

ENGINEERING EXHIBIT

Application for Digital Television Station Construction Permit

prepared for

**Greater Washington Educational
Telecommunications Association, Inc.**
WETA-DT Washington, DC

Facility ID 65670
Ch. 27 90 kW 254 m

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Exhibit 33

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Table 1	Antenna Horizontal Plane Radiation Pattern
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Figure 3	Predicted Coverage Contours

Exhibit 34

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Table 2	Interference Analysis Results Summary
Table 3	Class A Station Interference Analysis Results Summary
Attachment 1	FCC February 21, 2001 "30 Day" Letter to GWETA

Exhibit 36

Statement C	Environmental Considerations
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This material supplies a "hard copy" of the engineering portions of this application as entered April 13, 2004 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 04/13/2004	
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).

SECTION VII - DTV Engineering	
Complete Questions 1-5 of the Certification Checklist and provide all data and information for the proposed facility, as requested in Technical Specifications, Items 1-13.	
Certification Checklist: A correct answer of "Yes" to all of the questions below will ensure an expeditious grant of a construction permit. However, if the proposed facility is located within the Canadian or Mexican borders, coordination of the proposal under the appropriate treaties may be required prior to grant of the application. An answer of "No" will require additional evaluation of the applicable information in this form before a construction permit can be granted.	
1.	<p>The proposed DTV facility complies with 47 C.F.R. Section 73.622 in the following respects:</p> <p>(a) It will operate on the DTV channel for this station as established in 47 C.F.R. Section 73.622. <input checked="" type="radio"/> Yes <input type="radio"/> No</p> <p>(b) It will operate from a transmitting antenna located within 5.0 km (3.1 miles) of the DTV reference site for this location as established in 47 C.F.R. Section 73.622. <input checked="" type="radio"/> Yes <input type="radio"/> No</p> <p>(c) It will operate with an effective radiated power (ERP) and antenna height above average terrain (HAAT) that do not exceed the DTV reference ERP and HAAT for this station as established in 47 C.F.R. Section 73.622. <input type="radio"/> Yes <input checked="" type="radio"/> No</p>
2.	<p>The proposed facility will not have a significant environmental impact, including exposure of workers or the general public to levels of RF radiation exceeding the applicable health and safety guidelines, and therefore will not come within 47 C.F.R. Section 1.1307. <input checked="" type="radio"/> Yes <input type="radio"/> No</p> <p>Applicant must submit the Exhibit called for in Item 13.</p>
3.	<p>Pursuant to 47 C.F.R. Section 73.625, the DTV coverage contour of the proposed facility will encompass the allotted principal community. <input checked="" type="radio"/> Yes <input type="radio"/> No</p>
4.	<p>The requirements of 47 C.F.R. Section 73.1030 regarding notification to radio astronomy installations, radio receiving installations and FCC monitoring stations have either been satisfied or are not applicable. <input checked="" type="radio"/> Yes <input type="radio"/> No</p>
5.	<p>The antenna structure to be used by this facility has been registered by the Commission and will not require registration to support the proposed antenna, OR the FAA has previously determined that the proposed structure will not adversely effect safety in air navigation and this structure qualifies for later registration under the Commission's phased registration plan, OR the proposed installation on this structure does not require notification to the FAA pursuant to 47 C.F.R. Section 17.7. <input checked="" type="radio"/> Yes <input type="radio"/> No</p>

SECTION VII - DTV Engineering**TECHNICAL SPECIFICATIONS**

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.

TECH BOX	
1.	<p>Channel Number:</p> <p>DTV 27 Analog TV, if any 26</p>
2.	<p>Zone:</p> <p><input checked="" type="radio"/> I <input type="radio"/> II <input type="radio"/> III</p>

3.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees 38 Minutes 57 Seconds 1 <input checked="" type="radio"/> North <input type="radio"/> South Longitude: Degrees 77 Minutes 4 Seconds 47 <input checked="" type="radio"/> West <input type="radio"/> East																																																																																																																								
4.	Antenna Structure Registration Number: 1051670 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA																																																																																																																								
5.	Antenna Location Site Elevation Above Mean Sea Level: 125 meters																																																																																																																								
6.	Overall Tower Height Above Ground Level: 211 meters																																																																																																																								
7.	Height of Radiation Center Above Ground Level: 202 meters																																																																																																																								
8.	Height of Radiation Center Above Average Terrain (HAAT): 254 meters																																																																																																																								
9.	Maximum Effective Radiated Power (average power): 90 kW																																																																																																																								
10.	Antenna Specifications: a. Manufacturer DIE Model TUP-04-12-2 b. Electrical Beam Tilt: 0.5 degrees <input type="checkbox"/> Not Applicable c. Mechanical Beam Tilt: degrees toward azimuth degrees True <input checked="" type="checkbox"/> Not Applicable Attach as an Exhibit all data specified in 47 C.F.R. Section 73.685(c). [Exhibit 32] d. Polarization: <input checked="" type="radio"/> Horizontal <input type="radio"/> Circular <input type="radio"/> Elliptical e. Directional Antenna Relative Field Values: <input type="checkbox"/> Not applicable (Nondirectional) [For a composite directional (not off-the-shelf) antenna, press the following button to fill in the relative field values subform.] [Relative Field Values] <div style="text-align: center; padding: 10px;"> 10e. Directional Antenna Relative Field Values [Fill in this subform for a composite directional (not off-the-shelf) antenna, only.] </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td colspan="12" style="padding: 5px;">e. Directional Antenna Relative Field Values:</td> </tr> <tr> <td colspan="12" style="padding: 5px;">Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation</td> </tr> <tr> <td style="width: 10%;">Degrees</td><td style="width: 10%;">Value</td><td style="width: 10%;">Degrees</td><td style="width: 10%;">Value</td><td style="width: 10%;">Degrees</td><td style="width: 10%;">Value</td><td style="width: 10%;">Degrees</td><td style="width: 10%;">Value</td><td style="width: 10%;">Degrees</td><td style="width: 10%;">Value</td><td style="width: 10%;">Degrees</td><td style="width: 10%;">Value</td> </tr> <tr> <td>0</td><td>0.948</td><td>10</td><td>0.909</td><td>20</td><td>0.755</td><td>30</td><td>0.728</td><td>40</td><td>0.887</td><td>50</td><td>0.883</td> </tr> <tr> <td>60</td><td>0.696</td><td>70</td><td>0.642</td><td>80</td><td>0.828</td><td>90</td><td>0.968</td><td>100</td><td>0.928</td><td>110</td><td>0.762</td> </tr> <tr> <td>120</td><td>0.727</td><td>130</td><td>0.886</td><td>140</td><td>0.884</td><td>150</td><td>0.698</td><td>160</td><td>0.643</td><td>170</td><td>0.827</td> </tr> <tr> <td>180</td><td>0.967</td><td>190</td><td>0.927</td><td>200</td><td>0.762</td><td>210</td><td>0.729</td><td>220</td><td>0.887</td><td>230</td><td>0.883</td> </tr> <tr> <td>240</td><td>0.695</td><td>250</td><td>0.641</td><td>260</td><td>0.828</td><td>270</td><td>0.986</td><td>280</td><td>0.96</td><td>290</td><td>0.769</td> </tr> <tr> <td>300</td><td>0.599</td><td>310</td><td>0.773</td><td>320</td><td>0.911</td><td>330</td><td>0.835</td><td>340</td><td>0.74</td><td>350</td><td>0.83</td> </tr> <tr> <td>Additional Azimuths</td><td></td><td>274</td><td>1</td><td>3</td><td>0.954</td><td>45</td><td>0.916</td><td>93</td><td>0.975</td><td>183</td><td>0.974</td> </tr> </table> <div style="text-align: center; margin-top: 10px;"> Relative Field Polar Plot </div> <div style="margin-top: 20px; padding: 5px;"> If a directional antenna is proposed, the requirements of 47 C.F.R. Sections 73.625(c) must be satisfied. Exhibit required. [Exhibit 33] </div>	e. Directional Antenna Relative Field Values:												Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation												Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	0	0.948	10	0.909	20	0.755	30	0.728	40	0.887	50	0.883	60	0.696	70	0.642	80	0.828	90	0.968	100	0.928	110	0.762	120	0.727	130	0.886	140	0.884	150	0.698	160	0.643	170	0.827	180	0.967	190	0.927	200	0.762	210	0.729	220	0.887	230	0.883	240	0.695	250	0.641	260	0.828	270	0.986	280	0.96	290	0.769	300	0.599	310	0.773	320	0.911	330	0.835	340	0.74	350	0.83	Additional Azimuths		274	1	3	0.954	45	0.916	93	0.975	183	0.974
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11.	Does the proposed facility satisfy the interference protection provisions of 47 C.F.R. Section 73.623(a)? (Applicable only if Certification Checklist items 1(a), (b), or (c) are answered "No".) <input type="radio"/> Yes <input checked="" type="radio"/> No If "No", attach as an Exhibit justification therefor, including a summary of any related previously granted waivers. [Exhibit 34]
12.	If the proposed facility will not satisfy the coverage requirement of 47 C.F.R. Section 73.625, attach as an Exhibit justification therefor. (Applicable only if Certification Checklist item 3 is answered "No.") [Exhibit 35]
13.	Environmental Protection Act. Submit in an Exhibit the following: [Exhibit 36] a. If Certification Checklist Item 2 is answered "Yes," a brief explanation of why an Environmental Assessment is not required. Also describe in the Exhibit the steps that will be taken to limit RF radiation exposure to the public and to persons authorized access to the tower site. By checking "Yes" to Certification Checklist Item 2, 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. If Certification Checklist Item 2 is answered "No," an Environmental Assessment as required by 47 C.F.R Section 1.1311.
PREPARERS CERTIFICATION ON PAGE 8 MUST BE COMPLETED AND SIGNED.	

Exhibits**Exhibit 33****Description:** EXHIBIT 33 - STATEMENT A

EXHIBIT 33 - STATEMENT A - ATTACHED AS A PDF FILE

Attachment 33

Description
Exhibit 33 - Statement A

Exhibit 34**Description:** EXHIBIT 34 - STATEMENT B

EXHIBIT 34 - STATEMENT B - ATTACHED AS A PDF FILE

Attachment 34

Description
Exhibit 34 - Statement B

Exhibit 36**Description:** EXHIBIT 36 - STATEMENT C

EXHIBIT 36 - STATEMENT C - ATTACHED AS A PDF FILE

Attachment 36

Description
Exhibit 36 - Statement C

Exhibit 36 - Statement C
ENVIRONMENTAL CONSIDERATIONS
prepared for
Greater Washington Educational Telecommunications Association, Inc.
WETA-DT Washington, DC
Facility ID 65670
Ch. 27 90 kW 254 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

Greater Washington Educational Telecommunications Association, Inc. ("GWETA") herein proposes to modify the licensed WETA-DT, Washington, DC, Channel 27 digital television ("DTV") facility. *GWETA* proposes to relocate the WETA-DT facility to utilize an existing "common" transmitting antenna system. The subject "common" antenna system is currently employed by stations WUSA-DT (Channel 34) and WJLA-DT (Channel 39), both Washington, DC.

Based on information provided by the applicant, it is believed that the provisions of Section 1.1307(a)(1-7) would not apply in this case.

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. The proposal will not involve any change in overall structure height from that currently authorized. Since no change in overall structure height is proposed, 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

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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.

The transmitting antenna system's center of radiation is 202 meters above ground level. An ERP of 90 kilowatts, horizontally polarized, will be employed. According to elevation pattern data provided by the antenna manufacturer (see **Exhibit 33 - Figure 2**), the antenna has a relative field of 10 percent or less from 10 to 90 degrees below the horizontal plane (i.e.: below the antenna) on Channel 27. Thus, a value of 10 percent relative field is used for this calculation. The "uncontrolled/general population" limit specified in §1.1310 for Channel 27 (center frequency 551 MHZ) is 367.3 $\mu\text{W}/\text{cm}^2$.

OET-65's formula for television transmitting antennas is based on the NTSC transmission standards, where the average power is normally much less than the peak power. For the DTV facility in the instant proposal, the peak-to-average ratio is different than the NTSC ratio. The DTV ERP figure herein refers to the *average* power level. The formula used for calculating DTV 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 ²
ERP	=	total (average) ERP in Watts
F	=	relative field factor
D	=	distance in meters

Using this formula, the proposed facility would contribute a power density of 0.8 $\mu\text{W}/\text{cm}^2$ at two meters above ground level near antenna support structure, or 0.2 percent of the general population/uncontrolled limit. At ground level locations away from the base of the tower, the

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calculated RF power density is even lower, due to the increasing distance from the transmitting antenna.

§1.1307(b)(3) states that facilities contributing less than five percent of the exposure limit at locations with multiple transmitters (such as the case at hand) are categorically excluded from responsibility for taking any corrective action in the areas where their contribution is less than five percent. Since the instant situation meets the five percent exclusion test at all ground level areas, the impact of the WUSA and WJLA facilities and any other facilities near this site may be considered independently from this proposal. Accordingly, it is believed that the impact of the proposed operation should not be considered to be a factor at or near ground level as defined under §1.1307(b).

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 (or on nearby towers) 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 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 all pertinent stations.

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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.