

ENGINEERING EXHIBIT

Incentive Auction Channel Reassignment

Application for Digital Television Station Auxiliary Antenna Construction Permit

prepared for

Gray Television Licensee, LLC

WEAU(DT) Eau Claire, WI

Facility ID 7893

Ch. 17 276 kW 492 m

Gray Television Licensee, LLC (“Gray”) is the licensee of digital television station WEAU(DT), Channel 38, Facility ID 7893, Eau Claire WI. Reassignment of WEAU from Channel 38 to Channel 17 was specified in the *Incentive Auction Closing and Channel Reassignment Public Notice (“CCRPN”, DA 17-317, released April 13, 2017)*. A Construction Permit (“CP” file# 0000034098) authorizes WEAU to operate on Channel 17. *Gray* herein seeks authorization for an auxiliary antenna for WEAU on its post-auction Channel 17.

The CP authorizes WEAU to operate with a nondirectional antenna at 1000 kW effective radiated power (ERP) and 616 meters height above average terrain (HAAT). Under a separate minor modification application, *Gray* will propose to reduce the main antenna’s ERP to 740 kW. The proposed auxiliary facility will utilize an antenna side-mounted on the same tower structure as the authorized main antenna and will operate on Channel 17 at 276 kW ERP (directional) and an antenna HAAT of 492 meters.

The WEAU tower structure is associated with FCC Antenna Structure Registration number 1033664. No change to the overall structure height will result from this proposal.

The proposed antenna is a horizontally polarized directional Dielectric model TFU-24WB-R C160. The directional antenna’s azimuthal and elevation patterns are depicted in Figures 1 and 2, respectively.

Figure 3 shows that the 41 dBμ noise limited service contour of the proposed auxiliary facility does not extend beyond those of the 1000 kW ERP authorized main facility or the planned modification of the main facility to 740 kW ERP. 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 10 percent antenna relative field in downward elevations (pattern data shows less than 10 percent relative field at angles 25 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 $0.4 \mu\text{W}/\text{cm}^2$, 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.

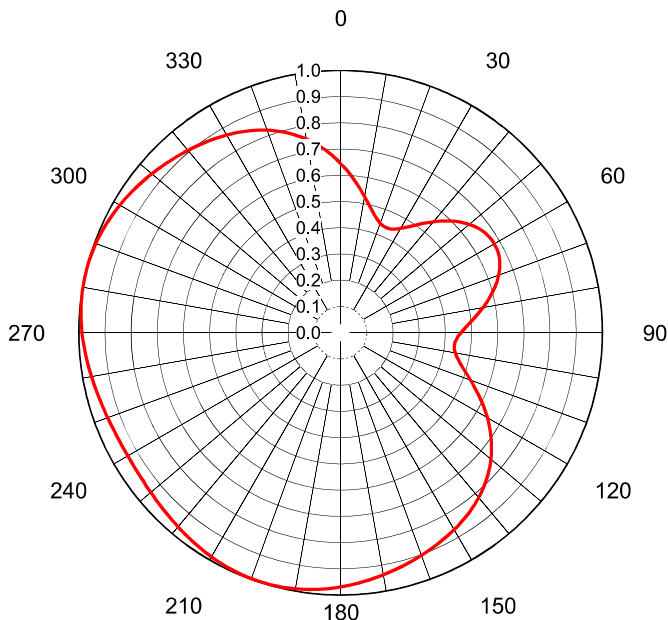
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power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

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.	February 24, 2020	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600



AZIMUTH PATTERN Horizontal Polarization

Proposal No. **20200223JMD**
Date **23-Feb-20**
Call Letters **WEAU**
Channel **17**
Frequency **491 MHz**
Antenna Type **TFU-24WB-R C160**
Gain **1.51 (1.79dB)**
Calculated

Pattern Number **WB-C160-17 Hpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.646	36	0.511	72	0.628	108	0.506	144	0.841	180	0.969	216	0.975	252	0.950	288	0.997	324	0.893
1	0.634	37	0.521	73	0.620	109	0.517	145	0.846	181	0.972	217	0.973	253	0.952	289	0.996	325	0.889
2	0.622	38	0.531	74	0.611	110	0.528	146	0.851	182	0.975	218	0.970	254	0.954	290	0.995	326	0.886
3	0.610	39	0.542	75	0.602	111	0.540	147	0.855	183	0.977	219	0.968	255	0.956	291	0.993	327	0.882
4	0.598	40	0.552	76	0.593	112	0.551	148	0.859	184	0.980	220	0.966	256	0.958	292	0.992	328	0.878
5	0.586	41	0.562	77	0.583	113	0.563	149	0.863	185	0.982	221	0.964	257	0.960	293	0.990	329	0.874
6	0.574	42	0.573	78	0.573	114	0.575	150	0.867	186	0.984	222	0.961	258	0.962	294	0.988	330	0.870
7	0.562	43	0.583	79	0.563	115	0.587	151	0.871	187	0.986	223	0.959	259	0.964	295	0.986	331	0.866
8	0.550	44	0.592	80	0.552	116	0.599	152	0.875	188	0.988	224	0.957	260	0.966	296	0.984	332	0.862
9	0.538	45	0.602	81	0.542	117	0.611	153	0.879	189	0.990	225	0.955	261	0.969	297	0.981	333	0.857
10	0.527	46	0.611	82	0.532	118	0.623	154	0.882	190	0.992	226	0.953	262	0.971	298	0.979	334	0.853
11	0.516	47	0.619	83	0.521	119	0.635	155	0.886	191	0.993	227	0.951	263	0.973	299	0.976	335	0.848
12	0.505	48	0.628	84	0.511	120	0.647	156	0.889	192	0.994	228	0.950	264	0.975	300	0.973	336	0.843
13	0.495	49	0.635	85	0.502	121	0.658	157	0.893	193	0.995	229	0.948	265	0.978	301	0.971	337	0.838
14	0.485	50	0.642	86	0.492	122	0.670	158	0.896	194	0.996	230	0.946	266	0.980	302	0.968	338	0.833
15	0.476	51	0.649	87	0.483	123	0.681	159	0.900	195	0.997	231	0.945	267	0.982	303	0.965	339	0.827
16	0.468	52	0.655	88	0.475	124	0.691	160	0.903	196	0.997	232	0.944	268	0.984	304	0.962	340	0.822
17	0.460	53	0.660	89	0.467	125	0.702	161	0.906	197	0.998	233	0.943	269	0.986	305	0.958	341	0.816
18	0.454	54	0.665	90	0.460	126	0.712	162	0.910	198	0.998	234	0.941	270	0.988	306	0.955	342	0.809
19	0.448	55	0.669	91	0.454	127	0.722	163	0.913	199	0.998	235	0.941	271	0.990	307	0.952	343	0.803
20	0.444	56	0.672	92	0.448	128	0.731	164	0.917	200	0.998	236	0.940	272	0.991	308	0.949	344	0.796
21	0.440	57	0.675	93	0.444	129	0.740	165	0.920	201	0.997	237	0.939	273	0.993	309	0.945	345	0.789
22	0.438	58	0.677	94	0.441	130	0.749	166	0.924	202	0.997	238	0.939	274	0.994	310	0.942	346	0.782
23	0.437	59	0.678	95	0.439	131	0.758	167	0.927	203	0.996	239	0.939	275	0.995	311	0.939	347	0.774
24	0.437	60	0.678	96	0.438	132	0.766	168	0.930	204	0.995	240	0.939	276	0.997	312	0.935	348	0.766
25	0.438	61	0.678	97	0.438	133	0.774	169	0.934	205	0.994	241	0.939	277	0.998	313	0.932	349	0.758
26	0.440	62	0.677	98	0.439	134	0.782	170	0.937	206	0.993	242	0.939	278	0.998	314	0.928	350	0.749
27	0.443	63	0.675	99	0.441	135	0.789	171	0.941	207	0.991	243	0.939	279	0.999	315	0.925	351	0.740
28	0.448	64	0.672	100	0.445	136	0.796	172	0.944	208	0.990	244	0.940	280	1.000	316	0.921	352	0.731
29	0.453	65	0.669	101	0.449	137	0.802	173	0.947	209	0.988	245	0.941	281	1.000	317	0.918	353	0.721
30	0.459	66	0.665	102	0.455	138	0.809	174	0.951	210	0.987	246	0.942	282	1.000	318	0.914	354	0.711
31	0.466	67	0.660	103	0.462	139	0.815	175	0.954	211	0.985	247	0.943	283	1.000	319	0.911	355	0.701
32	0.474	68	0.655	104	0.469	140	0.821	176	0.957	212	0.983	248	0.944	284	1.000	320	0.907	356	0.690
33	0.483	69	0.649	105	0.477	141	0.826	177	0.960	213	0.981	249	0.945	285	0.999	321	0.904	357	0.680
34	0.492	70	0.643	106	0.487	142	0.831	178	0.963	214	0.979	250	0.947	286	0.999	322	0.900	358	0.669
35	0.501	71	0.635	107	0.496	143	0.837	179	0.966	215	0.977	251	0.948	287	0.998	323	0.897	359	0.657



Figure 1
Auxiliary Antenna Azimuthal Pattern
WEAU(DT) Eau Claire, WI
Facility ID 7893
Ch. 17 276 kW 492 m

prepared for
Gray Television Licensee, LLC

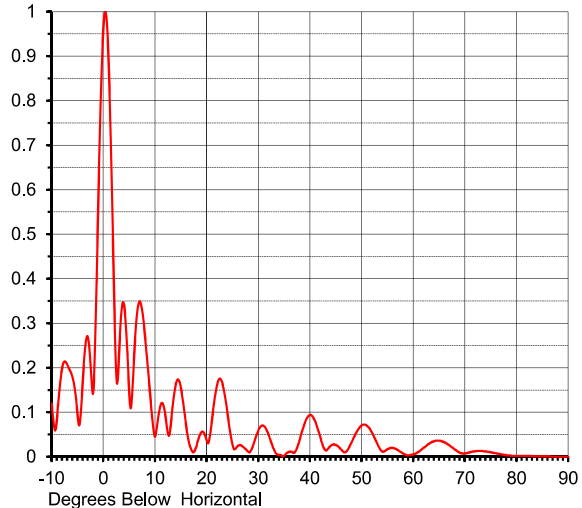
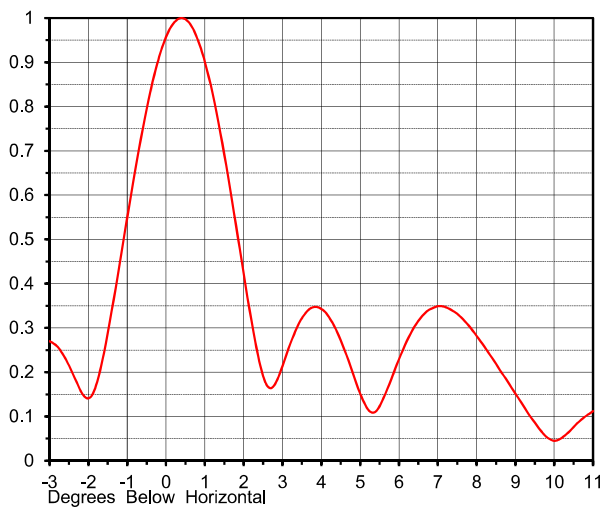
February, 2020

ELEVATION PATTERN

Proposal No. **20200223JMD**
 Date **23-Feb-20**
 Call Letters **WEAU**
 Channel **17**
 Frequency **491 MHz**
 Antenna Type **TFU-24WB-R C160**

RMS Directivity at Main Lobe **20.9 (13.20 dB)**
 RMS Directivity at Horizontal **19.1 (12.81 dB)**
 Calculated

Beam Tilt **0.50 deg**
 Pattern Number **24W209050-17**



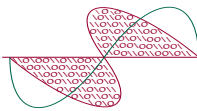
Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.120	10.0	0.045	30.0	0.058	50.0	0.070	70.0	0.007
-9.0	0.080	11.0	0.112	31.0	0.070	51.0	0.070	71.0	0.010
-8.0	0.196	12.0	0.095	32.0	0.050	52.0	0.055	72.0	0.012
-7.0	0.208	13.0	0.064	33.0	0.018	53.0	0.031	73.0	0.013
-6.0	0.181	14.0	0.160	34.0	0.004	54.0	0.012	74.0	0.012
-5.0	0.098	15.0	0.157	35.0	0.002	55.0	0.017	75.0	0.010
-4.0	0.162	16.0	0.075	36.0	0.011	56.0	0.020	76.0	0.008
-3.0	0.270	17.0	0.017	37.0	0.009	57.0	0.015	77.0	0.006
-2.0	0.141	18.0	0.022	38.0	0.037	58.0	0.008	78.0	0.004
-1.0	0.549	19.0	0.055	39.0	0.075	59.0	0.003	79.0	0.002
0.0	0.957	20.0	0.037	40.0	0.094	60.0	0.005	80.0	0.002
1.0	0.901	21.0	0.077	41.0	0.080	61.0	0.011	81.0	0.002
2.0	0.423	22.0	0.160	42.0	0.045	62.0	0.020	82.0	0.002
3.0	0.214	23.0	0.168	43.0	0.015	63.0	0.029	83.0	0.002
4.0	0.343	24.0	0.102	44.0	0.024	64.0	0.035	84.0	0.001
5.0	0.152	25.0	0.028	45.0	0.027	65.0	0.036	85.0	0.001
6.0	0.229	26.0	0.024	46.0	0.017	66.0	0.033	86.0	0.001
7.0	0.349	27.0	0.023	47.0	0.011	67.0	0.026	87.0	0.000
8.0	0.282	28.0	0.012	48.0	0.030	68.0	0.017	88.0	0.000
9.0	0.152	29.0	0.025	49.0	0.054	69.0	0.009	89.0	0.000
								90.0	0.000



Figure 2
Auxiliary Antenna Elevation Pattern
WEAU(DT) Eau Claire, WI
Facility ID 7893
Ch. 17 276 kW 492 m

prepared for
Gray Television Licensee, LLC

February, 2020



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

Figure 3
Proposed Auxiliary Contours
WEAU(DT) Eau Claire, WI
Facility ID 7893
Ch. 17 276 kW 492 m

prepared for
Gray Television Licensee, LLC

February, 2020

Ch. 17 Main Antenna
41 dBu Contour
As Authorized File# 0000034098
1000 kW 616 m nondirectional
Planned CP Modification
740 kW 616 m nondirectional

Proposed Auxiliary Ch. 17
276 kW 492 m directional
48 dBu
(Principal Community)
41 dBu
(Noise Limited Service Contour)

