



Kessler and Gehman Associates
Consultants • Broadcast • Wireless

MINOR MODIFICATION TO A LICENSED NON-COMMERCIAL FM BROADCAST STATION

CALL SIGN: WMBR(FM)
FACILITY ID: 64683
FCC FILE NO.: BLED-19950727KD
LOCATION: CAMBRIDGE, MA

Prepared For:

Technology Broadcasting
Corporation
C/o WMBR, 3 Ames Street
Cambridge, MA 02142

Prepared By:

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October 21, 2019

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1.0 PURPOSE OF FM MODIFICATION APPLICATION

Technology Broadcasting Corporation is licensed¹ to operate WMBR(FM) on Channel 201 with an ERP of 720W from an antenna which is mounted on a short tower section atop the roof of an existing building. The existing building is scheduled for demolition as soon as a new building of similar height is erected across the street. As with the existing building, the new building will have a tower section installed on the roof which rises 30' above the elevator shaft and shall be used to support the WMBR(FM) antenna and is the subject of the proposed modification.

2.0 ANTENNA ELEVATIONS

The proposed two bay FM facility shall be mounted at 107.3m Above Ground Level (AGL) or 110.3m Above Mean Sea Level (AMSL) as illustrated in Appendix A. Appendix B determines that the antenna Height Above Average Terrain (HAAT) as calculated and rounded by the FCC is 92m.

3.0 EFFECTIVE RADIATED POWER

Pursuant to 47 C.F.R. Section 73.211(b) entitled "Maximum limits", Class A FM stations will be authorized to operate with maximum facilities of 6kW ERP at 100 meters HAAT. An FM station with an HAAT that exceeds 100 meters will not be permitted to operate with an ERP greater than that which would result in a 60 dBu contour of 28.3 kilometers. Since the calculated HAAT is 92m and the proposed ERP is 640 Watts, the proposed facility is well within the 6kW / 100m 28.3km contour threshold.

¹ FCC File No.: BLED-19950727KD

4.0 FREQUENCY ALLOCATION STUDY

Appendix E demonstrates compliance with the following sections of the FCC rules:

- 47 CFR § 73.509 – Contour overlap Protection
- 47 CFR § 73.207 – Spacing Requirements
- 47 CFR § 73.525 – Television Channel 6 Protection

All contours were generated in accordance with 47 CFR § 73.333 engineering charts utilizing FCC 30 arc second terrain data. Appendix E illustrates prohibited contour overlap is caused by the licensed and proposed WMBR(FM) 54 dB μ V/m F(50,10) interfering contours which encroach within the WIQH(FM) 60 dB μ V/m F(50,50) protected contour. As demonstrated the proposed overlap area is 100% subsumed by the licensed overlap area and thus not new interference will be caused by the proposed facility and is thus compliant.

5.0 FM TRANSMITTER LOCATION AND COVERAGE REQUIREMENTS

Appendix F demonstrates that the transmitter location has been chosen so that, on the basis of the effective radiated power and antenna height above average terrain employed, a minimum field strength of 60 dB μ V/m (1-mV/m) will be provided over the entire principal community of Cambridge, MA.

6.0 AM STATION PROXIMITY

Pursuant to 47 C.F.R. Section 1.30002(b), there are no AM Stations located within 3km of the proposed facility.

7.0 INTERNATIONAL COORDINATION

The proposed facility is within 320km of the Canadian border and is subject to international coordination.

8.0 RADIO FREQUENCY RADIATION COMPLIANCE

A theoretical analysis has been conducted of the human exposure to radio frequency radiation (“RFR”) using the calculation methodology described in OET Bulletin 65, Edition 97-01. The RFR analysis is conducted pursuant to the following methodology:

Terrain extraction is compiled from the proposed tower site to radial lengths of 0.25 miles in 0.001 mile increments for 360 radials. The power density is calculated for each terrain point at 6 feet above ground level using the elevation and azimuth pattern of the proposed broadcast antenna. The power density calculations are conducted using the lower edge of the proposed channel frequency. To account for ground reflections, a coefficient of 1.6 was included in the calculation.

The resulting cylindrical polar analysis is then summarized into a coordinate plane graph using the following methodology:

Starting from the origin the maximum calculated RFR value is determined among the 360-degree radials for each 0.001 mile increment, the value is then converted into a percentage of the maximum allowable general population or uncontrolled exposure and plotted as a function of perpendicular distance from the tower.

The resulting RFR study in Appendix H demonstrates that the peak exposure is 57.9% of the most restrictive permissible exposure threshold at any location on

the roof which is not accessible to the public or 28.8% at any location upon the top floor which is accessible to the public. Pursuant to OET Bulletin 65 concerning multiple-user transmitter sites only those licensees whose transmitters produce power density levels greater than 5.0% of the exposure limit are considered significant contributors to RFR. Since the proposed operation is over 5% of the most permissible exposure at any location 2 meters above the ground, it is considered a significant contributor to RFR exposure. Thus, contributions to exposure from other RF sources in the vicinity of the proposed facility must be taken into account to which there are none to consider. The instant application is compliant with the FCC limits for human exposure to RF radiation and is excluded from further environmental processing.

9.0 CERTIFICATION

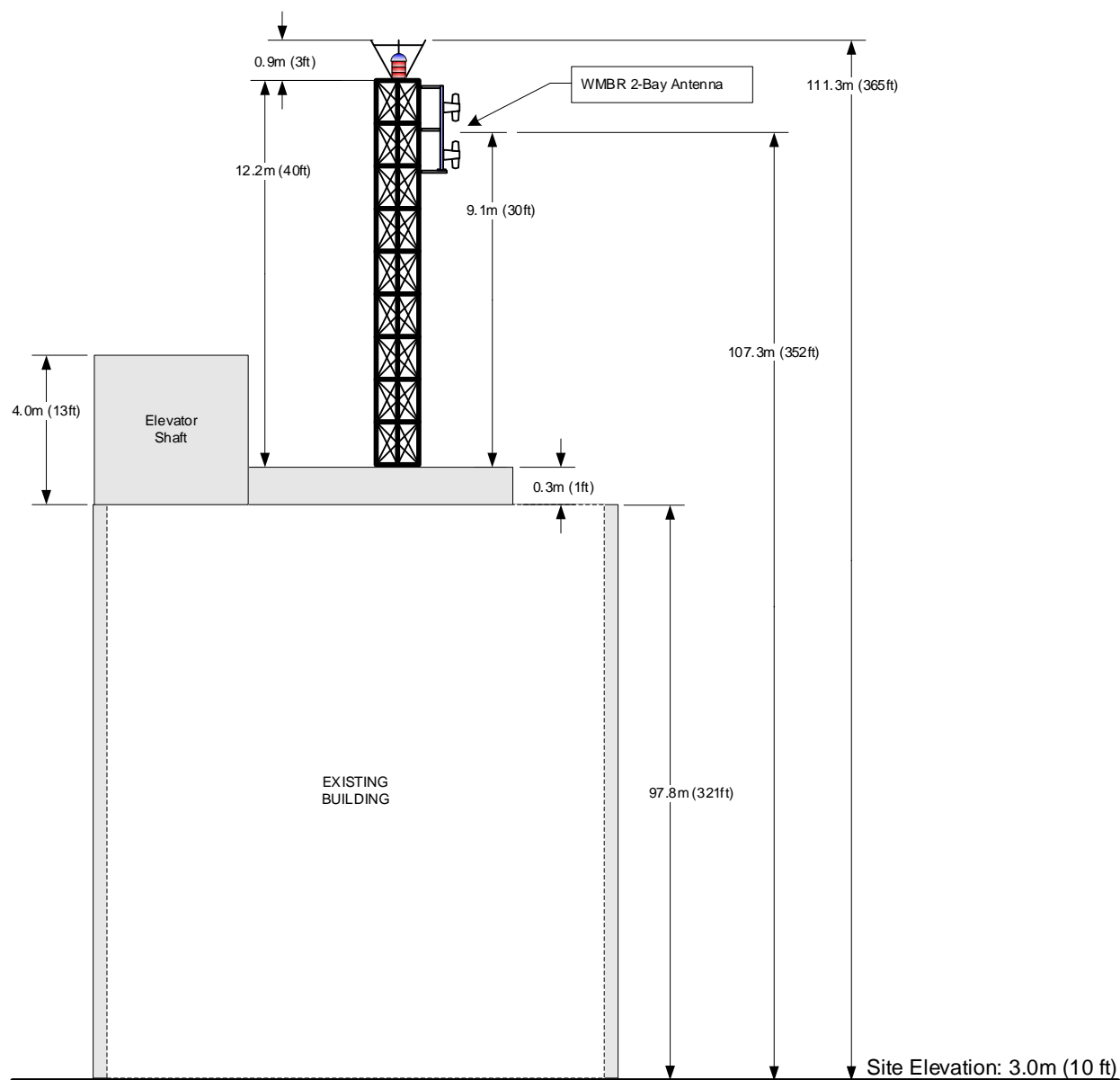
The foregoing statement and the report regarding the aforementioned engineering work are true and correct to the best of my knowledge. Executed on October 21, 2019.

KESSLER AND GEHMAN ASSOCIATES, INC.



Ryan Wilhour
Consulting Engineer

APPENDIX A – Tower Elevation Profile



Overall Height AGL:	365 ft / 111.3 m
Radiation Center AGL:	352 ft / 107.3 m
Radiation Center AMSL:	362 ft / 110.3 m
Radiation Center HAAT:	92 m
FAA Study Number	2019-ANE-3911-OE

NAD 83 Coordinates:	
N. Latitude:	42° 21' 42.1"
W. Longitude:	71° 5' 07.9"
NOTE:	NOT TO SCALE

APPENDIX B – Height Above Average Terrain Calculation

The Height Above Average Terrain (HAAT) was calculated from the FCC's HAAT Calculator tool:

<https://www.fcc.gov/media/radio/haat-calculator>

Results are as follows:

Antenna Height Above Average Terrain Calculations -- Results

Input Data

Latitude **42° 21' 42.1" North**

Longitude **71° 5' 7.9" West (NAD 83)**

These coordinates convert to NAD 27 coordinates of
42° 21' 41.75", North, 71° 05' 09.71" West (NAD 27).

Height of antenna radiation center above mean sea level: **110.3 meters AMSL**

Number of Evenly Spaced Radials = **8** 0° is referenced to True North

Results

Calculated HAAT = 92 meters

Antenna Height Above Average Terrain calculated
using FCC 30 second terrain database (continental USA only)

Individual "Radial HAAT" Values, in meters

0°	83.0 m
45°	104.8 m
90°	110.1 m
135°	109.0 m
180°	85.8 m
225°	75.4 m
270°	95.7 m
315°	74.2 m

APPENDIX C – Class B Equivalent Power Determination

The ERP was calculated from the FCC's "FMPOWER" tool:

<https://www.fcc.gov/media/radio/fmpower>

Results are as follows:

FMpower Results

NOTE: The calculated ERP exceeds the maximum ERP of **6.000 kW** permitted for Class A stations. Maximum coverage for the station class cannot be achieved using this HAAT.

Use of the 7.200 kW ERP for a Class A station in a construction permit or license application to the FCC will cause that application to be unacceptable and subject to dismissal.

6 kW ERP Class A facilities for equivalency determination:

Reference ERP = 6.000 kW ERP

Reference HAAT= 100 meters HAAT

F(50.50) 60 dBu protected contour at 28.3 km distance

Equivalent ERP = 7.200 kilowatts (kW)
(rounded per 47 CFR 73.212)

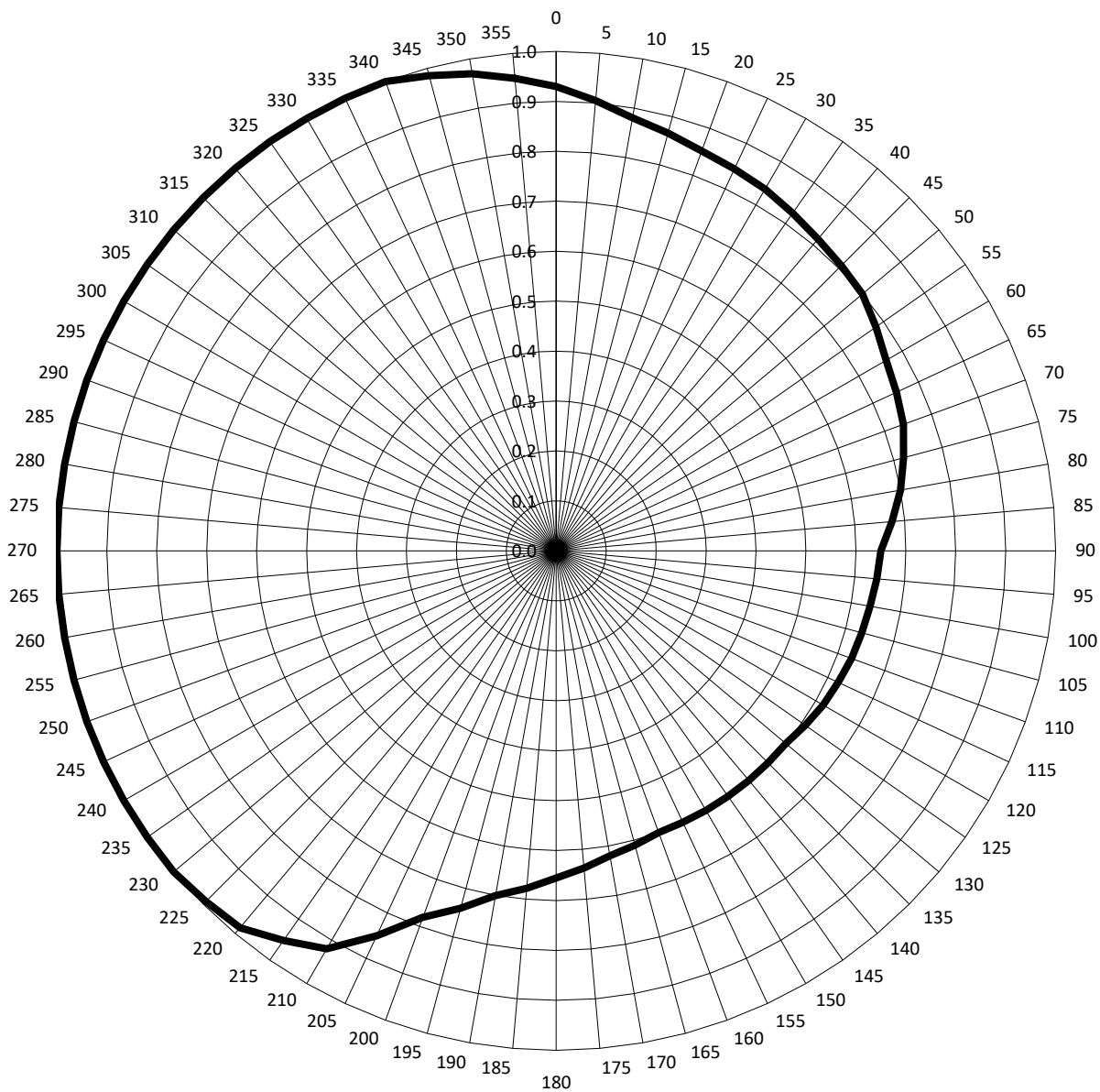
Unrounded ERP = 7.159 kW for 92 meters HAAT

Class A FM stations are authorized throughout the United States.

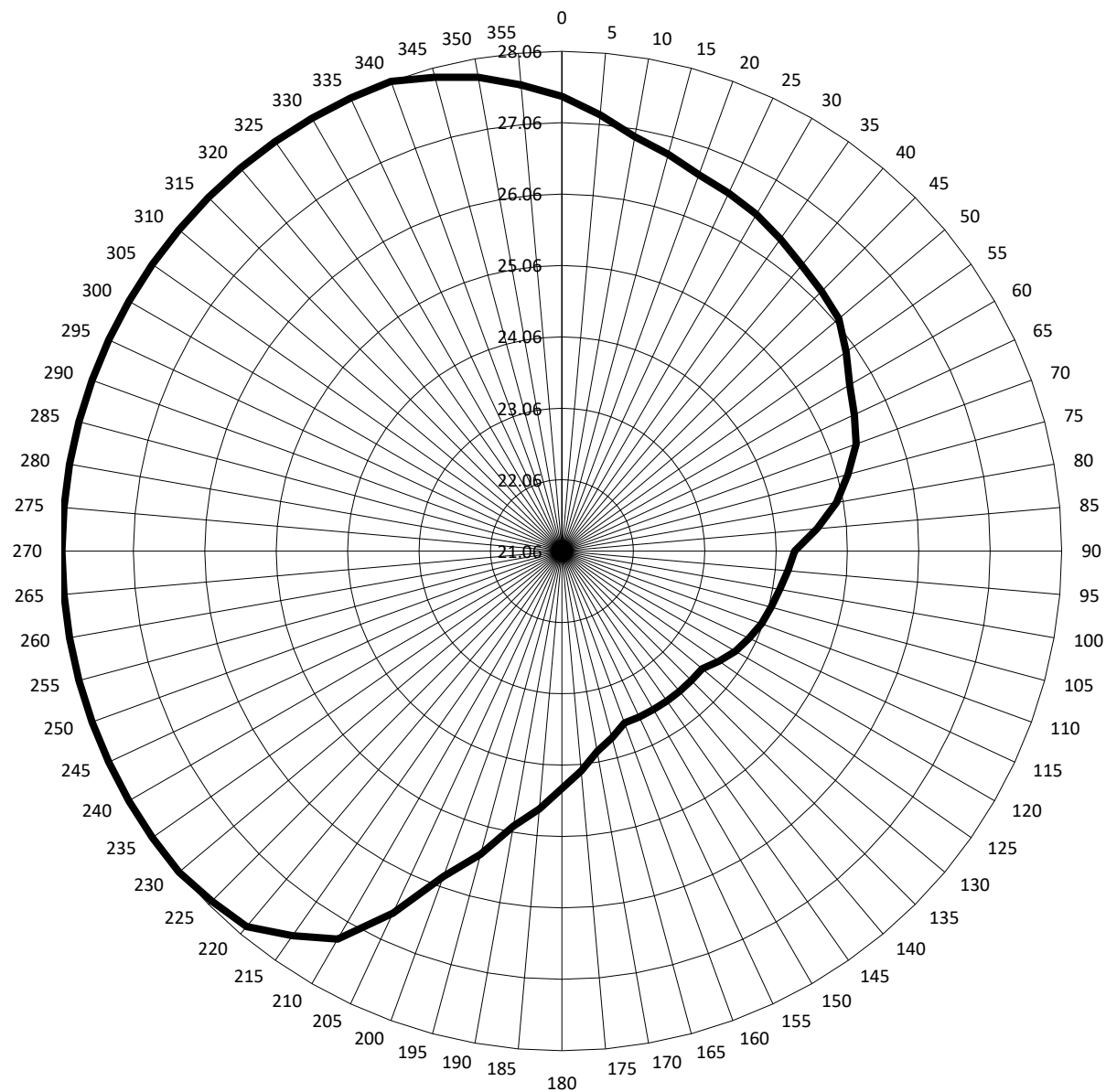
APPENDIX D – Proposed Antenna Azimuth Pattern

<u>AZIMUTH</u>	<u>RELATIVE FIELD</u>	<u>AZIMUTH</u>	<u>RELATIVE FIELD</u>
N000°E	0.930	N180°E	0.655
N010°E	0.880	N190°E	0.701
N020°E	0.852	N200°E	0.781
N030°E	0.836	N210°E	0.920
N040°E	0.815	N220°E	0.985
N050°E	0.800	N230°E	1.000
N060°E	0.763	N240°E	1.000
N070°E	0.740	N250°E	1.000
N080°E	0.700	N260°E	1.000
N090°E	0.650	N270°E	1.000
N100°E	0.638	N280°E	1.000
N110°E	0.629	N290°E	1.000
N120°E	0.617	N300°E	1.000
N130°E	0.600	N310°E	1.000
N140°E	0.600	N320°E	1.000
N150°E	0.600	N330°E	1.000
N160°E	0.600	N340°E	1.000
N170°E	0.620	N350°E	0.970

RELATIVE FIELD AZIMUTH PATTERN



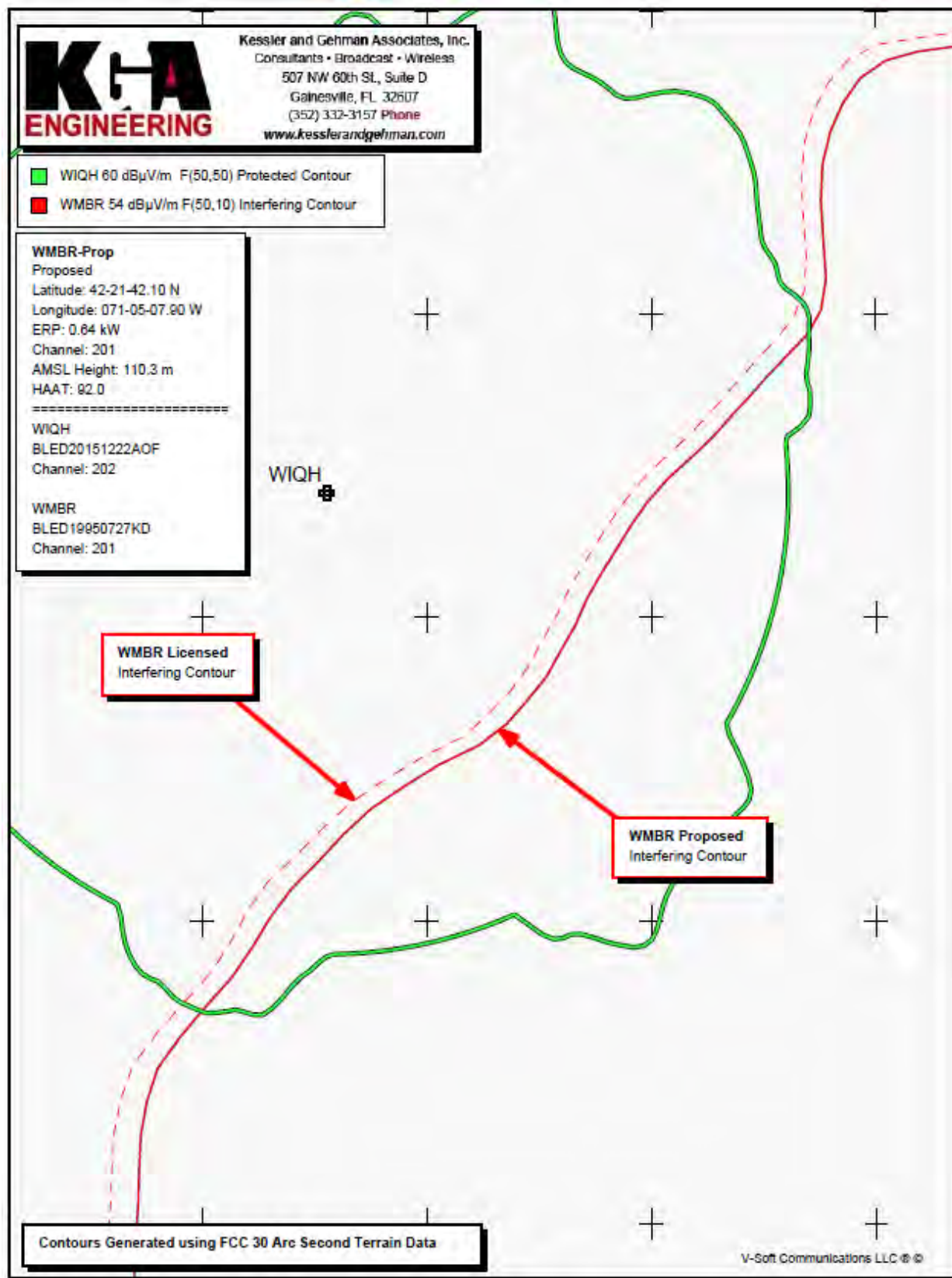
ERP - dBW



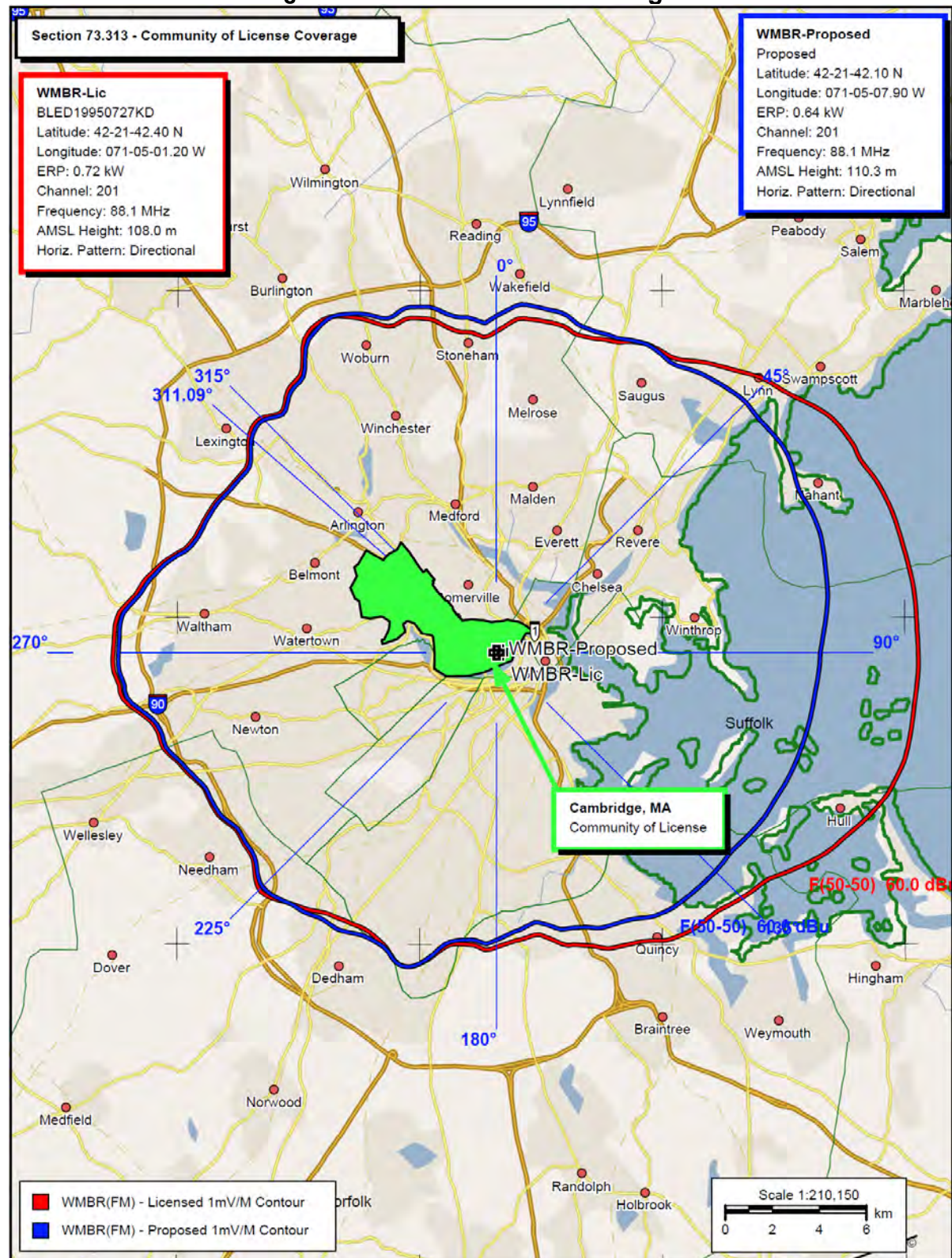
APPENDIX E – Allocation Studies and Maps

TECHNOLOGY BROADCASTING CORPORATION											
REFERENCE		CH# 201A - 88.1 MHz, Pwr= 0.64 kW DA, HAAT= 92.0 M, COR= 110.3 M								DISPLAY DATES	
42 21 42.1 N.		Average Protected F(50-50)= 15.7 km								DATA 10-14-19	
71 05 07.9 W.		Standard Directional								SEARCH 10-14-19	
CH	CALL	TYPE	ANT	AZI.	DIST	LAT.	Pwr(kW)	INT(km)	PRO(km)	*IN*	*OUT*
CITY		STATE		<--	FILE #	LNG.	HAAT(M)	COR(M)	LICENSEE	(Overlap in km)	
202A	WIQH	LIC		293.9	23.57	42 26 49.7	0.100	8.0	5.6	2.2	2.0<
Concord		MA		113.7	BLED20151222AOF	71 20 51.7	28	81	Concord-Carlisle Regional		
201A	WELH	LIC D		198.9	59.20	41 51 27.0	4.000	42.9	11.7	2.8	0.7
Providence		RI		18.8	BLED20101015ACD	71 19 03.7	41	72	The Wheeler School		
202A	WBMT	LIC		17.0	30.87	42 37 38.3	0.660	12.8	9.1	4.1	0.9
Boxford		MA		197.1	BLED20030801AHE	70 58 30.1	10	37	Masconomet Regional School		
201A	WCHC	LIC		257.2	61.16	42 14 15.3	0.100	28.3	8.6	18.3	1.9
Worcester		MA		76.7	BLED19880916KA	71 48 29.2		195	College Of The Holy Cross		
202A	WRPS	LIC		151.7	29.44	42 07 42.3	0.105	9.7	6.8	6.9	3.5
Rockland		MA		331.8	BLED20130207AAN	70 54 58.1	46	76	Rockland Public Schools		
202A	WGAO	LIC		220.1	40.06	42 05 08.3	0.175	14.4	10.4	12.1	9.5
Franklin		MA		39.9	BLED19941229KB	71 23 52.2	58	131	Dean College		
203A	WWRN	LIC D		50.9	40.68	42 35 30.3	2.700	1.8	17.8	24.0	21.4
Rockport		MA		231.1	BLED20160321AAL	70 42 02.1	59	65	Horizon Christian Fellowsh		
202A	WEVS	LIC D		323.4	53.91	42 45 00.3	5.000	15.4	10.9	24.4	22.0
Nashua		NH		143.1	BLED20050720ACY	71 28 45.2	21	89	New Hampshire Public Radio		
202A	WEVS	CP D		323.3	53.91	42 44 58.1	5.000	15.3	10.8	24.6	22.1
Nashua		NH		143.0	BPED20190722AAI	71 28 49.5	21	89	New Hampshire Public Radio		
201B	WNCH	LIC D		317.5	163.51	43 26 15.3	1.550	122.6	50.4	27.7	66.3
Norwich		VT		136.6	BMLD20120821ABW	72 27 06.3	686	973	Vermont Public Radio		
201A	WFHL	LIC		167.5	82.35	41 38 15.4	0.300	24.9	7.4	45.7	34.5
New Bedford		MA		347.7	BLED20100622ACC	70 52 17.1	41	51	New Bedford Christian Radi		
203A	WRRS	LIC		160.4	53.01	41 54 43.4	0.060	0.5	8.4	40.2	43.5
Middleborough Cente		MA		340.5	BLED20171226AAN	70 52 13.1	80	101	Talking Information Center		
06 1	WRGB	APP	HN	278.0	242.21	42 37 31.3	60.000	32.2	118.5	150.7R	91.5M
Schenectady		NY		96.0	0000035659	74 00 36.7	392	649			
06 1	WRGB	STA	HN	278.0	242.21	42 37 31.3	60.000	32.2	118.5	150.7R	91.5M
Schenectady		NY		96.0	0000035622	74 00 36.7	392	649			
6 --	WRGB-A	CHA	Y	278.0	242.20	42 37 31.3	30.200	32.2	110.1	142.3R	99.9M
Schenectady		NY		96.0	DTVBL73942	74 00 36.4	392	649			
06 1	WRGB	LI	HN	278.0	242.21	42 37 31.3	30.200	32.2	110.1	142.3R	99.9M
Schenectady		NY		96.0	BMLCDT-20110816AAF	74 00 36.7	392	649			

Terrain database is USGS 03 SEC, R= 73.215 qualifying spacings or FCC minimum spacings in KM, M= Margin in KM
Contour distances are on direct line to and from reference station. Reference Zone= , Co to 3rd adjacent.
All separation margins (if shown) include rounding. Call signs with exclamation marks need not be protected.
Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamttilt(Y,N,X)
« = Station meets FCC minimum distance spacing for its class.
< = Contour Overlaps



APPENDIX F – 47 CFR § 73.313 - Prediction of coverage



APPENDIX G – Topographical Site Location Map



APPENDIX H – OET65 Far Field Exposure to RF Emissions

