

TECHNICAL EXHIBIT
APPLICATION FOR CONSTRUCTION PERMIT
MINOR MODIFICATION OF LICENSE
KELLY BROADCASTING SYSTEM CORP.
FM STATION WNIK-FM
ARECIBO, PUERTO RICO
FACILITY ID 33877

July 13, 2019

CH 293B1 25 KW 115 M

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Technical Narrative

This technical exhibit was prepared on behalf of Kelly Broadcasting System Corp. licensee of station WNIK-FM, channel 293B1, Arecibo, Puerto Rico. By means of this application, Kelly Broadcasting System seeks construction permit (CP) to make minor changes in the licensed facilities of WNIK-FM. It is proposed to change transmitter site and to modify the antenna HAAT. This move should provide a significant improvement in the coverage of WNIK-FM. Specifications for the proposed operation are included herein as Figure 1.

It is proposed to mount the antenna on a proposed new supporting structure with 61 meters (200 feet) of overall height AGL that according to the FCC TOWAIR program does not require registration. Upon completion of the required environmental studies and local construction permits, the applicant will certify that the proposed construction will not have a significant environmental impact, as defined by 47 CFR 1.1307.

It is believed that the proposal conforms to the applicable rules and regulations of the Federal Communications Commission.

Transmitter Location

The proposed transmitting facility will use a 10-bay circularly polarized, full-wavelength, ERI SHPX-10AC antenna, to be side-mounted on a uniform cross-

section, guyed tower. The following NAD27 geographic coordinates describe the proposed WNIK-FM site location:

18° 22' 19" North Latitude

66° 37' 27" West Longitude

A map showing the location of the proposed transmitter site is included herein as Figure 2. A sketch showing the proposed antenna and supporting structure is included herein as Figure 3.

Quiet Zone Notification

As required by FCC rules pertaining to radio Quiet Zones, Section 73.1030(a), the National Astronomy and Ionosphere Center (NAIC) in Arecibo, Puerto Rico is being notified of this application. Copy of the notification letter to NAIC (Arecibo Observatory) and of their letter of consent of the proposed facility are included in Appendix 1.

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 located at Santa Isabel, PR, at a distance of 48.2 kilometers on a bearing of 147° True. The proposed operation will produce field strengths much lower than 10 mV/m at the FCC Santa Isabel, PR station.

Environmental Considerations¹

It is believed that the proposal will comply with the FCC Rules concerning human exposure to radio frequency (RF) energy. Based on Section 73.1310 of the FCC

¹ This statement addresses only human exposure to radiofrequency radiation and not to other non-radiofrequency radiation matters listed in the National Environmental Policy Act of 1969.

Rules, the pertinent maximum permissible exposure (MPE) limit for WNIK-FM is as follows:

Call Sign	Frequency (MHz)	MPE for General Population / Uncontrolled (GP/U) Exposure (uW/cm ²)	MPE for Occupational / Controlled (O/C) Exposure (uW/cm ²)
WNIK-FM	106.5	200	1000

There will be no other significant contributors of RF energy at this site. The calculation of RF energy at 2-m above ground was made under the procedures of OET Bulletin No. 65.² The formula employed is as follows:

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

where, S = power density in uW/cm², 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.

The proposed antenna, a 10-bay, ERI SHPX-10AC, full-wavelength antenna will be mounted with radiation center at the 47-meter level on the proposed tower structure. The power density at 2 meters above ground level at the base of the tower, based on a “worst-case” vertical relative field value of 0.28 for any depression angle greater than 5 degrees below the horizon (see antenna vertical pattern in Appendix 2), a total ERP of 50 kW (H+V) and an antenna center of radiation height above ground level of 52 meters, the calculated power density at two meters above ground level at the base of the tower is 64.7 microwatts per square centimeter (uW/cm²), or 32.3% of the Commission’s recommended limit applicable to uncontrolled exposure areas (200 uW/cm² for the FM band).

² Federal Communications Commission OET Bulletin No. 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (Edition 97-01, August 1997).

The applicant verifies that access to the tower site will be restricted and the site will be appropriately marked with RFR warning signs. In addition, procedures will be in effect in the event that workers or other authorized personnel enter the restricted area or climb the tower to ensure that appropriate measures will be taken to assure worker safety with respect to radio frequency radiation exposure. Such procedures include reducing the average exposure by spreading out the work over a longer period of time, wearing “accepted” RFR protective clothing and/or RFR exposure monitors or scheduling work when the station is shut down. It is noted that this technical exhibit only addresses the potential for radiofrequency electromagnetic field exposure.

AM Stations

The proposed facility is okay with respect to AM station towers; the closest AM Facility is WBQN, Barceloneta-Manati, PR, at 45.3° at a distance of 10.7 km.

Allocation Considerations

Figure 4 summarizes the allocation study for the proposed facility of WNIK-FM. As shown in the top summary based on the FM spacing table, the proposed facility does not meet the normal allocation spacing of Section 73.207 to two second-adjacent channels 291A, WRRH in Hormigueros and Channel 295B WMEG in Guayama, both of which are discussed below.

The bottom summary shown in Figure 4 is based on contours protection. With respect to Channel 291A Hormigueros, it is requested that the WNIK-FM proposal be treated as per the provisions of Section 73.215. Section 73.207 requires a minimum spacing of 48 kilometers and Section 73.215 requires a minimum spacing of 42 kilometers to WRRH; there are 45.3 kilometers between the proposed site and WRRH. Since WRRH is listed as a 73.215 facility, contour protections with WRRH were studied to the actual facilities of WRRH. As shown in Figure 5, the proposed WNIK-FM facility is in compliance with the requirements of Section 73.215.

With respect to the Channel 295B Guayama, it is requested that this proposal be treated as per the provisions of Section 73.215. Section 73.207 requires a minimum spacing of 71 kilometers and Section 73.215 requires a minimum spacing of 65 kilometers to WMEG; there are 66.9 kilometers between the proposed site and WMEG. Since WMEG is not a 73.215 facility, contour protections with WMEG were studied to the maximum facilities specified for its class, as per the provisions of Section 73.211(b)(3): 50 kW with a reference HAAT of 472 meters.

WMEG currently licensed facility is listed as operating with an ERP of 25 kW, an antenna HAAT of 594 meters and a radiation center (RC) height of 950 meters AMSL. To calculate the appropriate protected and interfering contours of the maximized facility of WMEG an ERP of 50 kW and a radiation center height of 828 meters AMSL [950-(594-472)] was used. As shown in Figure 6, the proposed WNIK-FM facility is in compliance with the requirements of Section 73.215.

As shown in Figure 4, the proposed facility of WNIK-FM will comply with protection requirements regarding IF channel separations..

City Coverage

Figure 7 is a map showing the predicted coverage contours of the proposed facility of WNIK-FM. The proposed 70 dBu will encompass 100% of the City and of the Municipality of Arecibo (obtained from the 2000 Census). A study of line-of-sight conditions with the city of Arecibo from the proposed site shows that line-of-sight conditions are fully adequate.

Coverage, Protected and Interfering Contours

The predicted contours were calculated in accordance with Section 73.313 of the FCC Rules, using the V-Soft FMCommander@2019 software in conjunction with the 30-second Global terrain database; contour calculation were made using an evenly spaced set of 72 radials. The antenna height elevations above average terrain were used

in conjunction with the propagation prediction curves of Section 73.333 to determine the distances to contours.

The “blanketing” contour for a 25 kilowatt FM station, as defined by 47 CFR 73.318, extends approximately 2 kilometers from the transmitter site. There are no FM or TV stations within this distance. Therefore, no receiver-induced inter-modulation interference or blanketing interference is expected, however, the applicant recognizes its responsibility to remedy complaints of blanketing interference as required by 47 CFR 73.318 and to protect existing facilities in accordance with applicable rules.



Reuben Jusino

Technical Consultant

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Tel. (787) 399-8788

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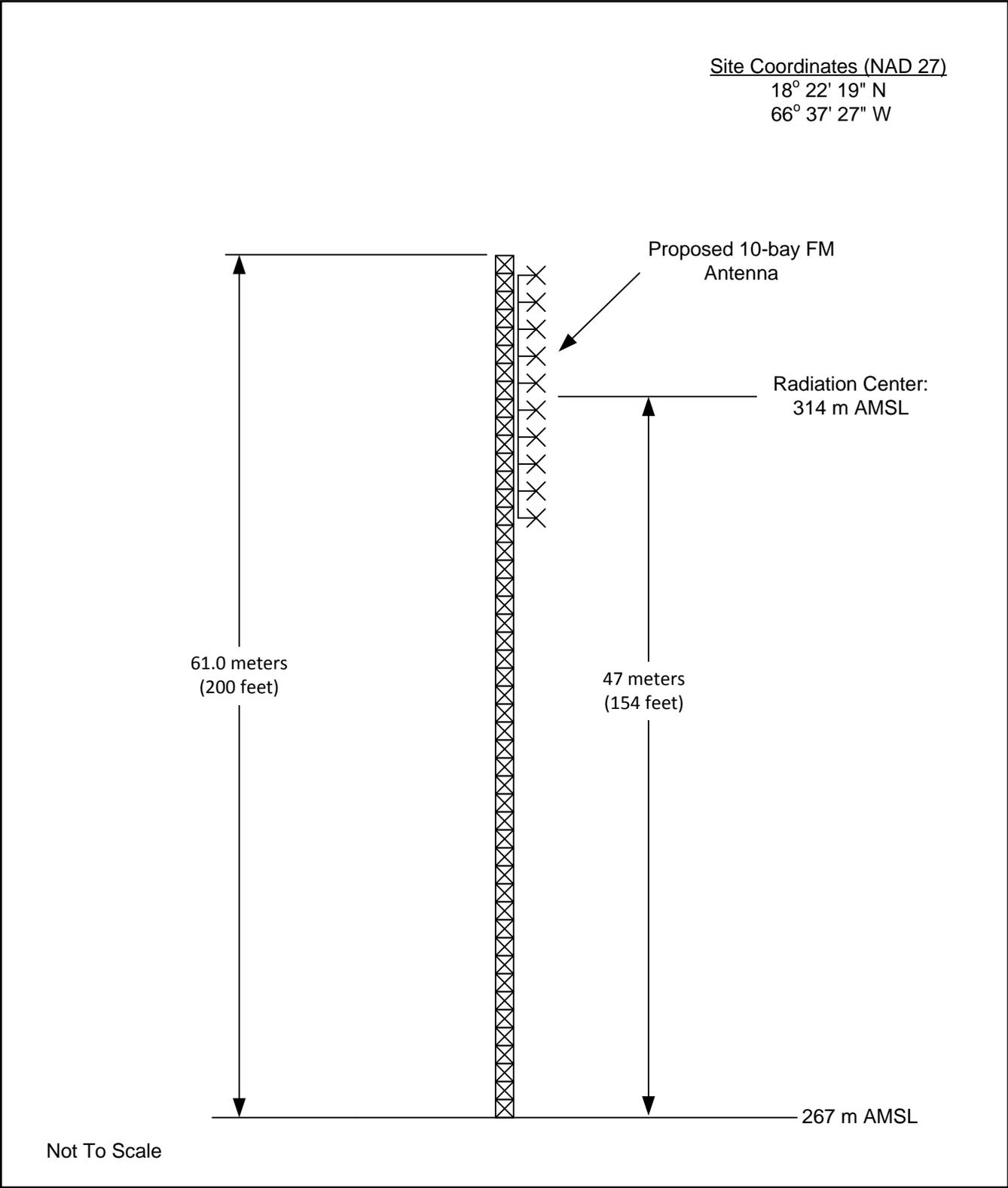
Engineering Specifications

Channel / Frequency	293B1 / 106.5 MHz
Site Coordinates (NAD27)	18° 22' 19" North Latitude 66° 37' 27" West Longitude
Site elevation	267 m AMSL
Average elevation of standard eight radials, 3 to 16 km	68 m AMSL
Overall height of antenna structure	61 m AGL / 328 m AMSL
Height of antenna radiation center	47 m AGL / 314 m AMSL
Antenna radiation center HAAT	115 m
Transmitter	Type Approved
Transmitter power output	4.7 kW
Transmission line, 1-5/8" air-dielectric	Andrew, HJ8-50B
Transmission line length	61 m
Transmission line efficiency	93.5%
Antenna	ERI SHPX-10AC
Polarization	Circular
Power gain	5.68
Antenna input power	4.4 kW
Effective radiated power	25 kW)



PROPOSED TRANSMITTER SITE

KELLY BROADCASTING SYSTEM CORP.
STATION WNIK-FM
ARECIBO, PUERTO RICO
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PROPOSED ANTENNA AND SUPPORTING STRUCTURE

KELLY BROADCASTING SYSTEM CORP.
STATION WNIK-FM
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CH 293B1 25 KW 115 M

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 FM STATION WNIK-FM, ARECIBO, PUERTO RICO

Summary of Allocation Analysis

Spacing Mode

IX Issue! Arecibo Spacings Mode DATA: 07-13-19 - Zone 1A

N. Lat. 18 22 19.0	314 m CDR	PR_VI Tables	Arecibo PR	M	WNIK-FM Prop
W. Lng. 66 37 27.0	25.0 kW N	CH 293. 106.5 B1	115.0 m HAAT		WNIK-FM 07-13-19

Call	Type	Ch	Location		Azi	Dist	FCC	Margin
WNIK-FM	LIC-N	293B1	Arecibo	PR	307.3	15.35	174.5	-159.2
W293DP	CP-D	293D	Juana Diaz	PR	159.5	44.95	92.5	-47.6
W292GC	LIC-D	292D	Corozal	PR	120.3	25.37	48.5	-23.1
W293DE	CP	293D	Guayama	PR	125.8	71.31	92.5	-21.2
WMEG	LIC	295B	Guayama	PR	115.4	66.91	70.5	-3.6
WRRH	LIC-Z	291A	Hormigueros	PR	236.3	45.27	47.5	-2.2
AL8615	RSV-A	293B	Christiansted	VI	108.7	217.62	210.5	7.1
W293DU	CP	293D	Fajardo	PR	90.4	103.85	92.5	11.4
W295BU	LIC-D	295D	Mayaguez	PR	264.3	59.01	40.5	18.5

End of Screen List, Cardinal Radials = 72

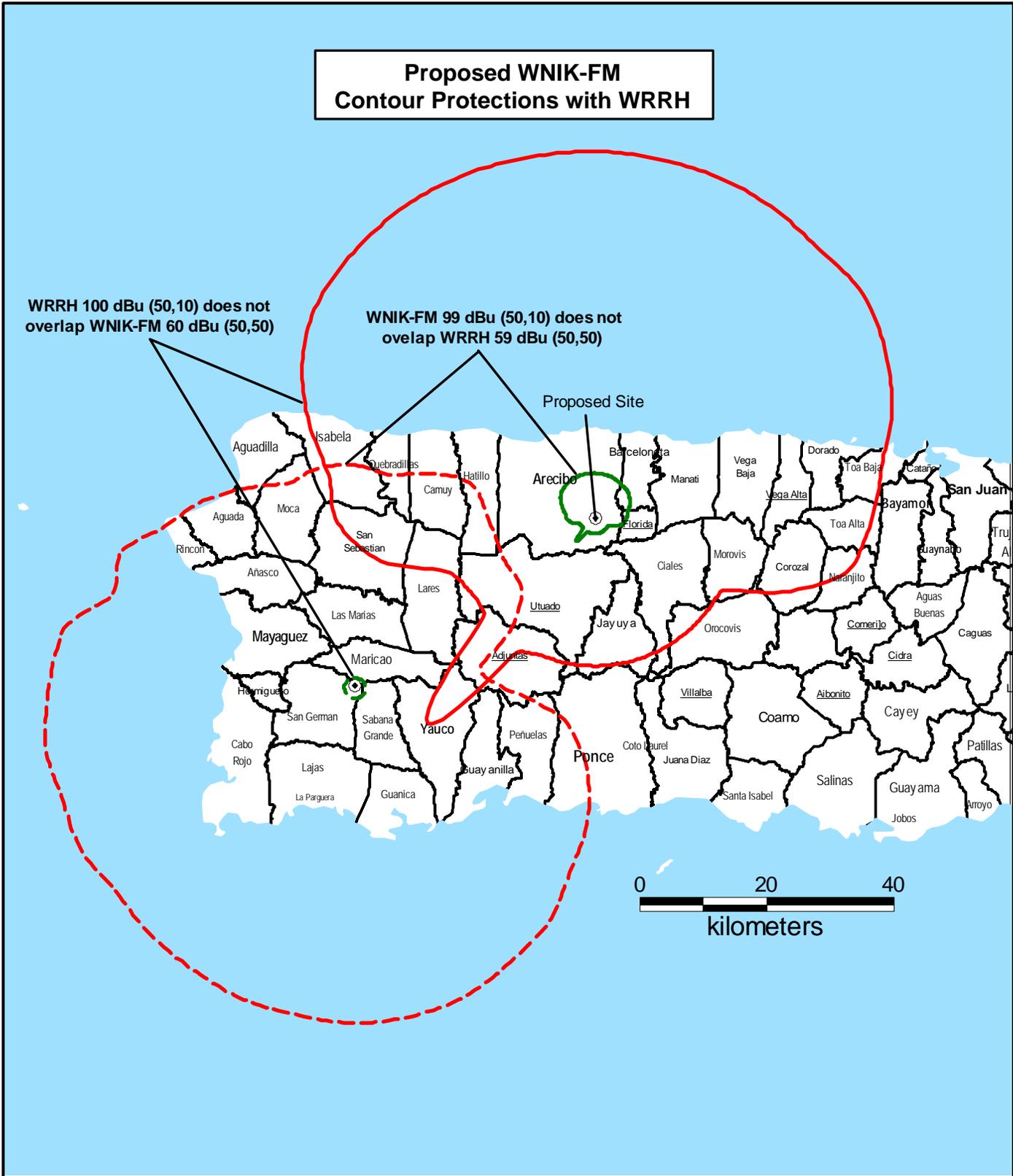
Interfering Contours Mode

IX Issue! Arecibo GLOBE 30 Sec DATA: 07-13-19 - Zone 1A

N. Lat. 18 22 19.0	314 m CDR	Contours are detailed	Arecibo PR	M	WNIK-FM Prop
W. Lng. 66 37 27.0	25.0 kW N	CH 293. 106.5 B1	115.0 m HAAT	*	WNIK-FM 07-13-19

Call	Type	Ch	Location		Azi	Dist	In	Out
WNIK-FM	LIC-N	293B1	Arecibo	PR	307.3	15.34	174.5R	-159.2M
W293DP	CP-D	293D	Juana Diaz	PR	159.5	44.78	-8.3	-61.6*
W292GC	LIC-D	292D	Corozal	PR	120.3	25.37	-6.3*	-38.7*
W293DE	CP	293D	Guayama	PR	125.8	71.27	5.3	-38.4
W293DU	CP	293D	Fajardo	PR	90.4	104.01	-8.3	-31.5*
WMEG^	LIC	295B	Guayama	PR	115.4	66.94	8.3	2.4
AL8615«	RSV-A	293B	Christiansted	VI	108.7	217.62	210.5R	7.1M
WRRH	LIC-Z	291A	Hormigueros	PR	236.3	45.25	11.5	9.5
W295BU	LIC-D	295D	Mayaguez	PR	264.3	59.10	13.5	48.2

End of Screen List, Cardinal Radials = 72

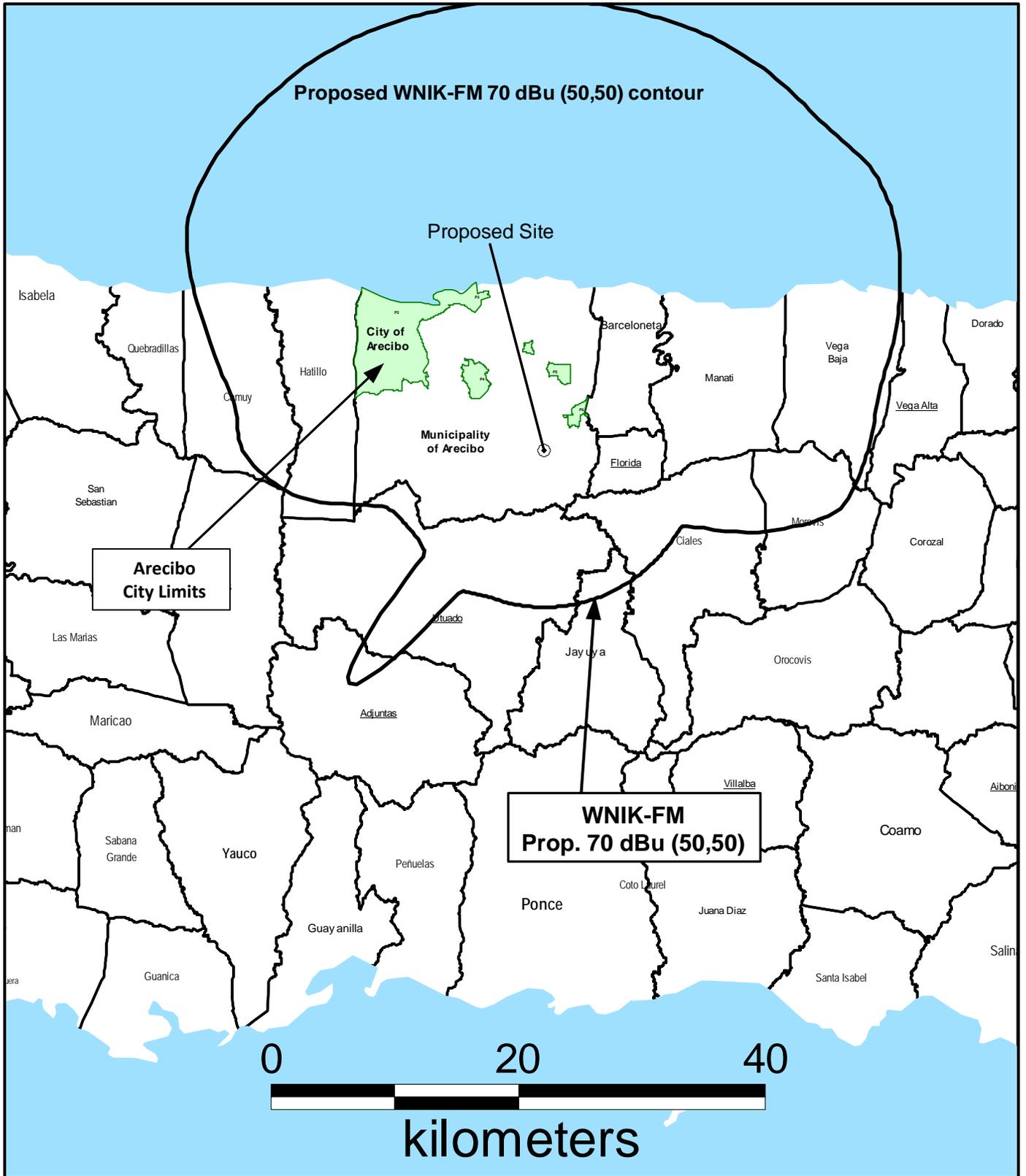


ALLOCATION STUDY WITH STATION WRRH
STATION WNIK-FM
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ALLOCATION STUDY WITH STATION WMEG

STATION WNIK-FM
ARECIBO, PUERTO RICO
CH 293B1 25 KW 115 M



PREDICTED COVERAGE CONTOUR

STATION WNIK-FM
ARECIBO, PUERTO RICO
CH 293B1 25 KW 115 M

July 13, 2019

Via email (prcz@naic.edu)

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

Gentlemen:

On behalf of Kelly Broadcasting System Corp., licensee of FM Station WNIK-FM, Arecibo, Puerto Rico, in accordance with Section 73.1030 of the FCC Rules, I hereby notify you of proposed changes in the facility of WNIK-FM. The particulars of the proposal are as follows:

Proposed Facility:

Geographical coordinates of antenna location (NAD83): 18-22-11.9 / 66-37-25.3
Antenna height (6-bay C-POL FM antenna): 52 m AGL; 319 m AMSL
Antenna directivity: 0 dB
Operating channel: 293 (106.5 MHz)
Type of emission: F3E
Effective isotropic radiated power: 82 kW - Circular Polarization

Please review this proposal and let us know your findings. Please feel free to communicate via email (reubenjusino@gmail.com) or regular mail.

Truly yours,



Reuben Jusino
Technical Consultant
PO Box 192063
San Juan, Puerto Rico 00919-2063
Tel. (787) 399-8788

ARECIBO OBSERVATORY

The William E. Gordon Telescope
Angel Ramos Foundation Science and Visitor Center



July 17, 2019

Mr. Grafton Olivera, P.E.
Consulting Engineer
5119 60th Drive E
Bradenton, FL 34203

Re: Kelly Broadcasting System Corp.
Changes in the facility of WNIK-FM
Operating channel: 293 (106.5 MHz)
Antenna location (NAD83): 18-22-11.9 / 66-37-25.3

Dear Eng. Olivera:

Thank you very much for your PRCZ approval request sent to us in accordance with the Puerto Rico Coordination zone agreements. We have considered the technical aspects of your application and find that proposed application, Mod of the station digital channel 293 (106.5 MHz), is unlikely to cause harmful interference to the passive use of the Radio Astronomy bands at the Arecibo Observatory:

We therefore have no objection to your proposed installation.

Sincerely yours,



Angel M. Vázquez
Spectrum Manager

AMV/ic

Cc: PRCZ files [File #17Ju19_01]

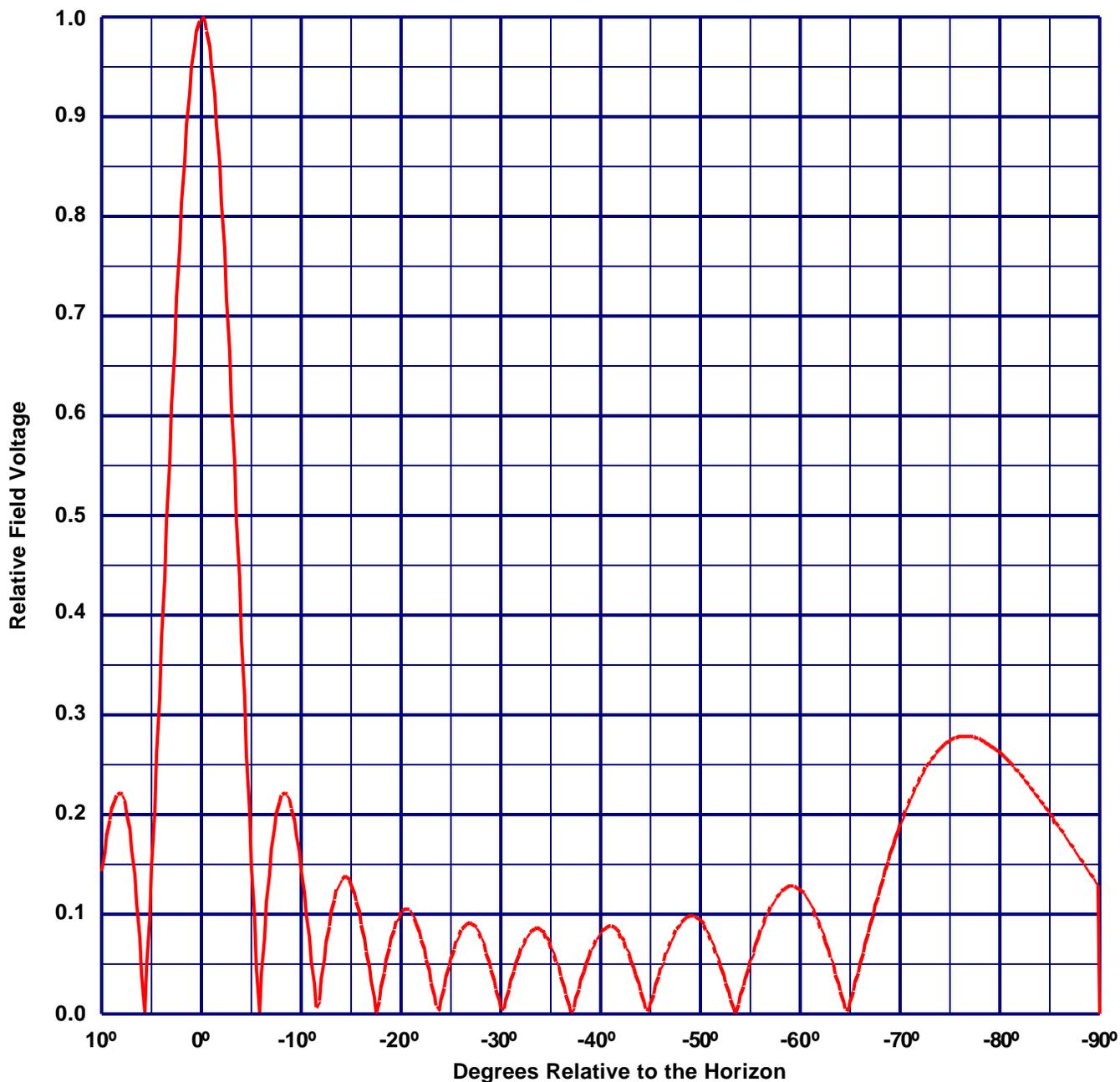


Vertical Plane Relative Field Pattern

ERI TYPE SHP, SHPX, MP, MPX, LP OR LPX ELEMENTS

A 10 level, 1 wave-length spaced non directional antenna

with 0° beam tilt, 0% null fill and a H/V maximum power ratio of 1.000



Vertical Polarization Gain:

Maximum: 5.680 (7.543 dB)

Horizontal Plane: 5.680 (7.543 dB)

Horizontal Polarization Gain:

Maximum: 5.680 (7.543 dB)

Horizontal Plane: 5.680 (7.543 dB)

TOWAIR Determination Results

*** NOTICE ***

TOWAIR's findings are not definitive or binding, and we cannot guarantee that the data in TOWAIR are fully current and accurate. In some instances, TOWAIR may yield results that differ from application of the criteria set out in 47 C.F.R. Section 17.7 and 14 C.F.R. Section 77.13. A positive finding by TOWAIR recommending notification should be given considerable weight. On the other hand, a finding by TOWAIR recommending either for or against notification is not conclusive. It is the responsibility of each ASR participant to exercise due diligence to determine if it must coordinate its structure with the FAA. TOWAIR is only one tool designed to assist ASR participants in exercising this due diligence, and further investigation may be necessary to determine if FAA coordination is appropriate.

DETERMINATION Results

Structure does not require registration. There are no airports within 8 kilometers (5 miles) of the coordinates you provided.

Your Specifications

NAD83 Coordinates

Latitude	18-22-11.9 north
Longitude	066-37-25.2 west

Measurements (Meters)

Overall Structure Height (AGL)	61
Support Structure Height (AGL)	1.5
Site Elevation (AMSL)	267

Structure Type

GTOWER - Guyed Structure Used for Communication Purposes

[Tower Construction Notifications](#)

Notify Tribes and Historic Preservation Officers of your plans to build a tower.

CLOSE WINDOW