



March 25, 2023

Engineering Statement, on behalf of Four Rivers Community Broadcasting

This application proposes to change the channel of **W285EW** from channel 285 to channel 289.

W285EW receives incoming interference on its licensed channel from both WSJO, Egg Harbor NJ and WIOV-FM, Ephrata, PA. The applicant proposes to change the channel to channel 289. This frequency is one channel outside of the minor change channels. Such a move in frequency is generally acceptable when the licensed frequency sees interference.

Using the **GLOBE terrain** elevation database, we have determined that the HAAT should be corrected to 42 meters. A modern review of the base elevation finds it is 95 meters and the antenna height above ground is 51 meters for a total 145 meters AMSL. No change is proposed to the licensed coordinates. The Commission's GLOBE, 30 arc-second, terrain database was selected for use throughout these documents.

Page #2 of this collection of documents is a contour-to-contour table showing use of the proposed channel 289, will not cause contour overlap to other stations or applications except for two 2nd adjacent stations. (WUMR, Philadelphia and WDAS-FM, Philadelphia.) Pages #3 and #4 of our "XField" studies show that, based on the distances, antenna heights, patterns, and power the actual interference from the proposal will not touch the ground.

Page #5 is a tabular channel-study at the existing licensed location for channel 285 documenting the existence of incoming interference contour overlap.

Page #6 shows the proposed Shively 6812B antenna vertical elevation field pattern, and on Page #7 we show its azimuth graph.

Page #8 is an R.F. power density study proving that the transmitter fully meets the Commission's requirements for protection to workers and the public.

Page #9 is a coverage map of Proposed 60 dBu service contour. This is followed on page #10 by a table of the distances to contour and HAATs.

Page #11 is a certification of my qualifications.

Consequently, this application meets all requirements for a construction permit grant.

Proposed Channel 289 Contour-to-Contour Study

Four Rivers Community Broadcasting

REFERENCE CH# 289D - 105.7 MHz, Pwr= 0.072 kW DA, HAAT= 42.0 M, COR= 145 M DISPLAY DATES
40 14 18.30 N. Average Protected F(50-50)= 6.1 km DATA 03-05-23
75 18 58.60 W. Standard Directional SEARCH 03-05-23

CH CITY	CALL	TYPE ANT STATE	AZI <--	DIST FILE #	LAT LNG	PWR (kW) HAAT (M)	INT (km) COR (M)	PRO (km) LICENSEE (Overlap	*OUT* in km)
291B Philadelphia	WUMR	LIC_CN PA	146.4 326.5	20.75 BMLH19850405KC	40 04 58.30 75 10 52.60	22.500 226	5.6 291	63.6 Ihm Licenses, LLC	-43.8*
287B Philadelphia	WDAS-FM	LIC_CN PA	163.4 343.4	22.81 BLH19930208KK	40 02 30.40 75 14 22.60	16.500 266	5.5 334	64.2 Ihm Licenses, LLC	-42.3*
286B Ephrata	WIOV-FM	LIC_CN PA	264.6 84.1	71.84 BLH19980603KD	40 10 30.30 76 09 29.80	25.000 214	5.8 360	64.9 Radio License Holding Cbc,	6.1
289D Camden	W289AZ	LIC DCN NJ	151.1 331.3	35.59 BLFT20150713ACM	39 57 28.40 75 06 52.60	0.250	18.5 63	5.4 Mega-Philadelphia, LLC, De	8.4
289B York	WQXA-FM	LIC DCN PA	257.7 76.8	120.20 BMLH20040831ABZ	39 59 56.40 76 41 41.90	25.000 215	129.6 369	63.6 Radio License Holding Cbc,	23.9
289D Bethlehem	W289AH	LIC_CN PA	349.4 169.4	47.50 BLFT20110321ABE	40 39 30.30 75 25 10.70	0.099 10	18.5 146	5.6 Northeastern Pennsylvania	25.2
289D Glen Gardner	W289CR	LIC DCN NJ	33.2 213.4	60.33 BLFT20180925ABW	40 41 30.80 74 55 28.20	0.218	16.9 348	4.8 Wrnj Radio, Inc.	37.8
289B1 Manahawkin	WCHR-FM	LIC DCN NJ	112.0 292.8	105.91 0000090805	39 52 31.40 74 09 55.80	13.000 139	104.5 149	43.5 Townsquare License, LLC	44.2
292D Reading	W292FD	LIC DCN PA	284.8 104.5	51.05 BLFT20170717ACY	40 21 16.30 75 53 55.70	0.010	0.0 388	0.9 Calvary Chapel Bible Broad	47.8
288A Tamaqua	WMGH-FM	LIC_CN PA	315.5 135.0	85.97 BLH19960422KD	40 47 14.30 76 01 57.70	1.400 148	44.0 510	29.2 Cc Broadcasting LLC	47.8

Terrain database is GLOBE 30 Sec , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
In & Out distances between contours are shown at closest points. Reference zone= East Zone, Co to 3rd adjacent.
All separation margins (if shown) include rounding.
Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt (Y,N,X)
Incoming contour overlap is ignored.
""affixed to 'IN' or 'OUT' values = site inside restricted contour.
Reference station has protected zone issue: AM tower

W285EW Camden, NJ, Showing Protection to WUMR, Channel: 291
 Geographic Coordinates: N. 40 14 18.30 W. 75 18 58.60
 74.1204(d) Study - Using FCC 30 meter Terrain Database
 Translator or LPFM Maximum Licensed ERP = 0.072 kW, Channel: 289
 Translator or LPFM Antenna Height AG = 51 meters
 W285EW Antenna Azimuth Model = Shively.PAT Vertical Model Name = SHIVELY 6812

Protected Station's Contour = 78.15291 dBu
 Translator's or LPFM's full Interference contour 118.15291

Review Azimuth = 0 Degrees True
 Horizontal Relative Field at Review Azimuth = 0.960
 Translator/LPFM ERP on the horizontal at Review Azimuth = 0.066 kW
 Distance between stations = 20.8 km
 Protected Station= WUMR, 22.5 kW, 291 M meters COR AMSL

Depression Angle From Degree(Deg)	Vertical Relative Field	Horizontal Relative Field	ERP (kw)	Dist to IX Contour Along Dep. Angle(m)	Dist to IX Contour From Tower Base(m)	Height IX Above Ground (m)
00.00	1.0	0.96	0.0691	072.1367	072.1367	051.000
05.00	0.99	0.96	0.0677	071.4153	071.1436	044.776
10.00	0.98	0.96	0.0664	070.6940	069.6200	038.724
15.00	0.965	0.96	0.0644	069.6119	067.2400	032.983
20.00	0.95	0.96	0.0624	068.5299	064.3970	027.561
25.00	0.91	0.96	0.0572	065.6444	059.4940	023.257
30.00	0.87	0.96	0.0523	062.7589	054.3508	019.621
35.00	0.823	0.96	0.0468	059.3324	048.6023	016.968
40.00	0.775	0.96	0.0415	055.9060	042.8264	015.064
45.00	0.713	0.96	0.0351	051.3974	036.3435	014.657
50.00	0.65	0.96	0.0292	046.8889	030.1396	015.081
55.00	0.58	0.96	0.0233	041.8393	023.9980	016.727
60.00	0.51	0.96	0.0180	036.7897	018.3949	019.139
65.00	0.435	0.96	0.0131	031.3795	013.2615	022.561
70.00	0.36	0.96	0.0090	025.9692	008.8820	026.597
75.00	0.275	0.96	0.0052	019.8376	005.1343	031.838
80.00	0.19	0.96	0.0025	013.7060	002.3800	037.502
85.00	0.1	0.96	0.0007	007.2137	000.6287	043.814
90.00	0.01	0.96	0.0000	000.7214	000.0000	050.279

W285EW Lansdale, PA, Showing Protection to **WDAS-FM**, Channel: 287
 Geographic Coordinates: N. 40 14 18.30 W. 75 18 58.60
 74.1204(d) Study - Using FCC 30 meter Terrain Database
 Translator or LPFM Maximum Licensed ERP = 0.072 kW, Channel: **289**
 Translator or LPFM Antenna Height AG = 51 meters
 W285EW Antenna Azimuth Model = Vertical Model Name = SHIVELY-6812

Protected Station's Contour = 76.57851 dBu
 Translator's or LPFM's full Interference contour 116.57851

Review Azimuth = 0 Degrees True
 Horizontal Relative Field at Review Azimuth = 0.960
 Translator/LPFM ERP on the horizontal at Review Azimuth = 0.066 kW
 Distance between stations = 22.8 km
 Protected Station= WDAS-FM, 16.5 kW, 334 M meters COR AMSL

Depression Angle From Degree(Deg)	Vertical Relative Field	Horizontal Relative Field	ERP (kw)	Dist to IX Contour Along Dep. Angle(m)	Dist to IX Contour From Tower Base(m)	Height IX Above Ground (m)
00.00	1.0	0.96	0.0691	086.4722	086.4722	051.000
05.00	0.99	0.96	0.0677	085.6074	085.2817	043.539
10.00	0.98	0.96	0.0664	084.7427	083.4553	036.285
15.00	0.965	0.96	0.0644	083.4456	080.6023	029.403
20.00	0.95	0.96	0.0624	082.1486	077.1944	022.904
25.00	0.91	0.96	0.0572	078.6897	071.3171	017.744
30.00	0.87	0.96	0.0523	075.2308	065.1518	013.385
35.00	0.823	0.96	0.0468	071.1234	058.2608	010.205
40.00	0.775	0.96	0.0415	067.0159	051.3372	007.923
45.00	0.713	0.96	0.0351	061.6114	043.5659	007.434
50.00	0.65	0.96	0.0292	056.2069	036.1291	007.943
55.00	0.58	0.96	0.0233	050.1539	028.7671	009.916
60.00	0.51	0.96	0.0180	044.1008	022.0504	012.808
65.00	0.435	0.96	0.0131	037.6154	015.8970	016.909
70.00	0.36	0.96	0.0090	031.1300	010.6471	021.747
75.00	0.275	0.96	0.0052	023.7798	006.1547	028.030
80.00	0.19	0.96	0.0025	016.4297	002.8530	034.820
85.00	0.1	0.96	0.0007	008.6472	000.7537	042.386
90.00	0.01	0.96	0.0000	000.8647	000.0000	050.135

Frequency Study
Documentation of Incoming Interference
 Contout-to-Contour Channel Study - Licensed Channel
 Four Rivers Community Broadcasting
 CH# **285D** - 104.9 MHz, Pwr= 0.05 kW DA, HAAT= 0.0 M, COR= 152 M
 Average Protected F(50-50)= 4.71 km
 Standard Directional

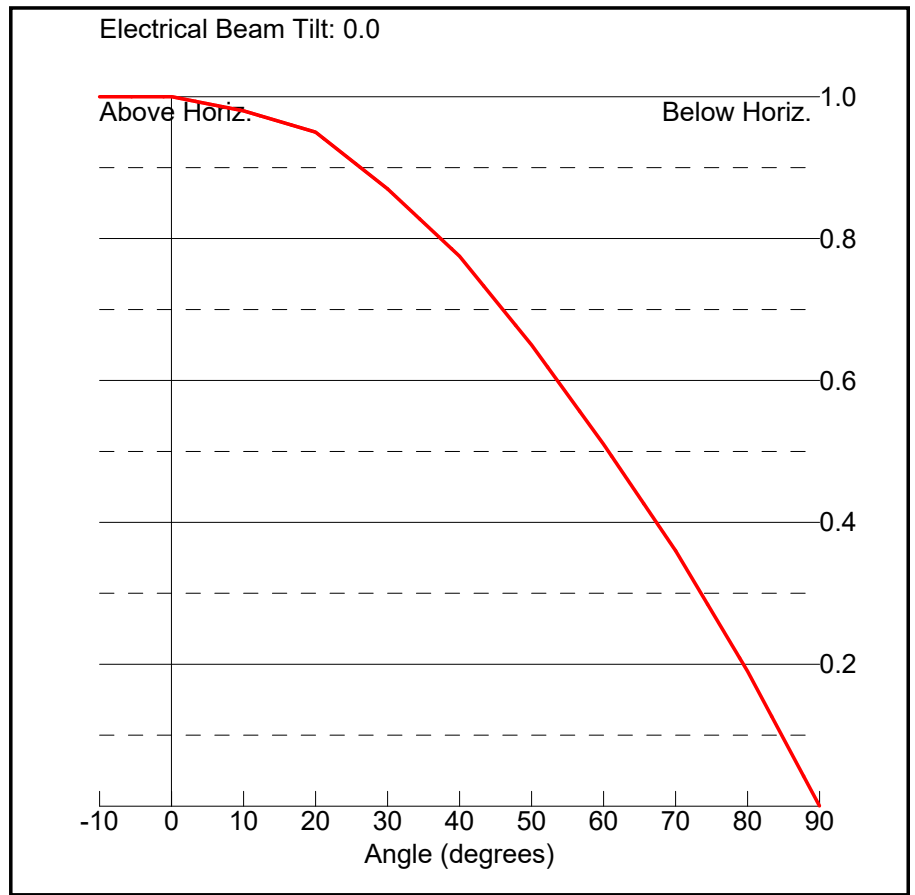
REFERENCE 40 14 18.30 N. 75 18 58.60 W. DISPLAY DATES DATA 03-25-23 SEARCH 03-25-23

CH CITY	CALL	TYPE STATE	ANT	AZI <--	DIST FILE #	LAT LNG	PWR (kW) HAAT (M)	INT (km) COR (M)	PRO (km) LICENSEE	*IN* (Overlap in km)	*OUT*
287B Philadelphia	WDAS-FM	LIC_CN PA		163.4 343.4	22.81 BLH19930208KK	40 02 30.40 75 14 22.60	16.500 266	5.5 334	64.2 Ihm Licenses, LLC	10.8	-42.3*
283B Philadelphia	WRFF	LIC_CN PA		163.4 343.4	22.81 BMLH20090513AAG	40 02 30.40 75 14 22.60	11.500 308	5.2 376	63.9 Ihm Licenses, LLC	11.1	-42.1*
285D Lansdale	W285EW	LIC DCN PA		0.0 291.4	0.00 BLFT20161014ACD	40 14 18.30 75 18 58.60	0.050	152	---Reference---		Four Rivers Community Broa
285B1 Egg Harbor City	WSJO	LIC NCN NJ		142.8 323.3	96.19 BLH19910726KB	39 32 49.40 74 38 17.50	10.000 155	102.4 167	43.8 Townsquare License, LLC	-13.3*	24.3
286B Ephrata	WIOV-FM	LIC_CN PA		264.6 84.1	71.84 BLH19980603KD	40 10 30.30 76 09 29.80	25.000 214	77.1 360	64.9 Radio License Holding Cbc,	-8.1*	1.2
285D N. Whitehall Townsh	W285DH	LIC_CN PA		335.5 155.3	53.13 BLFT19941207TI	40 40 22.30 75 34 40.60	0.013 105	23.3 250	6.9 The Trustees Of The Univer	25.6	33.4
285D Easton	WJRH	LIC_CN PA		10.1 190.2	51.92 BLED19920817KA	40 41 53.30 75 12 28.60	0.008 7	9.6 135	3.0 Lafayette College	37.6	33.5
286B New York	WWPR-FM	LIC_CN NY		62.8 243.7	125.98 BLH19940204KB	40 44 54.30 73 59 08.50	6.000 415	78.6 429	66.0 Ihm Licenses, LLC	41.0	47.2

 Terrain database is GLOBE 30 Sec , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
 In & Out distances between contours are shown at closest points. Reference zone= East Zone, Co to 3rd adjacent.
 All separation margins (if shown) include rounding.
 Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
 "*"affixed to 'IN' or 'OUT' values = site inside restricted contour.
 Reference station has protected zone issue: AM tower

Proposed Vertical Elevation Pattern

Angle (deg)	Relative Field
0.0	1.0
10.0	0.98
20.0	0.95
30.0	0.87
40.0	0.775
50.0	0.65
60.0	0.51
70.0	0.36
80.0	0.19
90.0	0.0



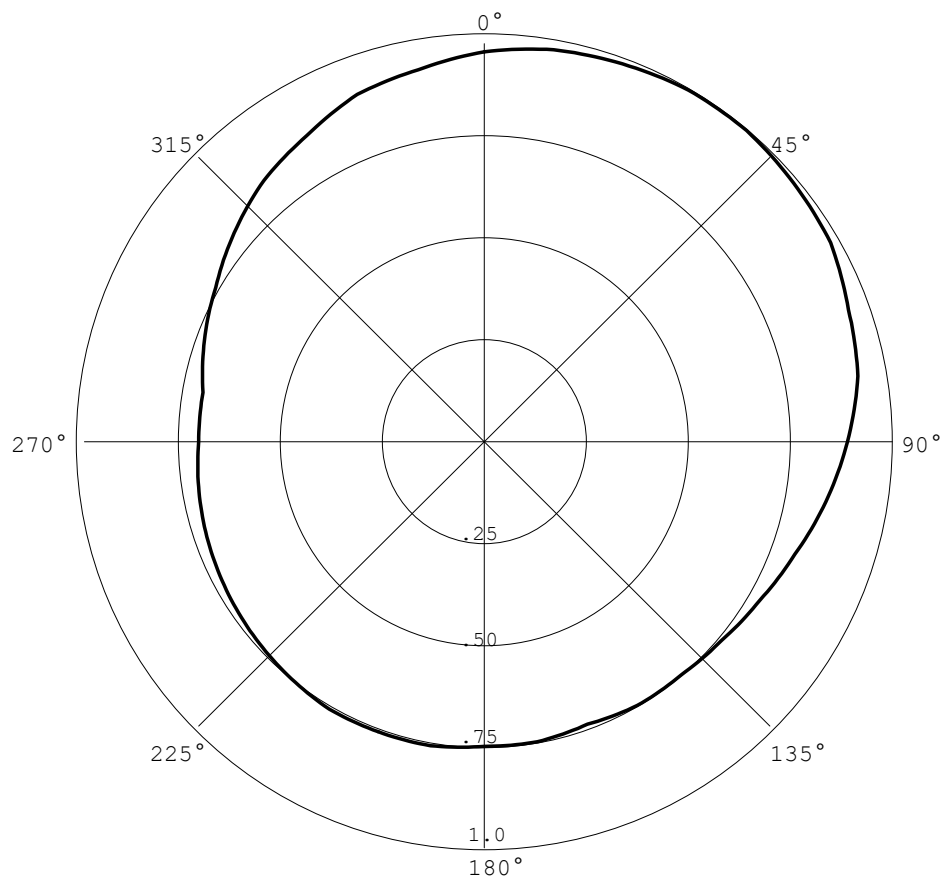
W285EW

03-08-2023

RMS (V) = .833

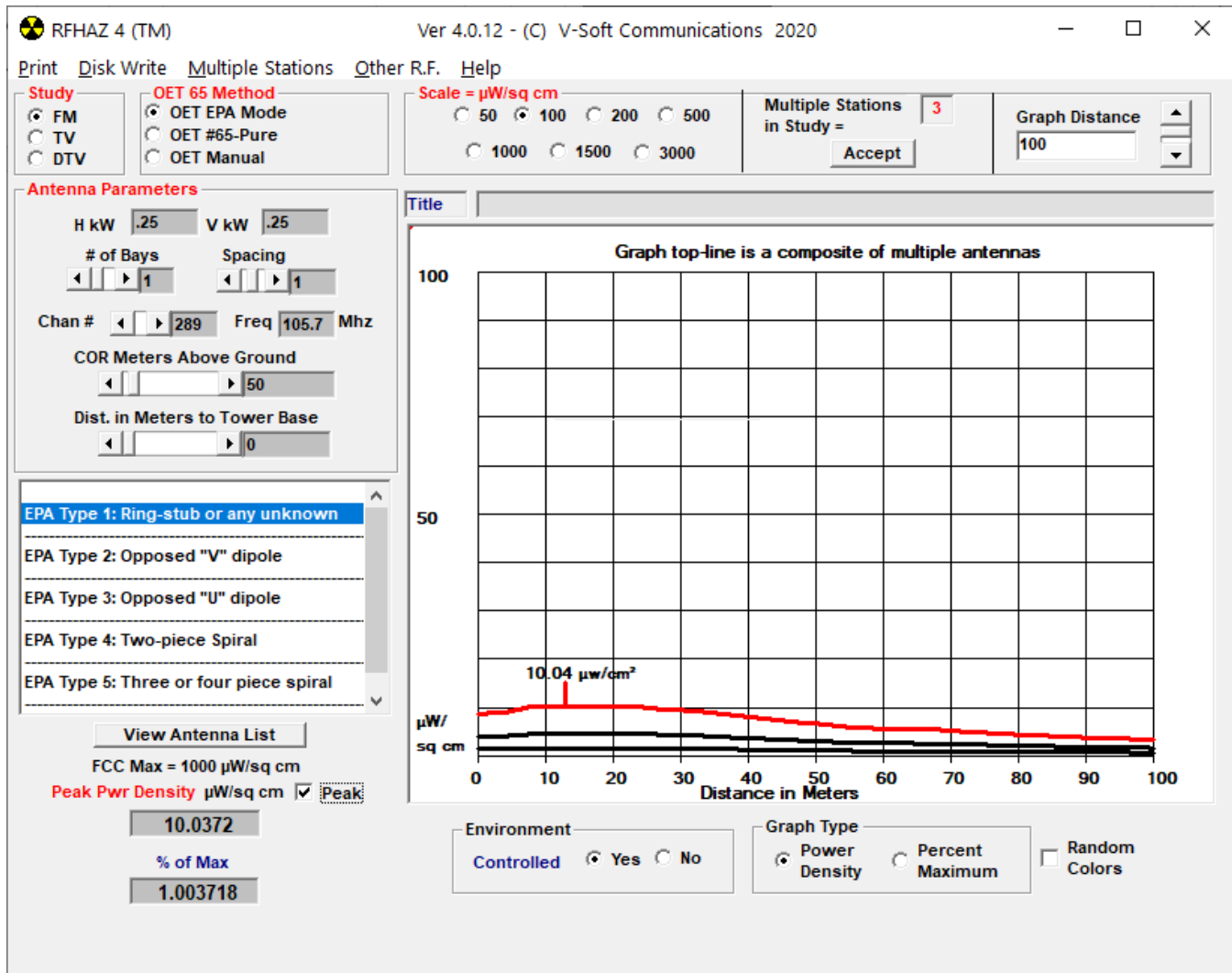
Graph is Relative Field

Azi	Field	dBk	kW
000	0.960	-11.781	0.066
010	0.980	-11.602	0.069
020	0.990	-11.514	0.071
030	1.000	-11.427	0.072
040	1.000	-11.427	0.072
050	0.990	-11.514	0.071
060	0.980	-11.602	0.069
070	0.950	-11.872	0.065
080	0.930	-12.057	0.062
090	0.890	-12.439	0.057
100	0.850	-12.838	0.052
110	0.810	-13.257	0.047
120	0.780	-13.585	0.044
130	0.760	-13.810	0.042
140	0.750	-13.925	0.040
150	0.750	-13.925	0.040
160	0.740	-14.042	0.039
170	0.750	-13.925	0.040
180	0.750	-13.925	0.040
190	0.760	-13.810	0.042
200	0.760	-13.810	0.042
210	0.760	-13.810	0.042
220	0.750	-13.925	0.040
230	0.740	-14.042	0.039
240	0.730	-14.160	0.038
250	0.720	-14.280	0.037
260	0.710	-14.402	0.036
270	0.700	-14.525	0.035
280	0.700	-14.525	0.035
290	0.730	-14.160	0.038
300	0.760	-13.810	0.042
310	0.800	-13.365	0.046
320	0.840	-12.941	0.051
330	0.870	-12.636	0.054
340	0.910	-12.246	0.060
350	0.930	-12.057	0.062



RF Hazard Study:

RF-Hazard Study below, shows all three low power antennas (W285EW, 0.072 kW, W246CN, 0.25 kW, W253CA, 0.25 kW) on the proposed tower. Maximum combined percentage will equal 1.00 percent of the maximum. The greatest power density is $10.0372 \mu\text{W}\cdot\text{cm}^2$ at a point 13 meters from the tower base.

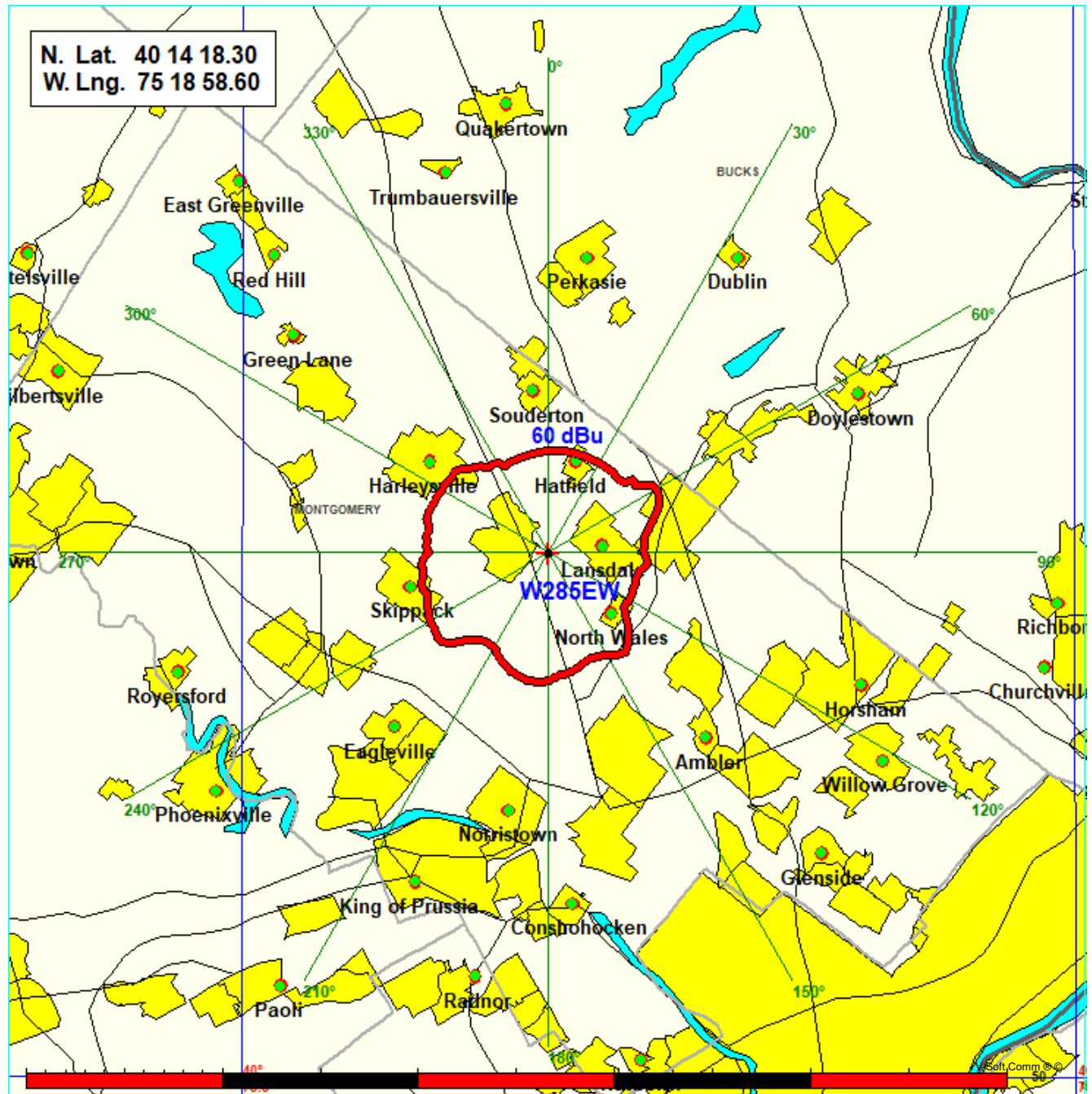
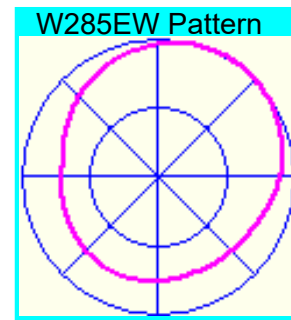


The tower on which the antenna is located is an AM tower transmitting with 0.25 kW of power. This tower has a fence with a short dimension distance of 4 meters enclosing it. This tower is a quarter-wave at 1440 kHz, therefore according to table 2, appendix A of the OET 65 bulletin, the power can be up to 1 kW. There are the proper posted safety signs to warn the public about the RF fields. There is no other user of this tower.

Coverage on Channel 289
Four Rivers Community Broadcasting

Coverage Study - GLOBE 30 Sec
03-08-2023

W285EW CH289 D , 0.072 kW, 42.0m HAAT, 145.0m COR AMSL
Service Contour = 60 dBu.



N. Lat. = 40 14 18.3 W. Lng. = 75 18 58.6
 HAAT and Distance to Contour,
 FCC, FM 2-10 Mi, 51 pts Method - FCC 30 Meter

HAAT's and Distances to 60 dBu Contour

Azi.	AV EL	HAAT	ERP kW	dBk	Field	60-F5
000	121.8	23.2	0.0664	-11.78	0.960	5.07
015	125.3	19.7	0.0699	-11.56	0.985	5.14
030	151.1	-6.1	0.0720	-11.43	1.000	5.18
045	107.6	37.4	0.0713	-11.47	0.995	5.74
060	92.0	53.0	0.0691	-11.60	0.980	6.81
075	109.8	35.2	0.0636	-11.96	0.940	5.42
090	103.7	41.3	0.0570	-12.44	0.890	5.72
105	106.6	38.4	0.0496	-13.05	0.830	5.32
120	110.4	34.6	0.0438	-13.58	0.780	4.89
135	90.0	55.0	0.0410	-13.87	0.755	6.11
150	85.8	59.2	0.0405	-13.93	0.750	6.31
165	85.8	59.2	0.0400	-13.98	0.745	6.29
180	75.6	69.4	0.0405	-13.93	0.750	6.80
195	78.2	66.8	0.0416	-13.81	0.760	6.72
210	94.4	50.6	0.0416	-13.81	0.760	5.88
225	86.1	58.9	0.0400	-13.98	0.745	6.28
240	63.5	81.5	0.0384	-14.16	0.730	7.27
255	65.2	79.8	0.0368	-14.34	0.715	7.12
270	74.5	70.5	0.0353	-14.52	0.700	6.63
285	76.3	68.7	0.0368	-14.34	0.715	6.61
300	82.3	62.7	0.0416	-13.81	0.760	6.52
315	93.4	51.6	0.0484	-13.15	0.820	6.16
330	105.3	39.7	0.0545	-12.64	0.870	5.55
345	118.5	26.5	0.0609	-12.15	0.920	4.96

Ave El= 95.98 M HAAT= 49.02 M AMSL= 145.0

**Declaration and
Statement of Qualifications**

I, Douglas L. Vernier, declare that I have received training as an engineer from the University of Michigan School of Engineering. That, I have received degrees from the University in the field of Broadcast Telecommunications. That, I have been active in broadcast consulting for over 40 years

That, I have held a Federal Communications Commission First Class Radiotelephone License continually since 1964. In 1985, this license was reissued by the Commission as a lifetime General Radiotelephone license no. PG-16-16464

That, I am certified as a Professional Broadcast Engineer (#50258) by the Society of Broadcast Engineers, Indianapolis, Indiana. (Life-time Certification received in 2010)

That, my qualifications are a matter of record with the Federal Communications Commission

That, I have been retained by Four Rivers Community Broadcasting. to prepare the engineering showing appended hereto

That, I have prepared this broadcast engineering showing, the technical information contained in same and the facts stated within are true of my knowledge

That, under penalty of perjury, I declare that the foregoing is correct.

Douglas L. Vernier

A handwritten signature in blue ink, appearing to read "Doug Vernier", with a large, stylized initial "D" and a horizontal line extending from the end of the signature.

Executed on March 6th 2023