Technical Report Supporting a Form 349 Minor Construction Permit Modification Application

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

for

W237BF.C - Methuen, MA
BMPFT-20170918AAW
(Facility ID: 139956)

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as a

Commercial, Fill-In
AM Translator for
WCCM(AM) - Methuen, MA

THIS FORM 349 FILING IS
BEING FILED AS A TRUE MINOR CHANGE
*APPLICATION AND DOES **NOT** REQUIRE A*
FURTHER "FOOTNOTE 22 - 250 MILE
(POST) 2016 WINDOW WAIVER"

November, 2017

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

Table of Contents

Supplemental Appendix(s):

Explanation of Technical Report *1*

EXPLANATION OF PROPOSAL: This Form 349 Filing and accompanying technical report supports a Minor Construction Permit Modification Application for FM Translator authorization W237BF.C (CH287D) - Methuen, MA (Facility ID: 139956), Construction Permit File Number BMPFT-20170918AAW. This Construction Permit was a "*250 Mile 2016 AM Fill-In Translator*" grant against underlying FM Translator license W237BF.L - Middlebury, VT (Facility ID: 139956), License Number BLFT-20050930BIZ, and further modified via a "*Footnote 22 - 250 Mile (Post) 2016 Window Application*" in response to the *Revitalization of the AM Radio Service*, First Report and Order (MB Docket No. 13-249 (FCC 15-142), released October 23, 2015; subsequent *Public Notice DA 15-1215*, released October 26, 2015; final *Public Notice DA 1491*, released December 23, 2015; and the *Second Report and Order*, MD Docket No. 13-249, released February 24, 2017; see Footnote 22. However, this further modification of W237BF.C is being filed as a true minor change application and does **NOT** require a further "Footnote 22 Waiver". Continued operation on the authorized frequency of CH287D (105.3 MHz) with a power of 0.250 kW ERP (circular polarization) is requested. A new site location and new COR of 141 meters AMSL is being proposed. This Form 349 Filing will continue to specify rebroadcast of Class D, AM Primary Station WCCM(AM) - Methuen, MA (1570 kHz); Facility ID No. 22798. The Translator will remain licensed to the community of Methuen, MA.

FACILITY COMPLIANCE SHOWINGS: A map of the proposed 60 dBµ service contour in relation to the present 60 dBµ service contour has been included in ***Exhibit 1***. The minor change proposed service area will overlap a portion of the present service area as noted in the exhibit. The proposed 60 dBµ 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 1003922. In support of this filing, 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 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 C.F.R. 47 Section 74.1204 toward all allocation protection concerns with the exception of WROR-FM - Framingham, MA (CH289B). A general allocation study for this proposal is found in ***Exhibit 6***.

The applicant would like to note the existence of a C.F.R. 47 Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WROR-FM - Framingham, MA (CH289B) as included in ***Exhibit 8***. At the Translator site location, protection of the worst case calculated 132.1 dBµ F(50:10) Interference Contour, corresponding to the worst case protected 92.1 dBµ F(50:50) protected contour, has been demonstrated through a downward radiation study as included herein. Full protection will be afforded the concern as the interference area will not reach the ground nor a seven-meter artificial plane representing a standard two story home when taking into account the downward radiation characteristics of the antenna. The antenna manufacturer's vertical radiation 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 each facility as included in ***Exhibit(s) 7(a-b)***. It is believed sufficient clearance exists, precluding the need for additional contour protection showings.

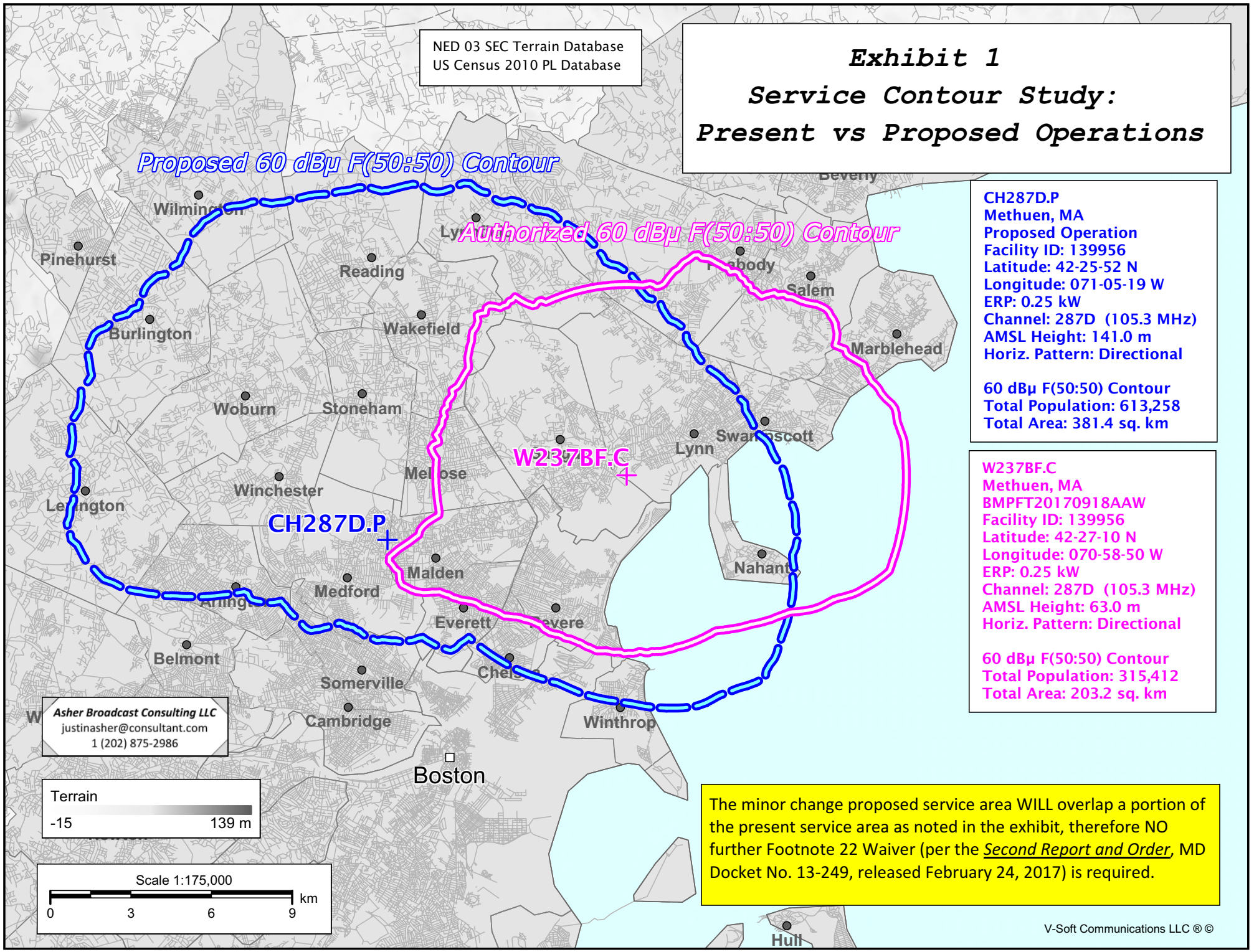
Regarding protection of international concerns, the facility is and will remain within 320 km from the common border between the United States and Canada. However full protection will be afforded all Canadian concerns as noted in ***Exhibit 6***.

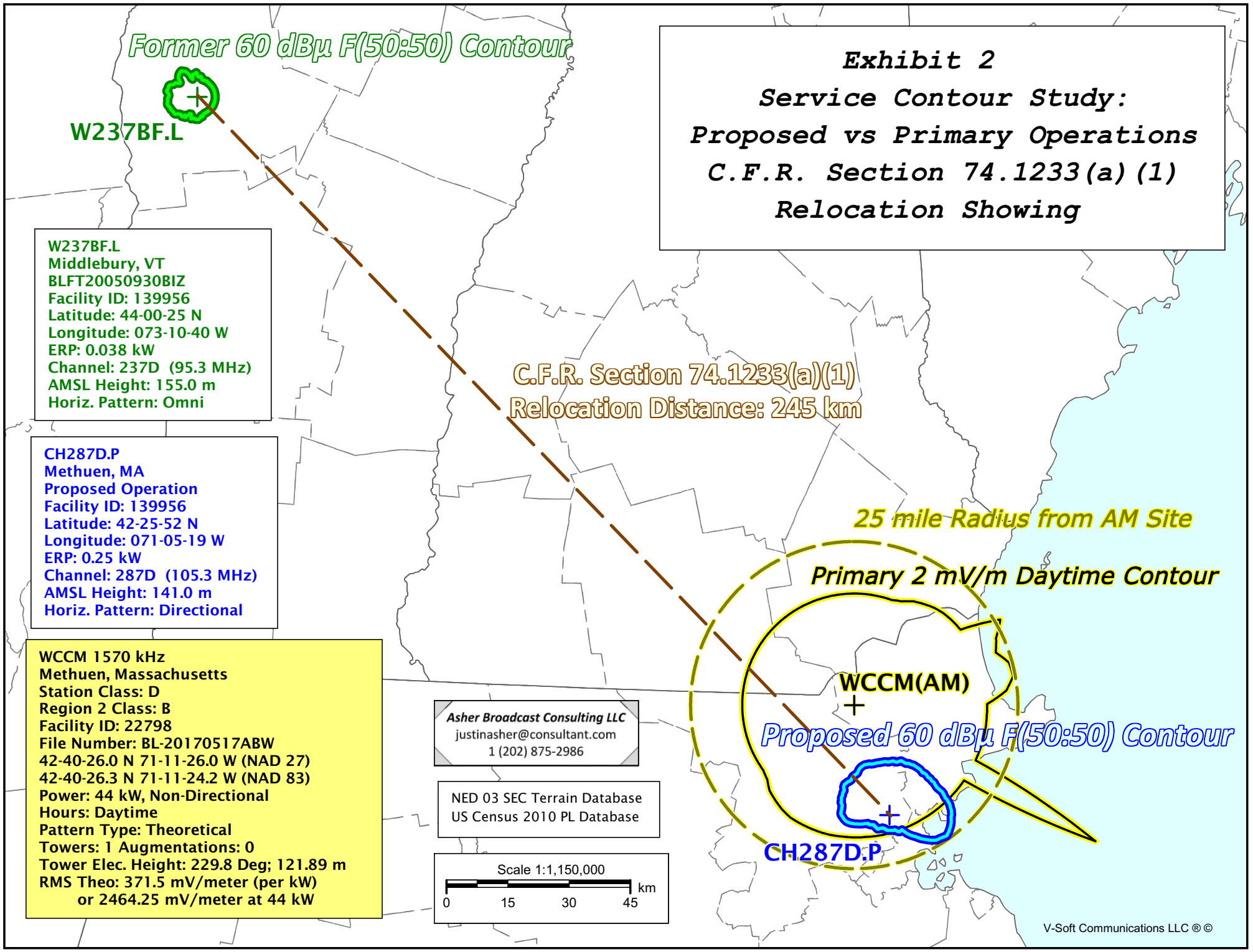
ENVIRONMENTAL COMPLIANCE SHOWINGS: The proposed facility complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments as set forth under §1.1310 and/or §1.1307(b)(3) of the Commission's rules and the guidelines for RF radiation protection 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 antenna and feed-line 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 eighteen 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
November 16, 2017


NED 03 SEC Terrain Database
US Census 2010 PL Database
Exhibit 1
Service Contour Study:
Present vs Proposed Operations
Proposed 60 dBμ F(50:50) Contour
Authorized 60 dBμ F(50:50) Contour
CH287D.P
Methuen, MA
Proposed Operation
Facility ID: 139956
Latitude: 42-25-52 N
Longitude: 071-05-19 W
ERP: 0.25 kW
Channel: 287D (105.3 MHz)
AMSL Height: 141.0 m
Horiz. Pattern: Directional
60 dBμ F(50:50) Contour
Total Population: 613,258
Total Area: 381.4 sq. km
W237BF.C
Methuen, MA
BMPFT20170918AAW
Facility ID: 139956
Latitude: 42-27-10 N
Longitude: 070-58-50 W
ERP: 0.25 kW
Channel: 287D (105.3 MHz)
AMSL Height: 63.0 m
Horiz. Pattern: Directional
60 dBμ F(50:50) Contour
Total Population: 315,412
Total Area: 203.2 sq. km
W237BF.C
CH287D.P
Pinehurst
Wilmington
Burlington
Reading
Wakefield
Woburn
Stoneham
Winchester
Lexington
Melrose
Malden
Medford
Everett
Belmont
Somerville
Cambridge
Boston
Winthrop
Chelsea
Revere
Lynn
Swampscott
Marblehead
Salem
Nahant
Hull
Asher Broadcast Consulting LLC
justinasher@consultant.com
1 (202) 875-2986
Terrain
-15
139 m
Scale 1:175,000
0
3
6
9
km
The minor change proposed service area WILL overlap a portion of the present service area as noted in the exhibit, therefore NO further Footnote 22 Waiver (per the Second Report and Order, MD Docket No. 13-249, released February 24, 2017) is required.
V-Soft Communications LLC ® ©


Former 60 dBµ F(50:50) Contour
W237BF.L
Exhibit 2
Service Contour Study:
Proposed vs Primary Operations
C.F.R. Section 74.1233(a)(1)
Relocation Showing
W237BF.L
Middlebury, VT
BLFT20050930BIZ
Facility ID: 139956
Latitude: 44-00-25 N
Longitude: 073-10-40 W
ERP: 0.038 kW
Channel: 237D (95.3 MHz)
AMSL Height: 155.0 m
Horiz. Pattern: Omni
C.F.R. Section 74.1233(a)(1)
Relocation Distance: 245 km
CH287D.P
Methuen, MA
Proposed Operation
Facility ID: 139956
Latitude: 42-25-52 N
Longitude: 071-05-19 W
ERP: 0.25 kW
Channel: 287D (105.3 MHz)
AMSL Height: 141.0 m
Horiz. Pattern: Directional
25 mile Radius from AM Site
Primary 2 mV/m Daytime Contour
WCCM(AM)
Proposed 60 dBµ F(50:50) Contour
CH287D.P
WCCM 1570 kHz
Methuen, Massachusetts
Station Class: D
Region 2 Class: B
Facility ID: 22798
File Number: BL-20170517ABW
42-40-26.0 N 71-11-26.0 W (NAD 27)
42-40-26.3 N 71-11-24.2 W (NAD 83)
Power: 44 kW, Non-Directional
Hours: Daytime
Pattern Type: Theoretical
Towers: 1 Augmentations: 0
Tower Elec. Height: 229.8 Deg; 121.89 m
RMS Theo: 371.5 mV/meter (per kW)
or 2464.25 mV/meter at 44 kW
Asher Broadcast Consulting LLC
justinasher@consultant.com
1 (202) 875-2986
NED 03 SEC Terrain Database
US Census 2010 PL Database
Scale 1:1,150,000
0 15 30 45 km
V-Soft Communications LLC ® ©

ASR Registration Search

Registration 1003922

Map Registration

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

Registration Detail

Reg Number	1003922	Status	Constructed
File Number	A0925742	Constructed	01/01/1985
EMI	No	Dismantled	
NEPA	No		

Antenna Structure

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

Location (in NAD83 Coordinates)

Lat/Long	42-25-52.0 N 071-05-17.0 W	Address	146 MURRAY ST
City, State	MEDFORD , MA		
Zip	02155	County	MIDDLESEX
Center of AM Array		Position of Tower in Array	

Heights (meters)

Elevation of Site Above Mean Sea Level	Overall Height Above Ground (AGL)
57.3	108.8
Overall Height Above Mean Sea Level	Overall Height Above Ground w/o Appurtenances
166.1	105.0

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	2004-ANE-555-OE	FAA Issue Date	06/30/2004

Owner & Contact Information

FRN	0015315880	Owner Entity Type	Limited Liability Company

Owner

Industrial Tower and Wireless, LLC
Attention To: Kevin P. Delaney
40 Lone Street
Marshfield , MA 02050

P: (781)319-1111
F: (781)837-4000
E: kevin.delaney@induscom.com

Contact

Attention To: Kevin P. Delaney
40 Lone Street
Marshfield , MA 02050

P: (781)319-1011
F: (781)837-4000
E: kevin.delaney@induscom.com

Last Action Status

Status	Constructed	Received	11/03/2014
Purpose	Admin Update	Entered	11/03/2014
Mode	Interactive		

Related Applications

11/03/2014	A0925742 - Admin Update (AU)
09/07/2010	A0694657 - Notification (NT)
08/31/2010	A0694336 - Modification (MD)

Related applications (6)

Comments

Comments

08/31/2010	SUPERSEDED TO CORRECT ELEV AND OWNERSHIP INFO PER LTR RECEIVED 11/27/96 FROM KEVIN P DELANEY (ENGINEERING & SITE DEVELOPMENT FOR INDUSTRIAL COMMUNICATIONS-SITE MANAGERS).
08/31/2010	CORRECTED OVERALL STRUCTURE HEIGHT, SUBMITTED ROUNDED TO THE NEAREST WHOLE NUMBER, TO INCLUDE THE TENTHS. ADDED FAA CLEARANCE DATA AND CLEARED STRUCTURE WITH FCC PARAGRAPHS BASED ON OLD TOWER FILE RECORD 065837, FAA 85-ANE-157-OE.

History

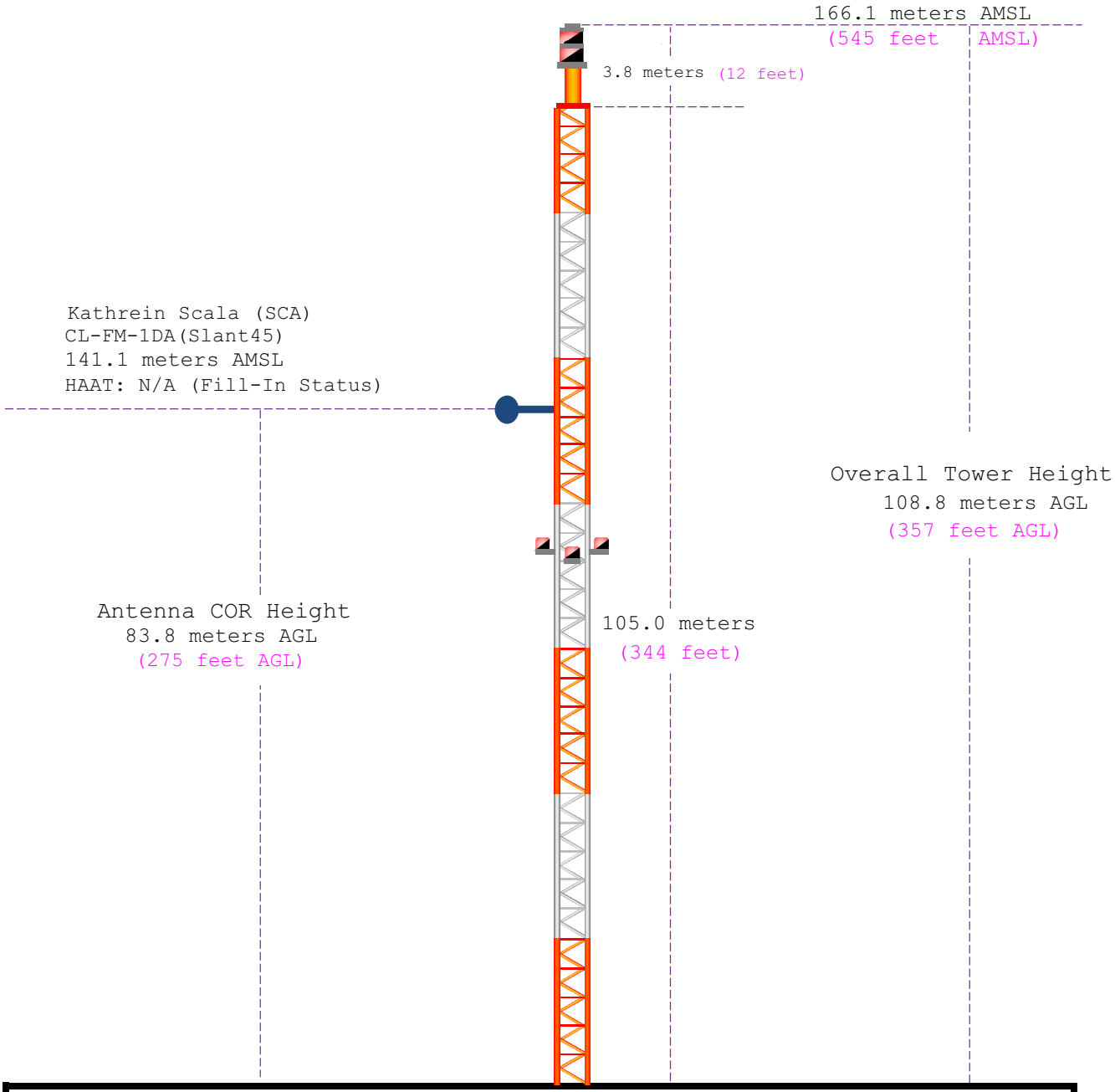
Date	Event
11/04/2014	Registration Printed
11/03/2014	ASR Application receipt email sent: Tower email
11/03/2014	Administrative Update Received

All History (14)

Automated Letters

11/04/2014	Authorization, Reference
09/01/2010	Authorization, Reference
07/26/2006	FRN Re-association, Reference 517504

Exhibit 4
Vertical Plan of Antenna System



Ground Elevation: 57.3 meters AMSL (188 feet AMSL)

Address: 146 Murry Street **City:** Medford **County:** Middlesex **State:** Mass.	**Latitude (D M S)** **Longitude (D M S)** NAD 27 datum values: 42 25 51.65372 71 05 18.81123 NAD 83 datum values: 42 25 52.00000 71 05 17.00000	
Antenna Structure Registration 1003922	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. = 422552.0 W. Lng. = 710519.0
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	39.0	102.0	0.2500	-6.02	1.000	12.99
030	30.9	110.1	0.2500	-6.02	1.000	13.49
060	32.1	108.9	0.2500	-6.02	1.000	13.41
090	1.5	139.5	0.2500	-6.02	1.000	15.22
120	6.2	134.8	0.1225	-9.12	0.700	12.47
150	2.4	138.6	0.0025	-26.02	0.100	4.75
180	13.9	127.1	0.0012	-29.12	0.070	3.72
210	26.2	114.8	0.0012	-29.12	0.070	3.57
240	13.6	127.4	0.0025	-26.02	0.100	4.55
270	58.3	82.7	0.2500	-6.02	1.000	11.75
300	42.6	98.4	0.2500	-6.02	1.000	12.77
330	27.8	113.2	0.2500	-6.02	1.000	13.67

Ave El= 24.54 M HAAT= 116.46 M AMSL= 141.0

NAD 1983 to NAD 1927 Conversion:

	Latitude	Longitude
NAD 27 datum values:	42 25 51.65372	71 05 18.81123
NAD 83 datum values:	42 25 52.00000	71 05 17.00000

Various Coordinate Conversion Calculations (NAD 1983):

Position Type	Lat Lon
Degrees Lat Long	42.4311111°, -071.0880556°
Degrees Minutes	42°25.86667', -071°05.28333'
Degrees Minutes Seconds	42°25'52.0000", -071°05'17.0000"
UTM	19T 328240mE 4699755mN
UTM centimeter	19T 328240.86mE 4699755.94mN
MGRS	19TCG2824099755
Grid North	-1.4°
GARS	218MA22
Maidenhead	FN42KK93KL42
GEOREF	HJDN54712586

Exhibit 6
Tabulation of Proposed Allocation

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

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

Costa-eagle Radio Ventures Limited Partnership

REFERENCE CH# 287D - 105.3 MHz, Pwr= 0.25 kW DA, HAAT= 116.5 M, COR= 141 M DISPLAY DATES
42 25 52.0 N. Average Protected F(50-50)= 13.87 km DATA 11-14-17
71 05 19.0 W. Standard Directional SEARCH 11-16-17

CH CALL / CITY	TYPE ANT / STATE	AZI <--	DIST / FILE #	LAT / LNG	PWR(kW) / HAAT(M)	INT(km) / COR(M)	PRO(km) / LICENSEE	*IN* (Overlap in km)	*OUT*
289B WROR-FM Framingham	LIC _C_ MA	177.2 357.2	9.33 BLH20000223AAP	42 20 50.0 71 04 59.0	23.000 224	5.7 247	64.3 Beasley Media Group, Llc	-0.1<	-55.1*<
287D W237BF Methuen	CP DC_ MA	74.8 254.8	9.18 BMPFT20170918AAW	42 27 10.0 70 58 50.0	0.250 42	26.6 63	8.0 Costa-eagle Radio Ventures	-31.9*	-47.5*
286B WWLI Providence	LIC _CX RI	204.5 24.3	76.22 BMLH20070206ABO	41 48 24.0 71 28 13.0	50.000 152	80.8 214	67.4 Radio License Holding Cbc,	-8.1*<	1.6
287A WSHK Kittery	LIC _CN ME	16.8 197.0	86.37 BLH19921030KC	43 10 28.0 70 46 50.0	2.200 113	76.1 142	25.2 Townsquare Media Portsmout	-3.0<	15.6
287D W287BT Fitchburg	LIC _C_ MA	286.8 106.2	63.93 BLFT20100408ABZ	42 35 40.0 71 50 12.0	0.150 81	52.2 327	16.2 K-zone Media Group, Llc	-0.5<	5.7
233B WJMN Boston	LIC _CX MA	219.1 39.0	17.69 BLH20031201AWA	42 18 27.0 71 13 27.0	9.200 353	5.5 394	1.8 Amfm Radio Licenses, L.l.c	14.5R	3.2M
285D WRBB Boston	LIC _CN MA	181.1 1.1	10.28 BLED19831213AB	42 20 19.0 71 05 28.0	0.019 27	1.6 55	3.7 Northeastern University	5.0	6.5
285A WBOQ Gloucester	LIC ZCX MA	27.8 207.9	26.18 BLH20130130ACE	42 38 22.0 70 56 22.0	6.000 98	1.8 119	19.3 Westport Communications Li	10.9	5.8
287L1 WFPC-LP Rindge	LIC ___ NH	296.5 115.8	88.29 BLL20030506AAF	42 46 52.0 72 03 26.0	0.100 18	 365	57.0 Franklin Pierce College		39.0
286L1 WBNH-LP Bedford	LIC ___ NH	328.8 148.5	67.10 BLL20160202ACF	42 56 48.0 71 30 56.0	0.100 	 109	44.0 Town Of Bedford, New Hamps		40.1
286L1 WBNH-LP Bedford	CP ___ NH	328.8 148.5	67.10 BXPL20171019AAZ	42 56 48.0 71 30 56.0	0.100 -3	 107	44.3 Town Of Bedford, New Hamps		40.2
288A WJYY Concord	LIC _CN NH	340.4 160.1	100.21 BLH19871005KD	43 16 46.0 71 30 15.0	1.550 139	38.6 298	25.6 Wbin Media Co., Inc.	48.4	54.7
284B WOCN-FM Orleans	LIC _E_ MA	128.8 309.5	114.69 BMLH19991229AAA	41 46 48.0 70 00 36.0	50.000 140	5.9 146	64.5 Cape Cod Broadcasting Lice	99.9	49.4
287D 1760392 Orleans	APP _C_ MA	128.8 309.5	114.66 BNPFT20170801AFB	41 46 49.0 70 00 37.0	0.250 	45.9 109	13.4 University Of Massachusett	59.8	71.4

Terrain database is NED 03 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.
< = Contour Overlap
Reference station has protected zone issue: AM tower

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

Costa-eagle Radio Ventures Limited Partnership

FMCommander Single Allocation Study - 11-16-2017 - NED 03 SEC
W237BF.P's Overlaps (In= -8.08 km, Out= 1.59 km)

W237BF.P CH 287 D DA
Lat= 42 25 52.0, Lng= 71 05 19.0
0.25 kW 116.5 m HAAT, 141 m COR
Prot.= 60 dBu, Intef.= 48 dBu

WWLI CH 286 B BMLH20070206ABO
Lat= 41 48 24.0, Lng= 71 28 13.0
50.0 kW 152 m HAAT, 214 m COR
Prot.= 54 dBu, Intef.= 54 dBu

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

11-16-2017 Terrain Data: NED 03 SEC FMOver Analysis

W237BF.P	WWLI BMLH20070206ABO
Channel = 287D	Channel = 286B
Max ERP = 0.25 kW	Max ERP = 50 kW
RCAMSL = 141 m	RCAMSL = 214 m
N. Lat. 42 25 52.0	N. Lat. 41 48 24.0
W. Lng. 71 05 19.0	W. Lng. 71 28 13.0
Protected	Interfering
60 dBu	54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
163.0	000.0012	0135.7	003.8	026.2	050.0000	0177.0	073.4	56.72*	8.47
164.0	000.0012	0136.5	003.8	026.2	050.0000	0176.8	073.3	56.73*	8.50
165.0	000.0012	0136.9	003.8	026.2	050.0000	0176.6	073.3	56.74*	8.52
166.0	000.0012	0136.8	003.8	026.1	050.0000	0176.3	073.3	56.74*	8.53
167.0	000.0012	0136.1	003.8	026.1	050.0000	0176.1	073.2	56.74*	8.54
168.0	000.0012	0136.2	003.8	026.0	050.0000	0175.8	073.2	56.75*	8.55
169.0	000.0012	0135.8	003.8	026.0	050.0000	0175.6	073.1	56.75*	8.55
170.0	000.0012	0135.7	003.8	026.0	050.0000	0175.3	073.1	56.75*	8.56
171.0	000.0012	0134.8	003.8	025.9	050.0000	0175.1	073.1	56.75*	8.56
172.0	000.0012	0134.0	003.8	025.9	050.0000	0174.8	073.0	56.75*	8.55
173.0	000.0012	0133.6	003.8	025.8	050.0000	0174.6	073.0	56.75*	8.55
174.0	000.0012	0132.1	003.8	025.8	050.0000	0174.3	073.0	56.74*	8.54
175.0	000.0012	0130.2	003.8	025.7	050.0000	0174.0	073.0	56.73*	8.51
176.0	000.0012	0129.3	003.8	025.7	050.0000	0173.8	073.0	56.73*	8.50
177.0	000.0012	0129.4	003.8	025.6	050.0000	0173.6	072.9	56.73*	8.51
178.0	000.0012	0129.1	003.7	025.6	050.0000	0173.4	072.9	56.73*	8.51
179.0	000.0012	0128.0	003.7	025.5	050.0000	0173.1	072.9	56.73*	8.49
180.0	000.0012	0127.1	003.7	025.5	050.0000	0172.9	072.9	56.72*	8.48
181.0	000.0012	0126.9	003.7	025.4	050.0000	0172.7	072.8	56.72*	8.48
182.0	000.0012	0126.6	003.7	025.4	050.0000	0172.5	072.8	56.72*	8.48
183.0	000.0012	0126.7	003.7	025.3	050.0000	0172.3	072.8	56.72*	8.48
184.0	000.0012	0128.3	003.7	025.3	050.0000	0172.1	072.7	56.73*	8.49
185.0	000.0012	0128.9	003.7	025.2	050.0000	0171.9	072.7	56.73*	8.50
186.0	000.0012	0129.9	003.8	025.2	050.0000	0171.8	072.7	56.73*	8.51
187.0	000.0012	0128.2	003.7	025.1	050.0000	0171.6	072.7	56.73*	8.49
188.0	000.0012	0126.7	003.7	025.1	050.0000	0171.4	072.7	56.72*	8.47
189.0	000.0012	0127.5	003.7	025.0	050.0000	0171.3	072.6	56.72*	8.48
190.0	000.0012	0128.5	003.7	025.0	050.0000	0171.1	072.6	56.72*	8.48
191.0	000.0012	0128.9	003.7	025.0	050.0000	0170.9	072.6	56.72*	8.48
192.0	000.0012	0125.5	003.7	024.9	050.0000	0170.7	072.6	56.70*	8.43
193.0	000.0012	0121.7	003.7	024.8	050.0000	0170.5	072.6	56.68*	8.37
194.0	000.0012	0119.2	003.6	024.8	050.0000	0170.3	072.7	56.67*	8.32
195.0	000.0012	0117.5	003.6	024.7	050.0000	0170.1	072.7	56.66*	8.29

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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	000.0012	0114.6	003.6	024.7	050.0000	0170.0	072.7	56.64*	8.24
197.0	000.0012	0112.5	003.5	024.6	050.0000	0169.8	072.7	56.63*	8.19
198.0	000.0012	0113.3	003.5	024.6	050.0000	0169.6	072.7	56.63*	8.19
199.0	000.0012	0112.8	003.5	024.5	050.0000	0169.5	072.7	56.62*	8.17
200.0	000.0012	0110.6	003.5	024.5	050.0000	0169.4	072.7	56.61*	8.13
201.0	000.0012	0109.8	003.5	024.4	050.0000	0169.3	072.7	56.60*	8.11
202.0	000.0012	0110.1	003.5	024.4	050.0000	0169.2	072.7	56.59*	8.10
203.0	000.0012	0111.5	003.5	024.3	050.0000	0169.0	072.7	56.60*	8.11
204.0	000.0012	0111.2	003.5	024.3	050.0000	0168.9	072.7	56.59*	8.09
205.0	000.0012	0112.2	003.5	024.2	050.0000	0168.8	072.7	56.59*	8.09
206.0	000.0012	0114.0	003.6	024.2	050.0000	0168.7	072.7	56.59*	8.10
207.0	000.0012	0113.7	003.5	024.1	050.0000	0168.6	072.7	56.58*	8.07
208.0	000.0012	0112.8	003.5	024.1	050.0000	0168.4	072.7	56.57*	8.04
209.0	000.0012	0113.5	003.5	024.0	050.0000	0168.3	072.7	56.57*	8.03
210.0	000.0012	0114.8	003.6	024.0	050.0000	0168.2	072.7	56.57*	8.02
211.0	000.0013	0114.8	003.7	023.9	050.0000	0168.1	072.6	56.59*	8.09
212.0	000.0014	0115.7	003.8	023.9	050.0000	0167.9	072.5	56.61*	8.16
213.0	000.0016	0114.8	003.8	023.8	050.0000	0167.8	072.5	56.63*	8.20
214.0	000.0017	0115.0	003.9	023.8	050.0000	0167.7	072.4	56.64*	8.25
215.0	000.0018	0114.2	004.0	023.7	050.0000	0167.6	072.3	56.65*	8.28
216.0	000.0019	0115.3	004.1	023.6	050.0000	0167.4	072.3	56.67*	8.34
217.0	000.0021	0116.7	004.2	023.5	050.0000	0167.2	072.2	56.69*	8.40
218.0	000.0022	0116.3	004.2	023.5	050.0000	0167.0	072.1	56.70*	8.41
219.0	000.0024	0116.7	004.3	023.4	050.0000	0166.8	072.1	56.70*	8.44
220.0	000.0025	0117.9	004.4	023.3	050.0000	0166.6	072.0	56.72*	8.49
221.0	000.0025	0120.0	004.4	023.3	050.0000	0166.5	072.0	56.72*	8.48
222.0	000.0025	0121.1	004.5	023.2	050.0000	0166.4	072.0	56.71*	8.46
223.0	000.0025	0121.4	004.5	023.1	050.0000	0166.2	072.0	56.70*	8.42
224.0	000.0025	0121.5	004.5	023.1	050.0000	0166.1	072.0	56.68*	8.38
225.0	000.0025	0120.9	004.4	023.0	050.0000	0166.0	072.1	56.67*	8.33
226.0	000.0025	0121.3	004.5	023.0	050.0000	0166.0	072.1	56.65*	8.30
227.0	000.0025	0120.3	004.4	022.9	050.0000	0165.9	072.1	56.64*	8.24
228.0	000.0025	0120.0	004.4	022.9	050.0000	0165.8	072.2	56.62*	8.19
229.0	000.0025	0119.8	004.4	022.8	050.0000	0165.8	072.2	56.61*	8.15
230.0	000.0025	0120.5	004.4	022.7	050.0000	0165.7	072.2	56.60*	8.12
231.0	000.0025	0122.5	004.5	022.7	050.0000	0165.7	072.3	56.59*	8.10
232.0	000.0025	0122.9	004.5	022.6	050.0000	0165.6	072.3	56.58*	8.06
233.0	000.0025	0123.5	004.5	022.6	050.0000	0165.5	072.3	56.56*	8.02
234.0	000.0025	0124.2	004.5	022.5	050.0000	0165.4	072.3	56.55*	7.97
235.0	000.0025	0124.5	004.5	022.5	050.0000	0165.3	072.4	56.53*	7.92
236.0	000.0025	0124.6	004.5	022.4	050.0000	0165.2	072.4	56.51*	7.87
237.0	000.0025	0124.4	004.5	022.3	050.0000	0165.2	072.5	56.50*	7.81
238.0	000.0025	0125.7	004.5	022.3	050.0000	0165.1	072.5	56.49*	7.78
239.0	000.0025	0126.6	004.5	022.2	050.0000	0165.1	072.5	56.47*	7.74
240.0	000.0025	0127.4	004.6	022.2	050.0000	0165.0	072.6	56.46*	7.69

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

11-16-2017 Terrain Data: NED 03 SEC FMOver Analysis

WWLI BMLH20070206ABO	W237BF.P
Channel = 286B	Channel = 287D
Max ERP = 50 kW	Max ERP = 0.25 kW
RCAMSL = 214 m	RCAMSL = 141 m
N. Lat. 41 48 24.0	N. Lat. 42 25 52.0
W. Lng. 71 28 13.0	W. Lng. 71 05 19.0
Protected	Interfering
54 dBu	48 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
339.0	050.0000	0140.5	063.7	259.8	000.1190	0086.0	055.1	31.60	
340.0	050.0000	0137.4	063.3	259.5	000.1144	0086.3	053.9	31.88	
341.0	050.0000	0137.9	063.4	259.8	000.1189	0086.0	052.8	32.42	
342.0	050.0000	0139.3	063.5	260.2	000.1244	0085.9	051.8	32.99	
343.0	050.0000	0137.2	063.2	260.0	000.1224	0085.8	050.6	33.34	
344.0	050.0000	0133.7	062.7	259.5	000.1145	0086.3	049.5	33.50	
345.0	050.0000	0132.1	062.5	259.4	000.1115	0086.5	048.4	33.79	
346.0	050.0000	0131.3	062.4	259.3	000.1104	0086.5	047.3	34.15	
347.0	050.0000	0128.3	061.9	258.8	000.1022	0086.9	046.2	34.25	
348.0	050.0000	0124.4	061.3	258.0	000.0907	0086.2	045.1	34.07	
349.0	050.0000	0123.9	061.2	257.9	000.0889	0086.1	044.0	34.38	
350.0	050.0000	0123.9	061.2	257.9	000.0881	0086.0	042.9	34.75	
351.0	050.0000	0123.3	061.1	257.7	000.0853	0086.0	041.9	35.03	
352.0	050.0000	0121.0	060.8	257.1	000.0766	0086.3	040.9	35.00	
353.0	050.0000	0120.4	060.7	256.8	000.0727	0086.5	039.8	35.22	
354.0	050.0000	0122.6	061.0	257.1	000.0771	0086.3	038.7	35.92	
355.0	050.0000	0124.7	061.3	257.4	000.0810	0086.2	037.6	36.59	
356.0	050.0000	0127.3	061.7	257.8	000.0864	0086.0	036.5	37.33	
357.0	050.0000	0128.5	061.9	257.8	000.0869	0086.0	035.4	37.84	
358.0	050.0000	0131.2	062.3	258.1	000.0921	0086.3	034.3	38.63	
359.0	050.0000	0133.0	062.6	258.3	000.0939	0086.3	033.1	39.24	
000.0	050.0000	0131.4	062.4	257.5	000.0820	0086.2	032.1	39.11	
001.0	050.0000	0130.2	062.2	256.7	000.0711	0086.6	031.1	39.03	
002.0	050.0000	0131.7	062.4	256.5	000.0693	0086.7	030.0	39.51	
003.0	050.0000	0134.0	062.8	256.6	000.0704	0086.7	028.8	40.23	
004.0	050.0000	0135.3	063.0	256.3	000.0665	0086.9	027.7	40.69	
005.0	050.0000	0139.2	063.5	256.7	000.0722	0086.5	026.5	41.79	
006.0	050.0000	0142.8	064.1	257.0	000.0759	0086.3	025.3	42.81	
007.0	050.0000	0144.5	064.3	256.7	000.0712	0086.6	024.2	43.38	

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)
008.0	050.0000	0146.8	064.6	256.4	000.0678	0086.9	023.0	44.05
009.0	050.0000	0148.1	064.8	255.7	000.0592	0086.9	021.9	44.31
010.0	050.0000	0150.6	065.1	255.3	000.0539	0086.6	020.7	44.80
011.0	050.0000	0153.5	065.5	254.9	000.0493	0087.0	019.5	45.41
012.0	050.0000	0155.3	065.8	253.9	000.0393	0088.4	018.4	45.49
013.0	050.0000	0158.2	066.1	253.1	000.0319	0090.0	017.2	45.74
014.0	050.0000	0159.2	066.3	251.4	000.0186	0091.1	016.2	44.39
015.0	050.0000	0159.4	066.3	249.1	000.0091	0094.7	015.2	42.48
016.0	050.0000	0159.1	066.2	246.2	000.0066	0109.5	014.3	43.16
017.0	050.0000	0160.6	066.4	243.6	000.0046	0117.1	013.3	43.42
018.0	050.0000	0162.5	066.6	240.6	000.0028	0127.9	012.3	43.32
019.0	050.0000	0164.8	066.9	237.1	000.0025	0124.6	011.4	44.06
020.0	050.0000	0164.8	066.9	232.2	000.0025	0123.0	010.7	45.04
021.0	050.0000	0163.8	066.8	226.3	000.0025	0121.0	010.3	45.69
022.0	050.0000	0164.7	066.9	220.3	000.0025	0118.3	009.7	46.45
023.0	050.0000	0166.0	067.1	213.6	000.0016	0115.1	009.3	45.18
024.0	050.0000	0168.2	067.3	206.5	000.0012	0114.1	008.9	44.58
025.0	050.0000	0171.1	067.6	198.7	000.0012	0113.4	008.6	45.08
026.0	050.0000	0175.5	068.1	190.3	000.0012	0129.0	008.4	46.62
027.0	050.0000	0181.3	068.7	181.2	000.0012	0126.8	008.3	46.71
028.0	050.0000	0183.7	068.9	173.4	000.0012	0133.2	008.7	46.32
029.0	050.0000	0185.1	069.1	166.8	000.0012	0136.2	009.3	45.28
030.0	050.0000	0186.6	069.2	161.3	000.0012	0136.5	010.1	43.91
031.0	050.0000	0186.5	069.2	157.2	000.0015	0138.1	011.1	43.39
032.0	050.0000	0186.2	069.2	154.0	000.0019	0139.0	012.1	42.85
033.0	050.0000	0185.1	069.1	151.7	000.0023	0138.8	013.2	41.95
034.0	050.0000	0184.1	069.0	149.8	000.0025	0138.6	014.3	40.98
035.0	050.0000	0183.8	068.9	148.0	000.0025	0139.0	015.4	40.00
036.0	050.0000	0184.3	069.0	146.2	000.0025	0138.2	016.5	39.02
037.0	050.0000	0185.9	069.2	144.4	000.0025	0136.3	017.6	37.99
038.0	050.0000	0187.8	069.3	142.8	000.0025	0136.7	018.7	37.12
039.0	050.0000	0189.3	069.5	141.6	000.0025	0136.8	019.9	36.20
040.0	050.0000	0189.4	069.5	140.9	000.0025	0136.8	021.0	35.27
041.0	050.0000	0190.0	069.5	140.2	000.0025	0136.9	022.2	34.36
042.0	050.0000	0190.0	069.5	139.7	000.0028	0137.1	023.4	33.91
043.0	050.0000	0190.4	069.6	139.3	000.0032	0137.2	024.6	33.72
044.0	050.0000	0190.8	069.6	139.0	000.0036	0137.4	025.8	33.40
045.0	050.0000	0191.2	069.7	138.7	000.0040	0137.5	027.0	32.98
046.0	050.0000	0191.7	069.7	138.5	000.0043	0137.5	028.3	32.52
047.0	050.0000	0191.7	069.7	138.4	000.0044	0137.5	029.5	31.87
048.0	050.0000	0191.8	069.7	138.4	000.0044	0137.5	030.7	31.22
049.0	050.0000	0192.0	069.7	138.3	000.0044	0137.5	031.9	30.59
050.0	050.0000	0191.3	069.7	138.5	000.0042	0137.5	033.1	29.76
051.0	050.0000	0191.3	069.7	138.6	000.0041	0137.5	034.3	29.06
052.0	050.0000	0191.2	069.7	138.7	000.0039	0137.5	035.5	28.29
053.0	050.0000	0191.1	069.7	138.9	000.0038	0137.5	036.8	27.50

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

Costa-eagle Radio Ventures Limited Partnership

FMCommander Single Allocation Study - 11-16-2017 - NED 03 SEC
W237BF.P's Overlaps (In= -0.52 km, Out= 5.72 km)

W237BF.P CH 287 D DA
Lat= 42 25 52.0, Lng= 71 05 19.0
0.25 kW 116.5 m HAAT, 141 m COR
Prot.= 60 dBu, Intef.= 40 dBu

W287BT CH 287 D BLFT20100408ABZ
Lat= 42 35 40.0, Lng= 71 50 12.0
0.15 kW 80.6 m HAAT, 327 m COR
Prot.= 60 dBu, Intef.= 40 dBu

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Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

11-16-2017 Terrain Data: NED 03 SEC FMOver Analysis

W237BF.P	W287BT BLFT20100408ABZ
Channel = 287D	Channel = 287D
Max ERP = 0.25 kW	Max ERP = 0.15 kW
RCAMSL = 141 m	RCAMSL = 327 m
N. Lat. 42 25 52.0	N. Lat. 42 35 40.0
W. Lng. 71 05 19.0	W. Lng. 71 50 12.0
Protected	Interfering
60 dBu	40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
246.0	000.0064	0110.3	005.5	109.7	000.1500	0202.6	059.9	37.19	
247.0	000.0072	0105.6	005.5	109.6	000.1500	0202.5	059.8	37.22	
248.0	000.0081	0100.1	005.6	109.6	000.1500	0202.4	059.7	37.24	
249.0	000.0090	0094.9	005.5	109.5	000.1500	0202.4	059.7	37.26	
250.0	000.0100	0093.7	005.7	109.5	000.1500	0202.4	059.5	37.32	
251.0	000.0156	0091.7	006.2	109.8	000.1500	0202.9	059.0	37.53	
252.0	000.0225	0090.2	006.7	110.0	000.1500	0203.3	058.5	37.73	
253.0	000.0306	0090.4	007.3	110.2	000.1500	0203.9	058.0	37.94	
254.0	000.0400	0088.3	007.7	110.4	000.1500	0204.3	057.6	38.10	
255.0	000.0506	0086.9	008.1	110.5	000.1500	0204.7	057.2	38.27	
256.0	000.0625	0087.1	008.6	110.7	000.1500	0204.8	056.8	38.46	
257.0	000.0756	0086.3	008.9	110.8	000.1500	0204.8	056.3	38.62	
258.0	000.0900	0086.1	009.3	110.9	000.1500	0204.9	055.9	38.79	
259.0	000.1056	0086.9	009.8	110.9	000.1500	0205.0	055.5	38.97	
260.0	000.1225	0085.8	010.1	111.0	000.1500	0205.0	055.1	39.10	
261.0	000.1332	0086.2	010.3	110.9	000.1500	0205.0	054.8	39.21	
262.0	000.1444	0088.7	010.6	110.9	000.1500	0205.0	054.5	39.37	
263.0	000.1560	0087.7	010.8	110.8	000.1500	0204.9	054.2	39.45	
264.0	000.1681	0086.6	010.9	110.7	000.1500	0204.8	054.0	39.52	
265.0	000.1806	0086.1	011.1	110.6	000.1500	0204.8	053.8	39.61	
266.0	000.1936	0085.7	011.2	110.5	000.1500	0204.7	053.6	39.70	
267.0	000.2070	0084.3	011.3	110.4	000.1500	0204.3	053.4	39.75	
268.0	000.2209	0082.8	011.4	110.2	000.1500	0203.8	053.3	39.78	
269.0	000.2352	0081.7	011.5	110.0	000.1500	0203.4	053.1	39.83	
270.0	000.2500	0082.7	011.8	109.9	000.1500	0203.0	052.8	39.93	
271.0	000.2500	0083.3	011.8	109.7	000.1500	0202.7	052.7	39.96	
272.0	000.2500	0084.7	011.9	109.5	000.1500	0202.3	052.5	40.00	0.00
273.0	000.2500	0085.2	011.9	109.3	000.1500	0202.6	052.4	40.05*	0.12
274.0	000.2500	0084.0	011.8	109.1	000.1500	0203.1	052.5	40.06*	0.16
275.0	000.2500	0084.0	011.8	108.9	000.1500	0203.2	052.4	40.09*	0.23
276.0	000.2500	0084.0	011.8	108.7	000.1500	0203.2	052.4	40.11*	0.27
277.0	000.2500	0082.6	011.7	108.4	000.1500	0202.8	052.4	40.07*	0.19

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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)	
278.0	000.2500	0083.0	011.8	108.2	000.1500	0202.4	052.3	40.08*	0.20
279.0	000.2500	0083.2	011.8	108.0	000.1500	0201.7	052.3	40.07*	0.17
280.0	000.2500	0082.5	011.7	107.8	000.1500	0200.8	052.3	40.02*	0.06
281.0	000.2500	0083.0	011.8	107.5	000.1500	0200.2	052.2	40.02*	0.05
282.0	000.2500	0083.7	011.8	107.3	000.1500	0199.9	052.2	40.03*	0.08
283.0	000.2500	0084.0	011.8	107.1	000.1500	0199.8	052.1	40.04*	0.11
284.0	000.2500	0087.2	012.0	106.9	000.1500	0199.7	051.9	40.13*	0.32
285.0	000.2500	0090.1	012.2	106.7	000.1500	0199.6	051.7	40.20*	0.51
286.0	000.2500	0089.9	012.2	106.4	000.1500	0199.8	051.7	40.20*	0.52
287.0	000.2500	0090.2	012.2	106.2	000.1500	0199.7	051.7	40.21*	0.53
288.0	000.2500	0091.0	012.3	105.9	000.1500	0199.5	051.7	40.22*	0.56
289.0	000.2500	0092.8	012.4	105.7	000.1500	0199.5	051.5	40.26*	0.66
290.0	000.2500	0094.1	012.5	105.5	000.1500	0199.4	051.5	40.28*	0.71
291.0	000.2500	0094.4	012.5	105.2	000.1500	0199.5	051.5	40.28*	0.73
292.0	000.2500	0093.8	012.5	105.0	000.1500	0199.5	051.5	40.26*	0.67
293.0	000.2500	0093.2	012.4	104.7	000.1500	0199.5	051.6	40.24*	0.61
294.0	000.2500	0094.0	012.5	104.5	000.1500	0199.7	051.6	40.26*	0.65
295.0	000.2500	0095.1	012.6	104.2	000.1500	0199.7	051.5	40.27*	0.69
296.0	000.2500	0097.1	012.7	104.0	000.1500	0199.5	051.5	40.29*	0.74
297.0	000.2500	0096.2	012.6	103.8	000.1500	0199.2	051.6	40.23*	0.60
298.0	000.2500	0095.5	012.6	103.5	000.1500	0198.8	051.7	40.18*	0.47
299.0	000.2500	0095.4	012.6	103.3	000.1500	0198.4	051.7	40.14*	0.36
300.0	000.2500	0098.4	012.8	103.0	000.1500	0198.2	051.6	40.18*	0.45
301.0	000.2500	0101.3	012.9	102.7	000.1500	0198.5	051.5	40.23*	0.59
302.0	000.2500	0104.5	013.1	102.4	000.1500	0198.7	051.4	40.29*	0.75
303.0	000.2500	0105.7	013.2	102.1	000.1500	0198.9	051.4	40.29*	0.75
304.0	000.2500	0106.5	013.3	101.9	000.1500	0198.6	051.4	40.27*	0.69
305.0	000.2500	0107.2	013.3	101.6	000.1500	0198.4	051.5	40.24*	0.61
306.0	000.2500	0106.1	013.2	101.4	000.1500	0198.1	051.6	40.17*	0.43
307.0	000.2500	0103.7	013.1	101.2	000.1500	0198.0	051.9	40.07*	0.18
308.0	000.2500	0103.2	013.1	101.0	000.1500	0197.7	052.0	40.01*	0.01
309.0	000.2500	0103.5	013.1	100.8	000.1500	0197.0	052.1	39.94	
310.0	000.2500	0100.8	012.9	100.7	000.1500	0196.6	052.3	39.82	
311.0	000.2500	0098.8	012.8	100.5	000.1500	0196.2	052.5	39.72	
312.0	000.2500	0098.9	012.8	100.3	000.1500	0196.1	052.7	39.67	
313.0	000.2500	0096.9	012.7	100.2	000.1500	0196.0	052.9	39.58	
314.0	000.2500	0098.7	012.8	099.9	000.1500	0195.8	052.9	39.56	
315.0	000.2500	0100.0	012.9	099.6	000.1500	0195.3	053.0	39.51	
316.0	000.2500	0101.9	013.0	099.4	000.1500	0194.5	053.0	39.47	
317.0	000.2500	0102.5	013.0	099.2	000.1500	0193.9	053.1	39.40	
318.0	000.2500	0102.4	013.0	099.0	000.1500	0193.1	053.2	39.30	
319.0	000.2500	0102.2	013.0	098.8	000.1500	0192.1	053.4	39.20	
320.0	000.2500	0100.0	012.9	098.7	000.1500	0191.5	053.6	39.08	
321.0	000.2500	0101.1	012.9	098.5	000.1500	0190.4	053.7	38.99	
322.0	000.2500	0100.9	012.9	098.3	000.1500	0189.8	053.9	38.90	

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

11-16-2017 Terrain Data: NED 03 SEC FMOver Analysis

W287BT BLFT20100408ABZ	W237BF.P
Channel = 287D	Channel = 287D
Max ERP = 0.15 kW	Max ERP = 0.25 kW
RCAMSL = 327 m	RCAMSL = 141 m
N. Lat. 42 35 40.0	N. Lat. 42 25 52.0
W. Lng. 71 50 12.0	W. Lng. 71 05 19.0
Protected	Interfering
60 dBu	40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
061.0	000.1500	0176.8	015.2	298.2	000.2500	0095.2	054.3	35.81	
062.0	000.1500	0180.1	015.3	298.2	000.2500	0095.3	054.0	35.93	
063.0	000.1500	0181.9	015.4	298.1	000.2500	0095.4	053.8	36.03	
064.0	000.1500	0182.1	015.4	297.9	000.2500	0095.6	053.5	36.13	
065.0	000.1500	0182.8	015.5	297.8	000.2500	0095.8	053.3	36.24	
066.0	000.1500	0184.1	015.5	297.6	000.2500	0095.8	053.1	36.33	
067.0	000.1500	0184.7	015.5	297.5	000.2500	0095.8	052.8	36.41	
068.0	000.1500	0185.1	015.5	297.3	000.2500	0095.8	052.6	36.50	
069.0	000.1500	0186.0	015.6	297.1	000.2500	0096.0	052.4	36.59	
070.0	000.1500	0187.4	015.6	297.0	000.2500	0096.2	052.2	36.70	
071.0	000.1500	0189.3	015.7	296.8	000.2500	0096.5	051.9	36.82	
072.0	000.1500	0191.2	015.8	296.7	000.2500	0096.7	051.6	36.93	
073.0	000.1500	0190.9	015.8	296.4	000.2500	0097.2	051.5	37.03	
074.0	000.1500	0190.0	015.8	296.2	000.2500	0097.2	051.3	37.09	
075.0	000.1500	0189.1	015.7	295.9	000.2500	0097.0	051.2	37.13	
076.0	000.1500	0188.3	015.7	295.7	000.2500	0096.4	051.0	37.14	
077.0	000.1500	0187.6	015.7	295.4	000.2500	0095.7	050.9	37.14	
078.0	000.1500	0186.9	015.6	295.1	000.2500	0095.3	050.7	37.17	
079.0	000.1500	0187.3	015.6	294.9	000.2500	0095.0	050.5	37.21	
080.0	000.1500	0186.3	015.6	294.6	000.2500	0094.5	050.4	37.22	
081.0	000.1500	0185.9	015.6	294.3	000.2500	0094.2	050.3	37.24	
082.0	000.1500	0185.9	015.6	294.1	000.2500	0094.1	050.1	37.29	
083.0	000.1500	0185.8	015.6	293.8	000.2500	0094.0	050.0	37.33	
084.0	000.1500	0185.6	015.6	293.5	000.2500	0093.9	049.9	37.37	
085.0	000.1500	0185.3	015.6	293.3	000.2500	0093.5	049.8	37.38	
086.0	000.1500	0184.8	015.5	293.0	000.2500	0093.1	049.7	37.39	
087.0	000.1500	0185.9	015.6	292.7	000.2500	0093.3	049.5	37.47	
088.0	000.1500	0188.3	015.7	292.5	000.2500	0093.4	049.3	37.55	
089.0	000.1500	0190.0	015.8	292.2	000.2500	0093.6	049.1	37.63	
090.0	000.1500	0189.7	015.7	291.9	000.2500	0093.8	049.0	37.68	
091.0	000.1500	0188.5	015.7	291.6	000.2500	0093.9	049.0	37.71	
092.0	000.1500	0188.2	015.7	291.3	000.2500	0094.1	048.9	37.75	
093.0	000.1500	0187.9	015.7	291.0	000.2500	0094.4	048.8	37.80	

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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)
094.0	000.1500	0186.1	015.6	290.6	000.2500	0094.4	048.8	37.80
095.0	000.1500	0186.0	015.6	290.3	000.2500	0094.4	048.7	37.83
096.0	000.1500	0186.7	015.6	290.0	000.2500	0094.1	048.7	37.84
097.0	000.1500	0187.5	015.7	289.7	000.2500	0093.8	048.6	37.85
098.0	000.1500	0189.0	015.7	289.4	000.2500	0093.7	048.4	37.88
099.0	000.1500	0193.3	015.9	289.1	000.2500	0093.1	048.2	37.92
100.0	000.1500	0195.9	016.0	288.8	000.2500	0092.4	048.1	37.91
101.0	000.1500	0197.6	016.1	288.5	000.2500	0091.8	048.0	37.90
102.0	000.1500	0198.8	016.1	288.2	000.2500	0091.3	047.9	37.89
103.0	000.1500	0198.2	016.1	287.8	000.2500	0090.7	047.9	37.84
104.0	000.1500	0199.5	016.2	287.5	000.2500	0090.5	047.8	37.85
105.0	000.1500	0199.5	016.2	287.2	000.2500	0090.4	047.8	37.85
106.0	000.1500	0199.6	016.2	286.8	000.2500	0090.0	047.8	37.82
107.0	000.1500	0199.8	016.2	286.5	000.2500	0089.8	047.8	37.80
108.0	000.1500	0201.7	016.2	286.2	000.2500	0089.9	047.7	37.83
109.0	000.1500	0203.2	016.3	285.8	000.2500	0090.0	047.7	37.87
110.0	000.1500	0203.3	016.3	285.5	000.2500	0090.4	047.7	37.89
111.0	000.1500	0205.0	016.4	285.1	000.2500	0090.3	047.6	37.90
112.0	000.1500	0202.5	016.3	284.8	000.2500	0089.6	047.8	37.79
113.0	000.1500	0204.6	016.4	284.4	000.2500	0088.7	047.7	37.73
114.0	000.1500	0205.9	016.4	284.1	000.2500	0087.5	047.7	37.62
115.0	000.1500	0205.3	016.4	283.8	000.2500	0086.3	047.8	37.49
116.0	000.1500	0205.4	016.4	283.4	000.2500	0085.3	047.9	37.38
117.0	000.1500	0203.9	016.3	283.1	000.2500	0084.3	048.0	37.25
118.0	000.1500	0202.9	016.3	282.8	000.2500	0083.7	048.1	37.15
119.0	000.1500	0202.4	016.3	282.5	000.2500	0083.7	048.2	37.11
120.0	000.1500	0200.9	016.2	282.2	000.2500	0083.7	048.3	37.06
121.0	000.1500	0199.3	016.1	281.9	000.2500	0083.6	048.5	37.00
122.0	000.1500	0198.9	016.1	281.6	000.2500	0083.3	048.6	36.93
123.0	000.1500	0198.4	016.1	281.3	000.2500	0083.3	048.7	36.88
124.0	000.1500	0196.6	016.0	281.0	000.2500	0083.1	048.9	36.80
125.0	000.1500	0196.7	016.0	280.7	000.2500	0082.7	049.0	36.73
126.0	000.1500	0197.7	016.1	280.4	000.2500	0082.6	049.1	36.70
127.0	000.1500	0197.1	016.1	280.1	000.2500	0082.6	049.3	36.64
128.0	000.1500	0196.6	016.0	279.8	000.2500	0082.6	049.4	36.58
129.0	000.1500	0197.0	016.0	279.6	000.2500	0082.6	049.5	36.54
130.0	000.1500	0196.1	016.0	279.3	000.2500	0082.8	049.7	36.50
131.0	000.1500	0195.7	016.0	279.0	000.2500	0083.2	049.9	36.47
132.0	000.1500	0197.1	016.0	278.7	000.2500	0083.3	050.0	36.45
133.0	000.1500	0197.6	016.1	278.5	000.2500	0083.2	050.1	36.39
134.0	000.1500	0196.9	016.0	278.2	000.2500	0083.2	050.3	36.32
135.0	000.1500	0195.2	016.0	278.0	000.2500	0083.0	050.5	36.23
136.0	000.1500	0193.3	015.9	277.8	000.2500	0082.9	050.8	36.13
137.0	000.1500	0193.4	015.9	277.6	000.2500	0082.7	050.9	36.06

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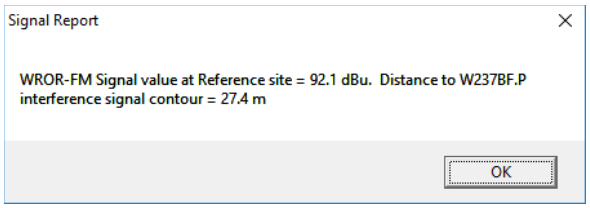
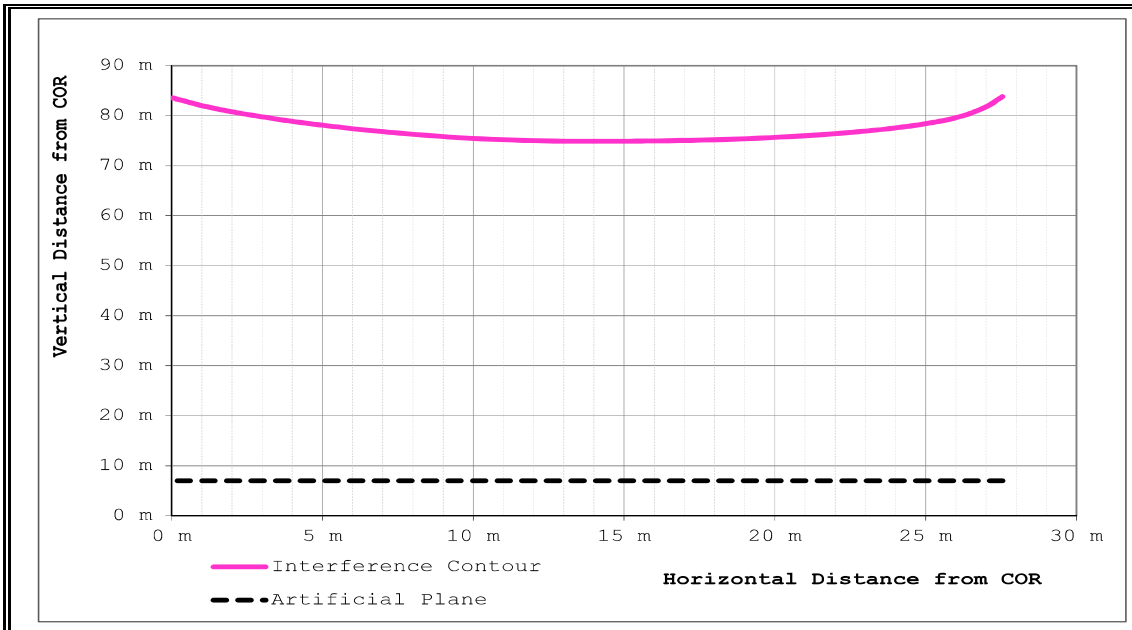
Exhibit 8
C.F.R. Section 74.1204(d) Second / Third Adjacent Given Interference Waiver Request

Yellow Text denotes the existence of a C.F.R. 47 Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WROR-FM - Framingham, MA (CH289B) as included in ***Exhibit 8***. At the Translator site location, protection of the worst case calculated 132.1 dBµ F(50:10) Interference Contour, corresponding to the worst case protected 92.1 dBµ F(50:50) protected contour, has been demonstrated through a downward radiation study as included herein. Full protection will be afforded the concern as the interference area will not reach the ground nor a seven-meter artificial plane representing a standard two story home when taking into account the downward radiation characteristics of the antenna. The antenna manufacturer's vertical radiation pattern data has been included in **Exhibit 9**.





Proposed Antenna: Scala CL-FM(Slant45) (1-Bay)
Proposed Power: 0.250 kW
Antenna Height AGL: 83.8 meters
Protection Plane Height: 7.0 meters
Protected Contour: 92.10 dBµ f(50:50)
Interference Contour: 132.10 dBµ f(50:50)

Field Strength (dBu) Equation
106.92-(20*(LOG10[DistMeters]/1000)))+[ERPin dBk]

Distance (Free Space) Equation:
(10^((106.92-[desired dBu]+[ERP in dBk])/20))*1000

Angle Below Horizon	Vertical Antenna Properties: Relative Field	ERP in kW	ERP in dBk	Meters from Antenna to Int. Contour	Meters from Antenna to Artificial Plane	Meters from Antenna to Ground Level	Field Strength at Protection Plane (dBµ)	Field Strength at Ground Level (dBµ)
0°	1.000	0.250	-6.02	27.54 m				
-5°	0.980	0.240	-6.20	26.99 m	881.18 m	961.50 m	101.82 dBµ	101.06 dBµ
-10°	0.950	0.226	-6.47	26.16 m	442.27 m	482.58 m	107.54 dBµ	106.78 dBµ
-15°	0.895	0.200	-6.98	24.65 m	296.73 m	323.78 m	110.49 dBµ	109.73 dBµ
-20°	0.820	0.168	-7.74	22.58 m	224.55 m	245.01 m	112.15 dBµ	111.39 dBµ
-25°	0.735	0.135	-8.69	20.24 m	181.72 m	198.29 m	113.04 dBµ	112.28 dBµ
-30°	0.645	0.104	-9.83	17.76 m	153.60 m	167.60 m	113.36 dBµ	112.61 dBµ
-35°	0.562	0.079	-11.03	15.48 m	133.90 m	146.10 m	113.36 dBµ	112.60 dBµ
-40°	0.470	0.055	-12.58	12.94 m	119.48 m	130.37 m	112.80 dBµ	112.04 dBµ
-45°	0.360	0.032	-14.89	9.91 m	108.61 m	118.51 m	111.31 dBµ	110.55 dBµ
-50°	0.250	0.016	-18.06	6.89 m	100.26 m	109.39 m	108.84 dBµ	108.08 dBµ
-55°	0.155	0.006	-22.21	4.27 m	93.76 m	102.30 m	105.27 dBµ	104.51 dBµ
-60°	0.085	0.002	-27.43	2.34 m	88.68 m	96.76 m	100.53 dBµ	99.77 dBµ
-65°	0.030	0.000	-36.48	0.83 m	84.74 m	92.46 m	91.88 dBµ	91.12 dBµ
-70°	0.020	0.000	-40.00	0.55 m	81.73 m	89.18 m	88.67 dBµ	87.91 dBµ
-75°	0.010	0.000	-46.02	0.28 m	79.51 m	86.76 m	82.89 dBµ	82.13 dBµ
-80°	0.010	0.000	-46.02	0.28 m	77.98 m	85.09 m	83.06 dBµ	82.30 dBµ
-85°	0.010	0.000	-46.02	0.28 m	77.09 m	84.12 m	83.16 dBµ	82.40 dBµ
-90°	0.010	0.000	-46.02	0.28 m	76.80 m	83.80 m	83.19 dBµ	82.43 dBµ

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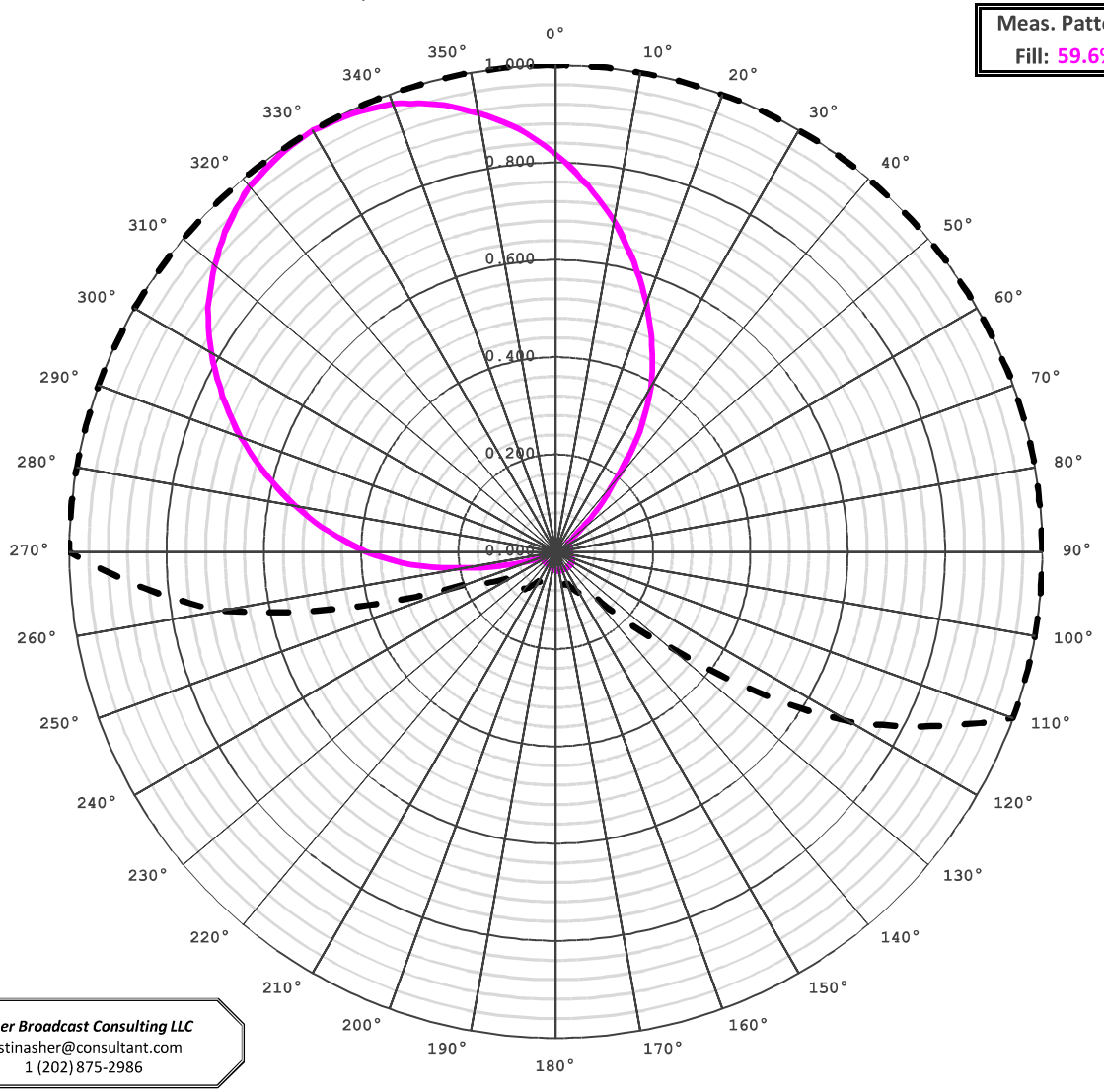
Manufacturer's	Make/Model	Orientation	Power
Element 1:	CI-FM(Slant45)	330° True	100.0%
Element 2:			
Element 3:			
Element 4:			
	Composite Power:		100%

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

Meas. Pattern
Fill: 59.6%



Azimuth ° True	FCC Pattern	Manufacturer's Pattern
0°	1.000	0.817
10°	1.000	0.690
20°	1.000	0.544
30°	1.000	0.390
40°	1.000	0.190
50°	1.000	0.050
60°	1.000	0.030
70°	1.000	0.030
80°	1.000	0.030
90°	1.000	0.030
100°	1.000	0.030
110°	1.000	0.034
120°	0.700	0.038
130°	0.300	0.040
140°	0.100	0.040
150°	0.100	0.040
160°	0.070	0.040
170°	0.070	0.040
180°	0.070	0.038
190°	0.070	0.034
200°	0.070	0.030
210°	0.070	0.030
220°	0.100	0.030
230°	0.100	0.030
240°	0.100	0.030
250°	0.200	0.050
260°	0.700	0.190
270°	1.000	0.390
280°	1.000	0.544
290°	1.000	0.690
300°	1.000	0.817
310°	1.000	0.916
320°	1.000	0.980
330°	1.000	1.000
340°	1.000	0.980
350°	1.000	0.916

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

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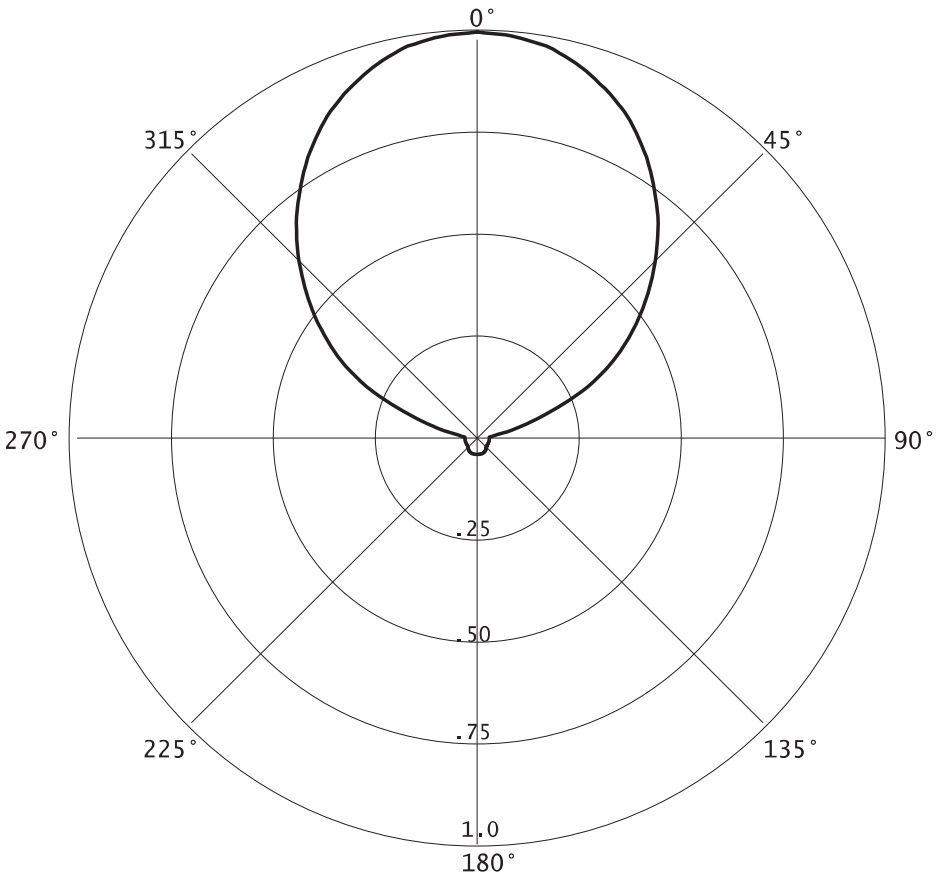
Exhibit 9
Copy of Manufacturer's Directional Antenna Documentation
(Actual Antenna Pattern rotated to 330.0°T) *(public record copy)*

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 9
Copy of Manufacturer's Directional Antenna Documentation
(Actual Antenna Pattern rotated to 330.0°T) *(public record copy)*

KATHREIN
SCALA DIVISION

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.

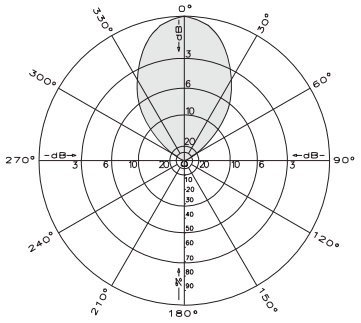
Like all Kathrein Scala Division antennas, the CL-FM is made of the finest materials using state of the art electrical and mechanical designs, resulting in superior performance and long service life.

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

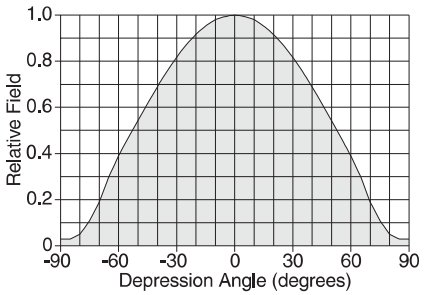
Specifications:

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 ft² (0.494 m²)
CL-FM/HRM	5.86 ft² (0.544 m²)
CL-FM/VRM	5.86 ft² (0.544 m²)
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.



Azimuth pattern (E-plane)



Elevation pattern (H-plane)

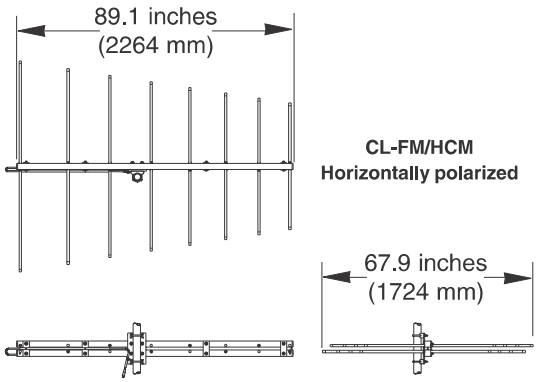
* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

10492-D

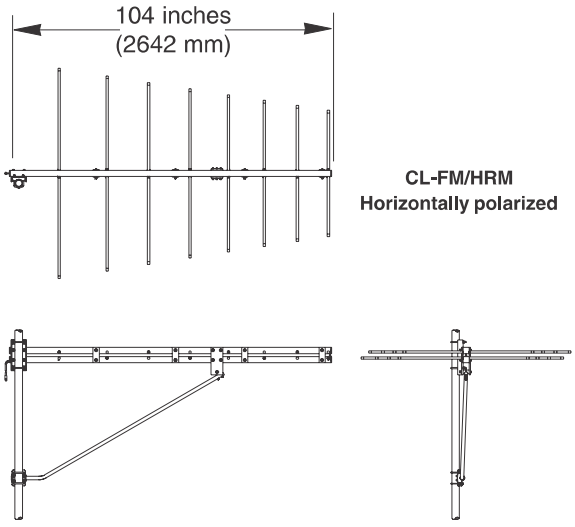
Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-6575
Email: broadcast@kathrein.com Internet: www.kathrein-scala.com

Exhibit 9
Copy of Manufacturer's Directional Antenna Documentation
(Actual Antenna Pattern rotated to 330.0°T) ***(public record copy)***

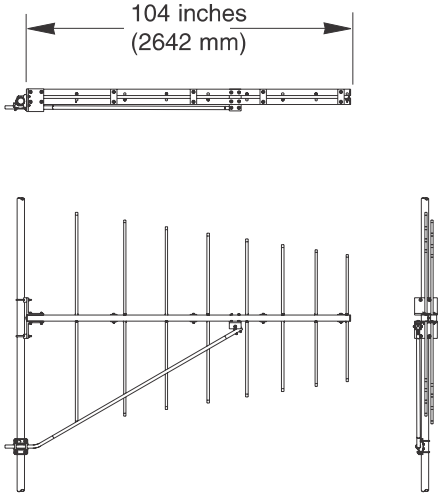
CL-FM
FM LOG-PERIODIC ANTENNA
7 dBd gain
88–108 MHz



CL-FM/HCM
Horizontally polarized



CL-FM/HRM
Horizontally polarized



CL-FM/VRM
Vertically 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

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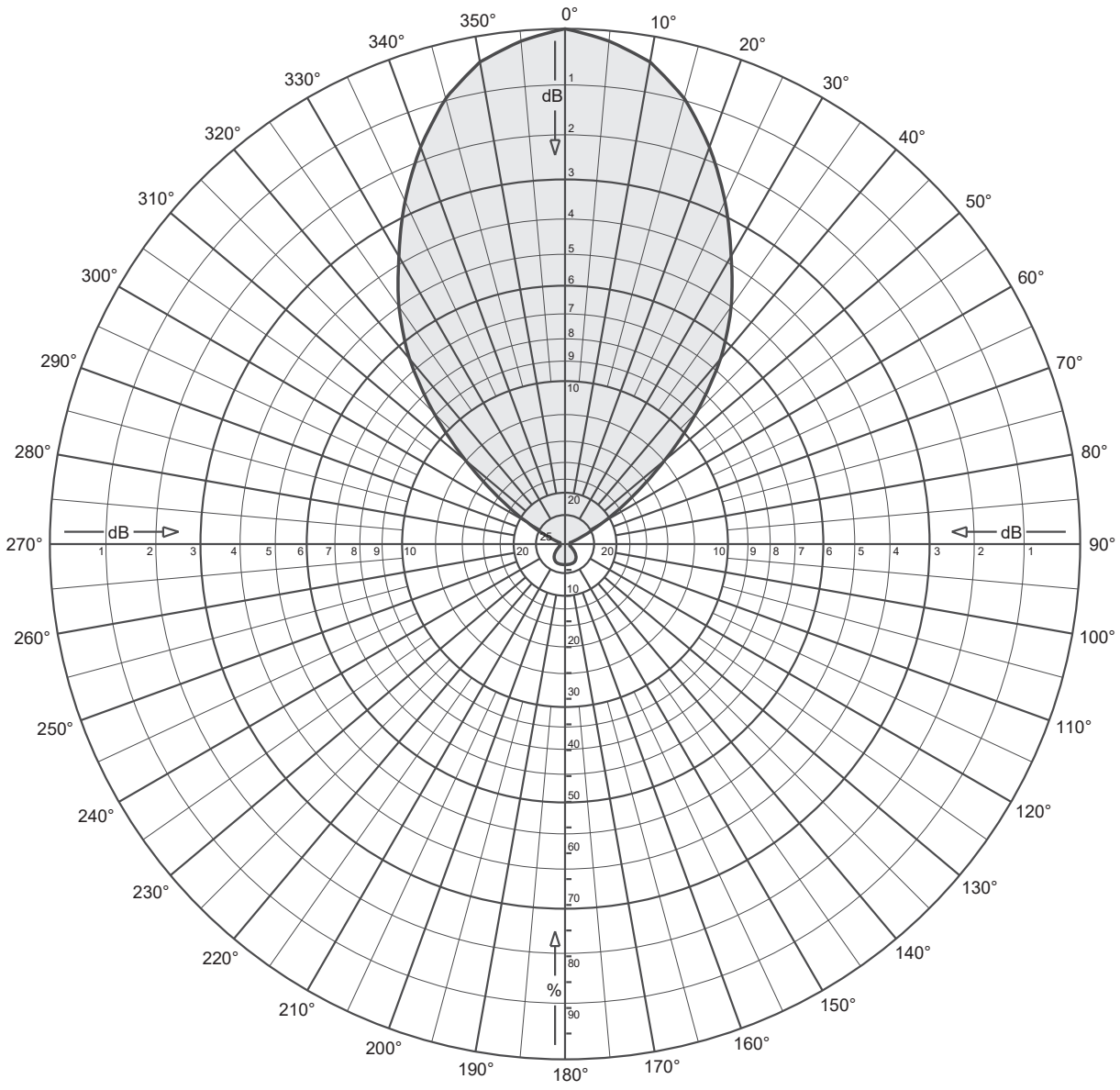

CL-FM
FM
Maximum gain: 7.0 dBd
Horizontal polarization Component
Horizontal radiation pattern
0 degree electrical downtilt

KATHREIN
SCALA DIVISION
Post Office Box 4580
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26-Oct-2011

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KATHREIN
SCALA DIVISION

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

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KATHREIN
SCALA DIVISION

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

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SCALA DIVISION

CL-FM
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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

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CL-FM
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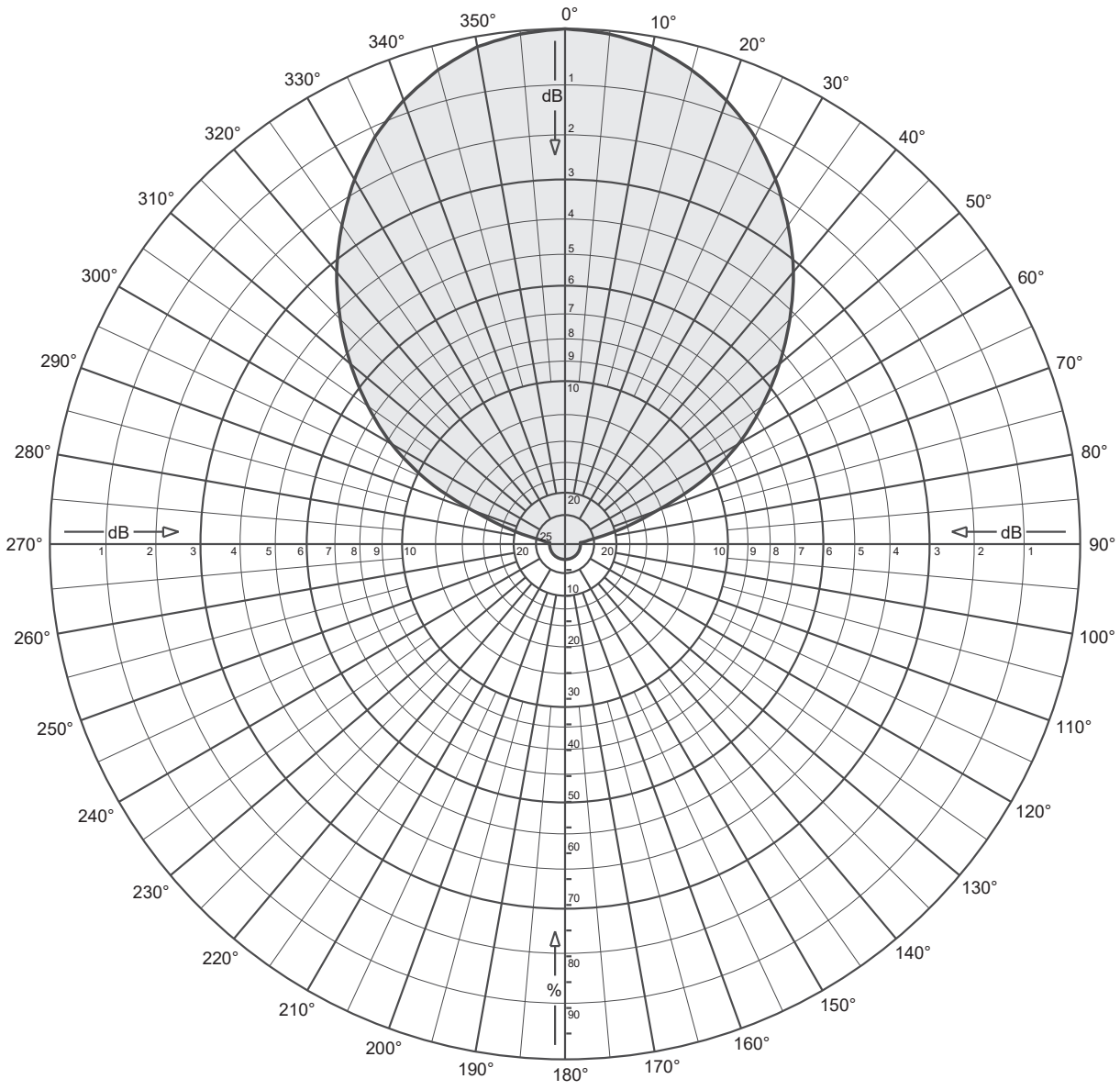
Horizontal polarization Component

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 330.0°T) *(public record copy)*



CL-FM
FM
Maximum gain: 7.0 dBd
Vertical polarization Component
Horizontal radiation pattern
0 degree electrical downtilt

KATHREIN
SCALA DIVISION
Post Office Box 4580
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Phone:(541)779-6500
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http://www.kathrein-scala.com

26-Oct-2011

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SCALA DIVISION

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Horizontal radiation pattern
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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 330.0°T) *(public record copy)*

KATHREIN
SCALA DIVISION

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
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KATHREIN
SCALA DIVISION

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

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Horizontal radiation pattern
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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