

I-435/I-35/K-10 Interchange Concept Study November 2009





I-435/I-35/K-10 Interchange Concept Study Draft July 2009



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Johnson County
City of Olathe
City of Lenexa
City of Overland Park



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Executive Summary

Nearly a quarter of a million people each day rely on the I-435/I-35/K-10 interchanges to enable them to move safely, efficiently and conveniently through Johnson County. Millions of dollars of goods move through this network everyday heading to nearby stores and businesses that make Johnson County an economic powerhouse benefiting all Kansans. Growing congestion, however, threatens the ability of the interchanges to provide the kind of safe and timely travel that best serves the transportation and economic development needs of the region and the state. As a result, the Kansas Department of Transportation (KDOT) in conjunction with its local partners of Lenexa, Olathe, Overland Park, Johnson County, and the Mid-America Regional Council (MARC) have embarked upon a study to determine what improvements should be made to safely handle future traffic demands and to support economic development.

Purpose of the Study

The purpose of this study is to develop an ultimate interchange concept which addresses traffic congestion and can be implemented in phases supporting both economic development and quality of life. Due to the anticipated increase in the movement of people and freight in and through the interchange area, the study will consider a range of multimodal approaches to meet current and future transportation needs through the year 2040. The study will respond to these needs in a cost effective manner that improves safety, mobility, and access.

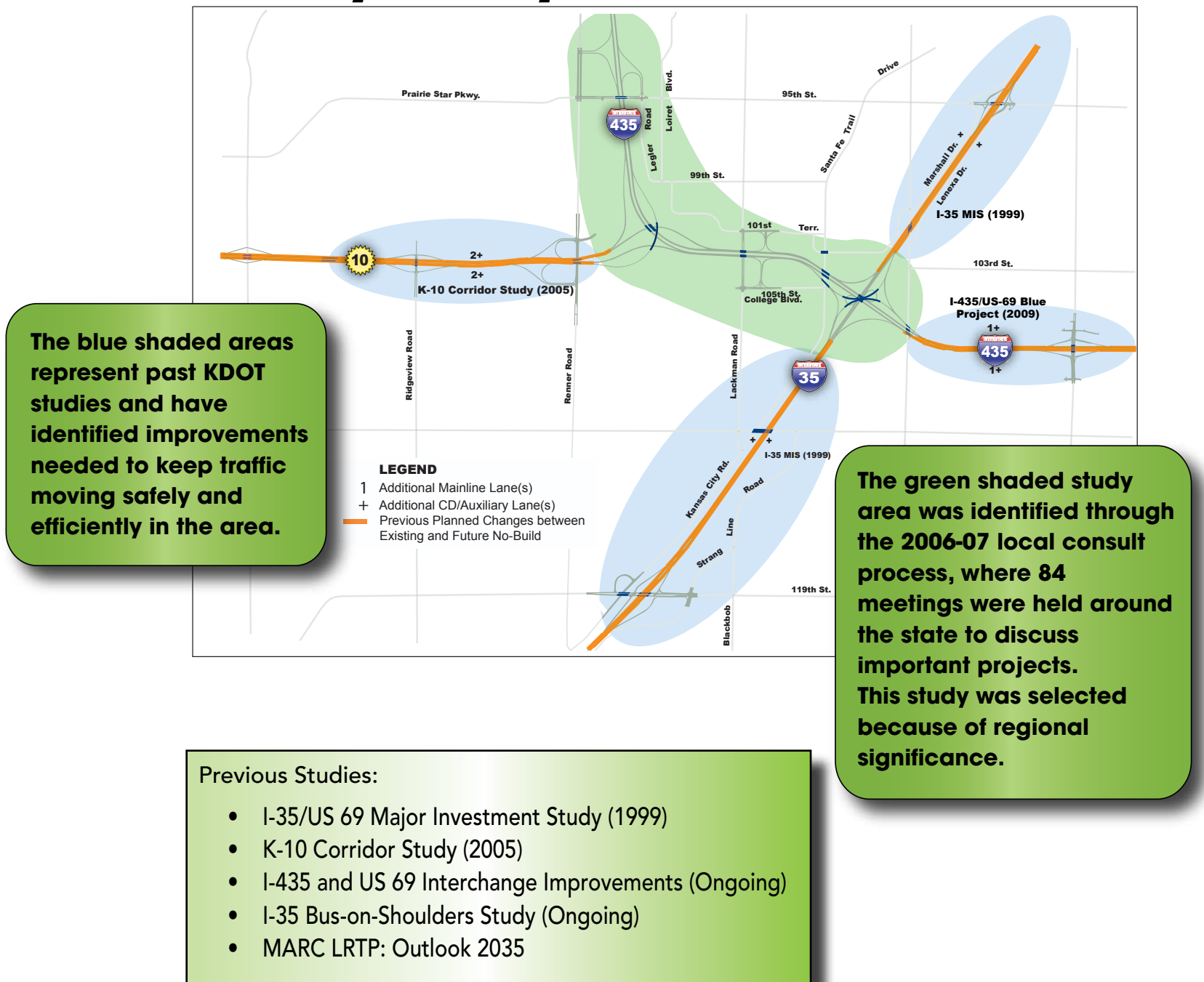
Why Study This Area Now?

Past KDOT studies have identified improvements within corridors leading to the I-435/I-35/K-10 study area. However, there has not been a study conducted to address the needs of the I-435/I-35/K-10 study area itself. The I-435/I-35/K-10 study area was also identified as one of eight priority projects through KDOT's 2006-2007 local consult process. The process consisted of 84 meetings around the state designed to listen to local and regional transportation needs. Due to the magnitude of the anticipated projects, KDOT decided to begin Preliminary Engineering (PE) activities immediately, even though no Right-of-Way acquisition or construction funds have been allocated. KDOT will then be in a position to begin construction as funds become available.

New Name for the Interchange

Given the complex nature of all the interchanges included in the study area, KDOT decided the I-435/I-35/K-10 Interchange Concept Study should be given a new more identifiable name. The name "Johnson County Gateway" was selected because of its regional significance and because many of the major highways serving southern and western Johnson County pass through the interchange area. Therefore, the I-435/I-35/K-10 Interchange Concept Study will also be referred to in this report as the Johnson County Gateway.

Why study this area now?



Regional Study

The I-435/I-35/K-10 Interchange Concept Study is divided into three phases. Phase 1 - Regional study will evaluate the existing and future conditions of the intersection of the I-435, I-35 and K-10 corridors in Johnson County from a regional and local perspective, Phase 2 will develop an ultimate concept for the interchange and Phase 3 will identify a phasing plan for construction.

The purpose of the Phase 1 Regional Study was to (1) better understand the existing conditions of the interchange and determine areas for improvement, (2) better understand the influence of regional and localized traffic generators on the interchange, (3) better understand future traffic levels and travel patterns, and (4) develop a simulation model within the immediate limits of the proposed interchange area. This model will be used to evaluate both the existing and future no-build conditions as well as the future build condition with the ultimate concept.

The following bullets summarize the existing conditions.

- With the exception of bridge surface maintenance, the bridges within the interchange area are in good condition.
- Most of the roadway pavement has experienced significant rehabilitation in recent years with pavement patching and overlays. Despite this rehabilitation, very little remaining service life is left in the pavement.
- Sections of the interchange area do not meet current design criteria. This includes several horizontal curves, ramp acceleration/deceleration lengths, weave distances and local service interchanges in close proximity to system interchanges.
- 230,000 drivers use the interchange every day.
- Severe congestion levels exist in both the AM and PM peak hours on portions of the I-435, I-35 and K-10 corridors. Today, 20 percent of the interchange is congested. A drive through the interchange that should take 3 minutes actually takes, on average, 4 minutes due to congestion.
- The K-10 and I-435 highway crash rates are higher than the Kansas statewide average for similar facilities. The highest density of crashes occurs on I-435 from K-10 to Quivira. Rear end crashes are the most prevalent crash type.
- Transit plays an important role in the interchange area. Johnson County Transit operates a number of fixed route and flexible route (paratransit) services through the interchange.
- The SCOUT system is operated in part of the interchange area.
- Ramp metering service will be added in November 2009, to I-435 just east of the study area.

The following bullets summarize the future no-build conditions.

- Regional historical growth patterns have shown a southerly and westerly development pattern along the I-35 and K-10 corridors. This growth pattern is expected to continue in the future. See Figures 20 through 21.
- Regional traffic generators surround the study interchange and rely on the interchange area for access to the interstate system.
- 360,000 drivers are expected to use the interchange by 2040.
- Severe congested conditions are expected to occur in much of the AM and PM peak hours on portions of the I-435, I-35 and K-10 corridors. By 2040, 50 percent of the interchange is expected to be congested. A typical drive through the interchange that should take 3 minutes in uncongested conditions is expected to take 16 minutes at the peak hour by 2040.
- As traffic demand and congestion increase, the number of crashes is also expected to increase.

In order to meet local, regional and statewide needs, KDOT will look to the public for feedback regarding the interchanges. Input received throughout the study process will augment the technical analysis and help the transportation planners and engineers develop recommendations to meet current and future transportation needs. Regional Study activities included:

- Community Interviews were conducted with transportation stakeholders, area businesses and interested citizens. The top three issues identified were:
 1. Safety—improving access to I-35 ramps and reducing congestion delays
 2. Funding
 3. Construction delays and management
- An Advisory Group (AG) was established to provide insight on key issues throughout the study. The AG met two times during the Regional Study.
- A web site (www.jocogateway.com) and project blog were launched in February 2009 to provide information and on-going updates about the study.
- Two online surveys were conducted. Survey 1—Interchange Use and Survey 2-Alternative Transportation Solutions.
- A public meeting was held to present the regional study information on May 14, 2009. Approximately 50 people attended.

1.0 Introduction

1.1 Study Background

The I-435/I-35/K-10 Interchange Concept Study will (1) evaluate the existing and future conditions of the intersection of the I-435, I-35 and K-10 corridors in Johnson County from a regional and local perspective, (2) develop an ultimate concept for the interchange and (3) identify a phasing plan for construction. The project is therefore divided into three study phases as described below.

Phase 1 - Regional Study: The purpose of this phase was to develop a simulation model within the immediate limits of the proposed interchange area and to better understand (1) the existing physical and operational conditions of the interchange, (2) the influence of regional and localized traffic generators on the interchange, and (3) the future no-build traffic levels and travel patterns. The Regional Study was used to evaluate both the existing and future no-build conditions. The Regional Study simulation model will be used later in the Concept Study to evaluate the future condition with the ultimate concept.

Phase 2 – Ultimate Concept: The next step will be to develop an Ultimate Concept for the interchange. The preferred concept will accommodate 2040 build traffic levels as determined through an AM and PM VISSIM traffic model operational analysis. The concept will also include the following engineering activities:

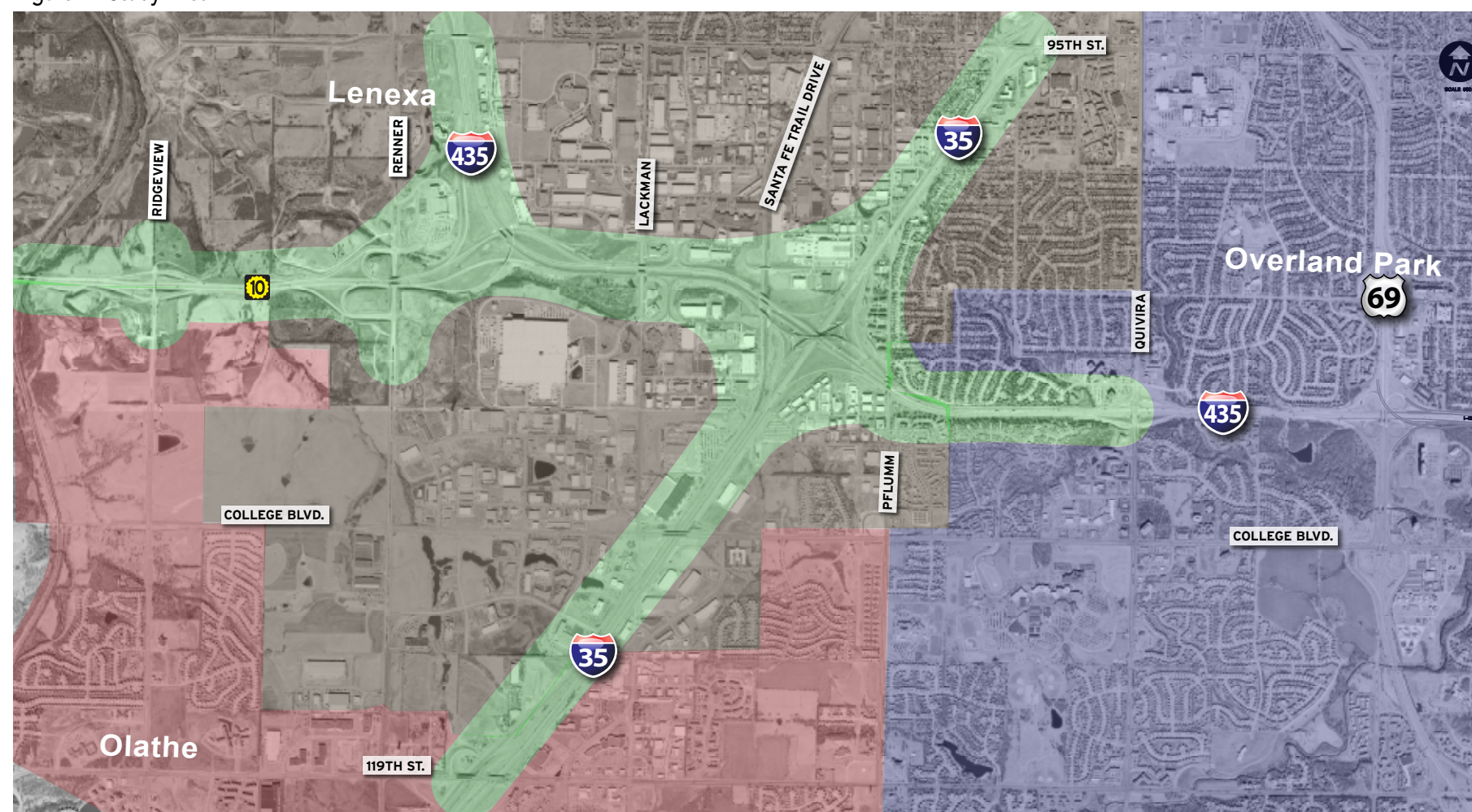
- Preliminary typical sections/design criteria
- Conceptual horizontal/vertical geometrics (referenced to existing baseline information collected through minimal surveys and as-built information)
- Conceptual guide sign layout
- Conceptual bridge and wall locations/types
- Evaluation of major watershed crossings and localized detention areas
- Preliminary grading/right-of-way needs
- General constructability/maintenance of traffic
- Environmental investigations
- Geological investigations
- Conceptual ITS/ramp metering managed lanes/Bus on Shoulder accommodation
- Identification of major utilities
- Railroad coordination
- Cost estimates

Phase 3 – Phasing Plan: The purpose of this phase will be to identify and prioritize phased construction projects, which will, over a period of time, lead to the construction of the ultimate concept. This phase will also identify interim projects. These projects are smaller improvements designed to solve specific, local problems in the short-term but are consistent with the larger, long-term solutions that are part of the ultimate layout.

1.2 Study Area

The primary study limits of the interchange are shown in Figure 1. The shaded area represents the boundary of the highway study area. Adjacent arterial roads that connect to the highway are also part of the study.

Figure 1 - Study Area



2.0 Traffic Forecast

2.1 Data Collection

Data collected from the study partners was used in the Regional Study. Table 1 shows the data collected and its intended use in the Regional Study.

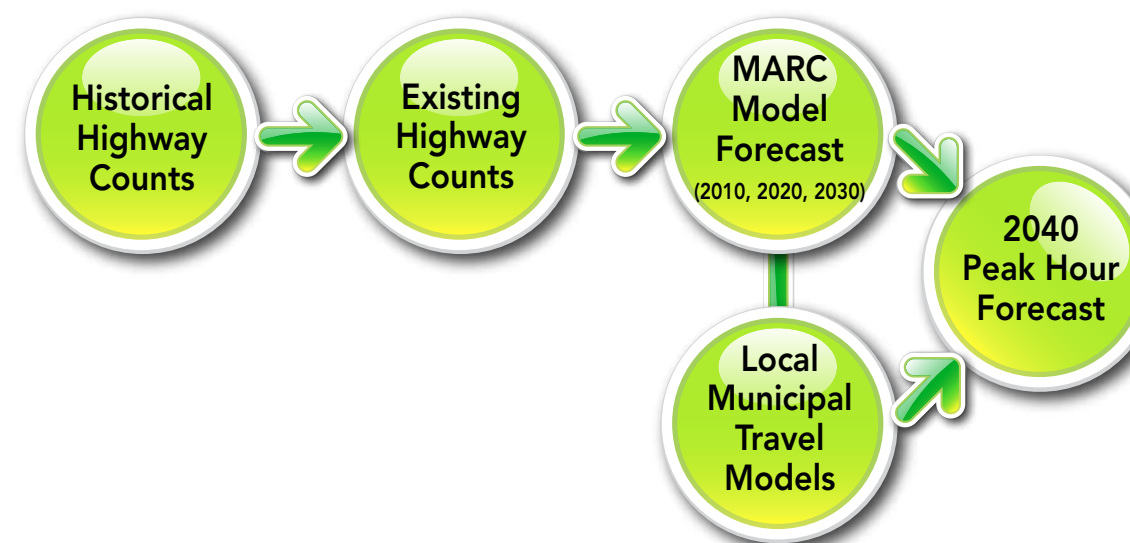
Table 1 - Data Collection

Data	Source	Data Use
Development Plans	Municipalities	Understanding of economic growth patterns in the study area
Regional Traffic Generators	Municipalities	Understanding of regional traffic generation not currently included in the MARC planning model
Crash Data	KDOT	Analysis of safety conditions
Existing Traffic	KDOT	Understanding of existing traffic demand
KC SCOUT Data	KC SCOUT	Traffic counts and speed data
Travel Time Data	HNTB	Travel time and speeds for simulation model calibration
Origin-Destination Data	Alliance	Understanding of travel characteristics
Field Observations	HNTB	Confirmation of traffic conditions for simulation model calibration
Socio-Economic Data	MARC	Understanding of historical and future changes in population and employment in Johnson County
Transit Data	Johnson County Transit	Understanding of transit usage in the study area
Pavement and Bridge Condition Reports	KDOT	Evaluation of the existing conditions and remaining service life of the pavement and bridges within the study area
As-Built Plans	KDOT	Compare existing vertical and horizontal geometry of the interchange area with current design criteria.

2.2 Traffic Forecast

Traffic in the study area was forecast to a 2040 design year. The traffic forecast methodology is the same design year and methodology that was used for the I-435 and US-69 Project traffic forecast (KDOT Proj. No 69-46 K-8251-05). The methodology for developing the forecasted traffic is shown in Figure 2. The MARC regional model was used to develop the freeway traffic and the local community (Lenexa, Olathe and Overland Park) travel models were used to develop the local arterial interchange traffic volumes.

Figure 2 -Traffic Forecast Methodology



2.3 Traffic Analysis

A VISSIM (version 5.0) microscopic traffic simulation model was built to analyze the study area transportation network. Existing and future traffic forecasts combined with origin-destination data were the primary inputs into the VISSIM model. Calibration of the model was performed by utilizing travel time runs in both the peak and off-peak direction during the AM and PM peak hours as well as SCOUT data. SCOUT is the regional intelligent transportation system sponsored by the Kansas Department of Transportation and Missouri Department of Transportation. Field observations were used to analyze vehicle queues and congestion. The VISSIM model was used to extract Highway Capacity Manual equivalent information related to the freeway mainline, merge and diverge conditions and arterial street operations around the interchanges.