

TECHNICAL EXHIBIT
CONSTRUCTION PERMIT APPLICATION
NEW LPFM STATION
YABUCOA, PUERTO RICO
CHANNEL 215L100
FACILITY ID 788532

Technical Narrative

The technical exhibit, of which this narrative is part, has been prepared on behalf of *Hogar CREA Inc.*, applicant of a LPFM station, Facility ID 788532, in Yabucoa, PR.

Proposed Transmitter Location

The proposed transmitting facility would operate on channel 215L100 (90.9 MHz) using an ERI, 100A-1, 1-Bay, circularly polarized antenna, side-mounted on an existing tower. The proposed station location is described by the following NAD 83 geographic coordinates:

18° 02' 12.6" North

65° 55' 29.1" West

It is proposed to side mount the antenna with its RC at a height of 61 meters (200 ft.) above ground on an existing 62.5-meter high (205 ft.) tower, with a site elevation of 449 meters AMSL. Thus, the antenna RC will be at a height of 510 meters AMSL, which according to the FCC HAAT web utility (using 8 radials) corresponds to a HAAT of 352 meters. For this HAAT the corresponding ERP is 1 Watt or 0.001 kW. The maximum permissible ERP of 1 Watt allowed under these conditions is requested for this LPFM facility. Appendix 1 shows the FCC Web site HAAT calculation, Appendix 2 shows the FCC Web site LPFM ERP Calculation.

Tower Registration

The FAA is not being notified of the proposed construction, as it is proposed to side-mount the FM antenna on an existing 1registered tower, ASRN 1010664.

Environmental Considerations

The proposal is excluded from environmental processing, as an existing supporting structure is to be employed and the proposal complies with the FCC Rules concerning human exposure to radio frequency (RF) energy.* The proposal would not exceed 0.007 % of the RF exposure limit for general population/uncontrolled environments for the frequency proposed. The calculation of RF energy at 2-m above ground was made under the procedures of OET Bulletin No. 65.† The formula employed is as follows:

$$S = \frac{(33.4)F^2P}{R^2}$$

where, S = power density in $\mu\text{W}/\text{cm}^2$, F = relative field factor at the angle to the calculation point, P = the total effective radiated power relative to a dipole in watts, and R = distance from the antenna radiation center to the calculation point in meters.

Based on the vertical radiation pattern of the proposed antenna, (Figure 2A), a relative field factor of 0.866 or less for any depression angle equal or greater than 30 degrees below horizon, a total effective radiated power of 1 watt (circular polarization) and an antenna radiation center height above ground of 61 m, the calculated power density will not exceed .0072 $\mu\text{W}/\text{cm}^2$. Therefore, the calculated RF exposure at 2 m above ground will not exceed 0.007 % of the limit of 200 $\mu\text{W}/\text{cm}^2$ for the general population and uncontrolled environments. As there will not be other significant RF emitters on the supporting structure, the proposal will comply with the FCC RF exposure guidelines.

The antenna system will be restricted from access and appropriate warning signs posted. In the event that personnel are required to climb the structure, the proposed LPFM station transmissions will be suspended for as long as necessary to prevent RF exposure above the FCC recommended limits.

* Given that the proposed ERP will not exceed 100 watts, the proposal is categorically excluded from environmental processing pursuant to Section 1.1307 of the FCC Rules.

† Federal Communications Commission OET Bulletin No. 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (Edition 97-01, August 1997).

FCC Monitoring Stations

FCC rules pertaining to FCC monitoring stations, Section 73.1030(c), requires that the proposed facility does not produce a field strength greater than 10 mV/m at the FCC stations. The closest FCC monitoring station to the proposed operation is in Santa Isabel, PR. at a distance of 48 kilometers. The proposed operation will produce field strengths much lower than 10 mV/m at the FCC Santa Isabel, PR station.

Quiet Zone Notification

As required by FCC rules pertaining to radio Quiet Zones, Section 73.1030(a), the National Radio Astronomy Observatory (NRAO) in Arecibo, Puerto Rico is being notified of this application. A copy of the notification letter to the Arecibo Observatory of the proposed facility is included herein as Appendix 3.

AM Stations Within 3.2 km

There are no non-directional AM stations located within 0.80 km of the above specified coordinates, nor any directional AM stations within 3.2 km of these coordinates: the closest AM Facility is WXEW, Yabucoa, PR, L, DAN at 76.7° at 6.1 km. Thus, the proposal is believed to be compliant with Section 47 CFR 73.1692.

Allocation Considerations

Figure 1 summarizes the allocation study for the proposed facility. As indicated in Figure 1, spacing with respect to co-channel and first adjacent channels is in line with FCC requirements.

An inspection of the facilities of nearby FM translators shows no translator getting their input signal on the third adjacent channel, or closer, of the proposed facility.

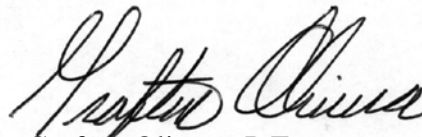
There is a short spacing to second-adjacent full-service FM stations WIPR-FM, Channel 217B and WIDA-FM, channel 213B, whose signal strength at the proposed site are predicted, using V-Soft FMCommander software, to be 100.8 dBu and 91 dBu respectively, WIDA-FM being the weaker of the two stations determines the maximum allowed signal for this site. As the proposed station will operate on Channel 215, second adjacent channel to WIDA-FM, the protection requirement of the undesired signal from the proposal is 40 dB

higher than the desired signal of this station, or 131 dBu for WIDA-FM; this contour defines the maximum extent of allowed predicted interference.

Since an ERP of 1 watt is proposed, the 131 dBu signal contour is calculated by means of a free-space calculation. Based on free-space calculations the minimum height above ground level that the 131 dBu contour would reach is 197 feet high, at a horizontal distance of 5 feet from the transmitting antenna. This is graphically depicted in Figure 2B. Therefore, no harmful interference is predicted to WIDA-FM (or WIPR-FM) as a result of the proposed LPFM facility. Figure 2A is a table and Figure 2B a graphic representation showing the computed distances to the predicted interfering contour. If waiver of FCC Rules, 47 C.F.R. Section 73.807 is required, waiver of this section of The Rules is respectfully requested.

The predicted contours signal levels were calculated in accordance with Section 73.313 of the FCC Rules, using the V-Soft FMCommander@2023 software in conjunction with the 30-second Global terrain database.

For the reasons stated above, it is believed that the proposed facility is in compliance with the applicable FCC Rules and Regulations.



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December 13, 2023

Figure 1

NEW LPFM CH 215L1 YABUCOA, PR
NEW LPFM WINDOW 2023

REFERENCE		DISPLAY DATES
18 02 12.60 N.	CLASS = L1	DATA 12-07-23
65 55 29.10 W.	PR & VI Spacings to 2nd Adj.	SEARCH 12-13-23
----- Channel 215 - 90.9 MHz -----		

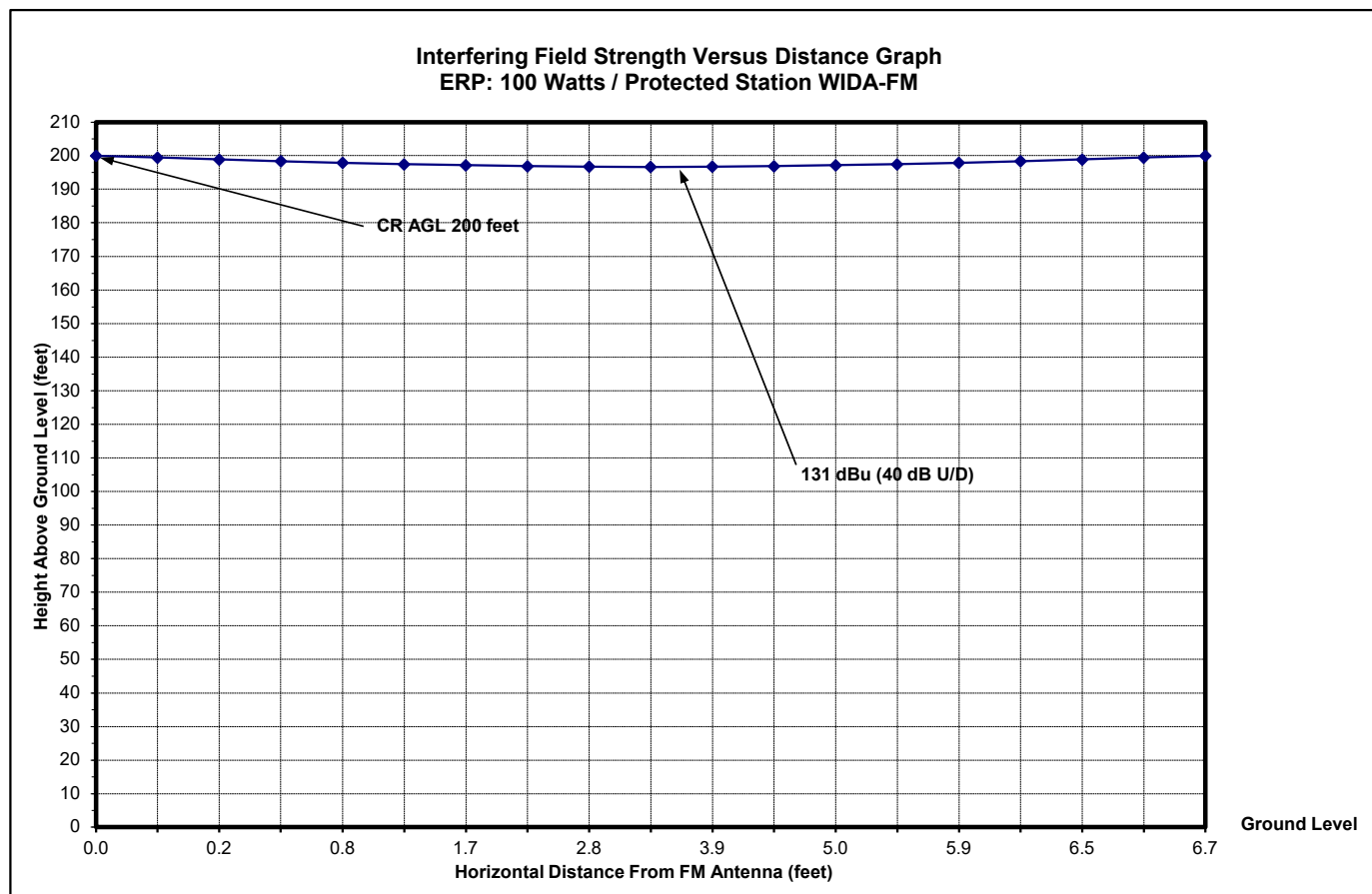
Call	Channel	Location	Azi	Dist	FCC	Margin
WCRP	STA 201B	Guayama	PR 302.2	15.91	0.0	15.9
WCRP	STA 201B	Guayama	PR 302.2	15.91	131.0	-115.1
WCRP	STA 201B	Guayama	PR 302.2	15.91	131.0	-115.1
WIPR-FM	LIC 217B	San Juan	PR 301.3	15.60	91.5	-75.9
WIDA-FM	LIC-D 213B	Carolina	PR 301.7	15.75	91.5	-75.8
WIPR-FM	STA 217B	San Juan	PR 326.3	30.46	91.5	-61.0
WODB-LP	LIC 215L1	Caguas	PR 331.7	24.84	23.5	1.3
R40150	215B	British Virgin Isla	BV 72.1	141.77	137.5	4.3
R42834	215B	British Virgin Isla	BV 72.1	141.77	137.5	4.3
R29678	215B	British Virgin Isla	BV 72.1	141.77	137.5	4.3
R28980	215B	British Virgin Isla	BV 72.1	141.77	137.5	4.3
R19463	RUL 215B	British Virgin Isla	VI 72.1	141.79	137.5	4.3
R19201	RUL 215B	British Virgin Isla	VI 72.1	141.79	137.5	4.3
R18791	RUL 215B	British Virgin Isla	VI 72.1	141.79	137.5	4.3
R19487	RUL 215B	British Virgin Isla	VI 72.1	141.79	137.5	4.3
WSKX	LIC 214B1	Christiansted	VI 104.1	135.95	81.5	54.5
WCXQ-LP	CP 215L1	Isabela-Camuy	PR 295.0	118.48	23.5	95.0
WLYM-LP	LIC 215L1	Mayaguez- Anasco	PR 277.3	132.35	23.5	108.9
WQHD-LP	LIC 216L1	Aguada-Aguadilla	PR 284.9	138.40	13.5	124.9

Reference station has protected zone issue: Arecibo
All separation margins include rounding

Figure 2A

ASRN 1010664 - Fac. ID: 788532			IX to	Desired dBu	91.0	
HECTOR L. FIGUEROA, PRESIDENT			WIDA-FM	U/D Ratio - dB	40	
HOGAR CREA, INC.				Undesired dBu	131.01	
NEW LPFM YABUCOA, PR	CHANNEL:	215	Site Elev. - M	449	RCAGL-M	RCAGL-FT
NAD 83: 18-02-12.6 N / 65-55-29.1 W	FREQ.	90.9	RC AGL - M	61.0	61.0	200.0
Interfering Field Strength Vs. Distance Graph			RC AMSL - M	510.0		
Ant.: ERI-100A-1, 1-Bay			FCC HAAT - M	352		
RC: 200 ft, Clearance 197 ft AGL	200.0	feet	ERP [FCC] - W	1	0.001	kW
Interfering Contour	131.01	dBu			-30	dBk
Signal from Station	91.01	dBu				
Depression Angle	VRF	ERP (dBk)	Distance to ; (m)**	Distance to Contour (feet)**	Horiz. Dist. (feet)	Height AGL (feet)
90	0.000	-354.3	0.0	0	0	200
85	0.087	-51.2	0.2	1	0	199
80	0.174	-45.2	0.4	1	0	199
75	0.259	-41.7	0.5	2	0	198
70	0.342	-39.3	0.7	2	1	198
65	0.423	-37.5	0.9	3	1	197
60	0.500	-36.0	1.0	3	2	197
55	0.574	-34.8	1.2	4	2	197
50	0.643	-33.8	1.3	4	3	197
45	0.707	-33.0	1.4	5	3	197
40	0.766	-32.3	1.6	5	4	197
35	0.819	-31.7	1.7	5	4	197
30	0.866	-31.2	1.8	6	5	197
25	0.906	-30.9	1.8	6	5	197
20	0.940	-30.5	1.9	6	6	198
15	0.966	-30.3	2.0	6	6	198
10	0.985	-30.1	2.0	7	6	199
5	0.996	-30.0	2.0	7	7	199
0	1.000	-30.0	2.0	7	7	200
MIN HD & HGT					904	197

Figure 2B



Appendix 1

Antenna Height Above Average Terrain Calculations -- Results

Input Data

Latitude **18° 2' 12.6"** North
Longitude **65° 55' 29.1"** West (NAD 83)

Height of antenna radiation center above mean sea level: **510** meters AMSL

Number of Evenly Spaced Radials = **8** 0° is referenced to True North

Results

Calculated HAAT = **352 meters**

Antenna Height Above Average Terrain calculated
using 1 km [GLOBE terrain data](#)

Individual "Radial HAAT" Values, in meters

0°	235.8 m
45°	405.9 m
90°	469.4 m
135°	490.1 m
180°	466.3 m
225°	412.1 m
270°	172.5 m
315°	167.7 m

[Print Results?](#)

[New Calculation?](#)

Appendix 2

Choose a U.S. State or Possession:

PR - Puerto Rico ▼

Station Class: 100 watt LPFM ▼

352 meters Antenna Height Above Average Terrain (HAAT)

Find Result

Print

Clear Data

Results:

Calculated ERP (rounded per Section 73.212) = 0.001 kW

Unrounded ERP = **0.001214 kW**

Comments:

Low Power FM (LPFM) stations are authorized throughout the United States.

Maximum class limit determined from:

Class: L1 Reference ERP: 0.1 kW Reference HAAT: 30 meters Distance to 60 dBu F(50,50) contour: 5.6 km

Appendix 3

Grafton Olivera, P.E.

Consulting Engineer

December 13, 2023

Via email (avazquez@nrao.edu)

Mr. Angel M. Vazquez
Puerto Rico Coordination Zone Program Administrator
National Radio Astronomy Observatory (NRAO)
520 Edgemont Road
Charlottesville, VA 22903-2475

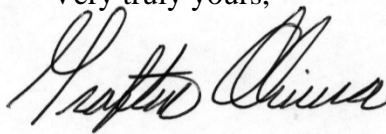
Gentlemen:

On behalf of our client, **HOGAR CREA, INC.**, applicant of a New LPFM station, Facility ID 788532, in Yabucoa, PR., in accordance with Section 73.1030 of FCC Rules, we hereby notify the Observatory of the proposed facility. The particulars of the proposal are as follows:

Geographical coordinates of antenna location (NAD83): 18-02-12.6 / 65-55-29.1
Antenna height: 61 m AGL, 510 m AMSL
Antenna Gain (horizontal plane): 0 dBd (non-directional)
Operating channel: 215L100, 90.9 MHz
Type of emission: F3E
Effective isotropic radiated power: 0.00164 kW (1 Watts - Circular Polarization)

Please review this proposal and let me know your findings; feel free to communicate via email (<mailto:Grafton.Olivera@outlook.com>), telephone (941-323-0381) or regular mail.

Very truly yours,



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