

ENGINEERING EXHIBIT

Incentive Auction Channel Reassignment

Application for Digital Television Station Auxiliary Antenna Construction Permit

prepared for

Gray Television Licensee, LLC

KVLY-TV Fargo, ND

Facility ID 61961

Ch. 36 92.6 kW 467 m

Gray Television Licensee, LLC (“Gray”) is the licensee of digital television station KVLY-TV, Facility ID 61961, Fargo, ND. A Construction Permit (“CP”, file# 0000044986) authorizes construction of the KVLY-TV post-auction facility on Channel 36. *Gray* proposes herein to construct an auxiliary antenna for KVLY-TV on its post-auction Channel 36. The initial operation on reassignment Channel 36 will commence with the auxiliary antenna proposed herein, in order to accommodate tower work including removal of the existing KVLY-TV Channel 44 main antenna, removal of the KVLY-TV former analog Channel 11 antenna, replacement of the main transmission line, and installation of post-auction Channel 36 main antenna.

The CP authorizes KVLY-TV to operate with a directional antenna at 330 kW ERP and 594 meters HAAT. The proposed auxiliary antenna will be side-mounted on the same tower structure as the authorized main antenna, and will operate at 92.6 kW ERP (directional) and an antenna HAAT of 467 meters.

The existing tower structure corresponds to FCC Antenna Structure Registration number 1046244. No change to the overall structure height will result.

The proposed antenna is a horizontally polarized Dielectric model TLP-32J(C). The directional antenna’s azimuthal pattern is supplied in Figure 1 and the elevation pattern is depicted in Figure 2.

Figure 3 shows that the 41 dBμ contour of the proposed auxiliary facility does not extend beyond the 41 dBμ contour 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 20 percent antenna relative field in downward elevations (pattern data shows less than 20 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 $0.6 \mu\text{W}/\text{cm}^2$, which is 0.1 percent of the general population/uncontrolled maximum permitted 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.

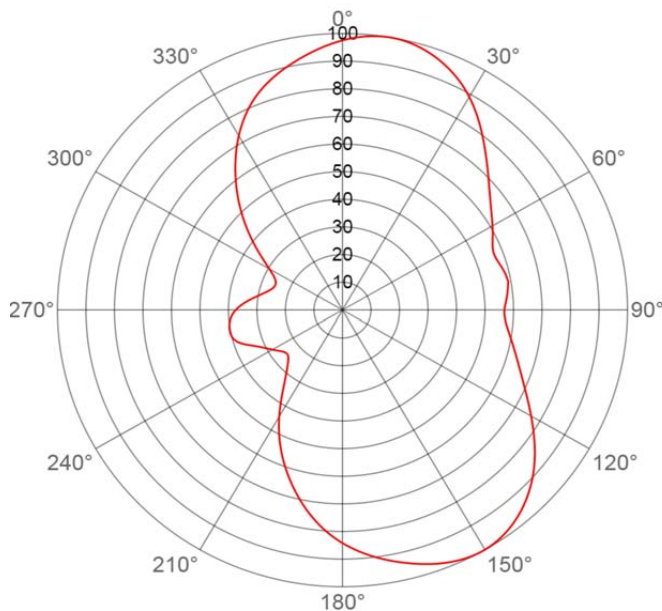
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power 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.

List of Attachments

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

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E.	August 14, 2018	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600



Horizontal Polarization AZIMUTH PATTERN

Exhibit No.

Date **14 Aug 2018**Call Letters **KVLY-TV**Channel **36**Antenna Type **TLP-32J (C)**Location **Fargo ND**

Customer

Gain **2.0 (3.01 dB)****Calculated**Drawing # **TLP-J**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.975	36	0.822	72	0.572	108	0.651	144	0.985	180	0.842	216	0.355	252	0.380	288	0.256	324	0.640
1	0.980	37	0.810	73	0.575	109	0.658	145	0.989	181	0.833	217	0.342	253	0.387	289	0.254	325	0.655
2	0.984	38	0.798	74	0.578	110	0.666	146	0.993	182	0.823	218	0.330	254	0.392	290	0.253	326	0.670
3	0.987	39	0.786	75	0.581	111	0.674	147	0.995	183	0.813	219	0.319	255	0.396	291	0.252	327	0.685
4	0.991	40	0.775	76	0.583	112	0.683	148	0.997	184	0.803	220	0.309	256	0.399	292	0.253	328	0.699
5	0.994	41	0.763	77	0.586	113	0.692	149	0.999	185	0.792	221	0.300	257	0.401	293	0.254	329	0.713
6	0.996	42	0.752	78	0.588	114	0.701	150	1.000	186	0.780	222	0.292	258	0.402	294	0.257	330	0.728
7	0.998	43	0.741	79	0.589	115	0.711	151	1.000	187	0.768	223	0.284	259	0.402	295	0.260	331	0.741
8	0.999	44	0.731	80	0.591	116	0.721	152	0.999	188	0.756	224	0.277	260	0.402	296	0.265	332	0.755
9	1.000	45	0.720	81	0.588	117	0.732	153	0.998	189	0.744	225	0.271	261	0.401	297	0.271	333	0.767
10	1.000	46	0.710	82	0.586	118	0.742	154	0.996	190	0.731	226	0.265	262	0.401	298	0.279	334	0.780
11	0.999	47	0.700	83	0.584	119	0.753	155	0.994	191	0.718	227	0.260	263	0.399	299	0.287	335	0.792
12	0.998	48	0.691	84	0.582	120	0.764	156	0.991	192	0.705	228	0.256	264	0.397	300	0.296	336	0.803
13	0.997	49	0.682	85	0.580	121	0.776	157	0.988	193	0.692	229	0.252	265	0.395	301	0.307	337	0.814
14	0.994	50	0.673	86	0.577	122	0.787	158	0.984	194	0.678	230	0.250	266	0.392	302	0.318	338	0.825
15	0.991	51	0.665	87	0.574	123	0.799	159	0.980	195	0.664	231	0.250	267	0.389	303	0.330	339	0.834
16	0.988	52	0.657	88	0.572	124	0.810	160	0.975	196	0.650	232	0.251	268	0.385	304	0.342	340	0.844
17	0.984	53	0.650	89	0.570	125	0.822	161	0.970	197	0.637	233	0.252	269	0.380	305	0.355	341	0.852
18	0.979	54	0.643	90	0.568	126	0.834	162	0.965	198	0.623	234	0.255	270	0.374	306	0.369	342	0.861
19	0.974	55	0.637	91	0.568	127	0.845	163	0.960	199	0.608	235	0.259	271	0.368	307	0.383	343	0.869
20	0.969	56	0.630	92	0.569	128	0.856	164	0.954	200	0.594	236	0.263	272	0.361	308	0.397	344	0.876
21	0.963	57	0.624	93	0.571	129	0.867	165	0.948	201	0.580	237	0.268	273	0.354	309	0.412	345	0.883
22	0.957	58	0.619	94	0.573	130	0.878	166	0.942	202	0.566	238	0.273	274	0.346	310	0.427	346	0.890
23	0.950	59	0.613	95	0.577	131	0.888	167	0.936	203	0.551	239	0.279	275	0.338	311	0.442	347	0.897
24	0.943	60	0.608	96	0.581	132	0.898	168	0.930	204	0.536	240	0.284	276	0.330	312	0.457	348	0.904
25	0.935	61	0.602	97	0.585	133	0.908	169	0.924	205	0.521	241	0.290	277	0.322	313	0.472	349	0.911
26	0.927	62	0.597	98	0.590	134	0.917	170	0.918	206	0.506	242	0.295	278	0.314	314	0.487	350	0.917
27	0.919	63	0.592	99	0.595	135	0.926	171	0.911	207	0.491	243	0.301	279	0.306	315	0.502	351	0.923
28	0.910	64	0.586	100	0.601	136	0.934	172	0.905	208	0.475	244	0.308	280	0.299	316	0.518	352	0.930
29	0.900	65	0.581	101	0.606	137	0.942	173	0.898	209	0.460	245	0.315	281	0.291	317	0.533	353	0.936
30	0.890	66	0.576	102	0.612	138	0.950	174	0.890	210	0.444	246	0.323	282	0.285	318	0.548	354	0.942
31	0.879	67	0.573	103	0.618	139	0.957	175	0.883	211	0.428	247	0.331	283	0.278	319	0.564	355	0.948
32	0.868	68	0.570	104	0.624	140	0.964	176	0.875	212	0.413	248	0.340	284	0.273	320	0.579	356	0.954
33	0.857	69	0.569	105	0.630	141	0.970	177	0.868	213	0.397	249	0.351	285	0.268	321	0.594	357	0.960
34	0.845	70	0.569	106	0.637	142	0.975	178	0.859	214	0.382	250	0.361	286	0.263	322	0.609	358	0.965
35	0.834	71	0.570	107	0.644	143	0.981	179	0.851	215	0.368	251	0.371	287	0.259	323	0.625	359	0.970



Figure 1
Auxiliary Antenna Azimuthal Pattern
KVLY-TV Fargo, ND
Facility ID 61961
Ch. 36 92.6 kW 467 m

prepared for
Gray Television Licensee, LLC

August, 2018

ELEVATION PATTERN

Exhibit No.

Date **14 Aug 2018**

Call Letters **KVLY-TV**

Channel **36**

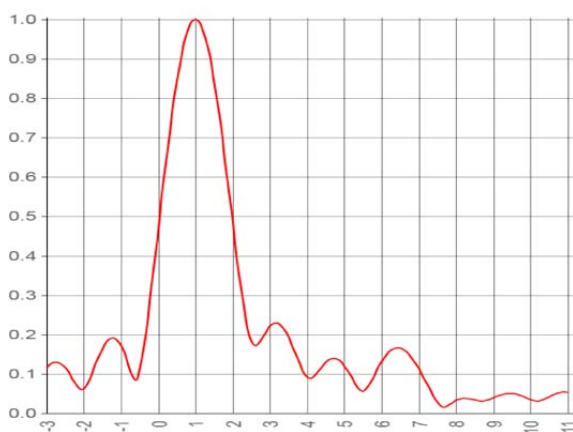
Antenna Type **TLP-32J (C)**

Location **Fargo ND**

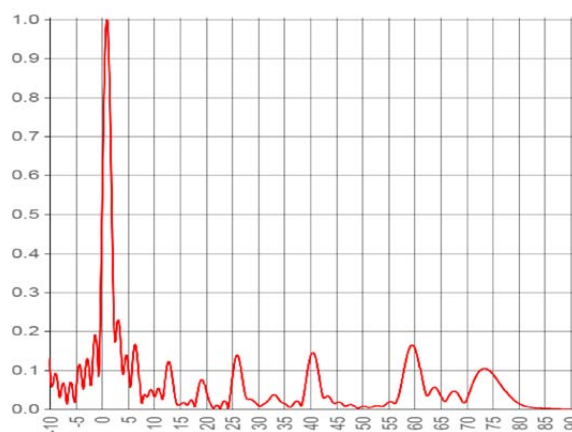
Customer

RMS Gain at Main Lobe **31.5 (14.98 dB)**
 RMS Gain at Horizontal **6.9 (8.41 dB)**
 Calculated

Beam Tilt **1 Degree**
 Drawing # **32L315100**



Degrees below horizontal



Degrees below horizontal

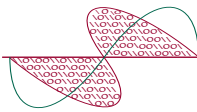
Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10	0.130	10	0.035	30	0.010	50	0.007	70	0.024
-9	0.091	11	0.053	31	0.012	51	0.005	71	0.060
-8	0.030	12	0.059	32	0.023	52	0.006	72	0.089
-7	0.047	13	0.120	33	0.037	53	0.008	73	0.103
-6	0.068	14	0.038	34	0.025	54	0.007	74	0.102
-5	0.041	15	0.011	35	0.015	55	0.017	75	0.091
-4	0.099	16	0.014	36	0.005	56	0.016	76	0.073
-3	0.115	17	0.022	37	0.017	57	0.038	77	0.054
-2	0.061	18	0.012	38	0.013	58	0.103	78	0.038
-1	0.173	19	0.073	39	0.053	59	0.155	79	0.024
0	0.469	20	0.049	40	0.131	60	0.160	80	0.015
1	1.000	21	0.010	41	0.133	61	0.111	81	0.009
2	0.485	22	0.009	42	0.059	62	0.046	82	0.005
3	0.221	23	0.009	43	0.031	63	0.043	83	0.004
4	0.092	24	0.013	44	0.026	64	0.056	84	0.003
5	0.121	25	0.076	45	0.016	65	0.036	85	0.002
6	0.131	26	0.139	46	0.015	66	0.021	86	0.002
7	0.113	27	0.081	47	0.008	67	0.041	87	0.001
8	0.033	28	0.025	48	0.011	68	0.044	88	0.001
9	0.039	29	0.022	49	0.003	69	0.025	89	0.000



Figure 2
Auxiliary Antenna Elevation Pattern
KVLY-TV Fargo, ND
Facility ID 61961
Ch. 36 92.6 kW 467 m

prepared for
Gray Television Licensee, LLC

August, 2018



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

Figure 3
Proposed Auxiliary Contours
KVLY-TV Fargo, ND
Facility ID 61961
Ch. 36 92.6 kW 467 m

prepared for
Gray Television Licensee, LLC

August, 2018

Authorized Reassignment Ch. 36
CP File# 0000044986
330 kW 594 m directional
41 dBu Contour

Proposed Auxiliary Ch. 36
92.6 kW 467 m directional
48 dBu (Principal Community)
41 dBu (NLSC)

