APPLICATION FOR CONSTRUCTION PERMIT

K298BM - CEDAR RAPIDS, IOWA
FACILITY ID: 152290
107.5 MHz / 250 W ERP ND

KZIA, INC.

SEPTEMBER 2018

JEREMY RUCK & ASSOCIATES, INC.
P.O. Box 415
221 S. 1st Avenue
Canton, IL 61520
Tel: 309.647.1200
Fax: 855.332.9537
jeremyruck.com

APPLICATION FOR CONSTRUCTION PERMIT

The following engineering statement and attached exhibits have been prepared for **KZIA, Inc.** ("KXIA"), licensee of FM translator station K298BM at Cedar Rapids, Iowa, and are in support of their application for construction permit.[1] This application seeks a construction permit to modify the existing license under FCC File No. BLFT-20131209XVV.

K298BM is licensed to operate with a maximum effective radiated power of 250 Watts at a center of 388 meters above mean sea level utilizing a non-directional antenna. No change in these parameters, or in the channel of operation, is proposed under this application. Rather, KZIA seeks only to change the model of antenna associated with K298BM. This change to the antenna system will allow for a combined operation with co-located translator K272GB. An application to modify the construction permit for that facility by specifying a different antenna is being filled concurrently with this application.

The primary facility for K298BM is FM broadcast station KZIA at Cedar Rapids, Iowa.[2] The proposed change in the antenna type does not affect the licensed technical parameters, and makes no changes in regard to compliance with the provisions of Section 74.1201(g) of the Commission's Rules. The 60 dBu service contour of K298BM will remain wholly contained within the 60 dBu service contour of KZIA.

Exhibit E-1 is a tabular interference study for K298BM. As this study demonstrates, K298BM continues to comply with the contour overlap provisions of Section 74.1204 of the

[1] The Facility ID for K298BM at Cedar Rapids, Iowa is 152290.
[2] The Facility ID for KZIA at Cedar Rapids, Iowa is 35556.

Commission's Rules with respect to all relevant authorizations with the exception of KFMW at Waterloo, Iowa, and KRQN at Vinton, Iowa.[3] The provisions of Section 74.1204(d) will be utilized in relation to those two facilities. The tabular interference study is graphically depicted in the contour map that comprises Exhibit E-2.

Although normally prohibited contour overlap would exist between K298BM and both KFMW and KRQN, no interference to populated regions is predicted to occur. Exhibit E-3 illustrates the K298BM transmitter site along with the KFMW 80.07 dBu service contour and the KRQN 104.55 dBu service contour. As is depicted, these contours intersect the proposed translator site. These two facilities operate second adjacent to K298BM, and as a result, interference to either is predicted to potentially occur in regions where the translator field strength is at least 40 dBu above the field strength of the full power station. Specifically interference is predicted to occur to KFMW when the translator field strength is at least 120.07 dBu, and to KRQN when at least 104.90 dBu. The latter is the more restrictive of the two, and will be utilized as the basis for this study.

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

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

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:

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

[3] The Facility ID for KFMW at Waterloo, Iowa is 51664. The Facility ID for KRQN at Vinton, Iowa is 89113.

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 values listed for the relative field at the various depression angles were obtained from published manufacturer data for the proposed antenna. The listed radii values on this tabulation indicate the boundaries of the interference region at a given depression angle. The tabulation demonstrates that the predicted interference region is confined to a horizontal radius of 656.8 meters from the antenna. Within this radius, however, the predicted interference region is at least 42.6 meters, 139.8 feet, above ground level.

The following five images illustrate the region in the vicinity of the tower utilized by the translator. The first image is an overhead view illustrating the tower location, the maximum interference radius of 656.8 meters described in the previous photograph, and four additional locations. The four additional locations are locations where the subsequent ground level images looking back at the tower were obtained. Taken together, it can be reasonably inferred from these five images that any predicted interference in the vicinity of the K298BM antenna would be confined to regions in which there is no population.

Satellite Image Overview.

Street Level Image from Location #1.

JEREMY RUCK & ASSOCIATES, INC.

P.O. Box 415
221 S. 1st Avenue
Canton, IL 61520

Tel: 309.647.1200
Fax: 855.332.9537
jeremyruck.com

Street Level Image from Location #2.

Street Level Image from Location #3.

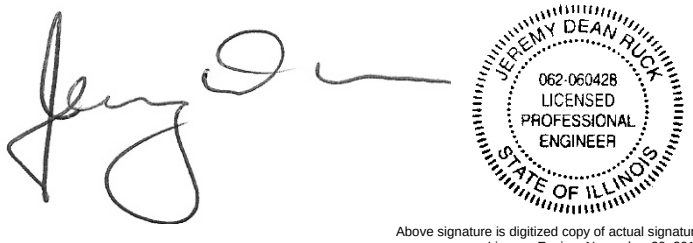
Street Level Image from Location #4.

The proposed facility would not constitute a significant environmental impact, and is exempt from environmental processing. The translator antenna would utilize an existing tower that is registered with the Commission. The presence of the antenna would not increase the existing environmental impact already present from the tower.

Additionally, the proposed facility would not constitute a radiofrequency radiation hazard to persons at the site. The Commission's online *FM Model* utility returns a calculated maximum power density of 0.048 $\mu W/cm^2$ at a distance of 515 meters from the tower. This value complies with the uncontrolled environment of the Commission's safety standard, and is sufficiently low to categorically exclude the facility. The Bext TFC2K model antenna is considered a "type-2" antenna, and was analyzed as such. Additionally, the effective radiated power utilized by *FM Model* also considered the contribution from K272GB, which will share the antenna.

KZIA certifies that it will coordinate with all users of the site to ensure that workers and other personnel 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, 2019

Jeremy D. Ruck, PE
September 27, 2018

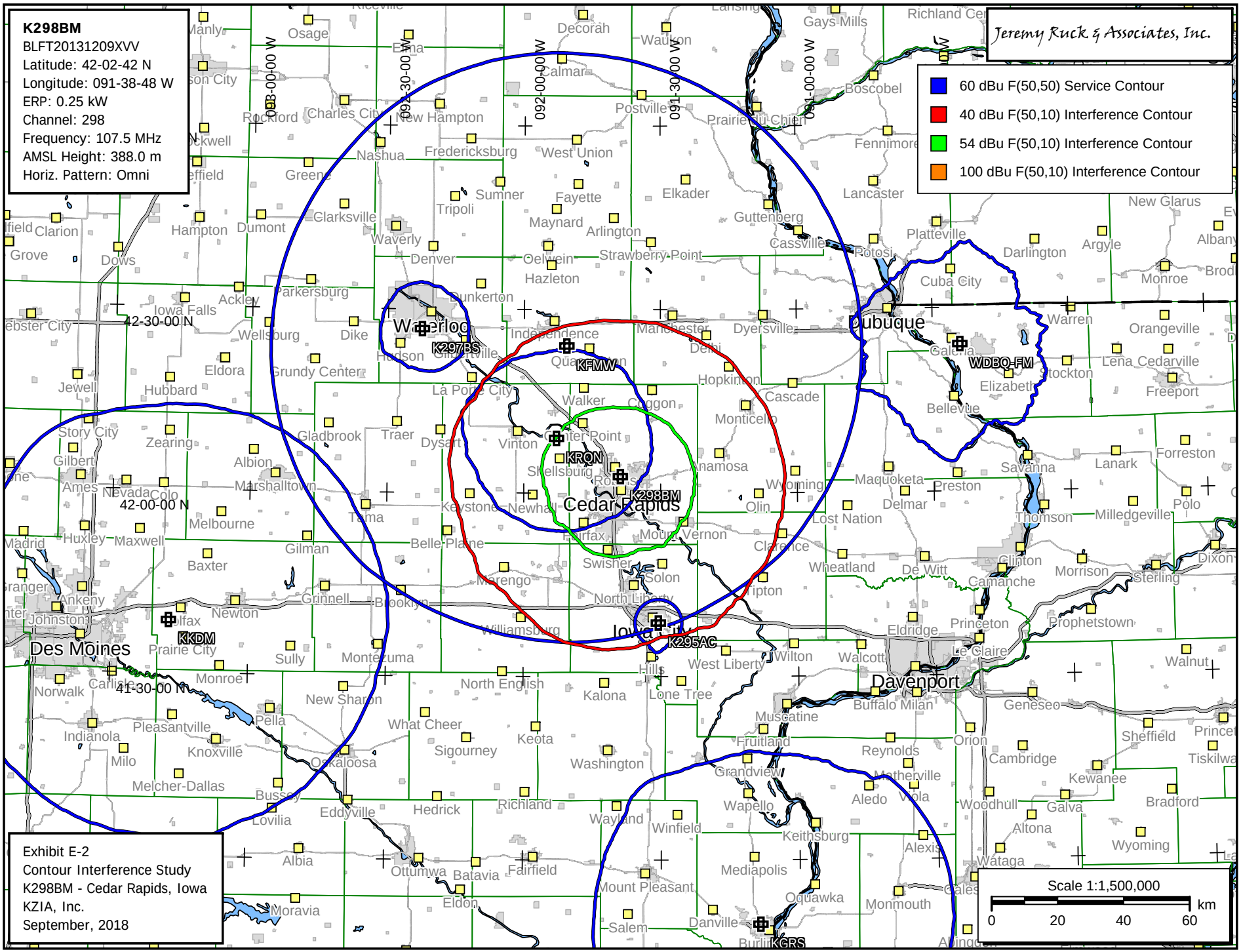
Jeremy Ruck & Associates, Inc.
Consulting Engineers - Canton, Illinois

Exhibit E-1 - Tabular Interference Study
K298BM - Cedar Rapids, Iowa

REFERENCE CH# 298D - 107.5 MHz, Pwr= 0.25 kW, HAAT= 140.5 M, COR= 388 M DISPLAY DATES
42 02 42.0 N. Average Protected F(50-50)= 15.29 km DATA 09-27-18
91 38 48.0 W. Omni-directional SEARCH 09-27-18

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)	
298D	K298BM	LIC	_C_	0.0	0.00	42 02 42.0	0.250		---Reference---		
Cedar Rapids		IA		0.0	BLFT20131209XVV	91 38 48.0	141	388	Kzia, Inc.		
300C	KFMW	LIC	_C_	337.8	42.71	42 24 02.0	100.000	13.1	89.8	15.0	-48.2*
Waterloo		IA		157.7	BMLH20170925AAD	91 50 36.0	550	834	Nrg License Sub, Llc		
298C1	KKDM	LIC	_CN	252.4	143.13	41 38 38.0	100.000	164.4	65.9	-36.7*	26.6
Des Moines		IA		71.3	BLH19980202KG	93 17 20.0	220	485	Clear Chan. B/casting Lice		
296A	KRQN	LIC	_CX	301.0	22.48	42 08 56.0	4.700	2.7	28.5	4.3	-7.1*
Vinton		IA		120.8	BMLH20051025ABI	91 52 50.0	113	366	George S. Flinn, Jr.		
298A	WDBQ-FM	LIC	_CN	68.5	110.09	42 24 02.0	6.000	93.9	32.6	1.9	27.7
Galena		IL		249.4	BMLH19970117KB	90 23 55.0	100	346	Townsquare Media Dubuque L		
295D	K295AC	LIC	_C_	165.5	45.82	41 38 45.0	0.250	1.1	7.1	29.1	37.6
Iowa City		IA		345.6	BLFT20110307AAS	91 30 32.0	18	238	Kirkwood Community College		
297D	K297BS	LIC	_C_	306.9	74.68	42 26 45.0	0.250	21.2	14.1	38.1	37.7
Waterloo		IA		126.4	BMLFT20160804ADD	92 22 29.3		385	Nrg License Sub, Llc		
297C1	KGRS	LIC	_CN	162.6	142.11	40 49 26.0	100.000	80.8	51.5	45.3	67.3
Burlington		IA		343.0	BLH19860915KC	91 08 33.0	131	316	Titan Broadcasting, Llc		

Terrain database is FCC 30 meter , 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= West 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.


K298BM
BLFT20131209XVV
Latitude: 42-02-42 N
Longitude: 091-38-48 W
ERP: 0.25 kW
Channel: 298
Frequency: 107.5 MHz
AMSL Height: 388.0 m
Horiz. Pattern: Omni
Jeremy Ruck & Associates, Inc.
60 dBu F(50,50) Service Contour
40 dBu F(50,10) Interference Contour
54 dBu F(50,10) Interference Contour
100 dBu F(50,10) Interference Contour
093-00-00 W
092-30-00 W
092-00-00 W
091-30-00 W
091-00-00 W
42-30-00 N
42-00-00 N
41-30-00 N
Waterloo
Cedar Rapids
Iowa City
Dubuque
Davenport
Des Moines
K297BS
KFMW
KRQN
K298BM
KKDM
K295AC
WDBQ-FM
KGRS
Exhibit E-2
Contour Interference Study
K298BM - Cedar Rapids, Iowa
KZIA, Inc.
September, 2018
Scale 1:1,500,000
0 20 40 60 km

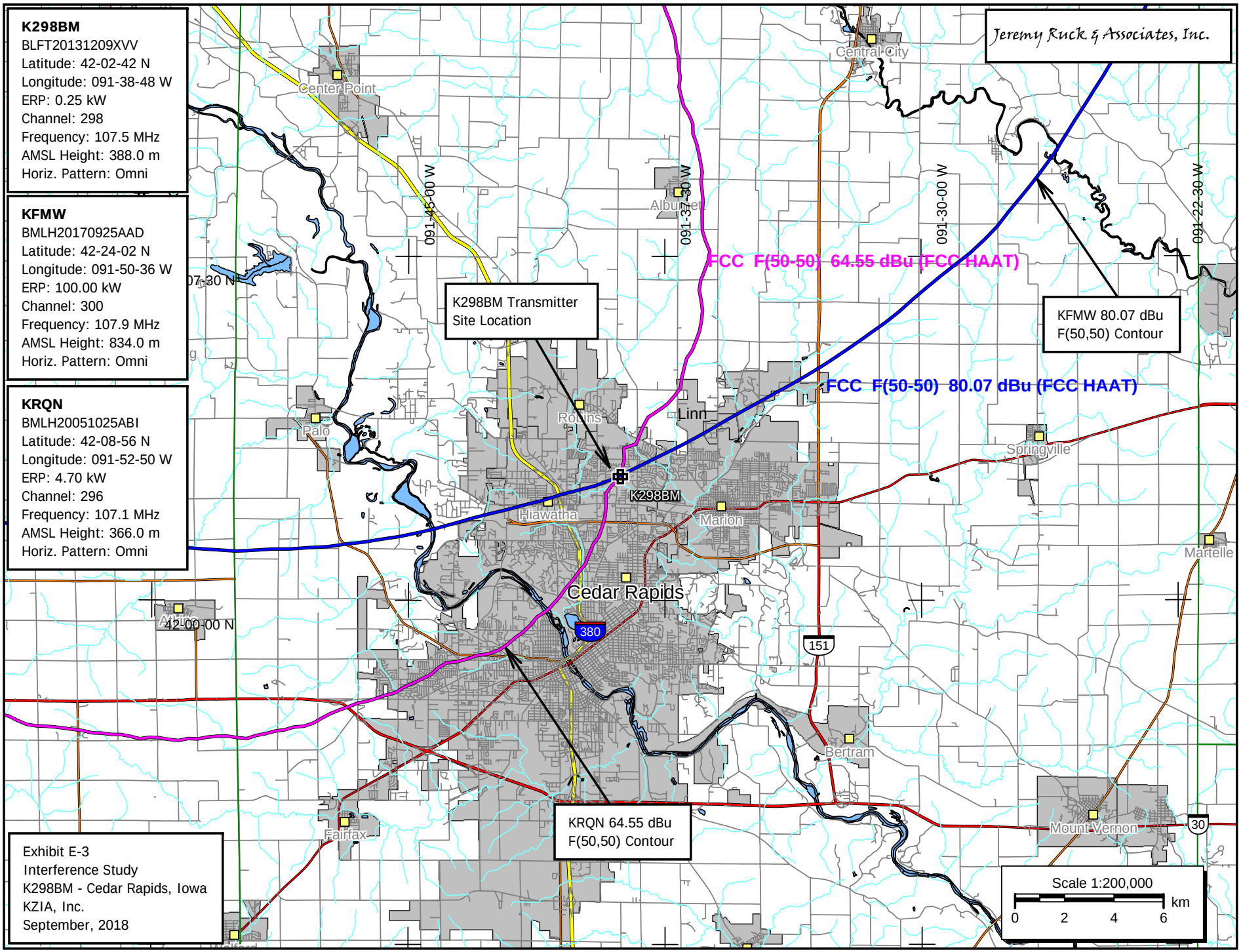
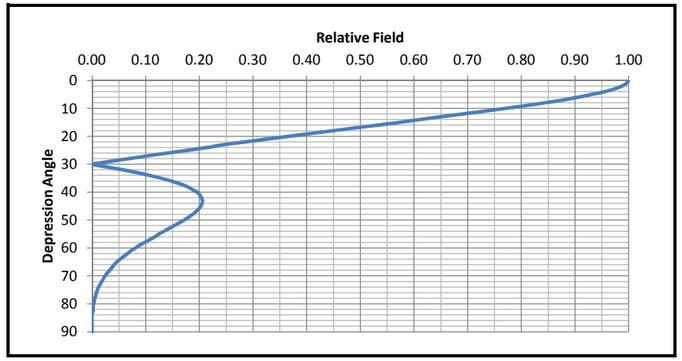
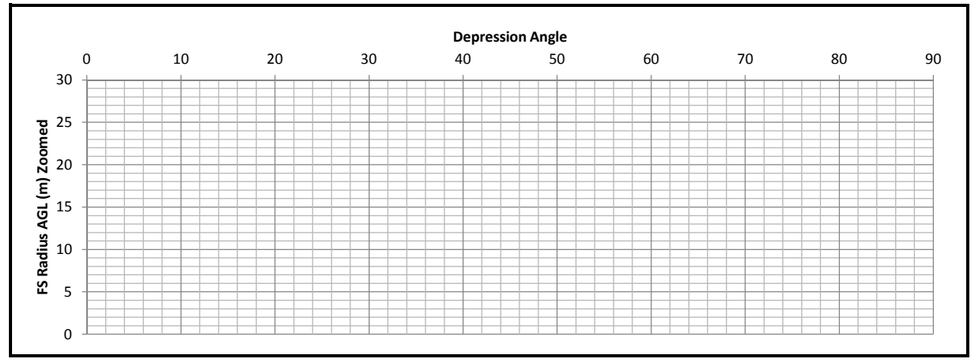

K298BM
BLFT20131209XVV
Latitude: 42-02-42 N
Longitude: 091-38-48 W
ERP: 0.25 kW
Channel: 298
Frequency: 107.5 MHz
AMSL Height: 388.0 m
Horiz. Pattern: Omni
KFMW
BMLH20170925AAD
Latitude: 42-24-02 N
Longitude: 091-50-36 W
ERP: 100.00 kW
Channel: 300
Frequency: 107.9 MHz
AMSL Height: 834.0 m
Horiz. Pattern: Omni
KRQN
BMLH20051025ABI
Latitude: 42-08-56 N
Longitude: 091-52-50 W
ERP: 4.70 kW
Channel: 296
Frequency: 107.1 MHz
AMSL Height: 366.0 m
Horiz. Pattern: Omni
Jeremy Ruck & Associates, Inc.
FCC F(50-50) 64.55 dBu (FCC HAAT)
FCC F(50-50) 80.07 dBu (FCC HAAT)
K298BM Transmitter Site Location
KFMW 80.07 dBu F(50,50) Contour
KRQN 64.55 dBu F(50,50) Contour
Center Point
Central City
Albuquerque
Palo
Robins
Linn
Springville
K298BM
Hiawatha
Marion
Martelle
Cedar Rapids
Bertram
Fairfax
Mount Vernon
380
151
30
091-38-00 W
091-30-00 W
091-22-30 W
42-00-00 N
Exhibit E-3
Interference Study
K298BM - Cedar Rapids, Iowa
KZIA, Inc.
September, 2018
Scale 1:200,000
km
0
2
4
6

Exhibit E-4
Proximity Interference Analysis
K298BM - Cedar Rapids, Iowa

Antenna No:	3	Center of Radiation:	140 m AGL
Manufacturer:	Bext	Effective Radiated Power:	250 Watts
Model:	TFC2K-4-HW	FS Contour:	104.55 dBu
Number of Bays:	4	E Field Strength:	0.16885 V/m
Bay Spacing:	0.5	Z0:	377 Ohms
		Power Density:	7.56238E-05 W/m^2





Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
0	1.0000	1.0000	250.00	656.84	656.84	0.00	140.00
1	0.9960	0.9920	248.00	654.21	654.11	11.42	128.58
2	0.9870	0.9742	243.54	648.30	647.90	22.63	117.37
3	0.9740	0.9487	237.17	639.76	638.88	33.48	106.52
4	0.9550	0.9120	228.01	627.28	625.75	43.76	96.24
5	0.9310	0.8668	216.69	611.52	609.19	53.30	86.70
6	0.9050	0.8190	204.76	594.44	591.18	62.14	77.86
7	0.8770	0.7691	192.28	576.05	571.75	70.20	69.80
8	0.8430	0.7106	177.66	553.71	548.32	77.06	62.94
9	0.8070	0.6512	162.81	530.07	523.54	82.92	57.08
10	0.7690	0.5914	147.84	505.11	497.43	87.71	52.29
11	0.7290	0.5314	132.86	478.83	470.04	91.37	48.63
12	0.6890	0.4747	118.68	452.56	442.67	94.09	45.91
13	0.6510	0.4238	105.95	427.60	416.64	96.19	43.81
14	0.6080	0.3697	92.42	399.36	387.49	96.61	43.39
15	0.5730	0.3283	82.08	376.37	363.54	97.41	42.59
16	0.5310	0.2820	70.49	348.78	335.27	96.14	43.86
17	0.4890	0.2391	59.78	321.19	307.16	93.91	46.09
18	0.4480	0.2007	50.18	294.26	279.86	90.93	49.07
19	0.4060	0.1648	41.21	266.68	252.15	86.82	53.18
20	0.3650	0.1332	33.31	239.75	225.29	82.00	58.00
21	0.3240	0.1050	26.24	212.82	198.68	76.27	63.73
22	0.2840	0.0807	20.16	186.54	172.96	69.88	70.12
23	0.2440	0.0595	14.88	160.27	147.53	62.62	77.38
24	0.2150	0.0462	11.56	141.22	129.01	57.44	82.56
25	0.1770	0.0313	7.83	116.26	105.37	49.13	90.87
26	0.1390	0.0193	4.83	91.30	82.06	40.02	99.98
27	0.1030	0.0106	2.65	67.65	60.28	30.71	109.29
28	0.0670	0.0045	1.12	44.01	38.86	20.66	119.34
29	0.0330	0.0011	0.27	21.68	18.96	10.51	129.49
30	0.0010	0.0000	0.00	0.66	0.57	0.33	139.67
31	0.0300	0.0009	0.23	19.71	16.89	10.15	129.85
32	0.0580	0.0034	0.84	38.10	32.31	20.19	119.81
33	0.0840	0.0071	1.76	55.17	46.27	30.05	109.95
34	0.1080	0.0117	2.92	70.94	58.81	39.67	100.33
35	0.1300	0.0169	4.23	85.39	69.95	48.98	91.02
36	0.1480	0.0219	5.48	97.21	78.65	57.14	82.86
37	0.1640	0.0269	6.72	107.72	86.03	64.83	75.17
38	0.1780	0.0317	7.92	116.92	92.13	71.98	68.02
39	0.1870	0.0350	8.74	122.83	95.46	77.30	62.70
40	0.1960	0.0384	9.60	128.74	98.62	82.75	57.25
41	0.2010	0.0404	10.10	132.02	99.64	86.62	53.38
42	0.2040	0.0416	10.40	133.99	99.58	89.66	50.34
43	0.2060	0.0424	10.61	135.31	98.96	92.28	47.72
44	0.2050	0.0420	10.51	134.65	96.86	93.54	46.46
45	0.2030	0.0412	10.30	133.34	94.28	94.28	45.72

Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
45	0.2030	0.0412	10.30	133.34	94.28	94.28	45.72
46	0.1990	0.0396	9.90	130.71	90.80	94.03	45.97
47	0.1930	0.0372	9.31	126.77	86.46	92.71	47.29
48	0.1870	0.0350	8.74	122.83	82.19	91.28	48.72
49	0.1800	0.0324	8.10	118.23	77.57	89.23	50.77
50	0.1710	0.0292	7.31	112.32	72.20	86.04	53.96
51	0.1620	0.0262	6.56	106.41	66.96	82.69	57.31
52	0.1530	0.0234	5.85	100.50	61.87	79.19	60.81
53	0.1430	0.0204	5.11	93.93	56.53	75.01	64.99
54	0.1340	0.0180	4.49	88.02	51.73	71.21	68.79
55	0.1240	0.0154	3.84	81.45	46.72	66.72	73.28
56	0.1170	0.0137	3.42	76.85	42.97	63.71	76.29
57	0.1070	0.0114	2.86	70.28	38.28	58.94	81.06
58	0.0980	0.0096	2.40	64.37	34.11	54.59	85.41
59	0.0880	0.0077	1.94	57.80	29.77	49.55	90.45
60	0.0810	0.0066	1.64	53.20	26.60	46.08	93.92
61	0.0720	0.0052	1.30	47.29	22.93	41.36	98.64
62	0.0660	0.0044	1.09	43.35	20.35	38.28	101.72
63	0.0590	0.0035	0.87	38.75	17.59	34.53	105.47
64	0.0520	0.0027	0.68	34.16	14.97	30.70	109.30
65	0.0460	0.0021	0.53	30.21	12.77	27.38	112.62
66	0.0410	0.0017	0.42	26.93	10.95	24.60	115.40
67	0.0370	0.0014	0.34	24.30	9.50	22.37	117.63
68	0.0330	0.0011	0.27	21.68	8.12	20.10	119.90
69	0.0280	0.0008	0.20	18.39	6.59	17.17	122.83
70	0.0240	0.0006	0.14	15.76	5.39	14.81	125.19
71	0.0210	0.0004	0.11	13.79	4.49	13.04	126.96
72	0.0180	0.0003	0.08	11.82	3.65	11.24	128.76
73	0.0150	0.0002	0.06	9.85	2.88	9.42	130.58
74	0.0120	0.0001	0.04	7.88	2.17	7.58	132.42
75	0.0100	0.0001	0.03	6.57	1.70	6.34	133.66
76	0.0080	0.0001	0.02	5.25	1.27	5.10	134.90
77	0.0070	0.0000	0.01	4.60	1.03	4.48	135.52
78	0.0050	0.0000	0.01	3.28	0.68	3.21	136.79
79	0.0040	0.0000	0.00	2.63	0.50	2.58	137.42
80	0.0030	0.0000	0.00	1.97	0.34	1.94	138.06
81	0.0020	0.0000	0.00	1.31	0.21	1.30	138.70
82	0.0020	0.0000	0.00	1.31	0.18	1.30	138.70
83	0.0010	0.0000	0.00	0.66	0.08	0.65	139.35
84	0.0000	0.0000	0.00	0.00	0.00	0.00	140.00
85	0.0000	0.0000	0.00	0.00	0.00	0.00	140.00
86	0.0000	0.0000	0.00	0.00	0.00	0.00	140.00
87	0.0000	0.0000	0.00	0.00	0.00	0.00	140.00
88	0.0000	0.0000	0.00	0.00	0.00	0.00	140.00
89	0.0000	0.0000	0.00	0.00	0.00	0.00	140.00
90	0.0000	0.0000	0.00	0.00	0.00	0.00	140.00