

# ***APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT***

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WGHC-LP  
FACILITY ID: 192321  
FILE NO: BNPL-20131114AYJ

LEGEND MEDIA NETWORK GROUP

AUGUST, 2016

## **APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT**

The following engineering statement and attached exhibits have been prepared for **Legend Media Network Group** ("Legend"), permittee of low-power FM station WGHC-LP at Chicago, Illinois, and are in support of their application for modification of construction permit.<sup>1</sup> This application seeks to modify the existing construction permit for WGHC-LP by changing the elevation of the antenna center of radiation.

Legend does not propose a change in the physical location authorized under the extant construction permit.<sup>2</sup> The proposed elevation change is necessary due to permitting requirements within the city of Chicago, and limitations to the antenna supporting structure. Since no change in the channel of operation or physical location is proposed, the technical parameters specified in this application represent a minor change to the construction permit.

The site elevation is 592 feet AMSL, which corresponds to a value of 180 meters AMSL. The proposed center of radiation would be at 24 meters above ground, or 204 meters AMSL. The overall height of the supporting structure is 24 meters AGL. Average terrain for the site is determined through the value in the following table.<sup>3</sup>

<b>Azimuth</b>	<b>Average Elevation</b>	<b>COR Above Average Terrain</b>
0	178.1	26.1
180	180.7	23.5
225	184.8	19.4
270	188.9	15.3
315	185.9	18.3
	<b>Average:</b>	<b>20.5</b>

<sup>1</sup> The Facility ID for WGHC-LP at Chicago, Illinois is 192321.

<sup>2</sup> The FCC File No. of the WGHC-LP construction permit is BNPL-20131114AYJ.

<sup>3</sup> Terrain data obtained from NED 3-second linearly interpolated terrain database. Radials of azimuths 45 through 135 degrees inclusive omitted per provisions of Section 73.313 of the Commission's Rules.

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The proposed center of radiation is therefore located at 20.5 meters above average terrain. As a result, a maximum effective radiated power of 100 Watts is applicable for WGHC-LP. Exhibit E-1 illustrates the 3 and 16 kilometer radii for the proposed site, as well as the proposed 34 dBu F(50,10) contour based on an effective radiated power of 100 Watts. This map demonstrates the exclusion of the 45, 90, and 135 degree true radials is appropriate.

For reference purposes, a single channel spacing study under Exhibit E-2 is included. This study demonstrates that the proposed facility would comply with the spacing requirements of Section 73.807 to all facilities with the exception of WLUP-FM, WFMT, and W252AW, all of which are located at Chicago, Illinois.<sup>4</sup> WLUP-FM and WFMT operate second adjacent to the WGHC-LP channel, and a second adjacent waiver will be sought with respect to those two facilities. Both the license and pending application for W252AW postdate the WGHC-LP construction permit. This application does not exacerbate any short spacing with either database record.

Although the proposed facility would continue to be short spaced to both WLUP-FM and WFMT, no interference is predicted to occur to either facility in any populated region. Exhibit E-3 illustrates the WGHC-LP transmitter site along with the WLUP-FM 91.8 dBu and WFMT 91.35 dBu service contours. Since the two full-power facilities operate on second adjacent channels to WGHC-LP, interference to either would be predicted to occur when the WGHC-LP field strength is at least 40 dB above its field strength. Specifically, interference to WLUP may potentially occur in regions where the WGHC-LP field strength is 131.8 dBu, and to WFMT when 131.35 dBu. Since the latter value is the more restrictive of the two, it will be used for calculations for both facilities.

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<sup>4</sup> The facility ID numbers for WLUP-FM, WFMT, and W252AW are 73233, 10801, and 149046 respectively.

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The power density for the interfering field strength is given by the following equation:

$$S = \frac{E^2}{Z_0}$$

In this equation, S represents the calculated power density in Watts per square meter, E is the electric field intensity, and  $Z_0$  is the characteristic impedance of free space of 377 ohms.

The power density is also given by:

$$S = \frac{P}{4\pi R^2}$$

Where S is the same units, P is the total power in Watts and R is the distance from the antenna. Rearranging the terms in the equation, it can be solved for the distance to the desired power density as follows:

$$R^2 = \frac{P}{4\pi S}$$

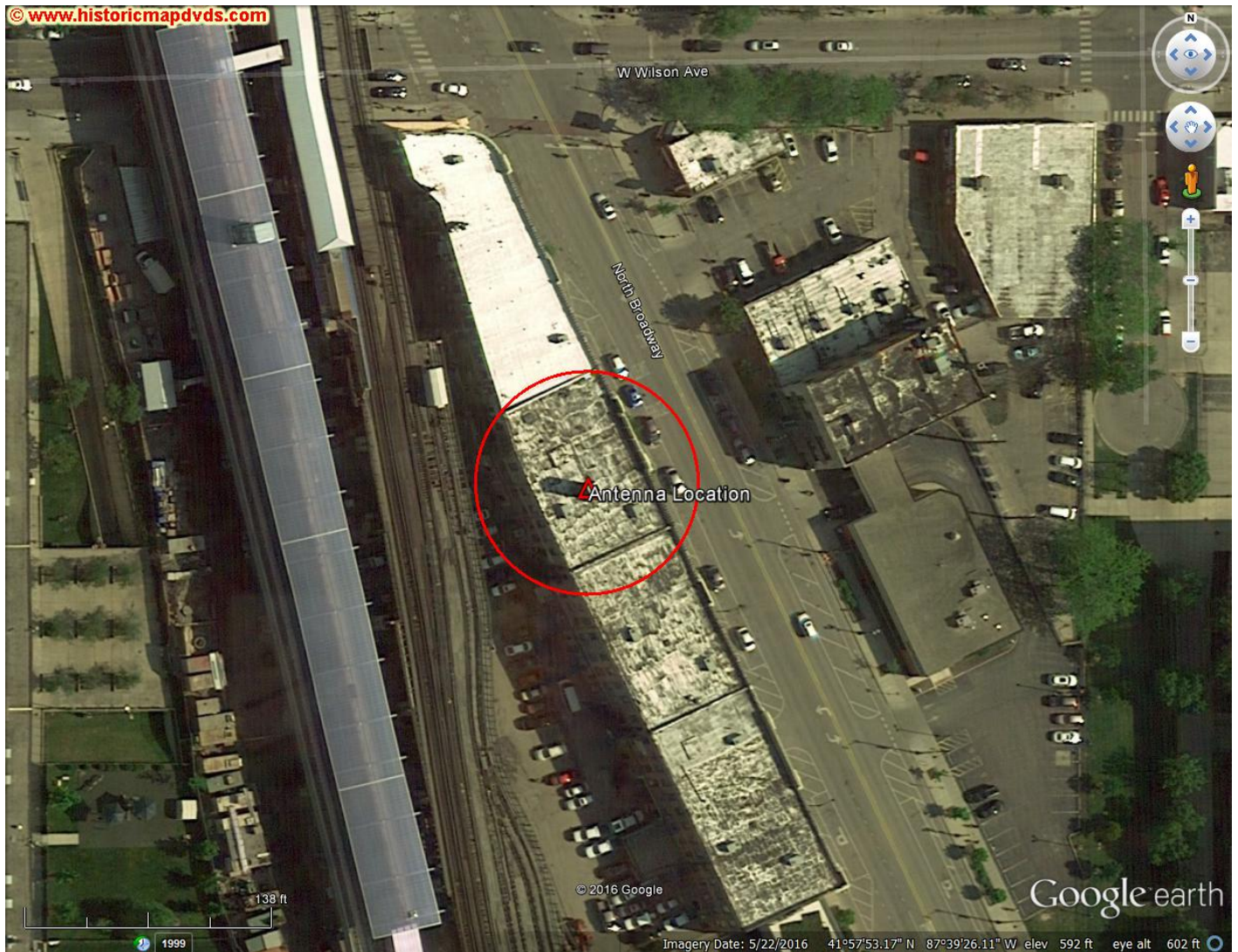
The results of these calculations for depression angles of 0 degrees to 90 degrees are tabulated in Exhibit E-4. The listed radii values indicate the region in which interference may potentially occur relative to the center of radiation of the antenna. As the values and tables indicate, this region is confined to a volume with an elevation of at least 13.5 meters above ground level, and within a horizontal range of 19 meters. These calculations are based on the actual antenna that will be utilized by the facility, which is a single bay Bext TFC2K.

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The following satellite image illustrates the location of the antenna, and the maximum horizontal radius in which interference may potentially occur.



As this map demonstrates, the only structure within the interference region is the multi-story building on which the antenna would be located. The following image is a street level photo looking northwest towards the building.

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The building is a three-story structure, with a roof height of 40 feet (12.2 meters). Since the closest approach to ground level is at 13.5 meters above ground, the interference region would be no closer to ground than 1.3 meters above the elevation of the building roof. As a result of these factors, it is respectfully submitted that the proposed facility would not result in interference to either full-power FM facility within a populated region.

The proposed facility complies with the relevant portions of Section 73.827 of the Commission's Rules. Four FM translator stations are authorized within 10 kilometers of the

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proposed site. Their information, including primary station and delivery method, is summarized in the following table.

<b>Callsign</b>	<b>Facility ID</b>	<b>City of License</b>	<b>Primary Station</b>	<b>Primary Channel</b>	<b>Delivery</b>
W216CL	91647	Chicago, IL	WBEZ	218	Other
W236CF	140658	Homewood, IL	WTMX	270	Off-Air
W244BQ	145323	Park Ridge, IL	WJKL	232	Off-Air
W248BB	144731	Hillside, IL	WEBG	238	Off-Air
W264BF	140680	Englewood, IL	WHLP	210	Off-Air
W264BK	155174	Chicago, IL	WRDZ	1300 kHz	Other
W268AY	145107	Seward Township, IL	WGRB	1390 kHz	Other
W280EM	140763	Chicago, IL	WTMX	270	Other

As this table demonstrates, none of the translators within 10 kilometers of the proposed facility is utilizing an input that is within three channels of the proposed operation.

The proposed facility would not constitute a significant environmental impact, and is exempt from environmental processing. The antenna would utilize a mast that is to be attached to the structure illustrated in previous photographs in this application. The addition of the antenna to this structure would not involve a site location specified in Section 1.1307(a)(1)-(7) of the Commission's Rules.

Additionally, the facility will not result in human exposure to radiofrequency radiation in excess of the applicable safety standards. Under a worst-case scenario, the minimum permissible distance to the antenna, without exceeding a power density of  $200 \mu\text{W}/\text{cm}^2$  would be 5.8 meters. The antenna center of radiation is 23.8 meters above ground level, and 11.6 meters above the rooftop. Thus, the area where the uncontrolled environment limit would be exceeded is 5.8 meters above the roof, or at least 3 meters above typical human height. Thus, no casual exposure to

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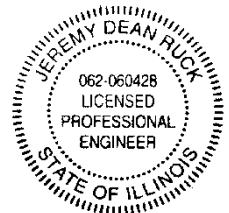
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radiofrequency radiation in excess of the uncontrolled environment limits would occur at ground level, at the rooftop level, or within the building.

Legend certifies that it will coordinate with all other users of the site to ensure that workers and other persons are not exposed to levels of radiofrequency radiation in excess of the applicable safety standards. Coordination activities will include, but are not necessarily limited to, a reduction in transmitter power or cessation of operation.

The preceding statement and attached exhibits have been prepared by me, or under my direction, and are true and accurate to the best of my belief and knowledge.



Above signature is digitized copy of actual signature  
License Expires November 30, 2017

Jeremy D. Ruck, PE  
August 19, 2016

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**WGHC-LP.C**

BNPL20131114AYJ

Latitude: 41-57-53 N

Longitude: 087-39-26.10 W

ERP: 0.10 kW

Channel: 252

Frequency: 98.3 MHz




AMSL Height: 204.2 m

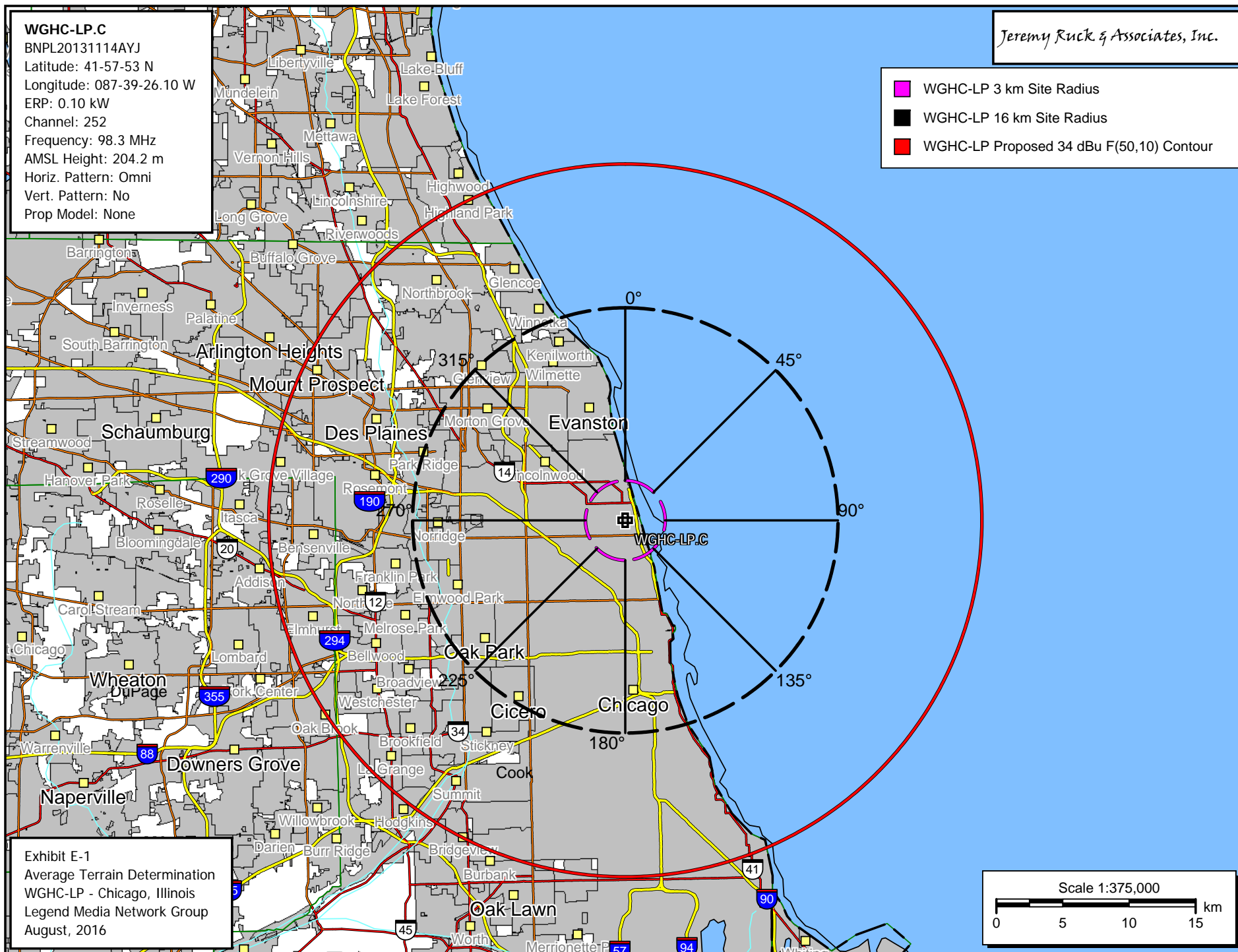
Horiz. Pattern: Omni

Vert. Pattern: No

Prop Model: None

*Jeremy Ruck & Associates, Inc.*

-  WGHC-LP 3 km Site Radius
-  WGHC-LP 16 km Site Radius
-  WGHC-LP Proposed 34 dBu F(50,10) Contour

**Exhibit E-1**

Average Terrain Determination

WGHC-LP - Chicago, Illinois

Legend Media Network Group

August, 2016

Jeremy Ruck & Associates, Inc.  
Consulting Engineers - Canton, Illinois  
Exhibit E-2 - Single Channel Spacing Study  
WGHC-LP - Chicago, Illinois

REFERENCE		DISPLAY DATES
41 57 53.0 N.	CLASS = L1	DATA 08-19-16
87 39 26.0 W.	Current Spacings to 2nd Adj.	SEARCH 08-19-16
----- Channel 252 - 98.3 MHz -----		

Call	Channel	Location	Azi	Dist	FCC	Margin
WLUP-FM	LIC 250B	Chicago	IL 158.9	7.84	66.5	-58.7
WFMT	LIC-N 254B	Chicago	IL 169.4	9.70	66.5	-56.8
WGHC-LP	CP 252L1	Chicago	IL 323.4	0.01	23.5	-23.5
W252AW	LIC-D 252D	Chicago	IL 243.6	23.90	38.5	-14.6
W252AW	APP-D 252D	Chicago	IL 181.5	22.19	31.5	-9.3
WCCQ	LIC 252A	Crest Hill	IL 216.7	73.31	66.5	6.8
WQEG-LP	CP 252L1	Chicago	IL 303.0	32.10	23.5	8.6
WRLR-LP	LIC 252L1	Round Lake Heights	IL 322.4	59.30	23.5	35.8
WYMR	LIC-Z 252A	Culver	IN 129.0	113.02	66.5	46.5
WCXT	LIC 252A	Hartford	MI 73.1	113.91	66.5	47.4

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All separation margins include rounding

**WGHC-LP.C**

BNPL20131114AYJ  
Latitude: 41-57-53 N  
Longitude: 087-39-26.10 W  
ERP: 0.10 kW  
Channel: 252  
Frequency: 98.3 MHz  
AMSL Height: 204.2 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

**WLUP-FM**

BMLH20110629BQR  
Latitude: 41-53-56 N  
Longitude: 087-37-23 W  
ERP: 4.00 kW  
Channel: 250  
Frequency: 97.9 MHz  
AMSL Height: 606.0 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

**WFMT**

BMLH20090415AAX  
Latitude: 41-52-44 N  
Longitude: 087-38-08 W  
ERP: 6.00 kW  
Channel: 254  
Frequency: 98.7 MHz  
AMSL Height: 651.0 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

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- WLUP-FM 91.8 dBu Service Contour
- WFMT 91.35 dBu Service Contour

FCC F(50-50) 91.80 dBu (FCC HAAT)

FCC F(50-50) 91.35 dBu (FCC HAAT)

WGHC-LP Site

WGHC-LP.C

WLUP Transmitter Site

WLUP-FM

WFMT Transmitter Site

WFMT

Oak Park

Exhibit E-3  
Interference Study  
WGHC-LP - Chicago, Illinois  
Legend Media Network Group  
August, 2016

Scale 1:100,000

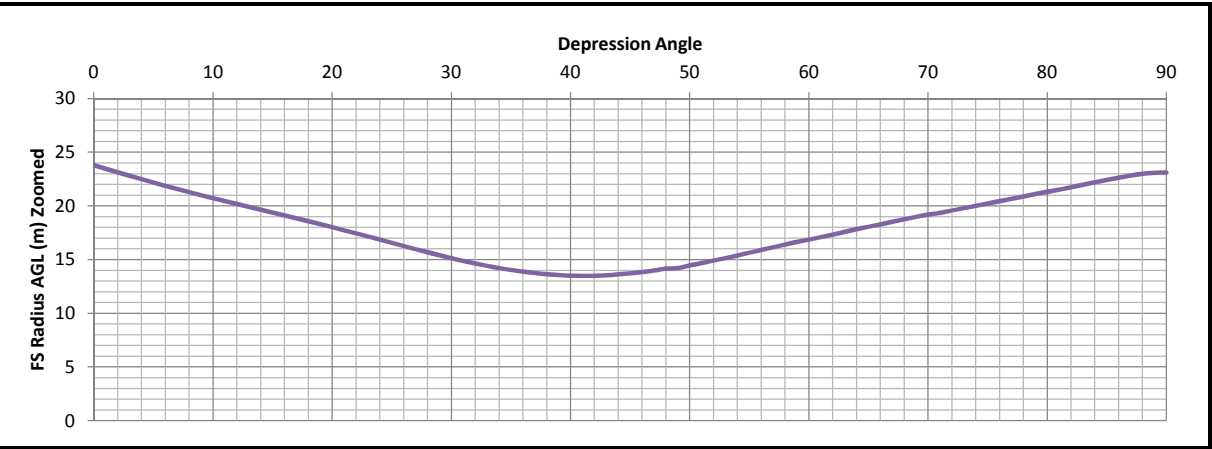
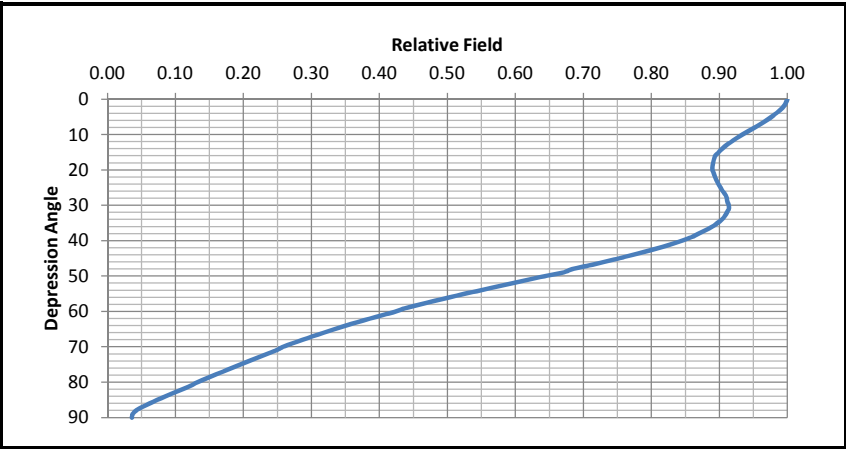
0 1 2 3 km

Exhibit E-4

Proximity Interference Analysis

WGHC-LP - Chicago, Illinois

Antenna No:	12	⬆	⬆	Center of Radiation:	23.8 m AGL
Manufacturer:	Bext	⬆	⬆	Effective Radiated Power:	100 Watts
Model:	TFC1K-1			FS Contour:	131.35 dBu
Number of Bays:	1			E Field Strength:	3.69403 V/m
Bay Spacing:	Lambda			Z0:	377 Ohms
				Power Density:	0.036195839 W/m^2



Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
0	1.0000	1.0000	100.00	18.99	18.99	0.00	23.80
1	0.9980	0.9960	99.60	18.95	18.95	0.33	23.47
2	0.9950	0.9900	99.00	18.89	18.88	0.66	23.14
3	0.9900	0.9801	98.01	18.80	18.77	0.98	22.82
4	0.9830	0.9663	96.63	18.67	18.62	1.30	22.50
5	0.9770	0.9545	95.45	18.55	18.48	1.62	22.18
6	0.9690	0.9390	93.90	18.40	18.30	1.92	21.88
7	0.9610	0.9235	92.35	18.25	18.11	2.22	21.58
8	0.9520	0.9063	90.63	18.08	17.90	2.52	21.28
9	0.9430	0.8892	88.92	17.91	17.69	2.80	21.00
10	0.9340	0.8724	87.24	17.74	17.47	3.08	20.72
11	0.9250	0.8556	85.56	17.56	17.24	3.35	20.45
12	0.9180	0.8427	84.27	17.43	17.05	3.62	20.18
13	0.9100	0.8281	82.81	17.28	16.84	3.89	19.91
14	0.9040	0.8172	81.72	17.17	16.66	4.15	19.65
15	0.8990	0.8082	80.82	17.07	16.49	4.42	19.38
16	0.8940	0.7992	79.92	16.98	16.32	4.68	19.12
17	0.8920	0.7957	79.57	16.94	16.20	4.95	18.85
18	0.8910	0.7939	79.39	16.92	16.09	5.23	18.57
19	0.8900	0.7921	79.21	16.90	15.98	5.50	18.30
20	0.8900	0.7921	79.21	16.90	15.88	5.78	18.02
21	0.8920	0.7957	79.57	16.94	15.81	6.07	17.73
22	0.8940	0.7992	79.92	16.98	15.74	6.36	17.44
23	0.8960	0.8028	80.28	17.01	15.66	6.65	17.15
24	0.8990	0.8082	80.82	17.07	15.59	6.94	16.86
25	0.9020	0.8136	81.36	17.13	15.52	7.24	16.56
26	0.9050	0.8190	81.90	17.18	15.45	7.53	16.27
27	0.9090	0.8263	82.63	17.26	15.38	7.84	15.96
28	0.9110	0.8299	82.99	17.30	15.27	8.12	15.68
29	0.9120	0.8317	83.17	17.32	15.15	8.40	15.40
30	0.9140	0.8354	83.54	17.36	15.03	8.68	15.12
31	0.9140	0.8354	83.54	17.36	14.88	8.94	14.86
32	0.9110	0.8299	82.99	17.30	14.67	9.17	14.63
33	0.9080	0.8245	82.45	17.24	14.46	9.39	14.41
34	0.9040	0.8172	81.72	17.17	14.23	9.60	14.20
35	0.8970	0.8046	80.46	17.03	13.95	9.77	14.03
36	0.8900	0.7921	79.21	16.90	13.67	9.93	13.87
37	0.8800	0.7744	77.44	16.71	13.35	10.06	13.74
38	0.8690	0.7552	75.52	16.50	13.00	10.16	13.64
39	0.8590	0.7379	73.79	16.31	12.68	10.26	13.54
40	0.8450	0.7140	71.40	16.05	12.29	10.31	13.49
41	0.8290	0.6872	68.72	15.74	11.88	10.33	13.47
42	0.8110	0.6577	65.77	15.40	11.44	10.30	13.50
43	0.7930	0.6288	62.88	15.06	11.01	10.27	13.53
44	0.7720	0.5960	59.60	14.66	10.54	10.18	13.62
45	0.7520	0.5655	56.55	14.28	10.10	10.10	13.70

Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
45	0.7520	0.5655	56.55	14.28	10.10	10.10	13.70
46	0.7300	0.5329	53.29	13.86	9.63	9.97	13.83
47	0.7080	0.5013	50.13	13.44	9.17	9.83	13.97
48	0.6840	0.4679	46.79	12.99	8.69	9.65	14.15
49	0.6700	0.4489	44.89	12.72	8.35	9.60	14.20
50	0.6430	0.4134	41.34	12.21	7.85	9.35	14.45
51	0.6190	0.3832	38.32	11.75	7.40	9.13	14.67
52	0.5950	0.3540	35.40	11.30	6.96	8.90	14.90
53	0.5720	0.3272	32.72	10.86	6.54	8.67	15.13
54	0.5490	0.3014	30.14	10.42	6.13	8.43	15.37
55	0.5250	0.2756	27.56	9.97	5.72	8.17	15.63
56	0.5030	0.2530	25.30	9.55	5.34	7.92	15.88
57	0.4810	0.2314	23.14	9.13	4.97	7.66	16.14
58	0.4600	0.2116	21.16	8.73	4.63	7.41	16.39
59	0.4390	0.1927	19.27	8.34	4.29	7.15	16.65
60	0.4240	0.1798	17.98	8.05	4.03	6.97	16.83
61	0.4050	0.1640	16.40	7.69	3.73	6.73	17.07
62	0.3860	0.1490	14.90	7.33	3.44	6.47	17.33
63	0.3680	0.1354	13.54	6.99	3.17	6.23	17.57
64	0.3500	0.1225	12.25	6.65	2.91	5.97	17.83
65	0.3340	0.1116	11.16	6.34	2.68	5.75	18.05
66	0.3180	0.1011	10.11	6.04	2.46	5.52	18.28
67	0.3020	0.0912	9.12	5.73	2.24	5.28	18.52
68	0.2870	0.0824	8.24	5.45	2.04	5.05	18.75
69	0.2720	0.0740	7.40	5.16	1.85	4.82	18.98
70	0.2580	0.0666	6.66	4.90	1.68	4.60	19.20
71	0.2480	0.0615	6.15	4.71	1.53	4.45	19.35
72	0.2340	0.0548	5.48	4.44	1.37	4.23	19.57
73	0.2210	0.0488	4.88	4.20	1.23	4.01	19.79
74	0.2080	0.0433	4.33	3.95	1.09	3.80	20.00
75	0.1950	0.0380	3.80	3.70	0.96	3.58	20.22
76	0.1820	0.0331	3.31	3.46	0.84	3.35	20.45
77	0.1700	0.0289	2.89	3.23	0.73	3.15	20.65
78	0.1570	0.0246	2.46	2.98	0.62	2.92	20.88
79	0.1440	0.0207	2.07	2.73	0.52	2.68	21.12
80	0.1320	0.0174	1.74	2.51	0.44	2.47	21.33
81	0.1220	0.0149	1.49	2.32	0.36	2.29	21.51
82	0.1100	0.0121	1.21	2.09	0.29	2.07	21.73
83	0.0970	0.0094	0.94	1.84	0.22	1.83	21.97
84	0.0850	0.0072	0.72	1.61	0.17	1.61	22.19
85	0.0730	0.0053	0.53	1.39	0.12	1.38	22.42
86	0.0620	0.0038	0.38	1.18	0.08	1.17	22.63
87	0.0510	0.0026	0.26	0.97	0.05	0.97	22.83
88	0.0420	0.0018	0.18	0.80	0.03	0.80	23.00
89	0.0370	0.0014	0.14	0.70	0.01	0.70	23.10
90	0.0360	0.0013	0.13	0.68	0.00	0.68	23.12

