

ENGINEERING EXHIBIT

Incentive Auction Channel Reassignment

Application for Digital Television Station Auxiliary Antenna Construction Permit

prepared for

University Of North Carolina

WUNC-TV Chapel Hill, NC

Facility ID 69080

Ch. 20 1000 kW 305 m

University Of North Carolina ("UNC") is the licensee of digital television station WUNC-TV, Facility ID 69080, Chapel Hill NC. Reassignment of WUNC-TV from Channel 25 to Channel 20 was specified in the *Incentive Auction Closing and Channel Reassignment Public Notice* (DA 17-317, released April 13, 2017). A Construction Permit ("CP", file# 0000034414) authorizes construction of the WUNC-TV post-auction facility on Channel 20. *UNC* herein seeks authorization for an auxiliary antenna for WUNC-TV on its post-auction Channel 20. The initial operation on reassignment Channel 20 may commence with the auxiliary antenna proposed herein, in order to accommodate tower work including removal of the existing Channel 25 main antenna and installation of the post-auction Channel 20 main antenna.

The reassignment CP authorizes WUNC-TV to operate with a directional antenna at 1000 kW effective radiated power (ERP) and 462 meters height above average terrain (HAAT). The proposed auxiliary antenna will be side-mounted on the same tower structure as the authorized main antenna, and will operate on Channel 20 at 1000 kW ERP (directional) and an antenna HAAT of 305 meters.

The WUNC-TV tower structure is associated with FCC Antenna Structure Registration number 1014574. No change to the overall structure height will result from this proposal.

The proposed antenna is an elliptically polarized directional RFS model SAA18-ATW_CX-G200-ES6R-20 (24 percent vertical polarization). The maximum horizontally

polarized ERP is 1000 kW and the maximum vertically polarized ERP is 240 kW. The vertically polarized component will not exceed the horizontally polarized component at any azimuth. The directional antenna's azimuthal patterns are depicted in Figures 1 and 1A for horizontal and vertical polarization, respectively. The antenna's elevation pattern is supplied in Figure 2 and 2A.

Figure 3 shows that the 41 dB μ noise limited service contour of the proposed auxiliary facility does not extend beyond that of the authorized main facility. Thus the proposal complies with §73.1675(a).

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed operation was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10), and considering 12 percent antenna relative field in downward elevations (pattern data shows less than 12 percent relative field at angles 35 to 90 degrees below the antenna), the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is 11.6 μ W/cm², which is 3.4 percent of the general population/uncontrolled maximum permitted exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent.

The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. This exhibit is limited to the evaluation of exposure to RF electromagnetic field.

Engineering Exhibit
University Of North Carolina (WUNC-TV)
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List of Attachments

Figure 1, 1A	Antenna Azimuthal Pattern
Figure 2, 2A	Antenna Elevation Pattern
Figure 3	Proposed Auxiliary Contours

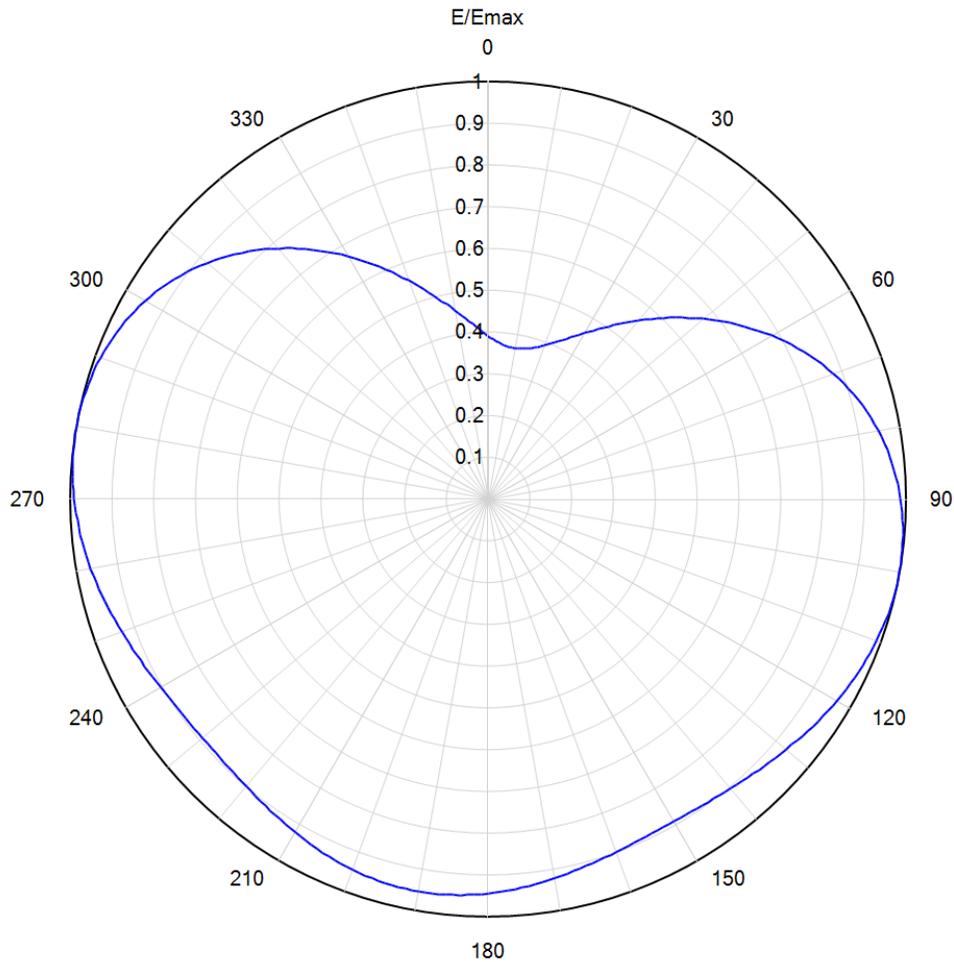
Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E.	June 27, 2019
207 Old Dominion Road	Yorktown, VA 23692

703-650-9600



Azimuth Pattern



Model: SAA18-ATW_CX-G200-ES6R-20

Polarization: Horizontal

Location: CHAPEL HILL

Frequency: 509.00 MHz

Customer: University of North Carolina

Directivity: 1.4 (1.46 dB)

Date: June 6, 2018

Elevation Angle: 0.50 degrees

Rotation Angle: 190 degrees

Horizontal Unit Pattern:

Note: Pattern Tolerance +/-5% of Emax

File = WUNC-interim-upgrade-hrp.pat



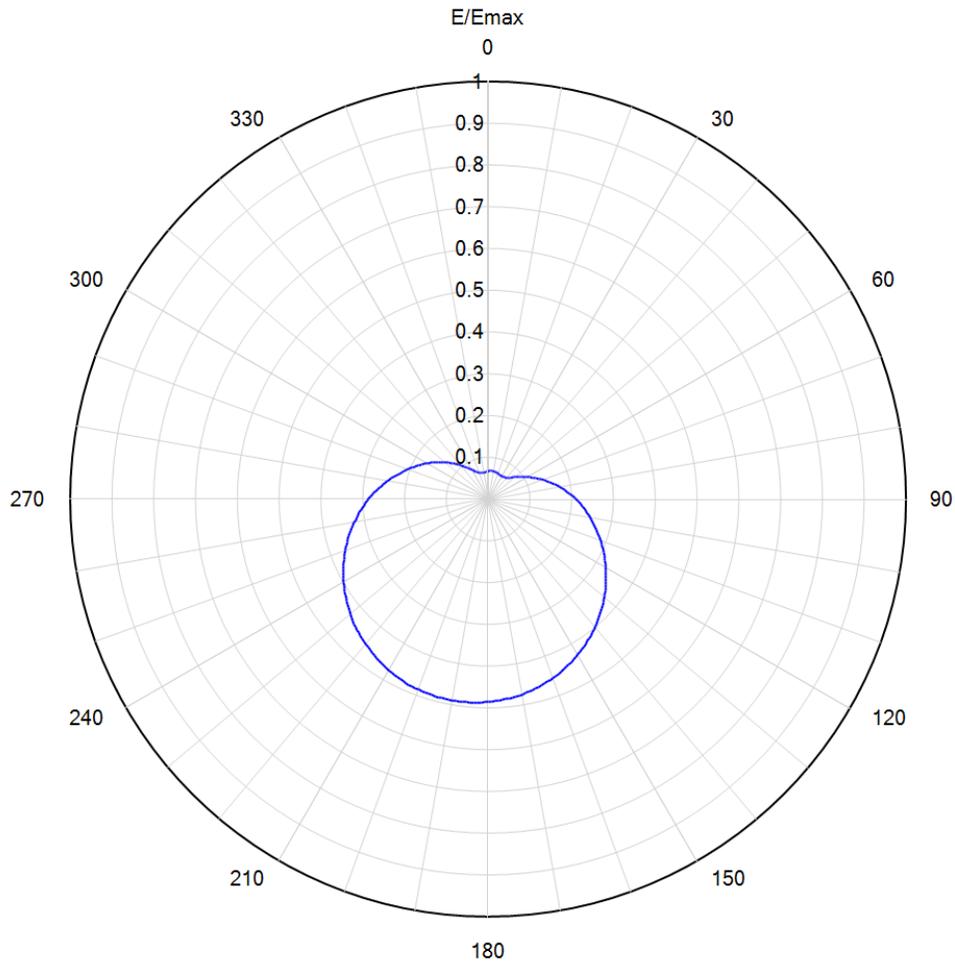
Figure 1
Auxiliary Antenna Azimuthal Pattern
Horizontal Polarization
WUNC-TV Chapel Hill, NC
Facility ID 69080
Ch. 20 1000 kW 305 m

prepared for
University Of North Carolina

June, 2019



Azimuth Pattern



Model: SAA18-ATW_CX-G200-ES6R-20

Location: CHAPEL HILL

Customer: University of North Carolina

Date: June 6, 2018

Rotation Angle: 190 degrees

Note: Pattern Tolerance +/-5% of Emax

Polarization: Vertical

Frequency: 509.00 MHz

Directivity: 2.6 (4.22 dB)

Elevation Angle: 0.50 degrees

Horizontal Unit Pattern:

File = 0-CA-129-4.22-500-ATW_C1_Vpol.pat



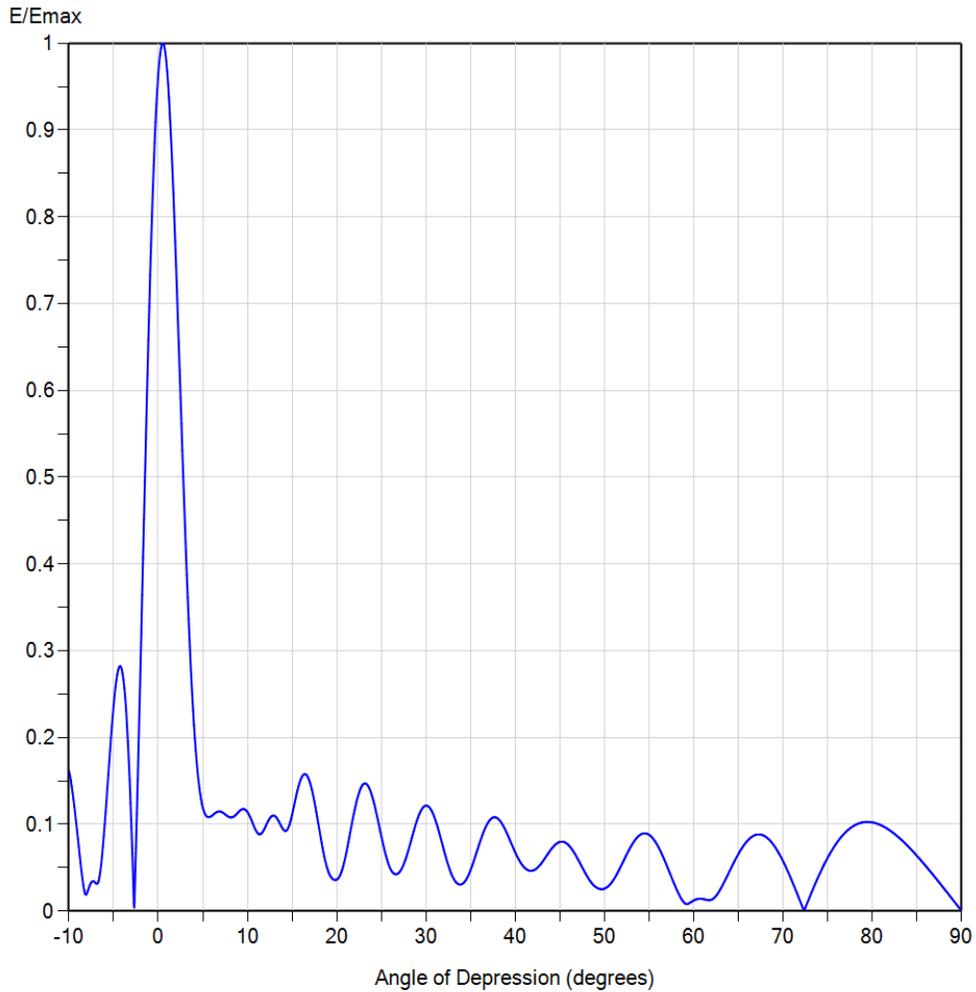
Figure 1A
Auxiliary Antenna Azimuthal Pattern
Vertical Polarization
WUNC-TV Chapel Hill, NC
Facility ID 69080
Ch. 20 1000 kW 305 m

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University Of North Carolina

June, 2019



Elevation Pattern



Model:	SAA18-ATW_CX-G200-ES6R-20	Frequency:	509.00 MHz
Polarization:	<u>Horizontal</u>	Directivity (Main Lobe):	16.8 (12.27 dBd)
Location:	CHAPEL HILL	Directivity (At Horizon):	15.7 (11.95 dBd)
Customer:	University of North Carolina	Beam Tilt:	0.50 degrees
Date:	June 6, 2018	Azimuth Angle:	460 degrees



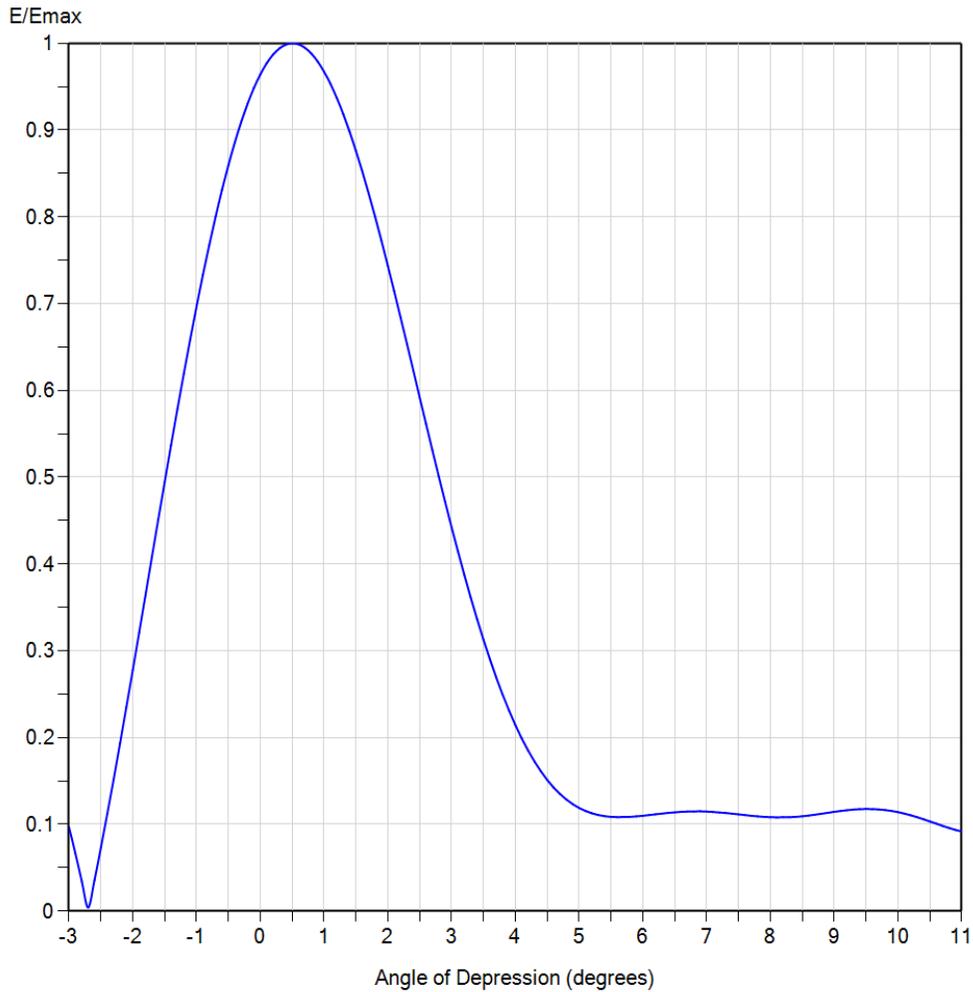
Figure 2
Auxiliary Antenna Elevation Pattern
WUNC-TV Chapel Hill, NC
Facility ID 69080
Ch. 20 1000 kW 305 m

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June, 2019



Elevation Pattern



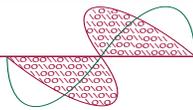
Model:	SAA18-ATW_CX-G200-ES6R-20	Frequency:	509.00 MHz
Polarization:	<u>Horizontal</u>	Directivity (Main Lobe):	16.8 (12.27 dBd)
Location:	CHAPEL HILL	Directivity (At Horizon):	15.7 (11.95 dBd)
Customer:	University of North Carolina	Beam Tilt:	0.50 degrees
Date:	June 6, 2018	Azimuth Angle:	460 degrees



**Figure 2A - Detail
Auxiliary Antenna Elevation Pattern
WUNC-TV Chapel Hill, NC
Facility ID 69080
Ch. 20 1000 kW 305 m**

prepared for
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June, 2019



Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 3
Proposed Auxiliary Contours
WUNC-TV Chapel Hill, NC
Facility ID 69080
Ch. 20 1000 kW 305 m

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University Of North Carolina
June, 2019

