

# Technical Report Supporting a Minor Modification of a Licensed Facility Construction Permit Application

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

*for*

*W275CL.L - Charlottesville, VA  
(Facility ID: 141162)*

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*Non-Adjacent Channel Change per  
47 C.F.R. Section 74.1233(a)(1)(i)(A)(2);  
& New DA Pattern*

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*as a Commercial,  
Fill-In Translator  
for WVAX(AM) - Charlottesville, VA*

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RF Appendix 1 - Radio Frequency Radiation Compliance Showing

**EXPLANATION OF PROPOSAL:** This LMS filing and accompanying technical report supports a Minor Modification of a Licensed Facility Construction Permit Application for FM Translator W275CL.L - Charlottesville, VA (Facility ID: 141162). This filing requests a 47 C.F.R. Section 74.1233(a)(1)(i)(A)(2) non-adjacent channel change from CH275D (102.9 MHz) to CH296D (107.1 MHz) based upon a showing of reduced interference. Operation on the new frequency of CH296D (107.1 MHz) with a new directional antenna pattern and power of 0.250 kW ERP circular polarization (H&V) is requested. The FM Translator will operate from a COR of 474.7 meters AMSL at the same site location. This filing will specify continued rebroadcast of Class C, AM Primary Station WVAX(AM) - Charlottesville, VA (1450 kHz); Facility ID No. 161156. The Translator will continue to provide service to the community of Charlottesville, VA.

**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***. Regarding permission to retransmit Primary Station, WVAX(AM) - Charlottesville, VA; both WVAX(AM) and W275CL(CH296D) are under common control of Tidewater Communications, LLC; therefore, permission to rebroadcast is implied.

The proposed facility will be located on the tower bearing Antenna Structure Registration Number 1015412. In support of this filing, a copy of the 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 NED 03 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 WCHV-FM - Charlottesville, VA (CH298A) and W294BY - Charlottesville, VA (CH294D). 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 WCHV-FM - Charlottesville, VA (CH298A) and W294BY - Charlottesville, VA (CH294D) as noted in **Exhibit 8**. The Interference Contour at the proposed Translator site has been calculated to be no less than the 135.2 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 dBu ratio. As seen in the attached 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 multiple dedicated transmitter buildings located at the remote mountain top site. However, structures of this nature have been exempt as a matter of FCC Policy (see a similar grant under BPFT-20160725ABE). Additional antenna manufacturer's directional antenna pattern data has been included in **Exhibit 9**.

There are two additional facilities, existing or proposed, close enough to merit further study. Therefore, a supplemental contour protection study has been provided toward these facilities as included in **Exhibit(s) 7(a-b)**. It is believed sufficient clearance exists, precluding the need for additional contour protection showings.

Regarding protection of international concerns, the facility is, and will remain, more than 320 km from the common border between the United States and Canada or Mexico. As a result, no further international protection showings are believed required.

**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 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**. The facility is, or will be, properly marked with signs. Entry is, or will be, restricted by means of fencing, 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 antenna and feedline are being added to an 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 twenty-two 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  
October 16, 2021

Terrain  
57 1089 m

# Exhibit 1

## Service Contour Study: Present vs Proposed Operations

*Proposed 60 dBμ F(50:50) Contour*

*Present 60 dBμ F(50:50) Contour*

**CH296D.P**  
Charlottesville, VA  
Proposed Operation  
Facility ID: 141162  
Latitude: 37-59-06.40 N  
Longitude: 078-28-47.40 W  
ERP: 0.25 kW  
Channel: 296D (107.1 MHz)  
AMSL Height: 474.7 m  
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour  
Total Population: 128,708  
Total Area: 813.9 sq. km

**W275CLL**  
Charlottesville, VA  
BLFT20170630AAT  
Facility ID: 141162  
Latitude: 37-59-06.50 N  
Longitude: 078-28-47 W  
ERP: 0.12 kW  
Channel: 275D (102.9 MHz)  
AMSL Height: 475.0 m  
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour  
Total Population: 122,580  
Total Area: 604.3 sq. km

NED 03 SEC Terrain Database  
US Census 2010 PL Database  
NED 1983 Coordinate Datum

Scale 1:250,000  
0 4 8 12 km

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

V-Soft Communications LLC ©

25 mile Radius from AM Site

## Exhibit 2

### Service Contour Study: Proposed vs Primary Operations

WVAX(AM) - 1450 kHz  
Charlottesville, Virginia  
Station Class: C  
Region 2 Class: C  
Facility ID: 161156  
File Number: BML-20191113AAG  
38-02-54.3 N 78-28-12.1 W (NAD 27)  
38-02-54.8 N 78-28-11.1 W (NAD 83)  
Power: 1 kW, Non-Directional  
Hours: Daytime  
Pattern Type: Theoretical  
Towers: 1 Augmentations: 0  
Tower Height: 159.2 Deg; 91.43 m  
RMS Theoretical: 356.8 mV/m

Proposed 60 dBu F(50:50) Contour

Primary 2 mV/m Daytime Contour

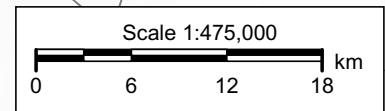
WVAX(AM)

CH296D.P

CH296D.P  
Charlottesville, VA  
Proposed Operation  
Facility ID: 141162  
Latitude: 37-59-06.40 N  
Longitude: 078-28-47.40 W  
ERP: 0.25 kW  
Channel: 296D (107.1 MHz)  
AMSL Height: 474.7 m  
Horiz. Pattern: Directional

NED 03 SEC Terrain Database  
US Census 2010 PL Database  
NAD 1983 Coordinate Datum

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



V-Soft Communications LLC ©

# Exhibit 3

## Copy of Existing Antenna Structure Registration

(public record copy)

**Registration Detail**

Reg Number	1015412	Status	Constructed
File Number	A0814993	Constructed	07/25/2008
EMI	No	Dismantled	
NEPA	No		

**Antenna Structure**

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

**Location** (in NAD83 Coordinates)

Lat/Long	37-59-06.4 N 078-28-47.4 W	Address	1840 Carters Mountain Trail (090228)
City, State	CHARLOTTESVILLE , VA		
Zip	22902	County	ALBEMARLE
Center of AM Array		Position of Tower in Array	

**Heights (meters)**

Elevation of Site Above Mean Sea Level	Overall Height Above Ground (AGL)
433.7	92.3
Overall Height Above Mean Sea Level	Overall Height Above Ground w/o Appurtenances
526.0	83.5

**Painting and Lighting Specifications**

FAA Chapters 4, 8, 12  
 Paint and Light in Accordance with FAA Circular Number 70/7460-1K

**FAA Notification**

FAA Study	2008-AEA-1656-OE	FAA Issue Date	07/25/2008
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**Owner & Contact Information**

FRN	0011498342	Owner Entity Type	Limited Liability Company
Assignor FRN	0005884689	Assignor ID	L00008376

**Owner**

American Towers, LLC  
 Attention To: Regulatory Compliance FAA FCC  
 10 Presidential Way  
 Woburn , MA 01801

P: (678)564-3236  
 F:  
 E: faa-fcc@americantower.com

**Contact**

Attention To: FAA FCC  
 10 Presidential Way  
 Woburn , MA 01801

P: (678)564-3236  
 F:  
 E: faa-fcc@americantower.com

**Last Action Status**

Status	Constructed	Received	01/15/2013
Purpose	Change Owner	Entered	01/15/2013
Mode	Interactive		

**Related Applications**

01/15/2013	A0814993 - Change Owner (OC)
12/15/2011	A0744722 - Admin Update (AU)
08/14/2009	A0646964 - Admin Update (AU)
Related applications (20)	

**Comments****Comments**

None

**History****Date****Event**

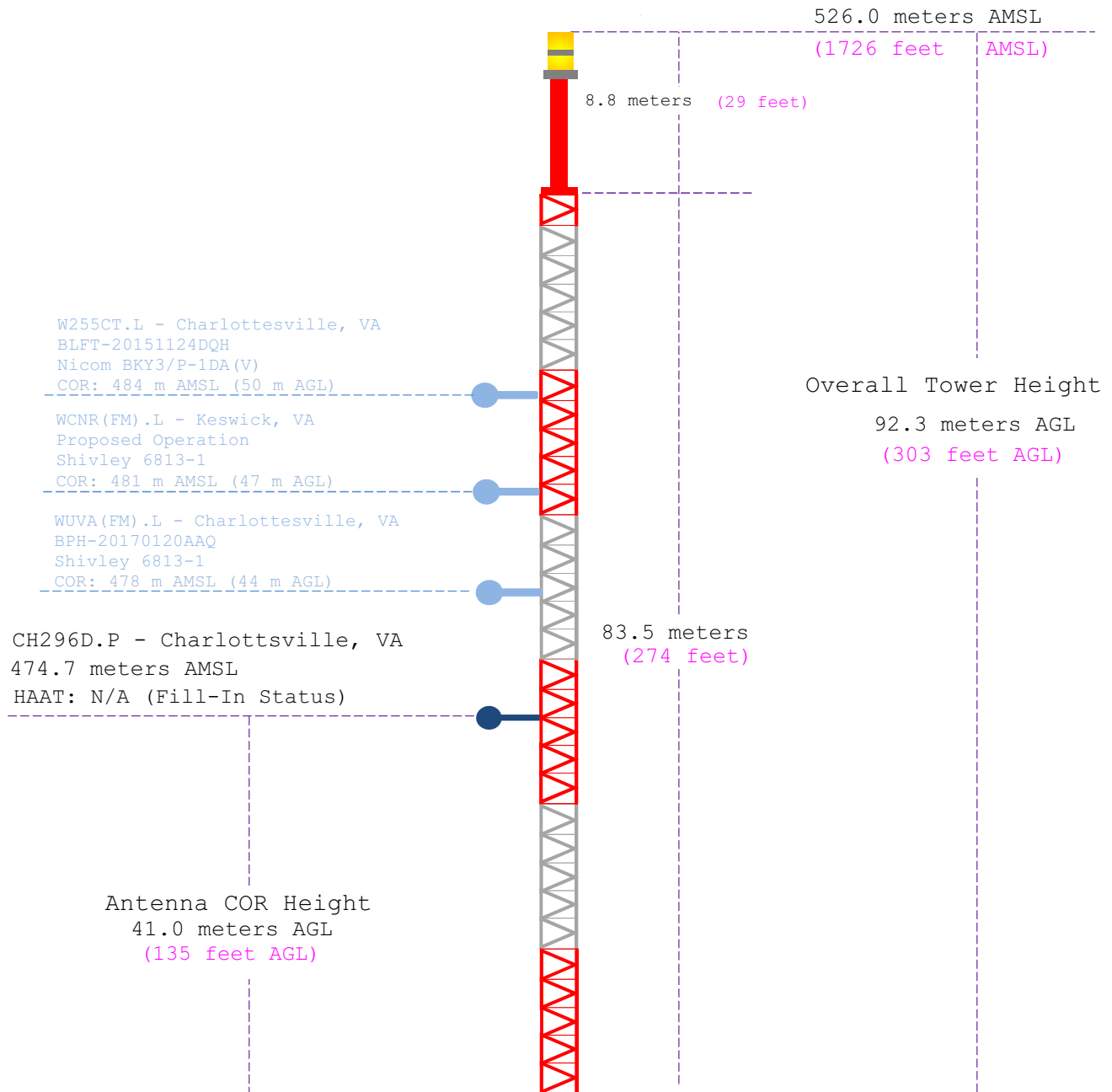
01/16/2013	Registration Printed
01/16/2013	Change of Ownership Letter Sent
01/15/2013	Change of Ownership Received
All History (40)	

**Automated Letters**

01/16/2013	Authorization, Reference
01/16/2013	Ownership Change, Reference 741836
08/15/2009	Authorization, Reference
All letters (19)	

# Exhibit 4

## Vertical Plan of Antenna System



Ground Elevation: 433.7 meters AMSL (1423 feet AMSL)		
<b>Address:</b> 1840 Carters Mountain Trail		
<b>City:</b> Charlottesville	<b>Latitude (D M S)</b>	<b>Longitude (D M S)</b>
<b>County:</b> Albemarle	NAD 27 datum values:	37 59 5.89398 78 28 48.35907
<b>State:</b> Virginia	NAD 83 datum values:	37 59 6.40000 78 28 47.40000
<b>Antenna Structure Registration</b>	<b>Asher Broadcast Consulting, LLC</b>	
1015412	justinasher@consultant.com	
	1(202)875-2986	

## ***Exhibit 5***

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

#### **HAAT Calculation (1983):**

N. Lat. = 375906.4    W. Lng. = 782847.4  
 HAAT and Distance to Contour,  
 FCC, FM 2-10 Mi, 51 pts Method - NED 03 SEC

Azi.	AV EL	HAAT	ERP kW	dBk	Field	60-F5
000	142.9	331.8	0.1743	-7.59	0.835	21.72
030	138.3	336.4	0.2500	-6.02	1.000	23.84
060	146.7	328.0	0.2500	-6.02	1.000	23.55
090	116.3	358.4	0.2500	-6.02	1.000	24.56
120	120.9	353.8	0.1225	-9.12	0.700	20.53
150	134.3	340.4	0.0400	-13.98	0.400	15.15
180	139.0	335.7	0.0025	-26.02	0.100	7.07
210	172.1	302.6	0.0025	-26.02	0.100	6.81
240	171.4	303.3	0.0025	-26.02	0.100	6.81
270	224.5	250.2	0.0025	-26.02	0.100	6.24
300	186.2	288.5	0.0025	-26.02	0.100	6.67
330	163.2	311.5	0.0225	-16.48	0.300	12.60

Ave El= 154.65 M    HAAT= 320.05 M    AMSL= 474.7

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

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum values:	37 59 5.89398	78 28 48.35907
NAD 83 datum values:	37 59 6.40000	78 28 47.40000

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

Position Type	Lat Lon
<b>Degrees Lat Long</b>	37.9851111°, -078.4798333°
<b>Degrees Minutes</b>	37°59.10667', -078°28.79000'
<b>Degrees Minutes Seconds</b>	37°59'06.4000", -078°28'47.4000"
<b>UTM</b>	17S 721326mE 4207159mN
<b>UTM centimeter</b>	17S 721326.09mE 4207159.91mN
<b>MGRS</b>	17SQC2132607159
<b>Grid North</b>	1.6°
<b>GARS</b>	204LR11
<b>Maidenhead</b>	FM07SX26KK02
<b>GEOREF</b>	GJMH31215910

# ***Exhibit 6***

## **Tabulation of Proposed Allocation**

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

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

Tidewater Communications, LLC											
REFERENCE		CH#	296D	- 107.1 MHz, Pwr= 0.25 kW DA, HAAT= 320.1 M,				COR= 474.7 M		DISPLAY DATES	
37 59 06.40 N.		Average Protected F(50-50)= 23.28 km								DATA 10-14-21	
78 28 47.40 W.		Standard Directional								SEARCH 10-14-21	
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)
298A	WCHV-FM	LIC	CN	207.7	0.02	37 59 05.50	0.210	1.0	24.1	-7.8*	-24.2*
Charlottesville		VA		27.7	BLH19960112KD	78 28 48.00	338	506	Monticello Media LLC		
294D	W294BY	LIC	CN	217.4	0.38	37 58 56.50	0.010	0.2	10.0	-6.1*	-9.8*
Charlottesville		VA		37.4	BLFT20151124CZT	78 28 57.00		481	Positive Alternative Radio		
296A	WTTX-FM	LIC	CN	204.7	74.96	37 22 19.50	1.700	72.1	23.6	-5.6	27.0
Appomattox		VA		24.5	BMLD20060112AEE	78 50 05.00	130	341	Positive Alternative Radio		
296A	WHFV	LIC	NCN	345.6	58.73	38 29 48.30	0.330	37.0	10.8	2.3	0.6
Shenandoah		VA		165.5	BLED20141031AAS	78 38 51.10	-65	393	Holy Family Communications		
296A	WCHG	LIC	CN	273.0	114.08	38 01 53.40	0.160	85.3	28.5	22.0	64.1
Hot Springs		VA		92.2	BMLD20110527AAF	79 46 51.10	429	1076	Pocahontas Communications		
297A	WBBT-FM	LIC	NCN	127.8	86.66	37 30 16.50	1.400	42.8	28.0	23.1	29.0
Powhatan		VA		308.3	BMLD20180102AAL	77 42 13.00	207	282	Vpm Media Corporation		
295D	W295CP	LIC	DCN	324.3	64.04	38 27 08.40	0.250	23.8	16.7	24.3	30.6
Harrisonburg		VA		144.1	0000116935	78 54 31.10		561	Tidewater Communications,		
293B	WBTJ	LIC	DCN	124.0	93.40	37 30 45.50	14.500	5.6	65.1	66.2	26.4
Richmond		VA		304.5	BLH20101005ACH	77 36 04.70	280	346	Audacy License, LLC		
299B	WWWT-FM	LIC	CN	33.5	101.16	38 44 30.40	29.000	6.1	66.9	71.1	32.0
Manassas		VA		213.9	BLH20070809ABB	77 50 06.90	197	357	Washington Dc FCC License		
293D	W293BQ	LIC	CN	336.7	55.78	38 26 44.40	0.010	0.2	13.8	36.6	41.6
Harrisonburg		VA		156.5	BLFT20130529AHL	78 44 00.00	566	993	Bible Broadcasting Network		
298D	W298BR	LIC	CN	324.3	64.04	38 27 08.40	0.010	0.2	7.6	47.9	56.1
Harrisonburg		VA		144.1	BLFT20170111ABD	78 54 31.10		572	Positive Alternative Radio		
297B	WLWV	LIC	CN	48.2	162.41	38 57 01.40	19.500	75.7	64.0	63.6	53.7
Washington		DC		229.1	BMLD20190214AAS	77 04 45.90	246	320	Educational Media Foundati		
295B	WWEG	LIC	CN	23.8	184.41	39 29 57.40	15.500	74.1	63.0	86.0	70.0
Myersville		MD		204.4	BLH20070518AAX	77 36 41.00	260	476	Manning Broadcasting Inc.		
296A	WCBC-FM	LIC	NCN	349.2	174.38	39 31 30.30	0.480	80.1	28.3	72.2	92.2
Keyser		WV		168.9	BMLH20141022ABE	78 51 42.00	253	619	Prosperitas Broadcasting S		
298D	W298CN	LIC	CN	220.8	93.08	37 20 57.00	0.250	1.1	19.2	85.3	73.4
Lynchburg		VA		40.4	BLFT20190814AAD	79 10 04.00		435	Mel Wheeler, Inc.		
295A	WZZI	LIC	NCN	234.3	125.52	37 19 14.50	0.290	44.3	28.5	74.4	86.9
Bedford		VA		53.6	BMLH20080904AAE	79 37 58.10	389	725	Wvjt, LLC		

Terrain database is NED 03 SEC , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM  
In & Out distances between contours are shown at closest points. 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.

# ***Exhibit 7a***

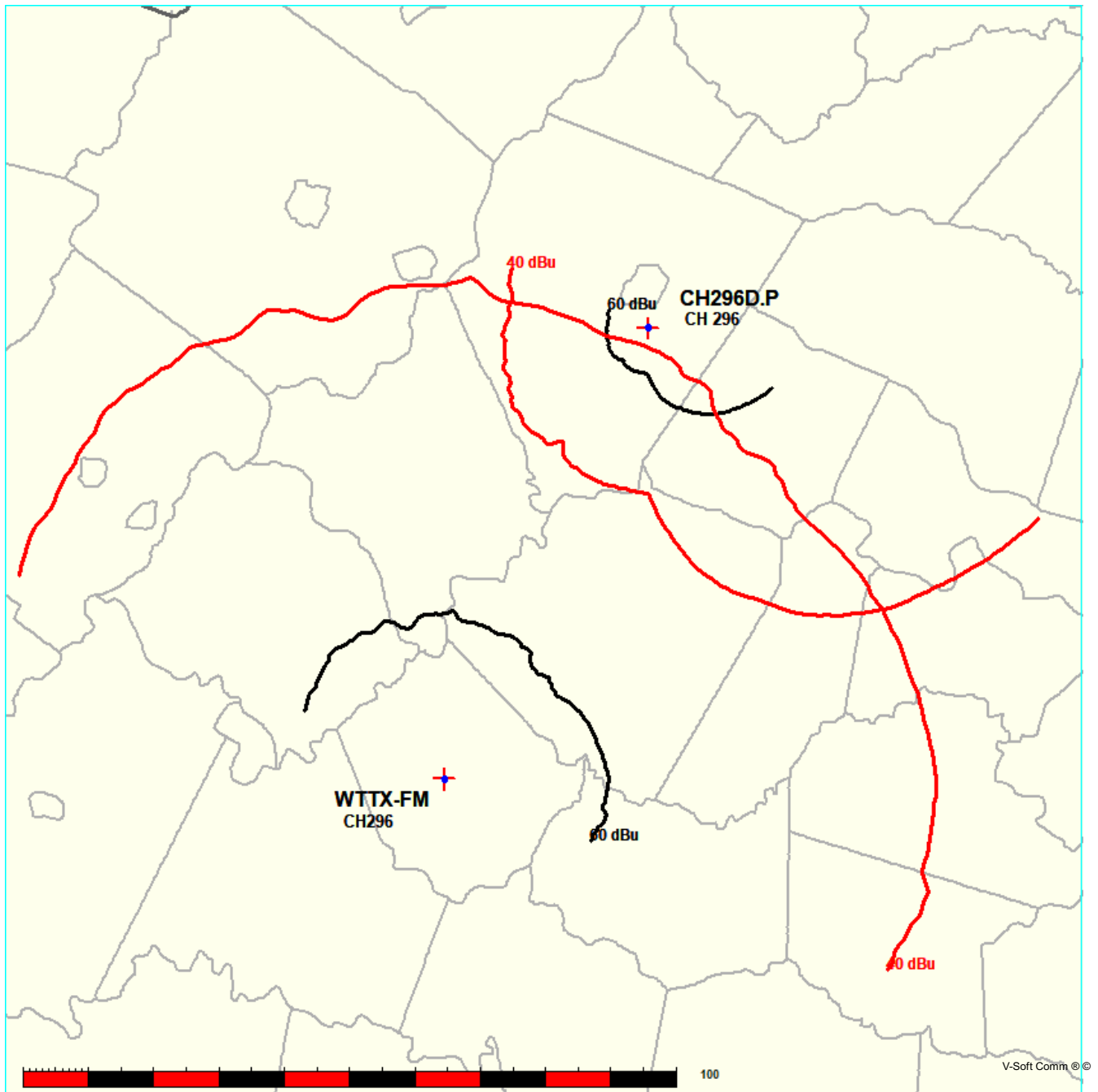
## **Contour Protection Studies Toward Select Allocation Concern(s)**

Tidewater Communications, LLC

FMCommander Single Allocation Study - 10-14-2021 - NED 03 SEC  
CH296D.P's Overlaps (In= -5.59 km, Out= 26.98 km)

CH296D.P CH 296 D DA  
Lat= 37 59 06.40, Lng= 78 28 47.40  
0.25 kW 320.1 m HAAT, 474.7 m COR  
Prot.= 60 dBu, Intef.= 40 dBu

WTTX-FM CH 296 A BMLED20060112AEE  
Lat= 37 22 19.50, Lng= 78 50 05.00  
1.7 kW 130 m HAAT, 341 m COR  
Prot.= 60 dBu, Intef.= 40 dBu



# ***Exhibit 7a***

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

10-14-2021

Terrain Data: NED 03 SEC

FMOVer Analysis

CH296D.P

WTTX-FM BMLED20060112AEE

Channel = 296D  
 Max ERP = 0.25 kW  
 RCAMSL = 474.7 m  
 N. Lat. 37 59 06.40  
 W. Lng. 78 28 47.40  
 Protected  
 60 dBu

Channel = 296A  
 Max ERP = 1.7 kW  
 RCAMSL = 341 m  
 N. Lat. 37 22 19.50  
 W. Lng. 78 50 05.00  
 Interfering  
 40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
164.0	000.0169	0333.4	012.2	031.4	001.7000	0119.7	066.2	41.49*	4.80
165.0	000.0156	0333.7	011.9	031.1	001.7000	0119.5	066.2	41.48*	4.76
166.0	000.0144	0334.9	011.7	030.9	001.7000	0119.9	066.2	41.50*	4.82
167.0	000.0132	0335.5	011.5	030.6	001.7000	0120.7	066.3	41.53*	4.94
168.0	000.0121	0336.7	011.2	030.3	001.7000	0122.3	066.3	41.61*	5.17
169.0	000.0110	0335.1	010.9	030.0	001.7000	0124.4	066.4	41.69*	5.43
170.0	000.0100	0334.4	010.7	029.8	001.7000	0125.9	066.5	41.74*	5.59
171.0	000.0090	0332.6	010.4	029.5	001.7000	0126.2	066.6	41.72*	5.52
172.0	000.0081	0330.2	010.0	029.2	001.7000	0126.7	066.8	41.70*	5.44
173.0	000.0072	0329.6	009.7	028.9	001.7000	0126.7	066.9	41.65*	5.30
174.0	000.0064	0330.7	009.4	028.6	001.7000	0126.7	067.1	41.60*	5.14
175.0	000.0056	0331.5	009.1	028.3	001.7000	0126.1	067.2	41.52*	4.87
176.0	000.0049	0332.2	008.7	028.1	001.7000	0126.2	067.4	41.45*	4.67
177.0	000.0042	0332.1	008.3	027.8	001.7000	0126.2	067.7	41.37*	4.42
178.0	000.0036	0333.9	008.0	027.5	001.7000	0126.2	068.0	41.29*	4.15
179.0	000.0030	0334.3	007.5	027.2	001.7000	0126.5	068.3	41.21*	3.89
180.0	000.0025	0335.7	007.1	027.0	001.7000	0127.3	068.6	41.14*	3.69
181.0	000.0025	0336.7	007.1	026.9	001.7000	0127.4	068.5	41.17*	3.77
182.0	000.0025	0335.7	007.1	026.8	001.7000	0127.5	068.5	41.19*	3.82
183.0	000.0025	0334.5	007.1	026.7	001.7000	0127.4	068.5	41.19*	3.85
184.0	000.0025	0332.5	007.0	026.6	001.7000	0127.2	068.4	41.20*	3.86
185.0	000.0025	0330.8	007.0	026.5	001.7000	0127.0	068.4	41.20*	3.86
186.0	000.0025	0329.5	007.0	026.4	001.7000	0126.9	068.4	41.20*	3.87
187.0	000.0025	0327.1	007.0	026.3	001.7000	0126.8	068.3	41.21*	3.89
188.0	000.0025	0326.0	007.0	026.2	001.7000	0126.8	068.3	41.22*	3.92
189.0	000.0025	0325.0	007.0	026.1	001.7000	0126.8	068.3	41.22*	3.94
190.0	000.0025	0325.1	007.0	026.0	001.7000	0126.6	068.2	41.23*	3.95
191.0	000.0025	0325.1	007.0	025.9	001.7000	0126.5	068.2	41.23*	3.97
192.0	000.0025	0323.4	007.0	025.8	001.7000	0126.4	068.2	41.23*	3.97
193.0	000.0025	0323.0	007.0	025.7	001.7000	0126.3	068.2	41.23*	3.97
194.0	000.0025	0324.3	007.0	025.6	001.7000	0126.1	068.1	41.23*	3.97
195.0	000.0025	0324.3	007.0	025.5	001.7000	0125.9	068.1	41.23*	3.97

# ***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)
196.0	000.0025	0324.8	007.0	025.4	001.7000	0125.8	068.1	41.23* 3.98
197.0	000.0025	0321.7	007.0	025.3	001.7000	0126.0	068.1	41.24* 4.00
198.0	000.0025	0321.0	007.0	025.2	001.7000	0126.1	068.1	41.25* 4.03
199.0	000.0025	0319.2	006.9	025.1	001.7000	0126.3	068.1	41.26* 4.06
200.0	000.0025	0317.4	006.9	025.0	001.7000	0126.1	068.1	41.25* 4.03
201.0	000.0025	0316.9	006.9	024.9	001.7000	0125.9	068.1	41.24* 4.00
202.0	000.0025	0316.3	006.9	024.8	001.7000	0125.7	068.1	41.23* 3.97
203.0	000.0025	0314.4	006.9	024.7	001.7000	0125.6	068.1	41.22* 3.94
204.0	000.0025	0312.6	006.9	024.6	001.7000	0125.7	068.1	41.22* 3.94
205.0	000.0025	0309.3	006.9	024.5	001.7000	0125.7	068.1	41.22* 3.92
206.0	000.0025	0305.8	006.8	024.4	001.7000	0125.7	068.1	41.21* 3.89
207.0	000.0025	0305.0	006.8	024.3	001.7000	0125.7	068.2	41.20* 3.87
208.0	000.0025	0307.6	006.8	024.2	001.7000	0125.7	068.1	41.21* 3.89
209.0	000.0025	0306.7	006.8	024.1	001.7000	0125.7	068.2	41.20* 3.87
210.0	000.0025	0302.6	006.8	024.0	001.7000	0125.7	068.2	41.19* 3.84
211.0	000.0025	0298.1	006.8	023.9	001.7000	0125.7	068.2	41.18* 3.79
212.0	000.0025	0295.5	006.7	023.8	001.7000	0125.7	068.3	41.16* 3.74
213.0	000.0025	0290.9	006.7	023.7	001.7000	0125.5	068.3	41.13* 3.65
214.0	000.0025	0280.8	006.6	023.6	001.7000	0125.3	068.5	41.08* 3.50
215.0	000.0025	0268.9	006.5	023.5	001.7000	0125.1	068.6	41.03* 3.31
216.0	000.0025	0254.5	006.3	023.5	001.7000	0124.9	068.8	40.96* 3.10
217.0	000.0025	0246.4	006.2	023.4	001.7000	0124.8	068.9	40.91* 2.96
218.0	000.0025	0257.0	006.3	023.3	001.7000	0124.6	068.8	40.93* 3.02
219.0	000.0025	0267.2	006.4	023.2	001.7000	0124.5	068.7	40.95* 3.08
220.0	000.0025	0282.1	006.6	023.1	001.7000	0124.3	068.6	40.98* 3.17
221.0	000.0025	0291.4	006.7	022.9	001.7000	0123.9	068.6	40.98* 3.17
222.0	000.0025	0291.2	006.7	022.8	001.7000	0123.7	068.6	40.96* 3.09
223.0	000.0025	0286.5	006.7	022.8	001.7000	0123.5	068.7	40.92* 2.98
224.0	000.0025	0287.7	006.7	022.7	001.7000	0123.3	068.7	40.90* 2.93
225.0	000.0025	0286.6	006.7	022.6	001.7000	0123.3	068.8	40.88* 2.86
226.0	000.0025	0290.9	006.7	022.5	001.7000	0123.2	068.8	40.88* 2.84
227.0	000.0025	0294.4	006.7	022.4	001.7000	0123.1	068.8	40.87* 2.82
228.0	000.0025	0297.9	006.8	022.3	001.7000	0123.2	068.8	40.87* 2.82
229.0	000.0025	0300.8	006.8	022.2	001.7000	0123.4	068.8	40.87* 2.81
230.0	000.0025	0303.2	006.8	022.1	001.7000	0123.4	068.9	40.86* 2.78
231.0	000.0025	0305.3	006.8	022.0	001.7000	0123.4	068.9	40.84* 2.73
232.0	000.0025	0304.5	006.8	021.9	001.7000	0123.3	069.0	40.82* 2.66
233.0	000.0025	0304.5	006.8	021.8	001.7000	0123.2	069.0	40.80* 2.59
234.0	000.0025	0300.4	006.8	021.8	001.7000	0123.2	069.1	40.77* 2.49
235.0	000.0025	0297.4	006.8	021.7	001.7000	0123.1	069.2	40.74* 2.39
236.0	000.0025	0298.0	006.8	021.6	001.7000	0123.0	069.3	40.71* 2.31
237.0	000.0025	0295.7	006.7	021.5	001.7000	0122.9	069.4	40.68* 2.21
238.0	000.0025	0298.5	006.8	021.4	001.7000	0122.9	069.4	40.66* 2.15
239.0	000.0025	0302.6	006.8	021.3	001.7000	0122.7	069.5	40.64* 2.08
240.0	000.0025	0303.3	006.8	021.3	001.7000	0122.5	069.5	40.61* 1.99
241.0	000.0025	0300.3	006.8	021.2	001.7000	0122.4	069.6	40.57* 1.86

# ***Exhibit 7a***

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

10-14-2021      Terrain Data: NED 03 SEC      FMOver Analysis

WTTX-FM    BMLED20060112AEE

CH296D.P

Channel = 296A  
 Max ERP = 1.7 kW  
 RCAMSL = 341 m  
 N. Lat. 37 22 19.50  
 W. Lng. 78 50 05.00  
 Protected  
     60 dBu

Channel = 296D  
 Max ERP = 0.25 kW  
 RCAMSL = 474.7 m  
 N. Lat. 37 59 06.40  
 W. Lng. 78 28 47.40  
 Interfering  
     40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
340.0	001.7000	0144.7	025.0	221.8	000.0025	0291.9	059.7	22.76	
341.0	001.7000	0141.4	024.8	221.4	000.0025	0292.5	059.5	22.88	
342.0	001.7000	0139.5	024.6	221.1	000.0025	0291.6	059.2	22.96	
343.0	001.7000	0133.1	024.2	220.4	000.0025	0287.5	059.1	22.86	
344.0	001.7000	0126.5	023.6	219.8	000.0025	0279.0	059.0	22.59	
345.0	001.7000	0123.9	023.4	219.4	000.0025	0272.8	058.8	22.46	
346.0	001.7000	0121.0	023.2	219.0	000.0025	0267.1	058.6	22.34	
347.0	001.7000	0121.1	023.2	218.8	000.0025	0264.4	058.3	22.37	
348.0	001.7000	0123.2	023.4	218.6	000.0025	0263.2	057.9	22.49	
349.0	001.7000	0127.8	023.7	218.6	000.0025	0263.3	057.3	22.71	
350.0	001.7000	0133.1	024.2	218.7	000.0025	0263.7	056.7	22.96	
351.0	001.7000	0136.8	024.4	218.6	000.0025	0262.9	056.2	23.13	
352.0	001.7000	0138.8	024.6	218.4	000.0025	0261.1	055.8	23.24	
353.0	001.7000	0141.3	024.8	218.3	000.0025	0259.5	055.4	23.36	
354.0	001.7000	0141.3	024.8	217.9	000.0025	0256.3	055.1	23.37	
355.0	001.7000	0140.7	024.7	217.6	000.0025	0252.2	054.8	23.33	
356.0	001.7000	0140.8	024.8	217.2	000.0025	0248.1	054.5	23.30	
357.0	001.7000	0141.2	024.8	216.9	000.0025	0246.1	054.2	23.35	
358.0	001.7000	0140.0	024.7	216.5	000.0025	0248.1	054.0	23.51	
359.0	001.7000	0140.1	024.7	216.1	000.0025	0252.6	053.7	23.77	
000.0	001.7000	0140.8	024.8	215.8	000.0025	0257.3	053.4	24.06	
001.0	001.7000	0142.4	024.9	215.5	000.0025	0261.6	053.1	24.35	
002.0	001.7000	0144.2	025.0	215.2	000.0025	0266.3	052.7	24.65	
003.0	001.7000	0148.1	025.3	215.0	000.0025	0269.6	052.3	24.96	
004.0	001.7000	0144.6	025.0	214.4	000.0025	0276.8	052.3	25.20	
005.0	001.7000	0136.3	024.4	213.6	000.0025	0284.8	052.6	25.33	
006.0	001.7000	0131.4	024.0	213.0	000.0025	0290.6	052.7	25.46	
007.0	001.7000	0129.4	023.9	212.6	000.0025	0293.7	052.7	25.58	
008.0	001.7000	0128.8	023.8	212.1	000.0025	0295.2	052.6	25.68	

## 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)
009.0	001.7000	0128.4	023.8	211.7	000.0025	0296.4	052.4	25.77
010.0	001.7000	0128.9	023.8	211.3	000.0025	0297.1	052.2	25.87
011.0	001.7000	0129.3	023.9	210.9	000.0025	0298.8	052.1	25.99
012.0	001.7000	0129.1	023.8	210.4	000.0025	0300.7	051.9	26.10
013.0	001.7000	0127.5	023.7	210.0	000.0025	0302.8	051.9	26.17
014.0	001.7000	0127.4	023.7	209.5	000.0025	0304.8	051.8	26.28
015.0	001.7000	0126.5	023.6	209.0	000.0025	0306.6	051.8	26.35
016.0	001.7000	0125.7	023.6	208.6	000.0025	0307.6	051.8	26.39
017.0	001.7000	0125.8	023.6	208.1	000.0025	0307.9	051.7	26.44
018.0	001.7000	0123.6	023.4	207.7	000.0025	0307.0	051.8	26.37
019.0	001.7000	0122.1	023.3	207.2	000.0025	0305.7	051.8	26.31
020.0	001.7000	0120.8	023.2	206.7	000.0025	0304.3	051.9	26.24
021.0	001.7000	0121.8	023.3	206.3	000.0025	0304.9	051.8	26.31
022.0	001.7000	0123.4	023.4	205.9	000.0025	0306.3	051.6	26.42
023.0	001.7000	0124.1	023.5	205.4	000.0025	0307.9	051.5	26.50
024.0	001.7000	0125.7	023.6	205.0	000.0025	0309.5	051.4	26.60
025.0	001.7000	0126.2	023.6	204.5	000.0025	0310.9	051.4	26.66
026.0	001.7000	0126.6	023.7	204.0	000.0025	0312.5	051.3	26.72
027.0	001.7000	0127.3	023.7	203.6	000.0025	0313.5	051.3	26.76
028.0	001.7000	0126.2	023.6	203.1	000.0025	0314.2	051.4	26.74
029.0	001.7000	0126.7	023.7	202.7	000.0025	0314.9	051.4	26.77
030.0	001.7000	0124.7	023.5	202.2	000.0025	0315.9	051.6	26.71
031.0	001.7000	0119.7	023.1	201.8	000.0025	0316.3	052.1	26.55
032.0	001.7000	0120.8	023.2	201.4	000.0025	0316.4	052.1	26.56
033.0	001.7000	0122.5	023.3	200.9	000.0025	0317.0	052.0	26.60
034.0	001.7000	0122.8	023.4	200.5	000.0025	0317.2	052.1	26.58
035.0	001.7000	0120.2	023.1	200.1	000.0025	0317.3	052.4	26.46
036.0	001.7000	0111.4	022.4	199.9	000.0025	0317.5	053.2	26.14
037.0	001.7000	0107.9	022.0	199.6	000.0025	0318.2	053.7	25.99
038.0	001.7000	0106.1	021.9	199.3	000.0025	0318.8	054.0	25.90
039.0	001.7000	0101.9	021.4	199.1	000.0025	0319.1	054.5	25.70
040.0	001.7000	0102.3	021.5	198.7	000.0025	0319.9	054.6	25.69
041.0	001.7000	0102.9	021.5	198.3	000.0025	0320.4	054.7	25.68
042.0	001.7000	0100.3	021.3	198.1	000.0025	0320.9	055.1	25.54
043.0	001.7000	0099.9	021.2	197.7	000.0025	0321.3	055.3	25.47
044.0	001.7000	0103.0	021.5	197.2	000.0025	0321.6	055.1	25.53
045.0	001.7000	0105.3	021.8	196.8	000.0025	0322.3	055.1	25.57
046.0	001.7000	0107.5	022.0	196.3	000.0025	0323.9	055.1	25.63
047.0	001.7000	0108.9	022.1	195.9	000.0025	0324.8	055.2	25.63
048.0	001.7000	0105.0	021.7	195.8	000.0025	0324.8	055.7	25.42
049.0	001.7000	0105.4	021.8	195.4	000.0025	0324.4	055.9	25.34
050.0	001.7000	0102.9	021.5	195.2	000.0025	0324.3	056.3	25.17
051.0	001.7000	0100.9	021.3	195.1	000.0025	0324.3	056.7	25.02
052.0	001.7000	0101.5	021.4	194.7	000.0025	0324.3	056.9	24.96
053.0	001.7000	0100.5	021.3	194.5	000.0025	0324.3	057.2	24.84

# ***Exhibit 7b***

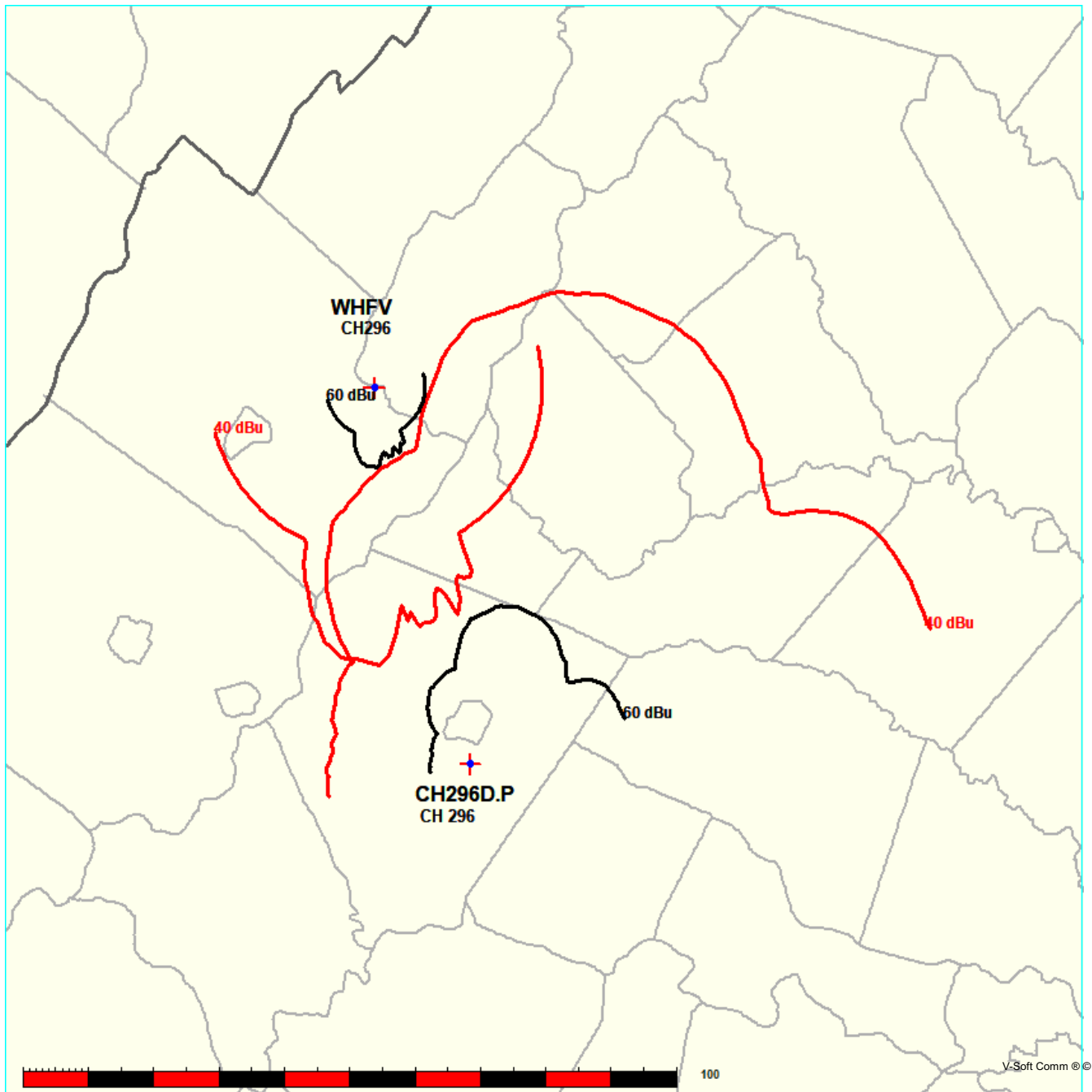
## **Contour Protection Studies Toward Select Allocation Concern(s)**

Tidewater Communications, LLC

FMCommander Single Allocation Study - 10-14-2021 - NED 03 SEC  
CH296D.P's Overlaps (In= 2.31 km, Out= 0.61 km)

CH296D.P CH 296 D DA  
Lat= 37 59 06.40, Lng= 78 28 47.40  
0.25 kW 320.1 m HAAT, 474.7 m COR  
Prot.= 60 dBu, Intef.= 40 dBu

WHFV CH 296 A 73.215 N BLED20141031AAS  
Lat= 38 29 48.30, Lng= 78 38 51.10  
0.33 kW -64.9 m HAAT, 393.2 m COR  
Prot.= 60 dBu, Intef.= 40 dBu



# ***Exhibit 7b***

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

10-14-2021

Terrain Data: NED 03 SEC

FMOver Analysis

CH296D.P

WHFV BLED20141031AAS

Channel = 296D  
 Max ERP = 0.25 kW  
 RCAMSL = 474.7 m  
 N. Lat. 37 59 06.40  
 W. Lng. 78 28 47.40  
 Protected  
 60 dBu

Channel = 296A  
 Max ERP = 0.33 kW  
 RCAMSL = 393.2 m  
 N. Lat. 38 29 48.30  
 W. Lng. 78 38 51.10  
 Interfering  
 40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
305.0	000.2500	0295.2	022.4	184.8	000.3300	0075.3	044.2	38.94	
306.0	000.2500	0298.0	022.5	184.6	000.3300	0075.2	043.8	39.08	
307.0	000.2500	0296.7	022.4	184.3	000.3300	0075.0	043.5	39.18	
308.0	000.2500	0299.1	022.5	184.1	000.3300	0075.0	043.1	39.32	
309.0	000.2500	0297.5	022.5	183.7	000.3300	0075.2	042.9	39.45	
310.0	000.2500	0294.2	022.3	183.3	000.3300	0075.6	042.6	39.58	
311.0	000.2500	0299.4	022.5	183.2	000.3300	0075.6	042.2	39.74	
312.0	000.2500	0302.3	022.6	183.0	000.3300	0075.6	041.8	39.89	
313.0	000.2500	0303.9	022.7	182.7	000.3300	0075.4	041.5	40.00	
314.0	000.2500	0306.2	022.8	182.4	000.3300	0075.3	041.1	40.13*	0.33
315.0	000.2500	0312.2	023.0	182.3	000.3300	0075.3	040.7	40.30*	0.77
316.0	000.2500	0310.0	022.9	181.8	000.3300	0076.1	040.4	40.48*	1.23
317.0	000.2500	0307.2	022.8	181.3	000.3300	0076.5	040.2	40.61*	1.55
318.0	000.2500	0307.3	022.8	180.9	000.3300	0076.8	039.9	40.76*	1.91
319.0	000.2500	0309.3	022.9	180.5	000.3300	0077.3	039.6	40.93*	2.36
320.0	000.2500	0311.6	023.0	180.2	000.3300	0077.2	039.3	41.06*	2.66
321.0	000.2500	0309.9	022.9	179.6	000.3300	0076.9	039.1	41.10*	2.77
322.0	000.2500	0309.8	022.9	179.2	000.3300	0077.9	038.8	41.31*	3.29
323.0	000.2500	0307.7	022.8	178.6	000.3300	0077.3	038.7	41.33*	3.32
324.0	000.2500	0308.5	022.9	178.2	000.3300	0076.0	038.4	41.28*	3.20
325.0	000.2500	0307.5	022.8	177.7	000.3300	0074.1	038.2	41.16*	2.90
326.0	000.2500	0304.8	022.7	177.1	000.3300	0072.7	038.1	41.06*	2.65
327.0	000.2500	0305.4	022.8	176.6	000.3300	0070.4	037.9	40.89*	2.21
328.0	000.2500	0308.3	022.9	176.1	000.3300	0067.2	037.6	40.65*	1.62
329.0	000.2500	0310.5	022.9	175.6	000.3300	0064.5	037.3	40.44*	1.09
330.0	000.2500	0311.5	023.0	175.1	000.3300	0061.0	037.1	40.10*	0.25
331.0	000.2500	0311.9	023.0	174.5	000.3300	0057.5	037.0	39.74	
332.0	000.2500	0311.7	023.0	174.0	000.3300	0053.9	036.8	39.26	
333.0	000.2500	0308.7	022.9	173.3	000.3300	0049.5	036.8	38.58	
334.0	000.2500	0309.5	022.9	172.8	000.3300	0050.9	036.6	38.88	
335.0	000.2500	0310.1	022.9	172.2	000.3300	0056.0	036.5	39.72	
336.0	000.2500	0310.3	022.9	171.6	000.3300	0055.1	036.3	39.64	

# ***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)
337.0	000.2500	0311.5	023.0	171.0	000.3300	0052.5	036.2	39.29
338.0	000.2500	0313.6	023.1	170.4	000.3300	0054.5	036.0	39.68
339.0	000.2500	0313.8	023.1	169.8	000.3300	0058.1	035.9	40.22* 0.55
340.0	000.2500	0316.2	023.1	169.1	000.3300	0059.5	035.8	40.47* 1.15
341.0	000.2500	0316.5	023.2	168.5	000.3300	0058.8	035.7	40.41* 0.99
342.0	000.2500	0318.1	023.2	167.9	000.3300	0057.9	035.6	40.32* 0.79
343.0	000.2500	0322.7	023.4	167.2	000.3300	0058.5	035.4	40.49* 1.19
344.0	000.2500	0322.0	023.3	166.6	000.3300	0058.0	035.4	40.42* 1.04
345.0	000.2500	0324.8	023.4	165.9	000.3300	0059.0	035.3	40.60* 1.46
346.0	000.2500	0324.5	023.4	165.3	000.3300	0057.1	035.3	40.34* 0.83
347.0	000.2500	0324.2	023.4	164.6	000.3300	0054.1	035.3	39.89
348.0	000.2500	0326.4	023.5	163.9	000.3300	0048.2	035.3	38.95
349.0	000.2500	0325.4	023.5	163.3	000.3300	0045.7	035.3	38.48
350.0	000.2500	0325.7	023.5	162.6	000.3300	0047.2	035.4	38.73
351.0	000.2500	0326.9	023.5	161.9	000.3300	0047.3	035.4	38.75
352.0	000.2500	0331.8	023.7	161.2	000.3300	0048.2	035.3	38.95
353.0	000.2500	0332.9	023.7	160.6	000.3300	0054.6	035.3	39.97
354.0	000.2500	0331.0	023.7	159.9	000.3300	0059.2	035.5	40.54* 1.32
355.0	000.2500	0332.4	023.7	159.3	000.3300	0058.2	035.6	40.38* 0.93
356.0	000.2500	0336.9	023.9	158.6	000.3300	0054.8	035.5	39.92
357.0	000.2500	0335.5	023.8	158.0	000.3300	0052.6	035.7	39.50
358.0	000.2500	0332.8	023.7	157.4	000.3300	0048.2	035.9	38.69
359.0	000.2500	0330.8	023.6	156.8	000.3300	0045.7	036.2	38.16
000.0	000.2500	0331.8	023.7	156.2	000.3300	0044.4	036.3	37.88
001.0	000.2500	0331.5	023.7	155.6	000.3300	0045.3	036.5	37.97
002.0	000.2500	0330.2	023.6	155.0	000.3300	0046.3	036.7	38.07
003.0	000.2500	0329.9	023.6	154.5	000.3300	0048.1	036.9	38.30
004.0	000.2500	0330.4	023.6	153.9	000.3300	0046.3	037.1	37.93
005.0	000.2500	0332.9	023.7	153.3	000.3300	0045.1	037.2	37.66
006.0	000.2500	0332.3	023.7	152.8	000.3300	0048.2	037.4	38.11
007.0	000.2500	0333.9	023.8	152.2	000.3300	0047.3	037.6	37.88
008.0	000.2500	0337.9	023.9	151.6	000.3300	0041.4	037.8	36.75
009.0	000.2500	0340.4	024.0	151.0	000.3300	0035.7	038.0	35.57
010.0	000.2500	0342.4	024.0	150.4	000.3300	0031.7	038.2	34.67
011.0	000.2500	0346.7	024.2	149.8	000.3300	0028.5	038.3	34.26
012.0	000.2500	0347.3	024.2	149.3	000.3300	0023.7	038.6	34.17
013.0	000.2500	0348.6	024.2	148.8	000.3300	0018.2	038.8	34.09
014.0	000.2500	0352.6	024.4	148.3	000.3300	0017.4	039.1	34.02
015.0	000.2500	0355.3	024.5	147.7	000.3300	0022.4	039.3	33.94
016.0	000.2500	0357.6	024.5	147.2	000.3300	0027.7	039.6	33.85
017.0	000.2500	0358.4	024.6	146.8	000.3300	0027.7	039.9	33.75
018.0	000.2500	0356.6	024.5	146.5	000.3300	0025.2	040.2	33.64
019.0	000.2500	0356.5	024.5	146.1	000.3300	0021.9	040.6	33.53
020.0	000.2500	0354.7	024.4	145.8	000.3300	0018.5	041.0	33.42
021.0	000.2500	0354.5	024.4	145.5	000.3300	0014.4	041.3	33.31

# ***Exhibit 7b***

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

10-14-2021      Terrain Data: NED 03 SEC      FMOver Analysis

WHFV    BLED20141031AAS

CH296D.P

Channel = 296A  
 Max ERP = 0.33 kW  
 RCAMSL = 393.2 m  
 N. Lat. 38 29 48.30  
 W. Lng. 78 38 51.10  
 Protected  
     60 dBu

Channel = 296D  
 Max ERP = 0.25 kW  
 RCAMSL = 474.7 m  
 N. Lat. 37 59 06.40  
 W. Lng. 78 28 47.40  
 Interfering  
     40 dBu

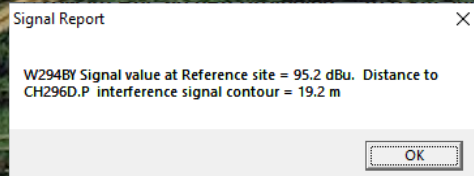
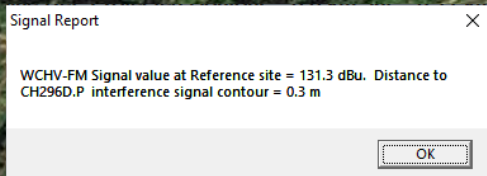
Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
121.0	000.3300	-0047.7	007.6	351.3	000.0485	0328.4	053.6	39.24	
122.0	000.3300	-0029.8	007.6	351.2	000.0476	0328.0	053.5	39.18	
123.0	000.3300	-0025.8	007.6	351.1	000.0467	0327.5	053.4	39.12	
124.0	000.3300	-0032.6	007.6	351.0	000.0458	0327.0	053.3	39.06	
125.0	000.3300	-0036.3	007.6	350.9	000.0448	0326.8	053.2	38.99	
126.0	000.3300	-0037.4	007.6	350.8	000.0439	0326.7	053.1	38.93	
127.0	000.3300	-0030.5	007.6	350.7	000.0429	0326.7	053.0	38.87	
128.0	000.3300	-0028.3	007.6	350.6	000.0419	0326.7	052.9	38.80	
129.0	000.3300	-0033.6	007.6	350.5	000.0409	0326.6	052.8	38.73	
130.0	000.3300	-0032.4	007.6	350.4	000.0399	0326.2	052.7	38.64	
131.0	000.3300	-0031.8	007.6	350.3	000.0389	0325.8	052.6	38.55	
132.0	000.3300	-0032.6	007.6	350.2	000.0378	0325.7	052.6	38.46	
133.0	000.3300	-0037.2	007.6	350.1	000.0368	0325.7	052.5	38.38	
134.0	000.3300	-0041.7	007.6	350.0	000.0361	0325.7	052.4	38.32	
135.0	000.3300	-0040.2	007.6	349.8	000.0360	0325.7	052.3	38.34	
136.0	000.3300	-0032.4	007.6	349.7	000.0359	0325.8	052.3	38.36	
137.0	000.3300	-0021.4	007.6	349.6	000.0359	0325.8	052.2	38.38	
138.0	000.3300	-0018.5	007.6	349.5	000.0358	0325.7	052.1	38.40	
139.0	000.3300	-0023.7	007.6	349.4	000.0357	0325.5	052.0	38.41	
140.0	000.3300	-0028.2	007.6	349.2	000.0357	0325.5	052.0	38.43	
141.0	000.3300	-0025.7	007.6	349.1	000.0356	0325.5	051.9	38.44	
142.0	000.3300	-0019.4	007.6	349.0	000.0355	0325.4	051.9	38.45	
143.0	000.3300	-0014.9	007.6	348.8	000.0354	0325.4	051.8	38.47	
144.0	000.3300	-0004.5	007.6	348.7	000.0354	0325.5	051.7	38.48	
145.0	000.3300	0008.1	007.6	348.6	000.0353	0325.6	051.7	38.50	
146.0	000.3300	0020.8	007.6	348.4	000.0352	0325.7	051.6	38.51	
147.0	000.3300	0028.2	007.6	348.3	000.0351	0325.8	051.6	38.52	
148.0	000.3300	0019.5	007.6	348.2	000.0351	0326.1	051.5	38.54	
149.0	000.3300	0020.1	007.6	348.0	000.0350	0326.4	051.5	38.56	
150.0	000.3300	0030.0	007.6	347.9	000.0349	0326.0	051.5	38.56	
151.0	000.3300	0035.8	008.3	348.0	000.0349	0326.3	050.8	38.84	
152.0	000.3300	0045.4	009.4	348.2	000.0351	0326.1	049.6	39.29	
153.0	000.3300	0047.0	009.6	348.0	000.0350	0326.4	049.4	39.38	

***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)
154.0	000.3300	0046.8	009.6	347.8	000.0349	0325.8	049.4	39.35
155.0	000.3300	0046.6	009.6	347.6	000.0348	0325.1	049.4	39.32
156.0	000.3300	0044.6	009.3	347.4	000.0346	0324.7	049.5	39.22
157.0	000.3300	0046.6	009.6	347.3	000.0346	0324.7	049.3	39.31
158.0	000.3300	0052.9	010.2	347.2	000.0345	0324.6	048.6	39.58
159.0	000.3300	0056.6	010.6	347.0	000.0344	0324.3	048.2	39.70
160.0	000.3300	0058.8	010.8	346.9	000.0343	0324.0	048.0	39.76
161.0	000.3300	0050.4	010.0	346.5	000.0342	0323.3	048.8	39.41
162.0	000.3300	0047.5	009.7	346.3	000.0340	0323.6	049.1	39.29
163.0	000.3300	0046.2	009.5	346.1	000.0339	0324.3	049.2	39.25
164.0	000.3300	0048.9	009.8	345.9	000.0338	0324.8	048.9	39.36
165.0	000.3300	0056.2	010.6	345.7	000.0337	0324.9	048.2	39.64
166.0	000.3300	0058.6	010.8	345.5	000.0336	0325.1	048.0	39.72
167.0	000.3300	0058.6	010.8	345.3	000.0335	0325.3	048.0	39.71
168.0	000.3300	0058.3	010.8	345.1	000.0333	0325.0	048.0	39.67
169.0	000.3300	0059.7	010.9	344.8	000.0332	0324.3	047.9	39.67
170.0	000.3300	0056.5	010.6	344.6	000.0331	0323.6	048.2	39.52
171.0	000.3300	0052.5	010.2	344.5	000.0330	0323.0	048.6	39.33
172.0	000.3300	0056.4	010.6	344.2	000.0329	0322.1	048.2	39.42
173.0	000.3300	0049.7	009.9	344.1	000.0328	0322.0	048.9	39.14
174.0	000.3300	0054.1	010.4	343.8	000.0327	0322.1	048.5	39.29
175.0	000.3300	0060.4	010.9	343.5	000.0325	0322.3	048.0	39.47
176.0	000.3300	0066.7	011.4	343.1	000.0323	0322.7	047.6	39.62
177.0	000.3300	0072.6	011.8	342.8	000.0321	0322.0	047.2	39.72
178.0	000.3300	0075.2	012.0	342.5	000.0319	0320.3	047.1	39.70
179.0	000.3300	0077.9	012.2	342.1	000.0318	0318.6	047.0	39.67
180.0	000.3300	0076.9	012.1	341.9	000.0316	0317.8	047.1	39.58
181.0	000.3300	0076.8	012.1	341.7	000.0315	0317.1	047.2	39.51
182.0	000.3300	0075.6	012.0	341.5	000.0314	0316.8	047.3	39.43
183.0	000.3300	0075.6	012.0	341.2	000.0313	0316.7	047.4	39.37
184.0	000.3300	0075.0	012.0	341.0	000.0312	0316.6	047.5	39.31
185.0	000.3300	0075.3	012.0	340.8	000.0310	0316.1	047.6	39.25
186.0	000.3300	0075.4	012.0	340.5	000.0309	0316.1	047.7	39.20
187.0	000.3300	0075.0	012.0	340.3	000.0308	0316.5	047.8	39.15
188.0	000.3300	0072.8	011.8	340.2	000.0307	0316.6	048.0	39.05
189.0	000.3300	0071.0	011.7	340.1	000.0307	0316.3	048.2	38.94
190.0	000.3300	0069.7	011.6	339.9	000.0305	0315.9	048.4	38.85
191.0	000.3300	0068.6	011.5	339.8	000.0304	0315.5	048.6	38.74
192.0	000.3300	0065.5	011.3	339.7	000.0304	0315.3	048.9	38.62
193.0	000.3300	0062.3	011.1	339.7	000.0303	0315.3	049.2	38.49
194.0	000.3300	0058.1	010.7	339.7	000.0304	0315.3	049.6	38.34
195.0	000.3300	0056.9	010.6	339.6	000.0303	0315.1	049.8	38.25
196.0	000.3300	0054.8	010.4	339.5	000.0302	0315.1	050.0	38.14
197.0	000.3300	0051.6	010.1	339.6	000.0303	0315.2	050.4	38.01

## Exhibit 8

### §74.1204(d) 2nd/3rd Adjacent Channel Given Interference Waiver Request



Yellow Highlighted Text denotes a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WCHV-FM - Charlottesville, VA (CH298A) and W294BY - Charlottesville, VA (CH294D) as noted in **Exhibit 8**. The Interference Contour at the proposed Translator site has been calculated to be no less than the 135.2 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 dBu ratio. As seen in the 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 multiple dedicated transmitter buildings located at the remote mountain top site. However, structures of this nature have been exempt as a matter of FCC Policy (see similar grant under BPFT-20160725ABE).

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

Multiple dedicated transmitter buildings. Structures of this nature have been exempt as a matter of FCC Policy (see similar grant under BPFT-20160725ABE).

**Site Coordinates** (NGS NADCON)

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum:	37 59 5.89398	78 28 48.35907
NAD 83 datum:	37 59 6.40000	78 28 47.40000

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

Google Earth Pro™  
Account #4375669785  
Used with Permission

Google Earth

300 ft

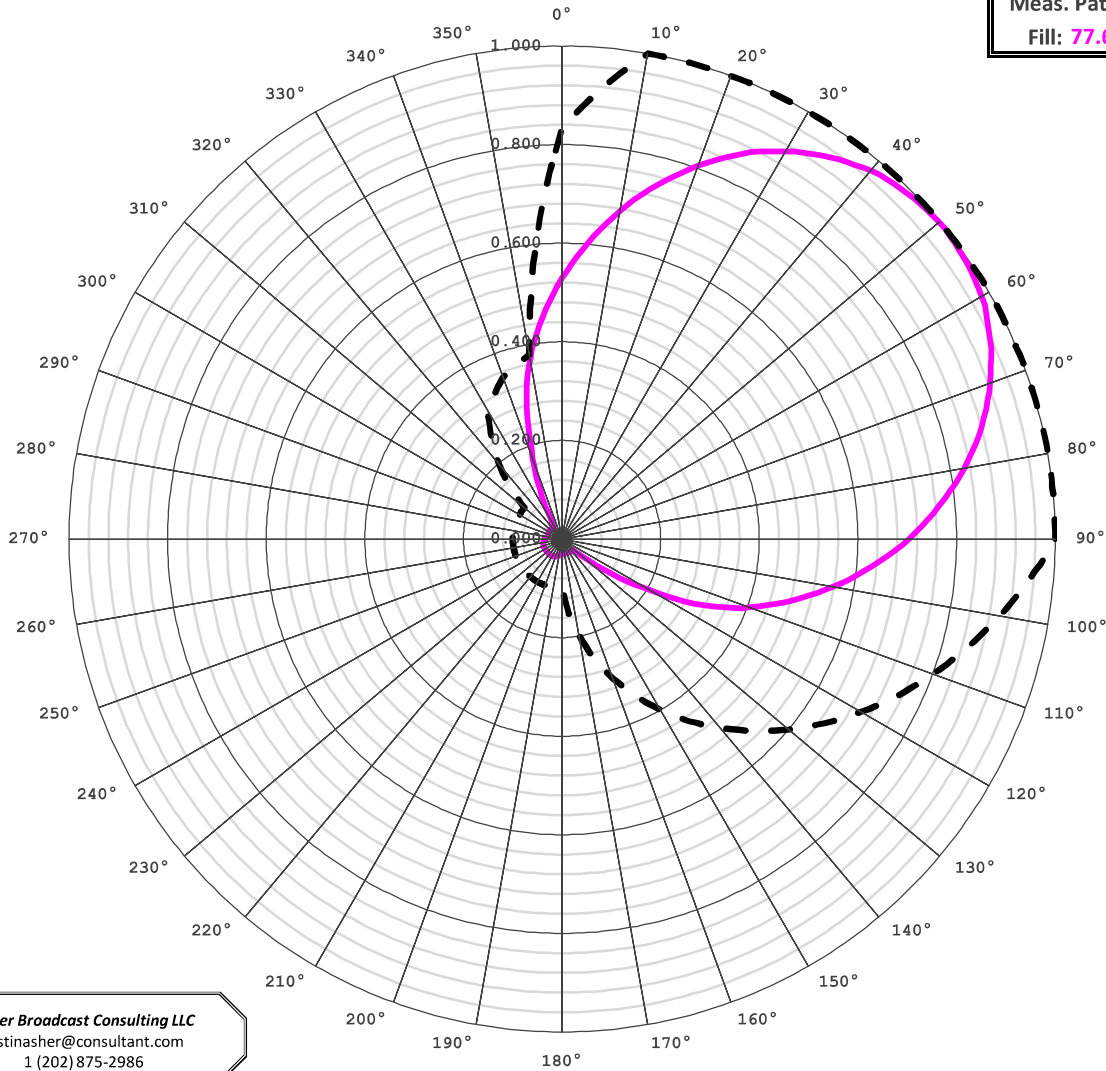


Manufacturer's	Make/Model	Orientation	Power
Element 1:	CL-FM(Slant45)	051° True	100.0%
Element 2:			
Element 3:			
Element 4:			

Composite Power: 100%

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

Meas. Pattern  
Fill: 77.6%



Azimuth ° True	FCC Pattern	Manufacturer's Pattern
0°	0.835	0.529
10°	1.000	0.676
20°	1.000	0.806
30°	1.000	0.908
40°	1.000	0.975
50°	1.000	0.999
60°	1.000	0.983
70°	1.000	0.924
80°	1.000	0.829
90°	1.000	0.704
100°	0.900	0.559
110°	0.800	0.406
120°	0.700	0.212
130°	0.600	0.062
140°	0.500	0.030
150°	0.400	0.030
160°	0.300	0.030
170°	0.200	0.030
180°	0.100	0.030
190°	0.100	0.033
200°	0.100	0.038
210°	0.100	0.040
220°	0.100	0.040
230°	0.100	0.040
240°	0.100	0.040
250°	0.100	0.040
260°	0.100	0.039
270°	0.100	0.034
280°	0.100	0.030
290°	0.100	0.030
300°	0.100	0.030
310°	0.100	0.030
320°	0.200	0.030
330°	0.300	0.046
340°	0.350	0.174
350°	0.380	0.372

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

Allocation (FCC) Pattern: ---  
Manufacturer's Pattern: ———

## Exhibit 8

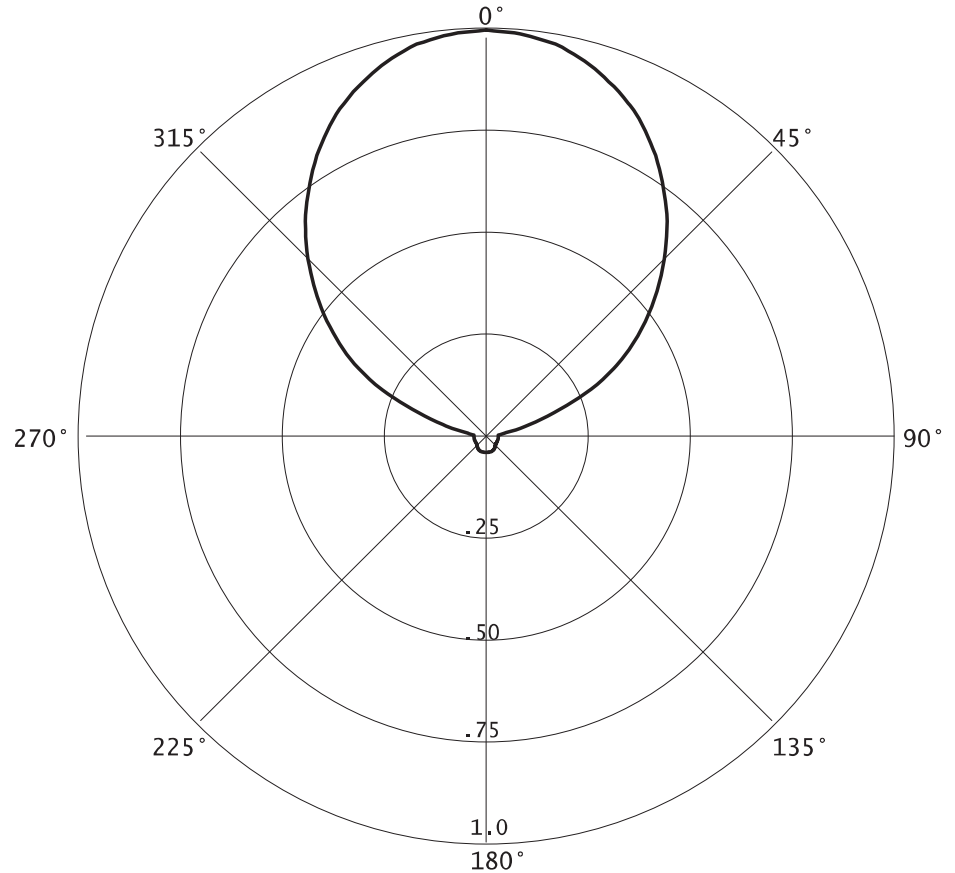
# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°T) (public record copy)

### CL-FM(Slant-45) COMPOSITE PATTERN

RMS(V)= .468

Graph is Relative Field

Azi	Field	dBk
000	1.000	00.000
010	0.980	-00.175
020	0.916	-00.762
030	0.817	-01.756
040	0.690	-03.223
050	0.544	-05.288
060	0.390	-08.179
070	0.190	-14.425
080	0.050	-26.021
090	0.030	-30.458
100	0.030	-30.458
110	0.030	-30.458
120	0.030	-30.458
130	0.030	-30.458
140	0.034	-29.370
150	0.038	-28.404
160	0.040	-27.959
170	0.040	-27.959
180	0.040	-27.959
190	0.040	-27.959
200	0.040	-27.959
210	0.038	-28.404
220	0.034	-29.370
230	0.030	-30.458
240	0.030	-30.458
250	0.030	-30.458
260	0.030	-30.458
270	0.030	-30.458
280	0.050	-26.021
290	0.190	-14.425
300	0.390	-08.179
310	0.544	-05.288
320	0.690	-03.223
330	0.817	-01.756
340	0.916	-00.762
350	0.980	-00.175



The directional antenna pattern will be produced by means of a Scala Log Periodic CL-FM broadcast element mounted at a 45° (degree) slant orientation to achieve horizontal and vertical polarization. The CL-FM(Slant-45) Directional Pattern is therefore a maximum composite pattern of the current CL-FM(Horizontal) and CL-FM(Vertical) broadcast patterns as notified by the Scala Division (Kathrein-Scala) of Kathrein, Inc.

The maximum antenna gain for a single CL-FM(Slant-45) element will be 4.0 dBd or the common Horizontal or Vertical maximum antenna gain of 7.0 dBd adjusted by 3 dBd for dual broadcast in the Horizontal and Vertical planes (4.0 dBd = 7.0 dBd - 3.0 dBd). The maximum gain for multiple bay options of the Scala CL-FM(Slant-45) antenna would therefore also be adjusted by -3 dBd to account for operation in the Horizontal and Vertical planes.

The antenna proposed in this application will be mounted in accordance with specific instructions provided by the antenna manufacturer. The directional antenna will be mounted on the tower which is of uniform cross section. No other antennas of any type are or will be mounted on the same tower level as the directional antenna.

No antenna is or will be mounted within any vertical or horizontal distance specified by the antenna manufacturer as being necessary for proper operation of the directional antenna. In addition, the antenna will be assembled under the supervision of a qualified engineer and installed pursuant to the manufacturer's instructions and manufacturer specified antenna orientation.

## Exhibit 8

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°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

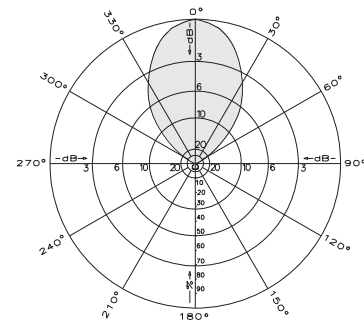
<b>CL-FM/HCM</b>	5.31 ft <sup>2</sup> (0.494 m <sup>2</sup> )
<b>CL-FM/HRM</b>	5.86 ft <sup>2</sup> (0.544 m <sup>2</sup> )
<b>CL-FM/VRM</b>	5.86 ft <sup>2</sup> (0.544 m <sup>2</sup> )
Wind survival rating*	120 mph (200 kph)
Shipping dimensions	116 x 14.5 x 6 inches (2946 x 369 x 153 mm)
Shipping weight	56 lb (25.4 kg)
Mounting	For masts of 2.375 inches (60 mm) OD.
<b>CL-FM/HCM</b>	Horizontal polarization center-mount
<b>CL-FM/HRM</b>	Horizontal polarization rear-mount
<b>CL-FM/VRM</b>	Vertical polarization rear-mount

See reverse for order information.

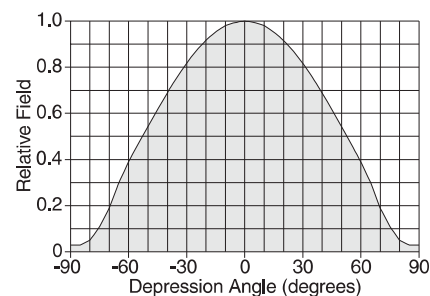
\* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.



10492-D



Azimuth pattern (E-plane)



Elevation pattern (H-plane)

## Exhibit 8

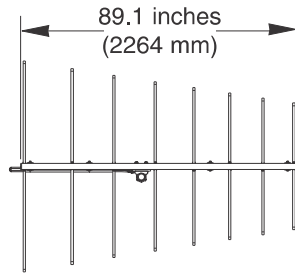
# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°T) (public record copy)

### CL-FM

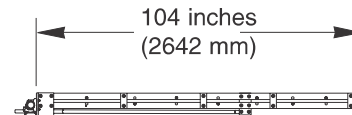
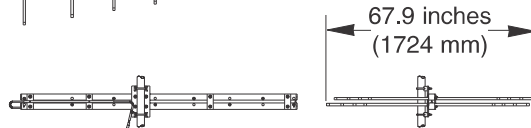
#### FM LOG-PERIODIC ANTENNA

7 dBd gain

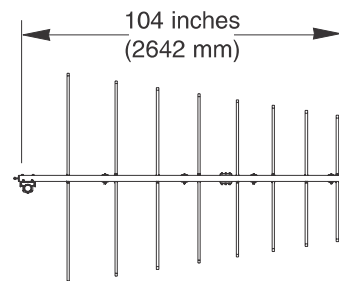
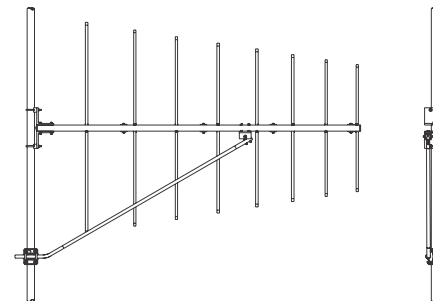
88–108 MHz



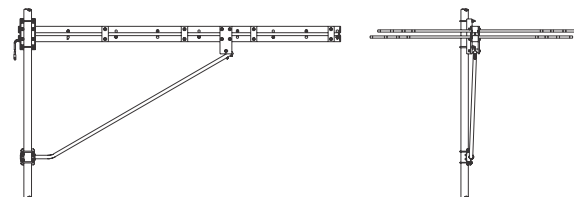
**CL-FM/HCM**  
Horizontally polarized



**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

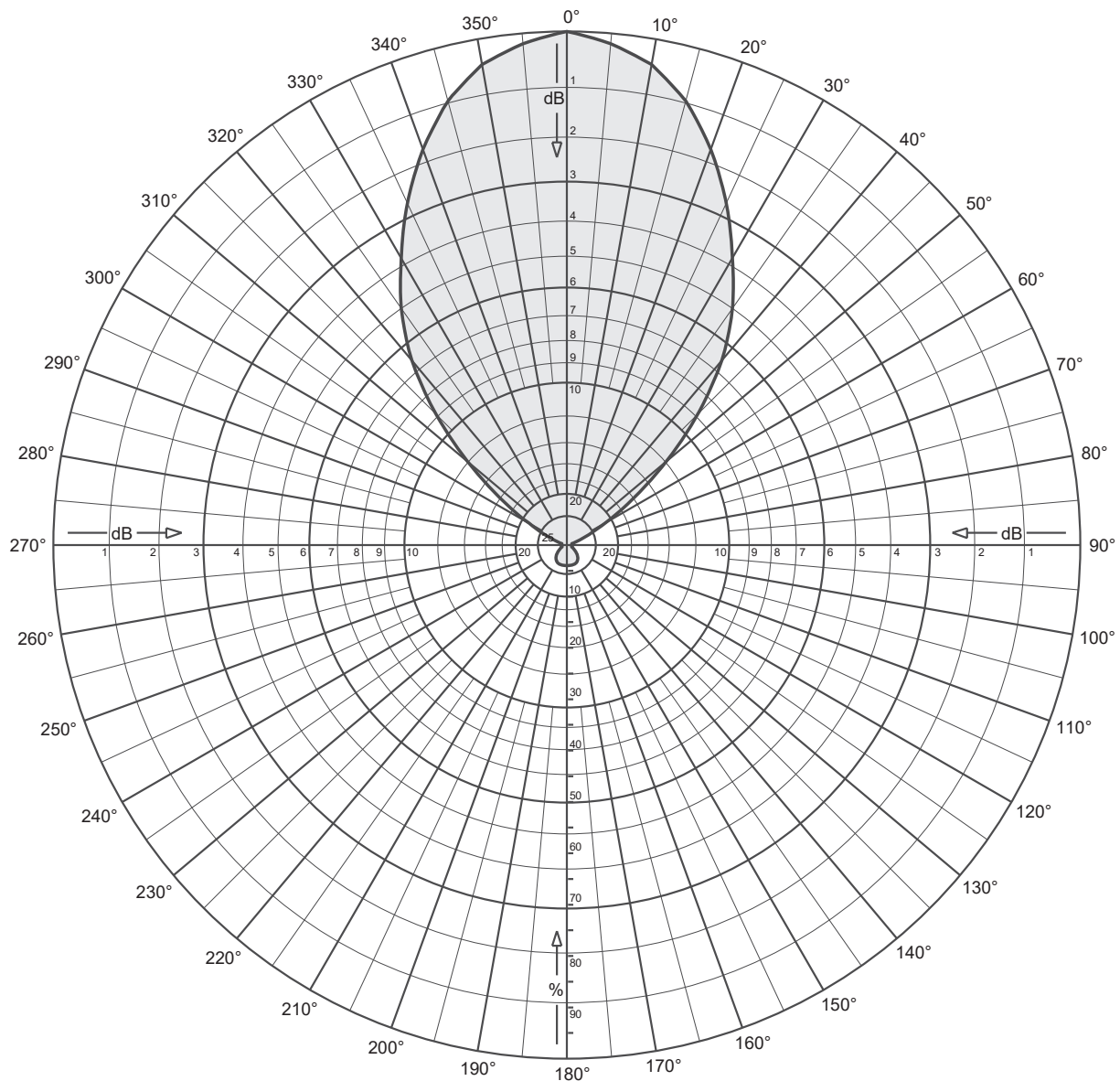
#### Order Information:

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 8

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt



## Exhibit 8

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°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 8

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°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 8

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°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 8

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 051.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

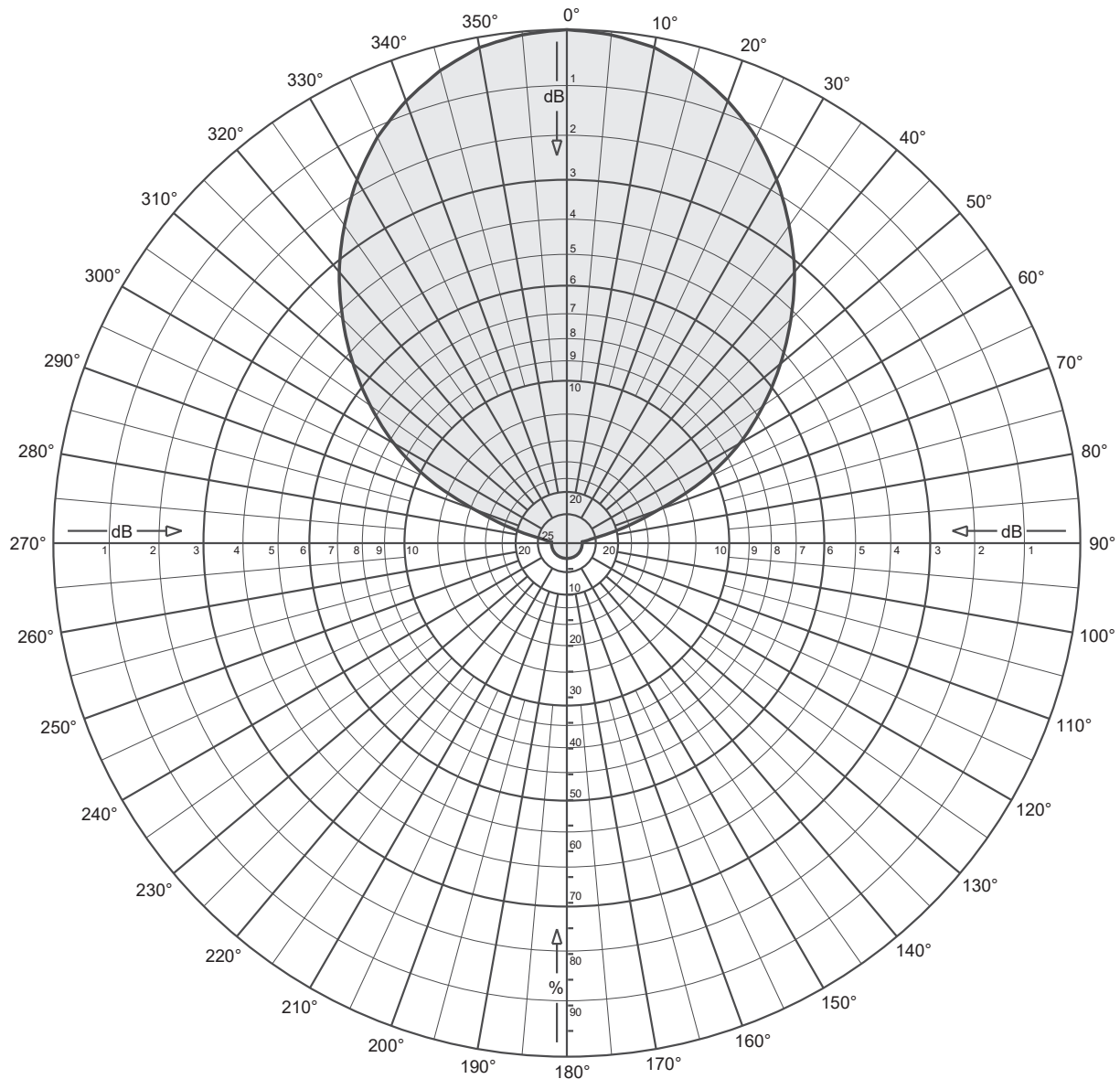
Horizontal radiation pattern

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 8

### Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°T) (public record copy)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt



## Exhibit 8

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°T) (public record copy)



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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 8

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°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 8

## Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 051.0°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 8

# Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 051.0°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