

## **ENGINEERING EXHIBIT**

### **Application for Digital Low Power Television Construction Permit**

prepared for

#### **Gray Television Licensee, LLC**

K49LC-D College Station, TX

Facility ID 182059

Ch. 49 (digital) 4.7 kW

*Gray Television Licensee, LLC* (“Gray”) is the licensee of digital Low Power Television (“LPTV”) station K49LC-D, Channel 49, College Station TX, Facility ID 182059, file# 0000008365. *Gray* herein seeks a Construction Permit to utilize an alternate transmitting location.

As proposed herein, K49LC-D will be relocated to the studio location associated with KBTX-TV (Ch. 50, Facility ID 6669, Bryan, TX), 9.1 km (5.7 miles) from the licensed K49LC-D site. *Gray* is the licensee of KBTX-TV. The proposed K49LC-D will utilize a directional transmitting antenna to be side mounted on a tower structure adjacent to the KBTX-TV studio building. The structure does not require an FCC Antenna Structure Registration number since its overall height is less than 61 meters above ground and the structure passes the FCC’s “TOWAIR” slope test program.

The proposed K49LC-LD facility will operate with a directional antenna at 4.7 kW effective radiated power using a “full service” out of channel emission mask. A plot of the directional antenna’s azimuthal pattern is supplied in Figure 1. Figure 2 depicts the 51 dBμ coverage contour of the proposed facility as well as that of the licensed facility, and demonstrates that the proposed contour has overlap with the licensed K49LC-D. The service area overlap demonstrates compliance with §73.3572 for a minor change.

Interference study per OET Bulletin 69<sup>1</sup> shows that the proposal complies with the FCC's interference protection requirements toward all digital television, television translator, LPTV, and Class A stations. The results, summarized in Table 1, show that any new interference does not exceed the FCC's interference limits (0.5 percent to full power and Class A stations, and 2.0 percent to secondary stations) to any facility.

Three licensed AM stations<sup>2</sup> are located within 3 km of the proposed site. The site is not within one wavelength of any authorized nondirectional AM station or within ten wavelengths of any authorized directional AM station (at the AM station's frequency). Further, no change to the overall structure height will result from this proposal and the tower structure is not base-insulated or detuned at any AM station's frequency. Therefore notification to any AM station and consideration of AM pattern disturbance is not required.

The nearest FCC monitoring station is 386 km distant at Kingsville, TX. This exceeds by a large margin the threshold minimum distance specified in §73.1030(c)(3) that would suggest consideration of the monitoring station. The site is not located within the areas requiring coordination with "quiet" zones specified in §73.1030(a) and (b). The site location is beyond the border areas requiring international coordination.

### **Human Exposure to Radiofrequency Electromagnetic Field (Environmental)**

The proposed K49LC-D operation was evaluated for human exposure to RF energy using the procedures outlined in the Commission's OET Bulletin Number 65. The transmitting antenna is a Kathrein panel array. Figure 3 supplies a plot of the antenna's elevation pattern as provided by the manufacturer. Based on OET-65 equation (10), and considering the antenna relative field in downward elevations, the graph in Figure 4 depicts calculated power density levels attributable to the

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<sup>1</sup>FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 ("OET-69"). The implementation of OET-69 for this study followed the guidelines of OET-69 as specified therein. The default cell size of 1 km was employed. Comparisons of various results of this computer program (run on a Sun Sparc processor) to the Commission's implementation of OET-69 show excellent correlation.

<sup>2</sup>KTAM (1240 kHz, Bryan TX, ND-U) is located 1.9 km distant, and KZNE (1150 kHz, College Station TX, DA-N) and KWBC (1550 kHz, College Station TX, DA-2) are located 2.8 km distant from the proposed site.

proposed K49LC-D at locations near the site at a height of two meters above ground level. The maximum calculated RF electromagnetic field attributable to the proposed K49LC-D facility is 79.7 percent of the general population / uncontrolled MPE limit at any location two meters above ground level, which occurs within 15 meters of the tower's base.

No other television broadcast, radio broadcast, or other nonexcluded facilities are known to be within sufficient distance to be a significant contributor to RF exposure at this location. The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. Access to the adjacent building's rooftop is restricted. The K49LC-D facility will reduce power or cease operation as necessary to protect persons having access to the rooftop, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. RF exposure warning signs will be posted at the tower base and at rooftop access points.

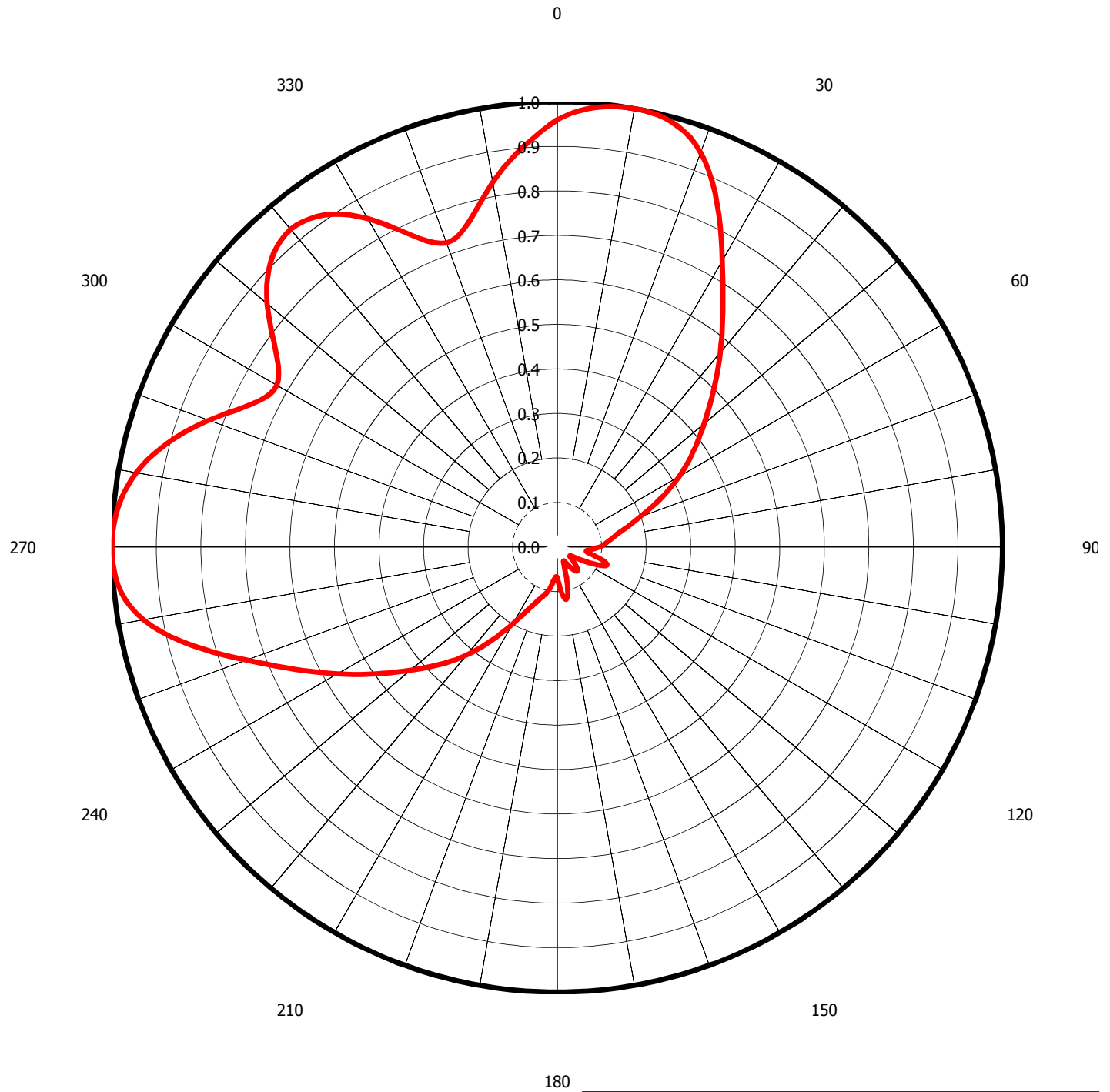
List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Coverage Contour Comparison
Figure 3	Antenna Elevation Pattern
Figure 4	Calculated RF Electromagnetic Field
Table 1	Interference Analysis Results Summary
Form 2100	Saved Version of Engineering Sections from FCC Form at Time of Upload

**Chesapeake RF Consultants, LLC**

Joseph M. Davis, P.E.	November 3, 2016	
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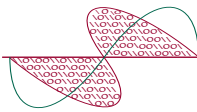
**Azimuth Pattern - Relative Field  
(True North)**



**Figure 1**  
**Antenna Azimuthal Pattern**  
**K49LC-D College Station, TX**  
**Facility ID 182059**  
**Ch. 49 (digital) 4.7 kW**

prepared for  
**Gray Television Licensee, LLC**

November, 2016

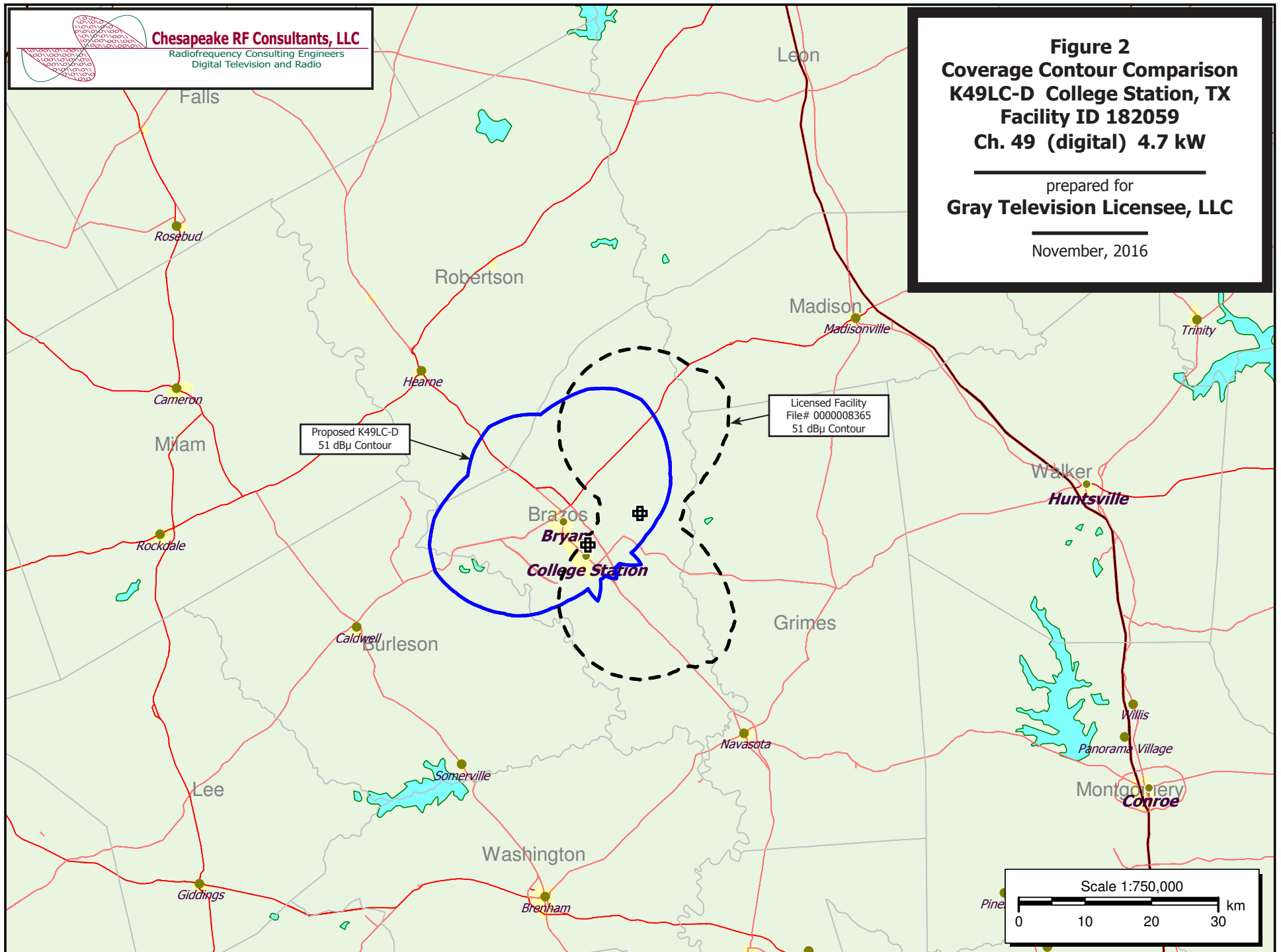


**Chesapeake RF Consultants, LLC**  
Radiofrequency Consulting Engineers  
Digital Television and Radio

**Figure 2**  
**Coverage Contour Comparison**  
**K49LC-D College Station, TX**  
**Facility ID 182059**  
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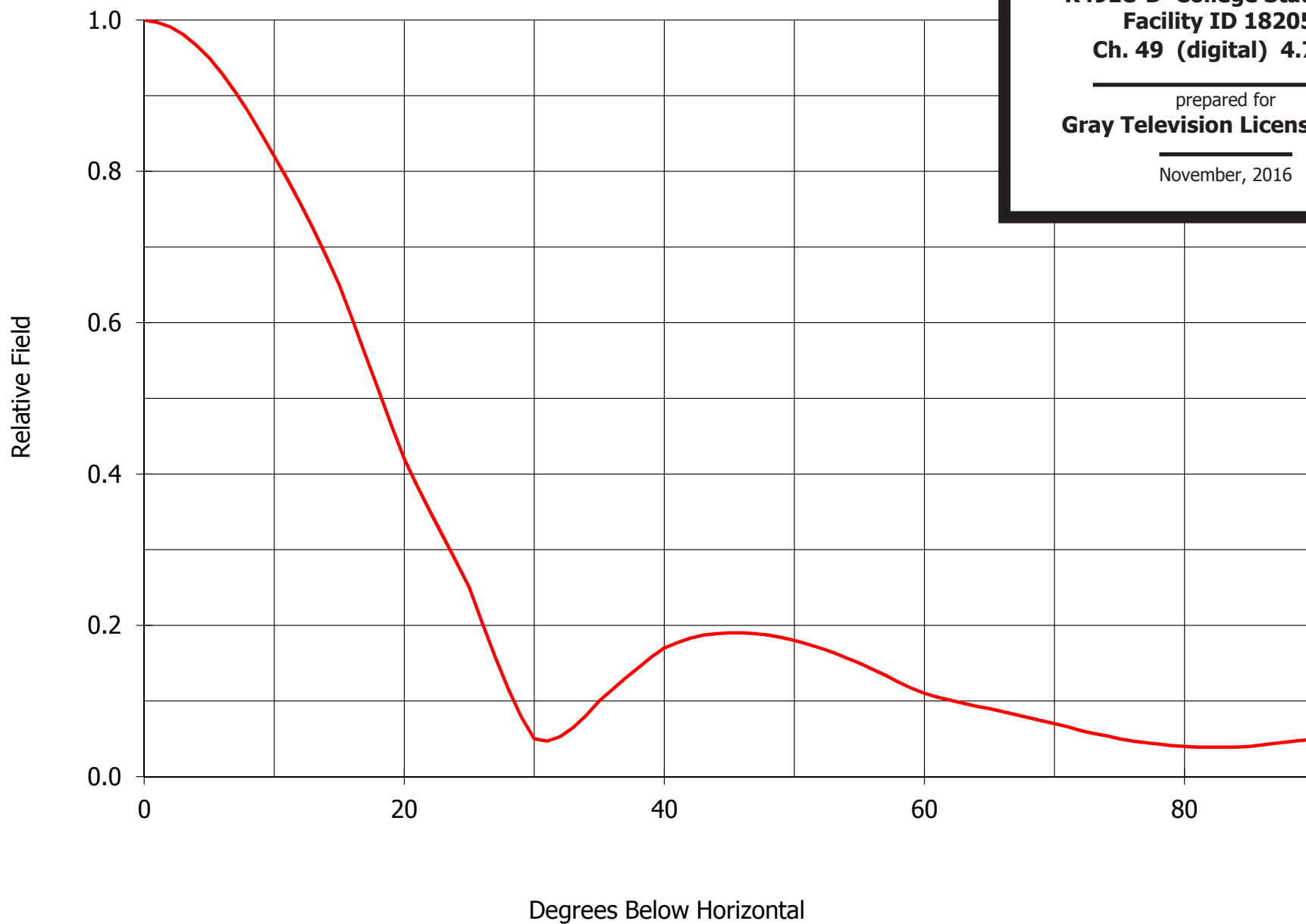
**Figure 3**  
**Antenna Elevation Pattern**  
**Kathrein Model K723147 1x2**  
**K49LC-D College Station, TX**  
**Facility ID 182059**  
**Ch. 49 (digital) 4.7 kW**  

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**Gray Television Licensee, LLC**  

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November, 2016



**Figure 4**  
**Calculated RF Electromagnetic Field**  
**K49LC-D College Station, TX**  
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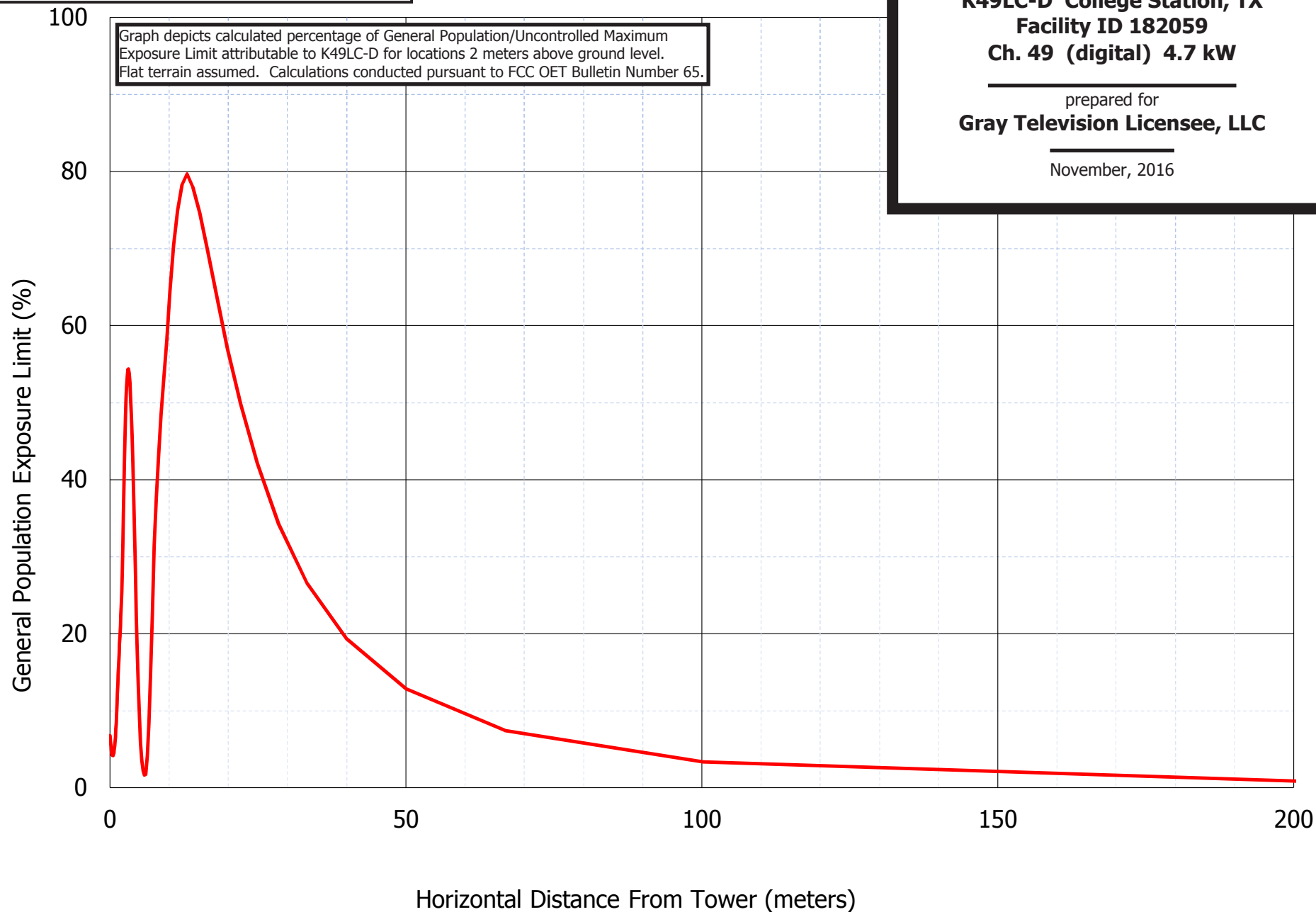
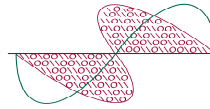


Table 1

**Interference Analysis Results Summary**

prepared for

**Gray Television Licensee, LLC****K49LC-D College Station, TX****Chesapeake RF Consultants, LLC**Radiofrequency Consulting Engineers  
Digital Television and Radio

K49LC-D	USERRECORD-01	COLLEGE STATION	TX US
Channel 49	ERP 4.7 kW	HAAT 30. m	RCAMSL 00091 m
FULL SERVICE MASK			
Latitude 030-38-34		Longitude 0096-19-52	
Dir Antenna	Make usr	Model K723147 1x2	Beam tilt N Ref Azimuth 320.

The LMS application requires NAD-83 coordinates. FCC internal systems then convert to NAD-27 and port over to CDBS for processing. This interference analysis utilizes truncated NAD-27 coordinates to replicate FCC processing.

Ch.	Call	City/State	Dist	Status	Application Ref. No.	---Population (2000 Census)---	
			(km)			Baseline	New Interference
47	K47ED	COLLEGE STATION TX	1.9	LIC	BLTT-19930505IG	---	none
48	K48NM-D	COLLEGE STATION TX	3.8	CP	BNPDTL-20100728ADP	125,710	873 (0.69%)
48	KTMD	GALVESTON TX	142.9	LIC	BLCDDT-20040325AEO	---	none
48	KLNK-LD	LUFKIN TX	171.8	LIC	BLDTL-20101216ADM	---	none
48	KLNK-LD	LUFKIN TX	150.9	CP	BLANK-13943	---	none
48	KVCV-LD	VICTORIA TX	194.0	LIC	BLANK-4468	---	none
49	W49DR-D	IOWA LA	327.3	CP	BNPDTL-20100407ABR	---	none
49	W49DQ-D	SULPHUR LA	279.0	CP	BNPDTL-20100407AAW	---	none
49	K49MM-D	ARDMORE OK	401.7	CP	BNPDTL-20101006AAJ	---	none
49	K49HT	ABILENE TX	253.7	LIC	BLTTL-20070309AAE	---	none
49	KNVA	AUSTIN TX	145.0	LIC	BLCDDT-20080808ACP	1,704,610	503 (0.03%)
49	KCBO-LP	CORPUS CHRISTI TX	332.8	CP	BDFCDTL-20080429ABA	---	none
49	KCBO-LP	CORPUS CHRISTI TX	332.8	LIC	BLTTL-20070122AAV	---	none
49	KJJM-LD	DALLAS & MESQUITE TX	224.6	CP	BDISDTL-20090622ADP	---	none
49	K49LS-D	HEMPHILL TX	246.4	CP	BNPDTL-20100423AAD	---	none
49	KEHO-LD	HOUSTON TX	140.9	CP MOD	BLANK-13660	---	none
49	KEHO-LD	HOUSTON TX	135.1	LIC	BLDTL-20140114AGG	---	none
49	KPTD-LP	PARIS TX	339.1	LIC	BLTTL-20070622ACU	---	none
50	KBTX-TV	BRYAN TX	30.4	LIC	BLCDDT-20090309ABZ	---	none
50	KNTA-LD	NEW BRAUNFELS TX	199.6	CP	BDCCDTL-20061030ACH	---	none
50	K50NC-D	VICTORIA TX	199.0	CP	BNPDTL-20100510AKK	---	none
56	KQHO-LD	HOUSTON TX	135.1	CP	BPTTL-20110317ABU	---	none



Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	182059
	State	Texas
	City	COLLEGE STATION
	LPD Channel	49

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	No
	ASR Number	
Coordinates (NAD83)	Latitude	30° 38' 34.9" N+
	Longitude	096° 19' 53.7" W-
	Structure Type	LTOWER-Lattice Tower
	Overall Structure Height	27.4 meters
	Support Structure Height	27.4 meters
	Ground Elevation (AMSL)	85.3 meters
Antenna Data	Height of Radiation Center Above Ground Level	5.5 meters
	Height of Radiation Center Above Mean Sea Level	90.8 meters
	Effective Radiated Power	4.7 kW

Antenna  
Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	1001033
Antenna Manufacturer and Model	Manufacturer:	KAT
	Model	K723147 1x2
	Rotation	320 degrees
	Electrical Beam Tilt	Not Applicable
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Horizontal
Elevation Radiation 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	
	Out-of-Channel Emission Mask:	Full Service

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	V <sub>A</sub> (Authorized Value)	Degree	V <sub>A</sub> (Authorized Value)	Degree	V <sub>A</sub> (Authorized Value)	Degree	V <sub>A</sub> (Authorized Value)
0	0.931	90	0.431	180	0.070	270	0.431
10	0.852	100	0.317	190	0.045	280	0.57
20	0.727	110	0.199	200	0.048	290	0.743
30	0.832	120	0.129	210	0.119	300	0.943
40	0.96	130	0.095	220	0.069	310	1
50	1	140	0.069	230	0.095	320	0.96
60	0.943	150	0.119	240	0.129	330	0.832
70	0.742	160	0.048	250	0.199	340	0.727
80	0.57	170	0.045	260	0.317	350	0.85

Additional Azimuths

Degree	V <sub>A</sub>
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