

**Environmental Exhibit and Supplemental Statement**

**Statement of Hammett & Edison, Inc., Consulting Engineers**

Hammett & Edison, Inc., Consulting Engineers, has been retained by KQED Inc., licensee of Non-Commercial Station KQED-FM, Channel 203B, San Francisco, California, to prepare the engineering portions of an application for construction permit for a new auxiliary antenna, to be located on Sutro Tower in San Francisco. Because the KQED-FM main antenna is located 7.4 kilometers to the south, at San Bruno Mountain, an application for construction permit is required for the proposed auxiliary antenna.

**Environmental Considerations**

The proposed operation would not be a major environmental action. None of the major environmental action triggers in Section 1.1310 of the FCC Rules are believed to apply. The auxiliary antenna will be side-mounted on an existing tower that has an Antenna Structure Registration, and will not increase the overall height of the tower.

The proposed operation is predicted ground-level power density of less than 0.5% of the 0.2 mW/cm<sup>2</sup> public limit applying at FM frequencies. Since this is less than 5% of the applicable limit, the station is categorically excluded by Section 1.1307(b)(3) of the FCC Rules from having to consider the contributions of other stations on the tower.

**Auxiliary Antenna Coverage Would Not Extend  
the Licensed Main Antenna Coverage Over Land**

As shown by the attached figure, the proposed operation of an auxiliary antenna with a maximum effective radiated rated power of 58.0 kW using a directional antenna would not extend the licensed F(50,50) 60 dBu contour over any land portion. There is a small arc over the Pacific Ocean where the proposed 60 dBu auxiliary antenna contour would slightly exceed the licensed 60 dBu contour, but since this contour extension does not occur over land it is believed to be permissible.



**Environmental Exhibit and Supplemental Statement**

**List of Figures**

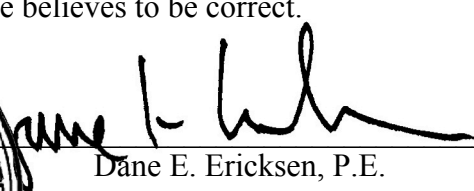
In carrying out these engineering studies, the following figures were prepared under my direct supervision:

1. Map showing F(50,50) 60 dBu contours of proposed auxiliary antenna operation versus licensed F(50,50) 60 dBu contour.
2. Manufacturer's documentation for proposed directional auxiliary antenna.

**Authorship**

The undersigned author of this statement is a qualified Professional Engineer, holding California Registration No. E-11654, which expires on September 30, 2020. This work has been carried out under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.

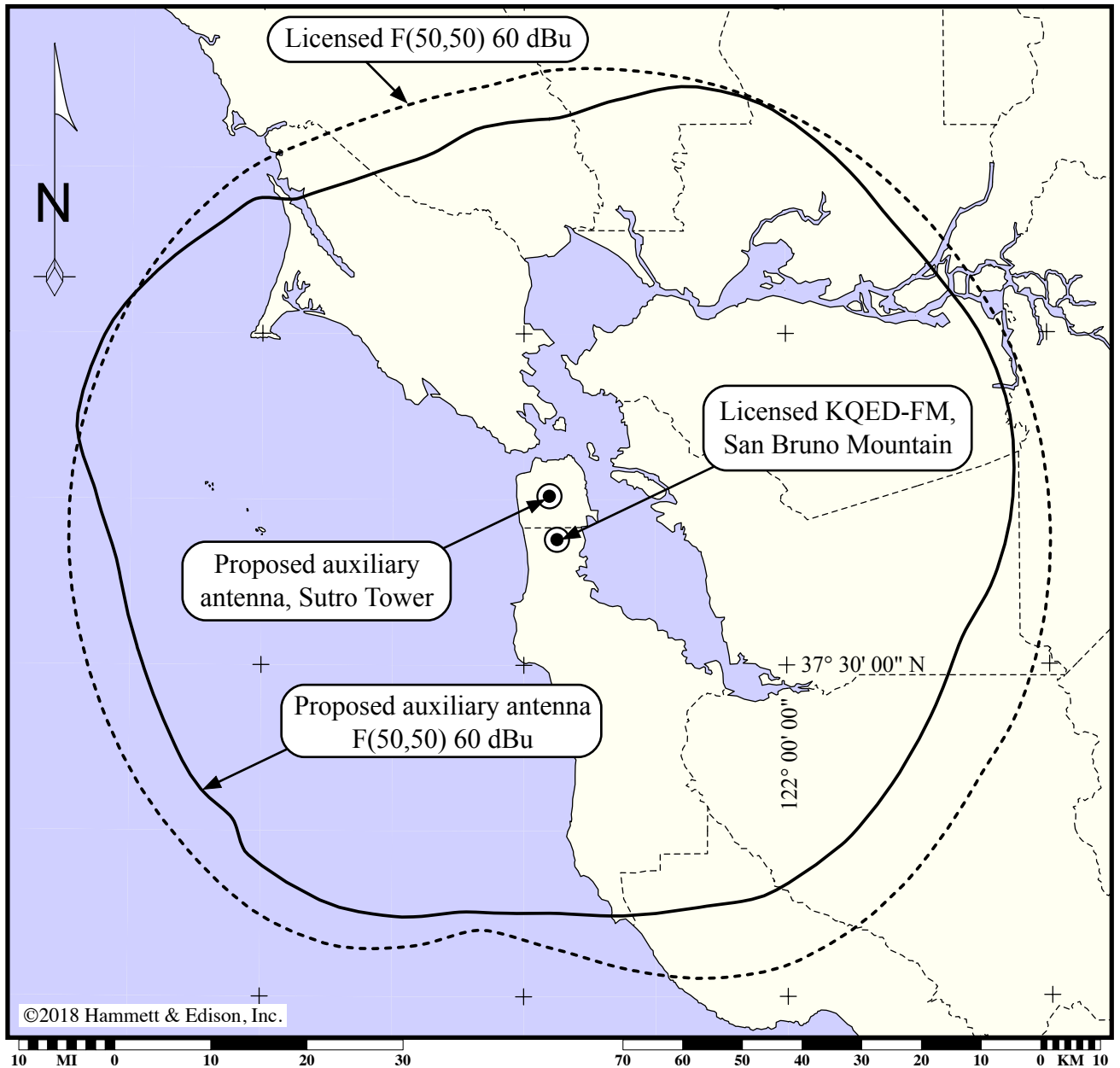


  
Dane E. Ericksen, P.E.

October 18, 2018



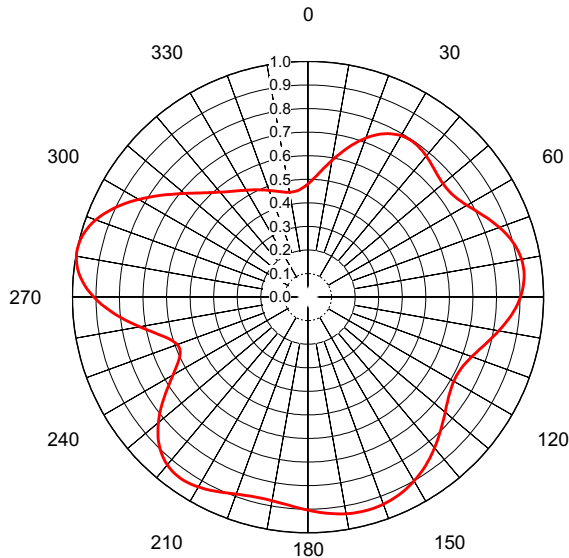
**Proposed Auxiliary Antenna Versus  
Licensed Main Antenna Coverage Contours**



Albers equal area map projection. Geographic coordinate marks shown at 30-minute increments. County limits shown taken from U.S. Census Bureau TIGER/Line 2010 data.



Manufacturer's Documentation for Proposed Directional Auxiliary Antenna



**AZIMUTH PATTERN**  
**Horizontal Polarization**

In Free Space

Proposal No. **C-06217-2**  
Date **31-Aug-18**  
Call Letters **KQED**

Frequency **88.5 MHz FM**  
Antenna Type **DCRS8D50PF10**  
Gain **1.6 (2.04dB)**  
Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.480	36	0.793	72	0.881	108	0.753	144	0.865	180	0.904	216	0.940	252	0.603	288	0.975	324	0.554
1	0.488	37	0.791	73	0.888	109	0.746	145	0.872	181	0.901	217	0.939	253	0.613	289	0.967	325	0.549
2	0.496	38	0.788	74	0.895	110	0.740	146	0.878	182	0.897	218	0.937	254	0.625	290	0.958	326	0.543
3	0.506	39	0.785	75	0.901	111	0.734	147	0.884	183	0.894	219	0.933	255	0.638	291	0.948	327	0.538
4	0.516	40	0.781	76	0.906	112	0.729	148	0.890	184	0.891	220	0.929	256	0.654	292	0.938	328	0.533
5	0.527	41	0.777	77	0.911	113	0.724	149	0.896	185	0.888	221	0.924	257	0.670	293	0.926	329	0.529
6	0.538	42	0.773	78	0.915	114	0.720	150	0.901	186	0.885	222	0.918	258	0.688	294	0.914	330	0.524
7	0.550	43	0.769	79	0.918	115	0.717	151	0.906	187	0.883	223	0.910	259	0.706	295	0.901	331	0.519
8	0.563	44	0.765	80	0.921	116	0.715	152	0.911	188	0.881	224	0.902	260	0.725	296	0.887	332	0.515
9	0.576	45	0.762	81	0.922	117	0.714	153	0.915	189	0.879	225	0.892	261	0.745	297	0.873	333	0.511
10	0.589	46	0.758	82	0.923	118	0.713	154	0.919	190	0.878	226	0.882	262	0.765	298	0.859	334	0.507
11	0.603	47	0.755	83	0.923	119	0.714	155	0.923	191	0.877	227	0.870	263	0.784	299	0.844	335	0.502
12	0.616	48	0.752	84	0.923	120	0.715	156	0.926	192	0.876	228	0.857	264	0.804	300	0.829	336	0.498
13	0.630	49	0.750	85	0.921	121	0.716	157	0.929	193	0.876	229	0.843	265	0.823	301	0.814	337	0.494
14	0.643	50	0.748	86	0.919	122	0.719	158	0.931	194	0.877	230	0.829	266	0.842	302	0.799	338	0.490
15	0.657	51	0.748	87	0.915	123	0.722	159	0.934	195	0.878	231	0.813	267	0.860	303	0.784	339	0.486
16	0.670	52	0.748	88	0.912	124	0.726	160	0.935	196	0.879	232	0.798	268	0.877	304	0.769	340	0.482
17	0.683	53	0.749	89	0.907	125	0.731	161	0.937	197	0.881	233	0.781	269	0.893	305	0.754	341	0.478
18	0.695	54	0.751	90	0.902	126	0.736	162	0.938	198	0.884	234	0.764	270	0.909	306	0.739	342	0.474
19	0.707	55	0.753	91	0.896	127	0.741	163	0.938	199	0.887	235	0.747	271	0.923	307	0.725	343	0.470
20	0.718	56	0.757	92	0.890	128	0.747	164	0.939	200	0.890	236	0.729	272	0.937	308	0.711	344	0.467
21	0.729	57	0.761	93	0.883	129	0.753	165	0.939	201	0.894	237	0.712	273	0.949	309	0.697	345	0.463
22	0.739	58	0.767	94	0.875	130	0.760	166	0.938	202	0.898	238	0.694	274	0.960	310	0.684	346	0.460
23	0.749	59	0.773	95	0.867	131	0.767	167	0.938	203	0.902	239	0.678	275	0.970	311	0.672	347	0.457
24	0.757	60	0.780	96	0.859	132	0.775	168	0.937	204	0.906	240	0.662	276	0.978	312	0.659	348	0.455
25	0.765	61	0.787	97	0.850	133	0.782	169	0.935	205	0.910	241	0.647	277	0.985	313	0.648	349	0.453
26	0.772	62	0.795	98	0.841	134	0.790	170	0.933	206	0.915	242	0.633	278	0.991	314	0.637	350	0.452
27	0.778	63	0.803	99	0.832	135	0.797	171	0.932	207	0.919	243	0.620	279	0.995	315	0.626	351	0.451
28	0.783	64	0.812	100	0.823	136	0.805	172	0.929	208	0.923	244	0.610	280	0.998	316	0.616	352	0.451
29	0.787	65	0.821	101	0.814	137	0.813	173	0.927	209	0.927	245	0.601	281	1.000	317	0.607	353	0.452
30	0.791	66	0.830	102	0.804	138	0.821	174	0.924	210	0.931	246	0.594	282	1.000	318	0.598	354	0.453
31	0.793	67	0.839	103	0.795	139	0.828	175	0.921	211	0.934	247	0.589	283	0.999	319	0.589	355	0.455
32	0.795	68	0.847	104	0.786	140	0.836	176	0.918	212	0.936	248	0.587	284	0.997	320	0.581	356	0.458
33	0.795	69	0.856	105	0.777	141	0.844	177	0.915	213	0.938	249	0.588	285	0.993	321	0.574	357	0.463
34	0.795	70	0.865	106	0.769	142	0.851	178	0.911	214	0.940	250	0.590	286	0.988	322	0.567	358	0.468
35	0.794	71	0.873	107	0.761	143	0.858	179	0.908	215	0.940	251	0.596	287	0.983	323	0.561	359	0.473

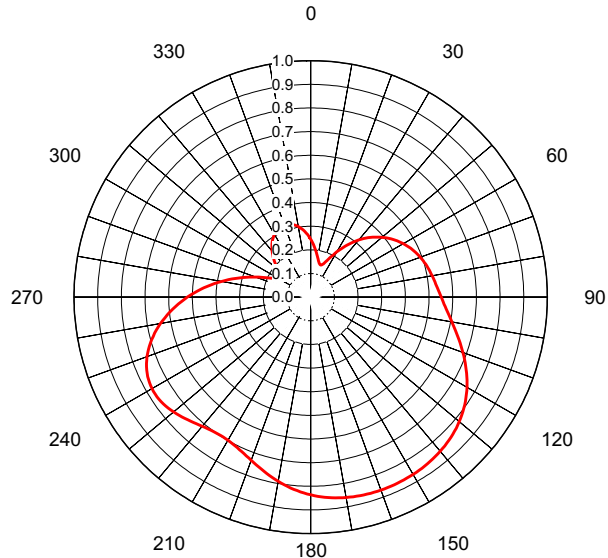
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**HAMMETT & EDISON, INC.**  
CONSULTING ENGINEERS  
SAN FRANCISCO

Manufacturer's Documentation for Proposed Directional Auxiliary Antenna



**AZIMUTH PATTERN  
Vertical Polarization**

In Free Space

Proposal No. **C-06217-2**  
Date **31-Aug-18**  
Call Letters **KQED**  
  
Frequency **88.5 MHz FM**  
Antenna Type **DCRS8D50PF10**  
Gain **2.19 (3.41dB)**  
Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.245	36	0.279	72	0.500	108	0.668	144	0.859	180	0.836	216	0.702	252	0.721	288	0.273
1	0.238	37	0.288	73	0.503	109	0.676	145	0.860	181	0.833	217	0.704	253	0.713	289	0.260
2	0.230	38	0.298	74	0.506	110	0.684	146	0.862	182	0.829	218	0.707	254	0.705	290	0.248
3	0.223	39	0.307	75	0.508	111	0.693	147	0.863	183	0.825	219	0.710	255	0.696	291	0.235
4	0.215	40	0.316	76	0.511	112	0.701	148	0.864	184	0.821	220	0.713	256	0.686	292	0.224
5	0.207	41	0.324	77	0.514	113	0.709	149	0.865	185	0.816	221	0.717	257	0.676	293	0.213
6	0.199	42	0.333	78	0.516	114	0.717	150	0.866	186	0.811	222	0.721	258	0.666	294	0.202
7	0.192	43	0.341	79	0.519	115	0.725	151	0.866	187	0.807	223	0.725	259	0.655	295	0.192
8	0.184	44	0.349	80	0.521	116	0.733	152	0.867	188	0.802	224	0.730	260	0.644	296	0.183
9	0.177	45	0.357	81	0.524	117	0.741	153	0.867	189	0.796	225	0.734	261	0.633	297	0.176
10	0.170	46	0.365	82	0.526	118	0.748	154	0.868	190	0.791	226	0.739	262	0.622	298	0.169
11	0.164	47	0.372	83	0.529	119	0.755	155	0.868	191	0.785	227	0.743	263	0.610	299	0.163
12	0.158	48	0.380	84	0.532	120	0.762	156	0.868	192	0.780	228	0.748	264	0.598	300	0.159
13	0.153	49	0.387	85	0.534	121	0.769	157	0.869	193	0.774	229	0.752	265	0.585	301	0.156
14	0.149	50	0.394	86	0.537	122	0.776	158	0.869	194	0.768	230	0.756	266	0.573	302	0.154
15	0.145	51	0.400	87	0.540	123	0.782	159	0.869	195	0.762	231	0.760	267	0.560	303	0.154
16	0.143	52	0.407	88	0.544	124	0.788	160	0.868	196	0.757	232	0.763	268	0.547	304	0.155
17	0.143	53	0.413	89	0.547	125	0.794	161	0.868	197	0.751	233	0.766	269	0.534	305	0.157
18	0.143	54	0.419	90	0.551	126	0.800	162	0.868	198	0.745	234	0.769	270	0.521	306	0.160
19	0.144	55	0.425	91	0.555	127	0.805	163	0.867	199	0.740	235	0.771	271	0.507	307	0.165
20	0.147	56	0.431	92	0.560	128	0.810	164	0.867	200	0.734	236	0.773	272	0.494	308	0.170
21	0.151	57	0.436	93	0.564	129	0.815	165	0.866	201	0.729	237	0.774	273	0.480	309	0.176
22	0.156	58	0.442	94	0.569	130	0.819	166	0.865	202	0.724	238	0.775	274	0.466	310	0.182
23	0.162	59	0.447	95	0.575	131	0.824	167	0.864	203	0.720	239	0.775	275	0.453	311	0.189
24	0.169	60	0.452	96	0.580	132	0.828	168	0.863	204	0.716	240	0.774	276	0.439	312	0.196
25	0.177	61	0.457	97	0.586	133	0.831	169	0.862	205	0.712	241	0.773	277	0.425	313	0.203
26	0.185	62	0.461	98	0.593	134	0.835	170	0.861	206	0.708	242	0.771	278	0.411	314	0.210
27	0.193	63	0.466	99	0.599	135	0.838	171	0.859	207	0.705	243	0.769	279	0.397	315	0.218
28	0.202	64	0.470	100	0.606	136	0.841	172	0.857	208	0.703	244	0.766	280	0.383	316	0.225
29	0.212	65	0.475	101	0.613	137	0.844	173	0.855	209	0.701	245	0.763	281	0.369	317	0.232
30	0.221	66	0.479	102	0.620	138	0.847	174	0.853	210	0.699	246	0.758	282	0.355	318	0.239
31	0.231	67	0.482	103	0.628	139	0.849	175	0.851	211	0.698	247	0.754	283	0.341	319	0.246
32	0.240	68	0.486	104	0.636	140	0.852	176	0.848	212	0.698	248	0.748	284	0.327	320	0.253
33	0.250	69	0.490	105	0.643	141	0.854	177	0.846	213	0.698	249	0.742	285	0.313	321	0.260
34	0.260	70	0.493	106	0.651	142	0.855	178	0.843	214	0.699	250	0.736	286	0.300	322	0.266
35	0.269	71	0.496	107	0.660	143	0.857	179	0.840	215	0.700	251	0.729	287	0.286	323	0.272

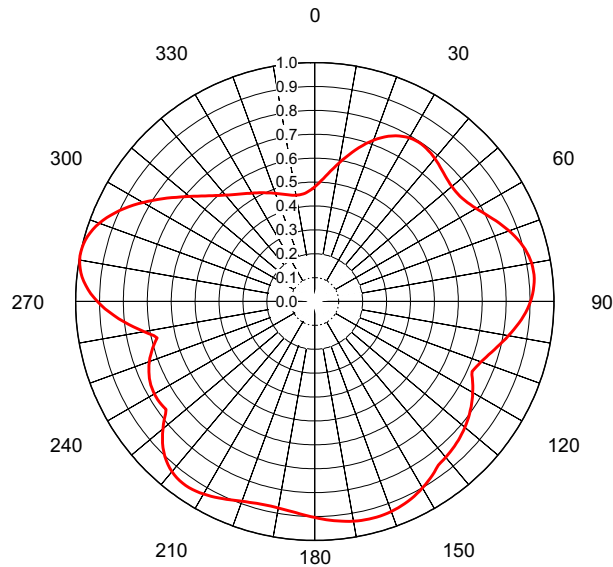
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Trusted for Decades. Ready for Tomorrow.



**HAMMETT & EDISON, INC.**  
CONSULTING ENGINEERS  
SAN FRANCISCO

Manufacturer's Documentation for Proposed Directional Auxiliary Antenna



**AZIMUTH PATTERN  
Composite**

In Free Space

Proposal No. **C-06217-2**

Date **31-Aug-18**

Call Letters **KQED**

Frequency **88.5 MHz FM**

Antenna Type **DCRS8D50PF10**

Gain **1.56 (1.94dB)**

Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.480	36	0.793	72	0.881	108	0.753	144	0.865	180	0.904	216	0.940	252	0.721	288	0.975
1	0.488	37	0.791	73	0.888	109	0.746	145	0.872	181	0.901	217	0.939	253	0.713	289	0.967
2	0.496	38	0.788	74	0.895	110	0.740	146	0.878	182	0.897	218	0.937	254	0.705	290	0.958
3	0.506	39	0.785	75	0.901	111	0.734	147	0.884	183	0.894	219	0.933	255	0.696	291	0.948
4	0.516	40	0.781	76	0.906	112	0.729	148	0.890	184	0.891	220	0.929	256	0.686	292	0.938
5	0.527	41	0.777	77	0.911	113	0.724	149	0.896	185	0.888	221	0.924	257	0.676	293	0.926
6	0.538	42	0.773	78	0.915	114	0.720	150	0.901	186	0.885	222	0.918	258	0.668	294	0.914
7	0.550	43	0.769	79	0.918	115	0.725	151	0.906	187	0.883	223	0.910	259	0.706	295	0.901
8	0.563	44	0.765	80	0.921	116	0.733	152	0.911	188	0.881	224	0.902	260	0.725	296	0.887
9	0.576	45	0.762	81	0.922	117	0.741	153	0.915	189	0.879	225	0.892	261	0.745	297	0.873
10	0.589	46	0.758	82	0.923	118	0.748	154	0.919	190	0.878	226	0.882	262	0.765	298	0.859
11	0.603	47	0.755	83	0.923	119	0.755	155	0.923	191	0.877	227	0.870	263	0.784	299	0.844
12	0.616	48	0.752	84	0.923	120	0.762	156	0.926	192	0.876	228	0.857	264	0.804	300	0.829
13	0.630	49	0.750	85	0.921	121	0.769	157	0.929	193	0.876	229	0.843	265	0.823	301	0.814
14	0.643	50	0.748	86	0.919	122	0.776	158	0.931	194	0.877	230	0.829	266	0.842	302	0.799
15	0.657	51	0.748	87	0.915	123	0.782	159	0.934	195	0.878	231	0.813	267	0.860	303	0.784
16	0.670	52	0.748	88	0.912	124	0.788	160	0.935	196	0.879	232	0.798	268	0.877	304	0.769
17	0.683	53	0.749	89	0.907	125	0.794	161	0.937	197	0.881	233	0.781	269	0.893	305	0.754
18	0.695	54	0.751	90	0.902	126	0.800	162	0.938	198	0.884	234	0.769	270	0.909	306	0.739
19	0.707	55	0.753	91	0.896	127	0.805	163	0.938	199	0.887	235	0.771	271	0.923	307	0.725
20	0.718	56	0.757	92	0.890	128	0.810	164	0.939	200	0.890	236	0.773	272	0.937	308	0.711
21	0.729	57	0.761	93	0.883	129	0.815	165	0.939	201	0.894	237	0.774	273	0.949	309	0.697
22	0.739	58	0.767	94	0.875	130	0.819	166	0.938	202	0.898	238	0.775	274	0.960	310	0.684
23	0.749	59	0.773	95	0.867	131	0.824	167	0.938	203	0.902	239	0.775	275	0.970	311	0.672
24	0.757	60	0.780	96	0.859	132	0.828	168	0.937	204	0.906	240	0.774	276	0.978	312	0.659
25	0.765	61	0.787	97	0.850	133	0.831	169	0.935	205	0.910	241	0.773	277	0.985	313	0.648
26	0.772	62	0.795	98	0.841	134	0.835	170	0.933	206	0.915	242	0.771	278	0.991	314	0.637
27	0.778	63	0.803	99	0.832	135	0.838	171	0.932	207	0.919	243	0.769	279	0.995	315	0.626
28	0.783	64	0.812	100	0.823	136	0.841	172	0.929	208	0.923	244	0.766	280	0.998	316	0.616
29	0.787	65	0.821	101	0.814	137	0.844	173	0.927	209	0.927	245	0.763	281	1.000	317	0.607
30	0.791	66	0.830	102	0.804	138	0.847	174	0.924	210	0.931	246	0.758	282	1.000	318	0.598
31	0.793	67	0.839	103	0.795	139	0.849	175	0.921	211	0.934	247	0.754	283	0.999	319	0.589
32	0.795	68	0.847	104	0.786	140	0.852	176	0.918	212	0.936	248	0.748	284	0.997	320	0.581
33	0.795	69	0.856	105	0.777	141	0.854	177	0.915	213	0.938	249	0.742	285	0.993	321	0.574
34	0.795	70	0.865	106	0.769	142	0.855	178	0.911	214	0.940	250	0.736	286	0.988	322	0.567
35	0.794	71	0.873	107	0.761	143	0.858	179	0.908	215	0.940	251	0.729	287	0.983	323	0.561

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CONSULTING ENGINEERS  
SAN FRANCISCO

Manufacturer's Documentation for Proposed Directional Auxiliary Antenna



**ELEVATION PATTERN**

Proposal No. **C-06217-2**

Date **31-Aug-18**

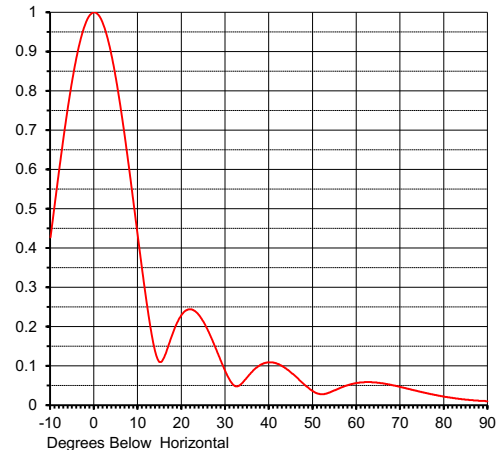
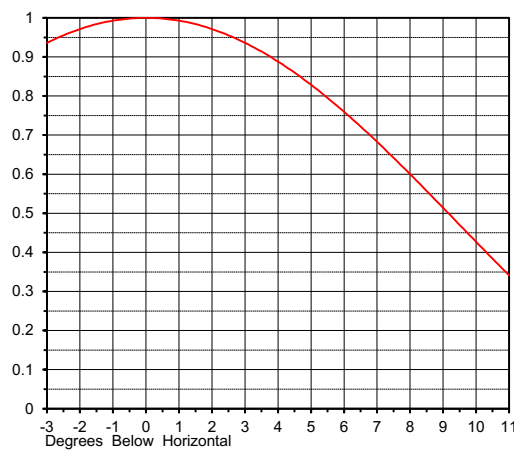
Call Letters **KQED**

Frequency **88.5 MHz FM**

Antenna Type **DCRS8D50PF10**

RMS Directivity at Main Lobe **4.4 ( 6.43 dB )**  
 RMS Directivity at Horizontal **4.4 ( 6.43 dB )**  
**Calculated**

Beam Tilt **0.00 deg**  
 Pattern Number **08C044000**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.427	10.0	0.427	30.0	0.086	50.0	0.036	70.0	0.046
-9.0	0.514	11.0	0.341	31.0	0.064	51.0	0.030	71.0	0.044
-8.0	0.600	12.0	0.260	32.0	0.050	52.0	0.028	72.0	0.041
-7.0	0.683	13.0	0.189	33.0	0.049	53.0	0.029	73.0	0.038
-6.0	0.760	14.0	0.134	34.0	0.058	54.0	0.033	74.0	0.036
-5.0	0.829	15.0	0.110	35.0	0.071	55.0	0.038	75.0	0.033
-4.0	0.888	16.0	0.122	36.0	0.084	56.0	0.043	76.0	0.031
-3.0	0.936	17.0	0.153	37.0	0.095	57.0	0.047	77.0	0.028
-2.0	0.971	18.0	0.184	38.0	0.103	58.0	0.051	78.0	0.026
-1.0	0.993	19.0	0.211	39.0	0.107	59.0	0.054	79.0	0.024
0.0	1.000	20.0	0.230	40.0	0.109	60.0	0.056	80.0	0.022
1.0	0.993	21.0	0.241	41.0	0.108	61.0	0.058	81.0	0.020
2.0	0.971	22.0	0.244	42.0	0.105	62.0	0.059	82.0	0.018
3.0	0.936	23.0	0.240	43.0	0.099	63.0	0.059	83.0	0.017
4.0	0.888	24.0	0.229	44.0	0.092	64.0	0.058	84.0	0.015
5.0	0.829	25.0	0.212	45.0	0.083	65.0	0.057	85.0	0.014
6.0	0.760	26.0	0.190	46.0	0.074	66.0	0.056	86.0	0.013
7.0	0.683	27.0	0.166	47.0	0.063	67.0	0.054	87.0	0.012
8.0	0.600	28.0	0.139	48.0	0.053	68.0	0.051	88.0	0.011
9.0	0.514	29.0	0.112	49.0	0.044	69.0	0.049	89.0	0.011
								90.0	0.010

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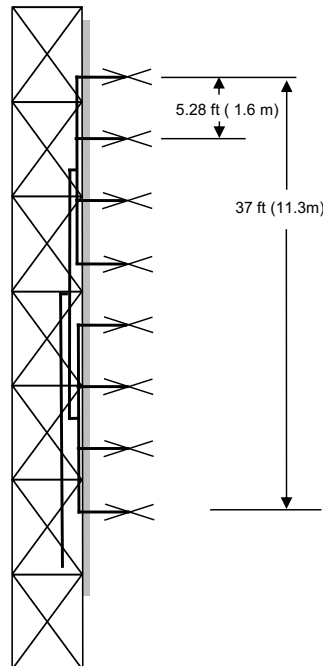


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Manufacturer's Documentation for Proposed Directional Auxiliary Antenna



MECHANICAL SPECIFICATIONS



Proposal No. **C-06217-2**  
Date **31-Aug-18**  
Call Letters **KQED**  
  
Frequency **88.5 MHz FM**  
Antenna Type **DCRS8D50PF10**

Preliminary Specifications

Side Mounted

Without ice TIA-222-G

Basic Wind Speed 90 m/h (144.8 km/h)

Structure Class II

Exposure Category B

Topography Category 3

Mechanical Specifications

Height	H2	37 ft (11.3m)	
Height of Center of Radiation	H3	18.5 ft (5.6m)	
Effective Projected Area	(EPA) <sub>A</sub>	61 ft <sup>2</sup> (5.7m <sup>2</sup> )	Mounts Excluded
Weight	W	875 lb (0.4t)	Mounts Excluded

Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA-222-G

Prepared by: JBC

Date: 3-Aug-18

ME:

EE:

Rev. No.2 by: JBC

Date: 31-Aug-18

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