

**Comprehensive Technical Exhibit**  
*Application for Construction Permit*  
KCPM-DT - Grand Forks, North Dakota  
G.I.G. of North Dakota, LLC  
April, 2010

**Application for Construction Permit**

The following engineering statement and attached exhibits have been prepared for **G.I.G. of North Dakota, LLC** ("GIG"), licensee of television station KCPM(TV) at Grand Forks, North Dakota, and are in support of their application for construction permit for post-transition DTV facilities.<sup>1</sup>

KCPM is currently licensed on channel 27 as an analog facility. Under the current authorization (see FCC File No. BLCT-20040105ACS), KCPM is licensed with a maximum effective radiated power of 18 kW at a center of radiation of 95.7 meters above average terrain. Currently KCPM is silent due to financial hardship.

As a post transition digital facility, KCPM would operate with a maximum effective radiated power of 11.1 kW at a center of radiation of 55.8 meters above average terrain.<sup>2</sup> The reduction in the center of radiation from the allotted value of 96.0 meters is a result of a change in the supporting structure at the site. Midcontinent Communications, the owner of the tower from whom GIG leases vertical real estate, dismantled the 152 meter structure registered under ASRN 1024438. This tower was replaced with the current structure, which has an overall height above ground of 60.7 meters (199 feet). The current structure is not registered, nor does it require registration per a determination from *Towair*.

The current analog transmitter, which has a maximum NTSC output of 1.0 kW, will be converted to digital for use by KCPM. Representatives of the manufacturer indicate that the

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<sup>1</sup> The Facility ID for KCPM at Grand Forks, North Dakota is 86208.

<sup>2</sup> Three second linearly interpolated terrain database utilized for average terrain determination. Samples of 8 and 360 radials return identical results.

following the conversion, the transmitter is expected to yield a maximum TPO of 0.55 kW digital. The transmission line, 310 feet of Andrew HJ7-50A 1 5/8" air dielectric semi-flexible coax has an attenuation of 1.56 dB at the channel of operation. The antenna, per manufacturer's technical data, has a peak gain of 14.61 dBd, and will be oriented with the main lobe at 200 degrees true. The resulting maximum ERP proposed is 11.1 kW. The antenna utilized is an off-the-shelf antenna; however, copies of patterns from the manufacturer are appended to this application following all other numbered technical exhibits.

The proposed facility would be located at the reference coordinates for the allocation. In addition, the channel proposed for use is the channel listed in the allocation for KCPM. Since the proposed facility would operate with a maximum effective radiated power less than that listed in the allotment and a center of radiation lower than that in the allotment, the resulting noise limited service contour would be wholly contained within the noise limited contour derived from the allocation as demonstrated in Exhibit E-1.

The proposed facility would comply with the principal community coverage requirements of Section 73.625 of the Commission's Rules. Exhibit E-2 illustrates the predicted coverage of the facility both by the Commission's standard contour methodology and by Longley-Rice. As this exhibit demonstrates, the predicted 48 dBu F(50,90) service contour would totally encompass Grand Forks, North Dakota. In addition, all of Grand Forks would receive a signal level no less than 48 dBu F(50,90) as determined by Longley-Rice.

Exhibits E-3 and E4 depict and tabulate the predicted DTV service area for the proposed facility. As illustrated in these exhibits, the proposed facility would receive a small amount of interference from Canadian facility CBWT. The predicted interference-free population is 89,477

persons according to the 2000 US Census. The Appendix B service area population is 108 thousand persons, thus the proposed facility would serve 82.8 percent of the allotment population.

In Exhibits E-5 and E-6, outgoing interference from the proposed facility is considered. As demonstrated on the map in exhibit E-5, there are no areas where the proposed facility is predicted to cause interference. In addition, exhibit E-6 demonstrates via tabular form that no proposed or existing facility would receive interference from the proposed facility. The proposed facility thus complies with the interference protection requirements of the Commission's Rules.

The requirements of Section 73.1030 of the Commission's Rules are not applicable to the proposed facility due to location. The proposed facility is not located within the affected areas in the vicinity of the National Radio Astronomy Observatory and the Naval Radio Research Observatory. In addition, due to its location within the continental United States, notification to the Arecibo radio telescope is not required. The closest FCC receiving installation to the proposed facility is located in Grand Island, Nebraska, which is sufficiently distant to negate any notification requirements.

The proposed facility would not have a significant environmental impact, and should be exempt from environmental processing. The facility would be located on an existing tower. The change from analog to digital operations would not increase the environmental impact already present from the supporting structure.

In addition, the proposed facility would not constitute an RF exposure hazard to persons in the vicinity of the tower. No other broadcast facilities propose the use of the tower, nor are any others currently authorized to utilize the tower. A worst-case scenario will be utilized for the

proposed facility to demonstrate that radiation from the antenna would not exceed the uncontrolled environment condition of the applicable safety standard at 2 meters above ground level. From OET Bulletin 65, the power density is calculated by the following:

$$S = \frac{33.4(E_{\text{Rel}})^2(ERP)}{h^2}$$

Since all radiation is assumed to be directed at the ground, the relative field component is assumed to have 1.0 as a value. The effective radiated power is simply the maximum effective radiated power of the proposed facility, which is 11.1 kW. The denominator term is the height of the center of radiation minus 2 meters to accommodate the average human height. This term therefore has 54.1 meters as a value since the center of radiation is 56.1 meters. The resulting worst case power density for KCPM is 117.8  $\mu\text{W}/\text{cm}^2$ . It is assumed that this power density occurs at all points in the vicinity of the tower.

Under the uncontrolled environment condition of the applicable safety standard, the maximum permissible power density is a function of the frequency of the channel of operation. Since the upper limit is the quotient of the frequency and 1500, the lowest frequency in the channel of operation (548 MHz) will be utilized for the frequency term. This results in a maximum permissible power density of 335  $\mu\text{W}/\text{cm}^2$ . Since the predicted worst-case power density is less than this value, it is apparent that the proposed facility would not constitute an RF exposure hazard to persons at the site.

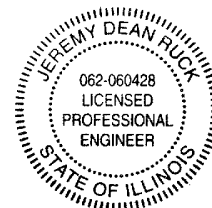
In order to protect workers having access to the site from being exposed to levels of non-ionizing radiation which may exceed the applicable safety standards, the applicant certifies that it

will coordinate with other present and future users of the site. Such coordination will include, but is not necessarily limited to, a reduction in transmitter power or cessation of operation.

The proposed facility would not use a tower that is a constituent element in an AM antenna system. The closest AM facility to the KCPM is KXXL (Facility ID 20323) at Grand Forks, North Dakota. This facility operates with a non-directional antenna system, and is located 1.79 kilometers from KCPM.

**Affidavit**

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, 2011

**Jeremy D. Ruck, PE**  
**April 26, 2010**



**KCPM-D.R****ALLOCATION**

Latitude: 47-57-45 N  
Longitude: 097-03-12 W  
ERP: 50.00 kW  
Channel: 27  
Frequency: 551.0 MHz  
AMSL Height: 347.0 m  
Elevation: 244.98 m  
Horiz. Pattern: Directional  
Vert. Pattern: No  
Prop Model: None

**KCPM-D.X  
PROPOSED**

Latitude: 47-57-45 N  
Longitude: 097-03-12 W  
ERP: 11.10 kW  
Channel: 27  
Frequency: 551.0 MHz  
AMSL Height: 307.9 m  
Elevation: 244.976 m  
Horiz. Pattern: Directional  
Vert. Pattern: Yes  
Elec Tilt: 0.0  
Prop Model: None

**D.L. Markley & Associates, Inc.**

-  Allocation Noise Limited Service Contour
-  Proposed Noise Limited Service Contour

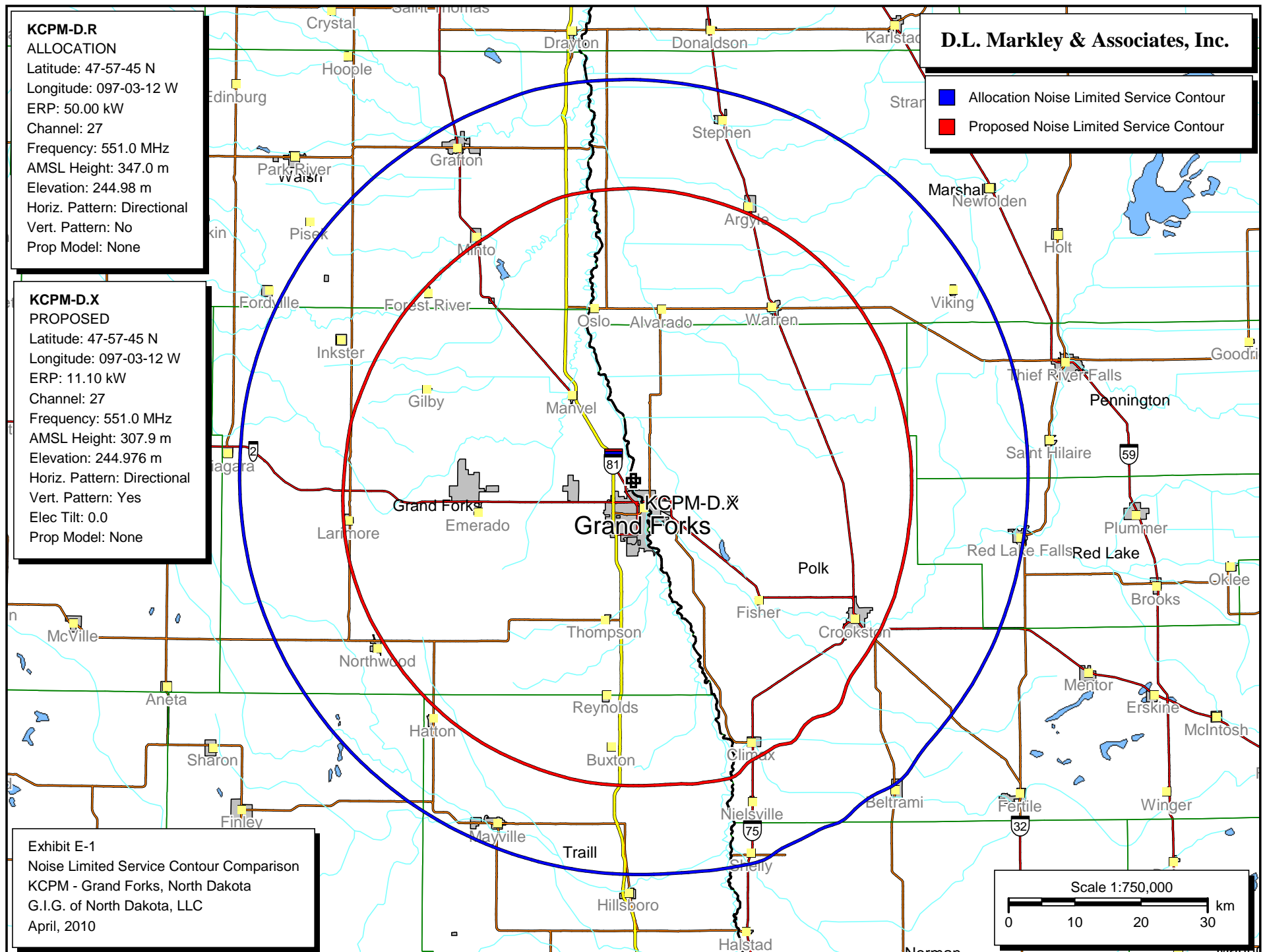


Exhibit E-1  
Noise Limited Service Contour Comparison  
KCPM - Grand Forks, North Dakota  
G.I.G. of North Dakota, LLC  
April, 2010

**KCPM-D.X****PROPOSED**

Latitude: 47-57-45 N

Longitude: 097-03-12 W

ERP: 11.10 kW

Channel: 27

Frequency: 551.0 MHz

AMSL Height: 307.9 m

Elevation: 244.976 m

Horiz. Pattern: Directional

Vert. Pattern: Yes

Elec Tilt: 0.0

Prop Model: Longley/Rice

Climate: Cont temperate

Conductivity: 0.0050

Dielec Const: 15.0

Refractivity: 301.0


Receiver Ht AG: 10.0 m

Receiver Gain: 0 dB

Time Variability: 90.0%

Sit. Variability: 50.0%

ITM Mode: Broadcast

 > 48.0 dBu 40.0 - 48.040.05 dBu F(50,90)  
Service Contour**D.L. Markley & Associates, Inc.**48 dBu F(50,90)  
Service ContourCity of License  
Grand Forks, ND**Exhibit E-2**

City of License Coverage

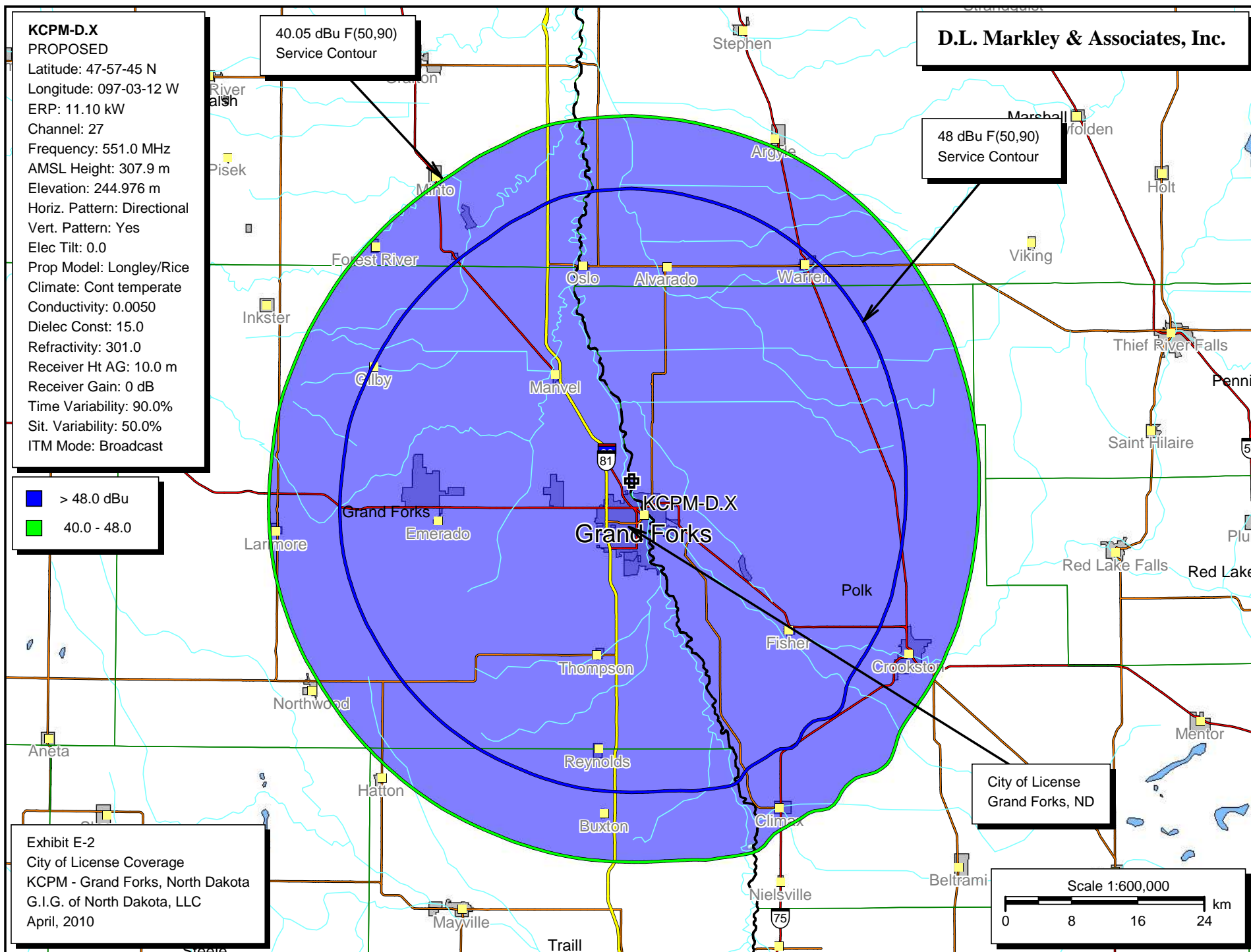
KCPM - Grand Forks, North Dakota

G.I.G. of North Dakota, LLC

April, 2010

Scale 1:600,000

0 8 16 24 km





**KCPM-D.X**

Latitude: 47-57-45 N  
Longitude: 097-03-12 W  
ERP: 11.10 kW  
Channel: 27  
Frequency: 551.0 MHz  
AMSL Height: 307.9 m  
Elevation: 244.976 m  
Horiz. Pattern: Directional  
Vert. Pattern: Yes  
Elec Tilt: 0.0  
Prop Model: Longley/Rice  
Climate: Cont temperate  
Conductivity: 0.0050  
Dielec Const: 15.0  
Refractivity: 301.0  
Receiver Ht AG: 10.0 m  
Receiver Gain: 0 dB  
Time Variability: 90.0%  
Sit. Variability: 50.0%  
ITM Mode: Broadcast

40.05 dBu F(50,90)  
Service Contour

**D.L. Markley & Associates, Inc.**

Interference-Free  
Population: 89,477

- ☒ KCPM-D.X
- ☐ 1362321-D.A
- ☒ CBWT-DT
- ☒ CBWT-PT-D
- ☐ CICO-TV-5
- ☐ K27JC-D
- ☐ K27JF-D
- ☐ K55BH-D.A
- ☐ K60BO-D.A
- ☐ K62AU-D.A
- ☐ MB-PT-644-D

> 40.0 dBu

Exhibit E-3  
DTV Service Area  
KCPM - Grand Forks, North Dakota  
G.I.G. of North Dakota, LLC  
April, 2010

Scale 1:600,000

0 8 16 24 km

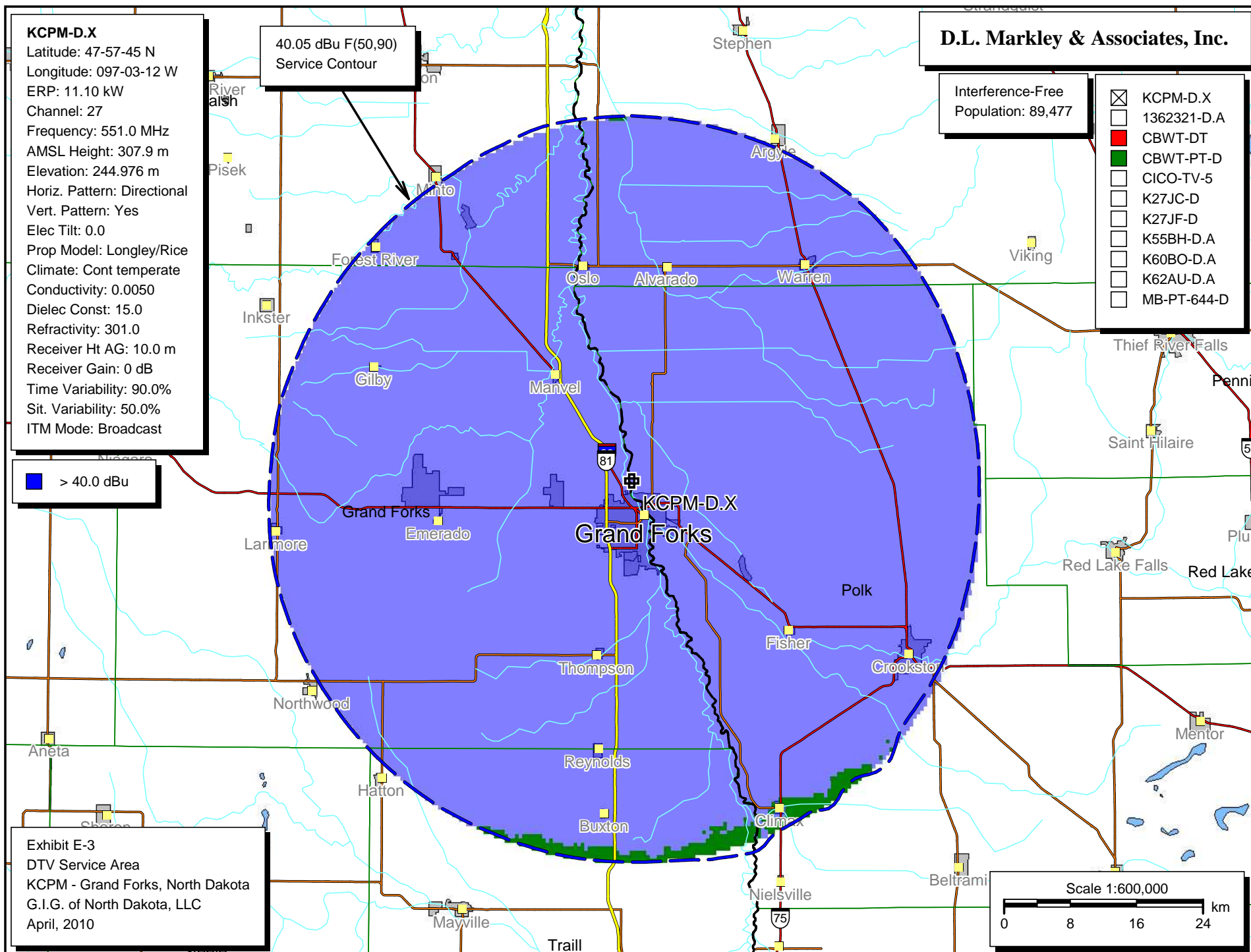


Exhibit E-4  
Summary of DTV Service Area Population Calculations

KCPM-D.X (27) GRAND FORKS, ND  
Broadcast Type: Digital Service: D  
Lat: 47-57-45 N Lng: 097-03-12 W ERP: 11.1 kW AMSL: 307.9 m  
TV Incoming Interference Study  
Interference Considered Within: Noise Limited FCC Contour  
Signal Resolution: 0.5 km  
LR Profile Spacing Increment: 0.1 km  
Consider NTSC Taboo: Yes  
KWX error points are considered to  
be interference free coverage.  
# of radials computed for protected contour: 360  
Protected contour calculated using 8 radial HAAT.  
Threshold for reception: 40.0455  
Pop Centroid DB: 2000 US Census (SF1)

Study Date: 4/26/2010  
TV Database Date: 4/24/2010

Primary Terrain: V-Soft 3 Second US Terrain  
Secondary Terrain: V-Soft 30 Second US Database

Population Database: 2000 US Census (SF1)

Percentages calculated using a baseline population of 89,664.

Stations which cause interference:

Call Letters	H Units	Population	%	Area (sq. km)
CBWT-DT (27)	0	0	0.000	0.83
CBWT-PT-D (27)	85	187	0.209	87.34

Masking Summary:

Call Letters	Total Interference Population	%	Unique Interference Population	%
CBWT-DT (27)	0	0.000	0	0.000
CBWT-PT-D (27)	187	0.209	187	0.209

Stations considered which do not cause interference:

1362321-D.A (27)  
CBWT-DT (27)  
CICO-TV-5 (27)  
K27JC-D (27)  
K27JF-D (27Z)  
K55BH-D.A (27)  
K60BO-D.A (27)  
K62AU-D.A (27)  
MB-PT-644-D (27)

Call Letters	City	State	Dist	Bear
1362321-D.A (27)	Minot	ND	317.1	275.6

CBWT-DT (27)	Winnipeg	MB	203.9	350.7
CBWT-PT-D (27)	Winnipeg	MB	203.9	350.7
CICO-TV-5 (27)	Rainy Lake Ind R	ON	244.9	69.1
K27JC-D (27)	Alexandria	MN	256.6	151.0
K27JF-D (27Z)	Walker	MN	209.8	116.5
K55BH-D.A (27)	Baudette	MN	200.0	65.9
K60BO-D.A (27)	Big Falls	MN	244.5	82.8
K62AU-D.A (27)	Alexandria	MN	256.6	151.0
MB-PT-644-D (27)	Brandon	MB	297.3	315.5

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Totals for KCPM-D.X (27)

Calculation Area Population:	89,664	(	6063.2 sq. km )
Not Affected by Terrain Loss:	89,664	(	6063.2 sq. km )
Total NTSC Interference:	0	(	0.0 sq. km )
DTV Only Interference:	187	(	87.3 sq. km )
Total DTV Interference:	187	(	87.3 sq. km )
Interfered Population:	187	(	87.3 sq. km )
Interference Free:	89,477	(	5975.9 sq. km )

Percent Interference: 0.21

Terrain Blocked Population:	0	(	0.0 sq. km)
Contour Area Population:	89,657		

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Interference Free Breakdown:

White:	81,901	( 91.5% )
Black:	950	( 1.1% )
Hispanic:	3,001	( 3.4% )
Native American:	1,741	( 1.9% )
Asian:	704	( 0.8% )
Pacific Islander:	45	( 0.1% )
Mixed Race:	1,096	( 1.2% )
Other:	39	( 0.0% )
Total:	89,477	

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	Housing Units	Population	% of County
Minnesota			
Marshall County			
County Pop	4,791	10,155	
KCPM-D.X (27)	1,496	3,306	
Ix Free	1,496	3,306	100.00
Polk County			
County Pop	14,008	31,369	
KCPM-D.X (27)	8,378	20,684	
CBWT-PT-D (27)	57	130	0.63
Ix Free	8,321	20,554	99.37

	Housing Units	Population	% of County
North Dakota			
Grand Forks County			
County Pop	27,373	66,109	
KCPM-D.X (27)	26,293	63,827	
Ix Free	26,293	63,827	100.00
Traill County			
County Pop	3,708	8,477	
KCPM-D.X (27)	480	1,159	
CBWT-PT-D (27)	28	57	4.92
Ix Free	452	1,102	95.08
Walsh County			
County Pop	5,757	12,389	
KCPM-D.X (27)	322	688	
Ix Free	322	688	100.00

**KCPM-D.X**

PROPOSED

Latitude: 47-57-45 N

Longitude: 097-03-12 W

ERP: 11.10 kW

Channel: 27

Frequency: 551.0 MHz

AMSL Height: 307.9 m

Elevation: 244.976 m

Horiz. Pattern: Directional

Vert. Pattern: Yes

Elec Tilt: 0.0

Prop Model: Longley/Rice

Climate: Cont temperate

Conductivity: 0.0050

Dielec Const: 15.0

Refractivity: 301.0

Receiver Ht AG: 10.0 m

Receiver Gain: 0 dB

Time Variability: 10.0%

Sit. Variability: 50.0%

ITM Mode: Broadcast

**D.L. Markley & Associates, Inc.**

- ☒ KCPM-D.X
- ☐ 1362321-D.A
- ☐ CBWT-DT
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- ☐ K27JC-D
- ☐ K27JF-D
- ☐ K55BH-D.A
- ☐ K60BO-D.A
- ☐ K62AU-D.A
- ☐ MB-PT-644-D

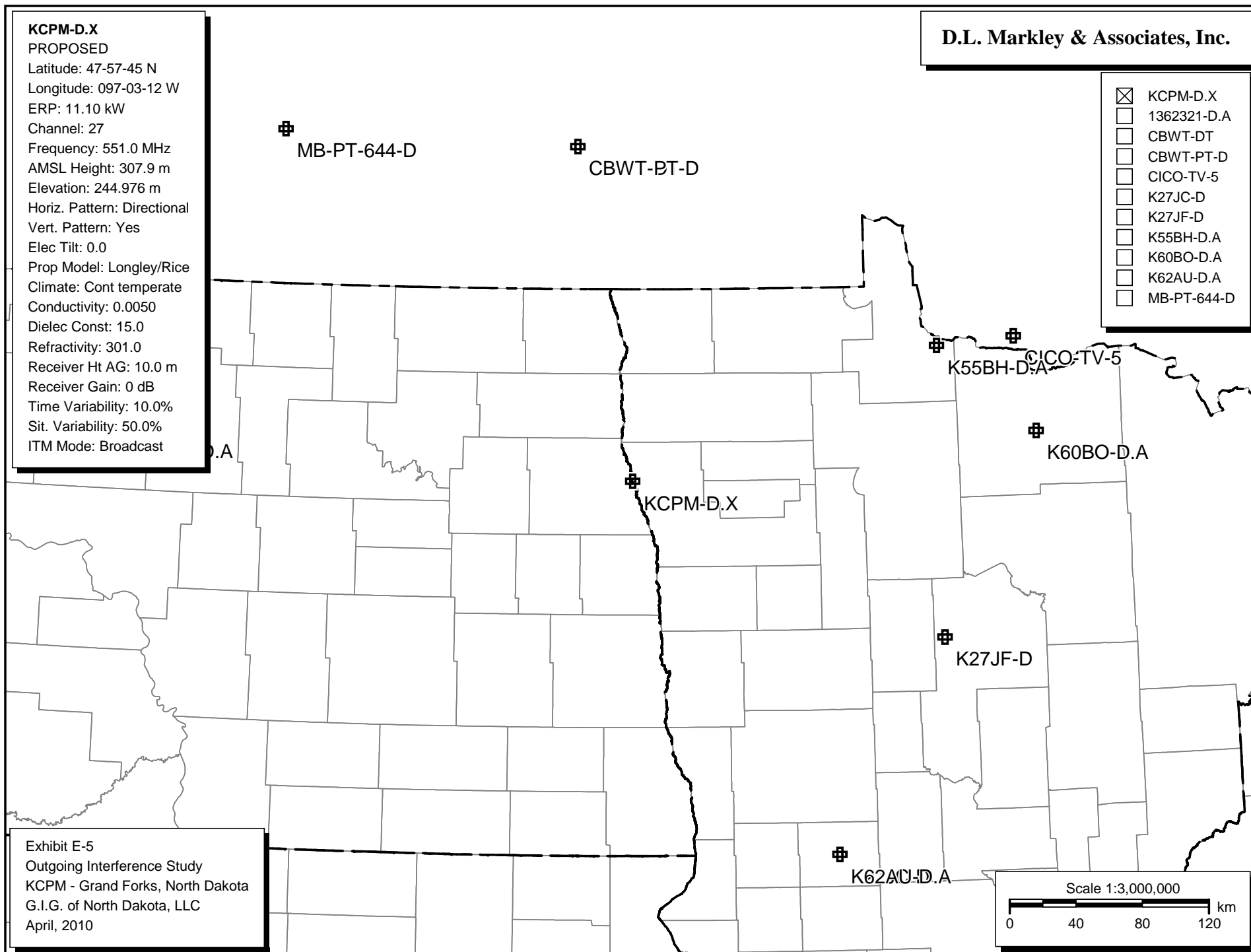


Exhibit E-5

Outgoing Interference Study

KCPM - Grand Forks, North Dakota

G.I.G. of North Dakota, LLC

April, 2010

Exhibit E-6  
Outgoing Interference Population Report

KCPM-D.X (27) GRAND FORKS, ND  
Broadcast Type: Digital Service: D  
Lat: 47-57-45 N Lng: 097-03-12 W ERP: 11.1 kW AMSL: 307.9 m  
TV Outgoing Interference Study  
Signal Resolution: 1.0 km  
Consider NTSC Taboo: Yes  
KWX error points are considered to  
be interference free coverage.  
Default # of radials computed for contours: 360  
Contours calculated using 8 radial HAAT.  
LR Profile Spacing Increment: 0.1 km  
Masked interference points are being  
counted as interference.  
Pop Centroid DB: 2000 US Census (SF1)

Study Date: 4/26/2010  
TV Database Date: 4/24/2010

Primary Terrain: V-Soft 3 Second US Terrain  
Secondary Terrain: V-Soft 30 Second US Database

Population Database: 2000 US Census (SF1)

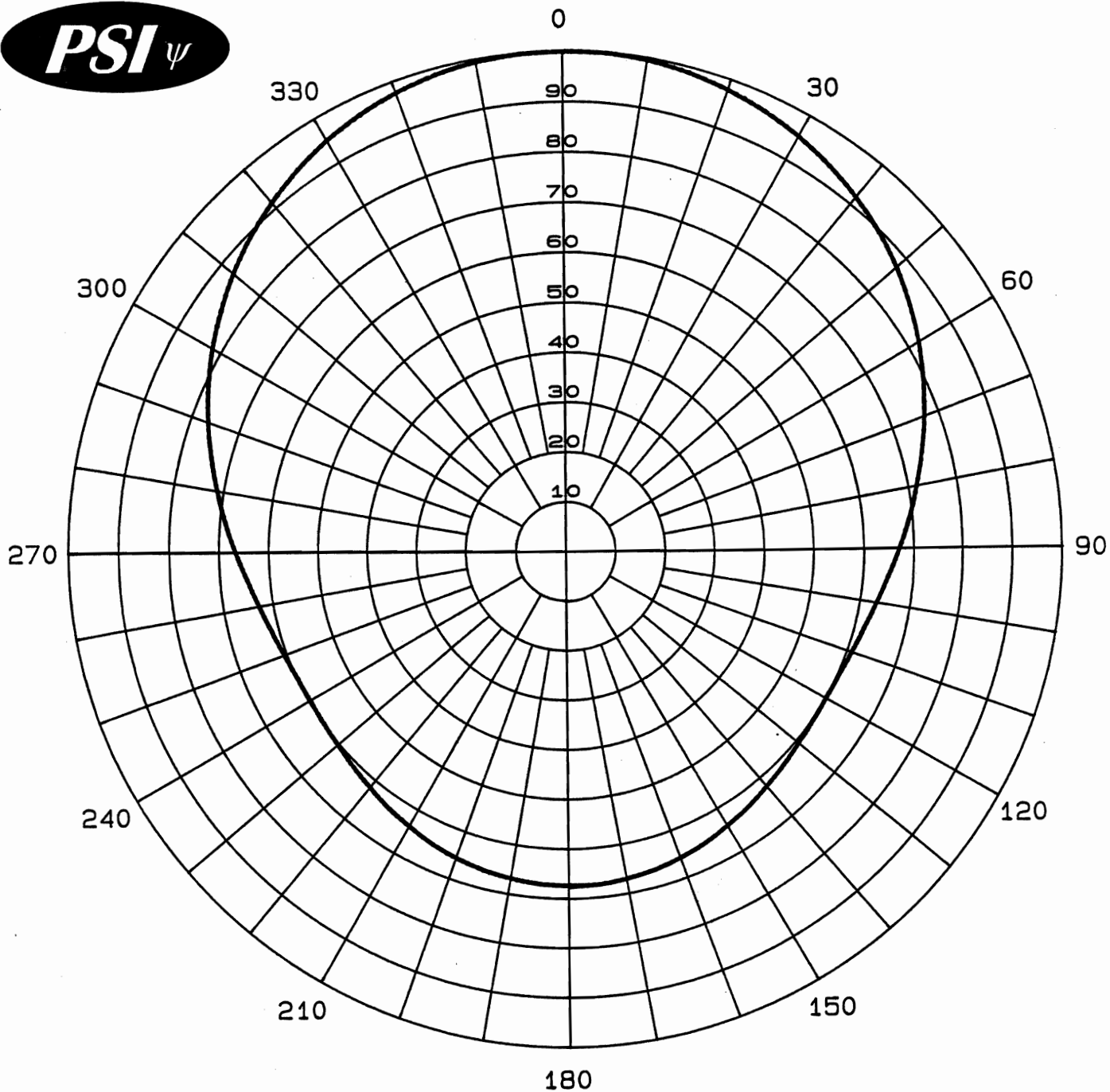
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Stations Considered:

Call Letters	City	State	Dist	Bear
1362321-D.A (27)	Minot	ND	317.1	275.6
CBWT-DT (27)	Winnipeg	MB	203.9	350.7
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K27JF-D (27Z)	Walker	MN	209.8	116.5
K55BH-D.A (27)	Baudette	MN	200.0	65.9
K60BO-D.A (27)	Big Falls	MN	244.5	82.8
K62AU-D.A (27)	Alexandria	MN	256.6	151.0
MB-PT-644-D (27)	Brandon	MB	297.3	315.5

Call	Area	HUnits	Contour	Masked Ix	Unmasked Ix	%
1362321-D.A (27)	0.0	0	59,909	0	0	0.0
CBWT-DT (27)	0.0	0	0	0	0	0.0
CBWT-PT-D (27)	0.0	0	1,687	0	0	0.0
CICO-TV-5 (27)	0.0	0	0	0	0	0.0
K27JC-D (27)	0.0	0	36,111	0	0	0.0
K27JF-D (27Z)	0.0	0	3,598	0	0	0.0
K55BH-D.A (27)	0.0	0	3,526	0	0	0.0
K60BO-D.A (27)	0.0	0	587	0	0	0.0
K62AU-D.A (27)	0.0	0	44,221	0	0	0.0
MB-PT-644-D (27)	0.0	0	0	0	0	0.0

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Housing Units    Population



Calculated Relative Field  
Azimuth Plane Pattern  
Low Power UHF Slot  
Antenna Type: PSILP  
Pattern Type: OI  
Directivity: 1.70 (2.314 dB)  
Date: 7/1/97  
Rev. 0

**PROPAGATION SYSTEMS, INC.**  
**PO BOX 113**  
**EBENSBURG, PA. 15931**





# LPTV ANTENNA

## Antenna Pattern: OI

Angle	Field	8-BAY		12-BAY		16-BAY		24-BAY		32-BAY	
		Gain	dB	Gain	dB	Gain	dB	Gain	dB	Gain	dB
0	1.000	15.81	11.99	21.59	13.34	28.90	14.61	43.01	16.34	54.40	17.36
10	1.000	15.81	11.99	21.59	13.34	28.90	14.61	43.01	16.34	54.40	17.36
20	0.980	15.18	11.81	20.74	13.17	27.76	14.43	41.31	16.16	52.25	17.18
30	0.950	14.27	11.54	19.48	12.90	26.08	14.16	38.82	15.89	49.10	16.91
40	0.910	13.09	11.17	17.88	12.52	23.93	13.79	35.62	15.52	45.05	16.54
50	0.870	11.97	10.78	16.34	12.13	21.87	13.40	32.55	15.13	41.18	16.15
60	0.820	10.63	10.27	14.52	11.62	19.43	12.89	28.92	14.61	36.58	15.63
70	0.760	9.13	9.61	12.47	10.96	16.69	12.23	24.84	13.95	31.42	14.97
80	0.710	7.97	9.01	10.88	10.37	14.57	11.63	21.68	13.36	27.42	14.38
90	0.660	6.89	8.38	9.40	9.73	12.59	11.00	18.74	12.73	23.70	13.75
100	0.630	6.27	7.98	8.57	9.33	11.47	10.60	17.07	12.32	21.59	13.34
110	0.610	5.88	7.70	8.03	9.05	10.75	10.32	16.00	12.04	20.24	13.06
120	0.600	5.69	7.55	7.77	8.91	10.40	10.17	15.48	11.90	19.58	12.92
130	0.600	5.69	7.55	7.77	8.91	10.40	10.17	15.48	11.90	19.58	12.92
140	0.620	6.08	7.84	8.30	9.19	11.11	10.46	16.53	12.18	20.91	13.20
150	0.640	6.48	8.11	8.84	9.47	11.84	10.73	17.62	12.46	22.28	13.48
160	0.660	6.89	8.38	9.40	9.73	12.59	11.00	18.74	12.73	23.70	13.75
170	0.670	7.10	8.51	9.69	9.86	12.97	11.13	19.31	12.86	24.42	13.88
180	0.670	7.10	8.51	9.69	9.86	12.97	11.13	19.31	12.86	24.42	13.88
190	0.670	7.10	8.51	9.69	9.86	12.97	11.13	19.31	12.86	24.42	13.88
200	0.660	6.89	8.38	9.40	9.73	12.59	11.00	18.74	12.73	23.70	13.75
210	0.640	6.48	8.11	8.84	9.47	11.84	10.73	17.62	12.46	22.28	13.48
220	0.620	6.08	7.84	8.30	9.19	11.11	10.46	16.53	12.18	20.91	13.20
230	0.600	5.69	7.55	7.77	8.91	10.40	10.17	15.48	11.90	19.58	12.92
240	0.600	5.69	7.55	7.77	8.91	10.40	10.17	15.48	11.90	19.58	12.92
250	0.610	5.88	7.70	8.03	9.05	10.75	10.32	16.00	12.04	20.24	13.06
260	0.630	6.27	7.98	8.57	9.33	11.47	10.60	17.07	12.32	21.59	13.34
270	0.660	6.89	8.38	9.40	9.73	12.59	11.00	18.74	12.73	23.70	13.75
280	0.710	7.97	9.01	10.88	10.37	14.57	11.63	21.68	13.36	27.42	14.38
290	0.760	9.13	9.61	12.47	10.96	16.69	12.23	24.84	13.95	31.42	14.97
300	0.820	10.63	10.27	14.52	11.62	19.43	12.89	28.92	14.61	36.58	15.63
310	0.870	11.97	10.78	16.34	12.13	21.87	13.40	32.55	15.13	41.18	16.15
320	0.910	13.09	11.17	17.88	12.52	23.93	13.79	35.62	15.52	45.05	16.54
330	0.950	14.27	11.54	19.48	12.90	26.08	14.16	38.82	15.89	49.10	16.91
340	0.980	15.18	11.81	20.74	13.17	27.76	14.43	41.31	16.16	52.25	17.18
350	1.000	15.81	11.99	21.59	13.34	28.90	14.61	43.01	16.34	54.40	17.36



Calculated Relative Field  
Elevation Pattern  
Model: PSILP16  
Beam Tilt: 1.0 degree  
Directivity: 17.00 (12.304 dB)  
Pattern: 16-Bay

