ENGINEERING STATEMENT FOR LA VOZ EVANGELICA DE PR, INC

WNRT-FM, MANATI, PR

SUPPORTING A CONSTRUCTION PERMIT APPLICATION

FOR WNRT-FM BOOSTER LOCATED IN AGUADA, PR

CH 245B 2400 W (MAX DA) 376M AMSL

APRIL 15, 2015

PREPARED BY:

JORGE R. FIGUEROA, PE

CONSULTING ENGINEER

PO BOX 903

SAINT JUST, PR 00978-0903

ENGINEERING STATEMENT

This Engineering Statement was prepared on behalf of La Voz Evangelica de Puerto Rico, Inc., licensee for WNRT-FM, Manati, PR, in support for an application for construction permit for WNRT-FM new booster in Aguada, PR. This booster will operate on Channel 245B (96.9 Mhz) and antenna radiation center at 376 M AMSL. They are proposing in this application a new booster transmitter site with an effective radiated power (ERP) of 2,400 W using a directional antenna.

Included within this statement are the antenna system patterns information, new site details, 54 dBu F(50,50) service contour for WNRT-FM main signal and the new 54 dBu F(50,50) service contour for the new WNRT-FM booster location. Also are included the values for antenna height above average terrain (HAAT) calculations. The HAAT (329M) and the 54 dBu F(50,50) contours were calculated using 36 evenly spaced radials with the 30 second (1 KM) GLOBE terrain database for Puerto Rico. [1]

In any case the predicted 54 dBu WNRT-FM new booster protected contour do not exceeds the WNRT-FM 54 dBu main station protected contour over land or 20% of main station ERP. This proposed facility complies with 47 C.F.R. Section 74.1205 interference criteria and there are no adjacent-channel FM facilities on that channel in Puerto Rico. This proposed facility will operated in unattended manner providing all the necessary circuits and equipment to suspend operation in the absence of the main station signal. In the event of the necessity to suspend the operation of the equipment, the control point is located at:

1820 Ramal San Jose
Road PR-8834
San Juan, PR 00926
Tel. 787-999-0360

Regarding to environmental protection, this facility complies with the established guidelines and is categorically excluded from environmental processing according to Section 1.1306 FCC Rules and do not represent any significant environmental impact.

This facility also comply with the environmental effects guidelines for RF emissions according to OET Bulletin 65 and do not represent any potential exposure for the general public and/or employment-related personnel. The calculations were made assuming: 30 M antenna radiation center above ground, 2,400W both horizontal and vertical plane, 0.20 toward ground relative field factor for 60 degrees or more depression angle. The combined RF energy was calculated at 2 M above ground level resulting 8.18 uW/cm^2, representing 4.09% of the 200 uW/cm^2 FCC not exceeding the 5.0% FCC uncontrolled environments. In any case, the licensee

[1] FCC Antenna Height Above Average Terrain (HAAT) Calculator; FCC FM and TV Propagation Curves Calculator

will reduce power if necessary to protect persons accessing the fenced area around the tower from RF energy exceeding the FCC guidelines.

This facility do not produce a field strength exceeding 10mV/m at the FCC monitoring station (Santa Isabel, Puerto Rico, NAD83, 18°00'18.9" N. Latitude, 66°22'30.6" W. Longitude at 91.9 KM @ 112°N azimuth) complying with Section 73.1030(c) not requiring notification to the FCC monitoring stations. The Arecibo Observatory in Puerto Rico was notified of the proposed facility modification pursuant to Section 73.1013.

OPERATING AND LOCATION PARAMETERS:

Channel / Frequency: 245B / 96.9 MHz

Site Coordinates 18° 18' 58.7" North Latitude; 67° 10' 48.6" West Longitude (NAD83)

Site Address: Road 411, 7 kilometers S-SE of the city of Aguada, PR

Site elevation: 346 M AMSL

Overall height of existing structure: 60 M AGL / 406 m AMSL

Height of antenna radiation center: 30 m AGL / 376 m AMSL

Transmitter power output: 0.398 kW

Transmission line: Andrew, LDF5-50A

Transmission line length: 50 M

Transmission line loss: 0.6 dB

Other losses: 0.2 dB

Antenna: Three Kathrein, CA5-FMCP Stacked Array

Polarization: Circular

Maximum Antenna Power Gain: 7.8 dBd (6.02X)

Antenna Main Lobes Azimuth: 15°N & 120°N

Antenna input power: 0.398 kW

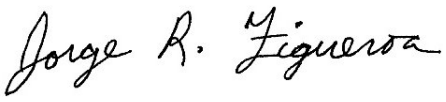
Effective radiated power (H & V) 2.4 kW

Transmitter output power: 480 W

Attached documents and engineering information:

- Antenna Manufacturer Information
- Height Above Average Terrain (HAAT) Data
- F(50,50) 54 dBu Contours Data
- Predicted 54 dBu All Puerto Rico Coverage Contour
- Predicted 54 dBu Detailed Coverage Contour
- Notification Letter to Arecibo Observatory
- Consent Letter from Arecibo Observatory

Prepared by:



Jorge R. Figueroa, PE
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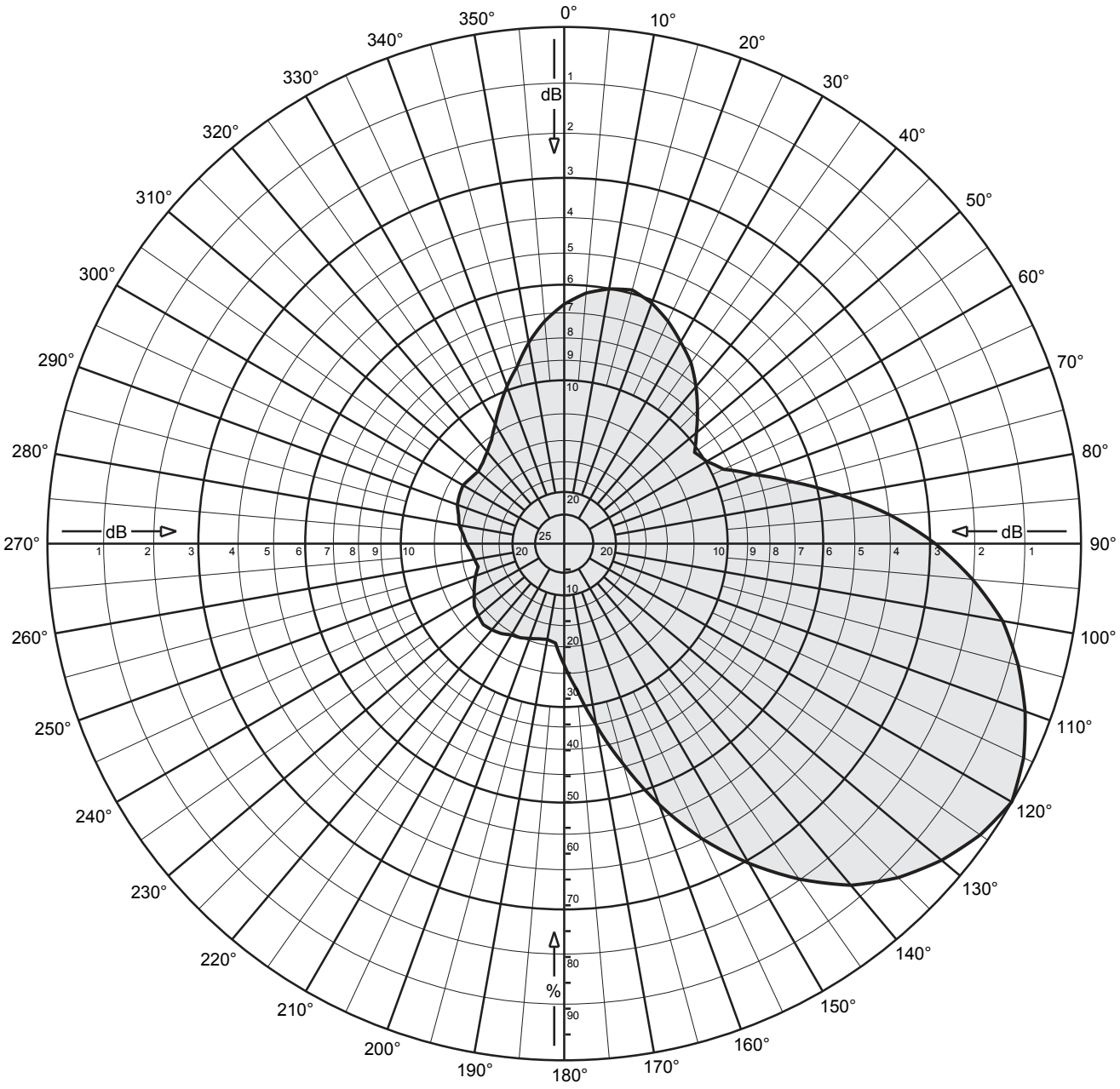
Tel. 787-761-2833
E-mail: ibs-pr@usa.net

April 15, 2015



Three CA5-FM/CP/RM/50N Yagi Antennas
Oriented one at 15 deg w/ 20% power
two at 120 deg w/ 40% power
Gain: 7.8 dBd (x 6.0)
Frequency:
Circular Polarization
Vertical stacked
Horizontal plane Pattern

KATHREIN
SCALA DIVISION
Post Office Box 4580
Medford, OR 97501 (USA)
Phone:(541)779-6500
Fax:(541)779-3991
http://www.kathrein-scala.com

KATHREIN
SCALA DIVISION

Three CA5-FM/CP/RM/50N Yagi Antennas
Oriented one at 15 deg w/ 20% power
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Gain: 7.8 dBd (x 6.0)

Frequency:
Circular Polarization
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Horizontal plane Pattern

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	0.463	-6.68	1.12	1.29	180	0.234	-12.60	-4.80	0.33
5	0.487	-6.25	1.55	1.43	185	0.193	-14.29	-6.49	0.22
10	0.501	-6.01	1.79	1.51	190	0.188	-14.51	-6.71	0.21
15	0.508	-5.88	1.92	1.56	195	0.191	-14.40	-6.60	0.22
20	0.495	-6.10	1.70	1.48	200	0.195	-14.19	-6.39	0.23
25	0.475	-6.47	1.33	1.36	205	0.201	-13.94	-6.14	0.24
30	0.451	-6.92	0.88	1.22	210	0.204	-13.81	-6.01	0.25
35	0.428	-7.38	0.42	1.10	215	0.212	-13.46	-5.66	0.27
40	0.397	-8.03	-0.23	0.95	220	0.218	-13.24	-5.44	0.29
45	0.365	-8.76	-0.96	0.80	225	0.222	-13.09	-5.29	0.30
50	0.334	-9.53	-1.73	0.67	230	0.217	-13.27	-5.47	0.28
55	0.308	-10.23	-2.43	0.57	235	0.212	-13.47	-5.67	0.27
60	0.318	-9.94	-2.14	0.61	240	0.201	-13.93	-6.13	0.24
65	0.340	-9.36	-1.56	0.70	245	0.192	-14.35	-6.55	0.22
70	0.390	-8.17	-0.37	0.92	250	0.183	-14.77	-6.97	0.20
75	0.460	-6.75	1.05	1.27	255	0.172	-15.27	-7.47	0.18
80	0.542	-5.32	2.48	1.77	260	0.176	-15.08	-7.28	0.19
85	0.633	-3.97	3.83	2.42	265	0.181	-14.86	-7.06	0.20
90	0.718	-2.88	4.92	3.11	270	0.189	-14.47	-6.67	0.22
95	0.793	-2.01	5.79	3.79	275	0.196	-14.16	-6.36	0.23
100	0.862	-1.29	6.51	4.47	280	0.206	-13.71	-5.91	0.26
105	0.910	-0.82	6.98	4.99	285	0.212	-13.49	-5.69	0.27
110	0.949	-0.45	7.35	5.43	290	0.220	-13.15	-5.35	0.29
115	0.981	-0.17	7.63	5.80	295	0.224	-13.01	-5.21	0.30
120	1.000	0.00	7.80	6.03	300	0.226	-12.92	-5.12	0.31
125	0.983	-0.15	7.65	5.82	305	0.221	-13.11	-5.31	0.29
130	0.953	-0.42	7.38	5.48	310	0.217	-13.26	-5.46	0.28
135	0.914	-0.78	7.02	5.04	315	0.222	-13.06	-5.26	0.30
140	0.863	-1.28	6.52	4.49	320	0.232	-12.70	-4.90	0.32
145	0.793	-2.02	5.78	3.79	325	0.245	-12.21	-4.41	0.36
150	0.714	-2.92	4.88	3.07	330	0.267	-11.47	-3.67	0.43
155	0.630	-4.01	3.79	2.39	335	0.294	-10.64	-2.84	0.52
160	0.537	-5.40	2.40	1.74	340	0.324	-9.79	-1.99	0.63
165	0.442	-7.10	0.70	1.18	345	0.354	-9.03	-1.23	0.75
170	0.357	-8.95	-1.15	0.77	350	0.395	-8.07	-0.27	0.94
175	0.284	-10.93	-3.13	0.49	355	0.432	-7.28	0.52	1.13

KATHREIN
SCALA DIVISION

The Scala CA5-FM/CP/RM is a ruggedly built yagi antenna, designed for professional FM transmit and receive applications.

Like all Scala antennas, the CA5-FM/CP/RM is made of the finest materials resulting in superior performance and long service life.

The CA5-FM/CP/RM may be used stand-alone or in stacked arrays for higher gain, increased side-lobe suppression, or custom azimuth patterns.

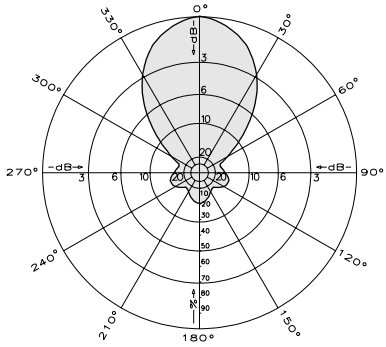
Specifications:

Frequency range	Any specified FM channel 88 to 108 MHz
Gain	6 dBd
Power gain	3.98
Impedance	50 ohms
VSWR	< 1.5:1
Polarization	Circular
Front-to-back ratio	>14 dB
Maximum input power	250 watts
Azimuth pattern	61 degrees (half-power)
Elevation pattern	61 degrees (half-power)
Connector	N female
Weight	35 lb (15.9 kg)
Dimensions	79 x 56 x 50.8 inches maximum (2007 x 1422 x 1290 mm)
Wind load Front	at 100 mph (160 kph) 98 lbf (377 N)
Wind survival rating*	120 mph (194 kph)
Shipping dimensions	84 x 13 x 8 inches maximum (2134 x 330 x 203 mm)
Shipping weight	38 lb (8.2 kg) maximum
Mounting	For masts of 2.375 inches (60 mm) OD.

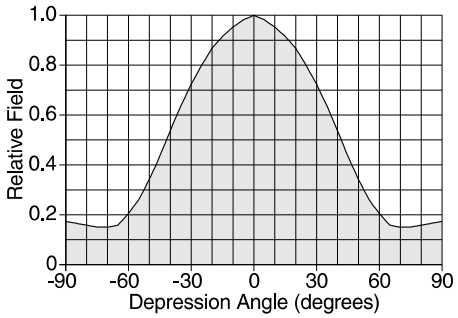
* Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further de**tails.**

Order Information:

Contact Scala Customer Service for detailed order information.



Azimuth pattern



Elevation pattern

RoHS Lead-Free

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

WNRT-FM PROPOSED BOOSTER AT AGUADA, PR

Antenna Height Above Average Terrain Calculations[1]

Antenna Height Above Average Terrain Calculations -- Results

Input Data

Latitude **18° 18' 58.7"** North
Longitude **67° 10' 48.6"** West (NAD 83)

Height of antenna radiation center above mean sea level: **376** meters AMSL

Number of Evenly Spaced Radials = **36** 0° is referenced to True North

Results

Calculated HAAT = **329 meters**

Antenna Height Above Average Terrain calculated
using 1 km GLOBE terrain data

Individual "Radial HAAT" Values, in meters

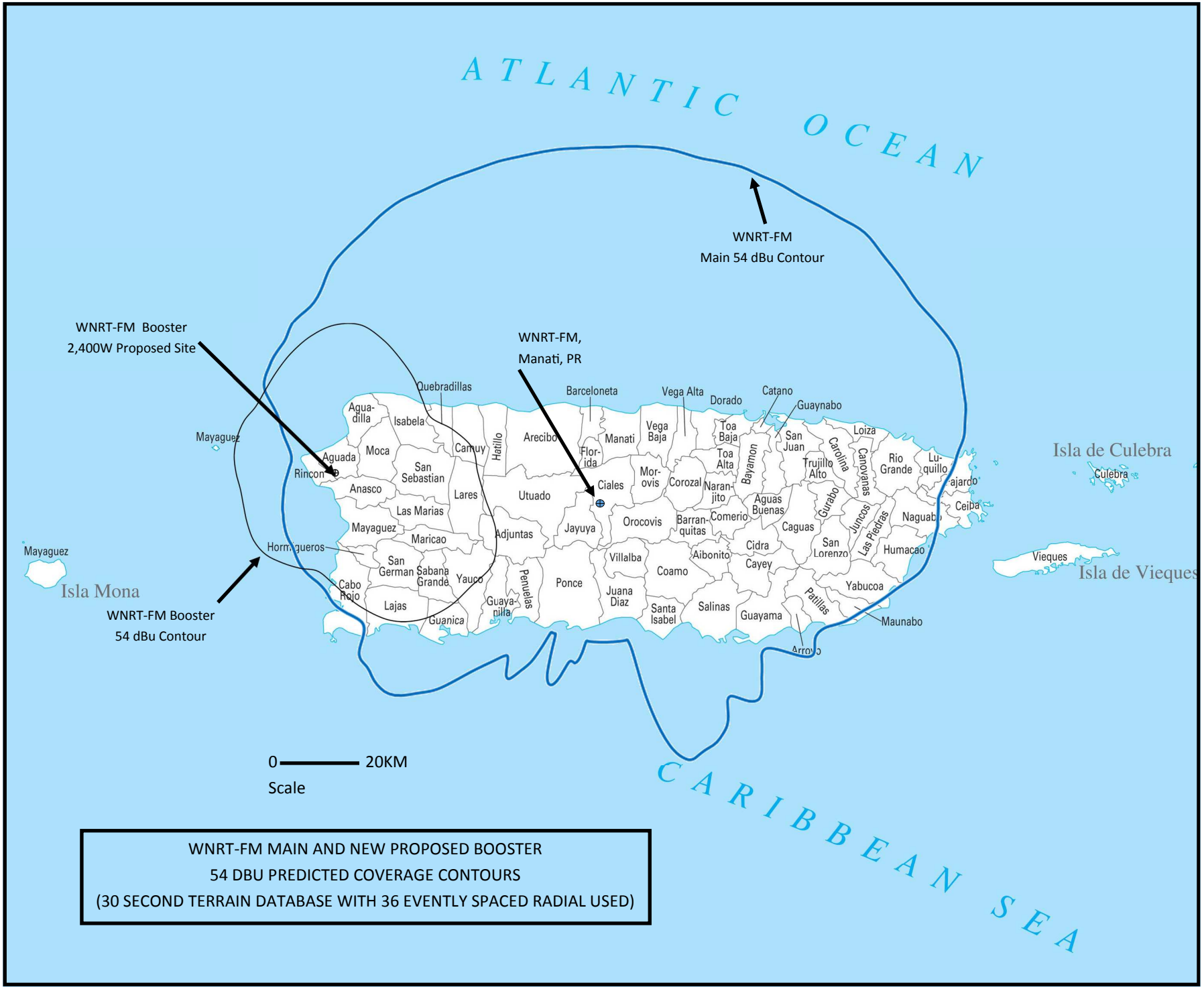
0°	360.7 m	180°	374.7 m
10°	343.9 m	190°	375.1 m
20°	305.8 m	200°	374.9 m
30°	280.9 m	210°	374.4 m
40°	276.8 m	220°	372.9 m
50°	282.0 m	230°	366.7 m
60°	277.5 m	240°	357.4 m
70°	293.4 m	250°	361.5 m
80°	270.2 m	260°	367.8 m
90°	216.7 m	270°	363.5 m
100°	212.8 m	280°	354.5 m
110°	260.5 m	290°	346.2 m
120°	292.8 m	300°	342.2 m
130°	284.7 m	310°	352.1 m
140°	306.9 m	320°	359.3 m
150°	335.7 m	330°	361.3 m
160°	359.6 m	340°	360.7 m
170°	369.8 m	350°	361.4 m

[1] http://transition.fcc.gov/mb/audio/bickel/haat_calculator.html

WNRT-FM NEW BOOSTER HAAT DATA (AGUADA, PR)

Coordinates (NAD83): 18-18-58.7/67-10-48.6
Site Elev AMSL = 346M, RC AGL = 30M, RC AMSL = 376M
Max ERP @ 120°N = 2.4 KW Antenna Input Power = 398 W

Radial	HAAT (M)	Ant Gain (dBd)	Pwr Gain	ERP Radial (KW)	54 dBu F(50,50) Contour Dist (KM)
0	360.7	1.1	1.288	0.51	39.97
10	343.9	1.8	1.514	0.60	40.40
20	305.8	1.7	1.479	0.59	38.14
30	280.9	0.9	1.230	0.49	35.32
40	276.8	-0.2	0.955	0.38	33.13
50	282.0	-1.7	0.676	0.27	30.79
60	277.5	-2.1	0.617	0.25	29.89
70	293.4	-0.4	0.912	0.36	33.71
80	270.2	2.5	1.778	0.71	37.56
90	216.7	4.9	3.090	1.23	38.45
100	212.8	6.5	4.467	1.78	41.15
110	260.5	7.4	5.495	2.19	46.13
120	292.8	7.8	6.026	2.40	49.18
130	284.7	7.4	5.495	2.19	47.78
140	306.9	6.5	4.467	1.78	47.36
150	335.7	4.9	3.090	1.23	45.87
160	359.6	2.4	1.738	0.69	42.34
170	369.8	-1.1	0.776	0.31	36.40
180	374.7	-4.8	0.331	0.13	30.02
190	375.1	-6.7	0.214	0.09	27.02
200	374.9	-6.4	0.229	0.09	27.46
210	374.4	-6.0	0.251	0.10	28.06
220	372.9	-5.4	0.288	0.11	28.96
230	366.7	-5.5	0.282	0.11	28.58
240	357.4	-6.1	0.245	0.10	27.28
250	361.5	-7.0	0.200	0.08	26.12
260	367.8	-7.3	0.186	0.07	25.88
270	363.5	-6.7	0.214	0.09	26.62
280	354.5	-5.9	0.257	0.10	27.48
290	346.2	-5.3	0.295	0.12	28.06
300	342.2	-5.1	0.309	0.12	28.21
310	352.1	-5.5	0.282	0.11	28.00
320	359.3	-4.9	0.324	0.13	29.26
330	361.3	-3.7	0.427	0.17	31.37
340	360.7	-2.0	0.631	0.25	34.37
350	361.4	-0.3	0.933	0.37	37.46
15		-5.9	1.549	0.62	



WNRT-FM MAIN AND NEW PROPOSED BOOSTER
54 DBU PREDICTED COVERAGE CONTOURS
(30 SECOND TERRAIN DATABASE WITH 36 EVENTLY SPACED RADIAL USED)

PREDICTED COVERAGE CONTOURS (54dBu)

WNRT-FM MANATI, PR MAIN PREDICTED CONTOUR (Green)

WNRT-FM AGUADA, PR PROPOSED BOOSTER PREDICTED CONTOUR (Orange)

Jorge R. Figueroa, P.E.

PO Box 903, Saint Just, PR 00978-0903
T: 787.761.2833 F: 787.748.7411
E-mail: ibs-pr@usa.net www.ibs-pr.com

March 31, 2015

Via email (angel@naic.edu)

Angel M. Vazquez, Spectrum Manager
National Astronomy and Ionosphere Center
Arecibo Observatory
HC3 Box 53995
Arecibo, PR 00612

Dear Eng. Vazquez,

On behalf of La Voz Evangelica de Puerto Rico, Inc. (WNRT-FM, Radio Triunfo), applicant for a new WNRT-FM booster in Aguada, Puerto Rico and in accordance with Section 73.1030 of the FCC Rules, we are hereby notifying of the proposed new construction. The new booster details are as follow:

Coordinates of antenna location (NAD83): 18-18-58.7 N / 67-10-48.6 W (Bo. Atalaya, Aguada, PR)
Antenna Radiation Center Height Above Ground: 30M; (376M AMSL)
Antenna directivity: Directional Main lobes at 15°N & 120°N (Pattern attached)
Operating Channel: 245B (96.9 MHz)
Emission Type: F3E
Maximum Effective isotropic radiated power: 3.9 kW (Circular Polarized)
Effective Isotropic Radiated Power Toward Observatory (45.3kM@86°N): 1.7 KW

Please, review this proposal and if you find any cause of concern, let us know immediately, so appropriate action can be taken.

Sincerely,

Jorge R. Figueroa

Jorge R. Figueroa, P.E.
Consultant Engineer

ARECIBO OBSERVATORY

The William E. Gordon Telescope

April 10, 2015

Mr. Jorge R. Figueroa, PE
Broadcast Consultant Engineer
P.O. Box 903
Saint Just, PR 00978-0903

Re: La Voz Evangélica de PR, Inc.
WNRT-FM, Radio Triunfo

Dear Jorge R. Figueroa:

Thank you very much for the copy of your FCC application sent to us in accordance with the Puerto Rico Coordination zone agreements. We have considered the technical aspects of your application and find that your installation/path originating in Aguada is unlikely to cause harmful interference to the passive use of the Radio Astronomy bands at the Observatory. We therefore have no objection to your proposed installation.

Sincerely yours,

Angel M. Vázquez
Spectrum Manager

AV:ws

Cc: PRCZ files [File #0015004001]