



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

May 28, 2019

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

RE: Notice of Exempt Modification for Crown Site BU: 806364
AT&T Site ID: CTL05841
143 R Old Blue Hill Road, Durham, CT 06422
Latitude: 41° 27' 33.67"/ Longitude: 72° 39' 45.83"

Dear Ms. Bachman:

AT&T currently maintains (9) antennas at the 116-foot level of the existing 120-foot monopole at 143 R Old Blue Hill Road in Durham, Connecticut. The tower is owned by Crown Castle. The property is owned by Mr. Francis E. Behrens. AT&T intends to replace (3) antennas, replace (3) RRHs, add (3) antennas, add (3) RRHs, (1) DC6 and (2) DC trunks.

The facility has been previously approved by the Connecticut Siting Council. Email requests for the original zoning approval documents were directed to the Town of Durham Planning and Zoning Office in September and December 2018 and have gone unanswered.

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 First Selectman Laura L. Francis, Town of Durham, Geoffrey L. Colegrove, 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.

The Foundation for a Wireless World.

CrownCastle.com

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
Real Estate Specialist
3 Corporate Park Drive, Suite 101, Clifton Park, NY 12065
T: (201) 236-9224
E: 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: Laura L. Francis, First Selectman
Town of Durham
Town Hall – 30 Town House Road
P.O. Box 428
Durham, CT 06422
860-349-3625

Geoffrey Colegrove, Town Planner
Town of Durham
Town Hall – 30 Town House Road
P.O. Box 428
Durham, CT 06422
860-349-8253

Francis E. Behrens
109 Old Blue Hills Road
Durham, CT 06422-3005

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

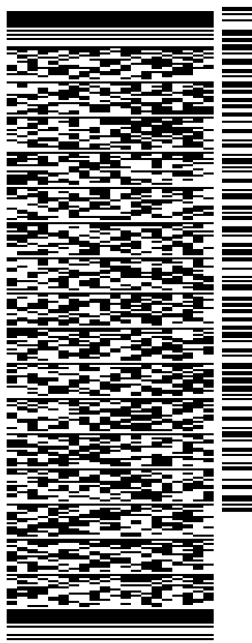
SHIP DATE: 28MAY19
ACTWGT: 4.20 LB
CAD: 104924194INET4100

BILL SENDER

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

NEW BRITAIN CT 06051

(860) 827-2951 REF: 1765 6880
INV/ DEPT:
PO:



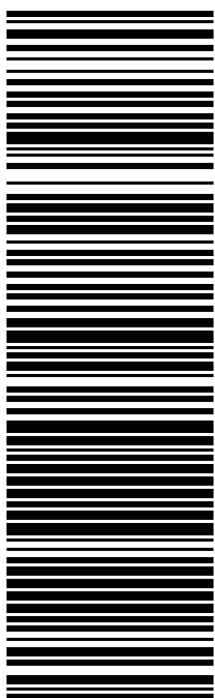
J191019010701uv

565J1/D66C/23AD

TRK# 7753 2386 5348
0201

WED - 29 MAY 10:30A
PRIORITY OVERNIGHT

EB BDLA
06051
CT-US BDL



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

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

SHIP DATE: 28MAY19
ACTWGT: 2.00 LB
CAD: 104924194IN/ET4100

BILL SENDER

TO LAURA L. FRANCIS, FIRST SELECTMAN

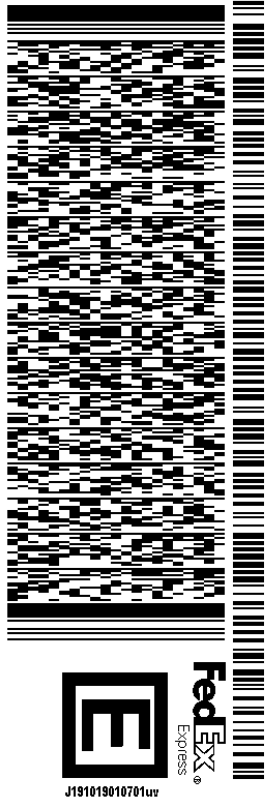
TOWN OF DURHAM

TOWN HALL - 30 TOWN HOUSE ROAD

PO BOX 428

DURHAM CT 06422

(860) 349-3625 REF: 1734.7890
INV/ PO: DEPT:

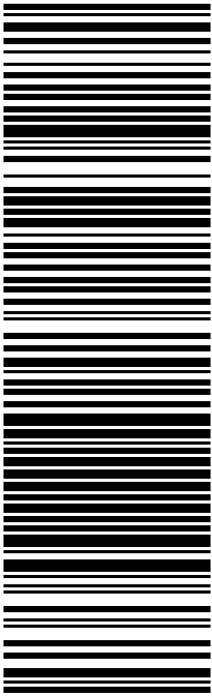


TRK# 7753 2389 8464
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EB RSPA

06422
CT-US BDL



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SUITE 101
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UNITED STATES US

SHIP DATE: 28MAY19
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BILL SENDER

TO GEOFFREY COLEGROVE, TOWN PLANNER

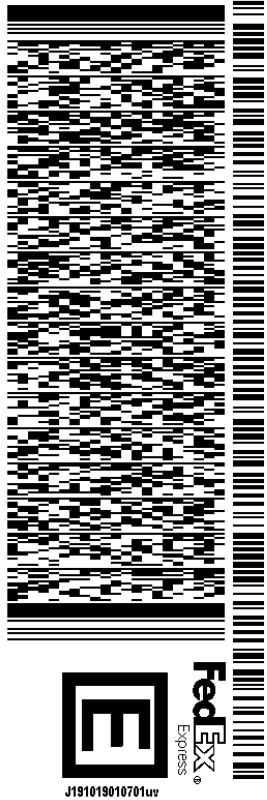
TOWN OF DURHAM

TOWN HALL - 30 TOWN HOUSE ROAD

PO BOX 428

DURHAM CT 06422

(860) 349-9253 REF: 1734.7890
INV/ DEPT:
PO:

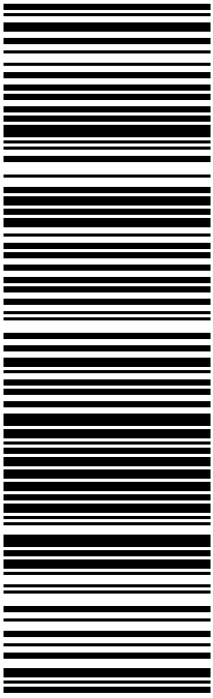


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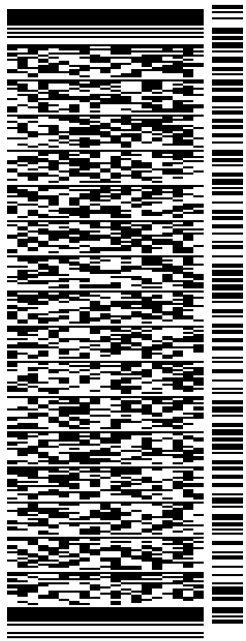
BILL SENDER

TO FRANCIS E. BEHRENS

109 OLD BLUE HILLS ROAD

DURHAM CT 06422

(201) 236-9224 REF: 1734.7890
INV: DEPT:
PO:



J191019010701uv

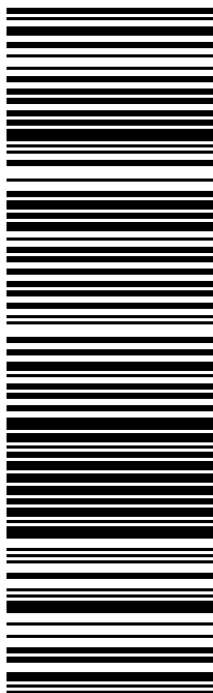
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Property Card: OLD BLUE HILLS RD
Town of Durham, CT



Parcel ID: 69-12
Account #: B0016900

Owner: BEHRENS FRANCIS E JR
Mailing Address: 109 OLD BLUE HILLS RD
DURHAM, CT 06422-3005

General Information	Assessed Value
<p>State Class: 130 Class: R Census-Tract: 5851 District No.: M Neighborhood: 80 Zone: FR Total Acres: 6.31</p>	<p>Land: \$126,400 Buildings: \$0 Total: \$2,030</p>
Sale History	
<p>Book/Page: 100-255 Deed Date: 19840824 Sale Date: Sale Type: 0 Sale Price: 0</p>	
Building Details	
<p>Living Units: 0 Style: 0 Year Built: 0 Effective Year Built: 0 Ture TLA: 0 Stories: 0 Total Rooms: 0 Total Bedrooms: 0 Number Full Baths: 0 Number Half Baths: 0 WB/FP Openings: 0 Heating Type: 0 Heating Fuel Type: 0</p>	<p>Basement: 0 FBLA Size: 0 Attic: 0 Exterior Walls: 0 Basement / Garage: 0</p>



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BUILDING SKETCH

	<u>Descriptor/Area</u>

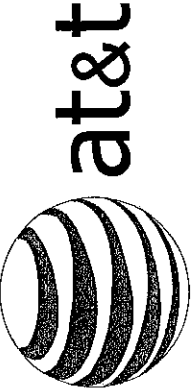


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NOTE:
ALL CONSTRUCTION ACTIVITIES ARE TO BE COMPLETED DIRECTLY THROUGH CROWN. CONTRACTOR MUST HAVE ALL NECESSARY PERMITS AND APPROVALS IN ORDER TO BEGIN. PRE-APPROVAL TO ENTER THE PROPERTY MUST BE OBTAINED. FOR ACCESS AUTHORIZATION, PLEASE CONTACT CROWN.



SITE NUMBER: CTL05841

FA LOCATION CODE: 10071003

SITE NAME: DURHAM CENTRAL

CROWN SITE NAME: HRT 106 (B) 943202

PROJECT: 4TX4RX SOFTWARE RETROFIT, LTE 4C, LTE 5C

PAGE ID: MRCTB038076, MRCTB038089, MRCTB037998,

BU#: 806364

PROJECT INFORMATION

- SCOPE OF WORK:**
- ITEMS TO BE REMOVED FROM EXISTING TOWER & ON GROUND:
 - REMOVE (3) ANTENNAS, (3) RRH's
 - INSTALL 1x18 ANTENNA (800-10584) (TYP. OF 2 PER SECTOR, TOTAL OF 6).
 - INSTALL 1x18 4x2 BBS (AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
 - INSTALL 1x18 4x2 BBS (AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
 - INSTALL 1x18 4x2 BBS (AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
 - INSTALL (2) DC TRUNK CABLES (30-4685-1645) (TOTAL OF 1).
 - INSTALL (2) DC TRUNK CABLES.
 - INSTALL (6) ANTENNA PIPE MAST
 - ITEMS TO BE MOUNTED INSIDE EXISTING SHELTER:
 - ADD 2ND XMU
 - ADD 660 FOR 5G AND DL4
 - ITEMS TO REMAIN:
 - (3) ANTENNAS, (3) RRH's, (2) SURGE SUPPRESSOR, (6) COAX CABLES, (2) FIBER TRUNK CABLE & (4) DC TRUNK CABLES.

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

LATITUDE (NAD 83): N 41° 27' 35.67"

LONGITUDE (NAD 83): W 72° 38' 45.83"

LANDLORD: CROWN CASTLE INTERNATIONAL
500 W. CUMMINGS PARK, STE 3600
WOBURN, MA 01817

TYPE OF SITE: MONOPOL/OUTDOOR

TOWER HEIGHT: 120'

RAD CENTER: 116'

CURRENT USE: TELECOMMUNICATIONS FACILITY

PROPOSED USE: TELECOMMUNICATIONS FACILITY

DRAWING INDEX

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

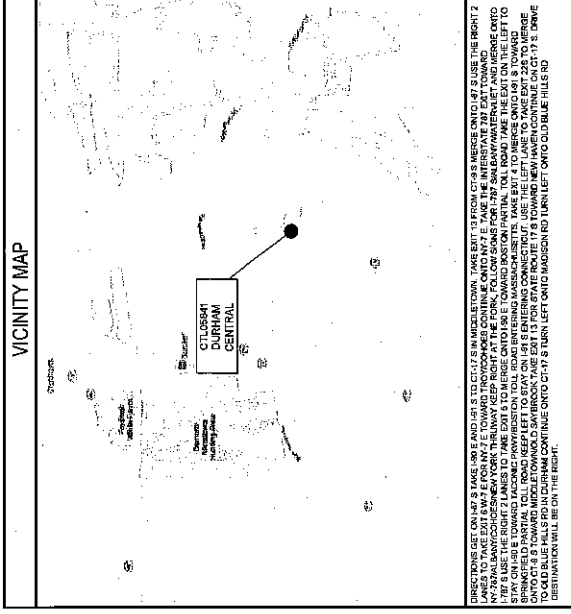
CROWN CASTLE SITE ID #: 806364
CROWN CASTLE SITE NAME: HRT 106 (B) 943202

ENGINEERING

- 2018 CONNECTICUT STATE BUILDING CODE
- 2018 AMENDMENT WITH ADDS INTERNATIONAL BUILDING CODE
- 2015 INTERNATIONAL MECHANICAL CODE
- 2015 INTERNATIONAL ENERGY CONSERVATION CODE
- 2017 NATIONAL ELECTRICAL CODE (NFPA 70: 2017)
- ANSI/ASPE-222G

GENERAL NOTES

- THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSIBLE BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
- CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE A/E REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.



UNDERGROUND SERVICE ALERT
STATE LAW REQUIRES
TWO WORKING DAYS NOTICE PRIOR TO ANY
EARTH MOVING. CALL 811

TITLE SHEET

T-1

FA# 10071003
SITE# CTL05841
DURHAM CENTRAL
143 R. OLD BLUE HILL ROAD
DURHAM, CT 06422

THE DRAWING IS THE PROPERTY OF JACOBS ENGINEERING GROUP, INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT EXPRESS WRITTEN PERMISSION BY JACOBS ENGINEERING GROUP, INC. FOR THE PURPOSES OF CONTRACTING OR FOR ANY OTHER PURPOSES WITHOUT THE EXPRESS WRITTEN PERMISSION OF JACOBS ENGINEERING GROUP, INC.

NO.	REVISION	DATE
1	ISSUED FOR PERMITTING	

PROJECT NO: 50020001
REVISION: BUS
CHECKED BY: CAT
SUBMITTALS

at&t



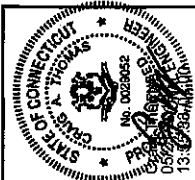
384 BRIDGE STREET
EAST SPRINGFIELD, MA 01107



3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12525



JACOBS ENGINEERING GROUP, INC.
125 ST. JAMES AVENUE, 3011 FOUR
EASTON, MA 02158



PROJECT NO. REC-2024
DRAWN BY: MMS
CHECKED BY: CRT

SUBMITTALS	
1	ISSUED FOR PERMITTING

ISSUING ENGINEER: THE PROFESSIONAL ENGINEER
PROFESSIONAL SEAL AND LICENSE NUMBER
PROFESSIONAL EXPIRATION DATE
PROFESSIONAL EXPIRATION DATE
PROFESSIONAL EXPIRATION DATE
PROFESSIONAL EXPIRATION DATE
PROFESSIONAL EXPIRATION DATE
PROFESSIONAL EXPIRATION DATE

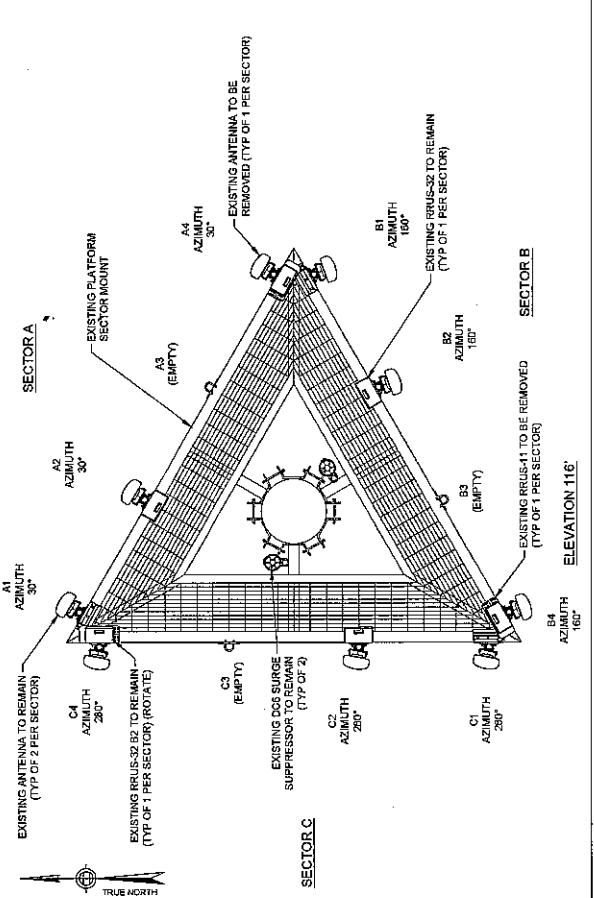
FW# 10071003
SITE# C7103641
DURHAM CENTRAL
145 CEDAR HILL ROAD
DURHAM, CT 06422

EXISTING & PROPOSED
ANTENNA LAYOUT

C-3

STRUCTURAL NOTE:

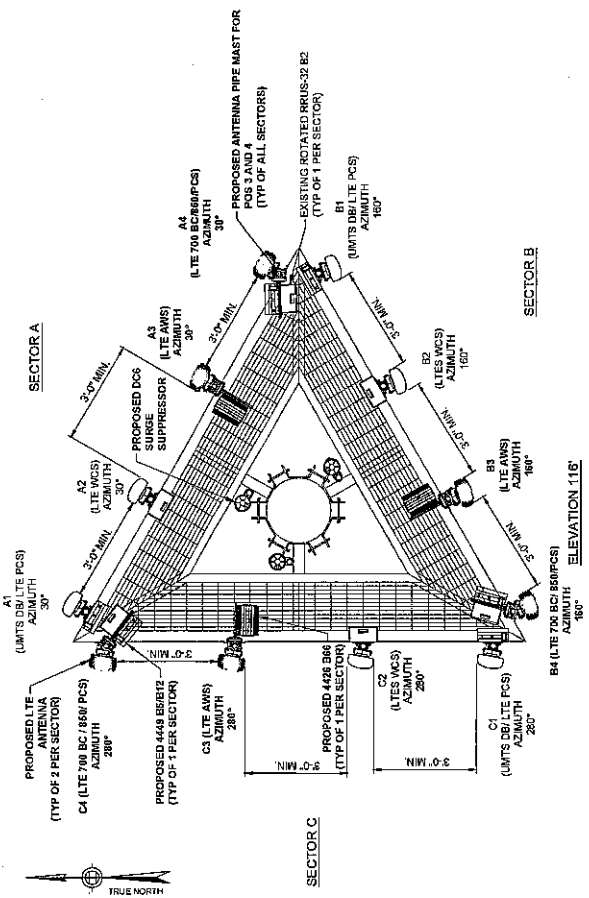
- CONTRACTOR SHALL REFER TO THE MOUNT ANALYSIS REPORT, SITE NUMBER: C7103641, SITE NAME: DURHAM CENTRAL, FA LOCATION: 0071003, CROWN ID NUMBER: 0071003, ORDER NUMBER: 174211, ISSUED BY: HUDSON DESIGN GROUP, LLC ON 04/25/19. THE MOUNT MODIFICATION MUST BE PERFORMED PRIOR TO THE INSTALLATION OF THE EQUIPMENT SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL VERIFY THAT ALL EQUIPMENT HARDWARE ARE INSTALLED PROPERLY AS DESCRIBED IN THIS REPORT.
- CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND ANTENNA HEIGHTS PRIOR TO THE INSTALLATION. CONTRACTOR SHALL NOT EXCEED MOUNTING MORE THAN 10% ABOVE THE MOUNTING HEIGHTS SPECIFIED TO AN ADJACENT ANTENNA MOUNTING PIPE AS NEEDED.



SCALE: N.T.S.

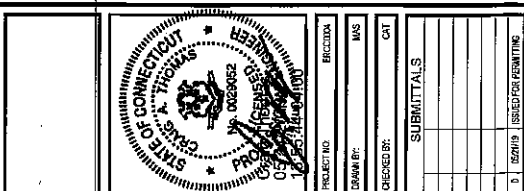
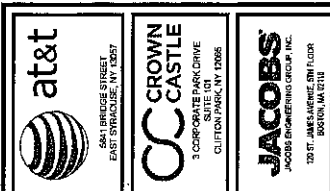
1 EXISTING ANTENNA LAYOUT

DO NOT INSTALL PROPOSED SQUID OR SURGE SUPPRESSOR ON TOWER LEG



SCALE: N.T.S.

2 PROPOSED ANTENNA LAYOUT



PROJECT NO.	ERISSON
DRAWN BY:	BUS
CHECKED BY:	CT
SUBMITTALS	
1	ISSUED FOR PERMITTING
<small>PROVIDE TO THE SPECIALTY VENDOR FOR QUOTE. THIS DRAWING IS FOR INFORMATION ONLY. IT IS NOT TO BE USED FOR CONSTRUCTION. THE SPECIALTY VENDOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FOR THE INSTALLATION OF THE EQUIPMENT. THE SPECIALTY VENDOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FOR THE INSTALLATION OF THE EQUIPMENT.</small>	
FAR #0071003 SITE# CT05941 DURHAM CENTRAL 143 S. G. BLUE HILL ROAD DURHAM, CT 06822	
EQUIPMENT DETAILS	
C-4	

MANUFACTURER: ERICSSON
MODEL NO.: RRU5-4426 B66
TECHNOLOGY: DUAL BAND
DIMENSIONS (HAWD): 14.96" x 13.19" x 5.80"
WEIGHT (lbs): 48.4
POWER SUPPLY: -48V

NOTE:
 PENDING FINAL PRODUCT SPECIFICATION

3 RRU5 SPECIFICATIONS
SCALE: N.T.S.

CUE DEE PART # 5335/5336 ERICSSON RRU MOUNTING KIT
 SKK 107 28391, SINGLE RRU SUPPORT KIT (PART #5335) (OR ENGINEER APPROVED EQUIVALENT) SKK 107 28392, EXPANSION KIT (PART #5336) (OR ENGINEER APPROVED EQUIVALENT)

MOUNTING NOTES:
 REFER TO PRODUCT SPECS FOR BOLT SIZE & PIPE DIAMETER TOLERANCES. THE PART NO. SKK107 28392 IS REQUIRED FOR (2) RRU5. ANTENNA NOT SHOWN FOR CLARITY.

6 RRU MOUNTING DETAIL
SCALE: N.T.S.

MANUFACTURER: ERICSSON
MODEL NO.: RRU5-4449 B5 & B12
TECHNOLOGY: DUAL BAND
DIMENSIONS (HAWD): 14.96" x 13.19" x 10.43"
WEIGHT (lbs): 73.0
POWER SUPPLY: -48V
TEMPERATURE: -40°C TO 55°C

2 RRU5 SPECIFICATIONS
SCALE: N.T.S.

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

5 DC6 MOUNTING DETAIL
SCALE: N.T.S.

MANUFACTURER: KATHREIN
MODEL NO.: 800710964
RADOME MATERIAL: FIBERGLASS, UV RESISTANT
COLOR: LIGHT GRAY
DIMENSIONS (LAWD): 30.7" x 18.5" x 8.2"
WEIGHT (lbs): 88.8
CONNECTOR: 8 x 4.5-10 FEMALE
FRONT WIND LOAD: 188 LBF @ 53 MPH
SIDE WIND LOAD: 390 LBF @ 53 MPH
WIND SPEED MAX.: >150 MPH (2-241 IMAH)

1 ANTENNA SPECIFICATIONS
SCALE: N.T.S.

RAYCAP DC6-48-60-18-RC
DIMENSIONS (HAWD): 31.41" x 10.24" x 18.5"
TOTAL WEIGHT (lbs): 22.2
NOMINAL OPERATING VOLTAGE: 20 VDC @ 200 mA
MAXIMUM DISCHARGE CURRENT: 60 MA @ 200 mA
VOLTAGE PROTECTION RATING: 400 V
WIND LOADING: 150 MPH (SUSTAINED)
 155 MPH (GUST)

4 DC SURGE PROTECTION SPECIFICATIONS
SCALE: N.T.S.

NOTES:
 1. MOUNTING OPTIONS ARE INCLUDED
 2. PRODUCTS WITH ANTENNA PURCHASE SHOULD BE A MINIMUM 30" FROM THE ANTENNA TO THE PANEL ANTENNAS.

7 ANTENNA MOUNTING DETAIL
SCALE: N.T.S.

9 DETAIL NOT USED
SCALE: N.T.S.

6 BACK TO BACK RRU MOUNTING KIT
SCALE: N.T.S.



864 BRIDGE STREET
EAST SYRACUSE, NY 13057



3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 13526



JACOBS ENGINEERING GROUP, INC.
1201 AMERICAN SQUARE
SUITE 200
BOSTON, MA 02116



PROJECT NO.:
DRAWN BY:
CHECKED BY:
DATE:

RECORDS:
BUS:
CAT:

SUBMITTALS

0 05/01/19 ISSUED FOR PERMITTING

THE SUBMITTALS SHALL BE PREPARED AND SUBMITTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONNECTICUT REGULATORY AND ADMINISTRATIVE PROCESSES SPECIFICALLY ALLOWED.

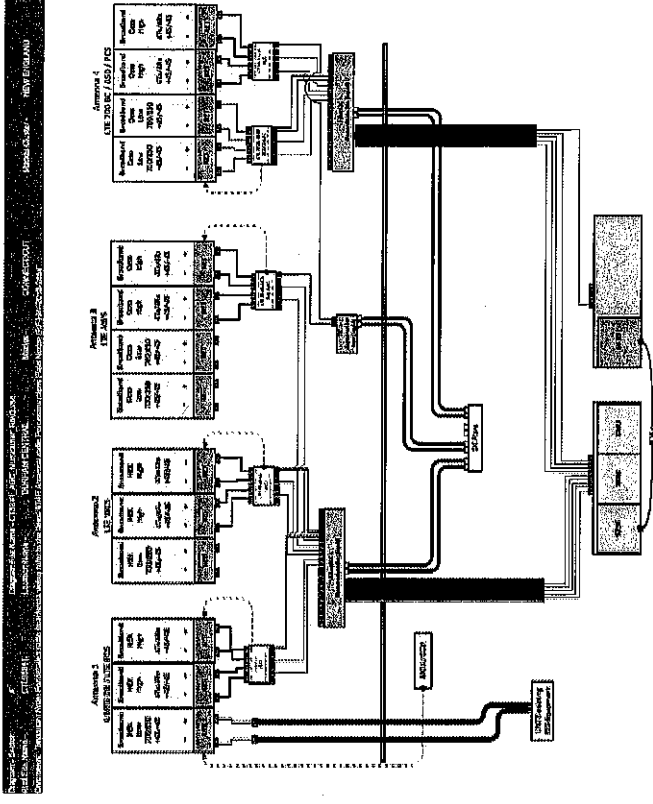
FA# 10071003
SITE# CT102641
DIRHAM CENTRAL
1435 CUDRUE HILL ROAD
DIRHAM, CT 06422

ANTENNA CHART &
RF EQUIPMENT
SCHEMATIC

RF-1

ANTENNA NUMBER	ANTENNA MODEL	ANTENNA SAND	AZIMUTH	ANTENNA CENTERLINE FROM GROUND	TILT	RRH'S	FEEDER	RAYCAP
A1	SBNH-1D65A (55"X11.5"X7.1")	UMTS DB/ LTE PCS	30°	115"	-	(1) 4415 B25 (LTE PCS)	(2) 1-50' EXISTING (LENGTH @ 166')	(1) RAYCAP DC3-48-60-18-8C
A2	SBNH-1D65A (55"X11.5"X7.1")	LTE WCS	30°	116"	-	(1) RRUS-32 (LTE WCS)	(1) FIBER (LENGTH @ 166')	(1) RAYCAP DC3-48-60-18-8C
A3	810-10884 (55"X20"X6.9")	LTE AWS	30°	116"	-	(1) 4428 B66 (LTE AWS)	-	(1) RAYCAP DC3-48-60-18-8C
A4	810-10884 (55"X20"X6.9")	LTE 700 B/C LTE 800 LTE PCS	30°	116"	-	(1) RRUS-32 S2 (LTE PCS) (1) 4449 B61912 (LTE 700)	(2) 1-50' EXISTING (LENGTH @ 166')	(1) RAYCAP DC3-48-60-18-8C
B1	SBNH-1D65A (55"X11.5"X7.1")	UMTS DB/ LTE PCS	180°	116"	-	(1) 4415 B25 (LTE PCS)	(1) FIBER (LENGTH @ 166')	(1) RAYCAP DC3-48-60-18-8C
B2	SBNH-1D65A (55"X11.5"X7.1")	LTE WCS	180°	118"	-	(1) RRUS-32 (LTE WCS)	-	(1) RAYCAP DC3-48-60-18-8C
B3	810-10884 (55"X20"X6.9")	LTE AWS	180°	118"	-	(1) 4428 B66 (LTE AWS)	-	(1) RAYCAP DC3-48-60-18-8C
B4	810-10884 (55"X20"X6.9")	LTE 700 B/C LTE 800 LTE PCS	180°	116"	-	(1) RRUS-32 S2 (LTE PCS) (1) 4449 B61912 (LTE 700)	-	(1) RAYCAP DC3-48-60-18-8C
G1	SBNH-1D65A (55"X11.5"X7.1")	UMTS DB/ LTE PCS	280°	116"	-	(1) 4415 B25 (LTE PCS)	(2) 1-50' EXISTING (LENGTH @ 166')	(1) RAYCAP DC3-48-60-18-8C
G2	SBNH-1D65A (55"X11.5"X7.1")	LTE WCS	280°	116"	-	(1) RRUS-32 (LTE WCS)	-	(1) RAYCAP DC3-48-60-18-8C
G3	810-10884 (55"X20"X6.9")	LTE AWS	280°	116"	-	(1) 4428 B66 (LTE AWS)	(2) DC (LENGTH @ 166')	(1) RAYCAP DC3-48-60-18-8C
G4	810-10884 (55"X20"X6.9")	LTE 700 B/C LTE 800 LTE PCS	280°	116"	-	(1) RRUS-32 S2 (LTE PCS) (1) 4449 B61912 (LTE 700)	-	(1) RAYCAP DC3-48-60-18-8C

- NOTES:
- EQUIPMENT LISTED IN BOLD, DELINEATES THAT THE EQUIPMENT IS PROPOSED
 - * DENOTES THAT EQUIPMENT IS TO BE GROUND MOUNTED



SCALE: NONE

2 RF EQUIPMENT SCHEMATIC

1 ANTENNA INFORMATION CHART

Date: **April 25, 2019**



Charles R. McGuirt
Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Hudson Design Group LLC
45 Beechwood Drive
N. Andover, MA 01845
(978) 557-5553

Subject: **Mount Analysis Report**

Carrier Designation: **AT&T Equipment Change-Out**
Carrier Site Number: CTL05841
Carrier Site Name: DURHAM CENTRAL

Crown Castle Designation: **Crown Castle BU Number:** 806364
Crown Castle Site Name: HRT 106(B) 943202
Crown Castle JDE Job Number: 551935
Crown Castle Order Number: 474211, Revision 0

Engineering Firm Designation: **Hudson Design Group LLC Report Designation:** 4461862

Site Data: **143 R Old Blue Hill Road, Durham, Middlesex, CT, 06422**
Latitude 41°27'33.67" Longitude -72°39'45.83"

Structure Information: **Tower Height & Type:** **120 ft Monopole**
Mount Elevation: **116 ft**
Mount Type: **12.5 ft Platform**

Dear Charles R. McGuirt,

Hudson Design Group LLC 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**
***Sufficient upon completion of the changes listed in the 'Recommendations' section of this report.**

The analysis has been performed in accordance with the TIA-222-H Standard based upon an ultimate 3-second gust wind speed of 127 mph. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: HDG
Respectfully Submitted by:

Michael Cabral
Structural Dept. Head
(978) 557-5553 x 231
MCabral@hudsondesigngroupllc.com



Daniel P. Hamm, P.E.
Principal

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1) INTRODUCTION

This is a 12.5' Platform Mount by Sabre Industries Towers and Poles, P/N C10855551C.

2) ANALYSIS CRITERIA

Building Code:	2015 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	127 mph
Exposure Category:	B
Topographic Factor at Base:	0.98
Topographic Factor at Mount:	1.53
Ice Thickness:	1.32 in
Wind Speed with Ice:	50 mph
Seismic S_s:	0.179
Seismic S₁:	0.062
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
116	116	6	Andrew	SBNHH-1D65A	12.5' Platform
		6	Kathrein	800-10964	
		3	Ericsson	RRUS 32	
		3	Ericsson	RRUS 32 B2	
		3	Ericsson	RRUS 4415	
		3	Ericsson	RRUS 4426 B66	
		3	Ericsson	RRUS 4449 B5/B12	
		3	Raycap	Squid Surge Arrestor	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
RFDS	AT&T	-	ON FILE

3.1) Analysis Method

RAM Elements (Version 14.0.1), 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.

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

3.2) Assumptions

- 1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- 2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
- 3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
- 4) Steel grades have been assumed as follows, unless noted otherwise:

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

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

4) ANALYSIS RESULTS

Table 3(a) - Mount Component Stresses vs. Capacity (Platform, Alpha Sector)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1	Face Members	42	116	63	Pass
1	Standoff Members	1	116	86	Pass
	Mount-to-Tower Connection	-	116	32	Pass

Table 3(b) - Mount Component Stresses vs. Capacity (Platform, Beta Sector)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1	Face Members	47	116	91	Pass
1	Standoff Members	11	116	87	Pass
	Mount-to-Tower Connection	-	116	32	Pass

Table 3(c) - Mount Component Stresses vs. Capacity (Platform, Gamma Sector)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1	Face Members	48	116	94	Pass
1	Standoff Members	16	116	84	Pass
	Mount-to-Tower Connection	-	116	34	Pass

Structure Rating (max from all components) =	94%
---	------------

Notes:

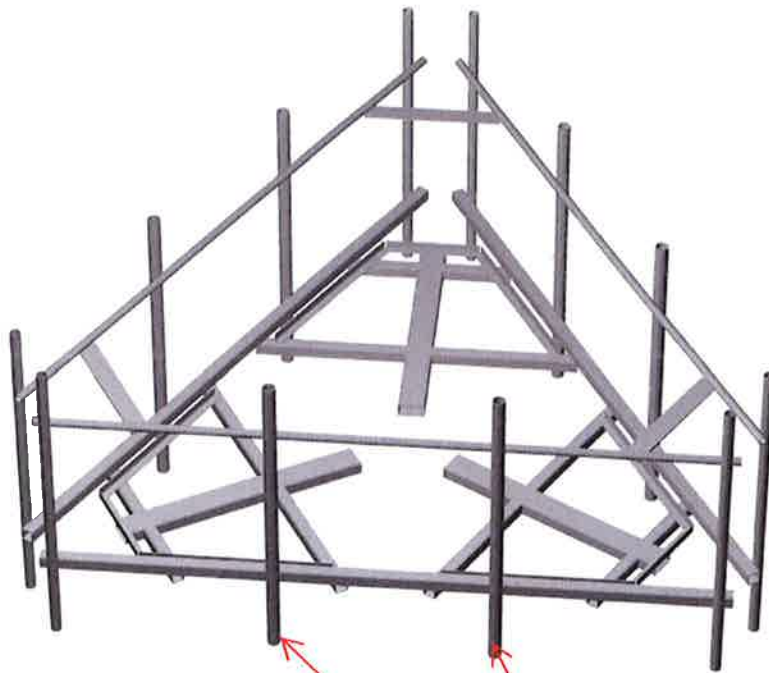
- 1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
- 2) All sectors are typical

4.1) Recommendations

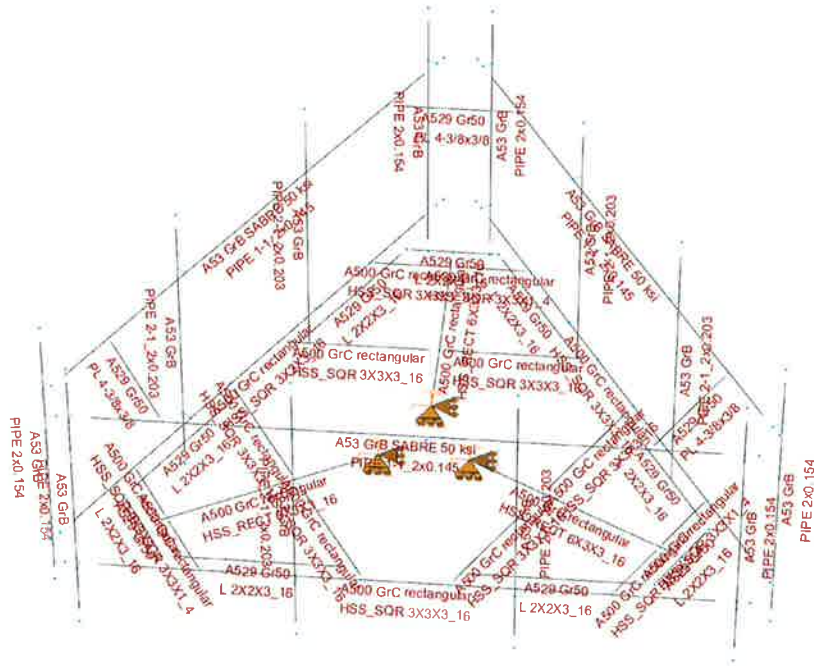
The mount has sufficient capacity to carry the proposed loading configuration. In order for the results of the analysis to be considered valid, the loading modification listed below must be completed.

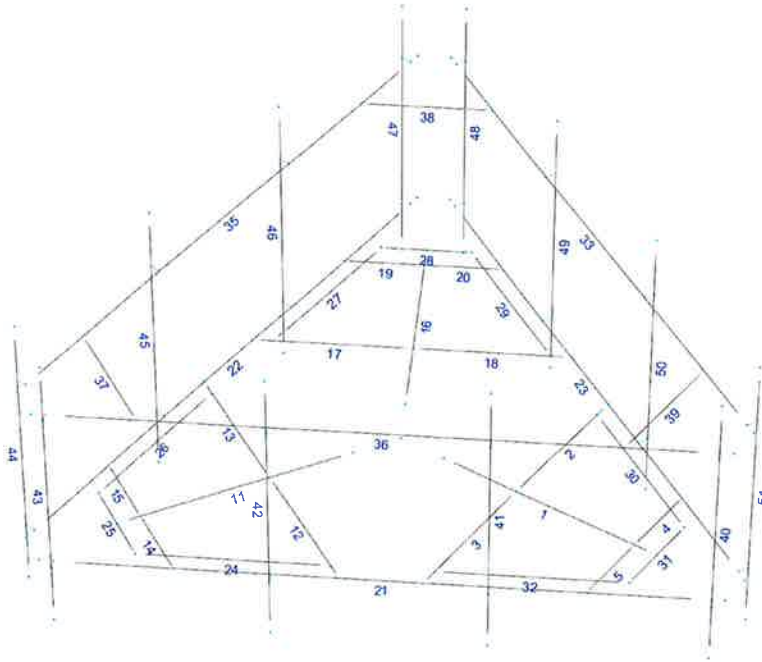
1. **Remove and replace existing pipe masts with new 2-1/2" std. (2.88" O.D.) pipe masts behind new 800-10964 antennas secured to the existing mount (typ. of 2 per sector, total of 6).**

APPENDIX A
WIRE FRAME AND RENDERED MODELS



Remove and replace existing pipe masts with new 2-1/2" std. (2.88" O.D.) pipe masts behind new 800-10964 antennas secured to the existing mount (typ. of 2 per sector, total of 6).





APPENDIX B
SOFTWARE INPUT CALCULATIONS

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



2.6.5.2 Velocity Pressure Coeff:

$K_z = 2.01 (z/z_g)^{2/\alpha}$
 $K_z =$ **1.031**
 $z =$ 116 (ft)
 $z_g =$ 1200 (ft)
 $\alpha =$ 7.0

$K_{zmin} \leq K_z \leq 2.01$

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_c
B	1200 ft	7.0	0.70	0.9
C	900 ft	9.5	0.85	1.0
D	700 ft	11.5	1.03	1.1

2.6.6.2 Topographic Factor:

Table 2-5

Topo. Category	K_t	f
2	0.43	1.25
3	0.53	2.0
4	0.72	1.5

$K_{zt} = [1 + (K_c K_t / K_h)]^2$

$K_h = e^{(fz/H)}$

$K_{zt} =$ **1.531789753**

$K_h =$ 2.0071116

$K_c =$ 0.9 (from Table 2-4)

$K_t =$ 0.53 (from Table 2-5)

$f =$ 2 (from Table 2-5)

$z =$ 116

$z_s =$ 540 (Mean elevation of base of structure above sea level)

$H =$ 333 (Ht. of the crest above surrounding terrain)

$K_{zt} =$ 1.53 (from 2.6.6.2.1)

$K_e =$ 0.98 (from 2.6.8)

(If Category 1 then $K_{zt} = 1.0$)

Category = 3

2.6.10 Design Ice Thickness

Max Ice Thickness =

$t_i =$ 1.00 in

Importance Factor =

$I =$ 1.0 (from Table 2-3)

$K_{Iz} =$ 1.13 (from Sec. 2.6.10)

$t_{Iz} = t_i * I * K_{Iz} * (K_{zt})^{0.35}$

$t_{Iz} =$ 1.32 in

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



2.6.9 Gust Effect Factor

2.6.9.1 Self Supporting Lattice Structures

$G_h = 1.0$ Latticed Structures > 600 ft

$G_h = 0.85$ Latticed Structures 450 ft or less

$G_h = 0.85 + 0.15 [h/150 - 3.0]$

$h =$ ht. of structure

$h = 120$

$G_h = 0.85$

2.6.9.2 Guyed Masts

$G_h = 0.85$

2.6.9.3 Pole Structures

$G_h = 1.1$

2.6.9 Appurtenances

$G_h = 1.0$

2.6.9.4 Structures Supported on Other Structures

(Cantilevered tubular or latticed spines, pole, structures on buildings ($ht. : width$ ratio > 5))

$G_h = 1.35$

$G_h = 1.00$

2.6.11.2 Design Wind Force on Appurtenances

$F = q_z * G_h * (EPA)_A$

$q_z = 0.00256 * K_z * K_{zt} * K_s * K_e * K_d * V_{max}^2$

$q_z = 60.75$

$q_z (ice) = 9.42$

$q_z (30) = 3.39$

$K_z = 1.031$ (from 2.6.5.2)

$K_{zt} = 1.5$ (from 2.6.6.2.1)

$K_s = 1.0$ (from 2.6.7)

$K_e = 0.98$ (from 2.6.8)

$K_d = 0.95$ (from Table 2-2)

$V_{max} = 127$ mph (Ultimate Wind Speed)

$V_{max (ice)} = 50$ mph

$V_{30} = 30$ mph

Table 2-2

Structure Type	Wind Direction Probability Factor, K_d
Latticed structures with triangular, square or rectangular cross sections	0.85
Tubular pole structures, latticed structures with other cross sections, appurtenances	0.95
Tubular pole structures supporting antennas enclosed within a cylindrical shroud	1.00

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



Determine Ca:

Table 2-9

Force Coefficients (Ca) for Appurtenances				
Member Type		Aspect Ratio ≤ 2.5	Aspect Ratio = 7	Aspect Ratio ≥ 25
		Ca	Ca	Ca
Flat		1.2	1.4	2.0
Square/Rectangular HSS		1.2 - 2.8(r_s) ≥ 0.85	1.4 - 4.0(r_s) ≥ 0.90	2.0 - 6.0(r_s) ≥ 1.25
Round	C < 39 (Subcritical)	0.7	0.8	1.2
	39 ≤ C ≤ 78 (Transitional)	4.14/(C ^{0.485})	3.66/(C ^{0.415})	46.8/(C ^{1.0})
	C > 78 (Supercritical)	0.5	0.6	0.6

Aspect Ratio is the overall length/width ratio in the plane normal to the wind direction.
 (Aspect ratio is independent of the spacing between support points of a linear appurtenance,
 Note: Linear interpolation may be used for aspect ratios other than those shown.

Ice Thickness = **1.32 in** Angle = **0 (deg)** Equivalent Angle = **180 (deg)**

Appurtenances	Height	Width	Depth	Flat Area	Aspect Ratio	Ca	Force (lbs)	Force (lbs) (w/ Ice)	Force (lbs) (30 mph)
SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	4.67	1.30	362	72	20
800-10964 Antenna	59.0	20.0	6.9	8.19	2.95	1.22	607	111	34
4426 B66 RRH	14.9	13.2	5.8	1.37	1.13	1.20	100	22	6
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	2.57	1.20	44	12	2
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.13	1.20	100	22	6
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.43	1.20	78	18	4
RRUS-32 RRH	27.2	12.1	7.0	2.29	2.25	1.20	167	34	9
RRUS-32 RRH (Shielded)	27.2	0.2	7.0	0.04	136.00	5.70	13	32	1
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	2.25	1.20	167	34	9
RRUS-32 B2 RRH (Shielded)	27.2	0.0	7.0	0.00	0.00	1.20	0	0	0
RRUS 4415 RRH	16.5	13.4	5.9	1.54	1.23	1.20	112	24	6
RRUS 4415 RRH (Shielded)	16.5	0.2	5.9	0.02	82.50	3.92	5	14	0
Surge Arrestor	24.0	9.7	9.7	1.62	2.47	0.70	69	15	4
1-1/2" Pipe	1.9	12.0		0.16	0.16	1.20	12	5	1
2" Pipe	2.4	12.0		0.20	0.20	1.20	14	6	1
2x2 Angle	2.0	12.0		0.17	0.17	2.00	20	9	1
HSS 3x3	3.0	12.0		0.25	0.25	1.25	19	7	1
PL 4-3/8x3/8	4.4	12.0		0.37	0.37	1.25	28	8	2
HSS 6x3	6.0	12.0		0.50	0.50	1.25	38	10	2

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



WIND LOADS

Angle = 30 (deg)

Ice Thickness = 1.32 in.

Equivalent Angle = 210 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Aspect Ratio	Aspect Ratio	Ca (normal)	Ca (side)	Force (lbs) (normal)	Force (lbs) (side)	Force (lbs) (angle)
SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	362	238	391
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	607	249	518
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	100	44	86
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	44	100	58
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	100	78	94
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	78	100	84
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	150
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	89	101	92
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	150
RRUS-32 B2 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	89	101	92
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	112	50	96
RRUS 4415 RRH (Shielded)	16.5	6.7	5.9	0.77	0.68	2.46	2.80	1.20	1.21	56	50	54

WIND LOADS WITH ICE:

SBNHH-1D65A Antenna	58.2	14.5	9.7	5.88	3.94	4.01	5.98	1.27	1.35	70	50	65
800-10964 Antenna	61.6	22.6	9.5	9.69	4.08	2.72	6.47	1.21	1.38	110	53	96
4426 B66 RRH	17.5	15.8	8.4	1.93	1.03	1.11	2.08	1.20	1.20	22	12	19
4426 B66 RRH (Side)	17.5	8.4	15.8	1.03	1.93	2.08	1.11	1.20	1.20	12	22	14
4449 B5/B12 RRH	17.5	15.8	13.0	1.93	1.59	1.11	1.35	1.20	1.20	22	18	21
4449 B5/B12 RRH (Side)	17.5	13.0	15.8	1.59	1.93	1.35	1.11	1.20	1.20	18	22	19
RRUS-32 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	32
RRUS-32 RRH (Shielded)	29.8	7.4	9.6	1.53	2.00	4.05	3.10	1.27	1.23	18	23	19
RRUS-32 B2 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	32
RRUS-32 B2 RRH (Shielded)	29.8	7.4	9.6	1.53	2.00	4.05	3.10	1.27	1.23	18	23	19
RRUS 4415 RRH	19.1	16.0	8.5	2.13	1.13	1.19	2.24	1.20	1.20	24	13	21
RRUS 4415 RRH (Shielded)	19.1	8.0	8.5	1.07	1.13	2.39	2.24	1.20	1.20	12	13	12

WIND LOADS AT 30 MPH:

SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	20	13	18
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	34	14	29
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	6	2	5
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	2	6	3
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	6	4	5
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	4	6	5
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	8
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	5	6	5
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	8
RRUS-32 B2 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	5	6	5
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	6	3	5
RRUS 4415 RRH (Shielded)	16.5	6.7	5.9	0.77	0.68	2.46	2.80	1.20	1.21	3	3	3

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



WIND LOADS

Angle = 60 (deg) Ice Thickness = 1.32 in. Equivalent Angle = 240 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs) (normal)	Force (lbs) (side)	Force (lbs) (angle)
SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	362	238	269
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	607	249	339
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	100	44	58
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	44	100	86
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	100	78	84
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	78	100	94
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	118
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	127	101	108
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	118
RRUS-32 B2 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	127	101	108
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	112	50	65
RRUS 4415 RRH (Shielded)	16.5	10.1	5.9	1.15	0.68	1.64	2.80	1.20	1.21	84	50	58

WIND LOADS WITH ICE:

SBNHH-1D65A Antenna	58.2	14.5	9.7	5.88	3.94	4.01	5.98	1.27	1.35	70	50	55
800-10964 Antenna	61.6	22.6	9.5	9.69	4.08	2.72	6.47	1.21	1.38	110	53	67
4426 B66 RRH	17.5	15.8	8.4	1.93	1.03	1.11	2.08	1.20	1.20	22	12	14
4426 B66 RRH (Side)	17.5	8.4	15.8	1.03	1.93	2.08	1.11	1.20	1.20	12	22	19
4449 B5/B12 RRH	17.5	15.8	13.0	1.93	1.59	1.11	1.35	1.20	1.20	22	18	19
4449 B5/B12 RRH (Side)	17.5	13.0	15.8	1.59	1.93	1.35	1.11	1.20	1.20	18	22	21
RRUS-32 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	26
RRUS-32 RRH (Shielded)	29.8	11.0	9.6	2.29	2.00	2.70	3.10	1.21	1.23	26	23	24
RRUS-32 B2 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	26
RRUS-32 B2 RRH (Shielded)	29.8	11.0	9.6	2.29	2.00	2.70	3.10	1.21	1.23	26	23	24
RRUS 4415 RRH	19.1	16.0	8.5	2.13	1.13	1.19	2.24	1.20	1.20	24	13	16
RRUS 4415 RRH (Shielded)	19.1	12.0	8.5	1.60	1.13	1.59	2.24	1.20	1.20	18	13	14

WIND LOADS AT 30 MPH:

SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	20	13	15
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	34	14	19
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	6	2	3
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	2	6	5
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	6	4	5
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	4	6	5
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	7
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	7	6	6
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	7
RRUS-32 B2 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	7	6	6
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	6	3	4
RRUS 4415 RRH (Shielded)	16.5	10.1	5.9	1.15	0.68	1.64	2.80	1.20	1.21	5	3	3

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



WIND LOADS

Angle = 90 (deg)

Ice Thickness = 1.32 in.

Equivalent Angle = 270 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs) (normal)	Force (lbs) (side)	Force (lbs) (angle)
SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	362	238	238
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	607	249	249
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	100	44	44
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	44	100	100
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	100	78	78
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	78	100	100
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	101
RRUS-32 RRH (Shielded)	27.2	0.2	7.0	0.04	1.32	136.00	3.89	5.70	1.26	13	101	101
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	101
RRUS-32 B2 RRH (Shielded)	27.2	0.0	7.0	0.00	1.32	0.00	3.89	1.20	1.26	0	101	101
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	112	50	50
RRUS 4415 RRH (Shielded)	16.5	0.2	5.9	0.02	0.68	82.50	2.80	3.92	1.21	5	50	50

WIND LOADS WITH ICE:

SBNHH-1D65A Antenna	58.2	14.5	9.7	5.88	3.94	4.01	5.98	1.27	1.35	70	50	50
800-10964 Antenna	61.6	22.6	9.5	9.69	4.08	2.72	6.47	1.21	1.38	110	53	53
4426 B66 RRH	17.5	15.8	8.4	1.93	1.03	1.11	2.08	1.20	1.20	22	12	12
4426 B66 RRH (Side)	17.5	8.4	15.8	1.03	1.93	2.08	1.11	1.20	1.20	12	22	22
4449 B5/B12 RRH	17.5	15.8	13.0	1.93	1.59	1.11	1.35	1.20	1.20	22	18	18
4449 B5/B12 RRH (Side)	17.5	13.0	15.8	1.59	1.93	1.35	1.11	1.20	1.20	18	22	22
RRUS-32 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	23
RRUS-32 RRH (Shielded)	29.8	2.8	9.6	0.59	2.00	10.53	3.10	1.52	1.23	8	23	23
RRUS-32 B2 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	23
RRUS-32 B2 RRH (Shielded)	29.8	2.6	9.6	0.55	2.00	11.33	3.10	1.54	1.23	8	23	23
RRUS 4415 RRH	19.1	16.0	8.5	2.13	1.13	1.19	2.24	1.20	1.20	24	13	13
RRUS 4415 RRH (Shielded)	19.1	2.8	8.5	0.38	1.13	6.75	2.24	1.39	1.20	5	13	13

WIND LOADS AT 30 MPH:

SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	20	13	13
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	34	14	14
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	6	2	2
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	2	6	6
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	6	4	4
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	4	6	6
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	6
RRUS-32 RRH (Shielded)	27.2	0.2	7.0	0.04	1.32	136.00	3.89	5.70	1.26	1	6	6
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	6
RRUS-32 B2 RRH (Shielded)	27.2	0.0	7.0	0.00	1.32	0.00	3.89	1.20	1.26	0	6	6
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	6	3	3
RRUS 4415 RRH (Shielded)	16.5	0.2	5.9	0.02	0.68	82.50	2.80	3.92	1.21	0	3	3

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



WIND LOADS

Angle = 120 (deg) Ice Thickness = 1.32 in. Equivalent Angle = 300 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs) (normal)	Force (lbs) (side)	Force (lbs) (angle)
SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	362	238	269
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	607	249	339
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	100	44	58
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	44	100	86
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	100	78	84
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	78	100	94
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	118
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	127	101	108
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	118
RRUS-32 B2 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	127	101	108
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	112	50	65
RRUS 4415 RRH (Shielded)	16.5	10.1	5.9	1.15	0.68	1.64	2.80	1.20	1.21	84	50	58

WIND LOADS WITH ICE:

SBNHH-1D65A Antenna	58.2	14.5	9.7	5.88	3.94	4.01	5.98	1.27	1.35	70	50	55
800-10964 Antenna	61.6	22.6	9.5	9.69	4.08	2.72	6.47	1.21	1.38	110	53	67
4426 B66 RRH	17.5	15.8	8.4	1.93	1.03	1.11	2.08	1.20	1.20	22	12	14
4426 B66 RRH (Side)	17.5	8.4	15.8	1.03	1.93	2.08	1.11	1.20	1.20	12	22	19
4449 B5/B12 RRH	17.5	15.8	13.0	1.93	1.59	1.11	1.35	1.20	1.20	22	18	19
4449 B5/B12 RRH (Side)	17.5	13.0	15.8	1.59	1.93	1.35	1.11	1.20	1.20	18	22	21
RRUS-32 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	26
RRUS-32 RRH (Shielded)	29.8	11.0	9.6	2.29	2.00	2.70	3.10	1.21	1.23	26	23	24
RRUS-32 B2 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	26
RRUS-32 B2 RRH (Shielded)	29.8	11.0	9.6	2.29	2.00	2.70	3.10	1.21	1.23	26	23	24
RRUS 4415 RRH	19.1	16.0	8.5	2.13	1.13	1.19	2.24	1.20	1.20	24	13	16
RRUS 4415 RRH (Shielded)	19.1	12.0	8.5	1.60	1.13	1.59	2.24	1.20	1.20	18	13	14

WIND LOADS AT 30 MPH:

SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	20	13	15
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	34	14	19
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	6	2	3
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	2	6	5
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	6	4	5
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	4	6	5
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	7
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	7	6	6
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	7
RRUS-32 B2 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	7	6	6
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	6	3	4
RRUS 4415 RRH (Shielded)	16.5	10.1	5.9	1.15	0.68	1.64	2.80	1.20	1.21	5	3	3

Date: 4/25/2019
 Project Name: HRT 106(B) 943202
 Project No.: 806364
 Designed By: BD Checked By: MSC



WIND LOADS

Angle = 150 (deg) Ice Thickness = 1.32 in. Equivalent Angle = 330 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs) (normal)	Force (lbs) (side)	Force (lbs) (angle)
SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	362	238	331
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	607	249	518
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	100	44	86
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	44	100	58
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	100	78	94
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	78	100	84
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	150
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	89	101	92
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	167	101	150
RRUS-32 B2 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	89	101	92
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	112	50	96
RRUS 4415 RRH (Shielded)	16.5	6.7	5.9	0.77	0.68	2.46	2.80	1.20	1.21	56	50	54

WIND LOADS WITH ICE:

SBNHH-1D65A Antenna	58.2	14.5	9.7	5.88	3.94	4.01	5.98	1.27	1.35	70	50	65
800-10964 Antenna	61.6	22.6	9.5	9.69	4.08	2.72	6.47	1.21	1.38	110	53	96
4426 B66 RRH	17.5	15.8	8.4	1.93	1.03	1.11	2.08	1.20	1.20	22	12	19
4426 B66 RRH (Side)	17.5	8.4	15.8	1.03	1.93	2.08	1.11	1.20	1.20	12	22	14
4449 B5/B12 RRH	17.5	15.8	13.0	1.93	1.59	1.11	1.35	1.20	1.20	22	18	21
4449 B5/B12 RRH (Side)	17.5	13.0	15.8	1.59	1.93	1.35	1.11	1.20	1.20	18	22	19
RRUS-32 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	32
RRUS-32 RRH (Shielded)	29.8	7.4	9.6	1.53	2.00	4.05	3.10	1.27	1.23	18	23	19
RRUS-32 B2 RRH	29.8	14.7	9.6	3.05	2.00	2.02	3.10	1.20	1.23	34	23	32
RRUS-32 B2 RRH (Shielded)	29.8	7.4	9.6	1.53	2.00	4.05	3.10	1.27	1.23	18	23	19
RRUS 4415 RRH	19.1	16.0	8.5	2.13	1.13	1.19	2.24	1.20	1.20	24	13	21
RRUS 4415 RRH (Shielded)	19.1	8.0	8.5	1.07	1.13	2.39	2.24	1.20	1.20	12	13	12

WIND LOADS AT 30 MPH:

SBNHH-1D65A Antenna	55.6	11.9	7.1	4.59	2.74	4.67	7.83	1.30	1.43	20	13	18
800-10964 Antenna	59.0	20.0	6.9	8.19	2.83	2.95	8.55	1.22	1.45	34	14	29
4426 B66 RRH	14.9	13.2	5.8	1.37	0.60	1.13	2.57	1.20	1.20	6	2	5
4426 B66 RRH (Side)	14.9	5.8	13.2	0.60	1.37	2.57	1.13	1.20	1.20	2	6	3
4449 B5/B12 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	6	4	5
4449 B5/B12 RRH (Side)	14.9	10.4	13.2	1.08	1.37	1.43	1.13	1.20	1.20	4	6	5
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	8
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	5	6	5
RRUS-32 B2 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	9	6	8
RRUS-32 B2 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	5	6	5
RRUS 4415 RRH	16.5	13.4	5.9	1.54	0.68	1.23	2.80	1.20	1.21	6	3	5
RRUS 4415 RRH (Shielded)	16.5	6.7	5.9	0.77	0.68	2.46	2.80	1.20	1.21	3	3	3

Date: 4/25/2019

Project Name: HRT 106(B) 943202

Project No.: 806364

Designed By: BD Checked By: MSC



ICE WEIGHT CALCULATIONS

Thickness of ice: 1.32 in.
Density of ice: 56 pcf

SBNHH-1D65A Antenna

Weight of ice based on total radial SF area:
Height (in): 55.6
Width (in): 11.9
Depth (in): 7.1
Total weight of ice on object: 113 lbs
Weight of object: 34.0 lbs

Combined weight of ice and object: 147 lbs

800-10964 Antenna

Weight of ice based on total radial SF area:
Height (in): 59.0
Width (in): 20.0
Depth (in): 6.9
Total weight of ice on object: 178 lbs
Weight of object: 84.0 lbs

Combined weight of ice and object: 262 lbs

RRUS-32 RRH

Weight of ice based on total radial SF area:
Height (in): 27.2
Width (in): 12.1
Depth (in): 7.0
Total weight of ice on object: 56 lbs
Weight of object: 60.0 lbs

Combined weight of ice and object: 116 lbs

RRUS-32 B2 RRH

Weight of ice based on total radial SF area:
Height (in): 27.2
Width (in): 12.1
Depth (in): 7.0
Total weight of ice on object: 56 lbs
Weight of object: 60.0 lbs

Combined weight of ice and object: 116 lbs

RRUS 4415 RRH

Weight of ice based on total radial SF area:
Height (in): 16.5
Width (in): 13.4
Depth (in): 5.9
Total weight of ice on object: 35 lbs
Weight of object: 46.0 lbs

Combined weight of ice and object: 81 lbs

4426 B66 RRH

Weight of ice based on total radial SF area:
Height (in): 14.9
Width (in): 13.2
Depth (in): 5.8
Total weight of ice on object: 32 lbs
Weight of object: 49.0 lbs

Combined weight of ice and object: 81 lbs

4449 B5/B12 RRH

Weight of ice based on total radial SF area:
Height (in): 14.9
Width (in): 13.2
Depth (in): 10.4
Total weight of ice on object: 36 lbs
Weight of object: 73.0 lbs

Combined weight of ice and object: 109 lbs

Squid Surge Arrestor

Weight of ice based on total radial SF area:
Depth (in): 24.0
Diameter(in): 9.7
Total weight of ice on object: 36 lbs
Weight of object: 33 lbs

Combined weight of ice and object: 69 lbs

1-1/2" Pipe

Per foot weight of ice:
diameter (in): 1.9
Per foot weight of ice on object: 5 plf

2" pipe

Per foot weight of ice:
diameter (in): 2.38
Per foot weight of ice on object: 6 plf

L 2x2 Angles

Weight of ice based on total radial SF area:
Height (in): 2
Width (in): 2
Per foot weight of ice on object: 7 plf

PL 4-3/8x3/8

Weight of ice based on total radial SF area:
Height (in): 4.38
Width (in): 0.38
Per foot weight of ice on object: 9 plf

HSS 3x3

Weight of ice based on total radial SF area:
Height (in): 3
Width (in): 3
Per foot weight of ice on object: 9 plf

HSS 6x3

Weight of ice based on total radial SF area:
Height (in): 6
Width (in): 3
Per foot weight of ice on object: 13 plf

Load data

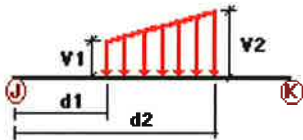
GLOSSARY

Comb : Indicates if load condition is a load combination

Load Conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
W0	Wind Load 0/60/120 deg	No	WIND
W30	Wind Load 30/90/150 deg	No	WIND
Di	Ice Load	No	LL
Wi0	Ice Wind Load 0/60/120 deg	No	WIND
Wi30	Ice Wind Load 30/90/150 deg	No	WIND
WL0	WL 30 mph 0/60/120 deg	No	WIND
WL30	WL 30 mph 30/90/150 deg	No	WIND
LL1	250 lb Live Load Center of Mount	No	LL
LL2	250 lb Live Load End of Mount	No	LL
LLa1	500 lb Live Load Antenna 1	No	LL
LLa2	500 lb Live Load Antenna 2	No	LL
LLa3	500 lb Live Load Antenna 3	No	LL
LLa4	500 lb Live Load Antenna 4	No	LL

Distributed force on members

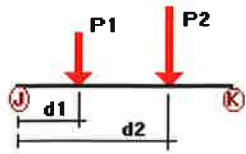


Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
DL	1	y	-0.01	-0.01	1.67	No	100.00	Yes
	2	y	-0.01	-0.01	0.40	No	100.00	Yes
	3	y	-0.01	-0.01	0.40	No	100.00	Yes
	4	y	-0.01	-0.01	0.40	No	100.00	Yes
	5	y	-0.01	-0.01	0.40	No	100.00	Yes
	11	y	-0.01	-0.01	1.67	No	100.00	Yes
	12	y	-0.01	-0.01	0.40	No	100.00	Yes
	13	y	-0.01	-0.01	0.40	No	100.00	Yes
	14	y	-0.01	-0.01	0.40	No	100.00	Yes
	15	y	-0.01	-0.01	0.40	No	100.00	Yes
	16	y	-0.01	-0.01	1.67	No	100.00	Yes
	17	y	-0.01	-0.01	0.40	No	100.00	Yes
	18	y	-0.01	-0.01	0.40	No	100.00	Yes
	19	y	-0.01	-0.01	0.40	No	100.00	Yes
	20	y	-0.01	-0.01	0.40	No	100.00	Yes

	24	y	-0.01	0.00	0.00	No	0.00	No
	25	y	-0.01	0.00	0.00	No	0.00	No
	26	y	-0.01	0.00	0.00	No	0.00	No
	27	y	-0.01	0.00	0.00	No	0.00	No
	28	y	-0.01	0.00	0.00	No	0.00	No
	29	y	-0.01	0.00	0.00	No	0.00	No
	30	y	-0.01	0.00	0.00	No	0.00	No
	31	y	-0.01	0.00	0.00	No	0.00	No
	32	y	-0.01	0.00	0.00	No	0.00	No
WO	1	Z	-0.038	-0.038	0.00	Yes	100.00	Yes
	2	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	3	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	4	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	5	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	11	Z	-0.038	-0.038	0.00	Yes	100.00	Yes
	12	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	13	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	14	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	15	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	17	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	18	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	19	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	20	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	21	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	22	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	23	Z	-0.019	-0.019	0.00	Yes	100.00	Yes
	33	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	35	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	36	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	44	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	45	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	46	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	47	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	48	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	49	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	50	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	51	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
W30	1	X	-0.038	-0.038	0.00	Yes	100.00	Yes
	2	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	3	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	4	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	5	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	11	X	-0.038	-0.038	0.00	Yes	100.00	Yes
	12	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	13	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	14	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	15	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	16	X	-0.038	-0.038	0.00	Yes	100.00	Yes
	22	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	23	X	-0.019	-0.019	0.00	Yes	100.00	Yes
	33	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	35	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	40	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	41	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	42	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	43	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	44	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	45	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	46	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	47	X	-0.014	-0.014	0.00	Yes	100.00	Yes

	48	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	49	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	50	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	51	X	-0.014	-0.014	0.00	Yes	100.00	Yes
Di	1	Y	-0.013	-0.013	0.00	Yes	100.00	Yes
	2	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	3	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	4	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	5	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	11	Y	-0.013	-0.013	0.00	Yes	100.00	Yes
	12	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	13	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	14	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	15	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	16	Y	-0.013	-0.013	0.00	Yes	100.00	Yes
	17	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	18	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	19	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	20	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	21	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	22	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	23	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	24	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	25	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	26	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	27	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	28	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	29	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	30	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	31	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	32	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	33	Y	-0.005	-0.005	0.00	Yes	100.00	Yes
	35	Y	-0.005	-0.005	0.00	Yes	100.00	Yes
	36	Y	-0.005	-0.005	0.00	Yes	100.00	Yes
	37	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	38	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	39	Y	-0.009	-0.009	0.00	Yes	100.00	Yes
	40	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	41	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	42	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	43	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	44	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	45	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	46	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	47	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	48	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	49	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	50	Y	-0.006	-0.006	0.00	Yes	100.00	Yes
	51	Y	-0.006	-0.006	0.00	Yes	100.00	Yes

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
DL	40	y	-0.017	0.50	No
		y	-0.017	5.13	No
		y	-0.06	3.00	No
	41	y	-0.042	0.50	No
		y	-0.042	5.42	No
		y	-0.06	3.00	No
	42	y	-0.042	0.50	No
		y	-0.042	5.42	No
		y	-0.122	3.00	No
	43	y	-0.017	0.50	No
		y	-0.017	5.13	No
		y	-0.046	3.00	No
	44	y	-0.017	0.50	No
		y	-0.017	5.13	No
		y	-0.06	3.00	No
	45	y	-0.042	0.50	No
		y	-0.042	5.42	No
		y	-0.06	3.00	No
	46	y	-0.042	0.50	No
		y	-0.042	5.42	No
		y	-0.122	3.00	No
	47	y	-0.017	0.50	No
		y	-0.017	5.13	No
		y	-0.046	3.00	No
	48	y	-0.017	0.50	No
		y	-0.017	5.13	No
		y	-0.06	3.00	No
	49	y	-0.042	0.50	No
		y	-0.042	5.42	No
		y	-0.06	3.00	No
50	y	-0.042	0.50	No	
	y	-0.042	5.42	No	
	y	-0.122	3.00	No	
51	y	-0.017	0.50	No	
	y	-0.017	5.13	No	
	y	-0.046	3.00	No	
W0	40	z	-0.181	0.50	No
		z	-0.181	5.13	No
		z	-0.013	3.00	No
	41	z	-0.304	0.50	No
		z	-0.304	5.42	No
		z	-0.304	0.50	No
	42	z	-0.304	5.42	No
		z	-0.304	0.50	No
		z	-0.304	5.42	No
	43	z	-0.181	0.50	No
		z	-0.181	5.13	No
		z	-0.005	3.00	No
	44	z	-0.135	0.50	No
		z	-0.135	5.13	No
		z	-0.108	3.00	No
45	z	-0.17	0.50	No	
	z	-0.17	5.42	No	
	z	-0.17	0.50	No	
46	z	-0.17	5.42	No	
	z	-0.17	0.50	No	
	z	-0.17	5.42	No	
47	z	-0.135	0.50	No	

		z	-0.135	5.13	No
		z	-0.058	3.00	No
	48	z	-0.135	0.50	No
		z	-0.135	5.13	No
		z	-0.108	3.00	No
	49	z	-0.17	0.50	No
		z	-0.17	5.42	No
	50	z	-0.17	0.50	No
		z	-0.17	5.42	No
	51	z	-0.135	0.50	No
		z	-0.135	5.13	No
		z	-0.058	3.00	No
W30	40	x	-0.119	0.50	No
		x	-0.119	5.13	No
		x	-0.101	3.00	No
	41	x	-0.125	0.50	No
		x	-0.125	5.42	No
		x	-0.101	3.00	No
	42	x	-0.125	0.50	No
		x	-0.125	5.42	No
		x	-0.10	3.00	No
	43	x	-0.119	0.50	No
		x	-0.119	5.13	No
		x	-0.05	3.00	No
	44	x	-0.166	0.50	No
		x	-0.166	5.13	No
		x	-0.092	3.00	No
	45	x	-0.259	0.50	No
		x	-0.259	5.42	No
		x	-0.092	3.00	No
	46	x	-0.259	0.50	No
		x	-0.259	5.42	No
		x	-0.084	3.00	No
	47	x	-0.166	0.50	No
		x	-0.166	5.13	No
		x	-0.054	3.00	No
	48	x	-0.166	0.50	No
		x	-0.166	5.13	No
		x	-0.092	3.00	No
	49	x	-0.259	0.50	No
		x	-0.259	5.42	No
		x	-0.092	3.00	No
	50	x	-0.259	0.50	No
		x	-0.259	5.42	No
		x	-0.084	3.00	No
	51	x	-0.166	0.50	No
		x	-0.166	5.13	No
		x	-0.054	3.00	No
Di	40	y	-0.057	0.50	No
		y	-0.057	5.13	No
		y	-0.056	3.00	No
	41	y	-0.089	0.50	No
		y	-0.089	5.42	No
		y	-0.056	3.00	No
	42	y	-0.089	0.50	No
		y	-0.089	5.42	No
		y	-0.068	3.00	No
	43	y	-0.057	0.50	No
		y	-0.057	5.13	No
		y	-0.035	3.00	No

	44	y	-0.057	0.50	No
		y	-0.057	5.13	No
		y	-0.056	3.00	No
	45	y	-0.089	0.50	No
		y	-0.089	5.42	No
		y	-0.056	3.00	No
	46	y	-0.089	0.50	No
		y	-0.089	5.42	No
		y	-0.068	3.00	No
	47	y	-0.057	0.50	No
		y	-0.057	5.13	No
		y	-0.035	3.00	No
	48	y	-0.057	0.50	No
		y	-0.057	5.13	No
		y	-0.056	3.00	No
	49	y	-0.089	0.50	No
		y	-0.089	5.42	No
		y	-0.056	3.00	No
	50	y	-0.089	0.50	No
		y	-0.089	5.42	No
		y	-0.068	3.00	No
	51	y	-0.057	0.50	No
		y	-0.057	5.13	No
		y	-0.035	3.00	No
Wi0	40	z	-0.036	0.50	No
		z	-0.036	5.13	No
		z	-0.032	3.00	No
	41	z	-0.056	0.50	No
		z	-0.056	5.42	No
	42	z	-0.056	0.50	No
		z	-0.056	5.42	No
	43	z	-0.036	0.50	No
		z	-0.036	5.13	No
		z	-0.014	3.00	No
	44	z	-0.028	0.50	No
		z	-0.028	5.13	No
		z	-0.024	3.00	No
	45	z	-0.034	0.50	No
		z	-0.034	5.42	No
	46	z	-0.034	0.50	No
		z	-0.034	5.42	No
	47	z	-0.028	0.50	No
		z	-0.028	5.13	No
		z	-0.014	3.00	No
	48	z	-0.028	0.50	No
		z	-0.028	5.13	No
		z	-0.024	3.00	No
	49	z	-0.034	0.50	No
		z	-0.034	5.42	No
	50	z	-0.034	0.50	No
		z	-0.034	5.42	No
	51	z	-0.028	0.50	No
		z	-0.028	5.13	No
		z	-0.014	3.00	No
Wi30	40	x	-0.025	0.50	No
		x	-0.025	5.13	No
		x	-0.023	3.00	No
	41	x	-0.027	0.50	No
		x	-0.027	5.42	No
		x	-0.023	3.00	No

	42	x	-0.027	0.50	No
		x	-0.027	5.42	No
		x	-0.022	3.00	No
	43	x	-0.025	0.50	No
		x	-0.025	5.13	No
		x	-0.013	3.00	No
	44	x	-0.033	0.50	No
		x	-0.033	5.13	No
		x	-0.019	3.00	No
	45	x	-0.048	0.50	No
		x	-0.048	5.42	No
		x	-0.019	3.00	No
	46	x	-0.048	0.50	No
		x	-0.048	5.42	No
		x	-0.019	3.00	No
	47	x	-0.033	0.50	No
		x	-0.033	5.13	No
		x	-0.012	3.00	No
	48	x	-0.033	0.50	No
		x	-0.033	5.13	No
		x	-0.019	3.00	No
	49	x	-0.048	0.50	No
		x	-0.048	5.42	No
		x	-0.019	3.00	No
	50	x	-0.048	0.50	No
		x	-0.048	5.42	No
		x	-0.019	3.00	No
	51	x	-0.033	0.50	No
		x	-0.033	5.13	No
		x	-0.012	3.00	No
WLO	40	z	-0.01	0.50	No
		z	-0.01	5.13	No
		z	-0.001	3.00	No
	41	z	-0.017	0.50	No
		z	-0.017	5.42	No
	42	z	-0.017	0.50	No
		z	-0.017	5.42	No
	43	z	-0.01	0.50	No
		z	-0.01	5.13	No
		z	-0.001	3.00	No
	44	z	-0.008	0.50	No
		z	-0.008	5.13	No
		z	-0.006	3.00	No
	45	z	-0.01	0.50	No
		z	-0.01	5.42	No
	46	z	-0.01	0.50	No
		z	-0.01	5.42	No
	47	z	-0.008	0.50	No
		z	-0.008	5.13	No
		z	-0.003	3.00	No
	48	z	-0.008	0.50	No
		z	-0.008	5.13	No
		z	-0.006	3.00	No
	49	z	-0.01	0.50	No
		z	-0.01	5.42	No
	50	z	-0.01	0.50	No
		z	-0.01	5.42	No
	51	z	-0.008	0.50	No
		z	-0.008	5.13	No
		z	-0.003	3.00	No

WL30	40	x	-0.007	0.50	No
		x	-0.007	5.13	No
		x	-0.006	3.00	No
	41	x	-0.007	0.50	No
		x	-0.007	5.42	No
		x	-0.006	3.00	No
	42	x	-0.007	0.50	No
		x	-0.007	5.42	No
		x	-0.006	3.00	No
	43	x	-0.007	0.50	No
		x	-0.007	5.13	No
		x	-0.003	3.00	No
	44	x	-0.009	0.50	No
		x	-0.009	5.13	No
		x	-0.005	3.00	No
	45	x	-0.015	0.50	No
		x	-0.015	5.42	No
		x	-0.005	3.00	No
	46	x	-0.015	0.50	No
		x	-0.015	5.42	No
		x	-0.005	3.00	No
	47	x	-0.009	0.50	No
		x	-0.009	5.13	No
		x	-0.003	3.00	No
	48	x	-0.009	0.50	No
		x	-0.009	5.13	No
		x	-0.005	3.00	No
	49	x	-0.015	0.50	No
		x	-0.015	5.42	No
		x	-0.005	3.00	No
	50	x	-0.015	0.50	No
		x	-0.015	5.42	No
		x	-0.005	3.00	No
	51	x	-0.009	0.50	No
		x	-0.009	5.13	No
		x	-0.003	3.00	No
LL1	21	y	-0.25	50.00	Yes
LL2	21	y	-0.25	0.00	No
LLa1	40	y	-0.50	50.00	Yes
LLa2	41	y	-0.50	50.00	Yes
LLa3	42	y	-0.50	50.00	Yes
LLa4	43	y	-0.50	50.00	Yes

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
DL	Dead Load	No	0.00	-1.00	0.00
W0	Wind Load 0/60/120 deg	No	0.00	0.00	0.00
W30	Wind Load 30/90/150 deg	No	0.00	0.00	0.00
Di	Ice Load	No	0.00	0.00	0.00
Wi0	Ice Wind Load 0/60/120 deg	No	0.00	0.00	0.00
Wi30	Ice Wind Load 30/90/150 deg	No	0.00	0.00	0.00
WL0	WL 30 mph 0/60/120 deg	No	0.00	0.00	0.00
WL30	WL 30 mph 30/90/150 deg	No	0.00	0.00	0.00

LL1	250 lb Live Load Center of Mount	No	0.00	0.00	0.00
LL2	250 lb Live Load End of Mount	No	0.00	0.00	0.00
LLa1	500 lb Live Load Antenna 1	No	0.00	0.00	0.00
LLa2	500 lb Live Load Antenna 2	No	0.00	0.00	0.00
LLa3	500 lb Live Load Antenna 3	No	0.00	0.00	0.00
LLa4	500 lb Live Load Antenna 4	No	0.00	0.00	0.00

Earthquake (Dynamic analysis only)

Condition	a/g	Ang. [Deg]	Damp. [%]
DL	0.00	0.00	0.00
W0	0.00	0.00	0.00
W30	0.00	0.00	0.00
Di	0.00	0.00	0.00
Wi0	0.00	0.00	0.00
Wi30	0.00	0.00	0.00
WL0	0.00	0.00	0.00
WL30	0.00	0.00	0.00
LL1	0.00	0.00	0.00
LL2	0.00	0.00	0.00
LLa1	0.00	0.00	0.00
LLa2	0.00	0.00	0.00
LLa3	0.00	0.00	0.00
LLa4	0.00	0.00	0.00

Geometry data

GLOSSARY

Cb22, Cb33	: Moment gradient coefficients
Cm22, Cm33	: Coefficients applied to bending term in interaction formula
d0	: Tapered member section depth at J end of member
DJX	: Rigid end offset distance measured from J node in axis X
DJY	: Rigid end offset distance measured from J node in axis Y
DJZ	: Rigid end offset distance measured from J node in axis Z
DKX	: Rigid end offset distance measured from K node in axis X
DKY	: Rigid end offset distance measured from K node in axis Y
DKZ	: Rigid end offset distance measured from K node in axis Z
dL	: Tapered member section depth at K end of member
Ig factor	: Inertia reduction factor (Effective Inertia/Gross Inertia) for reinforced concrete members
K22	: Effective length factor about axis 2
K33	: Effective length factor about axis 3
L22	: Member length for calculation of axial capacity
L33	: Member length for calculation of axial capacity
LB pos	: Lateral unbraced length of the compression flange in the positive side of local axis 2
LB neg	: Lateral unbraced length of the compression flange in the negative side of local axis 2
RX	: Rotation about X
RY	: Rotation about Y
RZ	: Rotation about Z
TO	: 1 = Tension only member 0 = Normal member
TX	: Translation in X
TY	: Translation in Y
TZ	: Translation in Z

Nodes

Node	X [ft]	Y [ft]	Z [ft]	Rigid Floor
1	0.00	0.00	0.00	0
2	0.866	0.00	0.50	0
3	2.3123	0.00	1.335	0
4	4.9645	0.00	2.8663	0
5	4.5061	0.00	3.6601	0
6	5.4228	0.00	2.0724	0
9	4.5495	0.00	2.6267	0
10	0.7706	0.00	4.0052	0
11	3.8539	0.00	-1.3352	0
12	3.7578	0.00	3.9978	0
13	5.3411	0.00	1.2555	0
24	-0.866	0.00	0.50	0
25	-2.3123	0.00	1.335	0
26	-4.9645	0.00	2.8663	0
27	-5.4228	0.00	2.0724	0
28	-4.5061	0.00	3.6601	0
29	-4.5495	0.00	2.6267	0
30	-3.8539	0.00	-1.3352	0
31	-0.7706	0.00	4.0052	0
32	-5.3411	0.00	1.2555	0
33	-3.7578	0.00	3.9978	0
34	0.00	0.00	-1.00	0

35	0.00	0.00	-2.67	0
36	0.00	0.00	-5.7325	0
37	0.9167	0.00	-5.7325	0
38	-0.9167	0.00	-5.7325	0
39	0.00	0.00	-5.2533	0
40	3.0833	0.00	-2.67	0
41	-3.0833	0.00	-2.67	0
42	1.5833	0.00	-5.2533	0
43	-1.5833	0.00	-5.2533	0
44	6.5872	0.00	3.4137	0
45	0.3372	0.00	-7.4116	0
48	-0.3372	0.00	-7.4116	0
49	-6.5872	0.00	3.4137	0
50	-6.25	0.00	3.9978	0
51	6.25	0.00	3.9978	0
53	-2.6979	0.00	-2.67	0
54	-3.6612	0.00	-1.0014	0
57	3.6612	0.00	-1.0014	0
58	2.6979	0.00	-2.67	0
59	-0.9633	0.00	3.6714	0
60	0.9633	0.00	3.6714	0
61	0.4622	0.00	-7.1951	0
62	6.4622	0.00	3.1972	0
63	2.4622	0.00	-3.731	0
64	4.4622	0.00	-0.2669	0
65	0.6354	0.00	-7.2951	0
66	6.6354	0.00	3.0972	0
67	2.6354	0.00	-3.831	0
68	4.6354	0.00	-0.3669	0
69	0.6354	4.75	-7.2951	0
70	6.6354	4.75	3.0972	0
71	2.6354	4.75	-3.831	0
72	4.6354	4.75	-0.3669	0
73	0.6354	-1.25	-7.2951	0
74	6.6354	-1.25	3.0972	0
75	2.6354	-1.25	-3.831	0
76	4.6354	-1.25	-0.3669	0
77	0.4622	3.50	-7.1951	0
78	0.6354	3.50	-7.2951	0
79	0.3372	3.50	-7.4116	0
80	2.4622	3.50	-3.731	0
81	2.6354	3.50	-3.831	0
82	4.4622	3.50	-0.2669	0
83	4.6354	3.50	-0.3669	0
84	6.5872	3.50	3.4137	0
85	6.4622	3.50	3.1972	0
86	6.6354	3.50	3.0972	0
113	-6.6354	4.75	3.0972	0
114	-0.6354	4.75	-7.2951	0
115	-4.6354	4.75	-0.3669	0
116	-2.6354	4.75	-3.831	0
117	-6.4622	3.50	3.1972	0
118	-6.6354	3.50	3.0972	0
119	-6.5872	3.50	3.4137	0
120	-4.4622	3.50	-0.2669	0
121	-4.6354	3.50	-0.3669	0
122	-2.4622	3.50	-3.731	0
123	-2.6354	3.50	-3.831	0
124	-0.3372	3.50	-7.4116	0
125	-0.4622	3.50	-7.1951	0

126	-0.6354	3.50	-7.2951	0
127	-6.6354	-1.25	3.0972	0
128	-0.6354	-1.25	-7.2951	0
129	-4.6354	-1.25	-0.3669	0
130	-2.6354	-1.25	-3.831	0
131	-0.4622	0.00	-7.1951	0
132	-0.6354	0.00	-7.2951	0
133	-2.4622	0.00	-3.731	0
134	-2.6354	0.00	-3.831	0
135	-4.4622	0.00	-0.2669	0
136	-4.6354	0.00	-0.3669	0
137	-6.4622	0.00	3.1972	0
138	-6.6354	0.00	3.0972	0
139	6.00	4.75	4.1978	0
140	-6.00	4.75	4.1978	0
141	2.00	4.75	4.1978	0
142	-2.00	4.75	4.1978	0
143	6.00	3.50	3.9978	0
144	6.00	3.50	4.1978	0
145	6.25	3.50	3.9978	0
146	2.00	3.50	3.9978	0
147	2.00	3.50	4.1978	0
148	-2.00	3.50	3.9978	0
149	-2.00	3.50	4.1978	0
150	-6.25	3.50	3.9978	0
151	-6.00	3.50	3.9978	0
152	-6.00	3.50	4.1978	0
153	6.00	-1.25	4.1978	0
154	-6.00	-1.25	4.1978	0
155	2.00	-1.25	4.1978	0
156	-2.00	-1.25	4.1978	0
157	-6.00	0.00	3.9978	0
158	-6.00	0.00	4.1978	0
159	-2.00	0.00	3.9978	0
160	-2.00	0.00	4.1978	0
161	2.00	0.00	3.9978	0
162	2.00	0.00	4.1978	0
163	6.00	0.00	3.9978	0
164	6.00	0.00	4.1978	0
165	-1.2972	3.50	-5.7488	0
166	-5.6272	3.50	1.751	0
169	1.2972	3.50	-5.7488	0
170	5.6272	3.50	1.751	0
171	4.33	3.50	3.9978	0
172	-4.33	3.50	3.9978	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
2	1	1	1	1	1	1
24	1	1	1	1	1	1
34	1	1	1	1	1	1

Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	Ig factor
1	2	4		HSS_RECT 6X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
2	11	3		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
3	10	3		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
4	13	9		HSS_SQR 3X3X1_4	A500 GrC rectangular	0.00	0.00	0.00
5	12	9		HSS_SQR 3X3X1_4	A500 GrC rectangular	0.00	0.00	0.00
11	24	26		HSS_RECT 6X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
12	31	25		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
13	30	25		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
14	33	29		HSS_SQR 3X3X1_4	A500 GrC rectangular	0.00	0.00	0.00
15	32	29		HSS_SQR 3X3X1_4	A500 GrC rectangular	0.00	0.00	0.00
16	34	36		HSS_RECT 6X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
17	41	35		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
18	40	35		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
19	43	39		HSS_SQR 3X3X1_4	A500 GrC rectangular	0.00	0.00	0.00
20	42	39		HSS_SQR 3X3X1_4	A500 GrC rectangular	0.00	0.00	0.00
21	51	50		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
22	49	48		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
23	45	44		HSS_SQR 3X3X3_16	A500 GrC rectangular	0.00	0.00	0.00
24	59	28		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
25	28	27		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
26	27	54		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
27	53	38		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
28	38	37		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
29	37	58		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
30	57	6		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
31	6	5		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
32	5	60		L 2X2X3_16	A529 Gr50	0.00	0.00	0.00
33	79	84		PIPE 1-1_2x0.145	A53 GrB SABRE 50...	0.00	0.00	0.00
35	119	124		PIPE 1-1_2x0.145	A53 GrB SABRE 50...	0.00	0.00	0.00
36	145	150		PIPE 1-1_2x0.145	A53 GrB SABRE 50...	0.00	0.00	0.00
37	172	166		PL 4-3/8x3/8	A529 Gr50	0.00	0.00	0.00
38	165	169		PL 4-3/8x3/8	A529 Gr50	0.00	0.00	0.00
39	170	171		PL 4-3/8x3/8	A529 Gr50	0.00	0.00	0.00
40	139	153		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
41	141	155		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
42	142	156		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
43	140	154		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
44	113	127		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
45	115	129		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
46	116	130		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
47	114	128		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
48	69	73		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
49	71	75		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
50	72	76		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
51	70	74		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00

Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
1	90.00	0	0.00	0.00	0.00
11	90.00	0	0.00	0.00	0.00
16	90.00	0	0.00	0.00	0.00
37	90.00	0	0.00	0.00	0.00
38	90.00	0	0.00	0.00	0.00
39	90.00	0	0.00	0.00	0.00

Rigid end offsets





Member	DJX [in]	DJY [in]	DJZ [in]	DKX [in]	DKY [in]	DKZ [in]
21	0.00	3.00	0.00	0.00	3.00	0.00
22	0.00	3.00	0.00	0.00	3.00	0.00
23	0.00	3.00	0.00	0.00	3.00	0.00
24	0.00	2.00	0.00	0.00	2.00	0.00
25	0.00	2.00	0.00	0.00	2.00	0.00
26	0.00	2.00	0.00	0.00	2.00	0.00
27	0.00	2.00	0.00	0.00	2.00	0.00
28	0.00	2.00	0.00	0.00	2.00	0.00
29	0.00	2.00	0.00	0.00	2.00	0.00
30	0.00	2.00	0.00	0.00	2.00	0.00
31	0.00	2.00	0.00	0.00	2.00	0.00
32	0.00	2.00	0.00	0.00	2.00	0.00
37	0.00	-0.95	0.00	0.00	-0.95	0.00
38	0.00	-0.95	0.00	0.00	-0.95	0.00
39	0.00	-0.95	0.00	0.00	-0.95	0.00

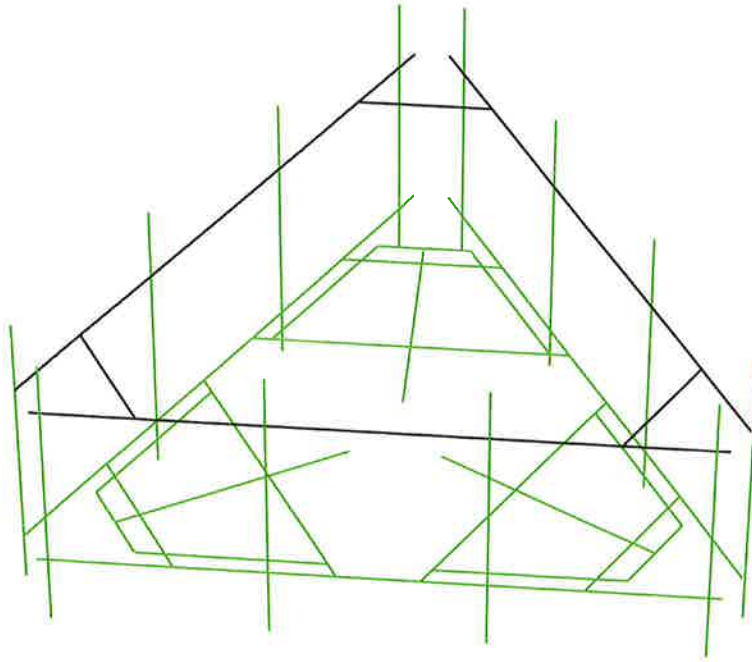
Hinges

Member	Node-J				Node-K				TOR	AXL	Axial rigidity
	M33	M22	V3	V2	M33	M22	V3	V2			
37	1	1	0	0	1	1	0	0	0	0	Full
38	1	1	0	0	1	1	0	0	0	0	Full
39	1	1	0	0	1	1	0	0	0	0	Full

APPENDIX C
SOFTWARE ANALYSIS OUTPUT

Design status

-  Not designed
-  Error on design
-  Design O.K.
-  With warnings



Steel Code Check

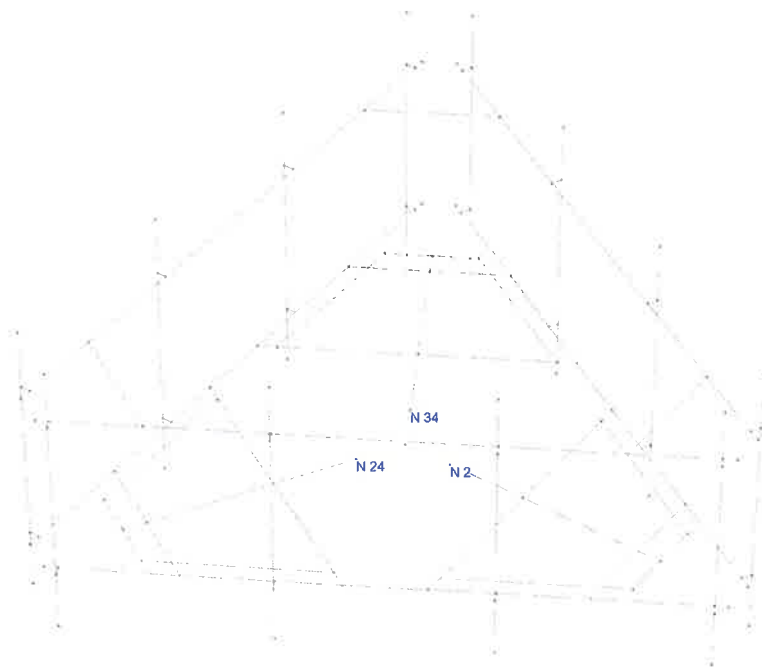
Report: Summary - Group by member
Load conditions to be included in design :

LC1=1.2DL+W0
 LC2=1.2DL+W30
 LC3=1.2DL-W0
 LC4=1.2DL-W30
 LC5=0.9DL+W0
 LC6=0.9DL+W30
 LC7=0.9DL-W0
 LC8=0.9DL-W30
 LC9=1.2DL+Di+W0
 LC10=1.2DL+Di+W30
 LC11=1.2DL+Di-W0
 LC12=1.2DL+Di-W30
 LC13=1.2DL
 LC15=1.2DL+1.5LL1
 LC16=1.2DL+1.5LL2
 LC17=1.2DL+W0+1.5LLa1
 LC18=1.2DL+W30+1.5LLa1
 LC19=1.2DL-W0+1.5LLa1
 LC20=1.2DL-W30+1.5LLa1
 LC21=1.2DL+W0+1.5LLa2
 LC22=1.2DL+W30+1.5LLa2
 LC23=1.2DL-W0+1.5LLa2
 LC24=1.2DL-W30+1.5LLa2
 LC25=1.2DL+W0+1.5LLa3
 LC26=1.2DL+W30+1.5LLa3
 LC27=1.2DL-W0+1.5LLa3
 LC28=1.2DL-W30+1.5LLa3
 LC29=1.2DL+W0+1.5LLa4
 LC30=1.2DL+W30+1.5LLa4
 LC31=1.2DL-W0+1.5LLa4
 LC32=1.2DL-W30+1.5LLa4

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_RECT 6X3X3_16	1	LC4 at 0.00%	0.86	OK	Eq. H1-1b
		11	LC2 at 0.00%	0.87	OK	Eq. H1-1b
		16	LC1 at 0.00%	0.84	OK	Eq. H1-1b
	HSS_SQR 3X3X1_4	4	LC2 at 100.00%	0.33	OK	Eq. H1-1b
		5	LC1 at 0.00%	0.28	OK	Eq. H1-1b
		14	LC1 at 0.00%	0.28	OK	Eq. H1-1b
		15	LC4 at 100.00%	0.33	OK	Eq. H1-1b
		19	LC4 at 0.00%	0.34	OK	Eq. H1-1b
		20	LC2 at 0.00%	0.35	OK	Eq. H1-1b
	HSS_SQR 3X3X3_16	2	LC4 at 100.00%	0.55	OK	Eq. H1-1b
		3	LC3 at 100.00%	0.46	OK	Eq. H1-1b
		12	LC3 at 100.00%	0.46	OK	Eq. H1-1b
		13	LC2 at 100.00%	0.55	OK	Eq. H1-1b
		17	LC1 at 100.00%	0.49	OK	Eq. H1-1b
		18	LC1 at 100.00%	0.48	OK	Eq. H1-1b
		21	LC4 at 44.44%	0.30	OK	Eq. H1-1b

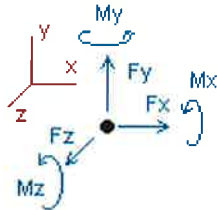
	22	LC4 at 56.25%	0.35	OK	Eq. H3-6
	23	LC2 at 43.75%	0.35	OK	Eq. H3-6
<hr/>					
L 2X2X3_16	24	LC11 at 84.38%	0.65	OK	Eq. H3-8
	25	LC12 at 50.00%	0.42	OK	Eq. H2-1
	26	LC9 at 15.63%	0.65	OK	Eq. H3-8
	27	LC10 at 84.38%	0.65	OK	Eq. H3-8
	28	LC11 at 50.00%	0.41	OK	Eq. H2-1
	29	LC12 at 15.63%	0.65	OK	Eq. H3-8
	30	LC9 at 84.38%	0.65	OK	Eq. H3-8
	31	LC9 at 50.00%	0.41	OK	Eq. H2-1
	32	LC11 at 15.63%	0.65	OK	Eq. H3-8
<hr/>					
PIPE 1-1_2x0.145	33	LC1 at 66.07%	0.45	With warnings	Eq. H1-1b
	35	LC1 at 33.93%	0.46	With warnings	Eq. H1-1b
	36	LC2 at 33.93%	0.42	With warnings	Eq. H1-1b
<hr/>					
PIPE 2-1_2x0.203	41	LC1 at 77.08%	0.62	OK	Eq. H1-1b
	42	LC1 at 77.08%	0.63	OK	Eq. H1-1b
	45	LC3 at 77.08%	0.71	OK	Eq. H1-1b
	46	LC4 at 77.08%	0.81	OK	Eq. H1-1b
	49	LC2 at 77.08%	0.80	OK	Eq. H1-1b
	50	LC3 at 77.08%	0.72	OK	Eq. H1-1b
<hr/>					
PIPE 2x0.154	40	LC17 at 77.08%	0.57	OK	Eq. H1-1b
	43	LC29 at 77.08%	0.56	OK	Eq. H1-1b
	44	LC3 at 77.08%	0.82	OK	Eq. H1-1b
	47	LC4 at 77.08%	0.91	OK	Eq. H1-1b
	48	LC2 at 77.08%	0.94	OK	Eq. H1-1b
	51	LC3 at 77.08%	0.79	OK	Eq. H1-1b
<hr/>					
PL 4-3/8x3/8	37	LC1 at 0.00%	0.11	With warnings	Eq. H3-1
	38	LC4 at 0.00%	0.15	With warnings	Eq. H3-1
	39	LC3 at 0.00%	0.11	With warnings	Eq. H3-1

APPENDIX D
ADDITIONAL CALCUATIONS



Analysis result

Reactions



Direction of positive forces and moments

Node	Forces [Kip]			Moments [Kip*ft]		
	FX	FY	FZ	MX	MY	MZ
Condition LC1=1.2DL+W0						
2	1.25664	0.50690	3.17439	1.04832	-2.66649	1.03383
34	-0.03387	2.94229	1.06345	7.14191	0.06030	-0.00360
24	-1.22277	0.50863	3.21832	1.01898	2.76934	-1.02874
SUM	0.00000	3.95782	7.45616	9.20921	0.16315	0.00150
Condition LC2=1.2DL+W30						
2	3.68127	-0.20131	1.16865	-0.06282	0.89970	-1.82020
34	3.16357	1.31886	-1.44325	2.63251	-4.15319	-1.88868
24	1.20433	2.84027	0.27459	-2.56873	0.91499	-6.42740
SUM	8.04917	3.95782	0.00000	0.00095	-2.33850	-10.13628
Condition LC3=1.2DL-W0						
2	1.23083	2.13052	-1.73482	-3.67217	2.67368	3.56364
34	0.03840	-0.30150	-3.93457	-1.85381	-0.05569	-0.02113
24	-1.26923	2.12880	-1.78678	-3.68594	-2.76740	-3.54400
SUM	0.00000	3.95782	-7.45616	-9.21192	-0.14941	-0.00149
Condition LC4=1.2DL-W30						
2	-1.19379	2.83873	0.27091	-2.56103	-0.89251	6.41768
34	-3.15904	1.32194	-1.42787	2.65559	4.15780	1.86394
24	-3.69633	-0.20285	1.15695	-0.09823	-0.91305	1.85466
SUM	-8.04917	3.95782	0.00000	-0.00366	2.35224	10.13629
Condition LC5=0.9DL+W0						
2	0.94570	0.17722	2.99444	1.37630	-2.66739	0.45915
34	-0.03443	2.61219	1.42234	6.48090	0.05972	-0.00051
24	-0.91127	0.17895	3.03938	1.35235	2.76909	-0.45715
SUM	0.00000	2.96837	7.45616	9.20955	0.16143	0.00150

Condition **LC6=0.9DL+W30**

2	3.37033	-0.53099	0.98871	0.26516	0.89880	-2.39489
34	3.16301	0.98876	-1.08436	1.97150	-4.15377	-1.88558
24	1.51583	2.51060	0.09565	-2.23536	0.91475	-5.85581
SUM	8.04917	2.96837	0.00000	0.00129	-2.34022	-10.13628

Condition **LC7=0.9DL-W0**

2	0.91990	1.80084	-1.91476	-3.34419	2.67278	2.98896
34	0.03783	-0.63159	-3.57568	-2.51482	-0.05627	-0.01804
24	-0.95773	1.79912	-1.96572	-3.35257	-2.76764	-2.97241
SUM	0.00000	2.96837	-7.45616	-9.21158	-0.15112	-0.00149

Condition **LC8=0.9DL-W30**

2	-1.50473	2.50905	0.09097	-2.23304	-0.89341	5.84299
34	-3.15961	0.99184	-1.06898	1.99458	4.15723	1.86704
24	-3.38483	-0.53253	0.97801	0.23514	-0.91330	2.42626
SUM	-8.04917	2.96837	0.00000	-0.00332	2.35052	10.13628

Condition **LC9=1.2DL+Di+Wi0**

2	2.68351	2.54096	1.88767	-2.33115	-0.37526	4.53262
34	0.00668	2.92263	-2.76993	6.12037	-0.00365	-0.00470
24	-2.69019	2.54214	1.86826	-2.35655	0.35775	-4.52690
SUM	0.00000	8.00574	0.98600	1.43267	-0.02116	0.00102

Condition **LC10=1.2DL+Di+W130**

2	3.00989	2.43130	1.59353	-2.51003	0.15192	4.08157
34	0.42680	2.67076	-3.09875	5.43318	-0.55746	-0.29177
24	-2.36169	2.90368	1.50522	-2.92608	0.14815	-5.34899
SUM	1.07500	8.00574	0.00000	-0.00294	-0.25739	-1.55918

Condition **LC11=1.2DL+Di-Wi0**

2	2.68722	2.79370	1.21501	-3.09081	0.38761	4.90372
34	-0.00103	2.41949	-3.42533	4.74990	0.00945	-0.01416
24	-2.68620	2.79254	1.22431	-3.09854	-0.35866	-4.89057
SUM	0.00000	8.00574	-0.98600	-1.43946	0.03840	-0.00101

Condition **LC12=1.2DL+Di-W130**

2	2.36085	2.90336	1.50916	-2.91193	-0.13957	5.35477
34	-0.42115	2.67136	-3.09651	5.43709	0.56326	0.27291
24	-3.01470	2.43101	1.58735	-2.52901	-0.14906	-4.06848
SUM	-1.07500	8.00574	0.00000	-0.00385	0.27463	1.55920

Condition **LC13=1.2DL**

2	1.24374	1.31871	0.71978	-1.31192	0.00360	2.29874
34	0.00226	1.32040	-1.43556	2.64405	0.00231	-0.01237
24	-1.24600	1.31871	0.71577	-1.33348	0.00097	-2.28637
SUM	0.00000	3.95782	0.00000	-0.00135	0.00687	0.00000

Condition **LC15=1.2DL+1.5LL1**

2	1.30916	1.55953	0.72471	-1.76980	0.01573	2.53378
34	0.00226	1.21375	-1.44540	2.40808	0.00231	-0.01237
24	-1.31143	1.55954	0.72070	-1.79135	-0.01117	-2.52141
SUM	0.00000	4.33282	0.00000	-1.15307	0.00687	0.00000

Condition **LC16=1.2DL+1.5LL2**

2	1.65706	1.87734	0.97026	-2.21901	-0.00254	3.59296
34	-0.16498	1.22561	-1.63932	2.35054	0.23347	0.10146
24	-1.49207	1.22986	0.66906	-1.30240	-0.21755	-1.91140
SUM	0.00000	4.33282	0.00000	-1.17087	0.01337	1.78301

Condition **LC17=1.2DL+WL0+1.5LLa1**

2	2.05293	2.38834	1.28896	-3.05282	-0.10512	4.75851
34	-0.32191	1.18090	-1.73791	2.21177	0.45249	0.19234
24	-1.73102	1.13858	0.72095	-1.22327	-0.32033	-1.53317
SUM	0.00000	4.70782	0.27200	-2.06432	0.02704	3.41768

Condition **LC18=1.2DL+WL30+1.5LLa1**

2	2.14488	2.35647	1.21369	-3.10059	0.03074	4.63033
34	-0.19302	1.11128	-1.82860	2.02109	0.28137	0.11075
24	-1.64685	1.24007	0.61491	-1.38156	-0.39091	-1.76608
SUM	0.30500	4.70782	0.00000	-2.46106	-0.07880	2.97500

Condition **LC19=1.2DL-WL0+1.5LLa1**

2	2.05879	2.45795	1.11091	-3.25982	0.09499	4.86255
34	-0.31693	1.04184	-1.91865	1.83153	0.44447	0.19146
24	-1.74186	1.20803	0.53574	-1.42976	-0.53475	-1.63647
SUM	0.00000	4.70782	-0.27200	-2.85805	0.00471	3.41754

Condition **LC20=1.2DL-WL30+1.5LLa1**

2	1.96684	2.48983	1.18618	-3.21206	-0.04087	4.99073
34	-0.44581	1.11145	-1.82796	2.02221	0.61559	0.27304
24	-1.82602	1.10654	0.64178	-1.27147	-0.46416	-1.40356
SUM	-0.30500	4.70782	0.00000	-2.46131	0.11055	3.86021

Condition **LC21=1.2DL+WL0+1.5LLa2**

2	1.49615	2.01348	0.88143	-2.54370	-0.08106	3.34466
34	-0.05022	1.16611	-1.42832	2.30748	0.08026	0.02325
24	-1.44593	1.52822	0.81889	-1.80592	-0.00236	-2.28815
SUM	0.00000	4.70782	0.27200	-2.04214	-0.00316	1.07975

Condition **LC22=1.2DL+WL30+1.5LLa2**

2	1.58810	1.98161	0.80616	-2.59147	0.05480	3.21648
34	0.07867	1.09650	-1.51901	2.11680	-0.09086	-0.05834
24	-1.36177	1.62971	0.71285	-1.96421	-0.07294	-2.52106
SUM	0.30500	4.70782	0.00000	-2.43888	-0.10900	0.63708

Condition **LC23=1.2DL-WL0+1.5LLa2**

2	1.50201	2.08309	0.70338	-2.75070	0.11905	3.44870
34	-0.04523	1.02706	-1.60907	1.92724	0.07223	0.02237
24	-1.45678	1.59767	0.63368	-2.01241	-0.21678	-2.39146
SUM	0.00000	4.70782	-0.27200	-2.83588	-0.02549	1.07961

Condition **LC24=1.2DL-WL30+1.5LLa2**

2	1.41006	2.11497	0.77865	-2.70294	-0.01681	3.57688
34	-0.17412	1.09667	-1.51838	2.11792	0.24336	0.10396
24	-1.54094	1.49618	0.73972	-1.85412	-0.14619	-2.15855
SUM	-0.30500	4.70782	0.00000	-2.43914	0.08035	1.52228

Condition **LC25=1.2DL+WL0+1.5LLa3**

2	1.44616	1.52814	0.81932	-1.78411	0.01407	2.30015
34	0.04976	1.16611	-1.42832	2.30748	-0.06762	-0.04710
24	-1.49592	2.01357	0.88100	-2.56551	0.09278	-3.33266
SUM	0.00000	4.70782	0.27200	-2.04214	0.03923	-1.07961

Condition **LC26=1.2DL+WL30+1.5LLa3**

2	1.53811	1.49627	0.74405	-1.83188	0.14994	2.17197
34	0.17865	1.09650	-1.51901	2.11680	-0.23874	-0.12869
24	-1.41176	2.11506	0.77496	-2.72380	0.02219	-3.56557
SUM	0.30500	4.70782	0.00000	-2.43888	-0.06661	-1.52228

Condition **LC27=1.2DL-WL0+1.5LLa3**

2	1.45202	1.59775	0.64127	-1.99111	0.21419	2.40420
34	0.05475	1.02706	-1.60906	1.92724	-0.07564	-0.04798
24	-1.50677	2.08302	0.69579	-2.77200	-0.12164	-3.43596
SUM	0.00000	4.70782	-0.27200	-2.83588	0.01690	-1.07975

Condition **LC28=1.2DL-WL30+1.5LLa3**

2	1.36007	1.62962	0.71654	-1.94335	0.07832	2.53237
34	-0.07414	1.09667	-1.51837	2.11792	0.09548	0.03361
24	-1.59093	1.98153	0.80183	-2.61371	-0.05106	-3.20305
SUM	-0.30500	4.70782	0.00000	-2.43914	0.12274	-0.63708

Condition **LC29=1.2DL+WL0+1.5LLa4**

2	1.73125	1.13850	0.72138	-1.20146	0.33205	1.54516
34	0.32146	1.18090	-1.73791	2.21177	-0.43986	-0.21619
24	-2.05270	2.38842	1.28852	-3.07463	0.11684	-4.74651
SUM	0.00000	4.70782	0.27200	-2.06432	0.00903	-3.41754

Condition **LC30=1.2DL+WL30+1.5LLa4**

2	1.82319	1.10662	0.64611	-1.24922	0.46791	1.41699
34	0.45034	1.11128	-1.82860	2.02109	-0.61098	-0.29778
24	-1.96854	2.48991	1.18248	-3.23292	0.04626	-4.97942
SUM	0.30500	4.70782	0.00000	-2.46106	-0.09681	-3.86021

Condition **LC31=1.2DL-WL0+1.5LLa4**

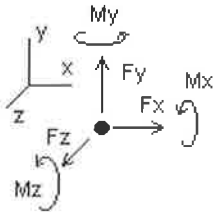
2	1.73711	1.20811	0.54333	-1.40846	0.53216	1.64921
34	0.32644	1.04184	-1.91865	1.83153	-0.44788	-0.21707
24	-2.06355	2.45787	1.10332	-3.28112	-0.09758	-4.84981
SUM	0.00000	4.70782	-0.27200	-2.85805	-0.01330	-3.41767

Condition **LC32=1.2DL-WL30+1.5LLa4**

2	1.64516	1.23998	0.61860	-1.36069	0.39630	1.77739
34	0.19755	1.11145	-1.82796	2.02221	-0.27676	-0.13548
24	-2.14771	2.35638	1.20936	-3.12283	-0.02700	-4.61691
SUM	-0.30500	4.70782	0.00000	-2.46131	0.09254	-2.97500

Envelope for nodal reactions

Note.- **Ic** is the controlling load condition



Direction of positive forces and moments

Envelope of nodal reactions for :

- LC1=1.2DL+W0
- LC2=1.2DL+W30
- LC3=1.2DL-W0
- LC4=1.2DL-W30
- LC5=0.9DL+W0
- LC6=0.9DL+W30
- LC7=0.9DL-W0
- LC8=0.9DL-W30
- LC9=1.2DL+Di+W0
- LC10=1.2DL+Di+W30
- LC11=1.2DL+Di-W0
- LC12=1.2DL+Di-W30
- LC13=1.2DL
- LC15=1.2DL+1.5LL1
- LC16=1.2DL+1.5LL2
- LC17=1.2DL+WL0+1.5LLa1
- LC18=1.2DL+WL30+1.5LLa1
- LC19=1.2DL-WL0+1.5LLa1
- LC20=1.2DL-WL30+1.5LLa1
- LC21=1.2DL+WL0+1.5LLa2
- LC22=1.2DL+WL30+1.5LLa2
- LC23=1.2DL-WL0+1.5LLa2
- LC24=1.2DL-WL30+1.5LLa2
- LC25=1.2DL+WL0+1.5LLa3
- LC26=1.2DL+WL30+1.5LLa3
- LC27=1.2DL-WL0+1.5LLa3
- LC28=1.2DL-WL30+1.5LLa3
- LC29=1.2DL+WL0+1.5LLa4
- LC30=1.2DL+WL30+1.5LLa4

LC31=1.2DL-WL0+1.5LLa4
 LC32=1.2DL-WL30+1.5LLa4

Node		Forces						Moments					
		Fx [Kip]	lc	Fy [Kip]	lc	Fz [Kip]	lc	Mx [Kip*ft]	lc	My [Kip*ft]	lc	Mz [Kip*ft]	lc
2	Max	3.681	LC2	2.903	LC12	3.174	LC1	1.37630	LC5	2.67368	LC3	6.41768	LC4
	Min	-1.505	LC8	-0.531	LC6	-1.915	LC7	-3.67217	LC3	-2.66739	LC5	-2.39489	LC6
34	Max	3.164	LC2	2.942	LC1	1.422	LC5	7.14191	LC1	4.15780	LC4	1.86704	LC8
	Min	-3.160	LC8	-0.632	LC7	-3.935	LC3	-2.51482	LC7	-4.15377	LC6	-1.88868	LC2
24	Max	1.516	LC6	2.904	LC10	3.218	LC1	1.35235	LC5	2.76934	LC1	2.42626	LC8
	Min	-3.696	LC4	-0.533	LC8	-1.966	LC7	-3.68594	LC3	-2.76764	LC7	-6.42740	LC2

Date: 4/25/2019

Project Name: HRT 106(B) 943202

Project No.: 806364

Designed By: BD Checked By: MSC



HUDSON
Design Group LLC

CHECK CONNECTION CAPACITY (Worse Case)

Reference: AISC Steel Construction Manual 14th Edition (ASD)

Bolt Type = A36 5/8" Threaded Rod

Allowable Tensile Load =

$F_{Tall} =$ 6673 lbs.

Allowable Shear Load =

$F_{Vall} =$ 4004 lbs.

No. of Supports = 1

No. of Bolts / Support = 4

Node	Wind Load	Gravity Loads	Tension Design	Shear Design	Tension/Shear Ratio	PASS/FAIL
N2	3681	2903	13.79%	18.13%	31.92%	PASS
N24	3696	2904	13.85%	18.13%	31.98%	PASS
N34	3935	2942	14.74%	18.37%	33.11%	PASS

Date: April 29, 2019



Rebecca Klein
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Kimley-Horn and Associates, Inc.
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Subject: Structural Analysis Report

Carrier Designation: AT&T Mobility Co-Locate
Carrier Site Number: CTL05841
Carrier Site Name: DURHAM CENTRAL

Crown Castle Designation: Crown Castle BU Number: 806364
Crown Castle Site Name: HRT 106(B) 943202
Crown Castle JDE Job Number: 551935
Crown Castle Work Order Number: 1728190
Crown Castle Order Number: 474211 Rev. 0

Engineering Firm Designation: Kimley-Horn and Associates, Inc. Project Number: 019558034

Site Data: 143 R Old Blue Hill Road, DURHAM, Middlesex County, CT
Latitude 41° 27' 33.7", Longitude -72° 39' 45.8"
120 Foot - Monopole

Dear Rebecca Klein,

Kimley-Horn and Associates, Inc. is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower.

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

LC7: Proposed Equipment Configuration **Sufficient Capacity**

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

Structural analysis prepared by: Zachary A. Medoff, PE under the supervision of Steven C. Ball, PE, SE

Respectfully submitted by:

Steven C. Ball, PE, SE



4.29.19

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1) INTRODUCTION

This tower is a 120 ft Monopole designed by Valmont.

2) ANALYSIS CRITERIA

TIA-222 Revision: TIA-222-H
 Risk Category: II
 Wind Speed: 130 mph
 Exposure Category: B
 Topographic Factor: 1
 Ice Thickness: 1.5 in
 Wind Speed with Ice: 50 mph
 Service Wind Speed: 60 mph

Table 1 – Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
116.0	116.0	6	Andrew	SBNHH-1D65A	6 2 6	3/4 3/8 1-5/8
		6	Kathrein	80010964		
		3	Ericsson	RRUS 32		
		3	Ericsson	RRUS 4426 B66		
		3	Ericsson	RRUS 32 B2		
		2	Raycap	DC6-48-60-18-8C		
		3	Ericsson	RRUS 4415		
		3	Ericsson	RRUS 4449 B5/B12		
		1	Raycap	DC6-48-60-18-8F		
		1	-	Platform Mount [LP 602-1]		

Table 2 – Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	
119.0	125.0	1	Decibel	DB809MT3-XT	2	7/8	
	123.0	1	Decibel	DB201-A			
	119.0	1	-	Side Arm Mount [SO 102-3]			
		2	-	Side Arm Mount [SO 701-1]			
107.0	107.0	1	Gabriel	GLF6-450	1	7/8	
		1	-	Pipe Mount [PM 601-1]			
100.0	101.0	6	Andrew	SBNHH-1D65B	12 2	7/8 1-5/8	
		6	Antel	LPA-80080/6CF			
		3	Nokia	AIRSCALE RRH 4T4R B5 160W			
		3	RFS Celwave	FDJ85020Q4-S1			
	100.0	100.0	3	Alcatel Lucent			B66A RRH4X45
			3	Alcatel Lucent			B13 RRH4X30-4R
			3	Alcatel Lucent			B25 RRH4X30
			2	Raycap			RXXDC-3315-PF-48
1	-	Platform Mount [LP 713-1]					

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	3	Commscope	NNVV-65B-R4	1 1 3	7/8 1/2 1-1/4
		3	RFS Celwave	APXVTM14-ALU-I20		
		6	Alcatel Lucent	RRH2X50-800		
		3	Alcatel Lucent	PCS 1900MHZ 4X45W-65MHZ		
	3	Alcatel Lucent	TD-RRH8X20-25			
	87.0	1	Fastback	IBR-1211-83-NA_CCIV2		
		1	Tekelec	EPSILON GPS ANTENNA 35 DB		
1		-	Platform Mount [LP 713-1]			
71.0	75.0	1	Commscope	SHP2-13	2 3	3/8 1-5/8
	73.0	3	Ericsson	AIR32 DB B66Aa B2a		
		3	RFS Celwave	APXVAA24_43-U-A20		
		3	Ericsson	AIR 21 B2A/B4P		
		3	Ericsson	RRUS 11 B12		
71.0	1	Site Pro 1	RMQP-496-HK Platform			
50.0	57.0	1	RFS Celwave	PD1142-1	3 1	7/8 1/2
	54.0	1	Decibel	ASP-655		
	53.0	1	RFS Celwave	PD1121-6		
	50.0	1	Decibel	DB492A		
		2	-	Side Arm Mount [SO 702-1]		
40.0	41.0	1	Tekelec	EPSILON GPS ANTENNA 35 DB	1	1/2
	40.0	1	-	Side Arm Mount [SO 701-1]	1	2 Cond.

3) ANALYSIS PROCEDURE

Table 3 – Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Associates	262150	CCSITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering	297341	CCSITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	262153	CCSITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Valmont (Incl. Extension Design)	942187	CCSITES
4-MOUNT ANALYSIS REPORTS	HDG (Conditional Pass)	04/25/2019	TSA

3.1) Analysis Method

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

3.2) Assumptions

- 1) Tower and structures were built and maintained in accordance with the manufacturer's specifications.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 3) Foundations were properly designed for the original design loads and were properly constructed.

This analysis may be affected if any assumptions are not valid or have been made in error. Kimley-Horn and Associates, Inc. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 – Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 100	Pole	TP20.263x15.403x0.1875	1	-4.79	744.51	34.3	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-21.47	1760.81	88.1	Pass
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-35.16	3235.70	82.0	Pass
							Summary	
						Pole (L2)	88.1	Pass
						RATING =	88.1	Pass

Table 5 – Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	78.3	Pass
1	Base Plate	0	40.7	Pass
1	Flange Connection	100	49.3	Pass
1	Base Foundation	0	8.8	Pass
1	Base Foundation Soil Interaction	0	37.8	Pass

Structure Rating (max from all components) =	88.1%
---	--------------

Notes:

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

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

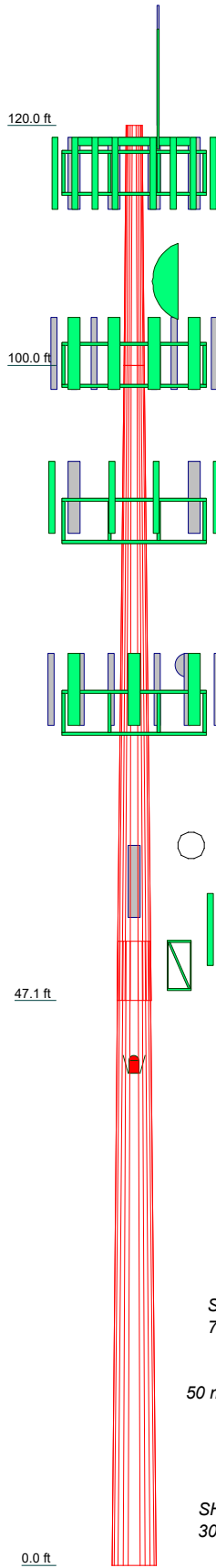
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
S-22	65 ksi	80 ksi			

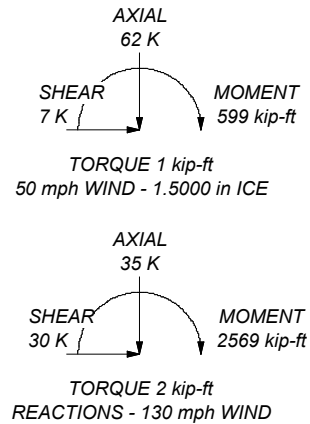
TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 88.1%

Section	1	2	3	
Length (ft)	20.00	52.92	52.00	
Number of Sides	12	12	12	
Thickness (in)	0.1875	0.2813	0.3750	
Socket Length (ft)		4.92	31.3720	
Top Dia (in)	15.4030	20.2630	44.0000	
Bot Dia (in)	20.2630	33.1300		
Grade		S-22		
Weight (K)	0.7	4.3	8.0	13.0



ALL REACTIONS ARE FACTORED



Kimley >>> Horn **Kimley-Horn & Associates, Inc.**
 421 Fayetteville St., Suite 600
 Raleigh, NC 27601
 Phone: (919) 677-2000
 FAX:

Job:	806364 - HRT 106(B) 943202			
Project:	WO #1728190			
Client:	Crown Castle	Drawn by:	Zachary A. Medoff, P.E.	
Code:	TIA-222-H	Date:	04/29/19	
Path:	K:\RAL Wireless\Crown\806364\WO #1728190\Models\LC7\806364-1728190.dwg		Scale:	NTS
			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:

- Tower is located in Middlesex County, Connecticut.
- Tower base elevation above sea level: 511.24 ft.
- Basic wind speed of 130 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56.00 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|---|--|
| Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
Use Code Stress Ratios
✓ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric | Distribute Leg Loads As Uniform
Assume Legs Pinned
✓ Assume Rigid Index Plate
✓ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
✓ Bypass Mast Stability Checks
✓ Use Azimuth Dish Coefficients
✓ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
✓ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs | Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
✓ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-H Bracing Resist. Exemption
Use TIA-222-H Tension Splice Exemption
<div style="background-color: #e0e0e0; text-align: center; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known |
|--|---|--|

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-100.00	20.00	0.00	12	15.4030	20.2630	0.1875	0.7500	S-22 (65 ksi)
L2	100.00-47.08	52.92	4.92	12	20.2630	33.1300	0.2813	1.1250	S-22 (65 ksi)
L3	47.08-0.00	52.00		12	31.3720	44.0000	0.3750	1.5000	S-22 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	15.8802	9.1864	271.4575	5.4471	7.9788	34.0225	550.0464	4.5212	3.6255	19.336
	20.9117	12.1206	623.5083	7.1870	10.4962	59.4030	1263.3968	5.9654	4.9280	26.283
L2	20.8786	18.0960	922.2208	7.1535	10.4962	87.8621	1868.6694	8.9063	4.6767	16.628
	34.1995	29.7486	4097.2352	11.7599	17.1613	238.7480	8302.1094	14.6414	8.1251	28.889
L3	33.5825	37.4288	4590.1944	11.0969	16.2507	282.4616	9300.9782	18.4213	7.4027	19.741
	45.4199	52.6772	12796.1526	15.6177	22.7920	561.4318	25928.4743	25.9261	10.7870	28.765

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

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	B	No	Surface Ar (CaAa)	120.00 - 0.00	1	1	0.000 0.000	0.3750		0.22
LDF4-50A(1/2)	C	No	Surface Ar (CaAa)	87.00 - 0.00	1	1	0.150 0.150	0.6250		0.15
* 2" Rigid Conduit	C	No	Surface Ar (CaAa)	40.00 - 0.00	1	1	0.180 0.180	2.0000		2.80

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	CaAa ft ² /ft	Weight plf
* LDF5-50A(7/8)	C	No	No	Inside Pole	119.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.33 0.33 0.33
* LDF7-50A(1-5/8)	A	No	No	Inside Pole	116.00 - 0.00	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.82 0.82 0.82 0.82
WR-VG86ST-BRD(3/4)	A	No	No	Inside Pole	116.00 - 0.00	4	No Ice 1/2" Ice 1" Ice 2" Ice	0.58 0.58 0.58 0.58
FB-L98B-034-XXX(3/8)	A	No	No	Inside Pole	116.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.06 0.06 0.06 0.06
WR-VG86ST-BRD(3/4)	A	No	No	Inside Pole	116.00 - 0.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.58 0.58 0.58 0.58
* LDF5-50A(7/8)	C	No	No	Inside Pole	107.00 - 0.00	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.33 0.33 0.33 0.33
* LDF5-50A(7/8)	C	No	No	Inside Pole	100.00 - 0.00	12	No Ice 1/2" Ice 1" Ice 2" Ice	0.33 0.33 0.33 0.33

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
HB158-1-08U8-S8J18(1-5/8)	C	No	No	Inside Pole	100.00 - 0.00	2	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
*									
HB114-1-08U4-M5F(1-1/4)	C	No	No	Inside Pole	87.00 - 0.00	3	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
HB114-08U3M12-XXXF(7/8)	C	No	No	Inside Pole	87.00 - 0.00	1	No Ice	0.00	0.68
							1/2" Ice	0.00	0.68
							1" Ice	0.00	0.68
							2" Ice	0.00	0.68
*									
HCS 6X12 4AWG(1-5/8)	A	No	No	Inside Pole	71.00 - 0.00	3	No Ice	0.00	2.40
							1/2" Ice	0.00	2.40
							1" Ice	0.00	2.40
							2" Ice	0.00	2.40
LDF2-50(3/8)	A	No	No	Inside Pole	71.00 - 0.00	2	No Ice	0.00	0.08
							1/2" Ice	0.00	0.08
							1" Ice	0.00	0.08
							2" Ice	0.00	0.08
*									
LDF5-50A(7/8)	C	No	No	Inside Pole	50.00 - 0.00	3	No Ice	0.00	0.33
							1/2" Ice	0.00	0.33
							1" Ice	0.00	0.33
							2" Ice	0.00	0.33
LDF4-50A(1/2)	C	No	No	Inside Pole	50.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
LDF4-50A(1/2)	C	No	No	Inside Pole	40.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	0.14
		B	0.000	0.000	0.750	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.01
L2	100.00-47.08	A	0.000	0.000	0.000	0.000	0.63
		B	0.000	0.000	1.984	0.000	0.01
		C	0.000	0.000	2.495	0.000	0.59
L3	47.08-0.00	A	0.000	0.000	0.000	0.000	0.75
		B	0.000	0.000	1.766	0.000	0.01
		C	0.000	0.000	10.943	0.000	0.75

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.00-100.00	A	1.438	0.000	0.000	0.000	0.000	0.14
		B		0.000	0.000	6.500	0.000	0.07
		C		0.000	0.000	0.000	0.000	0.01
L2	100.00-47.08	A	1.379	0.000	0.000	0.000	0.000	0.63
		B		0.000	0.000	16.575	0.000	0.17
		C		0.000	0.000	13.501	0.000	0.73
L3	47.08-0.00	A	1.228	0.000	0.000	0.000	0.000	0.75
		B		0.000	0.000	14.748	0.000	0.15
		C		0.000	0.000	34.954	0.000	1.14

Feed Line Center of Pressure

Section	Elevation	CP _x	CP _z	CP _x Ice	CP _z Ice
	ft	in	in	in	in
L1	120.00-100.00	0.1979	-0.1143	1.0450	-0.6033
L2	100.00-47.08	0.1011	0.1740	0.7038	0.3854
L3	47.08-0.00	-0.3046	1.1904	0.0283	2.0754

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L1	1	Safety Line 3/8	100.00 - 120.00	1.0000	1.0000
L2	1	Safety Line 3/8	47.08 - 100.00	1.0000	1.0000
L2	18	LDF4-50A(1/2)	47.08 - 87.00	1.0000	1.0000
L2	26	2" Rigid Conduit	47.08 - 40.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
DB809MT3-XT	A	From Leg	3.00	0.00	119.00	No Ice	2.84	2.84	0.03
			0.00			1/2" Ice	4.29	4.29	0.05
			6.00			1" Ice	5.75	5.75	0.08
						2" Ice	8.72	8.72	0.17
DB201-A	C	From Face	3.00	0.00	119.00	No Ice	3.13	3.13	0.03
			0.00			1/2" Ice	6.15	6.15	0.05
			4.00			1" Ice	9.17	9.17	0.08
						2" Ice	15.21	15.21	0.14
Side Arm Mount [SO 102-3]	C	None		0.00	119.00	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
						1" Ice	3.96	3.96	0.14
						2" Ice	4.92	4.92	0.20
Side Arm Mount [SO 701-1]	A	From Leg	1.50	0.00	119.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
Side Arm Mount [SO 701-1]	C	From Face	1.50	0.00	119.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
4' x 2" Mount Pipe	A	From Leg	3.00	0.00	119.00	No Ice	0.87	0.87	0.02
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
						2" Ice	1.90	1.90	0.06
4' x 2" Mount Pipe	C	From Face	3.00	0.00	119.00	No Ice	0.87	0.87	0.02
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
						2" Ice	1.90	1.90	0.06
* (2) SBNHH-1D65A w/ Mount Pipe	A	From Face	4.00	0.00	116.00	No Ice	3.04	2.45	0.05
			0.00			1/2" Ice	3.34	2.75	0.10
			0.00			1" Ice	3.65	3.05	0.16
						2" Ice	4.31	3.68	0.31
(2) SBNHH-1D65A w/ Mount Pipe	B	From Face	4.00	0.00	116.00	No Ice	3.04	2.45	0.05
			0.00			1/2" Ice	3.34	2.75	0.10
			0.00			1" Ice	3.65	3.05	0.16
						2" Ice	4.31	3.68	0.31

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
(2) SBNHH-1D65A w/ Mount Pipe	C	From Face	4.00		0.00	116.00	No Ice	3.04	2.45	0.05
			0.00				1/2" Ice	3.34	2.75	0.10
			0.00				1" Ice	3.65	3.05	0.16
							2" Ice	4.31	3.68	0.31
RRUS 32	A	From Face	4.00		0.00	116.00	No Ice	2.86	1.78	0.06
			0.00				1/2" Ice	3.08	1.97	0.08
			0.00				1" Ice	3.32	2.17	0.10
							2" Ice	3.81	2.58	0.16
RRUS 32	B	From Face	4.00		0.00	116.00	No Ice	2.86	1.78	0.06
			0.00				1/2" Ice	3.08	1.97	0.08
			0.00				1" Ice	3.32	2.17	0.10
							2" Ice	3.81	2.58	0.16
RRUS 32	C	From Face	4.00		0.00	116.00	No Ice	2.86	1.78	0.06
			0.00				1/2" Ice	3.08	1.97	0.08
			0.00				1" Ice	3.32	2.17	0.10
							2" Ice	3.81	2.58	0.16
RRUS 32 B2	A	From Face	4.00		0.00	116.00	No Ice	2.73	1.67	0.05
			0.00				1/2" Ice	2.95	1.86	0.07
			0.00				1" Ice	3.18	2.05	0.10
							2" Ice	3.66	2.46	0.16
RRUS 32 B2	B	From Face	4.00		0.00	116.00	No Ice	2.73	1.67	0.05
			0.00				1/2" Ice	2.95	1.86	0.07
			0.00				1" Ice	3.18	2.05	0.10
							2" Ice	3.66	2.46	0.16
RRUS 32 B2	C	From Face	4.00		0.00	116.00	No Ice	2.73	1.67	0.05
			0.00				1/2" Ice	2.95	1.86	0.07
			0.00				1" Ice	3.18	2.05	0.10
							2" Ice	3.66	2.46	0.16
RRUS 4415	A	From Face	4.00		0.00	116.00	No Ice	1.64	0.68	0.04
			0.00				1/2" Ice	1.80	0.79	0.06
			0.00				1" Ice	1.97	0.91	0.07
							2" Ice	2.33	1.18	0.11
RRUS 4415	B	From Face	4.00		0.00	116.00	No Ice	1.64	0.68	0.04
			0.00				1/2" Ice	1.80	0.79	0.06
			0.00				1" Ice	1.97	0.91	0.07
							2" Ice	2.33	1.18	0.11
RRUS 4415	C	From Face	4.00		0.00	116.00	No Ice	1.64	0.68	0.04
			0.00				1/2" Ice	1.80	0.79	0.06
			0.00				1" Ice	1.97	0.91	0.07
							2" Ice	2.33	1.18	0.11
DC6-48-60-18-8F	B	From Face	4.00		0.00	116.00	No Ice	0.92	0.92	0.03
			0.00				1/2" Ice	1.46	1.46	0.05
			0.00				1" Ice	1.64	1.64	0.07
							2" Ice	2.04	2.04	0.12
DC6-48-60-18-8C	C	From Face	4.00		0.00	116.00	No Ice	2.74	2.74	0.03
			0.00				1/2" Ice	2.96	2.96	0.05
			0.00				1" Ice	3.20	3.20	0.08
							2" Ice	3.68	3.68	0.15
(2) 80010964 w/ 2.5" Mount Pipe	A	From Leg	4.00		0.00	116.00	No Ice	10.31	5.83	0.12
			0.00				1/2" Ice	10.80	6.57	0.20
			0.00				1" Ice	11.30	7.33	0.28
							2" Ice	12.33	8.86	0.48
(2) 80010964 w/ 2.5" Mount Pipe	B	From Leg	4.00		0.00	116.00	No Ice	10.31	5.83	0.12
			0.00				1/2" Ice	10.80	6.57	0.20
			0.00				1" Ice	11.30	7.33	0.28
							2" Ice	12.33	8.86	0.48
(2) 80010964 w/ 2.5" Mount Pipe	C	From Leg	4.00		0.00	116.00	No Ice	10.31	5.83	0.12
			0.00				1/2" Ice	10.80	6.57	0.20
			0.00				1" Ice	11.30	7.33	0.28
							2" Ice	12.33	8.86	0.48
RRUS 4449 B5/B12	A	From Leg	4.00		0.00	116.00	No Ice	1.97	1.41	0.07
			0.00				1/2" Ice	2.14	1.56	0.09
			0.00				1" Ice	2.33	1.73	0.11
							2" Ice	2.72	2.07	0.16
RRUS 4449 B5/B12	B	From Leg	4.00		0.00	116.00	No Ice	1.97	1.41	0.07
			0.00				1/2" Ice	2.14	1.56	0.09
			0.00				1" Ice	2.33	1.73	0.11
							2" Ice	2.72	2.07	0.16
RRUS 4449 B5/B12	C	From Leg	4.00		0.00	116.00	No Ice	1.97	1.41	0.07
			0.00				1/2" Ice	2.14	1.56	0.09
			0.00				1" Ice	2.33	1.73	0.11
							2" Ice	2.72	2.07	0.16
RRUS 4426 B66	A	From Leg	4.00		0.00	116.00	No Ice	1.64	0.73	0.05
			0.00				1/2" Ice	1.80	0.84	0.06
			0.00				1" Ice	1.97	0.97	0.08
							2" Ice	2.33	1.24	0.11

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
RRUS 4426 B66	B	From Leg	4.00		0.00	116.00	No Ice	1.64	0.73	0.05
			0.00				1/2" Ice	1.80	0.84	0.06
			0.00				1" Ice	1.97	0.97	0.08
							2" Ice	2.33	1.24	0.11
RRUS 4426 B66	C	From Leg	4.00		0.00	116.00	No Ice	1.64	0.73	0.05
			0.00				1/2" Ice	1.80	0.84	0.06
			0.00				1" Ice	1.97	0.97	0.08
							2" Ice	2.33	1.24	0.11
DC6-48-60-18-8C	A	From Leg	4.00		0.00	116.00	No Ice	2.74	2.74	0.03
			0.00				1/2" Ice	2.96	2.96	0.05
			0.00				1" Ice	3.20	3.20	0.08
							2" Ice	3.68	3.68	0.15
Platform Mount [LP 602-1]	C	None			0.00	116.00	No Ice	32.03	32.03	1.34
							1/2" Ice	38.71	38.71	1.80
							1" Ice	45.39	45.39	2.26
							2" Ice	58.75	58.75	3.17
* Pipe Mount [PM 601-1]	B	From Leg	0.50		0.00	107.00	No Ice	3.00	0.90	0.07
			0.00				1/2" Ice	3.74	1.12	0.08
			0.00				1" Ice	4.48	1.34	0.09
							2" Ice	5.96	1.78	0.12
(2) LPA-80080/6CF w/ Mount Pipe	A	From Face	4.00		0.00	100.00	No Ice	4.56	10.26	0.05
			0.00				1/2" Ice	5.11	11.43	0.11
			1.00				1" Ice	5.61	12.31	0.19
							2" Ice	6.65	14.13	0.36
(2) LPA-80080/6CF w/ Mount Pipe	B	From Face	4.00		0.00	100.00	No Ice	4.56	10.26	0.05
			0.00				1/2" Ice	5.11	11.43	0.11
			1.00				1" Ice	5.61	12.31	0.19
							2" Ice	6.65	14.13	0.36
(2) LPA-80080/6CF w/ Mount Pipe	C	From Face	4.00		0.00	100.00	No Ice	4.56	10.26	0.05
			0.00				1/2" Ice	5.11	11.43	0.11
			1.00				1" Ice	5.61	12.31	0.19
							2" Ice	6.65	14.13	0.36
(2) SBNHH-1D65B w/ Mount Pipe	A	From Face	4.00		0.00	100.00	No Ice	4.09	3.30	0.07
			0.00				1/2" Ice	4.49	3.68	0.13
			1.00				1" Ice	4.89	4.07	0.20
							2" Ice	5.72	4.87	0.39
(2) SBNHH-1D65B w/ Mount Pipe	B	From Face	4.00		0.00	100.00	No Ice	4.09	3.30	0.07
			0.00				1/2" Ice	4.49	3.68	0.13
			1.00				1" Ice	4.89	4.07	0.20
							2" Ice	5.72	4.87	0.39
(2) SBNHH-1D65B w/ Mount Pipe	C	From Face	4.00		0.00	100.00	No Ice	4.09	3.30	0.07
			0.00				1/2" Ice	4.49	3.68	0.13
			1.00				1" Ice	4.89	4.07	0.20
							2" Ice	5.72	4.87	0.39
B25 RRH4X30	A	From Face	4.00		0.00	100.00	No Ice	2.12	1.29	0.05
			0.00				1/2" Ice	2.31	1.45	0.07
			0.00				1" Ice	2.50	1.61	0.09
							2" Ice	2.92	1.96	0.14
B25 RRH4X30	B	From Face	4.00		0.00	100.00	No Ice	2.12	1.29	0.05
			0.00				1/2" Ice	2.31	1.45	0.07
			0.00				1" Ice	2.50	1.61	0.09
							2" Ice	2.92	1.96	0.14
B25 RRH4X30	C	From Face	4.00		0.00	100.00	No Ice	2.12	1.29	0.05
			0.00				1/2" Ice	2.31	1.45	0.07
			0.00				1" Ice	2.50	1.61	0.09
							2" Ice	2.92	1.96	0.14
B13 RRH4X30-4R	A	From Face	4.00		0.00	100.00	No Ice	2.16	1.62	0.06
			0.00				1/2" Ice	2.35	1.79	0.08
			0.00				1" Ice	2.55	1.97	0.10
							2" Ice	2.97	2.36	0.15
B13 RRH4X30-4R	B	From Face	4.00		0.00	100.00	No Ice	2.16	1.62	0.06
			0.00				1/2" Ice	2.35	1.79	0.08
			0.00				1" Ice	2.55	1.97	0.10
							2" Ice	2.97	2.36	0.15
B13 RRH4X30-4R	C	From Face	4.00		0.00	100.00	No Ice	2.16	1.62	0.06
			0.00				1/2" Ice	2.35	1.79	0.08
			0.00				1" Ice	2.55	1.97	0.10
							2" Ice	2.97	2.36	0.15
B66A RRH4X45	A	From Face	4.00		0.00	100.00	No Ice	2.54	1.61	0.06
			0.00				1/2" Ice	2.75	1.79	0.08
			0.00				1" Ice	2.97	1.98	0.10
							2" Ice	3.43	2.37	0.16
B66A RRH4X45	B	From Face	4.00		0.00	100.00	No Ice	2.54	1.61	0.06
			0.00				1/2" Ice	2.75	1.79	0.08

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight
			Horz	Lateral			Front	Side	
			ft	ft	°	ft	ft ²	ft ²	K
				0.00		1" Ice	2.97	1.98	0.10
						2" Ice	3.43	2.37	0.16
B66A RRH4X45	C	From Face	4.00		0.00	No Ice	2.54	1.61	0.06
			0.00			1/2" Ice	2.75	1.79	0.08
			0.00			1" Ice	2.97	1.98	0.10
						2" Ice	3.43	2.37	0.16
(2) RXXDC-3315-PF-48	A	From Face	4.00		0.00	No Ice	2.51	1.65	0.02
			0.00			1/2" Ice	2.71	1.82	0.04
			0.00			1" Ice	2.91	1.99	0.07
						2" Ice	3.35	2.36	0.13
AIRSCALE RRH 4T4R B5 160W	A	From Face	4.00		0.00	No Ice	1.29	0.72	0.04
			0.00			1/2" Ice	1.43	0.83	0.05
			1.00			1" Ice	1.58	0.96	0.06
						2" Ice	1.90	1.22	0.10
AIRSCALE RRH 4T4R B5 160W	B	From Face	4.00		0.00	No Ice	1.29	0.72	0.04
			0.00			1/2" Ice	1.43	0.83	0.05
			1.00			1" Ice	1.58	0.96	0.06
						2" Ice	1.90	1.22	0.10
AIRSCALE RRH 4T4R B5 160W	C	From Face	4.00		0.00	No Ice	1.29	0.72	0.04
			0.00			1/2" Ice	1.43	0.83	0.05
			1.00			1" Ice	1.58	0.96	0.06
						2" Ice	1.90	1.22	0.10
FDJ85020Q4-S1	A	From Face	4.00		0.00	No Ice	0.96	0.36	0.02
			0.00			1/2" Ice	1.09	0.43	0.03
			1.00			1" Ice	1.24	0.52	0.04
						2" Ice	1.54	0.71	0.08
FDJ85020Q4-S1	B	From Face	4.00		0.00	No Ice	0.96	0.36	0.02
			0.00			1/2" Ice	1.09	0.43	0.03
			1.00			1" Ice	1.24	0.52	0.04
						2" Ice	1.54	0.71	0.08
FDJ85020Q4-S1	C	From Face	4.00		0.00	No Ice	0.96	0.36	0.02
			0.00			1/2" Ice	1.09	0.43	0.03
			1.00			1" Ice	1.24	0.52	0.04
						2" Ice	1.54	0.71	0.08
Platform Mount [LP 713-1]	C	None			0.00	No Ice	31.27	31.27	1.51
						1/2" Ice	39.68	39.68	1.93
						1" Ice	48.09	48.09	2.35
						2" Ice	64.91	64.91	3.19
(4) 6' x 2" Mount Pipe	A	From Face	4.00		0.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
(4) 6' x 2" Mount Pipe	B	From Face	4.00		0.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
(4) 6' x 2" Mount Pipe	C	From Face	4.00		0.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
*									
NNVV-65B-R4 w/ Mount Pipe	A	From Leg	4.00		0.00	No Ice	12.51	7.41	0.10
			0.00			1/2" Ice	13.11	8.60	0.19
			2.00			1" Ice	13.67	9.50	0.29
						2" Ice	14.82	11.33	0.52
NNVV-65B-R4 w/ Mount Pipe	B	From Leg	4.00		0.00	No Ice	12.51	7.41	0.10
			0.00			1/2" Ice	13.11	8.60	0.19
			2.00			1" Ice	13.67	9.50	0.29
						2" Ice	14.82	11.33	0.52
NNVV-65B-R4 w/ Mount Pipe	C	From Leg	4.00		0.00	No Ice	12.51	7.41	0.10
			0.00			1/2" Ice	13.11	8.60	0.19
			2.00			1" Ice	13.67	9.50	0.29
						2" Ice	14.82	11.33	0.52
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	4.00		0.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			2.00			1" Ice	7.47	6.47	0.19
						2" Ice	8.38	7.94	0.34
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	4.00		0.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			2.00			1" Ice	7.47	6.47	0.19
						2" Ice	8.38	7.94	0.34
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	4.00		0.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			2.00			1" Ice	7.47	6.47	0.19
						2" Ice	8.38	7.94	0.34

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
PCS 1900MHZ 4X45W-65MHZ	A	From Leg	4.00		0.00	87.00	No Ice	2.31	2.23	0.06
			0.00				1/2" Ice	2.52	2.43	0.08
			2.00				1" Ice	2.73	2.64	0.11
							2" Ice	3.17	3.08	0.17
PCS 1900MHZ 4X45W-65MHZ	B	From Leg	4.00		0.00	87.00	No Ice	2.31	2.23	0.06
			0.00				1/2" Ice	2.52	2.43	0.08
			2.00				1" Ice	2.73	2.64	0.11
							2" Ice	3.17	3.08	0.17
PCS 1900MHZ 4X45W-65MHZ	C	From Leg	4.00		0.00	87.00	No Ice	2.31	2.23	0.06
			0.00				1/2" Ice	2.52	2.43	0.08
			2.00				1" Ice	2.73	2.64	0.11
							2" Ice	3.17	3.08	0.17
(2) RRH2X50-800	A	From Leg	4.00		0.00	87.00	No Ice	1.70	1.28	0.05
			0.00				1/2" Ice	1.86	1.43	0.07
			2.00				1" Ice	2.03	1.58	0.09
							2" Ice	2.40	1.91	0.14
(2) RRH2X50-800	B	From Leg	4.00		0.00	87.00	No Ice	1.70	1.28	0.05
			0.00				1/2" Ice	1.86	1.43	0.07
			2.00				1" Ice	2.03	1.58	0.09
							2" Ice	2.40	1.91	0.14
(2) RRH2X50-800	C	From Leg	4.00		0.00	87.00	No Ice	1.70	1.28	0.05
			0.00				1/2" Ice	1.86	1.43	0.07
			2.00				1" Ice	2.03	1.58	0.09
							2" Ice	2.40	1.91	0.14
TD-RRH8X20-25	A	From Leg	4.00		0.00	87.00	No Ice	3.70	1.29	0.07
			0.00				1/2" Ice	3.95	1.46	0.09
			2.00				1" Ice	4.20	1.64	0.12
							2" Ice	4.72	2.02	0.18
TD-RRH8X20-25	B	From Leg	4.00		0.00	87.00	No Ice	3.70	1.29	0.07
			0.00				1/2" Ice	3.95	1.46	0.09
			2.00				1" Ice	4.20	1.64	0.12
							2" Ice	4.72	2.02	0.18
TD-RRH8X20-25	C	From Leg	4.00		0.00	87.00	No Ice	3.70	1.29	0.07
			0.00				1/2" Ice	3.95	1.46	0.09
			2.00				1" Ice	4.20	1.64	0.12
							2" Ice	4.72	2.02	0.18
IBR-1211-83-NA_CCIV2	C	From Leg	4.00		0.00	87.00	No Ice	1.15	0.50	0.01
			0.00				1/2" Ice	1.29	0.59	0.02
			0.00				1" Ice	1.44	0.69	0.03
							2" Ice	1.75	0.91	0.07
EPSILON GPS ANTENNA 35 DB	C	From Leg	4.00		0.00	87.00	No Ice	0.11	0.11	0.00
			0.00				1/2" Ice	0.16	0.16	0.00
			0.00				1" Ice	0.21	0.21	0.00
							2" Ice	0.34	0.34	0.01
Platform Mount [LP 713-1]	C	None			0.00	87.00	No Ice	31.27	31.27	1.51
							1/2" Ice	39.68	39.68	1.93
							1" Ice	48.09	48.09	2.35
							2" Ice	64.91	64.91	3.19
(2) 6' x 2" Mount Pipe	A	From Leg	4.00		0.00	87.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
			0.00				1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
(2) 6' x 2" Mount Pipe	B	From Leg	4.00		0.00	87.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
			0.00				1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
(2) 6' x 2" Mount Pipe	C	From Leg	4.00		0.00	87.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
			0.00				1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
* AIR 21 B2A/B4P	A	From Face	4.00		0.00	71.00	No Ice	5.92	4.22	0.08
			0.00				1/2" Ice	6.29	4.56	0.12
			2.00				1" Ice	6.66	4.91	0.17
							2" Ice	7.42	5.63	0.28
AIR 21 B2A/B4P	B	From Face	4.00		0.00	71.00	No Ice	5.92	4.22	0.08
			0.00				1/2" Ice	6.29	4.56	0.12
			2.00				1" Ice	6.66	4.91	0.17
							2" Ice	7.42	5.63	0.28
AIR 21 B2A/B4P	C	From Face	4.00		0.00	71.00	No Ice	5.92	4.22	0.08
			0.00				1/2" Ice	6.29	4.56	0.12
			2.00				1" Ice	6.66	4.91	0.17
							2" Ice	7.42	5.63	0.28
AIR32 DB B66Aa B2a	A	From Face	4.00		0.00	71.00	No Ice	6.51	4.71	0.11
			0.00				1/2" Ice	6.89	5.07	0.15
			2.00				1" Ice	7.27	5.43	0.20

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
AIR32 DB B66Aa B2a	B	From Face	4.00		0.00	71.00	2" Ice	8.06	6.18	0.32
			0.00				No Ice	6.51	4.71	0.11
			2.00				1/2" Ice	6.89	5.07	0.15
							1" Ice	7.27	5.43	0.20
AIR32 DB B66Aa B2a	C	From Face	4.00		0.00	71.00	2" Ice	8.06	6.18	0.32
			0.00				No Ice	6.51	4.71	0.11
			2.00				1/2" Ice	6.89	5.07	0.15
							1" Ice	7.27	5.43	0.20
APXVAA24_43-U-A20	A	From Face	4.00		0.00	71.00	2" Ice	8.06	6.18	0.32
			0.00				No Ice	20.27	8.74	0.10
			2.00				1/2" Ice	20.91	9.34	0.21
							1" Ice	21.57	9.95	0.33
APXVAA24_43-U-A20	B	From Face	4.00		0.00	71.00	2" Ice	22.90	11.18	0.60
			0.00				No Ice	20.27	8.74	0.10
			2.00				1/2" Ice	20.91	9.34	0.21
							1" Ice	21.57	9.95	0.33
APXVAA24_43-U-A20	C	From Face	4.00		0.00	71.00	2" Ice	22.90	11.18	0.60
			0.00				No Ice	20.27	8.74	0.10
			2.00				1/2" Ice	20.91	9.34	0.21
							1" Ice	21.57	9.95	0.33
RRUS 11 B12	A	From Face	4.00		0.00	71.00	2" Ice	22.90	11.18	0.60
			0.00				No Ice	2.79	1.19	0.05
			2.00				1/2" Ice	3.00	1.34	0.07
							1" Ice	3.21	1.50	0.10
RRUS 11 B12	B	From Face	4.00		0.00	71.00	2" Ice	3.67	1.84	0.15
			0.00				No Ice	2.79	1.19	0.05
			2.00				1/2" Ice	3.00	1.34	0.07
							1" Ice	3.21	1.50	0.10
RRUS 11 B12	C	From Face	4.00		0.00	71.00	2" Ice	3.67	1.84	0.15
			0.00				No Ice	2.79	1.19	0.05
			2.00				1/2" Ice	3.00	1.34	0.07
							1" Ice	3.21	1.50	0.10
RMQP-496-HK Platform	C	None			0.00	71.00	2" Ice	3.67	1.84	0.15
							No Ice	51.70	51.70	2.26
							1/2" Ice	62.70	62.70	2.94
							1" Ice	76.00	76.00	3.81
* PD1142-1	A	From Leg	6.00		0.00	50.00	2" Ice	92.20	92.20	4.94
			0.00				No Ice	1.32	1.32	0.01
			7.00				1/2" Ice	3.21	3.21	0.02
							1" Ice	5.12	5.12	0.05
DB492A	A	From Leg	6.00		0.00	50.00	2" Ice	8.99	8.99	0.14
			0.00				No Ice	1.10	1.10	0.01
			0.00				1/2" Ice	1.98	1.98	0.01
							1" Ice	2.86	2.86	0.01
ASP-655	A	From Leg	6.00		0.00	50.00	2" Ice	4.62	4.62	0.01
			0.00				No Ice	0.76	0.76	0.00
			4.00				1/2" Ice	1.97	1.97	0.01
							1" Ice	3.18	3.18	0.02
PD1121-6	B	From Leg	6.00		0.00	50.00	2" Ice	5.60	5.60	0.04
			0.00				No Ice	0.23	0.23	0.00
			3.00				1/2" Ice	0.41	0.41	0.00
							1" Ice	0.60	0.60	0.00
Side Arm Mount [SO 702-1]	A	From Leg	3.00		0.00	50.00	2" Ice	0.97	0.97	0.01
			0.00				No Ice	1.00	1.43	0.03
			0.00				1/2" Ice	1.00	2.05	0.04
							1" Ice	1.00	2.67	0.05
Side Arm Mount [SO 702-1]	B	From Leg	3.00		0.00	50.00	2" Ice	1.00	3.91	0.07
			0.00				No Ice	1.00	1.43	0.03
			0.00				1/2" Ice	1.00	2.05	0.04
							1" Ice	1.00	2.67	0.05
* EPSILON GPS ANTENNA 35 DB	A	From Leg	4.00		0.00	40.00	2" Ice	1.00	3.91	0.07
			0.00				No Ice	0.11	0.11	0.00
			1.00				1/2" Ice	0.16	0.16	0.00
							1" Ice	0.21	0.21	0.00
Side Arm Mount [SO 701-1]	A	From Leg	2.00		0.00	40.00	2" Ice	0.34	0.34	0.01
			0.00				No Ice	0.85	1.67	0.07
			0.00				1/2" Ice	1.14	2.34	0.08
							1" Ice	1.43	3.01	0.09
***						2" Ice	2.01	4.35	0.12	

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K	
GLF6-450	B	Grid	From Leg	1.00	0.00		107.00	6.40	No Ice	32.17	0.20
				0.00					1/2" Ice	33.01	0.37
				0.00					1" Ice	33.86	0.54
									2" Ice	35.54	0.88
*											
SHP2-13	B	Paraboloid w/Shroud (HP)	From Face	4.00	-90.00		71.00	2.00	No Ice	3.14	0.10
				0.00					1/2" Ice	3.41	0.13
				0.00					1" Ice	3.68	0.17
									2" Ice	4.21	0.23

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
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 100	Pole	Max Tension	20	0.00	-0.00	0.00
			Max. Compression	26	-12.34	-1.75	-0.41
			Max. Mx	8	-4.81	-116.44	-1.01
			Max. My	14	-4.86	-1.73	-112.82
			Max. Vy	8	8.03	-116.44	-1.01
			Max. Vx	14	7.71	-1.73	-112.82
L2	100 - 47.0833	Pole	Max. Torque	2			-1.38
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.16	-1.99	0.48
			Max. Mx	8	-21.49	-1095.78	-9.79
			Max. My	14	-21.53	-12.66	-1074.88
			Max. Vy	8	25.94	-1095.78	-9.79
L3	47.0833 - 0	Pole	Max. Vx	14	25.61	-12.66	-1074.88
			Max. Torque	14			1.55
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-61.58	-2.49	1.12
			Max. Mx	8	-35.16	-2553.22	-20.83
			Max. My	14	-35.16	-24.75	-2514.11
			Max. Vy	8	29.87	-2553.22	-20.83
			Max. Vx	14	29.53	-24.75	-2514.11
			Max. Torque	12			2.12

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	37	61.58	5.66	3.25
	Max. H _x	20	35.20	29.82	0.14
	Max. H _z	2	35.20	0.17	29.44
	Max. M _x	2	2510.93	0.17	29.44
	Max. M _z	8	2553.22	-29.83	-0.21
	Max. Torsion	12	2.11	-15.06	-25.70
	Min. Vert	25	26.40	15.01	25.69
	Min. H _x	8	35.20	-29.83	-0.21
	Min. H _z	14	35.20	-0.22	-29.49
	Min. M _x	14	-2514.11	-0.22	-29.49
	Min. M _z	20	-2550.42	29.82	0.14
	Min. Torsion	24	-2.04	15.01	25.69

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	29.33	0.00	0.00	-0.40	-0.89	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	35.20	-0.17	-29.44	-2510.93	17.33	1.61
0.9 Dead+1.0 Wind 0 deg - No Ice	26.40	-0.17	-29.44	-2481.71	17.39	1.60
1.2 Dead+1.0 Wind 30 deg - No Ice	35.20	14.70	-25.30	-2152.47	-1254.65	0.67
0.9 Dead+1.0 Wind 30 deg - No Ice	26.40	14.70	-25.30	-2127.44	-1239.82	0.66
1.2 Dead+1.0 Wind 60 deg - No Ice	35.20	25.68	-14.57	-1238.97	-2194.89	0.04
0.9 Dead+1.0 Wind 60 deg - No Ice	26.40	25.68	-14.57	-1224.52	-2169.14	0.03
1.2 Dead+1.0 Wind 90 deg - No Ice	35.20	29.83	0.21	20.83	-2553.22	-1.00
0.9 Dead+1.0 Wind 90 deg - No Ice	26.40	29.83	0.21	20.70	-2523.29	-1.00
1.2 Dead+1.0 Wind 120 deg - No Ice	35.20	25.96	14.98	1281.94	-2225.88	-1.75
0.9 Dead+1.0 Wind 120 deg - No Ice	26.40	25.96	14.98	1267.19	-2199.74	-1.74
1.2 Dead+1.0 Wind 150 deg - No Ice	35.20	15.06	25.70	2194.78	-1292.72	-2.11

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.0 Wind 150 deg - No Ice	26.40	15.06	25.70	2169.46	-1277.41	-2.10
1.2 Dead+1.0 Wind 180 deg - No Ice	35.20	0.22	29.49	2514.11	-24.75	-1.77
0.9 Dead+1.0 Wind 180 deg - No Ice	26.40	0.22	29.49	2485.11	-24.15	-1.75
1.2 Dead+1.0 Wind 210 deg - No Ice	35.20	-14.56	25.39	2160.82	1237.20	-0.84
0.9 Dead+1.0 Wind 210 deg - No Ice	26.40	-14.56	25.39	2135.94	1223.16	-0.83
1.2 Dead+1.0 Wind 240 deg - No Ice	35.20	-25.66	14.58	1239.09	2189.80	0.07
0.9 Dead+1.0 Wind 240 deg - No Ice	26.40	-25.66	14.58	1224.89	2164.69	0.08
1.2 Dead+1.0 Wind 270 deg - No Ice	35.20	-29.82	-0.14	-14.79	2550.42	0.81
0.9 Dead+1.0 Wind 270 deg - No Ice	26.40	-29.82	-0.14	-14.48	2521.12	0.81
1.2 Dead+1.0 Wind 300 deg - No Ice	35.20	-25.87	-14.92	-1276.69	2214.20	1.62
0.9 Dead+1.0 Wind 300 deg - No Ice	26.40	-25.87	-14.92	-1261.75	2188.77	1.62
1.2 Dead+1.0 Wind 330 deg - No Ice	35.20	-15.01	-25.69	-2196.24	1285.14	2.04
0.9 Dead+1.0 Wind 330 deg - No Ice	26.40	-15.01	-25.69	-2170.64	1270.49	2.03
1.2 Dead+1.0 Ice+1.0 Temp	61.58	0.00	-0.00	-1.12	-2.49	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	61.58	-0.30	-6.37	-582.84	33.14	0.13
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	61.58	3.12	-5.38	-488.70	-285.90	0.18
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	61.58	5.49	-3.10	-281.78	-503.34	-0.03
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	61.58	6.38	0.03	2.43	-585.66	-0.30
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	61.58	5.57	3.20	291.81	-512.64	-0.59
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	61.58	3.21	5.49	499.25	-296.70	-0.73
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	61.58	0.05	6.28	570.26	-8.89	-0.56
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	61.58	-3.11	5.39	486.92	279.85	-0.21
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	61.58	-5.70	2.93	258.75	522.33	0.45
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	61.58	-6.48	-0.19	-24.02	592.45	0.66
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	61.58	-5.66	-3.25	-300.29	518.28	0.57
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	61.58	-3.40	-5.49	-501.90	314.33	0.34
Dead+Wind 0 deg - Service	29.33	-0.03	-5.91	-501.09	2.74	0.33
Dead+Wind 30 deg - Service	29.33	2.95	-5.08	-429.58	-250.93	0.14
Dead+Wind 60 deg - Service	29.33	5.15	-2.92	-247.42	-438.46	0.01
Dead+Wind 90 deg - Service	29.33	5.98	0.04	3.83	-509.95	-0.20
Dead+Wind 120 deg - Service	29.33	5.21	3.01	255.36	-444.67	-0.35
Dead+Wind 150 deg - Service	29.33	3.02	5.16	437.41	-258.54	-0.43
Dead+Wind 180 deg - Service	29.33	0.04	5.92	501.08	-5.65	-0.36
Dead+Wind 210 deg - Service	29.33	-2.92	5.09	430.60	246.01	-0.17
Dead+Wind 240 deg - Service	29.33	-5.15	2.92	246.80	436.01	0.01
Dead+Wind 270 deg - Service	29.33	-5.98	-0.03	-3.27	507.96	0.16
Dead+Wind 300 deg - Service	29.33	-5.19	-2.99	-254.96	440.90	0.33
Dead+Wind 330 deg - Service	29.33	-3.01	-5.15	-438.35	255.59	0.41

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-29.33	0.00	0.00	29.33	0.00	0.000%
2	-0.17	-35.20	-29.44	0.17	35.20	29.44	0.000%
3	-0.17	-26.40	-29.44	0.17	26.40	29.44	0.000%
4	14.70	-35.20	-25.30	-14.70	35.20	25.30	0.000%
5	14.70	-26.40	-25.30	-14.70	26.40	25.30	0.000%
6	25.68	-35.20	-14.57	-25.68	35.20	14.57	0.000%
7	25.68	-26.40	-14.57	-25.68	26.40	14.57	0.000%
8	29.83	-35.20	0.21	-29.83	35.20	-0.21	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
9	29.83	-26.40	0.21	-29.83	26.40	-0.21	0.000%
10	25.96	-35.20	14.98	-25.96	35.20	-14.98	0.000%
11	25.96	-26.40	14.98	-25.96	26.40	-14.98	0.000%
12	15.06	-35.20	25.70	-15.06	35.20	-25.70	0.000%
13	15.06	-26.40	25.70	-15.06	26.40	-25.70	0.000%
14	0.22	-35.20	29.49	-0.22	35.20	-29.49	0.000%
15	0.22	-26.40	29.49	-0.22	26.40	-29.49	0.000%
16	-14.56	-35.20	25.39	14.56	35.20	-25.39	0.000%
17	-14.56	-26.40	25.39	14.56	26.40	-25.39	0.000%
18	-25.66	-35.20	14.58	25.66	35.20	-14.58	0.000%
19	-25.66	-26.40	14.58	25.66	26.40	-14.58	0.000%
20	-29.82	-35.20	-0.14	29.82	35.20	0.14	0.000%
21	-29.82	-26.40	-0.14	29.82	26.40	0.14	0.000%
22	-25.87	-35.20	-14.92	25.87	35.20	14.92	0.000%
23	-25.87	-26.40	-14.92	25.87	26.40	14.92	0.000%
24	-15.01	-35.20	-25.69	15.01	35.20	25.69	0.000%
25	-15.01	-26.40	-25.69	15.01	26.40	25.69	0.000%
26	0.00	-61.58	0.00	-0.00	61.58	0.00	0.000%
27	-0.30	-61.58	-6.37	0.30	61.58	6.37	0.000%
28	3.12	-61.58	-5.38	-3.12	61.58	5.38	0.000%
29	5.49	-61.58	-3.10	-5.49	61.58	3.10	0.000%
30	6.38	-61.58	0.03	-6.38	61.58	-0.03	0.000%
31	5.57	-61.58	3.20	-5.57	61.58	-3.20	0.000%
32	3.21	-61.58	5.49	-3.21	61.58	-5.49	0.000%
33	0.05	-61.58	6.28	-0.05	61.58	-6.28	0.000%
34	-3.11	-61.58	5.39	3.11	61.58	-5.39	0.000%
35	-5.70	-61.58	2.93	5.70	61.58	-2.93	0.000%
36	-6.48	-61.58	-0.19	6.48	61.58	0.19	0.000%
37	-5.66	-61.58	-3.25	5.66	61.58	3.25	0.000%
38	-3.40	-61.58	-5.49	3.40	61.58	5.49	0.000%
39	-0.03	-29.33	-5.91	0.03	29.33	5.91	0.000%
40	2.95	-29.33	-5.08	-2.95	29.33	5.08	0.000%
41	5.15	-29.33	-2.92	-5.15	29.33	2.92	0.000%
42	5.98	-29.33	0.04	-5.98	29.33	-0.04	0.000%
43	5.21	-29.33	3.01	-5.21	29.33	-3.01	0.000%
44	3.02	-29.33	5.16	-3.02	29.33	-5.16	0.000%
45	0.04	-29.33	5.92	-0.04	29.33	-5.92	0.000%
46	-2.92	-29.33	5.09	2.92	29.33	-5.09	0.000%
47	-5.15	-29.33	2.92	5.15	29.33	-2.92	0.000%
48	-5.98	-29.33	-0.03	5.98	29.33	0.03	0.000%
49	-5.19	-29.33	-2.99	5.19	29.33	2.99	0.000%
50	-3.01	-29.33	-5.15	3.01	29.33	5.15	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00011445
3	Yes	5	0.00000001	0.00005063
4	Yes	6	0.00000001	0.00013860
5	Yes	6	0.00000001	0.00004122
6	Yes	6	0.00000001	0.00013289
7	Yes	6	0.00000001	0.00003906
8	Yes	5	0.00000001	0.00009789
9	Yes	5	0.00000001	0.00004288
10	Yes	6	0.00000001	0.00013907
11	Yes	6	0.00000001	0.00004037
12	Yes	6	0.00000001	0.00014554
13	Yes	6	0.00000001	0.00004279
14	Yes	5	0.00000001	0.00024486
15	Yes	5	0.00000001	0.00010718
16	Yes	6	0.00000001	0.00012963
17	Yes	6	0.00000001	0.00003830
18	Yes	6	0.00000001	0.00013934
19	Yes	6	0.00000001	0.00004138
20	Yes	4	0.00000001	0.00081157
21	Yes	4	0.00000001	0.00031367
22	Yes	6	0.00000001	0.00014226
23	Yes	6	0.00000001	0.00004171
24	Yes	6	0.00000001	0.00013437
25	Yes	6	0.00000001	0.00003900
26	Yes	4	0.00000001	0.00002166
27	Yes	5	0.00000001	0.00035808
28	Yes	5	0.00000001	0.00061740
29	Yes	5	0.00000001	0.00059074
30	Yes	5	0.00000001	0.00035931
31	Yes	5	0.00000001	0.00063881
32	Yes	5	0.00000001	0.00065729
33	Yes	5	0.00000001	0.00036107
34	Yes	5	0.00000001	0.00055706
35	Yes	5	0.00000001	0.00058011
36	Yes	5	0.00000001	0.00036434
37	Yes	5	0.00000001	0.00066640
38	Yes	5	0.00000001	0.00066539
39	Yes	4	0.00000001	0.00015137
40	Yes	4	0.00000001	0.00060389
41	Yes	4	0.00000001	0.00051901
42	Yes	4	0.00000001	0.00060615
43	Yes	4	0.00000001	0.00057403
44	Yes	4	0.00000001	0.00067344
45	Yes	4	0.00000001	0.00017891
46	Yes	4	0.00000001	0.00048620
47	Yes	4	0.00000001	0.00059972
48	Yes	4	0.00000001	0.00005645
49	Yes	4	0.00000001	0.00061568
50	Yes	4	0.00000001	0.00052605

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	19.35	43	1.41	0.00
L2	100 - 47.0833	13.58	43	1.30	0.00
L3	52 - 0	3.48	43	0.63	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	DB809MT3-XT	43	19.06	1.41	0.00	22959
116.00	(2) SBNHH-1D65A w/ Mount Pipe	43	18.17	1.39	0.00	22959
107.00	GLF6-450	43	15.55	1.35	0.00	8830
100.00	(2) LPA-80080/6CF w/ Mount Pipe	43	13.58	1.30	0.00	5901
87.00	NNVV-65B-R4 w/ Mount Pipe	43	10.21	1.16	0.00	4698
75.00	SHP2-13	43	7.47	0.99	0.00	4024
71.00	AIR 21 B2A/B4P	43	6.65	0.93	0.00	3840

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
50.00	PD1142-1	43	3.22	0.60	0.00	3299
40.00	EPSILON GPS ANTENNA 35 DB	43	2.14	0.46	0.00	4101

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	120 - 100	96.73	10	7.06	0.02
L2	100 - 47.0833	67.97	10	6.53	0.01
L3	52 - 0	17.44	10	3.17	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
119.00	DB809MT3-XT	10	95.26	7.04	0.02	4770
116.00	(2) SBNHH-1D65A w/ Mount Pipe	10	90.85	6.98	0.02	4770
107.00	GLF6-450	10	77.78	6.77	0.02	1832
100.00	(2) LPA-80080/6CF w/ Mount Pipe	10	67.97	6.53	0.01	1222
87.00	NNVV-65B-R4 w/ Mount Pipe	10	51.10	5.83	0.01	963
75.00	SHP2-13	10	37.42	4.98	0.01	818
71.00	AIR 21 B2A/B4P	10	33.32	4.67	0.01	778
50.00	PD1142-1	10	16.15	3.03	0.00	661
40.00	EPSILON GPS ANTENNA 35 DB	10	10.72	2.33	0.00	821

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L _u	KI/r	A	P _u	φP _n	Ratio P _u /φP _n
	ft		ft	ft		in ²	K	K	
L1	120 - 100 (1)	TP20.263x15.403x0.1875	20.00	0.00	0.0	12.1206	-4.79	709.05	0.007
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	52.92	0.00	0.0	28.6660	-21.47	1676.96	0.013
L3	47.0833 - 0 (3)	TP44x31.372x0.375	52.00	0.00	0.0	52.6772	-35.16	3081.62	0.011

Pole Bending Design Data

Section No.	Elevation	Size	M _{ux}	φM _{nx}	Ratio M _{ux} /φM _{nx}	M _{uy}	φM _{ny}	Ratio M _{uy} /φM _{ny}
	ft		kip-ft	kip-ft		kip-ft	kip-ft	
L1	120 - 100 (1)	TP20.263x15.403x0.1875	117.07	332.31	0.352	0.00	332.31	0.000
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	1103.31	1213.13	0.909	0.00	1213.13	0.000
L3	47.0833 - 0 (3)	TP44x31.372x0.375	2568.64	3026.69	0.849	0.00	3026.69	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V _u	φV _n	Ratio V _u /φV _n	Actual T _u	φT _n	Ratio T _u /φT _n
	ft		K	K		kip-ft	kip-ft	
L1	120 - 100 (1)	TP20.263x15.403x0.1875	8.15	212.72	0.038	0.11	375.64	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio V_u ϕV_n	Actual T_u kip-ft	ϕT_n kip-ft	Ratio T_u ϕT_n
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	26.11	503.09	0.052	0.77	1400.75	0.001
L3	47.0833 - 0 (3)	TP44x31.372x0.375	30.02	924.49	0.032	1.75	3547.60	0.000

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	120 - 100 (1)	0.007	0.352	0.000	0.038	0.000	0.361	1.050	4.8.2
L2	100 - 47.0833 (2)	0.013	0.909	0.000	0.052	0.001	0.925	1.050	4.8.2
L3	47.0833 - 0 (3)	0.011	0.849	0.000	0.032	0.000	0.861	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	120 - 100	Pole	TP20.263x15.403x0.1875	1	-4.79	744.51	34.3	Pass	
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-21.47	1760.81	88.1	Pass	
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-35.16	3235.70	82.0	Pass	
							Summary		
							Pole (L2) RATING =	88.1	Pass

APPENDIX B
BASE LEVEL DRAWING



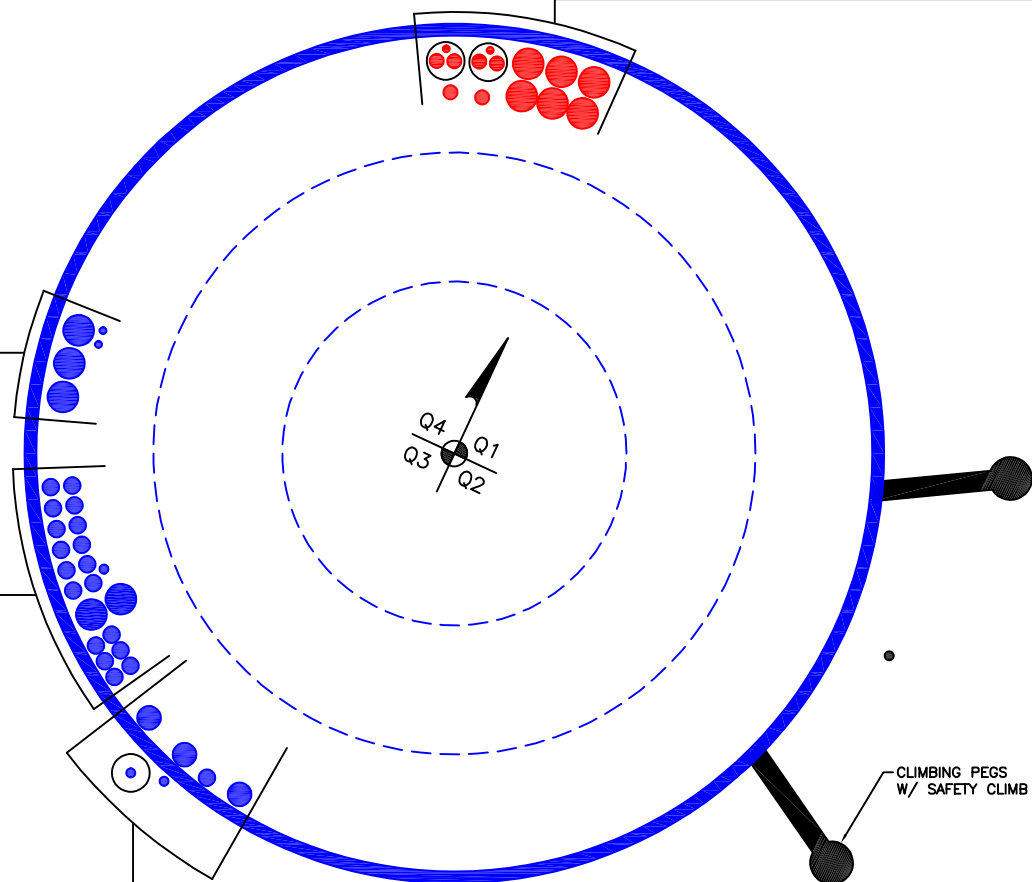
(PROPOSED EQUIPMENT CONFIGURATION)
(2) 3/8" TO 116 FT LEVEL
(6) 3/4" TO 116 FT LEVEL
(6) 1-5/8" TO 116 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(2) 3/8" TO 71 FT LEVEL
(3) 1-5/8" TO 71 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(12) 7/8" TO 100 FT LEVEL
(2) 1-5/8" TO 100 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 50 FT LEVEL
(3) 7/8" TO 50 FT LEVEL
(1) 7/8" TO 107 FT LEVEL
(2) 7/8" TO 119 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 40 FT LEVEL
(1) 1/2" TO 87 FT LEVEL
(1) 7/8" TO 87 FT LEVEL
(3) 1-1/4" TO 87 FT LEVEL



CLIMBING PEGS
W/ SAFETY CLIMB

APPENDIX C
ADDITIONAL CALCULATIONS

Monopole Flange Plate Connection

Elevation = 100 ft.

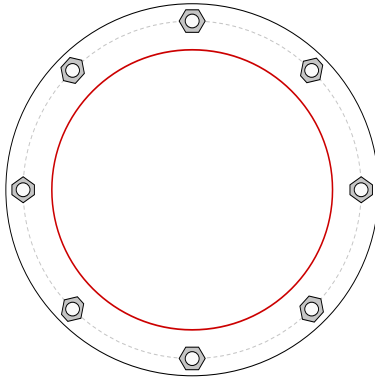


BU #	806364
Site Name	HRT 106(B) 943202
Order #	474211
TIA-222 Revision	
	H

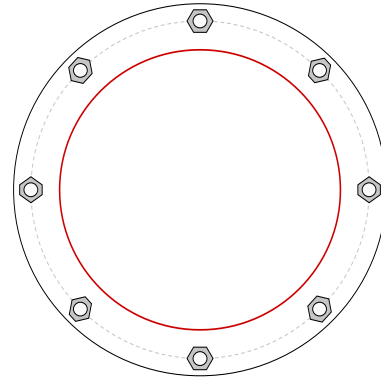
Applied Loads	
Moment (kip-ft)	119.23
Axial Force (kips)	8.61
Shear Force (kips)	13.14

*TIA-222-H Section 15.5 Applied

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(8) 1" ϕ bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 24.41" BC

Top Plate Data

26.91" OD x 1.5" Plate (S-128; Fy=60 ksi, Fu=80 ksi)

Bottom Plate Data

26.91" OD x 1.5" Plate (S-128; Fy=60 ksi, Fu=80 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

20.263" x 0.1875" 12-sided pole (S-22; Fy=65 ksi, Fu=80 ksi)

Bottom Pole Data

20.263" x 0.28125" 12-sided pole (S-22; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	28.21
Allowable (kips)	54.48
Stress Rating:	49.3% Pass

Top Plate Capacity

Max Stress (ksi):	8.41	(Flexural)
Allowable Stress (ksi):	54.00	
Stress Rating:	14.8%	Pass
Tension Side Stress Rating:	7.0%	Pass

Bottom Plate Capacity

Max Stress (ksi):	8.41	(Flexural)
Allowable Stress (ksi):	54.00	
Stress Rating:	14.8%	Pass
Tension Side Stress Rating:	7.0%	Pass

Monopole Base Plate Connection

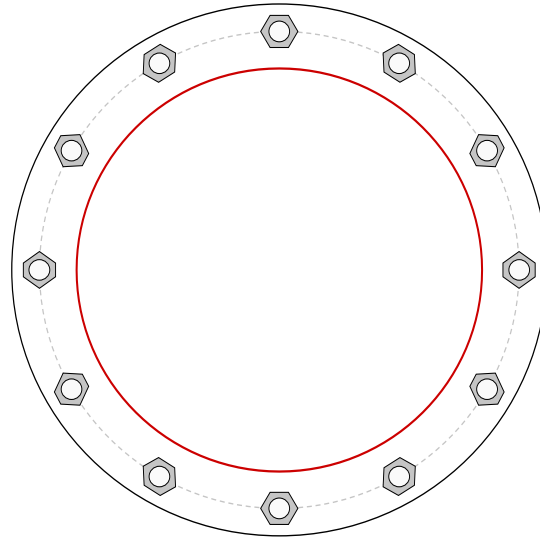


Site Info	
BU #	806364
Site Name	HRT 106(B) 943202
Order #	474211

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	0

Applied Loads	
Moment (kip-ft)	2568.64
Axial Force (kips)	35.16
Shear Force (kips)	30.02

*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data
(12) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 52.05" BC
Base Plate Data
58.05" OD x 2.75" Plate (S-128; $F_y=60$ ksi, $F_u=80$ ksi)
Stiffener Data
N/A
Pole Data
44" x 0.375" 12-sided pole (S-22; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary	<i>(units of kips, kip-in)</i>	
$Pu_c = 200.18$	$\phi Pn_c = 243.75$	Stress Rating
$Vu = 2.5$	$\phi Vn = 73.13$	78.3%
$Mu = n/a$	$\phi Mn = n/a$	Pass
Base Plate Summary		
Max Stress (ksi):	23.1	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	40.7%	Pass

Pier and Pad Foundation



BU # : 806364
Site Name: HRT 106(B) 94320
App. Number: 474211

TIA-222 Revision: H
Tower Type: Monopole

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

Superstructure Analysis Reactions		
Compression, P_{comp} :	35	kips
Base Shear, V_u_{comp} :	30	kips
Moment, M_u :	2569	ft-kips
Tower Height, H :	120	ft
BP Dist. Above Fdn, b_{pdist} :	2.25	in
Bolt Circle / Bearing Plate Width, BC :	52.05	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	304.69	30.00	9.4%	Pass
<i>Bearing Pressure (ksf)</i>	6.56	1.72	24.9%	Pass
<i>Overtuning (kip*ft)</i>	7279.81	2754.63	37.8%	Pass
<i>Pad Flexure (kip*ft)</i>	12270.43	1131.49	8.8%	Pass
<i>Pad Shear - 1-way (kips)</i>	2025.13	111.35	5.2%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.190	0.001	0.6%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	16228.24	0.00	0.0%	Pass

*Rating per TIA-222-H Section 15.5

Soil Rating*:	37.8%
Structural Rating*:	8.8%

Pad Properties		
Depth, D :	6	ft
Pad Width, W :	27	ft
Pad Thickness, T :	6	ft
Pad Rebar Size (Bottom), Sp :	11	
Pad Rebar Quantity (Bottom), mp :	27	
Pad Clear Cover, cc_{pad} :	4	in

Material Properties		
Rebar Grade, F_y :	60	ksi
Concrete Compressive Strength, F'_c :	4	ksi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	125	pcf
Ultimate Net Bearing, Q_{net} :	8.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	34	degrees
SPT Blow Count, N_{blows} :	25	
Base Friction, μ :		
Neglected Depth, N :	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	6	ft

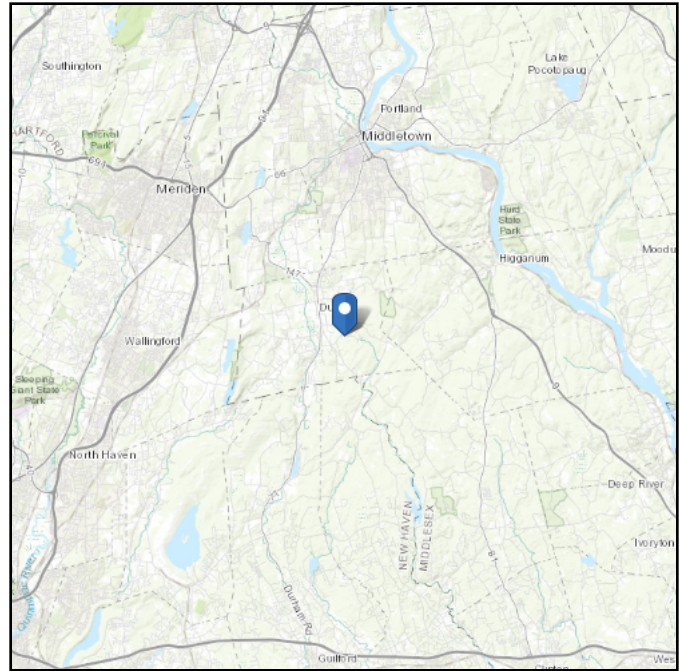
--Toggle between Gross and Net

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 511.24 ft (NAVD 88)
Latitude: 41.459353
Longitude: -72.662731



Wind

Results:

Wind Speed:	130 mph (per 2018 Connecticut State Building Code)
10-year MRI	78 Vmph
25-year MRI	87 Vmph
50-year MRI	95 Vmph
100-year MRI	103 Vmph

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

Date Accessed: Mon Apr 29 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 in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

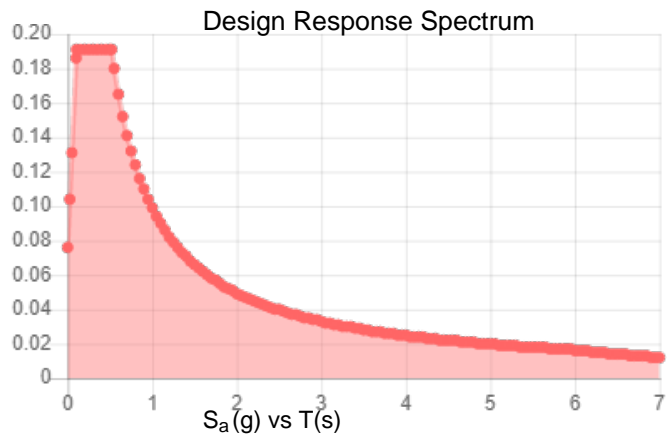
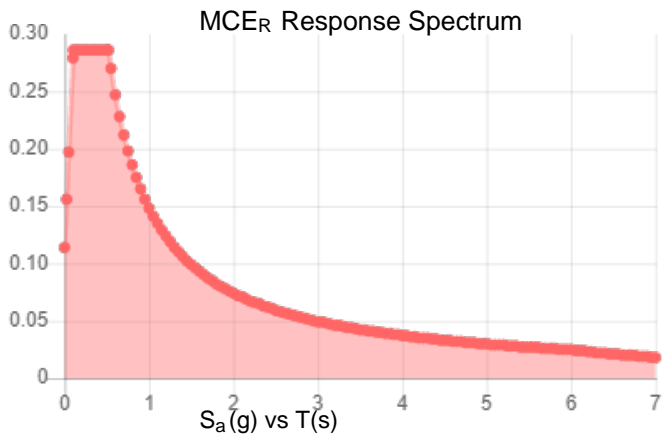
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

Site Soil Class: D - Stiff Soil

Results:

S_s :	0.179	S_{DS} :	0.191
S_1 :	0.062	S_{D1} :	0.099
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.091
S_{MS} :	0.286	PGA _M :	0.146
S_{M1} :	0.148	F _{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Mon Apr 29 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: 50 mph

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

Date Accessed: Mon Apr 29 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.

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

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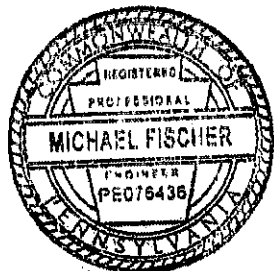
RF EMISSIONS COMPLIANCE REPORT

Crown Castle on behalf of AT&T Mobility, LLC

Crown Castle Site Name: HRT 106(B) 943202
Crown Castle Site BU: 806364
AT&T Mobility, LLC Site FA #: 10071003
143 R Old Blue Hill Road
DURHAM, CT
5/6/2019

Report Status:

AT&T Mobility, LLC Is Compliant



A handwritten signature in black ink, appearing to read "M. Fischer", written over the bottom portion of the professional seal.

Michael Fischer, P.E.
Registered Professional Engineer (Electrical)
Pennsylvania License Number PE076436
Expires September 30, 2019

Signed 06 May 2019

Prepared By:

Site Safe, LLC

8618 Westwood Center Drive
Suite 315

Vienna, VA 22182

Voice: 703-276-1100
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Engineering Statement in Re:
Electromagnetic Energy Analysis
Crown Castle
DURHAM, 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 Radiofrequency Electromagnetic Fields; and

That the technical information serving as the basis for this report was supplied by Crown Castle (see attached Site Summary and Carrier documents), and that AT&T Mobility, LLC's installation involves communications equipment, antennas and associated technical equipment at a location referred to as the "HRT 106(B) 943202" ("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 in addition to the emitters specified in the worksheet, there are additional collocated point-to-point microwave facilities on this structure, and the antennas used are highly directional and oriented at angles at or just below the horizontal, and that the energy present at ground level is typically so low as to be considered insignificant and has not been included in this analysis. A list of microwave antennas is included; 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 limits 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 2.494% of the maximum permissible exposure limits in any accessible area on the ground; and

That it is understood per FCC Guidelines and OET Bulletin 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 15.061% of the maximum in any accessible area up to two meters above the ground per OET Bulletin 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 Bulletin 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 carriers and frequency ranges 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, 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.

**Crown Castle
HRT 106(B) 943202
Site Summary**

Carrier	Area Maximum Percentage MPE
AT&T Mobility, LLC	0.18 %
AT&T Mobility, LLC	0.288 %
AT&T Mobility, LLC	0.127 %
AT&T Mobility, LLC (Proposed)	0.683 %
AT&T Mobility, LLC (Proposed)	0.459 %
AT&T Mobility, LLC (Proposed)	0.322 %
AT&T Mobility, LLC (Proposed)	0.435 %
Sprint	0.528 %
Sprint	0.528 %
Sprint	0.293 %
Sprint	0.295 %
Sprint	0.934 %
T-Mobile	0.454 %
T-Mobile	0.491 %
T-Mobile	0.999 %
T-Mobile	0.733 %
Town of Durham, CT	0.105 %
Town of Durham, CT	1.186 %
Town of Durham, CT	0.325 %
Town of Durham, CT	0.692 %
Verizon Wireless	1.181 %
Verizon Wireless	1.099 %
Verizon Wireless	0.877 %
Verizon Wireless	1.846 %
Composite Site MPE:	15.061 %

**AT&T Mobility, LLC
HRT 106(B) 943202
Carrier Summary**

Frequency: 2300 MHz
 Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 1.79975 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.17997 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65A	116	30	1400	1.137377	0.113738	1.623662	0.162366
ANDREW	SBNHH-1D65A	116	160	1400	1.137377	0.113738	1.623662	0.162366
ANDREW	SBNHH-1D65A	116	280	1400	1.146615	0.114662	1.623662	0.162366

**AT&T Mobility, LLC
HRT 106(B) 943202
Carrier Summary**

Frequency: 1900 MHz
 Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 2.87959 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.28796 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65A	116	30	2239	1.819803	0.18198	2.597859	0.259786
ANDREW	SBNHH-1D65A	116	160	2239	1.819803	0.18198	2.597859	0.259786
ANDREW	SBNHH-1D65A	116	280	2239	1.834585	0.183458	2.597859	0.259786

**AT&T Mobility, LLC
HRT 106(B) 943202
Carrier Summary**

Frequency: 850 MHz
 Maximum Permissible Exposure (MPE): 566.67 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 0.7199 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.12704 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65A	116	30	560	0.454951	0.080285	0.649465	0.114611
ANDREW	SBNHH-1D65A	116	160	560	0.454951	0.080285	0.649465	0.114611
ANDREW	SBNHH-1D65A	116	280	560	0.458646	0.080938	0.649465	0.114611

**AT&T Mobility, LLC (Proposed)
HRT 106(B) 943202
Carrier Summary**

Frequency: 2100 MHz
 Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 6.83397 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.6834 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Kathrein-Scala	800-10964	116	30	7911	2.600162	0.260016	6.221357	0.622136
Kathrein-Scala	800-10964	116	160	7911	2.569286	0.256929	6.221357	0.622136
Kathrein-Scala	800-10964	116	280	7911	2.600162	0.260016	6.221358	0.622136

AT&T Mobility, LLC (Proposed)
HRT 106(B) 943202
Carrier Summary

Frequency: 1900 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 4.59199 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.4592 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Kathrein-Scala	800-10964	116	30	5154	1.681558	0.168156	3.638	0.3638
Kathrein-Scala	800-10964	116	160	5154	1.681558	0.168156	3.638001	0.3638
Kathrein-Scala	800-10964	116	280	5154	1.683015	0.168302	3.638001	0.3638

**AT&T Mobility, LLC (Proposed)
HRT 106(B) 943202
Carrier Summary**

Frequency: 850 MHz
Maximum Permissible Exposure (MPE): 566.67 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.82415 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.32191 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Kathrein-Scala	800-10964	116	30	2631	1.166143	0.20579	1.424747	0.251426
Kathrein-Scala	800-10964	116	160	2631	1.163358	0.205299	1.424747	0.251426
Kathrein-Scala	800-10964	116	280	2631	1.163358	0.205299	1.424747	0.251426

**AT&T Mobility, LLC (Proposed)
HRT 106(B) 943202
Carrier Summary**

Frequency: 737 MHz
 Maximum Permissible Exposure (MPE): 491.33 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 2.13625 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.43479 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Kathrein-Scala	800-10964	116	30	2209	1.344835	0.273711	1.874586	0.38153
Kathrein-Scala	800-10964	116	160	2209	1.335971	0.271907	1.874586	0.38153
Kathrein-Scala	800-10964	116	280	2209	1.33597	0.271907	1.874586	0.38153

Sprint
HRT 106(B) 943202
Carrier Summary

Frequency: 1990 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 5.2817 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.52817 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Commscope	NNVV-65B-R4	87	10	2781	2.486412	0.248641	4.216474	0.421647
Commscope	NNVV-65B-R4	87	150	2781	2.486412	0.248641	4.216474	0.421647
Commscope	NNVV-65B-R4	87	270	2781	2.486412	0.248641	4.216474	0.421647

Sprint
HRT 106(B) 943202
Carrier Summary

Frequency: 1900 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 5.2817 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.52817 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Commscope	NNVV-65B-R4	87	10	2781	2.486412	0.248641	4.216474	0.421647
Commscope	NNVV-65B-R4	87	150	2781	2.486412	0.248641	4.216474	0.421647
Commscope	NNVV-65B-R4	87	270	2781	2.486412	0.248641	4.216474	0.421647

Sprint
HRT 106(B) 943202
Carrier Summary

Frequency: 869 MHz
Maximum Permissible Exposure (MPE): 579.33 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.6972 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.29296 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Commscope	NNVV-65B-R4	87	10	951	1.281581	0.221217	1.296337	0.223764
Commscope	NNVV-65B-R4	87	150	951	1.281581	0.221216	1.296337	0.223764
Commscope	NNVV-65B-R4	87	270	951	1.281581	0.221216	1.296337	0.223764

Sprint
HRT 106(B) 943202
Carrier Summary

Frequency: 862 MHz
Maximum Permissible Exposure (MPE): 574.67 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 1.6972 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.29534 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Commscope	NNVV-65B-R4	87	10	951	1.281581	0.223013	1.296337	0.225581
Commscope	NNVV-65B-R4	87	150	951	1.281581	0.223013	1.296337	0.225581
Commscope	NNVV-65B-R4	87	270	951	1.281581	0.223013	1.296337	0.225581

Sprint
HRT 106(B) 943202
Carrier Summary

Frequency: 2500 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 9.33589 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.93359 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
RFS	APXVTM14-C-I20	87	10	6168	2.785111	0.278511	5.978748	0.597875
RFS	APXVTM14-C-I20	87	150	6168	2.785111	0.278511	5.978748	0.597875
RFS	APXVTM14-C-I20	87	270	6168	2.785111	0.278511	5.978748	0.597875

**T-Mobile
HRT 106(B) 943202
Carrier Summary**

Frequency: 700 MHz
 Maximum Permissible Exposure (MPE): 466.67 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 2.11999 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.45428 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
RFS	APXVAARR24_43-U-NA20	73	60	1307	1.363995	0.292285	1.819223	0.389834
RFS	APXVAARR24_43-U-NA20	73	180	1307	1.363995	0.292285	1.819223	0.389834
RFS	APXVAARR24_43-U-NA20	73	300	1307	1.363995	0.292285	1.819223	0.389834

**T-Mobile
HRT 106(B) 943202
Carrier Summary**

Frequency: 600 MHz
 Maximum Permissible Exposure (MPE): 400 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 1.96412 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.49103 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
RFS	APXVAARR24_43-U-NA20	73	60	1251	1.504055	0.376014	1.648226	0.412057
RFS	APXVAARR24_43-U-NA20	73	180	1251	1.504055	0.376014	1.648226	0.412057
RFS	APXVAARR24_43-U-NA20	73	300	1251	1.504055	0.376014	1.648226	0.412057

**T-Mobile
HRT 106(B) 943202
Carrier Summary**

Frequency: 2100 MHz
 Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 9.98862 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.99886 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Ericsson	AIR32 DB B66AA-B2A	73	60	2313	9.872116	0.987212	9.909902	0.99099
Ericsson	AIR32 DB B66AA-B2A	73	180	2313	9.923817	0.992382	9.923817	0.992382
Ericsson	AIR32 DB B66AA-B2A	73	300	2313	9.923817	0.992382	9.923817	0.992382

**T-Mobile
HRT 106(B) 943202
Carrier Summary**

Frequency: 1900 MHz
Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 7.32992 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 0.73299 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Ericsson	AIR32 DB B66AA-B2A	73	60	2313	1.947973	0.194797	2.643792	0.264379
Ericsson	AIR 21 B2A B4P	73	60	2061	1.93514	0.193514	2.356287	0.235629
Ericsson	AIR32 DB B66AA-B2A	73	180	2313	1.947973	0.194797	2.643792	0.264379
Ericsson	AIR 21 B2A B4P	73	180	2061	1.93514	0.193514	2.356287	0.235629
Ericsson	AIR32 DB B66AA-B2A	73	300	2313	1.948435	0.194844	2.643792	0.264379
Ericsson	AIR 21 B2A B4P	73	300	2061	1.93514	0.193514	2.356287	0.235629

**Town of Durham, CT
HRT 106(B) 943202
Carrier Summary**

Frequency: 25 MHz
 Maximum Permissible Exposure (MPE): 288 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 0.30205 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.10488 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
RFS	PD1142-1	57	0	100	0.302051	0.104879	0.302051	0.104879

**Town of Durham, CT
HRT 106(B) 943202
Carrier Summary**

Frequency: 150 MHz
Maximum Permissible Exposure (MPE): 200 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 2.37275 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 1.18637 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	ASP655	54	0	100	2.221006	1.110503	2.221006	1.110503
ANDREW	DB201-A	123	0	100	0.660917	0.330459	0.660917	0.330459

**Town of Durham, CT
HRT 106(B) 943202
Carrier Summary**

Frequency: 154 MHz
 Maximum Permissible Exposure (MPE): 200 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 0.65042 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.32521 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
RFS	PD1121-6	53	0	100	0.63544	0.31772	0.650424	0.325212

**Town of Durham, CT
HRT 106(B) 943202
Carrier Summary**

Frequency: 850 MHz
 Maximum Permissible Exposure (MPE): 566.67 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 3.92212 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.69214 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	DB492A	50	0	100	3.781498	0.667323	3.836768	0.677077
ANDREW	DB809MT3-XT	125	0	100	0.106642	0.018819	0.106642	0.018819

**Verizon Wireless
HRT 106(B) 943202
Carrier Summary**

Frequency: 2100 MHz
 Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 11.81096 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 1.1811 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65B	101	30	7732	6.824032	0.682403	10.445446	1.044545
ANDREW	SBNHH-1D65B	101	170	7732	6.824031	0.682403	10.445449	1.044545
ANDREW	SBNHH-1D65B	101	290	7732	6.817173	0.681717	10.445447	1.044545

**Verizon Wireless
HRT 106(B) 943202
Carrier Summary**

Frequency: 1900 MHz
 Maximum Permissible Exposure (MPE): 1000 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 10.98632 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 1.09863 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65B	101	30	4583	8.130371	0.813037	10.425218	1.042522
ANDREW	SBNHH-1D65B	101	170	4583	8.130371	0.813037	10.425218	1.042522
ANDREW	SBNHH-1D65B	101	290	4583	8.015326	0.801533	10.425218	1.042522

**Verizon Wireless
HRT 106(B) 943202
Carrier Summary**

Frequency: 751 MHz
 Maximum Permissible Exposure (MPE): 500.67 $\mu\text{W}/\text{cm}^2$
 Maximum power density at ground level: 4.3914 $\mu\text{W}/\text{cm}^2$
 Highest percentage of Maximum Permissible Exposure: 0.87711 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
ANDREW	SBNHH-1D65B	101	30	2043	1.503468	0.300293	2.4488	0.489108
ANDREW	SBNHH-1D65B	101	170	2043	1.503468	0.300293	2.4488	0.489108
ANDREW	SBNHH-1D65B	101	290	2043	1.503468	0.300293	2.4488	0.489108

**Verizon Wireless
HRT 106(B) 943202
Carrier Summary**

Frequency: 850 MHz
Maximum Permissible Exposure (MPE): 566.67 $\mu\text{W}/\text{cm}^2$
Maximum power density at ground level: 10.46085 $\mu\text{W}/\text{cm}^2$
Highest percentage of Maximum Permissible Exposure: 1.84603 %

Antenna Make	Model	Height (feet)	Orientation (degrees true)	ERP (Watts)	On Axis		Area	
					Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE	Max Power Density ($\mu\text{W}/\text{cm}^2$)	Percent of MPE
Antel	LPA-80080-6CF	101	20	4019	2.551832	0.450323	4.222208	0.745096
ANDREW	SBNHH-1D65B	101	30	2892	3.588231	0.633217	3.941626	0.695581
Antel	LPA-80080-6CF	101	150	4019	2.561607	0.452048	4.222208	0.745096
ANDREW	SBNHH-1D65B	101	170	2892	3.588231	0.633217	3.941626	0.695581
Antel	LPA-80080-6CF	101	270	4019	2.551832	0.450323	4.222208	0.745096
ANDREW	SBNHH-1D65B	101	290	2892	3.588231	0.633217	3.941626	0.695581

HRT 106(B) 943202
Composite Microwave Antenna Summary

Carrier	Antenna Make/Model	Height (feet)
T-Mobile	Andrew SHP2-13	75
Town of Durham, CT	Gabriel GLF6-450	107