

TECHNICAL EXHIBIT  
APPLICATION FOR CONSTRUCTION PERMIT  
WDIN FM BOOSTER STATION  
MAYAGUEZ, PUERTO RICO

April 29, 2008

CH 275 2.5 KW(MAX-DA) 380 M AMSL

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Engineering Statement

This Technical Exhibit was prepared on behalf of HQ-103, Inc. licensee of FM station WDIN, Camuy, Puerto Rico in support of an application for construction permit for an FM booster station at Mayaguez, Puerto Rico. The instant application proposes an effective radiated power (ERP) of 2.5 kW using a directional antenna. The proposed booster facility will operate on Channel 275 (102.9 MHz) with an antenna radiation center height above mean sea level of 380 m. The proposed facility will employ a composite Scala, CA5-FMCP directional transmitting antenna array, with antenna elements oriented at 10° and 170° True. Proposed operating parameters are shown in Figure 1.

Tower Registration

It is proposed to mount the FM booster antenna in the existing tower of TV station WQHA. The overall height above ground of the existing tower is 61 m and according to the FCC Tower program, the structure does not require registration. There will be no change in the overall height of the existing structure.

Notification of FCC Monitoring Station and Arecibo Observatory

FCC rules, Section 73.1030(c), requires that the proposed facility do 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, Puerto Rico, at a distance of 91.9 kilometers on a bearing of 112° True. The proposed operation will produce field strengths much lower than 10 mV/m at the FCC Santa Isabel, PR station. Therefore, notification to the FCC monitoring station is not necessary.

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Mayaguez, Puerto Rico

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The Arecibo Observatory located near Arecibo, Puerto Rico is being notified of the proposed facility pursuant to Section 73.1030 of the FCC Rules concurrently with the filing of the instant application. Copy of the notification letter is shown in Appendix 1

### Environmental Considerations

The proposed facility is categorically excluded from environmental processing pursuant to Section 1.1306 of the FCC Rules. With respect to the potential for human exposure to radio frequency (RF) radiation, a conservative calculation of the FM energy in the downward direction indicates an RF level for the FM Booster of no greater than 4.3% of the FCC uncontrolled standard.\* Therefore, since the RF exposure is predicted not to exceed 5.0% of the FCC limit for uncontrolled environments, the proposal complies with the FCC limits for human exposure to RF radiation and it is categorically excluded from environmental processing. The applicant shall reduce power or cease operation as necessary to protect persons having access to fenced area around the tower from RF energy in excess of the FCC guidelines.

### Predicted Coverage Contour

The predicted 54 dBu coverage contours were calculated in accordance with Section 73.313 of the FCC Rules. The average terrain elevations from 3 to 16 km from the proposed site were computed using the U.S.G.S. 30-second terrain database. The distances to the predicted 54 dBu coverage contour for the proposed booster was determined using the average elevations of radials spaced every 5-degree of azimuth. The antenna radiation center height above average terrain and the ERP in each radial direction were used in conjunction with the propagation prediction curves of Section 73.333 to determine the distances to the contour. Figure 2 is a map showing the predicted 54 dBu coverage contours of the WDIN(FM) main facility and the proposed booster. As indicated in Figure 2, the proposed predicted 54 dBu contour of the booster will be contained within the WDIN main facility

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\* This is based on the proposed FM booster antenna radiation center height above ground of 30 m, effective radiated power in each polarization plane of 2.5 kW, and a downward relative field factor of 0.20 for any antenna depression angle greater than 60 degrees. Calculations were made at 2-m AGL according procedures outlined in FCC OET Bulletin No. 65. Calculated combined RF energy will not exceed 8.52 uW/cm<sup>2</sup> according to these assumptions. This is 4.3% of the FCC limit of 200 uW/cm<sup>2</sup> for uncontrolled environments.

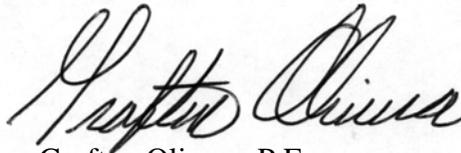
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predicted 54 dBu contour over land. The proposed maximum ERP for the booster is well within 20% of the licensed ERP of the primary station, WDIN(FM).

Allocation Considerations

The closest adjacent-channel FM facility in proximity to the proposed booster is W276AI, an FM translator on Channel 276 in Ponce, Puerto Rico. As shown in Figure 2, the 6-dB contour protection requirement is met with respect to W276AI with ample clearance. Therefore, the proposed facility meets the adjacent-channel protection requirements outlined in the FCC Rules. The proposed booster facility meets the other allocation requirements in all respects.



Grafton Olivera, P.E.  
Consulting Engineer

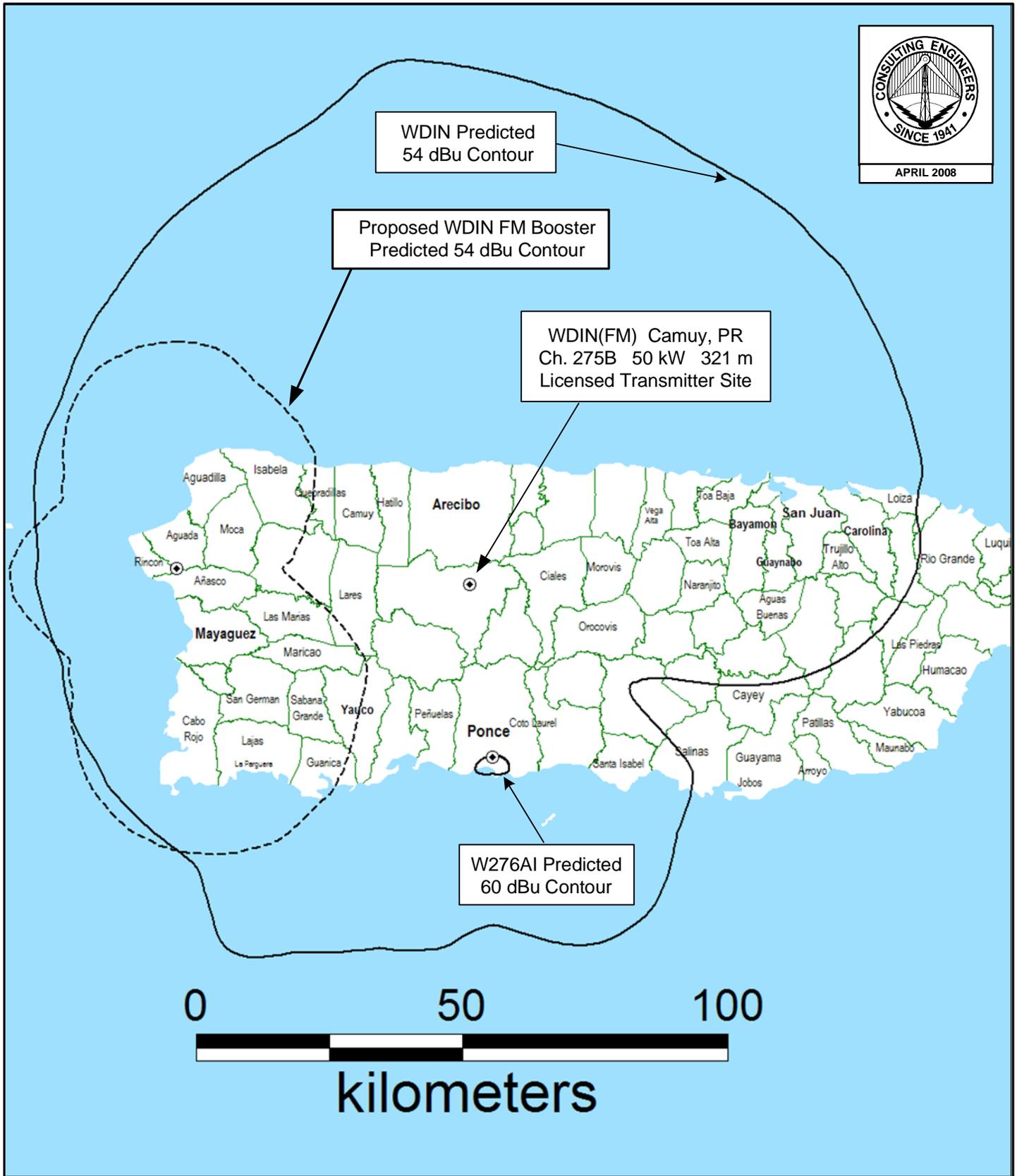
du Treil, Lundin & Rackley, Inc.  
201 Fletcher Ave.  
Sarasota, FL 34237-6019

April 29, 2008

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Engineering Specifications

Channel / Frequency	275 / 102.9 MHz
Site Coordinates	18°19'06" North Latitude 67°10'49" West Longitude
Site elevation	350 m AMSL
Overall height of existing structure	61 m AGL / 411 m AMSL
Height of antenna radiation center	30 m AGL / 380 m AMSL
Transmitter	Bext, XT20/FS500
Transmitter power output	0.5 kW
Transmission line	Andrew, LDF5-50A
Transmission line length	38.1 m
Transmission line efficiency	89.8%
Antenna	Scala, CA5-FMCP Composite Array
Polarization	Circular
Power gain	5.5
Antenna input power	0.45 kW
Effective radiated power (H & V)	2.5 kW



**PREDICTED COVERAGE CONTOURS**  
FM BOOSTER STATION FOR WDIN(FM)  
MAYAGUEZ, PUERTO RICO  
CH 275 2.5 KW(MAX-DA) 380 M AMSL  
du Treil, Lundin & Rackley, Inc. Sarasota, Florida

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Notification to the National Astronomy and Ionosphere Center

*{1 sheet follows}*



201 Fletcher Ave.  
Sarasota, FL 34237-6019  
941-329-6000  
941-329-6031 FAX

**Grafton Olivera**  
Direct Dial 941-329-6001  
e-mail: [grifton@dlr.com](mailto:grifton@dlr.com)

April 29, 2007

Via email ([prcz@naic.edu](mailto:prcz@naic.edu))

Dr. Tim Hankins, Director  
Mr. Reinaldo Velez, Spectrum Manager  
National Astronomy and Ionosphere Center  
Arecibo Observatory  
HC3 Box 53995  
Arecibo, PR 00612

Gentlemen:

On behalf of our client, HQ-103, Inc., applicant of an FM booster station in Mayaguez, Puerto Rico, in accordance with Section 73.1030 of the FCC Rules, we are hereby notifying of the facility. The particulars of the proposal are as follows:

Proposed Facilities

Geographical coordinates of antenna location (NAD83): 18-18-58.8 / 67-10-47.7  
Antenna radiation center height: 30m AGL; 380 m AMSL  
Antenna directivity: see attached antenna pattern  
Operating channel: 275 (102.9 MHz)  
Type of emission: F3E  
Effective isotropic radiated power: 4.1 kW (Circular Polarization)

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

Please feel free to communicate via email (<mailto:Grafton@dlr.com>), telefax (941-329-6030) or regular mail.

Very truly yours,

A handwritten signature in black ink, appearing to read "Grafton Olivera". The signature is fluid and cursive.

Grafton Olivera, P.E.

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Antenna Manufacturer's Pattern Data

*{2 sheets follow}*

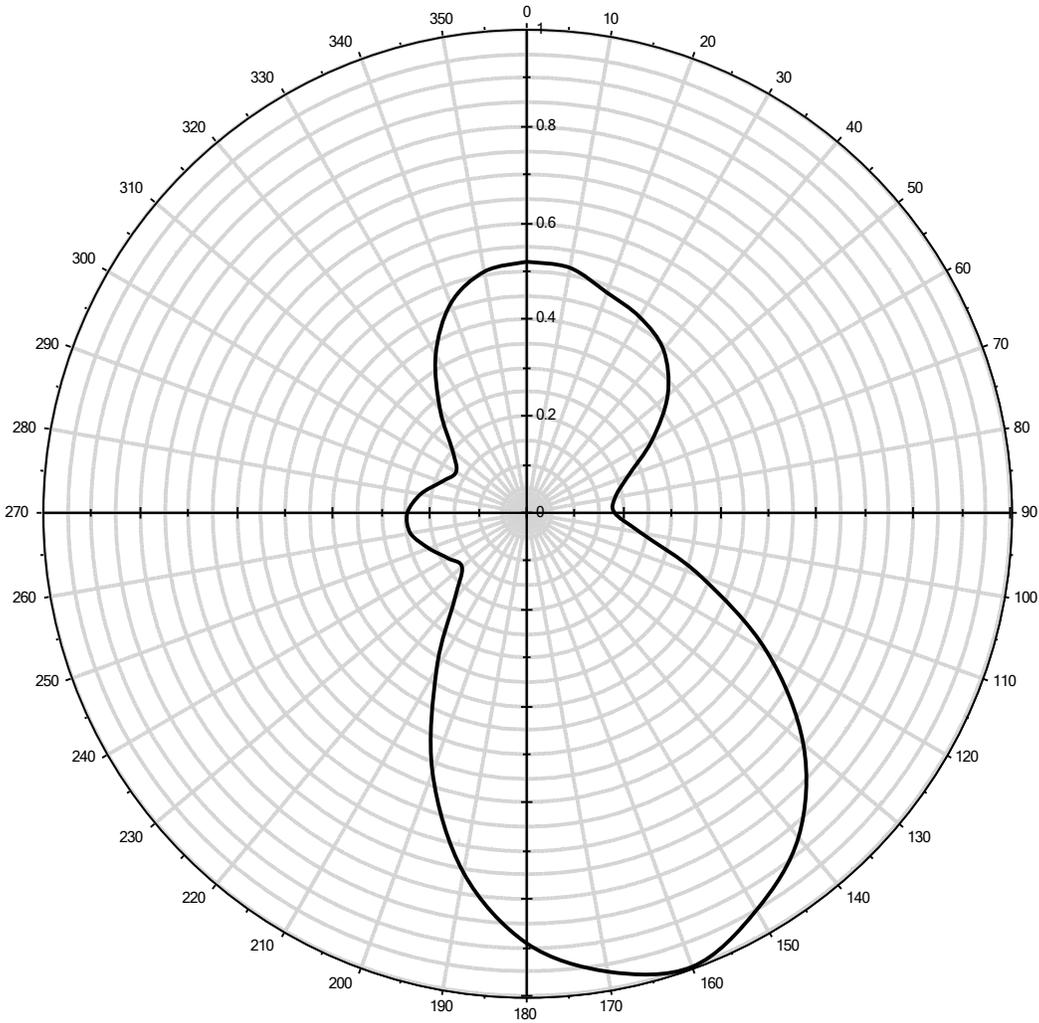
# DA Inquiry

du Treil, Lundin, & Rackley, Inc., Sarasota, Florida



**Antenna Pattern:** Antenna ID: 800124

**FM BOOSTER FOR  
WDIN, CAMUY, PR**  
(1) CA5-FMCP (25% Pwr) at 10°  
(2) CA5-FMCP (75% Pwr) at 160°



Antenna DLR ID #: 800124, Rotation: 0.00°

**Antenna Details:**

0°	0.520	60°	0.299	120°	0.573	180°	0.891	240°	0.188	300°	0.169
10°	0.515	70°	0.223	130°	0.747	190°	0.756	250°	0.215	310°	0.201
20°	0.485	80°	0.186	140°	0.875	200°	0.571	260°	0.244	320°	0.279
30°	0.468	90°	0.182	150°	0.950	210°	0.374	270°	0.247	330°	0.377
40°	0.440	100°	0.241	160°	1.000	220°	0.232	280°	0.223	340°	0.461
50°	0.381	110°	0.382	170°	0.964	230°	0.175	290°	0.188	350°	0.507

Antenna Make: Scala

Standard Pattern:

Antenna Model: CA5-FMCP Array

Last Change Date:

**CA5-FM/CP/RM**  
**FM YAGI ANTENNA**  
6 dBd gain  
88 to 108 MHz  
Circularly polarized

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.



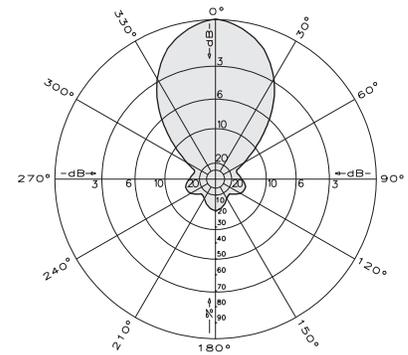
**Specifications:**

Frequency range	Any specified FM channel 88 to 108 MHz
Gain	6 dBd
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)
Equivalent flat plate area	2.84 ft <sup>2</sup> (0.264 m <sup>2</sup> ) maximum
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.

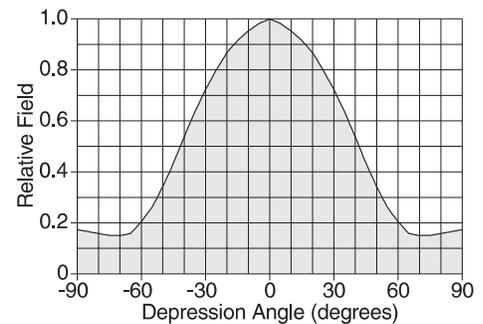
\* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

**Order Information:**

Contact Scala Customer Service for detailed order information.



**Azimuth pattern (E-plane)**



**Elevation pattern (H-plane)**



10748-B