

ENGINEERING EXHIBIT

Application for Digital Television Station Auxiliary Antenna Construction Permit

prepared for

Gray Television Licensee, LLC

KTVF(DT) Fairbanks, AK

Facility ID 49621

Ch. 26 15.6 kW 264 m

Gray Television Licensee, LLC (“Gray”) is the licensee of digital television station KTVF(DT), Facility ID 49621, Channel 26, Fairbanks AK. KTVF is licensed (file# BLCDT-20090720ACS) to operate with a directional antenna at 27 kW effective radiated power (ERP) and 471 meters height above average terrain (HAAT). *Gray* herein seeks authorization for an auxiliary antenna for KTVF. The proposed auxiliary antenna will operate at 15.6 kW ERP (directional) and an antenna HAAT of 264 meters from a separate transmitting location.

Gray proposes to utilize a side-mounted antenna on a separate tower structure located 12.3 km from the licensed KTVF facility. The proposed auxiliary facility’s tower structure is associated with FCC Antenna Structure Registration number 1002771. No change to the overall structure height will result from this proposal. The subject antenna supporting structure is owned by *Gray* and is utilized by *Gray*’s Class A television station KXDF-CD (Facility ID 64596, Fairbanks AK).

The proposed auxiliary antenna is an elliptically polarized directional ERI model AL12M-26-PLE (30 percent vertical polarization). The maximum horizontally polarized ERP is 15.6 kW and the maximum vertically polarized ERP is 4.7 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 Figures 2 and 2A.

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

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed facility 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 10 percent antenna relative field in downward elevations (pattern data shows 10 percent or less relative field at angles 20 to 90 degrees below the antenna), the calculated power density attributable to the proposed facility at locations near the transmitter site at a height of two meters above ground level is $0.9 \mu\text{W}/\text{cm}^2$, which is 0.2 percent of the general population / uncontrolled maximum permissible exposure limit. This is well 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.

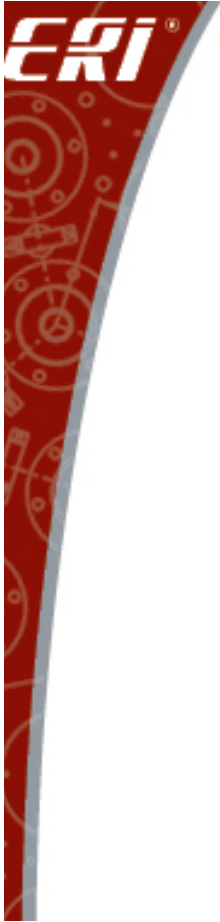
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power 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. No increase in structure height is proposed.

List of Attachments

Figure 1, 1A Antenna Azimuthal Pattern
Figure 2, 2A Antenna Elevation Pattern
Figure 3 Proposed Auxiliary Contours
Form 2100 Saved Version of Engineering Sections of FCC Form at Time of Upload

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E. December 19, 2022
207 Old Dominion Road Yorktown, VA 23692 703-650-9600



Spec Number: 20221219jmd preliminary

Model Number: AL12M-26-PLE

Azimuth Pattern	
Type:	ALPL-M
Directivity:	2.40 numeric (3.80 dB)
Peak(s) at:	
Polarization: Horizontal	
Frequency: 26 (ATSC)	
Location: Fairbanks AK	
Note: Pattern shape and directivity may vary with channel and mounting configuration.	

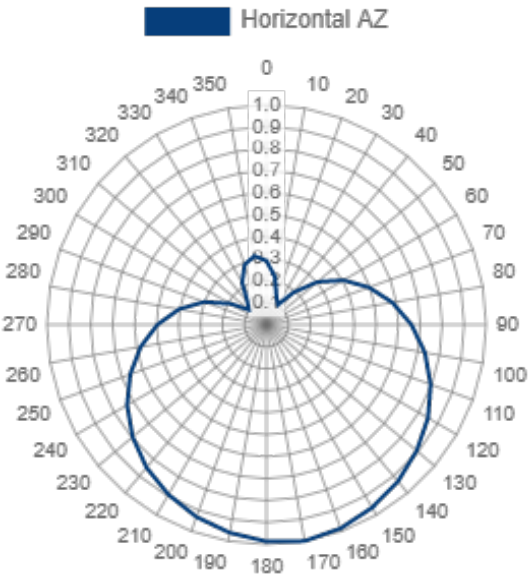
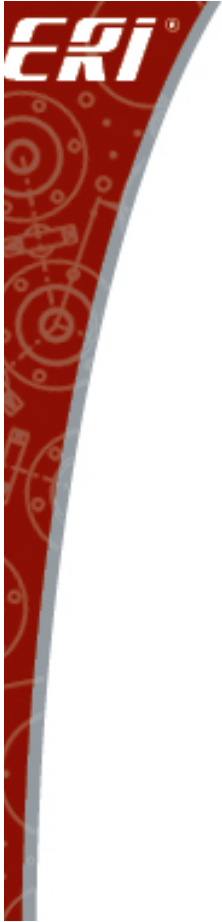


Figure 1
Auxiliary Antenna Azimuthal Pattern
Horizontal Polarization
KTVF(DT) Fairbanks, AK
Facility ID 49621
Ch. 26 15.6 kW 264 m

prepared for
Gray Television Licensee, LLC

December, 2022



Spec Number: 20221219jmd preliminary

Model Number: AL12M-26-PLE

Azimuth Pattern

Type:	ALPL-M	Polarization:	Vertical
Directivity:	2.52 numeric (4.01 dB)	Frequency:	26 (ATSC)
Peak(s) at:		Location:	Fairbanks AK
		Note: Pattern shape and directivity may vary with channel and mounting configuration.	

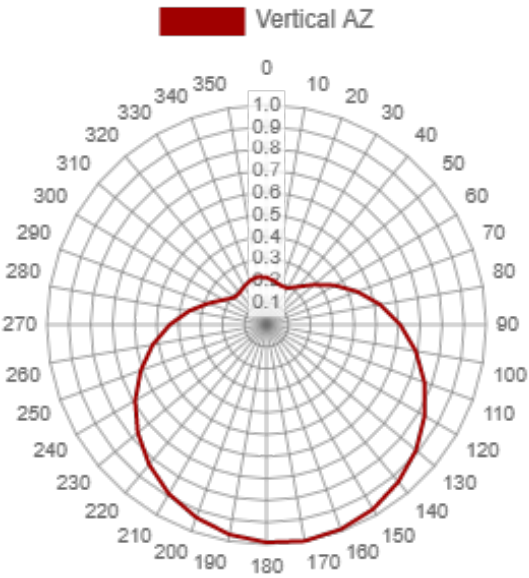
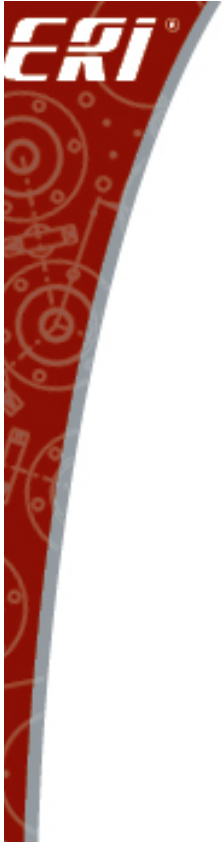


Figure 1A
Auxiliary Antenna Azimuthal Pattern
Vertical Polarization (Ref = 30%)
KTVF(DT) Fairbanks, AK
Facility ID 49621
Ch. 26 15.6 kW 264 m

prepared for
Gray Television Licensee, LLC

December, 2022



Spec Number: 20221219jmd preliminary

Model Number: AL12M-26-PLE

Elevation Pattern			
Type:	AL12PL5		Polarization: Horizontal
Directivity:			Frequency: 26 (ATSC)
Main Lobe:	12.72 numeric	(11.04 dB)	Location: Fairbanks AK
Horizontal:	10.19 numeric	(10.08 dB)	Beam Tilt: 1.25 degrees

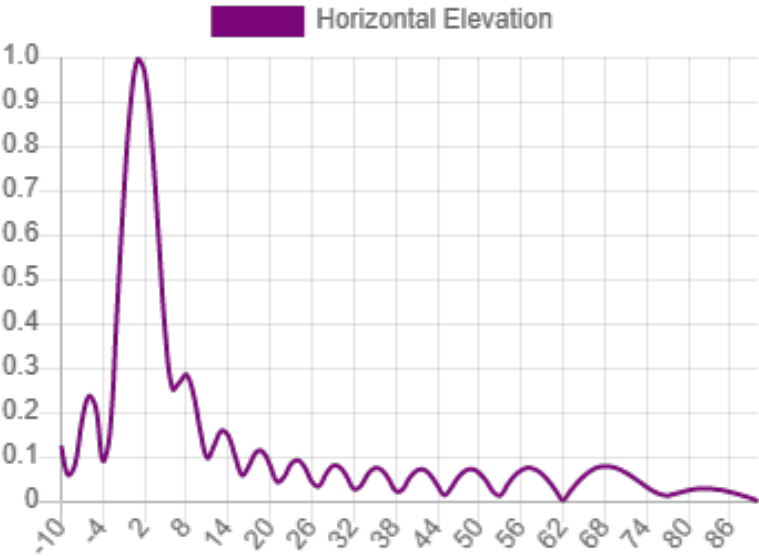


Figure 2
Auxiliary Antenna Elevation Pattern
KTVF(DT) Fairbanks, AK
Facility ID 49621
Ch. 26 15.6 kW 264 m

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December, 2022



Spec Number: 20221219jmd preliminary

Model Number: AL12M-26-PLE

		Elevation Pattern	
Type:	AL12PL5	Polarization:	Horizontal
Directivity:		Frequency:	26 (ATSC)
Main Lobe:	12.72 numeric (11.04 dB)	Location:	Fairbanks AK
Horizontal:	10.19 numeric (10.08 dB)	Beam Tilt:	1.25 degrees

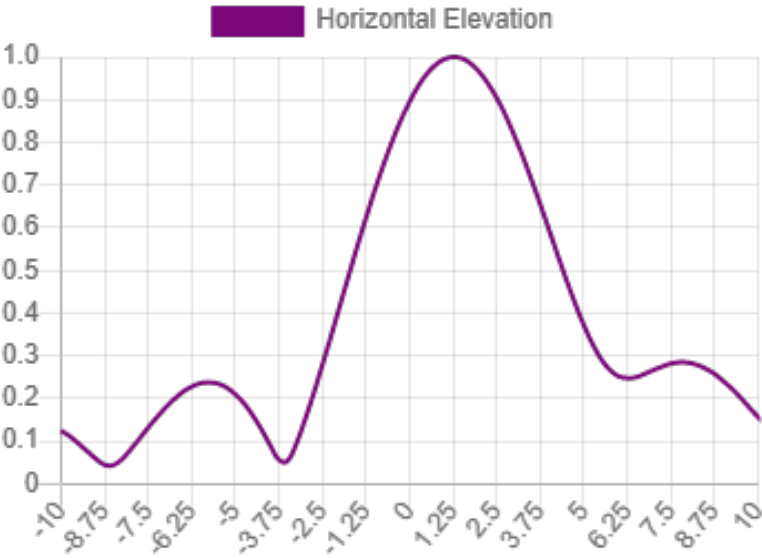
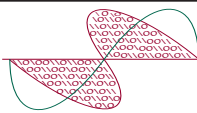


Figure 2A - Detail
Auxiliary Antenna Elevation Pattern
KTVF(DT) Fairbanks, AK
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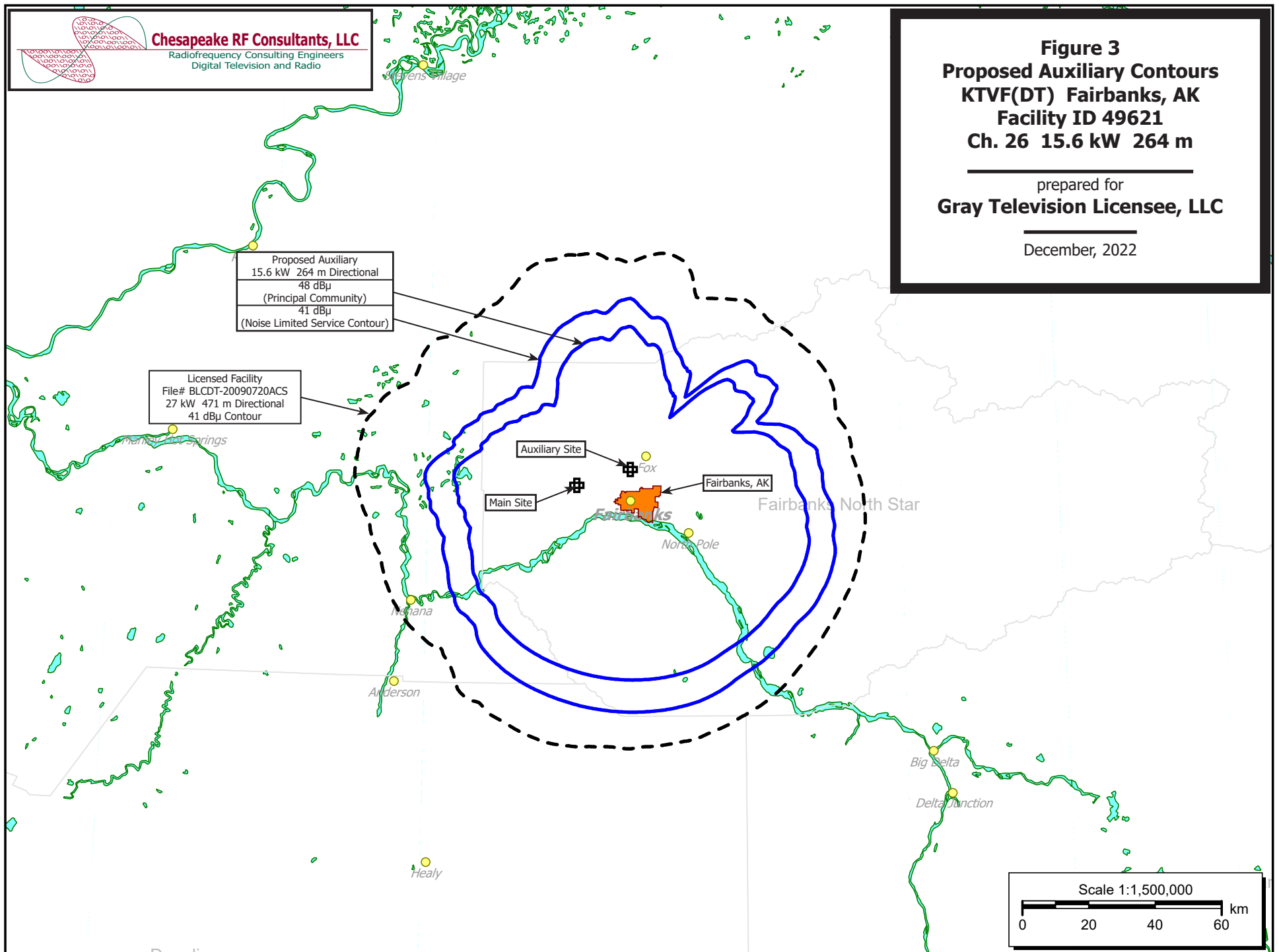


Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 3
Proposed Auxiliary Contours
KTVF(DT) Fairbanks, AK
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December, 2022



Channel and
Facility
Information

Section	Question	Response
Proposed Community of License	Facility ID	49621
	State	Alaska
	City	FAIRBANKS
	DTX Channel	26
	Designated Market Area	Fairbanks
Facility Type	Facility Type	Commercial
	Station Type	Auxiliary
Zone	Zone	2

**Antenna Location
Data**

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1002771
Coordinates (NAD83)	Latitude	64° 55' 19.0" N+
	Longitude	147° 43' 04.0" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	105.5 meters
	Support Structure Height	105.5 meters
	Ground Elevation (AMSL)	421.0 meters
Antenna Data	Height of Radiation Center Above Ground Level	91.0 meters
	Height of Radiation Center Above Average Terrain	264.0 meters
	Height of Radiation Center Above Mean Sea Level	512.0 meters
	Effective Radiated Power	15.6 kW

Antenna
Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	No
	Antenna ID	
Antenna Manufacturer and Model	Manufacturer:	ERI
	Model	AL12M-26-PLE
	Rotation	170 degrees
	Electrical Beam Tilt	1.25
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
DTV and DTS: Elevation Pattern	Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?	No
	Uploaded file for elevation antenna (or radiation) pattern data	

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	Value	Degree	Value	Degree	Value	Degree	Value
0	1.000	90	0.582	180	0.317	270	0.582
10	0.987	100	0.496	190	0.290	280	0.660
20	0.962	110	0.405	200	0.222	290	0.732
30	0.931	120	0.303	210	0.134	300	0.795
40	0.893	130	0.192	220	0.106	310	0.849
50	0.849	140	0.106	230	0.192	320	0.893
60	0.795	150	0.134	240	0.303	330	0.931
70	0.732	160	0.222	250	0.405	340	0.962
80	0.660	170	0.290	260	0.496	350	0.987

Additional Azimuths

Degree	V _A
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