

ENGINEERING EXHIBIT

Application for Construction Permit Change of Principal Community

prepared for

Sarkes Tarzian, Inc.
WTTS(FM) Trafalgar, IN
Facility ID 59141
Ch. 222B (92.3 MHz) 37 kW 332 m

Sarkes Tarzian, Inc. (“STI”) is the licensee of WTTS(FM), Channel 222B, Facility ID 59141, Bloomington, IN (BMLH-20160429ABG). *STI* herein submits an application for minor modification of WTTS to change the WTTS principal community to Trafalgar, IN. No technical changes are proposed to WTTS transmitting facility.

WTTS is licensed to operate at 37 kW effective radiated power (“ERP”) with a nondirectional antenna at 332 meters height above average terrain (“HAAT”). The WTTS antenna is side-mounted on the tower associated with FCC Antenna Structure Registration number 1026127.

WTTS is a so-called “superpower” station in that its licensed facility exceeds the maximum Class B parameters of 50 kW at 150 meters. WTTS is also a pre-1964 grandfathered short-spaced station. The proposal does not involve any change in the currently authorized transmitter site location or any other technical parameter.

The town of Trafalgar is located in Johnson County, Indiana. According to 2010 U.S. census data, Trafalgar has a population of 1,101 persons and an area of 6.8 square kilometers. The WTTS transmitter site is within the boundaries of Trafalgar.

A coverage contour map is supplied as Figure 1 showing that the proposed principal community of Trafalgar is encompassed by the WTTS 70 dBμ coverage contour.

An allocation spacing summary table for the WTTS transmitter site is provided in Table 1. The WTTS site is fully spaced to all authorized full power facilities, proposed stations, and allotments contained in the FCC's CDBS except for WOFX-FM (Ch. 223B, Cincinnati OH), WBST (Ch. 221A Muncie IN), and WBKR (Ch. 223C, Owensboro KY). Figure 2 is a map depicting the §73.207 minimum distance spacings, and shows that no fully-spaced site exists for WTTS. As a grandfathered pre-1964 short-spaced station,¹ a fully-spaced allotment point is not required for a change in principal community when no facility technical changes are proposed.²

Section 307(b) - Change of Principal Community

The allotment of WTTS's Channel 222B to Trafalgar would provide that community with its first local aural transmission service. Bloomington would continue to be served by stations WBWB(FM) (Ch. 244A, Bloomington, IN), WFHB(FM) (Ch. 217A, Bloomington IN), WFIU(FM) (Ch. 279B, Bloomington IN), and WGCL(AM) (1370 kHz, Bloomington IN).

WTTS would continue to operate as a superpower Class B facility at its currently authorized transmitter site with no change to its technical facility. Thus, no loss of actual service would result from the proposal.

Trafalgar is not within a US Census urbanized area ("UA"). Several urbanized areas are reached by the WTTS principal community contour (Indianapolis IN, Bloomington IN, and Columbus IN). The *Rural Radio* proceeding³ requires analysis of a principal community change proposal's ability to increase service to an urbanized area with its principal community contour. In *Rural Radio*, the FCC provided the following procedures regarding determination of whether

¹Review of on-file material at the FCC shows that WTTS is a grandfathered pre-1964 short-spaced station with respect to WOFX-FM and WBKR. WBST is a "3 kW" Class A station, where the 107.1 km actual distance to WTTS satisfies the 105 km minimum distance of §73.213(c)(1).

²*Amendment of Section 73.202(b), Table of Allotments, FM Broadcast Stations, (Toccoa and Sugar Hill, GA)*, MM Docket 98-162, Report and Order, DA 01-1734, Released July 20, 2001, 16 FCC Rcd 14069. Also see *Amendment of Section 73.202(b), Table of Allotments, FM Broadcast Stations, (Newnan and Peachtree City, GA)*, MM Docket 90-138, Report and Order, DA 92-1203, Released September 28, 1992, 7 FCC Rcd 6307.

³*Second Report And Order, First Order On Reconsideration, and Second Further Notice Of Proposed Rule Making*, MB Docket 09-52, FCC 11-28, Released March 3, 2011, 26 FCC Rcd 2556.

a proposed principal community change involves a threshold of 50 percent coverage to an urbanized area:

Para. 35

The determination of whether a proposed facility “could be modified” to cover 50 percent or more of an urbanized area will be made based on an applicant’s certification that there are no existing towers in the area to which, at the time of filing, the applicant’s antenna could be relocated pursuant to a minor modification application to serve 50 percent or more of an Urbanized Area.

Footnote 97

Specifically, a proponent would need to certify that there could be no rule-compliant minor modification on the proposed channel to provide a principal community signal over 50 percent or more of an Urbanized Area, in addition to covering the proposed community of license. In doing so, proponents will be required to consider all existing registered towers in the Commission’s Antenna Structure Registration database, in addition to any unregistered towers currently used by licensed radio stations. Furthermore, we expect all applicants and allotment proponents to consider widely-used techniques, such as directional antennas and contour protection, when certifying that the proposal could not be modified to provide a principal community signal over the community of license and 50 percent or more of an Urbanized Area. While this is not a conclusive test, it is one that the Commission will treat as establishing a rebuttable presumption of an allotment that could not be modified to serve both the majority of an Urbanized Area and the community of license.

Figure 3 supplies a search area map based on §73.215(e) minimum distance spacings to relevant stations. The search area is the maximum potential area where WTTS could be relocated under a rule-compliant minor modification. Existing tower locations within the search area are plotted on Figure 3 based on all towers in the FCC’s Antenna Structure Registration (“ASR”) database and unregistered towers currently used by licensed radio stations. A summary of those towers is provided on Figure 3.

From any location within the search area, the ability of WTTS to expand service over the Indianapolis UA is limited by several factors as described in the following.

1. Any relocation of WTTS would require a facility reduction. As a “superpower” FM station, §73.211(c) does not permit any extension of the 1 mV/m contour (60 dBμ) beyond its current location. Unless WTTS reduces its facility to a conforming Class B, there can be no extension in 60 dBμ contour. Consequently, the principal community (70 dBμ) contour cannot be moved appreciably towards the Indianapolis UA.

2. WBST (Ch. 221A Muncie IN, a “3 kW” Class A station) is located in the same general direction as the Indianapolis UA. The distance spacing between WTTS and WBST is presently 2.6 km clear of the §73.213(c)(1) limit which is applicable for WBST. Movement towards the Indianapolis UA that would not comply with §73.213(c)(1) could be accomplished under the contour protection requirements of §73.215. The contour protection requirements towards WBST would keep the WTTS principal community contour from extending closer to WBST, at 33°T from the WTTS site.
3. WITT(FM) (Ch. 220A, Zionsville IN) is also located in the same general direction as the Indianapolis UA. The distance spacing between WTTS and WITT is presently 3.3 km clear of the §73.207 limit. Movement towards WITT and the Indianapolis UA beyond 3.3 km could be accomplished under the contour protection requirements of §73.215. The contour protection requirements towards WITT would keep the WTTS principal community contour from extending closer to WITT, at 338°T from the WTTS site.
4. WZWZ(FM) (Ch. 223A, Kokomo, IN) is also located in the same general direction as the Indianapolis UA. The distance spacing between WTTS and WZWZ is presently 5.7 km clear of the §73.207 limit. Movement towards WZWZ and the Indianapolis UA beyond 5.7 km could be accomplished under the contour protection requirements of §73.215. The contour protection requirements towards WZWZ would keep the WTTS principal community contour from extending closer to WZWZ, at 359°T from the WTTS site.

WTTS presently covers 40.5 percent of the Indianapolis UA with its principal community coverage contour. The factors above result in no opportunity to extend the WTTS principal community contour to over 50 percent of the Indianapolis UA. Of the towers within the search area, the existing WTTS tower is the tallest having an overall height of 345.0 meters above ground level (“AGL”) and 610.0 meters above mean sea level (“AMSL”). The two next-tallest towers (ASR# 1041579 305.0 mAGL / 567.0 mAMSL and ASR# 1026377 304.8 mAGL / 572.7 mAMSL) are located within 0.5 km of WTTS and are just to the south of the WTTS tower. Use of either of those sites would result in a slight reduction of principal community contour coverage of the Indianapolis UA due to the slightly increased distance.

Of the remaining towers in the search area, the tallest is ASR# 1227985 having an overall height of 122 mAGL and 347.0 mAMSL. For completeness, a hypothetical site (“Site A”) was also chosen at the northernmost point of the search area (closest to Indianapolis). Figure 4 provides a comparison of the existing WTTS principal community contour and these two possible “best case” sites that are within the search area. For each site, the ERP was set as high as possible towards Indianapolis, in excess of the Class B ERP limit but complying with the §73.211(c) restriction on 60 dBμ contour extension and §73.215 contour protection. A directional pattern was derived to provide contour protection to WBST, WITT, and WZWZ. The resulting principal community contours are depicted on Figure 4 and in each case the result is a reduction in the area of the Indianapolis UA that could be covered. Use of ASR# 1227985 would achieve 28.8 percent principal community coverage of the Indianapolis UA, and the hypothetical “Site A” would cover 35.6 percent of the Indianapolis UA. Results for the remaining towers are similarly below the threshold 50 percent principal community coverage of the Indianapolis UA.

Therefore, this analysis demonstrates that the proposed Channel 222B allotment to Trafalgar could not achieve a minor modification to serve both the majority of the Indianapolis UA and the proposed community of license. As to other UAs in the region, only Columbus, IN is implicated. The Columbus, IN UA is presently encompassed by the WTTS principal community contour (see Figure 4), therefore the proposed change in principal community will not result in any increase of principal community coverage at Columbus IN.

The applicant is supplying a separate supporting statement further describing how the proposed re-allotment of Channel 222B from Bloomington, IN to Trafalgar, IN will result in a preferential arrangement of allotments.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The WTTS operation was evaluated for human exposure to RF energy using the procedures outlined in the FCC’s OET Bulletin Number 65. The transmitting antenna is an ERI model SHP-4AC consisting of four elements at 1.0 wavelength spacing. According to the FCC’s

“FMModel” software analysis,⁴ the graph in Figure 5 depicts calculated power density levels attributable to the proposed facility at locations near the tower at a height of two meters above ground level. That analysis shows that the maximum calculated RF electromagnetic field attributable to WTTS is $2.3 \mu\text{W}/\text{cm}^2$, which is 1.2 percent of the general population/uncontrolled maximum permitted exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal’s contribution is less than five percent.

The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC’s guidelines. RF exposure warning signs will continue to be posted and the tower will continue to be fenced. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. This exhibit is limited to the evaluation of exposure to RF electromagnetic field.

List of Attachments

Figure 1	Proposed Coverage Contours
Figure 2	§73.207 Full Spacing Limits
Figure 3	§73.215(e) Maximum Search Area
Figure 4	Coverage to Urbanized Area
Figure 5	RF Electromagnetic Field – FCC FMModel Results
Table 1	WTTS Transmitter Site §73.207 Allocation Spacing Study
Form 301	Saved Version of Engineering Sections from FCC Form at Time of Upload

Chesapeake RF Consultants, LLC

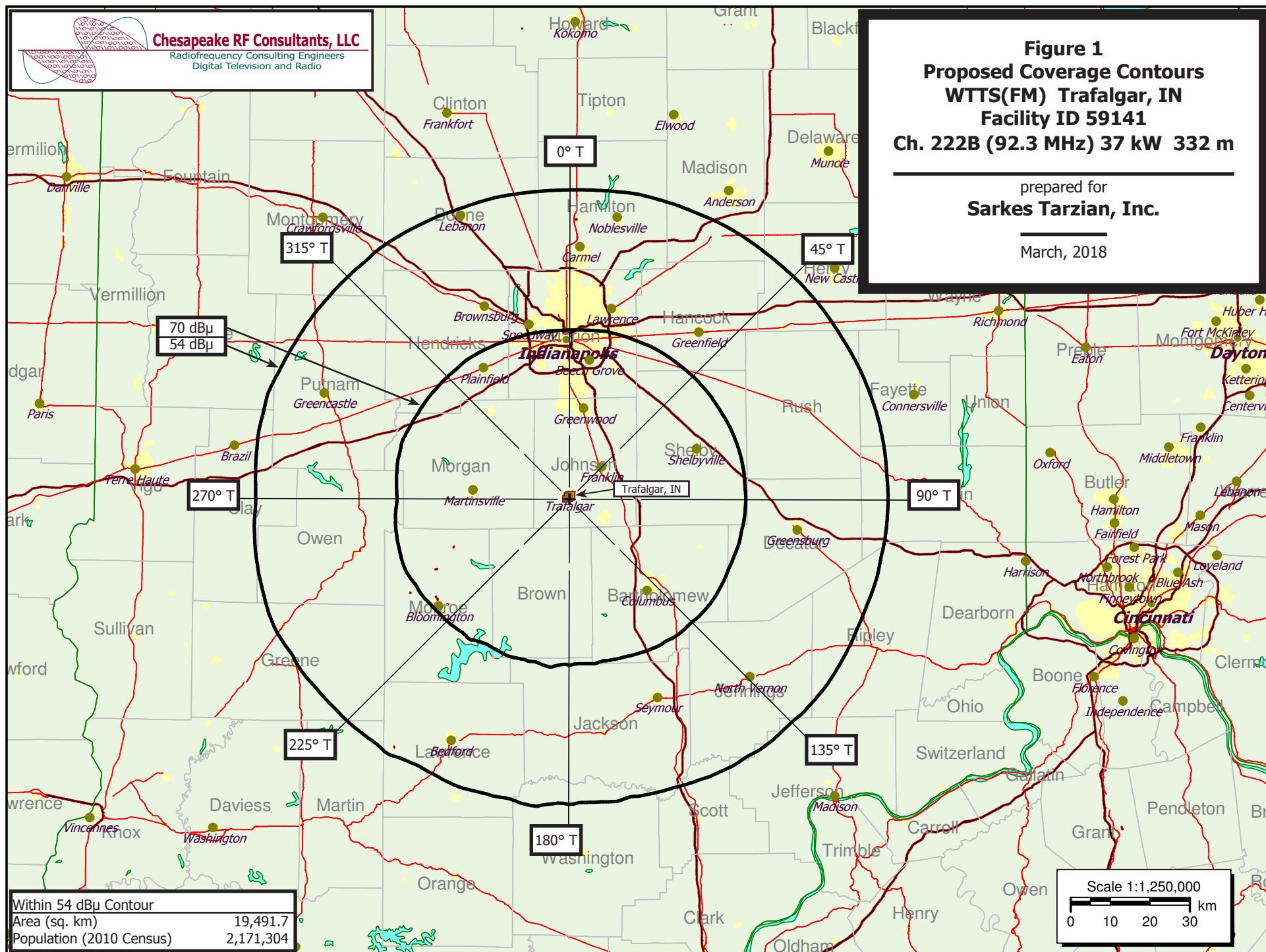
Joseph M. Davis, P.E.	March 6, 2018	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600

⁴“Office of Engineering and Technology Announces Updates to FMModel Software,” Public Notice, DA 16-340, March 31, 2016. FMModel is available at <https://www.fcc.gov/oet/software/fmmodel>.



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March, 2018





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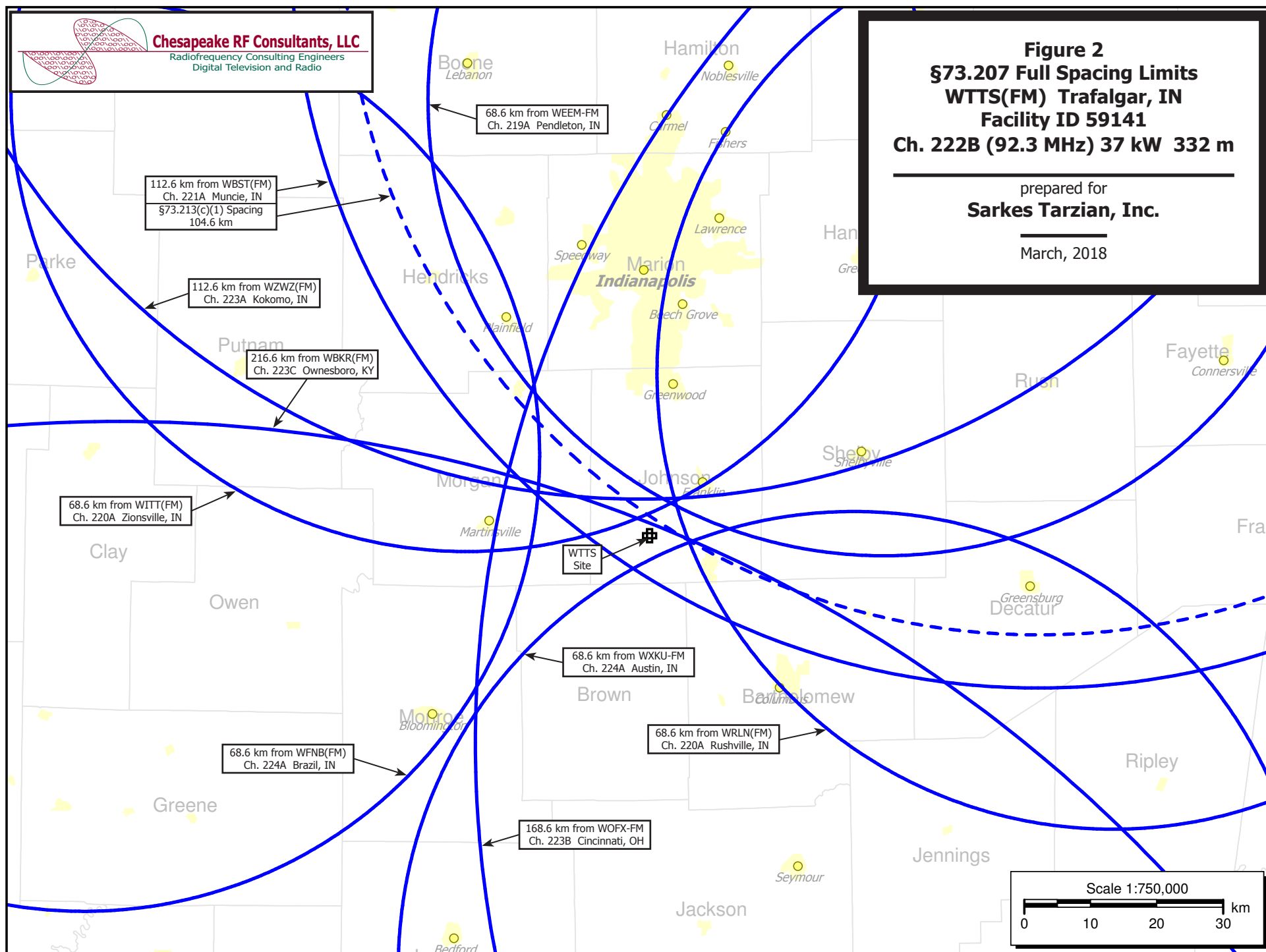
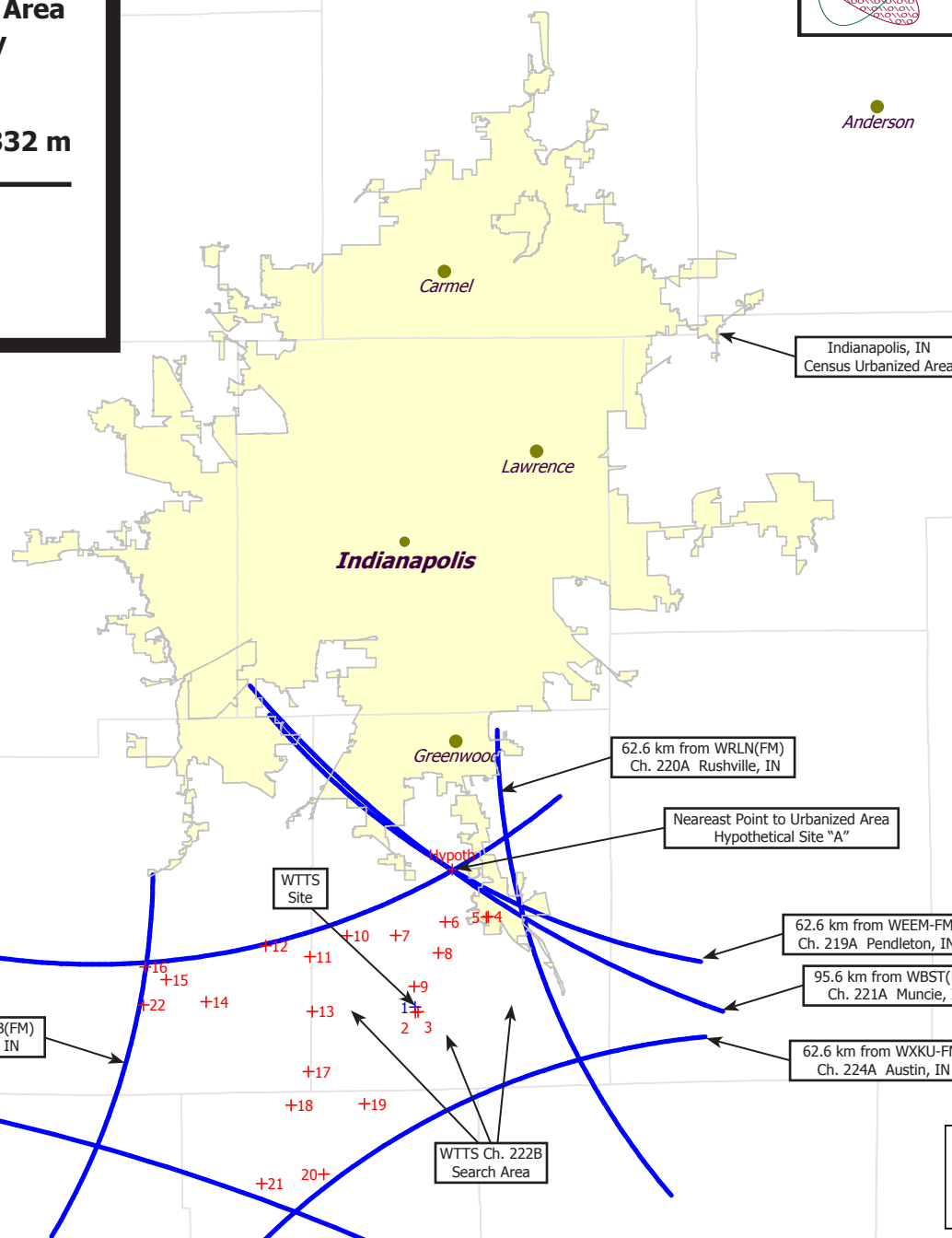


Figure 3
§73.215(e) Maximum Search Area
Urbanized Area Proximity
WTTS(FM) Trafalgar, IN
Facility ID 59141
Ch. 222B (92.3 MHz) 37 kW 332 m

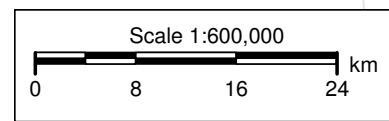
prepared for
Sarkes Tarzian, Inc.

March, 2018

Towers Within Search Area			
Key	ASR#	Overall Height (m) AGL	AMSL
1	1026127 existing WTTS	345.0	610.0
2	1041579	305.0	567.0
3	1026377	304.8	572.7
4	1245563	82.6	307.2
5	1227985	122.0	347.0
6	1039737	82.6	318.8
7	1255456	87.2	334.4
8	1028892	91.1	325.5
9	1302719	60.7	310.0
10	1034351	78.9	324.8
11	1247021	79.2	313.8
12	1226689	97.5	317.0
13	1030275	108.5	343.2
14	1277371	80.2	312.8
15	1008181	78.0	313.3
16	1039719	80.4	328.2
17	1230962	97.5	318.5
18	1214904	98.5	379.8
19	1297876	94.5	377.6
20	1250592	91.4	332.2
21	1276495	91.1	306.2
22	none WMTJ(AM)	53 (est)	236 (est)



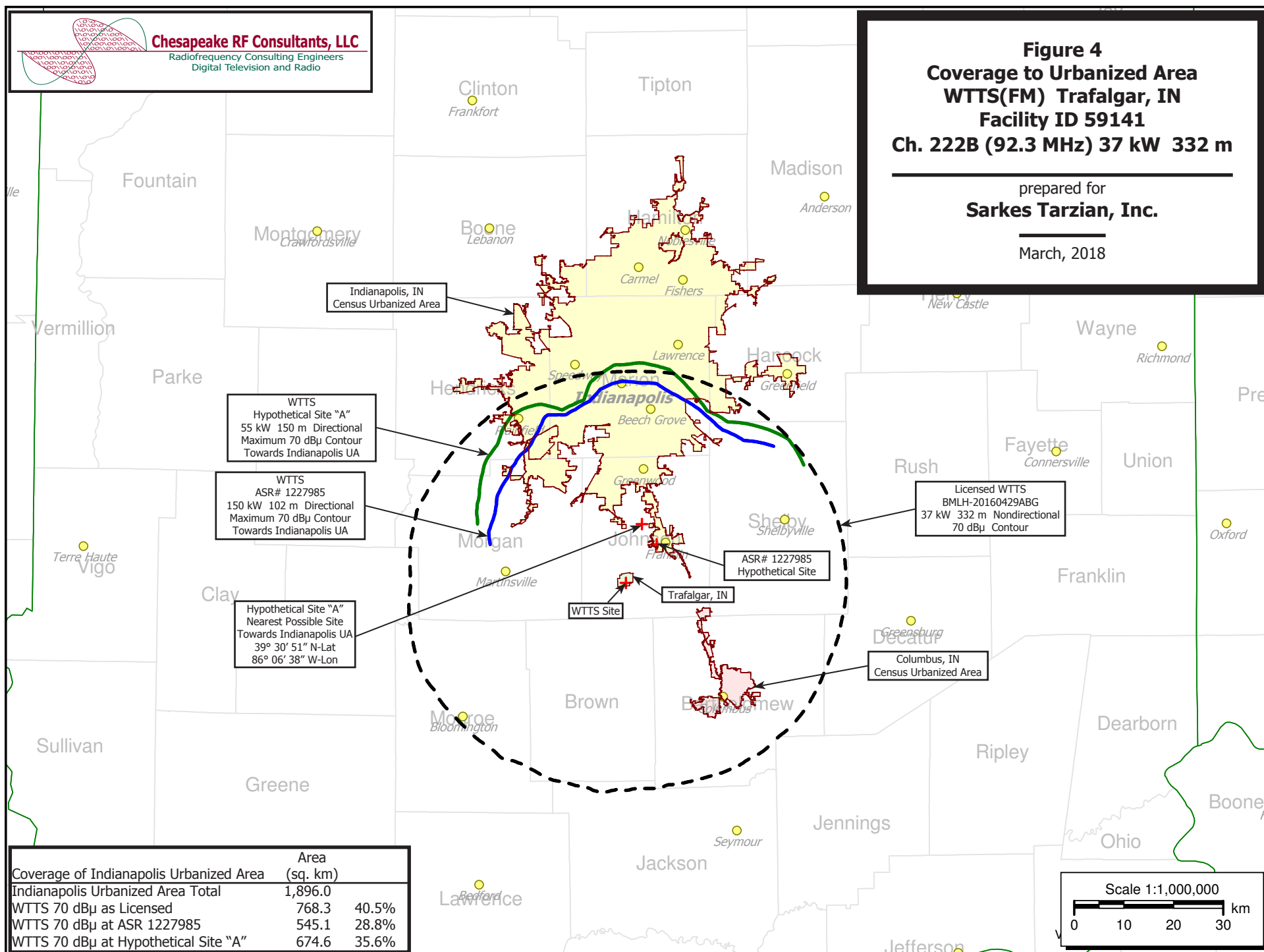
Note: No limit shown for WOFX-FM Ch. 223B Cincinnati, OH Grandfathered Pre-1964 station §73.215(e) Not applicable

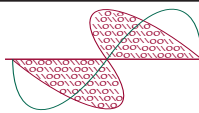




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Sarkes Tarzian, Inc.

March, 2018



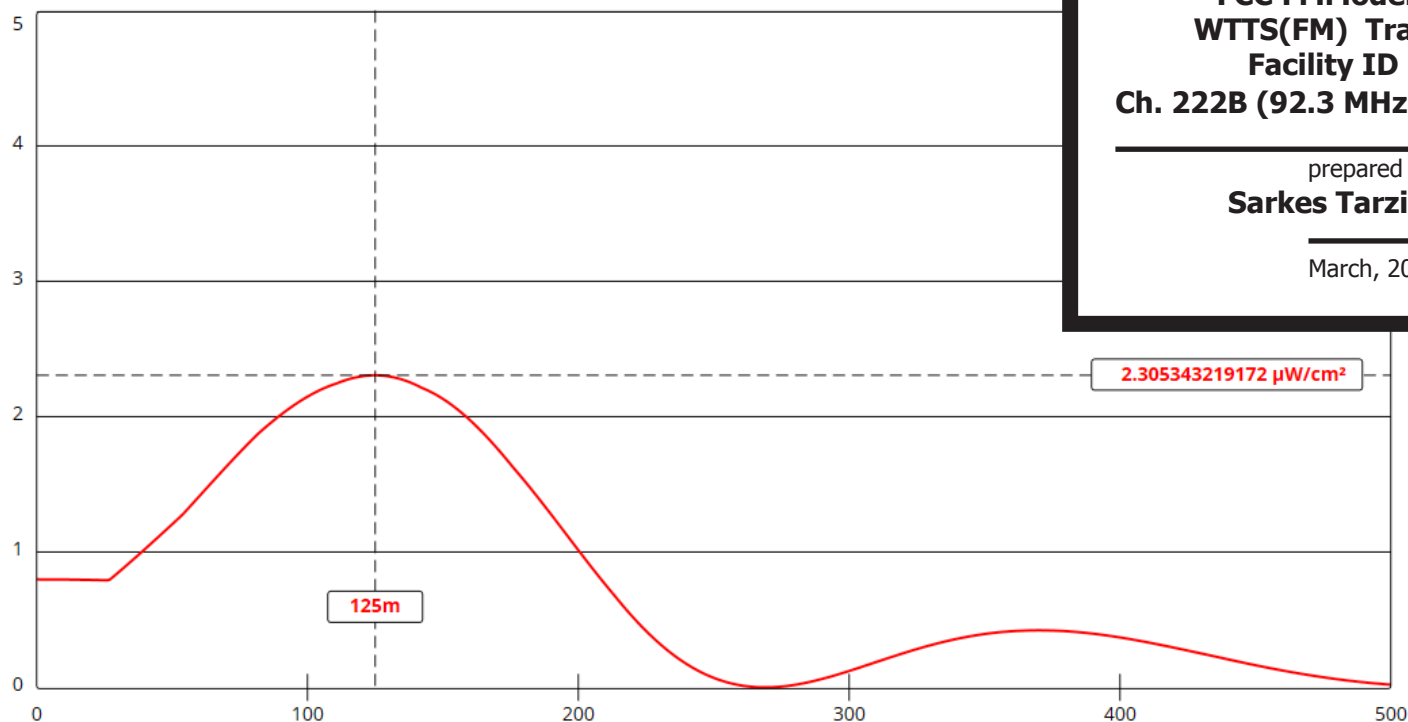


Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 5
RF Electromagnetic Field
FCC FModel Results
WTTS(FM) Trafalgar, IN
Facility ID 59141
Ch. 222B (92.3 MHz) 37 kW 332 m

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March, 2018



[View Tabular Results +](#)

Channel Selection	Channel 222 (92.3 MHz) ▾		
Antenna Type +	EPA Type 3: Opposed U Dipole ▾		
Height (m)	<input type="text" value="307"/>	Distance (m)	<input type="text" value="500"/>
ERP-H (W)	<input type="text" value="37000"/>	ERP-V (W)	<input type="text" value="37000"/>
Num of Elements	<input type="text" value="4"/>	Element Spacing (λ)	<input type="text" value="1"/>
Num of Points	<input type="text" value="500"/>	<input type="button" value="Apply"/>	



Table 1

WTTS Transmitter Site

§73.207 Allocation Spacing Study

prepared for

Sarkes Tarzian, Inc.

WTTS(FM) Trafalgar, IN

Facility ID 59141

REFERENCE		CLASS = B	DISPLAY DATES
39 24 27.0 N.			DATA 03-06-18
86 08 52.0 W.	Current	Spacings to 3rd Adj.	SEARCH 03-06-18
----- Channel 222 - 92.3 MHz -----			

Call		Channel	Location		Azi	Dist	FCC	Margin
WTTS	LIC	222B	Bloomington	IN	0.0	0.00	241.0	-241.0
WOFX-FM	LIC	223B	Cincinnati	OH	102.3	145.67	169.0	-23.3
WBST	LIC	221A	Muncie	IN	33.0	107.11	113.0	-5.9
WBKR	LIC	223C	Owensboro	KY	201.8	214.82	217.0	-2.2
WITT	LIC	220A	Zionsville	IN	337.5	71.76	69.0	2.8
WXKU-FM	LIC	224A	Austin	IN	154.8	71.82	69.0	2.8
WRLN	LIC	220A	Rushville	IN	70.6	73.84	69.0	4.8
WZWZ	LIC	223A	Kokomo	IN	359.3	118.16	113.0	5.2
WEEM-FM	LIC	219A	Pendleton	IN	28.1	74.47	69.0	5.5
WXCH	LIC	275A	Columbus	IN	146.4	29.52	15.0	14.5
WFNB	LIC	224A	Brazil	IN	278.1	86.04	69.0	17.0
WZDM	LIC	221A	Vincennes	IN	234.5	137.41	113.0	24.4
WFWI	LIC	222A	Fort Wayne	IN	22.8	205.75	178.0	27.8
WPWX	LIC	222B	Hammond	IN	335.2	273.15	241.0	32.2
WCOL-FM	LIC	222B	Columbus	OH	75.8	274.85	241.0	33.9
WBVX	LIC	221C2	Carlisle	KY	130.8	205.31	169.0	36.3
WREE	LIC	223B1	Urbana	IL	292.2	183.68	145.0	38.7
WHJO	LIC	220A	Terre Haute	IN	274.0	107.99	69.0	39.0
WFPK	LIC	220B	Louisville	KY	167.0	118.74	74.0	44.7
WROU-FM	LIC	221A	West Carrollton	OH	77.4	166.20	113.0	53.2
WJPR	LIC	219A	Jasper	IN	208.5	124.26	69.0	55.3
WJEF	LIC	220A	Lafayette	IN	330.9	126.27	69.0	57.3
WIWC	LIC	219A	Kokomo	IN	354.4	133.06	69.0	64.1
WSKL	LIC	225A	Veedersburg	IN	306.8	138.75	69.0	69.8
WROI	LIC	221A	Rochester	IN	356.8	183.10	113.0	70.1
WVXU	LIC	219B	Cincinnati	OH	101.9	145.68	74.0	71.7
WYGE	LIC	222C2	London	KY	142.5	313.60	241.0	72.6

Section III-B - FM Engineering**TECHNICAL SPECIFICATIONS**

Ensure that the specifications below are accurate. Contradicting data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.

TECH BOX

1.	Channel Number: 222
2.	Class (select one): <input type="radio"/> A <input type="radio"/> B1 <input checked="" type="radio"/> B <input type="radio"/> C3 <input type="radio"/> C2 <input type="radio"/> C1 <input type="radio"/> C0 <input type="radio"/> C <input type="radio"/> D
3.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees 39 Minutes 24 Seconds 27 <input checked="" type="radio"/> North <input type="radio"/> South Longitude: Degrees 86 Minutes 8 Seconds 52 <input checked="" type="radio"/> West <input type="radio"/> East
4.	Proposed Allotment or Assignment Coordinates: (NAD 27) <input checked="" type="checkbox"/> Not Applicable Latitude: Degrees Minutes Seconds <input type="radio"/> North <input type="radio"/> South Longitude: Degrees Minutes Seconds <input type="radio"/> West <input type="radio"/> East
5.	Antenna Structure Registration Number: 1026127 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA
6.	Overall Tower Height Above Ground Level: 345meters
7.	Height of Radiation Center Above Mean Sea Level: 574 meters(H) 574 meters(V)
8.	Height of Radiation Center Above Ground Level: 309meters(H) 309meters(V)
9.	Height of Radiation Center Above Average Terrain: 332meters(H) 332meters(V)
10.	Effective Radiated Power: 37 kW(H) 37 kW(V)
11.	Maximum Effective Radiated Power: <input checked="" type="checkbox"/> Not Applicable (Beam-Tilt Antenna ONLY) kW(H) kW(V)
12.	Directional Antenna Relative Field Values: <input checked="" type="checkbox"/> Not applicable (Nondirectional) Rotation (Degrees): <input type="checkbox"/> No Rotation

Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value
0		10		20		30		40		50	
60		70		80		90		100		110	
120		130		140		150		160		170	
180		190		200		210		220		230	
240		250		260		270		280		290	
300		310		320		330		340		350	
Additional Azimuths											

[Relative Field Polar Plot](#)

NOTE: In addition to the information called for in this section, an explanatory exhibit providing full particulars must be submitted for each question for which a "No" response is provided.

CERTIFICATION

AUXILIARY ANTENNA APPLICANTS ARE NOT REQUIRED TO RESPOND TO ITEMS 13-16. PROCEED TO ITEM 17.

13.	Availability of Channels. The proposed facility complies with the allotment requirements of 47 C.F.R. Section 73.203.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 27]
14.	Community Coverage. The proposed facility complies with 47 C.F.R. Section 73.315.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 28]
15.	Main Studio Location. The proposed main studio location complies with 47 C.F.R. Section 73.1125.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 29]
16.	Interference. The proposed facility complies with all of the following applicable rule sections: Check all those that apply: Separation Requirements. <input checked="" type="checkbox"/> a) 47 C.F.R. Section 73.207 Grandfathered Short-Spaced. <input checked="" type="checkbox"/> b) 47 C.F.R. Section 73.213(a) with respect to station(s): [Exhibit 31] Exhibit required <input type="checkbox"/> c) 47 C.F.R. Section 73.213(b) with respect to station(s): [Exhibit 32] Exhibit required <input checked="" type="checkbox"/> d) 47 C.F.R. Section 73.213(c) with respect to station(s): [Exhibit 33] Exhibit required. Contour Protection <input type="checkbox"/> e) 47 C.F.R. Section 73.215 with respect to station(s): [Exhibit 34] Exhibit required.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 30]
17.	Environmental Protection Act. The proposed facility is excluded from environmental processing under 47. C.F.R. Section 1.1306 (i.e., The facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine compliance through the use of the RF worksheets in Appendix A, an Exhibit is required. By checking "Yes" above, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.	<input checked="" type="radio"/> Yes <input type="radio"/> No See Explanation in [Exhibit 35]
18.	Community of License Change - Section 307(b). If the application is being submitted to change the facility's community of license, then the applicant certifies that it has attached an exhibit containing information demonstrating that the proposed community of license change constitutes a preferential arrangement of station assignments under Section 307(b) of the Communications Act of 1934, as amended (47 U.S.C. Section 307(b)). An exhibit is required unless this question is not applicable.	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A [Exhibit 36]

PREPARERS CERTIFICATION ON PAGE 3 MUST BE COMPLETED AND SIGNED.

SECTION III - PREPARER'S CERTIFICATION

I certify that I have prepared Section III (Engineering Data) on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name JOSEPH M. DAVIS, P.E.	Relationship to Applicant (e.g., Consulting Engineer) CONSULTING ENGINEER	
Signature	Date 3/6/2018	
Mailing Address CHESAPEAKE RF CONSULTANTS, LLC 207 OLD DOMINION ROAD		
City YORKTOWN	State or Country (if foreign address) VA	Zip Code 23692 -
Telephone Number (include area code) 7036509600	E-Mail Address (if available) JOSEPH.DAVIS@RF-CONSULTANTS.COM	