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

May 15, 2019

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

RE: **Notice of Exempt Modification for Crown Site BU: 806367**
AT&T Site ID: CT5386
65 Maple Avenue West, Haddam, CT 06441
Latitude: 41° 29′ 4.54″/ Longitude: -72° 34′ 20.81″

Dear Ms. Bachman:

AT&T currently maintains (9) antennas at the 89-foot level of the existing 116-foot monopole at 65 Maple Avenue West in Haddam, Connecticut. The tower is owned by Crown Castle. The property is owned by Mr. Louis W. D'Amico Sr., Trustee. AT&T intends to replace (6) antennas, add (3) antennas, remove (6) diplexers, replace (3) RRUs, add (6) RRU's and add (1) fiber cable.

The facility was approved by the Connecticut Siting Council in Docket No. 170 on November 15, 1995. AT&T's proposed modification will not violate the conditions set forth in the Decision and Order.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to Ms. Lizz Milardo, First Selectman, Town of Haddam, Mr. Bill Warner, Town Planner, 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: Lizz Milardo, First Selectman
Town of Haddam
Town Office Building
30 Field Park Drive
Haddam, CT 06438
860-345-3730

Bill Warner, Town Planner
Town of Haddam
Town Office Building
30 Field Park Drive
Haddam, CT 06438
860-345-3730

Louis W. D'Amico, Sr.
65 Maple Avenue West
Higganum, CT 06441

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

SHIP DATE: 15MAY19
ACTWGT: 4.00 LB
CAD: 104924194/INET4100

BILL SENDER

TO **MELANIE BACHMAN**
CONNECTICUT SITING COUNCIL
10 FRANKLIN SQUARE

NEW BRITAIN CT 06051
(860) 827-2951 REF: 1765.6680
INV:
PO: DEPT:

565J1/D66C/23AD

FedEx Express

E

J191019010701uv

THU - 16 MAY 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7752 2321 5447**

06051
BDL
CT-US

EB BDLA

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

SHIP DATE: 15MAY19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **LIZZ MILARDO, FIRST SELECTMAN**
TOWN OF HADDAM
TOWN OFFICE BUILDING
30 FIELD PARK DRIVE
HADDAM CT 06438
(860) 345-3730 REF: 1734.7680
INV:
PO: DEPT:

565J1/D66C/23AD

FedEx Express

J191019010701uv

TRK# 0201 **7752 2323 7268**

THU - 16 MAY 12:00P
PRIORITY OVERNIGHT

EB RSPA **06438**
CT-US **BDL**

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

SHIP DATE: 15MAY19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **BILL WARNER, TOWN PLANNER**
TOWN OF HADDAM
TOWN OFFICE BUILDING
30 FIELD PARK DRIVE
HADDAM CT 06438
(860) 345-3730 REF: 1734.7680
INV:
PO: DEPT:

565J1/D66C/23AD

FedEx Express

J191019010701uv

TRK# 0201 **7752 2325 5370**

THU - 16 MAY 12:00P
PRIORITY OVERNIGHT

EB RSPA

06438
CT-US **BDL**

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

SHIP DATE: 15MAY19
ACTWGT: 1.50 LB
CAD: 104924194/INET4100

BILL SENDER

TO **LOUIS W. D'AMICO SR.**
65 MAPLE AVENUE WEST

HIGGANUM CT 06441
(201) 236-9224 REF: 1734.7680
INV:
PO: DEPT:

565J1/D66C/23AD

FedEx Express

J191019010701uv

TRK# 0201 **7752 2327 6460**

THU - 16 MAY 10:30A
PRIORITY OVERNIGHT

EB RSPA

06441
CT-US **BDL**

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Filing Guides
Meetings & Minutes
Public Participation
Audio Link to New Britain Hearing Rooms
Programs & Services
Telecommunications Database
Publications
Other Resources
Statutes & Regulations
Electric Transmission Upgrade Projects
Frequently Asked Questions

Melanie Bachman,
Executive Director

DOCKET NO. 170 - An application of Metro Mobile CTS of Hartford, Inc. for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telecommunications facility located at 109 Maple Avenue West in the Higganum section of the Town of Haddam, Connecticut.

Connecticut Siting Council

November 15, 1995

DECISION AND ORDER

Pursuant to the foregoing Findings of Fact, and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a cellular telecommunications tower and equipment building at the proposed prime site in the Higganum section of Haddam, Connecticut, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to Bell Atlantic NYNEX Mobile, Inc. for the construction, operation, and maintenance of a cellular telecommunications tower, associated equipment, and building at the proposed prime site, located within an 88.85 acre parcel at 109 Maple Avenue West, Haddam, Connecticut. We find the effects on scenic resources and the environment from the alternate site to be more significant than the effects from the prime site, and therefore deny certification of the alternate site without prejudice.

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

1. The tower shall be constructed as a monopole, no taller than necessary to provide the proposed communications service and sufficient to accommodate tower sharing, and not to exceed a total height of 120 feet above ground level.

2. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be submitted to and approved by the Council prior to the commencement of facility construction and shall include plans for the tower and tower foundation; specifications for the placement of all antennas to be attached to this tower; plans for the equipment building, security fence, emergency generator and fuel tank; plans for the access road and utility line installation from 109 Maple Avenue West; plans for site clearing and tree trimming; and plans for water drainage and erosion and sedimentation controls consistent with the Connecticut Guidelines for Soil Erosion and Sedimentation Control, as amended.

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

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

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

6. If the facility does not initially provide, or permanently ceases to provide, cellular services following completion of construction, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapplication for any continued or new use shall be made to the Council before any such use is made.

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

8. The Certificate Holder shall notify the Council upon completion of construction and provide the final cost to construct the facility.

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

Hartford Courant and the Middletown Press.

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

The parties and intervenors to this proceeding are:

APPLICANT	**ITS REPRESENTATIVES**
Bell Atlantic NYNEX Mobile, Inc.	Brian C.S. Freeman, Esq. Kenneth C. Baldwin, Esq. Robinson & Cole One Commercial Plaza Hartford, CT 06103-3597 David S. Malko General Manager - Engineering Sandy M. Ranciato Manager - Regulatory Services Bell Atlantic NYNEX Mobile, Inc. 20 Alexander Drive Wallingford, CT 06492
INTERVENOR	**ITS REPRESENTATIVE**
Town of Haddam	The Honorable Marjorie W. DeBold First Selectman Town of Haddam 30 Field Park Drive Haddam, CT 06438
INTERVENOR	**ITS REPRESENTATIVE**
Springwich Cellular Limited Partnership	Peter J. Tyrrell, Esq. General Counsel - Wireless Springwich Cellular Limited Partnership 500 Enterprise Dr., 4th floor Rocky Hill, CT 06067

Content Last Modified on 8/9/2002 11:34:46 AM

65 MAPLE AVE WEST

Location	65 MAPLE AVE WEST	**Mblu**	23/ 001/ 1/ C/
Acct#	MT380800	**Owner**	DAMICO LOUIS W SR + LOUIS W JR TRUSTEES
Assessment	$263,450	**Appraisal**	$376,360
PID	992	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$188,860	$187,500	$376,360
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$132,200	$131,250	$263,450

Owner of Record

Owner	DAMICO LOUIS W SR + LOUIS W JR TRUSTEES	**Sale Price**	$0
Co-Owner	C/O CROWN ATLANTIC CO LLC PMB 3	**Certificate**	
Address	4017 WASHINGTON RD MCMURRAY, PA 15317	**Book & Page**	336/ 559
		Sale Date	04/05/2010

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
DAMICO LOUIS W SR + LOUIS W JR TRUSTEES	$0		336/ 559	04/05/2010
DAMICO LOUIS W SR + LOUIS W JR	$0		305/ 805	10/10/2006
DAMICO LOUIS W & MARJORY C DAMICO FAMILY	$0		256/ 789	01/27/2003
DAMICO LOUIS W	$0		233/1040	12/21/2000

Building Information

Building 1 : Section 1

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

Building Attributes

Building Photo

Field	Description
Style	Outbuildings
Model	
Grade:	
Stories	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Full Bthrms:	
Half Baths:	
Extra Fixtures	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Extra Kitchens	
Fireplace(s)	
Extra Opening(s)	
Gas Fireplace(s)	
Blocked FPL(s)	
Woodstove(s)	
Bsmt Garage(s)	
SF Fin Bsmt	
FBM Quality	
Whirlpool	
Sauna	
Foundation	

(http://images.vgsi.com/photos2/HaddamCTPhotos//\00\00\17/46.JPG)

Building Layout

Building

(http://images.vgsi.com/photos2/HaddamCTPhotos//Sketches/99

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

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	350
Description	Cell Tower
Zone	R-2
Neighborhood	CELL
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	0.25
Frontage	
Depth	
Assessed Value	$131,250
Appraised Value	$187,500

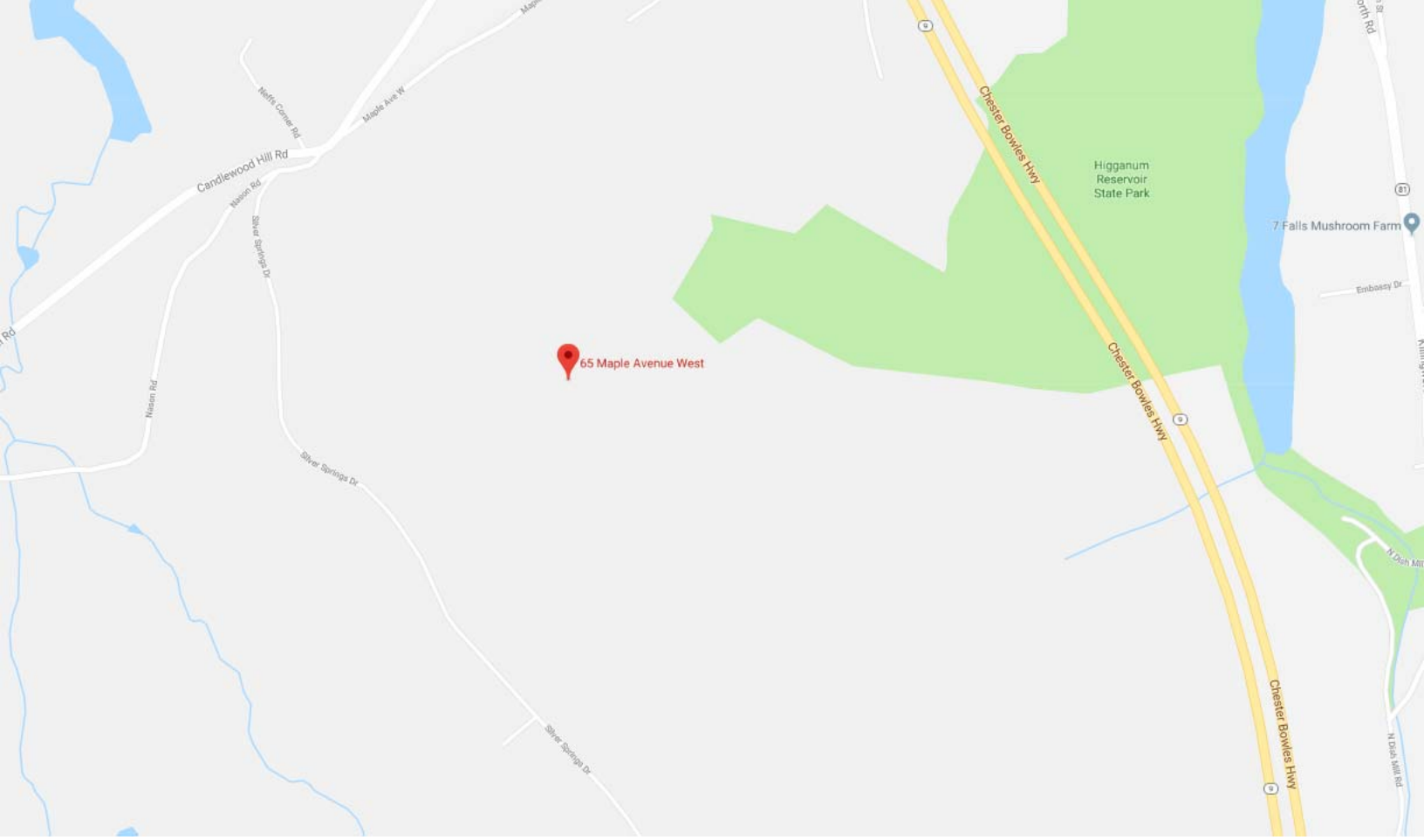
Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
FN4	FENCE-8' CHAIN			2240 L.F.	$32,260	1
SHDC	Cell Shed			580 S.F.	$156,600	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$188,860	$187,500	$376,360
2017	$188,860	$187,500	$376,360
2016	$188,860	$187,500	$376,360

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$132,200	$131,250	$263,450
2017	$132,200	$131,250	$263,450
2016	$132,200	$131,250	$263,450


65 Maple Avenue West
Chester Bowles Hwy
Higganum Reservoir State Park
7 Falls Mushroom Farm
Candlewood Hill Rd
Silver Springs Dr
Nelson Rd
Maple Ave W
Neffs Corner Rd
Embassy Dr
N Dish Mill Rd

PROJECT INFORMATION

SCOPE OF WORK:

ITEMS TO BE REMOVED FROM EXISTING TOWER & ON GROUND:

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

- INSTALL AT&T ANTENNA (HPA-65R-BU8AA) ALPHA & BETA (TYP. OF 2, TOTAL OF 4)
- INSTALL AT&T ANTENNA (800-10966) ALPHA & BETA (TYP. OF 1, TOTAL OF 2)
- INSTALL AT&T ANTENNA (HPA-65R-BU8AA) GAMMA (TYP. OF 2, TOTAL OF 2)
- INSTALL AT&T ANTENNA (800-10966) GAMMA (TYP. OF 1, TOTAL OF 1)
- INSTALL AT&T 4449 B5/B12 (700) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 4415 B25 (1900) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 8843 B2/B66A (AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL SURGE ARRESTOR (DC6-48-60-18-8F) (TOTAL OF 2).
- INSTALL (4) DC TRUNK CABLES & (1) FIBER TRUNK CABLES.

ITEMS TO BE MOUNTED INSIDE EXISTING SHELTER:

- ADD LBC
- REPLACE EXISTING BBU W/ 1x6630+1xXMU
- INSTALL AT&T DIPLEXER (DBCT108F1V92-1) (TYP. OF 1 PER SECTOR, TOTAL OF 3)
- ADD 6630 SG RBS

ITEMS TO REMAIN:

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

SITE ADDRESS:	109 MAPLE AVENUE WEST HADDAM CT, 06441
LATITUDE (NAD 83):	N 41° 29' 4.54"
LONGITUDE (NAD 83):	W 72° 34' 20.81"
LANDLORD:	CROWN CASTLE INTERNATIONAL 500 W. CUMMINGS PARK, STE 3600 WOBURN, MA 01801
TYPE OF SITE:	MONOPOLE/OUTDOOR
TOWER HEIGHT:	115'-5"
RAD CENTER:	89'
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY

at&t

SITE NUMBER: CT5386

FA LOCATION CODE: 10091802

SITE NAME: HADDAM NORTH CENTRAL

CROWN SITE NAME: HRT 046 943209

PROJECT: LTE 2C, 4TX4RX SOFTWARE RETROFIT, LTE 3C, LTE 4C

PACE ID: MRCTB037973, MRCTB038147, MRCTB037946, MRCTB038095

BU#: 806367

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.
126 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
PROFESSIONAL ENGINEER
05/07/19
09/23/19

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

SUBMITTALS

1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL
109 MAPLE AVENUE WEST
HADDAM CT, 06441

TITLE SHEET

T-1

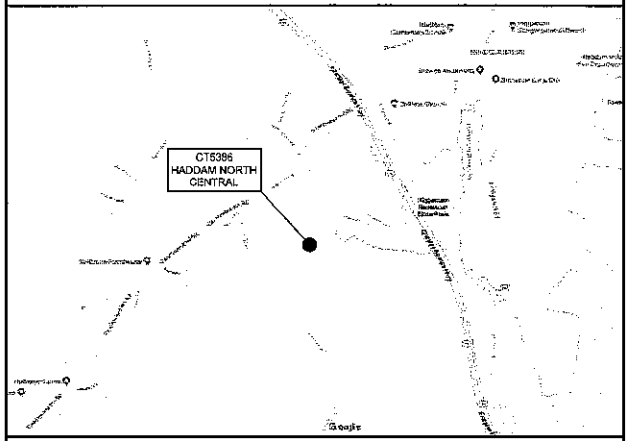
DRAWING INDEX

CROWN CASTLE SITE ID #: 806367
CROWN CASTLE SITE NAME: HRT 046 943209

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



TBD

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.

811

UNDERGROUND SERVICE ALERT

STATE LAW REQUIRES
TWO WORKING DAYS NOTICE PRIOR TO ANY
EARTH MOVING ACTIVITIES BY CALLING
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 IG2-(*)CS OR IGL-(*)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, 3CT MODEL #28-22. 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, IND-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 8.3.2.2.
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 TEMP-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
05/26/17

PROJECT NO:	ERC06004
DRAWN BY:	JV
CHECKED BY:	CAT

SUBMITTALS

1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL
103 MAPLE AVENUE WEST
HADDAM CT, 06441

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-00249.
9. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATIONS 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 79 (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-00927 LATEST VERSION.
24. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE SHALL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 8'-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 MANUFACTURERS 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
EXOTHERMIC WITH INSPECTION SLEEVE
GROUNDING BAR
SHELTER GROUNDING BAR
GROUND ROD
TEST GROUND ROD WITH INSPECTION SLEEVE
SINGLE POLE SWITCH
DUPLEX RECEPTACLE
DUPLEX GFCI RECEPTACLE
FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48-T8
EXISTING SMOKE DETECTION (DC)
EXISTING EMERGENCY LIGHTING (DC)
SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED-1-25A400/51K-SR4-120-PE-DDBTXD
EXISTING UTILITY POLE
EXISTING CHAIN LINK FENCE
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
PROPOSED UNDERGROUND TELCO
PROPOSED OVERHEAD POWER
PROPOSED OVERHEAD TELCO
PROPOSED OVERHEAD UTILITIES
PROPOSED ABOVE GROUND POWER
PROPOSED ABOVE GROUND TELCO

CALLOUT REFERENCE
REVISION REFERENCE
WORKPOINT
SECTION REFERENCE
DETAIL REFERENCE
ELEVATION REFERENCE

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	PC	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
5641 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
REGISTERED
PROFESSIONAL ENGINEER
05/07/19
09:56:56 -04'00'

PROJECT NO: ERC00004
DRAWN BY: JV
CHECKED BY: CAT

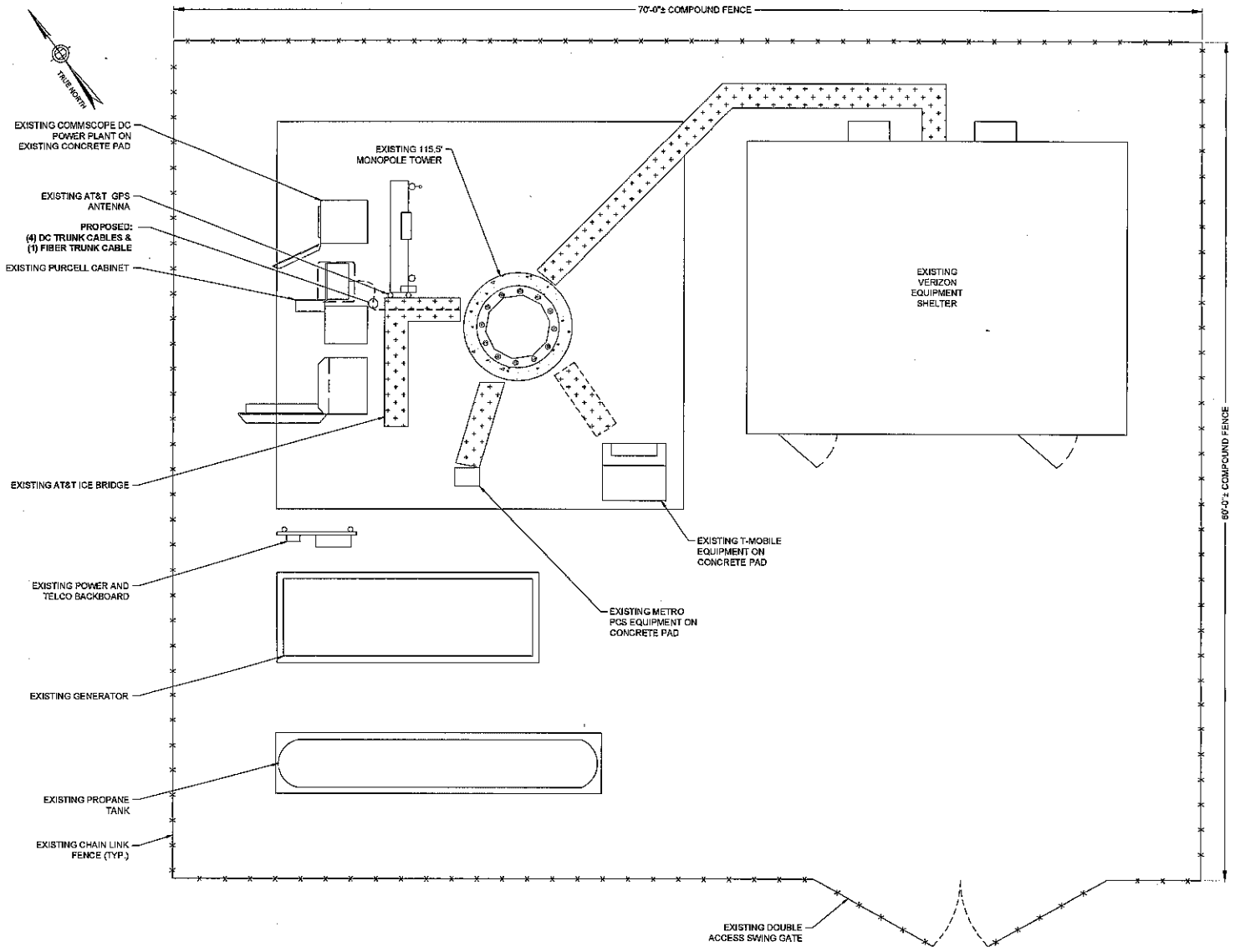
SUBMITTALS

1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL
100 MAPLE AVENUE WEST
HADDAM CT, 06441

GENERAL NOTES II

GN-2



NOTES:

1. PLAN BASED ON CONSTRUCTION DRAWINGS ADVANCE ENGINEERING GROUP ON 11/26/13. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING EQUIPMENT.

1 SITE PLAN

SCALE: 3/8" = 1'-0"

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
05/07/2019 08:37:06 -04'00'

PROJECT NO:	ERC0804
DRAWN BY:	JV
CHECKED BY:	CAT

SUBMITTALS

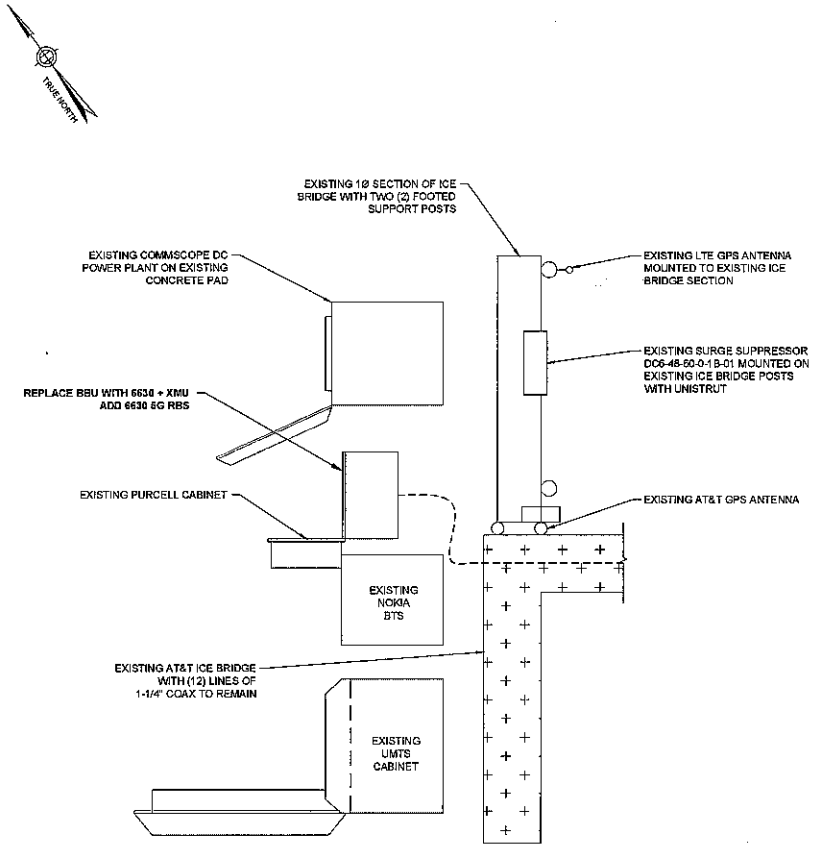
1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL

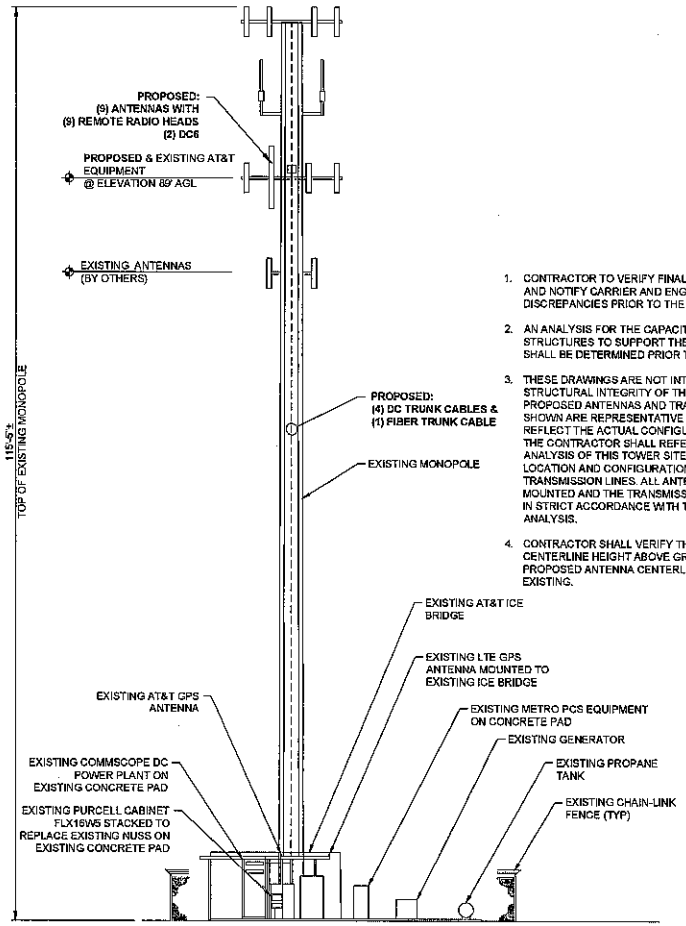
109 MAPLE AVENUE WEST
HADDAM CT, 06441

SITE PLAN

C-1



1 EQUIPMENT LAYOUT SCALE: 3/4" = 1'-0"



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

2 TOWER ELEVATION SCALE: 1/8" = 1'-0"

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SUITE 101
CLIFTON PARK, NY 12065

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

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED PROFESSIONAL ENGINEER
09/27/18

PROJECT NO.	ERCC0004
DRAWN BY:	JV
CHECKED BY:	CAT

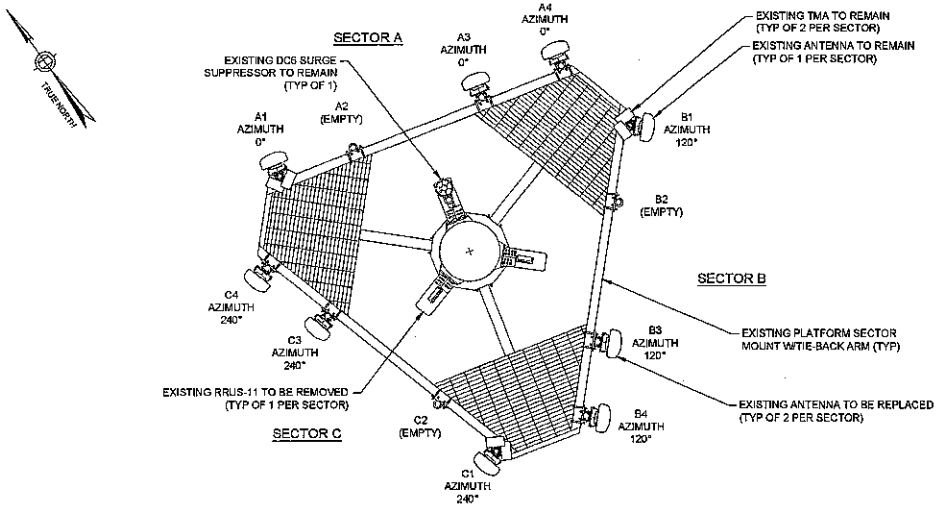
SUBMITTALS

1	05/07/18	ISSUED FOR CONSTRUCTION
0	04/17/18	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL
109 MAPLE AVENUE WEST
HADDAM CT, 06441

EQUIPMENT LAYOUT & PROPOSED TOWER ELEVATION

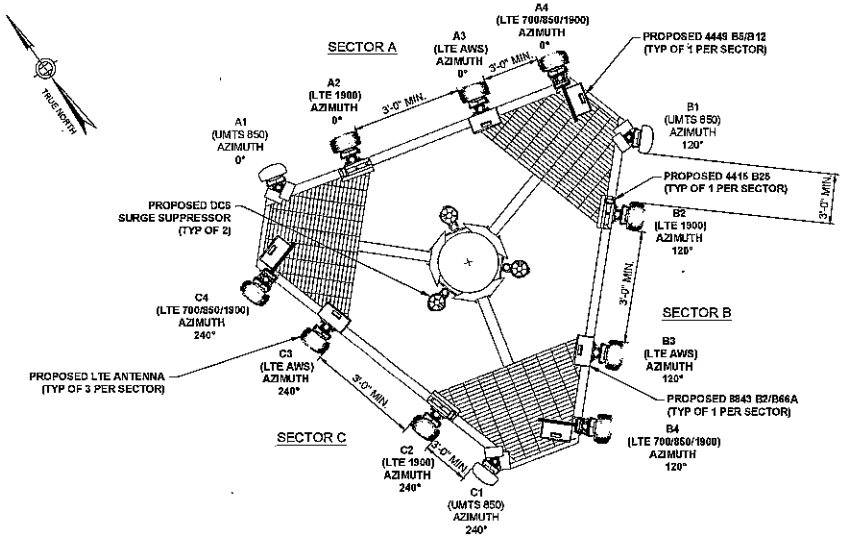
C-2



ELEVATION 89'

1 EXISTING ANTENNA LAYOUT

SCALE: N.T.S.



ELEVATION 89'

2 PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.

NOTES:

1. CONTRACTOR SHALL REFER TO THE MOUNT ANALYSIS REPORT; SITE NUMBER: CT5386; SITE NAME: HADDAM NORTH CENTRAL; FA LOCATION: 10091802; CROWN BU NUMBER: 806367 ; CROWN SITE NAME: HRT 046 943209; CROWN ORDER NUMBER: 806367 ; ISSUED BY JACOBS ENGINEERING GROUP DATED ON 03/25/2019. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE INSTALLED 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.

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5841 BRIDGE STREET
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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: BRCC0004
DRAWN BY: JV
CHECKED BY: CAT

SUBMITTALS

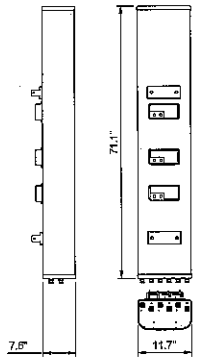
1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL
109 MAPLE AVENUE WEST
HADDAM CT, 06441

EXISTING & PROPOSED ANTENNA LAYOUT

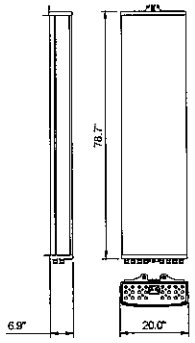
C-3

MANUFACTURER:	CCI
MODEL NO.:	HPA65R-BU6AA
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	71.1" x 11.7" x 7.5" 1807mm x 297mm x 193mm
WEIGHT (lbs):	41.9
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	201 LBS @ 100 MPH 894 N @ 161 KPH
SIDE WIND LOAD:	142 LBS @ 100 MPH 633 N @ 161 KPH
WIND SPEED MAX.:	>150 MPH (>241 KPH)



1 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

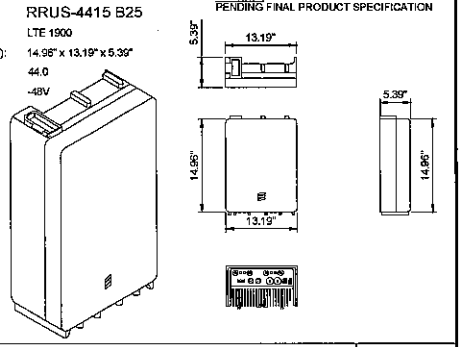
MANUFACTURER:	KATHREIN
MODEL NO.:	80010965
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	78.7" x 20.0" x 6.9" 1999mm x 508mm x 175mm
WEIGHT (lbs):	97.6
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	254 LBF @ 93 MPH 1130 N @ 150 KM/H
SIDE WIND LOAD:	256 LBF @ 93 MPH 1140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



2 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

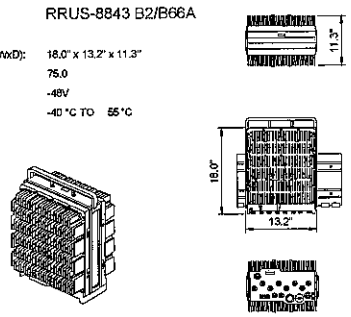
MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4415 B25
TECHNOLOGY:	LTE 1900
DIMENSIONS (HxWxD):	14.96" x 13.19" x 5.39"
WEIGHT (lbs):	44.0
POWER SUPPLY:	-48V

NOTE:
PENDING FINAL PRODUCT SPECIFICATION



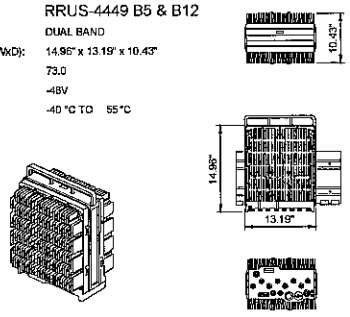
3 RRUS SPECIFICATIONS — SCALE: N.T.S.

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



4 RRUS SPECIFICATIONS — SCALE: N.T.S.

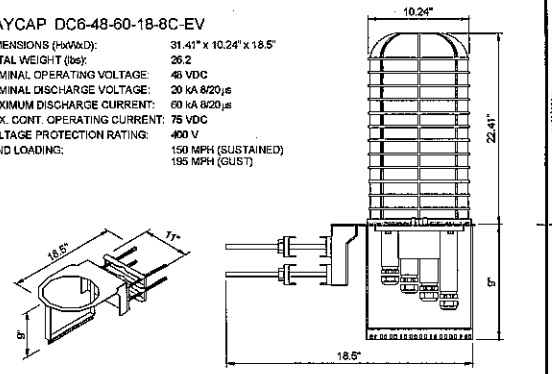
MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4449 B5 & B12
TECHNOLOGY:	DUAL BAND
DIMENSIONS (HxWxD):	14.96" x 13.19" x 10.43"
WEIGHT (lbs):	73.0
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C



5 RRUS SPECIFICATIONS — SCALE: N.T.S.

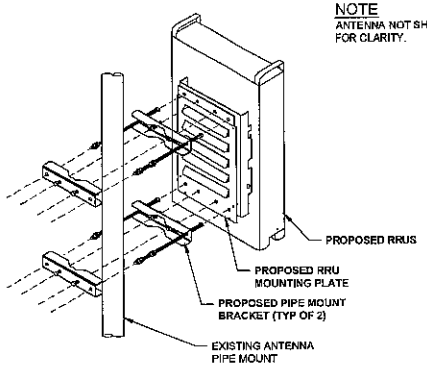
RAYCAP DC6-48-60-18-8C-EV

DIMENSIONS (HxWxD):	31.41" x 10.24" x 18.5"
TOTAL WEIGHT (lbs):	26.2
NOMINAL OPERATING VOLTAGE:	48 VDC
NOMINAL DISCHARGE VOLTAGE:	20 kA 8/20 µs
MAXIMUM DISCHARGE CURRENT:	60 kA 8/20 µs
MAX. CONT. OPERATING CURRENT:	75 VDC
VOLTAGE PROTECTION RATING:	400 V
WIND LOADING:	150 MPH (SUSTAINED) 195 MPH (GUST)



6 DC SURGE PROTECTION SPECIFICATIONS — SCALE: N.T.S.

NOTE
ANTENNA NOT SHOWN FOR CLARITY.



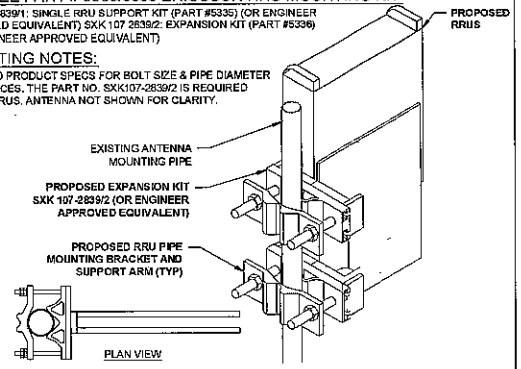
7 RRU MOUNTING DETAIL — SCALE: N.T.S.

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)

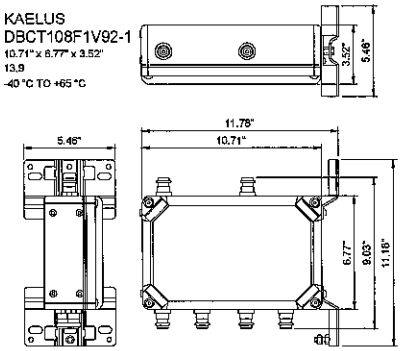
MOUNTING NOTES:

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.



8 TITLE — SCALE: N.T.S.

MANUFACTURER:	KAELUS
MODEL:	DBCT108F1V92-1
DIMENSIONS (HxWxD):	10.71" x 6.77" x 3.52"
TOTAL WEIGHT (lbs):	13.9
TEMPERATURE:	-40 °C TO +65 °C



9 DIPLEXER SPECIFICATIONS — SCALE: N.T.S.

at&t
5941 BRIDGE STREET
EAST SYRACUSE, NY 13057

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

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

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED PROFESSIONAL ENGINEER
05/07/2019
09:37:36-04'00'

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

SUBMITTALS

DETAIL NOT USED

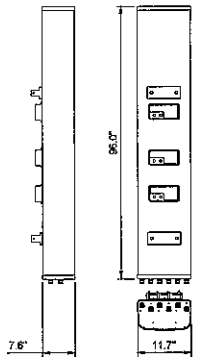
1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

FA# 10091602
SITE# CT5386
HADDAM NORTH CENTRAL
109 MAPLE AVENUE WEST
HADDAM CT, 06441

EQUIPMENT DETAILS

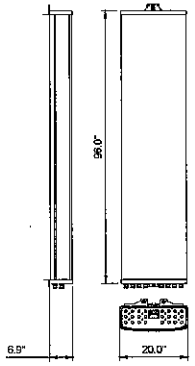
C-4

MANUFACTURER:	CCI
MODEL NO.:	HPA65R-BU8AA
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	96.0" x 11.7" x 7.6" 2438mm x 297mm x 193mm
WEIGHT (lbs):	54.0
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	287 LBS @ 100 MPH 1278 N @ 161 KPH
SIDE WIND LOAD:	206 LBS @ 100 MPH 916 N @ 161 KPH
WIND SPEED MAX.:	>150 MPH (>241 KPH)



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:	315 LBF @ 93 MPH 1405 N @ 150 KM/H
WIND SPEED MAX.:	>150 MPH (>241 KM/H)



2 ANTENNA SPECIFICATIONS SCALE: N.T.S.

3 SCALE: N.T.S.

4 SCALE: N.T.S.

5 SCALE: N.T.S.

6 SCALE: N.T.S.

7 SCALE: N.T.S.

8 SCALE: N.T.S.

9 SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 301
CLIFTON PARK, NY 12065

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

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED PROFESSIONAL ENGINEER
05/07/19
09/07/19

PROJECT NO: BRCC0004
DRAWN BY: JV
CHECKED BY: CAT

SUBMITTALS

DETAIL NOT USED

1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL

109 MAPLE AVENUE WEST
HADDAM CT, 06441

EQUIPMENT DETAILS

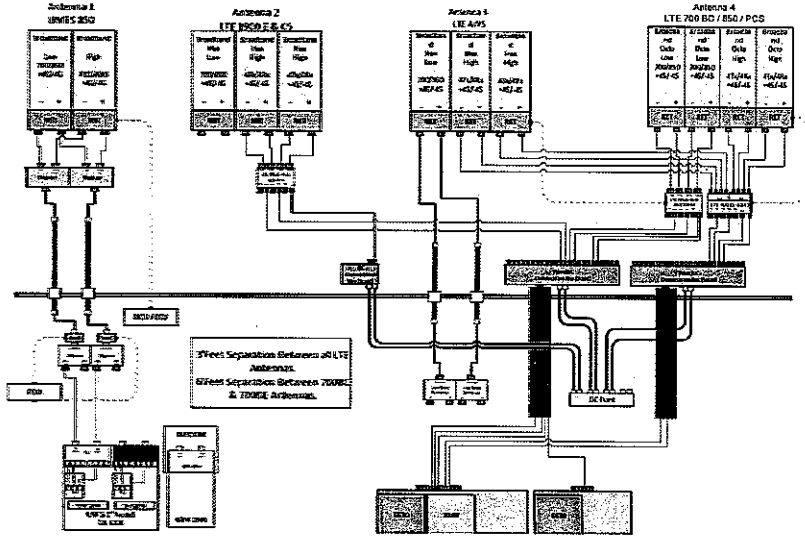
C-5

ANTENNA NUMBER	ANTENNA MODEL	ANTENNA BAND	AZIMUTH	ANTENNA CENTERLINE FROM GROUND	TMA's	RRH's	FEEDER	RAYCAP
A1	7770 (65"x11"x5")	UMTS 850	0°	89'	(2) LGP 21401	-	(2) 7/8" COAX (LENGTH @ 100')	(1) RAYCAP DC6-48-60-18-8F
A2	HPA-65R-BU6AA (71"x11.7"x8.4")	LTE 1900	0°	89'	-	(1) 4415 B25	(2) DC (LENGTH @ 100')	
A3	HPA-65R-BU6AA (71"x11.7"x8.4")	LTE AWS	0°	89'	-	(1) 8843 B2/B66A	(2) 7/8" COAX (LENGTH @ 100')	
A4	800-10965 (78.7"x20"x6.9")	LTE 700 LTE 850 LTE 1900 6G 850	0°	89'	-	(1) 4449 B5/B12	(2) DC (1) FIBER (LENGHT @ 100')	(2) RAYCAP DC6-48-60-18-8F
B1	7770 (65"x11"x5")	UMTS 850	120°	89'	(2) LGP 21401	-	(2) 7/8" COAX (LENGTH @ 100')	
B2	HPA-65R-BU6AA (71"x11.7"x8.4")	LTE 1900	120°	89'	-	(1) 4415 B25		
B3	HPA-65R-BU6AA (71"x11.7"x8.4")	LTE AWS	120°	89'	-	(1) 8843 B2/B66A	(2) 7/8" COAX (LENGTH @ 100')	
B4	800-10965 (78.7"x20"x6.9")	LTE 700 LTE 850 LTE 1900 6G 850	120°	89'	-	(1) 4449 B5/B12	(2) 7/8" COAX (LENGTH @ 100') (2) DC (1) FIBER (LENGTH @ 100')	
G1	7770 (65"x11"x5")	UMTS 850	240°	89'	(2) LGP 21401	-	(2) 7/8" COAX (LENGTH @ 100')	
G2	HPA-65R-BU8AA (96"x11.7"x7.6")	LTE 1900	240°	89'	-	(1) 4415 B25		
G3	HPA-65R-BU8AA (95"x11.7"x7.6")	LTE AWS	240°	89'	-	(1) 8843 B2/B66A	(2) 7/8" COAX (LENGTH @ 100')	
G4	800-10966 (96"x20"x6.9")	LTE 700 LTE 850 LTE 1900 6G 850	240°	89'	-	(1) 4449 B5/B12		

NOTES:

1. 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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BOSTON, MA 02116

STATE OF CONNECTICUT
CRAIG A. THOMAS
No. 0029052
LICENSED PROFESSIONAL ENGINEER
07/05/2019

PROJECT NO: ERCC0094
DRAWN BY: JN
CHECKED BY: CAT

SUBMITTALS

1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/17/19	ISSUED FOR PERMITTING

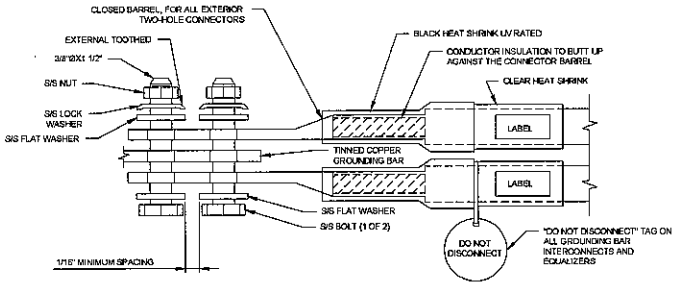
FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL
109 MAPLE AVENUE WEST
HADDAM CT, 06441

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", "T") 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

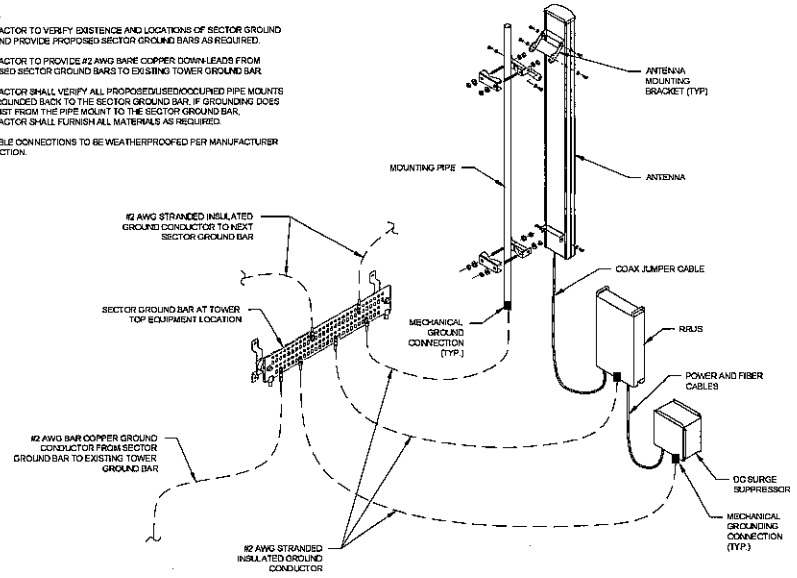
GROUNDING NOTES:

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 9' 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/REPLACE 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
05/08/19

PROJECT NO:	ERDC0004
DRAWN BY:	JV
CHECKED BY:	CAT

SUBMITTALS

1	05/07/19	ISSUED FOR CONSTRUCTION
0	04/12/19	ISSUED FOR PERMITTING

FA# 10091802
SITE# CT5386
HADDAM NORTH CENTRAL
109 MAPLE AVENUE WEST
HADDAM CT, 06441

GROUNDING DETAILS

G-1

PAUL J. FORD & COMPANY

Date: **March 29, 2019**

Amanda D Brown
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Paul J. Ford and Company
250 East Broad St., Suite 600
Columbus, OH 43215
(614) 221-6679

Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT5386
	Carrier Site Name:	CT5386
Crown Castle Designation:	**Crown Castle BU Number:**	806367
	Crown Castle Site Name:	HRT 046 943209
	Crown Castle JDE Job Number:	556168
	Crown Castle Work Order Number:	1714117
	Crown Castle Order Number:	477393 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37519-1174.001.7805
Site Data:	**MAPLE AVE WEST, HADDAM, Middlesex County, CT** **Latitude *41° 29' 4.54"*, Longitude *-72° 34' 20.81"*** **115.5 Foot - Monopole Tower**	

Dear Amanda D Brown,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

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

LC5: Proposed Equipment Configuration **Sufficient Capacity**

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

Respectfully submitted by:

Allen R Bonham, EI
Structural Designer
abonham@pauljford.com

RMF

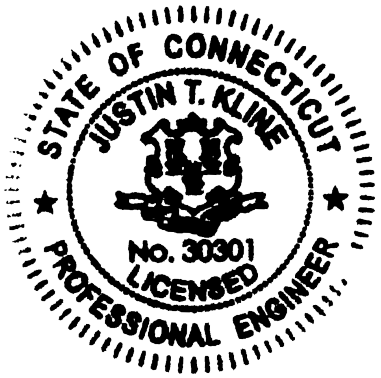


TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 115.5 ft Monopole tower designed by FWT INC. in March of 1996.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	130 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	40 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)
87.0	89.0	4	cci antennas	HPA65R-BU6A w/ Mount Pipe	2 2 4 12 1	3/8 7/16 3/4 7/8 2” Conduit
		2	cci antennas	HPA65R-BU8A w/ Mount Pipe		
		3	ericsson	RRUS 4415 B25		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 8843 B2/B66A		
		2	kathrein	80010965 w/ Mount Pipe		
		1	kathrein	80010966 w/ Mount Pipe		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		2	raycap	DC6-48-60-18-8C-EV		
		1	raycap	DC6-48-60-18-8F		
	87.0	6	powerwave technologies	LGP21401		
		1	tower mounts	Platform Mount [LP 304-1]		
85.0	85.0	3	ericsson	RRUS 11 B12	--	--
		1	tower mounts	Side Arm Mount [SO 102-3]		

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)
117.0	119.0	3	antel	BXA-171063-8BF-2 w/ Mount Pipe	15	1 5/8
		3	antel	BXA-70063/6CF w/ MP		
		4	antel	LPA-80063/6CF w/ MP		
		2	antel	LPA-80080/6CF w/ MP		
		6	rfs celwave	FD9R6004/2C-3L		
	117.0	1	tower mounts	Platform Mount [LP 1001-1]		
104.0	109.0	2	decibel	DB411-A	3	7/8
	107.0	1	maxrad	MFB4505		
	104.0	1	tower mounts	Side Arm Mount [SO 702-3]		
97.0	98.0	3	ems wireless	RR90-17-02DP w/ Mount Pipe	12	1 1/4
	97.0	3	commscope	ATBT-BOTTOM-24V		
		3	commscope	LNX-6515DS-VTM w/ Mount Pipe		
		3	ericsson	KRY 112 489/2		
		1	tower mounts	Side Arm Mount [SO 702-3]		
75.0	77.0	3	kathrein	742 213 w/ Mount Pipe	6	1 5/8
	75.0	1	tower mounts	Pipe Mount [PM 601-3]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 1927396, 3/1/1996	2200141	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 1927396, 3/1/1996	997499	CCISITES
4-GEOTECHNICAL REPORTS	FDH, 08-02135G, 3/18/2008	2225355	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 in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.

3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) The existing base plate grout was not considered in this analysis.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company 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	115.5 - 83.92	Pole	TP40.829x32.25x0.25	1	-8.32	1790.03	21.7	Pass
L2	83.92 - 41.25	Pole	TP51.92x38.8811x0.3125	2	-22.15	2808.03	48.6	Pass
L3	41.25 - 0	Pole	TP62.5x49.4614x0.375	3	-38.95	4073.37	59.6	Pass
							Summary	
						Pole (L3)	59.6	Pass
						Rating =	59.6	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	68.0	Pass
1	Base Plate	0	61.7	Pass
1	Base Foundation Structural Steel	0	36.4	Pass
1	Base Foundation Soil Interaction	0	74.7	Pass

Structure Rating (max from all components) =	74.7%

Notes:

- All structural ratings are per TIA-222-H Section 15.5

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

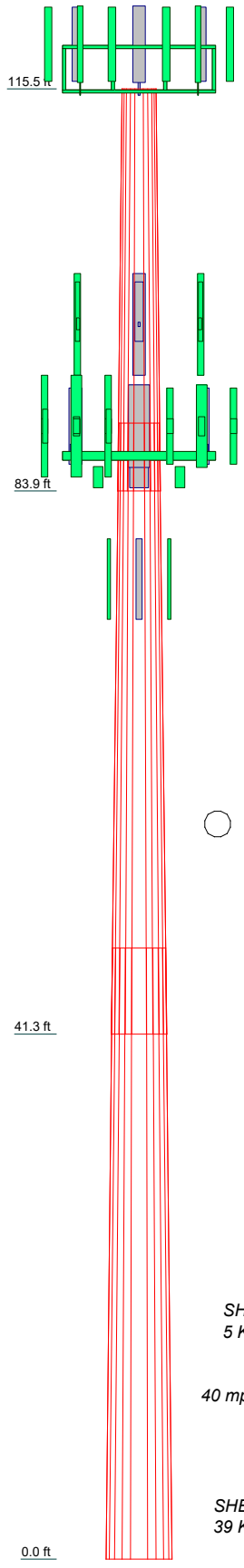
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	31.58	12	0.2500	5.33	32.2500	40.8290		3.1
2	48.00	12	0.3125	6.75	38.8811	51.9200	A572-65	7.4
3	48.00	12	0.3750		49.4614	62.5000		11.0
								21.5



ALL REACTIONS ARE FACTORED

AXIAL 70 K

SHEAR 5 K

MOMENT 442 kip-ft

TORQUE 1 kip-ft
40 mph WIND - 1.5000 in ICE

AXIAL 39 K

SHEAR 39 K

MOMENT 3026 kip-ft

TORQUE 6 kip-ft
REACTIONS - 130 mph WIND

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TIA-222-H Annex S
9. TOWER RATING: 59.6%

Paul J. Ford and Company
250 East Broad st., Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX:

Job:	***116' ft Monopole / HRT 046943209***		
Project:	***37519-1174.001.7805 / BU 806367***		
Client: Crown Castle	Drawn by: Allen R. Bonham, EI		App'd:
Code: TIA-222-H	Date: 03/29/19		Scale: NTS
Path: G:\TOWER\375_Crown_Castle\2019\37519-1174_806367_HRT 046 943209\37519-1174.001.7805_SA_171411737519-1174.001.7805.eri			Dwg No. E-1

Tower Input Data

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

1) Tower is located in Middlesex County, Connecticut.
2) Tower base elevation above sea level: 474.00 ft.
3) Basic wind speed of 130 mph.
4) Risk Category II.
5) Exposure Category C.
6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7) Topographic Category: 1.
8) Crest Height: 0.00 ft.
9) Nominal ice thickness of 1.5000 in.
10) Ice thickness is considered to increase with height.
11) Ice density of 56 pcf.
12) A wind speed of 40 mph is used in combination with ice.
13) Temperature drop of 50 °F.
14) Deflections calculated using a wind speed of 60 mph.
15) TIA-222-H Annex S.
16) A non-linear (P-delta) analysis was used.
17) Pressures are calculated at each section.
18) Stress ratio used in pole design is 1.05.
19) Tower analysis based on target reliabilities in accordance with Annex S.
20) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
21) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation 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	115.50-83.92	31.58	5.33	12	32.2500	40.8290	0.2500	1.0000	A572-65 (65 ksi)
L2	83.92-41.25	48.00	6.75	12	38.8811	51.9200	0.3125	1.2500	A572-65 (65 ksi)
L3	41.25-0.00	48.00		12	49.4614	62.5000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	33.2995	25.7600	3366.9120	11.4560	16.7055	201.5451	6822.2765	12.6783	7.9730	31.892
	42.1811	32.6661	6865.7163	14.5273	21.1494	324.6290	13911.8025	16.0773	10.2722	41.089
L2	41.6413	38.8096	7368.7188	13.8075	20.1404	365.8678	14931.0220	19.1009	9.5826	30.664
	53.6413	51.9300	17653.4791	18.4755	26.8946	656.3959	35770.7347	25.5584	13.0771	41.847
L3	52.9722	59.2718	18228.7383	17.5729	25.6210	711.4763	36936.3658	29.1718	12.2507	32.668
	64.5725	75.0159	36954.9224	22.2407	32.3750	1141.4648	74880.6918	36.9206	15.7450	41.987

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 115.50-83.92				1	1	1			
L2 83.92-41.25				1	1	1			
L3 41.25-0.00				1	1	1			

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 klf
LDF7-50A(1-5/8") **	C	No	No	Inside Pole	115.50 - 0.00	15	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
LCF78-50J(7/8")	C	No	No	Inside Pole	104.00 - 0.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
LCF78-50J(7/8")	C	No	No	CaAa (Out Of Face)	104.00 - 0.00	1	No Ice	0.11	0.00
							1/2" Ice	0.21	0.00
							1" Ice	0.31	0.00
							2" Ice	0.51	0.01
LCF78-50J(7/8")	C	No	No	CaAa (Out Of Face)	104.00 - 0.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.01
FLC 114-50J(1-1/4") **	C	No	No	Inside Pole	97.00 - 0.00	6	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
**									
2" (Nominal) Conduit	C	No	No	CaAa (Out Of Face)	87.00 - 0.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.01
LDF5-50A(7/8)	C	No	No	CaAa (Out Of Face)	87.00 - 0.00	2	No Ice	0.10	0.00
							1/2" Ice	0.20	0.00
							1" Ice	0.30	0.00
							2" Ice	0.50	0.01
LDF5-50A(7/8)	C	No	No	CaAa (Out Of Face)	87.00 - 0.00	10	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.01
FB-L98B-002-75000(3/8)	C	No	No	CaAa (Out Of Face)	87.00 - 0.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.01
WR-VG122ST-BRDA(7/16)	C	No	No	CaAa (Out Of Face)	87.00 - 0.00	2	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.01
FB-L98B-034-XXX(3/8)	C	No	No	CaAa (Out Of Face)	87.00 - 0.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.01
WR-VG86ST-BRD(3/4)	C	No	No	CaAa (Out Of Face)	87.00 - 0.00	4	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.01
**									
AVA7-50(1-5/8)	C	No	No	Inside Pole	75.00 - 0.00	6	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	115.50-83.92	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.843	0.50
L2	83.92-41.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.484	1.23
L3	41.25-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.035	1.23

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	115.50-83.92	A	1.423	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	10.313	0.97

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
L2	83.92-41.25	A	1.358	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	49.925	5.57
L3	41.25-0.00	A	1.217	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	46.649	5.12

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	115.50-83.92	-0.4892	0.2824	-1.2459	0.7193
L2	83.92-41.25	-1.5440	0.8914	-3.7577	2.1695
L3	41.25-0.00	-1.5669	0.9046	-3.8274	2.2097

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

Shielding Factor Ka

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

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-171063-8BF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
BXA-171063-8BF-2 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
BXA-171063-8BF-2 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.18 3.56 3.93 4.69	3.35 3.97 4.60 5.89	0.03 0.06 0.10 0.19
BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.82 8.37 8.89 9.94	5.41 6.56 7.42 9.20	0.04 0.10 0.17 0.33
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice	7.82 8.37 8.89	5.41 6.56 7.42	0.04 0.10 0.17

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	9.94	9.20	0.33
						2" Ice			
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.82 8.37 8.89 9.94	5.41 6.56 7.42 9.20	0.04 0.10 0.17 0.33
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.56 5.11 5.61 6.65	10.26 11.43 12.31 14.13	0.05 0.11 0.19 0.36
(2) LPA-80063/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.83 10.40 10.93 12.03	10.22 11.38 12.27 14.09	0.05 0.14 0.25 0.48
(2) LPA-80063/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.83 10.40 10.93 12.03	10.22 11.38 12.27 14.09	0.05 0.14 0.25 0.48
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 2.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
(3) 2.375" OD x 4' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.87 1.11 1.36 1.90	0.87 1.11 1.36 1.90	0.02 0.03 0.04 0.06
(3) 2.375" OD x 4' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.87 1.11 1.36 1.90	0.87 1.11 1.36 1.90	0.02 0.03 0.04 0.06
(3) 2.375" OD x 4' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.87 1.11 1.36 1.90	0.87 1.11 1.36 1.90	0.02 0.03 0.04 0.06
Platform Mount [LP 1001-1]	C	None		0.0000	117.00	No Ice 1/2" Ice 1" Ice 2" Ice	47.70 59.50 71.30 94.90	47.70 59.50 71.30 94.90	3.02 3.62 4.22 5.43
**									
DB411-A	A	From Leg	4.00 0.00 5.00	0.0000	104.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.50 2.70 3.90 6.30	1.50 2.70 3.90 6.30	0.03 0.03 0.04 0.06
MFB4505	B	From Leg	4.00 0.00	0.0000	104.00	No Ice 1/2"	0.84 1.50	0.84 1.50	0.00 0.01

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			Ice	2.13	2.13	0.02
						1" Ice	2.94	2.94	0.06
						2" Ice			
DB411-A	B	From Leg	4.00	0.0000	104.00	No Ice	1.50	1.50	0.03
			0.00			1/2"	2.70	2.70	0.03
			5.00			Ice	3.90	3.90	0.04
						1" Ice	6.30	6.30	0.06
						2" Ice			
Side Arm Mount [SO 702-3]	C	None		0.0000	104.00	No Ice	3.22	3.22	0.08
						1/2"	4.15	4.15	0.11
						Ice	5.08	5.08	0.15
						1" Ice	6.94	6.94	0.21
						2" Ice			
**									
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.0000	97.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice	14.51	15.27	0.51
						2" Ice			
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.0000	97.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice	14.51	15.27	0.51
						2" Ice			
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.0000	97.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice	14.51	15.27	0.51
						2" Ice			
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00	0.0000	97.00	No Ice	4.59	3.32	0.03
			0.00			1/2"	5.02	4.09	0.07
			1.00			Ice	5.44	4.78	0.12
						1" Ice	6.30	6.23	0.22
						2" Ice			
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00	0.0000	97.00	No Ice	4.59	3.32	0.03
			0.00			1/2"	5.02	4.09	0.07
			1.00			Ice	5.44	4.78	0.12
						1" Ice	6.30	6.23	0.22
						2" Ice			
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00	0.0000	97.00	No Ice	4.59	3.32	0.03
			0.00			1/2"	5.02	4.09	0.07
			1.00			Ice	5.44	4.78	0.12
						1" Ice	6.30	6.23	0.22
						2" Ice			
ATBT-BOTTOM-24V	A	From Leg	4.00	0.0000	97.00	No Ice	0.10	0.06	0.00
			0.00			1/2"	0.15	0.10	0.00
			0.00			Ice	0.20	0.15	0.01
						1" Ice	0.32	0.26	0.01
						2" Ice			
ATBT-BOTTOM-24V	B	From Leg	4.00	0.0000	97.00	No Ice	0.10	0.06	0.00
			0.00			1/2"	0.15	0.10	0.00
			0.00			Ice	0.20	0.15	0.01
						1" Ice	0.32	0.26	0.01
						2" Ice			
ATBT-BOTTOM-24V	C	From Leg	4.00	0.0000	97.00	No Ice	0.10	0.06	0.00
			0.00			1/2"	0.15	0.10	0.00
			0.00			Ice	0.20	0.15	0.01
						1" Ice	0.32	0.26	0.01
						2" Ice			
KRY 112 489/2	A	From Leg	4.00	0.0000	97.00	No Ice	0.56	0.37	0.02
			0.00			1/2"	0.66	0.45	0.02
			0.00			Ice	0.76	0.54	0.03
						1" Ice	1.00	0.75	0.05
						2" Ice			
KRY 112 489/2	B	From Leg	4.00	0.0000	97.00	No Ice	0.56	0.37	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
			0.00 0.00			1/2" Ice	0.66 0.76	0.45 0.54	0.02 0.03
						1" Ice 2" Ice	1.00	0.75	0.05
KRY 112 489/2	C	From Leg	4.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.56 0.66 0.76 1.00	0.37 0.45 0.54 0.75	0.02 0.02 0.03 0.05
Side Arm Mount [SO 702-3]	C	None		0.0000	97.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.22 4.15 5.08 6.94	3.22 4.15 5.08 6.94	0.08 0.11 0.15 0.21
**									
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	87.00	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	B	From Leg	4.00 0.00 2.00	0.0000	87.00	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 2.00	0.0000	87.00	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
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
(2) LGP21401	B	From Leg	4.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
(2) LGP21401	C	From Leg	4.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
DC6-48-60-18-8F	B	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.21 1.89 2.11 2.57	1.21 1.89 2.11 2.57	0.03 0.05 0.08 0.14
80010965 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
80010965 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
80010966 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	87.00	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

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) HPA65R-BU6A w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.09 8.64 9.16 10.22	7.19 8.36 9.24 11.05	0.07 0.14 0.21 0.39
(2) HPA65R-BU6A w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.09 8.64 9.16 10.22	7.19 8.36 9.24 11.05	0.07 0.14 0.21 0.39
(2) HPA65R-BU8A w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.47 12.19 12.92 14.29	10.18 11.70 13.25 15.59	0.09 0.18 0.28 0.51
RRUS 4449 B5/B12	A	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	B	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
(2) RRUS 4415 B25	B	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.68 0.79 0.91 1.18	0.04 0.06 0.07 0.11
RRUS 4415 B25	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.68 0.79 0.91 1.18	0.04 0.06 0.07 0.11
(3) RRUS 8843 B2/B66A	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16
(2) DC6-48-60-18-8C-EV	C	From Leg	4.00 0.00 2.00	0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.74 2.96 3.20 3.68	2.74 2.96 3.20 3.68	0.03 0.05 0.08 0.15
Platform Mount [LP 304-1]	C	None		0.0000	87.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.46 22.44 27.42 37.38	17.46 22.44 27.42 37.38	1.35 1.62 1.90 2.45
**									
RRUS 11 B12	A	From Leg	2.00 0.00 0.00	0.0000	85.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.83 3.04 3.26 3.71	1.18 1.33 1.48 1.83	0.05 0.07 0.10 0.15
RRUS 11 B12	B	From Leg	2.00 0.00 0.00	0.0000	85.00	No Ice 1/2" Ice 1" Ice	2.83 3.04 3.26 3.71	1.18 1.33 1.48 1.83	0.05 0.07 0.10 0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
RRUS 11 B12	C	From Leg	2.00 0.00 0.00	0.0000	85.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.83 3.04 3.26 3.71	1.18 1.33 1.48 1.83	0.05 0.07 0.10 0.15
Side Arm Mount [SO 102-3]	C	None		0.0000	85.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.00 3.48 3.96 4.92	3.00 3.48 3.96 4.92	0.08 0.11 0.14 0.20
**									
742 213 w/ Mount Pipe	A	From Leg	1.00 0.00 2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.37 5.95 6.50 7.61	4.62 6.00 6.98 8.85	0.05 0.09 0.15 0.28
742 213 w/ Mount Pipe	B	From Leg	1.00 0.00 2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.37 5.95 6.50 7.61	4.62 6.00 6.98 8.85	0.05 0.09 0.15 0.28
742 213 w/ Mount Pipe	C	From Leg	1.00 0.00 2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.37 5.95 6.50 7.61	4.62 6.00 6.98 8.85	0.05 0.09 0.15 0.28
Pipe Mount [PM 601-3]	C	None		0.0000	75.00	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
***									

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 115.50-83.92	99.22	1.264	0	99.320	A	0.000	99.320	99.320	100.00	0.000	0.000
					B	0.000	99.320		100.00	0.000	0.000
					C	0.000	99.320		100.00	0.000	2.843
L2 83.92-41.25	62.08	1.145	0	169.405	A	0.000	169.405	169.405	100.00	0.000	0.000
					B	0.000	169.405		100.00	0.000	0.000
					C	0.000	169.405		100.00	0.000	13.484
L3 41.25-0.00	20.72	0.909	0	202.030	A	0.000	202.030	202.030	100.00	0.000	0.000
					B	0.000	202.030		100.00	0.000	0.000
					C	0.000	202.030		100.00	0.000	13.035

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 115.50-83.92	99.22	1.264	0	1.4234	106.812	A	0.000	106.812	106.812	100.00	0.000	0.000
						B	0.000	106.812		100.00	0.000	0.000
						C	0.000	106.812		100.00	0.000	10.313
L2 83.92-41.25	62.08	1.145	0	1.3582	179.527	A	0.000	179.527	179.527	100.00	0.000	0.000
						B	0.000	179.527		100.00	0.000	0.000
						C	0.000	179.527		100.00	0.000	49.925
L3 41.25-0.00	20.72	0.909	0	1.2170	211.367	A	0.000	211.367	211.367	100.00	0.000	0.000
						B	0.000	211.367		100.00	0.000	0.000
						C	0.000	211.367		100.00	0.000	46.649

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 115.50-83.92	99.22	1.264	0	99.320	A	0.000	99.320	99.320	100.00	0.000	0.000
					B	0.000	99.320		100.00	0.000	0.000
					C	0.000	99.320		100.00	0.000	2.843
L2 83.92-41.25	62.08	1.145	0	169.405	A	0.000	169.405	169.405	100.00	0.000	0.000
					B	0.000	169.405		100.00	0.000	0.000
					C	0.000	169.405		100.00	0.000	13.484
L3 41.25-0.00	20.72	0.909	0	202.030	A	0.000	202.030	202.030	100.00	0.000	0.000
					B	0.000	202.030		100.00	0.000	0.000
					C	0.000	202.030		100.00	0.000	13.035

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
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

Comb. No.	Description
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	115.5 - 83.92	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-17.17	0.27	-1.29
			Max. Mx	8	-8.32	-302.51	-0.00
			Max. My	2	-8.36	-0.06	284.74
			Max. Vy	20	-14.51	302.31	-0.01
			Max. Vx	14	13.92	-0.05	-284.69
			Max. Torque	25			2.64
L2	83.92 - 41.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-43.89	10.91	-9.18
			Max. Mx	20	-22.15	1361.68	-3.65
			Max. My	14	-22.18	3.74	-1313.87
			Max. Vy	20	-30.07	1361.68	-3.65
			Max. Vx	14	29.34	3.74	-1313.87
			Max. Torque	25			4.80
L3	41.25 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-69.54	21.09	-15.07
			Max. Mx	20	-38.95	3026.17	-6.17
			Max. My	14	-38.95	6.68	-2943.26
			Max. Vy	20	-39.00	3026.17	-6.17
			Max. Vx	14	38.29	6.68	-2943.26
			Max. Torque	25			6.21

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	69.54	-0.00	0.00
	Max. H_x	21	29.23	38.99	-0.04
	Max. H_z	2	38.97	-0.04	38.27
	Max. M_x	2	2938.14	-0.04	38.27
	Max. M_z	8	3020.03	-38.98	0.04
	Max. Torsion	25	6.21	19.46	33.12
	Min. Vert	21	29.23	38.99	-0.04

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H_x	9	29.23	-38.99	0.04
	Min. H_z	14	38.97	0.04	-38.27
	Min. M_x	14	-2943.26	0.04	-38.27
	Min. M_z	20	-3026.17	38.98	-0.04
	Min. Torsion	13	-6.16	-19.46	-33.12

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	32.48	-0.00	0.00	2.10	2.52	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	38.97	0.04	-38.27	-2938.14	-0.54	-5.02
0.9 Dead+1.0 Wind 0 deg - No Ice	29.23	0.04	-38.27	-2929.70	-1.31	-5.02
1.2 Dead+1.0 Wind 30 deg - No Ice	38.97	19.53	-33.16	-2545.95	-1511.66	-2.49
0.9 Dead+1.0 Wind 30 deg - No Ice	29.23	19.53	-33.16	-2538.77	-1507.76	-2.50
1.2 Dead+1.0 Wind 60 deg - No Ice	38.97	33.78	-19.17	-1470.90	-2616.90	0.69
0.9 Dead+1.0 Wind 60 deg - No Ice	29.23	33.78	-19.17	-1467.02	-2609.57	0.69
1.2 Dead+1.0 Wind 90 deg - No Ice	38.97	38.98	-0.04	-1.05	-3020.03	3.67
0.9 Dead+1.0 Wind 90 deg - No Ice	29.23	38.99	-0.04	-1.68	-3011.49	3.67
1.2 Dead+1.0 Wind 120 deg - No Ice	38.97	33.74	19.10	1469.78	-2613.29	5.66
0.9 Dead+1.0 Wind 120 deg - No Ice	29.23	33.74	19.10	1464.62	-2605.98	5.67
1.2 Dead+1.0 Wind 150 deg - No Ice	38.97	19.46	33.12	2547.47	-1505.41	6.16
0.9 Dead+1.0 Wind 150 deg - No Ice	29.23	19.46	33.12	2539.00	-1501.53	6.16
1.2 Dead+1.0 Wind 180 deg - No Ice	38.97	-0.04	38.27	2943.26	6.67	5.02
0.9 Dead+1.0 Wind 180 deg - No Ice	29.23	-0.04	38.27	2933.53	5.89	5.02
1.2 Dead+1.0 Wind 210 deg - No Ice	38.97	-19.53	33.16	2551.09	1517.80	2.53
0.9 Dead+1.0 Wind 210 deg - No Ice	29.23	-19.53	33.16	2542.60	1512.34	2.53
1.2 Dead+1.0 Wind 240 deg - No Ice	38.97	-33.78	19.17	1476.03	2623.03	-0.64
0.9 Dead+1.0 Wind 240 deg - No Ice	29.23	-33.78	19.17	1470.85	2614.15	-0.65
1.2 Dead+1.0 Wind 270 deg - No Ice	38.97	-38.98	0.04	6.17	3026.17	-3.66
0.9 Dead+1.0 Wind 270 deg - No Ice	29.23	-38.99	0.04	5.51	3016.07	-3.67
1.2 Dead+1.0 Wind 300 deg - No Ice	38.97	-33.74	-19.10	-1464.65	2619.41	-5.70
0.9 Dead+1.0 Wind 300 deg - No Ice	29.23	-33.74	-19.10	-1460.79	2610.56	-5.71
1.2 Dead+1.0 Wind 330 deg - No Ice	38.97	-19.46	-33.12	-2542.36	1511.55	-6.20
0.9 Dead+1.0 Wind 330 deg - No Ice	29.23	-19.46	-33.12	-2535.18	1506.11	-6.21
1.2 Dead+1.0 Ice+1.0 Temp	69.54	0.00	-0.00	15.07	21.09	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	69.54	0.00	-5.29	-394.87	21.22	-1.04
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	69.54	2.68	-4.58	-339.94	-187.68	-0.53

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
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	69.54	4.64	-2.65	-189.86	-340.59	0.13
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	69.54	5.36	-0.00	15.16	-396.56	0.75
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	69.54	4.64	2.65	220.20	-340.57	1.17
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	69.54	2.68	4.58	370.30	-187.63	1.28
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	69.54	-0.00	5.29	425.25	21.27	1.04
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	69.54	-2.68	4.58	370.32	230.17	0.53
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	69.54	-4.64	2.65	220.24	383.08	-0.13
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	69.54	-5.36	0.00	15.21	439.05	-0.75
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	69.54	-4.64	-2.65	-189.82	383.06	-1.17
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	69.54	-2.68	-4.58	-339.92	230.13	-1.28
Dead+Wind 0 deg - Service	32.48	0.01	-7.68	-586.67	1.83	-1.01
Dead+Wind 30 deg - Service	32.48	3.92	-6.65	-508.15	-300.73	-0.50
Dead+Wind 60 deg - Service	32.48	6.78	-3.85	-292.89	-522.03	0.13
Dead+Wind 90 deg - Service	32.48	7.82	-0.01	1.41	-602.76	0.74
Dead+Wind 120 deg - Service	32.48	6.77	3.83	295.91	-521.31	1.14
Dead+Wind 150 deg - Service	32.48	3.90	6.64	511.69	-299.48	1.24
Dead+Wind 180 deg - Service	32.48	-0.01	7.68	590.93	3.27	1.01
Dead+Wind 210 deg - Service	32.48	-3.92	6.65	512.41	305.84	0.51
Dead+Wind 240 deg - Service	32.48	-6.78	3.85	297.16	527.13	-0.13
Dead+Wind 270 deg - Service	32.48	-7.82	0.01	2.85	607.87	-0.74
Dead+Wind 300 deg - Service	32.48	-6.77	-3.83	-291.64	526.41	-1.14
Dead+Wind 330 deg - Service	32.48	-3.90	-6.64	-507.42	304.58	-1.24

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	-32.48	0.00	0.00	32.48	-0.00	0.000%
2	0.04	-38.97	-38.27	-0.04	38.97	38.27	0.000%
3	0.04	-29.23	-38.27	-0.04	29.23	38.27	0.001%
4	19.53	-38.97	-33.16	-19.53	38.97	33.16	0.000%
5	19.53	-29.23	-33.16	-19.53	29.23	33.16	0.000%
6	33.78	-38.97	-19.17	-33.78	38.97	19.17	0.000%
7	33.78	-29.23	-19.17	-33.78	29.23	19.17	0.000%
8	38.99	-38.97	-0.04	-38.98	38.97	0.04	0.002%
9	38.99	-29.23	-0.04	-38.99	29.23	0.04	0.001%
10	33.74	-38.97	19.10	-33.74	38.97	-19.10	0.000%
11	33.74	-29.23	19.10	-33.74	29.23	-19.10	0.000%
12	19.46	-38.97	33.12	-19.46	38.97	-33.12	0.000%
13	19.46	-29.23	33.12	-19.46	29.23	-33.12	0.000%
14	-0.04	-38.97	38.27	0.04	38.97	-38.27	0.000%
15	-0.04	-29.23	38.27	0.04	29.23	-38.27	0.001%
16	-19.53	-38.97	33.16	19.53	38.97	-33.16	0.000%
17	-19.53	-29.23	33.16	19.53	29.23	-33.16	0.000%
18	-33.78	-38.97	19.17	33.78	38.97	-19.17	0.000%
19	-33.78	-29.23	19.17	33.78	29.23	-19.17	0.000%
20	-38.99	-38.97	0.04	38.98	38.97	-0.04	0.002%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
21	-38.99	-29.23	0.04	38.99	29.23	-0.04	0.001%
22	-33.74	-38.97	-19.10	33.74	38.97	19.10	0.000%
23	-33.74	-29.23	-19.10	33.74	29.23	19.10	0.000%
24	-19.46	-38.97	-33.12	19.46	38.97	33.12	0.000%
25	-19.46	-29.23	-33.12	19.46	29.23	33.12	0.000%
26	0.00	-69.54	0.00	-0.00	69.54	0.00	0.001%
27	0.00	-69.54	-5.29	-0.00	69.54	5.29	0.000%
28	2.68	-69.54	-4.58	-2.68	69.54	4.58	0.000%
29	4.64	-69.54	-2.65	-4.64	69.54	2.65	0.000%
30	5.36	-69.54	-0.00	-5.36	69.54	0.00	0.000%
31	4.64	-69.54	2.65	-4.64	69.54	-2.65	0.000%
32	2.68	-69.54	4.58	-2.68	69.54	-4.58	0.000%
33	-0.00	-69.54	5.29	0.00	69.54	-5.29	0.000%
34	-2.68	-69.54	4.58	2.68	69.54	-4.58	0.000%
35	-4.64	-69.54	2.65	4.64	69.54	-2.65	0.000%
36	-5.36	-69.54	0.00	5.36	69.54	-0.00	0.000%
37	-4.64	-69.54	-2.65	4.64	69.54	2.65	0.000%
38	-2.68	-69.54	-4.58	2.68	69.54	4.58	0.000%
39	0.01	-32.48	-7.68	-0.01	32.48	7.68	0.002%
40	3.92	-32.48	-6.65	-3.92	32.48	6.65	0.002%
41	6.78	-32.48	-3.85	-6.78	32.48	3.85	0.002%
42	7.82	-32.48	-0.01	-7.82	32.48	0.01	0.002%
43	6.77	-32.48	3.83	-6.77	32.48	-3.83	0.002%
44	3.90	-32.48	6.65	-3.90	32.48	-6.64	0.002%
45	-0.01	-32.48	7.68	0.01	32.48	-7.68	0.002%
46	-3.92	-32.48	6.65	3.92	32.48	-6.65	0.002%
47	-6.78	-32.48	3.85	6.78	32.48	-3.85	0.002%
48	-7.82	-32.48	0.01	7.82	32.48	-0.01	0.002%
49	-6.77	-32.48	-3.83	6.77	32.48	3.83	0.002%
50	-3.90	-32.48	-6.65	3.90	32.48	6.64	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	10	0.00000001	0.00004395
3	Yes	9	0.00000001	0.00014029
4	Yes	10	0.00000001	0.00014881
5	Yes	10	0.00000001	0.00011816
6	Yes	11	0.00000001	0.00003377
7	Yes	10	0.00000001	0.00012300
8	Yes	9	0.00000001	0.00014541
9	Yes	9	0.00000001	0.00011957
10	Yes	11	0.00000001	0.00004173
11	Yes	11	0.00000001	0.00003269
12	Yes	10	0.00000001	0.00013952
13	Yes	10	0.00000001	0.00011068
14	Yes	10	0.00000001	0.00004487
15	Yes	9	0.00000001	0.00014289
16	Yes	11	0.00000001	0.00003692
17	Yes	10	0.00000001	0.00013467
18	Yes	11	0.00000001	0.00003614
19	Yes	10	0.00000001	0.00013153
20	Yes	9	0.00000001	0.00014875
21	Yes	9	0.00000001	0.00012217
22	Yes	10	0.00000001	0.00013876
23	Yes	10	0.00000001	0.00010982
24	Yes	11	0.00000001	0.00004117
25	Yes	11	0.00000001	0.00003231
26	Yes	6	0.00000001	0.00002013
27	Yes	9	0.00000001	0.00011353
28	Yes	9	0.00000001	0.00011294
29	Yes	9	0.00000001	0.00011392
30	Yes	9	0.00000001	0.00011504

31	Yes	9	0.00000001	0.00012061
32	Yes	9	0.00000001	0.00012318
33	Yes	9	0.00000001	0.00012467
34	Yes	9	0.00000001	0.00013059
35	Yes	9	0.00000001	0.00013222
36	Yes	9	0.00000001	0.00012847
37	Yes	9	0.00000001	0.00012628
38	Yes	9	0.00000001	0.00012110
39	Yes	8	0.00000001	0.00009106
40	Yes	8	0.00000001	0.00008061
41	Yes	8	0.00000001	0.00008224
42	Yes	8	0.00000001	0.00009268
43	Yes	8	0.00000001	0.00009217
44	Yes	8	0.00000001	0.00008441
45	Yes	8	0.00000001	0.00009211
46	Yes	8	0.00000001	0.00008441
47	Yes	8	0.00000001	0.00008464
48	Yes	8	0.00000001	0.00009377
49	Yes	8	0.00000001	0.00008526
50	Yes	8	0.00000001	0.00009091

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	115.5 - 83.92	5.788	48	0.4043	0.0016
L2	89.25 - 41.25	3.656	48	0.3609	0.0017
L3	48 - 0	1.109	48	0.2058	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.00	BXA-171063-8BF-2 w/ Mount Pipe	48	5.788	0.4043	0.0016	124938
104.00	DB411-A	48	4.833	0.3891	0.0017	54321
97.00	LNX-6515DS-VTM w/ Mount Pipe	48	4.265	0.3776	0.0017	33767
87.00	7770.00 w/ Mount Pipe	48	3.484	0.3550	0.0017	22187
85.00	RRUS 11 B12	48	3.334	0.3495	0.0016	20903
75.00	742 213 w/ Mount Pipe	48	2.621	0.3170	0.0014	16251

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	115.5 - 83.92	28.789	20	2.0114	0.0083
L2	89.25 - 41.25	18.187	20	1.7941	0.0085
L3	48 - 0	5.520	20	1.0242	0.0034

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.00	BXA-171063-8BF-2 w/ Mount Pipe	20	28.789	2.0114	0.0083	25177
104.00	DB411-A	20	24.043	1.9352	0.0087	10946
97.00	LNX-6515DS-VTM w/ Mount Pipe	20	21.215	1.8773	0.0087	6804
87.00	7770.00 w/ Mount Pipe	20	17.334	1.7651	0.0084	4470
85.00	RRUS 11 B12	20	16.588	1.7375	0.0082	4211
75.00	742 213 w/ Mount Pipe	20	13.038	1.5761	0.0072	3273

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	115.5 - 83.92 (1)	TP40.829x32.25x0.25	31.58	0.00	0.0	31.5005	-8.32	1704.79	0.005
L2	83.92 - 41.25 (2)	TP51.92x38.8811x0.3125	48.00	0.00	0.0	50.0850	-22.15	2674.31	0.008
L3	41.25 - 0 (3)	TP62.5x49.4614x0.375	48.00	0.00	0.0	75.0159	-38.95	3879.40	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	115.5 - 83.92 (1)	TP40.829x32.25x0.25	302.51	1361.13	0.222	0.00	1361.13	0.000
L2	83.92 - 41.25 (2)	TP51.92x38.8811x0.3125	1361.68	2716.25	0.501	0.00	2716.25	0.000
L3	41.25 - 0 (3)	TP62.5x49.4614x0.375	3026.18	4919.18	0.615	0.00	4919.18	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	115.5 - 83.92 (1)	TP40.829x32.25x0.25	14.51	552.83	0.026	0.01	1902.90	0.000
L2	83.92 - 41.25 (2)	TP51.92x38.8811x0.3125	30.07	878.99	0.034	2.96	3848.45	0.001
L3	41.25 - 0 (3)	TP62.5x49.4614x0.375	39.00	1316.53	0.030	3.66	7194.44	0.001

Pole Interaction Design Data

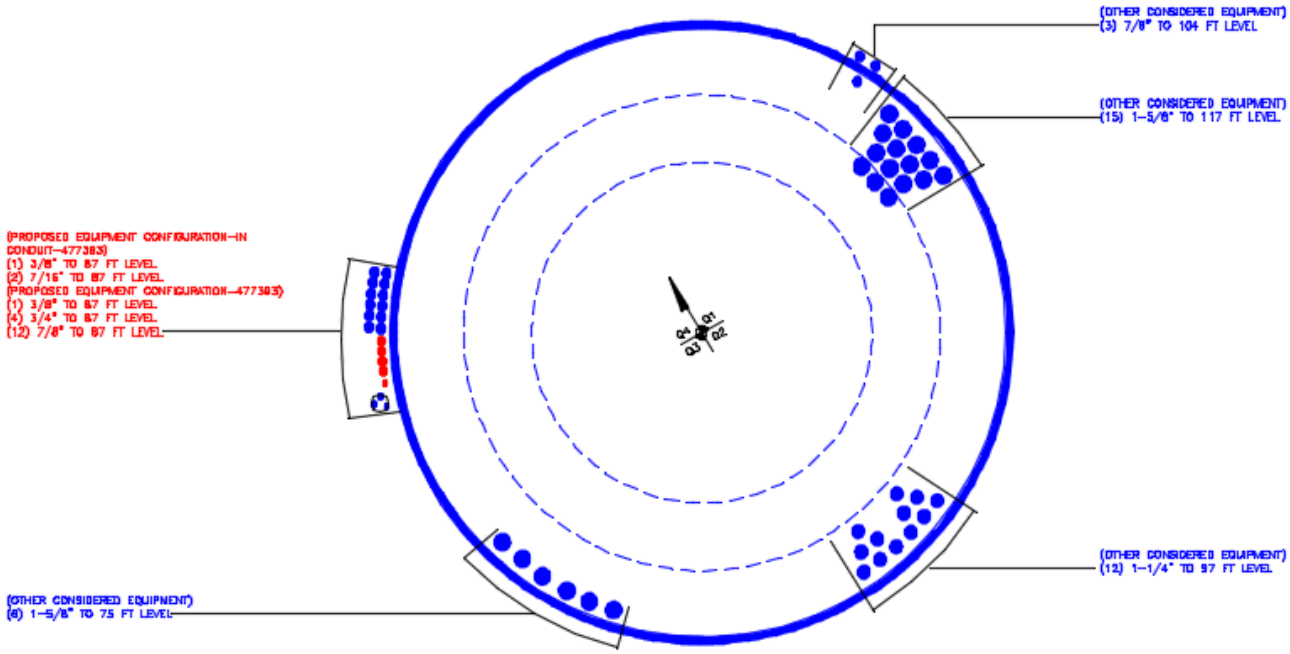
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	115.5 - 83.92 (1)	0.005	0.222	0.000	0.026	0.000	0.228 ✔	1.050	4.8.2 ✔
L2	83.92 - 41.25 (2)	0.008	0.501	0.000	0.034	0.001	0.511 ✔	1.050	4.8.2 ✔
L3	41.25 - 0 (3)	0.010	0.615	0.000	0.030	0.001	0.626 ✔	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	115.5 - 83.92	Pole	TP40.829x32.25x0.25	1	-8.32	1790.03	21.7	Pass
L2	83.92 - 41.25	Pole	TP51.92x38.8811x0.3125	2	-22.15	2808.03	48.6	Pass
L3	41.25 - 0	Pole	TP62.5x49.4614x0.375	3	-38.95	4073.37	59.6	Pass
							Summary	
						Pole (L3)	59.6	Pass
						RATING =	**59.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806367 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

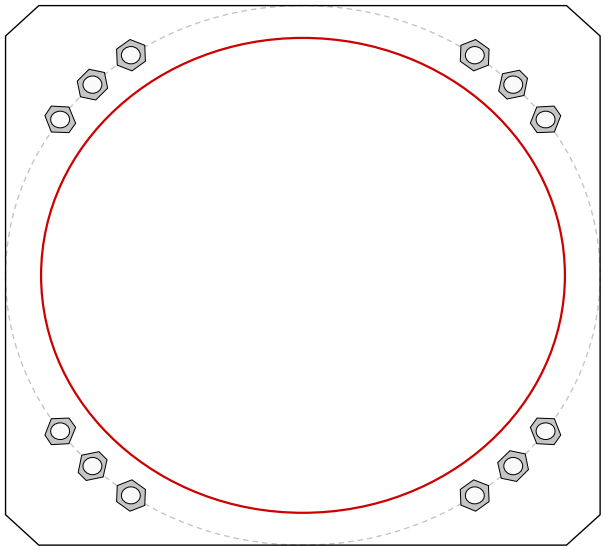
Monopole Base Plate Connection

Site Info	
BU #	806367
Site Name	HRT 046
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.75

Applied Loads	
Moment (kip-ft)	3026.17
Axial Force (kips)	38.95
Shear Force (kips)	39.00

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(12) 2-1/4" ø bolts (A615-75 X; Fy=75 ksi, Fu=100 ksi) on 71" BC

Anchor Spacing: 6 in

Base Plate Data

71" OD x 2.5" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

62.5" x 0.375" 12-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_c = 173.66	ϕPn_c = 243.75	**Stress Rating**
Vu = 3.25	ϕVn = 73.13	**68.0%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	34.98	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**61.7%**	**Pass**

Pier and Pad Foundation

BU # :	806367
Site Name:	
App. Number:	

TIA-222 Revision:	H
Tower Type:	Monopole

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

Superstructure Analysis Reactions		
Compression, P_{comp}:	39	kips
Base Shear, Vu_comp:	39	kips
Moment, M_u:	3026	ft-kips
Tower Height, **H**:	115.5	ft
BP Dist. Above Fdn, bp_{dist}:	6	in
Bolt Circle / Bearing Plate Width, **BC**:	71	in

Foundation Analysis Checks	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	115.06	39.00	**32.3%**	**Pass**
Bearing Pressure (ksf)	9.00	2.29	**25.4%**	**Pass**
*Overturning (kip*ft)*	4285.90	3201.50	**74.7%**	**Pass**
*Pad Flexure (kip*ft)*	3946.25	1507.29	**36.4%**	**Pass**
Pad Shear - 1-way (kips)	1072.17	203.45	**18.1%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.164	0.002	**1.1%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	3730.81	0.00	**0.0%**	**Pass**

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

Soil Rating*:	**74.7%**
Structural Rating*:	**36.4%**

Pad Properties		
Depth, **D**:	3.5	ft
Pad Width, **W**:	25	ft
Pad Thickness, **T**:	4	ft
Pad Rebar Size (Bottom), **Sp**:	8	
Pad Rebar Quantity (Bottom), **mp**:	26	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3	ksi
Dry Concrete Density, δc:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	120	pcf
Ultimate Gross Bearing, Qult:	12.000	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:	36	degrees
SPT Blow Count, N_{blows}:	33	
Base Friction, μ:	0.4	
Neglected Depth, **N**:	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	8	ft

<--Toggle between Gross and Net

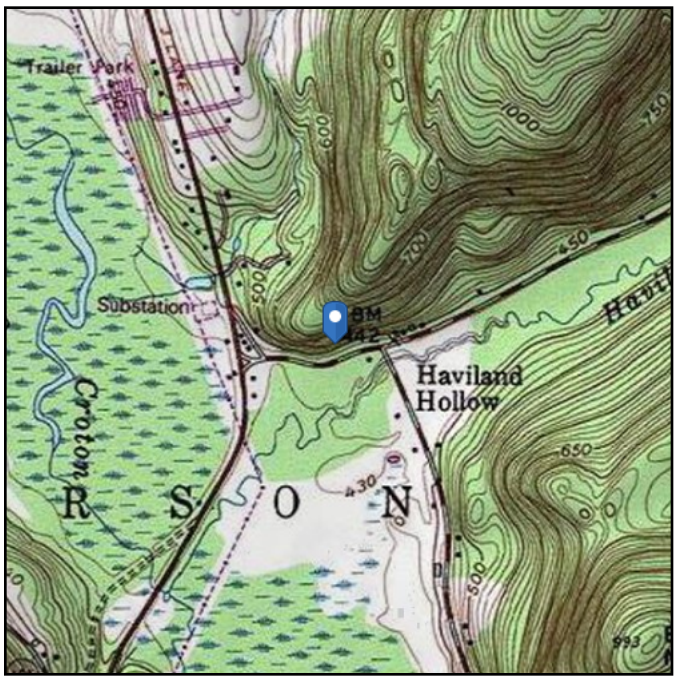
Version 3.2.0

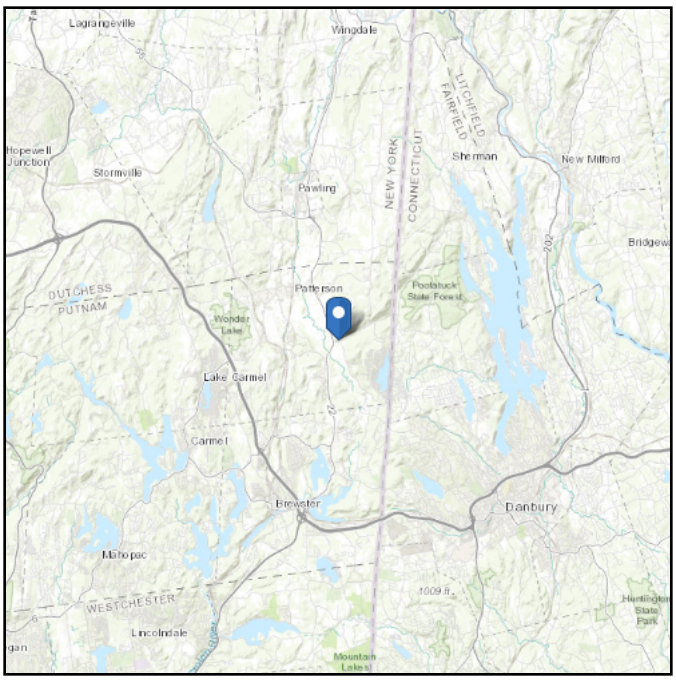
ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 484.48 ft (NAVD 88)
Latitude: 41.484594
Longitude: -73.572447





Wind

Results:

Wind Speed:	115 Vmph
10-year MRI	76 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 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:	Wed Mar 27 2019

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 not in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2.

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

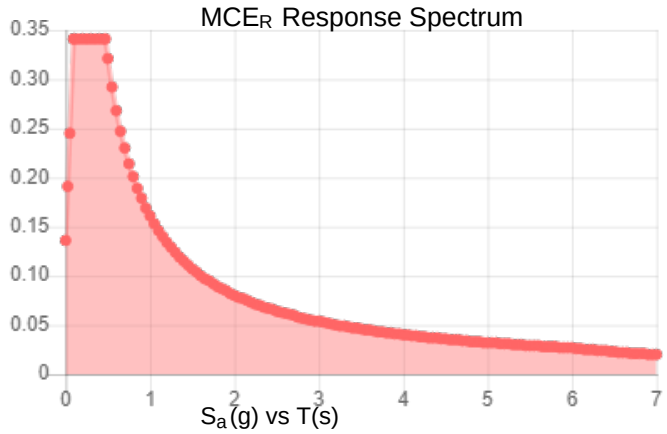
Seismic

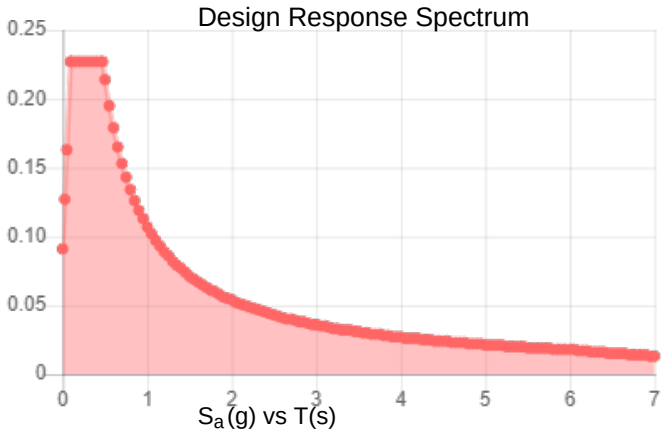
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.213	S_{DS} :	0.227
S_1 :	0.067	S_{D1} :	0.107
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.115
S_{MS} :	0.341	PGA_M :	0.181
S_{M1} :	0.161	F_{PGA} :	1.569
		I_e :	1

Seismic Design Category B





Data Accessed: Wed Mar 27 2019

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:	40 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed Mar 27 2019

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.

Date: **March 25, 2019**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
704-405-6607

Jacobs Engineering Group, Inc.
5449 Bells Ferry Rd
Acworth, GA 30102
770-701-2500
www.jacobs.com

Subject:	**Mount Analysis Report**	
Carrier Designation:	**AT&T Equipment Change-Out**	
	Carrier Site Number:	CT5386
	Carrier Site Name:	CT5386
Crown Castle Designation:	**Crown Castle BU Number:**	806367
	Crown Castle Site Name:	HRT 046 943209
	Crown Castle JDE Job Number:	556168
	Crown Castle PO Number:	1333043
	Crown Castle Application Number:	477393 Revision 0
Engineering Firm Designation:	**Jacobs Engineering Group, Inc. Report Designation:** ERCC0303	
Site Data:	**Maple Ave West** **Haddam, Middlesex County, CT, 06441** **Latitude 41°29'4.54" Longitude -72°34'20.81"**	
Structure Information:	**Tower Height & Type:**	**115.5 ft Monopole**
	Mount Elevation:	**87 ft**
	Mount Type:	**14.5 ft Platform**

Dear Charles McGuirt,

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

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

Platform (single) **Sufficient**

The analysis has been performed in accordance with the TIA-222-H Standard based upon an ultimate 3-second gust wind speed of 121 mph. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

We at Jacobs Engineering Group, Inc. appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance on this, please give us a call.

Mount analysis prepared by: Jean Pierre Chahwan

Engineer of Record:

Craig A. Thomas, PE
PE No. 0029052 3/25/19

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a 14.5 ft Platform Mount, mapped by Jacobs in February of 2019 .

2) ANALYSIS CRITERIA

Building Code:	2018 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	121 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1 in
Wind Speed with Ice:	50 mph
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration Information

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
87.0	89.0	4	CCI ANTENNAS	HPA65R-BU6A	Platform
		2	CCI ANTENNAS	HPA65R-BU8A	
		2	KATHREIN	80010965	
		1	KATHREIN	80010966	
		3	POWERWAVE TECHNOLOGIES	7770.00	
		3	ERICSSON	RRUS 4415 B25	
		3	ERICSSON	RRUS 4449 B5/B12	
		3	ERICSSON	RRUS 8843 B2/B66A	
		2	RAYCAP	DC6-48-60-18-8C-EV	
		1	RAYCAP	DC6-48-60-18-8F	
	87.0	6	POWERWAVE TECHNOLOGIES	LGP21401	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
4-MOUNT MAPPING	Jacobs	806367	CCISITES
MOUNT PHOTOS	AT&T	04/20/2018	CCISITES
APPLICATION	AT&T	477393 Revision *0*	CCISITES

3.1) Analysis Method

RISA-3D (Version 17.0.1), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

A tool internally developed, using Microsoft Excel, by Jacobs was used to calculate wind loading on all appurtenances, dishes, and mount members for various load cases. Selected output from the analysis is included in Appendix B.

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

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 Tables 1 and 2 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) The analysis will be required to be revised if the existing conditions in the field differ from those shown in the above-referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.
5) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325
U-Bolts	ASTM A307

6) Antenna pipes to be implemented vertically on/between the face members and equally spaced horizontally along the mount face.
7) RRHs to be implemented vertically between the face members.

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

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Platform)

Notes	Component	Critical Member	Mount Centerline (ft)	% Capacity	Pass / Fail
1	Antenna Pipe Members	7	87.0	21.0	Pass
1	Horizontal Members	22	87.0	15.4	Pass
1	Standoff Members	57	87.0	39.0	Pass
2	Mount-to-Tower Connection	-	87.0	9.3	Pass

Structure Rating (max from all components) =	39.0%

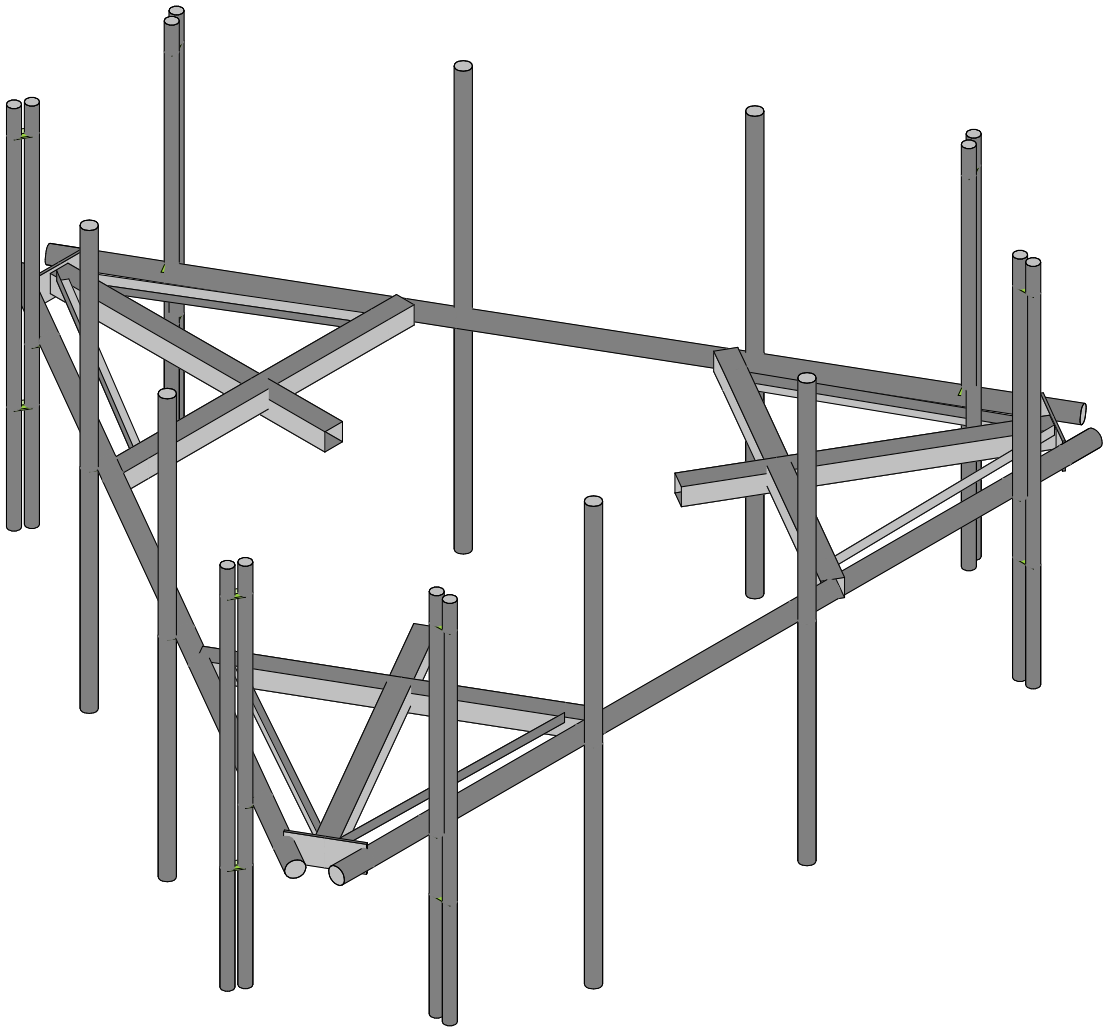
Notes:
1) See additional documentation in "Appendix C - Analysis Output" for calculations supporting the % capacity consumed.
2) See additional documentation in "Appendix D - Analysis Output" for calculations supporting the % capacity consumed.
3) Rating per TIA-222-H, Section 15.5.

4.1) Recommendations

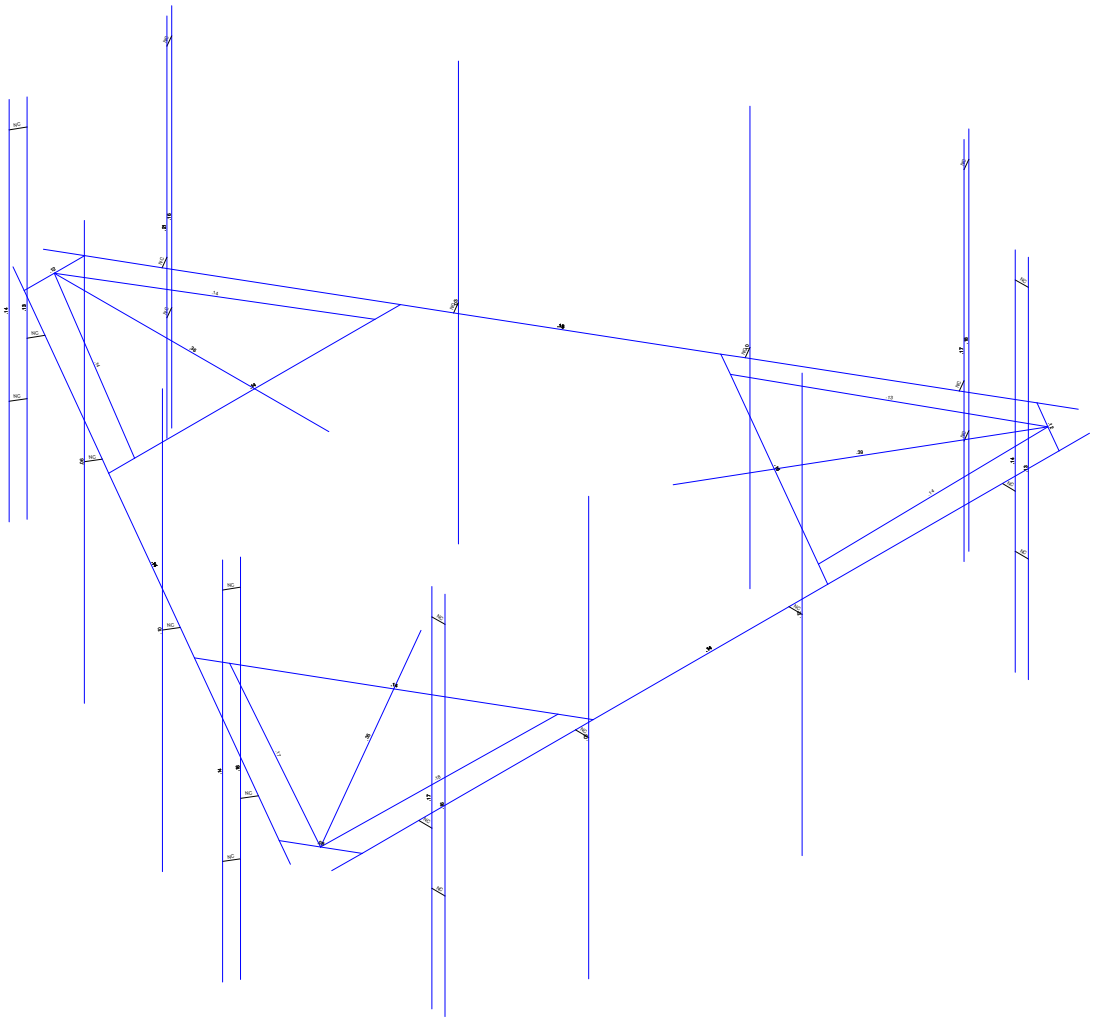
The mount has sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

WIRE FRAME AND RENDERED MODELS

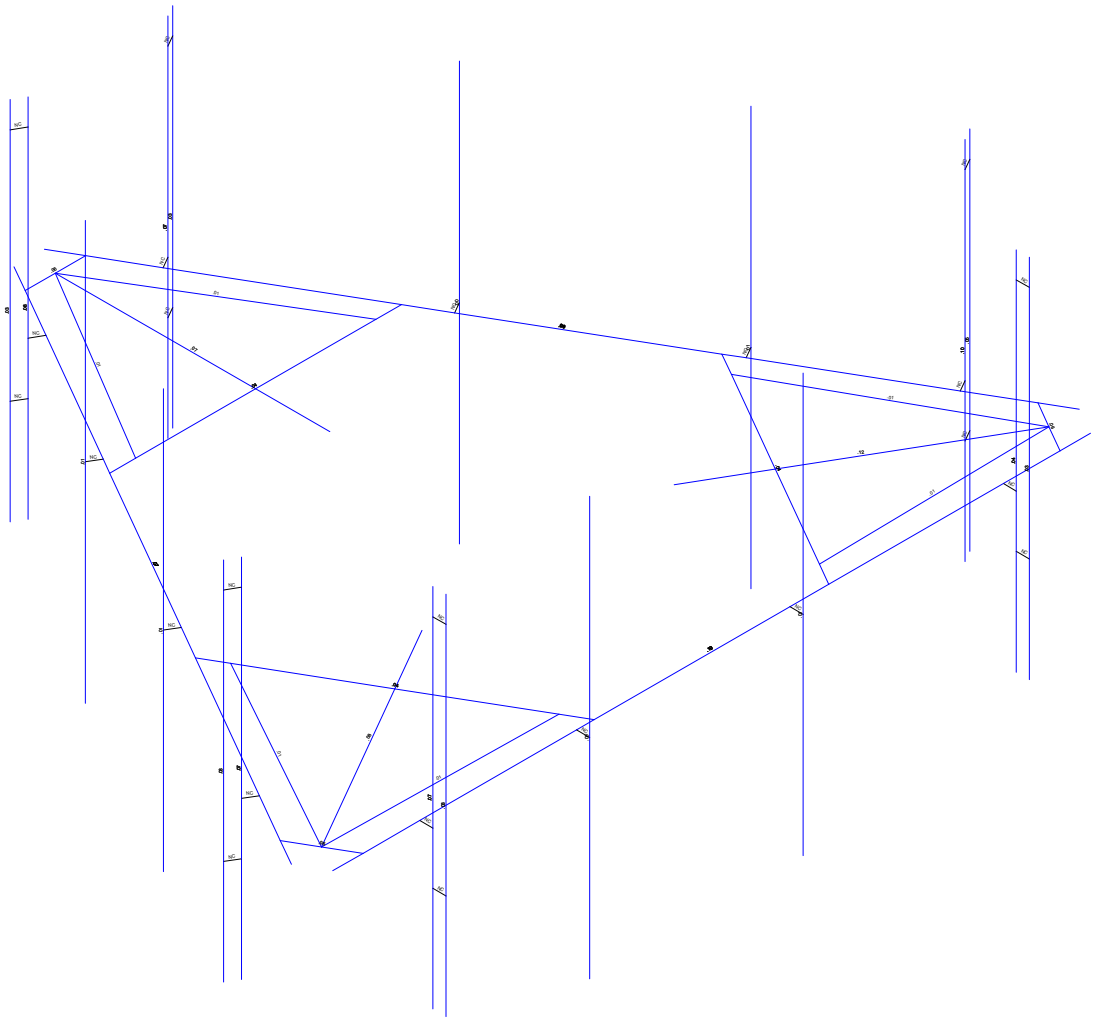


Jacobs Eng. Group, Inc.	Mapped Mount Frame	Page 1
H. Bedane		Mar 25, 2019 at 5:00 PM
ERCC0303 - 806367		14.5FT_Platform.R3D



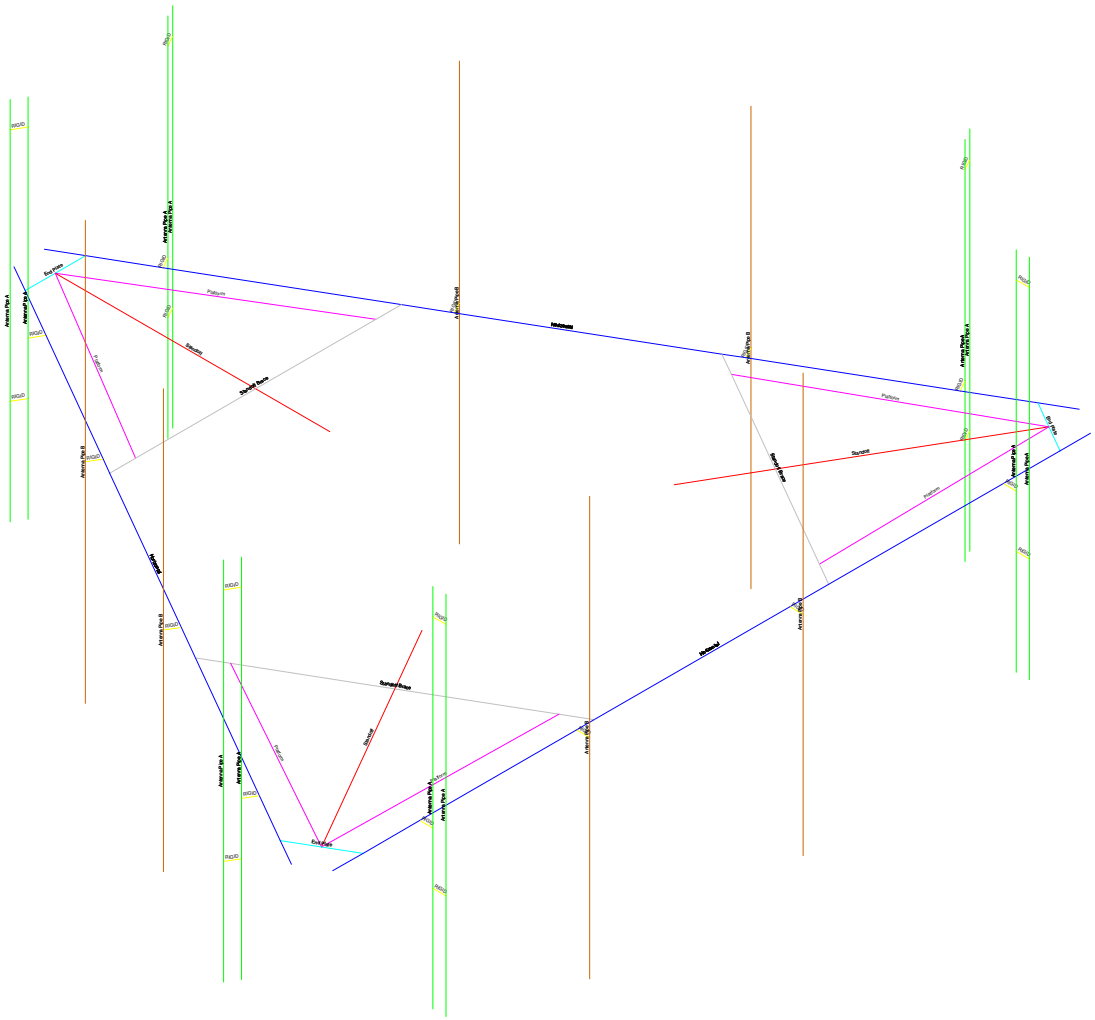
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Jacobs Eng. Group, Inc.	Mapped Mount Frame	Page 2
H. Bedane		Mar 25, 2019 at 5:01 PM
ERCC0303 - 806367		14.5FT_Platform.R3D

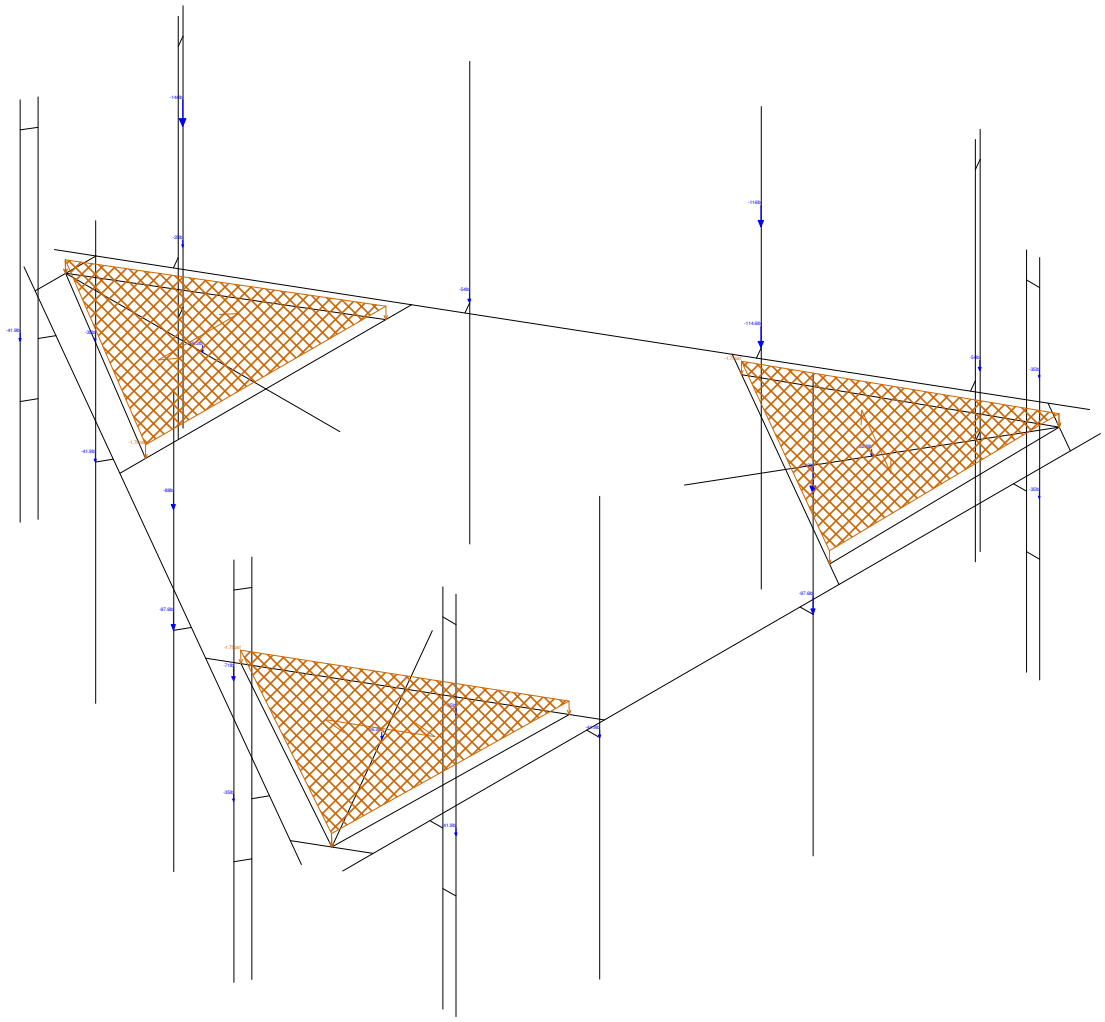


Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Jacobs Eng. Group, Inc.	Mapped Mount Frame	Page 3
H. Bedane		Mar 25, 2019 at 5:01 PM
ERCC0303 - 806367		14.5FT_Platform.R3D



Jacobs Eng. Group, Inc.	Mapped Mount Frame	Page 4
H. Bedane		Mar 25, 2019 at 5:01 PM
ERCC0303 - 806367		14.5FT_Platform.R3D



Jacobs Eng. Group, Inc.	Mapped Mount Frame	Page 5
H. Bedane		Mar 25, 2019 at 5:01 PM
ERCC0303 - 806367		14.5FT_Platform.R3D

APPENDIX B

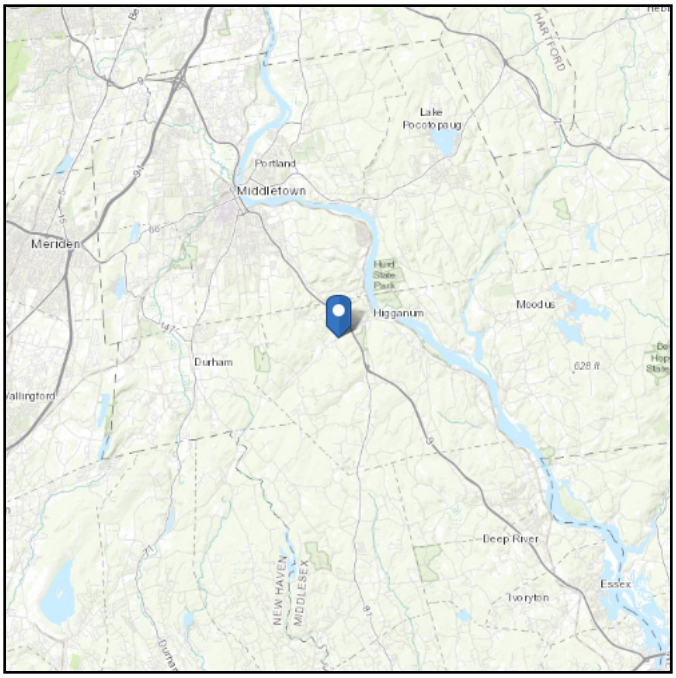
SOFTWARE INPUT CALCULATIONS

ASCE 7 Hazards Report

Address:
Maple Ave W
Higganum, Connecticut
06441

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 248.07 ft (NAVD 88)
Latitude: 41.487574
Longitude: -72.577667



Wind

Results:

Wind Speed:	121 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	92 Vmph
100-year MRI	99 Vmph
Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4
Date Accessed:	Thu Mar 21 2019

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 7-16 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 7-16 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.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Thu Mar 21 2019

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 500-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.

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**CCI ANTENNAS**		
Model #	**HPA65R-BU6A**		
Length	71.1	in	
Width	11.7	in	
Depth	7.6	in	
Weight	41.9	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	6.077		(w/o ice)
Length / Width	5.271		(w/ ice)
C_a	1.359		(w/o ice)
C_a	1.323		(w/ ice)
C_a	1.359		(service)
$(EPA)_A$	7.066	ft^2	(w/o ice)
$(EPA)_A$	8.432	ft^2	(w/ ice)
$(EPA)_A$	7.066	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	310.691	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	63.311	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	19.099	lb	(service)
Ice Weight	120.354	lb	
Weight	162.254	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	131.103		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	54.175		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.505		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	3	x	1
	4	x	1
	7	x	1
	8	x	1

Side

Manufacturer	CCI ANTENNAS		
Model #	HPA65R-BU6A		
Length	71.1	in	
Width	11.7	in	
Depth	7.6	in	
Weight	41.9	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	9.355		(w/o ice)
Length / Width	7.474		(w/ ice)
C_a	1.479		(w/o ice)
C_a	1.416		(w/ ice)
C_a	1.479		(service)
$(EPA)_A$	4.993	ft^2	(w/o ice)
$(EPA)_A$	6.363	ft^2	(w/ ice)
$(EPA)_A$	4.993	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	219.568	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	47.774	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	13.497	lb	(service)
Ice Weight	120.354	lb	
Weight	162.254	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	85.161		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	35.191		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	21.114		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	3	x	1
	4	x	1
	7	x	1
	8	x	1

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**CCI ANTENNAS**		
Model #	**HPA65R-BU8A**		
Length	96	in	
Width	11.7	in	
Depth	7.6	in	
Weight	54	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	8.205		(w/o ice)
Length / Width	7.061		(w/ ice)
C_a	1.440		(w/o ice)
C_a	1.402		(w/ ice)
C_a	1.440		(service)
$(EPA)_A$	10.110	ft^2	(w/o ice)
$(EPA)_A$	11.969	ft^2	(w/ ice)
$(EPA)_A$	10.110	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	444.563	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	89.872	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	27.328	lb	(service)
Ice Weight	162.503	lb	
Weight	216.503	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	131.103		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	54.175		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.505		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	10	x	1
	12	x	1
		x	
		x	

Side

Manufacturer	CCI ANTENNAS		
Model #	HPA65R-BU8A		
Length	96	in	
Width	11.7	in	
Depth	7.6	in	
Weight	54	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	12.632		(w/o ice)
Length / Width	10.012		(w/ ice)
C_a	1.588		(w/o ice)
C_a	1.500		(w/ ice)
C_a	1.588		(service)
$(EPA)_A$	7.240	ft^2	(w/o ice)
$(EPA)_A$	9.033	ft^2	(w/ ice)
$(EPA)_A$	7.240	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	318.362	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	67.827	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	19.570	lb	(service)
Ice Weight	162.503	lb	
Weight	216.503	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	85.161		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	35.191		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	21.114		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	10	x	1
	12	x	1
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**KATHREIN**		
Model #	**80010965**		
Length	78.7	in	
Width	20	in	
Depth	6.9	in	
Weight	97.6	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	3.935		(w/o ice)
Length / Width	3.643		(w/ ice)
C_a	1.264		(w/o ice)
C_a	1.251		(w/ ice)
C_a	1.264		(service)
$(EPA)_A$	12.432	ft^2	(w/o ice)
$(EPA)_A$	14.047	ft^2	(w/ ice)
$(EPA)_A$	12.432	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	546.686	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	105.472	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	33.605	lb	(service)
Ice Weight	196.971	lb	
Weight	294.571	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	224.108		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	92.607		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	55.564		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	2	x	1
	6	x	1
		x	
		x	

Side

Manufacturer	KATHREIN		
Model #	80010965		
Length	78.7	in	
Width	20	in	
Depth	6.9	in	
Weight	97.6	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	11.406		(w/o ice)
Length / Width	8.883		(w/ ice)
C_a	1.547		(w/o ice)
C_a	1.463		(w/ ice)
C_a	1.547		(service)
$(EPA)_A$	5.250	ft^2	(w/o ice)
$(EPA)_A$	6.737	ft^2	(w/ ice)
$(EPA)_A$	5.250	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	230.854	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	50.588	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	14.191	lb	(service)
Ice Weight	196.971	lb	
Weight	294.571	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	77.317		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	31.949		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	19.170		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	2	x	1
	6	x	1
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**KATHREIN**		
Model #	**80010966**		
Length	96	in	
Width	20	in	
Depth	6.9	in	
Weight	114.6	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	4.800		(w/o ice)
Length / Width	4.422		(w/ ice)
C_a	1.302		(w/o ice)
C_a	1.285		(w/ ice)
C_a	1.302		(service)
$(EPA)_A$	15.627	ft^2	(w/o ice)
$(EPA)_A$	17.523	ft^2	(w/ ice)
$(EPA)_A$	15.627	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	687.146	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	131.568	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	42.240	lb	(service)
Ice Weight	240.270	lb	
Weight	354.870	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	224.108		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	92.607		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	55.564		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	11	x	1
		x	
		x	
		x	

Side

Manufacturer	KATHREIN		
Model #	80010966		
Length	96	in	
Width	20	in	
Depth	6.9	in	
Weight	114.6	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	13.913		(w/o ice)
Length / Width	10.782		(w/ ice)
C_a	1.630		(w/o ice)
C_a	1.526		(w/ ice)
C_a	1.630		(service)
$(EPA)_A$	6.750	ft^2	(w/o ice)
$(EPA)_A$	8.532	ft^2	(w/ ice)
$(EPA)_A$	6.750	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	296.815	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	64.063	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	18.246	lb	(service)
Ice Weight	240.270	lb	
Weight	354.870	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	77.317		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	31.949		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	19.170		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	11	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**POWERWAVE TECHNOLOGIES**		
Model #	**7770**		
Length	55	in	
Width	11	in	
Depth	5	in	
Weight	35	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	5.000		(w/o ice)
Length / Width	4.331		(w/ ice)
C_a	1.311		(w/o ice)
C_a	1.281		(w/ ice)
C_a	1.311		(service)
$(EPA)_A$	4.958	ft^2	(w/o ice)
$(EPA)_A$	6.052	ft^2	(w/ ice)
$(EPA)_A$	4.958	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	218.000	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	45.439	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	13.401	lb	(service)
Ice Weight	81.546	lb	
Weight	116.546	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	123.260		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	50.934		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.560		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	1	x	1
	5	x	1
	9	x	1
		x	

Side

Manufacturer	POWERWAVE TECHNOLOGIES		
Model #	7770		
Length	55	in	
Width	11	in	
Depth	5	in	
Weight	35	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	11.000		(w/o ice)
Length / Width	7.936		(w/ ice)
C_a	1.533		(w/o ice)
C_a	1.431		(w/ ice)
C_a	1.533		(service)
$(EPA)_A$	2.635	ft^2	(w/o ice)
$(EPA)_A$	3.689	ft^2	(w/ ice)
$(EPA)_A$	2.635	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	115.886	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	27.698	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	7.124	lb	(service)
Ice Weight	81.546	lb	
Weight	116.546	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	56.027		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	23.152		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	13.891		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	1	x	1
	5	x	1
	9	x	1
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**ERICSSON**		
Model #	**RRUS 4415 B25**		
Length	14.96	in	
Width	13.19	in	
Depth	5.39	in	
Weight	44	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.134		(w/o ice)
Length / Width	1.115		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.480	ft^2	(w/o ice)
$(EPA)_A$	1.983	ft^2	(w/ ice)
$(EPA)_A$	1.480	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	65.076	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	14.888	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.000	lb	(service)
Ice Weight	25.823	lb	
Weight	69.823	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	147.800		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	61.074		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	36.645		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	6	x	2
	11	x	1
		x	
		x	

Side

Manufacturer	ERICSSON		
Model #	RRUS 4415 B25		
Length	14.96	in	
Width	13.19	in	
Depth	5.39	in	
Weight	44	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	2.776		(w/o ice)
Length / Width	2.259		(w/ ice)
C_a	1.212		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.212		(service)
$(EPA)_A$	0.611	ft^2	(w/o ice)
$(EPA)_A$	0.978	ft^2	(w/ ice)
$(EPA)_A$	0.611	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	26.864	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	7.347	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	1.651	lb	(service)
Ice Weight	25.823	lb	
Weight	69.823	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	60.397		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	24.958		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	14.975		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	6	x	2
	11	x	1
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**ERICSSON**		
Model #	**RRUS 4449 B5/B12**		
Length	17.9	in	
Width	13.19	in	
Depth	9.44	in	
Weight	71	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.357		(w/o ice)
Length / Width	1.306		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.771	ft^2	(w/o ice)
$(EPA)_A$	2.322	ft^2	(w/ ice)
$(EPA)_A$	1.771	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	77.865	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	17.437	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.786	lb	(service)
Ice Weight	34.865	lb	
Weight	105.865	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	147.800		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	61.074		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	36.645		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	2	x	2
	5	x	1
		x	
		x	

Side

Manufacturer	ERICSSON		
Model #	RRUS 4449 B5/B12		
Length	17.9	in	
Width	13.19	in	
Depth	9.44	in	
Weight	71	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.896		(w/o ice)
Length / Width	1.726		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.267	ft^2	(w/o ice)
$(EPA)_A$	1.757	ft^2	(w/ ice)
$(EPA)_A$	1.267	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	55.727	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	13.191	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	3.426	lb	(service)
Ice Weight	34.865	lb	
Weight	105.865	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	105.779		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	43.710		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	26.226		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	2	x	2
	5	x	1
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**ERICSSON**		
Model #	**RRUS 8843 B2/B66A**		
Length	14.9	in	
Width	13.2	in	
Depth	10.9	in	
Weight	72	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.129		(w/o ice)
Length / Width	1.110		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.475	ft^2	(w/o ice)
$(EPA)_A$	1.977	ft^2	(w/ ice)
$(EPA)_A$	1.475	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	64.864	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	14.845	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	3.987	lb	(service)
Ice Weight	30.527	lb	
Weight	102.527	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	147.912		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	61.120		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	36.672		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	9	x	2
	11	x	1
		x	
		x	

Side

Manufacturer	ERICSSON		
Model #	RRUS 8843 B2/B66A		
Length	14.9	in	
Width	13.2	in	
Depth	10.9	in	
Weight	72	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.367		(w/o ice)
Length / Width	1.305		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.218	ft^2	(w/o ice)
$(EPA)_A$	1.682	ft^2	(w/ ice)
$(EPA)_A$	1.218	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	53.562	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	12.629	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	3.293	lb	(service)
Ice Weight	30.527	lb	
Weight	102.527	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	122.139		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	50.471		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.282		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	9	x	2
	11	x	1
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**POWERWAVE TECHNOLOGIES**		
Model #	**LGP21401**		
Length	14	in	
Width	7	in	
Depth	2.7	in	
Weight	17.5	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	2.000		(w/o ice)
Length / Width	1.760		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	0.735	ft^2	(w/o ice)
$(EPA)_A$	1.119	ft^2	(w/ ice)
$(EPA)_A$	0.735	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	32.320	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	8.405	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	1.987	lb	(service)
Ice Weight	13.548	lb	
Weight	31.048	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	78.438		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	32.412		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	19.447		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	1	x	2
	4	x	2
	7	x	2
		x	

Side

Manufacturer	POWERWAVE TECHNOLOGIES		
Model #	LGP21401		
Length	14	in	
Width	7	in	
Depth	2.7	in	
Weight	17.5	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	5.185		(w/o ice)
Length / Width	3.302		(w/ ice)
C_a	1.319		(w/o ice)
C_a	1.236		(w/ ice)
C_a	1.319		(service)
$(EPA)_A$	0.312	ft^2	(w/o ice)
$(EPA)_A$	0.614	ft^2	(w/ ice)
$(EPA)_A$	0.312	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	13.706	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	4.613	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.843	lb	(service)
Ice Weight	13.548	lb	
Weight	31.048	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.255		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	12.502		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	7.501		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	1	x	2
	4	x	2
	7	x	2
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**RAYCAP**		
Model #	**DC6-48-60-18-8C-EV**		
Length	31.4	in	
Width	10.24	in	
Depth	10.24	in	
Weight	26.2	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	3.066		(w/o ice)
Length / Width	2.700		(w/ ice)
C_a	0.513		(w/o ice)
C_a	0.704		(w/ ice)
C_a	0.713		(service)
$(EPA)_A$	1.030	ft^2	(w/o ice)
$(EPA)_A$	1.842	ft^2	(w/ ice)
$(EPA)_A$	1.432	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	45.296	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	13.831	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	3.871	lb	(service)
Ice Weight	55.023	lb	
Weight	81.223	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	114.744		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	47.415		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	28.449		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	15	x	1
	16	x	1
		x	
		x	

Side

Manufacturer	RAYCAP		
Model #	DC6-48-60-18-8C-EV		
Length	31.4	in	
Width	10.24	in	
Depth	10.24	in	
Weight	26.2	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	3.066		(w/o ice)
Length / Width	2.700		(w/ ice)
C_a	0.513		(w/o ice)
C_a	0.704		(w/ ice)
C_a	0.713		(service)
$(EPA)_A$	1.030	ft^2	(w/o ice)
$(EPA)_A$	1.842	ft^2	(w/ ice)
$(EPA)_A$	1.432	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	45.296	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	13.831	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	3.871	lb	(service)
Ice Weight	55.023	lb	
Weight	81.223	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	114.744		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	47.415		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	28.449		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	15	x	1
	16	x	1
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**RAYCAP**		
Model #	**DC6-48-60-18-8F**		
Length	31.25	in	
Width	11	in	
Depth	11	in	
Weight	32.8	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	2.841		(w/o ice)
Length / Width	2.533		(w/ ice)
C_a	0.508		(w/o ice)
C_a	0.701		(w/ ice)
C_a	0.708		(service)
$(EPA)_A$	1.090	ft^2	(w/o ice)
$(EPA)_A$	1.936	ft^2	(w/ ice)
$(EPA)_A$	1.520	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	47.952	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	14.533	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.109	lb	(service)
Ice Weight	58.536	lb	
Weight	91.336	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	123.260		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	50.934		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.560		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)

Position	17	x	1
		x	
		x	
		x	

Side

Manufacturer	RAYCAP		
Model #	DC6-48-60-18-8F		
Length	31.25	in	
Width	11	in	
Depth	11	in	
Weight	32.8	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	2.841		(w/o ice)
Length / Width	2.533		(w/ ice)
C_a	0.508		(w/o ice)
C_a	0.701		(w/ ice)
C_a	0.708		(service)
$(EPA)_A$	1.090	ft^2	(w/o ice)
$(EPA)_A$	1.936	ft^2	(w/ ice)
$(EPA)_A$	1.520	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	47.952	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	14.533	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.109	lb	(service)
Ice Weight	58.536	lb	
Weight	91.336	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	123.260		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	50.934		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.560		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)

Position	17	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member / Size	**Antenna Pipe A** / **Pipe 2.0**		
Length	84	in	
Width	2.38	in	
Depth	2.38	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	35.294		(w/o ice)
Length / Width	18.788		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.062		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.499	ft^2	(w/o ice)
$(EPA)_A$	2.626	ft^2	(w/ ice)
$(EPA)_A$	1.499	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.785	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.235	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.048	lb/in	(service)
Ice Weight	0.503	lb/in	
Weight	0.503	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	26.669		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	11.020		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	6.612		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)
Quantity	12		(18 max)

Side

Member / Size	Antenna Pipe A / Pipe 2.0		
Length	84	in	
Width	2.38	in	
Depth	2.38	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	35.294		(w/o ice)
Length / Width	18.788		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.062		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.499	ft^2	(w/o ice)
$(EPA)_A$	2.626	ft^2	(w/ ice)
$(EPA)_A$	1.499	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.785	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.235	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.048	lb/in	(service)
Ice Weight	0.503	lb/in	
Weight	0.503	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	26.669		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	11.020		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	6.612		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)
Quantity	12		(18 max)

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member Size	**Antenna Pipe B Pipe 2.5**		
Length	96	in	
Width	2.88	in	
Depth	2.88	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	33.333		(w/o ice)
Length / Width	19.300		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.073		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	2.074	ft^2	(w/o ice)
$(EPA)_A$	3.352	ft^2	(w/ ice)
$(EPA)_A$	2.074	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.950	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.262	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.058	lb/in	(service)
Ice Weight	0.582	lb/in	
Weight	0.582	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.272		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	13.335		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	8.001		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)
Quantity	6		(18 max)

Side

Member Size	Antenna Pipe B Pipe 2.5		
Length	96	in	
Width	2.88	in	
Depth	2.88	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	33.333		(w/o ice)
Length / Width	19.300		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.073		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	2.074	ft^2	(w/o ice)
$(EPA)_A$	3.352	ft^2	(w/ ice)
$(EPA)_A$	2.074	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.950	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.262	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.058	lb/in	(service)
Ice Weight	0.582	lb/in	
Weight	0.582	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.272		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	13.335		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	8.001		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)
Quantity	6		(18 max)

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member Size	**Horizontal Pipe 3.0**		
Length	174	in	
Width	3.5	in	
Depth	3.5	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	49.714		(w/o ice)
Length / Width	30.867		(w/ ice)
C_a	1.193		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	4.542	ft^2	(w/o ice)
$(EPA)_A$	7.544	ft^2	(w/ ice)
$(EPA)_A$	4.568	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.148	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.326	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.071	lb/in	(service)
Ice Weight	0.681	lb/in	
Weight	0.681	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	39.219		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	16.206		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	9.724		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)
Quantity	3		(18 max)

Side

Member Size	Horizontal Pipe 3.0		
Length	174	in	
Width	3.5	in	
Depth	3.5	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	49.714		(w/o ice)
Length / Width	30.867		(w/ ice)
C_a	1.193		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	4.542	ft^2	(w/o ice)
$(EPA)_A$	7.544	ft^2	(w/ ice)
$(EPA)_A$	4.568	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.148	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.326	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.071	lb/in	(service)
Ice Weight	0.681	lb/in	
Weight	0.681	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	39.219		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	16.206		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	9.724		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)
Quantity	3		(18 max)

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	03/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member	**Standoff**		
Size	**HSS 4x4**		
Length	63	in	
Width	4	in	
Depth	4	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	S	(R / F / S)	
Length / Width	15.750		(w/o ice)
Length / Width	10.503		(w/ ice)
C_a	1.070		(w/o ice)
C_a	0.968		(w/ ice)
C_a	1.070		(service)
$(EPA)_A$	1.685	ft^2	(w/o ice)
$(EPA)_A$	2.450	ft^2	(w/ ice)
$(EPA)_A$	1.685	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.176	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.292	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.072	lb/in	(service)
Ice Weight	0.760	lb/in	
Weight	0.760	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	44.822		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	18.521		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	11.113		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.97	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.51	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.70	psf	(service)
Quantity	3		(12 max)

Side

Member	Standoff		
Size	HSS 4x4		
Length	63	in	
Width	4	in	
Depth	4	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	115.5	ft	
Antenna Centerline (z)	89	ft	
Basic Wind Speed (V)	121	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	S	(R / F / S)	
Length / Width	15.750		(w/o ice)
Length / Width	10.503		(w/ ice)
C_a	1.070		(w/o ice)
C_a	0.968		(w/ ice)
C_a	1.070		(service)
$(EPA)_A$	1.685	ft^2	(w/o ice)
$(EPA)_A$	2.450	ft^2	(w/ ice)
$(EPA)_A$	1.685	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.176	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.292	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.072	lb/in	(service)
Ice Weight	0.760	lb/in	
Weight	0.760	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.235		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.104		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.104	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	44.822		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	18.521		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	11.113		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	43.973	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	7.508	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	2.703	psf	(service)
Quantity	3		(12 max)

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distri...	Area(...	Surfa...
1	DEAD LOAD	None			-1		24		3	
2	DEAD LOAD (ICE)	None					24	24	3	
3	WIND LOAD (NO ICE) FRONT	None					24	24		
4	WIND LOAD (NO ICE) SIDE	None					24	24		
5	WIND LOAD (ICE) FRONT	None					24	24		
6	WIND LOAD (ICE) SIDE	None					24	24		
7	LIVE LOAD (MAN)	None					1		3	
8	WIND LOAD (SERVICE) FRONT	None					24	24		
9	WIND LOAD (SERVICE) SIDE	None					24	24		
10	LIVE LOAD (SERVICE)	None					1			
11	SEISMIC LOAD (LATERAL) FRONT	None								
12	SEISMIC LOAD (LATERAL) SIDE	None								
13	BLC 1 Transient Area Loads	None						12		
14	BLC 2 Transient Area Loads	None						12		
15	BLC 7 Transient Area Loads	None						12		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	DEAD LOAD	Yes	Y		1	1.4																				
2	DEAD LOAD + WIND LOAD (NO ICE) 0 D...	Yes	Y		1	1.2			3	1	4															
3	DEAD LOAD + WIND LOAD (NO ICE) 30 ...	Yes	Y		1	1.2			3	.866	4	.5														
4	DEAD LOAD + WIND LOAD (NO ICE) 60 ...	Yes	Y		1	1.2			3	.5	4	.866														
5	DEAD LOAD + WIND LOAD (NO ICE) 90 ...	Yes	Y		1	1.2			3		4	1														
6	DEAD LOAD + WIND LOAD (NO ICE) 120...	Yes	Y		1	1.2			3	-.5	4	.866														
7	DEAD LOAD + WIND LOAD (NO ICE) 150...	Yes	Y		1	1.2			3	-.8...	4	.5														
8	DEAD LOAD + WIND LOAD (NO ICE) 180...	Yes	Y		1	1.2			3	-1	4															
9	DEAD LOAD + WIND LOAD (NO ICE) 210...	Yes	Y		1	1.2			3	-.8...	4	-.5														
10	DEAD LOAD + WIND LOAD (NO ICE) 240...	Yes	Y		1	1.2			3	-.5	4	-.8...														
11	DEAD LOAD + WIND LOAD (NO ICE) 270...	Yes	Y		1	1.2			3		4	-1														
12	DEAD LOAD + WIND LOAD (NO ICE) 300...	Yes	Y		1	1.2			3	.5	4	-.8...														
13	DEAD LOAD + WIND LOAD (NO ICE) 330...	Yes	Y		1	1.2			3	.866	4	-.5														
14	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	1	6											
15	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	.866	6	.5										
16	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	.5	6	.866										
17	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5		6	1										
18	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	-.5	6	.866										
19	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	-.8...	6	.5										
20	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	-1	6											
21	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	-.8...	6	-.5										
22	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	-.5	6	-.8...										
23	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5		6	-1										
24	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	.5	6	-.8...										
25	DEAD LOAD + DEAD LOAD (ICE) + WIN...	Yes	Y		1	1.2	2	1					5	.866	6	-.5										
26	DEAD LOAD + LIVE LOAD (MAN)	Yes	Y		1	1.2											7	1.5								
27	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	1	9		10	1.5		
28	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	.866	9	.5	10	1.5		
29	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	.5	9	.866	10	1.5		
30	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8		9	1	10	1.5		
31	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	-.5	9	.866	10	1.5		
32	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	-.8...	9	.5	10	1.5		
33	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	-1	9		10	1.5		
34	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	-.8...	9	-.5	10	1.5		
35	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	-.5	9	-.8...	10	1.5		
36	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8		9	-1	10	1.5		

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
37	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	.5	9	-.8...	10	1.5
38	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Yes	Y		1	1.2													8	.866	9	-.5	10	1.5
39	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	1	12											
40	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	.866	12	.5										
41	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	.5	12	.866										
42	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11		12	1										
43	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	-.5	12	.866										
44	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	-.8...	12	.5										
45	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	-1	12											
46	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	-.8...	12	-.5										
47	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	-.5	12	-.8...										
48	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11		12	-1										
49	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	.5	12	-.8...										
50	DEAD LOAD + SEISMIC LOAD (VERTICA...	Yes	Y		1	1.2	1				11	.866	12	-.5										

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	N39	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N71	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N72	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Horizontal	PIPE_3.0	Beam	Pipe	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
2	Antenna Pipe A	PIPE_2.0	Column	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
3	Standoff	HSS4X4X4	Beam	SquareTube	A500 Gr.B ...	Typical	3.37	7.8	7.8	12.8
4	Standoff Brace	HSS4X4X4	Beam	SquareTube	A500 Gr.B ...	Typical	3.37	7.8	7.8	12.8
5	Platform	L2x2x4	Beam	Single Angle	A36 Gr.36	Typical	.944	.346	.346	.021
6	End Plate	PL6"x1/2"	Beam	RECT	A36 Gr.36	Typical	3	.063	9	.237
7	Antenna Pipe B	PIPE_2.5	Column	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N101			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
2	M2	N2	N102			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
3	M3	N4	N103			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
4	M4	N5	N104			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
5	M5	N7	N105			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
6	M6	N8	N106			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
7	M7	N10	N107			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
8	M8	N11	N108			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
9	M9	N13	N109			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
10	M10	N14	N110			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
11	M11	N16	N111			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
12	M12	N17	N112			Antenna Pipe A	Column	Pipe	A53 Gr.B	Typical
13	M13	N3	N113			Antenna Pipe B	Column	Pipe	A53 Gr.B	Typical
14	M14	N6	N114			Antenna Pipe B	Column	Pipe	A53 Gr.B	Typical
15	M15	N9	N115			Antenna Pipe B	Column	Pipe	A53 Gr.B	Typical
16	M16	N12	N116			Antenna Pipe B	Column	Pipe	A53 Gr.B	Typical
17	M17	N15	N117			Antenna Pipe B	Column	Pipe	A53 Gr.B	Typical
18	M18	N18	N118			Antenna Pipe B	Column	Pipe	A53 Gr.B	Typical
19	M19	N58	N56			End Plate	Beam	RECT	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
20	M20	N41	N50			End Plate	Beam	RECT	A36 Gr.36	Typical
21	M21	N51	N44			End Plate	Beam	RECT	A36 Gr.36	Typical
22	M22	N78	N80			Horizontal	Beam	Pipe	A53 Gr.B	Typical
23	M23	N79	N77			Horizontal	Beam	Pipe	A53 Gr.B	Typical
24	M24	N40	N45			Horizontal	Beam	Pipe	A53 Gr.B	Typical
25	M25	N48	N46		270	Platform	Beam	Single Angle	A36 Gr.36	Typical
26	M26	N48	N54			Platform	Beam	Single Angle	A36 Gr.36	Typical
27	M27	N57	N34		270	Platform	Beam	Single Angle	A36 Gr.36	Typical
28	M28	N57	N37			Platform	Beam	Single Angle	A36 Gr.36	Typical
29	M29	N49	N55		270	Platform	Beam	Single Angle	A36 Gr.36	Typical
30	M30	N49	N47			Platform	Beam	Single Angle	A36 Gr.36	Typical
31	M31	N73	N61			RIGID	None	None	RIGID	Typical
32	M32	N19	N20			RIGID	None	None	RIGID	Typical
33	M33	N21	N22			RIGID	None	None	RIGID	Typical
34	M34	N75	N60			RIGID	None	None	RIGID	Typical
35	M35	N74	N59			RIGID	None	None	RIGID	Typical
36	M36	N89	N90			RIGID	None	None	RIGID	Typical
37	M37	N91	N92			RIGID	None	None	RIGID	Typical
38	M38	N76	N62			RIGID	None	None	RIGID	Typical
39	M39	N81	N65			RIGID	None	None	RIGID	Typical
40	M40	N23	N24			RIGID	None	None	RIGID	Typical
41	M41	N25	N26			RIGID	None	None	RIGID	Typical
42	M42	N83	N64			RIGID	None	None	RIGID	Typical
43	M43	N82	N63			RIGID	None	None	RIGID	Typical
44	M44	N93	N94			RIGID	None	None	RIGID	Typical
45	M45	N95	N96			RIGID	None	None	RIGID	Typical
46	M46	N84	N66			RIGID	None	None	RIGID	Typical
47	M47	N85	N69			RIGID	None	None	RIGID	Typical
48	M48	N27	N28			RIGID	None	None	RIGID	Typical
49	M49	N29	N30			RIGID	None	None	RIGID	Typical
50	M50	N87	N68			RIGID	None	None	RIGID	Typical
51	M51	N86	N67			RIGID	None	None	RIGID	Typical
52	M52	N97	N98			RIGID	None	None	RIGID	Typical
53	M53	N99	N100			RIGID	None	None	RIGID	Typical
54	M54	N88	N70			RIGID	None	None	RIGID	Typical
55	M55	N57	N39			Standoff	Beam	SquareTube	A500 Gr....	Typical
56	M56	N48	N71			Standoff	Beam	SquareTube	A500 Gr....	Typical
57	M57	N49	N72			Standoff	Beam	SquareTube	A500 Gr....	Typical
58	M58	N33	N38			Standoff Brace	Beam	SquareTube	A500 Gr....	Typical
59	M59	N42	N35			Standoff Brace	Beam	SquareTube	A500 Gr....	Typical
60	M60	N32	N43			Standoff Brace	Beam	SquareTube	A500 Gr....	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp to...	Lcomp bo...	L-tor...	Kyy	Kzz	Cb	Func...
1	M1	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
2	M2	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
3	M3	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
4	M4	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
5	M5	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
6	M6	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
7	M7	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
8	M8	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
9	M9	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
10	M10	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
11	M11	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp to...	Lcomp bo...	L-tor...	Kyy	Kzz	Cb	Func...
12	M12	Antenna Pipe A	84	Segment	Segment	Lbyy			2.1	2.1		Lateral
13	M13	Antenna Pipe B	96	Segment	Segment	Lbyy			2.1	2.1		Lateral
14	M14	Antenna Pipe B	96	Segment	Segment	Lbyy			2.1	2.1		Lateral
15	M15	Antenna Pipe B	96	Segment	Segment	Lbyy			2.1	2.1		Lateral
16	M16	Antenna Pipe B	96	Segment	Segment	Lbyy			2.1	2.1		Lateral
17	M17	Antenna Pipe B	96	Segment	Segment	Lbyy			2.1	2.1		Lateral
18	M18	Antenna Pipe B	96	Segment	Segment	Lbyy			2.1	2.1		Lateral
19	M19	End Plate	13.92	Segment	Segment	Lbyy			.65	.65		Lateral
20	M20	End Plate	13.92	Segment	Segment	Lbyy			.65	.65		Lateral
21	M21	End Plate	13.92	Segment	Segment	Lbyy			.65	.65		Lateral
22	M22	Horizontal	174	Segment	Segment	Lbyy			2.1	2.1		Lateral
23	M23	Horizontal	174	Segment	Segment	Lbyy			2.1	2.1		Lateral
24	M24	Horizontal	174	Segment	Segment	Lbyy			2.1	2.1		Lateral
25	M25	Platform	53.645	Segment	Segment	Lbyy			.65	.65		Lateral
26	M26	Platform	53.645	Segment	Segment	Lbyy			.65	.65		Lateral
27	M27	Platform	53.645	Segment	Segment	Lbyy			.65	.65		Lateral
28	M28	Platform	53.645	Segment	Segment	Lbyy			.65	.65		Lateral
29	M29	Platform	53.645	Segment	Segment	Lbyy			.65	.65		Lateral
30	M30	Platform	53.645	Segment	Segment	Lbyy			.65	.65		Lateral
31	M55	Standoff	63	Segment	Segment	Lbyy			.65	.65		Lateral
32	M56	Standoff	63	Segment	Segment	Lbyy			.65	.65		Lateral
33	M57	Standoff	63	Segment	Segment	Lbyy			.65	.65		Lateral
34	M58	Standoff Brace	67.036	Segment	Segment	Lbyy			.65	.65		Lateral
35	M59	Standoff Brace	67.036	Segment	Segment	Lbyy			.65	.65		Lateral
36	M60	Standoff Brace	67.036	Segment	Segment	Lbyy			.65	.65		Lateral

Plate Primary Data

Label	A Joint	B Joint	C Joint	D Joint	Material	Thickness[in]
No Data to Print ...						

Member Point Loads (BLC 1 : DEAD LOAD)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Z	-35	48
2	M1	Z	-35	24
3	M14	Z	-97.6	48
4	M14	Z	-142	24
5	M13	Z	-41.9	48
6	M2	Z	-41.9	48
7	M2	Z	-35	24
8	M9	Z	-35	48
9	M9	Z	-71	24
10	M18	Z	-97.6	48
11	M18	Z	-88	24
12	M17	Z	-41.9	48
13	M17	Z	-35	24
14	M10	Z	-41.9	48
15	M5	Z	-35	48
16	M5	Z	-144	24
17	M16	Z	-54	48
18	M15	Z	-114.6	48
19	M15	Z	-44	24
20	M15	Z	-72	24
21	M6	Z	-54	48
22	M55	Z	-26.2	%50

Member Point Loads (BLC 1 : DEAD LOAD) (Continued)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
23	M56	Z	-26.2	%50
24	M57	Z	-32.8	%50

Member Point Loads (BLC 2 : DEAD LOAD (ICE))

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Z	-81.5	48
2	M1	Z	-27.1	24
3	M14	Z	-197	48
4	M14	Z	-69.7	24
5	M13	Z	-120.4	48
6	M2	Z	-120.4	48
7	M2	Z	-27.1	24
8	M9	Z	-81.5	48
9	M9	Z	-34.9	24
10	M18	Z	-197	48
11	M18	Z	-51.6	24
12	M17	Z	-120.4	48
13	M17	Z	-27.1	24
14	M10	Z	-120.4	48
15	M5	Z	-81.5	48
16	M5	Z	-61.1	24
17	M16	Z	-162.5	48
18	M15	Z	-240.3	48
19	M15	Z	-25.8	24
20	M15	Z	-30.5	24
21	M6	Z	-162.5	48
22	M55	Z	-55	%50
23	M56	Z	-55	%50
24	M57	Z	-58.5	%50

Member Point Loads (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Y	218	48
2	M1	Y	64.6	24
3	M14	Y	546.7	48
4	M14	Y	155.7	24
5	M13	Y	310.7	48
6	M2	Y	310.7	48
7	M2	Y	64.6	24
8	M9	Y	218	48
9	M9	Y	77.9	24
10	M18	Y	546.7	48
11	M18	Y	130.2	24
12	M17	Y	310.7	48
13	M17	Y	64.6	24
14	M10	Y	310.7	48
15	M5	Y	218	48
16	M5	Y	129.7	24
17	M16	Y	444.6	48
18	M15	Y	687.1	48
19	M15	Y	65.1	24
20	M15	Y	64.9	24
21	M6	Y	444.6	48
22	M55	Y	45.3	%50
23	M56	Y	45.3	%50
24	M57	Y	48	%50

Member Point Loads (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	X	115.9	48
2	M1	X	27.4	24
3	M14	X	230.9	48
4	M14	X	111.5	24
5	M13	X	219.6	48
6	M2	X	219.6	48
7	M2	X	27.4	24
8	M9	X	115.9	48
9	M9	X	55.7	24
10	M18	X	230.9	48
11	M18	X	53.7	24
12	M17	X	219.6	48
13	M17	X	27.4	24
14	M10	X	219.6	48
15	M5	X	115.9	48
16	M5	X	107.1	24
17	M16	X	318.4	48
18	M15	X	296.8	48
19	M15	X	26.9	24
20	M15	X	53.6	24
21	M6	X	318.4	48
22	M55	X	45.3	%50
23	M56	X	45.3	%50
24	M57	X	48	%50

Member Point Loads (BLC 5 : WIND LOAD (ICE) FRONT)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Y	45.4	48
2	M1	Y	16.8	24
3	M14	Y	105.5	48
4	M14	Y	34.9	24
5	M13	Y	63.3	48
6	M2	Y	63.3	48
7	M2	Y	16.8	24
8	M9	Y	45.4	48
9	M9	Y	17.4	24
10	M18	Y	105.5	48
11	M18	Y	29.8	24
12	M17	Y	63.3	48
13	M17	Y	16.8	24
14	M10	Y	63.3	48
15	M5	Y	45.4	48
16	M5	Y	29.7	24
17	M16	Y	89.9	48
18	M15	Y	131.6	48
19	M15	Y	14.9	24
20	M15	Y	14.8	24
21	M6	Y	89.9	48
22	M55	Y	13.8	%50
23	M56	Y	13.8	%50
24	M57	Y	14.5	%50

Member Point Loads (BLC 6 : WIND LOAD (ICE) SIDE)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	X	27.7	48
2	M1	X	9.2	24

Member Point Loads (BLC 6 : WIND LOAD (ICE) SIDE) (Continued)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
3	M14	X	50.6	48
4	M14	X	26.4	24
5	M13	X	47.8	48
6	M2	X	47.8	48
7	M2	X	9.2	24
8	M9	X	27.7	48
9	M9	X	13.2	24
10	M18	X	50.6	48
11	M18	X	14.7	24
12	M17	X	47.8	48
13	M17	X	9.2	24
14	M10	X	47.8	48
15	M5	X	27.7	48
16	M5	X	25.3	24
17	M16	X	67.8	48
18	M15	X	64.1	48
19	M15	X	7.3	24
20	M15	X	12.6	24
21	M6	X	67.8	48
22	M55	X	13.8	%50
23	M56	X	13.8	%50
24	M57	X	14.5	%50

Member Point Loads (BLC 7 : LIVE LOAD (MAN))

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M24	Z	-250	0

Member Point Loads (BLC 8 : WIND LOAD (SERVICE) FRONT)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Y	13.4	48
2	M1	Y	4	24
3	M14	Y	33.6	48
4	M14	Y	9.6	24
5	M13	Y	19.1	48
6	M2	Y	19.1	48
7	M2	Y	4	24
8	M9	Y	13.4	48
9	M9	Y	4.8	24
10	M18	Y	33.6	48
11	M18	Y	8	24
12	M17	Y	19.1	48
13	M17	Y	4	24
14	M10	Y	19.1	48
15	M5	Y	13.4	48
16	M5	Y	8	24
17	M16	Y	27.3	48
18	M15	Y	42.2	48
19	M15	Y	4	24
20	M15	Y	4	24
21	M6	Y	27.3	48
22	M55	Y	3.9	%50
23	M56	Y	3.9	%50
24	M57	Y	4.1	%50

Member Point Loads (BLC 9 : WIND LOAD (SERVICE) SIDE)

Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]

Member Point Loads (BLC 9 : WIND LOAD (SERVICE) SIDE) (Continued)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	X	7.1	48
2	M1	X	1.7	24
3	M14	X	14.2	48
4	M14	X	6.9	24
5	M13	X	13.5	48
6	M2	X	13.5	48
7	M2	X	1.7	24
8	M9	X	7.1	48
9	M9	X	3.4	24
10	M18	X	14.2	48
11	M18	X	3.3	24
12	M17	X	13.5	48
13	M17	X	1.7	24
14	M10	X	13.5	48
15	M5	X	7.1	48
16	M5	X	6.6	24
17	M16	X	19.6	48
18	M15	X	18.2	48
19	M15	X	1.7	24
20	M15	X	3.3	24
21	M6	X	19.6	48
22	M55	X	3.9	%50
23	M56	X	3.9	%50
24	M57	X	4.1	%50

Member Point Loads (BLC 10 : LIVE LOAD (SERVICE))

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M14	Z	-500	0

Member Distributed Loads (BLC 2 : DEAD LOAD (ICE))

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M1	Z	-.503	-.503	0	0
2	M2	Z	-.503	-.503	0	0
3	M3	Z	-.503	-.503	0	0
4	M4	Z	-.503	-.503	0	0
5	M5	Z	-.503	-.503	0	0
6	M6	Z	-.503	-.503	0	0
7	M7	Z	-.503	-.503	0	0
8	M8	Z	-.503	-.503	0	0
9	M9	Z	-.503	-.503	0	0
10	M10	Z	-.503	-.503	0	0
11	M11	Z	-.503	-.503	0	0
12	M12	Z	-.503	-.503	0	0
13	M13	Z	-.582	-.582	0	0
14	M14	Z	-.582	-.582	0	0
15	M15	Z	-.582	-.582	0	0
16	M16	Z	-.582	-.582	0	0
17	M17	Z	-.582	-.582	0	0
18	M18	Z	-.582	-.582	0	0
19	M22	Z	-.681	-.681	0	0
20	M23	Z	-.681	-.681	0	0
21	M24	Z	-.681	-.681	0	0
22	M55	Z	-.76	-.76	0	0
23	M56	Z	-.76	-.76	0	0
24	M57	Z	-.76	-.76	0	0

Member Distributed Loads (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M1	PY	.785	.785	0	0
2	M2	PY	.785	.785	0	0
3	M3	PY	.785	.785	0	0
4	M4	PY	.785	.785	0	0
5	M5	PY	.785	.785	0	0
6	M6	PY	.785	.785	0	0
7	M7	PY	.785	.785	0	0
8	M8	PY	.785	.785	0	0
9	M9	PY	.785	.785	0	0
10	M10	PY	.785	.785	0	0
11	M11	PY	.785	.785	0	0
12	M12	PY	.785	.785	0	0
13	M13	PY	.95	.95	0	0
14	M14	PY	.95	.95	0	0
15	M15	PY	.95	.95	0	0
16	M16	PY	.95	.95	0	0
17	M17	PY	.95	.95	0	0
18	M18	PY	.95	.95	0	0
19	M22	PY	1.148	1.148	0	0
20	M23	PY	1.148	1.148	0	0
21	M24	PY	1.148	1.148	0	0
22	M55	PY	1.176	1.176	0	0
23	M56	PY	1.176	1.176	0	0
24	M57	PY	1.176	1.176	0	0

Member Distributed Loads (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M1	PX	.785	.785	0	0
2	M2	PX	.785	.785	0	0
3	M3	PX	.785	.785	0	0
4	M4	PX	.785	.785	0	0
5	M5	PX	.785	.785	0	0
6	M6	PX	.785	.785	0	0
7	M7	PX	.785	.785	0	0
8	M8	PX	.785	.785	0	0
9	M9	PX	.785	.785	0	0
10	M10	PX	.785	.785	0	0
11	M11	PX	.785	.785	0	0
12	M12	PX	.785	.785	0	0
13	M13	PX	.95	.95	0	0
14	M14	PX	.95	.95	0	0
15	M15	PX	.95	.95	0	0
16	M16	PX	.95	.95	0	0
17	M17	PX	.95	.95	0	0
18	M18	PX	.95	.95	0	0
19	M22	PX	1.148	1.148	0	0
20	M23	PX	1.148	1.148	0	0
21	M24	PX	1.148	1.148	0	0
22	M55	PX	1.176	1.176	0	0
23	M56	PX	1.176	1.176	0	0
24	M57	PX	1.176	1.176	0	0

Member Distributed Loads (BLC 5 : WIND LOAD (ICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M1	PY	.235	.235	0	0
2	M2	PY	.235	.235	0	0

Member Distributed Loads (BLC 5 : WIND LOAD (ICE) FRONT) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
3	M3	PY	.235	.235	0	0
4	M4	PY	.235	.235	0	0
5	M5	PY	.235	.235	0	0
6	M6	PY	.235	.235	0	0
7	M7	PY	.235	.235	0	0
8	M8	PY	.235	.235	0	0
9	M9	PY	.235	.235	0	0
10	M10	PY	.235	.235	0	0
11	M11	PY	.235	.235	0	0
12	M12	PY	.235	.235	0	0
13	M13	PY	.262	.262	0	0
14	M14	PY	.262	.262	0	0
15	M15	PY	.262	.262	0	0
16	M16	PY	.262	.262	0	0
17	M17	PY	.262	.262	0	0
18	M18	PY	.262	.262	0	0
19	M22	PY	.326	.326	0	0
20	M23	PY	.326	.326	0	0
21	M24	PY	.326	.326	0	0
22	M55	PY	.292	.292	0	0
23	M56	PY	.292	.292	0	0
24	M57	PY	.292	.292	0	0

Member Distributed Loads (BLC 6 : WIND LOAD (ICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M1	PX	.235	.235	0	0
2	M2	PX	.235	.235	0	0
3	M3	PX	.235	.235	0	0
4	M4	PX	.235	.235	0	0
5	M5	PX	.235	.235	0	0
6	M6	PX	.235	.235	0	0
7	M7	PX	.235	.235	0	0
8	M8	PX	.235	.235	0	0
9	M9	PX	.235	.235	0	0
10	M10	PX	.235	.235	0	0
11	M11	PX	.235	.235	0	0
12	M12	PX	.235	.235	0	0
13	M13	PX	.262	.262	0	0
14	M14	PX	.262	.262	0	0
15	M15	PX	.262	.262	0	0
16	M16	PX	.262	.262	0	0
17	M17	PX	.262	.262	0	0
18	M18	PX	.262	.262	0	0
19	M22	PX	.326	.326	0	0
20	M23	PX	.326	.326	0	0
21	M24	PX	.326	.326	0	0
22	M55	PX	.292	.292	0	0
23	M56	PX	.292	.292	0	0
24	M57	PX	.292	.292	0	0

Member Distributed Loads (BLC 8 : WIND LOAD (SERVICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M1	PY	.048	.048	0	0
2	M2	PY	.048	.048	0	0
3	M3	PY	.048	.048	0	0
4	M4	PY	.048	.048	0	0

Member Distributed Loads (BLC 8 : WIND LOAD (SERVICE) FRONT) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
5	M5	PY	.048	.048	0	0
6	M6	PY	.048	.048	0	0
7	M7	PY	.048	.048	0	0
8	M8	PY	.048	.048	0	0
9	M9	PY	.048	.048	0	0
10	M10	PY	.048	.048	0	0
11	M11	PY	.048	.048	0	0
12	M12	PY	.048	.048	0	0
13	M13	PY	.058	.058	0	0
14	M14	PY	.058	.058	0	0
15	M15	PY	.058	.058	0	0
16	M16	PY	.058	.058	0	0
17	M17	PY	.058	.058	0	0
18	M18	PY	.058	.058	0	0
19	M22	PY	.071	.071	0	0
20	M23	PY	.071	.071	0	0
21	M24	PY	.071	.071	0	0
22	M55	PY	.072	.072	0	0
23	M56	PY	.072	.072	0	0
24	M57	PY	.072	.072	0	0

Member Distributed Loads (BLC 9 : WIND LOAD (SERVICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M1	PX	.048	.048	0	0
2	M2	PX	.048	.048	0	0
3	M3	PX	.048	.048	0	0
4	M4	PX	.048	.048	0	0
5	M5	PX	.048	.048	0	0
6	M6	PX	.048	.048	0	0
7	M7	PX	.048	.048	0	0
8	M8	PX	.048	.048	0	0
9	M9	PX	.048	.048	0	0
10	M10	PX	.048	.048	0	0
11	M11	PX	.048	.048	0	0
12	M12	PX	.048	.048	0	0
13	M13	PX	.058	.058	0	0
14	M14	PX	.058	.058	0	0
15	M15	PX	.058	.058	0	0
16	M16	PX	.058	.058	0	0
17	M17	PX	.058	.058	0	0
18	M18	PX	.058	.058	0	0
19	M22	PX	.071	.071	0	0
20	M23	PX	.071	.071	0	0
21	M24	PX	.071	.071	0	0
22	M55	PX	.072	.072	0	0
23	M56	PX	.072	.072	0	0
24	M57	PX	.072	.072	0	0

Member Distributed Loads (BLC 13 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M27	Z	-.082	-.082	10.729	53.645
2	M28	Z	-.082	-.082	10.729	53.645
3	M55	Z	-.042	-.166	0	25.2
4	M55	Z	-.166	-.29	25.2	50.4
5	M25	Z	-.082	-.082	10.729	53.645
6	M26	Z	-.082	-.082	10.729	53.645

Member Distributed Loads (BLC 13 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
7	M56	Z	-.042	-.166	0	25.2
8	M56	Z	-.166	-.29	25.2	50.4
9	M29	Z	-.082	-.082	10.729	53.645
10	M30	Z	-.082	-.082	10.729	53.645
11	M57	Z	-.042	-.166	0	25.2
12	M57	Z	-.166	-.29	25.2	50.4

Member Distributed Loads (BLC 14 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M27	Z	-.243	-.243	10.729	53.645
2	M28	Z	-.243	-.243	10.729	53.645
3	M55	Z	-.122	-.488	0	25.2
4	M55	Z	-.488	-.854	25.2	50.4
5	M25	Z	-.243	-.243	10.729	53.645
6	M26	Z	-.243	-.243	10.729	53.645
7	M56	Z	-.122	-.488	0	25.2
8	M56	Z	-.488	-.854	25.2	50.4
9	M29	Z	-.243	-.243	10.729	53.645
10	M30	Z	-.243	-.243	10.729	53.645
11	M57	Z	-.122	-.488	0	25.2
12	M57	Z	-.488	-.854	25.2	50.4

Member Distributed Loads (BLC 15 : BLC 7 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/in,F,psf]	End Magnitude[l...	Start Location[in,%]	End Location[in,%]
1	M27	Z	-1.884	-1.884	10.729	53.645
2	M28	Z	-1.884	-1.884	10.729	53.645
3	M55	Z	-.948	-3.789	0	25.2
4	M55	Z	-3.789	-6.63	25.2	50.4
5	M25	Z	-1.884	-1.884	10.729	53.645
6	M26	Z	-1.884	-1.884	10.729	53.645
7	M56	Z	-.948	-3.789	0	25.2
8	M56	Z	-3.789	-6.63	25.2	50.4
9	M29	Z	-1.884	-1.884	10.729	53.645
10	M30	Z	-1.884	-1.884	10.729	53.645
11	M57	Z	-.948	-3.789	0	25.2
12	M57	Z	-3.789	-6.63	25.2	50.4

Member Area Loads (BLC 1 : DEAD LOAD)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N34	N37	N57		Z	A-B	-1.75
2	N54	N46	N48		Z	A-B	-1.75
3	N55	N47	N49		Z	A-B	-1.75

Member Area Loads (BLC 2 : DEAD LOAD (ICE))

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N34	N37	N57		Z	A-B	-5.15
2	N54	N46	N48		Z	A-B	-5.15
3	N55	N47	N49		Z	A-B	-5.15

Member Area Loads (BLC 7 : LIVE LOAD (MAN))

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N34	N37	N57		Z	A-B	-40
2	N54	N46	N48		Z	A-B	-40

Member Area Loads (BLC 7 : LIVE LOAD (MAN)) (Continued)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
3	N55	N47	N49		Z	A-B	-40

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N39	m...	1287....	11	3078....	8	2304....	20	-2.116	2	.248	11	1.239	11
2		min	-1287....	5	-3110....	2	922.0...	2	-5.514	20	-.171	5	-1.238	5
3	N71	m...	1861....	10	1915....	9	2296....	16	2.719	26	-1.916	10	1.129	7
4		min	-1834....	4	-1898....	3	955.5...	10	.794	8	-4.786	26	-1.128	13
5	N72	m...	1987....	11	2408....	8	2605....	24	2.861	14	5.244	24	1.697	2
6		min	-2014....	5	-2392....	2	1104....	6	.904	8	1.979	6	-1.698	8
7	Totals:	m...	5083....	11	7388....	8	7098....	14						
8		min	-5083....	5	-7388....	2	3411....	8						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[l...	LC	z Shear[lb]	LC	Torque[k...	LC	y-y Moment[k-ft]	LC	z-z Mom...	LC
1	M1	1	max	0	50	.001	8	.015	23	0	50	0	50	0	50
2			min	0	1	-.012	14	0	5	0	1	0	1	0	1
3		2	max	302.185	2	14.517	8	11.685	11	0	5	.014	11	.031	8
4			min	-243.423	8	-8.101	2	-11.65	5	0	12	-.013	5	-.035	2
5		3	max	0	50	.045	14	-.005	30	0	50	0	50	0	50
6			min	0	1	-.003	8	-.055	23	0	1	0	1	0	1
7	M2	1	max	0	50	.002	8	0	11	0	50	0	50	0	50
8			min	0	1	-.012	14	-.015	17	0	1	0	1	0	1
9		2	max	300.418	2	11.589	20	2.063	23	0	11	.008	5	.05	8
10			min	-245.431	8	3.01	8	-2.268	17	0	5	-.008	11	-.055	2
11		3	max	0	50	.046	14	.053	17	0	50	0	50	0	50
12			min	0	1	-.004	8	.006	11	0	1	0	1	0	1
13	M3	1	max	0	50	.001	8	.015	23	0	50	0	50	0	50
14			min	0	1	-.012	14	0	5	0	1	0	1	0	1
15		2	max	314.577	8	116.217	8	81.93	11	.012	5	.144	11	.187	2
16			min	-231.033	2	-122.657	2	-81.683	5	-.012	11	-.143	5	-.169	8
17		3	max	0	50	.045	14	-.005	30	0	50	0	50	0	50
18			min	0	1	-.003	8	-.055	23	0	1	0	1	0	1
19	M4	1	max	0	50	.002	8	0	11	0	50	0	50	0	50
20			min	0	1	-.012	14	-.015	17	0	1	0	1	0	1
21		2	max	316.583	8	127.76	8	94.916	11	.016	5	.165	11	.207	2
22			min	-229.268	2	-134.64	2	-95.193	5	-.016	11	-.165	5	-.187	8
23		3	max	0	50	.046	14	.053	17	0	50	0	50	0	50
24			min	0	1	-.004	8	.006	11	0	1	0	1	0	1
25	M5	1	max	0	50	.02	20	.006	23	0	50	0	50	0	50
26			min	0	1	-.001	2	-.002	5	0	1	0	1	0	1
27		2	max	466.605	10	30.126	8	32.667	11	.005	13	.016	2	.02	11
28			min	-215.606	4	-37.027	2	-44.718	5	-.005	7	-.024	8	-.016	5
29		3	max	0	50	-.004	2	.005	5	0	50	0	50	0	50
30			min	0	1	-.073	20	-.022	23	0	1	0	1	0	1
31	M6	1	max	0	50	.002	8	.018	23	0	50	0	50	0	50
32			min	0	1	-.006	14	0	5	0	1	0	1	0	1
33		2	max	176.185	10	38.185	2	21.012	5	.005	7	.05	5	.067	8
34			min	-188.331	4	-40.882	8	-25.614	11	-.005	13	-.053	11	-.065	2
35		3	max	0	50	.02	14	-.005	4	0	50	0	50	0	50
36			min	0	1	-.003	8	-.069	22	0	1	0	1	0	1
37	M7	1	max	0	50	.02	20	.006	23	0	50	0	50	0	50
38			min	0	1	-.001	2	-.002	5	0	1	0	1	0	1
39		2	max	417.557	4	166.366	8	140.795	11	.026	13	.231	11	.274	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[l...	LC	z Shear[lb]	LC	Torque[k...	LC	y-y Moment[k-ft]	LC	z-z Mom...	LC
40			min	-264.656	10	-158.858	2	-128.76	5	-.026	7	-.197	5	-.295	8
41		3	max	0	50	-.004	2	.005	5	0	50	0	50	0	50
42			min	0	1	-.073	20	-.022	23	0	1	0	1	0	1
43	M8	1	max	0	50	.002	8	.018	23	0	50	0	50	0	50
44			min	0	1	-.006	14	0	5	0	1	0	1	0	1
45		2	max	217.484	4	106.868	8	91.763	11	.022	13	.14	11	.167	2
46			min	-147.033	10	-104.351	2	-86.968	5	-.022	7	-.127	5	-.174	8
47		3	max	0	50	.02	14	-.005	4	0	50	0	50	0	50
48			min	0	1	-.003	8	-.069	22	0	1	0	1	0	1
49	M9	1	max	0	50	.003	8	0	11	0	50	0	50	0	50
50			min	0	1	-.007	14	-.017	17	0	1	0	1	0	1
51		2	max	329.535	6	13.644	8	25.104	11	.002	9	.018	7	.016	6
52			min	-206.927	12	-18.139	2	-17.423	5	-.002	3	-.014	13	-.013	12
53		3	max	0	50	.024	14	.067	18	0	50	0	50	0	50
54			min	0	1	-.004	8	.005	12	0	1	0	1	0	1
55	M10	1	max	0	50	.017	20	.002	11	0	50	0	50	0	50
56			min	0	1	0	2	-.003	17	0	1	0	1	0	1
57		2	max	179.202	6	21.365	2	12.747	5	.003	3	.033	6	.039	8
58			min	-185.086	12	-23.601	8	-8.824	11	-.003	9	-.03	12	-.038	2
59		3	max	0	50	-.007	13	.011	17	0	50	0	50	0	50
60			min	0	1	-.066	19	-.004	11	0	1	0	1	0	1
61	M11	1	max	0	50	.003	8	0	11	0	50	0	50	0	50
62			min	0	1	-.007	14	-.017	17	0	1	0	1	0	1
63		2	max	321.28	12	130.329	8	96.588	11	.02	9	.144	11	.214	2
64			min	-215.183	6	-126.13	2	-104.614	5	-.02	3	-.166	5	-.226	8
65		3	max	0	50	.024	14	.067	18	0	50	0	50	0	50
66			min	0	1	-.004	8	.005	12	0	1	0	1	0	1
67	M12	1	max	0	50	.017	20	.002	11	0	50	0	50	0	50
68			min	0	1	0	2	-.003	17	0	1	0	1	0	1
69		2	max	214.237	12	89.742	8	74.889	11	.016	9	.107	11	.14	2
70			min	-150.054	6	-87.303	2	-78.744	5	-.016	3	-.118	5	-.146	8
71		3	max	0	50	-.007	13	.011	17	0	50	0	50	0	50
72			min	0	1	-.066	19	-.004	11	0	1	0	1	0	1
73	M13	1	max	0	50	-.006	8	-.005	36	0	50	0	50	0	50
74			min	0	1	-.116	14	-.092	17	0	1	0	1	0	1
75		2	max	54.233	25	45.594	8	45.587	11	0	50	.091	11	.091	2
76			min	26.297	2	-45.641	2	-45.625	5	0	1	-.091	5	-.091	8
77		3	max	0	50	.11	14	.09	23	0	50	0	50	0	50
78			min	0	1	.016	8	.005	30	0	1	0	1	0	1
79	M14	1	max	750	38	.089	8	.549	36	0	50	0	50	0	50
80			min	0	1	-4.431	27	-.07	5	0	1	0	1	0	1
81		2	max	946.697	38	201.389	8	157.33	11	0	50	.315	11	.405	2
82			min	196.697	2	-201.809	2	-157.17	5	0	1	-.314	5	-.403	8
83		3	max	0	50	.128	14	-.007	34	0	50	0	50	0	50
84			min	0	1	.013	8	-.049	16	0	1	0	1	0	1
85	M15	1	max	0	50	.153	8	.822	23	0	50	0	50	0	50
86			min	0	1	-.184	2	.083	5	0	1	0	1	0	1
87		2	max	249.733	25	175.753	8	126.467	11	0	50	.254	11	.352	2
88			min	165.497	2	-175.784	2	-126.017	5	0	1	-.252	5	-.352	8
89		3	max	0	50	.014	28	-.029	29	0	50	0	50	0	50
90			min	0	1	-.002	9	-.169	22	0	1	0	1	0	1
91	M16	1	max	0	50	.1	21	.095	22	0	50	0	50	0	50
92			min	0	1	.016	3	.007	4	0	1	0	1	0	1
93		2	max	54.233	25	45.629	8	45.63	11	0	50	.091	11	.091	2
94			min	26.297	2	-45.583	2	-45.591	5	0	1	-.091	5	-.091	8
95		3	max	0	50	-.018	7	-.01	27	0	50	0	50	0	50
96			min	0	1	-.099	25	-.09	20	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[l...	LC	z Shear[lb]	LC	Torque[k...	LC	y-y Moment[k-ft]	LC	z-z Mom...	LC
97	M17	1	max	0	50	.319	20	.008	12	0	50	0	50	0	50
98			min	0	1	.029	2	-.144	18	0	1	0	1	0	1
99		2	max	123.333	25	110.324	8	73.007	11	0	50	.146	11	.22	2
100			min	68.297	2	-110.171	2	-73.068	5	0	1	-.146	5	-.221	8
101		3	max	0	50	-.026	12	.057	19	0	50	0	50	0	50
102			min	0	1	-.132	18	.007	13	0	1	0	1	0	1
103	M18	1	max	0	50	.151	8	-.057	12	0	50	0	50	0	50
104			min	0	1	-.1	2	-.551	18	0	1	0	1	0	1
105		2	max	211.433	25	175.951	8	99.24	11	0	50	.198	11	.352	2
106			min	131.897	2	-175.9	2	-99.544	5	0	1	-.2	5	-.352	8
107		3	max	0	50	.001	26	.134	19	0	50	0	50	0	50
108			min	0	1	-.025	18	.023	38	0	1	0	1	0	1
109	M19	1	max	241.067	6	-97.8	2	273.936	8	.004	10	.071	2	.367	22
110			min	-240.078	12	-309.865	20	-273.34	2	-.037	16	-.071	8	-.025	4
111		2	max	268.625	10	62.301	12	273.936	8	.04	22	.089	8	.543	22
112			min	-266.211	4	-316.97	20	-273.34	2	-.037	16	-.088	2	.104	3
113		3	max	268.625	10	188.289	21	276.426	2	.04	22	.073	2	.328	20
114			min	-266.211	4	37.23	3	-279.359	8	.008	4	-.073	8	.07	2
115	M20	1	max	341.613	7	-62.138	10	201.741	9	.037	20	.051	4	.335	14
116			min	-339.778	13	-416.897	26	-203.38	3	-.002	26	-.05	10	-.005	26
117		2	max	341.613	7	247.717	15	201.741	9	.037	20	.069	9	.475	18
118			min	-339.778	13	-424.002	26	-203.38	3	-.038	24	-.07	3	.13	10
119		3	max	257.246	2	240.612	15	188.005	5	-.003	6	.049	4	.339	18
120			min	-255.978	8	31.407	26	-186.864	11	-.038	24	-.049	10	.028	12
121	M21	1	max	438.363	3	-65.58	7	199.84	6	.041	15	.052	13	.372	23
122			min	-437.593	9	-266.493	25	-200.517	12	.006	8	-.052	7	.094	5
123		2	max	438.363	3	127.472	12	294.044	13	.041	15	.092	7	.527	23
124			min	-437.593	9	-273.598	25	-292.934	7	-.04	20	-.092	13	.142	6
125		3	max	187.734	10	200.36	24	294.044	13	-.004	2	.078	13	.37	14
126			min	-186.36	4	48.973	6	-292.934	7	-.04	20	-.078	7	.007	8
127	M22	1	max	0	50	.007	13	.001	6	0	50	0	50	0	50
128			min	0	1	-.004	6	0	3	0	1	0	1	0	1
129		2	max	808.891	9	83.892	38	149.159	2	.059	22	.082	3	.542	25
130			min	-827.429	3	-95.79	7	-149.887	8	-.033	29	-.084	9	.226	7
131		3	max	0	50	.004	12	0	4	0	50	0	50	0	50
132			min	0	1	-.008	7	-.001	13	0	1	0	1	0	1
133	M23	1	max	0	50	.008	9	0	2	0	50	0	50	0	50
134			min	0	1	-.005	4	0	11	0	1	0	1	0	1
135		2	max	849.671	7	160.138	9	98.207	11	.019	37	.077	12	.514	26
136			min	-868.436	13	-29.68	3	-98.225	5	-.12	26	-.078	6	.176	9
137		3	max	0	50	.003	10	0	2	0	50	0	50	0	50
138			min	0	1	-.007	3	0	11	0	1	0	1	0	1
139	M24	1	max	0	50	0	50	0	50	0	50	0	50	0	50
140			min	0	1	-375	26	0	1	0	1	0	1	0	1
141		2	max	918.606	2	288.059	30	85.2	7	.065	26	.13	8	.515	23
142			min	-937.073	8	2.494	11	-85.182	13	-.205	27	-.131	2	-.037	30
143		3	max	0	50	0	50	0	50	0	50	0	50	0	50
144			min	0	1	0	1	0	1	0	1	0	1	0	1
145	M25	1	max	1352.824	3	9.786	26	39.766	26	0	26	-.002	2	-.01	10
146			min	-1359.727	9	-2.268	2	3.848	33	0	32	-.039	26	-.042	26
147		2	max	1352.824	3	9.786	26	-3.997	2	0	26	.01	26	-.013	12
148			min	-1359.727	9	-2.268	2	-15.915	26	0	32	-.008	17	-.044	18
149		3	max	1352.824	3	9.786	26	-15.265	2	0	26	-.006	9	-.027	13
150			min	-1359.727	9	-2.268	2	-102.973	26	0	32	-.068	26	-.133	26
151	M26	1	max	1055.776	5	45.355	26	6.961	12	0	25	-.002	7	.06	26
152			min	-1062.824	11	5.076	13	-2.073	6	0	26	-.044	26	.011	10
153		2	max	1055.776	5	-3.295	7	6.961	12	0	25	.009	26	.044	14

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[l...	LC	z Shear[lb]	LC	Torque[k...	LC	y-y Moment[k-ft]	LC	z-z Mom...	LC
154			min	-1062.824	11	-10.326	26	-2.073	6	0	26	-.008	15	.01	8
155		3	max	1055.776	5	-14.564	7	6.961	12	0	25	-.007	11	.123	26
156			min	-1062.824	11	-97.384	26	-2.073	6	0	26	-.065	26	.022	7
157	M27	1	max	1479.936	7	7.914	13	50.606	26	0	4	-.005	5	-.008	2
158			min	-1486.701	13	-3.905	7	4.145	2	0	22	-.042	26	-.053	26
159		2	max	1479.936	7	7.914	13	-.677	8	0	4	.014	26	-.008	26
160			min	-1486.701	13	-3.905	7	-7.874	14	0	22	-.009	21	-.047	22
161		3	max	1479.936	7	7.914	13	-11.946	8	0	4	-.007	13	-.026	6
162			min	-1486.701	13	-3.905	7	-92.133	26	0	22	-.057	26	-.091	26
163	M28	1	max	1478.552	9	47.572	26	8.486	4	0	16	0	10	.042	26
164			min	-1485.098	3	1.172	7	-1.152	10	0	10	-.039	26	.007	3
165		2	max	1478.552	9	-3.754	13	8.486	4	0	16	.016	26	.044	18
166			min	-1485.098	3	-12.586	19	-1.152	10	0	10	-.008	19	.004	26
167		3	max	1478.552	9	-15.023	13	8.486	4	0	16	-.004	3	.094	26
168			min	-1485.098	3	-95.167	26	-1.152	10	0	10	-.058	26	.026	11
169	M29	1	max	1189.406	11	5.23	4	52.367	26	0	8	-.004	9	-.013	6
170			min	-1197.487	5	-3.398	10	6.695	30	0	27	-.042	26	-.053	26
171		2	max	1189.406	11	5.23	4	.165	11	0	8	.016	26	-.003	26
172			min	-1197.487	5	-3.398	10	-4.956	17	0	27	-.007	25	-.039	14
173		3	max	1189.406	11	5.23	4	-11.103	11	0	8	-.007	5	-.016	10
174			min	-1197.487	5	-3.398	10	-90.372	26	0	27	-.054	26	-.081	26
175	M30	1	max	1424.271	13	50.153	26	11.322	8	0	34	-.002	2	.05	26
176			min	-1430.916	7	2.399	8	-7.012	2	0	3	-.041	26	.005	7
177		2	max	1424.271	13	.334	2	11.322	8	0	34	.015	26	.049	21
178			min	-1430.916	7	-9.295	20	-7.012	2	0	3	-.009	24	.005	26
179		3	max	1424.271	13	-10.934	2	11.322	8	0	34	-.005	7	.089	26
180			min	-1430.916	7	-92.587	26	-7.012	2	0	3	-.056	26	.009	2
181	M31	1	max	401.899	8	279.472	20	310.8	11	0	11	.078	5	.07	20
182			min	-401.9	2	101.779	2	-310.8	5	0	5	-.078	11	.025	2
183		2	max	401.899	8	279.472	20	310.8	11	0	11	.039	5	.035	20
184			min	-401.9	2	101.779	2	-310.8	5	0	5	-.039	11	.013	2
185		3	max	401.899	8	279.472	20	310.8	11	0	11	0	50	0	2
186			min	-401.9	2	101.779	2	-310.8	5	0	5	0	1	0	8
187	M32	1	max	82.714	8	299.896	8	48.793	11	.061	5	.012	5	.139	8
188			min	-90.927	2	-246.052	2	-48.71	5	-.061	11	-.012	11	-.14	2
189		2	max	82.714	8	299.896	8	48.793	11	.061	5	.006	5	.101	8
190			min	-90.927	2	-246.052	2	-48.71	5	-.061	11	-.006	11	-.109	2
191		3	max	82.714	8	299.896	8	48.793	11	.061	5	0	12	.064	8
192			min	-90.927	2	-246.052	2	-48.71	5	-.061	11	0	5	-.078	2
193	M33	1	max	94.181	8	301.871	8	61.94	11	.079	5	.016	5	.155	8
194			min	-102.89	2	-244.34	2	-62.038	5	-.079	11	-.016	11	-.156	2
195		2	max	94.181	8	301.871	8	61.94	11	.079	5	.009	5	.117	8
196			min	-102.89	2	-244.34	2	-62.038	5	-.079	11	-.009	11	-.126	2
197		3	max	94.181	8	301.871	8	61.94	11	.079	5	0	5	.079	8
198			min	-102.89	2	-244.34	2	-62.038	5	-.079	11	0	11	-.095	2
199	M34	1	max	507.182	8	382.94	20	378.88	11	.121	11	.173	5	.263	2
200			min	-507.184	2	149.019	2	-378.881	5	-.122	5	-.173	11	-.128	8
201		2	max	507.182	8	382.94	20	378.88	11	.121	11	.126	5	.245	2
202			min	-507.184	2	149.019	2	-378.881	5	-.122	5	-.126	11	-.147	8
203		3	max	507.182	8	382.94	20	378.88	11	.121	11	.078	5	.226	2
204			min	-507.184	2	149.019	2	-378.881	5	-.122	5	-.078	11	-.165	8
205	M35	1	max	414.482	8	335.704	20	275.183	11	.121	11	.121	5	.259	2
206			min	-414.482	2	140.957	2	-275.18	5	-.121	5	-.121	11	-.132	8
207		2	max	414.482	8	335.704	20	275.183	11	.121	11	.087	5	.241	2
208			min	-414.482	2	140.957	2	-275.18	5	-.121	5	-.087	11	-.15	8
209		3	max	414.482	8	335.704	20	275.183	11	.121	11	.052	5	.224	2
210			min	-414.482	2	140.957	2	-275.18	5	-.121	5	-.052	11	-.167	8

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[l...	LC	z Shear[lb]	LC	Torque[k...	LC	y-y Moment[k-ft]	LC	z-z Mom...	LC
211	M36	1	max	265.824	8	357.624	2	160.447	11	.139	11	.04	5	.276	2
212			min	-257.631	2	-187.074	8	-160.53	5	-.139	5	-.04	11	-.247	8
213		2	max	265.824	8	357.624	2	160.447	11	.139	11	.02	5	.231	2
214			min	-257.631	2	-187.074	8	-160.53	5	-.139	5	-.02	11	-.224	8
215		3	max	265.824	8	357.624	2	160.447	11	.139	11	0	5	.187	2
216			min	-257.631	2	-187.074	8	-160.53	5	-.139	5	0	12	-.201	8
217	M37	1	max	347.065	8	363.785	2	251	11	.201	11	.062	5	.333	2
218			min	-338.353	2	-180.943	8	-250.903	5	-.201	5	-.062	11	-.302	8
219		2	max	347.065	8	363.785	2	251	11	.201	11	.03	5	.287	2
220			min	-338.353	2	-180.943	8	-250.903	5	-.201	5	-.03	11	-.28	8
221		3	max	347.065	8	363.785	2	251	11	.201	11	0	11	.242	2
222			min	-338.353	2	-180.943	8	-250.903	5	-.201	5	0	5	-.257	8
223	M38	1	max	793.6	8	1090.349	33	433.6	11	.224	11	.108	5	.398	2
224			min	-793.6	2	337.215	2	-433.6	5	-.223	5	-.108	11	-.227	8
225		2	max	793.6	8	1090.349	33	433.6	11	.224	11	.054	5	.355	2
226			min	-793.6	2	337.215	2	-433.6	5	-.223	5	-.054	11	-.269	8
227		3	max	793.6	8	1090.349	33	433.6	11	.224	11	0	8	.313	2
228			min	-793.6	2	337.215	2	-433.6	5	-.223	5	0	2	-.312	8
229	M39	1	max	596.16	3	682.411	15	798.254	7	.235	7	.2	13	.269	10
230			min	-596.16	9	327.471	9	-798.406	13	-.236	13	-.2	7	-.103	4
231		2	max	596.16	3	682.411	15	798.254	7	.235	7	.1	13	.228	10
232			min	-596.16	9	327.471	9	-798.406	13	-.236	13	-.1	7	-.144	4
233		3	max	596.16	3	682.411	15	798.254	7	.235	7	0	8	.187	10
234			min	-596.16	9	327.471	9	-798.406	13	-.236	13	0	2	-.186	4
235	M40	1	max	101.203	4	402.899	4	122.405	7	.142	13	.026	13	.168	4
236			min	-117.679	10	-279.92	10	-122.135	13	-.143	7	-.026	7	-.17	10
237		2	max	101.203	4	402.899	4	122.405	7	.142	13	.011	13	.117	4
238			min	-117.679	10	-279.92	10	-122.135	13	-.143	7	-.011	7	-.135	10
239		3	max	101.203	4	402.899	4	122.405	7	.142	13	.005	7	.067	4
240			min	-117.679	10	-279.92	10	-122.135	13	-.143	7	-.005	13	-.1	10
241	M41	1	max	57.513	4	202.901	4	68.589	7	.094	13	.022	13	.104	4
242			min	-63.65	10	-161.859	10	-68.673	13	-.094	7	-.022	7	-.106	10
243		2	max	57.513	4	202.901	4	68.589	7	.094	13	.013	13	.079	4
244			min	-63.65	10	-161.859	10	-68.673	13	-.094	7	-.013	7	-.085	10
245		3	max	57.513	4	202.901	4	68.589	7	.094	13	.005	13	.053	4
246			min	-63.65	10	-161.859	10	-68.673	13	-.094	7	-.005	7	-.065	10
247	M42	1	max	481.819	4	370.555	16	544.899	7	.066	7	.256	13	.189	22
248			min	-481.822	10	121.762	10	-544.944	13	-.067	13	-.256	7	-.012	4
249		2	max	481.819	4	370.555	16	544.899	7	.066	7	.188	13	.142	22
250			min	-481.822	10	121.762	10	-544.944	13	-.067	13	-.188	7	-.027	4
251		3	max	481.819	4	370.555	16	544.899	7	.066	7	.12	13	.096	22
252			min	-481.822	10	121.762	10	-544.944	13	-.067	13	-.12	7	-.043	4
253	M43	1	max	386.054	4	500.558	16	448.372	7	.316	7	.208	13	.422	10
254			min	-386.06	10	271.648	10	-448.415	13	-.315	13	-.208	7	-.163	4
255		2	max	386.054	4	500.558	16	448.372	7	.316	7	.152	13	.388	10
256			min	-386.06	10	271.648	10	-448.415	13	-.315	13	-.152	7	-.197	4
257		3	max	386.054	4	500.558	16	448.372	7	.316	7	.096	13	.354	10
258			min	-386.06	10	271.648	10	-448.415	13	-.315	13	-.096	7	-.231	4
259	M44	1	max	218.907	4	522.104	10	259.975	7	.257	7	.07	13	.29	10
260			min	-202.449	10	-159.107	4	-260.381	13	-.256	13	-.07	7	-.229	4
261		2	max	218.907	4	522.104	10	259.975	7	.257	7	.037	13	.225	10
262			min	-202.449	10	-159.107	4	-260.381	13	-.256	13	-.037	7	-.209	4
263		3	max	218.907	4	522.104	10	259.975	7	.257	7	.005	13	.16	10
264			min	-202.449	10	-159.107	4	-260.381	13	-.256	13	-.005	7	-.189	4
265	M45	1	max	358.368	4	290.442	22	410.322	7	.297	7	.098	13	.295	10
266			min	-352.218	10	-108.9	4	-410.381	13	-.297	13	-.098	7	-.27	4
267		2	max	358.368	4	290.442	22	410.322	7	.297	7	.047	13	.263	10

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[l...	LC	z Shear[lb]	LC	Torque[k...	LC	y-y Moment[k-ft]	LC	z-z Mom...	LC
268			min	-352.218	10	-108.9	4	-410.381	13	-.297	13	-.047	7	-.257	4
269		3	max	358.368	4	290.442	22	410.322	7	.297	7	.005	7	.231	10
270			min	-352.218	10	-108.9	4	-410.381	13	-.297	13	-.005	13	-.243	4
271	M46	1	max	441.141	4	336.201	16	504.23	7	0	7	.126	13	.084	16
272			min	-441.141	10	116.165	10	-504.247	13	0	13	-.126	7	.029	10
273		2	max	441.141	4	336.201	16	504.23	7	0	7	.063	13	.042	16
274			min	-441.141	10	116.165	10	-504.247	13	0	13	-.063	7	.015	10
275		3	max	441.141	4	336.201	16	504.23	7	0	7	0	7	0	10
276			min	-441.141	10	116.165	10	-504.247	13	0	13	0	2	0	4
277	M47	1	max	370.268	12	348.592	24	434.424	3	.112	2	.109	9	.116	7
278			min	-370.268	6	143.874	6	-434.406	9	-.112	8	-.109	3	-.043	13
279		2	max	370.268	12	348.592	24	434.424	3	.112	2	.054	9	.098	7
280			min	-370.268	6	143.874	6	-434.406	9	-.112	8	-.054	3	-.062	13
281		3	max	370.268	12	348.592	24	434.424	3	.112	2	0	23	.08	7
282			min	-370.268	6	143.874	6	-434.406	9	-.112	8	0	9	-.08	13
283	M48	1	max	69.764	12	306.67	12	88.14	3	.106	9	.02	9	.122	12
284			min	-80.215	6	-230.142	6	-88.08	9	-.106	3	-.02	3	-.124	6
285		2	max	69.764	12	306.67	12	88.14	3	.106	9	.009	9	.084	12
286			min	-80.215	6	-230.142	6	-88.08	9	-.106	3	-.009	3	-.095	6
287		3	max	69.764	12	306.67	12	88.14	3	.106	9	.002	3	.045	12
288			min	-80.215	6	-230.142	6	-88.08	9	-.106	3	-.002	9	-.066	6
289	M49	1	max	44.274	12	199.651	12	52.624	3	.072	9	.016	9	.085	12
290			min	-49.521	6	-164.799	6	-52.676	9	-.072	3	-.016	3	-.087	6
291		2	max	44.274	12	199.651	12	52.624	3	.072	9	.01	9	.06	12
292			min	-49.521	6	-164.799	6	-52.676	9	-.072	3	-.01	3	-.066	6
293		3	max	44.274	12	199.651	12	52.624	3	.072	9	.003	9	.035	12
294			min	-49.521	6	-164.799	6	-52.676	9	-.072	3	-.003	3	-.046	6
295	M50	1	max	374.25	12	313.765	24	419.8	3	.066	3	.193	9	.16	18
296			min	-374.254	6	107.653	6	-419.79	9	-.066	9	-.193	3	-.019	12
297		2	max	374.25	12	313.765	24	419.8	3	.066	3	.141	9	.121	18
298			min	-374.254	6	107.653	6	-419.79	9	-.066	9	-.141	3	-.033	12
299		3	max	374.25	12	313.765	24	419.8	3	.066	3	.088	9	.086	6
300			min	-374.254	6	107.653	6	-419.79	9	-.066	9	-.088	3	-.046	12
301	M51	1	max	334.546	12	386.711	24	396.714	3	.212	3	.182	9	.274	6
302			min	-334.551	6	184.417	6	-396.687	9	-.211	9	-.182	3	-.103	12
303		2	max	334.546	12	386.711	24	396.714	3	.212	3	.132	9	.251	6
304			min	-334.551	6	184.417	6	-396.687	9	-.211	9	-.132	3	-.126	12
305		3	max	334.546	12	386.711	24	396.714	3	.212	3	.083	9	.228	6
306			min	-334.551	6	184.417	6	-396.687	9	-.211	9	-.083	3	-.15	12
307	M52	1	max	198.846	12	385.297	6	242.661	3	.218	3	.062	9	.232	6
308			min	-188.394	6	-150.363	12	-242.632	9	-.218	9	-.062	3	-.193	12
309		2	max	198.846	12	385.297	6	242.661	3	.218	3	.032	9	.184	6
310			min	-188.394	6	-150.363	12	-242.632	9	-.218	9	-.032	3	-.174	12
311		3	max	198.846	12	385.297	6	242.661	3	.218	3	.002	9	.136	6
312			min	-188.394	6	-150.363	12	-242.632	9	-.218	9	-.002	3	-.155	12
313	M53	1	max	264.027	12	245.231	18	301.265	3	.222	3	.072	9	.228	6
314			min	-258.785	6	-120.221	12	-301.141	9	-.222	9	-.072	3	-.207	12
315		2	max	264.027	12	245.231	18	301.265	3	.222	3	.034	9	.198	6
316			min	-258.785	6	-120.221	12	-301.141	9	-.222	9	-.034	3	-.192	12
317		3	max	264.027	12	245.231	18	301.265	3	.222	3	.003	3	.167	6
318			min	-258.785	6	-120.221	12	-301.141	9	-.222	9	-.003	9	-.177	12
319	M54	1	max	495.313	13	580.259	25	670.023	3	.226	2	.167	9	.229	7
320			min	-495.314	7	273.77	7	-669.993	9	-.226	8	-.168	3	-.09	13
321		2	max	495.313	13	580.259	25	670.023	3	.226	2	.084	9	.194	7
322			min	-495.314	7	273.77	7	-669.993	9	-.226	8	-.084	3	-.125	13
323		3	max	495.313	13	580.259	25	670.023	3	.226	2	0	12	.16	7
324			min	-495.314	7	273.77	7	-669.993	9	-.226	8	0	10	-.159	13

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[l...	LC	z Shear[lb]	LC	Torque[k...	LC	y-y Moment[k-ft]	LC	z-z Mom...	LC
325	M55	1	max	2996.313	2	-163.757	2	48.536	11	.072	4	.038	11	-.06	11
326			min	-2994.329	8	-519.466	20	-52.714	5	-.208	10	-.026	5	-.139	26
327		2	max	3001.237	2	-207.802	2	6.568	11	.072	4	.117	11	1.333	20
328			min	-2999.253	8	-604.477	20	-10.746	5	-.208	10	-.116	5	.419	2
329		3	max	3110.962	2	-925.14	2	1287.954	5	.171	5	1.238	5	5.514	20
330			min	-3078.526	8	-2302.301	20	-1287.481	11	-.248	11	-1.239	11	2.116	2
331	M56	1	max	2167.869	10	-158.815	10	54.756	7	.144	13	.036	7	-.06	3
332			min	-2164.389	4	-547.544	26	-55.248	13	-.188	7	-.035	13	-.137	26
333		2	max	2194.704	10	-202.86	10	21.141	7	.144	13	.142	7	1.484	26
334			min	-2191.224	4	-720.298	26	-21.634	13	-.188	7	-.142	13	.406	10
335		3	max	2320.924	10	-957.817	10	1382.93	13	.484	27	1.128	13	5.504	26
336			min	-2289.061	4	-2294.825	16	-1383.591	7	-.378	7	-1.129	7	2.115	10
337	M57	1	max	2396.265	6	-142.775	6	66.908	3	.152	9	.035	3	-.058	7
338			min	-2388.975	12	-495.354	24	-67.713	9	-.13	3	-.033	9	-.144	26
339		2	max	2423.393	6	-187.68	6	33	3	.152	9	.173	3	1.252	24
340			min	-2416.103	12	-581.607	24	-33.805	9	-.13	3	-.173	9	.369	6
341		3	max	2513.516	6	-1107.001	6	1903.893	9	.338	9	1.698	8	5.958	24
342			min	-2482.154	12	-2603.928	24	-1903.046	3	-1.002	28	-1.697	2	2.227	6
343	M58	1	max	381.853	10	-247.437	3	1336.431	13	.112	11	.425	7	.138	26
344			min	-393.486	4	-735.992	21	-1317.253	7	-.049	5	-.422	13	-.085	12
345		2	max	759.333	12	452.305	26	87.66	11	.147	12	.369	12	2.176	20
346			min	-763.697	6	-797.868	21	-71.77	6	-.077	5	-.356	6	.755	27
347		3	max	505.551	6	676.955	18	1296.323	9	.123	12	.433	8	.21	9
348			min	-515.137	12	203.984	38	-1313.091	3	-.098	6	-.427	2	-.112	3
349	M59	1	max	277.083	6	-254.359	11	1279.611	9	.133	7	.458	3	.213	27
350			min	-287.921	12	-680.935	17	-1261.631	3	-.068	13	-.454	9	-.11	8
351		2	max	818.775	8	817.543	14	155.777	8	.14	7	.477	8	2.201	17
352			min	-821.637	2	-578.805	30	-77.364	13	-.096	13	-.465	2	.902	11
353		3	max	512.845	2	752.612	14	939.631	5	.116	7	.284	4	.195	7
354			min	-523.484	8	287.426	8	-956.856	11	-.096	13	-.281	10	-.185	13
355	M60	1	max	719.204	2	-348.15	8	1168.204	5	.116	28	.513	11	.142	9
356			min	-729.562	8	-917.418	14	-1151.689	11	-.183	21	-.512	5	-.212	3
357		2	max	1174.709	8	952.814	35	203.595	3	.122	2	.468	4	2.536	23
358			min	-1177.957	2	-977.904	14	-133.327	11	-.234	21	-.458	10	1.038	6
359		3	max	523.823	9	901.824	35	1206.803	13	.102	2	.179	13	.276	2
360			min	-534.582	3	335.363	4	-1224.139	7	-.165	8	-.176	7	-.266	8

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	0	50	0	8	0	23	0	50	0	50	0	50	0	50
2			min	0	1	0	14	0	5	0	1	0	1	0	1	0	1
3		2	max	.296	2	.028	8	.023	11	.803	2	.705	8	.31	11	.305	5
4			min	-.239	8	-.016	2	-.023	5	-.705	8	-.803	2	-.305	5	-.31	11
5		3	max	0	50	0	14	0	30	0	50	0	50	0	50	0	50
6			min	0	1	0	8	0	23	0	1	0	1	0	1	0	1
7	M2	1	max	0	50	0	8	0	11	0	50	0	50	0	50	0	50
8			min	0	1	0	14	0	17	0	1	0	1	0	1	0	1
9		2	max	.295	2	.023	20	.004	23	1.241	2	1.135	8	.177	5	.183	11
10			min	-.241	8	.006	8	-.004	17	-1.135	8	-1.241	2	-.183	11	-.177	5
11		3	max	0	50	0	14	0	17	0	50	0	50	0	50	0	50
12			min	0	1	0	8	0	11	0	1	0	1	0	1	0	1
13	M3	1	max	0	50	0	8	0	23	0	50	0	50	0	50	0	50
14			min	0	1	0	14	0	5	0	1	0	1	0	1	0	1
15		2	max	.308	8	.228	8	.161	11	3.839	8	4.245	2	3.265	11	3.252	5
16			min	-.227	2	-.241	2	-.16	5	-4.245	2	-3.839	8	-3.252	5	-3.265	11

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
17		3	max	0	50	0	14	0	30	0	50	0	50	0	50	0	50
18			min	0	1	0	8	0	23	0	1	0	1	0	1	0	1
19	M4	1	max	0	50	0	8	0	11	0	50	0	50	0	50	0	50
20			min	0	1	0	14	0	17	0	1	0	1	0	1	0	1
21		2	max	.31	8	.251	8	.186	11	4.26	8	4.694	2	3.739	11	3.755	5
22			min	-.225	2	-.264	2	-.187	5	-4.694	2	-4.26	8	-3.755	5	-3.739	11
23		3	max	0	50	0	14	0	17	0	50	0	50	0	50	0	50
24			min	0	1	0	8	0	11	0	1	0	1	0	1	0	1
25	M5	1	max	0	50	0	20	0	23	0	50	0	50	0	50	0	50
26			min	0	1	0	2	0	5	0	1	0	1	0	1	0	1
27		2	max	.457	10	.059	8	.064	11	.371	5	.452	11	.369	2	.534	8
28			min	-.211	4	-.073	2	-.088	5	-.452	11	-.371	5	-.534	8	-.369	2
29		3	max	0	50	0	2	0	5	0	50	0	50	0	50	0	50
30			min	0	1	0	20	0	23	0	1	0	1	0	1	0	1
31	M6	1	max	0	50	0	8	0	23	0	50	0	50	0	50	0	50
32			min	0	1	0	14	0	5	0	1	0	1	0	1	0	1
33		2	max	.173	10	.075	2	.041	5	1.482	2	1.533	8	1.133	5	1.21	11
34			min	-.185	4	-.08	8	-.05	11	-1.533	8	-1.482	2	-1.21	11	-1.133	5
35		3	max	0	50	0	14	0	4	0	50	0	50	0	50	0	50
36			min	0	1	0	8	0	22	0	1	0	1	0	1	0	1
37	M7	1	max	0	50	0	20	0	23	0	50	0	50	0	50	0	50
38			min	0	1	0	2	0	5	0	1	0	1	0	1	0	1
39		2	max	.409	4	.326	8	.276	11	6.695	8	6.219	2	5.257	11	4.483	5
40			min	-.259	10	-.311	2	-.252	5	-6.219	2	-6.695	8	-4.483	5	-5.257	11
41		3	max	0	50	0	2	0	5	0	50	0	50	0	50	0	50
42			min	0	1	0	20	0	23	0	1	0	1	0	1	0	1
43	M8	1	max	0	50	0	8	0	23	0	50	0	50	0	50	0	50
44			min	0	1	0	14	0	5	0	1	0	1	0	1	0	1
45		2	max	.213	4	.21	8	.18	11	3.957	8	3.803	2	3.171	11	2.879	5
46			min	-.144	10	-.205	2	-.171	5	-3.803	2	-3.957	8	-2.879	5	-3.171	11
47		3	max	0	50	0	14	0	4	0	50	0	50	0	50	0	50
48			min	0	1	0	8	0	22	0	1	0	1	0	1	0	1
49	M9	1	max	0	50	0	8	0	11	0	50	0	50	0	50	0	50
50			min	0	1	0	14	0	17	0	1	0	1	0	1	0	1
51		2	max	.323	6	.027	8	.049	11	.301	12	.371	6	.414	7	.309	13
52			min	-.203	12	-.036	2	-.034	5	-.371	6	-.301	12	-.309	13	-.414	7
53		3	max	0	50	0	14	0	18	0	50	0	50	0	50	0	50
54			min	0	1	0	8	0	12	0	1	0	1	0	1	0	1
55	M10	1	max	0	50	0	20	0	11	0	50	0	50	0	50	0	50
56			min	0	1	0	2	0	17	0	1	0	1	0	1	0	1
57		2	max	.176	6	.042	2	.025	5	.861	2	.897	8	.759	6	.69	12
58			min	-.181	12	-.046	8	-.017	11	-.897	8	-.861	2	-.69	12	-.759	6
59		3	max	0	50	0	13	0	17	0	50	0	50	0	50	0	50
60			min	0	1	0	19	0	11	0	1	0	1	0	1	0	1
61	M11	1	max	0	50	0	8	0	11	0	50	0	50	0	50	0	50
62			min	0	1	0	14	0	17	0	1	0	1	0	1	0	1
63		2	max	.315	12	.256	8	.189	11	5.132	8	4.864	2	3.273	11	3.781	5
64			min	-.211	6	-.247	2	-.205	5	-4.864	2	-5.132	8	-3.781	5	-3.273	11
65		3	max	0	50	0	14	0	18	0	50	0	50	0	50	0	50
66			min	0	1	0	8	0	12	0	1	0	1	0	1	0	1
67	M12	1	max	0	50	0	20	0	11	0	50	0	50	0	50	0	50
68			min	0	1	0	2	0	17	0	1	0	1	0	1	0	1
69		2	max	.21	12	.176	8	.147	11	3.324	8	3.176	2	2.443	11	2.679	5
70			min	-.147	6	-.171	2	-.154	5	-3.176	2	-3.324	8	-2.679	5	-2.443	11
71		3	max	0	50	0	13	0	17	0	50	0	50	0	50	0	50
72			min	0	1	0	19	0	11	0	1	0	1	0	1	0	1
73	M13	1	max	0	50	0	8	0	36	0	50	0	50	0	50	0	50

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
74			min	0	1	0	14	0	17	0	1	0	1	0	1	0	1
75		2	max	.034	25	.057	8	.057	11	1.085	8	1.087	2	1.084	11	1.086	5
76			min	.016	2	-.057	2	-.057	5	-1.087	2	-1.085	8	-1.086	5	-1.084	11
77		3	max	0	50	0	14	0	23	0	50	0	50	0	50	0	50
78			min	0	1	0	8	0	30	0	1	0	1	0	1	0	1
79	M14	1	max	.466	38	0	8	0	36	0	50	0	50	0	50	0	50
80			min	0	1	-.006	27	0	5	0	1	0	1	0	1	0	1
81		2	max	.588	38	.25	8	.195	11	4.794	8	4.814	2	3.749	11	3.741	5
82			min	.122	2	-.251	2	-.195	5	-4.814	2	-4.794	8	-3.741	5	-3.749	11
83		3	max	0	50	0	14	0	34	0	50	0	50	0	50	0	50
84			min	0	1	0	8	0	16	0	1	0	1	0	1	0	1
85	M15	1	max	0	50	0	8	.001	23	0	50	0	50	0	50	0	50
86			min	0	1	0	2	0	5	0	1	0	1	0	1	0	1
87		2	max	.155	25	.218	8	.157	11	4.185	8	4.187	2	3.018	11	2.996	5
88			min	.103	2	-.218	2	-.157	5	-4.187	2	-4.185	8	-2.996	5	-3.018	11
89		3	max	0	50	0	28	0	29	0	50	0	50	0	50	0	50
90			min	0	1	0	9	0	22	0	1	0	1	0	1	0	1
91	M16	1	max	0	50	0	21	0	22	0	50	0	50	0	50	0	50
92			min	0	1	0	3	0	4	0	1	0	1	0	1	0	1
93		2	max	.034	25	.057	8	.057	11	1.086	8	1.084	2	1.086	11	1.085	5
94			min	.016	2	-.057	2	-.057	5	-1.084	2	-1.086	8	-1.085	5	-1.086	11
95		3	max	0	50	0	7	0	27	0	50	0	50	0	50	0	50
96			min	0	1	0	25	0	20	0	1	0	1	0	1	0	1
97	M17	1	max	0	50	0	20	0	12	0	50	0	50	0	50	0	50
98			min	0	1	0	2	0	18	0	1	0	1	0	1	0	1
99		2	max	.077	25	.137	8	.091	11	2.628	8	2.621	2	1.737	11	1.74	5
100			min	.042	2	-.137	2	-.091	5	-2.621	2	-2.628	8	-1.74	5	-1.737	11
101		3	max	0	50	0	12	0	19	0	50	0	50	0	50	0	50
102			min	0	1	0	18	0	13	0	1	0	1	0	1	0	1
103	M18	1	max	0	50	0	8	0	12	0	50	0	50	0	50	0	50
104			min	0	1	0	2	0	18	0	1	0	1	0	1	0	1
105		2	max	.131	25	.219	8	.123	11	4.19	8	4.188	2	2.36	11	2.374	5
106			min	.082	2	-.219	2	-.124	5	-4.188	2	-4.19	8	-2.374	5	-2.36	11
107		3	max	0	50	0	26	0	19	0	50	0	50	0	50	0	50
108			min	0	1	0	18	0	38	0	1	0	1	0	1	0	1
109	M19	1	max	.08	6	-.049	2	.137	8	.102	4	1.469	22	3.413	2	3.432	8
110			min	-.08	12	-.155	20	-.137	2	-1.469	22	-.102	4	-3.432	8	-3.413	2
111		2	max	.09	10	.031	12	.137	8	-.417	3	2.17	22	4.252	8	4.204	2
112			min	-.089	4	-.158	20	-.137	2	-2.17	22	.417	3	-4.204	2	-4.252	8
113		3	max	.09	10	.094	21	.138	2	-.278	2	1.311	20	3.492	2	3.526	8
114			min	-.089	4	.019	3	-.14	8	-1.311	20	.278	2	-3.526	8	-3.492	2
115	M20	1	max	.114	7	-.031	10	.101	9	.02	26	1.34	14	2.427	4	2.402	10
116			min	-.113	13	-.208	26	-.102	3	-1.34	14	-.02	26	-2.402	10	-2.427	4
117		2	max	.114	7	.124	15	.101	9	-.522	10	1.899	18	3.332	9	3.353	3
118			min	-.113	13	-.212	26	-.102	3	-1.899	18	.522	10	-3.353	3	-3.332	9
119		3	max	.086	2	.12	15	.094	5	-.111	12	1.355	18	2.352	4	2.333	10
120			min	-.085	8	.016	26	-.093	11	-1.355	18	.111	12	-2.333	10	-2.352	4
121	M21	1	max	.146	3	-.033	7	.1	6	-.378	5	1.486	23	2.514	13	2.504	7
122			min	-.146	9	-.133	25	-.1	12	-1.486	23	.378	5	-2.504	7	-2.514	13
123		2	max	.146	3	.064	12	.147	13	-.568	6	2.107	23	4.425	7	4.437	13
124			min	-.146	9	-.137	25	-.146	7	-2.107	23	.568	6	-4.437	13	-4.425	7
125		3	max	.063	10	.1	24	.147	13	-.028	8	1.481	14	3.749	13	3.73	7
126			min	-.062	4	.024	6	-.146	7	-1.481	14	.028	8	-3.73	7	-3.749	13
127	M22	1	max	0	50	0	13	0	12	0	50	0	50	0	50	0	50
128			min	0	1	0	6	0	3	0	1	0	1	0	1	0	1
129		2	max	.391	9	.081	38	.144	2	-1.666	7	3.995	25	.606	3	.617	9
130			min	-.4	3	-.093	7	-.145	8	-3.995	25	1.666	7	-.617	9	-.606	3

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
131		3	max	0	50	0	12	0	10	0	50	0	50	0	50	0	50
132			min	0	1	0	7	0	7	0	1	0	1	0	1	0	1
133	M23	1	max	0	50	0	9	0	8	0	50	0	50	0	50	0	50
134			min	0	1	0	4	0	5	0	1	0	1	0	1	0	1
135		2	max	.41	7	.155	9	.095	11	-1.295	9	3.786	26	.566	12	.576	6
136			min	-.42	13	-.029	3	-.095	5	-3.786	26	1.295	9	-.576	6	-.566	12
137		3	max	0	50	0	10	0	8	0	50	0	50	0	50	0	50
138			min	0	1	0	3	0	5	0	1	0	1	0	1	0	1
139	M24	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
140			min	0	1	-.362	26	0	1	0	1	0	1	0	1	0	1
141		2	max	.444	2	.278	30	.082	7	.276	30	3.792	23	.957	8	.968	2
142			min	-.453	8	.002	11	-.082	13	-3.792	23	-.276	30	-.968	2	-.957	8
143		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
144			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
145	M25	1	max	1.433	3	.023	26	.095	26	1.213	26	-.286	10	-.129	2	2.728	26
146			min	-1.44	9	-.005	2	.009	33	.286	10	-1.213	26	-2.219	26	.158	2
147		2	max	1.433	3	.023	26	-.01	2	1.264	18	-.373	12	.595	26	.575	17
148			min	-1.44	9	-.005	2	-.038	26	.373	12	-1.264	18	-.467	17	-.732	26
149		3	max	1.433	3	.023	26	-.037	2	3.847	26	-.768	13	-.351	9	4.789	26
150			min	-1.44	9	-.005	2	-.247	26	.768	13	-3.847	26	-3.894	26	.431	9
151	M26	1	max	1.118	5	.109	26	.017	12	-.304	10	1.727	26	-.107	7	3.084	26
152			min	-1.126	11	.012	13	-.005	6	-1.727	26	.304	10	-2.508	26	.132	7
153		2	max	1.118	5	-.008	7	.017	12	-.288	8	1.28	14	.531	26	.581	15
154			min	-1.126	11	-.025	26	-.005	6	-1.28	14	.288	8	-.472	15	-.653	26
155		3	max	1.118	5	-.035	7	.017	12	-.627	7	3.567	26	-.419	11	4.592	26
156			min	-1.126	11	-.234	26	-.005	6	-3.567	26	.627	7	-3.734	26	.515	11
157	M27	1	max	1.568	7	.019	13	.121	26	1.545	26	-.217	2	-.264	5	2.973	26
158			min	-1.575	13	-.009	7	.01	2	.217	2	-1.545	26	-2.417	26	.325	5
159		2	max	1.568	7	.019	13	-.002	8	1.369	22	-.241	26	.82	26	.655	21
160			min	-1.575	13	-.009	7	-.019	14	.241	26	-1.369	22	-.532	21	-1.008	26
161		3	max	1.568	7	.019	13	-.029	8	2.627	26	-.741	6	-.378	13	3.992	26
162			min	-1.575	13	-.009	7	-.221	26	.741	6	-2.627	26	-3.246	26	.465	13
163	M28	1	max	1.566	9	.114	26	.02	4	-.216	3	1.2	26	.004	10	2.737	26
164			min	-1.573	3	.003	7	-.003	10	-1.2	26	.216	3	-2.225	26	-.004	10
165		2	max	1.566	9	-.009	13	.02	4	-.112	26	1.267	18	.889	26	.58	19
166			min	-1.573	3	-.03	19	-.003	10	-1.267	18	.112	26	-.472	19	-1.093	26
167		3	max	1.566	9	-.036	13	.02	4	-.766	11	2.712	26	-.256	3	4.057	26
168			min	-1.573	3	-.228	26	-.003	10	-2.712	26	.766	11	-3.299	26	.314	3
169	M29	1	max	1.26	11	.013	4	.126	26	1.519	26	-.369	6	-.234	9	2.953	26
170			min	-1.269	5	-.008	10	.016	30	.369	6	-1.519	26	-2.401	26	.288	9
171		2	max	1.26	11	.013	4	0	11	1.14	14	-.087	26	.9	26	.501	25
172			min	-1.269	5	-.008	10	-.012	17	.087	26	-1.14	14	-.407	25	-1.107	26
173		3	max	1.26	11	.013	4	-.027	11	2.344	26	-.469	10	-.393	5	3.814	26
174			min	-1.269	5	-.008	10	-.217	26	.469	10	-2.344	26	-3.101	26	.484	5
175	M30	1	max	1.509	13	.12	26	.027	8	-.134	7	1.431	26	-.111	2	2.889	26
176			min	-1.516	7	.006	8	-.017	2	-1.431	26	.134	7	-2.349	26	.136	2
177		2	max	1.509	13	0	2	.027	8	-.157	26	1.423	21	.865	26	.663	24
178			min	-1.516	7	-.022	20	-.017	2	-1.423	21	.157	26	-.539	24	-1.063	26
179		3	max	1.509	13	-.026	2	.027	8	-.27	2	2.573	26	-.281	7	3.965	26
180			min	-1.516	7	-.222	26	-.017	2	-2.573	26	.27	2	-3.224	26	.346	7
181	M31	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
182			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
183		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
184			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
185		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
186			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
187	M32	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
188			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
189		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
190			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
191		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
192			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
193	M33	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
194			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
195		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
196			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
197		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
198			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
199	M34	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
200			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
201		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
202			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
203		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
204			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
205	M35	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
206			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
207		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
208			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
209		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
210			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
211	M36	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
212			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
213		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
214			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
215		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
216			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
217	M37	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
218			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
219		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
220			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
221		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
222			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
223	M38	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
224			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
225		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
226			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
227		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
228			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
229	M39	1	max	0	3	0	50	0	50	0	50	0	50	0	50	0	50
230			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
231		2	max	0	3	0	50	0	50	0	50	0	50	0	50	0	50
232			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
233		3	max	0	3	0	50	0	50	0	50	0	50	0	50	0	50
234			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
235	M40	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
236			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
237		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
238			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
239		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
240			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
241	M41	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
242			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
243		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
244			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
245		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
246			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
247	M42	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
248			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
249		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
250			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
251		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
252			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
253	M43	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
254			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
255		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
256			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
257		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
258			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
259	M44	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
260			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
261		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
262			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
263		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
264			min	0	9	0	1	0	1	0	1	0	1	0	1	0	1
265	M45	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
266			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
267		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
268			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
269		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
270			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
271	M46	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
272			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
273		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
274			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
275		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
276			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1
277	M47	1	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
278			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
279		2	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
280			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
281		3	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
282			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
283	M48	1	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
284			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
285		2	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
286			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
287		3	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
288			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
289	M49	1	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
290			min	0	5	0	1	0	1	0	1	0	1	0	1	0	1
291		2	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
292			min	0	5	0	1	0	1	0	1	0	1	0	1	0	1
293		3	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
294			min	0	5	0	1	0	1	0	1	0	1	0	1	0	1
295	M50	1	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
296			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
297		2	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
298			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
299		3	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
300			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
301	M51	1	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
302			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
303		2	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
304			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
305		3	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
306			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
307	M52	1	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
308			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
309		2	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
310			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
311		3	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
312			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
313	M53	1	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
314			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
315		2	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
316			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
317		3	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
318			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
319	M54	1	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
320			min	0	7	0	1	0	1	0	1	0	1	0	1	0	1
321		2	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
322			min	0	7	0	1	0	1	0	1	0	1	0	1	0	1
323		3	max	0	13	0	50	0	50	0	50	0	50	0	50	0	50
324			min	0	7	0	1	0	1	0	1	0	1	0	1	0	1
325	M55	1	max	.889	2	-.106	2	.032	11	.426	26	-.184	11	.117	11	.081	5
326			min	-.889	8	-.338	20	-.034	5	.184	11	-.426	26	-.081	5	-.117	11
327		2	max	.891	2	-.135	2	.004	11	-1.29	2	4.1	20	.359	11	.357	5
328			min	-.89	8	-.393	20	-.007	5	-4.1	20	1.29	2	-.357	5	-.359	11
329		3	max	.923	2	-.601	2	.837	5	-6.511	2	16.967	20	3.808	5	3.811	11
330			min	-.914	8	-1.497	20	-.837	11	-16.967	20	6.511	2	-3.811	11	-3.808	5
331	M56	1	max	.643	10	-.103	10	.036	7	.423	26	-.185	3	.112	7	.108	13
332			min	-.642	4	-.356	26	-.036	13	.185	3	-.423	26	-.108	13	-.112	7
333		2	max	.651	10	-.132	10	.014	7	-1.249	10	4.567	26	.437	7	.437	13
334			min	-.65	4	-.468	26	-.014	13	-4.567	26	1.249	10	-.437	13	-.437	7
335		3	max	.689	10	-.623	10	.899	13	-6.507	10	16.935	26	3.472	13	3.474	7
336			min	-.679	4	-1.492	16	-.899	7	-16.935	26	6.507	10	-3.474	7	-3.472	13
337	M57	1	max	.711	6	-.093	6	.043	3	.444	26	-.178	7	.109	3	.101	9
338			min	-.709	12	-.322	24	-.044	9	.178	7	-.444	26	-.101	9	-.109	3
339		2	max	.719	6	-.122	6	.021	3	-1.134	6	3.853	24	.533	3	.532	9
340			min	-.717	12	-.378	24	-.022	9	-3.853	24	1.134	6	-.532	9	-.533	3
341		3	max	.746	6	-.72	6	1.238	9	-6.852	6	18.332	24	5.226	8	5.223	2
342			min	-.737	12	-1.693	24	-1.237	3	-18.332	24	6.852	6	-5.223	2	-5.226	8
343	M58	1	max	.113	10	-.161	3	.869	13	.261	12	.424	26	1.308	7	1.297	13
344			min	-.117	4	-.478	21	-.856	7	-.424	26	-.261	12	-1.297	13	-1.308	7
345		2	max	.225	12	.294	26	.057	11	-2.322	27	6.697	20	1.136	12	1.095	6
346			min	-.227	6	-.519	21	-.047	6	-6.697	20	2.322	27	-1.095	6	-1.136	12
347		3	max	.15	6	.44	18	.843	9	.343	3	.647	9	1.331	8	1.315	2
348			min	-.153	12	.133	38	-.854	3	-.647	9	-.343	3	-1.315	2	-1.331	8
349	M59	1	max	.082	6	-.165	11	.832	9	.338	8	.657	27	1.408	3	1.396	9
350			min	-.085	12	-.443	17	-.82	3	-.657	27	-.338	8	-1.396	9	-1.408	3
351		2	max	.243	8	.531	14	.101	8	-2.774	11	6.773	17	1.467	8	1.431	2
352			min	-.244	2	-.376	30	-.05	13	-6.773	17	2.774	11	-1.431	2	-1.467	8
353		3	max	.152	2	.489	14	.611	5	.569	13	.599	7	.875	4	.865	10
354			min	-.155	8	.187	8	-.622	11	-.599	7	-.569	13	-.865	10	-.875	4
355	M60	1	max	.213	2	-.226	8	.759	5	.652	3	.436	9	1.579	11	1.575	5
356			min	-.216	8	-.596	14	-.749	11	-.436	9	-.652	3	-1.575	5	-1.579	11
357		2	max	.349	8	.619	35	.132	3	-3.193	6	7.804	23	1.439	4	1.411	10
358			min	-.35	2	-.636	14	-.087	11	-7.804	23	3.193	6	-1.411	10	-1.439	4

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[...	LC	z Shear[...	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
359		3	max	.155	9	.586	35	.785	13	.817	8	.851	2	.552	13	.542	7
360			min	-.159	3	.218	4	-.796	7	-.851	2	-.817	8	-.542	7	-.552	13

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shea...	Loc.....		L...	phi*Pn...	phi*Pn...	phi*M...	phi*M...	...	Eqn
1	M1	PIPE_2.0	.126	60	2	.026	60		8	11014....	32130	1.872	1.872	3...	H1-1b
2	M2	PIPE_2.0	.156	60	2	.034	60		8	11014....	32130	1.872	1.872	3...	H1-1b
3	M3	PIPE_2.0	.143	60	2	.044	48		10	30475....	32130	1.872	1.872	1...	H1-1b
4	M4	PIPE_2.0	.174	60	2	.066	48		5	30475....	32130	1.872	1.872	1...	H1-1b
5	M5	PIPE_2.0	.165	60	8	.030	60		2	11014....	32130	1.872	1.872	4...	H1-1b
6	M6	PIPE_2.0	.182	60	8	.046	60		2	11014....	32130	1.872	1.872	3...	H1-1b
7	M7	PIPE_2.0	.210	48	8	.072	48		2	16811....	32130	1.872	1.872	2...	H1-1b
8	M8	PIPE_2.0	.168	60	8	.105	48		13	30475....	32130	1.872	1.872	2...	H1-1b
9	M9	PIPE_2.0	.142	60	8	.027	60		2	11014....	32130	1.872	1.872	4...	H1-1b
10	M10	PIPE_2.0	.138	60	8	.033	60		2	11014....	32130	1.872	1.872	3...	H1-1b
11	M11	PIPE_2.0	.162	48	8	.067	48		2	16811....	32130	1.872	1.872	2...	H1-1b
12	M12	PIPE_2.0	.126	60	7	.078	48		3	30475....	32130	1.872	1.872	2...	H1-1b
13	M13	PIPE_2.5	.026	48	3	.003	48		3	28468....	50715	3.596	3.596	1...	H1-1b
14	M14	PIPE_2.5	.116	48	2	.013	48		2	28468....	50715	3.596	3.596	1...	H1-1b
15	M15	PIPE_2.5	.101	48	2	.012	48		2	28468....	50715	3.596	3.596	1...	H1-1b
16	M16	PIPE_2.5	.026	48	10	.003	48		10	28468....	50715	3.596	3.596	2...	H1-1b
17	M17	PIPE_2.5	.063	48	8	.007	48		8	28468....	50715	3.596	3.596	2...	H1-1b
18	M18	PIPE_2.5	.100	48	8	.012	48		8	28468....	50715	3.596	3.596	2...	H1-1b
19	M19	PL6"x1/2"	.122	6.96	9	.060	6.96	y	22	92300....	97200	1.012	12.15	1...	H1-1b
20	M20	PL6"x1/2"	.095	6.96	3	.055	6.96	y	25	92300....	97200	1.012	12.15	1...	H1-1b
21	M21	PL6"x1/2"	.121	6.96	13	.060	6.96	y	14	92300....	97200	1.012	12.15	1...	H1-1b
22	M22	PIPE_3.0	.154	113.633	20	.087	58....		10	64359....	65205	5.749	5.749	1...	H1-1b
23	M23	PIPE_3.0	.144	60.367	20	.066	166...		18	46837....	65205	5.749	5.749	1...	H1-1b
24	M24	PIPE_3.0	.144	60.367	16	.096	113...		2	46837....	65205	5.749	5.749	1...	H1-1b
25	M25	L2x2x4	.183	53.645	26	.012	53....	z	26	19948...	30585.6	.691	1.577	2...	H2-1
26	M26	L2x2x4	.173	53.645	26	.010	53....	y	26	19948...	30585.6	.691	1.577	2...	H2-1
27	M27	L2x2x4	.140	53.645	26	.010	53....	z	26	19948...	30585.6	.691	1.577	2...	H2-1
28	M28	L2x2x4	.143	53.645	26	.010	53....	y	26	19948...	30585.6	.691	1.577	3...	H2-1
29	M29	L2x2x4	.130	53.645	26	.011	53....	z	26	19948...	30585.6	.691	1.577	3...	H2-1
30	M30	L2x2x4	.138	53.645	26	.011	53....	y	26	19948...	30585.6	.691	1.577	2...	H2-1
31	M55	HSS4X4X4	.356	63	18	.067	63	y	23	13902...	139518	16.181	16.181	2...	H1-1b
32	M56	HSS4X4X4	.351	63	14	.076	63	y	19	13902...	139518	16.181	16.181	2...	H1-1b
33	M57	HSS4X4X4	.390	63	14	.122	63	y	27	13902...	139518	16.181	16.181	2...	H1-1b
34	M58	HSS4X4X4	.139	33.518	19	.041	0	z	13	13821...	139518	16.181	16.181	1...	H1-1b
35	M59	HSS4X4X4	.142	33.518	19	.039	0	z	8	13821...	139518	16.181	16.181	1...	H1-1b
36	M60	HSS4X4X4	.163	33.518	22	.043	61....	z	8	13821...	139518	16.181	16.181	1...	H1-1b

Envelope Plate/Shell Principal Stresses

Plate	Surf...	Sigma1 [ksi]	LC	Sigma2 [ksi]	LC	Tau Max [ksi]	LC	Angle [rad]	LC	Von Mises [ksi]	LC
No Data to Print ...											

APPENDIX D

ADDITIONAL CALCUATIONS

JACOBS™

CONNECTION CHECK
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	806367
Engineer:	JP Chahwan
Date:	3/25/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Type A

Connection Type	Single Bolt or Threaded Part		
Max Vertical, V_{us}	2605	lb	
Max Normal	3110	lb	
Max Tangential	2014	lb	
Max Vertical Moment, T_{ur}		k-ft	(ubolt)
V_{ub}	3293	lb	
T_{ub}	3110	lb	
Bolt Size, d	0.5	in	
No. of Bolts	4		
Bolt Grade	A325		
Bolt Spacing, L_b	10	in	
Threads in Shear Plane	Yes		
Clear Distance, L_c		in	(ubolt)
Thickness of Connected Part, t		in	(ubolt)
Tensile of Connected Part, F_u		ksi	(ubolt)
Diameter of Suport Member, D		in	(ubolt)
Slotted Holes			(ubolt)
n	13	per inch	
F_{ub}	120	ksi	
Pretension, T_p	4	kip	
ϕR_{nt}	13	kip	
ϕR_{nv}	9	kip	
ϕR_n	0	kip	
ϕR_{ns}	1	kip	
ϕR_{nr}	0	kip	
Total ϕR_{nt}	**51083**	lb	
Total ϕR_{nv}	**35343**	lb	
Total ϕR_n	**0**	lb	
Total ϕR_{ns}	**5693**	lb	
Total ϕR_{nr}	**0**	lb	

Equations

ϕ =	0.75		
$A_n = \pi/4(d - 0.9382/n)^2$	0.142	in^2	
R_b =	1		
$A_b = \pi d^2/4$	0.196	in^2	
$R_{nt} = F_{ub}A_n$	17.028	kip	
$R_{nv} = 0.625R_bF_{ub}A_b$	11.781	kip	
ϕ =	0.8		
$R_n = 1.2(L_c+d/4)tF_u \le 2.4dtF_u$	N/A	kip	
$R_n = 1.0L_ctF_u \le 2.0dtF_u$	N/A	kip	
ϕ_u =	1.0		
$R_{ns} = 0.30(2T_p-T_{ut}) \ge 0$	1.423	kip	
$R_{nr} = 0.5(DR_{ns})$	0.000	kip	

Combined Shear and Tension	0.012		1.2%
Shear	0.093		9.3%
Tension	0.061		6.1%
Bearing	0.000		0.0%
Torsion Transfer	0.000		0.0%
			9.3%

Type B

Connection Type	Single Bolt or Threaded Part		
Max Vertical, V_{us}		lb	
Max Normal		lb	
Max Tangential		lb	
Max Vertical Moment, T_{ur}		k-ft	(ubolt)
V_{ub}	0	lb	
T_{ub}	0	lb	
Bolt Size, d	0.5	in	
No. of Bolts	1		
Bolt Grade	A325		
Bolt Spacing, L_b	10	in	
Threads in Shear Plane	Yes		
Clear Distance, L_c		in	(ubolt)
Thickness of Connected Part, t		in	(ubolt)
Tensile of Connected Part, F_u		ksi	(ubolt)
Diameter of Suport Member, D		in	(ubolt)
Slotted Holes			(ubolt)
n	13	per inch	
F_{ub}	120	ksi	
Pretension, T_p	4	kip	
ϕR_{nt}	13	kip	
ϕR_{nv}	9	kip	
ϕR_n	0	kip	
ϕR_{ns}	2	kip	
ϕR_{nr}	0	kip	
Total ϕR_{nt}	**12771**	lb	
Total ϕR_{nv}	**8836**	lb	
Total ϕR_n	**0**	lb	
Total ϕR_{ns}	**2356**	lb	
Total ϕR_{nr}	**0**	lb	

Equations

ϕ =	0.75		
$A_n = \pi/4(d - 0.9382/n)^2$	0.142	in^2	
R_b =	1		
$A_b = \pi d^2/4$	0.196	in^2	
$R_{nt} = F_{ub}A_n$	17.028	kip	
$R_{nv} = 0.625R_bF_{ub}A_b$	11.781	kip	
ϕ =	0.8		
$R_n = 1.2(L_c+d/4)tF_u \le 2.4dtF_u$	N/A	kip	
$R_n = 1.0L_ctF_u \le 2.0dtF_u$	N/A	kip	
ϕ_u =	1.0		
$R_{ns} = 0.30(2T_p-T_{ut}) \ge 0$	2.356	kip	
$R_{nr} = 0.5(DR_{ns})$	0.000	kip	

Combined Shear and Tension	0.000		0.0%
Shear	0.000		0.0%
Tension	0.000		0.0%
Bearing	0.000		0.0%
Torsion Transfer	0.000		0.0%
			0.0%

RF EMISSIONS COMPLIANCE REPORT

Crown Castle on Behalf of AT&T Mobility, LLC

Site: HRT 046 943209
Crown Castle Site ID: 806367
App ID: 477393
MAPLE AVE WEST
HADDAM, CT
5/14/2019

Report Status:

AT&T Mobility, LLC Is Compliant

Signed 14 May 2019

Prepared By:

Site Safe, 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
AT&T Mobility, LLC
HADDAM, 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 Site Safe, 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 Radio Frequency Electromagnetic Fields; and

That the technical information serving as the basis for this report was supplied by AT&T Mobility, LLC (see attached Site Summary and Carrier documents) and that AT&T Mobility, LLC's installation involves communications equipment, antennas and associated technical equipment at a location referred to as "HRT 046 943209" ("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 has 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 energy 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 frequencies 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 4.180% of the maximum permissible exposure limits in any accessible area on the ground; and

That it is understood per FCC Guidelines and OET 65 Appendix A, that regardless of the existent radio frequency environment, only those licensees whose contributions exceed 5% 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 7.184% 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; and

In summary, it is stated here that the proposed operation at the site will 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(b), 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 this 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.

AT&T Mobility, LLC
HRT 046 943209
Site Summary

Carrier	Area Maximum Percentage MPE
AT&T Mobility, LLC	0.22 %
AT&T Mobility, LLC (Proposed)	0.565 %
AT&T Mobility, LLC (Proposed)	1.339 %
AT&T Mobility, LLC (Proposed)	0.911 %
AT&T Mobility, LLC (Proposed)	1.145 %
Haddam Volunteer Fire Company	0.19 %
MetroPCS	0.428 %
T-Mobile	0.234 %
T-Mobile	0.234 %
T-Mobile	0.361 %
Verizon Wireless	0.316 %
Verizon Wireless	0.604 %
Verizon Wireless	0.637 %
Composite Site MPE:	7.184 %

AT&T Mobility, LLC
HRT 046 943209
Carrier Summary

Frequency:	869	MHz
Maximum Permissible Exposure (MPE):	579.33	µW/cm^2
Maximum power density at ground level:	1.27441	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.21998	%

					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_00	89	0	547	0.708016	0.122212	1.094365	0.188901
Powerwave	7770_00	89	120	547	0.708919	0.122368	1.094365	0.188901
Powerwave	7770_00	89	240	547	0.708016	0.122212	1.094365	0.188901

AT&T Mobility, LLC (Proposed)
HRT 046 943209
Carrier Summary

Frequency:	2345	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	5.6548	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.56548	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10965	89	0	3954	2.780403	0.27804	5.124329	0.512433
Kathrein-Scala	800-10965	89	120	3954	2.786568	0.278657	5.124328	0.512433
Kathrein-Scala	800-10966	89	240	3855	2.520651	0.252065	5.339871	0.533987

AT&T Mobility, LLC (Proposed)
HRT 046 943209
Carrier Summary

Frequency:	2110	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	13.38678	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	1.33868	%

					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	HPA65R-BU6A	89	0	5497	9.294627	0.929463	12.765292	1.276529
CCI Antennas	HPA65R-BU6A	89	120	5497	9.294627	0.929463	12.765293	1.276529
CCI Antennas	HPA65R-BU8A	89	240	5372	13.307425	1.330742	13.307425	1.330742

AT&T Mobility, LLC (Proposed)
HRT 046 943209
Carrier Summary

Frequency:	1930	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	9.11434	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.91143	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10965	89	0	6168	3.522325	0.352233	7.628684	0.762868
Kathrein-Scala	800-10965	89	120	6168	3.522325	0.352233	7.628684	0.762868
Kathrein-Scala	800-10966	89	240	6168	4.03304	0.403304	8.543789	0.854379

AT&T Mobility, LLC (Proposed)
HRT 046 943209
Carrier Summary

Frequency:	734	MHz
Maximum Permissible Exposure (MPE):	489.33	µW/cm^2
Maximum power density at ground level:	5.60257	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	1.14494	%

					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	HPA65R-BU6A	89	0	2819	2.933067	0.599401	3.023219	0.617824
CCI Antennas	HPA65R-BU6A	89	120	2819	2.921951	0.597129	3.023219	0.617824
CCI Antennas	HPA65R-BU8A	89	240	3312	2.573619	0.525944	5.096612	1.041542

Haddam Volunteer Fire Company
HRT 046 943209
Carrier Summary

Frequency:	450	MHz
Maximum Permissible Exposure (MPE):	300	µW/cm^2
Maximum power density at ground level:	0.56969	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.1899	%

					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**
Maxrad	MFB4505	107	0	100	0.569687	0.189896	0.569687	0.189896

MetroPCS
HRT 046 943209
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	4.27759	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.42776	%

					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	742213	77	30	3260	1.850843	0.185084	3.774411	0.377441
Kathrein-Scala	742213	77	150	3260	1.850843	0.185084	3.774411	0.377441
Kathrein-Scala	742213	77	270	3260	1.850843	0.185084	3.774411	0.377441

T-Mobile
HRT 046 943209
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.33885	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.23389	%

					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**
EMS	RR90-17-00DP	98	30	1214	0.923391	0.092339	1.934676	0.193468
EMS	RR90-17-00DP	98	150	1214	0.923391	0.092339	1.934676	0.193468
EMS	RR90-17-00DP	98	270	1214	0.923391	0.092339	1.934677	0.193468

T-Mobile
HRT 046 943209
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.33885	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.23389	%

					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**
EMS	RR90-17-00DP	98	30	1214	0.923391	0.092339	1.934676	0.193468
EMS	RR90-17-00DP	98	150	1214	0.923391	0.092339	1.934676	0.193468
EMS	RR90-17-00DP	98	270	1214	0.923391	0.092339	1.934677	0.193468

T-Mobile
HRT 046 943209
Carrier Summary

Frequency:	700	MHz
Maximum Permissible Exposure (MPE):	466.67	µW/cm^2
Maximum power density at ground level:	1.68592	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.36127	%

					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	LNX-6515DS-VTM	97	30	1854	1.351006	0.289501	1.563642	0.335066
ANDREW	LNX-6515DS-VTM	97	150	1854	1.351006	0.289501	1.563642	0.335066
ANDREW	LNX-6515DS-VTM	97	270	1854	1.351005	0.289501	1.563642	0.335066

Verizon Wireless
HRT 046 943209
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	3.15778	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.31578	%

					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**
Antel	BXA-171063-8CF	119	30	4945	2.005016	0.200502	2.857678	0.285768
Antel	BXA-171063-8CF	119	150	4945	2.007572	0.200757	2.857678	0.285768
Antel	BXA-171063-8CF	119	270	4945	2.007572	0.200757	2.857678	0.285768

Verizon Wireless
HRT 046 943209
Carrier Summary

Frequency:	751	MHz
Maximum Permissible Exposure (MPE):	500.67	µW/cm^2
Maximum power density at ground level:	3.0254	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.60428	%

					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**
Antel	BXA-70063-6CF	119	30	4019	2.432652	0.485883	2.871807	0.573597
Antel	BXA-70063-6CF	119	150	4019	2.42646	0.484646	2.871807	0.573597
Antel	BXA-70063-6CF	119	270	4019	2.432652	0.485883	2.871807	0.573597

Verizon Wireless
HRT 046 943209
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	3.60874	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.63684	%

					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**
Antel	LPA-80080-6CF	119	30	2010	0.975629	0.17217	1.489128	0.262787
Antel	LPA-80080-6CF	119	150	2010	0.979366	0.172829	1.489128	0.262787
Antel	LPA-80080-6CF	119	270	2010	0.975629	0.17217	1.489128	0.262787
Antel	LPA-80080-6CF	119	30	2010	0.975629	0.17217	1.489128	0.262787
Antel	LPA-80080-6CF	119	150	2010	0.979366	0.172829	1.489128	0.262787
Antel	LPA-80080-6CF	119	270	2010	0.975629	0.17217	1.489128	0.262787