

ENGINEERING STATEMENT RE  
APPLICATION IN SUPPORT OF MODIFICATION  
OF CONSTRUCTION PERMIT  
(FCC FILE NO. 0000029978)  
FOR REPACKED FACILITIES  
**WVIR-TV, CHARLOTTESVILLE, VIRGINIA**  
CHANNEL 2 79.4 KW ERP MAX 362 M HAAT

OCTOBER 2017

COHEN, DIPPELL AND EVERIST, P.C.  
CONSULTING ENGINEERS  
RADIO AND TELEVISION  
WASHINGTON, D.C.

COHEN, DIPPELL AND EVERIST, P. C.

City of Washington            )  
  ) ss  
District of Columbia         )

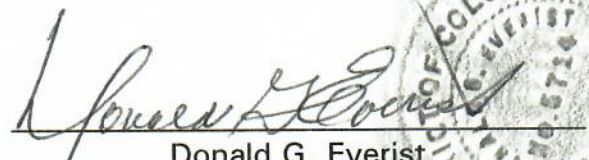
Donald G. Everist, being duly sworn upon his oath, deposes and states that:

He is a graduate electrical engineer, a Registered Professional Engineer in the District of Columbia, and is President, Secretary and Treasurer of Cohen, Dippell and Everist, P.C., Consulting Engineers, Radio - Television, with offices at 1420 N Street, N.W., Suite One, Washington, D.C. 20005;


That his qualifications are a matter of record in the Federal Communications Commission;

That the attached engineering report was prepared by him or under his supervision and direction and

That the facts stated herein are true of his own knowledge, except such facts as are stated to be on information and belief, and as to such facts he believes them to be true.

  
Donald G. Everist  
District of Columbia  
Professional Engineer  
Registration No. 5714

Subscribed and sworn to before me this 27<sup>th</sup> day of October, 2017.

  
Notary Public

My Commission Expires: 2/28/2018



This engineering statement has been prepared on behalf of Virginia Broadcasting Corporation, licensee of TV Station WVIR-TV, Charlottesville, Virginia, in support of its application for modification of construction permit (FCC File No. 0000029978) to operate on Channel 2 as authorized by the Incentive Auction for repacked facilities and the current priority window.

Station WVIR-TV is currently licensed to operate on Channel 32 (578-584 MHz) for its digital TV operation with 1000 kW maximum effective radiated power ("ERP") at 367.9 meters height above average terrain ("HAAT").

Antenna Site

It is proposed to top-mount the Channel 2 DTV antenna on the existing WVIR-DT guyed tower (see Exhibit E-1). The tower registration is 1018769.

The WVIR-TV antenna site is located on the Carters Mountain Orchard, east of Route 20, approximately 5.6 km (3.5 miles) south of Charlottesville, Virginia.

The geographic coordinates of the existing tower are as follows:

North Latitude: 37° 59' 0.5"

West Longitude: 78° 28' 54"

NAD-27

North Latitude: 37° 59' 1.0"

West Longitude: 78° 28' 53"

NAD-83

Equipment Data

Antenna: Dielectric, Model No. TDM-3A2 or equivalent with 1.0 degree electrical beam tilt. The vertical plane pattern and other exhibits required by Section 73.625(c) are herein included as Exhibits E-2

Transmission Line: 91.4 meters (300 ft) of Dielectric, Type EIA/DCA, 6-1/8" 75 ohm or equivalent with total loss of 0.10 dB

Elevation Data

Elevation of the site above mean sea level	445 meters (1460 feet)
Elevation of the top of structure including antenna above ground with lighting and appurtenances	95.7 meters (314 feet)
Elevation of the top of supporting structure above mean sea level with lighting and appurtenances	540.7 meters (1774 feet)
Height of DTV antenna radiation center above ground	89.8 meters (294.6 feet)
Height of DTV antenna radiation center above mean sea level	534.8 meters (1754.6 feet)
Height of DTV antenna radiation center above average terrain	362 meters (1187.7 feet)

Topographic Data

The average HAAT from the eight cardinal radials from 3.2 to 16.1 kilometers have been previously determined.

### Interference Analysis

A study of predicted interference caused by the proposed WVIR operation on Channel 2 digital operation has been performed using the Longley-Rice program for which the source data has been posted by the Commission on its website at <http://www.fcc.gov/oet/tvstudy>. Comparison of service/interference areas and population indicates this model closely matches the FCC's digital TVStudy 2.2 evaluation program. Best efforts have been made to use data and calculation identical to the FCC's program. The model employs the Longley-Rice propagation methodology and evaluates in grid cells of approximately 1 sq. km. Using one-second terrain data sampled approximately every 1.0 km at one-degree azimuth intervals with 2010 census centroids, all studies are based upon data in the Commission's current Licensing and Management System ("LMS") database update of the FCC's engineering database.

### Contour Data

Utilizing the formula in Section 73.625(b)(2) for the effective heights along each radial, the depression angle  $A_h$ , for each azimuth has been calculated. The maximum radiation value has been used to calculate the ERP where the vertical radiation pattern field value at these angles is greater than 90% of the maximum.

Table I provides the distances calculated by TVStudy 2.2 along each radial spaced every ten degrees in azimuth to the predicted F(50,90) 35 dBu and 28 dBu F(50,90) contours, the effective radiated power and the effective antenna heights. The predicted 35 dBu and 28 dBu contours determined from these distances are shown on the attached map (Exhibit E-4).

The distances along each radial to the limits of F(50,90) 35 dBu and 28 dBu F(50,90) contours were determined from reference to the appropriate propagation data for Channels 2-6, as published by the Commission in Section 73.699 of its rules.

#### Environmental Statement

The proposed WVIR-TV antenna will replace the current Channel 29 antenna and will be top-mounted on the existing guyed tower.

An evaluation has been made to determine compliance with the Commission's specified standards for human exposure to RF fields as set forth in the OET Bulletin No. 65 dated August 1997. For a maximum effective radiated power of 79.4 kW (H&V) and a radiation center of 87.3 meters above ground level, the proposed DTV operation would have a maximum of 4.42 microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ) radio frequency field levels ("RFF") at 2 meters above the base of the tower, based on an antenna field factor of 0.150 in the downward direction 50 to 90 degrees (see Exhibit E-2). The Commission's guidelines for Channel 2 TV operation are 1000  $\mu\text{W}/\text{cm}^2$  for the occupational/controlled and 200  $\mu\text{W}/\text{cm}^2$  for the general population/ uncontrolled environment.

There are multiple emitters utilizing the Carter's Mountain antenna farm. However, those television operations within 100 meters will be changing their facilities due to the repack therefore, the RFF study will not consider those stations and addresses only WVIR-TV.

The RFF contribution by WVIR-TV will be calculated using the following formula:

$$S = \frac{33.4(F^2) \text{ Total ERP}}{R^2}$$

where:

S = power density in  $\mu\text{W}/\text{cm}^2$

F = relative field factor

Total ERP = ERP Horizontal Polarization + ERP Vertical Polarization

R = RCAGL - 2 meters

ERP = RMS ERP in watts for DTV Stations

**WVIR-TV DTV Facility** (based on the numbers in this application)

Channel 2	Freq:	56 - 62 MHz Range
	ERP =	158.8 kW (H&V)
	Polarization =	Circular
	RCAGL -2 meters =	85.95 meters

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Total ERP = 158.8 kW (Circular)  
R = 85.3 meters  
F = 0.150 (from elevation data)

$$S = < 16.5 \mu\text{W}/\text{cm}^2 \text{ (2 meters above ground)}$$

Therefore, WVIR-TV contributes less than  $16.5 \mu\text{W}/\text{cm}^2$  at 2 meters above ground.

The limit for an uncontrolled environment (general population) for this frequency is  $200 \mu\text{W}/\text{cm}^2$ .

WVIR-TV contributes less than nine percent RFF level for an uncontrolled environment (general population) two meters above the ground.

Therefore, the RFF percentage will be less than nine percent of the limit for an uncontrolled environment at two meters above ground. Based on this analysis, RFF levels will not exceed current FCC guidelines.

Therefore, members of the public and personnel working around the proposed WVIR-DT, Channel 2 DTV facility would not be exposed to RFF exceeding the Commission's guidelines. With respect to work performed on the tower, Station WVIR-TV will establish procedure to ensure that workers are not exposed to RFF levels above the Commission's guidelines, by reducing or turning off the power, as appropriate.

FCC Rule, Section 1.1307

An environmental assessment ("EA") is categorically excluded under Section 1.1306 of the FCC Rules and Regulations because the tower structure is existing and will not be modified so as to invoke the need for environmental analysis. The existing tower is registered with the FCC, and approved by the FAA, and neither the ASR nor FAA approval will require modification. It was not constructed during 2001-2005 and thus is not a "twilight tower."

While some structural reinforcement of the tower will be required to support additional weight, there will be no material change in visual appearance, since one antenna is being substituted for another with no increase in overall structure height, including the height of the top-mounted antenna.

Compliance with OET Bulletin No. 65 (non-ionizing radiation) is discussed in the previous section of this exhibit.



ABOVE GROUND

ABOVE MEAN SEA LEVEL

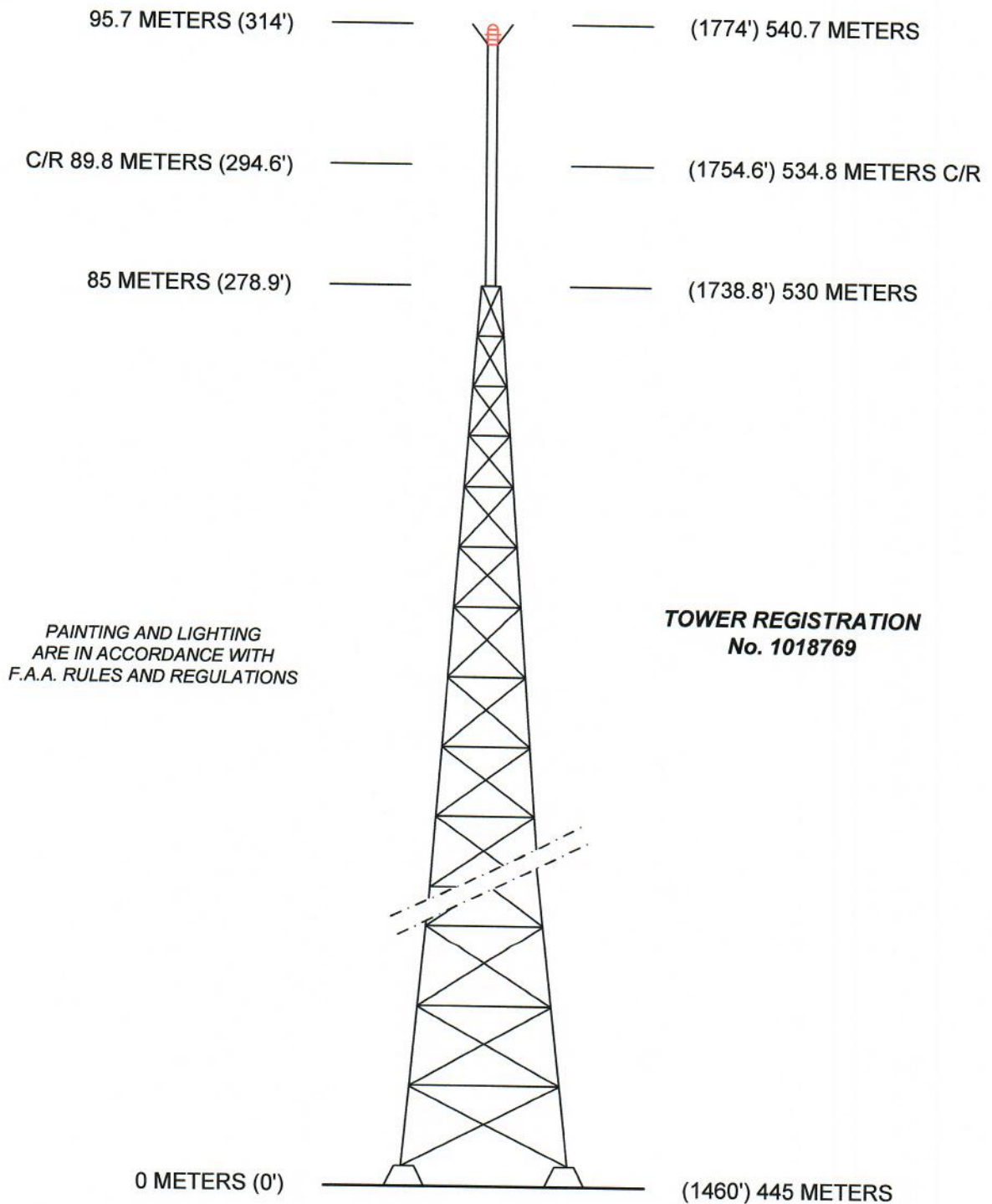


EXHIBIT E-1  
VERTICAL SKETCH  
FOR THE REPACKED OPERATION OF  
**WVIR-DT, CHARLOTTESVILLE, VIRGINIA**  
CHANNEL 2 80 kW MAX. ERP 362 METERS HAAT  
OCTOBER 2017

EXHIBIT E-2

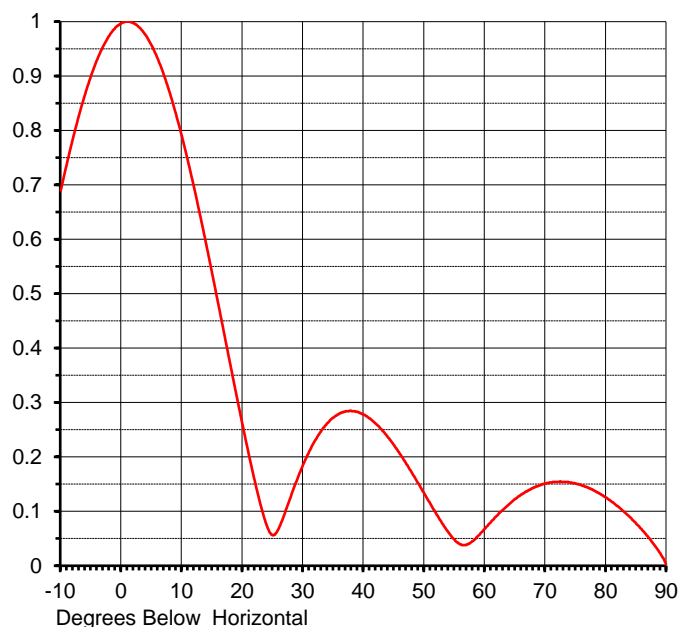
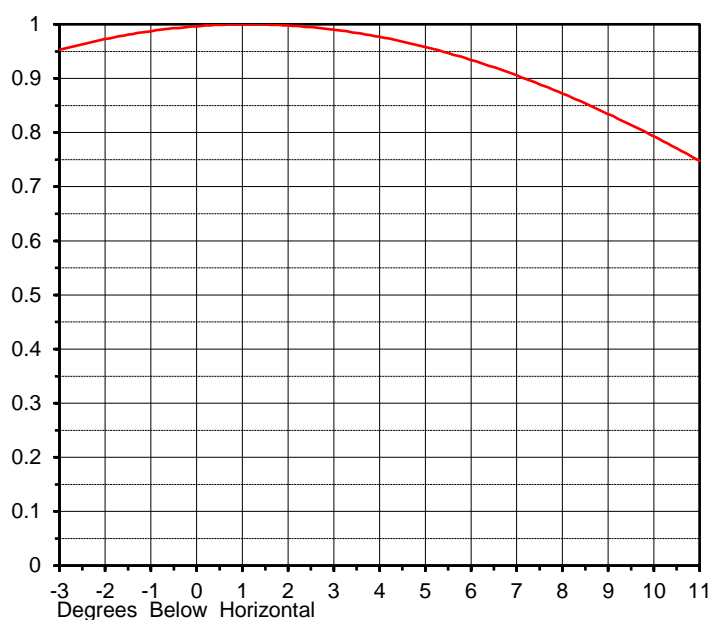
ANTENNA MANUFACTURER DATA

## ELEVATION PATTERN

Proposal No. **C-70741**  
 Date **24-May-17**  
 Call Letters **WVIR**  
 Channel **2**  
 Frequency **57 MHz**  
 Antenna Type **TDM-3A2**

RMS Directivity at Main Lobe **2.9 ( 4.62 dB )**  
 RMS Directivity at Horizontal **2.9 ( 4.62 dB )**  
**Calculated**

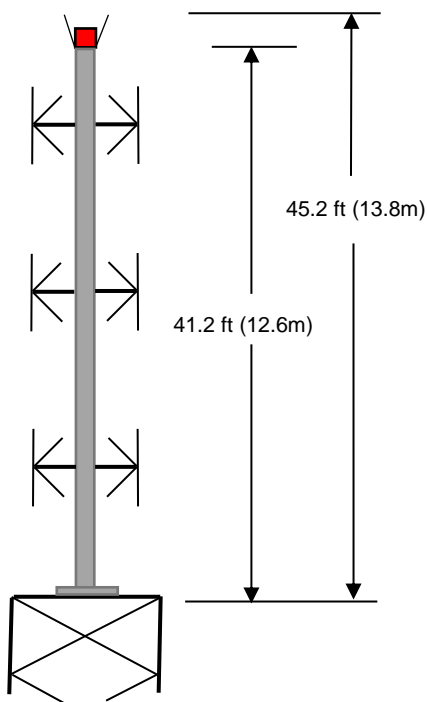
Beam Tilt **1.00 deg**  
 Pattern Number **03D028100**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.690	10.0	0.789	30.0	0.186	50.0	0.133	70.0	0.151
-9.0	0.739	11.0	0.743	31.0	0.210	51.0	0.114	71.0	0.153
-8.0	0.785	12.0	0.695	32.0	0.231	52.0	0.095	72.0	0.154
-7.0	0.828	13.0	0.644	33.0	0.248	53.0	0.077	73.0	0.154
-6.0	0.866	14.0	0.591	34.0	0.262	54.0	0.061	74.0	0.153
-5.0	0.901	15.0	0.536	35.0	0.272	55.0	0.048	75.0	0.151
-4.0	0.930	16.0	0.481	36.0	0.280	56.0	0.039	76.0	0.148
-3.0	0.955	17.0	0.425	37.0	0.284	57.0	0.039	77.0	0.144
-2.0	0.974	18.0	0.369	38.0	0.284	58.0	0.045	78.0	0.138
-1.0	0.989	19.0	0.313	39.0	0.283	59.0	0.056	79.0	0.132
0.0	0.997	20.0	0.259	40.0	0.278	60.0	0.068	80.0	0.125
1.0	1.000	21.0	0.206	41.0	0.271	61.0	0.080	81.0	0.117
2.0	0.997	22.0	0.157	42.0	0.261	62.0	0.092	82.0	0.109
3.0	0.989	23.0	0.111	43.0	0.250	63.0	0.103	83.0	0.099
4.0	0.975	24.0	0.074	44.0	0.236	64.0	0.113	84.0	0.089
5.0	0.956	25.0	0.056	45.0	0.222	65.0	0.123	85.0	0.077
6.0	0.932	26.0	0.069	46.0	0.205	66.0	0.131	86.0	0.065
7.0	0.902	27.0	0.097	47.0	0.188	67.0	0.137	87.0	0.052
8.0	0.869	28.0	0.128	48.0	0.170	68.0	0.143	88.0	0.038
9.0	0.831	29.0	0.158	49.0	0.152	69.0	0.148	89.0	0.022
								90.0	0.000

This document contains proprietary and confidential information of Dielectric. It is to be used solely for the purpose for which it is provided.  
 No disclosure, reproduction, or use of this document or any part of it may be made without the written permission of Dielectric.

## MECHANICAL SPECIFICATIONS



Proposal No. **C-70741**  
 Date **24-May-17**  
 Call Letters **WVIR**  
 Channel **2**  
 Frequency **57 MHz**  
 Antenna Type **TDM-3A2**

### Preliminary Specifications

#### Top Mounted

#### With ice TIA/EIA-222-F

Height AGL 250 ft (76.2 m)  
 Basic Wind Speed 70 m/h (112.7 km/h)

Design Ice 0.75 in (1.9 cm)  
 Wind Speed w/Ice 30 m/h ( km/hr)

#### Mechanical Specifications

		without ice	with ice
Height with Lightning Protector	H4	45.2 ft (13.8m)	
Height less Lightning Protector	H2	41.2 ft (12.6m)	
Height of Center of Radiation	H3	21.2 ft (6.5m)	
Force Coeff. x Projected Area	CaAc	ft <sup>2</sup> ( m <sup>2</sup> )	ft <sup>2</sup> ( m <sup>2</sup> )
Moment Arm	D1	ft ( m)	ft ( m)

Weight W lb ( t) lb ( t)

Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA/EIA-222-F

Prepared by: JBC

Date: 24-May-17

ME:

EE:

This document contains proprietary and confidential information of Dielectric. It is to be used solely for the purpose for which it is provided. No disclosure, reproduction, or use of this document or any part of it may be made without the written permission of Dielectric. Mechanical data is based on listed criteria and should be verified by the tower engineer.

EXHIBIT E-3

ALLOCATION STUDY

tvstudy v2.2.3 (Dxtpx3)  
Database: localhost, Study: WVIR-NewSite2, Model: Longley-Rice  
Start: 2017.11.01 18:34:10

Study created: 2017.10.19 18:58:11

Study build station data: LMS TV 2017-10-13 (20)

Proposal: WVIR-TV D2 DT CP CHARLOTTESVILLE, VA  
File number: NewSite2  
Facility ID: 70309  
Station data: User record  
Record ID: 92  
Country: U.S.  
Zone: I

Stations affected by proposal:

Call	Chan	Svc	Status	City, State	File Number	Distance
KJWP	D2	DT	LIC	WILMINGTON, DE	BLCDT20131129AIH	361.7 km
WQED	D2	DT	CP	PITTSBURGH, PA	BLANK0000025254	302.0
WBRA-TV	D3	DT	LIC	ROANOKE, VA	BLEDT20131218CHV	171.4

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D2  
Latitude: 37 59 1.00 N (NAD83)  
Longitude: 78 28 53.00 W  
Height AMSL: 526.9 m  
HAAT: 0.0 m  
Peak ERP: 79.4 kW  
Antenna: Omnidirectional  
Elev Pattn: Generic

28.0 dBu contour:

Azimuth	ERP	HAAT	Distance
---------	-----	------	----------

0.0 deg	79.4 kW	382.6 m	136.4 km
45.0	79.4	295.5	128.4
90.0	79.4	410.8	139.2
135.0	79.4	398.7	138.0
180.0	79.4	392.5	137.4
225.0	79.4	347.3	133.0
270.0	79.4	310.0	129.8
315.0	79.4	354.9	133.7

Database HAAT does not agree with computed HAAT  
 Database HAAT: 0 m    Computed HAAT: 362 m

ERP exceeds maximum  
 ERP: 79.4 kW    ERP maximum: 5.67 kW

\*\*Proposal service area extends beyond baseline plus 1.0%  
 Proposal service area population is more than 95.0% of baseline

Distance to Canadian border: 508.6 km

Distance to Mexican border: 2184.9 km

Conditions at FCC monitoring station: Laurel MD  
 Bearing: 47.2 degrees    Distance: 195.1 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:  
 Bearing: 284.4 degrees    Distance: 2311.7 km

Study cell size: 2.00 km  
 Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%  
 Maximum new IX to LPTV: 2.00%

---

Interference to BLCDT20131129AIH LIC, scenario 1

\*\*IX: 0.80% interference

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	KJWP	D2	DT	LIC	WILMINGTON, DE	BLCDT20131129AIH	
Undesireds:	WVIR-TV	D2	DT	BL	CHARLOTTESVILLE, VA	DTVBL70309	361.7 km
	WVIR-TV	D2	DT	CP	CHARLOTTESVILLE, VA	NewSite2	361.7
	WSBE-TV	D2	DT	CP	PROVIDENCE, RI	BLANK00000029862	388.5
	WJLP	D3	DT	LIC	MIDDLETOWN TOWNSHIP, NJ	BLANK00000001037	132.3
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX
35855.7	11,594,463	34940.7	11,467,616	34532.5	11,038,674	34044.1 10,950,599	1.41 0.80
Undesired		Total IX		Unique IX, before		Unique IX, after	
WVIR-TV D2 DT BL	12.1	631	12.1	631	500.4	88,706	
WVIR-TV D2 DT CP	500.4	88,706	0.0	0	0.0	0	
WSBE-TV D2 DT CP	32.0	21,725	364.2	406,586	364.2	406,586	
WJLP D3 DT LIC	396.2	428,311					

-----  
Interference to BLANK0000025254 CP, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WQED	D2	DT	CP	PITTSBURGH, PA	BLANK00000025254	
Undesireds:	WVIR-TV	D2	DT	BL	CHARLOTTESVILLE, VA	DTVBL70309	302.0 km
	WVIR-TV	D2	DT	CP	CHARLOTTESVILLE, VA	NewSite2	302.0
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX
27846.4	3,310,841	26682.8	3,221,156	26638.5	3,220,614	26264.6 3,210,493	1.40 0.31
Undesired		Total IX		Unique IX, before		Unique IX, after	
WVIR-TV D2 DT BL	44.2	542	44.2	542	418.1	10,663	
WVIR-TV D2 DT CP	418.1	10,663					

-----  
Interference to BLEDT20131218CHV LIC, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WBRA-TV	D3	DT	LIC	ROANOKE, VA	BLEDT20131218CHV	



Undesireds:	WVIR-TV	D2	DT	BL	CHARLOTTESVILLE, VA	DTVBL70309	171.4 km
	WVIR-TV	D2	DT	CP	CHARLOTTESVILLE, VA	NewSite2	171.4

Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX
51076.4 1,726,408	48714.1 1,677,204	48670.4 1,676,716	48412.4 1,672,526	0.53 0.25

Undesired	Total IX	Unique IX, before	Unique IX, after
WVIR-TV D2 DT BL	43.7 488	43.7 488	
WVIR-TV D2 DT CP	301.7 4,678		301.7 4,678

-----

Interference to proposal, scenario 1  
2.45% interference

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WVIR-TV	D2	DT	CP	CHARLOTTESVILLE, VA	NewSite2	
Undesireds:	KJWP	D2	DT	LIC	WILMINGTON, DE	BLC DT20131129AIH	361.7 km
	WQED	D2	DT	CP	PITTSBURGH, PA	BLANK0000025254	302.0
	WBRA-TV	D3	DT	LIC	ROANOKE, VA	BLEDT20131218CHV	171.4

Service area	Terrain-limited	IX-free	Percent IX
56859.9 3,181,007	53190.2 3,106,939	52375.1 3,030,665	1.53 2.45

Undesired	Total IX	Unique IX	Prcnt Unique IX
KJWP D2 DT LIC	200.0 58,221	179.9 52,788	0.34 1.70
WQED D2 DT CP	148.2 7,244	128.1 1,811	0.24 0.06
WBRA-TV D3 DT LIC	487.0 16,242	487.0 16,242	0.92 0.52

TABLE I  
COMPUTED COVERAGE DATA  
FOR THE PROPOSED DTV OPERATION OF  
WVIR-TV, CHARLOTTESVILLE, VIRGINIA  
CHANNEL 2 79.4 KW ERP ND 362 METERS HAAT  
OCTOBER 2017

<u>Radial</u> N ° E, T	<u>Average</u> <u>Elevation</u> meters	<u>Effective</u> <u>Height</u> meters	<u>Depression</u> <u>Angle</u> degrees	<u>Effective</u> <u>Radiated</u> <u>Power</u> kW	<u>Distance to Contour</u>	
					<u>35 dBu</u> km	<u>28 dBu</u> km
0	144.3	382.6	0.542	79.4	115.4	136.4
10	163.6	363.3	0.528	79.4	114.3	134.5
20	183.0	343.9	0.514	79.4	113.7	132.7
30	202.4	324.5	0.499	79.4	113.1	131.0
40	221.7	305.2	0.484	79.4	112.2	129.3
50	218.6	308.3	0.486	79.4	112.4	129.6
60	193.0	333.9	0.506	79.4	113.4	131.8
70	167.4	359.5	0.525	79.4	114.2	134.2
80	141.7	385.2	0.544	79.4	115.6	136.7
90	116.1	410.8	0.561	79.4	117.5	139.2
100	118.8	408.1	0.560	79.4	117.3	138.9
110	121.5	405.4	0.558	79.4	117.1	138.7
120	124.2	402.7	0.556	79.4	116.9	138.4
130	126.9	400.0	0.554	79.4	116.7	138.1
140	128.9	398.0	0.553	79.4	116.5	137.9
150	130.3	396.6	0.552	79.4	116.4	137.8
160	131.7	395.2	0.551	79.4	116.3	137.7
170	133.0	393.9	0.550	79.4	116.2	137.5
180	134.4	392.5	0.549	79.4	116.1	137.4
190	144.5	382.4	0.542	79.4	115.4	136.4
200	154.5	372.4	0.535	79.4	114.8	135.4
210	164.5	362.4	0.527	79.4	114.3	134.4
220	174.6	352.3	0.520	79.4	114.0	133.5
230	183.7	343.2	0.513	79.4	113.7	132.7
240	192.0	334.9	0.507	79.4	113.5	131.9
250	200.3	326.6	0.501	79.4	113.2	131.2
260	208.6	318.3	0.494	79.4	112.9	130.5
270	216.9	310.0	0.488	79.4	112.5	129.8

TABLE I  
COMPUTED COVERAGE DATA  
FOR THE PROPOSED DTV OPERATION OF  
WVIR-TV, CHARLOTTESVILLE, VIRGINIA  
CHANNEL 2 79.4 KW ERP ND 362 METERS HAAT  
OCTOBER 2017

<u>Radial</u> N ° E, T	<u>Average</u> <u>Elevation</u> meters	<u>Effective</u> <u>Height</u> meters	<u>Depression</u> <u>Angle</u> degrees	<u>Effective</u> <u>Radiated</u> <u>Power</u> kW	<u>Distance to Contour</u>	
					<u>35 dBu</u> km	<u>28 dBu</u> km
280	206.9	320.0	0.495	79.4	113.0	130.7
290	196.9	330.0	0.503	79.4	113.3	131.5
300	186.9	340.0	0.511	79.4	113.6	132.4
310	177.0	349.9	0.518	79.4	113.9	133.3
320	168.9	358.0	0.524	79.4	114.1	134.0
330	162.7	364.2	0.529	79.4	114.4	134.6
340	156.6	370.3	0.533	79.4	114.7	135.2
350	150.4	376.5	0.537	79.4	115.0	135.8

