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**ENGINEERING REPORT**

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**K291CE, Houston, TX, Channel 291D FM Translator Minor Mod**

**ENGINEERING STATEMENT**

**PROTECTION TO KOVE-FM AND KHCB-FM**

All contour non-overlap protection requirements are met with the exception of Houston, TX stations KOVE-FM, Galveston, TX (293C) and KHCB-FM, Houston, TX (289C), discussed below.

KOVE-FM (61.4 kilometers at 144 degrees True) and KHCB-FM (20.1 kilometers at 185 degrees True) are second adjacent-channel to the proposed channel 291D facility. The 60 dBu F50,50 service contour extends well beyond the proposed 291D transmitter site. Using the well-established *Living Way Ministries* Methodology, no actual interference to any population is predicted to exist to KHCB-FM or KOVE-FM.

Note that a rule waiver of Section 74.1204 for this second/third adjacent-channel protection using the well-established *Living Way Ministries* Methodology is respectfully requested if such a rule waiver is deemed necessary for protection to any station.

The F50,50 signal strength from KHCB-FM at the proposed 291D transmitter site is at least 92 dBu (the “desired” signal to KHCB-FM). The F50,50 signal strength from KOVE-FM at the proposed 291D transmitter site is at least 72 dBu (the other “desired” signal). The second/third adjacent-channel protection of Section 74.1204 is an undesired-to-desired (“U/D”) dB signal strength ratio of 40:1. Therefore, predicted interference to KHCB-FM and KOVE-FM from the proposed 283D facility is a signal of greater than or equal to 112 dBu.

Figure EE1 is the vertical plane relative field pattern for the proposed Shively Labs 6813-3SS(0.54)-EF antenna. By adjusting for the vertical plane downward relative field values of the proposed antenna, it is herein demonstrated that the 112 dBu interfering signal (using a free space field determination) does not exist at any point where the public has access within the building or on the building rooftop. (The nearest floor with public access is at least 60 feet, or 18 meters, below the bottom bay of the proposed antenna.)

Attached as Figure EE2 is a tabulation of various points on the top public access floor. (Note that the horizontal distance studied is to 26 meters—the antenna location will be placed so that no distance horizontally beyond 26 meters will be within the building.) (Column B is the different distances from the tower base to each studied point.) The actual distance from the antenna to each point is listed in Column C, the hypotenuse of the vertical height (Column A) and the horizontal distance (Column B). Also, the vertical distance from the antenna bottom to the calculated interference signal for each studied point is provided in Column K. Because the calculated distance to the free space interfering signal (Column J) is less than the hypotenuse distance (Column C) and the interfering signal vertical distance (Column K) is less than the vertical distance (Column A) for each studied point, the interfering signal does not reach any studied point. Therefore, pursuant to Section 74.1204(d) of the FCC Rules, KHCB-FM and KOVE-FM are adequately protected by the proposed facility.

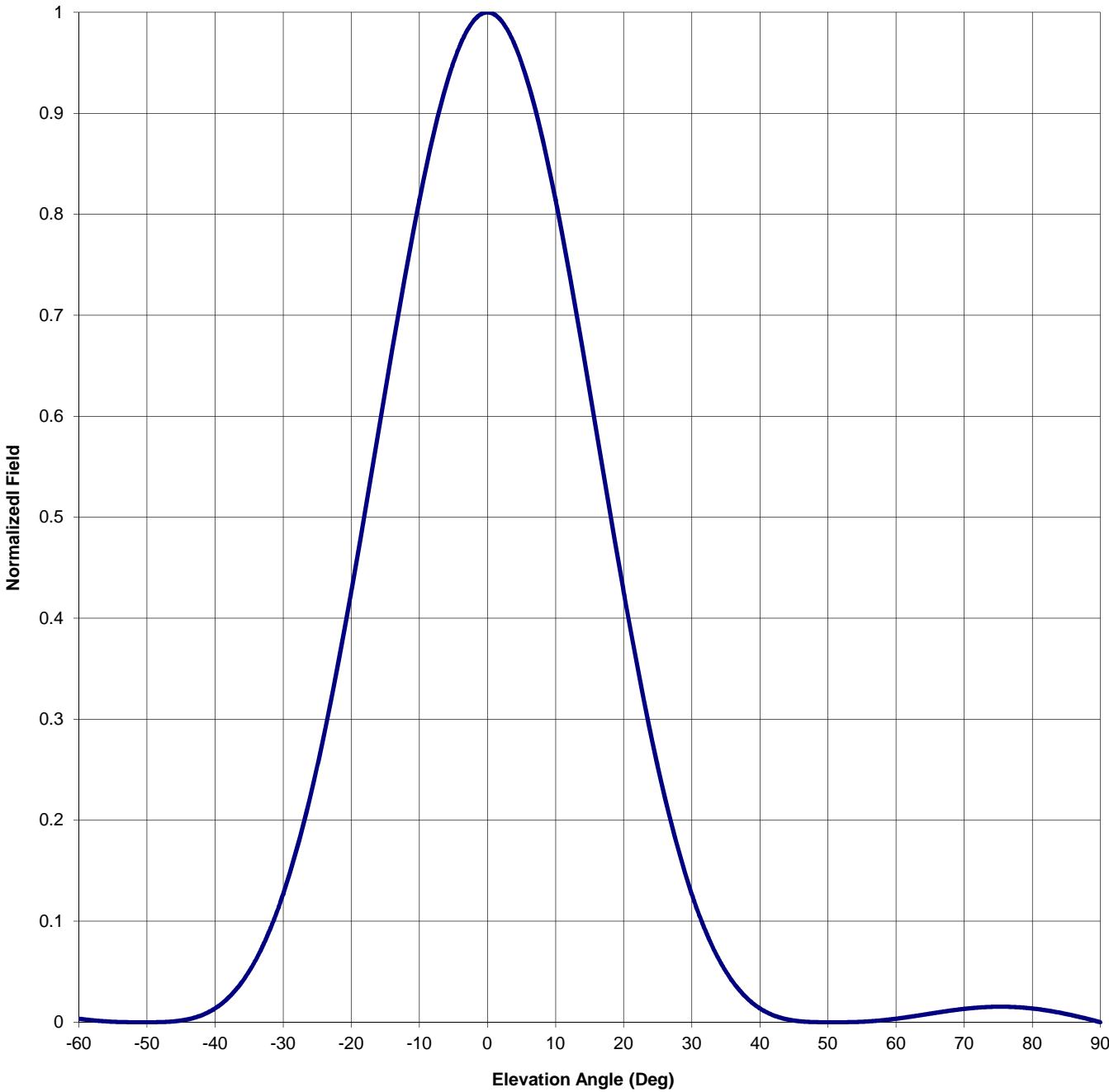
# FIGURE EE1 (1 of 2)

Antenna Mfg.: Shively Labs  
Antenna Type: 6813.3SS

Date: 11/2/2015

Station: 0	Beam Tilt	0
Frequency: 106.1	Gain (Max)	1.303 1.150 dB
Channel #: 291	Gain (Horizon)	1.303 1.150 dB

Figure: Note: dB is ref dipole. Hpol



# FIGURE EE1 (2 of 2)

Antenna Mfg.: Shively Labs

Date: 11/2/2015

Antenna Type: 6813.3SS

Station: 0

Beam Tilt

0

Frequency: 106.1

Gain (Max)

1.303

1.150 dB

Channel #: 291

Gain (Horizon)

1.303

1.150 dB

Figure: Note: dB is ref dipole. Hpol

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.003	0	1.000	46	0.001
-89	0.002	-43	0.005	1	0.998	47	0.000
-88	0.004	-42	0.007	2	0.992	48	0.000
-87	0.005	-41	0.010	3	0.982	49	0.000
-86	0.007	-40	0.014	4	0.968	50	0.000
-85	0.008	-39	0.019	5	0.950	51	0.000
-84	0.009	-38	0.025	6	0.929	52	0.000
-83	0.011	-37	0.032	7	0.905	53	0.000
-82	0.012	-36	0.040	8	0.877	54	0.000
-81	0.013	-35	0.050	9	0.847	55	0.000
-80	0.014	-34	0.062	10	0.814	56	0.001
-79	0.014	-33	0.075	11	0.779	57	0.001
-78	0.015	-32	0.091	12	0.743	58	0.002
-77	0.015	-31	0.108	13	0.704	59	0.003
-76	0.015	-30	0.127	14	0.665	60	0.003
-75	0.015	-29	0.148	15	0.625	61	0.004
-74	0.015	-28	0.171	16	0.585	62	0.005
-73	0.015	-27	0.197	17	0.545	63	0.006
-72	0.015	-26	0.224	18	0.505	64	0.007
-71	0.014	-25	0.253	19	0.465	65	0.008
-70	0.013	-24	0.285	20	0.426	66	0.010
-69	0.012	-23	0.318	21	0.389	67	0.011
-68	0.012	-22	0.352	22	0.352	68	0.012
-67	0.011	-21	0.389	23	0.318	69	0.012
-66	0.010	-20	0.426	24	0.285	70	0.013
-65	0.008	-19	0.465	25	0.253	71	0.014
-64	0.007	-18	0.505	26	0.224	72	0.015
-63	0.006	-17	0.545	27	0.197	73	0.015
-62	0.005	-16	0.585	28	0.171	74	0.015
-61	0.004	-15	0.625	29	0.148	75	0.015
-60	0.003	-14	0.665	30	0.127	76	0.015
-59	0.003	-13	0.704	31	0.108	77	0.015
-58	0.002	-12	0.743	32	0.091	78	0.015
-57	0.001	-11	0.779	33	0.075	79	0.014
-56	0.001	-10	0.814	34	0.062	80	0.014
-55	0.000	-9	0.847	35	0.050	81	0.013
-54	0.000	-8	0.877	36	0.040	82	0.012
-53	0.000	-7	0.905	37	0.032	83	0.011
-52	0.000	-6	0.929	38	0.025	84	0.009
-51	0.000	-5	0.950	39	0.019	85	0.008
-50	0.000	-4	0.968	40	0.014	86	0.007
-49	0.000	-3	0.982	41	0.010	87	0.005
-48	0.000	-2	0.992	42	0.007	88	0.004
-47	0.000	-1	0.998	43	0.005	89	0.002
-46	0.001	0	1.000	44	0.003	90	0.000
-45	0.002			45	0.002		

## FIGURE EE2

### FREE SPACE FIELD STRENGTH AT A DISTANCE STUDY RESULTS

PROJECT: HOUSTON, TX, CHANNEL 291D

2-Nov-15

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K
	Vert	Horiz	Hypot-	Down-			Pattern	Free	Adjusted	Interf	Vert
	Dist	Dist	enuse	ward			Relative	Space	ERP in	Distance	Interf
	From	From	Dist	Angle			Field at	Inter-	Down-	along	Distance
	Ant	Tower	fr Ant	fr Ant	Max	Max	Down-	ferring	ward	Hypot-	below
	Bottom	Base	Bottom	Bottom	ERP	ERP	ward	Signal	Angle	enuse	Antenna
Pt	(meters)	(meters)	(meters)	(degrees)	(watts)	(dBmw)	Angle	(dBu)	(dBmW)	(meters)	(meters)
1	16	0.1	16.0	<a href="#">89.6</a>	190	<a href="#">52.79</a>	0.002	112.0	<a href="#">-1.19</a>	0.5	<a href="#">0.5</a>
2	16	2	16.1	<a href="#">82.9</a>	190	<a href="#">52.79</a>	0.012	112.0	<a href="#">14.37</a>	2.9	<a href="#">2.9</a>
3	16	4	16.5	<a href="#">76.0</a>	190	<a href="#">52.79</a>	0.015	112.0	<a href="#">16.31</a>	3.7	<a href="#">3.5</a>
4	16	6	17.1	<a href="#">69.4</a>	190	<a href="#">52.79</a>	0.013	112.0	<a href="#">15.07</a>	3.2	<a href="#">3.0</a>
5	16	8	17.9	<a href="#">63.4</a>	190	<a href="#">52.79</a>	0.007	112.0	<a href="#">9.69</a>	1.7	<a href="#">1.5</a>
6	16	10	18.9	<a href="#">58.0</a>	190	<a href="#">52.79</a>	0.002	112.0	<a href="#">-1.19</a>	0.5	<a href="#">0.4</a>
7	16	12	20.0	<a href="#">53.1</a>	190	<a href="#">52.79</a>	0.001	112.0	<a href="#">-7.21</a>	0.2	<a href="#">0.2</a>
8	16	14	21.3	<a href="#">48.8</a>	190	<a href="#">52.79</a>	0.001	112.0	<a href="#">-7.21</a>	0.2	<a href="#">0.2</a>
9	16	16	22.6	<a href="#">45.0</a>	190	<a href="#">52.79</a>	0.002	112.0	<a href="#">-1.19</a>	0.5	<a href="#">0.3</a>
10	16	18	24.1	<a href="#">41.6</a>	190	<a href="#">52.79</a>	0.010	112.0	<a href="#">12.79</a>	2.4	<a href="#">1.6</a>
11	16	20	25.6	<a href="#">38.7</a>	190	<a href="#">52.79</a>	0.025	112.0	<a href="#">20.75</a>	6.1	<a href="#">3.8</a>
12	16	22	27.2	<a href="#">36.0</a>	190	<a href="#">52.79</a>	0.040	112.0	<a href="#">24.83</a>	9.7	<a href="#">5.7</a>
13	16	24	28.8	<a href="#">33.7</a>	190	<a href="#">52.79</a>	0.075	112.0	<a href="#">30.29</a>	18.3	<a href="#">10.1</a>
14	16	26	30.5	<a href="#">31.6</a>	190	<a href="#">52.79</a>	0.108	112.0	<a href="#">33.46</a>	26.3	<a href="#">13.8</a>

NOTE: Study point at 2 meters above ground (or rooftop, see write-up) level.

**RESULTS: COLUMN J DISTANCES ARE LESS THAN COLUMN C AND COLUMN K DISTANCES ARE LESS THAN COLUMN A DISTANCES IN ALL INSTANCES; THEREFORE, INTERFERRING SIGNAL DOES NOT EXIST AT ANY LOCATION (TWO METERS OR LESS ABOVE GROUND LEVEL)**