

ENGINEERING EXHIBIT

Digital Television Station Application for Minor Modification of Licensed Facility

prepared for

Gray Television Licensee, LLC
KOSA-TV Odessa, TX
Facility ID 6865
Ch. 31 500 kW 226 m

Gray Television Licensee, LLC (“*Gray*”) is the licensee of digital television station KOSA-TV, Channel 7, Facility ID 6865, Odessa TX. The digital channel allotment for KOSA-TV was recently changed from Channel 7 to Channel 31 as described in the FCC Report and Order (“R&O”) in MB Docket 22-435¹. Pursuant to the R&O, *Gray* is submitting this minor change application (Form 2100 Schedule A) to obtain a Construction Permit to specify operation on Channel 31.

As described in MB Docket 22-435, *Gray* proposes to implement the Channel 31 substitution with a top-mounted transmitting antenna to be installed on the existing KOSA-TV tower structure which would replace the existing top-mounted Channel 7 antenna. The KOSA-TV tower structure is associated with FCC Antenna Structure Registration number 1233693. No increase to the overall structure height will result.

The proposed antenna is an elliptically polarized directional ERI model ATW28H2-ETWCx-30/31H (30 percent vertical polarization). The maximum horizontally polarized effective radiated power (“ERP”) is 500 kW and the maximum vertically polarized ERP is 150 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. Similarly, the antenna’s elevation patterns are depicted in Figures 2 and 2A.

¹*Amendment of Section 73.622(j), Table of DTV Allotments, Television Broadcast Stations (Odessa, TX), MB Docket No. 22-435, RM 11940, DA 23-158, released March 1, 2023.*

Figure 3 supplies a map that demonstrates compliance with §73.625(a)(1) regarding coverage of the entire principal community.

The KOSA-TV facility proposed herein conforms exactly to the technical parameters adopted in MB Docket 22-435, therefore realizing a 100.0 percent match of the allotted service population. Since no change in technical parameters from those specified in the Channel 31 allotment will occur, interference analysis to other television facilities is not required.

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 10 percent antenna relative field in downward elevations (pattern data shows less than 10 percent relative field at angles 10 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 $5.1 \mu\text{W}/\text{cm}^2$, which is 1.3 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. No increase in structure height is proposed.

Engineering Exhibit
Gray Television Licensee, LLC (KOSA-TV)
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List of Attachments

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

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E. March 31, 2023
207 Old Dominion Road Yorktown, VA 23692

703-650-9600



Azimuth Pattern

Type:	ATW-WC	Polarization:	Horizontal
Directivity:	1.40 numeric (1.46 dB)	Frequency:	31 (ATSC)
Peak(s) at:		Location:	Odessa, TX
		NOTE: Pattern shape and directivity may vary with channel and mounting configuration.	

Relative Field

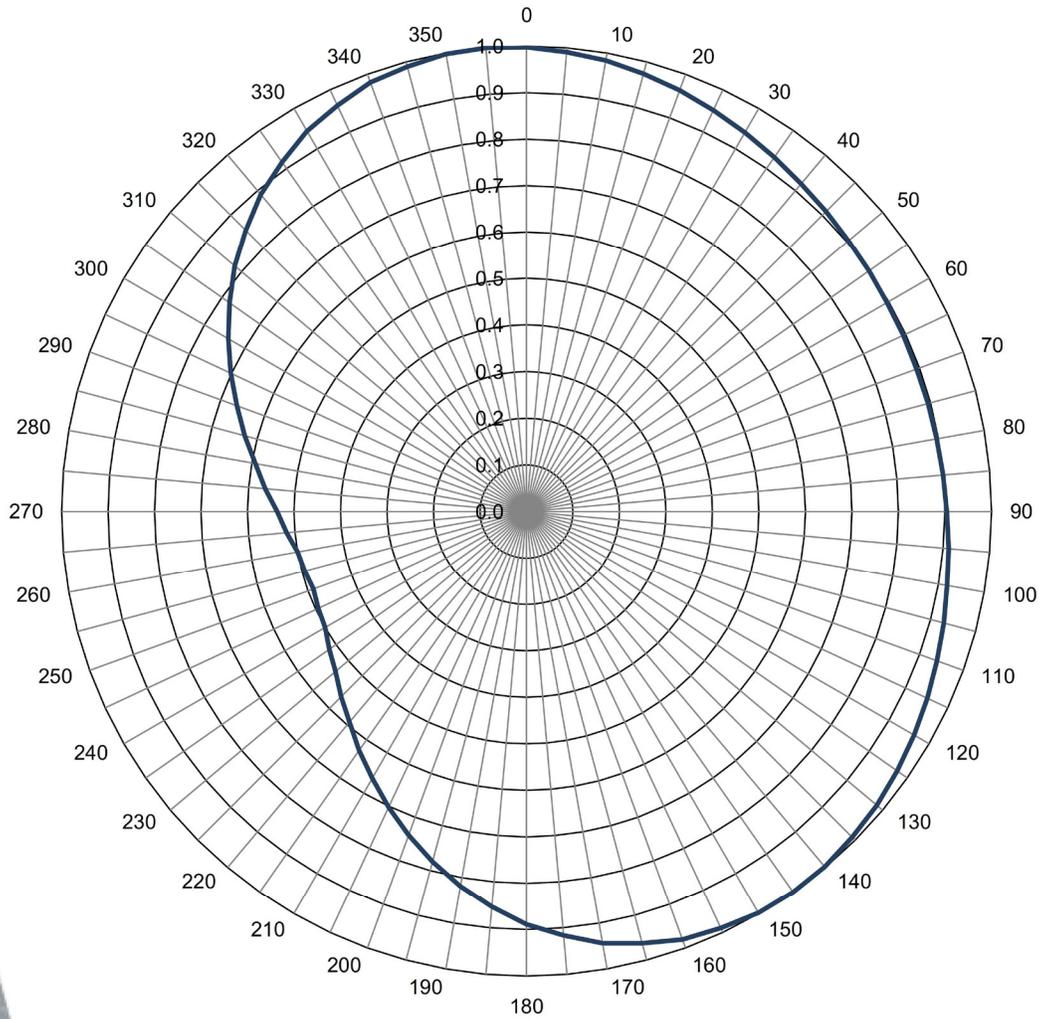


Figure 1
Antenna Azimuthal Pattern
Horizontal Polarization
KOSA-TV Odessa, TX
Facility ID 6865
Ch. 31 500 kW 226 m

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March, 2023



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Azimuth Pattern

Type:	ATW-V8	Polarization:	Vertical
Directivity:	1.80 numeric (2.55 dB)	Frequency:	31 (ATSC)
Peak(s) at:		Location:	Odessa, TX
		NOTE: Pattern shape and directivity may vary with channel and mounting configuration.	

Relative Field

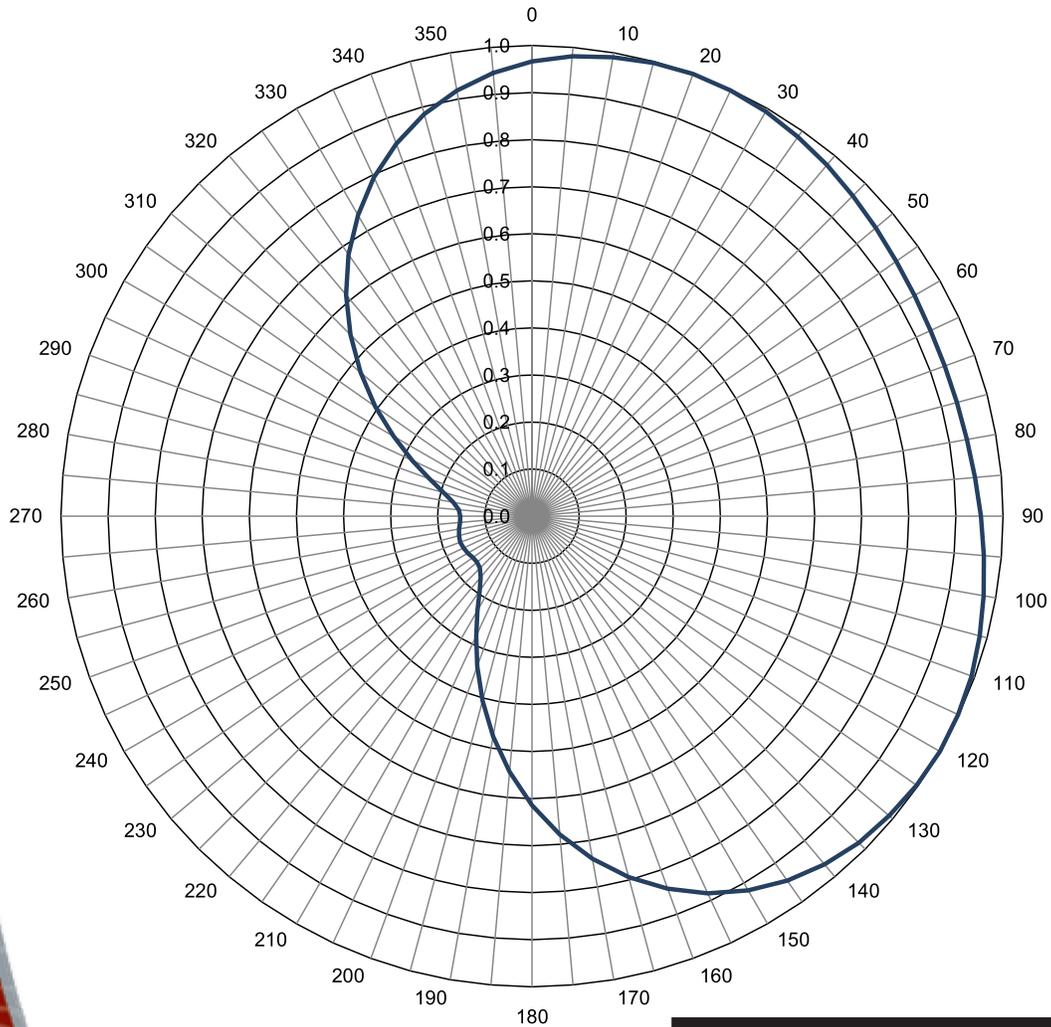


Figure 1A
Antenna Azimuthal Pattern
Vertical Polarization (Ref 30%)
KOSA-TV Odessa, TX
Facility ID 6865
Ch. 31 500 kW 226 m

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Elevation Pattern

Type:	ATW28H2H	Polarization:	Horizontal
Directivity:		Frequency:	31 (ATSC)
Main Lobe:	28.00 numeric (14.47 dB)	Location:	Odessa, TX
Horizontal:	23.44 numeric (13.70 dB)	Beam Tilt:	0.50 degrees

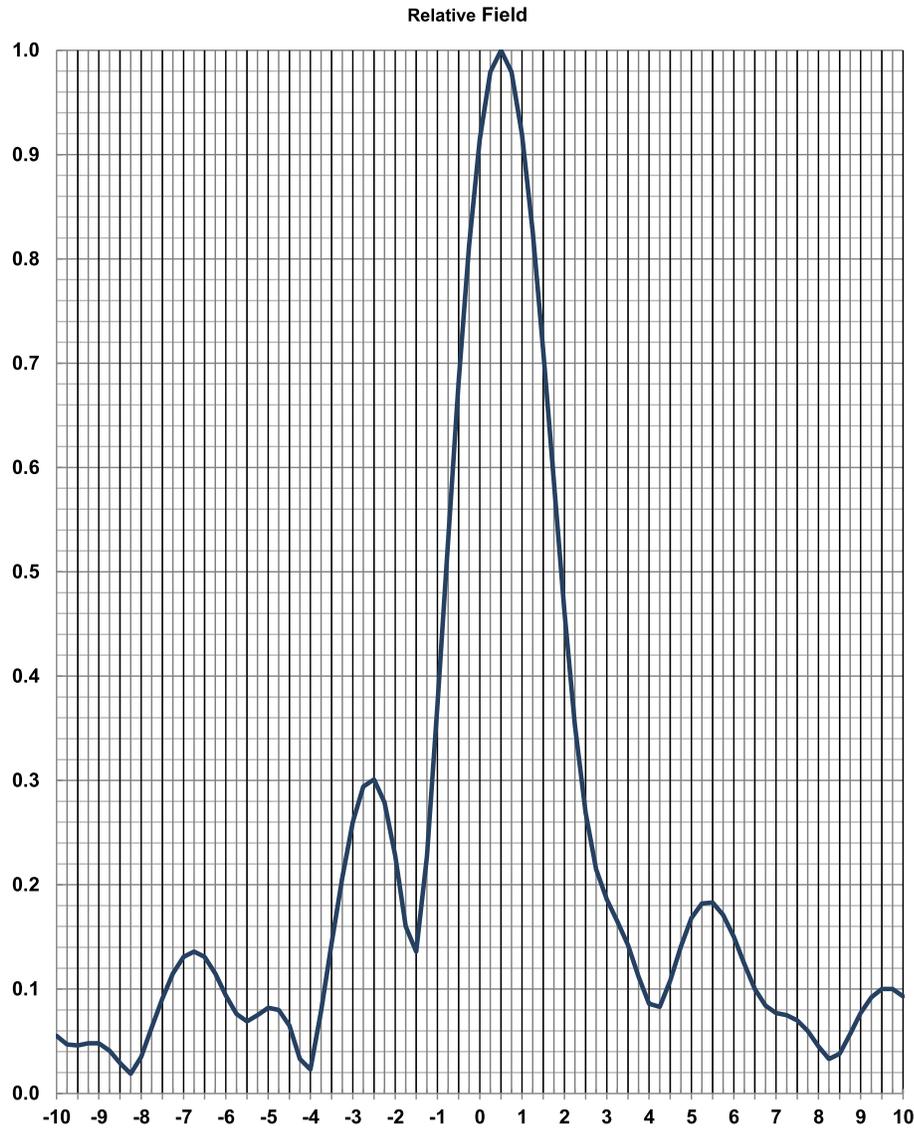


Figure 2
Antenna Elevation Pattern
Horizontal Polarization
KOSA-TV Odessa, TX
Facility ID 6865
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Elevation Pattern

Type:	ATW26H2H	Polarization:	Vertical
Directivity:		Frequency:	31 (ATSC)
Main Lobe:	26.00 numeric (14.15 dB)	Location:	Odessa, TX
Horizontal:	21.67 numeric (13.36 dB)	Beam Tilt:	0.50 degrees

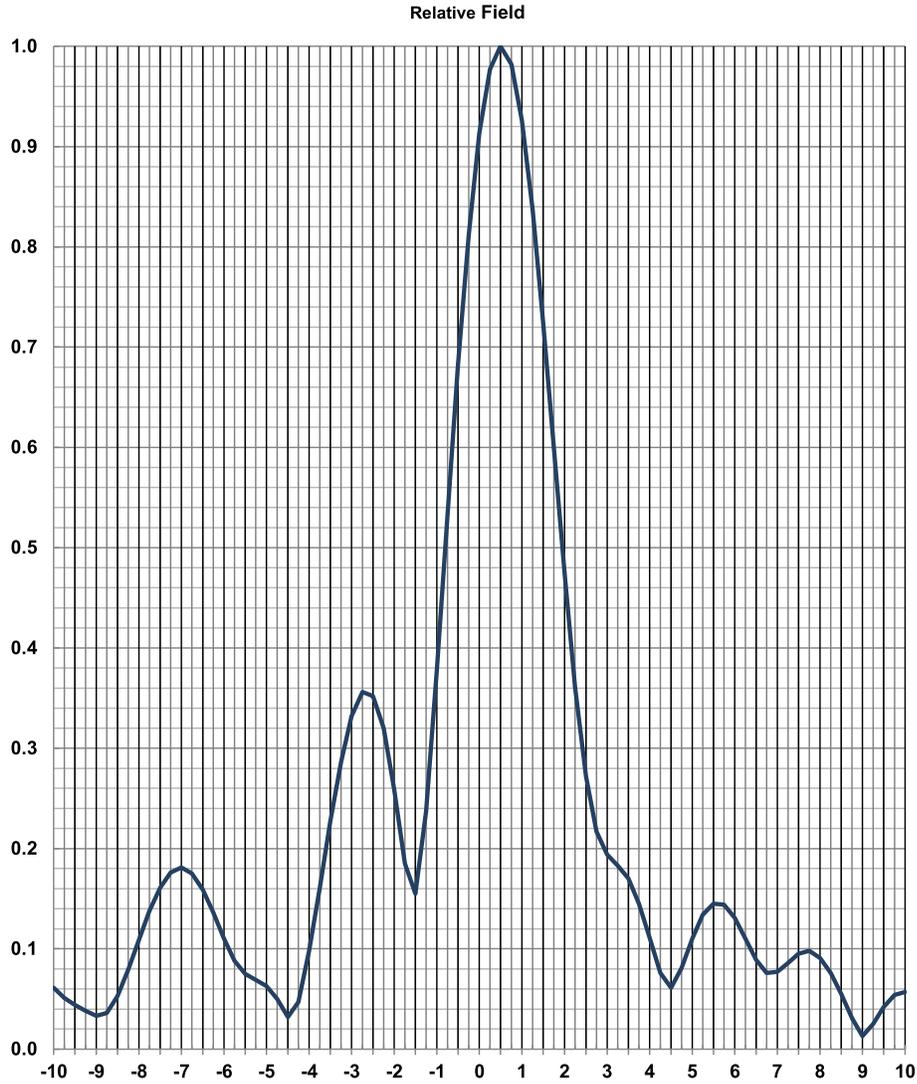


Figure 2A
Antenna Elevation Pattern
Vertical Polarization
KOSA-TV Odessa, TX
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**Channel and
Facility
Information**

Section	Question	Response
Proposed Community of License	Facility ID	6865
	State	Texas
	City	ODESSA
	DTV Channel	31
	Designated Market Area	Odessa-Midland
Facility Type	Facility Type	Commercial
	Station Type	Main
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	1233693
Coordinates (NAD83)	Latitude	31° 51' 50.8" N+
	Longitude	102° 34' 42.5" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	222.5 meters
	Support Structure Height	198.3 meters
	Ground Elevation (AMSL)	955.6 meters
Antenna Data	Height of Radiation Center Above Ground Level	208.8 meters
	Height of Radiation Center Above Average Terrain	225.5 meters
	Height of Radiation Center Above Mean Sea Level	1164.4 meters
	Effective Radiated Power	500 kW

**Antenna
Technical Data**

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	1008993
Antenna Manufacturer and Model	Manufacturer:	ERI
	Model	ATW28H2-ETWCx-30/31H
	Rotation	70 degrees
	Electrical Beam Tilt	0.5
	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	0.893	90	0.981	180	0.488	270	0.981
10	0.896	100	0.944	190	0.500	280	0.998
20	0.904	110	0.889	200	0.536	290	0.998
30	0.919	120	0.819	210	0.592	300	0.984
40	0.940	130	0.741	220	0.663	310	0.963
50	0.963	140	0.663	230	0.741	320	0.940
60	0.984	150	0.592	240	0.819	330	0.919
70	0.998	160	0.536	250	0.889	340	0.904
80	0.998	170	0.500	260	0.944	350	0.896

Additional Azimuths

Degree	V _A
75	1.000
285	1.000