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PENSACOLA CHRISTIAN COLLEGE, INC.

FM TRANSLATOR STATION W214CA

MUSKEGON, MI

FACILITY ID: 84429

MINOR CHANGE APPLICATION

**MAKE CHANGES TO SITE LOCATION,
ANTENNA TYPE, AND RADIATED POWER (ERP)**

FEBRUARY 2019

ENGINEERING EXHIBIT

IN SUPPORT OF

**APPLICATION FOR AUTHORITY TO
CONSTRUCT OR MAKE CHANGES IN AN
FM TRANSLATOR OR FM BOOSTER STATION**

ENGINEERING EXHIBIT

PENSACOLA CHRISTIAN COLLEGE, INC.

FM TRANSLATOR STATION W214CA

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FEBRUARY 2019

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PENSACOLA CHRISTIAN COLLEGE, INC.
FM TRANSLATOR STATION W214CA
MUSKEGON, MI
FACILITY ID: 84429

FEBRUARY 2019

NARRATIVE STATEMENT

The engineering exhibit, of which this narrative is part, was prepared on behalf of PENSACOLA CHRISTIAN COLLEGE, INC., in support of an application to modify the license facility of W214CA, Muskegon, Michigan. No change in the designation of the primary station is sought.

The licensee seeks to make changes to the antenna system, the antenna site location, and the effective radiated power of the facility. The changes sought are classified as “minor” by the Commission’s application processing rules.

In support of the requested changes the following figures, exhibits or tables are provided:

Figure 1 – Supporting Structure Tower:

No changes are proposed in the existing structure’s overall height. The applicant proposes to side-mount its antenna on an existing tower, which does not require FAA notice of proposed construction or FCC Tower registration (ASR). The overall height of the structure is 32 meters above ground and passes the FCC/FAA tower to airport slope test, as noted in Figure 1.

Figure 2 – Vertical Sketch of Tower and Antenna:

A vertical sketch of antenna supporting structure with the antenna mounting elevation and other antenna details is provided as Figure 2.

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Nondirectional (Omni) Antennas Details:

The antenna is a circular polarized, NICOM BKG-77-3-HW, a three-bay/element half-wave spaced antenna. The effective radiated power is 0.025 kW (25 watts) using H & V polarization.

Figure 3 – Predicted Service Contour:

The predicted service contour for the FM translator facility was calculated in accordance with the provisions of 47 CFR 73.313. The average terrain elevations from 3 to 16 kilometers from the proposed translator site were obtained from the NGDC 30-second computer database. The standard twelve radials evenly spaced at 30-degree intervals were used for determining the distance to the 60 dBu translator service contour.

Figure 4 – FM Channel Study with Wavier Request to 2nd Adjacent Station:

The proposed operation fully protects all other stations of concern as detailed in the contour overlap study in Figure 4.

Applicant requests processing of this application with a WAIVER REQUEST regarding interference contour overlap with second adjacent channel station WBLV, Twin Lake, MI, FCC Facility ID: 5902. Details of the waiver request are included in Figure 4.

Interference from this proposal to WBLV does not occur as the interference contour does not touch or reach the surface of the earth. Therefore, no population within the interference contour exists and a grant of the waiver request concerning contour overlap with WBLV is permissible and in the public interest.

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Muskegon, MI

Environmental Considerations:

The applicant believes its proposal will not significantly affect the environment for the following reasons:

The proposal does not meet any of the criteria specified in Section 1.1307 of the FCC Rules. More specifically, the proposed facilities are not known to fall within any of the categories enumerated in Sections 1.1307(a)(1)-(7) and will not involve the use of high intensity white lights. Furthermore, operation of the proposed facility will not involve the exposure of workers or the general public to levels of radio frequency electromagnetic fields exceeding guidelines adopted by the Federal Communications Commission.

The results of the FCC's FM Model computer program output indicate that the power density from this proposal using a "Type 1 or Other" EPA model antenna is predicted to be $0.2314 \mu\text{W}/\text{cm}^2$ or less. The computed power density is 0.0023% of the Commission's guidelines for a controlled area and 0.0115% for an uncontrolled area. This level is well below the Commission's guidelines for maximum exposure levels to electromagnetic fields and no further study is required.

The applicant will fully-cooperate and coordinate with all site users as required by the Commission's rules.

Summary:

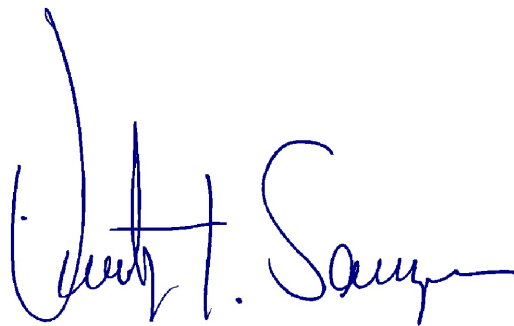
The FM translator will operate as a NONCOMMERCIAL translator in the RESERVE BAND for NCE FM Broadcast Station WPCS, Pensacola, Florida, Facility ID: 52230, with a maximum ERP 0.025 kilowatts (H & V Polarization), utilizing a simple three-bay (element) HALFWAVE SPACED NONDIRECTIONAL antenna system operating on FM Channel 214D (90.7 MHz).

Pensacola Christian College, Inc.
FM Translator, W214CA
Muskegon, MI

The proposed operation is fully in compliance with all areas of the Commission's rules and applicable international agreements.

A WAIVER request to the extent necessary is included in the exhibits (see Figure 4) with regards to protection to 2nd-Adjacent Channel WBLV, Twin Lake, Michigan. The request is based upon no population within the predicted interference contour from this proposal.

February 6, 2019

A handwritten signature in blue ink, appearing to read "Timothy Z. Sawyer". The signature is fluid and cursive, with a large initial "T" and "S".

Timothy Z. Sawyer, Consulting

Engineer

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Existing Communications Tower - No Changes Are Proposed

DETERMINATION Results

PASS SLOPE(100:1)NO FAA REQ - 5344.0 Meters (17532.5 Feet)away & below slope by 19.0 Meters (62.3400 Feet)

Type	C/R	Latitude	Longitude	Name	Address	Lowest Elevation (m)	Runway Length (m)
AIRP	R	43-10-17.00N	086-13-50.00W	MUSKEGON COUNTY	MUSKEGON MUSKEGON, MI	189.3	1981.5

PASS SLOPE(100:1)NO FAA REQ - 4852.0 Meters (15918.4 Feet)away & below slope by 14.0 Meters (45.93 Feet)

Type	C/R	Latitude	Longitude	Name	Address	Lowest Elevation (m)	Runway Length (m)
AIRP	R	43-10-30.00N	086-14-15.00W	MUSKEGON COUNTY	MUSKEGON MUSKEGON, MI	189.3	1981.5

Your Specifications

NAD83 Coordinates

Latitude	43-13-06.1 north
Longitude	086-14-41.2 west

Measurements (Meters)

Overall Structure Height (AGL)	32
Support Structure Height (AGL)	32
Site Elevation (AMSL)	191

Structure Type

GTOWER - Guyed Structure Used for Communication Purposes

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**FAA NOTICE OF PROPOSE CONSTRUCTION - NOT REQUIRED
FCC TOWER REGISTRATION (ASR) - NOT REQUIRED**

W214CA
MUSKEGON, MI

**FIGURE
1**

FALL CHURCH, VIRGINIA 22043-2555

SIZE

A

CAGE NO

N/A

DWG NO

20190206W214CA.F1

REV

NONE

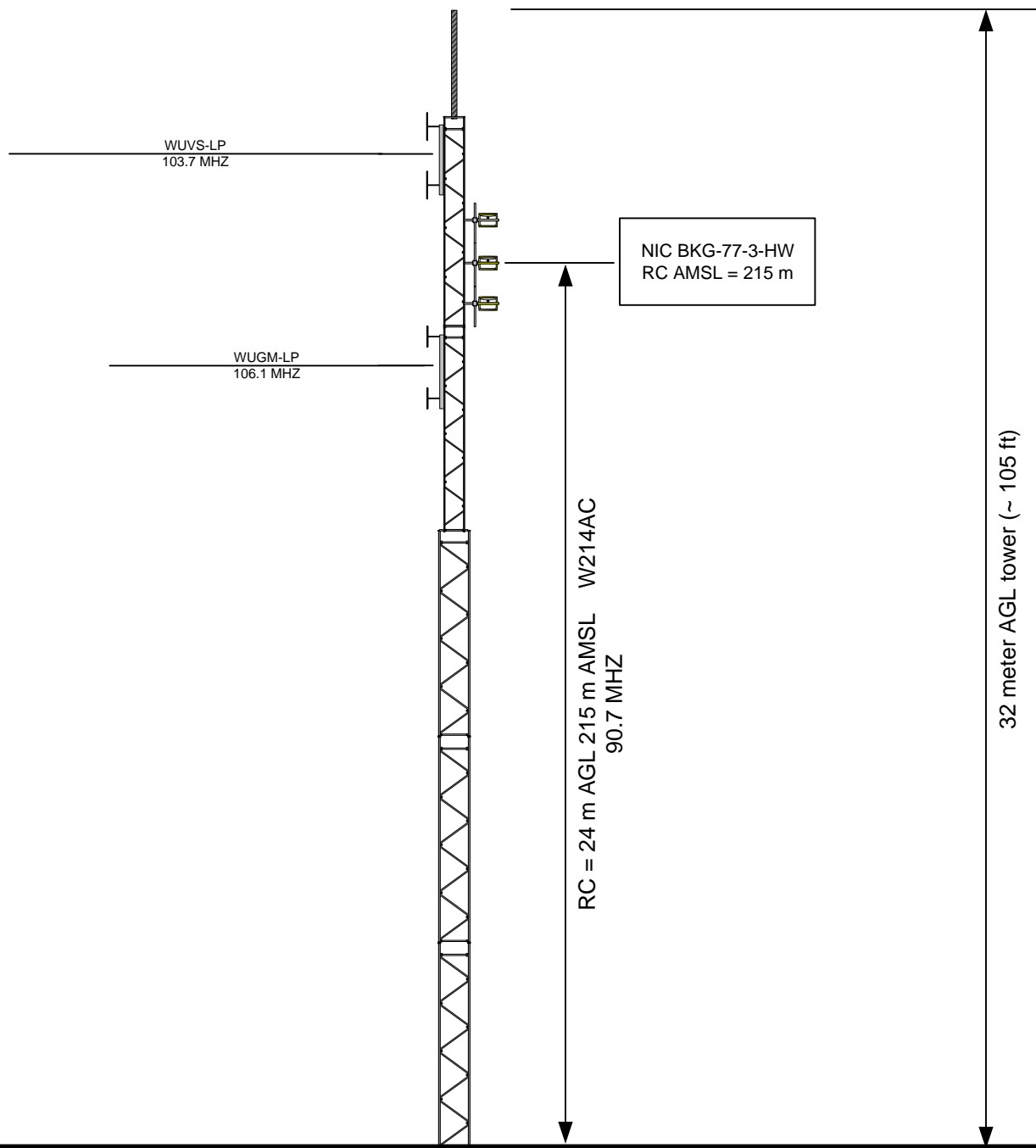
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SCALE

N/A

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SHEET



Note - All elevation are rounded to the nearest meter in accordance with FCC Form 349 Instructions.

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VERTICAL SKETCH OF EXISTING SUPPORTING STRUCTURE

**W214CA
MUSKEGON, MI**

**FIGURE
2**

FALL CHURCH, VIRGINIA 22043-2555

SIZE
A

CAGE NO
N/A

DWG NO
20190115W214CA

REV
NONE

(c) 2019, ALL RIGHTS RESERVED

SCALE DO NOT SCALE

FEBRUARY 2019

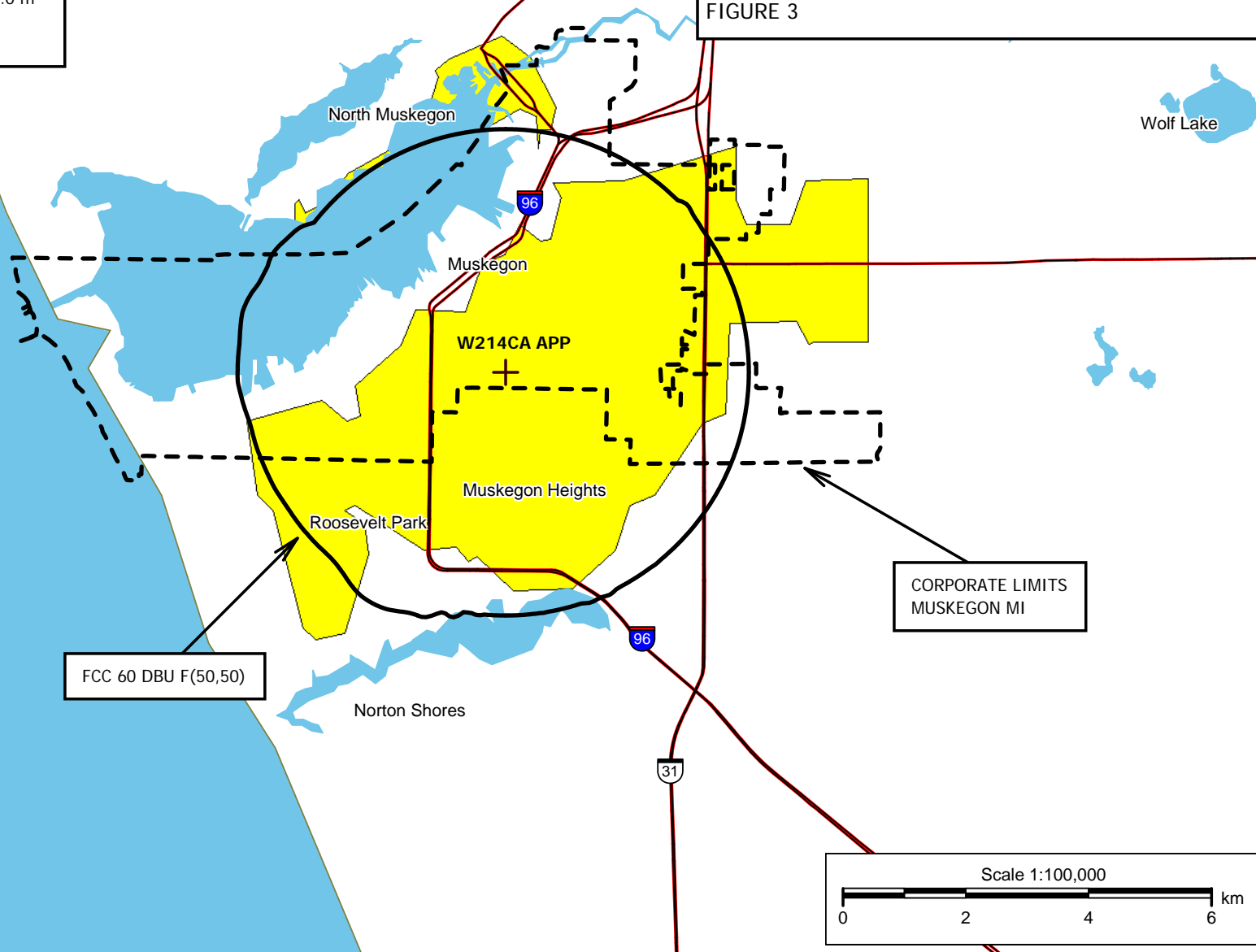
SHEET

W214CA APP

FCC FacID: 84429
NAD 27 Latitude: 43-13-06 N
NAD 27 Longitude: 086-14-41 W
ERP: 0.025 kW
Channel: 214 Frequency: 90.7 MHz
Antenna RCAMSL Height: 215.0 m
Site Elevation: 191.0 m
Horiz. Pattern: Omni

PREDICTED SERVICE CONTOUR - W214CA

MINOR CHANGE APPLICATION
MUSKEGON, MICHIGAN
CHANNEL 214D - 90.7 MHZ
MAX ERP: 0.025 KW (25 WATTS) RCAMSL: 215 METERS
NONDIRECTIONAL ANTENNA SYSTEM
FIGURE 3



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FM TRANSLATOR - CONTOUR STUDY
W214CA - MINOR CHANGE APPLICATION
Pensacola Christian College, Inc.

FIGURE 4-1

REFERENCE CH# 214D - 90.7 MHz, Pwr= 0.025 kW, HAAT= 29.1 M, COR= 215 M
43 13 06.0 N. Average Protected F(50-50)= 3.9 km
86 14 41.0 W. Omni-directional

CH CITY	CALL	TYPE	ANT STATE	AZI. <--	DIST FILE #	LAT. LNG.	Pwr(kW) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
212C1 Twin Lake	WBLV	LIC	CX MI	23.8 203.9	40.55 BLED20151020AAA	43 33 07.6 86 02 31.0	100.000 186	8.4 429	64.5 Blue Lake Fine Arts Camp	28.2	-24.3* #1
214D Muskegon	W214CA!	LIC	V MI	359.2 179.2	6.57 BLFT20080902AAG	43 16 39.0 86 14 45.0	0.019 51		---Reference---		
214B Berrien Springs	WAUS	LIC	CN MI	183.6 3.5	139.86 BLED19920424KA	41 57 42.0 86 21 02.0	50.000 150	138.2 366	52.7 Andrews Broadcasting Corp.	-2.3<	74.5
217B Grand Rapids	WCSG	LIC	DCN MI	133.9 314.3	67.49 BLED19910801KA	42 47 46.0 85 38 58.0	37.000 174	6.1 400	53.8 Cornerstone University	57.4	13.4
214B Delafield	WHAD	LIC	CX WI	263.8 82.4	176.03 BLED20030129AIT	43 01 42.0 88 23 32.0	72.000 208	153.3 487	60.6 State Of Wisconsin - Educa	18.4	101.6
214D Walker	W214AY	LIC	C MI	126.1 306.4	45.73 BLFT20140328ADL	42 58 32.0 85 47 28.0	0.013	23.2 326	6.9 Calvary Chapel Of Twin Fal	18.5	26.1

Terrain database is NGDC 30 SEC, R= 73.215 qualifying spacings or FCC minimum spacings in KM, M= Margin in KM
Contour distances are on direct line to and from reference station. Reference Zone= East Zone, Co to 3rd adjacent.
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.

The translator's 34 dBu F(50-10) contour does not touch Canada.
Facility is okay with respect to AM station towers.
Facility is okay with respect to FCC monitoring stations.
Facility is okay toward West Virginia Quiet Zone.
Facility is okay toward Table Mountain.

NOTES:

#1 WAIVER REQUEST TO 2ND ADJACENT CHANNEL STATION WBLV, TWIN LAKE MI IS REQUESTED - PREDICTED INTERFERENCE
CONTOUR FROM THIS PROPOSAL DOES NOT TOUCH GROUND, NO POPULATION WITHIN OVERLAPPING CONTOUR. FULL DETAILS
ARE INCLUDED IN FIGURE 4-2.

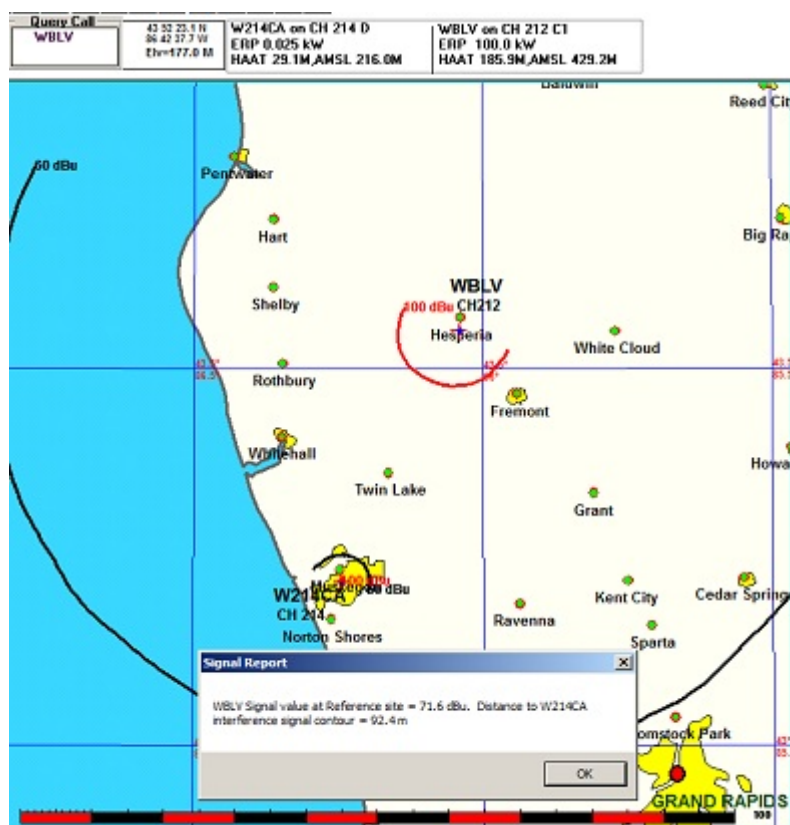
SECOND-ADJACENT CHANNEL WAIVER REQUEST

To: WBLV, TWIN LAKE, MI
BLED-20151020AAA

Basis for Waiver Request: No population within predicted interference contour area.

Second-Adjacent Channel Station WBLV, is predicted to have a signal level of 71.6 dBu at the proposed site (the reference site). The D/U (desired to undesired) signal ratio is 40 dBu. Thus, the interfering signal level from this proposal is $71.6 + 40 = 111.6$ dBu to WBLV.

The map below shows the calculated predicted signal level from the second-adjacent channel facility at the proposed translator site, and the predicted interfering contour distance (maximum horizontal distance).



As detailed on the following pages, the interference signal from this proposal does not reach the ground, or any populated or traveled areas and cannot cause interference to any populated areas when the downward radiation characteristics of the specified antenna system are used.

There are no tall building, roof tops, or occupied spaces within the interference contour from this proposal. No interference is predicted to occur to a populated area.

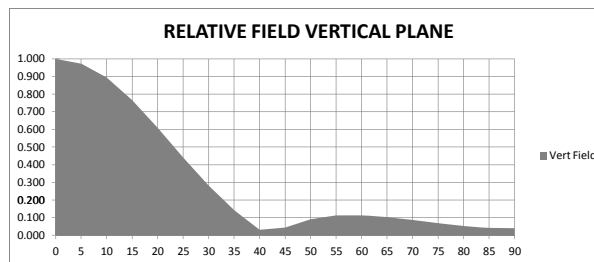
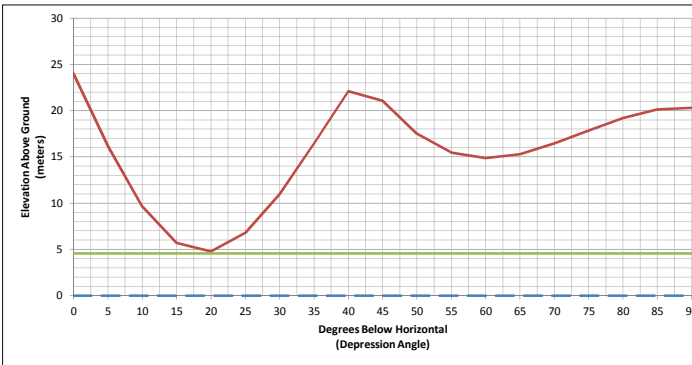
Applicant believes that it has demonstrate that due to lack of population within the interference contour that it is in compliance with the Commission's rules - however, should a waiver of the rules with regards to the third-adjacent station contour overlap be necessary, it respectfully requests that said waiver be granted. A grant is in the public interest in that it has been demonstrated that no harm will occur and that no population is present within the elevated contour.

	Antenna
Manufacturer	NIC
Model	BKG-77-3-HW
Number of Bays	3
Inter-Bay Spacing	0.5 (HALF WAVE)

Center of Radiation:	24	m AGL
Effective Radiated Power (ERP):	25	Watts
Interference Contour FS:	111.58	dBu
E Field Strength:	0.29648	V/m
Free Space Impedance:	377	Ohms
Power Density:	0.00023316	W/m^2
Maximum Free Space Distance:	92.37	meters

FIGURE 4-2 WAIVER TO SECOND ADJACENT CHANNEL STATION
WBLV
INTERFERENCE CONTOUR DOES NOT REACH GROUND LEVEL
NO POPULATION WITHIN CONTOUR
111.58 DBU FREE SPACE
INTERFERENCE CONTOUR PLOTTED ABOVE GROUND LEVEL

DEPRESSION ANGLE	RELATIVE		ERP WATTS	IN METERS			
	FIELD	POWER		VECTOR LENGTH	HORIZONTAL	VERTICAL	AGL
0	1.0000	1.0000	25.00	92.37	92.37	0.00	24.00
5	0.9740	0.9487	23.72	89.97	89.63	7.84	16.16
10	0.8960	0.8028	20.07	82.76	81.51	14.37	9.63
15	0.7660	0.5868	14.67	70.76	68.35	18.31	5.69
20	0.6090	0.3709	9.27	56.25	52.86	19.24	4.76
25	0.4410	0.1945	4.86	40.74	36.92	17.22	6.78
30	0.2820	0.0795	1.99	26.05	22.56	13.02	10.98
35	0.1420	0.0202	0.50	13.12	10.74	7.52	16.48
40	0.0320	0.0010	0.03	2.96	2.26	1.90	22.10
45	0.0450	0.0020	0.05	4.16	2.94	2.94	21.06
50	0.0920	0.0085	0.21	8.50	5.46	6.51	17.49
55	0.1130	0.0128	0.32	10.44	5.99	8.55	15.45
60	0.1140	0.0130	0.32	10.53	5.27	9.12	14.88
65	0.1040	0.0108	0.27	9.61	4.06	8.71	15.29
70	0.0870	0.0076	0.19	8.04	2.75	7.55	16.45
75	0.0690	0.0048	0.12	6.37	1.65	6.16	17.84
80	0.0530	0.0028	0.07	4.90	0.85	4.82	19.18
85	0.0420	0.0018	0.04	3.88	0.34	3.86	20.14
90	0.0400	0.0016	0.04	3.69	0.00	3.69	20.31



NO OCCUPIED ROOFS OR OTHER OCCUPIED AREAS WITHIN THE INTERFERENCE CONTOUR THAT EXCEED THE MINIMUM ELEVATION OF THE INTERFERENCE CONTOUR ABOVE GROUND

3-D VIEW OF AREA - SINGLE STORY ROOFS - NO POPULATED AREAS ABOVE GROUND LEVEL
 RED VERTICAL LINE APPROXIMATE SIZE AND LOCATION OF TOWER



111.58 DBU FREE-SPACE INTERFERENCE CONTOUR ~ 92 METER GROUND RADIUS



OUTER RED CONTOUR IS MAXIMUM HORIZONTAL DISTANCE 92 METER RADIUS, INNER RED CONTOURS ARE LOWEST AGL ELEVATION AT 36 TO 68 METERS RADIUS

