

# Technical Report Supporting a Form 349 Minor Change in Licensed Facility Construction Permit Application

Pursuant to 47 C.F.R. Section 74:

*for*

*W268CZ.L - Northampton, MA  
(Facility ID: 200012)*

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*"New Site Relocation"*

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*as a*

*Commercial, Fill-In Translator  
for Class C AM Station  
WHMP(AM) - Northampton, MA*

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July, 2018

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*Asher Broadcast Consulting, LLC*  
justinasher@consultant.com  
1(202)875-2986

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RF Appendix 1 - Radio Frequency Radiation Compliance Showing

**EXPLANATION OF PROPOSAL:** This Form 349 Filing and accompanying technical report supports a Minor Change in Licensed Facility Construction Permit Application for FM Fill-In Translator W268CZ.L - Northampton, MA (Facility ID: 200012). This FCC Form 349 Filing requests a relocation to a new site. Continued operation on CH268D (101.5 MHz) with 0.175 kW ERP (Circular Polarization with separate horizontal and vertical elements) at 404 meters (H) AMSL and 401 meters (V) is requested. This Form 349 Filing will continue to specify rebroadcast of Class C, AM Primary Station WHMP(AM) - Northampton, MA (1400 kHz); Facility ID No. 46962. The Translator will continue to be licensed to the community of Northampton, MA.

**FACILITY COMPLIANCE SHOWINGS:** A map of the proposed 60 dB $\mu$  service contour in relation to the present 60 dB $\mu$  service contour has been included in **Exhibit 1**. The minor change proposed service area will overlap a portion of the presently licensed service area as noted in the exhibit. The proposed 60 dB $\mu$  contour of the Translator lies wholly inside the larger of the AM primary daytime 2.0 mV/m contour or a 25 mile radius around the AM site. The primary station service contour relationship has been plotted in **Exhibit 2**.

The proposed facility will be located on the tower bearing Antenna Structure Registration Number 1028013. In support of the requested site location, a copy of the existing ASRN has been included in **Exhibit 3**. A depiction of the tower and antenna configuration has been included in **Exhibit 4**. Further notification to the FAA or ASR governing authorities is not required as this proposal will not increase the overall tower height.

The applicant would like to note use of the FCC 30 second terrain database for all allocation, contour and HAAT showings contained herein. A copy of the proposed HAAT calculation has been included in **Exhibit 5**.

**ALLOCATION COMPLIANCE SHOWINGS:** The proposed Translator remains in compliance with 47 C.F.R. Section 74.1204 toward all allocation protection concerns with the exception of WAQY(FM) - Springfield, MA (CH271B) and WRNX(FM) - Amherst, MA (CH265A). A general allocation study for this proposal is found in **Exhibit 6**.

The applicant would like to note the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WAQY(FM) - Springfield, MA (CH271B) and WRNX(FM) - Amherst, MA (CH265A). The Interference Contour at the proposed Translator site has been calculated to be no less than the 105.2 dBµ F(50:10) interference contour corresponding to the worst case protected contour at the Translator site. This represents the proposed interference contour which falls wholly within the 40:1 dB ratio. As seen in the **Exhibit 8** Aerial Photograph, there is a lack of population, housing, buildings or major roads within this interference contour. The applicant would like to note the existence of the dedicated transmitter building located at the base of the tower. However, structures of this nature have been exempt as a matter of FCC Policy. A copy of the manufacturer's directional antenna pattern data has been included in **Exhibit 9**.

There are four facilities, existing or proposed, close enough to merit further study. Therefore, a supplemental contour protection study has been provided toward each facility as included in **Exhibit(s) 7(a-d)**. It is believed sufficient clearance exists precluding the need for additional contour protection showings. A copy of the antenna manufacturer specifications has been included in **Exhibit 9**.

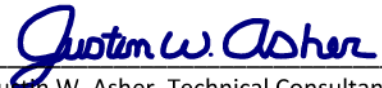
Regarding protection of international concerns, the facility is, and will remain, within 320 km from the common border between the United States and Canada. However full protection will be afforded all Canadian concerns as noted in **Exhibit 6**.

**ENVIRONMENTAL COMPLIANCE SHOWINGS:** The proposed facility complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments as set forth under §1.1310 and/or §1.1307(b)(3) of the Commission's rules and the guidelines for RF radiation protection guidelines as set forth in OET Bulletin No. 65 (Edition 97-01), and the accompanying Supplement A, (Edition 97-01). Compliance has been demonstrated in the attached **RF Appendix 1** of this filing. The facility is, or will be, properly marked with signs. Entry is, or will be, restricted by means of fencing with locked doors or gates. In addition, coordination with other users of the site will be secured to reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.



Regarding compliance with the NEPA, Nationwide Programmatic Agreement and NHPA Section 106 for tower co-location, compliance with the Agreement is not required where no new tower construction is being proposed and the tower is not being substantially altered. Specifically, compliance is not necessary where only an existing antenna is being modified on the existing structure, as here. However, should the Commission determine compliance is necessary, upon notification to the applicant, the applicant will file FCC Form 621.

**CERTIFICATION OF TECHNICAL CONSULTANT:** *I declare, under penalty of perjury, that the contents of this report are true and accurate to the best of my knowledge and belief. I further certify I have over nineteen years of experience as a broadcast technical consultant before the Federal Communications Commission ("the FCC"); and am familiar with the Code of Federal Regulations Title 47 ("the Rules") as pertaining to this report and its contents herein. The underlying data utilized in this report was taken directly from FCC databases or indirectly through third party software vendors securing data directly from FCC databases. This firm cannot be held liable for errors or omissions resulting from the underlying data. The information contained herein is believed accurate to the date reported below.*



Justin W. Asher, Technical Consultant

July 02, 2018

FCC 30 SEC Terrain Database  
US Census 2010 PL Database

Terrain  
11 582 m

# Exhibit 1

## Service Contour Study: Present vs Proposed Operations

*Present 60 dBμ F(50:50) Contour*

*Proposed 60 dBμ F(50:50) Contour*

W268CZ.L

W268CZ.P

W268CZ.L  
Northampton, MA  
BLFT20180522AAF  
Facility ID: 200012  
Latitude: 42-22-25 N  
Longitude: 072-40-26 W  
ERP: 0.235 kW  
Channel: 268D (101.5 MHz)  
AMSL Height: 259.0 m  
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour  
Total Population: 102,770  
Total Area: 526.8 sq. km

W268CZ.P  
Northampton, MA  
Proposed Operation  
Facility ID: 200012  
Latitude: 42-21-49 N  
Longitude: 072-25-24 W  
ERP: 0.175 kW  
Channel: 268D (101.5 MHz)  
AMSL Height: 404.0 m  
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour  
Total Population: 94,766  
Total Area: 731.3 sq. km

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Scale 1:250,000  
0 3 6 9 km

V-Soft Communications LLC ©

25 mile Radius from AM Site

## Exhibit 2

### Service Contour Study: Proposed vs Primary Operations

WHMP 1400 kHz  
Northampton, Massachusetts  
Station Class: C  
Region 2 Class: C  
Facility ID: 46962  
File Number: BL-  
42-19-36.0 N 72-39-28.0 W (NAD 27)  
42-19-36.3 N 72-39-26.3 W (NAD 83)  
Power: 1 kW, Non-Directional  
Hours: Unlimited  
Pattern Type: Theoretical  
Towers: 1 Augmentations: 0  
Tower Electrical Height: 90.2 Deg; 53.65 m  
RMS Theoretical: 305.78 mV/meter

W268CZ.P  
Northampton, MA  
Proposed Operation  
Facility ID: 200012  
Latitude: 42-21-49 N  
Longitude: 072-25-24 W  
ERP: 0.175 kW  
Channel: 268D (101.5 MHz)  
AMSL Height: 404.0 m  
Horiz. Pattern: Directional

Terrain  
2 1059 m

FCC 30 SEC Terrain Database  
US Census 2010 PL Database

Scale 1:475,000  
0 8 16 24 km

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**Exhibit 3**  
**Copy of Existing Antenna Structure Registration**  
*(public record copy)*

**Registration Detail**

Reg Number	1028013	Status	Constructed
File Number	A0033239	Constructed	05/21/1997
EMI	No	Dismantled	
NEPA	No		

**Antenna Structure**

Structure Type TOWER - Free standing or Guyed Structure used for Commu

**Location** (in NAD83 Coordinates)

Lat/Long	42-21-49.0 N 072-25-22.0 W	Address	SUMMIT OF MOUNT LINCOLN
City, State	PELHAM , MA		
Zip	01002	County	HAMPSHIRE
Center of AM Array		Position of Tower in Array	

**Heights (meters)**

Elevation of Site Above Mean Sea Level	Overall Height Above Ground (AGL)
377.3	106.4
Overall Height Above Mean Sea Level	Overall Height Above Ground w/o Appurtenances
483.7	105.5

**Painting and Lighting Specifications**

FAA Chapters 3, 4, 5, 13  
Paint and Light in Accordance with FAA Circular Number 70/7460-1H

**FAA Notification**

FAA Study	94-ANE-061-OE	FAA Issue Date	03/21/1994
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**Owner & Contact Information**

FRN	Owner Entity Type
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**Owner**

UNIVERSITY OF MASSACHUSETTS DBA = WFCR	P: (413)545-0100
Attention To: MARTIN MILLER	F:
HAMPSHIRE HOUSE	E:
AMHERST , MA 01003-3630	

**Contact**

P:  
F:  
E:

**Last Action Status**

Status	Constructed	Received	08/20/1997
Purpose	New	Entered	08/20/1997
Mode	Interactive		

**Related Applications**

08/20/1997	A0033239 - New (NE)
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**Comments**

**Comments**

None

**History**

**Date**

**Event**

None

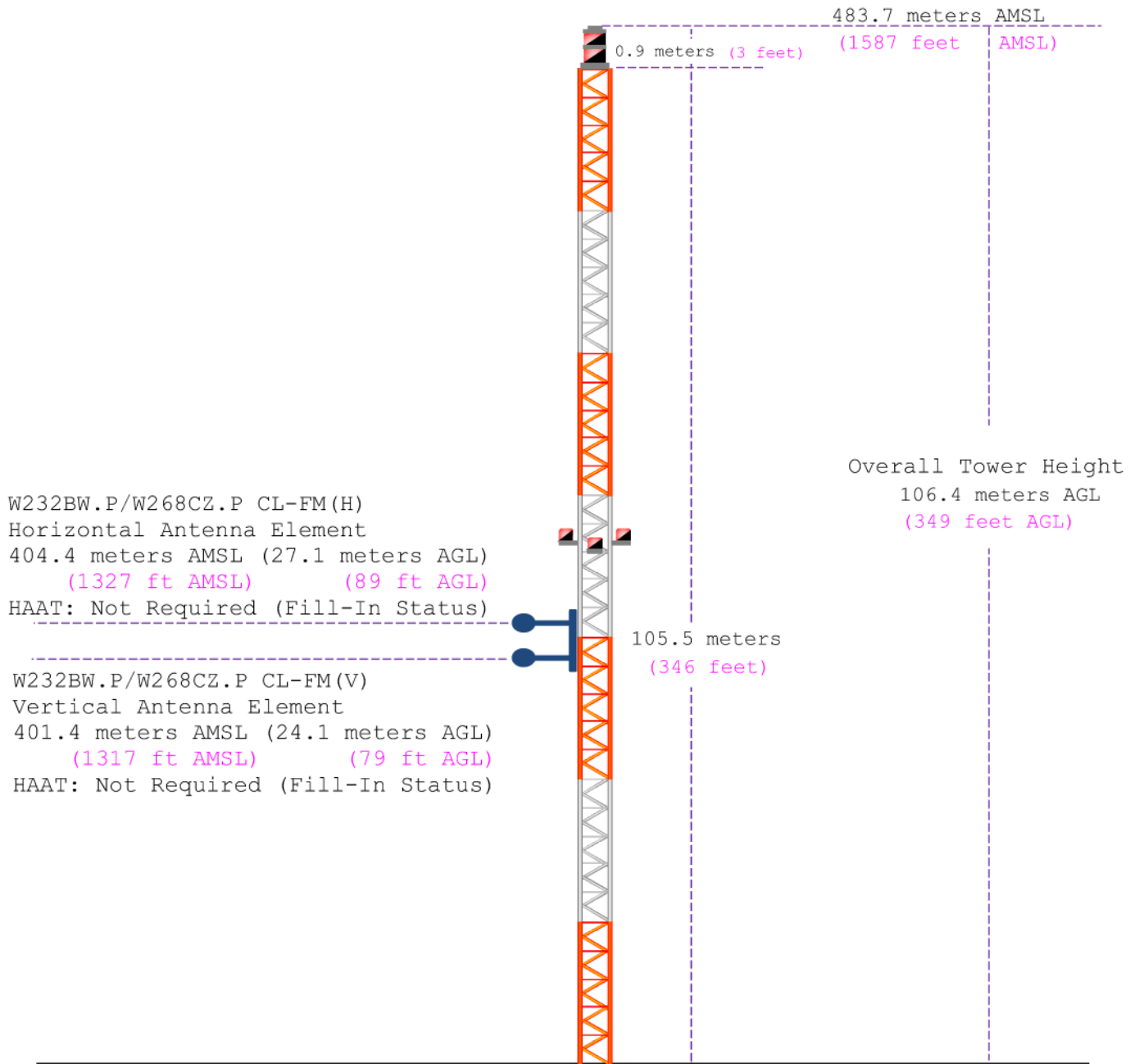
**Automated Letters**

None



# Exhibit 4

## Vertical Plan of Antenna System



Ground Elevation: 377.3 meters AMSL (1238 feet AMSL)		
Address: Summit of Mount Lincoln		
City: Pelham	Latitude (D M S) Longitude (D M S)	
County: Hampshire	NAD 27 datum values: 42 21 48.67454 72 25 23.69319	
State: Massachusetts	NAD 83 datum values: 42 21 49.00000 72 25 22.00000	
Antenna Structure Registration 1028013	Drawing Is Not To Scale	Asher Broadcast Consulting, LLC justinasher@consultant.com 1(202)875-2986

## ***Exhibit 5***

### **HAAT and Miscellaneous Coordinate Information**

#### **HAAT Calculation (1927):**

N. Lat. = 422149.0    W. Lng. = 722524.0  
 HAAT and Distance to Contour,  
 FCC, FM 2-10 Mi, 51 pts Method - FCC 30 SEC

Azi.	AV EL	HAAT	ERP kW	dBk	Field	60-F5
000	333.5	70.5	0.1120	-9.51	0.800	8.93
030	252.8	151.2	0.1120	-9.51	0.800	12.98
060	211.2	192.8	0.1120	-9.51	0.800	14.69
090	211.8	192.2	0.0158	-18.03	0.300	9.09
120	201.5	202.5	0.0280	-15.53	0.400	10.76
150	201.5	202.5	0.1750	-7.57	1.000	16.98
180	151.1	252.9	0.0280	-15.53	0.400	11.98
210	100.2	303.8	0.0280	-15.53	0.400	13.12
240	104.8	299.2	0.1120	-9.51	0.800	18.51
270	63.1	340.9	0.1750	-7.57	1.000	22.02
300	75.5	328.5	0.1418	-8.48	0.900	20.56
330	180.9	223.1	0.0354	-14.51	0.450	11.93

Ave El= 173.99 M    HAAT= 230.01 M    AMSL= 404.0

#### **NAD 1983 to NAD 1927 Conversion:**

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum values:	42 21 48.67454	72 25 23.69319
NAD 83 datum values:	42 21 49.00000	72 25 22.00000

#### **Various Coordinate Conversion Calculations (NAD 1983):**

Position Type	Lat Lon
<b>Degrees Lat Long</b>	42.3636111°, -072.4227778°
<b>Degrees Minutes</b>	42°21.81667', -072°25.36667'
<b>Degrees Minutes Seconds</b>	42°21'49.0000", -072°25'22.0000"
<b>UTM</b>	18T 712226mE 4693366mN
<b>UTM centimeter</b>	18T 712226.69mE 4693366.24mN
<b>MGRS</b>	18TYM1222693366
<b>Grid North</b>	1.7°
<b>GARS</b>	216MA14
<b>Maidenhead</b>	FN32SI97GG44
<b>GEOREF</b>	HJCN34632181

# **Exhibit 6**

## **Tabulation of Proposed Allocation**

Blue Text indicates contour protection studies toward select allocation concern(s) as included in **Exhibit(s) 7(a-d)**.

Yellow Highlighted Text denotes the existence of multiple 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Requests as included in **Exhibit 8**.

Saga Communications Of New England, Llc CH# 268D - 101.5 MHz, Pwr= 0.175 kW DA, HAAT= 230.0 M, COR= 404 M Average Protected F(50-50)= 18.13 km Standard Directional											
REFERENCE		DISPLAY DATES									
42 21 49.0 N.		DATA 06-29-18									
72 25 24.0 W.		SEARCH 06-29-18									
CH	CALL	TYPE	ANT	AZI	DIST	LAT	PWR (kW)	INT (km)	PRO (km)	*IN*	*OUT*
CITY	STATE			<--	FILE #	LNG	HAAT (M)	COR (M)	LICENSEE	(Overlap in km)	
268D	W268CZ	LIC DV		273.2	20.61	42 22 25.0	0.235		---Reference---		
Northampton	MA			93.0	BLFT20180522AAF	72 40 26.0		259	Saga Communications Of New		
<b>271B</b>	<b>WAQY</b>	<b>LIC CN</b>		<b>216.7</b>	<b>38.81</b>	<b>42 05 00.0</b>	<b>17.000</b>	<b>5.7</b>	<b>66.1</b>	<b>13.1</b>	<b>-28.1*&lt;</b>
<b>Springfield</b>	<b>MA</b>			<b>36.5</b>	<b>BMLH19930514KA</b>	<b>72 42 16.0</b>	<b>238</b>	<b>317</b>	<b>Saga Communications Of New</b>		
268A	WRSY	LIC NCN		338.1	57.84	42 50 46.0	0.120	56.3	17.7	-8.4<	7.0
Marlboro	VT			157.9	BLH19960830KA	72 41 16.0	227	597	Saga Communications Of Ne		
<b>265A</b>	<b>WRNX</b>	<b>LIC ZEX</b>		<b>235.8</b>	<b>22.03</b>	<b>42 15 07.0</b>	<b>0.870</b>	<b>1.9</b>	<b>29.1</b>	<b>1.9</b>	<b>-7.8*&lt;</b>
<b>Amherst</b>	<b>MA</b>			<b>55.6</b>	<b>BLH20120110ADN</b>	<b>72 38 41.0</b>	<b>262</b>	<b>364</b>	<b>Cc Licenses, Llc, As Debto</b>		
268B	WPDH	LIC CN		241.6	148.33	41 43 09.0	4.400	129.4	67.0	-7.1<	5.7
Poughkeepsie	NY			60.6	BLH19861110KF	73 59 47.0	469	580	Townsquare Media Poughkeep		
268D	W268CQ	LIC C		98.7	43.71	42 18 11.0	0.054	39.7	12.0	-4.8<	2.2
Leicester	MA			279.0	BLFT20161114AAA	71 53 52.0		466	Blount Masscom, Inc.		
269L1	WIOM-LP	LIC		196.5	23.45	42 09 40.9	0.100			4.2	1.8
Springfield	MA			16.5	BLL20171106AAE	72 30 15.7	5	85	Catholic Communications Co		
267B	WKCI-FM	LIC NCX		202.9	112.07	41 26 01.0	12.000	77.8	66.2	17.5	20.9
Hamden	CT			22.5	BLH20021011ABD	72 56 45.0	279	379	Cc Licenses, Llc, As Debto		
268A	WWBB	LIC ZCX		125.3	102.78	41 49 30.4	6.000	70.5	20.1	18.0	35.8
Providence	RI			306.0	BLH20151123CHI	71 24 38.0	91	132	Clear Chan. B/casting Lice		
214A	WTCC	LIC CX		204.4	31.08	42 06 32.0	4.000	171.7	72.2	9.5R	21.6M
Springfield	MA			24.3	BMLLED20070314ADO	72 34 45.0	28	98	Springfield Technical Comm		
269A	WBRK-FM	LIC CX		280.4	70.47	42 28 31.0	3.000	19.5	13.2	29.1	24.7
Pittsfield	MA			99.9	BMLH20080131AKI	73 16 07.0	44	443	Wbrk, Inc.		
266D	W266DK	CP C		132.7	48.56	42 03 59.0	0.250	1.1	8.6	31.1	39.0
Southbridge	MA			313.0	BNPFT20171220AAV	71 59 28.0		249	Emmanuel Communications, I		
268D	1784900	APP DC		44.5	96.81	42 58 54.4	0.099	51.6	15.8	31.2	35.0
Manchester	NH			225.1	BNPFT20180130AEQ	71 35 21.2		449	Capstar Tx, Llc		
266B	WGIR-FM	LIC CN		44.5	96.80	42 58 54.0	11.500	4.8	60.2	71.9	35.1
Manchester	NH			225.1	BLH19910718KC	71 35 21.0	313	457	Capstar Tx, Llc, As Debtor		

Terrain database is FCC NGDC 30 Sec , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM  
 Contour distances are on direct line to and from reference station. Reference zone= East Zone, Co to 3rd adjacent.  
 All separation margins (if shown) include rounding.  
 Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, \_= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)  
 "\*"affixed to 'IN' or 'OUT' values = site inside restricted contour.  
 < = Station meets FCC minimum distance spacing for its class.  
 < = Contour Overlap  
 Reference station has protected zone issue: Canada

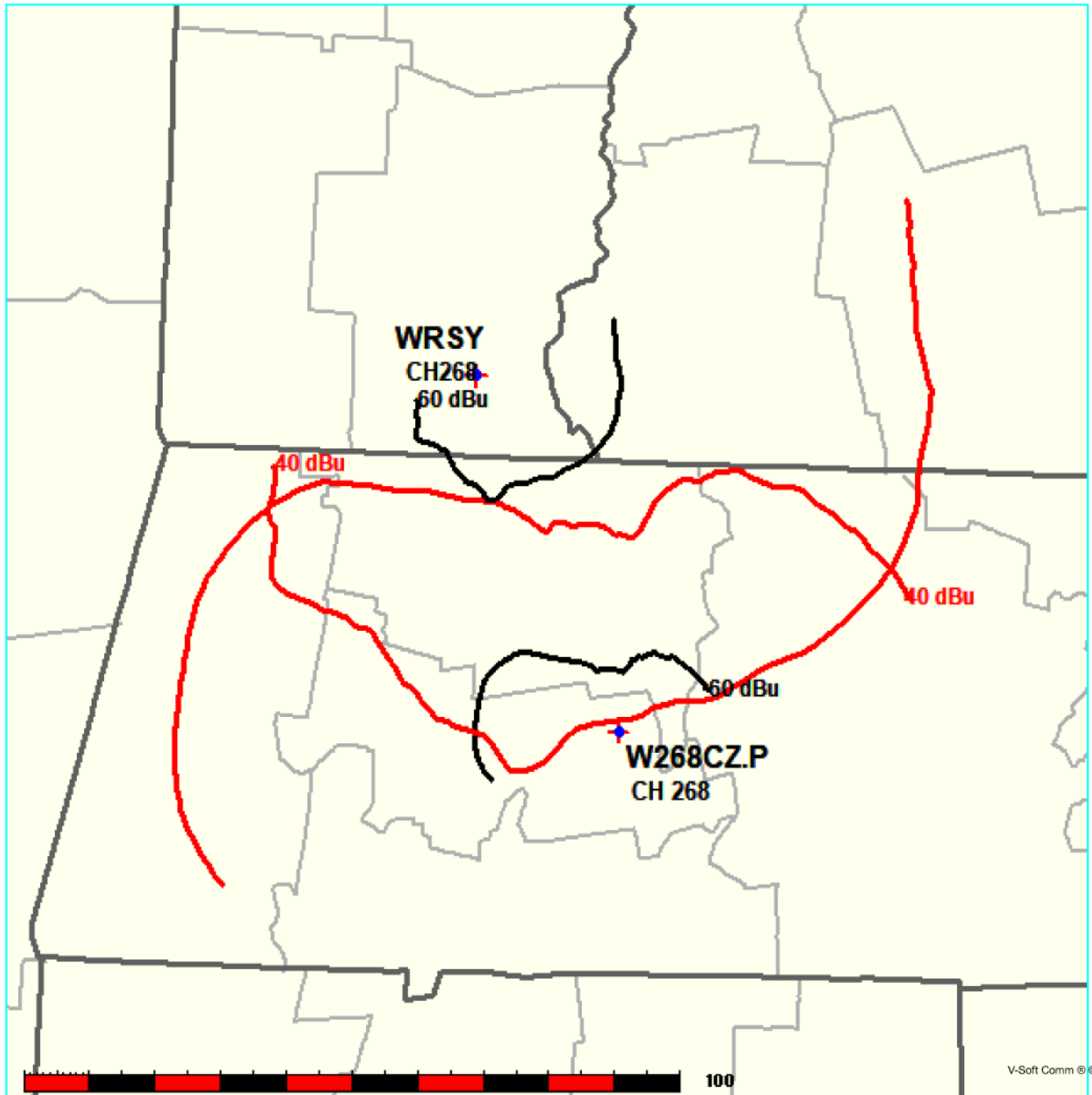
***Exhibit 7a***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Saga Communications Of New England, Llc

FMCommander Single Allocation Study - 06-29-2018 - FCC NGDC 30 Sec  
W268CZ.P's Overlaps (In= -8.36 km, Out= 6.99 km)

W268CZ.P CH 268 D DA  
Lat= 42 21 49.0, Lng= 72 25 24.0  
0.175 kW 230 m HAAT, 404 m COR  
Prot.= 60 dBu, Intef.= 40 dBu

WRSY CH 268 A 73.215 N BLH19960830KA  
Lat= 42 50 46.0, Lng= 72 41 16.0  
0.12 kW 227 m HAAT, 597 m COR  
Prot.= 60 dBu, Intef.= 40 dBu





# ***Exhibit 7a***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

06-29-2018

Terrain Data: FCC NGDC 30 Sec

FMOVer Analysis

W268CZ.P

WRSY BLH19960830KA

Channel = 268D  
Max ERP = 0.175 kW  
RCAMSL = 404 m  
N. Lat. 42 21 49.0  
W. Lng. 72 25 24.0  
Protected  
60 dBu

Channel = 268A  
Max ERP = 0.12 kW  
RCAMSL = 597 m  
N. Lat. 42 50 46.0  
W. Lng. 72 41 16.0  
Interfering  
40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
295.0	000.1750	0332.0	021.7	177.4	000.1200	0263.0	044.5	44.71*	11.58
296.0	000.1750	0331.6	021.7	177.2	000.1200	0268.0	044.2	45.01*	12.34
297.0	000.1750	0331.1	021.7	176.9	000.1200	0273.3	043.9	45.32*	13.13
298.0	000.1750	0330.4	021.7	176.7	000.1200	0279.3	043.6	45.64*	13.97
299.0	000.1750	0329.6	021.7	176.4	000.1200	0285.8	043.2	45.98*	14.85
300.0	000.1750	0328.5	021.6	176.1	000.1200	0292.2	043.0	46.31*	15.71
301.0	000.1750	0327.1	021.6	175.7	000.1200	0297.1	042.7	46.58*	16.43
302.0	000.1750	0325.4	021.5	175.4	000.1200	0301.1	042.4	46.82*	17.05
303.0	000.1750	0323.5	021.5	175.0	000.1200	0304.2	042.1	47.03*	17.59
304.0	000.1750	0321.6	021.4	174.6	000.1200	0306.2	041.9	47.20*	18.02
305.0	000.1750	0319.4	021.4	174.2	000.1200	0307.4	041.6	47.34*	18.37
306.0	000.1750	0316.8	021.3	173.8	000.1200	0308.7	041.4	47.48*	18.71
307.0	000.1750	0313.4	021.2	173.3	000.1200	0309.4	041.2	47.59*	18.97
308.0	000.1750	0309.1	021.0	172.8	000.1200	0308.6	041.0	47.63*	19.06
309.0	000.1750	0303.7	020.8	172.3	000.1200	0306.7	040.9	47.63*	19.01
310.0	000.1750	0297.0	020.6	171.7	000.1200	0305.2	040.8	47.62*	18.96
311.0	000.1750	0289.2	020.3	171.1	000.1200	0303.7	040.8	47.59*	18.86
312.0	000.1750	0280.5	020.0	170.4	000.1200	0301.4	040.8	47.52*	18.65
313.0	000.1750	0271.4	019.7	169.8	000.1200	0298.2	040.9	47.40*	18.33
314.0	000.1750	0263.4	019.4	169.1	000.1200	0294.2	040.9	47.26*	17.94
315.0	000.1750	0256.3	019.2	168.5	000.1200	0289.5	040.9	47.11*	17.50
316.0	000.1750	0250.0	018.9	168.0	000.1200	0284.3	040.9	46.94*	17.02
317.0	000.1750	0244.1	018.7	167.4	000.1200	0279.1	041.0	46.77*	16.55
318.0	000.1750	0240.5	018.6	166.9	000.1200	0274.7	040.9	46.65*	16.20
319.0	000.1750	0239.3	018.5	166.5	000.1200	0270.9	040.8	46.58*	15.98
320.0	000.1750	0238.7	018.5	166.1	000.1200	0267.6	040.7	46.53*	15.82
321.0	000.1750	0237.1	018.4	165.6	000.1200	0264.8	040.6	46.47*	15.66
322.0	000.1750	0234.3	018.3	165.1	000.1200	0262.1	040.6	46.40*	15.45
323.0	000.1750	0230.6	018.2	164.6	000.1200	0259.6	040.6	46.31*	15.21
324.0	000.1750	0226.5	018.0	164.1	000.1200	0257.4	040.6	46.22*	14.98
325.0	000.1750	0222.5	017.8	163.7	000.1200	0255.8	040.7	46.14*	14.79
326.0	000.1750	0220.2	017.7	163.2	000.1200	0255.0	040.7	46.12*	14.73
327.0	000.1750	0220.2	017.7	162.8	000.1200	0254.9	040.6	46.15*	14.80
328.0	000.1750	0222.1	017.8	162.4	000.1200	0255.4	040.4	46.24*	15.01

***Exhibit 7a***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
329.0	000.1750	0224.0	017.9	162.0	000.1200	0256.2	040.3	46.34* 15.23
330.0	000.1750	0223.1	017.9	161.5	000.1200	0257.4	040.2	46.39* 15.36
331.0	000.1750	0218.5	017.7	161.0	000.1200	0258.5	040.4	46.37* 15.33
332.0	000.1750	0210.8	017.3	160.5	000.1200	0259.4	040.6	46.28* 15.14
333.0	000.1750	0202.0	017.0	160.1	000.1200	0260.1	041.0	46.15* 14.87
334.0	000.1750	0193.1	016.6	159.6	000.1200	0260.6	041.3	46.01* 14.57
335.0	000.1750	0184.2	016.2	159.2	000.1200	0261.4	041.7	45.88* 14.28
336.0	000.1750	0174.7	015.8	158.7	000.1200	0262.6	042.1	45.73* 13.96
337.0	000.1750	0165.0	015.3	158.3	000.1200	0263.6	042.6	45.56* 13.57
338.0	000.1750	0155.5	014.7	158.0	000.1200	0264.8	043.1	45.37* 13.16
339.0	000.1750	0147.4	014.3	157.7	000.1200	0265.7	043.5	45.21* 12.80
340.0	000.1750	0142.9	014.1	157.3	000.1200	0266.7	043.8	45.13* 12.62
341.0	000.1750	0141.3	014.0	157.0	000.1200	0267.5	043.9	45.12* 12.60
342.0	000.1750	0140.5	013.9	156.7	000.1200	0268.5	044.0	45.13* 12.62
343.0	000.1750	0137.6	013.8	156.4	000.1200	0269.4	044.1	45.08* 12.52
344.0	000.1750	0132.8	013.5	156.2	000.1200	0270.2	044.4	44.98* 12.31
345.0	000.1750	0126.3	013.2	155.9	000.1200	0271.0	044.8	44.86* 12.02
346.0	000.1750	0119.2	012.8	155.7	000.1200	0271.8	045.2	44.72* 11.70
347.0	000.1750	0112.4	012.5	155.5	000.1200	0272.5	045.6	44.58* 11.38
348.0	000.1750	0109.4	012.3	155.3	000.1200	0273.3	045.8	44.52* 11.24
349.0	000.1750	0107.8	012.2	155.1	000.1200	0274.0	045.9	44.49* 11.17
350.0	000.1750	0105.1	012.1	154.8	000.1200	0274.4	046.1	44.43* 11.02
351.0	000.1750	0100.8	011.8	154.7	000.1200	0274.8	046.4	44.32* 10.76
352.0	000.1750	0097.0	011.6	154.5	000.1200	0275.0	046.6	44.22* 10.52
353.0	000.1750	0093.9	011.5	154.3	000.1200	0275.2	046.9	44.13* 10.30
354.0	000.1750	0090.8	011.3	154.2	000.1200	0275.2	047.1	44.03* 10.07
355.0	000.1750	0087.4	011.1	154.0	000.1200	0275.2	047.4	43.93* 9.82
356.0	000.1750	0084.0	010.9	153.9	000.1200	0275.2	047.6	43.83* 9.56
357.0	000.1750	0080.0	010.6	153.8	000.1200	0275.1	047.9	43.70* 9.25
358.0	000.1750	0075.8	010.4	153.8	000.1200	0275.1	048.2	43.57* 8.93
359.0	000.1750	0071.7	010.1	153.7	000.1200	0275.0	048.5	43.45* 8.61
000.0	000.1750	0070.5	010.0	153.5	000.1200	0274.8	048.7	43.38* 8.44
001.0	000.1750	0070.0	010.0	153.4	000.1200	0274.6	048.8	43.33* 8.32
002.0	000.1750	0069.5	010.0	153.2	000.1200	0274.3	048.9	43.28* 8.18
003.0	000.1750	0068.8	009.9	153.1	000.1200	0274.0	049.0	43.22* 8.03
004.0	000.1750	0068.7	009.9	152.9	000.1200	0273.8	049.1	43.17* 7.92
005.0	000.1750	0069.9	010.0	152.7	000.1200	0273.5	049.2	43.15* 7.87
006.0	000.1750	0073.0	010.2	152.4	000.1200	0273.2	049.1	43.17* 7.92
007.0	000.1750	0077.7	010.5	152.0	000.1200	0273.2	048.9	43.24* 8.07
008.0	000.1750	0084.3	010.9	151.5	000.1200	0273.8	048.7	43.34* 8.34
009.0	000.1750	0092.3	011.4	151.0	000.1200	0275.0	048.4	43.49* 8.71
010.0	000.1750	0098.7	011.7	150.6	000.1200	0276.3	048.3	43.60* 8.99
011.0	000.1750	0103.2	012.0	150.2	000.1200	0277.5	048.2	43.66* 9.15
012.0	000.1750	0106.0	012.1	149.9	000.1200	0278.6	048.2	43.68* 9.22
013.0	000.1750	0110.0	012.4	149.5	000.1200	0279.5	048.2	43.72* 9.31

# ***Exhibit 7a***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

06-29-2018      Terrain Data: FCC NGDC 30 Sec      FMOver Analysis

WRSY    BLH19960830KA

W268CZ.P

Channel = 268A  
 Max ERP = 0.12 kW  
 RCAMSL = 597 m  
 N. Lat. 42 50 46.0  
 W. Lng. 72 41 16.0  
 Protected  
     60 dBu

Channel = 268D  
 Max ERP = 0.175 kW  
 RCAMSL = 404 m  
 N. Lat. 42 21 49.0  
 W. Lng. 72 25 24.0  
 Interfering  
     40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
113.0	000.1200	0419.9	022.1	358.4	000.1035	0073.9	045.0	33.49	
114.0	000.1200	0419.2	022.1	358.2	000.1022	0074.9	044.6	33.66	
115.0	000.1200	0417.5	022.1	357.9	000.1008	0076.0	044.3	33.83	
116.0	000.1200	0414.8	022.0	357.6	000.0991	0077.3	044.0	34.01	
117.0	000.1200	0411.3	021.9	357.3	000.0974	0078.8	043.7	34.18	
118.0	000.1200	0408.0	021.8	356.9	000.0956	0080.2	043.4	34.35	
119.0	000.1200	0404.8	021.7	356.6	000.0937	0081.7	043.2	34.52	
120.0	000.1200	0401.8	021.7	356.2	000.0919	0083.1	042.9	34.68	
121.0	000.1200	0398.6	021.6	355.9	000.0900	0084.5	042.6	34.83	
122.0	000.1200	0394.7	021.5	355.4	000.0879	0085.9	042.4	34.96	
123.0	000.1200	0389.9	021.4	355.0	000.0858	0087.4	042.1	35.08	
124.0	000.1200	0385.4	021.3	354.6	000.0836	0089.0	041.9	35.20	
125.0	000.1200	0381.2	021.1	354.1	000.0815	0090.4	041.7	35.31	
126.0	000.1200	0377.5	021.0	353.7	000.0794	0091.8	041.5	35.41	
127.0	000.1200	0374.0	021.0	353.2	000.0774	0093.1	041.3	35.50	
128.0	000.1200	0370.6	020.9	352.8	000.0753	0094.5	041.1	35.58	
129.0	000.1200	0366.3	020.8	352.3	000.0731	0095.9	040.9	35.66	
130.0	000.1200	0361.2	020.6	351.8	000.0709	0097.6	040.8	35.72	
131.0	000.1200	0355.0	020.5	351.3	000.0685	0099.5	040.7	35.79	
132.0	000.1200	0348.3	020.3	350.7	000.0662	0101.9	040.6	35.88	
133.0	000.1200	0341.9	020.1	350.2	000.0639	0104.4	040.5	35.95	
134.0	000.1200	0336.3	020.0	349.7	000.0620	0106.3	040.4	36.01	
135.0	000.1200	0331.5	019.8	349.2	000.0604	0107.5	040.3	36.02	
136.0	000.1200	0328.0	019.7	348.7	000.0589	0108.2	040.2	36.01	
137.0	000.1200	0326.2	019.7	348.2	000.0575	0108.9	040.1	36.02	
138.0	000.1200	0325.1	019.6	347.8	000.0562	0110.0	040.0	36.06	
139.0	000.1200	0323.7	019.6	347.3	000.0548	0111.2	039.8	36.10	
140.0	000.1200	0321.7	019.5	346.8	000.0534	0113.2	039.7	36.18	
141.0	000.1200	0319.4	019.5	346.4	000.0520	0116.5	039.6	36.33	

***Exhibit 7a***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
142.0	000.1200	0317.2	019.4	345.9	000.0506	0120.3	039.5	36.48
143.0	000.1200	0314.8	019.3	345.4	000.0493	0123.8	039.5	36.60
144.0	000.1200	0311.3	019.2	344.9	000.0479	0127.3	039.5	36.69
145.0	000.1200	0305.8	019.0	344.3	000.0464	0130.9	039.5	36.74
146.0	000.1200	0297.9	018.8	343.7	000.0448	0134.2	039.6	36.72
147.0	000.1200	0289.5	018.5	343.2	000.0434	0136.8	039.8	36.65
148.0	000.1200	0283.5	018.3	342.7	000.0420	0138.7	039.9	36.57
149.0	000.1200	0280.7	018.2	342.2	000.0408	0140.1	039.9	36.51
150.0	000.1200	0278.2	018.1	341.7	000.0396	0140.9	040.0	36.42
151.0	000.1200	0275.1	018.0	341.2	000.0384	0141.2	040.0	36.29
152.0	000.1200	0273.2	018.0	340.8	000.0373	0141.5	040.0	36.17
153.0	000.1200	0273.9	018.0	340.3	000.0363	0142.1	039.9	36.11
154.0	000.1200	0275.3	018.0	339.9	000.0354	0143.1	039.9	36.10
155.0	000.1200	0274.1	018.0	339.4	000.0354	0144.8	039.9	36.19
156.0	000.1200	0270.7	017.9	339.0	000.0354	0147.5	040.0	36.29
157.0	000.1200	0267.6	017.8	338.5	000.0354	0150.9	040.1	36.43
158.0	000.1200	0264.7	017.7	338.1	000.0354	0154.6	040.2	36.58
159.0	000.1200	0261.8	017.6	337.7	000.0354	0158.6	040.3	36.74
160.0	000.1200	0260.1	017.5	337.2	000.0354	0162.7	040.3	36.92
161.0	000.1200	0258.6	017.5	336.8	000.0354	0166.9	040.4	37.10
162.0	000.1200	0256.1	017.4	336.4	000.0354	0171.0	040.5	37.24
163.0	000.1200	0254.9	017.3	336.0	000.0354	0175.1	040.6	37.40
164.0	000.1200	0256.8	017.4	335.5	000.0354	0179.3	040.6	37.62
165.0	000.1200	0261.4	017.6	335.1	000.0354	0183.6	040.5	37.87
166.0	000.1200	0267.2	017.8	334.6	000.0354	0188.0	040.3	38.14
167.0	000.1200	0275.5	018.1	334.1	000.0354	0192.6	040.1	38.45
168.0	000.1200	0284.7	018.4	333.5	000.0354	0197.4	039.9	38.79
169.0	000.1200	0293.3	018.6	333.0	000.0354	0202.4	039.7	39.11
170.0	000.1200	0299.5	018.8	332.4	000.0354	0207.2	039.6	39.38
171.0	000.1200	0303.5	019.0	331.9	000.0354	0211.6	039.6	39.59
172.0	000.1200	0305.8	019.1	331.4	000.0354	0215.5	039.6	39.75
173.0	000.1200	0309.1	019.2	330.9	000.0354	0219.0	039.7	39.90
174.0	000.1200	0308.0	019.1	330.5	000.0354	0221.3	039.8	39.93
175.0	000.1200	0304.3	019.0	330.1	000.0354	0222.7	040.1	39.87
176.0	000.1200	0293.3	018.6	329.9	000.0356	0223.4	040.5	39.72
177.0	000.1200	0272.1	017.9	330.0	000.0355	0223.2	041.3	39.34
178.0	000.1200	0252.4	017.2	330.0	000.0354	0223.0	042.1	38.98
179.0	000.1200	0241.6	016.8	329.9	000.0356	0223.3	042.6	38.79
180.0	000.1200	0238.4	016.7	329.7	000.0362	0223.8	042.8	38.78
181.0	000.1200	0235.1	016.6	329.4	000.0368	0224.1	043.1	38.75
182.0	000.1200	0233.3	016.5	329.2	000.0374	0224.2	043.3	38.73
183.0	000.1200	0231.4	016.5	328.9	000.0381	0223.9	043.5	38.70
184.0	000.1200	0227.7	016.3	328.7	000.0386	0223.6	043.8	38.62
185.0	000.1200	0224.7	016.2	328.5	000.0391	0223.2	044.0	38.55
186.0	000.1200	0223.4	016.1	328.2	000.0397	0222.7	044.3	38.50

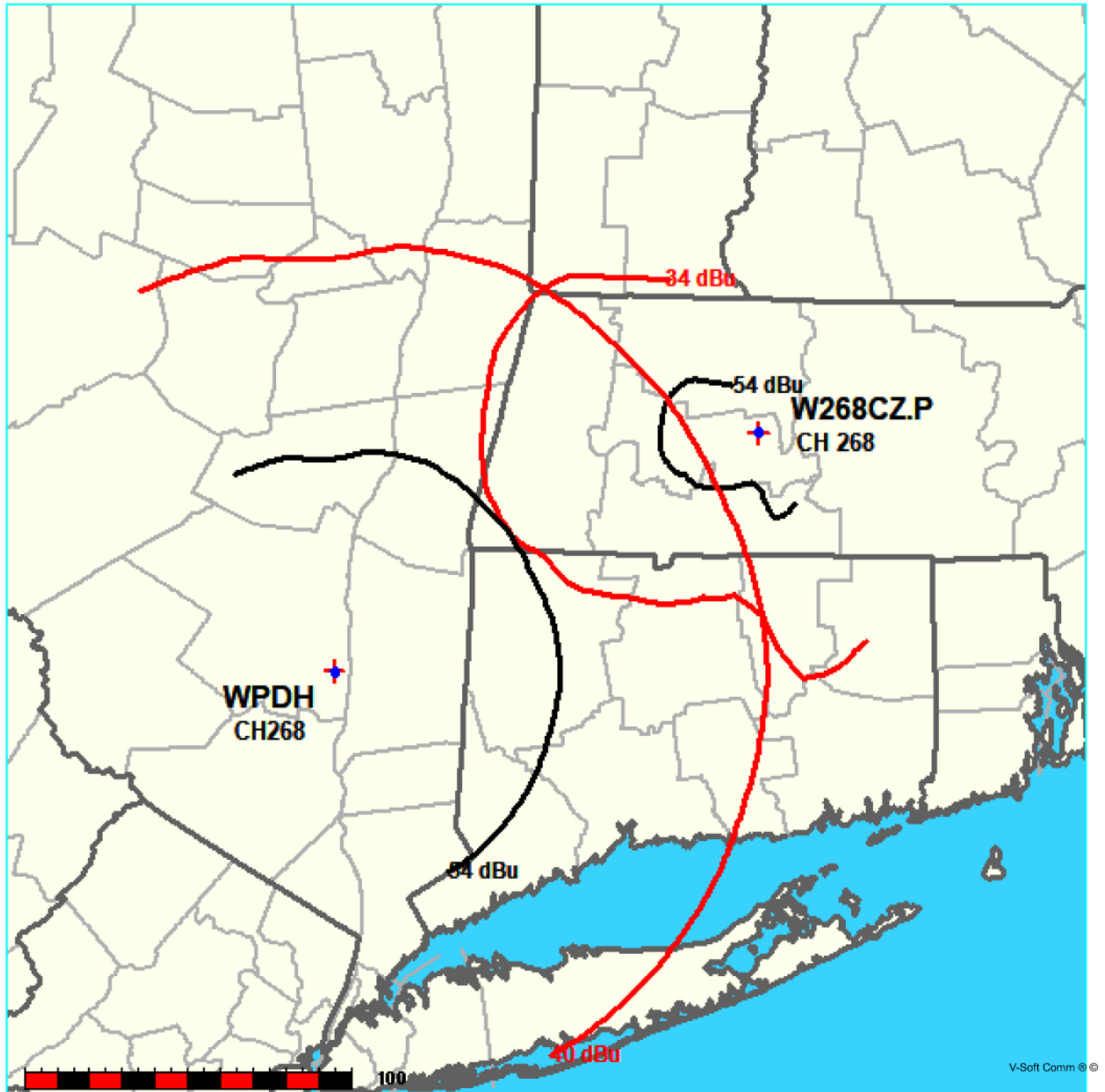
***Exhibit 7b***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Saga Communications Of New England, Llc

FMCommander Single Allocation Study - 06-29-2018 - FCC NGDC 30 Sec  
W268CZ.P's Overlaps (In= -7.14 km, Out= 5.66 km)

W268CZ.P CH 268 D DA  
Lat= 42 21 49.0, Lng= 72 25 24.0  
0.175 kW 230 m HAAT, 404 m COR  
Prot.= 54 dBu, Intef.= 34 dBu

WPDH CH 268 B BLH19861110KF  
Lat= 41 43 09.0, Lng= 73 59 47.0  
4.4 kW 469 m HAAT, 580 m COR  
Prot.= 54 dBu, Intef.= 40 dBu



## Exhibit 7b

### Contour Protection Studies Toward Select Allocation Concern(s)

06-29-2018

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

W268CZ.P

WPDH BLH19861110KF

Channel = 268D  
Max ERP = 0.175 kW  
RCAMSL = 404 m  
N. Lat. 42 21 49.0  
W. Lng. 72 25 24.0  
Protected  
54 dBu

Channel = 268B  
Max ERP = 4.4 kW  
RCAMSL = 580 m  
N. Lat. 41 43 09.0  
W. Lng. 73 59 47.0  
Interfering  
40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
200.0	000.0158	0300.7	016.0	065.0	004.4000	0482.2	136.8	38.05	
201.0	000.0168	0301.2	016.2	065.0	004.4000	0482.2	136.4	38.16	
202.0	000.0179	0301.4	016.5	065.0	004.4000	0482.2	136.0	38.26	
203.0	000.0191	0301.4	016.8	065.0	004.4000	0482.2	135.6	38.36	
204.0	000.0202	0301.4	017.1	065.0	004.4000	0482.2	135.2	38.47	
205.0	000.0214	0301.2	017.3	065.0	004.4000	0482.2	134.8	38.57	
206.0	000.0227	0301.2	017.6	065.0	004.4000	0482.2	134.4	38.67	
207.0	000.0240	0301.6	017.8	064.9	004.4000	0482.1	134.0	38.77	
208.0	000.0253	0302.6	018.1	064.9	004.4000	0482.1	133.6	38.88	
209.0	000.0266	0303.5	018.4	064.9	004.4000	0482.1	133.2	38.98	
210.0	000.0280	0303.8	018.6	064.8	004.4000	0482.1	132.8	39.08	
211.0	000.0294	0303.7	018.9	064.8	004.4000	0482.0	132.5	39.18	
212.0	000.0309	0303.0	019.1	064.7	004.4000	0482.0	132.1	39.27	
213.0	000.0324	0301.8	019.3	064.6	004.4000	0482.0	131.8	39.36	
214.0	000.0339	0300.6	019.4	064.5	004.4000	0481.9	131.4	39.44	
215.0	000.0354	0299.6	019.6	064.4	004.4000	0481.9	131.1	39.53	
216.0	000.0370	0299.1	019.8	064.4	004.4000	0481.8	130.7	39.62	
217.0	000.0387	0298.9	020.0	064.3	004.4000	0481.8	130.4	39.70	
218.0	000.0403	0298.8	020.2	064.2	004.4000	0481.8	130.1	39.79	
219.0	000.0420	0298.7	020.4	064.1	004.4000	0481.7	129.7	39.88	
220.0	000.0437	0298.6	020.6	064.0	004.4000	0481.7	129.4	39.96	
221.0	000.0473	0298.5	021.0	063.9	004.4000	0481.7	128.9	40.09*	0.36
222.0	000.0510	0298.6	021.4	063.8	004.4000	0481.7	128.4	40.22*	0.86
223.0	000.0549	0298.4	021.8	063.7	004.4000	0481.7	127.9	40.34*	1.35
224.0	000.0589	0298.1	022.1	063.6	004.4000	0481.6	127.4	40.46*	1.82
225.0	000.0630	0297.6	022.5	063.5	004.4000	0481.6	127.0	40.58*	2.27
226.0	000.0673	0297.5	022.8	063.4	004.4000	0481.6	126.5	40.69*	2.73
227.0	000.0717	0298.1	023.2	063.3	004.4000	0481.6	126.0	40.81*	3.20
228.0	000.0762	0299.6	023.6	063.1	004.4000	0481.6	125.5	40.94*	3.70
229.0	000.0809	0301.4	024.0	063.0	004.4000	0481.6	125.0	41.07*	4.20
230.0	000.0857	0303.2	024.4	062.9	004.4000	0481.7	124.5	41.19*	4.70
231.0	000.0882	0305.1	024.6	062.7	004.4000	0481.7	124.2	41.28*	5.03
232.0	000.0907	0306.9	024.9	062.5	004.4000	0481.8	123.9	41.36*	5.35

## ***Exhibit 7b***

### **Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
233.0	000.0933	0308.5	025.1	062.3	004.4000	0481.8	123.6	41.44* 5.67
234.0	000.0958	0309.2	025.3	062.2	004.4000	0482.0	123.3	41.51* 5.94
235.0	000.0984	0308.9	025.4	062.0	004.4000	0482.1	123.1	41.56* 6.16
236.0	000.1011	0307.7	025.5	061.8	004.4000	0482.2	122.9	41.61* 6.34
237.0	000.1038	0305.6	025.6	061.6	004.4000	0482.4	122.8	41.64* 6.48
238.0	000.1065	0303.3	025.7	061.4	004.4000	0482.5	122.7	41.67* 6.60
239.0	000.1092	0301.0	025.7	061.1	004.4000	0482.7	122.6	41.70* 6.70
240.0	000.1120	0299.2	025.8	060.9	004.4000	0482.9	122.5	41.73* 6.82
241.0	000.1145	0299.0	025.9	060.7	004.4000	0483.1	122.4	41.77* 6.97
242.0	000.1171	0301.8	026.2	060.5	004.4000	0483.3	122.2	41.84* 7.25
243.0	000.1197	0307.9	026.6	060.3	004.4000	0483.5	121.8	41.94* 7.65
244.0	000.1223	0317.2	027.1	060.1	004.4000	0483.7	121.3	42.08* 8.19
245.0	000.1250	0326.3	027.6	059.8	004.4000	0483.9	120.8	42.21* 8.70
246.0	000.1276	0333.5	028.1	059.6	004.4000	0484.1	120.4	42.32* 9.14
247.0	000.1303	0338.4	028.4	059.3	004.4000	0484.3	120.1	42.40* 9.46
248.0	000.1331	0341.6	028.7	059.1	004.4000	0484.6	119.8	42.46* 9.70
249.0	000.1358	0343.5	028.9	058.8	004.4000	0484.8	119.7	42.51* 9.88
250.0	000.1386	0344.4	029.1	058.6	004.4000	0485.0	119.6	42.54* 9.99
251.0	000.1421	0344.7	029.3	058.3	004.4000	0485.2	119.5	42.56* 10.10
252.0	000.1456	0344.8	029.5	058.0	004.4000	0485.4	119.4	42.58* 10.18
253.0	000.1491	0344.9	029.7	057.8	004.4000	0485.5	119.4	42.60* 10.24
254.0	000.1527	0345.1	029.8	057.5	004.4000	0485.7	119.4	42.62* 10.30
255.0	000.1563	0345.2	030.0	057.3	004.4000	0485.8	119.3	42.62* 10.34
256.0	000.1599	0345.2	030.2	057.0	004.4000	0485.9	119.3	42.63* 10.35
257.0	000.1636	0345.1	030.3	056.7	004.4000	0486.0	119.4	42.63* 10.35
258.0	000.1674	0344.8	030.5	056.5	004.4000	0486.2	119.4	42.62* 10.32
259.0	000.1712	0344.4	030.6	056.2	004.4000	0486.4	119.4	42.61* 10.29
260.0	000.1750	0344.0	030.8	055.9	004.4000	0486.5	119.5	42.60* 10.24
261.0	000.1750	0343.7	030.8	055.7	004.4000	0486.7	119.7	42.55* 10.03
262.0	000.1750	0343.7	030.8	055.5	004.4000	0486.9	120.0	42.50* 9.82
263.0	000.1750	0343.6	030.8	055.2	004.4000	0487.2	120.2	42.44* 9.61
264.0	000.1750	0343.7	030.8	055.0	004.4000	0487.5	120.5	42.39* 9.40
265.0	000.1750	0343.8	030.8	054.8	004.4000	0487.8	120.7	42.33* 9.19
266.0	000.1750	0343.9	030.8	054.6	004.4000	0488.2	121.0	42.28* 8.96
267.0	000.1750	0343.6	030.8	054.4	004.4000	0488.6	121.3	42.22* 8.71
268.0	000.1750	0342.8	030.7	054.2	004.4000	0488.9	121.6	42.14* 8.43
269.0	000.1750	0341.9	030.7	054.0	004.4000	0489.3	121.9	42.07* 8.14
270.0	000.1750	0340.9	030.6	053.8	004.4000	0489.7	122.2	41.99* 7.83
271.0	000.1750	0339.9	030.6	053.6	004.4000	0490.0	122.6	41.91* 7.52
272.0	000.1750	0338.9	030.5	053.4	004.4000	0490.3	123.0	41.83* 7.20
273.0	000.1750	0338.4	030.5	053.2	004.4000	0490.7	123.3	41.75* 6.88
274.0	000.1750	0337.7	030.5	053.0	004.4000	0491.0	123.7	41.67* 6.55
275.0	000.1750	0337.0	030.4	052.8	004.4000	0491.3	124.0	41.58* 6.21
276.0	000.1750	0336.3	030.4	052.7	004.4000	0491.5	124.4	41.49* 5.86
277.0	000.1750	0335.7	030.4	052.5	004.4000	0491.8	124.8	41.40* 5.50

# ***Exhibit 7b***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

06-29-2018

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

WPDH BLH19861110KF

W268CZ.P

Channel = 268B

Max ERP = 4.4 kW

RCAMSL = 580 m

N. Lat. 41 43 09.0

W. Lng. 73 59 47.0

Protected

54 dBu

Channel = 268D

Max ERP = 0.175 kW

RCAMSL = 404 m

N. Lat. 42 21 49.0

W. Lng. 72 25 24.0

Interfering

34 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
016.0	004.4000	0497.0	067.9	267.2	000.1750	0343.5	110.8	26.37	
017.0	004.4000	0498.8	068.1	267.0	000.1750	0343.6	109.6	26.69	
018.0	004.4000	0501.0	068.2	266.8	000.1750	0343.7	108.4	27.01	
019.0	004.4000	0503.3	068.4	266.7	000.1750	0343.7	107.3	27.33	
020.0	004.4000	0505.6	068.5	266.5	000.1750	0343.8	106.1	27.66	
021.0	004.4000	0507.9	068.7	266.3	000.1750	0343.8	105.0	27.99	
022.0	004.4000	0510.1	068.8	266.1	000.1750	0343.9	103.8	28.32	
023.0	004.4000	0511.6	068.9	265.8	000.1750	0343.9	102.7	28.64	
024.0	004.4000	0512.1	069.0	265.5	000.1750	0343.9	101.6	28.95	
025.0	004.4000	0511.5	068.9	265.1	000.1750	0343.8	100.6	29.25	
026.0	004.4000	0510.0	068.8	264.7	000.1750	0343.8	099.6	29.54	
027.0	004.4000	0508.0	068.7	264.3	000.1750	0343.7	098.7	29.81	
028.0	004.4000	0506.4	068.6	263.8	000.1750	0343.7	097.8	30.08	
029.0	004.4000	0505.3	068.5	263.4	000.1750	0343.6	096.9	30.36	
030.0	004.4000	0504.4	068.4	262.9	000.1750	0343.6	096.0	30.63	
031.0	004.4000	0503.5	068.4	262.5	000.1750	0343.6	095.1	30.91	
032.0	004.4000	0502.7	068.3	262.0	000.1750	0343.7	094.2	31.17	
033.0	004.4000	0501.8	068.3	261.4	000.1750	0343.7	093.3	31.43	
034.0	004.4000	0500.7	068.2	260.9	000.1750	0343.7	092.5	31.69	
035.0	004.4000	0499.7	068.1	260.4	000.1750	0343.9	091.7	31.94	
036.0	004.4000	0498.5	068.0	259.8	000.1741	0344.1	091.0	32.16	
037.0	004.4000	0497.1	067.9	259.2	000.1718	0344.3	090.3	32.34	
038.0	004.4000	0495.5	067.8	258.6	000.1695	0344.6	089.6	32.50	
039.0	004.4000	0493.9	067.7	257.9	000.1671	0344.8	088.9	32.66	
040.0	004.4000	0492.8	067.6	257.3	000.1647	0345.0	088.3	32.81	
041.0	004.4000	0492.2	067.6	256.6	000.1623	0345.1	087.6	32.96	
042.0	004.4000	0492.2	067.6	256.0	000.1599	0345.2	087.0	33.11	
043.0	004.4000	0492.5	067.6	255.3	000.1575	0345.2	086.3	33.26	
044.0	004.4000	0492.7	067.6	254.7	000.1551	0345.2	085.7	33.39	



## ***Exhibit 7b***

### **Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
045.0	004.4000	0492.4	067.6	254.0	000.1525	0345.1	085.2	33.49
046.0	004.4000	0491.9	067.6	253.2	000.1500	0345.0	084.7	33.58
047.0	004.4000	0491.5	067.5	252.5	000.1474	0344.9	084.2	33.66
048.0	004.4000	0491.8	067.6	251.8	000.1448	0344.8	083.7	33.74
049.0	004.4000	0492.7	067.6	251.0	000.1422	0344.7	083.2	33.83
050.0	004.4000	0493.4	067.7	250.3	000.1396	0344.5	082.7	33.89
051.0	004.4000	0493.3	067.7	249.5	000.1373	0344.1	082.4	33.92
052.0	004.4000	0492.4	067.6	248.7	000.1350	0343.1	082.1	33.91
053.0	004.4000	0491.0	067.5	247.9	000.1328	0341.3	081.9	33.85
054.0	004.4000	0489.2	067.4	247.1	000.1305	0338.7	081.8	33.74
055.0	004.4000	0487.5	067.3	246.3	000.1283	0334.9	081.7	33.58
056.0	004.4000	0486.5	067.2	245.4	000.1261	0329.6	081.5	33.36
057.0	004.4000	0485.9	067.1	244.6	000.1239	0322.9	081.4	33.11
058.0	004.4000	0485.4	067.1	243.8	000.1217	0315.1	081.3	32.80
059.0	004.4000	0484.6	067.1	243.0	000.1196	0307.6	081.3	32.49
060.0	004.4000	0483.7	067.0	242.1	000.1174	0302.4	081.3	32.23
061.0	004.4000	0482.8	066.9	241.3	000.1153	0299.5	081.4	32.04
062.0	004.4000	0482.1	066.9	240.5	000.1132	0298.8	081.5	31.91
063.0	004.4000	0481.6	066.8	239.7	000.1111	0299.7	081.6	31.83
064.0	004.4000	0481.7	066.9	238.9	000.1088	0301.3	081.7	31.75
065.0	004.4000	0482.2	066.9	238.0	000.1066	0303.2	081.8	31.69
066.0	004.4000	0483.0	066.9	237.2	000.1044	0305.1	081.9	31.62
067.0	004.4000	0484.1	067.0	236.4	000.1022	0306.9	082.1	31.54
068.0	004.4000	0485.5	067.1	235.6	000.1000	0308.3	082.2	31.44
069.0	004.4000	0486.9	067.2	234.8	000.0979	0309.1	082.4	31.31
070.0	004.4000	0488.3	067.3	234.0	000.0958	0309.2	082.7	31.14
071.0	004.4000	0489.4	067.4	233.2	000.0938	0308.7	082.9	30.94
072.0	004.4000	0490.6	067.5	232.4	000.0918	0307.6	083.3	30.71
073.0	004.4000	0492.1	067.6	231.6	000.0898	0306.3	083.6	30.47
074.0	004.4000	0493.9	067.7	230.9	000.0879	0304.8	084.0	30.21
075.0	004.4000	0496.0	067.9	230.1	000.0860	0303.4	084.3	29.95
076.0	004.4000	0498.1	068.0	229.3	000.0825	0302.0	084.7	29.60
077.0	004.4000	0499.6	068.1	228.6	000.0790	0300.7	085.2	29.22
078.0	004.4000	0500.5	068.2	227.9	000.0757	0299.4	085.7	28.82
079.0	004.4000	0501.3	068.2	227.2	000.0725	0298.4	086.3	28.41
080.0	004.4000	0501.9	068.3	226.5	000.0695	0297.7	086.9	28.01
081.0	004.4000	0501.9	068.3	225.9	000.0668	0297.4	087.6	27.61
082.0	004.4000	0502.5	068.3	225.2	000.0640	0297.5	088.3	27.21
083.0	004.4000	0503.2	068.4	224.6	000.0614	0297.8	089.0	26.82
084.0	004.4000	0503.8	068.4	224.0	000.0590	0298.0	089.8	26.42
085.0	004.4000	0505.0	068.5	223.4	000.0566	0298.3	090.5	26.01
086.0	004.4000	0506.2	068.6	222.8	000.0542	0298.5	091.3	25.60
087.0	004.4000	0507.1	068.6	222.3	000.0521	0298.6	092.1	25.18
088.0	004.4000	0507.8	068.7	221.7	000.0501	0298.6	092.9	24.74

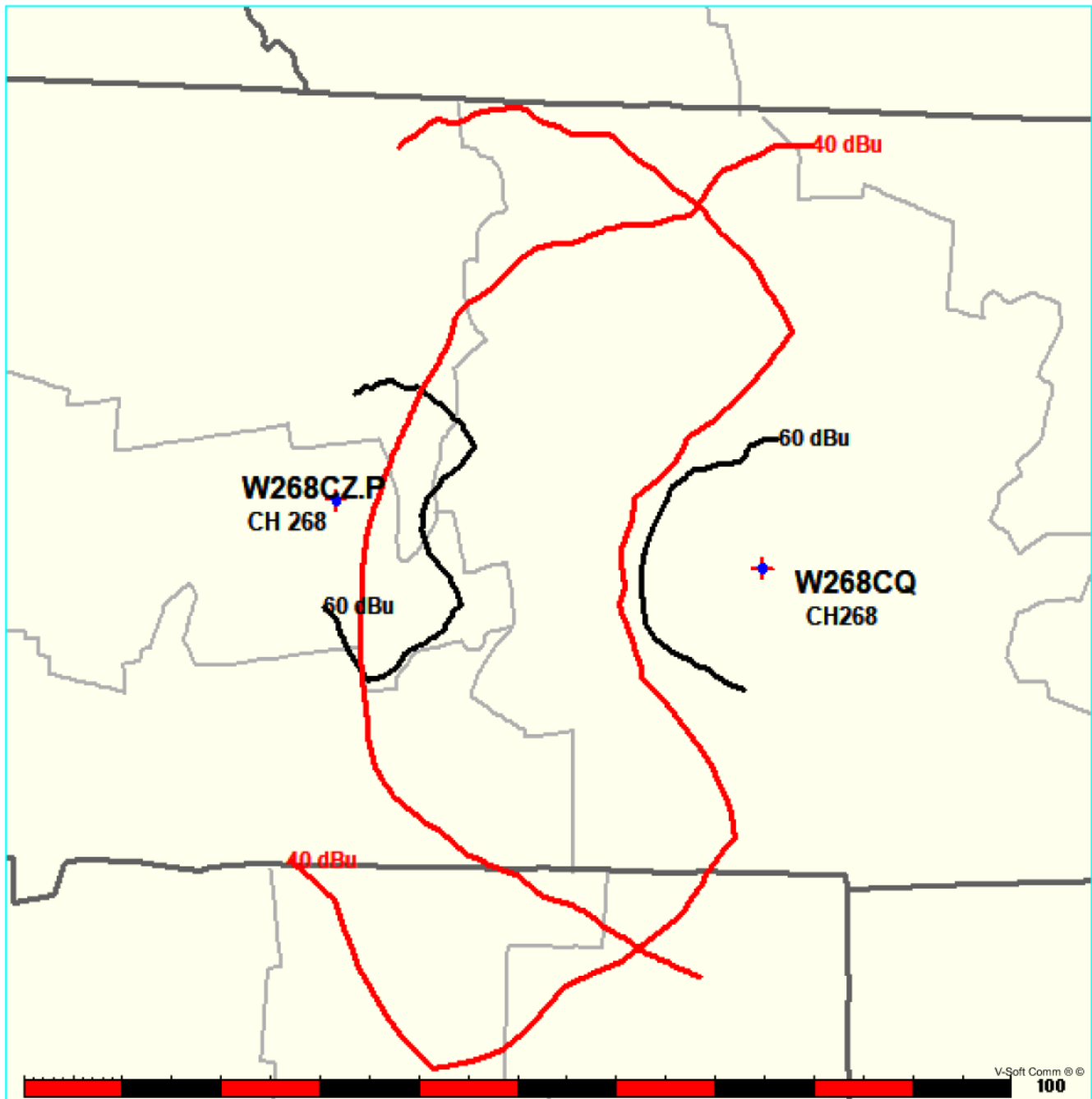
***Exhibit 7c***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Saga Communications Of New England, Llc

FMCommander Single Allocation Study - 06-29-2018 - FCC NGDC 30 Sec  
W268CZ.P's Overlaps (In= -4.85 km, Out= 2.22 km)

W268CZ.P CH 268 D DA  
Lat= 42 21 49.0, Lng= 72 25 24.0  
0.175 kW 230 m HAAT, 404 m COR  
Prot.= 60 dBu, Intef.= 40 dBu

W268CQ CH 268 D BLFT20161114AAA  
Lat= 42 18 11.0, Lng= 71 53 52.0  
0.054 kW 0 m HAAT, 466 m COR  
Prot.= 60 dBu, Intef.= 40 dBu



# ***Exhibit 7c***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

06-29-2018

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

W268CZ.P

W268CQ BLFT20161114AAA

Channel = 268D  
 Max ERP = 0.175 kW  
 RCAMSL = 404 m  
 N. Lat. 42 21 49.0  
 W. Lng. 72 25 24.0  
 Protected  
 60 dBu

Channel = 268D  
 Max ERP = 0.054 kW  
 RCAMSL = 466 m  
 N. Lat. 42 18 11.0  
 W. Lng. 71 53 52.0  
 Interfering  
 40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
057.0	000.1120	0187.5	014.5	295.4	000.0540	0172.2	034.3	42.23*	4.45
058.0	000.1120	0189.8	014.6	295.3	000.0540	0172.2	034.0	42.36*	4.70
059.0	000.1120	0191.6	014.7	295.1	000.0540	0172.2	033.8	42.49*	4.95
060.0	000.1120	0192.8	014.7	294.9	000.0540	0172.2	033.5	42.61*	5.18
061.0	000.1120	0193.4	014.7	294.7	000.0540	0172.1	033.3	42.72*	5.40
062.0	000.1120	0193.8	014.7	294.5	000.0540	0172.1	033.1	42.83*	5.61
063.0	000.1120	0193.9	014.7	294.2	000.0540	0172.1	032.9	42.94*	5.81
064.0	000.1120	0194.2	014.7	293.9	000.0540	0172.1	032.7	43.05*	6.02
065.0	000.1120	0195.3	014.8	293.7	000.0540	0172.1	032.5	43.16*	6.24
066.0	000.1120	0196.6	014.8	293.4	000.0540	0172.1	032.2	43.28*	6.46
067.0	000.1120	0197.9	014.9	293.2	000.0540	0172.2	032.0	43.41*	6.69
068.0	000.1120	0199.1	014.9	292.9	000.0540	0172.3	031.8	43.53*	6.91
069.0	000.1120	0199.5	014.9	292.6	000.0540	0172.4	031.6	43.63*	7.11
070.0	000.1120	0199.2	014.9	292.2	000.0540	0172.5	031.4	43.74*	7.30
071.0	000.1011	0198.7	014.5	291.4	000.0540	0173.0	031.6	43.68*	7.21
072.0	000.0907	0198.2	014.1	290.6	000.0540	0173.4	031.7	43.62*	7.10
073.0	000.0809	0198.7	013.7	289.8	000.0540	0173.8	031.9	43.56*	6.99
074.0	000.0717	0199.5	013.4	289.1	000.0540	0174.4	032.1	43.50*	6.88
075.0	000.0630	0200.9	013.0	288.4	000.0540	0174.8	032.2	43.42*	6.74
076.0	000.0549	0202.3	012.6	287.7	000.0540	0175.1	032.4	43.33*	6.57
077.0	000.0473	0203.7	012.2	287.0	000.0540	0175.4	032.7	43.22*	6.37
078.0	000.0403	0204.9	011.8	286.3	000.0540	0175.8	032.9	43.10*	6.14
079.0	000.0339	0205.7	011.4	285.6	000.0540	0176.3	033.2	42.96*	5.87
080.0	000.0280	0206.2	010.9	285.0	000.0540	0176.8	033.6	42.79*	5.56
081.0	000.0266	0206.6	010.7	284.6	000.0540	0177.1	033.6	42.79*	5.55
082.0	000.0253	0206.8	010.6	284.2	000.0540	0177.3	033.7	42.77*	5.52
083.0	000.0240	0207.0	010.5	283.8	000.0540	0177.4	033.8	42.75*	5.48
084.0	000.0227	0207.2	010.3	283.5	000.0540	0177.6	033.8	42.72*	5.44
085.0	000.0214	0205.6	010.2	283.1	000.0540	0177.8	033.9	42.67*	5.34
086.0	000.0202	0202.1	009.9	282.7	000.0540	0178.0	034.1	42.59*	5.19
087.0	000.0191	0198.4	009.7	282.3	000.0540	0178.2	034.3	42.51*	5.03
088.0	000.0179	0194.6	009.5	281.9	000.0540	0178.4	034.5	42.42*	4.86
089.0	000.0168	0192.7	009.3	281.6	000.0540	0178.7	034.6	42.35*	4.73

# ***Exhibit 7c***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
090.0	000.0158	0192.2	009.1	281.3	000.0540	0178.9	034.8	42.29* 4.62
091.0	000.0158	0191.7	009.1	281.0	000.0540	0179.2	034.7	42.31* 4.66
092.0	000.0158	0191.1	009.1	280.8	000.0540	0179.5	034.7	42.34* 4.70
093.0	000.0158	0190.5	009.0	280.5	000.0540	0179.9	034.7	42.36* 4.75
094.0	000.0158	0189.6	009.0	280.3	000.0540	0180.3	034.7	42.37* 4.78
095.0	000.0158	0188.2	009.0	280.0	000.0540	0180.7	034.7	42.38* 4.81
096.0	000.0158	0186.7	009.0	279.7	000.0540	0181.2	034.8	42.39* 4.83
097.0	000.0158	0185.4	008.9	279.5	000.0540	0181.6	034.8	42.40* 4.85
098.0	000.0158	0183.9	008.9	279.2	000.0540	0182.0	034.8	42.40* 4.85
099.0	000.0158	0182.0	008.8	279.0	000.0540	0182.4	034.9	42.39* 4.84
100.0	000.0158	0180.4	008.8	278.7	000.0540	0182.7	034.9	42.39* 4.83
101.0	000.0158	0180.5	008.8	278.5	000.0540	0183.1	034.9	42.40* 4.86
102.0	000.0158	0182.6	008.9	278.2	000.0540	0183.4	034.9	42.44* 4.94
103.0	000.0158	0185.3	008.9	277.9	000.0540	0183.8	034.8	42.48* 5.03
104.0	000.0158	0188.3	009.0	277.7	000.0540	0184.2	034.8	42.53* 5.12
105.0	000.0158	0191.6	009.1	277.4	000.0540	0184.6	034.7	42.58* 5.22
106.0	000.0158	0194.5	009.1	277.1	000.0540	0185.0	034.7	42.62* 5.30
107.0	000.0158	0196.6	009.2	276.8	000.0540	0185.3	034.6	42.64* 5.35
108.0	000.0158	0197.7	009.2	276.6	000.0540	0185.4	034.7	42.64* 5.36
109.0	000.0158	0197.3	009.2	276.3	000.0540	0185.5	034.7	42.62* 5.32
110.0	000.0158	0196.1	009.2	276.1	000.0540	0185.6	034.8	42.59* 5.26
111.0	000.0168	0195.3	009.3	275.7	000.0540	0185.8	034.7	42.65* 5.37
112.0	000.0179	0195.0	009.5	275.4	000.0540	0186.2	034.6	42.71* 5.50
113.0	000.0191	0194.9	009.6	275.1	000.0540	0186.5	034.5	42.78* 5.63
114.0	000.0202	0195.4	009.8	274.7	000.0540	0186.9	034.4	42.84* 5.76
115.0	000.0214	0196.6	009.9	274.4	000.0540	0187.2	034.3	42.91* 5.89
116.0	000.0227	0198.0	010.1	274.0	000.0540	0187.5	034.2	42.97* 6.02
117.0	000.0240	0199.3	010.3	273.6	000.0540	0187.7	034.1	43.03* 6.13
118.0	000.0253	0200.6	010.4	273.2	000.0540	0188.0	034.0	43.08* 6.24
119.0	000.0266	0201.7	010.6	272.8	000.0540	0188.4	034.0	43.13* 6.34
120.0	000.0280	0202.5	010.8	272.4	000.0540	0188.7	033.9	43.17* 6.42
121.0	000.0370	0202.6	011.5	271.5	000.0540	0189.4	033.4	43.50* 7.05
122.0	000.0473	0202.2	012.2	270.6	000.0540	0190.2	032.9	43.78* 7.61
123.0	000.0589	0201.7	012.8	269.7	000.0540	0191.0	032.5	44.04* 8.10
124.0	000.0717	0201.6	013.4	268.7	000.0540	0191.7	032.1	44.27* 8.55
125.0	000.0857	0201.6	014.0	267.7	000.0540	0191.9	031.7	44.46* 8.91
126.0	000.1011	0201.2	014.6	266.7	000.0540	0192.2	031.5	44.64* 9.24
127.0	000.1177	0199.7	015.1	265.7	000.0540	0192.5	031.2	44.78* 9.49
128.0	000.1355	0196.7	015.6	264.8	000.0540	0193.5	031.1	44.91* 9.75
129.0	000.1546	0193.6	016.0	263.9	000.0540	0195.0	031.0	45.04* 10.03
130.0	000.1750	0190.6	016.5	262.9	000.0540	0196.6	030.9	45.16* 10.27
131.0	000.1750	0188.9	016.4	262.7	000.0540	0196.9	031.1	45.03* 10.05
132.0	000.1750	0188.4	016.4	262.4	000.0540	0197.4	031.4	44.92* 9.87
133.0	000.1750	0189.0	016.4	262.0	000.0540	0197.9	031.6	44.83* 9.71

# ***Exhibit 7c***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

06-29-2018

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

W268CQ BLFT20161114AAA

W268CZ.P

Channel = 268D  
 Max ERP = 0.054 kW  
 RCAMSL = 466 m  
 N. Lat. 42 18 11.0  
 W. Lng. 71 53 52.0  
 Protected  
 60 dBu

Channel = 268D  
 Max ERP = 0.175 kW  
 RCAMSL = 404 m  
 N. Lat. 42 21 49.0  
 W. Lng. 72 25 24.0  
 Interfering  
 40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
234.0	000.0540	0213.6	012.9	113.5	000.0196	0195.0	035.8	38.11	
235.0	000.0540	0215.7	013.0	113.4	000.0195	0195.0	035.6	38.19	
236.0	000.0540	0217.6	013.0	113.3	000.0193	0194.9	035.3	38.27	
237.0	000.0540	0219.4	013.1	113.1	000.0192	0194.9	035.1	38.34	
238.0	000.0540	0221.4	013.1	113.0	000.0190	0194.9	034.9	38.42	
239.0	000.0540	0223.1	013.2	112.8	000.0189	0194.8	034.7	38.49	
240.0	000.0540	0224.2	013.2	112.7	000.0187	0194.8	034.5	38.55	
241.0	000.0540	0224.8	013.2	112.4	000.0184	0194.9	034.3	38.59	
242.0	000.0540	0224.9	013.2	112.2	000.0181	0194.9	034.1	38.62	
243.0	000.0540	0224.7	013.2	111.9	000.0179	0195.0	033.9	38.65	
244.0	000.0540	0224.1	013.2	111.7	000.0175	0195.1	033.8	38.66	
245.0	000.0540	0222.8	013.2	111.4	000.0172	0195.2	033.6	38.65	
246.0	000.0540	0220.9	013.1	111.0	000.0168	0195.3	033.5	38.63	
247.0	000.0540	0218.7	013.1	110.7	000.0165	0195.4	033.4	38.59	
248.0	000.0540	0216.2	013.0	110.3	000.0161	0195.8	033.3	38.56	
249.0	000.0540	0213.8	012.9	109.9	000.0158	0196.2	033.2	38.55	
250.0	000.0540	0211.9	012.9	109.6	000.0158	0196.6	033.1	38.62	
251.0	000.0540	0210.5	012.8	109.2	000.0158	0197.0	033.0	38.70	
252.0	000.0540	0209.2	012.8	108.9	000.0158	0197.4	032.8	38.77	
253.0	000.0540	0207.7	012.7	108.5	000.0158	0197.7	032.7	38.83	
254.0	000.0540	0206.4	012.7	108.2	000.0158	0197.7	032.7	38.89	
255.0	000.0540	0205.1	012.7	107.8	000.0158	0197.6	032.6	38.93	
256.0	000.0540	0203.9	012.6	107.4	000.0158	0197.3	032.5	38.96	
257.0	000.0540	0202.9	012.6	107.1	000.0158	0196.8	032.4	38.99	
258.0	000.0540	0201.8	012.6	106.7	000.0158	0196.1	032.3	39.00	
259.0	000.0540	0200.8	012.5	106.3	000.0158	0195.3	032.2	39.00	
260.0	000.0540	0199.6	012.5	106.0	000.0158	0194.4	032.2	39.00	
261.0	000.0540	0198.7	012.5	105.6	000.0158	0193.5	032.1	39.00	
262.0	000.0540	0197.9	012.5	105.2	000.0158	0192.4	032.0	38.98	

***Exhibit 7c***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
263.0	000.0540	0196.5	012.4	104.8	000.0158	0191.1	032.0	38.95
264.0	000.0540	0194.8	012.4	104.4	000.0158	0189.8	031.9	38.91
265.0	000.0540	0193.2	012.3	104.1	000.0158	0188.5	031.9	38.87
266.0	000.0540	0192.4	012.3	103.7	000.0158	0187.2	031.9	38.84
267.0	000.0540	0192.2	012.3	103.3	000.0158	0186.1	031.8	38.82
268.0	000.0540	0191.8	012.3	102.9	000.0158	0185.1	031.8	38.80
269.0	000.0540	0191.5	012.3	102.5	000.0158	0184.1	031.7	38.79
270.0	000.0540	0190.7	012.2	102.2	000.0158	0183.1	031.7	38.75
271.0	000.0540	0189.8	012.2	101.8	000.0158	0182.0	031.7	38.72
272.0	000.0540	0189.0	012.2	101.4	000.0158	0181.1	031.6	38.69
273.0	000.0540	0188.2	012.2	101.0	000.0158	0180.5	031.6	38.66
274.0	000.0540	0187.4	012.1	100.6	000.0158	0180.2	031.6	38.65
275.0	000.0540	0186.6	012.1	100.2	000.0158	0180.2	031.6	38.65
276.0	000.0540	0185.6	012.1	099.8	000.0158	0180.6	031.6	38.66
277.0	000.0540	0185.1	012.1	099.5	000.0158	0181.1	031.6	38.69
278.0	000.0540	0183.7	012.0	099.1	000.0158	0181.8	031.7	38.70
279.0	000.0540	0182.3	012.0	098.7	000.0158	0182.7	031.7	38.71
280.0	000.0540	0180.7	011.9	098.3	000.0158	0183.4	031.8	38.72
281.0	000.0540	0179.2	011.9	097.9	000.0158	0183.9	031.8	38.72
282.0	000.0540	0178.4	011.9	097.6	000.0158	0184.5	031.9	38.72
283.0	000.0540	0177.9	011.9	097.2	000.0158	0185.1	031.9	38.73
284.0	000.0540	0177.4	011.8	096.8	000.0158	0185.6	031.9	38.73
285.0	000.0540	0176.8	011.8	096.5	000.0158	0186.1	032.0	38.73
286.0	000.0540	0176.0	011.8	096.1	000.0158	0186.6	032.0	38.72
287.0	000.0540	0175.4	011.8	095.8	000.0158	0187.0	032.1	38.71
288.0	000.0540	0175.0	011.8	095.4	000.0158	0187.6	032.1	38.70
289.0	000.0540	0174.4	011.7	095.1	000.0158	0188.1	032.2	38.69
290.0	000.0540	0173.7	011.7	094.7	000.0158	0188.6	032.3	38.67
291.0	000.0540	0173.2	011.7	094.4	000.0158	0189.2	032.4	38.66
292.0	000.0540	0172.6	011.7	094.0	000.0158	0189.6	032.4	38.64
293.0	000.0540	0172.2	011.7	093.7	000.0158	0189.9	032.5	38.61
294.0	000.0540	0172.1	011.7	093.4	000.0158	0190.2	032.6	38.58
295.0	000.0540	0172.2	011.7	093.0	000.0158	0190.4	032.7	38.56
296.0	000.0540	0172.4	011.7	092.7	000.0158	0190.7	032.7	38.53
297.0	000.0540	0172.7	011.7	092.4	000.0158	0190.8	032.8	38.50
298.0	000.0540	0172.5	011.7	092.1	000.0158	0191.1	032.9	38.46
299.0	000.0540	0172.1	011.7	091.7	000.0158	0191.2	033.0	38.42
300.0	000.0540	0171.8	011.7	091.4	000.0158	0191.4	033.1	38.37
301.0	000.0540	0171.7	011.7	091.1	000.0158	0191.6	033.2	38.32
302.0	000.0540	0171.9	011.7	090.8	000.0158	0191.7	033.3	38.28
303.0	000.0540	0172.2	011.7	090.5	000.0158	0191.9	033.4	38.24
304.0	000.0540	0172.7	011.7	090.2	000.0158	0192.1	033.5	38.20
305.0	000.0540	0174.1	011.7	089.9	000.0159	0192.2	033.6	38.20
306.0	000.0540	0176.1	011.8	089.5	000.0163	0192.4	033.6	38.27

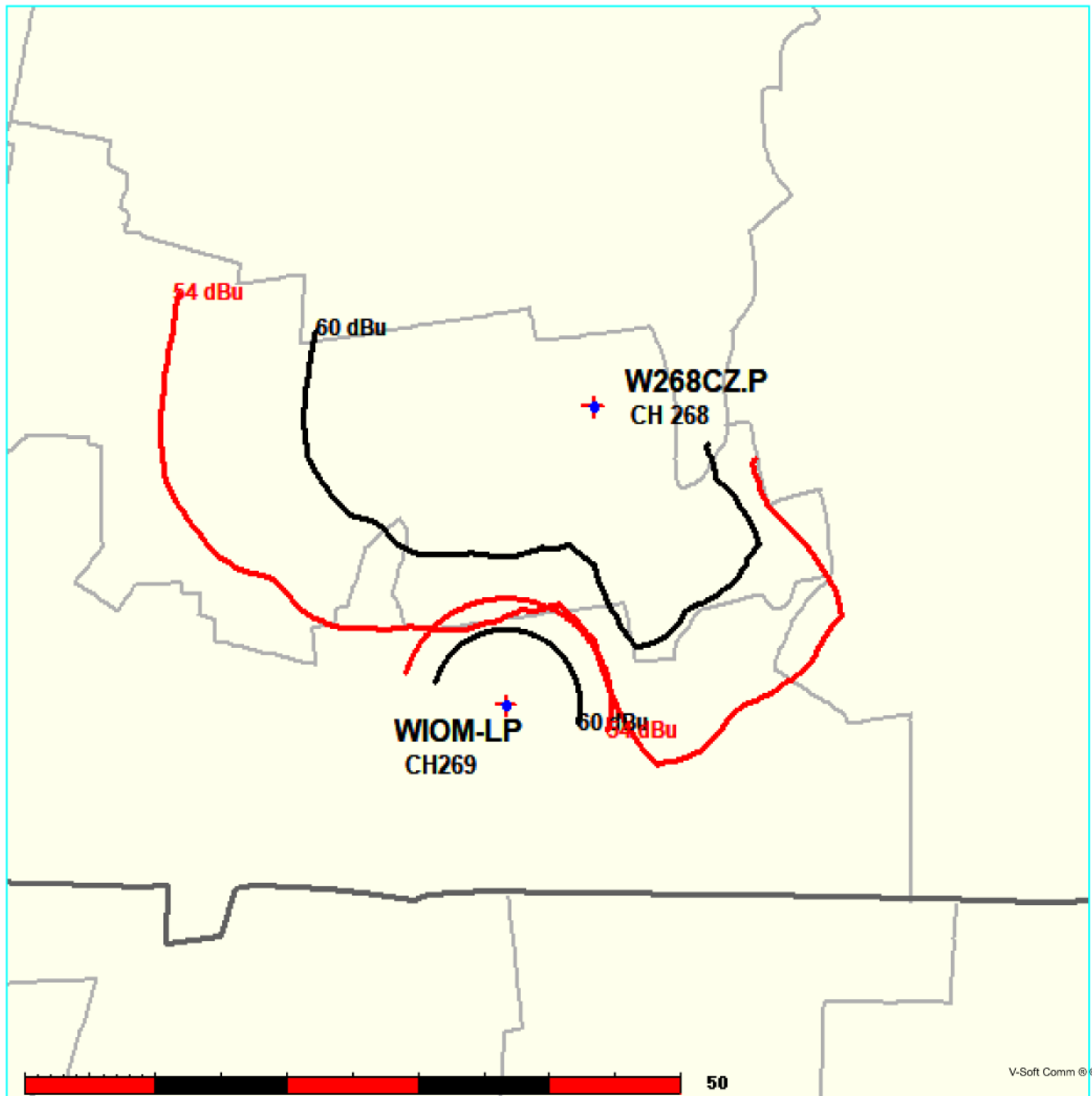
***Exhibit 7d***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Saga Communications Of New England, Llc

FMCommander Single Allocation Study - 06-29-2018 - FCC NGDC 30 Sec  
W268CZ.P's Overlaps (In= 4.23 km, Out= 1.75 km)

W268CZ.P CH 268 D DA  
Lat= 42 21 49.0, Lng= 72 25 24.0  
0.175 kW 230 m HAAT, 404 m COR  
Prot.= 60 dBu, Intef.= 54 dBu

WIOM-LP CH 269 L1 BLL20171106AAE  
Lat= 42 09 40.9, Lng= 72 30 15.7  
0.1 kW 4.575908 m HAAT, 85 m COR  
Prot.= 60 dBu, Intef.= 54 dBu



# ***Exhibit 7d***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

06-29-2018

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

W268CZ.P

WIOM-LP BLL20171106AAE

Channel = 268D  
Max ERP = 0.175 kW  
RCAMSL = 404 m  
N. Lat. 42 21 49.0  
W. Lng. 72 25 24.0  
Protected  
60 dBu

Channel = 269L1  
Max ERP = 0.1 kW  
RCAMSL = 85 m  
N. Lat. 42 09 40.9  
W. Lng. 72 30 15.7  
Interfering  
54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
155.0	000.1750	0202.2	017.0	062.8	000.1000	-0032.6	015.6	42.53	
156.0	000.1750	0205.3	017.1	063.2	000.1000	-0032.9	015.3	42.79	
157.0	000.1750	0210.0	017.3	063.9	000.1000	-0033.6	015.0	43.06	
158.0	000.1750	0215.2	017.5	064.7	000.1000	-0034.2	014.6	43.43	
159.0	000.1750	0220.0	017.7	065.5	000.1000	-0034.7	014.3	43.81	
160.0	000.1750	0224.0	017.9	066.0	000.1000	-0035.0	014.0	44.20	
161.0	000.1750	0227.6	018.0	066.6	000.1000	-0035.1	013.7	44.62	
162.0	000.1750	0230.8	018.2	067.0	000.1000	-0035.0	013.3	45.05	
163.0	000.1750	0233.4	018.3	067.3	000.1000	-0034.8	013.0	45.50	
164.0	000.1750	0235.3	018.3	067.5	000.1000	-0034.6	012.7	45.96	
165.0	000.1750	0236.6	018.4	067.6	000.1000	-0034.6	012.4	46.44	
166.0	000.1750	0237.2	018.4	067.5	000.1000	-0034.6	012.1	46.92	
167.0	000.1750	0237.3	018.4	067.2	000.1000	-0034.8	011.7	47.41	
168.0	000.1750	0237.2	018.4	066.9	000.1000	-0035.0	011.4	47.90	
169.0	000.1750	0237.2	018.4	066.6	000.1000	-0035.1	011.1	48.41	
170.0	000.1750	0237.8	018.4	066.3	000.1000	-0035.1	010.8	48.94	
171.0	000.1546	0238.7	017.9	063.1	000.1000	-0032.7	010.6	49.20	
172.0	000.1355	0239.3	017.3	059.5	000.1000	-0030.3	010.5	49.34	
173.0	000.1177	0239.8	016.7	055.7	000.1000	-0030.4	010.5	49.36	
174.0	000.1011	0240.7	016.0	051.9	000.1000	-0034.1	010.6	49.23	
175.0	000.0857	0242.5	015.4	048.3	000.1000	-0036.7	010.7	49.01	
176.0	000.0717	0244.2	014.8	044.8	000.1000	-0037.2	010.9	48.68	
177.0	000.0589	0246.1	014.1	041.4	000.1000	-0043.3	011.2	48.25	
178.0	000.0473	0247.9	013.4	038.2	000.1000	-0053.0	011.5	47.71	
179.0	000.0370	0250.4	012.7	035.2	000.1000	-0062.5	011.9	47.08	
180.0	000.0280	0252.9	012.0	032.4	000.1000	-0066.2	012.4	46.32	
181.0	000.0266	0253.9	011.9	031.3	000.1000	-0066.0	012.4	46.33	
182.0	000.0253	0252.2	011.7	030.0	000.1000	-0065.3	012.5	46.24	
183.0	000.0240	0249.9	011.5	028.8	000.0840	-0063.9	012.6	45.36	
184.0	000.0227	0249.7	011.3	027.7	000.0704	-0061.1	012.6	44.51	
185.0	000.0214	0251.4	011.2	026.7	000.0589	-0056.5	012.7	43.69	
186.0	000.0202	0252.9	011.1	025.7	000.0485	-0050.8	012.7	42.78	
187.0	000.0191	0254.9	011.0	024.7	000.0393	-0045.5	012.8	41.80	



***Exhibit 7d***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
188.0	000.0179	0257.4	010.9	023.7	000.0314	-0040.9	012.8	40.75
189.0	000.0168	0260.9	010.8	022.8	000.0246	-0037.0	012.9	39.63
190.0	000.0158	0265.0	010.7	021.9	000.0187	-0033.6	012.9	38.39
191.0	000.0158	0269.7	010.8	021.2	000.0145	-0030.9	012.8	37.47
192.0	000.0158	0274.4	010.9	020.4	000.0107	-0027.7	012.7	36.32
193.0	000.0158	0279.9	011.0	019.6	000.0090	-0024.2	012.5	35.76
194.0	000.0158	0284.6	011.1	018.8	000.0090	-0021.2	012.4	35.92
195.0	000.0158	0289.1	011.2	017.9	000.0090	-0019.1	012.3	36.07
196.0	000.0158	0292.2	011.2	017.0	000.0090	-0017.9	012.2	36.17
197.0	000.0158	0294.8	011.3	016.1	000.0090	-0017.1	012.2	36.24
198.0	000.0158	0297.3	011.3	015.1	000.0090	-0016.5	012.2	36.30
199.0	000.0158	0299.5	011.3	014.2	000.0090	-0015.9	012.1	36.34
200.0	000.0158	0300.7	011.4	013.2	000.0090	-0015.5	012.1	36.34
201.0	000.0168	0301.2	011.6	012.2	000.0090	-0015.4	012.0	36.59
202.0	000.0179	0301.4	011.7	011.1	000.0090	-0014.8	011.8	36.82
203.0	000.0191	0301.4	011.9	009.9	000.0090	-0014.6	011.7	37.02
204.0	000.0202	0301.4	012.1	008.7	000.0090	-0014.2	011.6	37.20
205.0	000.0214	0301.2	012.3	007.4	000.0090	-0014.6	011.5	37.36
206.0	000.0227	0301.2	012.4	006.2	000.0090	-0015.0	011.4	37.50
207.0	000.0240	0301.6	012.6	004.8	000.0090	-0013.7	011.3	37.64
208.0	000.0253	0302.6	012.8	003.4	000.0090	-0014.5	011.2	37.77
209.0	000.0266	0303.5	013.0	002.0	000.0090	-0018.2	011.2	37.87
210.0	000.0280	0303.8	013.1	000.5	000.0090	-0018.7	011.1	37.93
211.0	000.0294	0303.7	013.3	359.1	000.0113	-0017.6	011.1	38.93
212.0	000.0309	0303.0	013.4	357.7	000.0153	-0015.1	011.1	40.25
213.0	000.0324	0301.8	013.5	356.3	000.0199	-0012.6	011.1	41.33
214.0	000.0339	0300.6	013.7	355.0	000.0251	-0012.1	011.2	42.26
215.0	000.0354	0299.6	013.8	353.6	000.0308	-0012.2	011.2	43.06
216.0	000.0370	0299.1	013.9	352.3	000.0371	-0011.2	011.3	43.77
217.0	000.0387	0298.9	014.1	350.9	000.0442	-0009.4	011.4	44.41
218.0	000.0403	0298.8	014.2	349.5	000.0511	-0007.1	011.5	44.91
219.0	000.0420	0298.7	014.4	348.2	000.0570	-0005.5	011.6	45.22
220.0	000.0437	0298.6	014.5	346.9	000.0630	-0005.2	011.7	45.48
221.0	000.0473	0298.5	014.8	345.0	000.0722	-0002.9	011.7	46.01
222.0	000.0510	0298.6	015.1	343.2	000.0819	0000.2	011.8	46.46
223.0	000.0549	0298.4	015.3	341.4	000.0920	0002.6	011.9	46.82
224.0	000.0589	0298.1	015.6	339.6	000.1000	0002.2	012.0	47.00
225.0	000.0630	0297.6	015.9	337.9	000.1000	0002.5	012.1	46.79
226.0	000.0673	0297.5	016.2	336.2	000.1000	0006.1	012.3	46.55
227.0	000.0717	0298.1	016.5	334.5	000.1000	0011.4	012.5	46.29
228.0	000.0762	0299.6	016.8	332.7	000.1000	0016.1	012.7	46.02
229.0	000.0809	0301.4	017.1	331.0	000.1000	0020.0	012.9	45.71
230.0	000.0857	0303.2	017.4	329.4	000.1000	0023.9	013.1	45.38
231.0	000.0882	0305.1	017.6	328.4	000.1000	0026.0	013.4	45.01

# ***Exhibit 7d***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

06-29-2018      Terrain Data: FCC NGDC 30 Sec      FMOver Analysis

WIOM-LP    BLL20171106AAE

W268CZ.P

Channel = 269L1  
 Max ERP = 0.1 kW  
 RCAMSL = 85 m  
 N. Lat. 42 09 40.9  
 W. Lng. 72 30 15.7  
 Protected  
 60 dBu

Channel = 268D  
 Max ERP = 0.175 kW  
 RCAMSL = 404 m  
 N. Lat. 42 21 49.0  
 W. Lng. 72 25 24.0  
 Interfering  
 54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
334.0	000.1000	0012.9	005.6	207.7	000.0249	0302.3	019.7	53.25	
335.0	000.1000	0009.9	005.6	207.5	000.0247	0302.1	019.6	53.26	
336.0	000.1000	0006.7	005.6	207.4	000.0244	0301.9	019.5	53.28	
337.0	000.1000	0004.0	005.6	207.2	000.0242	0301.8	019.4	53.30	
338.0	000.1000	0002.4	005.6	207.0	000.0239	0301.6	019.4	53.31	
339.0	000.1000	0002.0	005.6	206.8	000.0237	0301.5	019.3	53.32	
340.0	000.1000	0002.4	005.6	206.6	000.0234	0301.4	019.2	53.33	
341.0	000.1000	0002.7	005.6	206.4	000.0232	0301.3	019.1	53.33	
342.0	000.1000	0001.9	005.6	206.2	000.0229	0301.2	019.1	53.34	
343.0	000.1000	0000.5	005.6	206.0	000.0226	0301.2	019.0	53.34	
344.0	000.1000	-0001.1	005.6	205.7	000.0224	0301.2	018.9	53.34	
345.0	000.1000	-0002.8	005.6	205.5	000.0221	0301.2	018.9	53.34	
346.0	000.1000	-0004.4	005.6	205.3	000.0218	0301.2	018.8	53.33	
347.0	000.1000	-0005.3	005.6	205.1	000.0215	0301.2	018.8	53.33	
348.0	000.1000	-0005.4	005.6	204.8	000.0212	0301.3	018.7	53.32	
349.0	000.1000	-0006.2	005.6	204.6	000.0209	0301.3	018.6	53.30	
350.0	000.1000	-0007.9	005.6	204.3	000.0206	0301.4	018.6	53.29	
351.0	000.1000	-0009.6	005.6	204.1	000.0203	0301.4	018.5	53.27	
352.0	000.1000	-0010.9	005.6	203.8	000.0200	0301.4	018.5	53.25	
353.0	000.1000	-0012.0	005.6	203.5	000.0197	0301.4	018.4	53.22	
354.0	000.1000	-0012.1	005.6	203.3	000.0194	0301.4	018.4	53.19	
355.0	000.1000	-0012.1	005.6	203.0	000.0191	0301.4	018.3	53.16	
356.0	000.1000	-0012.1	005.6	202.7	000.0188	0301.4	018.3	53.13	
357.0	000.1000	-0013.8	005.6	202.5	000.0184	0301.4	018.2	53.09	
358.0	000.1000	-0015.6	005.6	202.2	000.0181	0301.4	018.2	53.05	
359.0	000.1000	-0017.5	005.6	201.9	000.0178	0301.4	018.2	53.00	
000.0	000.1000	-0018.3	005.6	201.6	000.0175	0301.3	018.1	52.95	
001.0	000.1000	-0019.1	005.6	201.3	000.0172	0301.3	018.1	52.90	
002.0	000.1000	-0018.2	005.6	201.0	000.0168	0301.2	018.1	52.84	
003.0	000.1000	-0015.6	005.6	200.7	000.0165	0301.1	018.0	52.78	

***Exhibit 7d***  
**Contour Protection Studies Toward Select Allocation Concern(s)**

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
004.0	000.1000	-0013.3	005.6	200.4	000.0162	0301.0	018.0	52.72
005.0	000.1000	-0013.9	005.6	200.1	000.0159	0300.8	018.0	52.65
006.0	000.1000	-0014.8	005.6	199.8	000.0158	0300.6	017.9	52.62
007.0	000.1000	-0014.8	005.6	199.5	000.0158	0300.2	017.9	52.63
008.0	000.1000	-0014.4	005.6	199.2	000.0158	0299.8	017.9	52.64
009.0	000.1000	-0014.2	005.6	198.9	000.0158	0299.3	017.9	52.64
010.0	000.1000	-0014.7	005.6	198.6	000.0158	0298.7	017.9	52.64
011.0	000.1000	-0014.8	005.6	198.3	000.0158	0298.0	017.9	52.63
012.0	000.1000	-0015.4	005.6	198.0	000.0158	0297.2	017.8	52.62
013.0	000.1000	-0015.5	005.6	197.6	000.0158	0296.4	017.8	52.60
014.0	000.1000	-0015.8	005.6	197.3	000.0158	0295.6	017.8	52.58
015.0	000.1000	-0016.4	005.6	197.0	000.0158	0294.8	017.8	52.57
016.0	000.1000	-0017.1	005.6	196.7	000.0158	0294.0	017.8	52.55
017.0	000.1000	-0017.9	005.6	196.4	000.0158	0293.2	017.8	52.53
018.0	000.1000	-0019.4	005.6	196.1	000.0158	0292.4	017.8	52.50
019.0	000.1000	-0022.0	005.6	195.7	000.0158	0291.4	017.8	52.47
020.0	000.1000	-0025.9	005.6	195.4	000.0158	0290.5	017.8	52.44
021.0	000.1000	-0030.2	005.6	195.1	000.0158	0289.5	017.8	52.40
022.0	000.1000	-0034.0	005.6	194.8	000.0158	0288.3	017.9	52.36
023.0	000.1000	-0037.8	005.6	194.5	000.0158	0286.9	017.9	52.31
024.0	000.1000	-0042.2	005.6	194.2	000.0158	0285.5	017.9	52.25
025.0	000.1000	-0047.2	005.6	193.9	000.0158	0284.0	017.9	52.19
026.0	000.1000	-0052.7	005.6	193.6	000.0158	0282.6	017.9	52.14
027.0	000.1000	-0058.1	005.6	193.3	000.0158	0281.2	017.9	52.08
028.0	000.1000	-0062.1	005.6	193.0	000.0158	0279.7	018.0	52.01
029.0	000.1000	-0064.2	005.6	192.7	000.0158	0278.0	018.0	51.94
030.0	000.1000	-0065.2	005.6	192.4	000.0158	0276.3	018.0	51.87
031.0	000.1000	-0065.8	005.6	192.1	000.0158	0274.7	018.1	51.79
032.0	000.1000	-0066.1	005.6	191.8	000.0158	0273.3	018.1	51.72
033.0	000.1000	-0066.1	005.6	191.5	000.0158	0271.9	018.1	51.65
034.0	000.1000	-0065.3	005.6	191.2	000.0158	0270.6	018.2	51.58
035.0	000.1000	-0063.2	005.6	190.9	000.0158	0269.3	018.2	51.51
036.0	000.1000	-0060.0	005.6	190.6	000.0158	0267.9	018.2	51.43
037.0	000.1000	-0056.8	005.6	190.3	000.0158	0266.6	018.3	51.36
038.0	000.1000	-0053.6	005.6	190.1	000.0158	0265.3	018.3	51.28
039.0	000.1000	-0050.5	005.6	189.8	000.0160	0264.1	018.4	51.26
040.0	000.1000	-0047.5	005.6	189.5	000.0162	0263.0	018.4	51.26
041.0	000.1000	-0044.5	005.6	189.3	000.0165	0261.9	018.5	51.26
042.0	000.1000	-0041.9	005.6	189.0	000.0168	0260.9	018.5	51.26
043.0	000.1000	-0039.7	005.6	188.8	000.0171	0260.0	018.6	51.26
044.0	000.1000	-0038.0	005.6	188.5	000.0174	0259.1	018.6	51.25
045.0	000.1000	-0037.0	005.6	188.3	000.0176	0258.2	018.7	51.24
046.0	000.1000	-0036.7	005.6	188.0	000.0179	0257.5	018.8	51.24
047.0	000.1000	-0036.8	005.6	187.8	000.0181	0256.9	018.8	51.23
048.0	000.1000	-0036.8	005.6	187.6	000.0184	0256.4	018.9	51.22



## Signal Report

WAQY Signal value at Reference site = 67.1 dBu. Distance to W268CZ.P  
interference signal contour = 409.1 m

OK

## Signal Report

WRNX Signal value at Reference site = 65.2 dBu. Distance to W268CZ.P  
interference signal contour = 512.1 m

OK

***Exhibit 8***  
***47 C.F.R. Section 74.1204(d)***  
***2nd/3rd Adjacent Channel***  
***Given Interference Waiver Request***

**105.2 dB $\mu$  F(50:10) Interference Contour**

Yellow Highlighted Text denotes the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WAQY(FM) - Springfield, MA (CH271B) and WRNX(FM) - Amherst, MA (CH265A). The Interference Contour at the proposed Translator site has been calculated to be no less than the 105.2 dB $\mu$  F(50:10) interference contour corresponding to the worst case protected contour at the Translator site. This represents the proposed interference contour which falls wholly within the 40:1 dB ratio. As seen in the **Exhibit 8** Aerial Photograph, there is a lack of population, housing, buildings or major roads within this interference contour. The applicant would like to note the existence of the dedicated transmitter building located at the base of the tower. However, structures of this nature have been exempt as a matter of FCC Policy.

**Site Coordinates**

(NGS NADCON)

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum:	42 21 48.67454	72 25 23.69319
NAD 83 datum:	42 21 49.00000	72 25 22.00000

Asher Broadcast Consulting LLC  
justinasher@consultant.com  
1 (202) 875-2986

Google Earth

Google Earth Pro™  
Account #4375669785  
Used with Permission

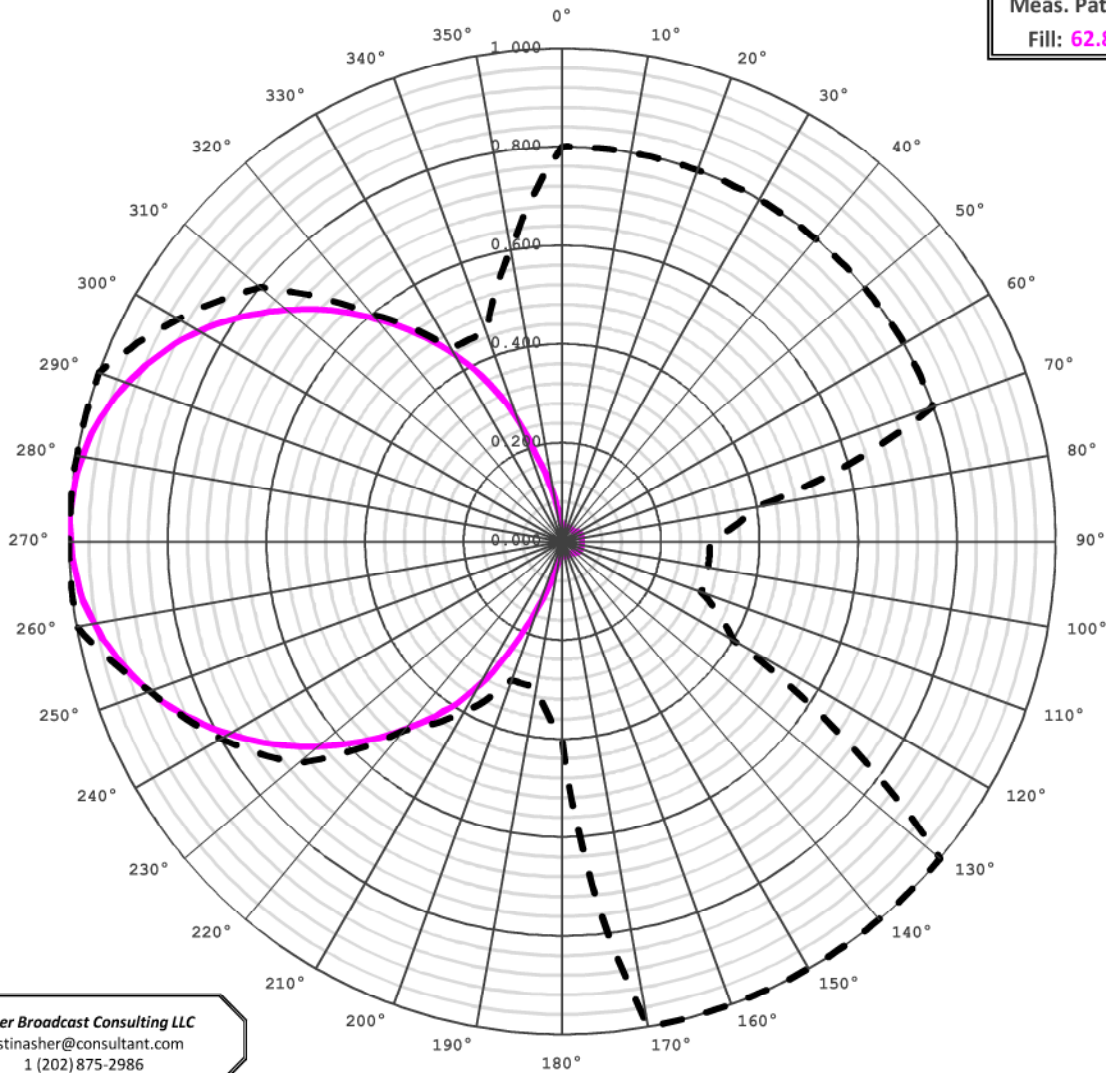
2000 ft

Manufacturer's	Make/Model	Orientation	Power
Element 1:	CI-FM(H&V)	273° True	100.0%
Element 2:			
Element 3:			
Element 4:			

Composite Power: 100%

## Exhibit 9 - Copy of Manufacturer's Directional Antenna Pattern Data

Meas. Pattern  
Fill: 62.8%



Azimuth ° True	FCC Pattern	Manufacturer's Pattern
0°	0.800	0.030
10°	0.800	0.030
20°	0.800	0.030
30°	0.800	0.030
40°	0.800	0.030
50°	0.800	0.031
60°	0.800	0.037
70°	0.800	0.040
80°	0.400	0.040
90°	0.300	0.040
100°	0.300	0.040
110°	0.300	0.040
120°	0.400	0.039
130°	1.000	0.035
140°	1.000	0.030
150°	1.000	0.030
160°	1.000	0.030
170°	1.000	0.030
180°	0.400	0.030
190°	0.300	0.038
200°	0.300	0.142
210°	0.400	0.336
220°	0.500	0.498
230°	0.700	0.647
240°	0.800	0.781
250°	0.890	0.890
260°	1.000	0.964
270°	1.000	0.996
280°	1.000	0.988
290°	1.000	0.938
300°	0.900	0.851
310°	0.800	0.730
320°	0.600	0.588
330°	0.450	0.437
340°	0.450	0.256
350°	0.600	0.086

Asher Broadcast Consulting LLC  
justinasher@consultant.com  
1 (202) 875-2986

FCC Pattern: ---  
Manufacturer's Pattern: ———



# Exhibit 9

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 273.0°T) (public record copy)



### CL-FM

#### FM LOG-PERIODIC ANTENNA

7 dBd gain  
88–108 MHz

The Kathrein Scala Division CL-FM is a ruggedly built log-periodic antenna, designed for professional FM transmit and receive applications.

Like all Kathrein Scala Division antennas, the CL-FM is made of the finest materials using state of the art electrical and mechanical designs, resulting in superior performance and long service life.

The CL-FM may be used stand-alone or in stacked arrays for higher gain, increased side-lobe suppression, or custom azimuth patterns.

#### Specifications:

Frequency range	88–108 MHz (broadband)
Gain	7 dBd
Impedance	50 or 75 ohms
VSWR	< 1.5:1
Polarization	Horizontal or vertical
Front-to-back ratio	>25 dB
Maximum input power	250 watts, type "N" 75 ohm connector 500 watts, type "N" 50 ohm connector
Azimuth pattern	52 degrees (half-power) horizontal polarization
Elevation pattern	78 degrees (half-power) horizontal polarization
Connector	Female 50Ω or 75Ω N
Weight	45 lb (20.4 kg)
Dimensions	104 x 67.9 inches (2642 x 1724 mm)

#### Equivalent flat plate area

**CL-FM/HCM** 5.31 ft<sup>2</sup> (0.494 m<sup>2</sup>)

**CL-FM/HRM** 5.86 ft<sup>2</sup> (0.544 m<sup>2</sup>)

**CL-FM/VRM** 5.86 ft<sup>2</sup> (0.544 m<sup>2</sup>)

Wind survival rating\* 120 mph (200 kph)

Shipping dimensions 116 x 14.5 x 6 inches  
(2946 x 369 x 153 mm)

Shipping weight 56 lb (25.4 kg)

Mounting For masts of 2.375 inches  
(60 mm) OD.

**CL-FM/HCM** Horizontal polarization center-mount

**CL-FM/HRM** Horizontal polarization rear-mount

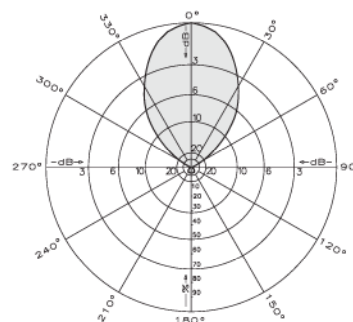
**CL-FM/VRM** Vertical polarization rear-mount

See reverse for order information.

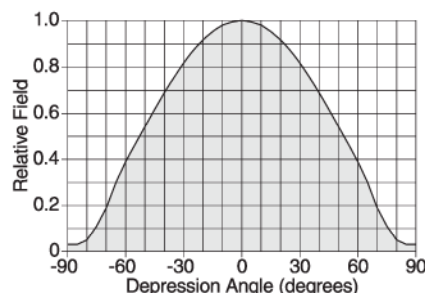
\* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.



10492-D



Azimuth pattern (E-plane)



Elevation pattern (H-plane)

## Exhibit 9

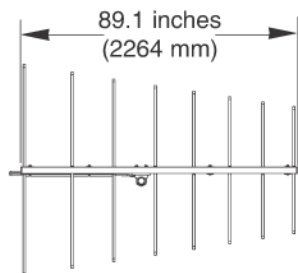
# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 273.0°T)

## CL-FM

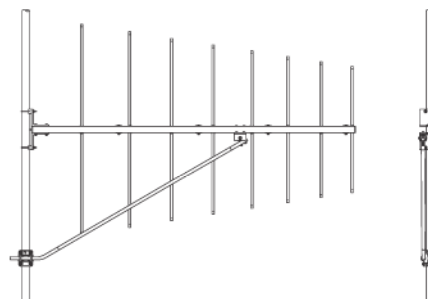
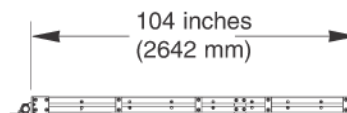
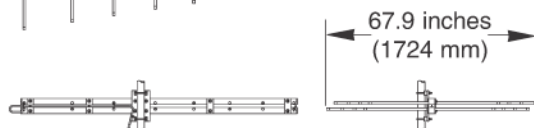
### FM LOG-PERIODIC ANTENNA

7 dBd gain

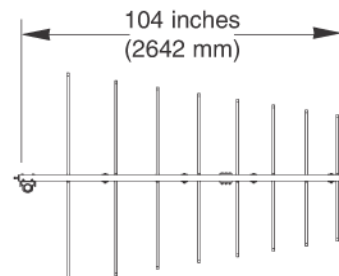
88–108 MHz



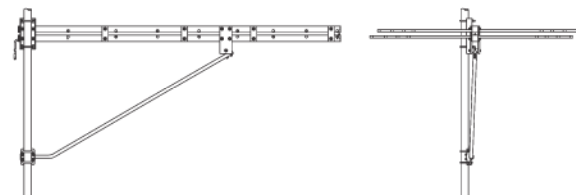
CL-FM/HCM  
Horizontally polarized



CL-FM/VRM  
Vertically polarized



CL-FM/HRM  
Horizontally polarized



Vertically polarized antennas require lateral stabilization (not supplied) to prevent the antenna from turning on the mounting pipe.

#### Order Information:

Model	Description
CL-FM/HCM/50N	Antenna with 50Ω N connector Horizontal polarization center-mount
CL-FM/HCM/75N	Antenna with 75Ω N connector Horizontal polarization center-mount
CL-FM/HRM/50N	Antenna with 50Ω N connector Horizontal polarization rear-mount

#### Order Information:

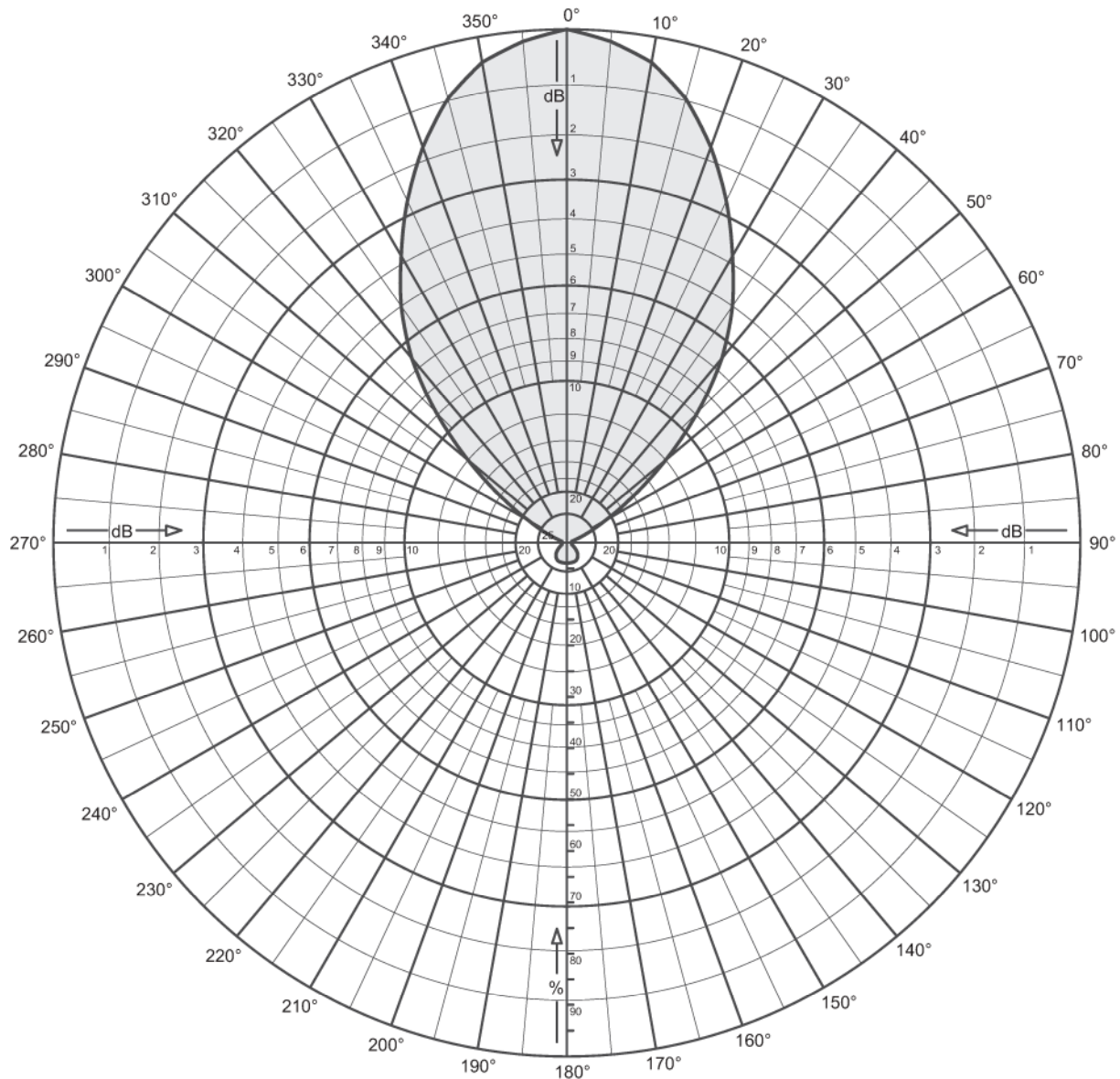
Model	Description
CL-FM/HRM/75N	Antenna with 75Ω N connector Horizontal polarization rear-mount
CL-FM/VRM/50N	Antenna with 50Ω N connector Vertical polarization rear-mount
CL-FM/VRM/75N	Antenna with 75Ω N connector Vertical polarization rear-mount

All specifications are subject to change without notice

## Exhibit 9

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 273.0°T)

(public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt





## Exhibit 9

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	7.00	5.01	45	0.360	-8.87	-1.87	0.65
1	0.996	-0.03	6.97	4.97	46	0.338	-9.42	-2.42	0.57
2	0.992	-0.07	6.93	4.93	47	0.316	-10.01	-3.01	0.50
3	0.988	-0.10	6.90	4.89	48	0.294	-10.63	-3.63	0.43
4	0.984	-0.14	6.86	4.85	49	0.272	-11.31	-4.31	0.37
5	0.980	-0.18	6.82	4.81	50	0.250	-12.04	-5.04	0.31
6	0.974	-0.23	6.77	4.75	51	0.231	-12.73	-5.73	0.27
7	0.968	-0.28	6.72	4.70	52	0.212	-13.47	-6.47	0.23
8	0.962	-0.34	6.66	4.64	53	0.193	-14.29	-7.29	0.19
9	0.956	-0.39	6.61	4.58	54	0.174	-15.19	-8.19	0.15
10	0.950	-0.45	6.55	4.52	55	0.155	-16.19	-9.19	0.12
11	0.939	-0.55	6.45	4.42	56	0.141	-17.02	-10.02	0.10
12	0.928	-0.65	6.35	4.32	57	0.127	-17.92	-10.92	0.08
13	0.917	-0.75	6.25	4.21	58	0.113	-18.94	-11.94	0.06
14	0.906	-0.86	6.14	4.11	59	0.099	-20.09	-13.09	0.05
15	0.895	-0.96	6.04	4.01	60	0.085	-21.41	-14.41	0.04
16	0.880	-1.11	5.89	3.88	61	0.077	-22.27	-15.27	0.03
17	0.865	-1.26	5.74	3.75	62	0.069	-23.22	-16.22	0.02
18	0.850	-1.41	5.59	3.62	63	0.061	-24.29	-17.29	0.02
19	0.835	-1.57	5.43	3.49	64	0.053	-25.51	-18.51	0.01
20	0.820	-1.72	5.28	3.37	65	0.045	-26.94	-19.94	0.01
21	0.803	-1.91	5.09	3.23	66	0.040	-27.96	-20.96	0.01
22	0.786	-2.09	4.91	3.10	67	0.035	-29.12	-22.12	0.01
23	0.769	-2.28	4.72	2.96	68	0.030	-30.46	-23.46	0.00
24	0.752	-2.48	4.52	2.83	69	0.025	-32.04	-25.04	0.00
25	0.735	-2.67	4.33	2.71	70	0.020	-33.98	-26.98	0.00
26	0.717	-2.89	4.11	2.58	71	0.018	-34.89	-27.89	0.00
27	0.699	-3.11	3.89	2.45	72	0.016	-35.92	-28.92	0.00
28	0.681	-3.34	3.66	2.32	73	0.014	-37.08	-30.08	0.00
29	0.663	-3.57	3.43	2.20	74	0.012	-38.42	-31.42	0.00
30	0.645	-3.81	3.19	2.09	75	0.010	-40.00	-33.00	0.00
31	0.628	-4.03	2.97	1.98	76	0.010	-40.00	-33.00	0.00
32	0.612	-4.26	2.74	1.88	77	0.010	-40.00	-33.00	0.00
33	0.595	-4.50	2.50	1.78	78	0.010	-40.00	-33.00	0.00
34	0.579	-4.75	2.25	1.68	79	0.010	-40.00	-33.00	0.00
35	0.562	-5.00	2.00	1.59	80	0.010	-40.00	-33.00	0.00
36	0.544	-5.29	1.71	1.48	81	0.010	-40.00	-33.00	0.00
37	0.525	-5.59	1.41	1.38	82	0.010	-40.00	-33.00	0.00
38	0.507	-5.90	1.10	1.29	83	0.010	-40.00	-33.00	0.00
39	0.488	-6.22	0.78	1.20	84	0.010	-40.00	-33.00	0.00
40	0.470	-6.56	0.44	1.11	85	0.010	-40.00	-33.00	0.00
41	0.448	-6.97	0.03	1.01	86	0.010	-40.00	-33.00	0.00
42	0.426	-7.41	-0.41	0.91	87	0.010	-40.00	-33.00	0.00
43	0.404	-7.87	-0.87	0.82	88	0.010	-40.00	-33.00	0.00
44	0.382	-8.36	-1.36	0.73	89	0.010	-40.00	-33.00	0.00

## Exhibit 9

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 273.0°T)

(public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
90	0.010	-40.00	-33.00	0.00	135	0.029	-30.75	-23.75	0.00
91	0.010	-40.00	-33.00	0.00	136	0.030	-30.49	-23.49	0.00
92	0.010	-40.00	-33.00	0.00	137	0.031	-30.23	-23.23	0.00
93	0.010	-40.00	-33.00	0.00	138	0.032	-29.98	-22.98	0.01
94	0.010	-40.00	-33.00	0.00	139	0.033	-29.74	-22.74	0.01
95	0.010	-40.00	-33.00	0.00	140	0.034	-29.50	-22.50	0.01
96	0.010	-40.00	-33.00	0.00	141	0.034	-29.37	-22.37	0.01
97	0.010	-40.00	-33.00	0.00	142	0.034	-29.24	-22.24	0.01
98	0.010	-40.00	-33.00	0.00	143	0.035	-29.12	-22.12	0.01
99	0.010	-40.00	-33.00	0.00	144	0.036	-29.00	-22.00	0.01
100	0.010	-40.00	-33.00	0.00	145	0.036	-28.87	-21.87	0.01
101	0.010	-40.00	-33.00	0.00	146	0.036	-28.75	-21.75	0.01
102	0.010	-40.00	-33.00	0.00	147	0.037	-28.64	-21.64	0.01
103	0.010	-40.00	-33.00	0.00	148	0.038	-28.52	-21.52	0.01
104	0.010	-40.00	-33.00	0.00	149	0.038	-28.40	-21.40	0.01
105	0.010	-40.00	-33.00	0.00	150	0.038	-28.29	-21.29	0.01
106	0.010	-40.00	-33.00	0.00	151	0.039	-28.25	-21.25	0.01
107	0.010	-40.00	-33.00	0.00	152	0.039	-28.20	-21.20	0.01
108	0.010	-40.00	-33.00	0.00	153	0.039	-28.16	-21.16	0.01
109	0.010	-40.00	-33.00	0.00	154	0.039	-28.11	-21.11	0.01
110	0.010	-40.00	-33.00	0.00	155	0.039	-28.07	-21.07	0.01
111	0.010	-39.58	-32.58	0.00	156	0.040	-28.05	-21.05	0.01
112	0.011	-39.17	-32.17	0.00	157	0.040	-28.02	-21.02	0.01
113	0.012	-38.79	-31.79	0.00	158	0.040	-28.00	-21.00	0.01
114	0.012	-38.42	-31.42	0.00	159	0.040	-27.98	-20.98	0.01
115	0.012	-38.06	-31.06	0.00	160	0.040	-27.96	-20.96	0.01
116	0.013	-37.72	-30.72	0.00	161	0.040	-27.96	-20.96	0.01
117	0.013	-37.39	-30.39	0.00	162	0.040	-27.96	-20.96	0.01
118	0.014	-37.08	-30.08	0.00	163	0.040	-27.96	-20.96	0.01
119	0.014	-36.77	-29.77	0.00	164	0.040	-27.96	-20.96	0.01
120	0.015	-36.48	-29.48	0.00	165	0.040	-27.96	-20.96	0.01
121	0.016	-35.92	-28.92	0.00	166	0.040	-27.96	-20.96	0.01
122	0.017	-35.39	-28.39	0.00	167	0.040	-27.96	-20.96	0.01
123	0.018	-34.89	-27.89	0.00	168	0.040	-27.96	-20.96	0.01
124	0.019	-34.42	-27.42	0.00	169	0.040	-27.96	-20.96	0.01
125	0.020	-33.98	-26.98	0.00	170	0.040	-27.96	-20.96	0.01
126	0.021	-33.56	-26.56	0.00	171	0.040	-27.96	-20.96	0.01
127	0.022	-33.15	-26.15	0.00	172	0.040	-27.96	-20.96	0.01
128	0.023	-32.77	-25.77	0.00	173	0.040	-27.96	-20.96	0.01
129	0.024	-32.40	-25.40	0.00	174	0.040	-27.96	-20.96	0.01
130	0.025	-32.04	-25.04	0.00	175	0.040	-27.96	-20.96	0.01
131	0.026	-31.77	-24.77	0.00	176	0.040	-27.96	-20.96	0.01
132	0.027	-31.50	-24.50	0.00	177	0.040	-27.96	-20.96	0.01
133	0.027	-31.24	-24.24	0.00	178	0.040	-27.96	-20.96	0.01
134	0.028	-31.00	-24.00	0.00	179	0.040	-27.96	-20.96	0.01

# Exhibit 9

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
180	0.040	-27.96	-20.96	0.01	225	0.029	-30.75	-23.75	0.00
181	0.040	-27.96	-20.96	0.01	226	0.028	-31.00	-24.00	0.00
182	0.040	-27.96	-20.96	0.01	227	0.027	-31.24	-24.24	0.00
183	0.040	-27.96	-20.96	0.01	228	0.027	-31.50	-24.50	0.00
184	0.040	-27.96	-20.96	0.01	229	0.026	-31.77	-24.77	0.00
185	0.040	-27.96	-20.96	0.01	230	0.025	-32.04	-25.04	0.00
186	0.040	-27.96	-20.96	0.01	231	0.024	-32.40	-25.40	0.00
187	0.040	-27.96	-20.96	0.01	232	0.023	-32.77	-25.77	0.00
188	0.040	-27.96	-20.96	0.01	233	0.022	-33.15	-26.15	0.00
189	0.040	-27.96	-20.96	0.01	234	0.021	-33.56	-26.56	0.00
190	0.040	-27.96	-20.96	0.01	235	0.020	-33.98	-26.98	0.00
191	0.040	-27.96	-20.96	0.01	236	0.019	-34.42	-27.42	0.00
192	0.040	-27.96	-20.96	0.01	237	0.018	-34.89	-27.89	0.00
193	0.040	-27.96	-20.96	0.01	238	0.017	-35.39	-28.39	0.00
194	0.040	-27.96	-20.96	0.01	239	0.016	-35.92	-28.92	0.00
195	0.040	-27.96	-20.96	0.01	240	0.015	-36.48	-29.48	0.00
196	0.040	-27.96	-20.96	0.01	241	0.014	-36.77	-29.77	0.00
197	0.040	-27.96	-20.96	0.01	242	0.014	-37.08	-30.08	0.00
198	0.040	-27.96	-20.96	0.01	243	0.013	-37.39	-30.39	0.00
199	0.040	-27.96	-20.96	0.01	244	0.013	-37.72	-30.72	0.00
200	0.040	-27.96	-20.96	0.01	245	0.012	-38.06	-31.06	0.00
201	0.040	-27.98	-20.98	0.01	246	0.012	-38.42	-31.42	0.00
202	0.040	-28.00	-21.00	0.01	247	0.012	-38.79	-31.79	0.00
203	0.040	-28.02	-21.02	0.01	248	0.011	-39.17	-32.17	0.00
204	0.040	-28.05	-21.05	0.01	249	0.010	-39.58	-32.58	0.00
205	0.039	-28.07	-21.07	0.01	250	0.010	-40.00	-33.00	0.00
206	0.039	-28.11	-21.11	0.01	251	0.010	-40.00	-33.00	0.00
207	0.039	-28.16	-21.16	0.01	252	0.010	-40.00	-33.00	0.00
208	0.039	-28.20	-21.20	0.01	253	0.010	-40.00	-33.00	0.00
209	0.039	-28.25	-21.25	0.01	254	0.010	-40.00	-33.00	0.00
210	0.038	-28.29	-21.29	0.01	255	0.010	-40.00	-33.00	0.00
211	0.038	-28.40	-21.40	0.01	256	0.010	-40.00	-33.00	0.00
212	0.038	-28.52	-21.52	0.01	257	0.010	-40.00	-33.00	0.00
213	0.037	-28.64	-21.64	0.01	258	0.010	-40.00	-33.00	0.00
214	0.036	-28.75	-21.75	0.01	259	0.010	-40.00	-33.00	0.00
215	0.036	-28.87	-21.87	0.01	260	0.010	-40.00	-33.00	0.00
216	0.036	-29.00	-22.00	0.01	261	0.010	-40.00	-33.00	0.00
217	0.035	-29.12	-22.12	0.01	262	0.010	-40.00	-33.00	0.00
218	0.034	-29.24	-22.24	0.01	263	0.010	-40.00	-33.00	0.00
219	0.034	-29.37	-22.37	0.01	264	0.010	-40.00	-33.00	0.00
220	0.034	-29.50	-22.50	0.01	265	0.010	-40.00	-33.00	0.00
221	0.033	-29.74	-22.74	0.01	266	0.010	-40.00	-33.00	0.00
222	0.032	-29.98	-22.98	0.01	267	0.010	-40.00	-33.00	0.00
223	0.031	-30.23	-23.23	0.00	268	0.010	-40.00	-33.00	0.00
224	0.030	-30.49	-23.49	0.00	269	0.010	-40.00	-33.00	0.00

## Exhibit 9

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

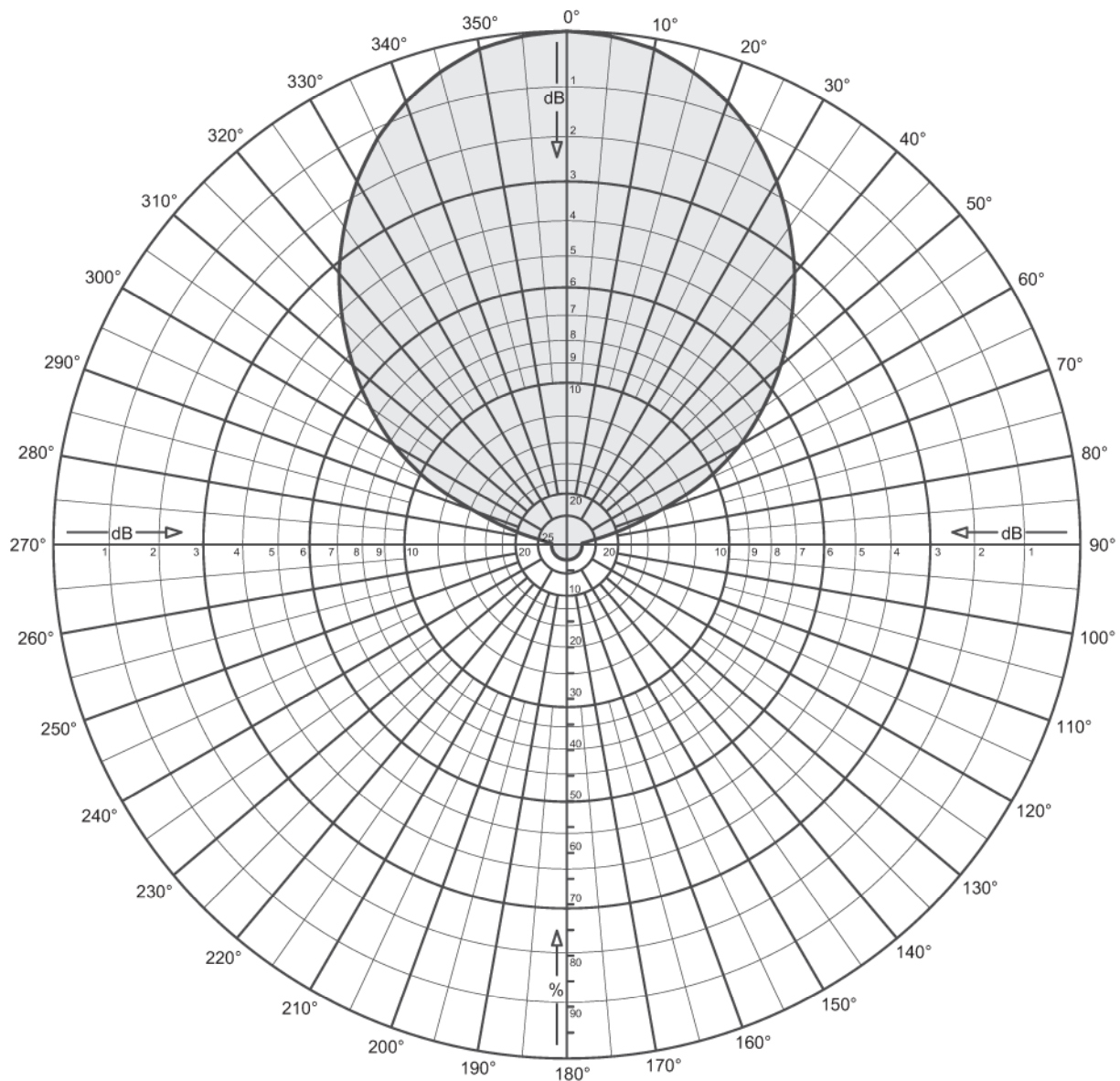
0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
270	0.010	-40.00	-33.00	0.00	315	0.360	-8.87	-1.87	0.65
271	0.010	-40.00	-33.00	0.00	316	0.382	-8.36	-1.36	0.73
272	0.010	-40.00	-33.00	0.00	317	0.404	-7.87	-0.87	0.82
273	0.010	-40.00	-33.00	0.00	318	0.426	-7.41	-0.41	0.91
274	0.010	-40.00	-33.00	0.00	319	0.448	-6.97	0.03	1.01
275	0.010	-40.00	-33.00	0.00	320	0.470	-6.56	0.44	1.11
276	0.010	-40.00	-33.00	0.00	321	0.488	-6.22	0.78	1.20
277	0.010	-40.00	-33.00	0.00	322	0.507	-5.90	1.10	1.29
278	0.010	-40.00	-33.00	0.00	323	0.525	-5.59	1.41	1.38
279	0.010	-40.00	-33.00	0.00	324	0.544	-5.29	1.71	1.48
280	0.010	-40.00	-33.00	0.00	325	0.562	-5.00	2.00	1.59
281	0.010	-40.00	-33.00	0.00	326	0.579	-4.75	2.25	1.68
282	0.010	-40.00	-33.00	0.00	327	0.595	-4.50	2.50	1.78
283	0.010	-40.00	-33.00	0.00	328	0.612	-4.26	2.74	1.88
284	0.010	-40.00	-33.00	0.00	329	0.628	-4.03	2.97	1.98
285	0.010	-40.00	-33.00	0.00	330	0.645	-3.81	3.19	2.09
286	0.012	-38.42	-31.42	0.00	331	0.663	-3.57	3.43	2.20
287	0.014	-37.08	-30.08	0.00	332	0.681	-3.34	3.66	2.32
288	0.016	-35.92	-28.92	0.00	333	0.699	-3.11	3.89	2.45
289	0.018	-34.89	-27.89	0.00	334	0.717	-2.89	4.11	2.58
290	0.020	-33.98	-26.98	0.00	335	0.735	-2.67	4.33	2.71
291	0.025	-32.04	-25.04	0.00	336	0.752	-2.48	4.52	2.83
292	0.030	-30.46	-23.46	0.00	337	0.769	-2.28	4.72	2.96
293	0.035	-29.12	-22.12	0.01	338	0.786	-2.09	4.91	3.10
294	0.040	-27.96	-20.96	0.01	339	0.803	-1.91	5.09	3.23
295	0.045	-26.94	-19.94	0.01	340	0.820	-1.72	5.28	3.37
296	0.053	-25.51	-18.51	0.01	341	0.835	-1.57	5.43	3.49
297	0.061	-24.29	-17.29	0.02	342	0.850	-1.41	5.59	3.62
298	0.069	-23.22	-16.22	0.02	343	0.865	-1.26	5.74	3.75
299	0.077	-22.27	-15.27	0.03	344	0.880	-1.11	5.89	3.88
300	0.085	-21.41	-14.41	0.04	345	0.895	-0.96	6.04	4.01
301	0.099	-20.09	-13.09	0.05	346	0.906	-0.86	6.14	4.11
302	0.113	-18.94	-11.94	0.06	347	0.917	-0.75	6.25	4.21
303	0.127	-17.92	-10.92	0.08	348	0.928	-0.65	6.35	4.32
304	0.141	-17.02	-10.02	0.10	349	0.939	-0.55	6.45	4.42
305	0.155	-16.19	-9.19	0.12	350	0.950	-0.45	6.55	4.52
306	0.174	-15.19	-8.19	0.15	351	0.956	-0.39	6.61	4.58
307	0.193	-14.29	-7.29	0.19	352	0.962	-0.34	6.66	4.64
308	0.212	-13.47	-6.47	0.23	353	0.968	-0.28	6.72	4.70
309	0.231	-12.73	-5.73	0.27	354	0.974	-0.23	6.77	4.75
310	0.250	-12.04	-5.04	0.31	355	0.980	-0.18	6.82	4.81
311	0.272	-11.31	-4.31	0.37	356	0.984	-0.14	6.86	4.85
312	0.294	-10.63	-3.63	0.43	357	0.988	-0.10	6.90	4.89
313	0.316	-10.01	-3.01	0.50	358	0.992	-0.07	6.93	4.93
314	0.338	-9.42	-2.42	0.57	359	0.996	-0.03	6.97	4.97



## Exhibit 9

**Copy of Manufacturer's Directional Antenna Documentation**  
(Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt



# Exhibit 9

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	7.00	5.01	45	0.618	-4.19	2.81	1.91
1	0.998	-0.01	6.99	5.00	46	0.602	-4.40	2.60	1.82
2	0.997	-0.02	6.98	4.99	47	0.588	-4.61	2.39	1.73
3	0.996	-0.03	6.97	4.97	48	0.573	-4.84	2.16	1.65
4	0.995	-0.04	6.96	4.96	49	0.558	-5.06	1.94	1.56
5	0.993	-0.06	6.94	4.95	50	0.544	-5.30	1.70	1.48
6	0.991	-0.08	6.92	4.92	51	0.528	-5.54	1.46	1.40
7	0.988	-0.10	6.90	4.89	52	0.513	-5.80	1.20	1.32
8	0.985	-0.13	6.87	4.87	53	0.498	-6.06	0.94	1.24
9	0.982	-0.15	6.85	4.84	54	0.483	-6.33	0.67	1.17
10	0.980	-0.18	6.82	4.81	55	0.467	-6.60	0.40	1.10
11	0.975	-0.22	6.78	4.76	56	0.452	-6.90	0.10	1.02
12	0.969	-0.27	6.73	4.71	57	0.436	-7.20	-0.20	0.95
13	0.964	-0.32	6.68	4.65	58	0.421	-7.51	-0.51	0.89
14	0.958	-0.37	6.63	4.60	59	0.405	-7.84	-0.84	0.82
15	0.952	-0.42	6.58	4.55	60	0.390	-8.18	-1.18	0.76
16	0.946	-0.49	6.51	4.48	61	0.372	-8.59	-1.59	0.69
17	0.938	-0.56	6.44	4.41	62	0.354	-9.02	-2.02	0.63
18	0.931	-0.62	6.38	4.34	63	0.336	-9.47	-2.47	0.57
19	0.923	-0.69	6.31	4.27	64	0.318	-9.95	-2.95	0.51
20	0.916	-0.76	6.24	4.21	65	0.300	-10.46	-3.46	0.45
21	0.908	-0.84	6.16	4.13	66	0.278	-11.12	-4.12	0.39
22	0.899	-0.92	6.08	4.05	67	0.256	-11.84	-4.84	0.33
23	0.890	-1.01	5.99	3.97	68	0.234	-12.62	-5.62	0.27
24	0.882	-1.10	5.90	3.89	69	0.212	-13.47	-6.47	0.23
25	0.873	-1.18	5.82	3.82	70	0.190	-14.42	-7.42	0.18
26	0.862	-1.29	5.71	3.72	71	0.174	-15.19	-8.19	0.15
27	0.851	-1.41	5.59	3.63	72	0.158	-16.03	-9.03	0.13
28	0.840	-1.52	5.48	3.53	73	0.142	-16.95	-9.95	0.10
29	0.829	-1.63	5.37	3.44	74	0.126	-17.99	-10.99	0.08
30	0.817	-1.75	5.25	3.35	75	0.110	-19.17	-12.17	0.06
31	0.806	-1.88	5.12	3.25	76	0.098	-20.18	-13.18	0.05
32	0.793	-2.02	4.98	3.15	77	0.086	-21.31	-14.31	0.04
33	0.781	-2.15	4.85	3.05	78	0.074	-22.62	-15.62	0.03
34	0.767	-2.30	4.70	2.95	79	0.062	-24.15	-17.15	0.02
35	0.756	-2.44	4.56	2.86	80	0.050	-26.02	-19.02	0.01
36	0.742	-2.59	4.41	2.76	81	0.046	-26.74	-19.74	0.01
37	0.729	-2.74	4.26	2.67	82	0.042	-27.54	-20.54	0.01
38	0.716	-2.90	4.10	2.57	83	0.038	-28.40	-21.40	0.01
39	0.704	-3.05	3.95	2.48	84	0.034	-29.37	-22.37	0.01
40	0.690	-3.22	3.78	2.39	85	0.030	-30.46	-23.46	0.00
41	0.675	-3.41	3.59	2.29	86	0.030	-30.46	-23.46	0.00
42	0.661	-3.60	3.40	2.19	87	0.030	-30.46	-23.46	0.00
43	0.646	-3.79	3.21	2.09	88	0.030	-30.46	-23.46	0.00
44	0.632	-3.99	3.01	2.00	89	0.030	-30.46	-23.46	0.00

# Exhibit 9

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
90	0.030	-30.46	-23.46	0.00	135	0.030	-30.46	-23.46	0.00
91	0.030	-30.46	-23.46	0.00	136	0.030	-30.46	-23.46	0.00
92	0.030	-30.46	-23.46	0.00	137	0.030	-30.46	-23.46	0.00
93	0.030	-30.46	-23.46	0.00	138	0.030	-30.46	-23.46	0.00
94	0.030	-30.46	-23.46	0.00	139	0.030	-30.46	-23.46	0.00
95	0.030	-30.46	-23.46	0.00	140	0.030	-30.46	-23.46	0.00
96	0.030	-30.46	-23.46	0.00	141	0.030	-30.46	-23.46	0.00
97	0.030	-30.46	-23.46	0.00	142	0.030	-30.46	-23.46	0.00
98	0.030	-30.46	-23.46	0.00	143	0.030	-30.46	-23.46	0.00
99	0.030	-30.46	-23.46	0.00	144	0.030	-30.46	-23.46	0.00
100	0.030	-30.46	-23.46	0.00	145	0.030	-30.46	-23.46	0.00
101	0.030	-30.46	-23.46	0.00	146	0.030	-30.46	-23.46	0.00
102	0.030	-30.46	-23.46	0.00	147	0.030	-30.46	-23.46	0.00
103	0.030	-30.46	-23.46	0.00	148	0.030	-30.46	-23.46	0.00
104	0.030	-30.46	-23.46	0.00	149	0.030	-30.46	-23.46	0.00
105	0.030	-30.46	-23.46	0.00	150	0.030	-30.46	-23.46	0.00
106	0.030	-30.46	-23.46	0.00	151	0.030	-30.46	-23.46	0.00
107	0.030	-30.46	-23.46	0.00	152	0.030	-30.46	-23.46	0.00
108	0.030	-30.46	-23.46	0.00	153	0.030	-30.46	-23.46	0.00
109	0.030	-30.46	-23.46	0.00	154	0.030	-30.46	-23.46	0.00
110	0.030	-30.46	-23.46	0.00	155	0.030	-30.46	-23.46	0.00
111	0.030	-30.46	-23.46	0.00	156	0.030	-30.46	-23.46	0.00
112	0.030	-30.46	-23.46	0.00	157	0.030	-30.46	-23.46	0.00
113	0.030	-30.46	-23.46	0.00	158	0.030	-30.46	-23.46	0.00
114	0.030	-30.46	-23.46	0.00	159	0.030	-30.46	-23.46	0.00
115	0.030	-30.46	-23.46	0.00	160	0.030	-30.46	-23.46	0.00
116	0.030	-30.46	-23.46	0.00	161	0.030	-30.46	-23.46	0.00
117	0.030	-30.46	-23.46	0.00	162	0.030	-30.46	-23.46	0.00
118	0.030	-30.46	-23.46	0.00	163	0.030	-30.46	-23.46	0.00
119	0.030	-30.46	-23.46	0.00	164	0.030	-30.46	-23.46	0.00
120	0.030	-30.46	-23.46	0.00	165	0.030	-30.46	-23.46	0.00
121	0.030	-30.46	-23.46	0.00	166	0.030	-30.46	-23.46	0.00
122	0.030	-30.46	-23.46	0.00	167	0.030	-30.46	-23.46	0.00
123	0.030	-30.46	-23.46	0.00	168	0.030	-30.46	-23.46	0.00
124	0.030	-30.46	-23.46	0.00	169	0.030	-30.46	-23.46	0.00
125	0.030	-30.46	-23.46	0.00	170	0.030	-30.46	-23.46	0.00
126	0.030	-30.46	-23.46	0.00	171	0.030	-30.46	-23.46	0.00
127	0.030	-30.46	-23.46	0.00	172	0.030	-30.46	-23.46	0.00
128	0.030	-30.46	-23.46	0.00	173	0.030	-30.46	-23.46	0.00
129	0.030	-30.46	-23.46	0.00	174	0.030	-30.46	-23.46	0.00
130	0.030	-30.46	-23.46	0.00	175	0.030	-30.46	-23.46	0.00
131	0.030	-30.46	-23.46	0.00	176	0.030	-30.46	-23.46	0.00
132	0.030	-30.46	-23.46	0.00	177	0.030	-30.46	-23.46	0.00
133	0.030	-30.46	-23.46	0.00	178	0.030	-30.46	-23.46	0.00
134	0.030	-30.46	-23.46	0.00	179	0.030	-30.46	-23.46	0.00

## Exhibit 9

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
180	0.030	-30.46	-23.46	0.00	225	0.030	-30.46	-23.46	0.00
181	0.030	-30.46	-23.46	0.00	226	0.030	-30.46	-23.46	0.00
182	0.030	-30.46	-23.46	0.00	227	0.030	-30.46	-23.46	0.00
183	0.030	-30.46	-23.46	0.00	228	0.030	-30.46	-23.46	0.00
184	0.030	-30.46	-23.46	0.00	229	0.030	-30.46	-23.46	0.00
185	0.030	-30.46	-23.46	0.00	230	0.030	-30.46	-23.46	0.00
186	0.030	-30.46	-23.46	0.00	231	0.030	-30.46	-23.46	0.00
187	0.030	-30.46	-23.46	0.00	232	0.030	-30.46	-23.46	0.00
188	0.030	-30.46	-23.46	0.00	233	0.030	-30.46	-23.46	0.00
189	0.030	-30.46	-23.46	0.00	234	0.030	-30.46	-23.46	0.00
190	0.030	-30.46	-23.46	0.00	235	0.030	-30.46	-23.46	0.00
191	0.030	-30.46	-23.46	0.00	236	0.030	-30.46	-23.46	0.00
192	0.030	-30.46	-23.46	0.00	237	0.030	-30.46	-23.46	0.00
193	0.030	-30.46	-23.46	0.00	238	0.030	-30.46	-23.46	0.00
194	0.030	-30.46	-23.46	0.00	239	0.030	-30.46	-23.46	0.00
195	0.030	-30.46	-23.46	0.00	240	0.030	-30.46	-23.46	0.00
196	0.030	-30.46	-23.46	0.00	241	0.030	-30.46	-23.46	0.00
197	0.030	-30.46	-23.46	0.00	242	0.030	-30.46	-23.46	0.00
198	0.030	-30.46	-23.46	0.00	243	0.030	-30.46	-23.46	0.00
199	0.030	-30.46	-23.46	0.00	244	0.030	-30.46	-23.46	0.00
200	0.030	-30.46	-23.46	0.00	245	0.030	-30.46	-23.46	0.00
201	0.030	-30.46	-23.46	0.00	246	0.030	-30.46	-23.46	0.00
202	0.030	-30.46	-23.46	0.00	247	0.030	-30.46	-23.46	0.00
203	0.030	-30.46	-23.46	0.00	248	0.030	-30.46	-23.46	0.00
204	0.030	-30.46	-23.46	0.00	249	0.030	-30.46	-23.46	0.00
205	0.030	-30.46	-23.46	0.00	250	0.030	-30.46	-23.46	0.00
206	0.030	-30.46	-23.46	0.00	251	0.030	-30.46	-23.46	0.00
207	0.030	-30.46	-23.46	0.00	252	0.030	-30.46	-23.46	0.00
208	0.030	-30.46	-23.46	0.00	253	0.030	-30.46	-23.46	0.00
209	0.030	-30.46	-23.46	0.00	254	0.030	-30.46	-23.46	0.00
210	0.030	-30.46	-23.46	0.00	255	0.030	-30.46	-23.46	0.00
211	0.030	-30.46	-23.46	0.00	256	0.030	-30.46	-23.46	0.00
212	0.030	-30.46	-23.46	0.00	257	0.030	-30.46	-23.46	0.00
213	0.030	-30.46	-23.46	0.00	258	0.030	-30.46	-23.46	0.00
214	0.030	-30.46	-23.46	0.00	259	0.030	-30.46	-23.46	0.00
215	0.030	-30.46	-23.46	0.00	260	0.030	-30.46	-23.46	0.00
216	0.030	-30.46	-23.46	0.00	261	0.030	-30.46	-23.46	0.00
217	0.030	-30.46	-23.46	0.00	262	0.030	-30.46	-23.46	0.00
218	0.030	-30.46	-23.46	0.00	263	0.030	-30.46	-23.46	0.00
219	0.030	-30.46	-23.46	0.00	264	0.030	-30.46	-23.46	0.00
220	0.030	-30.46	-23.46	0.00	265	0.030	-30.46	-23.46	0.00
221	0.030	-30.46	-23.46	0.00	266	0.030	-30.46	-23.46	0.00
222	0.030	-30.46	-23.46	0.00	267	0.030	-30.46	-23.46	0.00
223	0.030	-30.46	-23.46	0.00	268	0.030	-30.46	-23.46	0.00
224	0.030	-30.46	-23.46	0.00	269	0.030	-30.46	-23.46	0.00



# Exhibit 9

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 273.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
270	0.030	-30.46	-23.46	0.00	315	0.618	-4.19	2.81	1.91
271	0.030	-30.46	-23.46	0.00	316	0.632	-3.99	3.01	2.00
272	0.030	-30.46	-23.46	0.00	317	0.646	-3.79	3.21	2.09
273	0.030	-30.46	-23.46	0.00	318	0.661	-3.60	3.40	2.19
274	0.030	-30.46	-23.46	0.00	319	0.675	-3.41	3.59	2.29
275	0.030	-30.46	-23.46	0.00	320	0.690	-3.22	3.78	2.39
276	0.034	-29.37	-22.37	0.01	321	0.704	-3.05	3.95	2.48
277	0.038	-28.40	-21.40	0.01	322	0.716	-2.90	4.10	2.57
278	0.042	-27.54	-20.54	0.01	323	0.729	-2.74	4.26	2.67
279	0.046	-26.74	-19.74	0.01	324	0.742	-2.59	4.41	2.76
280	0.050	-26.02	-19.02	0.01	325	0.756	-2.44	4.56	2.86
281	0.062	-24.15	-17.15	0.02	326	0.767	-2.30	4.70	2.95
282	0.074	-22.62	-15.62	0.03	327	0.781	-2.15	4.85	3.05
283	0.086	-21.31	-14.31	0.04	328	0.793	-2.02	4.98	3.15
284	0.098	-20.18	-13.18	0.05	329	0.806	-1.88	5.12	3.25
285	0.110	-19.17	-12.17	0.06	330	0.817	-1.75	5.25	3.35
286	0.126	-17.99	-10.99	0.08	331	0.829	-1.63	5.37	3.44
287	0.142	-16.95	-9.95	0.10	332	0.840	-1.52	5.48	3.53
288	0.158	-16.03	-9.03	0.13	333	0.851	-1.41	5.59	3.63
289	0.174	-15.19	-8.19	0.15	334	0.862	-1.29	5.71	3.72
290	0.190	-14.42	-7.42	0.18	335	0.873	-1.18	5.82	3.82
291	0.212	-13.47	-6.47	0.23	336	0.882	-1.10	5.90	3.89
292	0.234	-12.62	-5.62	0.27	337	0.890	-1.01	5.99	3.97
293	0.256	-11.84	-4.84	0.33	338	0.899	-0.92	6.08	4.05
294	0.278	-11.12	-4.12	0.39	339	0.908	-0.84	6.16	4.13
295	0.300	-10.46	-3.46	0.45	340	0.916	-0.76	6.24	4.21
296	0.318	-9.95	-2.95	0.51	341	0.923	-0.69	6.31	4.27
297	0.336	-9.47	-2.47	0.57	342	0.931	-0.62	6.38	4.34
298	0.354	-9.02	-2.02	0.63	343	0.938	-0.56	6.44	4.41
299	0.372	-8.59	-1.59	0.69	344	0.946	-0.49	6.51	4.48
300	0.390	-8.18	-1.18	0.76	345	0.952	-0.42	6.58	4.55
301	0.405	-7.84	-0.84	0.82	346	0.958	-0.37	6.63	4.60
302	0.421	-7.51	-0.51	0.89	347	0.964	-0.32	6.68	4.65
303	0.436	-7.20	-0.20	0.95	348	0.969	-0.27	6.73	4.71
304	0.452	-6.90	0.10	1.02	349	0.975	-0.22	6.78	4.76
305	0.467	-6.60	0.40	1.10	350	0.980	-0.18	6.82	4.81
306	0.483	-6.33	0.67	1.17	351	0.982	-0.15	6.85	4.84
307	0.498	-6.06	0.94	1.24	352	0.985	-0.13	6.87	4.87
308	0.513	-5.80	1.20	1.32	353	0.988	-0.10	6.90	4.89
309	0.528	-5.54	1.46	1.40	354	0.991	-0.08	6.92	4.92
310	0.544	-5.30	1.70	1.48	355	0.993	-0.06	6.94	4.95
311	0.558	-5.06	1.94	1.56	356	0.995	-0.04	6.96	4.96
312	0.573	-4.84	2.16	1.65	357	0.996	-0.03	6.97	4.97
313	0.588	-4.61	2.39	1.73	358	0.997	-0.02	6.98	4.99
314	0.602	-4.40	2.60	1.82	359	0.998	-0.01	6.99	5.00