



# **OWL ENGINEERING & EMC TEST LABS, INC.**

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**CONSULTING COMMUNICATIONS ENGINEERS • EMC TEST LABORATORIES**

**5844 Hamline Avenue North, Shoreview, MN 55126  
651-784-7445 • Fax 651-784-7541**

**ENGINEERING EXHIBIT FOR AN AMENDMENT TO A  
MINOR CHANGE APPLICATION FOR A  
CONSTRUCTION PERMIT  
TO MODIFY A LICENSED FACILITY  
WQBX BLH-20140508ABS  
FACILITY ID# 60788  
ALMA, MICHIGAN  
JACOM, INC.**

**PROCESSING UNDER §73.215 IS REQUESTED**

**CHANNEL 285 A      6 KW (H&V)      100 METERS HAAT**

**NOVEMBER 3, 2014**



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## ENGINEERING STATEMENT

This engineering exhibit, of which this Statement is a part, was prepared in accordance with the Rules and Regulations of the Federal Communications Commission and pursuant to the provisions of Section III-B of FCC Form 301 on behalf of Jacom, Inc. (hereafter "Jacom") in support of an application for authority to modify an existing FM broadcast facility (WQBX) operating on channel 285 (104.9 MHz) at Alma, MI.

The purpose of this application is to request a change in city of license and request processing under §73.215.

This power/height combination is an allowable Class A facility permitted under the current rules and regulations.

**Jacom** proposes to operate from a site uniquely described by the geographic coordinates:

(NAD 27)

43° 22' 08" North Latitude  
84° 36' 19" West Longitude

(NAD 83)

43° 22' 08.1" North Latitude  
84° 36' 19" West Longitude

The existing tower has been registered as ASR# 1236309 and Notification to the FAA is not required since there are no changes in either the location or total height proposed by this instant application.

Engineering Figure 1 is a portion of the Ithaca, MI 7.5 minute USGS map that shows the exact location of the tower. A search was performed for the presence of any other communications facilities located nearby and none were found.

Figure 2 shows an aerial view of the proposed site and that the surrounding area is rural there is not expected to be any problem with blanketing interference. The applicant is



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aware of the provisions of §73.318 of the FCC's Rules and the requirement for satisfying all complaints of blanketing interference that are received within a one-year period. The main studio for the station is presently located in Alma, MI area and will still be within the 70 dBuV coverage contour in full compliance with §73.1125.

## ALLOCATION CONSIDERATIONS

A review of allotments and assignments on channel 285, on the three immediately upper adjacent, the three immediately lower adjacent channels shows that the site proposed would not be in full compliance with §73.207 for stations WAIR and processing under §73.215 is requested.

## FM CHANNEL SPACING STUDY

REFERENCE		CLASS = A Int = A				DATA 11-03-14	
43 22 08.0 N.		Current Spacings to 3rd Adj.				SEARCH 11-03-14	
84 36 19.0 W.		Channel 285 - 104.9 MHz					
Call	Channel	Location	Azi	Dist	FCC	Margin	
Lat.	Lng.	Ant	Power	HAAT			
WAIR	CP -Z 285A	Lake City	MI 330.1	113.16	115.0	-1.8 ***	
44 14 56.0	85 18 48.0	ZCX	2.800 kW	149 M			
Smile Fm			BPED20140325AGI				
WAIR	LIC-N 285A	Lake City	MI 330.1	113.16	115.0	-1.8 ***	
44 14 56.0	85 18 48.0	NCX	1.600 kW	149 M			
Smile Fm			BLED20041202ADC				
WCZY-FM	LIC 282A	Mount Pleasant	MI 324.9	30.64	31.0	-0.36	
43 35 39.0	84 49 26.0	CN	3.000 kW	100 M			
Latitude Media, LLC			BLH19910828KB				
WBXX	LIC 285A	Marshall	MI 192.8	120.24	115.0	5.2	
42 18 47.0	84 55 46.0	CN	6.000 kW	100 M			
Townsquare Media Battle Cr			BMLH19900518KC				
WILZ	LIC-N 283A	Saginaw	MI 87.0	55.25	31.0	24.3	
43 23 34.0	83 55 27.0	NCN	2.900 kW	126 M			
Radio License Holding Cbc,			BLH19920825KB				
WMRP-LP	CP 284L1	Mundy Township	MI 123.7	89.55	56.0	33.6	
42 55 08.0	83 41 31.0		0.100 kW	29 M			
Swartz Creek Radio			BPL20130826AJE				
AL6792	RSV-A 287B	Coopersville	MI 268.8	102.66	69.0	33.7	
43 20 36.0	85 52 16.0		0.000 kW	150 M			
			RM10545				
WMRP-LP	LIC 284L1	Mundy Township	MI 123.9	89.67	56.0	33.7	
42 54 59.0	83 41 33.0		0.100 kW	29 M			
Swartz Creek Radio			BLL20080310ADN				
WKJC	LIC 284C2	Tawas City	MI 33.9	140.45	106.0	34.5	
44 24 48.0	83 37 14.0	CN	50.000 kW	150 M			
Carroll Enterprises, Inc.			BLH19970121KA				
WHTS	LIC 287B	Coopersville	MI 266.9	106.21	69.0	37.2	
43 18 35.0	85 54 45.0	CX	20.000 kW	242 M			
Radio License Holding Cbc,			BLH20060516ACU				
WWCK-FM	LIC-Z 288B1	Flint	MI 116.9	87.17	48.0	39.2	
43 00 39.0	83 39 04.0	ZCN	25.000 kW	100 M			
Cumulus Licensing LLC			BLH19970124KD				
WMGC-FM	LIC 286B	Detroit	MI 130.4	155.54	113.0	42.5	
42 27 13.0	83 09 50.0	CX	50.000 kW	150 M			
Greater Boston Radio, Inc.			BMLH20061004AIW				

\*\*\* Short-spaced condition



Figure 1 also shows the location of an allocation site that demonstrates that a fully spaced location is available.

## FM CHANNEL SPACING STUDY ALLOCATION SITE

REFERENCE										DISPLAY DATES	
43 20 43.0 N.		CLASS = A Int = A1						DATA	11-03-14		
84 36 51.0 W.		Current Spacings to 3rd Adj.						SEARCH	11-03-14		
----- Channel 285 - 104.9 MHz -----											
Call		Channel		Location		Azi		Dist	FCC	Margin	
Lat.		Lng.		Ant		Power		HAAT			
WAIR		LIC-N 285A		Lake City		MI 331.1		115.09	114.5	0.59	
44 14 56.0		85 18 48.0		NCX		1.600 kW		149 M			
Smile Fm		BLED20041202ADC									
WAIR		CP -Z 285A		Lake City		MI 331.1		115.09	114.5	0.59	
44 14 56.0		85 18 48.0		ZCX		2.800 kW		149 M			
Smile Fm		BPED20140325AGI									
WCZY-FM		LIC 282A		Mount Pleasant		MI 328.6		32.44	30.5	1.9	
43 35 39.0		84 49 26.0		CN		3.000 kW		100 M			
Latitude Media, Llc		BLH19910828KB									
WBXX		LIC 285A		Marshall		MI 192.7		117.52	114.5	3.0	
42 18 47.0		84 55 46.0		CN		6.000 kW		100 M			
Townsquare Media		Battle Cr		BMLH19900518KC							
DW285DU		LIC 285D		Fremont		MI 277.8		106.50	84.5	22.0	
43 28 06.0		85 55 05.0		C		0.010 kW		67 M			
Horizon Christian		Fellowsh		BLFT20070622AAG							
W286CI		LIC 286D		Saginaw		MI 80.1		56.13	33.5	22.6	
43 25 47.0		83 55 52.0		C		0.170 kW		37 M			
Plonta Broadcasting Inc.		BLFT20130610AAD									
WILZ		LIC-N 283A		Saginaw		MI 84.4		56.17	30.5	25.7	
43 23 34.0		83 55 27.0		NCN		2.900 kW		126 M			
Radio License Holding Cbc,		BLH19920825KB									
WMRP-LP		CP 284L1		Mundy Township		MI 122.0		88.73	55.5	33.2	



## COVERAGE CONTOURS

The three-to-sixteen-kilometer average terrain elevations were derived from the Defense Mapping Agency 3-second topography database.

The effective antenna radiation center height for each of the eight standard 45-degree spaced radials was used in conjunction with the F (50, 50) metric curves of Figure 1 of §73.333 of the Rules to determine the distances to the 70 dBuV and 60 dBuV coverage contours. The contours drawn from the data are depicted on the map included as Engineering Figure 3. As is readily evident, all of Alma, MI is within the proposed 70 dBuV coverage contour as required by the rules.

## DISTANCE TO CONTOURS

DISTANCES TO CONTOURS (Kilometers):

Antenna COR elevation (AMSL): 327 meters      Average HAAT: 100 meters

Frequency: 104.9000 MHz

Coordinates: N 43° 22' 8.00"      W 84° 36' 19.00"

F(50,50) Curves      Number of Contours: 2

AZ (degs)	HAAT (m)	ERPd (kW)	CONTOUR LEVELS (dBuV):	
			70.0	60.0
0.0	105	6.0000	16.6	29.1
45.0	110	6.0000	17.0	29.7
90.0	105	6.0000	16.6	29.1
135.0	104	6.0000	16.5	29.0
180.0	90	6.0000	15.3	27.2
225.0	94	6.0000	15.7	27.8
270.0	95	6.0000	15.8	27.9
315.0	94	6.0000	15.7	27.7

Figure 4 shows the interference contours with WAIR and the proposed facility. The WAIR facility is considered with maximized power output and antenna height for its class. No overlap is predicted. Figure 5 shows the tabulated interference contours and no overlap is predicted.

## POPULATION AND AREA DATA

Based on the 2010 U.S. Census of Population, the numbers of persons enclosed by the proposed 60 dBuV coverage contour are 75,799 persons. The population count was made through the employment of a computer program containing a database including the geographic coordinates of the centroids of population groupings. The area within the proposed 60 dBuV coverage contour is 2,513 square kilometers was determined by a computerized integration program.



## ANSI Power Density Calculations

The power density at the base of the tower was calculated using the following formula from OST Bulletin Number 65, August, 1997:

$$S = \frac{0.64 \times 1.64 \times ERP \times 1000}{\pi(R^2)}$$

Where:                      S =                      power density in milliwatts per square centimeter  
                                 ERP =                      effective radiated power in watts  
                                 R =                      distance to radiation source in centimeters  
                                 Pi =                      3.14

The site is considered to be a controlled site since access to the tower area is restricted by a fence.

Using:

ERP = 12 kW (6 KW Vertical & 6 KW Horizontal)  
R = 9,900 cm. (99 meters)

Using this formula and the values shown below, a power density of 40.9  $\mu\text{W}/\text{cm}^2$  is predicted to exist at the base of the tower. This predicted value is 20.5% for the Public exposure limit of 200  $\mu\text{W}/\text{cm}^2$  and 4.1% of the controlled exposure maximum limit of 1,000  $\mu\text{W}/\text{cm}^2$ .

Access to RF circuitry is restricted by a metal fence that surrounds the tower and limits access to the public. Signs are posted warning of the potential danger. When persons require access to the site, tower or antenna for maintenance purposes, the transmitter power will be reduced or completely eliminated to comply with ANSI guidelines. Hence, the conditions of §1.1306(b) (3) would not be involved.



## ENVIRONMENTAL IMPACT STATEMENT

The instant proposal is categorically excluded from environmental processing since none of the conditions of §1.1306(b) (2) and (3) would be involved for the following reasons:

- 1) The site proposed is not in or near any location referenced in §1.1306(b)(1) as being of environmental interest.
- 2) The provisions of §1.1306(b) (2) relating to the use of high intensity strobe lighting do not apply since this tower is not utilizing this type of lighting.
- 3) Compliance to §1.1306(b)(3) regarding human exposure to RF radiation was examined for multiple sources. A search was made about the proposed site coordinates to locate any additional sources of RF radiation and none were found.

## CONCLUSIONS

Based on the engineering studies provided, the following conclusions can be obtained:

- (1) Implementation of the instant proposal will continue to provide Alma, MI with a full time aural broadcast service.
- (2) 75,799 persons in 2,513 square kilometers would have an available signal strength of 60 dBuv or greater from the proposed construction location.
- (3) All of Alma, MI would be served with a signal of 70 dBuv or greater from the proposed construction site.
- (4) The proposal is in complete conformance with all technical rules of the Federal Communications Commission.

Garrett G. Lysiak, P.E.  
November 3, 2014



(ALMA NORTH)

(BRECKENRIDGE)

084° 55' 10.00" W  
043° 40' 35.70" N

(ST LOUIS)

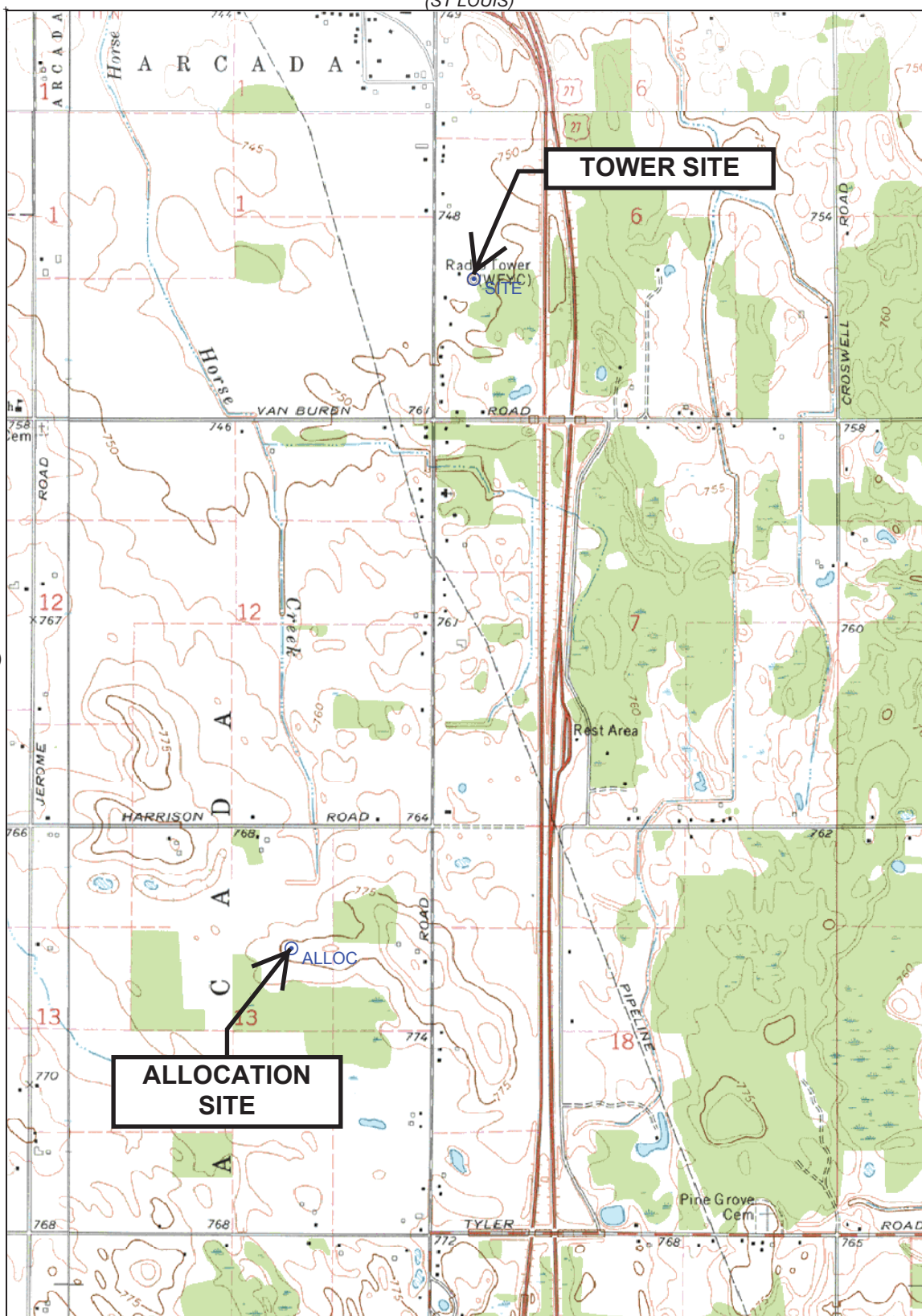
084° 17' 41.69" W  
043° 40' 35.70" N

(ALMA SOUTH)

(RATHBONE)

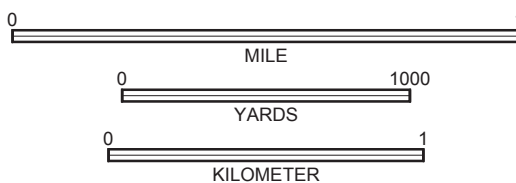
(PERRINTON)

(ASHLEY)



Declination

(POMPEII)  
SCALE 1:24000



GN 1.64° E  
MN 6.53° W

CONTOUR INTERVAL 5 FEET  
NATIONAL GEODETIC VERTICAL DATUM 1929

ITHACA, MI  
1973

**FIGURE 1 - SITE MAP**

(ALMA NORTH  
SE, MI)

(SAINT LOUIS  
SE, MI)

084° 38' 39.52" W  
043° 24' 33.34" N

(SAINT LOUIS SW, MI)

084° 33' 58.43" W  
043° 24' 33.34" N

(ALMA SOUTH NE,  
MI)

(ITHACA NE, MI)

043° 19' 43.84" N  
084° 38' 39.52" W

(ALMA SOUTH SE,  
MI)

(ITHACA SW, MI)  
SCALE 1:3000

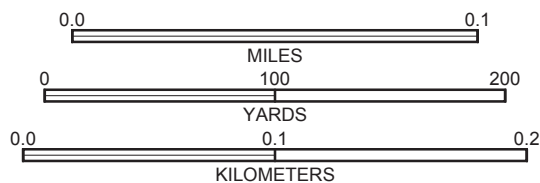
084° 33' 58.43" W  
043° 19' 43.84" N

(ITHACA SE, MI)

Declination



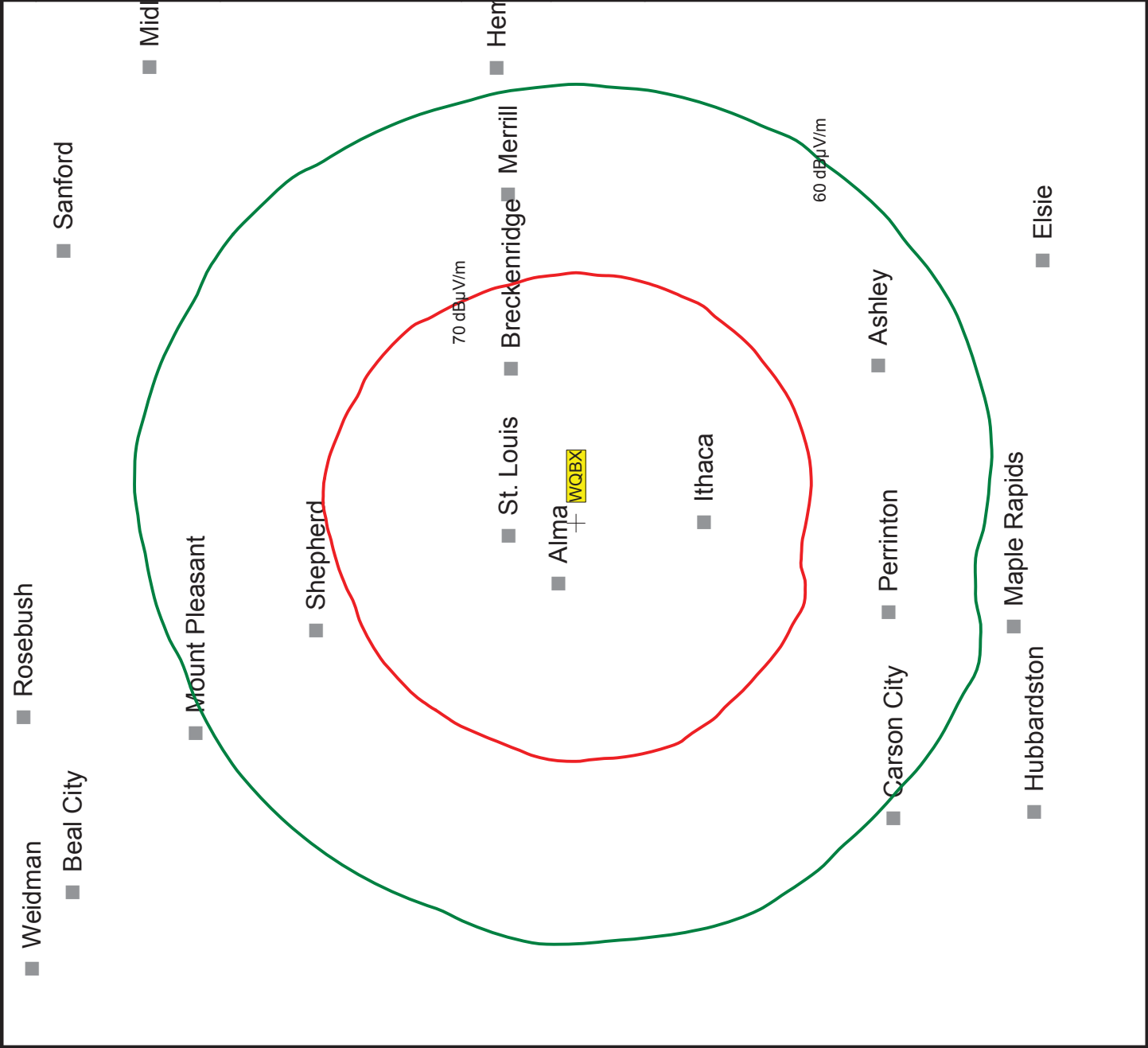
GN 1.64° E  
MN 6.53° W



CONTOUR INTERVAL UNKNOWN NONE  
NATIONAL GEODETIC VERTICAL DATUM 1929

ITHACA NW, MI, MI  
JUL 3, 2010

**FIGURE 2 - AERIAL MAP**



Prop. mo del: FCC-EDX  
Time: 50.0% Loc.: 50.0%  
Prediction Confidence Margin: 0.0dB  
Climate: Continental Temperate  
Land use (clutter): none  
Atmospheric Abs.: none  
K Factor: 1.333  
RX Antenna - Type: OMNI  
Height: 2.0 m AGL Gain: -2.15 dBd

Field strength at remote

70.0 dBuV/m  
60.0 dBuV/m

Display threshold level: -120.0 dBmW

Sites

Site: ALMA  
N43°22'08.00" W84°36'19.00" 230.0 m  
WQBX Tx.Ht.AGL: 97.0 m Total ERPd: 9.84kW  
Grp: 1 omni-horizontal/0.0° 104.9000 MHz

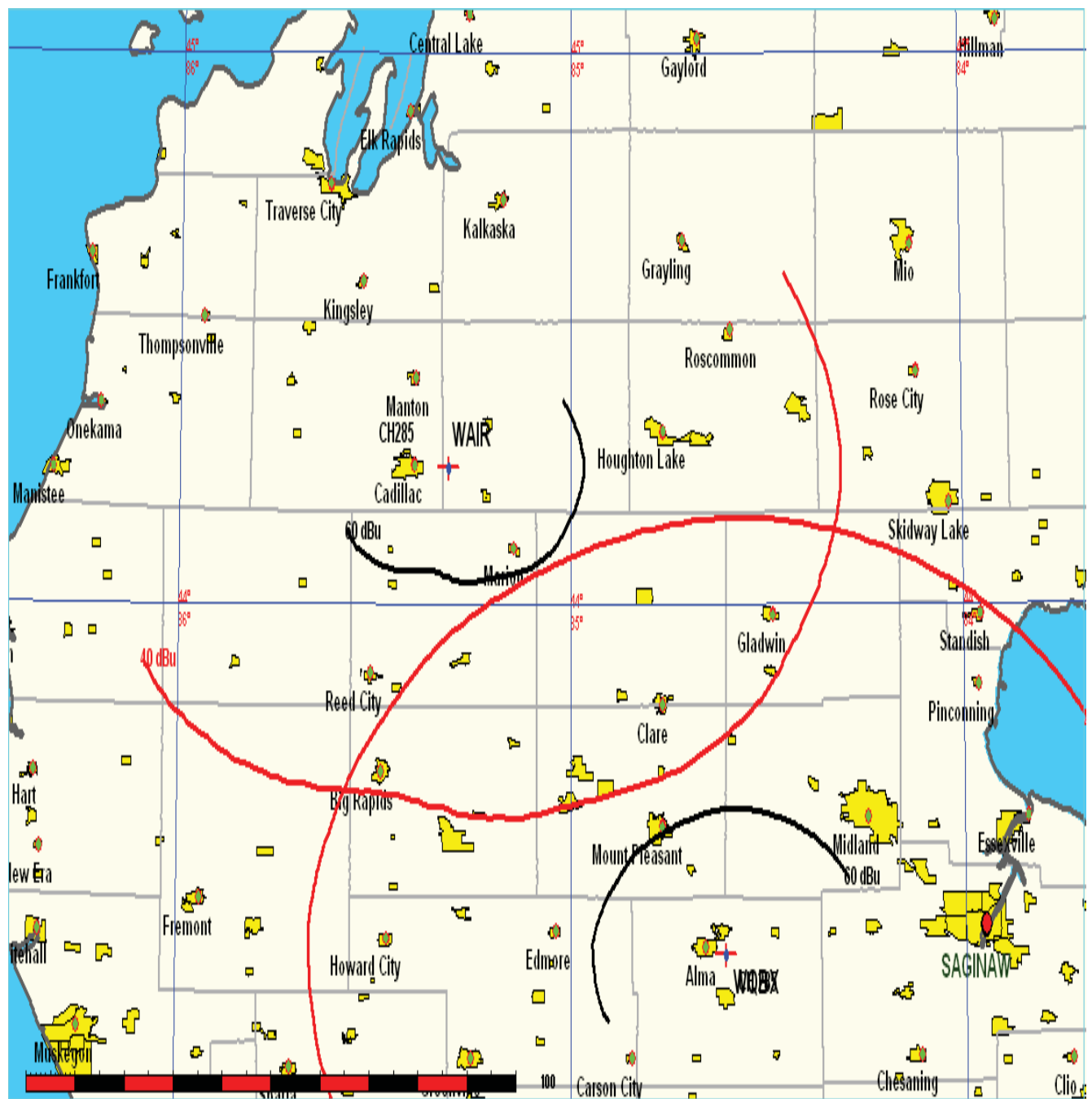


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SIGNAL COVERAGE

NOVEMBER 3, 2014

FIGURE 3



**FIGURE 4 - WAIR INTERFERENCE CONTOURS**



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## FIGURE 5 INTERFERENCE CONTOURS - TABULATED

WQBX

WAIR BLED20041202ADC

(^ Max Class Parameters)

Channel = 285A

Channel = 285A

Max ERP = 6 kW

Max ERP = 1.6 kW

RCAMSL = 326.29 M, 100M HAAT

RCAMSL = 550 M

N. Lat. 43 22 08.0

N. Lat. 44 14 56.0

W. Lng. 84 36 19.0

W. Lng. 85 18 48.0

Protected

Interfering

60 dBuV

40 dBuV

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
270.0	006.0000	0093.6	027.4	163.1	001.6000	0133.1	102.3	31.54	
271.0	006.0000	0093.9	027.5	163.0	001.6000	0133.1	101.8	31.65	
272.0	006.0000	0094.2	027.5	162.9	001.6000	0133.0	101.3	31.77	
273.0	006.0000	0094.5	027.5	162.9	001.6000	0133.0	100.9	31.88	
274.0	006.0000	0094.6	027.6	162.8	001.6000	0132.9	100.4	31.99	
275.0	006.0000	0094.0	027.5	162.6	001.6000	0133.0	100.0	32.10	
276.0	006.0000	0093.7	027.4	162.5	001.6000	0133.1	099.6	32.21	
277.0	006.0000	0093.4	027.4	162.4	001.6000	0133.1	099.1	32.32	
278.0	006.0000	0092.9	027.3	162.2	001.6000	0133.2	098.7	32.42	
279.0	006.0000	0092.6	027.3	162.1	001.6000	0133.3	098.3	32.53	
280.0	006.0000	0092.3	027.2	161.9	001.6000	0133.1	097.9	32.63	
281.0	006.0000	0092.4	027.3	161.8	001.6000	0133.1	097.5	32.74	
282.0	006.0000	0092.3	027.2	161.7	001.6000	0133.1	097.1	32.84	
283.0	006.0000	0091.9	027.2	161.5	001.6000	0133.0	096.7	32.94	
284.0	006.0000	0091.4	027.1	161.3	001.6000	0133.0	096.3	33.04	
285.0	006.0000	0091.0	027.1	161.1	001.6000	0133.0	096.0	33.14	
286.0	006.0000	0090.4	027.0	160.9	001.6000	0133.0	095.6	33.23	
287.0	006.0000	0089.6	026.9	160.7	001.6000	0132.9	095.3	33.31	
288.0	006.0000	0089.6	026.9	160.5	001.6000	0133.1	094.9	33.42	
289.0	006.0000	0089.7	026.9	160.4	001.6000	0133.3	094.5	33.53	
290.0	006.0000	0089.6	026.9	160.2	001.6000	0133.5	094.2	33.63	
291.0	006.0000	0089.6	026.9	160.0	001.6000	0133.6	093.8	33.74	
292.0	006.0000	0089.8	026.9	159.8	001.6000	0133.8	093.5	33.85	
293.0	006.0000	0089.7	026.9	159.6	001.6000	0134.1	093.1	33.95	
294.0	006.0000	0089.3	026.8	159.4	001.6000	0134.5	092.8	34.05	
295.0	006.0000	0089.6	026.9	159.2	001.6000	0134.9	092.5	34.17	
296.0	006.0000	0089.8	026.9	159.0	001.6000	0135.1	092.1	34.27	
297.0	006.0000	0089.3	026.8	158.8	001.6000	0135.8	091.8	34.38	
298.0	006.0000	0089.2	026.8	158.6	001.6000	0136.3	091.5	34.48	
299.0	006.0000	0089.1	026.8	158.3	001.6000	0136.6	091.2	34.58	
300.0	006.0000	0088.8	026.8	158.1	001.6000	0136.7	091.0	34.65	
301.0	006.0000	0088.7	026.7	157.9	001.6000	0136.8	090.7	34.73	
302.0	006.0000	0089.0	026.8	157.6	001.6000	0136.8	090.4	34.83	
303.0	006.0000	0088.7	026.7	157.4	001.6000	0136.8	090.2	34.89	
304.0	006.0000	0088.6	026.7	157.1	001.6000	0136.9	089.9	34.97	
305.0	006.0000	0089.1	026.8	156.9	001.6000	0137.2	089.6	35.07	
306.0	006.0000	0089.4	026.8	156.7	001.6000	0137.5	089.3	35.17	
307.0	006.0000	0089.3	026.8	156.4	001.6000	0137.7	089.1	35.24	
308.0	006.0000	0089.4	026.8	156.1	001.6000	0138.0	088.8	35.32	
309.0	006.0000	0089.9	026.9	155.9	001.6000	0138.5	088.6	35.42	





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310.0	006.0000	0090.3	027.0	155.6	001.6000	0138.8	088.3	35.51		
Azimuth	ERP	HAAT	Dist	Azimuth	ERP	HAAT	Dist	Actual	IX	
(degrees)	(kW)	(m)	(km)	(degrees)	(kW)	(m)	(km)	(dBu)	(km)	
311.0	006.0000	0090.6	027.0	155.4	001.6000	0139.2	088.1	35.60		
312.0	006.0000	0090.9	027.0	155.1	001.6000	0139.6	087.8	35.68		
313.0	006.0000	0091.5	027.1	154.8	001.6000	0140.1	087.6	35.78		
314.0	006.0000	0091.9	027.2	154.6	001.6000	0140.6	087.3	35.86		
315.0	006.0000	0092.3	027.2	154.3	001.6000	0140.9	087.1	35.94		
316.0	006.0000	0092.9	027.3	154.0	001.6000	0141.4	086.9	36.03		
317.0	006.0000	0093.5	027.4	153.7	001.6000	0141.8	086.7	36.11		
318.0	006.0000	0093.8	027.5	153.4	001.6000	0142.1	086.5	36.18		
319.0	006.0000	0093.9	027.5	153.1	001.6000	0142.2	086.3	36.23		
320.0	006.0000	0093.6	027.4	152.8	001.6000	0142.3	086.3	36.25		
321.0	006.0000	0093.1	027.3	152.5	001.6000	0143.1	086.2	36.29		
322.0	006.0000	0093.0	027.3	152.2	001.6000	0144.1	086.1	36.36		
323.0	006.0000	0092.9	027.3	151.9	001.6000	0144.9	086.1	36.42		
324.0	006.0000	0092.9	027.3	151.5	001.6000	0145.5	086.0	36.46		
325.0	006.0000	0093.3	027.4	151.2	001.6000	0145.8	085.9	36.51		
326.0	006.0000	0093.7	027.4	150.9	001.6000	0146.1	085.8	36.55		
327.0	006.0000	0093.5	027.4	150.6	001.6000	0146.4	085.8	36.57		
328.0	006.0000	0093.6	027.4	150.3	001.6000	0146.7	085.7	36.60		
329.0	006.0000	0093.4	027.4	150.0	001.6000	0147.5	085.7	36.63		
330.0	006.0000	0093.2	027.4	149.6	001.6000	0148.3	085.8	36.65		
331.0	006.0000	0093.0	027.3	149.3	001.6000	0149.1	085.8	36.68		
332.0	006.0000	0093.1	027.4	149.0	001.6000	0150.0	085.8	36.72		
333.0	006.0000	0093.5	027.4	148.7	001.6000	0150.6	085.8	36.75		
334.0	006.0000	0093.4	027.4	148.4	001.6000	0151.0	085.8	36.75		
335.0	006.0000	0093.5	027.4	148.1	001.6000	0151.6	085.9	36.77		
336.0	006.0000	0094.1	027.5	147.7	001.6000	0152.2	085.8	36.80		
337.0	006.0000	0094.8	027.6	147.4	001.6000	0152.6	085.8	36.82		
338.0	006.0000	0095.1	027.6	147.1	001.6000	0153.1	085.8	36.83		
339.0	006.0000	0095.4	027.7	146.8	001.6000	0153.8	085.9	36.84		
340.0	006.0000	0095.6	027.7	146.4	001.6000	0154.7	086.0	36.86		
341.0	006.0000	0095.8	027.7	146.1	001.6000	0155.4	086.1	36.86		
342.0	006.0000	0096.5	027.8	145.8	001.6000	0155.9	086.1	36.88		
343.0	006.0000	0096.6	027.8	145.5	001.6000	0156.5	086.2	36.86		
344.0	006.0000	0096.5	027.8	145.2	001.6000	0157.2	086.4	36.84		
345.0	006.0000	0097.0	027.9	144.9	001.6000	0157.8	086.5	36.84		
346.0	006.0000	0097.8	028.0	144.5	001.6000	0158.5	086.6	36.84		
347.0	006.0000	0098.8	028.1	144.2	001.6000	0159.1	086.6	36.86		
348.0	006.0000	0099.3	028.2	143.9	001.6000	0159.9	086.7	36.85		
349.0	006.0000	0100.0	028.3	143.6	001.6000	0160.6	086.8	36.84		
350.0	006.0000	0100.4	028.3	143.2	001.6000	0161.2	087.0	36.82		
351.0	006.0000	0101.1	028.4	142.9	001.6000	0161.9	087.2	36.80		
352.0	006.0000	0101.5	028.5	142.6	001.6000	0162.4	087.3	36.77		
353.0	006.0000	0102.2	028.6	142.3	001.6000	0163.0	087.5	36.74		
354.0	006.0000	0102.7	028.7	142.0	001.6000	0163.3	087.7	36.70		
355.0	006.0000	0103.2	028.7	141.7	001.6000	0163.7	087.9	36.65		
356.0	006.0000	0103.6	028.8	141.4	001.6000	0164.0	088.2	36.59		
357.0	006.0000	0104.3	028.9	141.1	001.6000	0164.4	088.4	36.54		
358.0	006.0000	0104.7	028.9	140.8	001.6000	0164.9	088.6	36.48		
359.0	006.0000	0105.1	029.0	140.6	001.6000	0165.2	088.9	36.42		
000.0	006.0000	0105.6	029.0	140.3	001.6000	0165.7	089.2	36.36		
001.0	006.0000	0106.1	029.1	140.0	001.6000	0166.3	089.4	36.30		
002.0	006.0000	0106.8	029.2	139.7	001.6000	0166.5	089.7	36.23		



# OWL ENGINEERING & EMC TEST LABS, INC.

CONSULTING COMMUNICATIONS ENGINEERS · EMC TEST LABORATORIES

5844 Hamline Avenue North, Shoreview, MN 55126  
651-784-7445 • Fax 651-784-7541

003.0	006.0000	0107.5	029.3		139.4	001.6000	0166.0	090.0	36.13	
Azimuth	ERP	HAAT	Dist		Azimuth	ERP	HAAT	Dist	Actual	IX
(degrees)	(kW)	(m)	(km)		(degrees)	(kW)	(m)	(km)	(dBu)	(km)
-----										
004.0	006.0000	0107.5	029.3		139.2	001.6000	0165.9	090.3	36.02	
005.0	006.0000	0107.4	029.3		139.0	001.6000	0166.1	090.7	35.91	
006.0	006.0000	0107.4	029.3		138.8	001.6000	0166.2	091.1	35.81	
007.0	006.0000	0107.7	029.3		138.5	001.6000	0166.4	091.4	35.71	
008.0	006.0000	0107.8	029.3		138.3	001.6000	0166.6	091.8	35.62	
009.0	006.0000	0108.1	029.3		138.1	001.6000	0166.9	092.2	35.52	
010.0	006.0000	0107.9	029.3		137.9	001.6000	0167.2	092.6	35.41	
011.0	006.0000	0107.8	029.3		137.7	001.6000	0167.5	093.0	35.30	
012.0	006.0000	0107.8	029.3		137.5	001.6000	0167.7	093.4	35.19	
013.0	006.0000	0107.8	029.3		137.3	001.6000	0168.0	093.8	35.08	
014.0	006.0000	0107.9	029.3		137.2	001.6000	0168.3	094.2	34.97	
015.0	006.0000	0108.0	029.3		137.0	001.6000	0168.6	094.6	34.86	
016.0	006.0000	0108.1	029.3		136.8	001.6000	0168.7	095.1	34.74	
017.0	006.0000	0108.2	029.3		136.6	001.6000	0168.8	095.5	34.62	
018.0	006.0000	0108.2	029.4		136.5	001.6000	0169.0	096.0	34.51	
019.0	006.0000	0108.0	029.3		136.4	001.6000	0169.2	096.4	34.38	
020.0	006.0000	0108.0	029.3		136.2	001.6000	0169.4	096.9	34.26	
021.0	006.0000	0108.0	029.3		136.1	001.6000	0169.6	097.3	34.14	
022.0	006.0000	0108.2	029.4		136.0	001.6000	0169.7	097.8	34.02	
023.0	006.0000	0108.6	029.4		135.8	001.6000	0169.7	098.2	33.90	
024.0	006.0000	0109.0	029.4		135.7	001.6000	0169.8	098.7	33.78	
025.0	006.0000	0108.8	029.4		135.6	001.6000	0169.9	099.2	33.65	
026.0	006.0000	0108.5	029.4		135.5	001.6000	0170.0	099.7	33.52	
027.0	006.0000	0108.5	029.4		135.4	001.6000	0170.1	100.2	33.40	
028.0	006.0000	0108.3	029.4		135.3	001.6000	0170.2	100.7	33.27	
029.0	006.0000	0108.5	029.4		135.2	001.6000	0170.3	101.1	33.15	
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CONSULTING COMMUNICATIONS ENGINEERS • EMC TEST LABORATORIES

5844 Hamline Avenue North, Shoreview, MN 55126  
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WAIR BLED20041202ADC

Channel = 285A  
Max ERP = 1.6 kW  
RCAMSL = 550 M  
N. Lat. 44 14 56.0  
W. Lng. 85 18 48.0  
Protected  
60 dBu

WQBX

(^ Max Class Parameters)  
Channel = 285A  
Max ERP = 6 kW  
RCAMSL = 327 M, 100M HAAT  
N. Lat. 43 22 08.0  
W. Lng. 84 36 19.0  
Interfering  
40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
090.0	001.6000	0185.4	027.6	343.6	006.0000	0097.3	102.0	36.03	
091.0	001.6000	0185.4	027.6	343.5	006.0000	0097.3	101.5	36.13	
092.0	001.6000	0185.5	027.6	343.4	006.0000	0097.3	101.1	36.24	
093.0	001.6000	0185.7	027.6	343.3	006.0000	0097.3	100.6	36.34	
094.0	001.6000	0184.9	027.6	343.2	006.0000	0097.3	100.2	36.44	
095.0	001.6000	0184.6	027.5	343.1	006.0000	0097.3	099.7	36.54	
096.0	001.6000	0183.6	027.5	343.0	006.0000	0097.3	099.3	36.63	
097.0	001.6000	0183.3	027.4	342.8	006.0000	0097.3	098.9	36.73	
098.0	001.6000	0182.4	027.4	342.7	006.0000	0097.3	098.5	36.83	
099.0	001.6000	0182.0	027.4	342.6	006.0000	0097.3	098.1	36.93	
100.0	001.6000	0181.9	027.4	342.4	006.0000	0097.4	097.7	37.03	
101.0	001.6000	0181.3	027.3	342.3	006.0000	0097.4	097.3	37.12	
102.0	001.6000	0180.7	027.3	342.1	006.0000	0097.3	096.9	37.21	
103.0	001.6000	0180.0	027.2	341.9	006.0000	0097.2	096.5	37.30	
104.0	001.6000	0179.9	027.2	341.8	006.0000	0097.1	096.1	37.40	
105.0	001.6000	0178.9	027.2	341.6	006.0000	0097.0	095.7	37.48	
106.0	001.6000	0177.9	027.1	341.4	006.0000	0096.8	095.4	37.56	
107.0	001.6000	0178.3	027.1	341.3	006.0000	0096.7	095.0	37.65	
108.0	001.6000	0178.7	027.1	341.1	006.0000	0096.6	094.6	37.75	
109.0	001.6000	0178.5	027.1	340.9	006.0000	0096.5	094.2	37.84	
110.0	001.6000	0177.6	027.1	340.7	006.0000	0096.3	093.9	37.91	
111.0	001.6000	0176.7	027.0	340.5	006.0000	0096.3	093.6	37.99	
112.0	001.6000	0176.3	027.0	340.3	006.0000	0096.3	093.2	38.08	
113.0	001.6000	0176.6	027.0	340.1	006.0000	0096.3	092.9	38.17	
114.0	001.6000	0176.6	027.0	339.9	006.0000	0096.3	092.5	38.26	
115.0	001.6000	0176.4	027.0	339.7	006.0000	0096.3	092.2	38.34	
116.0	001.6000	0175.4	026.9	339.4	006.0000	0096.2	091.9	38.41	
117.0	001.6000	0174.9	026.9	339.2	006.0000	0096.2	091.6	38.49	
118.0	001.6000	0175.0	026.9	339.0	006.0000	0096.1	091.3	38.57	
119.0	001.6000	0175.8	026.9	338.8	006.0000	0096.0	091.0	38.65	
120.0	001.6000	0176.6	027.0	338.6	006.0000	0096.0	090.6	38.74	
121.0	001.6000	0177.2	027.0	338.3	006.0000	0096.0	090.3	38.82	
122.0	001.6000	0177.7	027.1	338.1	006.0000	0095.9	090.0	38.90	
123.0	001.6000	0178.2	027.1	337.9	006.0000	0095.7	089.7	38.97	
124.0	001.6000	0178.0	027.1	337.6	006.0000	0095.6	089.5	39.03	
125.0	001.6000	0178.1	027.1	337.4	006.0000	0095.5	089.2	39.10	
126.0	001.6000	0178.5	027.1	337.1	006.0000	0095.5	088.9	39.17	
127.0	001.6000	0177.8	027.1	336.8	006.0000	0095.4	088.7	39.22	
128.0	001.6000	0177.2	027.0	336.6	006.0000	0095.3	088.6	39.27	
129.0	001.6000	0176.6	027.0	336.3	006.0000	0095.1	088.4	39.31	
130.0	001.6000	0175.5	026.9	336.0	006.0000	0094.8	088.2	39.33	





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CONSULTING COMMUNICATIONS ENGINEERS • EMC TEST LABORATORIES

5844 Hamline Avenue North, Shoreview, MN 55126  
651-784-7445 • Fax 651-784-7541

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
131.0	001.6000	0174.5	026.9	335.7	006.0000	0094.5	088.1	39.36	
132.0	001.6000	0173.3	026.8	335.4	006.0000	0094.3	088.0	39.37	
133.0	001.6000	0172.1	026.7	335.1	006.0000	0094.3	087.9	39.40	
134.0	001.6000	0171.0	026.6	334.8	006.0000	0094.3	087.8	39.43	
135.0	001.6000	0170.4	026.6	334.5	006.0000	0094.3	087.7	39.46	
136.0	001.6000	0169.6	026.5	334.2	006.0000	0094.2	087.6	39.48	
137.0	001.6000	0168.5	026.5	333.9	006.0000	0094.0	087.5	39.49	
138.0	001.6000	0167.0	026.3	333.6	006.0000	0094.0	087.5	39.50	
139.0	001.6000	0166.0	026.3	333.3	006.0000	0094.1	087.4	39.51	
140.0	001.6000	0166.3	026.3	333.0	006.0000	0094.2	087.3	39.55	
141.0	001.6000	0164.7	026.2	332.7	006.0000	0094.1	087.3	39.54	
142.0	001.6000	0163.3	026.1	332.4	006.0000	0094.0	087.4	39.53	
143.0	001.6000	0161.8	026.0	332.1	006.0000	0093.8	087.4	39.52	
144.0	001.6000	0159.6	025.8	331.8	006.0000	0093.8	087.5	39.49	
145.0	001.6000	0157.5	025.7	331.5	006.0000	0093.8	087.6	39.46	
146.0	001.6000	0155.6	025.5	331.2	006.0000	0093.8	087.7	39.43	
147.0	001.6000	0153.3	025.4	330.9	006.0000	0093.7	087.8	39.39	
148.0	001.6000	0151.7	025.2	330.6	006.0000	0093.8	087.9	39.37	
149.0	001.6000	0150.0	025.1	330.3	006.0000	0093.8	088.0	39.34	
150.0	001.6000	0147.4	024.9	330.0	006.0000	0093.9	088.2	39.29	
151.0	001.6000	0146.0	024.8	329.7	006.0000	0094.0	088.3	39.26	
152.0	001.6000	0144.6	024.7	329.4	006.0000	0094.0	088.5	39.23	
153.0	001.6000	0142.2	024.5	329.2	006.0000	0094.1	088.7	39.18	
154.0	001.6000	0141.4	024.5	328.9	006.0000	0094.2	088.8	39.16	
155.0	001.6000	0139.9	024.3	328.6	006.0000	0094.1	088.9	39.11	
156.0	001.6000	0138.3	024.2	328.4	006.0000	0094.2	089.1	39.07	
157.0	001.6000	0137.1	024.1	328.1	006.0000	0094.2	089.3	39.03	
158.0	001.6000	0136.7	024.1	327.8	006.0000	0094.3	089.4	39.01	
159.0	001.6000	0135.2	024.0	327.6	006.0000	0094.3	089.6	38.95	
160.0	001.6000	0133.6	023.9	327.4	006.0000	0094.2	089.8	38.89	
161.0	001.6000	0133.0	023.8	327.1	006.0000	0094.2	089.9	38.85	
162.0	001.6000	0133.2	023.8	326.8	006.0000	0094.2	090.0	38.83	
163.0	001.6000	0133.1	023.8	326.6	006.0000	0094.2	090.1	38.80	
164.0	001.6000	0132.6	023.8	326.3	006.0000	0094.2	090.3	38.75	
165.0	001.6000	0132.0	023.7	326.1	006.0000	0094.3	090.5	38.71	
166.0	001.6000	0132.5	023.8	325.9	006.0000	0094.4	090.6	38.69	
167.0	001.6000	0132.0	023.7	325.6	006.0000	0094.4	090.8	38.64	
168.0	001.6000	0132.0	023.7	325.4	006.0000	0094.3	090.9	38.59	
169.0	001.6000	0132.0	023.7	325.1	006.0000	0094.1	091.1	38.54	
170.0	001.6000	0129.6	023.6	325.0	006.0000	0094.0	091.4	38.45	
171.0	001.6000	0127.2	023.4	324.8	006.0000	0093.9	091.8	38.35	
172.0	001.6000	0125.7	023.3	324.6	006.0000	0093.9	092.1	38.27	
173.0	001.6000	0125.5	023.2	324.4	006.0000	0093.8	092.3	38.22	
174.0	001.6000	0124.5	023.2	324.2	006.0000	0093.7	092.5	38.15	
175.0	001.6000	0123.3	023.1	324.0	006.0000	0093.6	092.8	38.07	
176.0	001.6000	0121.0	022.9	323.8	006.0000	0093.6	093.2	37.97	
177.0	001.6000	0119.2	022.7	323.7	006.0000	0093.6	093.5	37.89	
178.0	001.6000	0118.6	022.7	323.5	006.0000	0093.6	093.8	37.82	
179.0	001.6000	0115.9	022.5	323.4	006.0000	0093.6	094.2	37.71	
180.0	001.6000	0112.8	022.2	323.3	006.0000	0093.6	094.7	37.60	
181.0	001.6000	0110.1	021.9	323.2	006.0000	0093.6	095.1	37.49	
182.0	001.6000	0109.8	021.9	323.0	006.0000	0093.6	095.4	37.43	
183.0	001.6000	0109.2	021.9	322.9	006.0000	0093.6	095.6	37.36	



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CONSULTING COMMUNICATIONS ENGINEERS • EMC TEST LABORATORIES

5844 Hamline Avenue North, Shoreview, MN 55126  
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Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
184.0	001.6000	0108.2	021.8	322.7	006.0000	0093.7	096.0	37.28	
185.0	001.6000	0104.8	021.4	322.7	006.0000	0093.7	096.5	37.16	
186.0	001.6000	0104.4	021.4	322.6	006.0000	0093.7	096.8	37.09	
187.0	001.6000	0103.8	021.3	322.4	006.0000	0093.8	097.1	37.02	
188.0	001.6000	0102.2	021.2	322.4	006.0000	0093.8	097.4	36.94	
189.0	001.6000	0101.8	021.1	322.2	006.0000	0093.8	097.7	36.86	
190.0	001.6000	0101.8	021.1	322.1	006.0000	0093.8	098.0	36.80	
191.0	001.6000	0103.1	021.2	321.9	006.0000	0093.7	098.2	36.75	
192.0	001.6000	0103.4	021.3	321.7	006.0000	0093.7	098.5	36.69	
193.0	001.6000	0103.8	021.3	321.6	006.0000	0093.7	098.7	36.63	
194.0	001.6000	0104.3	021.4	321.4	006.0000	0093.7	099.0	36.57	
195.0	001.6000	0106.6	021.6	321.2	006.0000	0093.7	099.2	36.53	
196.0	001.6000	0107.6	021.7	321.0	006.0000	0093.8	099.4	36.48	
197.0	001.6000	0108.7	021.8	320.8	006.0000	0093.8	099.7	36.42	
198.0	001.6000	0109.7	021.9	320.7	006.0000	0093.9	099.9	36.36	
199.0	001.6000	0110.9	022.0	320.5	006.0000	0094.0	100.2	36.31	
200.0	001.6000	0113.7	022.3	320.3	006.0000	0094.2	100.4	36.27	
201.0	001.6000	0115.6	022.4	320.1	006.0000	0094.3	100.7	36.21	
202.0	001.6000	0117.6	022.6	319.9	006.0000	0094.4	100.9	36.16	
203.0	001.6000	0119.7	022.8	319.7	006.0000	0094.5	101.2	36.10	
204.0	001.6000	0119.3	022.8	319.6	006.0000	0094.5	101.6	36.02	
205.0	001.6000	0120.5	022.8	319.5	006.0000	0094.6	101.9	35.95	
206.0	001.6000	0123.9	023.1	319.2	006.0000	0094.6	102.2	35.90	
207.0	001.6000	0126.3	023.3	319.1	006.0000	0094.6	102.5	35.83	
208.0	001.6000	0127.2	023.4	318.9	006.0000	0094.7	102.8	35.75	
209.0	001.6000	0127.8	023.4	318.8	006.0000	0094.7	103.2	35.68	