

# ENGINEERING EXHIBIT

## Application for Modification of Construction Permit

prepared for

**The WBEZ Alliance, Inc.**

WAJW(FM) Chesterton, Indiana

Facility ID 3248

Ch. 208B 50 kW (MAX-DA) 74 m

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FCC Form 340, Section VII-FM

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*This material supplies a "hard copy" of the engineering portions of this application as entered September 4, 2002 for filing electronically. Since the FCC's electronic filing system may be accessed by anyone with the applicant's name and password, and electronic data may otherwise be altered in an unauthorized fashion, we cannot be responsible for changes made subsequent to our entry of this data and related attachments.*

**Section VII Preparer's Certification**

I certify that I have prepared Section VII (Engineering Data) on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name JOSEPH M. DAVIS, P.E.		Relationship to Applicant (e.g., Consulting Engineer) CONSULTING ENGINEER	
Signature		Date 9/4/2002	
Mailing Address CAVELL, MERTZ & DAVIS, INC. 7839 ASHTON AVENUE			
City MANASSAS		State or Country (if foreign address) VA	Zip Code 20109-
Telephone Number (include area code) 7033929090		E-Mail Address (if available) JDAVIS@CMDCONSULTING.COM	

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(a)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

<b>Section VII - FM Engineering on Channels 200-220</b>												
<b>TECHNICAL SPECIFICATIONS</b>												
Ensure that the specifications below are accurate. Contradicting data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.												
<b>TECH BOX</b>												
1.	Channel Number: 208											
2.	Class (select one): <input type="radio"/> D <input type="radio"/> A <input type="radio"/> B1 <input checked="" type="radio"/> B <input type="radio"/> C3 <input type="radio"/> C2 <input type="radio"/> C1 <input type="radio"/> C0 <input type="radio"/> C											
3.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees 41 Minutes 42 Seconds 58 <input checked="" type="radio"/> North <input type="radio"/> South  Longitude: Degrees 86 Minutes 51 Seconds 47 <input checked="" type="radio"/> West <input type="radio"/> East											
4.	Antenna Structure Registration Number: 1027621 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA											
5.	Antenna Location Site Elevation Above Mean Sea Level: 185.9 meters											
6.	Overall Tower Height Above Ground Level: 94.7 meters											
7.	Height of Radiation Center Above Ground Level: 88.7 meters(H) 88.7 meters(V)											
8.	Height of Radiation Center Above Average Terrain: 73.7 meters(H) 73.7 meters(V)											
9.	Effective Radiated Power: 50 kW(H) 50 kW(V)											
10.	Maximum Effective Radiated Power: <input checked="" type="checkbox"/> Not Applicable kW(H) kW(V) (Beam-Tilt Antenna ONLY)											
11.	Directional Antenna Relative Field Values: <input type="checkbox"/> Not applicable (Nondirectional)  Rotation (Degrees): 0 <input checked="" type="checkbox"/> No Rotation											
	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value

0	1	10	1	20	0.832	30	0.661	40	0.525	50	0.417
60	0.359	70	0.339	80	0.339	90	0.339	100	0.368	110	0.399
120	0.502	130	0.632	140	0.795	150	0.795	160	0.777	170	0.777
180	0.617	190	0.591	200	0.603	210	0.759	220	0.741	230	0.741
240	0.741	250	0.717	260	0.734	270	0.661	280	0.589	290	0.589
300	0.741	310	0.832	320	1	330	1	340	1	350	1
Additional Azimuths											

**NOTE: In addition to the information called for in this section, an explanatory exhibit providing full particulars must be submitted for each question for which a "No" response is provided.**

#### CERTIFICATION

#### AUXILIARY ANTENNA APPLICANTS ARE NOT REQUIRED TO RESPOND TO ITEMS 12-16.

12. **Main Studio Location.** The proposed main studio location complies with 47 C.F.R. Section 73.1125. ☐ Yes ☒ No
- See Explanation in [Exhibit 13]

13. **Interference.** The proposed facility complies with all of the following applicable rule sections. ☒ Yes ☐ No
- Check all that apply:
- See Explanation in [Exhibit 14]

##### Contour Overlap Requirements.

- a. ☒ 47 C.F.R. Section 73.509

**Exhibit Required.**

[Exhibit 15]

##### Spacing Requirements.

- b. ☒ 47 C.F.R. Section 73.207 with respect to station(s)

##### Grandfathered Short-Spaced.

- c. ☐ 47 C.F.R. Section 73.213(a) with respect to station(s)

**Exhibit Required.**

[Exhibit 16]

##### Contour Protection.

- d. ☐ 47 C.F.R. Section 73.215(a) with respect to station(s)

**Exhibit Required.**

[Exhibit 17]

##### Television Channel 6 Protection.

- e. ☒ 47 C.F.R. Section 73.525 with respect to station(s)

**Exhibit Required.**

[Exhibit 18]

14. **Reserved Channels Above 220.**

- a. **Allotment.** The proposed facility complies with the allotment requirements of 47 C.F.R. Section 73.203. ☐ Yes ☐ No  
See Explanation in [Exhibit 19]
- b. **Community Coverage.** The proposed facility complies with 47 C.F.R. Section 73.315. ☐ Yes ☐ No  
See Explanation in [Exhibit 20]

15.	<b>International Borders.</b> The proposed antenna location is not within 320 kilometers of the common border between the United States and Canada or Mexico.  If "No," specify the country and provide an exhibit of compliance with all provisions of the relevant International Agreement.	<input type="radio"/> Yes <input checked="" type="radio"/> No <input checked="" type="radio"/> Canada <input type="radio"/> Mexico [Exhibit 21]
16.	<b>Environmental Protection Act.</b> The proposed facility is excluded from environmental processing under 47. C.F.R. Section 1.1306 (i.e., The facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine compliance through the use of the RF worksheets in Worksheet #7, an <b>Exhibit is required.</b>  By checking "Yes" above, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.	<input checked="" type="radio"/> Yes <input type="radio"/> No  See Explanation in [Exhibit 22]
<b>PREPARER'S CERTIFICATION ON PAGE 8 MUST BE COMPLETED AND SIGNED.</b>		

**Exhibit 13****Description:** EXHIBIT 13

EXHIBIT 13 - STATEMENT A AND WAIVER REQUEST ATTACHED AS PDF FILES

**Attachment 13**

Description	Type	Conversion	
		Status	File
<a href="#">Exhibit 13 - Statement A</a>	Adobe Acrobat File	not needed	PDF
<a href="#">Exhibit 13 - Waiver Request</a>	Adobe Acrobat File	not needed	PDF

**Exhibit 14****Description:** EXHIBIT 14 - STATEMENT B

EXHIBIT 14 - STATEMENT B - ATTACHED AS A PDF FILE

**Attachment 14**

Description	Type	Conversion	
		Status	File
<a href="#">Exhibit 14 - Statement B</a>	Adobe Acrobat File	not needed	PDF

**Exhibit 15****Description:** EXHIBIT 15

SEE EXHIBIT 14

**Attachment 15****Exhibit 18****Description:** EXHIBIT 18

SEE EXHIBIT 13

**Attachment 18****Exhibit 21****Description:** EXHIBIT 21

SEE EXHIBIT 13

**Attachment 21****Exhibit 22**

**Description:** EXHIBIT 22 - STATEMENT C

EXHIBIT 22 - STATEMENT C - ATTACHED AS A PDF FILE

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**Attachment 22**

Description	Type	Conversion	
		Status	File
<a href="#">Exhibit 22 - Statement C</a>	Adobe Acrobat File	not needed	PDF

Exhibit 22 - Statement C  
**ENVIRONMENTAL CONSIDERATIONS**  
prepared for  
**The WBEZ Alliance, Inc.**  
WAJW(FM) Chesterton, Indiana  
Facility ID 3248  
Ch. 208B 50 kW (MAX-DA) 74 m

The instant proposal is not believed to have a significant environmental impact as defined under Section 1.1306 of the Commission's Rules. Consequently, preparation of an Environmental Assessment is not required.

**Nature of The Proposal**

The instant application seeks to modify the existing Construction Permit for WAJW. The instant proposal involves replacement of the existing WAJW antenna with a directional antenna system, mounted at a higher elevation on the existing tower structure, and an increase in the maximum effective radiated power ("ERP").

The use of existing transmitting locations has been characterized as being environmentally preferable by the Commission, according to Note 1 of §1.1306 of the FCC Rules. No change in overall structure height is proposed, thus no change in current structure marking and lighting requirements is anticipated. Therefore, it is believed that this application may be categorically excluded from environmental processing pursuant to §1.1306 of the Commission's rules.

**Human Exposure to Radiofrequency Radiation**

The proposed operation was evaluated for human exposure to radiofrequency energy using the procedures outlined in the Commission's OET Bulletin No. 65 ("OET 65"). OET 65 describes a means of determining whether a proposed facility exceeds the radiofrequency exposure guidelines adopted in §1.1310. Under present Commission policy, a facility may be presumed to comply with the limits specified in §1.1310 if it satisfies the exposure criteria set forth in OET 65. Based upon that methodology, and as demonstrated in the following, the proposed transmitting system will comply with the cited adopted guidelines.

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**ENVIRONMENTAL CONSIDERATIONS**  
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It is proposed to install the WAJW antenna such that its center of radiation is 88.7 meters above ground level. A maximum effective radiated power (“ERP”) of 50 kilowatts, circularly polarized, will be employed utilizing a Shively model 6810 4-bay, one-wavelength spaced antenna. The “uncontrolled/general population” limit specified in §1.1310 for the FM radio band is 200  $\mu\text{W}/\text{cm}^2$ .

Calculations were made per OET 65 to predict power density attributable to the proposed facility at points two meters above ground level locations in the immediate vicinity of the tower. According to elevation pattern data provided by the manufacturer of the proposed antenna system (see **Exhibit 22 - Figure 6**), the WAJW antenna<sup>1</sup> will have a relative field of less than 35 percent from 15 to 90 degrees below the horizontal plane (*i.e.*, below the antenna). Thus, a conservative value of 35 percent relative field is used for this calculation.

The formula used for calculating FM signal density in this analysis is essentially the same as equation (9) in OET-65.

$$S = (33.4098) (F^2) (ERP) / D^2$$

Where:

$S$	=	power density in microwatts/cm <sup>2</sup>
$ERP$	=	total (average) ERP in Watts
$F$	=	relative field factor
$D$	=	distance in meters

Using this formula and the assumptions above, the proposed facility would contribute a power density of 54.4  $\mu\text{W}/\text{cm}^2$  at two meters above ground level near antenna support structure, or 27.2 percent of the general population/uncontrolled limit. At ground level locations away from the

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<sup>1</sup>Should an alternate antenna make and/or model eventually be employed for the actual WAJW facility, a revised analysis of RF exposure will be provided as appropriate in an exhibit to the FCC Form 302-FM *Application for License* to cover the construction.



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**ENVIRONMENTAL CONSIDERATIONS**  
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base of the tower, the calculated RF power density is even lower, due to the increasing distance from the transmitting antenna.

According to the Commission's database, the only other non-excluded emitter authorized at or near this site is WEFM(FM) (Ch. 240A, Michigan City, IN). Representatives from WEFM have advised that WEFM will be relocating its facility to a separate tower structure, to be located over 9 km from the WAJW site. Under the instant proposal, the WAJW antenna will occupy the tower space presently employed by the WEFM antenna system, following removal of the WEFM antenna. Thus, since WEFM will vacate the tower and the surrounding area (prior to the construction of the proposed WAJW facility), its contribution to total RF electromagnetic field does not require consideration.

Thus, based on this analysis, the Commission's limit regarding general population / uncontrolled exposure to RF electromagnetic field is not exceeded at ground level locations near the WAJW tower site.

**Safety of Tower Workers and the General Public**

As demonstrated herein, excessive levels of RF energy will not be caused at publicly accessible areas at ground level near the antenna supporting structure. Consequently, members of the general public will not be exposed to RF levels in excess of the Commission's guidelines. Nevertheless, tower access will continue to be restricted and controlled through the use of a locked fence. Additionally, appropriate RF exposure warning signs will continue to be posted.

With respect to worker safety, it is believed that based on the preceding analysis, excessive exposure would not occur in areas at ground level. A site exposure policy will continue to be employed protecting maintenance workers from excessive exposure when work must be performed on the tower in areas where high RF levels may be present. Such protective measures may include, but will not be limited to, restriction of access to areas where levels in excess of the guidelines may

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**ENVIRONMENTAL CONSIDERATIONS**  
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be expected, power reduction, or the complete shutdown of facilities when work or inspections must be performed in areas where the exposure guidelines will be exceeded. On-site RF exposure measurements may also be undertaken to establish the bounds of safe working areas. The applicant will coordinate exposure procedures with any pertinent stations.

**Conclusion**

Based on the preceding, it is believed that the instant proposal may be categorically excluded from environmental processing under Section 1.1306 of the Rules, hence preparation of an Environmental Assessment is not required.

**EXHIBIT 22 - FIGURE 6**  
**ANTENNA VERTICAL PLANE**  
**(ELEVATION) PATTERN**

prepared September 2002 for  
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Cavell, Mertz & Davis, Inc.  
Manassas, Virginia

