

ENGINEERING STATEMENT
IN SUPPORT OF AN APPLICATION
TO CONSTRUCT REPACKED FACILITIES
PURSUANT TO DA 17-314
KAJJ-CD KALISPELL, MONTANA
CHANNEL 18 9.55 KW ND ERP 829 METERS HAAT

JUNE 2017

COHEN, DIPPELL AND EVERIST, P.C.
CONSULTING ENGINEERS
RADIO AND TELEVISION
WASHINGTON, D.C.

Introduction

This engineering statement has been prepared on behalf of KPAX Communications, Inc. ("KPAX"), licensee of Class A television station KAJJ-CD, Kalispell, Montana (Facility ID 35453). This statement supports the application to construct repacked facilities pursuant to DA 17-314, Channel 18, Kalispell, Montana.

KAJJ-CD hereby requests authorization for digital facilities to change from the existing Channel 39 to Channel 18 with an effective radiated power ("ERP") of 9.55 kW (non-directional) at a radiation center above mean sea level ("RCAMSL") of 2082 meters. This height results in a height above average terrain of 829 meters.

KAJJ-CD proposes to replace its existing antenna on the KCFW-TV multi-use tower site in Lakeside, Montana. The Antenna Structure Registration Number for the KCFW-TV site is 1000780 and a diagram of the tower is shown as Exhibit E-1.

The geographic coordinates of the existing tower are:

North Latitude: 48° 00' 48"

West Longitude: 114° 21' 55"

NAD 27

North Latitude: 48° 00' 48"

West Longitude: 114° 21' 58"

NAD 83

Equipment Data

Antenna: Dielectric, Type DLP-8B (or equivalent) elliptically polarized directional antenna with 1.5° electrical beam tilt. The azimuth and vertical plane patterns and other exhibits required by Section 73.625(c) are included in Exhibit E-2.

Transmission Line: 150 feet (45.72 m) of Andrew, Heliac, Type AVA 7-50, 1-5/8" 50 ohm foam dielectric line (or equivalent) with an attenuation of 0.462 dB/100 ft.

Power Data

Transmitter output ("TPO"): At filter output	2.0 kW	3.01 dBk
Transmission Line Efficiency/(Loss):	85.3%	(0.693 dB)
Input power to the antenna:	1.706 kW	2.317 dB
Antenna power gain	Horizontal 5.6 Vertical 2.4	7.48 dB 3.81 dB
Effective Radiated Power (ERP)		
Maximum, Main Lobe:	Horizontal 9.55 kW Vertical 4.1 kW	9.80 dBk 6.12 dBk

Elevation Data

Elevation of site above mean sea level	2035.8 meters 6679.1 feet
Overall height above ground of existing tower structure and appurtenances (including lightning protection)	73.1 meters 239.8 feet
Overall height above mean sea level of existing tower and appurtenances (including lightning protection)	2108.8 meters 6918.6 feet
Center of radiation of Channel 18 antenna above ground	45.7 meters 150 feet

Center of radiation of Channel 18 antenna above mean sea level	2081.5 feet 6829.1 feet
Antenna height above average terrain	829 meters 2719.8 feet

NOTE: Slight height differences result due to conversion to metric.

Other Broadcast Facilities

A brief analysis was completed to determine the presence of stations in the vicinity of the KCFW-TV tower using the June 12, 2017 data contained within the Commission's Consolidated Database System ("CDBS"). Within 0.1 km of the proposed site, there are two authorized FM radio stations and 2 digital television stations other than KAJJ-CD. There are no AM facilities within 3.22 km of the existing tower. Although no adverse technical effects are expected due to the proposed changes, the licensee will take measures to resolve any problems proven to be related to the changes proposed in this application.

FCC Rule, Section 1.1307

The proposed 9.55 kW non-directional operation will utilize a Dielectric, Type DLP-8B antenna (or equivalent) described above with a center of radiation above ground of 45.7 meters. The antenna will be side-mounted on an existing tower with an overall height of 73.1 meters above ground.

Pursuant to OET Bulletin No. 65 dated August 1997, non-broadcast stations are all exempt from RFF evaluations.

The RFF contribution of the proposed KAJJ-CD operation will be calculated using the following formula:

$$S = \frac{33.4(F^2) \text{ Total ERP}}{R^2}$$

where:

S = power density in $\mu\text{W}/\text{cm}^2$

F = relative field factor

Total ERP = ERP Horizontal Polarization + ERP Vertical Polarization

R = RCAGL - 2 meters

ERP = RMS ERP in watts for DTV Stations

There are no AM stations within 3.22 km of the existing tower site. There are two FM stations, KLKM(FM) and KALS(FM) operating on the tower. In addition digital television facilities, KCFW-TV and KUKL are operating from this tower. According to CDBS, there are no other broadcast stations operating within 100 meters of the site.

No adverse technical effect is anticipated by the substituted DTV operation to any other FCC licensed facility. If required, the licensee will install filters or take other measures as necessary to resolve the problem.

The radio frequency field ("RFF") contribution of the proposed operation operates is as follows:

Based on the elevation pattern from the manufacturer's antenna data, a maximum downward field of 0.120 in the range of 20° to 90° would create a maximum field level of 3.4 $\mu\text{W}/\text{cm}^2$ in the vicinity of the base of the tower.

The limit for an uncontrolled environment is $331 \mu\text{W}/\text{cm}^2$ and for a controlled environment is $1657 \mu\text{W}/\text{cm}^2$ for the UHF Channel 18.

The proposed operation contributes less than two percent RFF level for an uncontrolled environment two meters above the ground at the proposed site or approximately one percent RFF level for a controlled environment two meters above ground at the existing site.

The licensee indicates that access to the site is approximately 10 miles on an unimproved road from a main highway. The unimproved road is not regularly traveled. Therefore, it is believed this site qualifies under Situation B of OET Bulletin 65 as discussed below:

From Pages 77 and 78, guidance for such a situation is provided from the FCC publication entitled, "*Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, OET Bulletin 65, Edition 97-01, August 1997*", "*Appendix B, Summary of 1986 Mass Media Bureau, Public Notice on RF Compliance*".

A portion is abstracted as follows:

Situations

(B) High RF levels are produced at ground level in a remote area not likely to be visited by the public.

- If the area of concern is marked by appropriate warning signs, an applicant may assume that there is no significant effect on the human environment with regard to exposure of the general public. It is recommended that fences also be used where feasible.

Therefore, members of the public and personnel working around the existing tower site would not be exposed to RFF levels exceeding the FCC standards. With respect to work performed on the tower, the licensee will establish procedure to ensure for the proposed facility

that workers are not exposed to RFF levels above those prescribed by FCC, by reducing or turning off the power, as appropriate.

Appropriate warning signs are posted.

Authorized personnel and rigging contractors will be alerted to the potential zone of high radio frequency field levels on the tower, and if necessary, the station will operate with reduced power or terminate the operation of the transmitter as appropriate when it is necessary for authorized personnel or contractors to perform work on or near the tower. Workers and the general public, therefore, will not be subjected to RFF levels in excess of the current FCC guidelines.

Environmental Assessment

An environmental assessment (“EA”) is categorically excluded under Section 1.1306 of the FCC Rules and Regulations as the tower was constructed prior to the requirements specified in WT Docket No. 03-128 and the applicant indicates:

- (a)(1) The existing tower is not located in an officially designated wilderness area.
- (a)(2) The existing tower is not located in an officially designated wildlife preserve.
- (a)(3) The proposed facilities will not affect any listed threatened or endangered species or habitats.
- (a)(3)(ii) The proposed facilities will not jeopardize the continued existence of any proposed endangered or threatened species or likely to result in the destruction or adverse modification of proposed critical habitats.

- (a)(4) The proposed facilities will be located on a tower which was built prior to the adoption of WT Docket No. 03-128 and will not affect any known districts, sites, buildings, structures, or objects significant in American history, architecture, archaeology, engineering, or culture.
- (a)(5) The existing tower is not located near any known Indian religious sites.
- (a)(6) The existing tower is not located in a flood plain.
- (a)(7) The installation of the DTV facilities on an existing tower will not involve a significant change in surface features of the ground in the vicinity of the tower.
- (a)(8) It is not proposed to equip the tower with high intensity white lights unless required by the FAA.
- (b) Workers and the general public will not be subjected to RFF levels in excess of the current FCC guidelines contained in OET Bulletin No. 65, Edition 97-01, dated August 1997 and Supplement A.

ABOVE MEAN SEA LEVEL

ABOVE GROUND

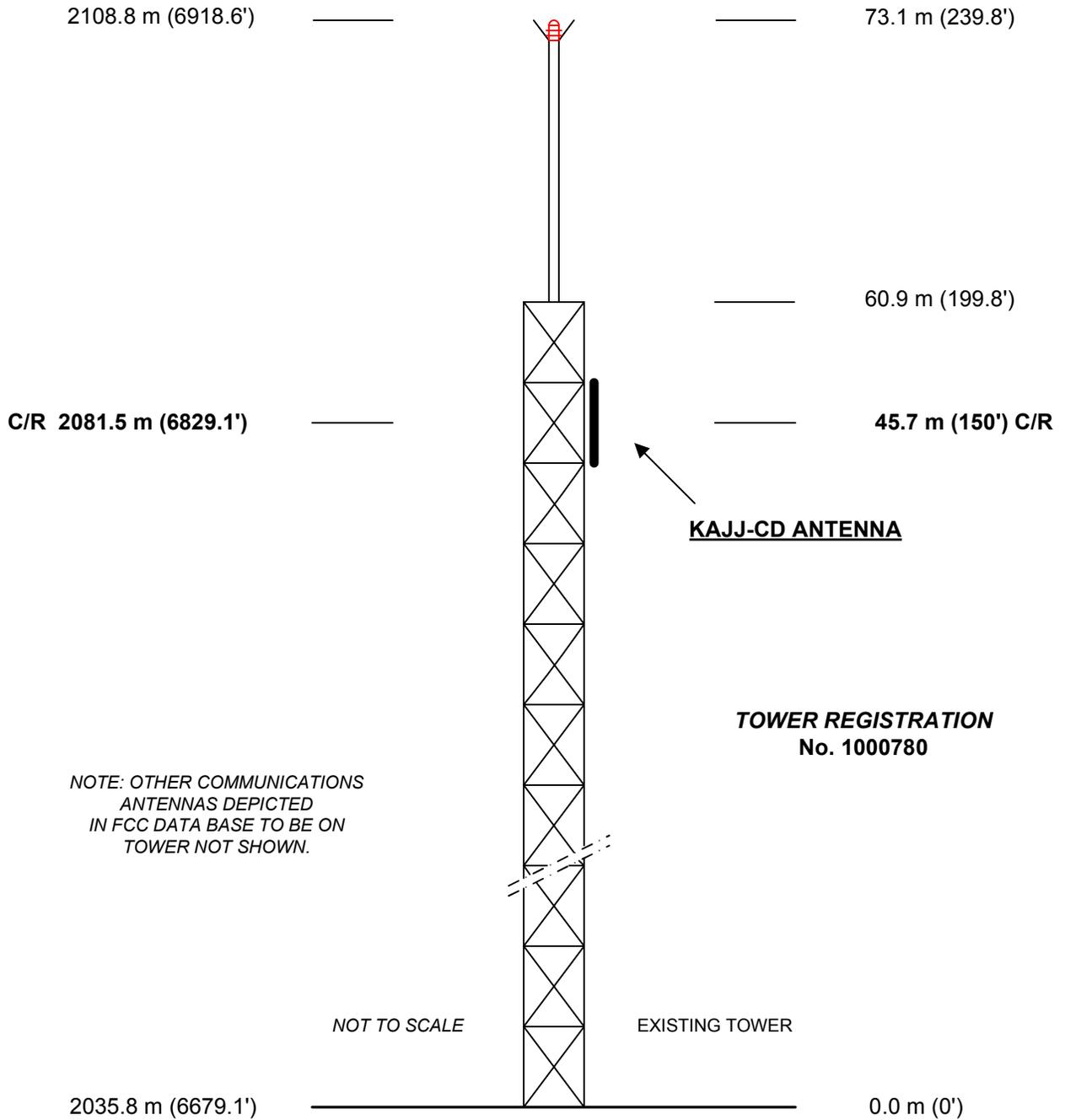


EXHIBIT E - 1
VERTICAL SKETCH
FOR THE OPERATION OF
KAJJ-CD, KALISPELL, MONTANA
CHANNEL 18 9.55 kW 829 METERS HAAT
JUNE 2017

EXHIBIT E-2

ANTENNA MANUFACTURER DATA

System Summary

Exhibit No.	
Date	22 Apr 2017
Call Letters	KAJJ
Channel	18
Antenna Type	B
Location	KALISPELL, MT
Customer	CORDILLERA

Antenna

	Hpol	Vpol
ERP:	9.6 kW (9.82 dBk)	4.1 kW (6.12 dBk)
RMS Gain*:	5.6 (7.48 dB)	2.4 (3.81 dB)

Antenna Input Power:

1.7 kW

Transmission Line

Type:	Flexline Foam		
Size:	1-5/8"		
Impedance:	50 ohm		
Length:	140 ft (42.7 m)	Attenuation:	0.7 dB
		Efficiency:	84.93 %

Transmitter Output

2.0 kW (3.05 dBk)

* Gain is with respect to half wave dipole.

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ELEVATION PATTERN

Exhibit No.

 Date **22 Apr 2017**

 Call Letters **KAJJ**

 Channel **18**

 Antenna Type **B**

 Location **KALISPELL, MT**

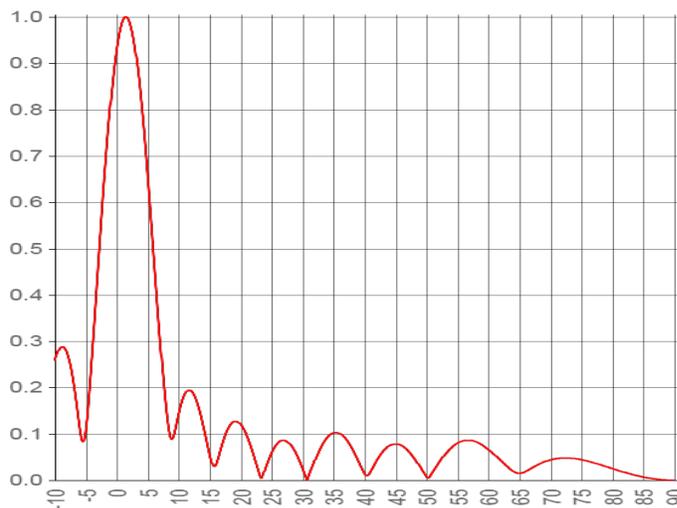
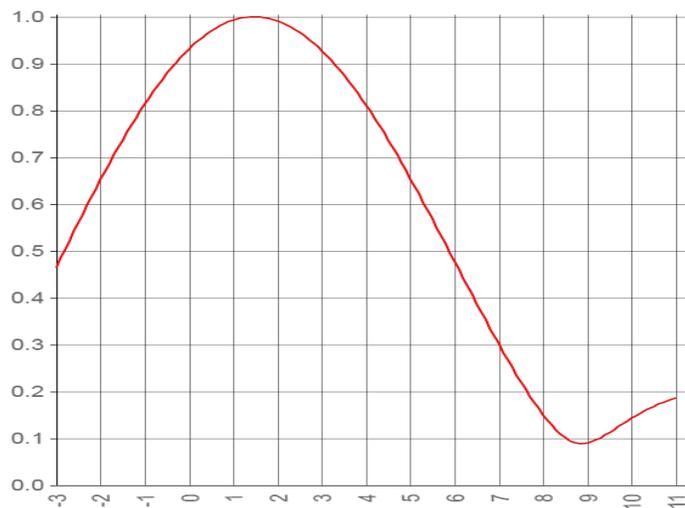
 Customer **CORDILLERA**

 RMS Gain at Main Lobe **8.0 (9.03 dB)**

 Beam Tilt **1.5 Degrees**

 RMS Gain at Horizontal **6.9 (8.42 dB)**

Drawing #

Calculated


Degrees below horizontal

Degrees below horizontal

Angle	Field								
-10	0.258	10	0.143	30	0.025	50	0.007	70	0.044
-9	0.287	11	0.186	31	0.010	51	0.018	71	0.047
-8	0.273	12	0.193	32	0.044	52	0.038	72	0.048
-7	0.213	13	0.166	33	0.073	53	0.056	73	0.048
-6	0.117	14	0.115	34	0.093	54	0.070	74	0.047
-5	0.111	15	0.056	35	0.102	55	0.080	75	0.044
-4	0.271	16	0.034	36	0.101	56	0.085	76	0.041
-3	0.464	17	0.078	37	0.088	57	0.086	77	0.038
-2	0.652	18	0.112	38	0.068	58	0.083	78	0.034
-1	0.814	19	0.127	39	0.041	59	0.076	79	0.029
0	0.932	20	0.120	40	0.015	60	0.066	80	0.025
1	0.993	21	0.095	41	0.020	61	0.055	81	0.021
2	0.991	22	0.058	42	0.044	62	0.042	82	0.017
3	0.928	23	0.015	43	0.063	63	0.030	83	0.013
4	0.811	24	0.027	44	0.074	64	0.019	84	0.010
5	0.655	25	0.060	45	0.078	65	0.015	85	0.007
6	0.478	26	0.080	46	0.075	66	0.019	86	0.004
7	0.301	27	0.086	47	0.064	67	0.027	87	0.003
8	0.150	28	0.077	48	0.048	68	0.034	88	0.001
9	0.090	29	0.055	49	0.028	69	0.040	89	0.000

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TABLE I
COMPUTED COVERAGE DATA
FOR THE PROPOSED DTV OPERATION OF
KAJJ-CD, KALIPSELL, MONTANA
CHANNEL 18 9.55 KW ND ERP 829 METERS HAAT
JUNE 2017

<u>Radial</u> <u>Bearing</u> (N ° E, T)	<u>Average*</u>	<u>Effective</u> <u>Height</u> meters	<u>Depression</u> <u>Angle</u> degrees	<u>ERP At</u> <u>Radio</u> <u>Horizon</u> kW	<u>Distance to Contour F(50/90)</u>	
	<u>Elevation</u> <u>3.2 to 16.1 km</u> meters				<u>58 dBu</u> <u>City Grade</u> km	<u>49.15 dBu</u> <u>Noise-Limited</u> km
0	1378.7	703.3	0.735	9.550	56.2	69.8
10	1331.2	750.8	0.759	9.550	57.0	70.7
20	1283.7	798.4	0.783	9.550	57.9	71.7
30	1236.1	845.9	0.806	9.550	58.7	72.6
40	1188.6	893.4	0.828	9.550	59.4	73.5
50	1146.3	935.7	0.847	9.550	60.1	74.3
60	1109.3	972.8	0.864	9.550	60.7	75.1
70	1072.2	1009.8	0.880	9.550	61.2	75.9
80	1035.1	1046.9	0.896	9.550	61.8	76.8
90	998.0	1084.0	0.912	9.550	62.3	77.6
100	1070.2	1011.8	0.881	9.550	61.3	76.0
110	1142.4	939.7	0.849	9.550	60.2	74.4
120	1214.5	867.5	0.816	9.550	59.0	73.0
130	1286.7	795.3	0.781	9.550	57.8	71.6
140	1315.2	766.9	0.767	9.550	57.3	71.1
150	1299.9	782.1	0.775	9.550	57.6	71.4
160	1284.7	797.3	0.782	9.550	57.9	71.6
170	1269.5	812.5	0.790	9.550	58.1	71.9
180	1254.3	827.7	0.797	9.550	58.4	72.2
190	1292.3	789.7	0.778	9.550	57.7	71.5
200	1330.3	751.7	0.759	9.550	57.0	70.8
210	1368.3	713.8	0.740	9.550	56.3	70.0
220	1406.2	675.8	0.720	9.550	55.6	69.2
230	1419.6	662.4	0.713	9.550	55.4	68.8
240	1408.3	673.7	0.719	9.550	55.6	69.1
250	1397.1	684.9	0.725	9.550	55.8	69.4
260	1385.8	696.2	0.731	9.550	56.0	69.6
270	1374.5	707.5	0.737	9.550	56.2	69.9

TABLE I
COMPUTED COVERAGE DATA
FOR THE PROPOSED DTV OPERATION OF
KAJJ-CD, KALIPSELL, MONTANA
CHANNEL 18 9.55 KW ND ERP 829 METERS HAAT
JUNE 2017

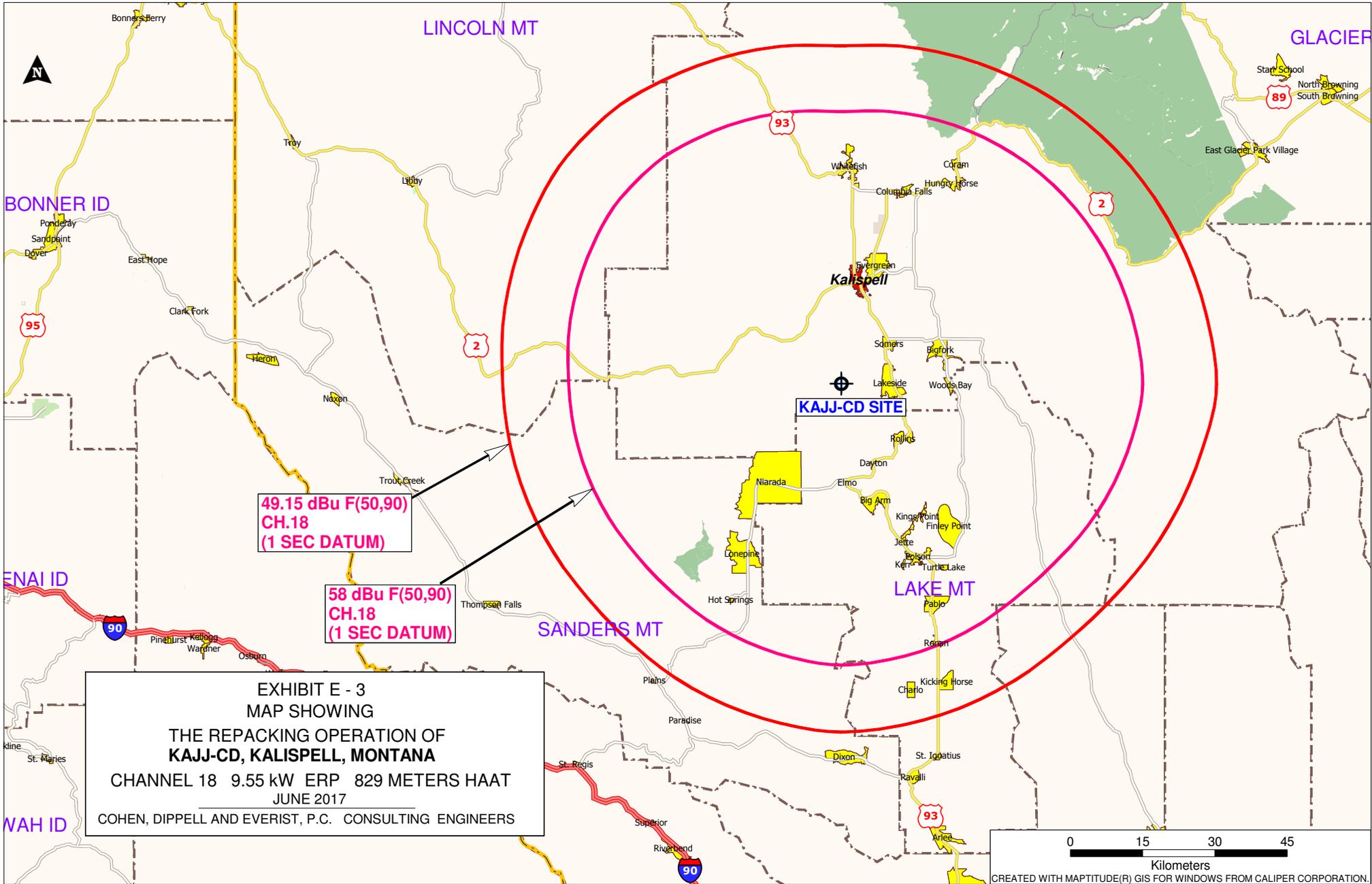
<u>Radial</u> <u>Bearing</u> (N ° E, T)	<u>Average*</u> <u>Elevation</u> <u>3.2 to 16.1 km</u> meters	<u>Effective</u> <u>Height</u> meters	<u>Depression</u> <u>Angle</u> degrees	<u>ERP At</u> <u>Radio</u> <u>Horizon</u> kW	<u>Distance to Contour F(50/90)</u>	
					<u>58 dBu</u> <u>City Grade</u> km	<u>49.15 dBu</u> <u>Noise-Limited</u> km
280	1329.9	752.1	0.760	9.550	57.1	70.8
290	1285.2	796.8	0.782	9.550	57.8	71.6
300	1240.5	841.5	0.804	9.550	58.6	72.5
310	1195.8	886.2	0.825	9.550	59.3	73.3
320	1196.3	885.7	0.824	9.550	59.3	73.3
330	1241.9	840.1	0.803	9.550	58.6	72.5
340	1287.5	794.5	0.781	9.550	57.8	71.6
350	1333.1	748.9	0.758	9.550	57.0	70.7

*Based on data from FCC one-second data base.

DTV Channel 18 (494-500 MHz)
 Average Elevation 3.2 to 16.1 km 1261.36 meters AMSL
 Center of Radiation 2081.5 meters AMSL
 Antenna Height Above Average Terrain 829 meters
 Effective Radiated Power 9.55 kW (9.80 dBk) Max.

North Latitude: 48° 00' 48"
 West Longitude: 114° 21' 55"

(NAD-27)

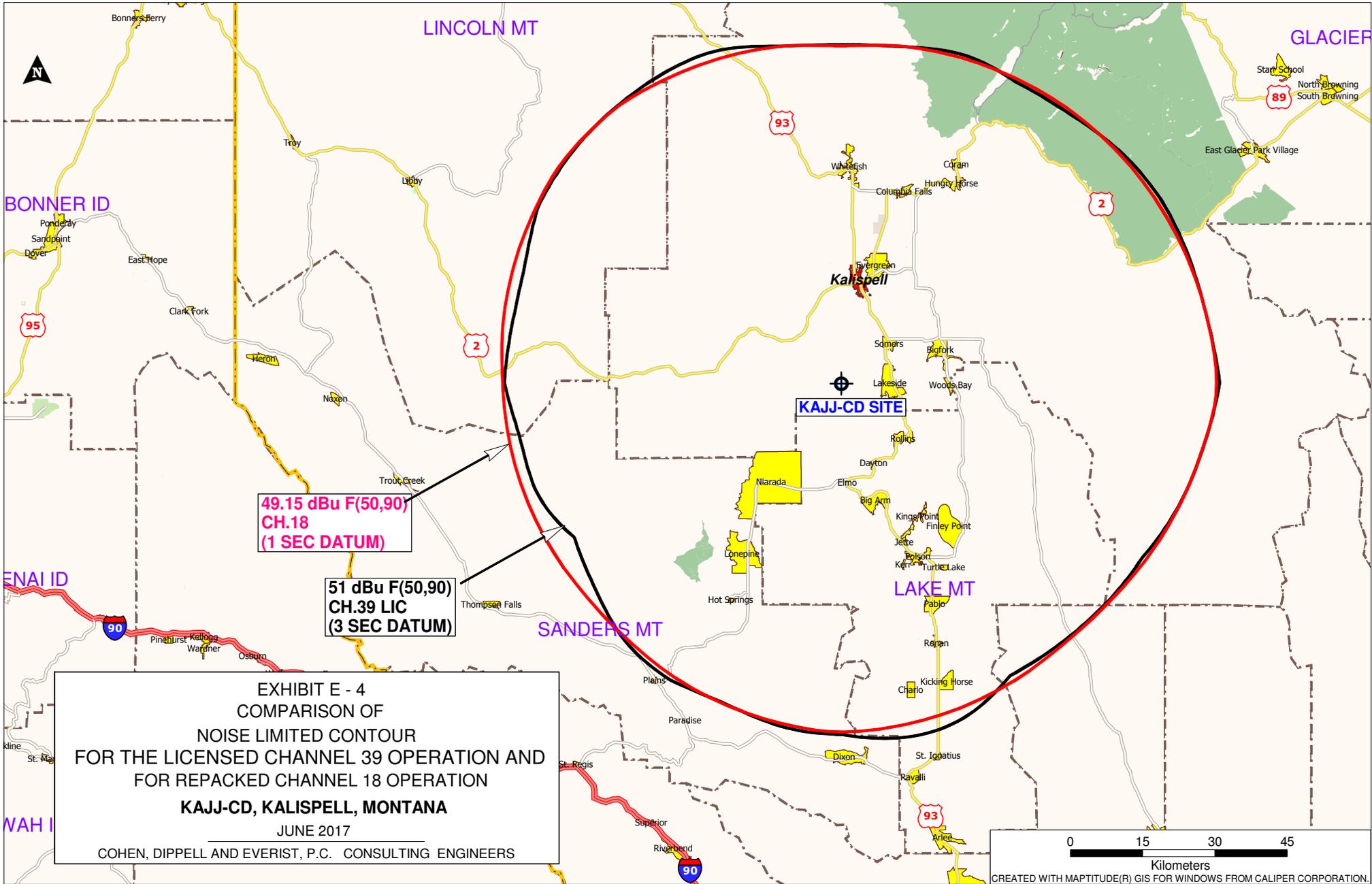


49.15 dBu F(50,90)
CH.18
(1 SEC DATUM)

58 dBu F(50,90)
CH.18
(1 SEC DATUM)

EXHIBIT E - 3
MAP SHOWING
THE REPACKING OPERATION OF
KAJJ-CD, KALISPELL, MONTANA
CHANNEL 18 9.55 kW ERP 829 METERS HAAT
JUNE 2017
COHEN, DIPPELL AND EVERIST, P.C. CONSULTING ENGINEERS

0 15 30 45
Kilometers
CREATED WITH MAPTITUDE(R) GIS FOR WINDOWS FROM CALIPER CORPORATION.



**49.15 dBu F(50,90)
CH.18
(1 SEC DATUM)**

**51 dBu F(50,90)
CH.39 LIC
(3 SEC DATUM)**

KAJJ-CD SITE

**EXHIBIT E - 4
COMPARISON OF
NOISE LIMITED CONTOUR
FOR THE LICENSED CHANNEL 39 OPERATION AND
FOR REPACKED CHANNEL 18 OPERATION
KAJJ-CD, KALISPELL, MONTANA
JUNE 2017
COHEN, DIPPELL AND EVERIST, P.C. CONSULTING ENGINEERS**

0 15 30 45
Kilometers
CREATED WITH MAPTITUDE(R) GIS FOR WINDOWS FROM CALIPER CORPORATION.