

May 22, 2015

Ms. Sandra L. Day
Planning Division
P.O. Box 708
Lawrence, KS 66044

Re: Third Party Review for a New Communication Tower at 2001 Moodie Road
LAWC Barker Cell Site

Dear Ms. Day:

Burns & McDonnell has completed our radio collocation feasibility assessment and report the following:

Applicant

PAMCORP, LLC on behalf of Verizon Wireless, LLC

Project

Applicant proposes to construct a telecommunications tower in Lawrence, Kansas. Burns & McDonnell conducted a study in accordance with the Land Development Code to determine the extent to which the Applicant has, or has not, met the Burden of Proof required by Subsection 20-529 (7).

Proposed tower: LAWC Barker

Location: 2001 Moodie Road, Lawrence, Kansas, 66046

Geographic Coordinates: Lat. 38-56-55.05 North; Long. 95-13-33.43 West

Approximate Ground Elevation: 871 feet above mean sea level.

Structure height: 120 feet above ground level.

Transmitter Frequency Bands: 1860-1900 MHz; 700 MHz

Analysis

Burns & McDonnell reviewed the project data provided by the City including:

- Applicant's software-generated radio signal propagation models showing current radio signal coverage and proposed coverage after construction of the new tower.
- Applicant's zoning application including proposed site design drawings.

Burns & McDonnell's engineer travelled to Lawrence on May 22, 2015 and reviewed the proposed tower location, and other structures in the general area of study. The proposed tower site would be located in an improved area on Moodie Road 375 feet northeast of the existing Ottawa COOP grain elevator.

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The New Telecommunications Towers – Burden of Proof

In accordance with the Land Development Code Subsection 20-529 (7) requires that the applicant meet the burden of proof by showing that one or more of the following conditions exist:

- (i) No existing telecommunications towers or structures are located within the geographic area required to meet the applicant's engineering requirements;
- (ii) Existing telecommunications towers or structures are not of sufficient height, and could not be extended to become sufficient in height, to meet the applicant's engineering requirements;
- (iii) Existing telecommunications towers or structures do not have sufficient structural capacity to support the applicant's proposed telecommunications antenna and related equipment; and the existing or approved telecommunications tower cannot be reinforced, modified or replaced to accommodate planned or equivalent equipment at a reasonable cost;
- (iv) The proposed telecommunications antenna would cause excessive electromagnetic interference with an existing telecommunications antenna on the telecommunications tower or structure, or the telecommunications antenna on the existing telecommunications tower or structure would cause interference with the proposed telecommunications antenna; and reconfiguration would not resolve the interference problem; or
- (v) The applicant demonstrates that there are other limiting factors, not including the provisions of this Article, that render existing telecommunications towers or structures unsuitable for its proposed telecommunications antenna.

The Applicant's software-generated radio signal propagation models show the current network coverage both before and after construction of the proposed site. Based on Burns & McDonnell experience, these propagation models represent a reasonable approximation of coverage performance for the network.

Towers and structures already occupied by the applicant were evaluated to determine whether height could be extended to cover the desired Barker area. Otherwise, the applicant's propagation models and their construction proposal are sufficient evidence that these current facilities do not sufficiently cover the desired area.

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Name: Jayhawk

The facility is installed on a water tower. Significant extension of height is not feasible.

Name: Bull Winkles

The facility is installed on a 10-story building. Significant extension of height is not feasible.

Name: Oread

The facility is installed on an 8-story building. Significant extension of height is not feasible.

Name: DT Lawrence

The facility is installed on a 6-story building. Significant extension of height is not feasible.

Name: East Lawrence

The facility is installed on a 94-foot self-supporting tower owned by American Tower Corporation. The current structure does not appear to be capable of a height extension sufficient to cover the desired area.

Name: Wakarusa River

This is a 157-foot monopole tower. It is Burns & McDonnell's opinion that a tower at this location, due to its distance from the desired area, would have to be increased to an unreasonable height to provide coverage, and the current structure is not capable of being extended to such a height.

Burns & McDonnell obtained a list of existing communication towers not currently occupied by the applicant and located within an approximate one-mile radius of the proposed site. Given the radio coverage characteristics, frequency re-use and capacity requirements of 4G LTE, a reasonable expectation for "very good" coverage is a 0.5 to 0.75 mile radius around a given site. Therefore, a one-mile search radius for alternate sites is conservative, i.e. sites more than a mile from the proposed site would not have any reasonable expectation of providing the desired coverage.

FCC Reg. No. 1240758

Owner: Knology of Kansas, Inc.

This is a 202-foot guyed tower located in a residential area. The tower supports CATV and cellular antennas. The tower appears to be fully loaded and is too distant to provide adequate coverage of the required area in Burns & McDonnell's opinion.

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FCC Reg. No. 1258675

Owner: T-Mobile USA Towers LLC

At 1.1 miles from the proposed site, this tower is outside the search area but was included due to its prominent location along K-10. This is a 160-foot monopole tower. It is too distant from the proposed site to provide coverage of the desired area, and the current structure is not capable of being extended to sufficient height to overcome the distance.

FCC Reg. No. 1240013

Owner: Douglas County, KS

This is a 199-foot self-supporting tower located near the Law Enforcement Center. This tower appears fully occupied and would not appear to be a candidate for colocation. It is also too far to the northeast to provide adequate coverage of the required area in Burns & McDonnell's opinion. Other problems related to the close spacing of this tower to existing network sites are explained in applicant's radio propagation study report.

Grain Elevator

Owner: Ottawa COOP

This 130-foot structure is located approximately 365 southwest of the proposed site. There are numerous land mobile radio antennas currently on the structure. Burns & McDonnell contacted the applicant's representative concerning use of this structure for their proposed antennas. The applicant's representative explained that the Grain Elevator had been studied by Verizon engineering and operations groups and found to be unsuitable, primarily because the roof is accessible only from a single man lift that is insufficient for their operations and maintenance needs.

Harper Water Tower

Owner: City of Lawrence

This structure is not of sufficient height to cover the proposed area and is already occupied by a cellular array.

A summary of the findings of this study are shown provided in Table 1. Attachment A contains a map of the radio sites that were reviewed, and Attachment B contains photographs of these sites.

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Table 1
 Study Findings

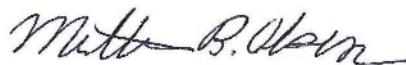
	Burden of Proof Disqualifying Condition				Applicant-Occupied
	(ii)	(iii)	(iv)	(v)	
Location	Height Limitations	Structural Limitations	Electromagnetic Interference	Other Disqualifier	
Jayhawk	X				Yes
Bull Winkles	X				Yes
Oread	X				Yes
Bull Winkles	X				Yes
DT Lawrence	X				Yes
East Lawrence	X			X	Yes
Wakarusa River	X			X	Yes
1240758	X	X		X	No
1258675	X			X	No
1240013	X			X	No
Grain Elevator				X	No
Harper Water Tower	X				No

X=disqualifying condition is met for the site.

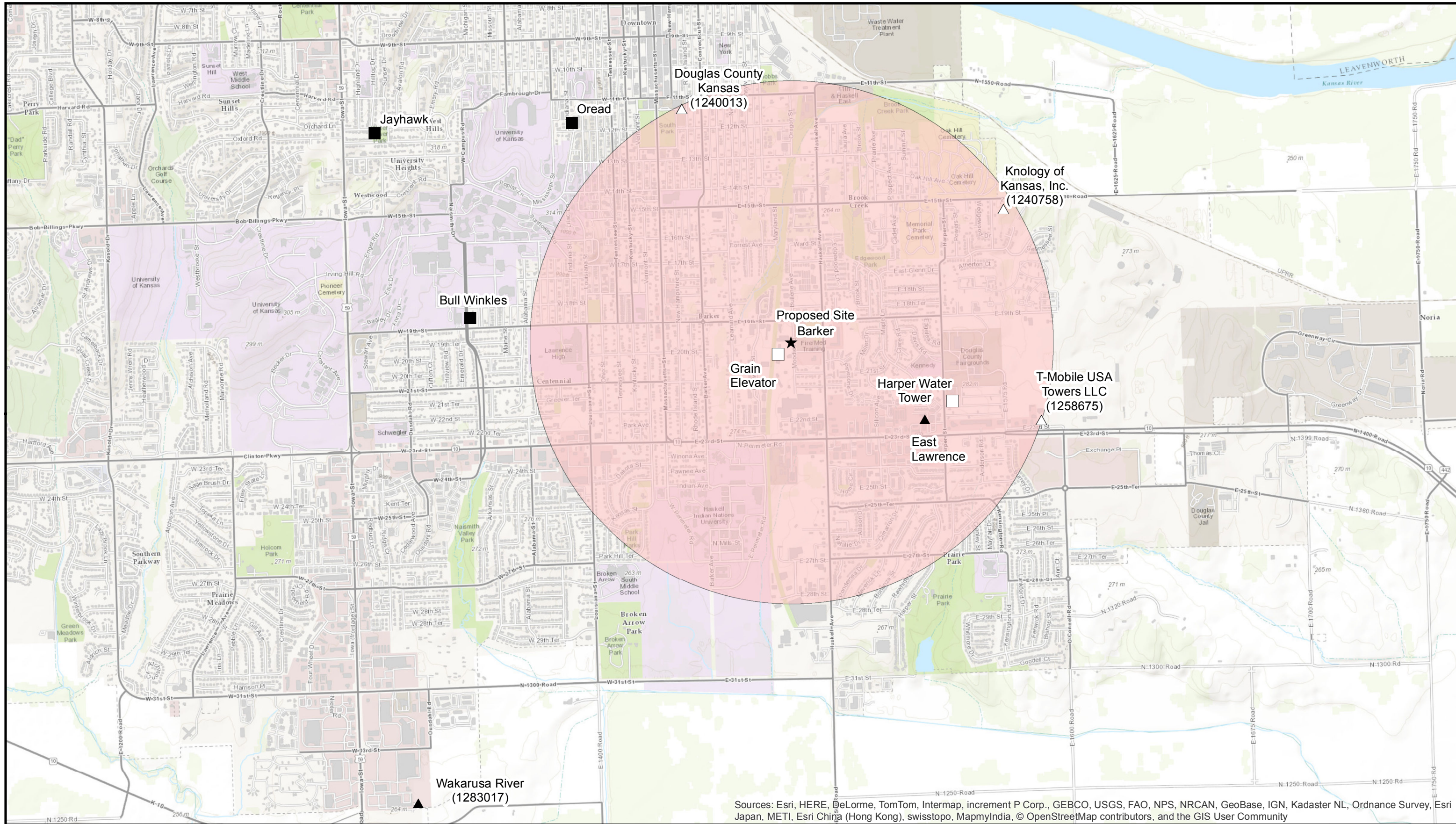
Findings

No existing telecommunications towers or structures are located within the geographic area required to meet the applicant's engineering requirements. The Burden of Proof required of the Applicant has been met as shown in Table 1. These findings are Burns & McDonnell's independent professional opinion based on our experience related to the propagation characteristics of the radio frequency bands proposed, our experience in the design and construction of similar radio facilities, and our observations of the site and the surrounding area.

Sincerely,



Matthew B. Olson, P.E.
 License KS20642
 Attachment A-Third Party Review LAWC Barker
 Attachment B-Photographs of Proposed Site and Other Structures



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Legend

- One-Mile Search Area
- Other Structure Occupied by Applicant
- Other Structure Not Occupied by Applicant
- Tower Not Occupied by Applicant
- Tower Occupied by Applicant
- Proposed Site

Attachment A
Third Party Review LAWC Barker
05/29/2015



Attachment B

Photographs of Proposed Site and Other Area Structures



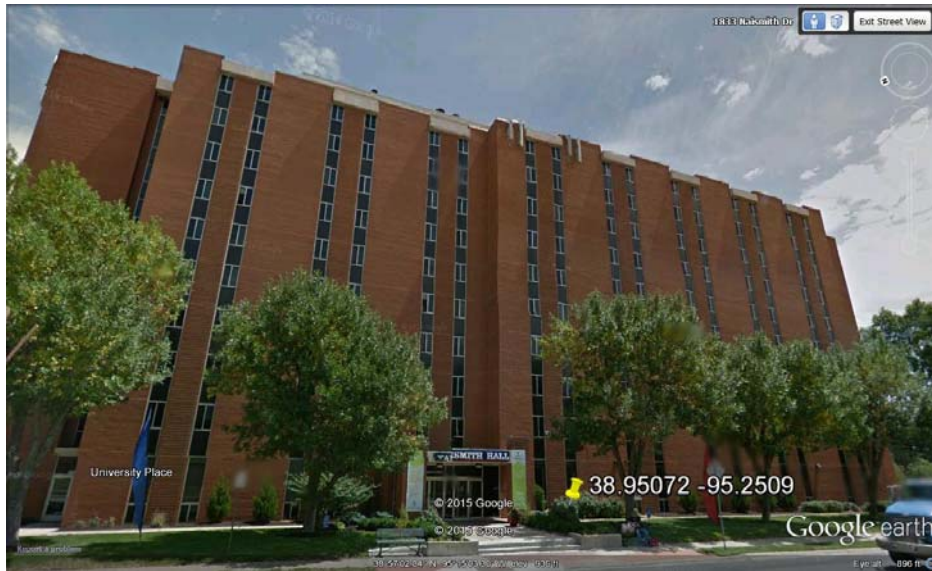
2001 Moodie Road, Lawrence, KS
Looking Northwest



2001 Moodie Road, Lawrence, KS
Looking West



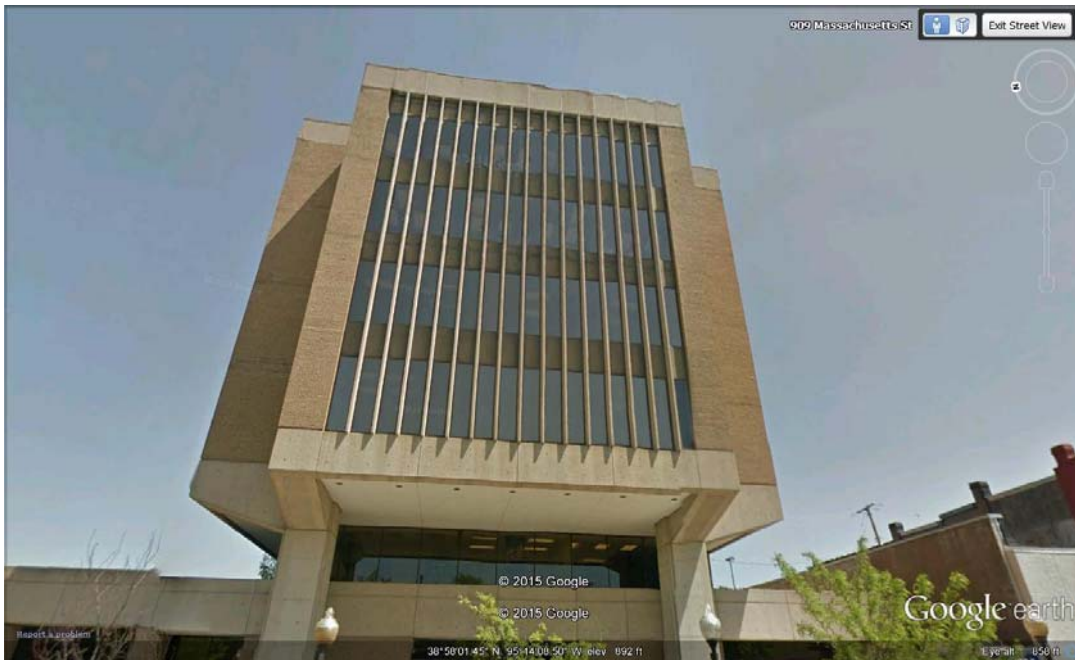
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Name: Wakarusa River



FCC Reg. No. 1240758
Owner: Knology of Kansas, Inc.



FCC Reg. No 1258675
Owner: T-Mobile USA Towers LLC



FCC Reg. No. 1240013
Owner Douglas County, KS



Grain Elevator on Moodie Road near Proposed Site
Owner: Ottawa COOP



Harper Water Tower