



56 Prospect Street,
P.O. Box 270
Hartford, CT 06103

Kathleen M. Shanley
Manager – Transmission Siting
Tel: (860) 728-4527

October 13, 2020

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

**RE: Notice of Exempt Modification
Eversource Site # ES-047 Coventry
400 Riley Mountain Road, Coventry, CT 06238
Latitude: 41-47-56.22 N / Longitude: 72-19-55.96 W**

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy (“Eversource”) currently maintains one omni-directional antenna mounted at 152 feet above ground level (“AGL”) on an existing 152-foot steel monopole located at 400 Riley Mountain Road in Coventry. See [Attachment A](#), Parcel Map and Property Card. The tower and property is owned by Crown Castle. Eversource and Crown Castle have entered into an agreement allowing the modification of Eversource’s equipment on the existing tower. See [Attachment B](#), Letter of Authorization. Eversource plans to install one 12-foot 7-inch tall omni-directional antenna, to be mounted at 152 feet AGL, and two 7/8-inch diameter coaxial cables. There will be no changes to the fenced compound, the tower or the existing antennas and equipment on the tower. The tower and existing and proposed equipment are depicted on [Attachment C](#), Construction Drawings, dated July 15, 2020 and [Attachment D](#), Structural Analysis, dated May 4, 2020. The Connecticut Siting Council approved Eversource’s use of the tower at this location under Tower Share TS-EVER-032-180830 in July, 2018.

The proposed installation is part of Eversource’s program to update the current obsolete analog voice radio communications system to a modern digital voice communications system. The new system will enable the highest level of voice communications under all operating conditions, including during critical emergency and storm restoration activities. The new radio system will also provide for remote control of distribution safety equipment.

Please accept this letter as notification, pursuant to Regulations of Connecticut State Agencies (“R.C.S.A.”) §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being delivered to Julie A. Blanchard, Town Council Chair for the Town of Coventry, John Elsesser, Town Manager for the Town of Coventry and Eric Trott, Director of Land Use for the Town of Coventry via private courier. Proof of delivery is attached. See [Attachment E](#), Proof of Delivery of Notice.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2):

1. There will be no change to the height of the existing tower.
2. The proposed modifications will not require 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 new antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard as shown in the attached Radio Frequency Emissions Report, dated July 28, 2020 (Attachment F – Power Density Report).
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, Eversource respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2). One original copy of this notice has been provided via courier to the Council.

Communications regarding this Notice of Exempt Modification should be directed to Kathleen Shanley at (860) 728-4527.

By: 

Kathleen M. Shanley
Manager – Transmission Siting

cc: Julie A. Blanchard, Town Council Chair, Town of Coventry
John Elsesser, Town Manager, Town of Coventry
Eric Trott, Director of Land Use, Town of Coventry
Crown Castle

Attachments

- A. Parcel Map and Property Card
- B. Letter of Authorization
- C. Construction Drawings
- D. Structural Analysis
- E. Proof of Delivery of Notice
- F. Power Density Report

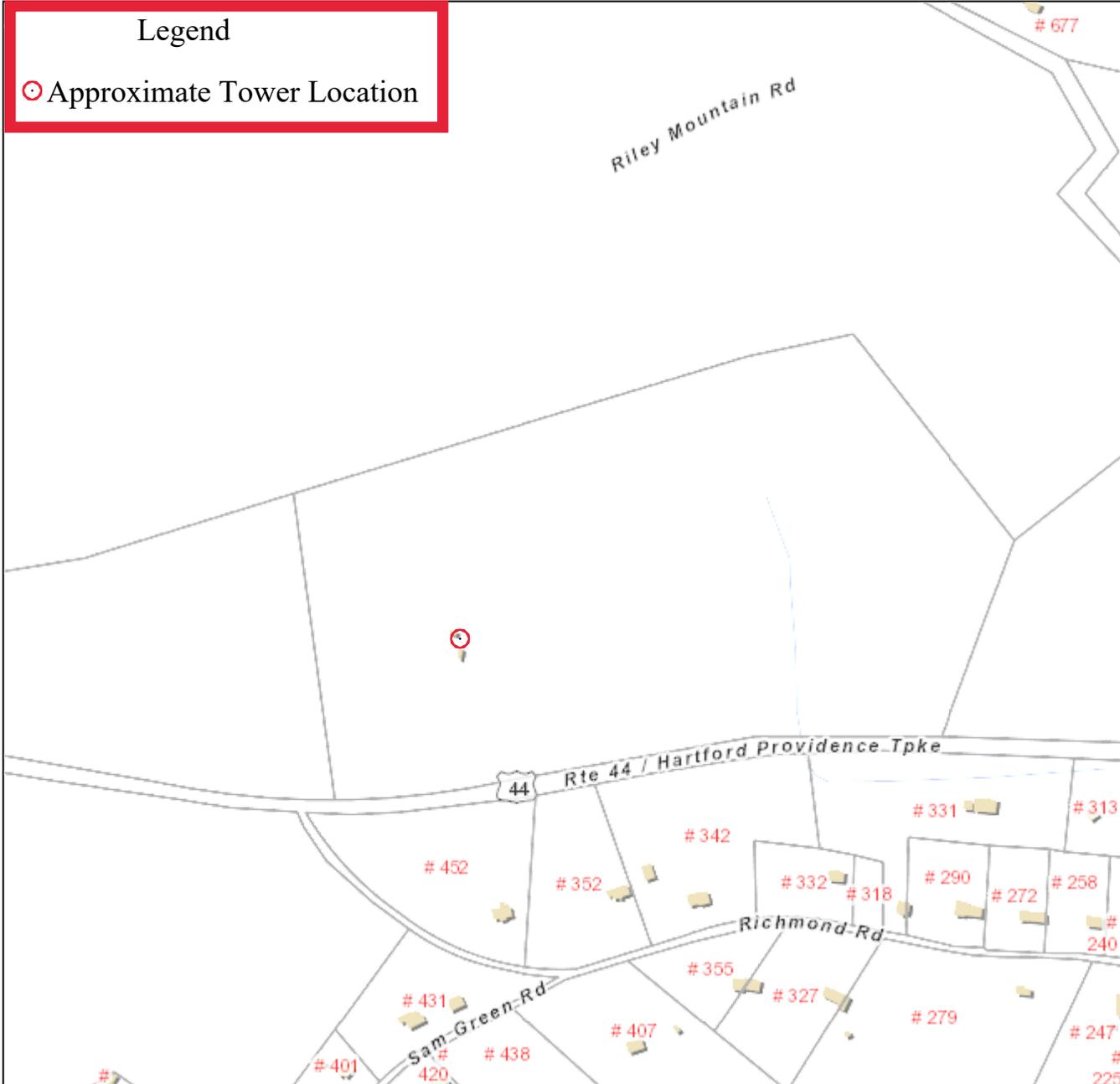
ATTACHMENT A – PARCEL MAP AND PROPERTY CARD

Town of Coventry

Geographic Information System (GIS)



Date Printed: 4/24/2020



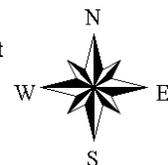
Legend

⊙ Approximate Tower Location

MAP DISCLAIMER - NOTICE OF LIABILITY

This map is for assessment purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The Town of Coventry and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 400 feet



400 RILEY MOUNTAIN RD

Location 400 RILEY MOUNTAIN RD

Mblu 011 / / 0003T / /

Acct# R06342

Owner WALLBEOFF JAMES +
CONCETTA TRUSTEES

PBN

Assessment \$398,200

Appraisal \$568,900

PID 6054

Building Count 1

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2019	\$211,400	\$357,500	\$568,900

Assessment			
Valuation Year	Improvements	Land	Total
2019	\$147,900	\$250,300	\$398,200

Owner of Record

Owner	WALLBEOFF JAMES + CONCETTA TRUSTEES	Sale Price	\$0
Co-Owner	C/O SPRINT SPECTRUM	Certificate	
Address	PO BOX 8430 KANSAS CITY, MO 64114	Book & Page	0770/0286
		Sale Date	09/23/2002
		Instrument	29

Ownership History

Ownership History					
Owner	Sale Price	Certificate	Book & Page	Instrument	Sale Date
WALLBEOFF JAMES + CONCETTA TRUSTEES	\$0		0770/0286	29	09/23/2002

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: \$0

Building Percent Good:

Replacement Cost

Less Depreciation: \$0

Building Attributes

Field	Description
Style	Outbuildings
Model	
Grade:	
Story Height	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Extra Fixtures	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Num Kitchens	
Bsmt Gar	
Usrflid 103	
Usrflid 104	
Fire_Places	
Usrflid 106	
Usrflid 107	
Num Park	
Fireplaces	
Usrflid 108	
Usrflid 101	
Usrflid 102	
Usrflid 100	
Usrflid 300	

Building Photo



(<http://images.vgsi.com/photos/CoventryCTPhotos/default.jpg>)

Building Layout

Building Layout (ParcelSketch.ashx?pid=6054&bid=6054)

Building Sub-Areas (sq ft)	<u>Legend</u>
No Data for Building Sub-Areas	

Usrflid 301

Extra Features

Extra Features	<u>Legend</u>
No Data for Extra Features	

Land

Land Use	Land Line Valuation
Use Code 100	Size (Acres) 1.00
Description Resid Vacant	Frontage
Zone GR80	Depth
Neighborhood	Assessed Value \$250,300
Alt Land Appr No	Appraised Value \$357,500
Category	

Outbuildings

Outbuildings						<u>Legend</u>
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
FN9	Fence- Average			280.00 S.F.	\$900	1
SHD5	Cell Shed			240.00 S.F.	\$64,800	1
SHD5	Cell Shed			360.00 S.F.	\$102,600	1
CNP1	Canopy			220.00 S.F.	\$3,200	1
SHD5	Cell Shed			140.00 S.F.	\$39,900	1

Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2018	\$179,400	\$357,500	\$536,900
2018	\$179,400	\$357,500	\$536,900
2017	\$179,400	\$357,500	\$536,900

Assessment			
Valuation Year	Improvements	Land	Total
2018	\$125,600	\$250,300	\$375,900
2018	\$125,600	\$250,300	\$375,900
2017	\$125,600	\$250,300	\$375,900

ATTACHMENT B – LETTER OF AUTHORIZATION



6325 Ardrey Kell Rd, Suite 600
Charlotte, NC 28277

Phone: (704) 405-6552
Fax: (724) 416-6297
www.crowncastle.com

Crown Castle Letter of Authorization

CT - CONNECTICUT SITING COUNCIL

,

**Re: Application for Zoning/Building Permit
Crown Castle telecommunications site at: REILLY MTN. RD., COVENTRY, CT 6238**

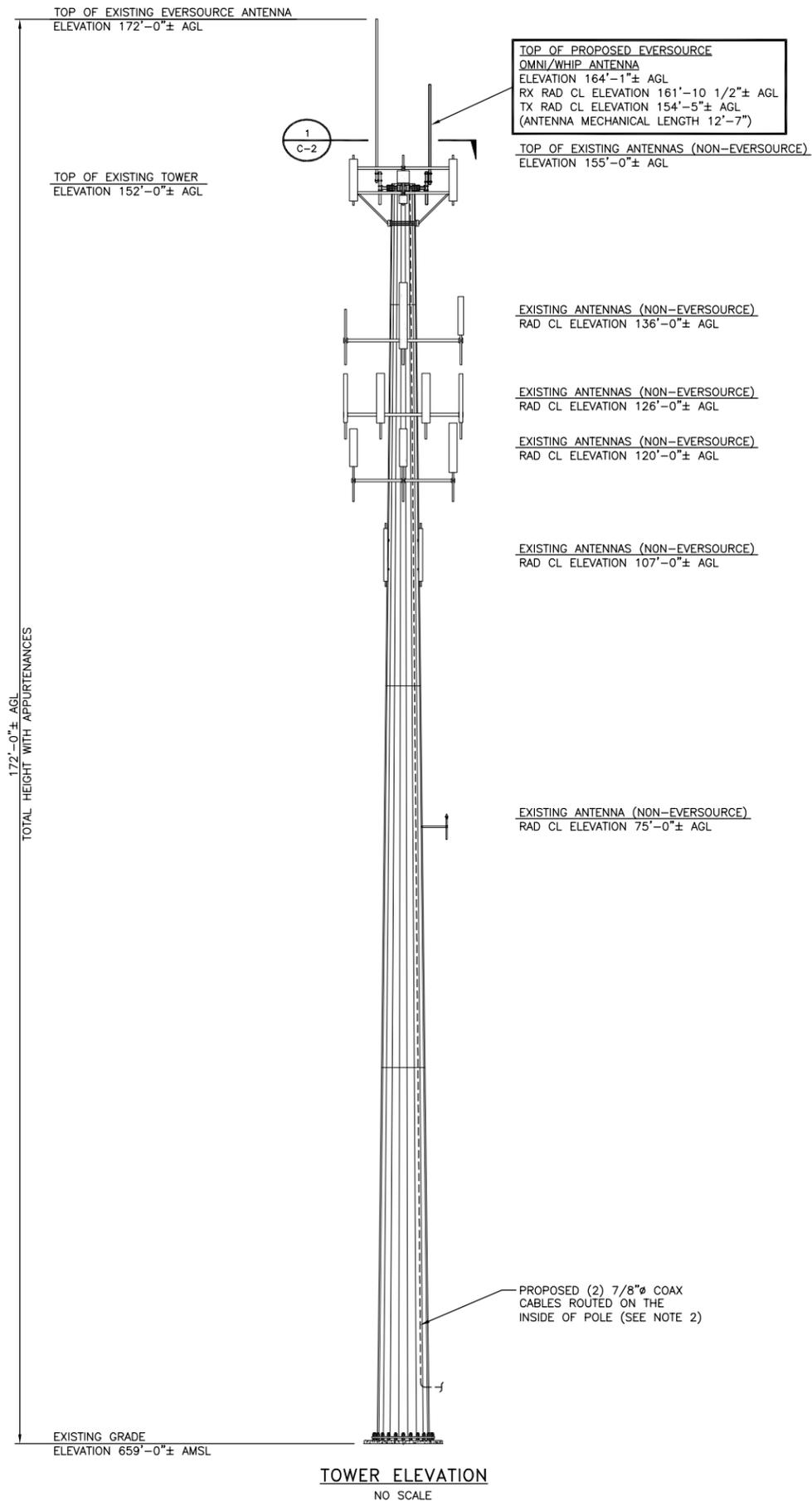
GLOBAL SIGNAL ACQUISITIONS II LLC ("Crown Castle") hereby authorizes EVERSOURCE ENERGY, including their Agent, to act as our Agent in the processing of all zoning applications, building permits and approvals through the CT - CONNECTICUT SITING COUNCIL for the existing wireless communications site described below:

**Crown Site ID/Name: 876385/N. COVENTRY / WALLBEOFF
Customer Site ID: ES-047/Coventry
Site Address: Reilly Mtn. Rd., COVENTRY, CT 6238
APN:**

Crown Castle

By: Zachary Plummer Date: 5/20/20
Zachary Plummer
Real Estate Specialist

ATTACHMENT C – CONSTRUCTION DRAWINGS



NOTES

1. BLACK & VEATCH HAS NOT EVALUATED THE EXISTING STRUCTURE FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO THE STRUCTURAL ANALYSIS BY OTHERS PRIOR TO ANY CONSTRUCTION.
2. COAX CABLES TO BE ROUTED INSIDE POLE PER STRUCTURAL ANALYSIS BY OTHERS.
3. RESERVED TOWER LOADING NOT SHOWN PER CLIENT REQUEST.

EVERSOURCE ENERGY

107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286-2000

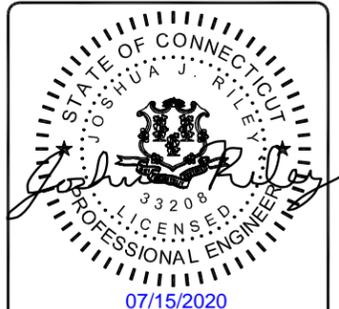


BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-2522

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	TH

REV	DATE	DESCRIPTION
0	07/15/20	ISSUED FOR FILING

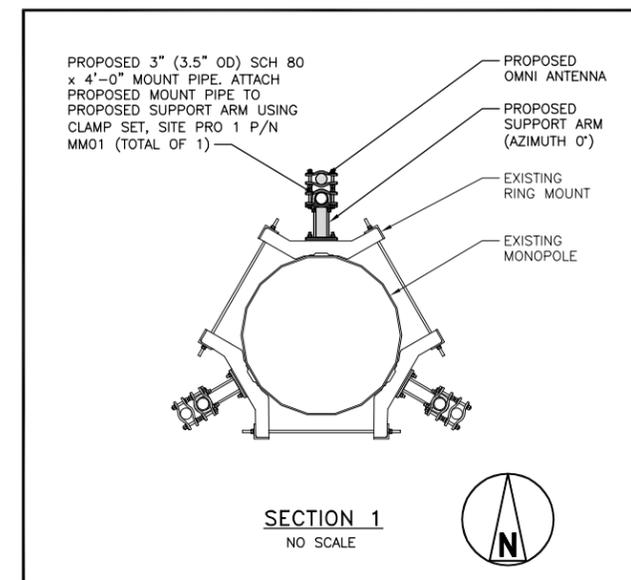


IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

COVENTRY (CCI 876385)
400 RILEY MOUNTAIN ROAD
COVENTRY, CT 06238

SHEET TITLE
TOWER ELEVATION & ANTENNA EQUIPMENT

SHEET NUMBER
C-2



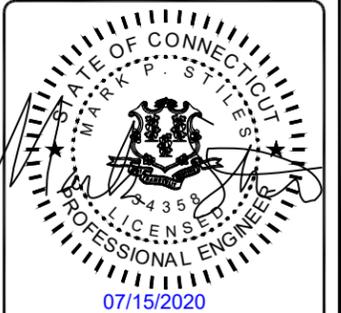


PROJECT NO: 405025

DRAWN BY: TYW

CHECKED BY: TH

REV	DATE	DESCRIPTION
0	07/15/20	ISSUED FOR FILING

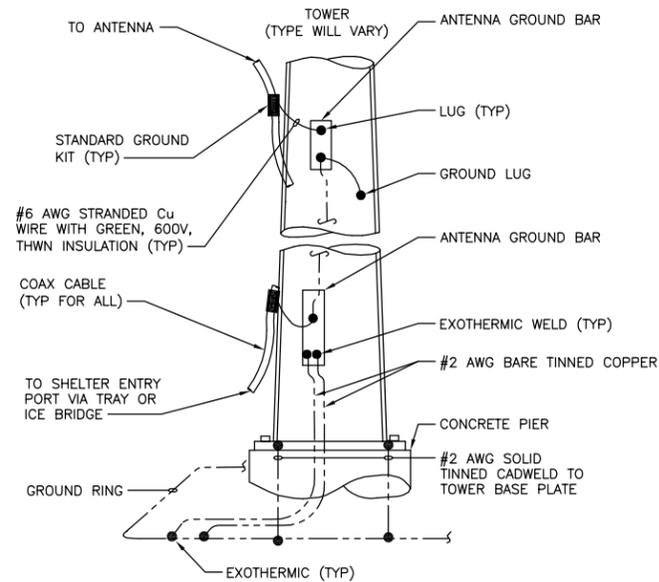


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COVENTRY (CCI 876385)
400 RILEY MOUNTAIN ROAD
COVENTRY, CT 06238

SHEET TITLE
**GROUNDING
DETAILS**

SHEET NUMBER
G-1

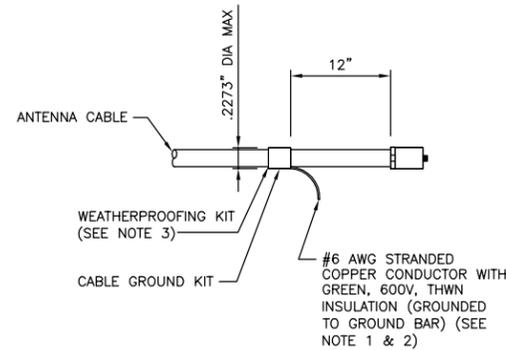


NOTE

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, ANTENNA LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.

ANTENNA CABLE GROUNDING

NO SCALE

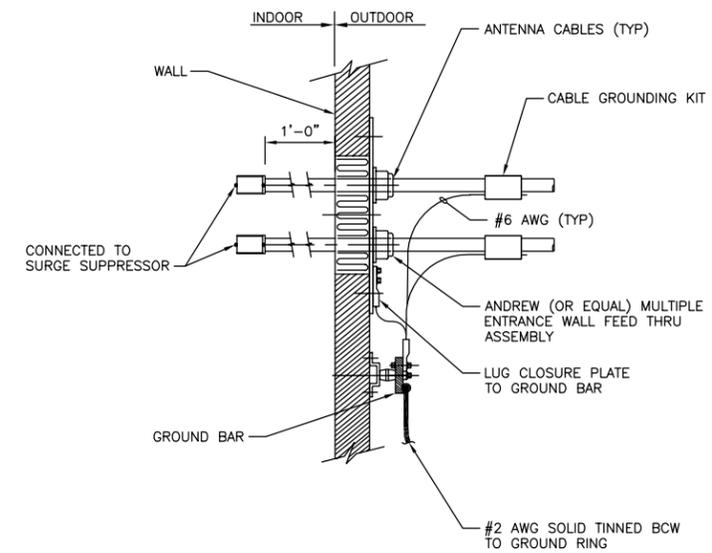


NOTES

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

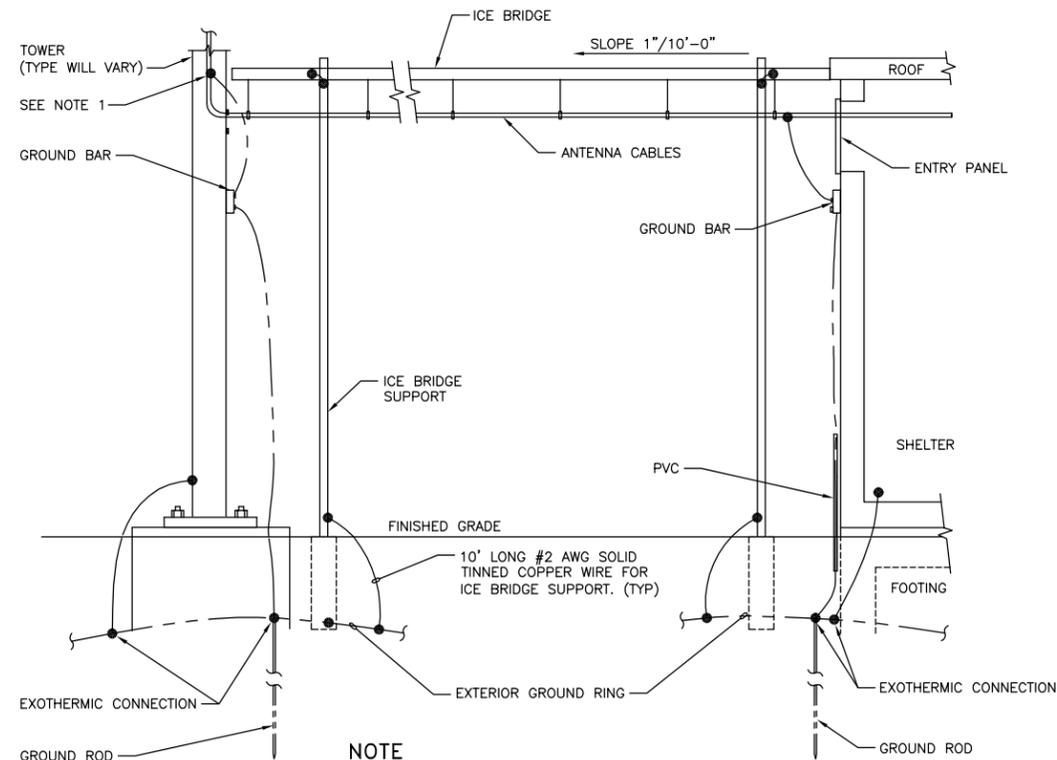
CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NO SCALE



CABLE INSTALLATION WITH WALL FEED THRU ASSEMBLY

NO SCALE



NOTE

1. PROVIDE GROUND KIT 6" BEFORE TURN

ICE BRIDGE AND ANTENNA CABLE DETAIL

NO SCALE

SYMBOLS

●	EXOTHERMIC CONNECTION
■	COMPRESSION CONNECTION
⊕	5/8"Øx10'-0" COPPER CLAD STEEL GROUND ROD.
⊕	TEST GROUND ROD WITH INSPECTION SLEEVE
---	GROUNDING CONDUCTOR
(A)	KEY NOTES
— X — X — X — X — X —	CHAINLINK FENCE
— □ — □ — □ — □ — □ —	WOOD FENCE
---	LEASE AREA
▨	ICE BRIDGE
▧	CABLE TRAY
— G — G — G — G — G —	GAS LINE
— E/T — E/T — E/T — E/T —	UNDERGROUND ELECTRICAL/TELCO
— E/C — E/C — E/C — E/C —	UNDERGROUND ELECTRICAL/CONTROL
— E — E — E — E — E —	UNDERGROUND ELECTRICAL
— T — T — T — T — T —	UNDERGROUND TELCO
---	PROPERTY LINE (PL)

ABBREVIATIONS

AC	ALTERNATING CURRENT	MGB	MASTER GROUNDING BAR
AIC	AMPERAGE INTERRUPTION CAPACITY	MIN	MINIMUM
ANI	AUXILIARY NETWORK INTERFACE	MW	MICROWAVE
ATM	ASYNCHRONOUS TRANSFER MODE	MTS	MANUAL TRANSFER SWITCH
ATS	AUTOMATIC TRANSFER SWITCH	NEC	NATIONAL ELECTRICAL CODE
AWG	AMERICAN WIRE GAUGE	OC	ON CENTER
AWS	ADVANCED WIRELESS SERVICES	PP	POLARIZING PRESERVING
BATT	BATTERY	PCU	PRIMARY CONTROL UNIT
BBU	BASEBAND UNIT	PDU	PROTOCOL DATA UNIT
BTC	BARE TINNED COPPER CONDUCTOR	PWR	POWER
BTS	BASE TRANSCEIVER STATION	RECT	RECTIFIER
CCU	CLIMATE CONTROL UNIT	RET	REMOTE ELECTRICAL TILT
CDMA	CODE DIVISION MULTIPLE ACCESS	RMC	RIGID METALLIC CONDUIT
CHG	CHARGING	RF	RADIO FREQUENCY
CLU	CLIMATE UNIT	RUC	RACK USER COMMISSIONING
COMM	COMMON	RRH	REMOTE RADIO HEAD
DC	DIRECT CURRENT	RRU	REMOTE RADIO UNIT
DIA	DIAMETER	RWY	RACEWAY
DWG	DRAWING	SFP	SMALL FORM-FACTOR PLUGGABLE
EC	ELECTRICAL CONDUCTOR	SIAD	SMART INTEGRATED ACCESS DEVICE
EMT	ELECTRICAL METALLIC TUBING	SSC	SITE SOLUTIONS CABINET
FIF	FACILITY INTERFACE FRAME	T1	1544KBPS DIGITAL LINE
GEN	GENERATOR	TDMA	TIME-DIVISION MULTIPLE ACCESS
GPS	GLOBAL POSITIONING SYSTEM	TMA	TOWER MOUNT AMPLIFIER
GSM	GLOBAL SYSTEM FOR MOBILE	TVSS	TRANSIENT VOLTAGE SUPPRESSION SYSTEM
HVAC	HEAT/VENTILATION/AIR CONDITIONING	TYP	TYPICAL
ICF	INTERCONNECTION FRAME	UMTS	UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM
IGR	INTERIOR GROUNDING RING (HALO)	UPS	UNINTERRUPTIBLE POWER SUPPLY (DC POWER PLANT)
LTE	LONG TERM EVOLUTION		

EVERSOURCE ENERGY

107 SELDEN STREET
BERLIN, CT 06037
PHONE: (800) 286-2000



BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211
PHONE: (913) 458-2522

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	TH

REV	DATE	DESCRIPTION
0	07/15/20	ISSUED FOR FILING



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COVENTRY (CCI 876385)
400 RILEY MOUNTAIN ROAD
COVENTRY, CT 06238

SHEET TITLE
NOTES & SPECIFICATIONS

SHEET NUMBER
N-3

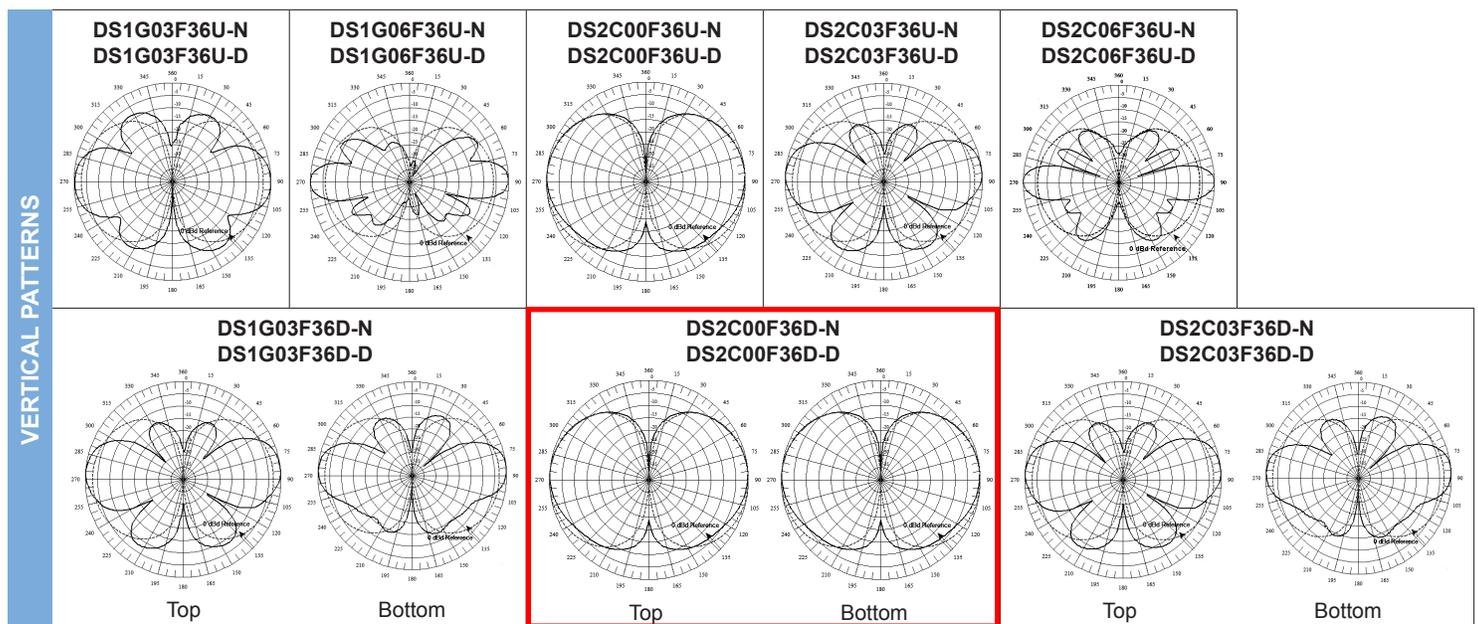
REFERENCE CUTSHEETS

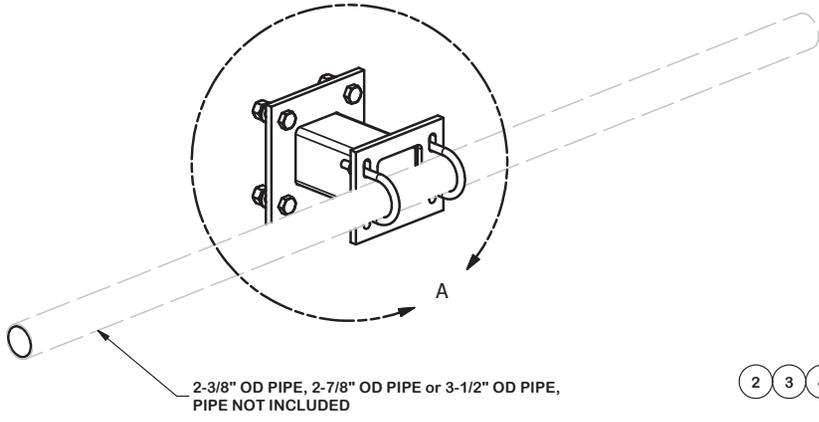
VHF Omni Antennas (160-222 MHz)



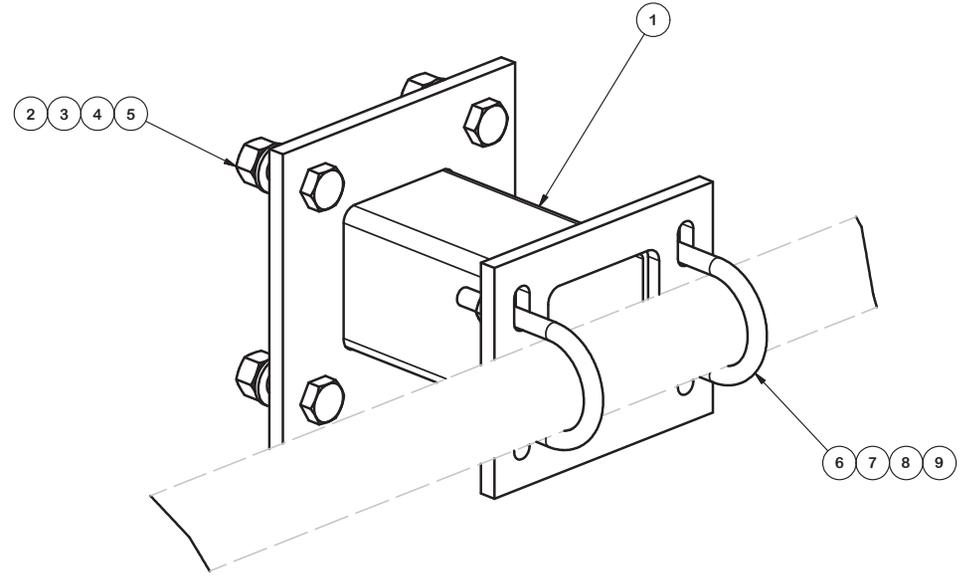
DS2C00F36D-D

		160-174 MHz						217-222 MHz									
Model Number		DS1G03F36U-N	DS1G03F36U-D	DS1G06F36U-N	DS1G06F36U-D	DS1G03F36D-N	DS1G03F36D-D	DS2C00F36U-N	DS2C00F36U-D	DS2C03F36U-N	DS2C03F36U-D	DS2C06F36U-N	DS2C06F36U-D	DS2C00F36D-N	DS2C00F36D-D	DS2C03F36D-N	DS2C03F36D-D
Input Connector		N(F)	7/16 DIN														
Type		Single		Single		Dual		Single		Single		Single		Dual		Dual	
ELECTRICAL	Bandwidth, MHz	14		14		14		5		5		5		5		5	
	Power, Watts	500		500		350		500		500		500		350		350	
	Gain, dBd	3		6		3		0		3		6		0		3	
	Horizontal Beamwidth, degrees	360		360		360		360		360		360		360		360	
	Vertical Beamwidth, degrees	30		16		30		60		30		16		60		30	
	Beam Tilt, degrees	0		0		0		0		0		0		0		0	
	Isolation (minimum), dB	N/A		N/A		30		N/A		N/A		N/A		30		30	
MECHANICAL	Number of Connectors	1		1		2		1		1		1		2		2	
	Flat Plate Area, ft ²	2.10		3.63		3.69		1.28		1.64		2.58		2.09		3.08	
	Lateral Windload Thrust, lbf	88		152		155		54		69		109		88		129	
	Wind Speed FUJb[without ice, mph	FJ0		150		150		250		225		175		190		160	
	Mounting Hardware included	DSH3V3R		DSH3V3N		DSH3V3N		DSH2V3R		DSH2V3R		DSH3V3N		DSH3V3R		DSH3V3N	
DIMENSIONS	Length, ft(m)	12.7 (3.9)		21.9 (6.7)		22.3 (6.8)		7.7 (2.3)		9.9 (3)		15.6 (4.8)		12.6 (3.8)		18.6 (5.7)	
	Radome O.D., in(cm)	3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)	
	Mast O.D., in(cm)	2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)	
	Net Weight w/o bracket, lb(kg)	37 (16.8)		60 (27.2)		63 (28.6)		19 (8.6)		26 (11.8)		47 (21.3)		40 (18.1)		70 (31.8)	
	Shipping Weight, lb(kg)	67 (30.4)		90 (40.8)		93 (42.2)		39 (17.7)		56 (25.4)		77 (34.9)		70 (31.8)		100 (45.4)	





PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	X-WWM01	8" STAND-OFF ARM / WALL MOUNT		18.12	18.12
2	4	A582112	5/8" x 2-1/2" HDG A325 HEX BOLT	2 1/2 in	0.33	1.34
3	4	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.14
4	4	G58LW	5/8" HDG LOCKWASHER		0.03	0.10
5	4	A58NUT	5/8" HDG A325 HEX NUT		0.13	0.52
6	2	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" GALV. U-BOLT		0.66	1.31
6	2	X-UB1300	1/2" X 3" X 5" X 2" GALV U-BOLT		0.74	1.48
6	2	X-UB1358	1/2" X 3-5/8" X 5-1/2" X 3" GALV U-BOLT		0.77	1.54
7	4	G12FW	1/2" HDG USS FLATWASHER		0.03	0.14
8	4	G12LW	1/2" HDG LOCKWASHER		0.01	0.06
9	4	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	0.29
					TOTAL WT. #	26.06



DETAIL A

TOLERANCE NOTES
 TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
 SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$)
 DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
 LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES
 BENDS ARE $\pm 1/2$ DEGREE
 ALL OTHER MACHINING ($\pm 0.030"$)
 ALL OTHER ASSEMBLY ($\pm 0.060"$)

PROPRIETARY NOTE:
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION		8" STAND-OFF ANTENNA WALL MOUNT, SITE PRO 1	
CPD NO.	DRAWN BY	ENG. APPROVAL	
4714	RH18 3/23/2010		
CLASS	SUB	DRAWING USAGE	CHECKED BY
81	01	CUSTOMER	BMC 5/10/2010

 A valmont COMPANY	Locations: New York, NY Atlanta, GA Los Angeles, CA Plymouth, IN Salem, OR Dallas, TX		
	Engineering Support Team: 1-888-753-7446		
PART NO.	MM01	PAGE	1 OF 1
DWG. NO.	MM01		

ATTACHMENT D – STRUCTURAL ANALYSIS REPORT



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

Date: **May 04, 2020**

Amanda D Brown
 Crown Castle
 6325 Ardrey Kell RddSuite 600
 Charlotte, NC 28277

Subject: **Structural Analysis Report**

Carrier Designation: **Eversource Energy Co-Locate**

Carrier Site Number: ES-047

Carrier Site Name: Coventry

Crown Castle Designation: **Crown Castle BU Number:** 876385

Crown Castle Site Name: N. COVENTRY / WALLBEOFF

Crown Castle JDE Job Number: 563898

Crown Castle Work Order Number: 1844224

Crown Castle Order Number: 483388 Rev. 9

Engineering Firm Designation: **Crown Castle Project Number:** 1844224

Site Data: **Reilly Mtn. Rd., COVENTRY, Tolland County, CT**
Latitude 41° 47' 56.21", Longitude -72° 19' 55.88"
152 Foot - Monopole Tower

Dear Amanda D Brown,

Crown Castle is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above mentioned tower.

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

LC7: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 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: Matthew Schmitt

Respectfully submitted by:



Terry P. Styran, P.E.
 Senior Project Engineer

5/5/2020

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Other Considered Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Table 5 – Tower Component Stresses vs. Capacity – LC7

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 152 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	130 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	2 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)	
152.0	162.0	1	db spectra	DS9A09F36D-N	2	1-5/8	
	159.0	1	db spectra	DS2C00F36D-D			
	152.0	152.0	1	bird technologies group	430-94C-09168-M-110/48	2	7/8
			1	tower mounts	Pipe Mount [PM 601-3]	1	1/2

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)	
150.0	152.0	3	alcatel lucent	PCS 1900MHZ 4X45W-65MHZ	4	1-1/4	
		3	commscope	NNVV-65B-R4 w/ Mount Pipe			
		3	nokia	FZHN			
		3	rfs celwave	APXVTM14-ALU-I20 w/ Mount Pipe			
	150.0	150.0	6	alcatel lucent			RRH2X50-800
			1	tower mounts			Platform Mount [LP 602-1_KCKR]
133.0	136.0	3	ems wireless	RR90-17-02DP w/ Mount Pipe	13	1-5/8	
		3	ericsson	KRY 112 144/2			
		3	ericsson	RADIO 4449 B12/B71			
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe			
	133.0	133.0	1				Handrail Kit [P/N: F3P-HRK14]
			3	ericsson			KRY 112 71/2
			1	tower mounts			Platform Mount [LP 304-1]
124.0	126.0	3	alcatel lucent	RRH2X60-PCS	20	1-5/8	
		3	alcatel lucent	RRH2x60-700			
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	andrew	SBNHH-1D65B w/ Mount Pipe			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		3	antel	LPA-171080-12CF-EDIN-2 w/ Mount Pipe		
		6	antel	LPA-80080/6CF w/ Mount Pipe		
		2	rfs celwave	DB-T1-6Z-8AB-0Z		
		1	tower mounts	Platform Mount [LP 304-1]		
116.0	120.0	2	cci antennas	HPA-65R-BUU-H6 w/ Mount Pipe	12 4 2 2	1-1/4 3/4 3/8 Conduits
		1	cci antennas	HPA-65R-BUU-H8 w/ Mount Pipe		
		3	ericsson	RRUS 32		
		3	ericsson	RRUS 32 B2		
		3	ericsson	RRUS 4478 B14		
		3	ericsson	RRUS-11		
		2	kathrein	80010965 w/ Mount Pipe		
		1	kathrein	80010966 w/ Mount Pipe		
		6	powerwave technologies	7020.00		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
	2	raycap	DC6-48-60-18-8F			
	116.0	6	powerwave technologies	LGP21401		
		1	tower mounts	Miscellaneous [NA 510-1]		
		1	tower mounts	Platform Mount [LP 714-1]		
107.0	107.0	3	kathrein	742 213	6	1-5/8
		1	tower mounts	Pipe Mount [PM 601-3]		
74.0	75.0	1	lucent	KS24019-L112A	1	1/2
	74.0	1	tower mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Goodkind & O'Dea, Inc.	1531969	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors, Inc.	1441268	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors, Inc.	1614566	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

- 1) Tower and structures were built and maintained in accordance with the manufacturer's specifications.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	152 - 137.42	Pole	TP37.31x33.03x0.313	1	-5.210	2161.645	2.9	Pass
L2	137.42 - 91.09	Pole	TP50.15x35.167x0.375	2	-27.750	3493.833	21.1	Pass
L3	91.09 - 44.79	Pole	TP62.86x47.413x0.438	3	-46.139	5115.600	29.8	Pass
L4	44.79 - 0	Pole	TP75x59.537x0.5	4	-76.101	7262.367	32.9	Pass
							Summary	
						Pole (L4)	32.9	Pass
						RATING =	32.9	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	28.8	Pass
1	Base Plate	0	40.6	Pass
1	Base Foundation Structure	0	37.2	Pass
1	Base Foundation Soil Interaction	0	32.0	Pass

Structure Rating (max from all components) =	40.6%
---	--------------

Notes:

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

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

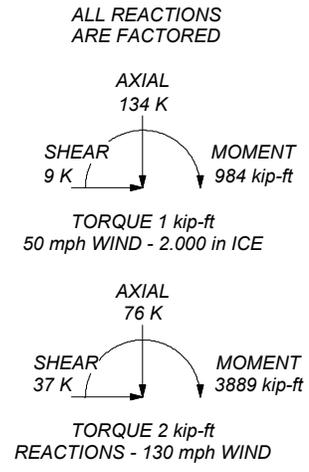
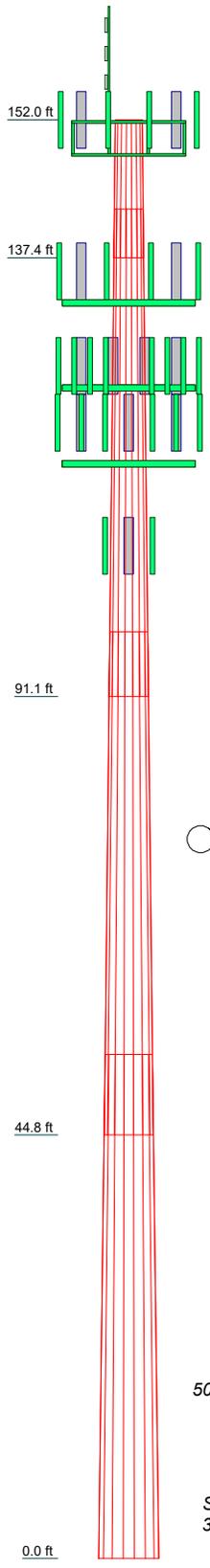
MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Tolland 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 2.00 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 0.000 ft
8. TOWER RATING: 32.9%

Section	1	2	3	4	
Length (ft)	14.580	51.500	53.130	53.210	
Number of Sides	18	18	18	18	
Thickness (in)	0.313	0.375	0.438	0.500	
Socket Length (ft)	5.170	6.830	8.420		
Top Dia (in)	33.030	35.167	47.413	59.537	
Bot Dia (in)	37.310	50.150	62.860	75.000	
Grade			A572-65		
Weight (K)	1.7	8.8	13.7	19.2	43.5



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

Job: 876385	Project:	
Client: Crown Castle	Drawn by: Matthew Schmitt	App'd:
Code: TIA-222-H	Date: 05/04/20	Scale: NTS
Path:	Dwg No. E-1	

R:\USA Models - Letters\Work Area\MSchmitt2.D Processed S&I\876385.WD 1044224\Production\jbschr\876385.dgn

Tower Input Data

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

- 1) Tower is located in Tolland County, Connecticut.
- 2) Tower base elevation above sea level: 707.000 ft.
- 3) Basic wind speed of 130 mph.
- 4) Risk Category II.
- 5) Exposure Category B.
- 6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- 7) Topographic Category: 1.
- 8) Crest Height: 0.000 ft.
- 9) Nominal ice thickness of 2.000 in.
- 10) Ice thickness is considered to increase with height.
- 11) Ice density of 56.000 pcf.
- 12) A wind speed of 50 mph is used in combination with ice.
- 13) Temperature drop of 50.000 °F.
- 14) Deflections calculated using a wind speed of 60 mph.
- 15) A non-linear (P-delta) analysis was used.
- 16) Pressures are calculated at each section.
- 17) Stress ratio used in pole design is 1.05.
- 18) Tower analysis based on target reliabilities in accordance with Annex S.
- 19) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- 20) 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
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Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	152.000- 137.420	14.580	5.170	18	33.030	37.310	0.313	1.250	A572-65 (65 ksi)

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
L2	137.420-91.090	51.500	6.830	18	35.167	50.150	0.375	1.500	A572-65 (65 ksi)
L3	91.090-44.790	53.130	8.420	18	47.413	62.860	0.438	1.750	A572-65 (65 ksi)
L4	44.790-0.000	53.210		18	59.537	75.000	0.500	2.000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	33.491	32.452	4388.688	11.615	16.779	261.555	8783.151	16.229	5.263	16.842
	37.837	36.697	6346.168	13.134	18.953	334.829	12700.685	18.352	6.017	19.253
L2	37.179	41.412	6333.245	12.351	17.865	354.506	12674.823	20.710	5.529	14.745
	50.866	59.245	18544.257	17.670	25.476	727.905	37112.916	29.628	8.166	21.777
L3	50.093	65.231	18185.953	16.676	24.086	755.049	36395.835	32.622	7.575	17.314
	63.762	86.681	42672.286	22.160	31.933	1336.312	85400.720	43.349	10.293	23.528
L4	62.863	93.692	41255.942	20.958	30.245	1364.068	82566.170	46.855	9.599	19.197
	76.080	118.232	82905.472	26.448	38.100	2175.997	165920.03	59.127	12.320	24.64

3

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor Ar	Adjust. Factor Ar	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
L1 152.000-137.420				1	1	1			
L2 137.420-91.090				1	1	1			
L3 91.090-44.790				1	1	1			
L4 44.790-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Componen t Type	Placement ft	Total Number	Number Per Row	Start/En d Position	Width or Diamete r in	Perimete r in	Weight plf
* HCA78-50J(7/8)	A	No	Surface Ar (CaAa)	152.000 - 0.000	2	2	-0.050 -0.025	1.103		0.460
FLC 12-50J(1/2")	A	No	Surface Ar (CaAa)	152.000 - 0.000	1	1	-0.100 -0.100	0.640		0.170
FLC 158-50J(1-5/8")	A	No	Surface Ar (CaAa)	152.000 - 0.000	2	2	-0.125 -0.072	2.015		0.920
HB158-1-08U8-S8J18(1-5/8) ****	A	No	Surface Ar (CaAa)	124.000 - 0.000	2	2	-0.250 -0.200	1.980		1.300

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight plf
*									
HB114-1-0813U4-M5J(1-1/4)	A	No	No	Inside Pole	150.000 - 0.000	3	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	1.200 1.200 1.200 1.200
HB114-13U3M12-XXXF(1-1/4)	A	No	No	Inside Pole	150.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.992 0.992 0.992 0.992
*									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	133.000 - 0.000	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.820 0.820 0.820 0.820
HCS 6X12 4AWG(1-5/8")	C	No	No	Inside Pole	133.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	2.400 2.400 2.400 2.400
AVA7-50(1-5/8)	C	No	No	Inside Pole	133.000 - 0.000	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.700 0.700 0.700 0.700
*									
LDF7-50A(1 5/8)	A	No	No	Inside Pole	124.000 - 0.000	18	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.820 0.820 0.820 0.820
*									
LCF114-50J(1-1/4)	A	No	No	Inside Pole	116.000 - 0.000	12	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.700 0.700 0.700 0.700
WR-VG86ST-BRD(3/4)	A	No	No	Inside Pole	116.000 - 0.000	4	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.584 0.584 0.584 0.584
FB-L98B-034-XXX(3/8)	A	No	No	Inside Pole	116.000 - 0.000	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.057 0.057 0.057 0.057
2" Rigid Conduit	A	No	No	Inside Pole	116.000 - 0.000	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	2.800 2.800 2.800 2.800
*									
AVA7-50(1-5/8)	B	No	No	Inside Pole	107.000 - 0.000	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.700 0.700 0.700 0.700
*									
LDF4-50A(1/2)	A	No	No	Inside Pole	74.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.000 0.000 0.000 0.000	0.150 0.150 0.150 0.150

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	152.000-137.420	A	0.000	0.000	10.025	0.000	0.100

Tower Section n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L2	137.420-91.090	B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
		A	0.000	0.000	44.889	0.000	1.330
L3	91.090-44.790	B	0.000	0.000	0.000	0.000	0.067
		C	0.000	0.000	0.000	0.000	0.483
		A	0.000	0.000	50.171	0.000	1.918
L4	44.790-0.000	B	0.000	0.000	0.000	0.000	0.194
		C	0.000	0.000	0.000	0.000	0.533
		A	0.000	0.000	48.534	0.000	1.858
		B	0.000	0.000	0.000	0.000	0.188
		C	0.000	0.000	0.000	0.000	0.516

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	152.000-137.420	A	1.971	0.000	0.000	32.410	0.000	0.516
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L2	137.420-91.090	A	1.923	0.000	0.000	135.492	0.000	3.074
		B		0.000	0.000	0.000	0.000	0.067
		C		0.000	0.000	0.000	0.000	0.483
L3	91.090-44.790	A	1.826	0.000	0.000	146.570	0.000	3.768
		B		0.000	0.000	0.000	0.000	0.194
		C		0.000	0.000	0.000	0.000	0.533
L4	44.790-0.000	A	1.631	0.000	0.000	137.663	0.000	3.520
		B		0.000	0.000	0.000	0.000	0.188
		C		0.000	0.000	0.000	0.000	0.516

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	152.000-137.420	-4.137	-1.544	-5.025	-1.893
L2	137.420-91.090	-5.791	-1.576	-6.560	-1.912
L3	91.090-44.790	-6.609	-1.656	-7.698	-2.089
L4	44.790-0.000	-6.868	-1.722	-8.292	-2.248

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	2	HCA78-50J(7/8)	137.42 - 152.00	1.0000	1.0000
L1	3	FLC 12-50J(1/2")	137.42 - 152.00	1.0000	1.0000
L1	4	FLC 158-50J(1-5/8")	137.42 - 152.00	1.0000	1.0000
L1	18	HB158-1-08U8-S8J18(1-5/8)	137.42 - 124.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L2	2	HCA78-50J(7/8)	91.09 - 137.42	1.0000	1.0000
L2	3	FLC 12-50J(1/2")	91.09 - 137.42	1.0000	1.0000
L2	4	FLC 158-50J(1-5/8")	91.09 - 137.42	1.0000	1.0000
L2	18	HB158-1-08U8-S8J18(1-5/8)	91.09 - 124.00	1.0000	1.0000
L3	2	HCA78-50J(7/8)	44.79 - 91.09	1.0000	1.0000
L3	3	FLC 12-50J(1/2")	44.79 - 91.09	1.0000	1.0000
L3	4	FLC 158-50J(1-5/8")	44.79 - 91.09	1.0000	1.0000
L3	18	HB158-1-08U8-S8J18(1-5/8)	44.79 - 91.09	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
*									
DS9A09F36D-N	A	From Leg	1.000	0.000	152.000	No Ice	5.760	5.760	0.047
			0.000			1/2"	7.713	7.713	0.088
			10.000			Ice	9.683	9.683	0.142
						1" Ice	13.673	13.673	0.287
						2" Ice			
DS2C00F36D-D	C	From Leg	1.000	0.000	152.000	No Ice	4.080	4.080	0.040
			0.000			1/2"	5.473	5.473	0.069
			7.000			Ice	6.883	6.883	0.108
						1" Ice	9.552	9.552	0.211
						2" Ice			
430-94C-09168-M-110/48	B	From Leg	1.000	0.000	152.000	No Ice	1.031	1.031	0.020
			0.000			1/2"	1.174	1.174	0.030
			0.000			Ice	1.323	1.323	0.042
						1" Ice	1.644	1.644	0.074
						2" Ice			
Pipe Mount [PM 601-3]	A	None		0.000	152.000	No Ice	3.170	3.170	0.195
						1/2"	3.790	3.790	0.232
						Ice	4.420	4.420	0.279
						1" Ice	5.760	5.760	0.401
						2" Ice			
*									
NNVV-65B-R4 w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	7.550	4.230	0.110
			0.000			1/2"	8.040	4.670	0.197
			2.000			Ice	8.530	5.120	0.296
						1" Ice	9.560	6.050	0.529
						2" Ice			
NNVV-65B-R4 w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	7.550	4.230	0.110
			0.000			1/2"	8.040	4.670	0.197
			2.000			Ice	8.530	5.120	0.296
						1" Ice	9.560	6.050	0.529
						2" Ice			
NNVV-65B-R4 w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	7.550	4.230	0.110
			0.000			1/2"	8.040	4.670	0.197
			2.000			Ice	8.530	5.120	0.296
						1" Ice	9.560	6.050	0.529
						2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CA _A Front ft ²	CA _A Side ft ²	Weight K	
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	150.000	2" Ice			
						No Ice	4.090	2.860	0.077
						1/2"	4.480	3.230	0.127
						Ice	4.880	3.610	0.185
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	150.000	1" Ice	5.710	4.400	0.331
						2" Ice			
						No Ice	4.090	2.860	0.077
						1/2"	4.480	3.230	0.127
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	150.000	Ice	4.880	3.610	0.185
						1" Ice	5.710	4.400	0.331
						2" Ice			
						No Ice	4.090	2.860	0.077
FZHN	A	From Leg	4.000 0.000 2.000	0.000	150.000	1/2"	2.197	0.715	0.058
						Ice	2.381	0.829	0.075
						1" Ice	2.772	1.089	0.116
						2" Ice			
FZHN	B	From Leg	4.000 0.000 2.000	0.000	150.000	No Ice	2.020	0.607	0.044
						1/2"	2.197	0.715	0.058
						Ice	2.381	0.829	0.075
						1" Ice	2.772	1.089	0.116
FZHN	C	From Leg	4.000 0.000 2.000	0.000	150.000	2" Ice			
						No Ice	2.020	0.607	0.044
						1/2"	2.197	0.715	0.058
						Ice	2.381	0.829	0.075
PCS 1900MHZ 4X45W- 65MHZ	A	From Leg	4.000 0.000 2.000	0.000	150.000	1" Ice	3.185	3.093	0.173
						2" Ice			
						No Ice	2.322	2.238	0.060
						1/2"	2.527	2.441	0.083
PCS 1900MHZ 4X45W- 65MHZ	B	From Leg	4.000 0.000 2.000	0.000	150.000	Ice	2.739	2.651	0.110
						1" Ice	3.185	3.093	0.173
						2" Ice			
						No Ice	2.322	2.238	0.060
PCS 1900MHZ 4X45W- 65MHZ	C	From Leg	4.000 0.000 2.000	0.000	150.000	1/2"	2.527	2.441	0.083
						Ice	2.739	2.651	0.110
						1" Ice	3.185	3.093	0.173
						2" Ice			
(2) RRH2X50-800	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice	1.701	1.282	0.053
						1/2"	1.864	1.428	0.070
						Ice	2.035	1.580	0.090
						1" Ice	2.398	1.908	0.138
(2) RRH2X50-800	B	From Leg	4.000 0.000 0.000	0.000	150.000	2" Ice			
						No Ice	1.701	1.282	0.053
						1/2"	1.864	1.428	0.070
						Ice	2.035	1.580	0.090
(2) RRH2X50-800	C	From Leg	4.000 0.000 0.000	0.000	150.000	1" Ice	2.398	1.908	0.138
						2" Ice			
						No Ice	1.701	1.282	0.053
						1/2"	1.864	1.428	0.070
Platform Mount [LP 602- 1_KCKR]	C	None		0.000	150.000	Ice	55.870	55.870	3.267
						1" Ice	69.850	69.850	5.398
						2" Ice			
						No Ice	42.300	42.300	1.618

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Transition Ladder	C	From Leg	2.000	0.000	150.000	2" Ice			
			0.000			No Ice	6.000	6.000	0.160
			-5.000			1/2"	8.000	8.000	0.240
						Ice	10.000	10.000	0.320
6' x 2" Mount Pipe	A	From Leg	4.000	0.000	150.000	2" Ice			
			0.000			No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
						Ice	2.294	2.294	0.048
6' x 2" Mount Pipe	B	From Leg	4.000	0.000	150.000	2" Ice			
			0.000			No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
						Ice	2.294	2.294	0.048
6' x 2" Mount Pipe	C	From Leg	4.000	0.000	150.000	2" Ice			
			0.000			No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
						Ice	2.294	2.294	0.048
* RR90-17-02DP w/ Mount Pipe	A	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	4.470	2.920	0.034
			3.000			1/2"	5.080	3.500	0.067
						Ice	5.700	4.100	0.108
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	4.470	2.920	0.034
			3.000			1/2"	5.080	3.500	0.067
						Ice	5.700	4.100	0.108
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	4.470	2.920	0.034
			3.000			1/2"	5.080	3.500	0.067
						Ice	5.700	4.100	0.108
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	14.690	6.870	0.186
			3.000			1/2"	15.460	7.550	0.315
						Ice	16.230	8.250	0.458
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	14.690	6.870	0.186
			3.000			1/2"	15.460	7.550	0.315
						Ice	16.230	8.250	0.458
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	14.690	6.870	0.186
			3.000			1/2"	15.460	7.550	0.315
						Ice	16.230	8.250	0.458
KRY 112 71/2	A	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	0.583	0.398	0.013
			0.000			1/2"	0.688	0.488	0.018
						Ice	0.799	0.586	0.025
KRY 112 71/2	B	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	0.583	0.398	0.013
			0.000			1/2"	0.688	0.488	0.018
						Ice	0.799	0.586	0.025
KRY 112 71/2	C	From Leg	4.000	0.000	133.000	2" Ice			
			0.000			No Ice	0.583	0.398	0.013
			0.000			1/2"	0.688	0.488	0.018
						Ice	0.799	0.586	0.025

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
KRY 112 144/2	A	From Leg	4.000 0.000 3.000	0.000	133.000	1" Ice	1.045	0.805	0.044
						2" Ice			
						No Ice	0.479	0.232	0.010
						1/2" Ice	0.568	0.299	0.014
						Ice	0.664	0.376	0.019
KRY 112 144/2	B	From Leg	4.000 0.000 3.000	0.000	133.000	1" Ice	0.879	0.552	0.035
						2" Ice			
						No Ice	0.479	0.232	0.010
						1/2" Ice	0.568	0.299	0.014
						Ice	0.664	0.376	0.019
KRY 112 144/2	B	From Leg	4.000 0.000 3.000	0.000	133.000	1" Ice	0.879	0.552	0.035
						2" Ice			
						No Ice	0.479	0.232	0.010
						1/2" Ice	0.568	0.299	0.014
						Ice	0.664	0.376	0.019
RADIO 4449 B12/B71	A	From Leg	4.000 0.000 3.000	0.000	133.000	1" Ice	0.879	0.552	0.035
						2" Ice			
						No Ice	1.650	1.163	0.074
						1/2" Ice	1.810	1.301	0.090
						Ice	1.978	1.447	0.109
RADIO 4449 B12/B71	B	From Leg	4.000 0.000 3.000	0.000	133.000	1" Ice	2.336	1.762	0.155
						2" Ice			
						No Ice	1.650	1.163	0.074
						1/2" Ice	1.810	1.301	0.090
						Ice	1.978	1.447	0.109
RADIO 4449 B12/B71	C	From Leg	4.000 0.000 3.000	0.000	133.000	1" Ice	2.336	1.762	0.155
						2" Ice			
						No Ice	1.650	1.163	0.074
						1/2" Ice	1.810	1.301	0.090
						Ice	1.978	1.447	0.109
Platform Mount [LP 304-1]	C	None		0.000	133.000	1" Ice	2.336	1.762	0.155
						2" Ice			
						No Ice	17.490	17.490	1.349
						1/2" Ice	21.370	21.370	1.709
						Ice	25.280	25.280	2.131
Handrail Kit [P/N: F3P-HRK14]	C	None		0.000	133.000	1" Ice	33.170	33.170	3.164
						2" Ice			
						No Ice	6.010	6.010	0.436
						1/2" Ice	8.270	8.270	0.539
						Ice	10.200	10.200	0.681
6' x 2" Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	133.000	1" Ice	14.060	14.060	0.965
						2" Ice			
						No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						Ice	2.294	2.294	0.048
6' x 2" Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	133.000	1" Ice	3.060	3.060	0.090
						2" Ice			
						No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						Ice	2.294	2.294	0.048
6' x 2" Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	133.000	1" Ice	3.060	3.060	0.090
						2" Ice			
						No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						Ice	2.294	2.294	0.048
* (2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	124.000	1" Ice	3.060	3.060	0.090
						2" Ice			
						No Ice	4.564	10.259	0.046
						1/2" Ice	5.105	11.427	0.113
						Ice	5.612	12.312	0.187
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.000 0.000	0.000	124.000	1" Ice	6.651	14.129	0.363
						2" Ice			
						No Ice	4.564	10.259	0.046
						1/2" Ice	5.105	11.427	0.113

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			2.000			Ice 5.612	12.312	0.187
						1" Ice 6.651	14.129	0.363
						2" Ice		
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 4.564	10.259	0.046
						1/2" 5.105	11.427	0.113
						Ice 5.612	12.312	0.187
						1" Ice 6.651	14.129	0.363
						2" Ice		
LPA-171080-12CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 3.956	7.095	0.037
						1/2" 4.508	8.302	0.086
						Ice 5.029	9.242	0.143
						1" Ice 6.087	11.104	0.282
						2" Ice		
LPA-171080-12CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 3.956	7.095	0.037
						1/2" 4.508	8.302	0.086
						Ice 5.029	9.242	0.143
						1" Ice 6.087	11.104	0.282
						2" Ice		
LPA-171080-12CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 3.956	7.095	0.037
						1/2" 4.508	8.302	0.086
						Ice 5.029	9.242	0.143
						1" Ice 6.087	11.104	0.282
						2" Ice		
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 4.090	3.300	0.066
						1/2" 4.490	3.680	0.130
						Ice 4.890	4.070	0.204
						1" Ice 5.720	4.870	0.386
						2" Ice		
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 4.090	3.300	0.066
						1/2" 4.490	3.680	0.130
						Ice 4.890	4.070	0.204
						1" Ice 5.720	4.870	0.386
						2" Ice		
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 4.090	3.300	0.066
						1/2" 4.490	3.680	0.130
						Ice 4.890	4.070	0.204
						1" Ice 5.720	4.870	0.386
						2" Ice		
RRH2x60-700	A	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 3.500	1.816	0.060
						1/2" 3.761	2.052	0.083
						Ice 4.029	2.289	0.109
						1" Ice 4.585	2.785	0.173
						2" Ice		
RRH2x60-700	B	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 3.500	1.816	0.060
						1/2" 3.761	2.052	0.083
						Ice 4.029	2.289	0.109
						1" Ice 4.585	2.785	0.173
						2" Ice		
RRH2x60-700	C	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 3.500	1.816	0.060
						1/2" 3.761	2.052	0.083
						Ice 4.029	2.289	0.109
						1" Ice 4.585	2.785	0.173
						2" Ice		
RRH4X45-AWS4 B66	A	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 2.660	1.586	0.064
						1/2" 2.878	1.769	0.084
						Ice 3.104	1.959	0.108
						1" Ice 3.577	2.359	0.165
						2" Ice		
RRH4X45-AWS4 B66	B	From Leg	4.000 0.000 2.000	0.000	124.000	No Ice 2.660	1.586	0.064
						1/2" 2.878	1.769	0.084
						Ice 3.104	1.959	0.108
						1" Ice 3.577	2.359	0.165
						2" Ice		
RRH4X45-AWS4 B66	C	From Leg	4.000 0.000	0.000	124.000	No Ice 2.660	1.586	0.064
						1/2" 2.878	1.769	0.084

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K
			2.000			Ice 3.104	1.959	0.108
						1" Ice 3.577	2.359	0.165
						2" Ice		
RRH2X60-PCS	A	From Leg	4.000	0.000	124.000	No Ice 2.200	1.723	0.055
			0.000			1/2" 2.393	1.901	0.075
			2.000			Ice 2.593	2.087	0.099
						1" Ice 3.015	2.480	0.155
						2" Ice		
RRH2X60-PCS	B	From Leg	4.000	0.000	124.000	No Ice 2.200	1.723	0.055
			0.000			1/2" 2.393	1.901	0.075
			2.000			Ice 2.593	2.087	0.099
						1" Ice 3.015	2.480	0.155
						2" Ice		
RRH2X60-PCS	C	From Leg	4.000	0.000	124.000	No Ice 2.200	1.723	0.055
			0.000			1/2" 2.393	1.901	0.075
			2.000			Ice 2.593	2.087	0.099
						1" Ice 3.015	2.480	0.155
						2" Ice		
(2) DB-T1-6Z-8AB-0Z	A	From Leg	4.000	0.000	124.000	No Ice 4.800	2.000	0.044
			0.000			1/2" 5.070	2.193	0.080
			2.000			Ice 5.348	2.393	0.120
						1" Ice 5.926	2.815	0.213
						2" Ice		
Platform Mount [LP 304-1]	C	None		0.000	124.000	No Ice 17.490	17.490	1.349
						1/2" 21.370	21.370	1.709
						Ice 25.280	25.280	2.131
						1" Ice 33.170	33.170	3.164
						2" Ice		
6' x 2" Mount Pipe	A	From Leg	4.000	0.000	124.000	No Ice 1.425	1.425	0.022
			0.000			1/2" 1.925	1.925	0.033
			0.000			Ice 2.294	2.294	0.048
						1" Ice 3.060	3.060	0.090
						2" Ice		
6' x 2" Mount Pipe	B	From Leg	4.000	0.000	124.000	No Ice 1.425	1.425	0.022
			0.000			1/2" 1.925	1.925	0.033
			0.000			Ice 2.294	2.294	0.048
						1" Ice 3.060	3.060	0.090
						2" Ice		
6' x 2" Mount Pipe	C	From Leg	4.000	0.000	124.000	No Ice 1.425	1.425	0.022
			0.000			1/2" 1.925	1.925	0.033
			0.000			Ice 2.294	2.294	0.048
						1" Ice 3.060	3.060	0.090
						2" Ice		
*								
7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	116.000	No Ice 5.746	4.254	0.055
			0.000			1/2" 6.179	5.014	0.103
			4.000			Ice 6.607	5.711	0.157
						1" Ice 7.488	7.155	0.287
						2" Ice		
7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	116.000	No Ice 5.746	4.254	0.055
			0.000			1/2" 6.179	5.014	0.103
			4.000			Ice 6.607	5.711	0.157
						1" Ice 7.488	7.155	0.287
						2" Ice		
7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	116.000	No Ice 5.746	4.254	0.055
			0.000			1/2" 6.179	5.014	0.103
			4.000			Ice 6.607	5.711	0.157
						1" Ice 7.488	7.155	0.287
						2" Ice		
80010965 w/ Mount Pipe	A	From Leg	4.000	0.000	116.000	No Ice 12.260	5.790	0.136
			0.000			1/2" 13.030	6.470	0.226
			4.000			Ice 13.800	7.170	0.328
						1" Ice 15.410	8.600	0.570
						2" Ice		
80010965 w/ Mount Pipe	B	From Leg	4.000	0.000	116.000	No Ice 12.260	5.790	0.136

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	
			0.000				1/2"	13.030	6.470	0.226
			4.000				Ice	13.800	7.170	0.328
							1" Ice	15.410	8.600	0.570
							2" Ice			
80010966 w/ Mount Pipe	C	From Leg	4.000	0.000	116.000	No Ice	14.610	6.840	0.159	
			0.000			1/2"	15.470	7.630	0.267	
			4.000			Ice	16.350	8.420	0.389	
						1" Ice	18.140	10.060	0.677	
						2" Ice				
HPA-65R-BUU-H6 w/ Mount Pipe	A	From Leg	4.000	0.000	116.000	No Ice	9.220	6.250	0.074	
			0.000			1/2"	9.980	6.960	0.143	
			4.000			Ice	10.760	7.700	0.224	
						1" Ice	12.360	9.220	0.420	
						2" Ice				
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Leg	4.000	0.000	116.000	No Ice	9.220	6.250	0.074	
			0.000			1/2"	9.980	6.960	0.143	
			4.000			Ice	10.760	7.700	0.224	
						1" Ice	12.360	9.220	0.420	
						2" Ice				
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg	4.000	0.000	116.000	No Ice	12.250	8.330	0.105	
			0.000			1/2"	13.190	9.230	0.194	
			4.000			Ice	14.160	10.150	0.297	
						1" Ice	16.140	12.050	0.543	
						2" Ice				
(2) LGP21401	A	From Leg	4.000	0.000	116.000	No Ice	1.104	0.207	0.014	
			0.000			1/2"	1.239	0.274	0.021	
			0.000			Ice	1.381	0.348	0.030	
						1" Ice	1.688	0.521	0.055	
						2" Ice				
(2) LGP21401	B	From Leg	4.000	0.000	116.000	No Ice	1.104	0.207	0.014	
			0.000			1/2"	1.239	0.274	0.021	
			0.000			Ice	1.381	0.348	0.030	
						1" Ice	1.688	0.521	0.055	
						2" Ice				
(2) LGP21401	C	From Leg	4.000	0.000	116.000	No Ice	1.104	0.207	0.014	
			0.000			1/2"	1.239	0.274	0.021	
			0.000			Ice	1.381	0.348	0.030	
						1" Ice	1.688	0.521	0.055	
						2" Ice				
(2) 7020.00	A	From Leg	4.000	0.000	116.000	No Ice	0.102	0.175	0.002	
			0.000			1/2"	0.147	0.239	0.005	
			4.000			Ice	0.199	0.311	0.009	
						1" Ice	0.326	0.476	0.022	
						2" Ice				
(2) 7020.00	B	From Leg	4.000	0.000	116.000	No Ice	0.102	0.175	0.002	
			0.000			1/2"	0.147	0.239	0.005	
			4.000			Ice	0.199	0.311	0.009	
						1" Ice	0.326	0.476	0.022	
						2" Ice				
(2) 7020.00	C	From Leg	4.000	0.000	116.000	No Ice	0.102	0.175	0.002	
			0.000			1/2"	0.147	0.239	0.005	
			4.000			Ice	0.199	0.311	0.009	
						1" Ice	0.326	0.476	0.022	
						2" Ice				
RRUS 4478 B14	A	From Leg	4.000	0.000	116.000	No Ice	1.843	1.059	0.060	
			0.000			1/2"	2.012	1.197	0.076	
			4.000			Ice	2.190	1.342	0.094	
						1" Ice	2.566	1.656	0.140	
						2" Ice				
RRUS 4478 B14	B	From Leg	4.000	0.000	116.000	No Ice	1.843	1.059	0.060	
			0.000			1/2"	2.012	1.197	0.076	
			4.000			Ice	2.190	1.342	0.094	
						1" Ice	2.566	1.656	0.140	
						2" Ice				
RRUS 4478 B14	C	From Leg	4.000	0.000	116.000	No Ice	1.843	1.059	0.060	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			0.000			1/2"	2.012	1.197	0.076
			4.000			Ice	2.190	1.342	0.094
						1" Ice	2.566	1.656	0.140
						2" Ice			
RRUS 32	A	From Leg	4.000	0.000	116.000	No Ice	2.857	1.777	0.055
			0.000			1/2"	3.083	1.968	0.077
			4.000			Ice	3.316	2.166	0.103
						1" Ice	3.805	2.583	0.165
						2" Ice			
RRUS 32	B	From Leg	4.000	0.000	116.000	No Ice	2.857	1.777	0.055
			0.000			1/2"	3.083	1.968	0.077
			4.000			Ice	3.316	2.166	0.103
						1" Ice	3.805	2.583	0.165
						2" Ice			
RRUS 32	C	From Leg	4.000	0.000	116.000	No Ice	2.857	1.777	0.055
			0.000			1/2"	3.083	1.968	0.077
			4.000			Ice	3.316	2.166	0.103
						1" Ice	3.805	2.583	0.165
						2" Ice			
RRUS 32 B2	A	From Leg	4.000	0.000	116.000	No Ice	2.731	1.668	0.053
			0.000			1/2"	2.953	1.855	0.074
			4.000			Ice	3.182	2.049	0.098
						1" Ice	3.663	2.458	0.157
						2" Ice			
RRUS 32 B2	B	From Leg	4.000	0.000	116.000	No Ice	2.731	1.668	0.053
			0.000			1/2"	2.953	1.855	0.074
			4.000			Ice	3.182	2.049	0.098
						1" Ice	3.663	2.458	0.157
						2" Ice			
RRUS 32 B2	C	From Leg	4.000	0.000	116.000	No Ice	2.731	1.668	0.053
			0.000			1/2"	2.953	1.855	0.074
			4.000			Ice	3.182	2.049	0.098
						1" Ice	3.663	2.458	0.157
						2" Ice			
RRUS-11	A	From Leg	4.000	0.000	116.000	No Ice	2.784	1.187	0.048
			0.000			1/2"	2.992	1.334	0.068
			4.000			Ice	3.207	1.490	0.092
						1" Ice	3.658	1.833	0.150
						2" Ice			
RRUS-11	B	From Leg	4.000	0.000	116.000	No Ice	2.784	1.187	0.048
			0.000			1/2"	2.992	1.334	0.068
			4.000			Ice	3.207	1.490	0.092
						1" Ice	3.658	1.833	0.150
						2" Ice			
RRUS-11	C	From Leg	4.000	0.000	116.000	No Ice	2.784	1.187	0.048
			0.000			1/2"	2.992	1.334	0.068
			4.000			Ice	3.207	1.490	0.092
						1" Ice	3.658	1.833	0.150
						2" Ice			
(2) DC6-48-60-18-8F	A	From Leg	4.000	0.000	116.000	No Ice	1.212	1.212	0.020
			0.000			1/2"	1.892	1.892	0.042
			4.000			Ice	2.105	2.105	0.067
						1" Ice	2.570	2.570	0.126
						2" Ice			
Platform Mount [LP 714-1]	C	None		0.000	116.000	No Ice	37.510	37.510	1.600
						1/2"	41.700	41.700	2.496
						Ice	45.890	45.890	3.458
						1" Ice	54.290	54.290	5.583
						2" Ice			
Miscellaneous [NA 510-1]	C	None		0.000	116.000	No Ice	6.360	6.360	0.256
						1/2"	8.520	8.520	0.344
						Ice	10.620	10.620	0.459
						1" Ice	14.640	14.640	0.769
						2" Ice			

*

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
742 213	A	From Leg	1.000 0.000 0.000	0.000	107.000	No Ice	3.570	1.600	0.022
						1/2" Ice	4.210	2.210	0.047
						Ice	4.860	2.830	0.078
						1" Ice	6.210	4.130	0.158
742 213	B	From Leg	1.000 0.000 0.000	0.000	107.000	No Ice	3.570	1.600	0.022
						1/2" Ice	4.210	2.210	0.047
						Ice	4.860	2.830	0.078
						1" Ice	6.210	4.130	0.158
742 213	C	From Leg	1.000 0.000 0.000	0.000	107.000	No Ice	3.570	1.600	0.022
						1/2" Ice	4.210	2.210	0.047
						Ice	4.860	2.830	0.078
						1" Ice	6.210	4.130	0.158
Pipe Mount [PM 601-3]	C	None		0.000	107.000	No Ice	3.170	3.170	0.195
						1/2" Ice	3.790	3.790	0.232
						Ice	4.420	4.420	0.279
						1" Ice	5.760	5.760	0.401
* KS24019-L112A	C	From Leg	3.000 0.000 1.000	0.000	74.000	No Ice	0.100	0.100	0.005
						1/2" Ice	0.180	0.180	0.006
						Ice	0.260	0.260	0.008
						1" Ice	0.420	0.420	0.011
Side Arm Mount [SO 701-1]	C	From Leg	1.500 0.000 0.000	0.000	74.000	No Ice	0.850	1.670	0.065
						1/2" Ice	1.140	2.340	0.079
						Ice	1.430	3.010	0.093
						1" Ice	2.010	4.350	0.121
						2" Ice			

Load Combinations

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

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

Maximum Member Forces

Sectio n No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	152 - 137.42	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-14.464	2.202	-0.271
			Max. Mx	20	-5.210	50.637	-0.246
			Max. My	14	-5.209	0.636	-50.237
			Max. Vy	20	-6.116	50.637	-0.246
			Max. Vx	2	-6.117	0.635	49.732
			Max. Torque	2			1.120
L2	137.42 - 91.09	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-66.791	6.351	4.924
			Max. Mx	20	-27.759	803.582	0.203
			Max. My	2	-27.750	0.809	809.213
			Max. Vy	20	-25.182	803.582	0.203
			Max. Vx	2	-25.394	0.809	809.213
			Max. Torque	4			1.909
L3	91.09 - 44.79	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-93.385	11.210	7.197
			Max. Mx	20	-46.144	2056.460	-0.507
			Max. My	2	-46.139	0.810	2071.234
			Max. Vy	20	-30.794	2056.460	-0.507
			Max. Vx	2	-31.021	0.810	2071.234
			Max. Torque	4			2.039
L4	44.79 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-133.594	16.983	10.530
			Max. Mx	20	-76.101	3862.656	-0.686
			Max. My	2	-76.101	1.009	3889.105
			Max. Vy	20	-36.996	3862.656	-0.686
			Max. Vx	2	-37.219	1.009	3889.105
			Max. Torque	4			2.038

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	133.594	-0.000	-0.000
	Max. H _x	21	57.084	36.975	-0.013
	Max. H _z	3	57.084	-0.013	37.199
	Max. M _x	2	3889.105	-0.013	37.198
	Max. M _z	8	3856.503	-36.975	0.013
	Max. Torsion	4	2.038	-18.499	32.222
	Min. Vert	3	57.084	-0.013	37.199
	Min. H _x	9	57.084	-36.975	0.013
	Min. H _z	15	57.084	0.013	-37.199
	Min. M _x	14	-3886.342	0.013	-37.198
	Min. M _z	20	-3862.656	36.975	-0.013
	Min. Torsion	16	-2.036	18.499	-32.222

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	63.426	0.000	0.000	-1.126	2.506	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	76.112	0.013	-37.198	-3889.105	1.009	-1.807
0.9 Dead+1.0 Wind 0 deg - No Ice	57.084	0.013	-37.199	-3871.020	0.237	-1.806
1.2 Dead+1.0 Wind 30 deg - No Ice	76.112	18.499	-32.222	-3369.444	-1928.593	-2.038
0.9 Dead+1.0 Wind 30 deg - No Ice	57.084	18.499	-32.222	-3353.677	-1920.536	-2.036
1.2 Dead+1.0 Wind 60 deg - No Ice	76.112	32.028	-18.611	-1947.128	-3340.609	-1.722
0.9 Dead+1.0 Wind 60 deg - No Ice	57.084	32.028	-18.611	-1937.870	-3326.091	-1.721
1.2 Dead+1.0 Wind 90 deg - No Ice	76.112	36.975	-0.013	-3.448	-3856.503	-0.944
0.9 Dead+1.0 Wind 90 deg - No Ice	57.084	36.975	-0.013	-3.086	-3839.685	-0.944
1.2 Dead+1.0 Wind 120 deg - No Ice	76.112	32.016	18.589	1940.787	-3338.542	0.086
0.9 Dead+1.0 Wind 120 deg - No Ice	57.084	32.016	18.589	1932.250	-3324.035	0.086
1.2 Dead+1.0 Wind 150 deg - No Ice	76.112	18.477	32.210	3364.616	-1925.013	1.092
0.9 Dead+1.0 Wind 150 deg - No Ice	57.084	18.477	32.210	3349.561	-1916.975	1.091
1.2 Dead+1.0 Wind 180 deg - No Ice	76.112	-0.013	37.198	3886.342	5.143	1.806
0.9 Dead+1.0 Wind 180 deg - No Ice	57.084	-0.013	37.199	3868.959	4.350	1.804
1.2 Dead+1.0 Wind 210 deg - No Ice	76.112	-18.499	32.222	3366.682	1934.745	2.036
0.9 Dead+1.0 Wind 210 deg - No Ice	57.084	-18.499	32.222	3351.617	1925.122	2.034
1.2 Dead+1.0 Wind 240 deg - No Ice	76.112	-32.028	18.611	1944.367	3346.761	1.721
0.9 Dead+1.0 Wind 240 deg - No Ice	57.084	-32.028	18.611	1935.811	3330.678	1.720
1.2 Dead+1.0 Wind 270 deg - No Ice	76.112	-36.975	0.013	0.686	3862.656	0.946
0.9 Dead+1.0 Wind 270 deg - No Ice	57.084	-36.975	0.013	1.026	3844.272	0.945
1.2 Dead+1.0 Wind 300 deg - No Ice	76.112	-32.016	-18.589	-1943.550	3344.696	-0.084
0.9 Dead+1.0 Wind 300 deg	57.084	-32.016	-18.589	-1934.310	3328.624	-0.083

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
- No Ice						
1.2 Dead+1.0 Wind 330 deg	76.112	-18.477	-32.210	-3367.379	1931.166	-1.092
- No Ice						
0.9 Dead+1.0 Wind 330 deg	57.084	-18.477	-32.210	-3351.622	1921.562	-1.090
- No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	133.594	0.000	0.000	-10.530	16.983	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	133.594	-0.002	-9.154	-977.599	17.272	-0.565
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	133.594	4.555	-7.927	-848.058	-463.629	-0.602
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	133.594	7.891	-4.575	-494.151	-815.674	-0.477
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	133.594	9.113	0.002	-10.705	-944.533	-0.225
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	133.594	7.893	4.579	472.739	-815.678	0.087
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	133.594	4.558	7.929	826.644	-463.636	0.376
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	133.594	0.002	9.154	956.181	17.264	0.565
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	133.594	-4.555	7.927	826.640	498.165	0.602
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	133.594	-7.891	4.575	472.732	850.210	0.477
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	133.594	-9.113	-0.002	-10.713	979.069	0.225
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	133.594	-7.893	-4.579	-494.157	850.214	-0.087
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	133.594	-4.558	-7.929	-848.062	498.172	-0.376
Dead+Wind 0 deg - Service	63.426	0.003	-7.463	-778.841	2.142	-0.363
Dead+Wind 30 deg - Service	63.426	3.711	-6.464	-674.857	-383.834	-0.409
Dead+Wind 60 deg - Service	63.426	6.426	-3.734	-390.352	-666.278	-0.346
Dead+Wind 90 deg - Service	63.426	7.418	-0.003	-1.561	-769.508	-0.190
Dead+Wind 120 deg - Service	63.426	6.423	3.729	387.342	-665.864	0.017
Dead+Wind 150 deg - Service	63.426	3.707	6.462	672.149	-383.119	0.219
Dead+Wind 180 deg - Service	63.426	-0.003	7.463	776.546	2.968	0.362
Dead+Wind 210 deg - Service	63.426	-3.711	6.464	672.562	388.944	0.409
Dead+Wind 240 deg - Service	63.426	-6.426	3.734	388.057	671.388	0.346
Dead+Wind 270 deg - Service	63.426	-7.418	0.003	-0.734	774.618	0.190
Dead+Wind 300 deg - Service	63.426	-6.423	-3.729	-389.637	670.975	-0.017
Dead+Wind 330 deg - Service	63.426	-3.707	-6.462	-674.443	388.229	-0.219

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	0.000	-63.426	0.000	0.000	63.426	0.000	0.000%
2	0.013	-76.112	-37.200	-0.013	76.112	37.198	0.002%
3	0.013	-57.084	-37.200	-0.013	57.084	37.199	0.002%
4	18.499	-76.112	-32.222	-18.499	76.112	32.222	0.000%
5	18.499	-57.084	-32.222	-18.499	57.084	32.222	0.000%
6	32.029	-76.112	-18.611	-32.028	76.112	18.611	0.000%
7	32.029	-57.084	-18.611	-32.028	57.084	18.611	0.000%
8	36.976	-76.112	-0.013	-36.975	76.112	0.013	0.002%
9	36.976	-57.084	-0.013	-36.975	57.084	0.013	0.002%
10	32.016	-76.112	18.589	-32.016	76.112	-18.589	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
11	32.016	-57.084	18.589	-32.016	57.084	-18.589	0.000%
12	18.477	-76.112	32.210	-18.477	76.112	-32.210	0.000%
13	18.477	-57.084	32.210	-18.477	57.084	-32.210	0.000%
14	-0.013	-76.112	37.200	0.013	76.112	-37.198	0.002%
15	-0.013	-57.084	37.200	0.013	57.084	-37.199	0.002%
16	-18.499	-76.112	32.222	18.499	76.112	-32.222	0.000%
17	-18.499	-57.084	32.222	18.499	57.084	-32.222	0.000%
18	-32.029	-76.112	18.611	32.028	76.112	-18.611	0.000%
19	-32.029	-57.084	18.611	32.028	57.084	-18.611	0.000%
20	-36.976	-76.112	0.013	36.975	76.112	-0.013	0.002%
21	-36.976	-57.084	0.013	36.975	57.084	-0.013	0.002%
22	-32.016	-76.112	-18.589	32.016	76.112	18.589	0.000%
23	-32.016	-57.084	-18.589	32.016	57.084	18.589	0.000%
24	-18.477	-76.112	-32.210	18.477	76.112	32.210	0.000%
25	-18.477	-57.084	-32.210	18.477	57.084	32.210	0.000%
26	0.000	-133.594	0.000	-0.000	133.594	-0.000	0.000%
27	-0.002	-133.594	-9.154	0.002	133.594	9.154	0.000%
28	4.555	-133.594	-7.927	-4.555	133.594	7.927	0.000%
29	7.891	-133.594	-4.575	-7.891	133.594	4.575	0.000%
30	9.113	-133.594	0.002	-9.113	133.594	-0.002	0.000%
31	7.893	-133.594	4.579	-7.893	133.594	-4.579	0.000%
32	4.558	-133.594	7.929	-4.558	133.594	-7.929	0.000%
33	0.002	-133.594	9.154	-0.002	133.594	-9.154	0.000%
34	-4.555	-133.594	7.927	4.555	133.594	-7.927	0.000%
35	-7.891	-133.594	4.575	7.891	133.594	-4.575	0.000%
36	-9.113	-133.594	-0.002	9.113	133.594	0.002	0.000%
37	-7.893	-133.594	-4.579	7.893	133.594	4.579	0.000%
38	-4.558	-133.594	-7.929	4.558	133.594	7.929	0.000%
39	0.003	-63.426	-7.463	-0.003	63.426	7.463	0.000%
40	3.711	-63.426	-6.465	-3.711	63.426	6.464	0.000%
41	6.426	-63.426	-3.734	-6.426	63.426	3.734	0.000%
42	7.418	-63.426	-0.003	-7.418	63.426	0.003	0.000%
43	6.423	-63.426	3.729	-6.423	63.426	-3.729	0.000%
44	3.707	-63.426	6.462	-3.707	63.426	-6.462	0.000%
45	-0.003	-63.426	7.463	0.003	63.426	-7.463	0.000%
46	-3.711	-63.426	6.465	3.711	63.426	-6.464	0.000%
47	-6.426	-63.426	3.734	6.426	63.426	-3.734	0.000%
48	-7.418	-63.426	0.003	7.418	63.426	-0.003	0.000%
49	-6.423	-63.426	-3.729	6.423	63.426	3.729	0.000%
50	-3.707	-63.426	-6.462	3.707	63.426	6.462	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00042827
3	Yes	4	0.00000001	0.00037582
4	Yes	5	0.00000001	0.00031546
5	Yes	5	0.00000001	0.00026171
6	Yes	5	0.00000001	0.00036955
7	Yes	5	0.00000001	0.00030782
8	Yes	4	0.00000001	0.00020771
9	Yes	4	0.00000001	0.00018491
10	Yes	5	0.00000001	0.00034286
11	Yes	5	0.00000001	0.00028526
12	Yes	5	0.00000001	0.00032374
13	Yes	5	0.00000001	0.00026890
14	Yes	4	0.00000001	0.00043429
15	Yes	4	0.00000001	0.00038112
16	Yes	5	0.00000001	0.00037925
17	Yes	5	0.00000001	0.00031566
18	Yes	5	0.00000001	0.00032063
19	Yes	5	0.00000001	0.00026593
20	Yes	4	0.00000001	0.00020213

21	Yes	4	0.00000001	0.00018004
22	Yes	5	0.00000001	0.00033951
23	Yes	5	0.00000001	0.00028183
24	Yes	5	0.00000001	0.00036320
25	Yes	5	0.00000001	0.00030185
26	Yes	4	0.00000001	0.00002504
27	Yes	5	0.00000001	0.00021386
28	Yes	5	0.00000001	0.00021755
29	Yes	5	0.00000001	0.00021495
30	Yes	5	0.00000001	0.00020463
31	Yes	5	0.00000001	0.00021071
32	Yes	5	0.00000001	0.00021165
33	Yes	5	0.00000001	0.00020757
34	Yes	5	0.00000001	0.00021815
35	Yes	5	0.00000001	0.00021948
36	Yes	5	0.00000001	0.00021413
37	Yes	5	0.00000001	0.00022338
38	Yes	5	0.00000001	0.00022372
39	Yes	4	0.00000001	0.00002604
40	Yes	4	0.00000001	0.00002475
41	Yes	4	0.00000001	0.00003622
42	Yes	4	0.00000001	0.00001917
43	Yes	4	0.00000001	0.00002632
44	Yes	4	0.00000001	0.00002288
45	Yes	4	0.00000001	0.00002598
46	Yes	4	0.00000001	0.00003983
47	Yes	4	0.00000001	0.00002388
48	Yes	4	0.00000001	0.00001931
49	Yes	4	0.00000001	0.00002523
50	Yes	4	0.00000001	0.00003340

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	152 - 137.42	6.225	39	0.332	0.001
L2	142.59 - 91.09	5.572	39	0.330	0.001
L3	97.92 - 44.79	2.720	39	0.260	0.000
L4	53.21 - 0	0.808	39	0.137	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.000	DS9A09F36D-N	39	6.225	0.332	0.001	212273
150.000	NNVV-65B-R4 w/ Mount Pipe	39	6.086	0.332	0.001	212273
133.000	RR90-17-02DP w/ Mount Pipe	39	4.915	0.323	0.001	63023
124.000	(2) LPA-80080/6CF w/ Mount Pipe	39	4.315	0.312	0.001	44569
116.000	7770.00 w/ Mount Pipe	39	3.799	0.299	0.000	35332
107.000	742 213	39	3.244	0.281	0.000	28582
74.000	KS24019-L112A	39	1.543	0.196	0.000	19251

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
-------------	-----------------	---------------------------	-----------------------	-----------	------------

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	152 - 137.42	31.093	2	1.659	0.004
L2	142.59 - 91.09	27.832	2	1.647	0.004
L3	97.92 - 44.79	13.587	2	1.298	0.002
L4	53.21 - 0	4.038	2	0.685	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.000	DS9A09F36D-N	2	31.093	1.659	0.004	44027
150.000	NNVV-65B-R4 w/ Mount Pipe	2	30.398	1.657	0.004	44027
133.000	RR90-17-02DP w/ Mount Pipe	2	24.553	1.612	0.003	12841
124.000	(2) LPA-80080/6CF w/ Mount Pipe	2	21.553	1.557	0.003	9008
116.000	7770.00 w/ Mount Pipe	2	18.976	1.491	0.002	7107
107.000	742 213	2	16.208	1.402	0.002	5741
74.000	KS24019-L112A	2	7.711	0.979	0.001	3857

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L1	152 - 137.42 (1)	TP37.31x33.03x0.313	14.580	0.000	0.0	35.192	-5.210	2058.710	0.003
L2	137.42 - 91.09 (2)	TP50.15x35.167x0.375	51.500	0.000	0.0	56.880	-27.750	3327.460	0.008
L3	91.09 - 44.79 (3)	TP62.86x47.413x0.438	53.130	0.000	0.0	83.282	-46.139	4872.000	0.009
L4	44.79 - 0 (4)	TP75x59.537x0.5	53.210	0.000	0.0	118.23 1	-76.101	6916.540	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio M _{ux} / φM _{nx}	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio M _{uy} / φM _{ny}
L1	152 - 137.42 (1)	TP37.31x33.03x0.313	50.683	1817.458	0.028	0.000	1817.458	0.000
L2	137.42 - 91.09 (2)	TP50.15x35.167x0.375	809.213	3815.617	0.212	0.000	3815.617	0.000
L3	91.09 - 44.79 (3)	TP62.86x47.413x0.438	2071.233	6830.525	0.303	0.000	6830.525	0.000
L4	44.79 - 0 (4)	TP75x59.537x0.5	3889.108	11650.000	0.334	0.000	11650.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	152 - 137.42 (1)	TP37.31x33.03x0.313	6.122	617.612	0.010	0.466	1919.008	0.000
L2	137.42 - 91.09 (2)	TP50.15x35.167x0.375	25.394	984.902	0.026	1.582	4177.658	0.000
L3	91.09 - 44.79 (3)	TP62.86x47.413x0.438	31.021	1446.690	0.021	1.808	7676.708	0.000
L4	44.79 - 0 (4)	TP75x59.537x0.5	37.219	2055.880	0.018	1.807	13537.749	0.000

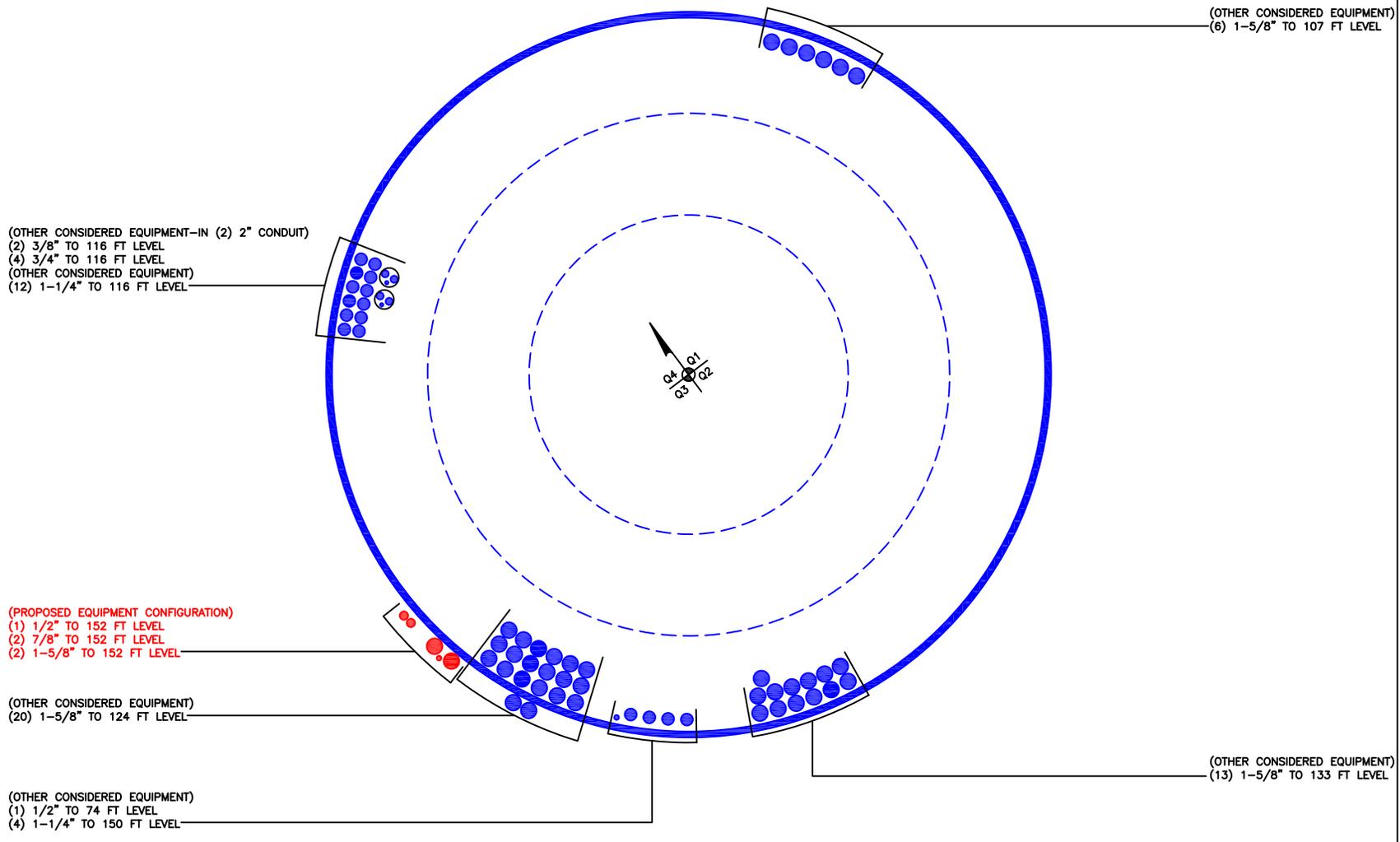
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	Ratio V_u	Ratio T_u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		ϕP_n	ϕM_{nx}	ϕM_{ny}	ϕV_n	ϕT_n			
L1	152 - 137.42 (1)	0.003	0.028	0.000	0.010	0.000	0.031	1.050	4.8.2
L2	137.42 - 91.09 (2)	0.008	0.212	0.000	0.026	0.000	0.221	1.050	4.8.2
L3	91.09 - 44.79 (3)	0.009	0.303	0.000	0.021	0.000	0.313	1.050	4.8.2
L4	44.79 - 0 (4)	0.011	0.334	0.000	0.018	0.000	0.345	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	152 - 137.42	Pole	TP37.31x33.03x0.313	1	-5.210	2161.645	2.9	Pass	
L2	137.42 - 91.09	Pole	TP50.15x35.167x0.375	2	-27.750	3493.833	21.1	Pass	
L3	91.09 - 44.79	Pole	TP62.86x47.413x0.438	3	-46.139	5115.600	29.8	Pass	
L4	44.79 - 0	Pole	TP75x59.537x0.5	4	-76.101	7262.367	32.9	Pass	
							Summary		
							Pole (L4)	32.9	Pass
							RATING =	32.9	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Monopole Base Plate Connection

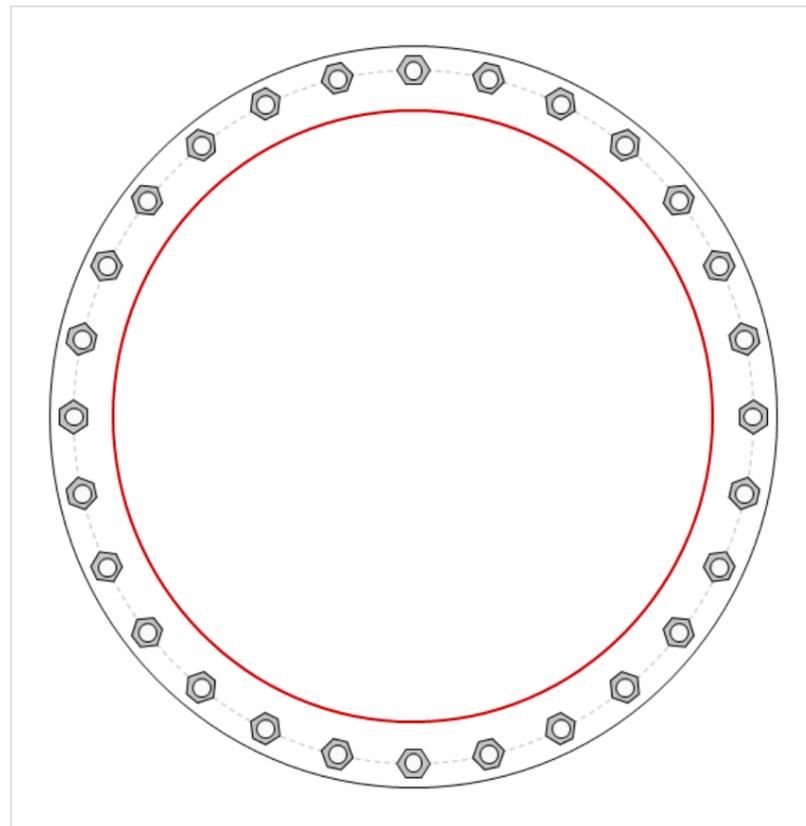


Site Info	
BU #	876385
Site Name	COVENTRY / WALLBEC
Order #	483388 Rev 9

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	0.75

Applied Loads	
Moment (kip-ft)	3889.11
Axial Force (kips)	76.10
Shear Force (kips)	37.22

*TIA-222-H Section 15.5 Applied



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

Anchor Rod Data
(28) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 85" BC
Base Plate Data
91" OD x 2.25" Plate (A572-60; $F_y=60$ ksi, $F_u=75$ ksi)
Stiffener Data
N/A
Pole Data
75" x 0.5" 18-sided pole (A572-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary		
<i>(units of kips, kip-in)</i>		
$P_{u_c} = 81.13$	$\phi P_{n_c} = 268.39$	Stress Rating
$V_u = 1.33$	$\phi V_n = 120.77$	28.8%
$M_u = n/a$	$\phi M_n = n/a$	Pass
Base Plate Summary		
Max Stress (ksi):	23	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	40.6%	Pass

Pier and Pad Foundation



BU #: 876385
 Site Name: N. COVENTRY / W
 App. Number: 483388 Rev 9

TIA-222 Revision: H
 Tower Type: Monopole

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

Superstructure Analysis Reactions		
Compression, P_{comp} :	76	kips
Base Shear, Vu_{comp} :	37	kips
Moment, M_u :	3889	ft-kips
Tower Height, H :	152	ft
BP Dist. Above Fdn, bp_{dist} :	3	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	627.32	37.00	5.6%	Pass
<i>Bearing Pressure (ksf)</i>	12.76	2.86	21.3%	Pass
<i>Overtuning (kip*ft)</i>	13205.39	4231.25	32.0%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	10510.81	4111.00	37.2%	Pass
<i>Pier Compression (kip)</i>	51554.88	163.48	0.3%	Pass
<i>Pad Flexure (kip*ft)</i>	7275.14	1337.83	17.5%	Pass
<i>Pad Shear - 1-way (kips)</i>	1033.61	192.19	17.7%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.190	0.033	16.4%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	6624.33	2466.60	35.5%	Pass

Pier Properties		
Pier Shape:	Square	
Pier Diameter, $dpier$:	9	ft
Ext. Above Grade, E :	1	ft
Pier Rebar Size, Sc :	8	
Pier Rebar Quantity, mc :	62	
Pier Tie/Spiral Size, St :	4	
Pier Tie/Spiral Quantity, mt :	10	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

*Rating per TIA-222-H Section 15.5

Soil Rating*:	32.0%
Structural Rating*:	37.2%

Pad Properties		
Depth, D :	8	ft
Pad Width, W :	29	ft
Pad Thickness, T :	3	ft
Pad Rebar Size (Top), Sp_{top} :	9	
Pad Top Rebar Quantity (Top), mp_{top} :	25	
Pad Rebar Size (Bottom), Sp :	9	
Pad Rebar Quantity (Bottom), mp :	54	
Pad Clear Cover, cc_{pad} :	3	in

Material Properties		
Rebar Grade, Fy :	60	ksi
Concrete Compressive Strength, $F'c$:	4	ksi
Dry Concrete Density, δc :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	127	pcf
Ultimate Net Bearing, Q_{net} :	16.000	ksf
Cohesion, Cu :	0.000	ksf
Friction Angle, ϕ :	40	degrees
SPT Blow Count, N_{blows} :	50	
Base Friction, μ :	0.55	
Neglected Depth, N :	4.50	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, gw :	n/a	ft

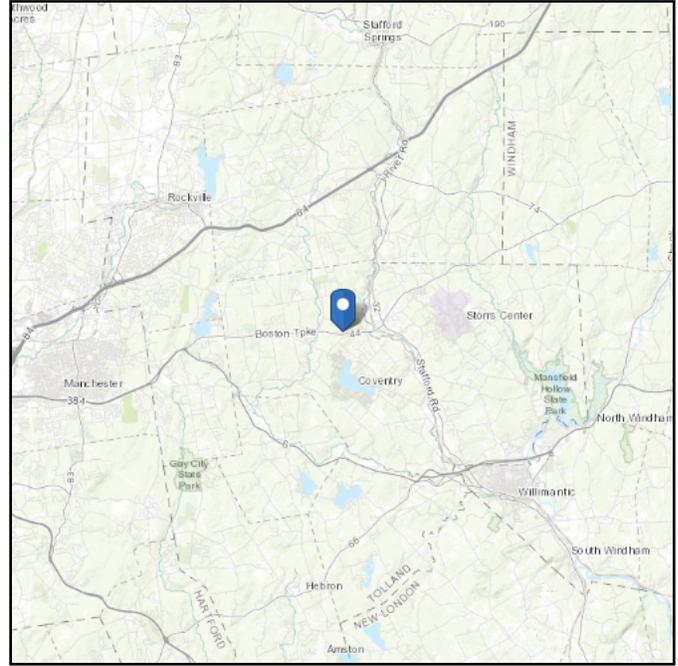
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ASCE 7 Hazards Report

Address:
No Address at This
Location

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

Elevation: 707.05 ft (NAVD 88)
Latitude: 41.798947
Longitude: -72.332189

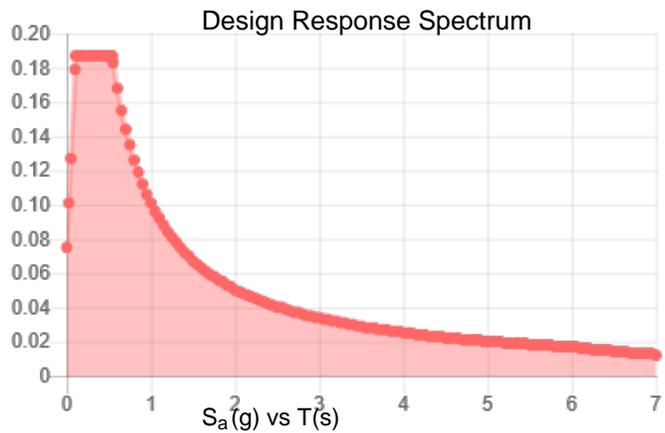
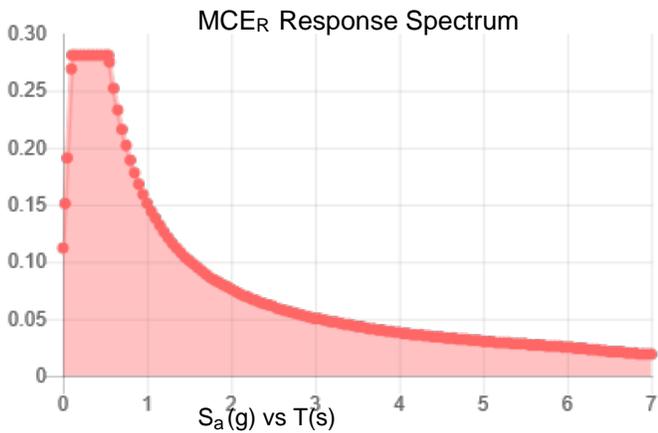


Site Soil Class: D - Stiff Soil

Results:

S_S :	0.176	S_{DS} :	0.187
S_1 :	0.063	S_{D1} :	0.101
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.088
S_{MS} :	0.281	PGA _M :	0.14
S_{M1} :	0.151	F _{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Thu Apr 09 2020

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: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

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

Date Accessed: Thu Apr 09 2020

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

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

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

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

ATTACHMENT E – PROOF OF DELIVERY OF NOTICE

Ref: CT587100-ES047 C Date: 09Oct20
Dep: BL GRAPHICS Wgt: 0.75 LBS

SHIPPING: 0.00
SPECIAL: 0.00
HANDLING: 0.00
0.00 TOTAL: 0.00

DV:

Svcs: MORNING 2DAY
TRK: 9151 3346 5310

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 09OCT20
ACTWGT: 0.75 LB
CAD: 0765627/CAFE3311

BILL THIRD PARTY

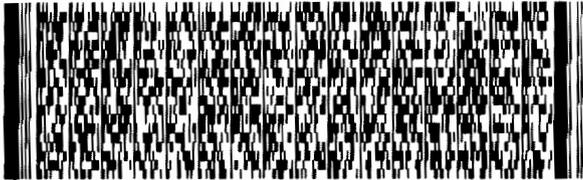
TO

**CONNECTICUT SITING COUNCIL
10 FRANKLIN SQUARE**

NEW BRITAIN CT 06051

REF: CT587100-ES047 COVENTRY

DEPT: BL GRAPHICS



**FedEx
Express**



J191219032001 LW

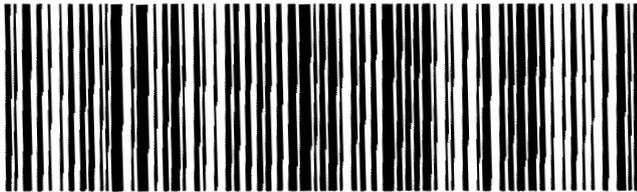
**TUE - 13 OCT 10:30A
MORNING 2DAY**

TRK# 9151 3346 5310
0201

00 BDLA

**06051
CT-US BDL**

Post-Net-40-TRK-EXP-0620-24



565C2/A27E/0582

Ref: CT587100-ES-047 Date: 09Oct20
Dep: BL GRAPHICS Wgt: 0.80 LBS

SHIPPING: 0.00
SPECIAL: 0.00
HANDLING: 0.00
TOTAL: 0.00

Svos: MORNING 2DAY
TRK: 9151 3346 5309

ORIGIN ID:RSPA (800) 301-3077

SHIP DATE: 09OCT20
ACTWGT: 0.80 LB
CAD: 0765627/CAFE3311

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

BILL THIRD PARTY

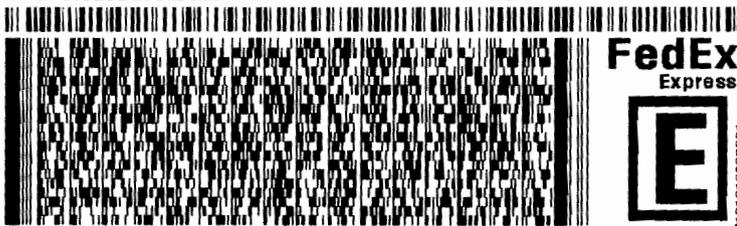
TO **876385 N. COVENTRY**
CROWN CASTLE
6325 ARDREY KELL ROAD, SUITE 600

CHARLOTTE NC 28277

REF: CT587100-ES-047 COVENTRY

DEPT: BL GRAPHICS

565C3/A27E/05AR

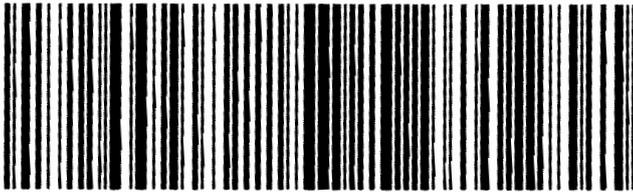


TUE - 13 OCT 10:30A
MORNING 2DAY

TRK# **9151 3346 5309**
0201

SH MEOA

28277
NC-US CLT



Postnet City/State/Zip+4 9151 3346 5309

Ref: CT587100-ES-047 Date: 09Oct20
Dep: BL GRAPHICS Wgt: 0.80 LBS

SHIPPING: 0.00
SPECIAL: 0.00
HANDLING: 0.00
TOTAL: 0.00

DV:

Svcs: MORNING 2DAY
TRCK: 9151 3346 5294

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 09OCT20
ACTWGT: 0.80 LB MAN
CAD: 0765627/CAFE3311

BILL THIRD PARTY

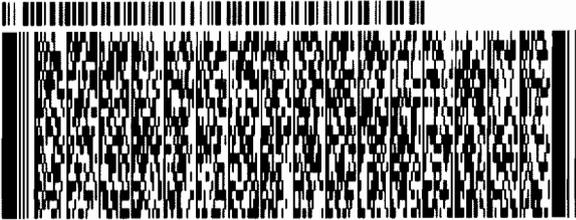
TO **ERIC TROTT, DIRECTOR OF LAND USE**
TOWN OF COVENTRY
1712 MAIN STREET

COVENTRY CT 06238

REF: CT587100-ES-047 COVENTRY

DEPT: BL GRAPHICS

565C2/R27E/05AR



FedEx
Express



J191219062001 LV

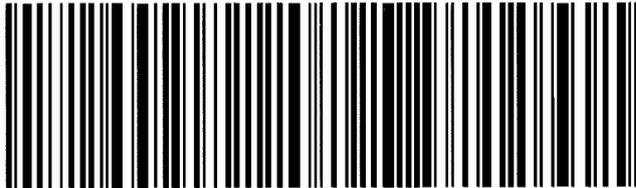
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MORNING 2DAY

TRK# 9151 3346 5294
0201

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06238
CT-US BDL

Can. # 565146 3791012 4557 00240



Ref: CT587100-ES-047 Date: 09Oct20
Dep: BL GRAPHICS Wgt: 0.80 LBS

SHIPPING: 0.00
SPECIAL: 0.00
HANDLING: 0.00
0.00 TOTAL: 0.00

Svcs: MORNING 2DAY
TRK: 9151 3346 5283

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES
355 RESEARCH PARKWAY

MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 09OCT20
ACTWGT: 0.80 LB MAN
CAD: 0765627/CAFE3311

BILL THIRD PARTY

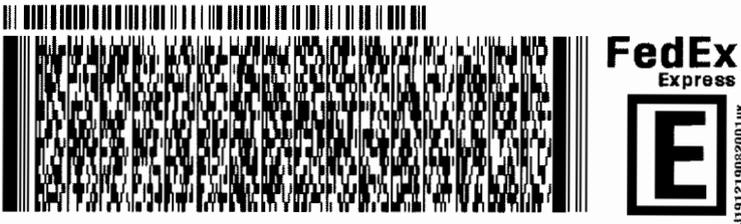
TO **JOHN ELSESSER, TOWN MANAGER**
TOWN OF COVENTRY
1712 MAIN STREET

COVENTRY CT 06238

REF: CT587100-ES-047 COVENTRY

DEPT: BL GRAPHICS

565C2/A27E/05R2



J191219082001W

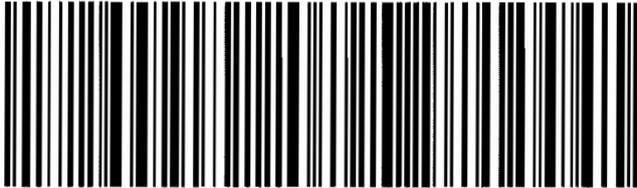
TUE - 13 OCT 12:00P
MORNING 2DAY

TRK# 9151 3346 5283
0201

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06238
CT-US BDL

Post-Net 430-4110-2200-00



Ref: CT587100-ES-047 Date: 09Oct20
Dep: BL GRAPHICS Wgt: 0.80 LBS
DV: 0.00

SHIPPING: 0.00
SPECIAL: 0.00
HANDLING: 0.00
TOTAL: 0.00

Svcs: MORNING 2DAY
TRK: 9151 3346 5272

ORIGIN ID:RSPA (800) 301-3077
BL COMPANIES
355 RESEARCH PARKWAY
MERIDEN, CT 06450
UNITED STATES US

SHIP DATE: 09OCT20
ACTWGT: 0.80 LB
CAD: 0765627/CAFE3311

BILL THIRD PARTY

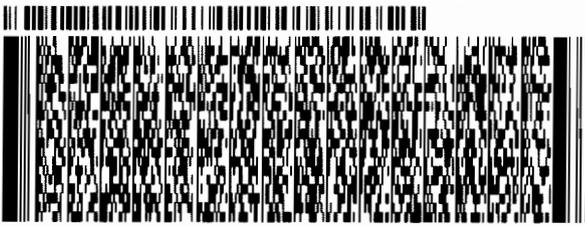
TO **JULIE A. BLANCHARD, TOWN COUNCIL**
TOWN OF COVENTRY
1712 MAIN STREET

565C2/A27E/05A2

COVENTRY CT 06238

REF: CT587100-ES-047 COVENTRY

DEPT: BL GRAPHICS



FedEx
Express



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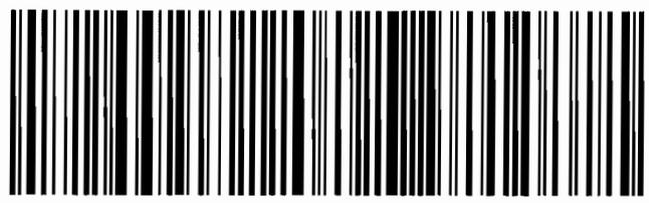
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MORNING 2DAY

TRK# 9151 3346 5272
0201

00 GONA

06238
CT-US **BDL**

Postmaster: Please Do Not Open



ATTACHMENT F - POWER DENSITY REPORT



C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
603-644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions Report



ES-047

400 Riley Mountain Road

Coventry, CT 06238

July 28, 2020

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Eversource installation on the monopole at 400 Riley Mountain Road in Coventry, CT. Eversource is proposing to install one omnidirectional antenna as part of its 220 MHz communications system.

This report considers the proposed antenna configuration as detailed by Eversource along with % MPE (Maximum Permissible Exposure) measurements around the existing tower to determine FCC compliance of the facility.



Figure 1: View of ES-047 Coventry

Site Address	400 Riley Mountain Road
Latitude	41° 47' 56.21" N
Longitude	72° 19' 55.88" W
Site Elevation AMSL	659'
Survey Engineer	Marc Salas
Survey Date/Time	6/16/2020; 3:00 PM – 4:00 PM

Table 1: Survey Information

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached “FCC Limits for Maximum Permissible Exposure (MPE)” in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

4. Power Density Calculation Methods

The power density calculation results were generated using the following formula as outlined in FCC bulletin OET 65, and Connecticut Siting Council recommendations:

$$\text{Power Density} = \left(\frac{1.6^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern¹

These calculations assume that the antennas are operating at 100 percent capacity and full power, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not consider actual terrain elevations which could attenuate the signal. As a result, the calculated power density and corresponding % MPE levels reported below are much higher than the actual levels will be from the final installation.

5. Proposed Antenna Configuration

Table 2 below lists the technical details of the proposed Eversource installation. These parameters are applied to the above calculation methods in order to calculate the % MPE values of the proposed equipment.

Operator	Antenna Model	TX Freq. (MHz)	Ant Gain (dBd)	Power ERP (Watts)	Number of Channels	Vertical Beamwidth	Length (ft)	Antenna Centerline Height (ft)
Eversource	dBspectra DS2C00F36D	217	0	124	4	60°	12.6	155.5

Table 2: Eversource Antenna Configuration (Proposed)^{2 3}

¹ In cases where the digital antenna pattern of the proposed antenna is unavailable, a pattern with similar characteristics was substituted for use in the calculations.

² Transmit power assumes 0 dB of cable loss.

³ Transmit antenna height listed for the proposed antenna is conservatively based on the Crown Castle Structural Analysis Report dated May 4, 2020 and the overall mechanical length of the antenna. The proposed antenna consists of two internally stacked antennas – upper is for receive, lower is for transmit. In cases where the digital antenna pattern is unavailable, a similar antenna pattern was substituted in the calculations.

6. Measurement Procedure

Frequencies from 300 KHz to 50 GHz were measured using the Narda Probe EA 5091, E-Field, shaped, FCC probe in conjunction with the NBM550 survey meter. The EA 5091 probe is “shaped” such that in a mixed signal environment (i.e.: more than one frequency band is used in a particular location), it accurately measures the percent of MPE.

From FCC OET Bulletin No. 65 - Edition 97-01 – “A useful characteristic of broadband probes used in multiple-frequency RF environments is a frequency-dependent response that corresponds to the variation in MPE limits with frequency. Broadband probes having such a “shaped” response permit direct assessment of compliance at sites where RF fields result from antennas transmitting over a wide range of frequencies. Such probes can express the composite RF field as a percentage of the applicable MPEs”.

Probe Description - As suggested in FCC OET Bulletin No. 65 - Edition 97-01, the response of the measurement instrument should be essentially isotropic, (i.e., independent of orientation or rotation angle of the probe). For this reason, the Narda EA 5091 probe was used for these measurements.

Sampling Description - At each measurement location, a spatially averaged measurement is collected over the height of an average human body. The NBM550 survey meter performs a time average measurement while the user slowly moves the probe over a distance range of 20 cm to 200 cm (about 6 feet) above ground level. The results recorded at each measurement location include average values over the spatial distance.

Instrumentation Information - A summary of specifications for the equipment used is provided in the table below.

Manufacturer	Narda Microwave			
Probe	EA 5091, Serial# 0116			
Calibration Date	May 2020			
Calibration Interval	24 Months			
Meter	NBM550, Serial# E-1069			
Calibration Date	May 2020			
Calibration Interval	24 Months			
Probe Specifications	Frequency Range	Field Measured	Standard	Measurement Range
	300 KHz-50 GHz	Electric Field	U.S. FCC 1997 Occupational/Controlled	0.2 – 600 % of Standard

Table 3: Instrumentation Information

Instrument Measurement Uncertainty - The total measurement uncertainty of the NARDA measurement probe and meter is no greater than ± 3 dB (0.5% to 6%), ± 1 dB (6% to 100%), ± 2 dB (100% to 600%). The factors which contribute to this include the probe’s frequency response deviation, calibration uncertainty, ellipse ratio, and isotropic response⁴. Every effort is taken to reduce the overall uncertainty during measurement collection including pointing the probe directly at the likely highest source of emissions.

⁴ For further details, please refer to Narda Safety Test Solutions NBM550 Probe Specifications, pg. 64 http://www.narda-sts.us/pdf_files/DataSheets/NBM-Probes_DataSheet.pdf

7. Surveyed and Calculated % MPE Results

Measured and calculated results and a description of each survey location are detailed in the table below. Measurements were recorded on June 16, 2020 between 3:00 PM and 4:00 PM. The calculated % MPE contribution from the proposed equipment modifications was then added to the measured % MPE values in the “Composite % MPE” column. These calculated values incorporate the antenna pattern of the antenna model specified by Eversource to determine the “Off Beam Loss” factor shown in the power density formula from Section 4. All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Table 4 below lists 12 measurements recorded in the vicinity of the tower. The highest spatially averaged measurement was 1.29% (Average Uncontrolled/General Population MPE) and was recorded at Location 5 by the northeast side of the monopole tower compound. The highest composite (measured + calculated) % MPE value is calculated to be 2.27% (Average Uncontrolled/General Population) and is calculated to occur at the same location (Location 5).

Meas. Location	Location Description	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (Eversource Proposed)	Composite % MPE (Uncontrolled / General)
1	Compound access gate	41.79896	-72.33228	20	< 1.00%	0.26%	< 1.26%
2	SW corner of fenced compound	41.79884	-72.33230	47	1.02%	0.85%	1.87%
3	SE corner of fenced compound	41.79881	-72.33210	60	< 1.00%	1.18%	< 2.18%
4	E side of fenced compound	41.79892	-72.33207	39	< 1.00%	0.68%	< 1.68%
5	NE corner of fenced compound	41.79903	-72.33205	51	1.29%	0.98%	2.27%
6	NW corner of fenced compound	41.79905	-72.33225	39	< 1.00%	0.67%	< 1.67%
7	Parking / turnaround area by compound	41.79899	-72.33242	60	< 1.00%	1.24%	< 2.24%
8	Along access road, approaching compound	41.79952	-72.33282	267	< 1.00%	0.93%	< 1.93%
9	Along access road	41.80010	-72.33301	475	< 1.00%	0.32%	< 1.32%
10	Along access road, near lumber pile	41.80097	-72.33310	777	< 1.00%	0.11%	< 1.11%
11	Along access road	41.80201	-72.33098	1167	< 1.00%	0.05%	< 1.05%
12	Gate to access road, off Riley Mountain Road	41.80331	-72.32817	1936	< 1.00%	0.02%	< 1.02%

Table 4: Measured and Calculated % MPE Results ⁵

⁵ Due to measurement uncertainty at low levels (See Table 3), any readings outside the measurement range of the probe (< 1.00 % FCC General Population/Uncontrolled MPE) are noted as such.

Figures 2 and 3 below are aerial views⁶ of the tower location and the surrounding area, along with the measurement locations listed in Table 4.



Figure 2: Measurement Points – Zoom In

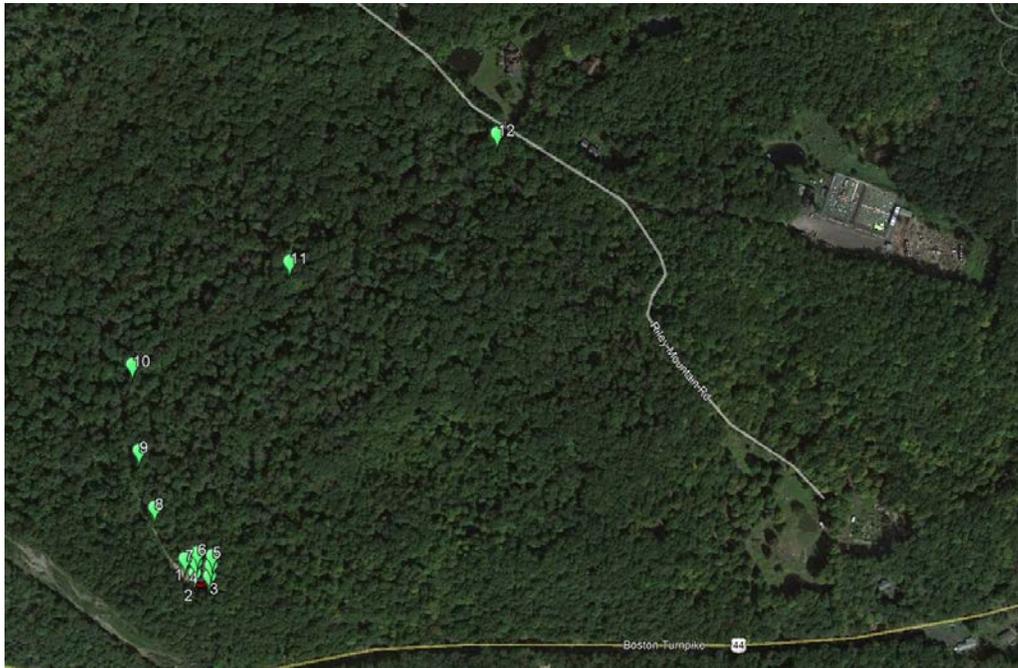


Figure 3: All Measurement Points

⁶ Map showing location of telecommunications facility and the surrounding area. *Google Earth*, <https://earth.google.com/web/>.

8. Conclusion

A number of accessible areas around the tower at 400 Riley Mountain Road in Coventry, CT were surveyed and found to be well within the mandated General Population/Uncontrolled limits for Maximum Permissible Exposure, as delineated in the Federal Communications Commission's Radio Frequency exposure rules published in 47 CFR 1.1307(b)(1)-(b)(3).

The highest spatially averaged % MPE measurement of all surveyed points based on the 1997 FCC standard for exposure to the general population is 1.29% MPE. This measurement was recorded at Location 5 by the northeast corner of the fenced compound.

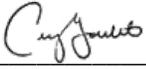
The highest composite (measured + calculated) power density is **2.27% of the FCC General Population MPE limit** with the proposed Eversource equipment is calculated to occur at Location 5.

The above analysis concludes that RF exposure at ground level around the tower, both currently and with the proposed antenna installation, will be below the maximum power density limits as outlined by the FCC in the OET Bulletin 65 Ed. 97-01.

As noted previously, the calculated % MPE levels are more conservative (higher) than the actual levels will be from the finished installation.

9. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in FCC OET Bulletin 65 Edition 97-01, IEEE Std. C95.1, and IEEE Std. C95.3.



Report Prepared By: Cory Goulet
Associate RF Engineer
C Squared Systems, LLC

July 27, 2020
Date



Reviewed/Approved By: Keith Vellante
Director of RF Services
C Squared Systems, LLC

July 28, 2020
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure⁷

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure⁸

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 5: FCC Limits for Maximum Permissible Exposure (MPE)

⁷ Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

⁸ General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

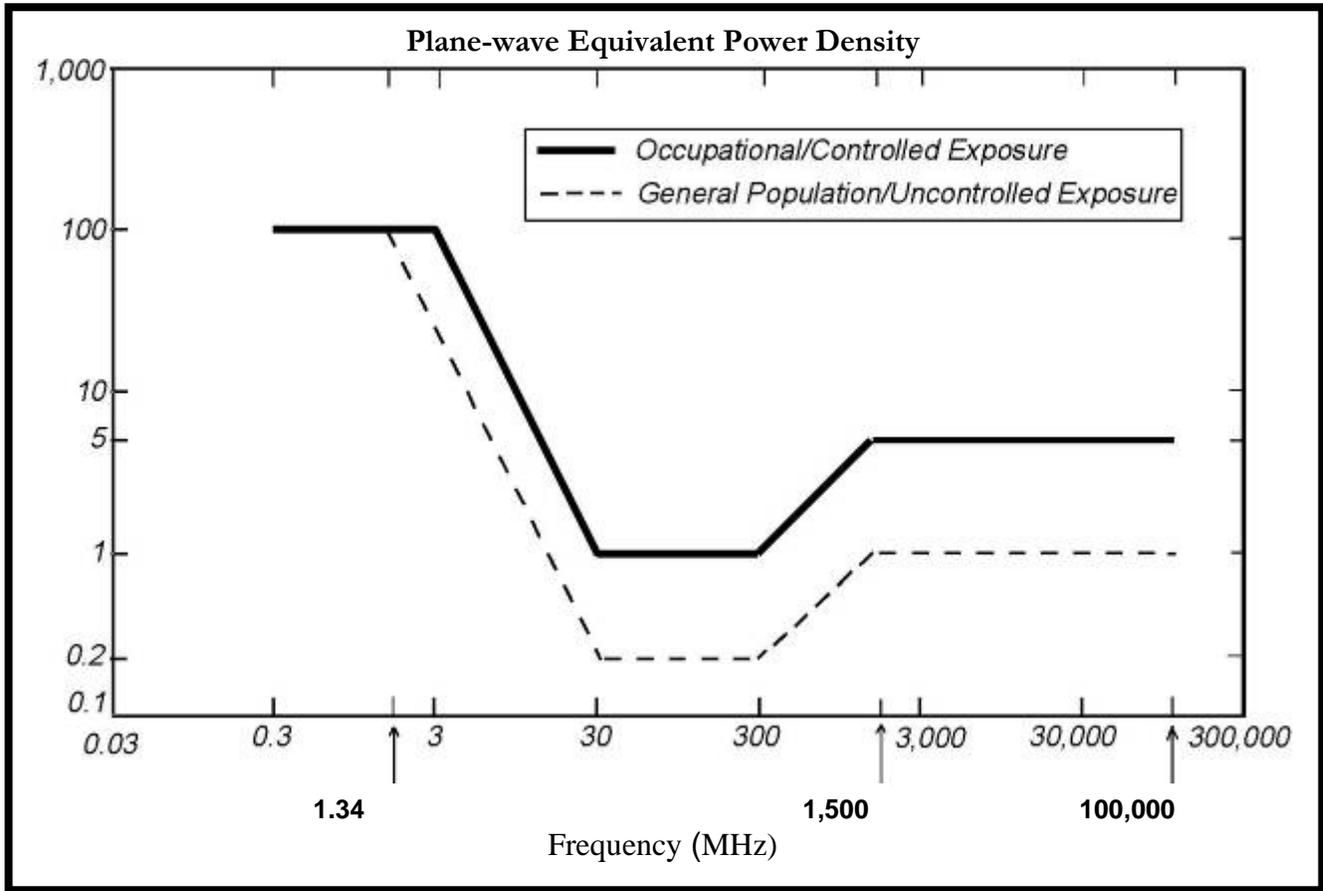
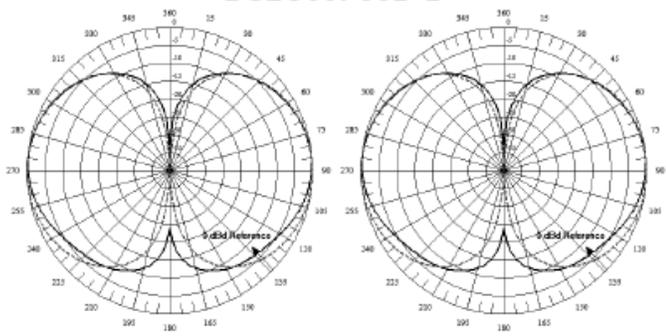


Figure 4: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheet and Electrical Patterns

<p>217 MHz</p> <p>Manufacturer: dbSpectra Model #: DS2C00F36D Frequency Band: 160 - 222 MHz Gain: 0 dBd Vertical Beamwidth: 60° Horizontal Beamwidth: 360° Polarization: Vertical-Polarization Length: 12.6'</p>	<p style="text-align: center;">DS2C00F36D-N DS2C00F36D-D</p>  <p style="text-align: center;">Top Bottom</p>
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