

LPFM Allocation Study

Afro-American Historical Society of Delaware ("AAHSD") desires to mount a Channel 237 Shively 6812B six bay LPFM antenna on a proposed new tower near 501 S. Walnut Street, Wilmington, DE, 19801. The proposed tower coordinates in NAD 27 are: 39-43-52.14 NL, 75-33-16.06 WL. Figure A is a picture¹ of the site.

Figure B of this document is an LPFM Allocation Spacing Study from the proposed site. The AAHSD facility is short spaced to one second adjacent facility, WBEN, Facility ID 22308, Channel 239, Philadelphia, PA. The AAHSD facility must not cause interference to this facility. AAHSD proposes to use a six bay Shively 6812B low power antenna with 0.68659 wavelength bay spacing to eliminate downward radiation. The effective radiated power ("ERP") will be 100 watts. Figures C and D show the 63.6 db μ contour of the WBEN License. Second adjacent channels are protected to a value 40 db μ higher than the coverage contour. Therefore, it would require a signal level of 103.6 db μ to interfere with WBEN. The AAHSD facility will not interfere with the station if the 103.6 db μ signal of the proposed LPFM does not reach any occupied area around the tower site.

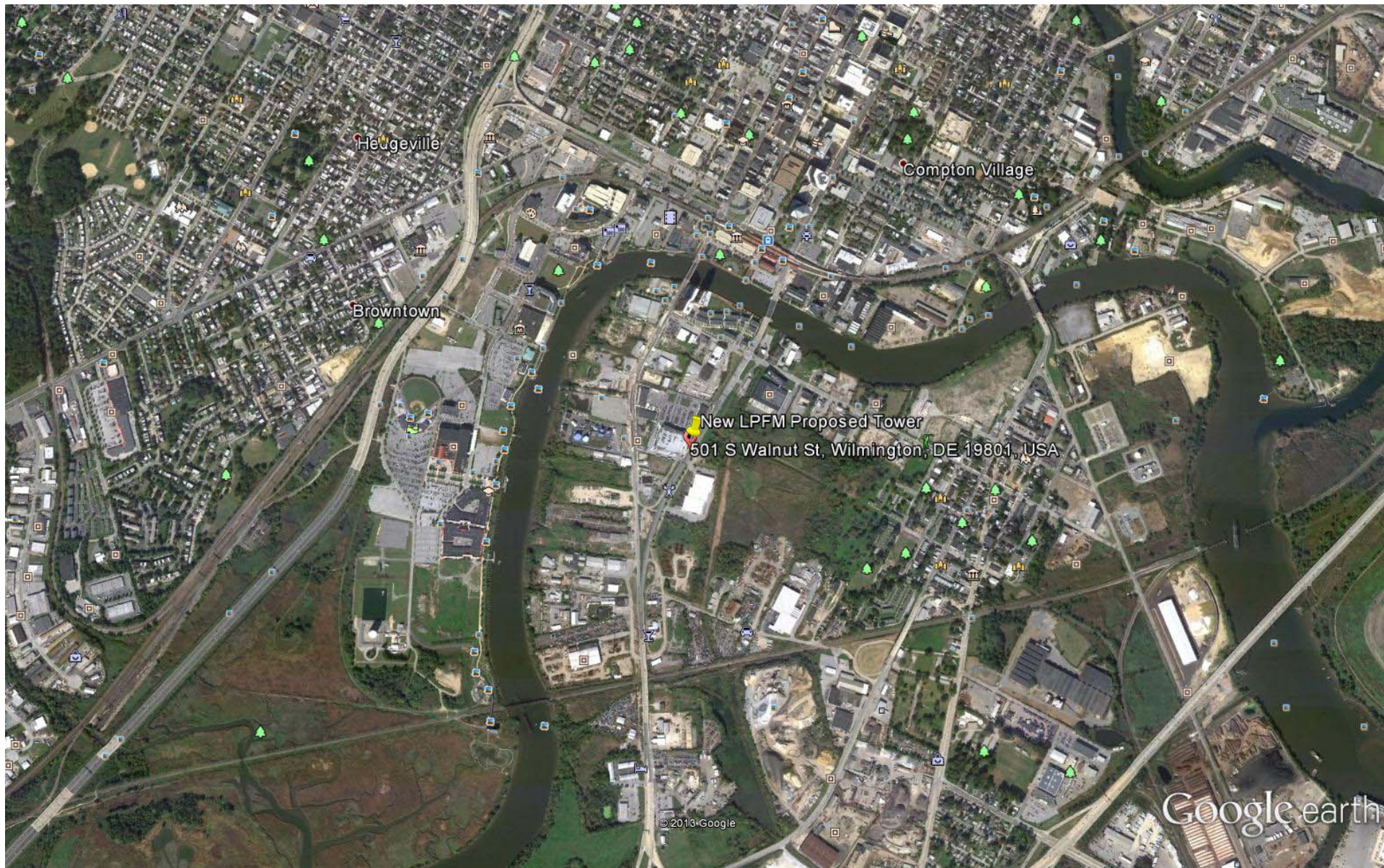
Figures E through H define the design of the proposed Shively antenna². The overall height of the proposed tower is 60 meters. The six bay antenna is mounted to give a COR of 54.0 meters above ground level. FAA notification is required. Figure H shows the level of the AAHSD signal at 10 meters above ground. All buildings near the site are below this level. The maximum radiation of 101.73 db μ occurs at a distance of 128.6 m at a 20 degree down tilt from the site. Occupied portions of any nearby buildings receive less than the interfering signal level even without taking material and other building losses into account. There are no buildings or occupied areas in the major lobe of the antenna. Therefore, this proposal causes no interference to any second adjacent facility within their protected service contour. All occupied buildings, residences, roadways, highways and vehicles are protected from second adjacent channel interference to WBEN.

AAHSD meets all co-channel and first adjacent spacing requirements. AAHSD respectfully requests a waiver of the second adjacent spacing requirements due to the fact that this proposed facility will cause no interference to any second adjacent channel shortspaced facility. Afro-American Historical Society of Delaware will perform any test or measurements

¹ Picture obtained from Google Earth.

² This design spreadsheet was obtained from Shively Laboratories. The calculations of field strength are based on the free space formula. The field strength spreadsheet was derived by Ellis Engineering using data from the Shively Laboratories output and additions from Clarence Beverage with Communications Technologies, Inc. The antenna design has been checked and approved by Shively Laboratories.

required should the Commission grant a Construction Permit with conditions requiring tests or measurements.



Google earth

miles
km



Figure A

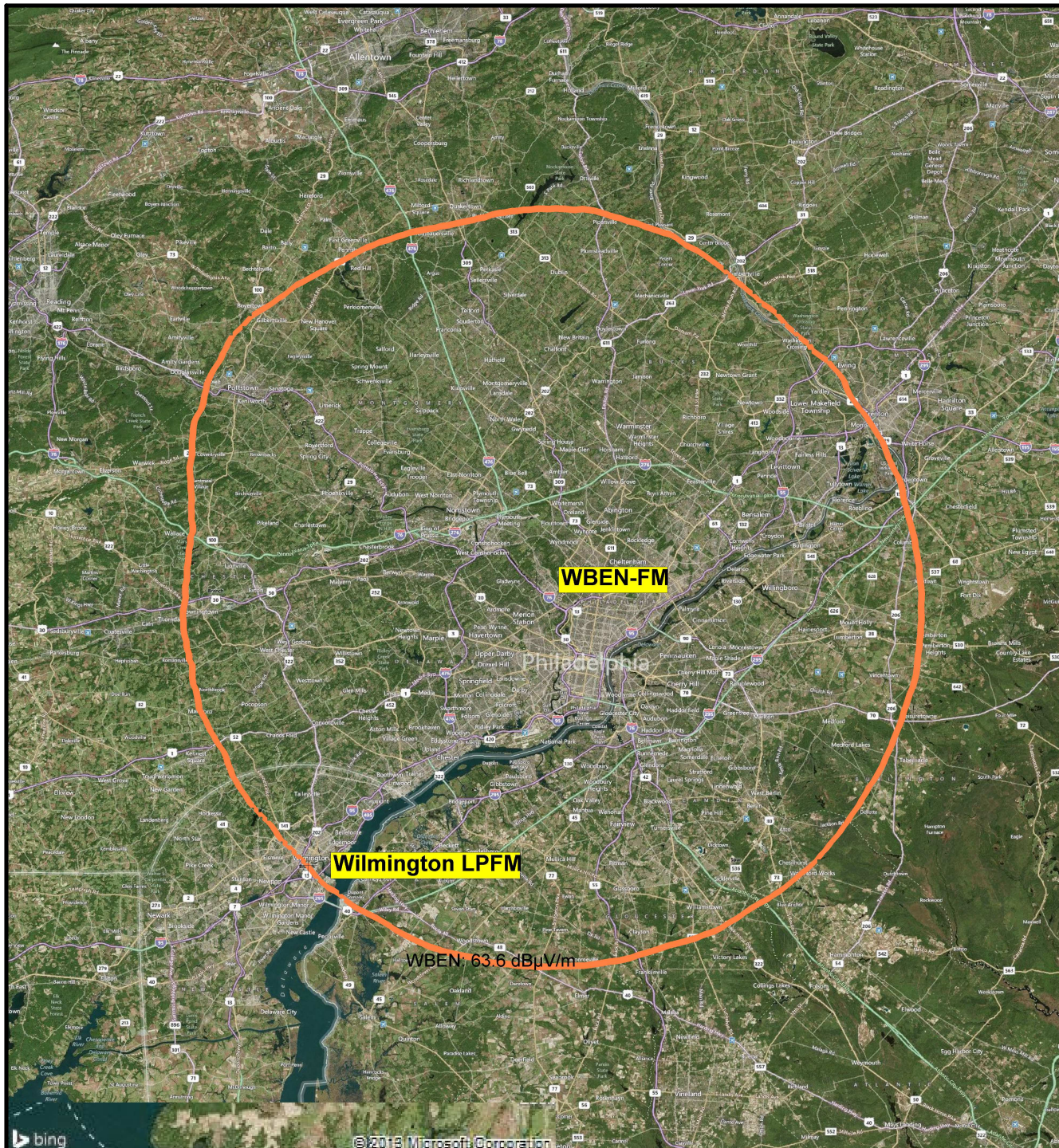
Figure B

LPFM Spacing Study

Client: NEW
FM Study for Proposed Site: 39-43-52.1400, 75-33-16.0600
Desired Class: L1

Channel: 237 Frequency: 95.3 MHz

Channel	Facility/Application ID	City	State	Callsign	Licensee	Facility Status	Class	Service	Latitude	Longitude	Distance Between Facilities	Direction True North	Required Distance	Spacing Status	Separation Distance
234	4669	DOVER	DE	WDSD	CAPSTAR TX LLC	LIC	B	FM	39-12-3.000000	75-33-55.000000	58.8843	180.9058	67	****SHORT****	-8.1157
234	4669	DOVER	DE	WDSD	CAPSTAR TX LLC	USE	B	FA	39-12-3.000000	75-33-55.000000	58.8843	180.9058	67	****SHORT****	-8.1157
234	157407	ALLENTOWN	PA	W234AX	FAMILY LIFE MINISTRIES, INC.	LIC	D	FX	40-35-55.000000	75-25-12.000000	96.998	6.7821	6	OK	90.998
234	4669	DOVER	DE	WDSD	CAPSTAR TX LLC	CP	B	FS	39-12-4.600000	75-33-54.300000	58.8347	180.8902	67	****SHORT****	-8.1653
235	56368	FOLSOM	PA	WRSD	RIDLEY SCHOOL DISTRICT	LIC	D	FM	39-53-12.000000	75-20-1.000000	25.6089	47.6039	6	OK	19.6089
235	84035	POTTSVILLE	PA	W235AD	NORTHEASTERN PENNSYLVANIA EDUCATIONAL TELEVISION ASSOCIATION	LIC	D	FX	40-40-36.000000	76-11-50.000000	118.3941	332.4687	6	OK	112.3941
235	141458	RADNOR	PA	W235AP	FOUR RIVERS COMMUNITY BROADCASTING CORPORATION	LIC	D	FX	40-2-47.000000	75-23-27.000000	37.6957	21.7949	6	OK	31.6957
235	144043	COATESVILLE	PA	W235AT	HOPE CHRISTIAN CHURCH OF MARLTON, INC.	LIC	D	FX	40-2-52.000000	75-53-33.000000	45.5181	320.5642	6	OK	39.5181
235	141548	MARLTON	NJ	NEW	HOPE CHRISTIAN CHURCH OF MARLTON, INC.	APP	D	FX	39-51-33.000000	74-56-51.000000	53.8947	74.7086	6	OK	47.8947
235	141475	PHILADELPHIA	PA	NEW	HOPE CHRISTIAN CHURCH OF MARLTON, INC.	APP	D	FX	40-3-50.000000	75-5-4.000000	54.5959	47.4149	6	OK	48.5959
235	141475	PHILADELPHIA	PA	NEW	HOPE CHRISTIAN CHURCH OF MARLTON, INC.	APP	D	FX	40-3-50.000000	75-5-4.000000	54.5959	47.4149	6	OK	48.5959
235	141548	MARLTON	NJ	NEW	HOPE CHRISTIAN CHURCH OF MARLTON, INC.	APP	D	FX	39-51-33.000000	74-56-51.000000	53.8947	74.7086	6	OK	47.8947
235	140327	VINELAND	NJ	W235BY	AMFM RADIO LICENSES, L.L.C.	CP	D	FX	39-31-24.400000	75-1-14.900000	51.2949	116.7161	6	OK	45.2949
236	52353	BALTIMORE	MD	WRBS-FM	PETER & JOHN RADIO FELLOWSHIP, INC.	LIC	B	FM	39-15-21.000000	76-40-29.000000	109.8716	241.2952	97	OK	12.8716
236	52353	BALTIMORE	MD	WRBS-FM	PETER & JOHN RADIO FELLOWSHIP, INC.	USE	B	FA	39-15-21.000000	76-40-29.000000	109.8716	241.2952	97	OK	12.8716
236	3125	ATLANTIC CITY	NJ	WAYV	EQUITY COMMUNICATIONS, L.P.	USE	B	FA	39-22-51.000000	74-27-4.000000	102.4953	112.3007	97	OK	5.4953
236	14375	BETHLEHEM	PA	WZZO	CAPSTAR TX LLC	USE	B	FA	40-37-13.000000	75-17-37.000000	101.1945	12.6832	97	OK	4.1945
236	85965	BURLINGTON	NJ	W236AF	BURLINGTON COUNTY COLLEGE	LIC	D	FX	40-4-55.000000	74-52-11.000000	70.3247	56.3688	13	OK	57.3247
236	3125	ATLANTIC CITY	NJ	WAYV	EQUITY COMMUNICATIONS, L.P.	LIC	B	FM	39-22-51.000000	74-27-3.000000	102.5174	112.2956	97	OK	5.5174
236	14375	BETHLEHEM	PA	WZZO	CAPSTAR TX LLC	LIC	B	FM	40-37-13.000000	75-17-37.000000	101.1945	12.6832	97	OK	4.1945
236	157852	MILLBOURNE	PA	NEW	DENISE CHOI	APP	D	FX	39-56-54.000000	75-13-9.000000	37.4853	49.9627	13	OK	24.4853
236	144165	GETTYSBURG	PA	W236CE	HOPE CHRISTIAN CHURCH OF MARLTON, INC.	CP	D	FX	39-54-16.000000	77-0-10.000000	125.4925	278.8195	13	OK	112.4925
236	157852	MILLBOURNE	PA	NEW	DENISE CHOI	APP	D	FX	39-56-54.000000	75-13-9.000000	37.4853	49.9627	13	OK	24.4853
237	16661	LAUREL	DE	WKDB	GREAT SCOTT BROADCASTING	LIC	A	FM	38-30-12.000000	75-39-39.000000	136.6169	183.8612	67	OK	69.6169
237	16661	LAUREL	DE	WKDB	GREAT SCOTT BROADCASTING	USE	A	FA	38-33-18.000000	75-34-24.000000	130.5817	180.7159	67	OK	63.5817
237	47286	SHAMOKIN	PA	WBLL-FM	CLEAR CHANNEL BROADCASTING LICENSES, INC.	USE	A	FA	40-45-36.000000	76-32-19.000000	141.6457	323.7579	67	OK	74.6457
237	47286	SHAMOKIN	PA	WBLL-FM	CLEAR CHANNEL BROADCASTING LICENSES, INC.	LIC	A	FM	40-45-36.000000	76-32-19.000000	141.6457	323.7579	67	OK	74.6457
237	141376	HARRISONVILLE	NJ	W237CD	PRIORITY RADIO, INC.	LIC	D	FX	39-20-20.000000	75-12-23.000000	52.8404	145.5059	24	OK	28.8404
237	47286	SHAMOKIN	PA	WBLL-FM	CLEAR CHANNEL BROADCASTING LICENSES, INC.	LIC	A	FS	40-45-36.000000	76-32-19.000000	141.6457	323.7579	67	OK	74.6457
237	144115	NEW HOLLAND	PA	W237DC	HOPE CHRISTIAN CHURCH OF MARLTON, INC.	LIC	D	FX	40-4-45.000000	76-0-45.000000	55.0208	314.611	24	OK	31.0208
237	158598	HARRISBURG	PA	W237DE	CUMULUS LICENSING LLC	LIC	D	FX	40-18-59.000000	76-57-4.000000	135.7852	298.5912	24	OK	111.7852
237	141664	PENNSAUKEN	NJ	NEW	BROADCAST LEARNING CENTER, INC.	APP	D	FX	39-57-9.000000	75-3-44.000000	48.7762	59.7442	24	OK	24.7762
237	141664	PENNSAUKEN	NJ	NEW	BROADCAST LEARNING CENTER, INC.	APP	D	FX	39-57-9.000000	75-3-44.000000	48.7762	59.7442	24	OK	24.7762
238	151209	WILDWOOD	NJ	W238BL	PRIORITY RADIO, INC.	LIC	D	FX	39-0-33.000000	74-52-13.000000	99.5041	143.6628	13	OK	86.5041
238	142126	MANAHAWKIN	NJ	NEW	EDWARD A. SCHOVER	APP	D	FX	39-41-57.000000	74-14-4.000000	113.2469	91.7969	13	OK	100.2469
238	142126	MANAHAWKIN	NJ	NEW	EDWARD A. SCHOVER	APP	D	FX	39-37-53.000000	74-21-11.600000	103.6499	96.1344	13	OK	90.6499
238	142126	MANAHAWKIN	NJ	NEW	EDWARD A. SCHOVER	APP	D	FX	39-37-53.000000	74-21-11.600000	103.6499	96.1344	13	OK	90.6499
239	22308	PHILADELPHIA	PA	WBEN-FM	GREATER PHILADELPHIA RADIO, INC.	USE	B	FA	40-3-33.000000	75-14-20.000000	45.3305	36.5411	67	****SHORT****	-21.6695
239	22308	PHILADELPHIA	PA	WBEN-FM	GREATER PHILADELPHIA RADIO, INC.	LIC	B	FM	40-2-21.000000	75-14-13.000000	43.6721	38.4556	67	****SHORT****	-23.3279
239	22308	PHILADELPHIA	PA	WBEN-FM	GREATER PHILADELPHIA RADIO, INC.	LIC	B	FS	40-2-30.000000	75-14-24.000000	43.7283	37.9607	67	****SHORT****	-23.2717
239	22308	PHILADELPHIA	PA	WBEN-FM	GREATER PHILADELPHIA RADIO, INC.	LIC	B	FS	40-2-30.000000	75-14-24.000000	43.7283	37.9607	67	****SHORT****	-23.2717
240	54710	GLEN BURNIE	MD	WWIN-FM	RADIO ONE LICENSES, LLC	LIC	A	FM	39-12-16.000000	76-34-7.000000	105.0525	236.1765	29	OK	76.0525
240	54710	GLEN BURNIE	MD	WWIN-FM	RADIO ONE LICENSES, LLC	USE	A	FA	39-12-16.000000	76-34-7.000000	105.0525	236.1765	29	OK	76.0525
291	53973	PHILADELPHIA	PA	WISX	AMFM RADIO LICENSES, L.L.C.	LIC	B	FS	40-2-36.600000	75-14-32.300000	43.7682	37.5929	12	OK	31.7682



Wilmington, DE LPFM - Harmon Carey

Sites

Site: Wilmington LPFM
 N39°43'52.14" W75°33'16.06" 2.0 m
 WILM Tx.Ht.AGL: 54.0 m Total ERPd: 0.10 kW
 Model: 1 Isotropic-horizontal/0.0° 95 .3000 MHz

Site: WBEN-FM
 N40°02'21.00" W75°14'13.00" 74.0 m
 WBEN Tx.Ht.AGL: 342.0 m Total ERPd: 8.90 kW
 Model: 1 Isotropic-horizontal/0.0° 95 .7000 MHz

Field strength at remote

■ = 63.6 dBuV/m

Display threshold level: -120.0 dBmW



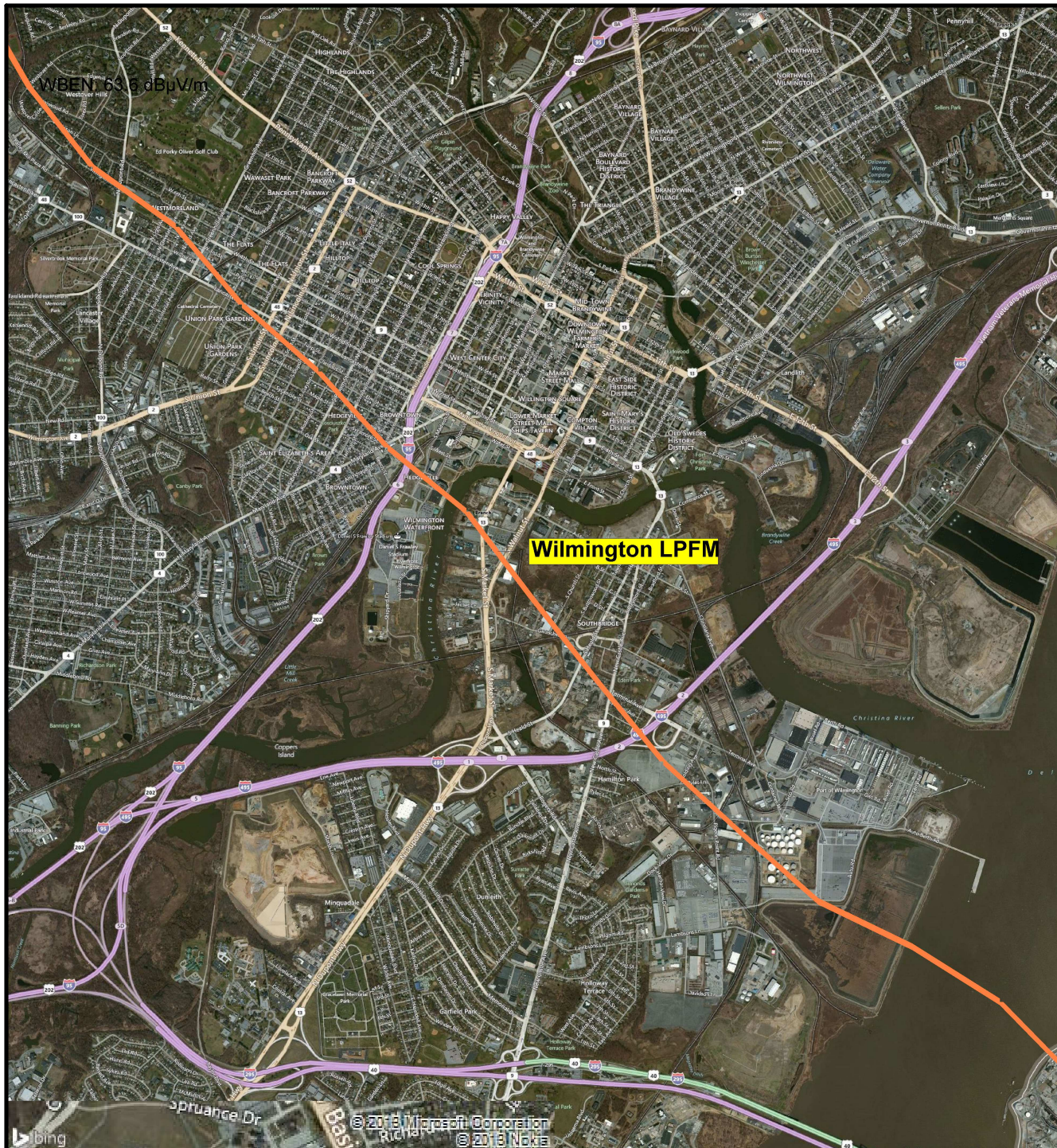
LPFM Site

Contours

Figure 1

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Figure C




Wilmington, DE LPFM - Harmon Carey

Sites

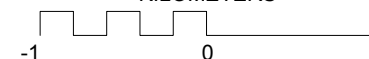
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N39°43'52.14" W75°33'16.06" 2.0 m
WILM Tx.Ht.AGL: 54.0 m Total ERPd: 0.10 kW
Model: 1 Isotropic-horizontal/0.0° 95 .3000 MHz

Site: WBEN-FM
N40°02'21.00" W75°14'13.00" 74.0 m
WBEN Tx.Ht.AGL: 342.0 m Total ERPd: 8.90 kW
Model: 1 Isotropic-horizontal/0.0° 95 .7000 MHz

Field strength at remote

 = 63.6 dBuV/m
Display threshold level: -120.0 dBmW

KILOMETERS



LPFM Site

Contours

Figure 2

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Figure D

Figure E

User specified data is entered only in yellow highlighted cells

Antenna Manufacturer	Shively Labs
Antenna Type	6812B
Station	LPFM
Frequency (MHz)	95.3
Channel #	237
Wavelength (in)	123.8
Number of Bays	6
Bay Spacing (in)	85
Beam Tilt Angle (Deg)	0
Center (1) or End (0) Fed	1
End Bay Line Length Delta (in)	0
Tee Offset Length for Center Fed (in)	0
Computed (0) or Custom (1) Excitation	0
Figure	FIGURE 1
Total Gain	2.594
Azimuth Gain	1
Computed Elevation Gain	2.594

Computed Array Excitation			Custom Excitation		Phase for Null Fill	Phase for Beam Tilt
Bay #	Bay Amp.	Bay Phase (Deg)	Bay Amp.	Bay Phase (Deg)		
1	1	0.00			0.00	0.00
2	1	0.00			0.00	0.00
3	1	0.00			0.00	0.00
4	1	0.00			0.00	0.00
5	1	0.00			0.00	0.00
6	1	0.00			0.00	0.00

Figure F

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
0	1.000	46	0.014
1	0.992	47	0.004
2	0.967	48	0.021
3	0.926	49	0.037
4	0.871	50	0.051
5	0.803	51	0.063
6	0.724	52	0.073
7	0.637	53	0.082
8	0.544	54	0.088
9	0.447	55	0.092
10	0.350	56	0.094
11	0.255	57	0.095
12	0.164	58	0.094
13	0.080	59	0.091
14	0.004	60	0.088
15	0.062	61	0.083
16	0.118	62	0.078
17	0.162	63	0.072
18	0.194	64	0.065
19	0.215	65	0.059
20	0.224	66	0.052
21	0.223	67	0.045
22	0.213	68	0.039
23	0.194	69	0.032
24	0.170	70	0.026
25	0.140	71	0.021
26	0.107	72	0.016
27	0.072	73	0.011
28	0.036	74	0.007
29	0.002	75	0.004
30	0.030	76	0.001
31	0.059	77	0.002
32	0.085	78	0.004
33	0.105	79	0.005
34	0.121	80	0.006
35	0.132	81	0.007
36	0.138	82	0.007
37	0.139	83	0.007
38	0.136	84	0.007
39	0.128	85	0.006
40	0.118	86	0.005
41	0.104	87	0.004
42	0.088	88	0.003
43	0.070	89	0.001
44	0.052	90	0.000
45	0.033		

Figure G

Antenna Mfg.: Shively Labs

Date: 11/12/2013

Antenna Type: 6812B

Station: LPFM

Beam Tilt 0

Frequency: 95.3

Gain (Max) 2.594 4.141 dB

Channel #: 237

Gain (Horizon) 2.594 4.141 dB

Figure: FIGURE 1

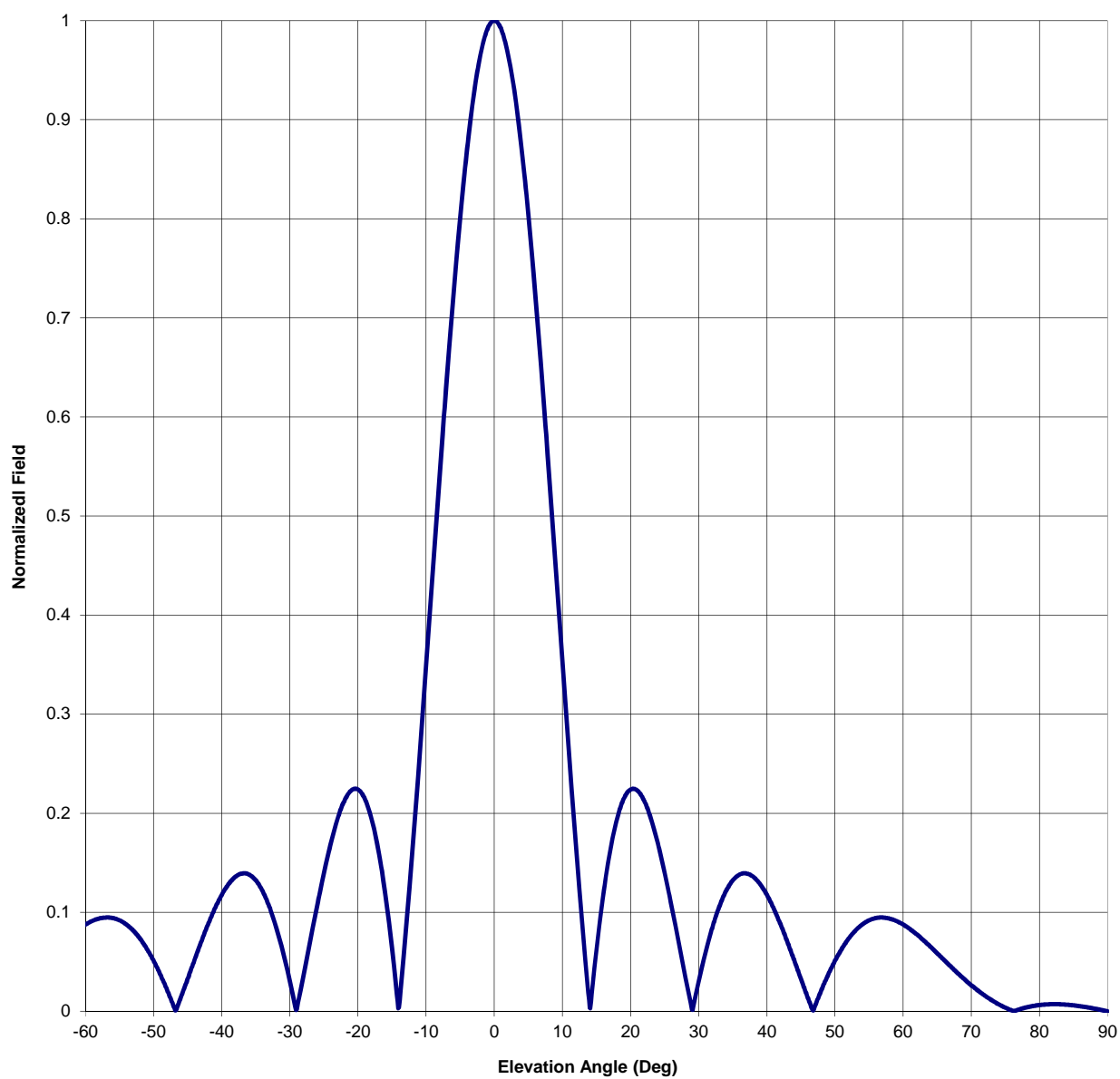


Figure H

Analysis of Signal Levels At 10 Meters Above Ground

LPFM H AGL	44	
LPFM ERP	100	
LPFM channel	237	
LPFM HAAT	30	
Interference Contour	103.6	
Highest signal at 10 m AG	101.73	Adequate Choice

Depression Angle, Degrees	Relative Field	ERP Watts	dBk	Distance to the Ground in Kilometers	Free Space Signal
90	0.000	0.0000	-344.1	0.0440	-210.04
85	0.006	0.0036	-54.4	0.0442	79.63
80	0.006	0.0040	-54.0	0.0447	79.92
75	0.004	0.0013	-58.7	0.0456	75.05
70	0.026	0.0697	-41.6	0.0468	91.94
65	0.059	0.3437	-34.6	0.0485	98.56
60	0.088	0.7683	-31.1	0.0508	101.66
55	0.092	0.8434	-30.7	0.0537	101.58
50	0.051	0.2605	-35.8	0.0574	95.89
45	0.033	0.1071	-39.7	0.0622	91.34
40	0.118	1.3815	-28.6	0.0685	101.62
35	0.132	1.7472	-27.6	0.0767	101.65
30	0.030	0.0921	-40.4	0.0880	87.67
25	0.140	1.9534	-27.1	0.1041	99.48
20	0.224	5.0132	-23.0	0.1286	101.73
15	0.062	0.3904	-34.1	0.1700	88.23
10	0.350	12.2788	-19.1	0.2534	99.74
5	0.803	64.4772	-11.9	0.5048	100.95
4	0.871	75.8534	-11.2	0.6308	99.72
3	0.926	85.7620	-10.7	0.8407	97.76
2	0.967	93.4544	-10.3	1.2608	94.61
1	0.992	98.3300	-10.1	2.5211	88.81

Notes:

Antenna radiation center above ground (meters):	44
Maximum ERP (watts) at 0° Depression angle:	100

Free Space Signal = 106.92 -20*log(distance in km) + dBk