M15A	Y	1.411	1.411	33.664	35.642
16	M15A	Y	1.411	1.411	35.642	37.621
17	M15A	Y	1.411	1.411	37.621	39.599
18	M15A	Y	1.411	-23.987	39.599	41.577
19	M15A	Y	-23.987	-74.784	41.577	43.555
20	M57	Y	-5.24	-7.744	10.3	30.9
21	M57	Y	-7.744	-10.247	30.9	51.5
22	M8	Y	-13.209	-6.817	0	23.4
23	M8	Y	-6.817	-.425	23.4	46.8
24	M15A	Y	-7.573	-7.573	80.052	102.445
25	M56	Y	-74.784	-23.987	7.945	9.923
26	M56	Y	-23.987	1.411	9.923	11.901
27	M56	Y	1.411	1.411	11.901	13.879
28	M56	Y	1.411	1.411	13.879	15.858
29	M56	Y	1.411	1.411	15.858	17.836
30	M56	Y	1.411	-19.99	17.836	19.814
31	M56	Y	-19.99	-32.377	19.814	21.793
32	M56	Y	-32.377	-10.976	21.793	23.771
33	M56	Y	-10.976	1.411	23.771	25.749
34	M56	Y	1.411	-10.977	25.749	27.727
35	M56	Y	-10.977	-32.385	27.727	29.706
36	M56	Y	-32.385	-19.996	29.706	31.684
37	M56	Y	-19.996	1.411	31.684	33.662
38	M56	Y	1.411	1.411	33.662	35.64
39	M56	Y	1.411	1.411	35.64	37.619
40	M56	Y	1.411	1.411	37.619	39.597
41	M56	Y	1.411	-23.999	39.597	41.575
42	M56	Y	-23.999	-74.819	41.575	43.553
43	M1	Y	-7.573	-7.573	80.052	102.445
44	M8	Y	-.425	-6.817	70.2	93.6
45	M8	Y	-6.817	-13.209	93.6	117
46	M55	Y	-74.819	-23.999	7.947	9.925
47	M55	Y	-23.999	1.411	9.925	11.903
48	M55	Y	1.411	1.411	11.903	13.881
49	M55	Y	1.411	1.411	13.881	15.86
50	M55	Y	1.411	1.411	15.86	17.838
51	M55	Y	1.411	-19.996	17.838	19.816
52	M55	Y	-19.996	-32.385	19.816	21.794
53	M55	Y	-32.385	-10.977	21.794	23.773
54	M55	Y	-10.977	1.411	23.773	25.751
55	M55	Y	1.411	-10.976	25.751	27.729
56	M55	Y	-10.976	-32.377	27.729	29.707
57	M55	Y	-32.377	-19.99	29.707	31.686
58	M55	Y	-19.99	1.411	31.686	33.664
59	M55	Y	1.411	1.411	33.664	35.642
60	M55	Y	1.411	1.411	35.642	37.621
61	M55	Y	1.411	1.411	37.621	39.599
62	M55	Y	1.411	-23.987	39.599	41.577
63	M55	Y	-23.987	-74.784	41.577	43.555

Member Distributed Loads (BLC 11 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M1	Z	-41.679	-41.679	0	117
2	MP3	Z	-19.798	-19.798	0	96

Member Distributed Loads (BLC 11 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
3	MP2	Z	-23.966	-23.966	0	96
4	MP1	Z	-19.798	-19.798	0	96
5	M8	Z	-20.84	-20.84	0	117
6	M15A	Z	-20.84	-20.84	0	117
7	M10	Z	0	0	0	6
8	M12	Z	0	0	0	6
9	MP9	Z	-19.798	-19.798	0	96
10	MP7	Z	-19.798	-19.798	0	96
11	M16A	Z	0	0	0	6
12	M18	Z	0	0	0	6
13	MP6	Z	-19.798	-19.798	0	96
14	MP4	Z	-19.798	-19.798	0	96
15	M47A	Z	0	0	0	6
16	MP8	Z	-23.966	-23.966	0	96
17	M51A	Z	0	0	0	6
18	MP5	Z	-23.966	-23.966	0	96
19	M55	Z	-20.84	-20.84	0	51.5
20	M56	Z	-41.679	-41.679	0	51.5
21	M57	Z	-20.84	-20.84	0	51.5
22	M25	Z	-23.966	-23.966	0	117
23	M26	Z	-11.983	-11.983	0	117
24	M27	Z	-11.983	-11.983	0	117
25	M28	Z	-9.899	-9.899	0	49.392
26	M29	Z	-19.798	-19.798	0	49.392
27	M30	Z	-9.899	-9.899	0	49.392
28	M31	Z	0	0	0	22.392
29	M32	Z	0	0	0	22.392
30	M33	Z	0	0	0	22.392

Member Distributed Loads (BLC 12 : BLC 3 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M14	X	0	0	0	6
2	M15	X	0	0	0	6
3	M16	X	0	0	0	6
4	MP3	X	-19.798	-19.798	0	96
5	MP2	X	-23.966	-23.966	0	96
6	MP1	X	-19.798	-19.798	0	96
7	M8	X	-36.095	-36.095	0	117
8	M15A	X	-36.095	-36.095	0	117
9	M10	X	0	0	0	6
10	M12	X	0	0	0	6
11	MP9	X	-19.798	-19.798	0	96
12	MP7	X	-19.798	-19.798	0	96
13	M16A	X	0	0	0	6
14	M18	X	0	0	0	6
15	MP6	X	-19.798	-19.798	0	96
16	MP4	X	-19.798	-19.798	0	96
17	M47A	X	0	0	0	6
18	MP8	X	-23.966	-23.966	0	96
19	M51A	X	0	0	0	6
20	MP5	X	-23.966	-23.966	0	96
21	M55	X	-36.095	-36.095	0	51.5
22	M57	X	-36.095	-36.095	0	51.5
23	M26	X	-20.755	-20.755	0	117
24	M27	X	-20.755	-20.755	0	117
25	M28	X	-17.145	-17.145	0	49.392

Member Distributed Loads (BLC 12 : BLC 3 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
26	M30	X	-17.145	-17.145	0	49.392
27	M31	X	0	0	0	22.392
28	M33	X	0	0	0	22.392

Member Distributed Loads (BLC 13 : BLC 4 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M1	Y	-44.721	-14.344	7.945	9.923
2	M1	Y	-14.344	.844	9.923	11.901
3	M1	Y	.844	.844	11.901	13.879
4	M1	Y	.844	.844	13.879	15.858
5	M1	Y	.844	.844	15.858	17.836
6	M1	Y	.844	-11.954	17.836	19.814
7	M1	Y	-11.954	-19.361	19.814	21.793
8	M1	Y	-19.361	-6.564	21.793	23.771
9	M1	Y	-6.564	.844	23.771	25.749
10	M1	Y	.844	-6.564	25.749	27.727
11	M1	Y	-6.564	-19.366	27.727	29.706
12	M1	Y	-19.366	-11.958	29.706	31.684
13	M1	Y	-11.958	.844	31.684	33.662
14	M1	Y	.844	.844	33.662	35.64
15	M1	Y	.844	.844	35.64	37.619
16	M1	Y	.844	.844	37.619	39.597
17	M1	Y	.844	-14.351	39.597	41.575
18	M1	Y	-14.351	-44.742	41.575	43.553
19	M15A	Y	-7.089	-4.077	11.7	35.1
20	M15A	Y	-4.077	-1.065	35.1	58.5
21	M57	Y	-4.529	-4.529	14.555	36.948
22	M8	Y	-4.529	-4.529	14.552	36.945
23	M15A	Y	-44.721	-14.344	73.445	75.423
24	M15A	Y	-14.344	.844	75.423	77.401
25	M15A	Y	.844	.844	77.401	79.379
26	M15A	Y	.844	.844	79.379	81.358
27	M15A	Y	.844	.844	81.358	83.336
28	M15A	Y	.844	-11.954	83.336	85.314
29	M15A	Y	-11.954	-19.361	85.314	87.293
30	M15A	Y	-19.361	-6.564	87.293	89.271
31	M15A	Y	-6.564	.844	89.271	91.249
32	M15A	Y	.844	-6.564	91.249	93.227
33	M15A	Y	-6.564	-19.366	93.227	95.206
34	M15A	Y	-19.366	-11.958	95.206	97.184
35	M15A	Y	-11.958	.844	97.184	99.162
36	M15A	Y	.844	.844	99.162	101.14
37	M15A	Y	.844	.844	101.14	103.119
38	M15A	Y	.844	.844	103.119	105.097
39	M15A	Y	.844	-14.351	105.097	107.075
40	M15A	Y	-14.351	-44.742	107.075	109.053
41	M56	Y	-6.128	-4.631	0	20.6
42	M56	Y	-4.631	-3.134	20.6	41.2
43	M1	Y	-44.721	-14.344	73.445	75.423
44	M1	Y	-14.344	.844	75.423	77.401
45	M1	Y	.844	.844	77.401	79.379
46	M1	Y	.844	.844	79.379	81.358
47	M1	Y	.844	.844	81.358	83.336
48	M1	Y	.844	-11.954	83.336	85.314
49	M1	Y	-11.954	-19.361	85.314	87.293
50	M1	Y	-19.361	-6.564	87.293	89.271

Member Distributed Loads (BLC 13 : BLC 4 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
51	M1	Y	-6.564	.844	89.271	91.249
52	M1	Y	.844	-6.564	91.249	93.227
53	M1	Y	-6.564	-19.366	93.227	95.206
54	M1	Y	-19.366	-11.958	95.206	97.184
55	M1	Y	-11.958	.844	97.184	99.162
56	M1	Y	.844	.844	99.162	101.14
57	M1	Y	.844	.844	101.14	103.119
58	M1	Y	.844	.844	103.119	105.097
59	M1	Y	.844	-14.351	105.097	107.075
60	M1	Y	-14.351	-44.742	107.075	109.053
61	M8	Y	-4.529	-4.529	80.055	102.448
62	M55	Y	-3.134	-4.631	10.3	30.9
63	M55	Y	-4.631	-6.128	30.9	51.5

Member Distributed Loads (BLC 14 : BLC 5 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M1	Z	-7.392	-7.392	0	117
2	MP3	Z	-3.511	-3.511	0	96
3	MP2	Z	-4.25	-4.25	0	96
4	MP1	Z	-3.511	-3.511	0	96
5	M8	Z	-3.696	-3.696	0	117
6	M15A	Z	-3.696	-3.696	0	117
7	M10	Z	0	0	0	6
8	M12	Z	0	0	0	6
9	MP9	Z	-3.511	-3.511	0	96
10	MP7	Z	-3.511	-3.511	0	96
11	M16A	Z	0	0	0	6
12	M18	Z	0	0	0	6
13	MP6	Z	-3.511	-3.511	0	96
14	MP4	Z	-3.511	-3.511	0	96
15	M47A	Z	0	0	0	6
16	MP8	Z	-4.25	-4.25	0	96
17	M51A	Z	0	0	0	6
18	MP5	Z	-4.25	-4.25	0	96
19	M55	Z	-3.696	-3.696	0	51.5
20	M56	Z	-7.392	-7.392	0	51.5
21	M57	Z	-3.696	-3.696	0	51.5
22	M25	Z	-4.25	-4.25	0	117
23	M26	Z	-2.125	-2.125	0	117
24	M27	Z	-2.125	-2.125	0	117
25	M28	Z	-1.756	-1.756	0	49.392
26	M29	Z	-3.511	-3.511	0	49.392
27	M30	Z	-1.756	-1.756	0	49.392
28	M31	Z	0	0	0	22.392
29	M32	Z	0	0	0	22.392
30	M33	Z	0	0	0	22.392

Member Distributed Loads (BLC 15 : BLC 6 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M14	X	0	0	0	6
2	M15	X	0	0	0	6
3	M16	X	0	0	0	6
4	MP3	X	-3.511	-3.511	0	96
5	MP2	X	-4.25	-4.25	0	96
6	MP1	X	-3.511	-3.511	0	96
7	M8	X	-6.401	-6.401	0	117

Member Distributed Loads (BLC 15 : BLC 6 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
8	M15A	X	-6.401	-6.401	0	117
9	M10	X	0	0	0	6
10	M12	X	0	0	0	6
11	MP9	X	-3.511	-3.511	0	96
12	MP7	X	-3.511	-3.511	0	96
13	M16A	X	0	0	0	6
14	M18	X	0	0	0	6
15	MP6	X	-3.511	-3.511	0	96
16	MP4	X	-3.511	-3.511	0	96
17	M47A	X	0	0	0	6
18	MP8	X	-4.25	-4.25	0	96
19	M51A	X	0	0	0	6
20	MP5	X	-4.25	-4.25	0	96
21	M55	X	-6.401	-6.401	0	51.5
22	M57	X	-6.401	-6.401	0	51.5
23	M26	X	-3.681	-3.681	0	117
24	M27	X	-3.681	-3.681	0	117
25	M28	X	-3.041	-3.041	0	49.392
26	M30	X	-3.041	-3.041	0	49.392
27	M31	X	0	0	0	22.392
28	M33	X	0	0	0	22.392

Member Distributed Loads (BLC 16 : BLC 7 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
1	M1	Y	-299.134	-95.948	7.945	9.923
2	M1	Y	-95.948	5.645	9.923	11.901
3	M1	Y	5.645	5.645	11.901	13.879
4	M1	Y	5.645	5.645	13.879	15.858
5	M1	Y	5.645	5.645	15.858	17.836
6	M1	Y	5.645	-79.958	17.836	19.814
7	M1	Y	-79.958	-129.508	19.814	21.793
8	M1	Y	-129.508	-43.904	21.793	23.771
9	M1	Y	-43.904	5.645	23.771	25.749
10	M1	Y	5.645	-43.907	25.749	27.727
11	M1	Y	-43.907	-129.539	27.727	29.706
12	M1	Y	-129.539	-79.986	29.706	31.684
13	M1	Y	-79.986	5.645	31.684	33.662
14	M1	Y	5.645	5.645	33.662	35.64
15	M1	Y	5.645	5.645	35.64	37.619
16	M1	Y	5.645	5.645	37.619	39.597
17	M1	Y	5.645	-95.996	39.597	41.575
18	M1	Y	-95.996	-299.277	41.575	43.553
19	M15A	Y	-47.417	-27.269	11.7	35.1
20	M15A	Y	-27.269	-7.12	35.1	58.5
21	M57	Y	-30.291	-30.291	14.555	36.948
22	M8	Y	-30.291	-30.291	14.552	36.945
23	M15A	Y	-299.134	-95.948	73.445	75.423
24	M15A	Y	-95.948	5.645	75.423	77.401
25	M15A	Y	5.645	5.645	77.401	79.379
26	M15A	Y	5.645	5.645	79.379	81.358
27	M15A	Y	5.645	5.645	81.358	83.336
28	M15A	Y	5.645	-79.958	83.336	85.314
29	M15A	Y	-79.958	-129.508	85.314	87.293
30	M15A	Y	-129.508	-43.904	87.293	89.271
31	M15A	Y	-43.904	5.645	89.271	91.249
32	M15A	Y	5.645	-43.907	91.249	93.227

Member Distributed Loads (BLC 16 : BLC 7 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/ft,F,psf]	Start Location[in..	End Location[in,...
33	M15A	Y	-43.907	-129.539	93.227	95.206
34	M15A	Y	-129.539	-79.986	95.206	97.184
35	M15A	Y	-79.986	5.645	97.184	99.162
36	M15A	Y	5.645	5.645	99.162	101.14
37	M15A	Y	5.645	5.645	101.14	103.119
38	M15A	Y	5.645	5.645	103.119	105.097
39	M15A	Y	5.645	-95.996	105.097	107.075
40	M15A	Y	-95.996	-299.277	107.075	109.053
41	M56	Y	-40.99	-30.975	0	20.6
42	M56	Y	-30.975	-20.96	20.6	41.2
43	M1	Y	-299.134	-95.948	73.445	75.423
44	M1	Y	-95.948	5.645	75.423	77.401
45	M1	Y	5.645	5.645	77.401	79.379
46	M1	Y	5.645	5.645	79.379	81.358
47	M1	Y	5.645	5.645	81.358	83.336
48	M1	Y	5.645	-79.958	83.336	85.314
49	M1	Y	-79.958	-129.508	85.314	87.293
50	M1	Y	-129.508	-43.904	87.293	89.271
51	M1	Y	-43.904	5.645	89.271	91.249
52	M1	Y	5.645	-43.907	91.249	93.227
53	M1	Y	-43.907	-129.539	93.227	95.206
54	M1	Y	-129.539	-79.986	95.206	97.184
55	M1	Y	-79.986	5.645	97.184	99.162
56	M1	Y	5.645	5.645	99.162	101.14
57	M1	Y	5.645	5.645	101.14	103.119
58	M1	Y	5.645	5.645	103.119	105.097
59	M1	Y	5.645	-95.996	105.097	107.075
60	M1	Y	-95.996	-299.277	107.075	109.053
61	M8	Y	-30.291	-30.291	80.055	102.448
62	M55	Y	-20.96	-30.975	10.3	30.9
63	M55	Y	-30.975	-40.99	30.9	51.5

Member Area Loads (BLC 1 : Self Weight)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N3	N109	N104		Y	Two Way	-10
2	N110	N106	N17A		Y	Two Way	-10
3	N103	N107	N4		Y	Two Way	-10

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N111A	N113A	N112A	N110B	Z	Open Structure	-100.03

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N110B	N112A	N115A	N114A	X	Open Structure	-100.03

Member Area Loads (BLC 4 : Ice Weight)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N3	N109	N104		Y	Two Way	-5.98
2	N110	N106	N17A		Y	Two Way	-5.98
3	N103	N107	N4		Y	Two Way	-5.98

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

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N111A	N113A	N112A	N110B	Z	Open Structure	-17.74

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

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N110B	N112A	N115A	N114A	X	Open Structure	-17.74

Member Area Loads (BLC 7 : Service Live 1)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N3	N109	N104		Y	Two Way	-40
2	N110	N106	N17A		Y	Two Way	-40
3	N103	N107	N4		Y	Two Way	-40

APPENDIX D

ADDITIONAL CALCUATIONS

Date:	1/29/2019
Client	Crown Castle
Carrier	AT&T
Engineer:	CLK
Site:	881536
Job #:	1039-A0002-B

Code:	LRFD	
Axial:	1524.00	lbs
Shear:	3004.00	lbs

Bolt Capacity (1/2" A307 Bolt)				
	Ult Load / Bolt	Factored Load (ϕ=0.75)	# of Bolts	Factor Joint Capacity
Axial (lb)	8226.7	6170.0	2	12340
Shear(lb)	5133.3	3850.0	2	7700

Interaction Check	
T /ϕT_n	12.4%
V /ϕVn	39.0%
≤1.0	16.7%
	OK

APPENDIX E

MOUNT MODIFICATION DESIGN DRAWINGS (MDD) / SUPPLEMENTAL 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 A307. 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.

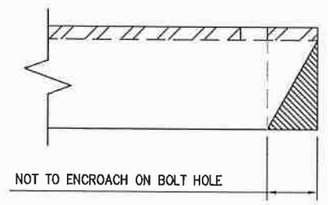
TOWER PLUMB & TENSION NOTES:

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
Fax # (518) 690-0783

at&t

STATE OF CONNECTICUT
JOSEPH R. JOHNSTON
29460
LICENSED PROFESSIONAL ENGINEER
JAN 30 2019

Joseph R. Johnston

No.	Submittal / Revision	App'd	Date
0	ISSUED FOR REVIEW	JRJ	01/25/19

Drawn: BE Date: 01/25/19
Designed: CK Date: 01/25/19
Checked: NRQ Date: 01/25/19

Project Number: 1039-A0002-B

Project Title: BU# 881536

CTL05107

120 UNIVERSAL DRIVE
NORTH HAVEN, CT 06473

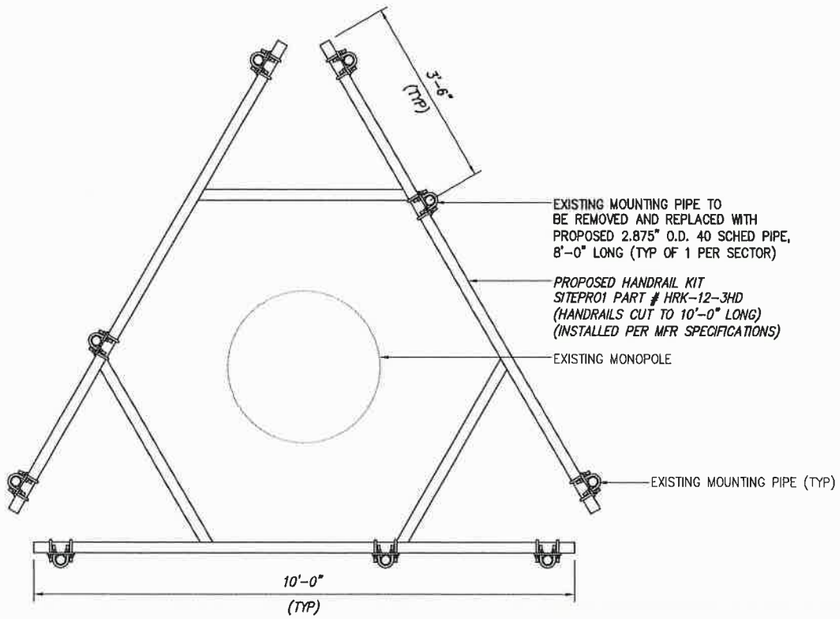
Prepared For:

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

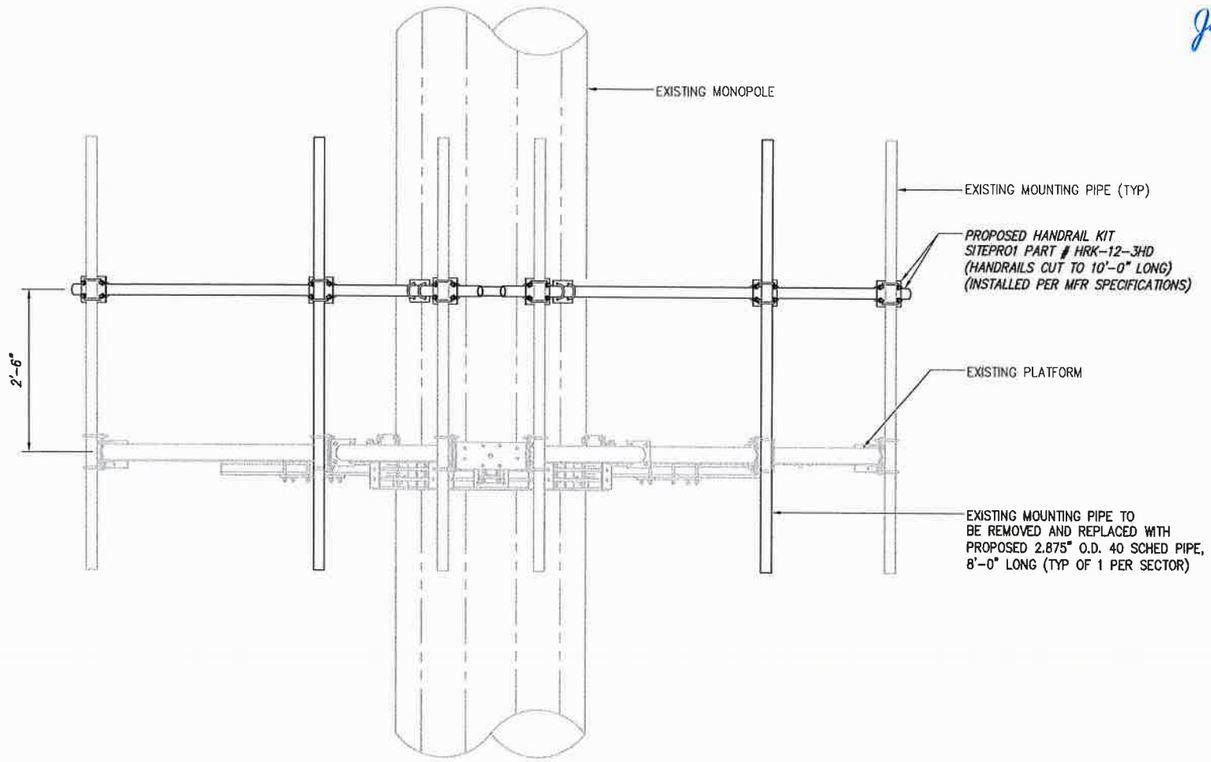
Drawing Scale: AS NOTED
Date: 01/25/19

Drawing Title: GENERAL NOTES

Drawing Number: S-1



1 PLAN VIEW
SCALE: NOT TO SCALE



2 ELEVATION VIEW
SCALE: NOT TO SCALE

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STATE OF CONNECTICUT
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PROFESSIONAL ENGINEER
JAN 30 2019
29460
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1039-A0002-B

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CTL05107

120 UNIVERSAL DRIVE
NORTH HAVEN, CT 06473

Prepared For:

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

Drawing Scale:
AS NOTED

Date:
01/25/19

Drawing Title
PLATFORM MODIFICATION

Drawing Number
S-2

RF EMISSIONS COMPLIANCE REPORT

Crown Castle on behalf of AT&T Mobility, LLC

Crown Castle Site Name: NORTH HAVEN TOWER
Crown Castle Site ID: 881536
AT&T Mobility, LLC FA #: 10071172
120 Universal Drive
North Haven, CT
1/14/2019

Report Status:

AT&T Mobility, LLC Is Compliant

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
North Haven, CT

My signature on the cover of this document indicates:

That I am registered as a Professional Engineer in the jurisdiction indicated; and

That I have extensive professional experience in the wireless communications engineering industry; and

That I am an employee of Sitesafe, LLC in Vienna, Virginia; 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 "NORTH HAVEN TOWER" ("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 3.174% 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 7.61% 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
NORTH HAVEN TOWER
Site Summary

Carrier	Area Maximum Percentage MPE
AT&T Mobility, LLC	0.233 %
AT&T Mobility, LLC (Proposed)	0.621 %
AT&T Mobility, LLC (Proposed)	0.515 %
AT&T Mobility, LLC (Proposed)	0.557 %
AT&T Mobility, LLC (Proposed)	0.578 %
AT&T Mobility, LLC (Proposed)	0.341 %
AT&T Mobility, LLC (Proposed)	0.329 %
Sprint	0.72 %
Sprint	0.823 %
Sprint	0.31 %
Sprint (Decommissioned)	0 %
T-Mobile	1.179 %
T-Mobile	0.581 %
T-Mobile	0.354 %
T-Mobile	0.47 %
Composite Site MPE:	7.61 %

AT&T Mobility, LLC
NORTH HAVEN TOWER
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	1.32265	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.23341	%

					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	121	40	1094	0.736082	0.129897	1.133479	0.200026
Powerwave	7770	121	160	1094	0.737021	0.130063	1.133479	0.200026
Powerwave	7770	121	280	1094	0.737021	0.130063	1.133479	0.200026

AT&T Mobility, LLC (Proposed)
NORTH HAVEN TOWER
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	6.20505	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.6205	%

					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	800-10966	121	40	7364	3.024104	0.30241	6.019987	0.601999
Kathrein-Scala	800-10966	121	160	7364	3.024104	0.30241	6.019986	0.601999
Kathrein-Scala	800-10966	121	280	7364	3.055481	0.305548	6.019985	0.601999

AT&T Mobility, LLC (Proposed)
NORTH HAVEN TOWER
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	5.14881	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.51488	%

					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	800-10966	121	40	6168	2.423304	0.24233	4.559692	0.455969
Kathrein-Scala	800-10966	121	160	6168	2.422685	0.242268	4.559692	0.455969
Kathrein-Scala	800-10966	121	280	6168	2.422687	0.242269	4.559691	0.455969

AT&T Mobility, LLC (Proposed)
NORTH HAVEN TOWER
Carrier Summary

Frequency:	763	MHz
Maximum Permissible Exposure (MPE):	508.67	µW/cm^2
Maximum power density at ground level:	2.83323	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.55699	%

					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	800-10966	121	40	1812	0.946336	0.186042	1.266606	0.249005
Kathrein-Scala	800-10966	121	40	1812	0.946336	0.186042	1.266606	0.249005
Kathrein-Scala	800-10966	121	160	1812	0.946336	0.186042	1.266606	0.249005
Kathrein-Scala	800-10966	121	160	1812	0.946336	0.186042	1.266606	0.249005
Kathrein-Scala	800-10966	121	280	1812	0.946336	0.186042	1.266606	0.249005
Kathrein-Scala	800-10966	121	280	1812	0.946336	0.186042	1.266606	0.249005

AT&T Mobility, LLC (Proposed)
NORTH HAVEN TOWER
Carrier Summary

Frequency:	2300	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	5.7821	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.57821	%

					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**
CCI Antennas	OPA-65R-LCUU-H6	121	40	3206	4.974184	0.497418	5.749914	0.574991
CCI Antennas	OPA-65R-LCUU-H6	121	160	3206	4.950154	0.495015	5.749914	0.574991
CCI Antennas	OPA-65R-LCUU-H6	121	280	3206	4.950154	0.495015	5.749914	0.574991

AT&T Mobility, LLC (Proposed)
NORTH HAVEN TOWER
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	1.93419	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.34133	%

					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**
CCI Antennas	OPA-65R-LCUU-H6	121	40	3021	1.307557	0.230745	1.879795	0.331728
CCI Antennas	OPA-65R-LCUU-H6	121	160	3021	1.307557	0.230745	1.879795	0.331728
CCI Antennas	OPA-65R-LCUU-H6	121	280	3021	1.307557	0.230745	1.879795	0.331728

AT&T Mobility, LLC (Proposed)
NORTH HAVEN TOWER
Carrier Summary

Frequency:	737	MHz
Maximum Permissible Exposure (MPE):	491.33	µW/cm^2
Maximum power density at ground level:	1.6162	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.32894	%

					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**
CCI Antennas	OPA-65R-LCUU-H6	121	40	2513	1.277218	0.259949	1.477196	0.30065
CCI Antennas	OPA-65R-LCUU-H6	121	160	2513	1.277218	0.259949	1.477196	0.30065
CCI Antennas	OPA-65R-LCUU-H6	121	280	2513	1.276079	0.259718	1.477196	0.300651

Sprint
NORTH HAVEN TOWER
Carrier Summary

Frequency:	2500	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	7.20335	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.72034	%

					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**
RFS	APXVTM14-C-I20	98	10	6168	2.297455	0.229746	4.626974	0.462697
RFS	APXVTM14-C-I20	98	100	6168	2.297455	0.229746	4.626974	0.462697
RFS	APXVTM14-C-I20	98	190	6168	2.297455	0.229746	4.626974	0.462697

Sprint
NORTH HAVEN TOWER
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	8.22513	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.82251	%

					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	P40-16-XLPP-RR	98	10	3583	2.120229	0.212023	3.374091	0.337409
Powerwave	P40-16-XLPP-RR	98	10	1991	1.177907	0.117791	1.874499	0.18745
RFS	APXVSPP18-C-A20	98	100	3804	1.46252	0.146252	3.729795	0.37298
RFS	APXVSPP18-C-A20	98	100	3804	1.46252	0.146252	3.729795	0.37298
Powerwave	P40-16-XLPP-RR	98	190	3583	2.120229	0.212023	3.374091	0.337409
Powerwave	P40-16-XLPP-RR	98	190	1991	1.177907	0.117791	1.874499	0.18745

Sprint
NORTH HAVEN TOWER
Carrier Summary

Frequency:	862	MHz
Maximum Permissible Exposure (MPE):	574.67	µW/cm^2
Maximum power density at ground level:	1.77917	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.3096	%

					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	P40-16-XLPP-RR	98	10	1315	1.680021	0.292347	1.727452	0.300601
RFS	APXVSPP18-C-A20	98	100	1084	0.84856	0.147661	0.868366	0.151108
Powerwave	P40-16-XLPP-RR	98	190	1315	1.680021	0.292347	1.727452	0.300601

Sprint (Decommissioned)
NORTH HAVEN TOWER
Carrier Summary

Frequency:	862	MHz
Maximum Permissible Exposure (MPE):	574.67	µW/cm^2
Maximum power density at ground level:	0	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0	%

					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	844G65VTZASX	110	20	0	0	0	0	0
ANDREW	844G65VTZASX	110	20	0	0	0	0	0
ANDREW	844G65VTZASX	110	20	0	0	0	0	0
ANDREW	844G65VTZASX	110	20	0	0	0	0	0
ANDREW	844G65VTZASX	110	140	0	0	0	0	0
ANDREW	844G65VTZASX	110	140	0	0	0	0	0
ANDREW	844G65VTZASX	110	140	0	0	0	0	0
ANDREW	844G65VTZASX	110	140	0	0	0	0	0
ANDREW	844G65VTZASX	110	260	0	0	0	0	0
ANDREW	844G65VTZASX	110	260	0	0	0	0	0
ANDREW	844G65VTZASX	110	260	0	0	0	0	0
ANDREW	844G65VTZASX	110	260	0	0	0	0	0

T-Mobile
NORTH HAVEN TOWER
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	11.78644	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	1.17864	%

					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**
Ericsson	AIR 21 B2A B4P	84	40	2061	1.484758	0.148476	1.735216	0.173522
Ericsson	AIR 32 B2A-B66AA	84	40	2313	7.297162	0.729716	7.326076	0.732608
Ericsson	AIR 21 B2A B4P	84	150	2061	1.484759	0.148476	1.735216	0.173522
Ericsson	AIR 32 B2A-B66AA	84	150	2313	7.337345	0.733734	7.337345	0.733734
Ericsson	AIR 21 B2A B4P	84	270	2061	1.484758	0.148476	1.735215	0.173522
Ericsson	AIR 32 B2A-B66AA	84	270	2313	7.337345	0.733734	7.337345	0.733734

T-Mobile
NORTH HAVEN TOWER
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	5.81106	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.58111	%

					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**
Ericsson	AIR 21 B2A B4P	84	40	2061	1.484758	0.148476	1.735216	0.173522
Ericsson	AIR 32 B2A-B66AA	84	40	2313	1.637712	0.163771	1.946939	0.194694
Ericsson	AIR 21 B2A B4P	84	150	2061	1.484759	0.148476	1.735216	0.173522
Ericsson	AIR 32 B2A-B66AA	84	150	2313	1.637712	0.163771	1.946939	0.194694
Ericsson	AIR 21 B2A B4P	84	270	2061	1.484758	0.148476	1.735215	0.173522
Ericsson	AIR 32 B2A-B66AA	84	270	2313	1.637712	0.163771	1.946939	0.194694

T-Mobile
NORTH HAVEN TOWER
Carrier Summary

Frequency:	700	MHz
Maximum Permissible Exposure (MPE):	466.67	µW/cm^2
Maximum power density at ground level:	1.65009	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.35359	%

					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**
RFS	APXVAARR24_43-U-NA20	84	40	1307	1.083249	0.232125	1.339619	0.287061
RFS	APXVAARR24_43-U-NA20	84	150	1307	1.083249	0.232125	1.339619	0.287061
RFS	APXVAARR24_43-U-NA20	84	270	1307	1.083249	0.232125	1.339619	0.287061

T-Mobile
NORTH HAVEN TOWER
Carrier Summary

Frequency:	600	MHz
Maximum Permissible Exposure (MPE):	400	µW/cm^2
Maximum power density at ground level:	1.87833	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.46958	%

					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**
RFS	APXVAARR24_43-U-NA20	84	40	1251	1.217657	0.304414	1.226352	0.306588
RFS	APXVAARR24_43-U-NA20	84	150	1251	1.220911	0.305228	1.226352	0.306588
RFS	APXVAARR24_43-U-NA20	84	270	1251	1.217657	0.304414	1.226352	0.306588