Joplin West Corridor Purpose and Need Study

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Executive Summary
Joplin West Corridor Purpose and Need Study

Introduction

Joplin, Missouri is located in southwest Missouri in the "four-states" region encompassing Missouri, Oklahoma, Kansas, and Arkansas. Located at the edge of the Ozark Mountain region, Joplin has a current population of approximately 50,000. The daytime population is roughly 270,000, making it one of Missouri's largest metropolitan areas. As part of their on-going efforts, Joplin is actively pursuing the continued vitality of the region.

As the largest metropolitan area in the four-state region, the Missouri Department of Transportation (MoDOT), the city of Joplin, and the Joplin Area Transportation Study Organization (JATSO) have cooperatively undertaken this purpose and need study to investigate the transportation needs of western Joplin.

Why We Are Studying Western Joplin?

Joplin is actively engaged in transportation planning to create a system where access patterns support community goals. Among the region's goals are to:

- Provide for the development of an efficient and safe transportation system for the movement of people and goods.
- Provide a transportation system that enhances economic vitality in the Joplin area.
- Provide for a balanced transportation system that provides a choice of travel modes for different individuals and activities.
- Provide for a more vibrant, more pedestrian-friendly downtown.

In accordance with these goals, the Joplin Metropolitan Area Long Range Transportation Plan[1] (LRTP) includes a new corridor on the west side of Joplin. This western corridor is identified as a 16-mile limited access highway on new alignment between Route 171 and I-44. The West Joplin Purpose and Need Study will investigate the transportation issues that affect western Joplin, evaluate the benefits of a new western corridor and identify the evaluation criteria that will be important for determining how well alternatives will address the identified transportation issues.

How We Are Studying Western Joplin?

A purpose and need study is considered a "Pre-NEPA" document. It is unique because it doesn't investigate specific solutions, but rather focuses on issues and how to properly consider those issues. In this case, the transportation issues associated with western Joplin will be considered within the context of a new western corridor. The major elements of the Joplin West Corridor Purpose and Need Study include:

- The investigation of community and economic development trends.
- The creation of a traffic model to predict changes in traffic volumes and pathways.
- The investigation of changes in level of service.
- The analysis of crash rates in western Joplin.
- The review of existing roadway

[1] The LRTP serves as the "blueprint" for the Joplin metropolitan area's transportation system through the year 2025.

conditions and configurations.

- The evaluation of multimodal connectivity.
- The development/implementation of a public involvement plan to engage stakeholders.

What are the Issues Facing Western Joplin?

The Joplin West Corridor Purpose and Need Study identified the following purpose and need elements:

1) A western corridor is critical to accommodating the economic development, population growth, and land use changes projected for Joplin.

2) The lack of a western corridor affects the safety and operation of the region's other north/south corridors.

3) A western corridor will benefit multi-modal connectivity in Joplin.

Important Travel Trends in Western Joplin

The important travel trends uncovered by the traffic modeling efforts include:

- Without a western corridor, the total annual detour miles traveled by the through trips entering Joplin at Route 171 and exiting the region at I-44 and Route 66 could exceed 687,000 miles annually. The economic impact due to lost productivity at just these locations could be as high as 17,000 hours per year, roughly 2,100 work days.
- Without an appropriate western pathway, eastern Joplin will continue to experience growth and this in turn will result in disproportionately higher traffic along the region's major eastern north/south corridors. *For example, without a western corridor, traffic volumes on portions of Main Street will increase 30 percent over existing conditions.*
- Without a new western corridor, truck traffic will increase on the local road system which will negatively impact economic development in Joplin due to increased congestion and travel times.
- A western corridor will foster additional economic development and improved mobility in the Joplin area. *For example, roughly 50 percent of the corridor-related trips on Route 66 are expected to be on non-casino trips.*
- Without a western corridor, traffic on the existing (local) roadways would increase substantially - more than doubling in some cases.

Next Steps

One thing that a purpose and need study does not do is examine specific alternatives. With the transportation issues confronting the region well established, it is now appropriate for decision-makers to move forward with the development and evaluation of specific solutions (configurations/alternatives) to address these issues.

The technical data collected in the purpose and need study will form the basis to evaluate which solutions are superior. The typical progression is from conceptual alternatives (*typically broad and non-specific solutions*) to reasonable alternatives (*specific solutions that clearly satisfy the project's purpose and need*) to the preferred alternative (*the solution that best accomplishes the purpose and need while avoiding, minimizing, or mitigating impacts*). At each step, more detailed data is available to assist in the decision-making process. Within this process, public involvement and stakeholder involvement is vital. It allows MoDOT, and its partners, to better understand the needs, goals, and desires of those most closely affected by the project.

Section A: Project Purpose and Background

1. Project Purpose

The Missouri Department of Transportation (MoDOT), the city of Joplin, and the Joplin Area Transportation Study Organization (JATSO) have cooperatively undertaken the development of this Joplin West Corridor Purpose and Need Study.

The regional transportation planning process has revealed that development trends in western Joplin will be inadequate to support future community goals and needs. This has resulted in the inclusion of a new alignment north/south corridor in western Joplin into the Joplin Metropolitan Area Long-Range Transportation Plan (LRTP). This western corridor is identified as a 16-mile limited access highway on new alignment between Route 171 and Interstate Route 44 (I-44). The Joplin West Corridor Purpose and Need Study team will investigate the transportation issues that affect western Joplin, evaluate the benefits of a new western corridor, and identify the evaluation criteria that will be important for determining how well alternatives will address the identified transportation issues.

2. Study Area

Joplin, Missouri is located in southwestern Missouri in the "four-states" region encompassing Missouri, Oklahoma, Kansas, and Arkansas. The Joplin West Corridor Purpose and Need Study utilized a *study area* that included the entirety of Newton and Jasper Counties. This large study area was necessary to encompass all data that would affect the project's focus area. Since the focus of this project is the transportation problems affecting western Joplin, the area of concern will primarily include the area west of Route 43/Main Street, east of Galena, Kansas, North of I-44, and south of Carl Junction. **Figure A-1** and **Exhibit A-1** in **Appendix A** are general depictions of the area addressed in this report.

The Joplin area generally has three principal north/south and three principal east/west roadway travel corridors. These corridors form the backbone of the region's transportation system.

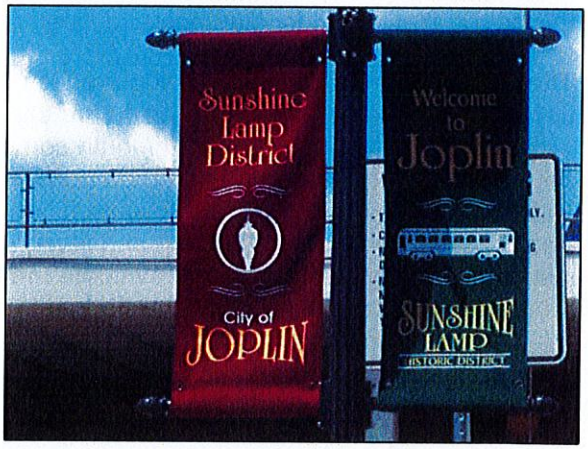
FIGURE A-1
General Vicinty Map



a. Principal North/South Corridors in Joplin

The major north/south corridors in Joplin, from west to east are as follows:

- Main Street/Loop 44/Route 43 (Main Street)
- Range Line Road/Business Route 71 (BR-71)
- US Route 71/Route 249 (Route 249)



The Sunshine District is centered on Main Street

Main Street is the area's original north/south arterial and the westernmost major north/south corridor. It provides the shortest route between the Joplin Regional Airport (to the north) and I-44 (to the south). Nearly all major civic and community assets are located along Main Street. Downtown Joplin is centered on and bisected by Main Street. The historic Sunshine Lamp District is also along Main Street. The configuration of Main Street varies widely from four-lane divided (grass median) sections to the south, five-lane urban sections through downtown, and two-lane highways to the north. Posted speed limits also vary (from 25 to 45 miles per hour [mph]). Signalized intersections are numerous. The parts of Main Street between Route FF (32nd Street) and Murphy Boulevard are maintained by Joplin, and the balance is under MoDOT jurisdiction.

The BR-71 corridor is located approximately 3.5 miles to the east of Main Street. This corridor supports a newer generation of typical suburban roadside commercial development—big box outlets, strip malls, and various restaurants. Miscellaneous capacity enhancements have occurred as the result of the growth of the city eastward. The typical configuration is a modern five-lane section with posted speed limits of 35 to 45 mph.


View of the BR-71/Route FF Intersection

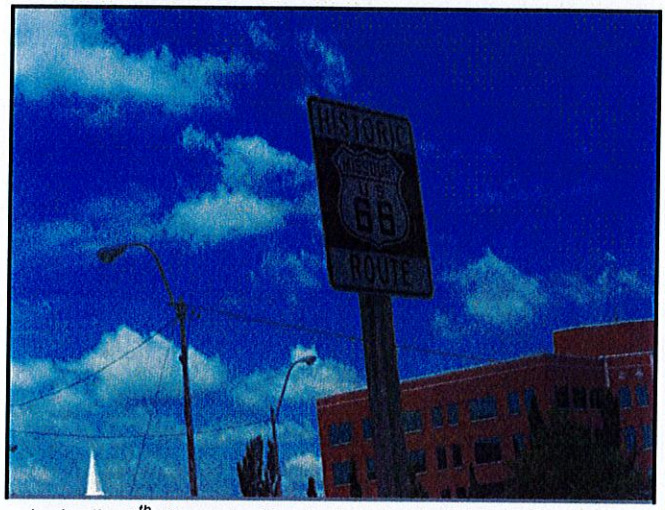
Route 249 has recently been completed and is approximately 5 miles east of downtown Joplin. The typical configuration is a four-lane highway, with a center-grassed median. Directional interchanges exist at the termini: Route 171 and I-44. Diamond interchanges exist at Route AA/Zora, Route TT/Newman, and 7th Street/Route 66.

b. Principal East/West Corridors in Joplin

The major east/west corridors in Joplin, from north to south are as follows:

- Route 171
- Route 66/7th Street
- Interstate Route 44[1]

Route 171 is the northernmost highway in Joplin. It is the major commuter corridor between Joplin and Pittsburg, Kansas. Pittsburg is a small city approximately 25 miles from Joplin. It is the home of the Pittsburg State University and the most populous city in Crawford County. Through Joplin, Route 171 is the city's northern tier, connecting Carl Junction, the Joplin Regional Airport, Webb City, and Route 249/Business Route 71. From Carl Junction to the airport, Route 171 is primarily a two-lane roadway, which transitions to a multilane highway from that point to the northeast.



In Joplin, 7th Street is also designated as Historic Route 66.

Route 66 is the area's original east/west arterial. The intersection of Main Street and Route 66 (7th Street) is the figurative heart of Joplin. One of the original federal routes, Route 66, was established on November 11, 1926 and originally ran from Chicago to Los Angeles. Route 66 underwent many improvements and realignments over its lifetime. Ultimately it was decommissioned on June 27, 1985 and replaced by the interstate highway system. Nevertheless, the roadway had become ingrained into the psyche of the nation. In Joplin, configuration of Route 66 varies between two-lane rural highway and four- and five-lane urban sections.

Parts of Route 66 have been designated as National Scenic Byway. In Missouri, upwards of 300 miles of old Route 66 remains. On July 10, 1990, the Governor of Missouri signed House Bill 1629 designating Route 66 as a historic highway in Missouri and allowing MoDOT to post appropriate signs along the right-of-way. This joint project between MoDOT and the Route 66 Association of Missouri resulted in the installation of Historic Route 66 signs along the entire length of Historic Route 66 in Missouri. Another joint effort between MoDOT and the Route 66 Association of Missouri including the installation of directional signs and arrows at strategic places to assist the traveling public with navigating Route 66 in Missouri[2].

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[1] Route FF/32nd Street roughly parallels I-44 and is also an important local east/west roadway. It is also roughly the boundary between Newton and Jasper Counties.

[2] While largely a volunteer effort, Route 66 casts a large economic footprint — mostly through the tourism. The Route 66 News lists 46 separate events (festivals/rallies/car shows) for 2008. Additionally, the road serves a quasi-pilgrimage route for antique car enthusiasts and those nostalgic for mid-20th century America. Along the way, visitors will find hotels, restaurants, museums, and other attractions. While the "dollars and cents" benefits of this type of heritage tourism are difficult to quantify, tourism is a powerful economic development tool. Tourism creates jobs, provides new business opportunities, and strengthens local economies. Cultural heritage tourism can have a tremendous economic impact on local economies. In addition to economic benefits like new businesses, jobs, and higher property values, tourism adds less tangible—but equally important—payoffs. A well-managed tourism program improves the quality of life as residents take advantage of the services and attractions that tourism adds. It promotes community pride, which grows as people work together to develop a thriving tourist industry.

In Jasper and Newton Counties, I-44 is a four-lane divided highway. There are interchanges at US-166/US-400 (Exit 1), Route 43 (Exit 4), Main Street (Exit 6), BR-71 (Exit 8), US-71/Route 249 (Exit 11), US-71 (Exit 18), 100th Street in Parshley (Exit 22), Route 37 (Exit 26), and Route U (Exit 29).

3. Summary of Work Plan

A purpose and need study is generally considered a "Pre-NEPA" (National Environmental Policy Act) document. It is intended as an investigation of transportation problems, rather than an evaluation of solutions. The definition of problems will allow for informed decision-making.

The specific goals of the Joplin West Corridor Purpose and Need Study are to investigate the transportation issues that affect western Joplin, evaluate the benefits of a new western corridor, and identify the evaluation criteria that will be important for determining how well alternatives will address the identified transportation issues. To accomplish these goals, the following activities were determined necessary during the development of the project's work plan:

- Investigate the goals of regional planning efforts.
- Develop a traffic model to predict changes in traffic volumes and pathways.
- Investigate changes in levels of service.
- Analyze crash rate trends in western Joplin.
- Review existing roadway conditions and configurations.
- Draft project design standards.
- Conduct an environmental screening.
- Evaluate the area's multimodal connectivity needs.
- Develop/implement a public involvement plan to engage stakeholders.

A summary of the work conducted to accomplish these work plan goals is detailed below.

a. Public Involvement Plan

To effectively utilize stakeholder input, a Public Involvement Plan developed in accordance with FHWA guidance was implemented for the Joplin West Corridor Purpose and Need Study. The purpose of public involvement is to share information and solicit ideas to develop the best possible approach to a project.

The key elements of this project's Public Involvement Plan included the establishment of a collaborative project team of MoDOT, the city of Joplin, and JATSO. These entities worked cooperatively throughout the project and conducted biweekly progress meetings. The project team participated with data collection, research, establishment of community goals, and model development. This level of involvement allowed for a high level of awareness within each member organization. Another component of the Public Involvement Plan was the identification of important stakeholders to develop a dialog with these individuals/groups. This approach yielded important data and general expressions of support. The final major element of the Public Involvement Plan was the team's commitment to be available to all interested governmental agencies in venues open to the public.

Appendix B contains all important outreach materials, including a summary of the public involvement plan, outreach letters, news coverage, a summary of stakeholder input, and drafts of project-related presentations.

b. Review of Regional Transportation Planning

The inclusion of a western corridor into the LRTP is the result of a long-term trend in the planning process that guides the development of the Joplin Metropolitan Area. There are several key research efforts that form the bedrock for investigating the transportation-related conditions affecting Joplin; such as:

- The I-44 Purpose and Need Statement
- The City of Joplin Comprehensive Development Plan Update
- The Joplin Downtown Revitalization Plan
- The 2007 Regional Origin and Destination (O/D) Survey
- The Joplin Metropolitan Area Long-Range Transportation Plan

Appendix C contains a summary of these efforts, with a specific emphasis on how western Joplin may be potentially affected.

c. Development of Design Guidelines

An important element to consider early in the purpose and need process is the definition of appropriate design guidelines for the project. Design guidelines include components such as design speed, intersection/interchange spacing, right-of-way width, and horizontal and vertical curvature limits.

The draft Design Guidelines are contained in **Appendix C.**

The guidelines for the Joplin West Corridor were developed using the guidance for Practical Design and the latest accepted MoDOT practices. The expected project design year will be 2035.

d. Environmental Screening

MoDOT policy requires that a Request for Environmental Services (RES) be prepared at each project development milestone.

The RES process ensures that the necessary information for approvals and clearances from the Federal Highway Administration (FHWA) and environmental resource agencies are obtained. During the RES process, MoDOT staff examines the project and determines what environmental or historic preservation concerns, if any, are associated with the project. The goal of this process is to ensure project compliance with state and federal regulations thus preventing project delays or stoppages.

The RES for Initial Screening Stage of the Joplin West Purpose and Need Study is contained in **Appendix C.**

e. Traffic Modeling for the Joplin West Corridor Purpose and Need Study

To predict changes in traffic volumes and pathways, the project team used a traffic modeling approach that incorporated the two usable travel models which include the Joplin region.

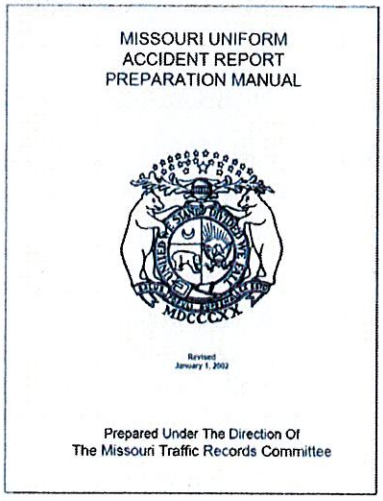
The first model is the Joplin model developed in the late 1990s. It is based on the quick response methods (documented in National Cooperative Highway Research Program [NCHRP] 185/365) and implemented using QRS II® software. For this project, model roadway networks developed for this model have already been converted from QRS II® to Transcad® format. This represents the Joplin area in detail and is comprised of about 200 traffic analysis zones. **Exhibit A-4** shows the traffic area zones (TAZs) network. Networks are generally detailed to the minor arterial level and also represent significant collector facilities.

The second model is the Missouri statewide traffic model. It was developed as a statewide planning tool with a network and zone system representing the entire state of Missouri. This model executes on the Transcad® software platform and includes both a process and data management interface to simplify model execution for the user. While the statewide model is a newer effort, it is cumbersome because of the scale of the network, the number of zones, and its reliance on statewide calibration.

The traffic modeling approach for the Joplin West Corridor Purpose and Need Study was to create a subarea model within the statewide model by isolating Joplin. This required the use of the cordon intercept data (from the 2007 Regional O/D Survey) to update the external movements. This approach allowed application of the statewide model framework to the Joplin subarea without substantive changes. It also allowed use of tools previously developed for the I-44 Purpose and Need Statement and other Transcad® based efforts.

This approach represents the best of both options because the model structure/ calibration of the statewide model is captured while retaining the focused nature of the city model. Because this application may be of continuing interest to MoDOT or local users, it is included in this report as **Appendix D.** The design year for the traffic projections is 2035.

f. Crash Rate Analysis


MISSOURI UNIFORM
ACCIDENT REPORT
PREPARATION MANUAL

Revised
January 1, 2002

Prepared Under The Direction Of
The Missouri Traffic Records Committee

To evaluate crash rates, the Missouri Uniform Accident Report Preparation Manual was used. The Missouri uniform accident report is often referred to as the crash report. The crash report contains information about the people involved in the crash, the road conditions, vehicle actions, etc. By knowing how the crash occurred, countermeasures can be implemented to prevent future crashes. Information available on a crash report that is typically important to review includes the following:

- Accident data and time
- Crash location
- Crash diagram
- Person information, i.e., use safety device, personal injury level, etc.
- Type of vehicles involved
- Vehicle's sequence of events

- Contributing circumstances
- Traffic control
- Roadway information, i.e., profile, alignment, pavement type, and so forth
- Weather condition at time of crash
- Brief narrative about events of the crash

MoDOT collects and collates this data for use in its projects. For the Joplin West Corridor Purpose and Need Study, crash data for the 5 years between 2003 and 2007 were collected and used.

g. Level of Service Analysis

To evaluate level of service (LOS), intersection LOS was evaluated for 2000 and 2035 with a western corridor, and 2035 without a western corridor.

LOS is a measure of a roadway's ability to handle traffic demand. The LOS methodology chosen for this analysis is the Intersection Capacity Utilization (ICU) method. This method is a simple tool that is ideal for planning applications and is not intended for operations or signal timing design. The ICU approach utilizes measures of the proportion of the reference cycle (assumed signal cycle) used by conflicting movements (e.g., through traffic and opposing left turns). This provides a measure of the total time available to accommodate all critical intersection movements and the ability of the intersection to meet expected traffic demand.). The LOS categories range from A to F in order of decreasing operational quality and are summarized in **Table A-1**.

A more complete description of the LOS analysis is contained in **Appendix E**.

4. Logical Termini and Independent Utility

FHWA regulations (23 CFR 771.111[f]) establish criteria for projects that require that an action evaluated in an environmental impact statement or finding of no significant impact shall include the following specifications:



Logical Termini (North): Route 171

- Route 171 is the major east/west corridor, north of Joplin.
- This area represents the northern extent of Joplin. Immediately to the west is Carl Junction. Immediately to the east is Webb City. In the northeastern quadrant of the Route 171/Route 43 intersection is the Joplin Regional Airport.

- Connect logical termini and be of sufficient length to address environmental matters on a broad scope. Logical termini is typically defined as connecting points with known features (land uses, economic areas, population concentrations, cross route locations, and so forth) at either end of a proposed transportation route that enhance good planning and serve to make the route useable. Logical termini are considered rational end points for a transportation improvement.
- Have independent utility or independent significance; that is, be usable and be a reasonable expenditure even if there are no additional transportation improvements in the area. A project is typically considered to have independent utility if it could be constructed absent

the construction of other projects in the area. Portions of a multiphase project that depend upon other phases of the project do not have independent utility.

- Allow consideration for alternatives for other reasonably foreseeable transportation improvements, such as organizing the project to force a new alignment solution at the expense of less extensive solutions such as major safety improvements or other local projects.



Logical Termini (South): Interstate Route 44

- Interstate Route 44 is the major east/west corridor, south of Joplin.
- Existing interchanges in this area include exit 1 (US Route 166/400), exit 4 (Route 43) and exit 6 (Route 43/Main Street).

Based on the assumptions described in this section, the logical termini proposed for the Joplin West Corridor Purpose and Need Study includes the major east/west corridors that bound Joplin. To the north, this is the Route 171. To the south, this is I-44 between Exits 1 and 6. Based on existing data, these termini should adequately comply with 23 CFR 771.111(f).

Section B: Elements of the Purpose and Need for a Joplin West Corridor

The main focus of a purpose and need study is to identify the transportation issues affecting the area of study. This section will examine the transportation issues associated with western Joplin within the context of a new western corridor. The Joplin West Corridor Joplin Purpose and Need Study identified the following purpose and need elements:

1) A western corridor is critical to accommodating the economic development, population growth, and land use changes projected for Joplin. The benefits of a western corridor can be characterized by:

- A western corridor will attract a substantial number of users.
- A western corridor will provide substantial improvement to the I-44 interchanges servicing Joplin.
- A western corridor will balance the Joplin transportation network.

2) A western corridor can improve the safety and operation of the region's transportation network. These improvements can be summarized as:

- A western corridor will improve the LOS at key intersections within the Joplin transportation network.
- A western corridor will increase the transportation system's total capacity and reduce inappropriate traffic on local roadways.
- A western corridor will divert traffic away from local roadways with designs that are not compatible with expected traffic demands.
- A western corridor will minimize circuitous travel through Joplin.

3) A western corridor will benefit multimodal connectivity in Joplin. These benefits can be summarized as:

- A western corridor will improve connectivity between the roadway and rail networks.
- A western corridor will improve connectivity between the roadway and air cargo networks.

1. A Western Corridor is Critical to Accommodating the Economic Development, Population Growth, and Land Use Changes Projected for Joplin

Based on the research conducted during the Joplin West Corridor Purpose and Need Study, it has been determined that a western corridor is critical for accommodating the economic development, population growth, and land use changes projected for Joplin. This chapter will examine these factors through the following elements:

- A western corridor will attract a substantial number of users.
- A western corridor will provide substantial improvement to the I-44 interchanges servicing Joplin.
- A western corridor will balance the Joplin transportation network.

a. A Western Corridor Will Attract a Substantial Number of Users

The development of southwest Joplin is a regional goal. All planning efforts are conducted with the intention of facilitating development. For example, the Joplin Comprehensive Plan identifies both commercial and industrial opportunity areas in southwestern Joplin. Opportunity areas are places where the creation of quality development is possible and are to be encouraged. The inclusion of a western corridor in the LRTP is another example of the region's desire to facilitate business, residential, and commercial growth in the area between Joplin and Kansas.

The development of southwest Joplin is underway. The Downstream Casino Resort is a $301 million Las Vegas-style destination resort that opened in July 2008. The operators expect the resort to employ 1,200 people and host 2 million visitors per year. Other near-term developments include projects such as the Wildwood Ranch. This is a planned unit development-type project. The low-density residential component has begun, and commercial, office, manufacturing, warehouses, hotels, and apartments are planned. Given its geographic location, Joplin is also a hub for the warehouse and freight industries. In 2008, *Expansion Solutions Magazine* recognized Joplin as a top-five pick in the warehousing/distribution sector. There are numerous large freight companies located in the area that provide logistics services. **Exhibit A-3** depicts many of the important developments in Joplin, such as the Downstream Casino and the Wildwood Ranch.

The travel demand model predicts that a western corridor will attract a substantial number of users. **Table B-1** provides a comparison of vehicular movements, from the north to the casino area. The current pathway to this area is considerably west of Joplin via US-166 and Kansas Route 26.

- US-166/US-400 is a two-lane highway with 12-foot lanes and 10-foot gravel shoulders in Missouri and 10-foot paved shoulders in Kansas. The posted speed limit is 55 mph. Near the casino, US-166/US Route 400 are coincident. They diverge in Kansas, with US-166 extending to the west toward Baxter Springs and Chetopa and US-400 proceeding north toward Pittsburg and Fort Scott.
- Kansas Route 26 is a two-lane highway with 12-foot lanes and 10-foot paved shoulders. The posted speed limit is 55 mph. Route 26 extends northward from US-166/US-400 to Route 66 in Galena, Kansas.

The base case used in the project's travel demand modeling assumes that the Downstream Casino is not yet open. The future condition projections are for 2035.

TABLE B-1

Two-Way ADTs on Northern Pathways in Southwestern Joplin

Pathway	Base Case ADT	2035 ADT without Western Corridor	2035 ADT with Western Corridor
US-166/US-400	2,410	2,944	2,944
Route 26	2,406	6,876	1,552
Typical/Default Western Corridor	N/A	N/A	10,104
Total	**4,816**	**9,820**	**14,600**

The balance of this section will evaluate how the west corridor is expected to affect vehicular movements in Joplin.

A Western Corridor Will Maximize Trips in Southwest Joplin
The number of vehicles coming to southwestern Joplin from the north is highest with a western corridor. The new west corridor will handle the vast majority of this traffic. The highest 2035 two-way average daily traffic (ADT) on the western corridor is predicted to be 10,104. Without a western corridor, 4,780 fewer vehicles per day are expected.

A Western Corridor Will Minimize Increases to Local Roadways
Existing local roadways were not meant to carry the high traffic volumes forecasted by the travel demand model. Many of the roadways in western Joplin already experience high crash rates relative to state averages for comparable roadways. Without a west corridor, daily traffic on the existing (local) roadways would more than double (9,820 is a 117 percent increase over the base case's 4,523). The extent of the increases on the local roadways (without a western corridor) varies by location. In general, the extent of the increases declines to the north, particularly north of Route 66.

A Western Corridor Will Concentrate Development in Missouri
Without a western corridor, Route 26 in Kansas will be a primary route to southwest Joplin. With a typical/default western corridor, it is assumed that all of the Route 26 traffic destined for the casino will use the new western corridor. The predicted 2035 daily volumes would roughly triple—from 2,113 to 6,876. Without improved pathways in Missouri, the economic development associated with large-scale generators, such as the casino, will accrue outside the state of Missouri.

b. A Western Corridor Will Provide Substantial Improvement to the I-44 Interchanges Servicing Joplin

Interstate 44 is vital to the mobility needs of Joplin. A large number of the trips with a destination of Joplin are routed via I-44. Many of the Joplin interchanges have safety, operation, and geometric deficiencies.

- Exit 1 is at the Missouri/Oklahoma border. US-166 begins and ends at the I-44 interchange. There are no southbound movements at this interchange.

- Exit 4 is a modified diamond interchange at Route 43 (southbound). Schifferdecker Avenue/Coyote Drive is the northbound connection into Joplin.
- Exit 6 is a diamond interchange at Route 43/Main Street.
- Exit 8 is a cloverleaf interchange at Business Route 71.
- Exit 11 is a partial cloverleaf, semi-directional interchange at Route 71 (south)/Route 249 (north).
- Exit 15 is a split diamond at Route 66. Exit 18 is a cloverleaf interchange at Route 71 (north).

The I-44 Purpose and Need Statement[1] reported that each of these interchanges have safety, operation, and geometric issues that negatively affect their function.

Any regional transportation project may positively or negatively affect I-44. The consequences of inefficiently utilizing the interchanges to I-44 can be expected to negatively affect community and economic development in Joplin. The balance of this section will provide an evaluation of how the Joplin West Corridor is expected to affect I-44.



I-44 is Vital to the Mobility Needs of Joplin

Many of the Joplin I-44 interchanges have safety, operation, and geometric issues. The consequences of inefficiently utilizing the interchanges to I-44 can be expected to negatively affect community and economic development.

Development in the southwestern Joplin is expected to increase the volumes of traffic coming from Joplin toward this area, negatively impacting the I-44 interchanges.

A western corridor will divert substantial amounts of traffic (15 percent), which would otherwise use I-44, to access southwest Joplin.

A Western Corridor Could Reduce Traffic on I-44 at Exit 1

Existing and planned large generators in southwestern Joplin have the potential to substantially increase traffic volumes on I-44 and its interchanges. This could result in negative impacts. Modeling indicates that a western corridor could substantially reduce the volume of traffic accessing southwestern Joplin through I-44.

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[1] In 2007, MoDOT committed to examining I-44 in a comprehensive way. The first product of the Improve I-44 program was a purpose and need statement — a document defining the magnitude of the transportation problems. See http://www.modot.org/i44planningforprogress. The I-44 Purpose and Need Statement evaluated each of the 78 interchanges on I-44 for safety, operation, and geometrics.

Relative to safety, a total crash rate analysis, a fatal crash rate analysis, and a crash location severity analysis were conducted on the 78 interchanges along I-44. For each analysis, criteria were established to identify interchanges that have particularly problematic safety performance. The analysis found that many of the interchanges exceeded one or more of these criteria. Of the 78 interchanges, 17 (22 percent) exceeded the established total crash rate criteria. 50 percent (39 interchanges) exceeded the established fatal crash rate criteria. Approximately 37 percent (29 interchanges) had crash hotspots. Only eight interchanges were found to exceed the crash-related criteria for all three criteria. This included several of the Joplin interchanges (Exit 6, Exit 8, and Exit 11).

Relative to operations, a LOS analysis was used to determine if a given facility will be able to adequately handle future traffic volumes. The analysis focused on weaving movements, ramp merge movements, and ramp diverge movements. In the base year (existing), most of the existing interchanges operated well, with only four ramps and two weaving segments operating at levels of service worse than the recommended thresholds. One of these locations was the eastbound weave at the US 71 North/Route 59 South cloverleaf (Exit 18). In the future (2035), numerous merge, diverge and weaving movements were found to operate at levels worse than the recommended thresholds. Exits 6, 8, and 18 had multiple problematic movements.

Relative to geometrics, the I-44 interchanges were evaluated against seven key design features (two relating to access management and five relating to horizontal and vertical geometry). Many interchanges have at least one geometric design deficiency. This is generally the result of evolving standards. The highest number of deficiencies encountered was four; one of these is Exit 4.

The travel demand model predicts substantial growth in traffic utilizing I-44 Exit 1. Traffic volumes at US-166 (from I-44) are expected to increase roughly 500 percent between the base case and 2035 (see **Table B-2**).

TABLE B-2

Two-Way ADTs on US-166 Immediately North of I-44

Base Case (Existing) ADT	2035 ADT without a Western Corridor	2035 ADT with a Western Corridor
3,603	22,160	19,318

The travel demand model also predicts that 15 percent more vehicles (2,842 per day) will use I-44, Exit 1, if a western corridor is unavailable. This demonstrates the positive effect of a western corridor on Joplin and I-44.

A Western Corridor Could Reduce Traffic at Other Joplin Interchanges of I-44
Not only do the re-routed vehicles provide relief (reducing the number of vehicles getting on and off I-44) for the Exit 1 interchange, it also provides relief for the other Joplin interchanges.

The interchanges that seemingly benefit the most from the travel pattern alterations associated with a western corridor are the interchanges at Exit 4 (Route 43 southbound), Exit 6 (Main Street), and Exit 8 (Business Route 71). **Table B-3** provides a summary of two-way ADTs on I-44.

TABLE B-3

Two-Way ADTs on I-44 Between the Joplin Interchanges

Between Interchanges	Base Case	2035 without a Western Corridor	2035 with a Western Corridor	Difference (Percent Difference)
1 and 4	31,136	49,283	45,916	3,367 (-6.8%)
4 and 6	40,784	56,386	53,138	3,248 (-5.8%)
6 and 8	44,262	50,526	50,811	285 (0.56%)
8 and 11	38,494	41,425	40,020	1,405 (-3.4%)

This represents thousands of fewer vehicles that will use I-44 interchanges if a western corridor is in place. It is assumed that these trips would have taken one of Joplin's major north/south corridors to access I-44 and from there, to the southwestern Joplin area. Removing these vehicles will benefit interchange operation, as well as operations along the respective north/south corridors.

c. A Western Corridor will Balance the Joplin Transportation Network

Major north/south transportation improvements in Joplin have been concentrated in the eastern half of the region. For example, Business Route 71 has been developed to its existing condition over the past 20 years. Recent improvements along Business Route 71 include the multiple lanes with coordinated signals and improved intersections. Route 249 has been recently

completed and represents a controlled access corridor between Route 171 and I-44 with interchanges at the major Joplin east/west corridors. This development represents the completion of the long-range vision for the areas to the east of Joplin. With this route complete, the long-range transportation planning process will be focused on the needs of western Joplin.

Without a western corridor, the expected traffic growth and planned alterations to traffic patterns will result in a situation where the increases in traffic along the major eastern north/south corridors will begin to exceed the expected levels, perhaps leading to degraded service. The travel demand modeling for Joplin's major north/south corridors is summarized in **Table B-4** The balance of this section will evaluate the specifics of how a western corridor will affect the balance of traffic among Joplin's major north/south corridors.

A Western Corridor Benefits Business Route 71

Overall, on a length-weighted corridor basis[2], a western corridor will reduce daily traffic volumes on Business Route 71 by more than 5 percent (26,800 vs. 28,350). Other benefits of a western corridor on Business Route 71 include:

- Between Route FF and I-44 as many as 33,530 vehicles per day are expected in 2035. A typical western corridor is expected to reduce these volumes by about 7 percent (31,280). While the operational efficiency of a complicated roadway like Business Route 71 is influenced by numerous individual movements, reducing total volumes on the busiest road in the system should generally be considered beneficial.
- Between Route 171 and Zora Street a typical western corridor is expected to reduce Business Route 71 traffic dramatically. In this area, the no-western corridor scenario is expected to produce nearly 20 percent more vehicles on Business Route 71 in 2035 (19,340 vs. 16,250).

A Western Corridor Affects Main Street

Traffic volumes on Main Street are influenced by several factors. For example, while truck and speed restrictions will tend to diminish use, growth and proximity will continue to attract users. On a weighted corridor basis, Main Street is expected to experience roughly 17 percent more vehicles in future; with or without a western corridor. On a segment basis, the impacts are more subtle and complex:

- Between Route 171 and Zora Street, the western corridor scenario is about 10 percent higher than the no-western corridor scenario (23,050 vs. 20,970). This seems to be the result of interplay between the western corridor and the increasingly important Zora corridor. The lack of restrictions on this part of Main Street may also be a factor. Overall, this result also seems to support the notion of economic development benefits of an additional major north/south corridor in Joplin.

Between Zora Street and Route 66, the western corridor scenario should experience reduced usage, becoming the lowest volume segment in the Main Street corridor (14,350). This is the expected result of the implementation of speed and truck restrictions.

[2] The corridor's ADT calculated by weighting the model generated ADTs in accordance with the length of the roadway represented.

TABLE B-4

Two-Way ADTs for Major North/South Corridors

Route 249			
	Existing	**Without Western Corridor (2035)**	**With Western Corridor (2035)**
Route 171 to Zora Street	N/A	10,950	11,030
Zora Street to Route 66	2,610	12,380	12,500
Route 66 to I-44	9,620	21,280	21,120
I-44 to Route FF	20,520	24,390	23,010
Corridor Weighted Average	**7,480**	**15,130**	**15,040**
Main Street			
	Existing	**Without Western Corridor (2035)**	**With Western Corridor (2035)**
Route 171 to Zora Street	18,740	20,970	23,050
Zora Street to Route 66	14,940	19,470	14,350
Route 66 to Route FF	15,210	19,580	17,520
Route FF to I-44	19,630	25,210	23,190
Corridor Weighted Average	**16,890**	**20,930**	**21,140**
Business Route 71			
	Existing	**Without Western Corridor (2035)**	**With Western Corridor (2035)**
Route 171 to Zora Street	22,020	19,340	16,250
Zora Street to Route 66	29,570	31,440	30,060
Route 66 to Route FF	27,080	32,710	32,740
Route FF to I-44	31,220	33,530	31,280
Corridor Weighted Average	**26,680**	**28,350**	**23,800**

2. A Western Corridor Can Improve the Safety and Operation of the Region's Transportation Network

Based on the research conducted during the Joplin West Corridor Purpose and Need Study, it has been determined that a western corridor will improve the safety and operational quality of traffic on Joplin's roadways. This chapter will examine this through the following elements:

- A western corridor will improve the LOS at key intersections within the Joplin transportation network.
- A western corridor will increase the transportation system's total capacity and reduce inappropriate traffic on local roadways.
- A western corridor will divert traffic away from local roadways with designs that are not compatible with traffic demands.
- A western corridor will minimize circuitous travel through Joplin.

a. A Western Corridor Will Improve the Level of Service (LOS) at Key Intersections Within the Joplin Transportation Network.

Traffic forecasting for the Joplin West Corridor Purpose and Need Study was completed using a TransCAD®-based travel demand forecasting model. The model is a tool used for link level analysis. The details of the nature and development of this model are contained in **Appendix D**. Model output was used to evaluate intersection LOS. A total of 70 important intersections were evaluated for existing LOS, 2035 LOS without a western corridor, and 2035 LOS with a western corridor.

The LOS methodology chosen for this analysis is the Intersection Capacity Utilization (ICU) method. The ICU approach provides a measure of the total time available to accommodate all critical intersection movements and the ability of the intersection to meet expected travel demand. This simple tool is appropriate for planning applications. The methodology, limitations, and results of the LOS analysis are contained in **Appendix E**.

The ICU methodology is related to the more common Highway Capacity Manual (HCM) methodology, but is a more appropriate tool for use in planning procedures where signal information is not available. While the HCM method is based on estimating delays for the intersection, the ICU method calculates a volume to capacity (V/C) ratio for all movements. Both the ICU and the HCM use the same saturated flow rates, lost time, and volume adjustments, thus generating comparable results. **Table B-5** summarizes the LOS metrics

TABLE B-5
Level of Service and Intersection Capacity Utilization

ICU	ICU Level of Service	Description
0 to 55%	A	The intersection has no congestion.
>55% to 64%	B	The intersection has very little congestion.
>64% to 73%	C	The intersection has no major congestion.
>73% to 82%	D	The intersection normally has no congestion, but occasionally has major congestion. Minor queues may occur, but are not expected.
>82% to 91%	E	The intersection is right on the verge of congested conditions. Moderate queues may be expected, but not continuous.
>91% to 100%	F	The intersection is over capacity and likely experiences congestion periods of 15 to 60 consecutive minutes. Moderate queues are common.

Overall, there are no existing intersections with major congestion (LOS E or worse). Modest congestion (LOS D) exists at only two intersections:

- South Main Street and East 7th Street
- Business Route 71 and East 20th Street

In the future, with or without a western corridor, only the intersection of South Main Street and East 7th Street is expected to experience major congestion, and the intersections of Business Route 71 with East 20th Street and East 7th Street are both expected to experience moderate congestion. A western corridor is not expected to have a significant effect on these intersections.



Overall, the LOS at the area's major intersections is good and not dramatically different amongst the alternatives considered (Existing/ Future /Future with a Western Corridor).

However, when the underlying metric (ICU) is considered a western corridor provides discernable improvements.

The balance of this section will evaluate the major findings of the LOS analysis, as they relate to the purpose and need of the Joplin West Corridor.

Overall, a Western Corridor Will Improve the System's ICU

In 2035, the ICU of the evaluated intersections is lower (improves) when a western corridor is in place. The average ICU of the evaluated intersections is as follows:

- Existing: 40 percent
- 2035 with a western corridor: 45 percent
- 2035 without a western corridor: 47 percent

A Western Corridor Improves the Conditions at 30 Intersections
Under the scenario where a western corridor is place, the ICU improves at 30 intersections within Joplin. These intersections are often at key locations and perpetuate the expected trend that the addition of a western corridor will allow traffic to utilize the western corridor, in lieu of a less desirable pathway along one of the area's other major corridors. ICU improvements occur along the following routes:

- I-44 intersections at Exits 1, 4, 6, 8, and 11
- Several Main Street intersections
- Route JJ
- Schifferdecker Avenue
- Route 26
- Route 66

The average improvement is four percentage points. The maximum improvement is 18 percentage points of ICU.

All Intersections at the Western Corridor will Operate Well
A western corridor could potentially intersect several existing roadways. Six of these potential intersections were evaluated (Route 26, Route ZZ, Route JJ, Route 66, 20th Street, and Route 166). All of these intersections, in 2035, will operate at LOS A or B.

Many of the Fastest Growing Intersections will be Improved by a Western Corridor
There are 12 intersections that are expected to have their ICU increase at least 15 percentage points by 2035. Seven of these fast growing intersections are positively affected by a western corridor.

b. A Western Corridor Will Increase the Transportation System's Total Capacity and Reduce Inappropriate Traffic on Local Roadways

As discussed previously, regional planning efforts specify a desire for substantial growth in western Joplin. To facilitate this growth, the need for a fourth major north/south corridor is widely expected. In fact, the LRTP includes a new alignment western corridor as a future project (LRTP Project 101). **Appendix C** provides the complete list of programmed and future projects from the LRTP.

Using the travel demand model created for this project, it is possible to examine the validity of the region's planning goals. A powerful tool to use for this is the comparison of future conditions with and without a typical/default western corridor. This section will examine two aspects of the consequences expected by the implementation of a western corridor: *Total Daily System Capacity* and *Rerouting of North/South Movements on Internal Streets.*

A Western Corridor Will Increase Total Daily System Capacity
One way to examine a transportation system is through the total system usage. Daily system capacity can be calculated in two ways: by daily vehicle miles of travel (VMT), or by capacity miles in the system. Both measures were calculated through the project's travel demand model for each of the three conditions under consideration (existing, future conditions without a western corridor, and future conditions with a western corridor).

- Base Case: 2,016,050 daily vehicle miles of travel, or 4,509,600 capacity miles

- 2035 without a western corridor: 2,431,100 daily vehicle miles of travel, or 4,798,600 capacity miles
- 2035 with a western corridor: 2,433,900 daily vehicle miles of travel, or 5,507,750 capacity miles

The impact of the western corridor is represented by the difference in the 2035 projections. In this case, an additional 2,806 miles of travel per day, as well as an additional 709,150 in capacity miles are available.

It is often difficult to put macroscopic metrics, like the Total Daily System Capacity, into perspective for decision-making. In this case, the macroscopic metrics tend to support the regional planning goal of increased development in western Joplin. Questions such as "Is the increase significant or worth the expense?" or "Can other solutions provide better or cheaper results?" are more appropriately addressed later in the NEPA process.

A Western Corridor Will Reduce Inappropriate Traffic on Local Roadways
A metric that avoids some of the limitations of a macroscopic view is the comparison of specific movements, with and without a typical/default western corridor.

A community with a vibrant, more pedestrian-friendly downtown is envisioned when planning for Joplin. To achieve these goals, vehicular traffic will be constrained in the future. The planned speed reductions and truck restrictions on Main Street will force traffic to another north/south corridor. This creates a situation where traffic bound for a destination to the west of Joplin will be forced to take a circuitous route, which in turn would have negative effects on operations along those routes. It also creates a situation where truck traffic on local roads is expected to grow substantially. These local roads are largely recognized as neighborhood streets where the quality of life would be negatively affected by increases in truck traffic. When a western corridor is included in the evaluation, substantial traffic reductions along local roadways is achieved.

In regards to overall traffic, **Table B-6** provides examples of the traffic reductions associated with a western corridor. Two of the north/south corridors in western Joplin (Route JJ and Black Cat Road) will experience substantial traffic increases without a western corridor. In some parts of these corridors, the reduction in local traffic is in excess of 50 percent. While most north/south corridors in Joplin will benefit from a western corridor, Jackson Avenue/Lone Elm Road and Schifferdecker Avenue are not expected to see significant reduction in traffic volumes. This may be attributed to a preponderance of local trips that require access to Main Street.

TABLE B-6
Examples of Two-Way ADT Traffic Reductions Associated with a Western Corridor

Route JJ			
	Without a Western Corridor	**With a Western Corridor**	**Reduction**
At Route 171	2,558	2,242	12 percent
Bellecenter Road	4,971	2,717	45 percent
Black Cat Road			
	Without a Western Corridor	**With a Western Corridor**	**Reduction**
At Route 171	2,541	1,886	26 percent
At Bellecenter Road	962	459	52 percent

Based on travel demand modeling, the overall percentage of trucks in the traffic stream will grow proportionately with general traffic. However, on some local roadways adjacent to Main Street, the percentage of trucks will increase (between the base case and the future case) as speed reductions and truck restrictions take effect. For quantification purposes, the percentage of trucks was calculated on the minor north/south corridors adjacent to Main Street during the base case and for the corresponding future conditions.

Without a western corridor, the increases in truck traffic on local roads are expected to be most extensive in the near west, with Schifferdecker Avenue and Jackson Avenue/Lone Elm Road becoming more important truck routes. In the future, the truck volumes are expected to exceed 12 percent of the total traffic stream—volumes more typical of larger arterials and expressways. This is a substantial increase over existing conditions. In some cases, the percentage of trucks on the local roadways will increase by 65 percent. Local truck traffic is essential to the operation of any city. For Joplin, the implementation of speed reductions and truck restrictions on Main Street will force truck traffic to other routes. On some north/south corridors to the west of Main Street, without a western corridor, the percentage of trucks is expected to increase substantially. Increases in truck traffic would negatively impact the quality of life of these neighborhood streets.

c. A Western Corridor Will Replace Local Roadways with Designs that are not Compatible with Expected Traffic Demands

The evaluation of the existing transportation system included a crash rate study and a roadway design study.

The crash rate study utilized the Missouri Uniform Accident Report Preparation Manual and covered the 5 years between 2003 and 2007. Within the focus area, each roadway was evaluated as its own continuous segment. Each segment was then evaluated based on the amount of traffic it carried (AADT) and the number of crashes that occurred over that segment. This calculation allowed for a direct comparison of one roadway segment to another's crash rate, and most importantly against the state average for similar facilities. Crash rates are generally a good indication if a facility is approaching a level of operation that is beyond its capacity to accommodate.

Based on a crash rate study and a roadway design study, it was determined that many of the roadways in western Joplin have above average crash rates and designs that are unsuited for high volumes and widespread truck traffic.

A western corridor would provide a viable substitute to the local roadway system thereby improving the safety along the local system.

The roadway design study utilized American Association of State Highway and Transportation Officials (AASHTO) categories to describe the roadways in western Joplin. Posted speeds, intersection configuration/spacing, right-of-way width, horizontal/vertical curvatures, and other important roadway elements were catalogued using existing data and site visits.

The balance of this section will evaluate the major findings of the crash rate and roadway design studies, as they relate to the purpose and need of the Joplin West Corridor.

A Western Corridor will Redistribute Traffic Away from Local Roadways Experiencing Above Average Crash Rates

Many of the local roadways in west Joplin are primarily low volume roadways. The increases in traffic, especially trucks, that would result from the community's desired levels of development is expected to exacerbate the crash rate situation. Based on the crash rate data for 2003 through 2007, the following local roadways have above average crash rates:

Route 171: The 7.3-mile portion of Route 171 from Kafir Road to St. Louis Avenue experiences overall crash rates about 20 percent above Missouri statewide average for similar facilities.

Route 96: The 3.8-mile portion of Route 96, near Carl Junction experiences overall crash rates about 100 percent above the Missouri statewide average for similar facilities.

Route FF: The 0.25-mile portion of MO FF (E 32nd Street) from Route 43 to Indiana Avenue experiences overall crash rates about 75 percent above the Missouri statewide average for similar facilities.

Summary of Crash Rate Analysis

- Many roadways in western Joplin have above average crash rates.
- Crash rates are fairly constant throughout the 5-year study period (2003 to 2007).
- Many of the roadways in the study area are primarily low volume roadways. Redistribution of vehicles, especially trucks, to these roadways is expected to exacerbate the crash rate situation.

Route 66: The 6.17-mile portion of Route 66 from the Missouri/Kansas state line to Grand Avenue, just east of MO 43 experiences overall crash rates about 80 percent above the Missouri statewide average for similar facilities.

US-166: The 0.9-mile portion of US-166 from the Missouri/Kansas state line to I-44 experiences overall crash rates approximately equal to the Missouri statewide average for similar facilities.

Route P: The 6.6-mile portion of Route P from the Missouri/Kansas state line to Route 66 experiences overall crash rates 150 percent of the Missouri statewide average for similar facilities.

Route 43: The 12.3-mile portion of Route 43 from Kafir Road to I-44 experiences overall crash rates 20 percent above the Missouri statewide average for similar facilities.

Route Z: The 2.7-mile portion of Route Z from Route JJ to Route 171 experiences overall crash rates 250 percent above the Missouri statewide average for similar facilities

Route JJ: The 4.0-mile portion of Route JJ from Route Z to Route P experiences overall crash rates 70 percent above the Missouri statewide average for similar facilities.

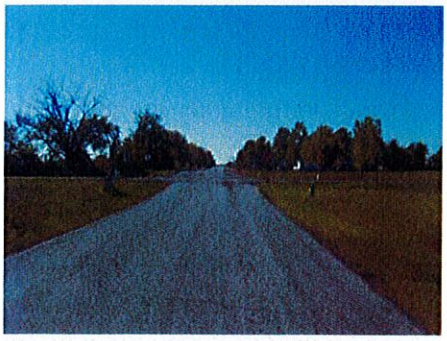
Route YY: The 4.0-mile portion of MO YY from the Missouri/Kansas State line to Route JJ experiences overall crash rates 30 percent above the Missouri statewide average for similar facilities.

A western corridor would redistribute traffic away from these local roadways and would consequently improve safety along these routes.

A Western Corridor is Better Suited to Increased Traffic Volumes in Comparison to the Existing System

The roadways in western Joplin are mostly rural roadways. AASHTO categorizes rural roadways into four major categories:

- Rural Principal Arterial: Roadways designed for trip length and density suitable for statewide or interstate travel.
- Rural Minor Arterial: Roadways that provide linkage to larger towns and are suitable for both interstate and inter-county service. These routes should be expected to provide relatively high travel speeds and minimum interference to through movement.
- Rural Collector: Roadways intended for inter-county travel with shorter travel distances. Moderate speeds are typical, as collector roads are meant to accumulate traffic from local roads.
- Rural Local Road: Roadways that provide access to land adjacent to the collector roadway network and serves travel over short distances. This classification covers all roadways not included in the previous classifications.



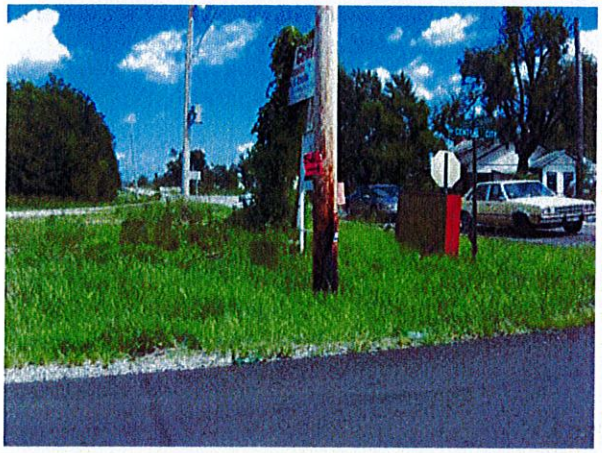
Many roads in western Joplin have no shoulders.

- The principal east/west roadway in western Joplin is US Route 66. This roadway is primarily a four-lane divided highway of moderate volume. Given the AASHTO defined classifications above, US Route 66 is most similar to a major collector roadway.

The principal north/south roadway in western Joplin is Route JJ. This roadway would be classified as a minor collector roadway according to AASHTO. This roadway has 10-foot asphalt driving lanes, with gravel shoulders. The setbacks on this corridor are more generous than the surrounding local roads.

Most of the other roadways in the area would be classified as rural local roads. These roads are asphalt driving surface, with narrow, approximately 10-foot lanes. Most have no paved or even gravel shoulders, as many are directly adjacent to a ditch and a dirt bank, leaving virtually no clear zone for safety.

Speed limits vary considerably on these roadways from 35 mph to 55 mph. Stops signs are frequent, driver expectations are challenged, as some intersection stops are two-way, while others are four-way. Several intersections are offset, where a driver must make a slight jog while crossing a more major roadway. In a few locations, the major traveled way experiences a sharp curve with a major speed reduction. Drivers unfamiliar with the area could easily become confused with the unusual conditions, resulting in a network that does not provide an appropriate through route for traffic.



Driver control systems (speed limits, stop signs, etc.) are widespread and inconsistent, making driver expectancy an issue.

The topography of western Joplin varies considerably. While some areas are relatively flat, with some gentle rolling terrain, others have more drastic geographic changes. Stream crossings indicate floodplain issues. Horizontal and vertical sight distance is an issue on most of the roadways, specifically the local roadways towards the southern portion of the study area where vertical and horizontal alignment frequently changes in the hilly topography.

Land use along the roadways is primarily rural. Homes and buildings are often built extremely close to the roadway due to the terrain. The northern sections of the study area have more generous set-backs, as allowed by the terrain.

As discussed previously, the roadways in western Joplin experience high crash rates, relative to state averages for comparable roadways. Increases in traffic will exacerbate this situation. The local roadways were not meant to carry high traffic volumes, through traffic, or commercial vehicles. Existing collector routes have been designed to carry higher volumes, but for the most part, lack continuity. Maintenance issues will increase as volumes and truck percentages increase. The consequences of increases in volumes and redistributed truck traffic are expected to be increased travel times, reduced safety and difficult driving conditions. As part of



Summary of Roadway Design Study

The condition of existing roadways in western Joplin varies widely. Among the identified problems include the following:

- Driver control systems (speed limits, stop signs, etc.) are widespread and inconsistent, making driver confusion an issue.
- The topography of western Joplin is diverse, making horizontal and vertical sight distances an issue.
- Many of the roadways in the area have narrow driving surfaces, narrow paved or gravel shoulders and roadside bank/ditch configurations; making the lack of clear zones for safety an issue.

this project, preliminary consideration of design guidelines was undertaken. Following the principles of Practical Design, initial design guidelines were outlined and are contained in **Appendix C**. Adherence to these criteria should allow for the new or reconstructed roadways to operate in a manner consistent with the traffic conditions expected for the future.

d. A Western Corridor Will Minimize Circuitous Travel through Joplin

The region's major planning documents focus on providing a more vibrant, more pedestrian-friendly downtown. To achieve these goals, vehicular traffic is expected to be constrained by speed reductions and truck restrictions. All of the major north/south corridors in Joplin are located east of Main Street. Consequently, any through traffic bound for the west of Joplin may be forced to take a circuitous route. This type of detour may represent hundreds of thousands of miles of extra travel and thousands of hours in lost productivity, annually.

A western corridor could eliminate these detours. Using the Joplin 2007 Regional Origin/Destination Survey[3], the following detour impacts have been identified:

Detours from Northwest Joplin to Points West, via I-44

The longest of the circuitous trips would be for vehicles coming into the Joplin area from the northwest, destined for points west through I-44. Stations 314 through 315 are located in the northwestern most part of the O/D survey's cordon. Station 314 is on Route 171. The O/D Survey provides an estimate of a 24-hour count of 4,700 vehicles entering at Station 314. Thirteen percent (615) of Station 314's traffic are through trips. Of the Station 314 through trips, 40 vehicles exit the Joplin area at the western I-44 station (Station 305)— roughly 1 percent of all trips. Assuming all of these vehicles divert from Main Street, the additional miles traveled can be significant. If Business Route 71 is taken, roughly 51,000 detour miles will be traveled annually. Given the signalization on Business Route 71 and the projected volume increases, the newly opened Route 249 may be a more attractive alternative. If all the through traffic destined for I-44 westbound takes Route 249, the annual detour mileage will be roughly 105,000 miles. The truck stream on Route 171, at Station 314, is among the highest in the region, and between 12 and 13 percent of the traffic stream are commercial trucks. On an annual basis, this may represent between 6,000 and 13,000 miles of additional commercial truck traffic in the Joplin area, depending on the detour route.



Speed reductions and truck restrictions on Main Street will force through traffic to take another north/south corridor

- The total annual detour miles traveled for through trips entering Joplin from the northwest and exiting the region at I-44 and Route 66 is estimated to be between 198,000 miles and 687,000 miles (depending on which detour route is taken).
- At an average speed of 40 mph, the lost productivity at just these locations could be as high as 17,000 hours per year, roughly 2,100 work days.

Station 315 is located at Route 43/Main Street, north of Route 171. The O/D Survey estimated a 24-hour count of 8,484 vehicles entering at Station 315. The total number of through trips at this

[3] The Joplin 2007 Regional O/D Survey is described in **Appendix C** and **Exhibit A-5**.

station is 656, with 57 vehicles exiting the Joplin area at the western I-44 (Station 305). Assuming that all of these vehicles abandon Main Street, the additional miles traveled can be significant. If Business Route 71 is taken, roughly 73,000 detour miles will be traveled annually. Given the signalization on Business 71 and the projected volume increases, the newly opened Route 249 may be a more attractive alternative. If all through traffic destined for I-44 westbound takes Route 249, the annual detour mileage will be roughly 153,000 miles. At Station 315, 656 of the 8,484 vehicles in the 24-hour count are commercial trucks. Assuming the same percentage exits the area at I-44 (west), this may represent between 6,000 and 12,000 extra commercial truck traffic miles in the Joplin area annually.

Detours from Northwest Joplin to Points West, via Route 66

The same type of route choice can be seen through trips entering on either Route 171 or Route 43/Main Street and exiting the Joplin area on Route 66. Using the data in the O/D survey, roughly 96,000 extra miles of travel may result from vehicles intending to use Route 66 to access destinations to the west of Joplin, but forced to abandon Main Street (in favor of BR-71) because of speed reductions and truck restrictions. If the longer detour at Route 249 is used, the extra miles of travel would be much higher (407,000 miles).

From just these locations, the total annual detour miles traveled for the through trips entering on either Route 171 or Route 43/Main Street and exiting the region at I-44 and Route 66 is estimated to be between 198,000 miles and 687,000 miles (depending on which detour route is taken). Other similar detour pathways may also exist, but are more difficult to quantify. Another consideration when appraising these numbers is that driver behavior is difficult to predict and some of the assumptions used in these calculations may be overly simplistic. Nevertheless, the implementation of speed reductions and truck restrictions on Main Street will force through traffic to take another north/south corridor.

The implementation of a western corridor will eliminate these types of inefficiencies.

3. A Western Corridor will Benefit Multi-Modal Connectivity in Joplin

Joplin's location makes it a vital passageway and a potentially important multimodal hub. Joplin is served by approximately 50 major freight carriers because of its location at the cross roads of two important NHS facilities – I-44 and US-71. High volumes of truck traffic have been important factors underlying the other purpose and need elements discussed in this chapter. In general, multimodal connectivity is currently constrained in Joplin due to the inadequacy of the existing transportation network.

In this section, the focus will be how a western corridor may affect the movement of goods by rail and by air. Improving the connections between air and rail with the roadway network will provide important benefits. This chapter will examine this through the following elements:

- A western corridor will improve connectivity between the roadway and rail networks.
- A western corridor will improve connectivity between the roadway and air cargo networks.

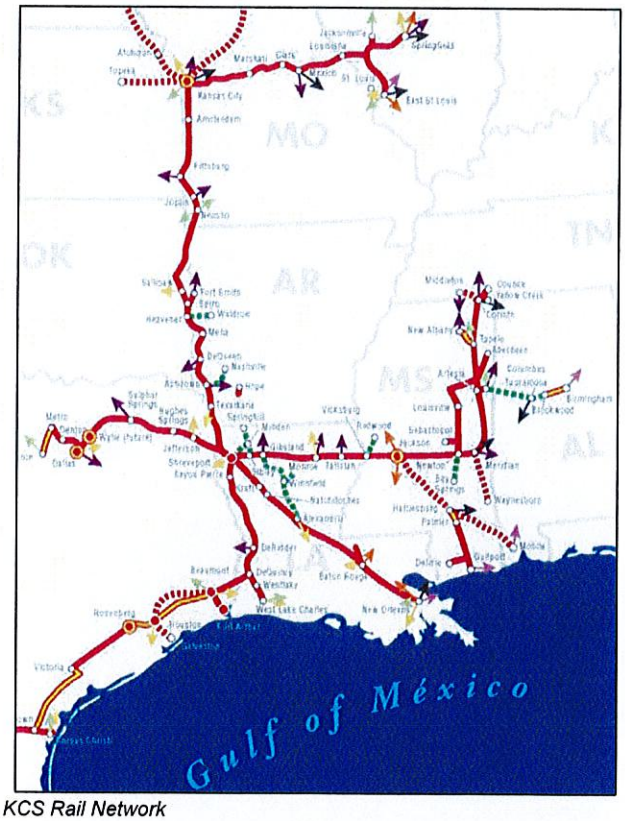
a. A Western Corridor will Improve Connectivity between the Roadway and Rail Networks

Several important rail lines connect through Joplin, including the Kansas City Southern (KCS) railroad, the Burlington Northern Santa Fe (BNSF) Railroad and the Missouri and Northern Arkansas (MNA) Railroad. These provide cargo connectivity to the region's airports, truck terminals, and businesses. Passenger trains no longer serve the city. **Exhibit A-9** in Appendix A, from the Joplin Metropolitan Area Long Range Transportation Plan (LRTP) depicts the important rail lines within Joplin.

The balance of this section will discuss how a western corridor may beneficially improve connectivity to the existing rail operations.

Kansas City Southern (KCS)
Headquartered in Kansas City, Missouri, KCS operates in 10 states. Among the Class I railroads, it has the shortest route between Kansas City and the Gulf of Mexico. It also has expanded into Mexico. According to the LRTP, between 10 and 20 KCS trains traverse the Joplin area per day.

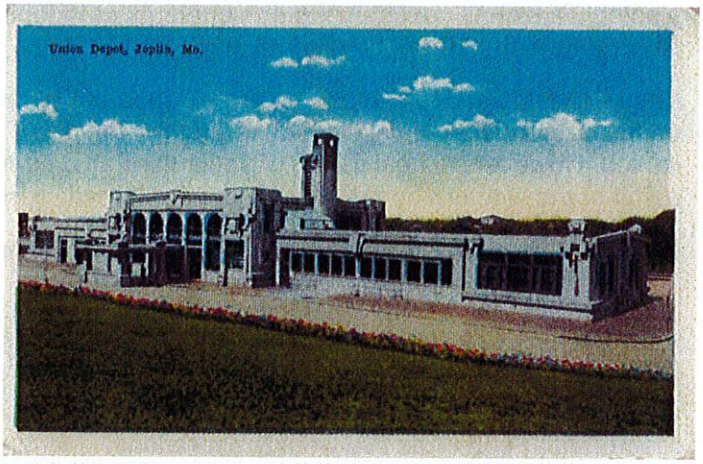
The KCS line enters the Joplin area from the northwest, parallel to Route 171. It traverses downtown Joplin roughly along the route of Main Street. It continues on a southeastern path intersecting I-44 between Exits 8 and 11.



KCS Rail Network

To the north of Joplin, the location of the KCS rail line puts it in close proximity to both the Joplin Regional Airport and the northern logical termini of the western corridor. This proximity will provide the opportunity for new synergies between these important regional elements. The Joplin Regional Airport is actively expanding its air cargo facilities. Its air freight servicing is increasing. The land adjacent to the rail line is available for development and the western corridor provides a long-desired north/south roadway between Route 171 and I-44.

The Joplin Union Depot lies along this line in downtown Joplin. Currently abandoned, the angular prairie-modern styled building is the size of a city block, featuring a two-story center section with wings extending to the north and south. The last train left the station on November 3, 1969. The Joplin Union Depot was designated a national historic landmark in 1972. Previous restoration attempts have failed. Planning efforts in Joplin are striving to create a vibrant, pedestrian-friendly downtown and the western corridor is a component of that vision. If successful, it is not inconceivable that a future, successful, restoration of the Joplin Union Depot is possible.



The Joplin Union Depot, from the Missouri Digital Heritage Collection

To the south of Joplin, the the KCS rail line is in close proximity to I-44. In this area, there are numerous truck freight operations, such as the Crossroads Center Business Park and the Hammons Convention and Trade Center. As discussed previously, a western corridor is expected to reduce traffic volumes on the existing travel lanes and at the interchanges in the vicinity of Joplin. For example:

- The travel demand model predicts that 3,367 fewer vehicles per day will use I-44 (between Exits 1 and 4, if a western corridor is available).
- The travel demand model predicts that 3,248 fewer vehicles per day will use I-44 (between Exits 4 and 6, if a western corridor is available).
- The travel demand model predicts that 1,405 fewer vehicles per day will use I-44 (between Exits 8 and 11, if a western corridor is available).

These improvements will optimize the operation of existing I-44, allow for increased modal choice, and attract additional economic investments.

Burlington Northern Santa Fe (BNSF)

The BNSF Railway Company operates one of the largest North American rail networks, with about 32,000 route miles in 28 states and 2 Canadian provinces. BNSF is among the world's top transporters of intermodal traffic. The coal that this Class I railroad hauls generates about 10 percent of the electricity produced in the United States. In Joplin, coal is by far the most common rail import – about five million tons. According to the LRTP, between 20 and 30 BNSF trains traverse the Joplin area per day.

The principal BNSF lines in Joplin are east/west lines on either side of Route 66. A western corridor will cross both of these rail lines. This portion of Joplin is identified in the Joplin Comprehensive Plan as *commercial and industrial opportunity areas*. The multimodal opportunities provided by the western corridor and the BNSF lines have the potential to achieve the community goals envisioned.

Missouri and Northern Arkansas (MNA)

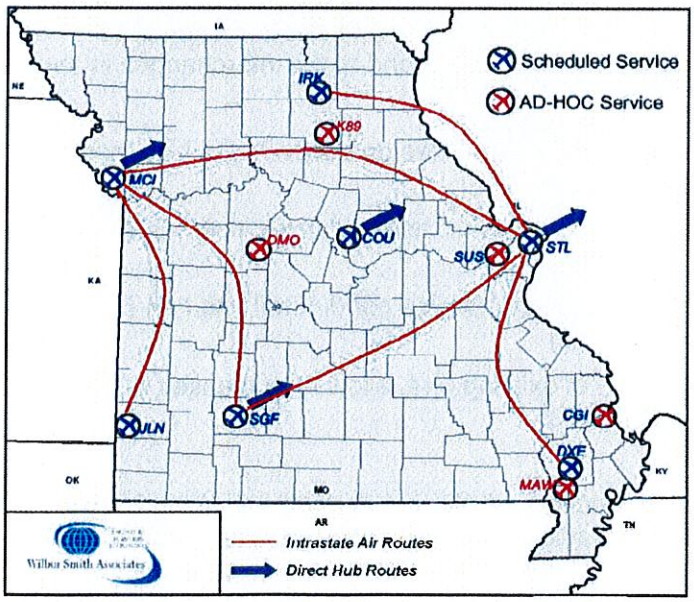
The Missouri and Northern Arkansas Railroad is short-line railroad (non-Class I) operating approximately 540 miles of line in Arkansas, Kansas, and Missouri. MNA traffic generally consists of grain, frozen foods, minerals, steel, chemicals, asphalt, and forest products. MNA also operates unit coal trains to power plants at Independence, AR and Montrose, MO. According to the LRTP, between 6 and 10 MNA trains traverse the Joplin area per day.

The MNA lines in Joplin make up the balance of the rail lines in Joplin. Most of these lines are on the eastern side of Joplin. Consequently, the direct benefits of the western corridor would be limited. However, the balancing of vehicular traffic on the area's north/south corridors, as a result of the western corridor, will reduce rail road crossing traffic and conflicts.

b. A Western Corridor will Improve Connectivity between the Roadway and Air Cargo Networks

The Joplin Regional Airport is the primary commercial, military, cargo, general aviation, and corporate aviation resource in southwestern Missouri. Joplin is a component of the Missouri Air Cargo Network. There are scheduled routes to Kansas City International Airport. The LRTP reports that FedEx has five weekly operations.

The Joplin Regional Airport is located at the intersection of Route 171 and Route 43. While passenger operations are limited, air cargo is increasing. As reported in the LRTP, the Missouri Statewide Freight Study estimates total shipments at 20 tons per year. This flow is considered an important component for economic development. In addition to modernizing the aviation infrastructure at the airport, the expansion of the air cargo freight facilities is underway. These improvements include new terminals, improved parking, loading bridges, and a dedicated business center.



Missouri Air Cargo Network from the Missouri Statewide Freight Study

The northern logical terminus of the western corridor is in the vicinity of the Joplin Regional Airport. The improvements to the roadway network will benefit air cargo operations at the airport. Many of these have been described elsewhere in this document, including:

- A western corridor will improve the LOS at key intersections within the Joplin transportation network.
- A western corridor will increase the transportation system's total capacity and reduce inappropriate traffic on local roadways.
- A western corridor will minimize circuitous travel through Joplin.

Air cargo is predicated on the need for expedited, time-definite delivery. This is costly and is limited to valuable materials. The availability of expedited, time-definite delivery is an important component to optimizing the regional economy. As the economy grows and air cargo shipments become increasingly necessary to support a diverse economy, an efficient roadway network is essential to complete the delivery of the air cargo. The western corridor is an essential component to the Joplin roadway network.

Appendix A: Exhibits

This appendix contains the following exhibits:

1. Exhibit A-1 Vicinity Map
2. Exhibit A-2 Future Projects
3. Exhibit A-3 Important Resources/Aerial Map
4. Exhibit A-4 TAZ Map
5. Exhibit A-5 O/D Survey Map Interview Stations and Total Trips
6. Exhibit A-6 Base Case Model Results
7. Exhibit A-7 2035 Model Results (without Bypass)
8. Exhibit A-8 2035 Results (with a Western Bypass)
9. Exhibit A-9 Freight Network

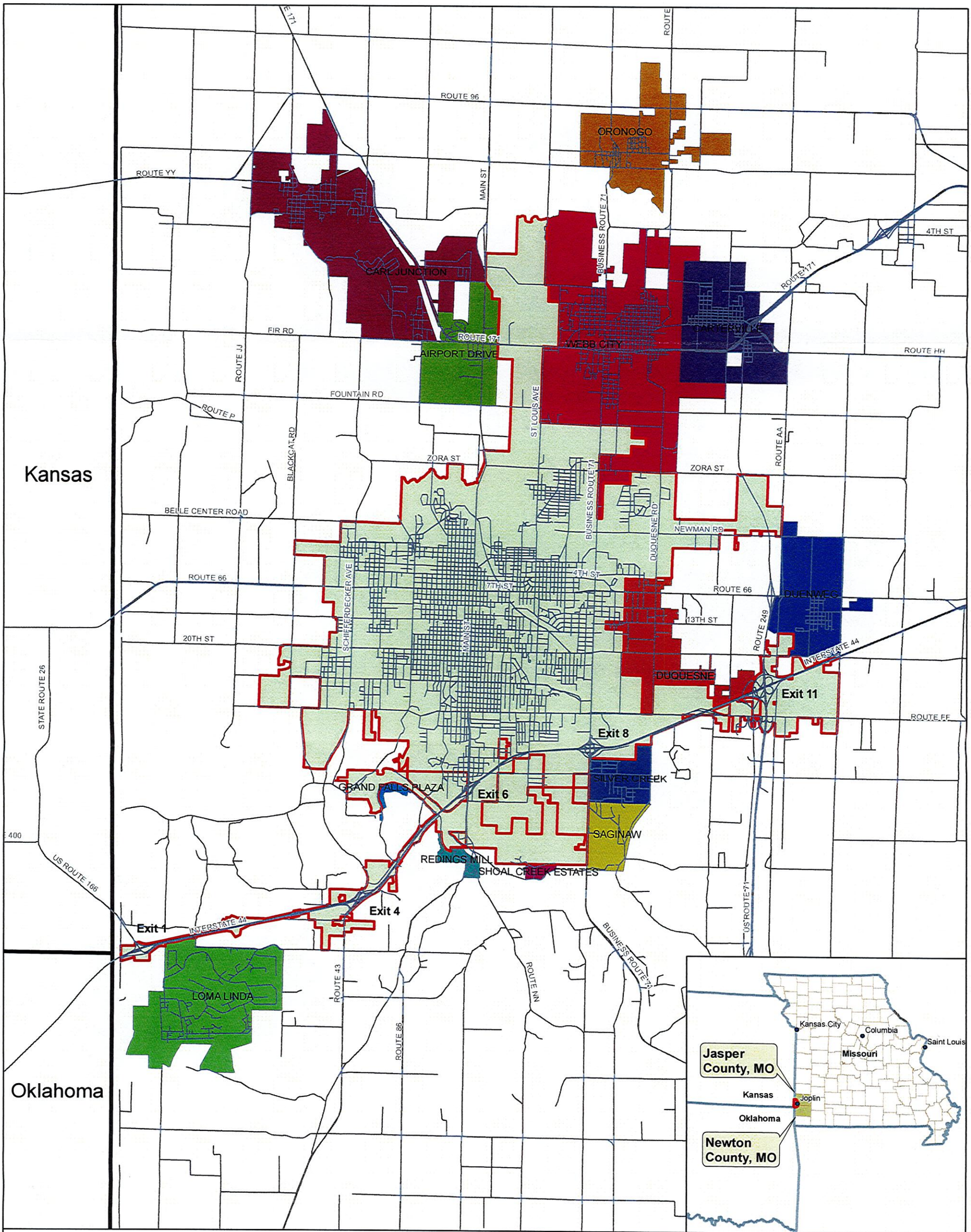


Exhibit A-1
Vicinity Map
West Joplin Purpose and Need Statement

Legend

- Joplin City Limits
- State Boundary

Municipalities

- Airport Drive
- Carl Junction
- Carterville
- Duenweng
- Duquesne
- Grand Falls Plaza
- Loma Linda
- Orongo
- Redings Mill
- Saginaw
- Shoal Creek Estates
- Silver Creek
- Webb City

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JOPLIN METROPOLITAN AREA

LONG RANGE TRANSPORTATION PLAN - 2005 UPDATE

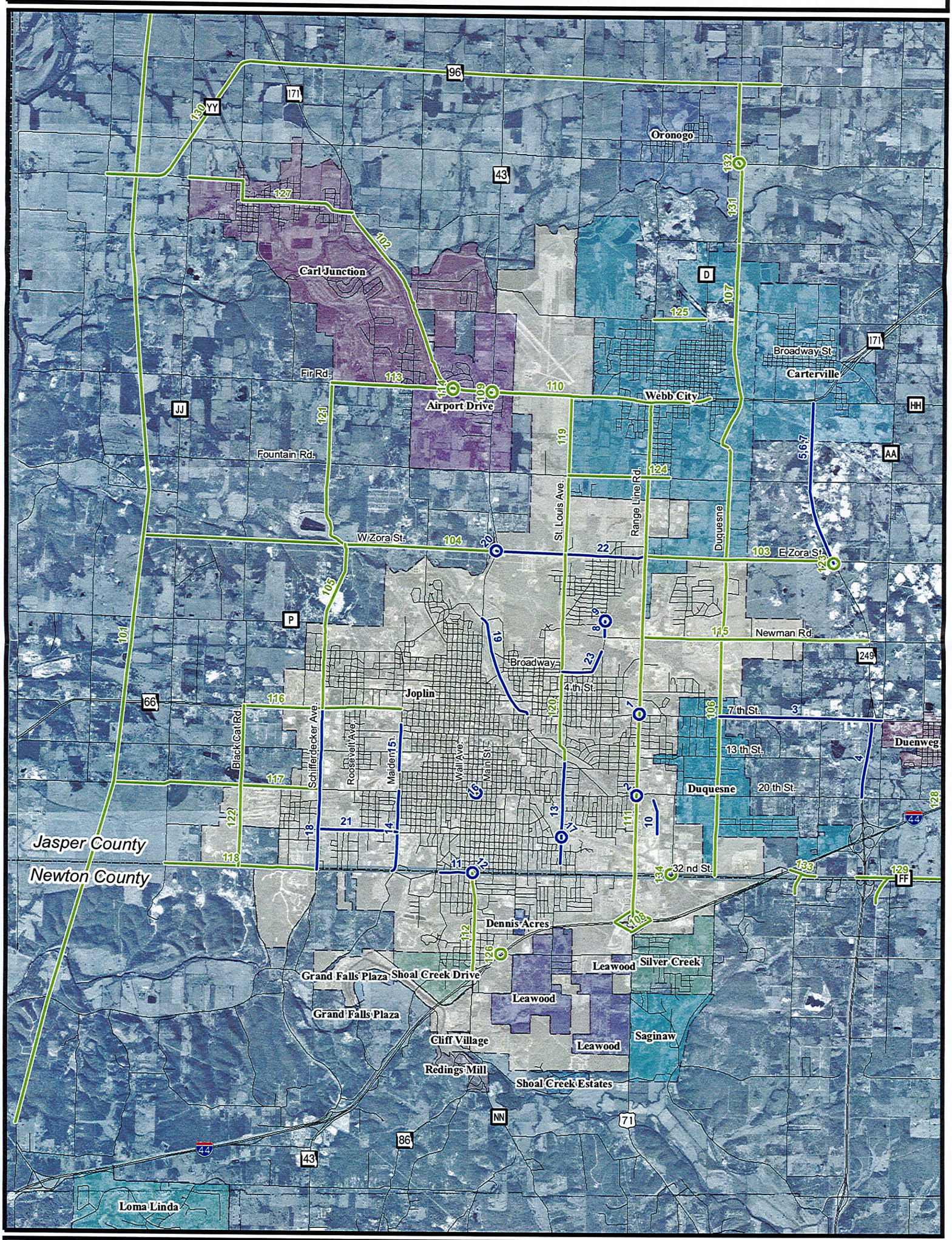


EXHIBIT 3-2

Future Projects

Joplin Area Transportation Study Organization (JATSO)

HNTB

Future Projects

- Programmed Projects
- Long Range Projects

NOTE: Refer to Tables 3-1 and 4-3 for Project Descriptions

Miles

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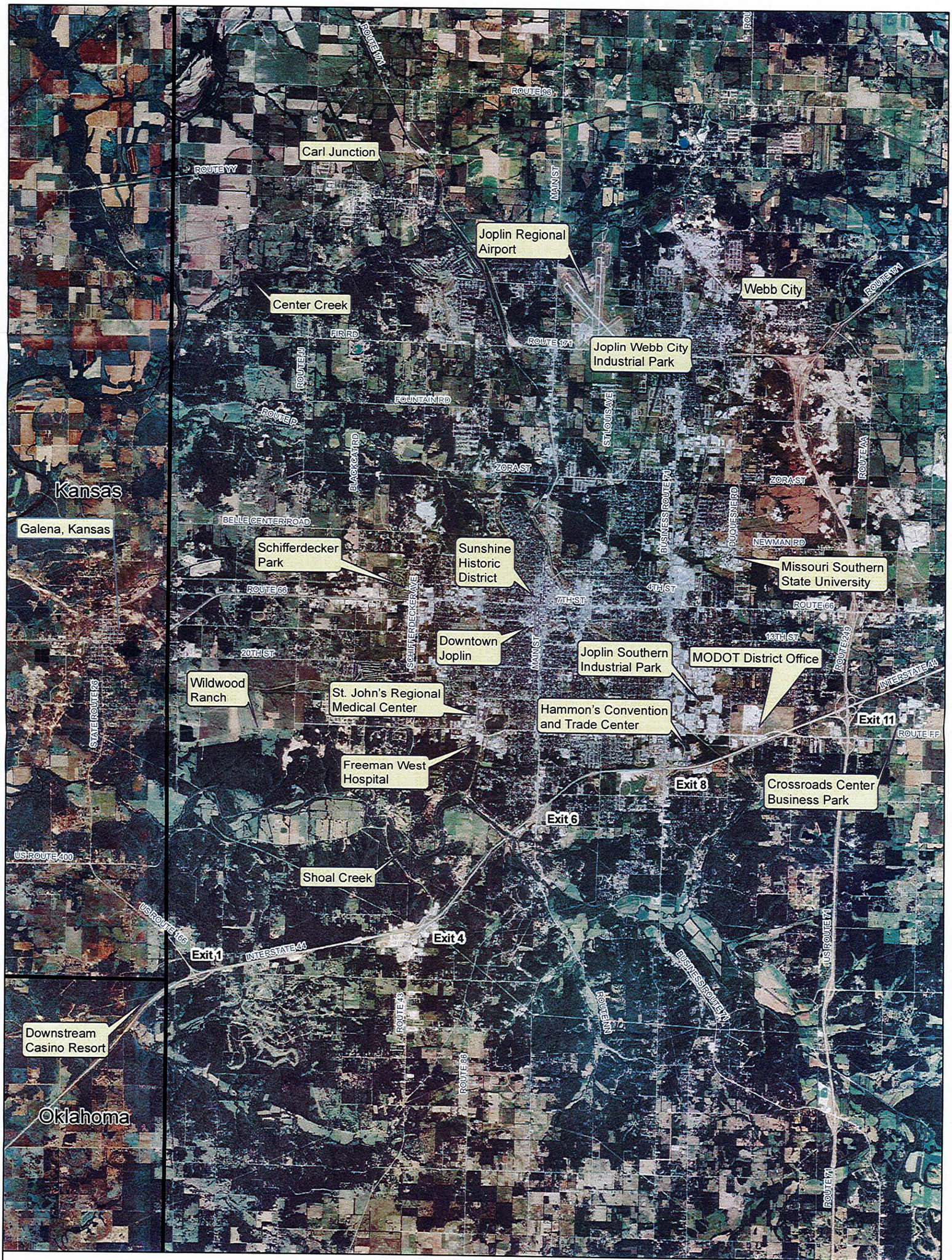


Exhibit A-3
Important Resources/Aerial Map
West Joplin Purpose and Need Statement

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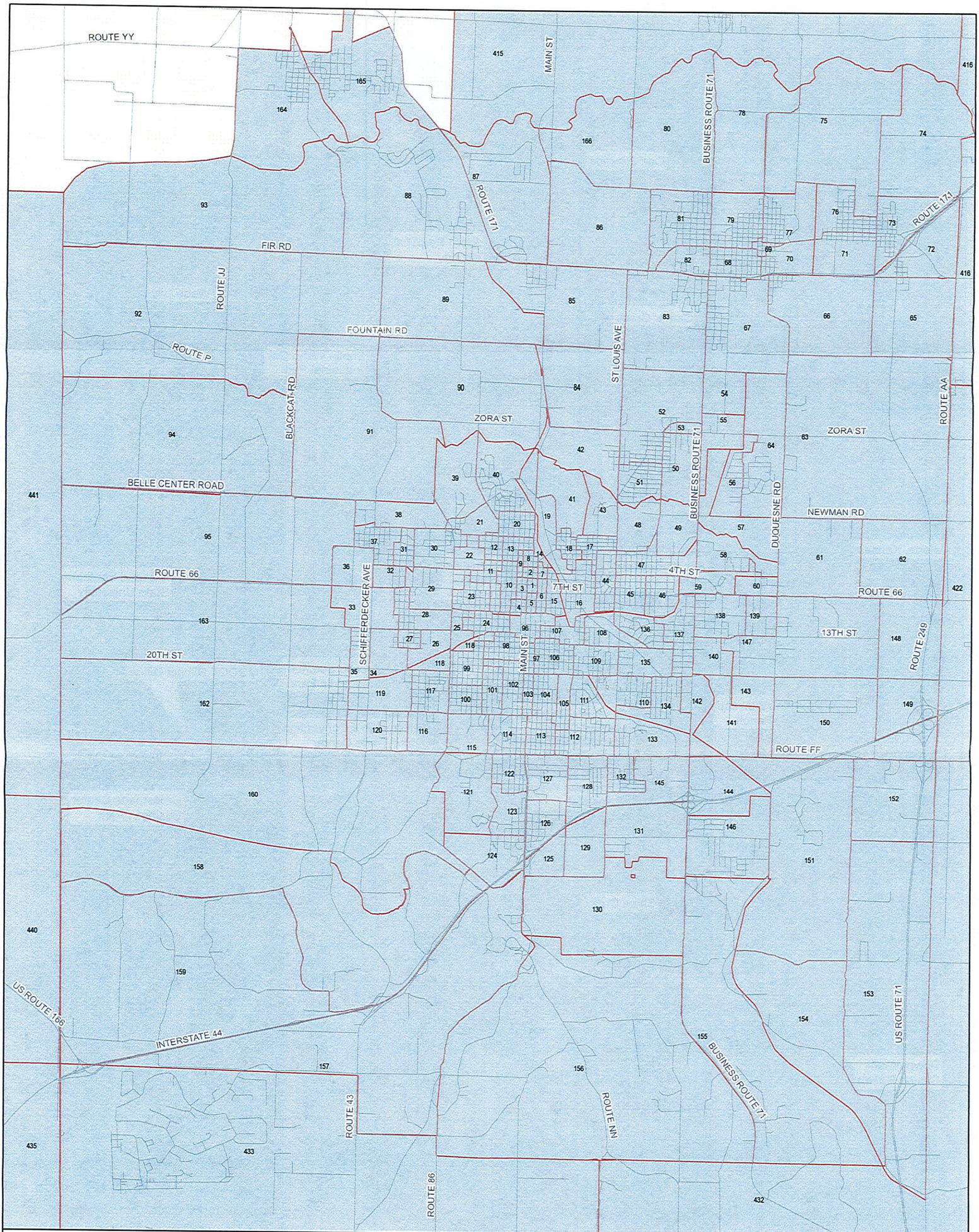


Exhibit A-4
TAZ Map
West Joplin Purpose and Need Statemant

Legend

Joplin TAZ

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1 inch equals 6,000 feet

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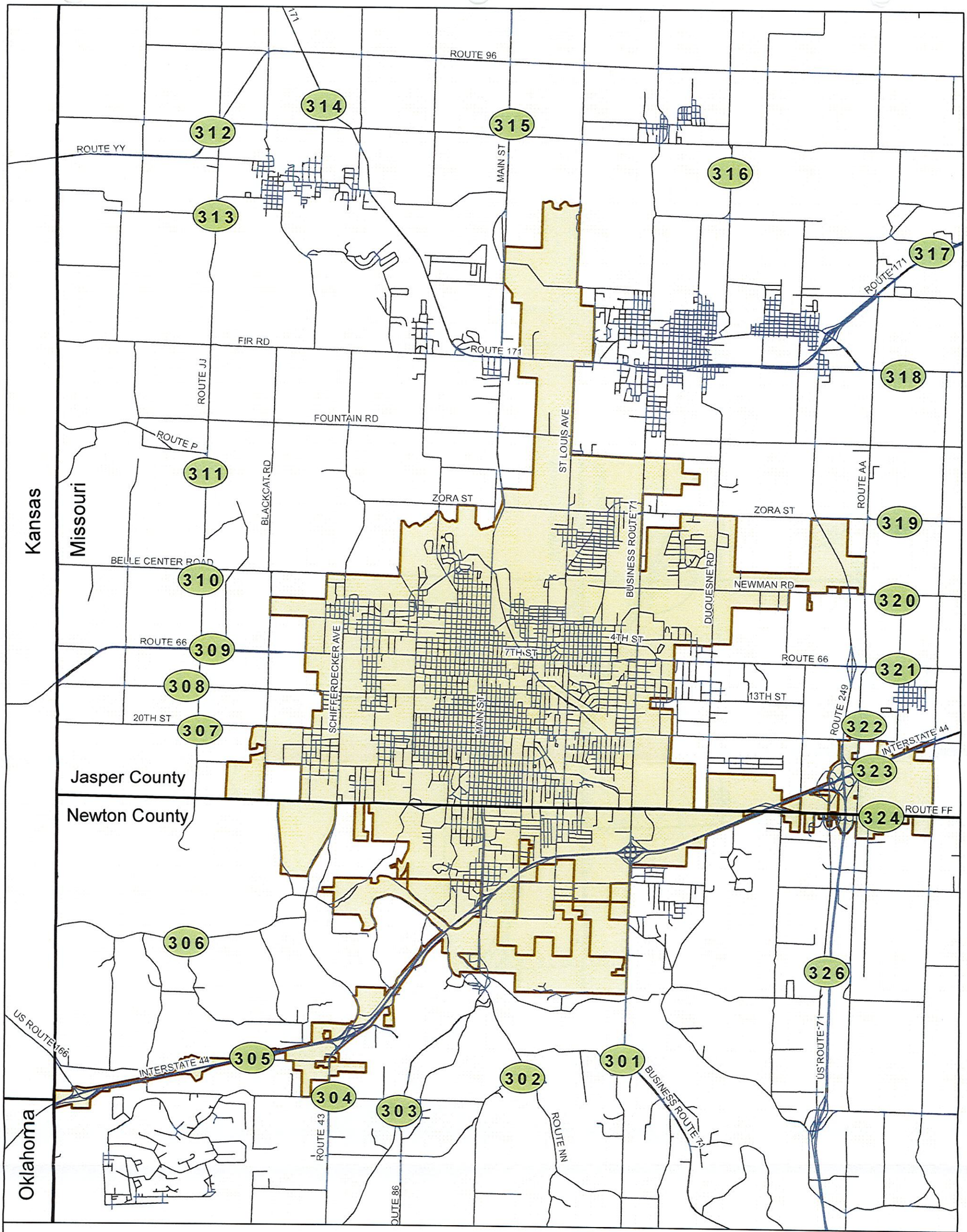


Exhibit A-5
O/D Survey Map Interview Stations and Total Trips
West Joplin Purpose and Need Statement

Interview Station	Location	Total Trips
301	BS 71 (Rangeline South)	6757
302	Route NN	2403
303	Highway 86	2615
304	Highway 43 (South Side)	9437
305	Interstate 44 (West Side)	29263
306	Bagdad Road	2449
307	20th Street (West Side)	2972
308	Junge Boulevard	807
309	Route 66 (7th St. - West Side)	10380
310	Belle Center Road	1126
311	Route P	760
312	Route Z	1618
313	Route JJ	2139
314	Highway 171 (West Side)	4700

Interview Station	Location	Total Trips
315	Highway 43 (North Side)	8484
316	Route D	4980
317	Highway 171 (East Side)	11636
318	Route HH	5780
319	Route AA	946
320	Newman Road	1196
321	Route 66 (7th St. - East Side)	10253
322	20th Street (East Side)	3226
323	Interstate 44 (East Side)	37312
324	Route FF (32nd St.)	10737
325	Warner Road	729
326	US Highway 71	19137
Total Trips		191842

Legend

- mo_counties
- Joplin City Limits
- Interview Station

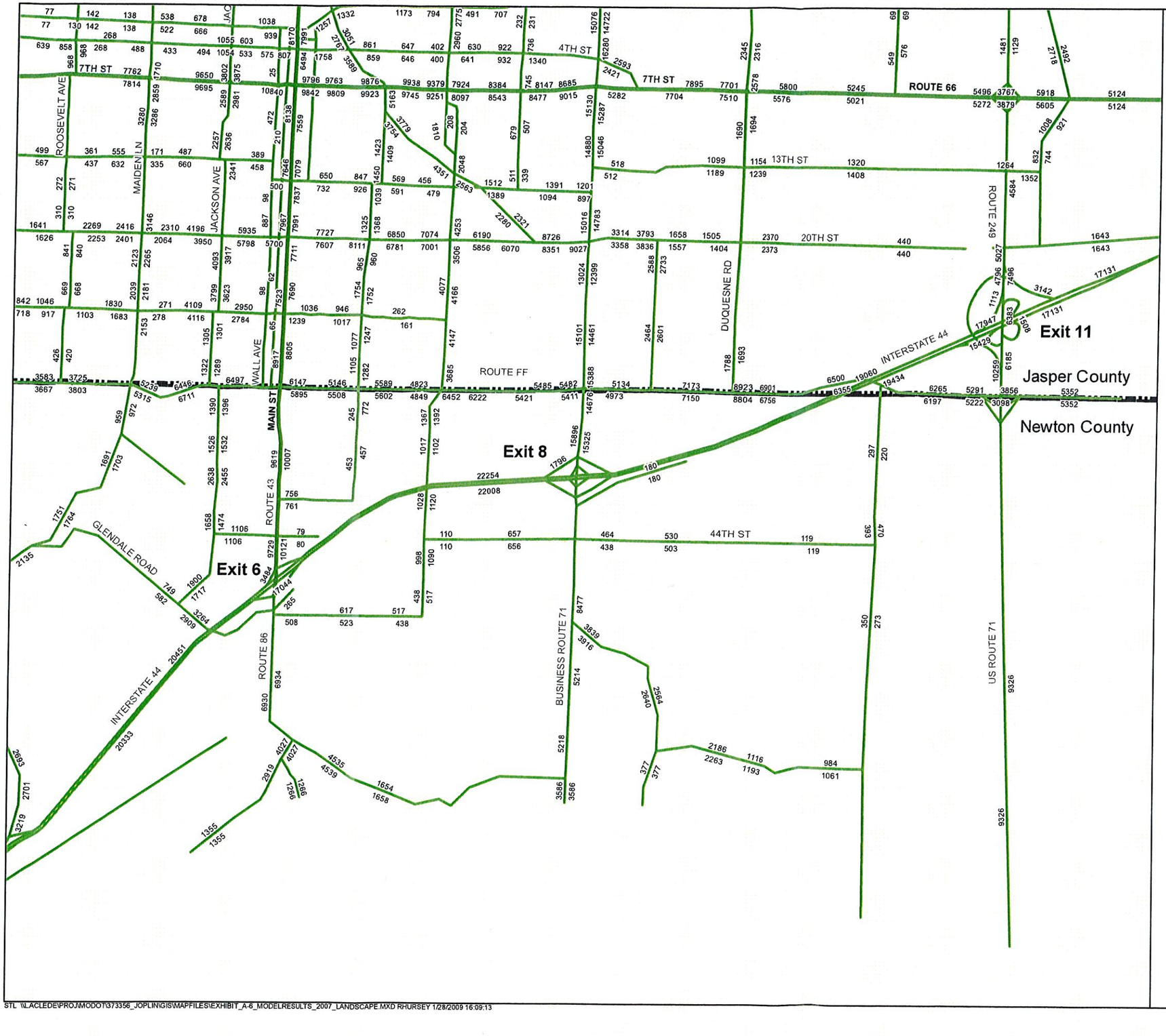
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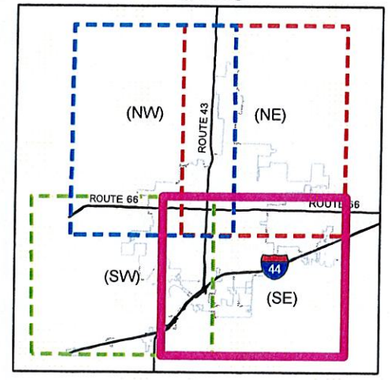
Source: ETC Institute - Joplin 2007 Regional O/D Survey

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Exhibit A-6 (SE)
Base Case Model Results (Existing)
West Joplin Purpose and Need Statement



Key Map



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Note:
Volumes depicted represent the Average Daily Traffic (ADT) for the base case (existing).

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Exhibit A-6 (SW)
Base Case Model Results (Existing)
West Joplin Purpose and Need Statement

Kansas

Missouri

Cherokee County

Jasper County

Newton County

ROUTE 66

20TH ST

7TH ST

SCHIFFERDECKER AVE

ROOSEVELT AVE

MAIDEN LN

JACKSON AVE

WALL AVE

MAIN ST

ROUTE 43

ROUTE 86

STATE ROUTE 26

US ROUTE 400

US ROUTE 166

GLENDALE ROAD

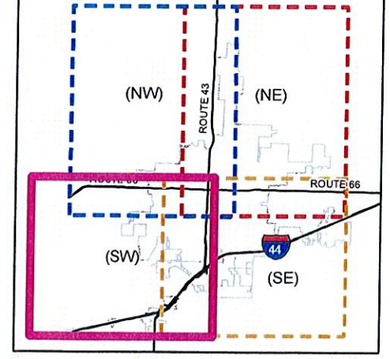
INTERSTATE 44

Exit 1

Exit 4

Exit 6

Key Map

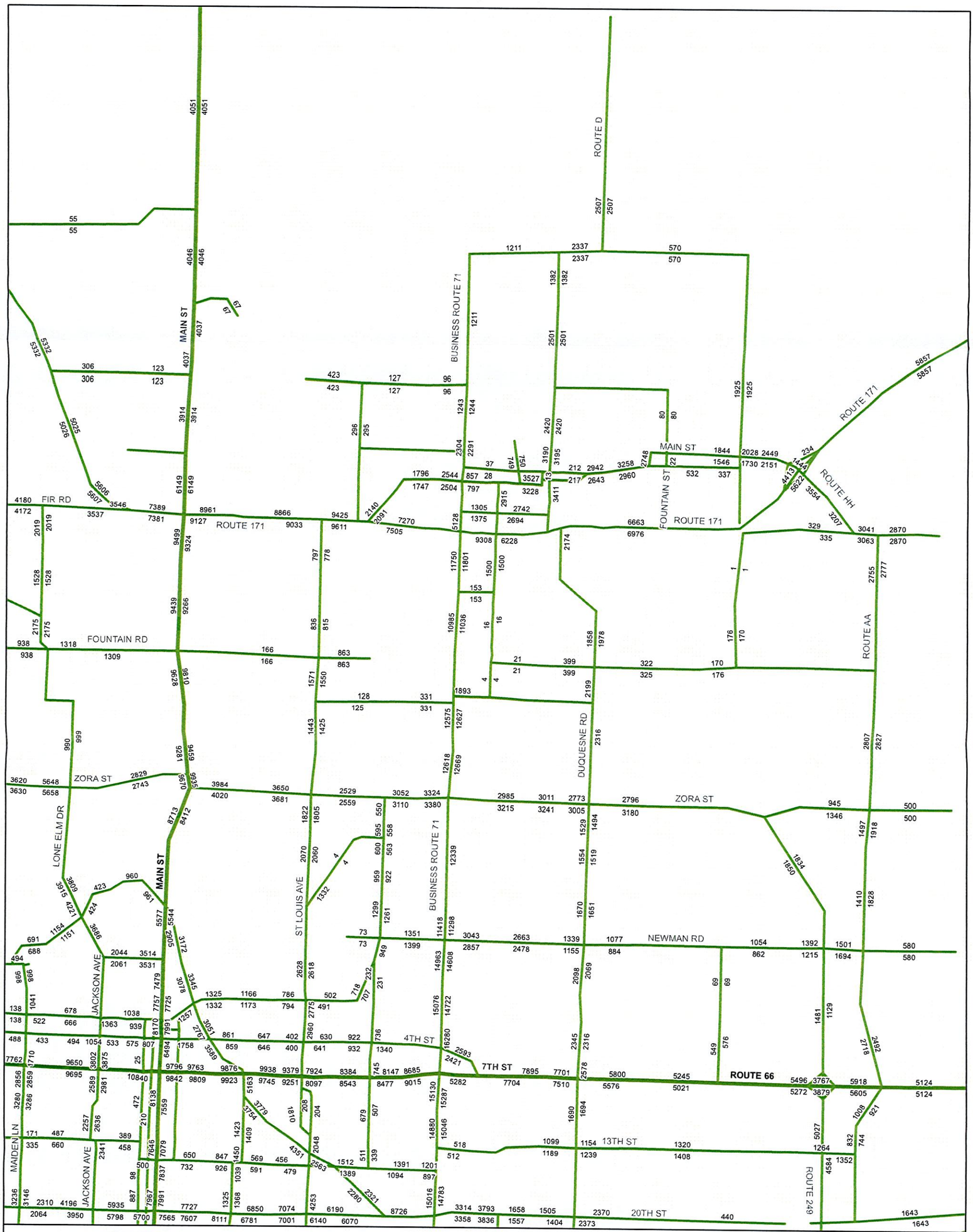


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Note:
Volumes depicted represent the Average Daily Traffic (ADT) for the base case (existing).

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Key Map

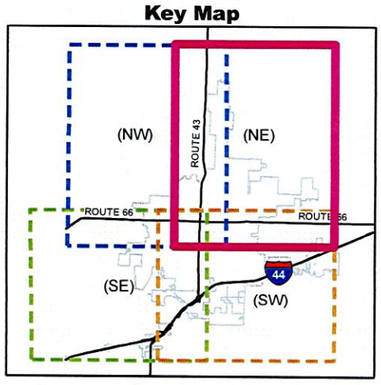


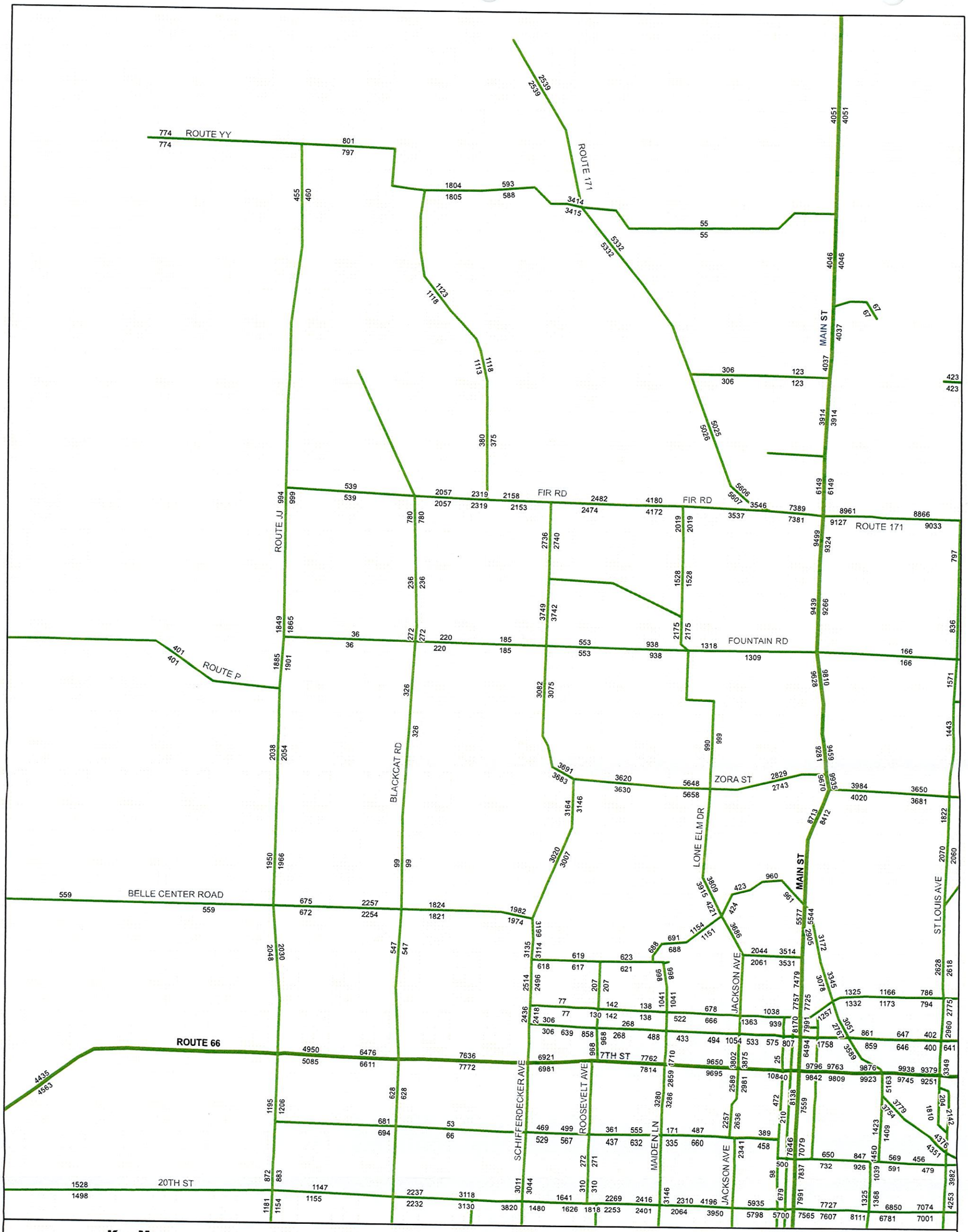
Exhibit A-6 (NE)
Base Case Model Results (Existing)
West Joplin Purpose and Need Statement

Note:
Volumes depicted represent the Average Daily Traffic (ADT) for the base case (existing).

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Key Map

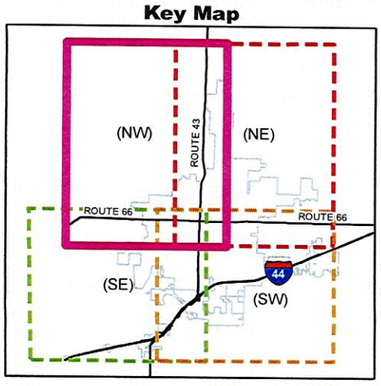


Exhibit A-6 (NW)
Base Case Model Results (Existing)
West Joplin Purpose and Need Statement

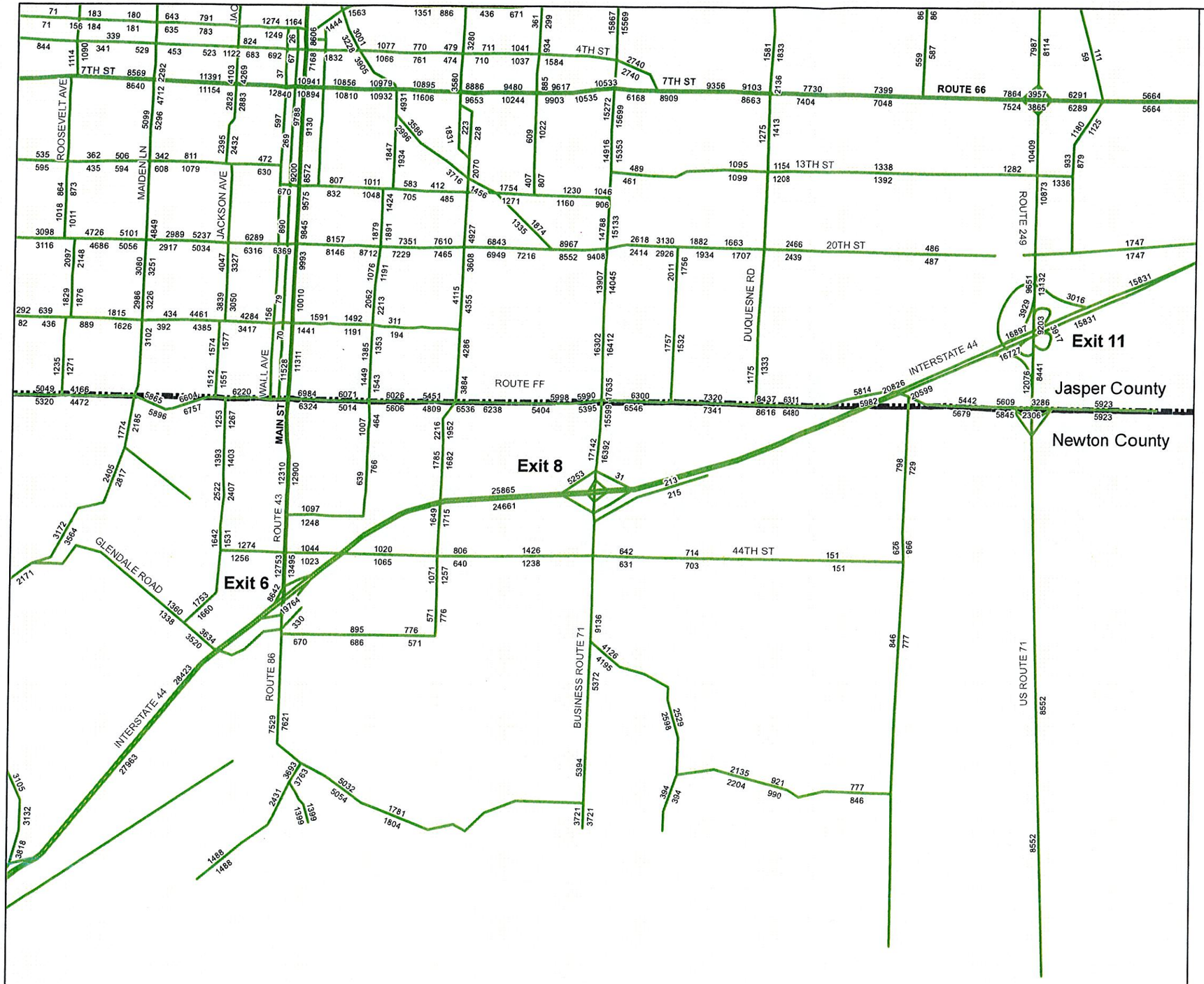
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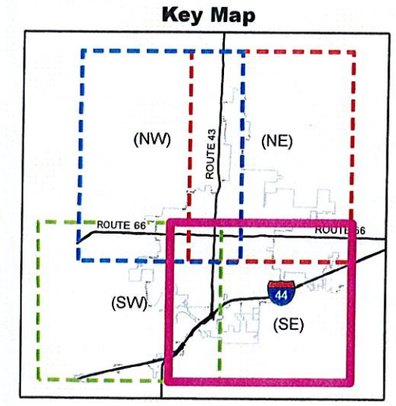
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Exhibit A-7 (SE)
2035 Model Results (without Bypass)
West Joplin Purpose and Need Statement





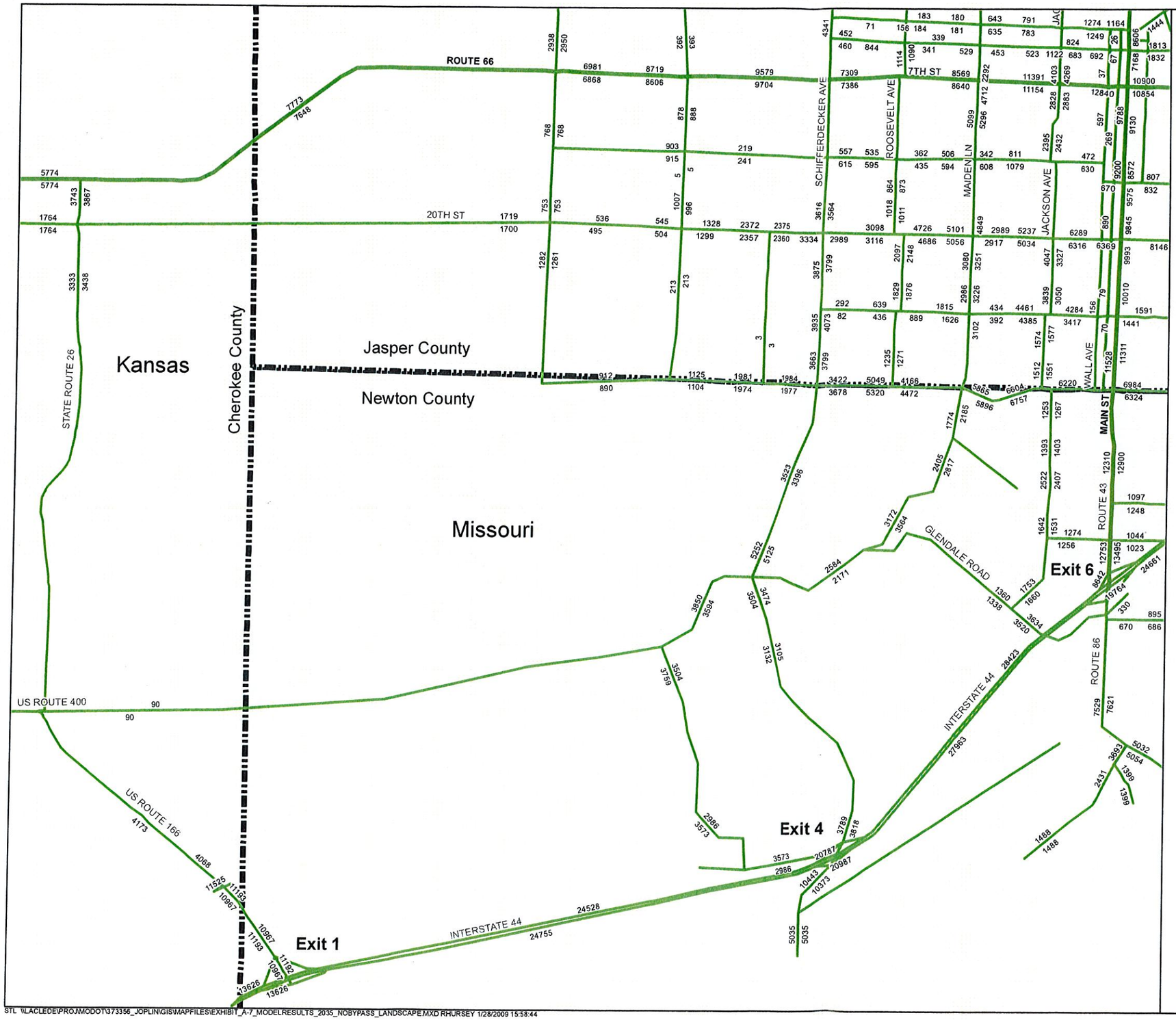
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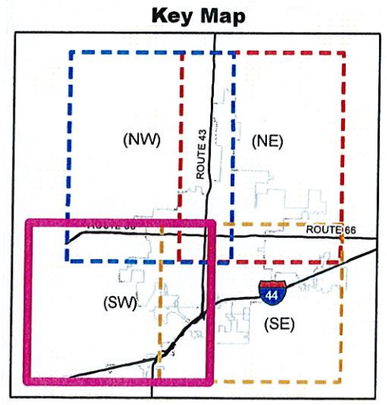
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Note:
Volumes depicted represent the Average Daily Traffic (ADT) for 2035 (without bypass).

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Exhibit A-7(SW)
2035 Model Results (without Bypass)
West Joplin Purpose and Need Statement



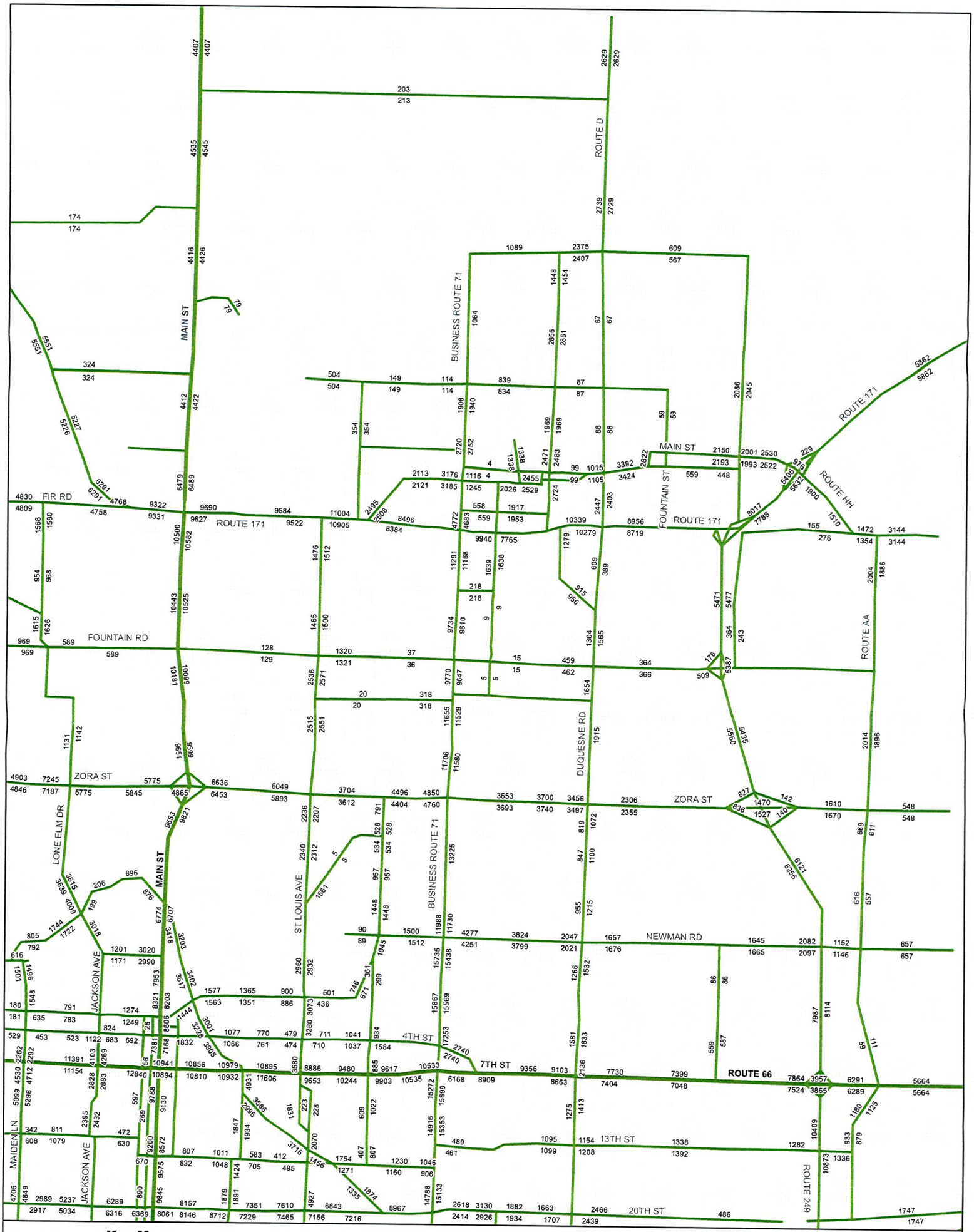


N

0 3,500 7,000 10,500 Feet

Note:
Volumes depicted represent the Average Daily Traffic (ADT) for 2035 (without bypass).

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Key Map

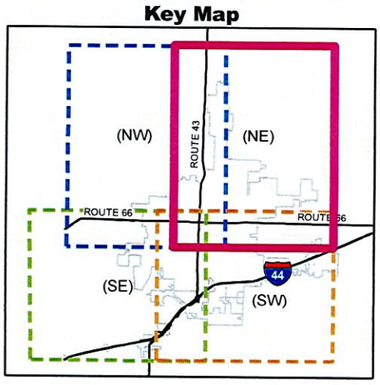


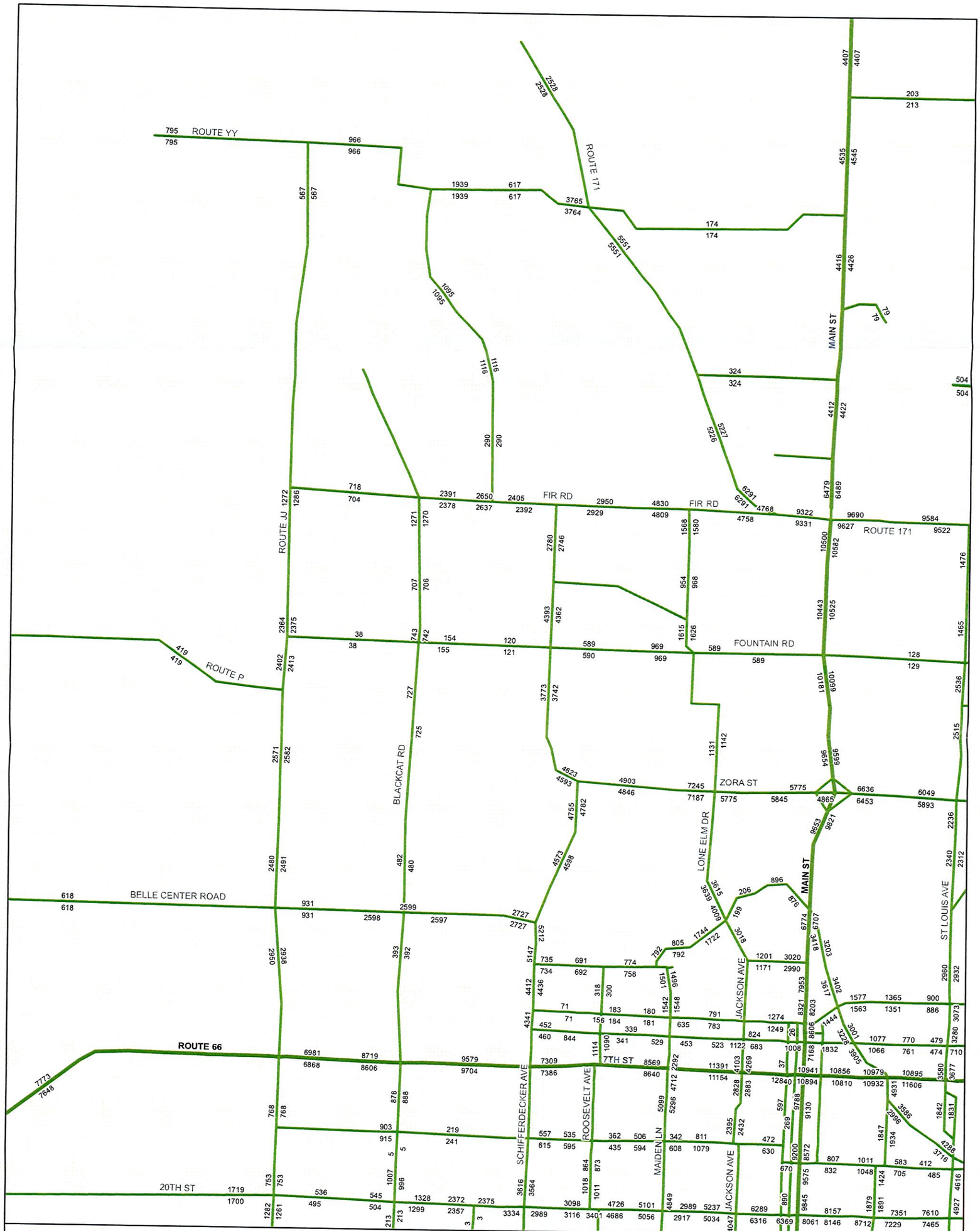
Exhibit A-7 (NE)
2035 Model Results (without Bypass)
West Joplin Purpose and Need Statement

Note:
Volumes depicted represent the Average DailyTraffic (ADT) for 2035 (without bypass).

N

0 3,500 7,000
Feet

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Key Map

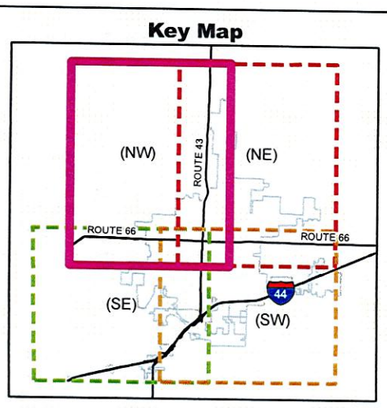


Exhibit A-7 (NW)
2035 Model Results (without Bypass)
West Joplin Purpose and Need Statement

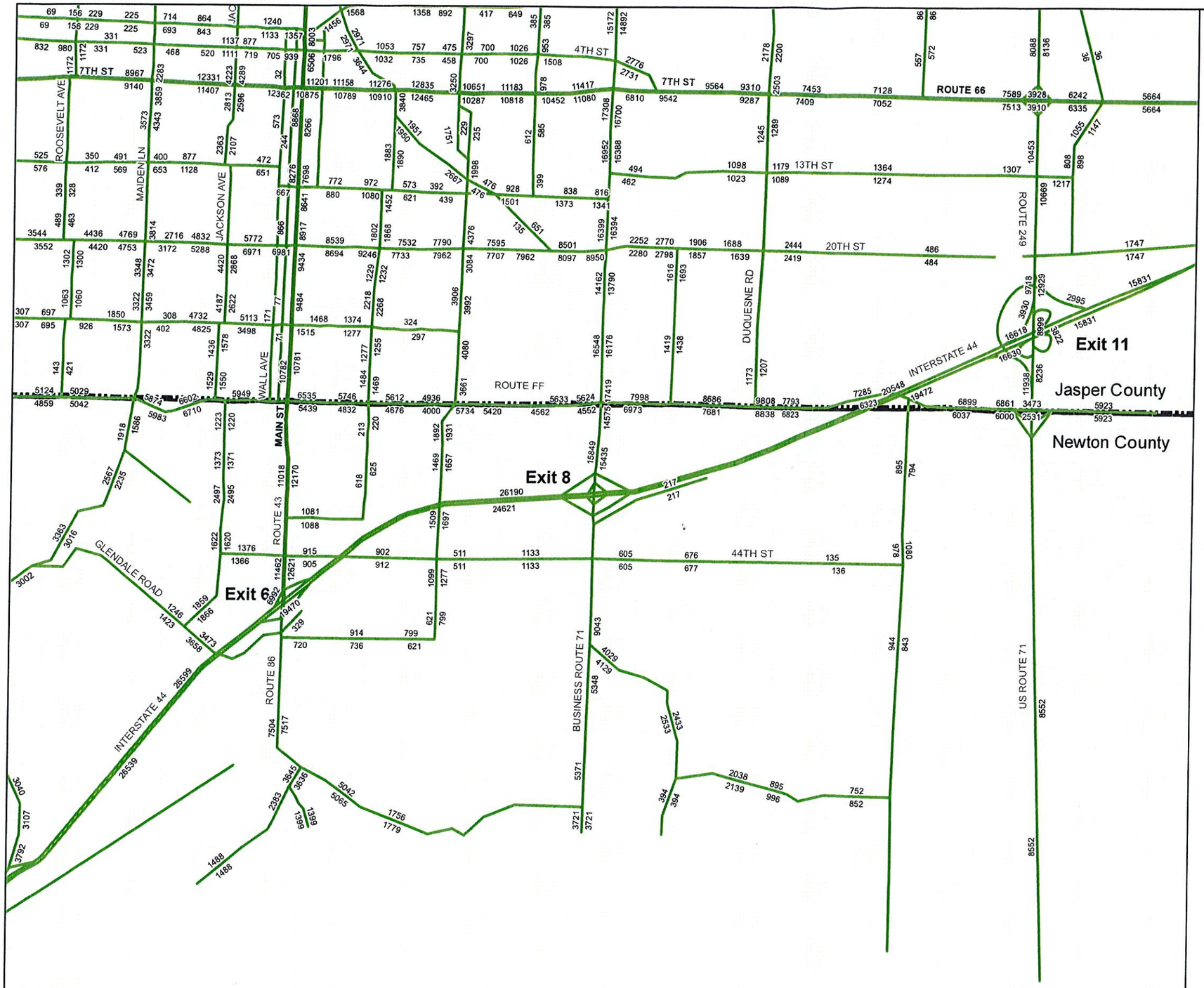
Note:
Volumes depicted represent the Average DailyTraffic (ADT) for 2035 (without bypass).

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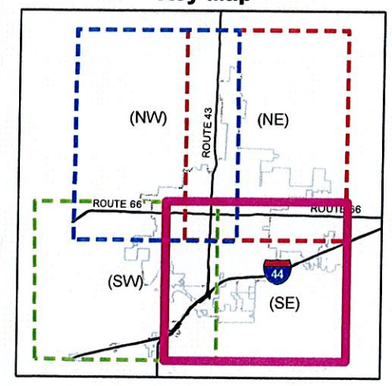
0 3,500 7,000 Feet

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Exhibit A-8 (SE)
2035 Model Results (with a Western Bypass)
West Joplin Purpose and Need Statement



Key Map



N

0 3,500 7,000 10,500 Feet

Note:
Volumes depicted represent the Average Daily Traffic (ADT) for 2035 (with a Western Bypass).

STL \\LACLEDE\PROJ\MODOT\373356_JOPLIN\GIS\MAPFILES\EXHIBIT_A-8_MODELRESULTS_2035_BYPASS_LANDSCAPE.MXD RHURSEY 1/28/2009 16:12:53

Exhibit A-8 (SW)
2035 Model Results (with a Western Bypass)
West Joplin Purpose and Need Statement

Kansas

Cherokee County

Jasper County

Newton County

Missouri

ROUTE 66

20TH ST

7TH ST

MAIN ST

SCHIFFERDECKER AVE

ROOSEVELT AVE

MAIDEN LN

JACKSON AVE

WALL AVE

STATE ROUTE 26

US ROUTE 400

US ROUTE 166

ROUTE 43

ROUTE 86

GLENDALE ROAD

INTERSTATE 44

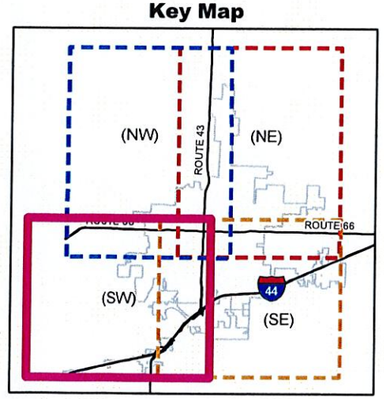
(Western Bypass)

Exit 1

Exit 4

Exit 6

Key Map

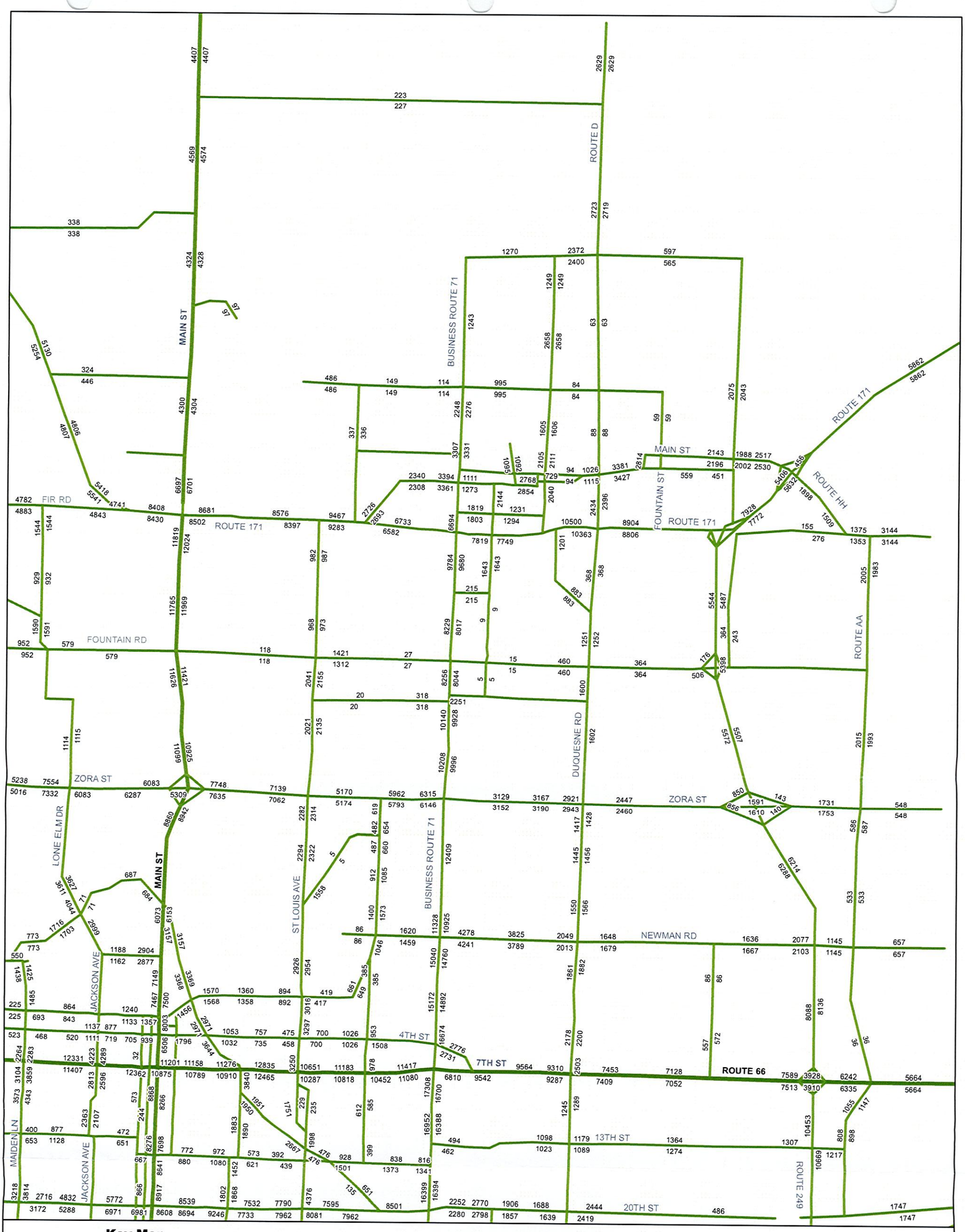


N

0 3,500 7,000 10,500 Feet

Note:
Volumes depicted represent the Average Daily Traffic (ADT) for 2035 (with a Western Bypass).

STL \\LACLEDE\PROJ\MODOT\373356_JOPLIN\GIS\MAPFILES\EXHIBIT_A-8_MODELRESULTS_2035_BYPASS_LANDSCAPE.MXD RHURSEY 1/28/2009 16:12:53



Key Map

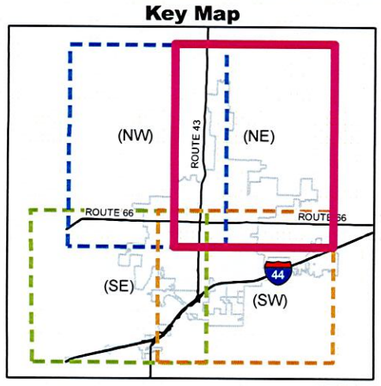


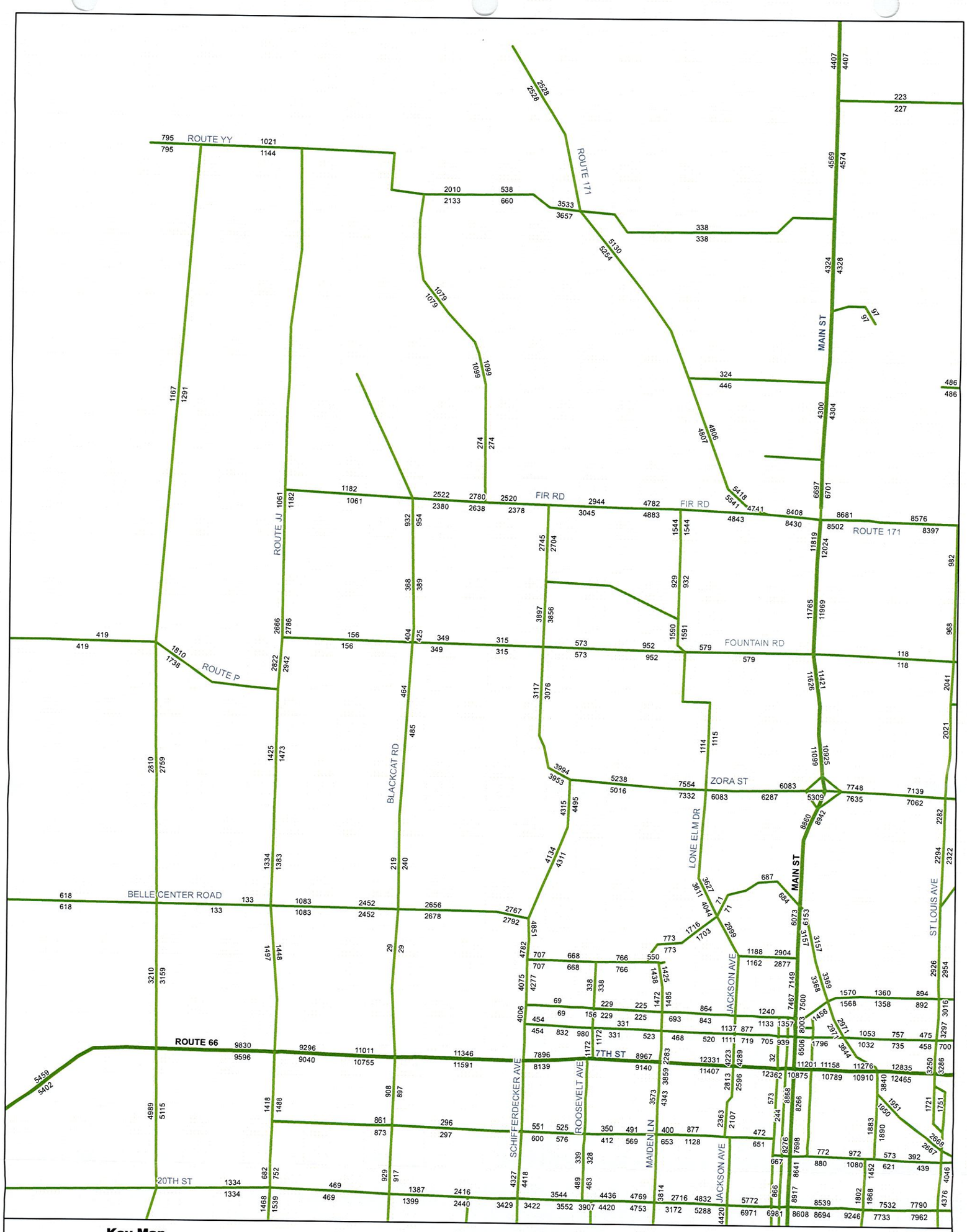
Exhibit A-8 (NE)
2035 Model Results (with a Western Bypass)
West Joplin Purpose and Need Statement

Note:
Volumes depicted represent the Average Daily Traffic (ADT) for 2035 (with a Western Bypass).

N

0 3,500 7,000 Feet

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Key Map

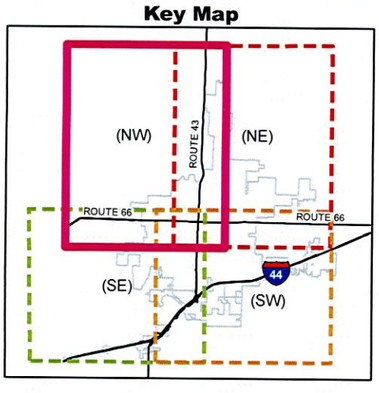


Exhibit A-8 (NW)
2035 Model Results (with a Western Bypass)
West Joplin Purpose and Need Statement

Note:
Volumes depicted represent the Average Daily Traffic (ADT) for 2035 (with a Western Bypass).

N

0 3,500 7,000
Feet

STL \\LACLEDE\PROJ\MODOT\373356_JOPLIN\GIS\MAPFILES\EXHIBIT_A-8_MODELRESULTS_2035_BYPASS_PORTRAIT.MXD RHURSEY 1/28/2009 16:13:24

JOPLIN METROPOLITAN AREA

LONG RANGE TRANSPORTATION PLAN - 2005 UPDATE

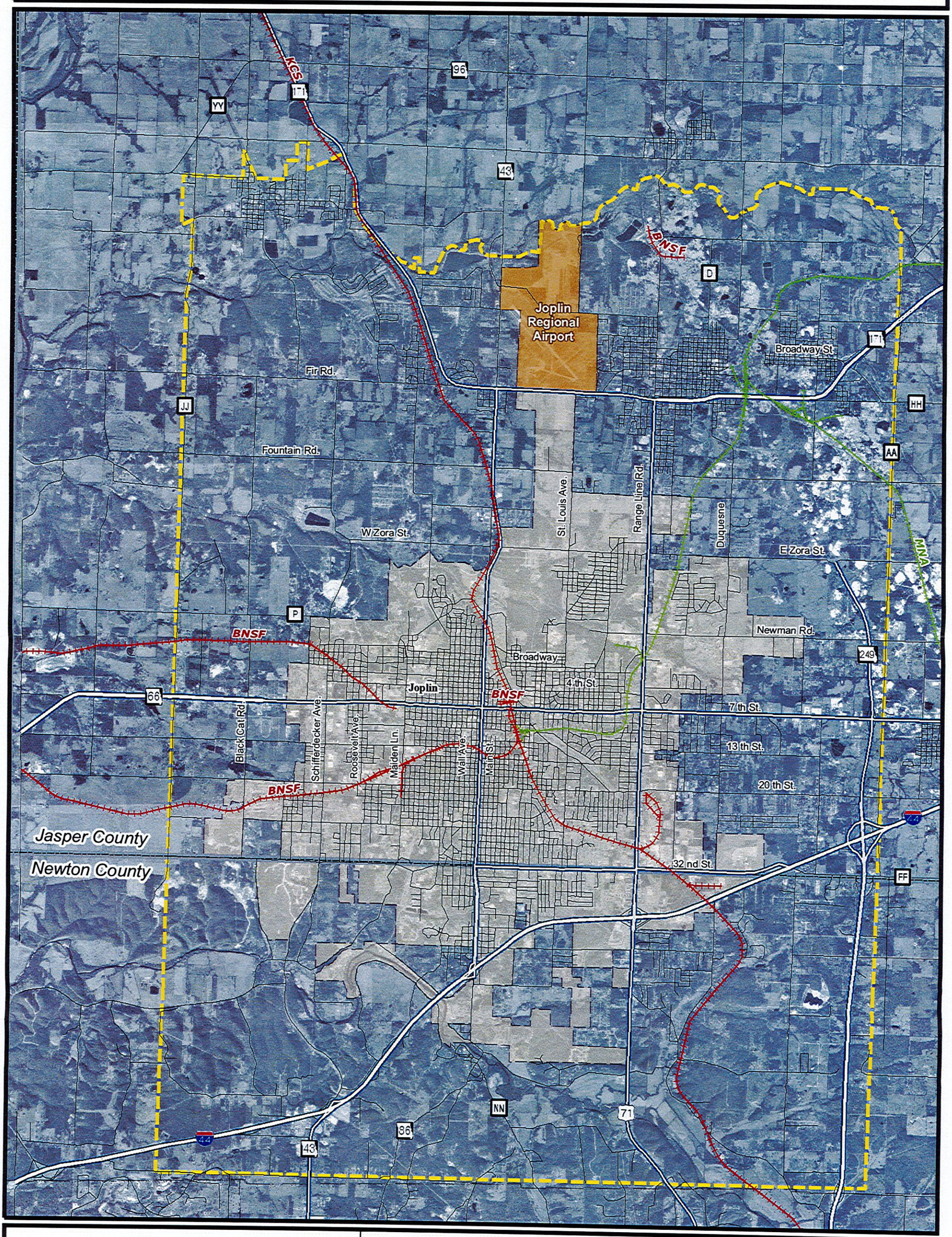


EXHIBIT 2-5

Freight Network

Joplin Area Transportation Study Organization (JATSO)

HNTB

Legend

- Major Freight Corridors
- Airport
- Class 1 Railroads
- Non-Class 1 Railroads

Source: MoDOT (2004)

0 0.5 1 1.5 Miles

Appendix B: Public Involvement Materials

The Joplin West Corridor Purpose and Need Study has been developed in accordance with Federal Highway Administration (FHWA) Regulation 23 Code of Federal Regulations (CFR) 771, the procedures outlined in the FHWA Technical Advisory T6640.8A, FHWA's Purpose and Need Policy Memorandum dated September 18, 1990, and the joint FHWA/FTA Memorandum dated July 23, 2003, and Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section(s): [6002-6005, 6007, 6009, 6010]. Compliance with these regulations requires an effective public involvement program.

This appendix contains supporting materials pertaining to the Joplin West Corridor Purpose and Need Statement's public involvement activities. The materials in this appendix include the following:

1. Summary of Public Involvement Plan
2. Stakeholder List, Kickoff Letters, and Responses
3. Press Coverage
4. Joplin Area Transportation Study Organization (JATSO) Presentation – January 15, 2009

1. Summary of Public Involvement Plan

Public involvement is an important component of project development. Not only is public involvement the right thing to do, it is the law. There are numerous state and federal legal requirements associated with public involvement. For example, the National Environmental Policy Act (NEPA) and the FHWA require stakeholder involvement during planning and environmental processes.



NEPA requires an "effective" public involvement plan.

The purpose of public involvement is to share information and solicit ideas to develop the best possible approach to a project. It is important to stress that public involvement is a dialogue between the project team and the project's stakeholders. This means that each side is dedicated to listening and learning from each other. It is through this process of sharing ideas that public involvement achieves its goal of improving decision-making. There are numerous techniques to create an environment where a successful dialogue can flourish. Not all techniques are applicable to every project or situation.

This public involvement plan (PIP) establishes the approach and philosophy of MoDOT and the consultant study team for identifying and engaging the communities, officials, local citizens, and other potentially affected interests. The goals of the PIP are to provide a clear description of how the study team will solicit input, develop two-way communication with the public, document public opinions regarding the transportation planning process, and achieve informed consent for the study's findings and recommendations.

The work associated with the West Joplin Purpose and Need Statement was organized in terms of four general tasks. The public involvement activities of each task are summarized below:

a. Task 1 – Project Startup

For Task 1, public involvement efforts included the following:

- Coordination among project team technical staff (MoDOT, City of Joplin, Newton and Jasper Counties, JATSO, and CH2M HILL)
- Interviews with neighboring Department of Transportation (DOT) staff
- Identification of stakeholders
- Establishment of core project team and decision-making strategies

b. Task 2 – Data Collection

For Task 2, public involvement efforts included the following:

- Data requests from project team technical staff
- Development/dissemination of project kickoff letter to stakeholders
- Stakeholder follow-up and coordination
- Biweekly working sessions with core project team

c. Task 3 – Predictive Modeling/Establishment of Needs

For Task 3, public involvement efforts included the following:

- Stakeholder follow-up and coordination
- Biweekly working sessions with core project team

d. Task 4 – Produce Purpose and Need Statement

For Task 4, public involvement efforts included the following:

- Stakeholder follow-up and coordination
- Biweekly working sessions with core project team
- Summary of public involvement activities in the purpose and need document
- A working session to discuss the preliminary draft purpose and need statement

b. Task 2 – Data Collection

For Task 2, public involvement efforts included the following:

- Data requests from project team technical staff
- Development/dissemination of project kickoff letter to stakeholders
- Stakeholder follow-up and coordination
- Biweekly working sessions with core project team

c. Task 3 – Predictive Modeling/Establishment of Needs

For Task 3, public involvement efforts included the following:

- Stakeholder follow-up and coordination
- Biweekly working sessions with core project team

d. Task 4 – Produce Purpose and Need Statement

For Task 4, public involvement efforts included the following:

- Stakeholder follow-up and coordination
- Biweekly working sessions with core project team
- Summary of public involvement activities in the purpose and need document
- A working session to discuss the preliminary draft purpose and need statement

2. Stakeholder List, Kickoff Letters, and Responses

a. Initial Stakeholder List

This list was developed based on coordination among the core project team:

- Carl Junction School District
- Joplin School District
- Mid Central Contractors
- Jasper County Water Supply District 1
- Dean's Cabinet Shop
- Pittsburg State University
- Downstream Casino
- Quapaw Tribe
- Penn National Casino
- FMC West
- St. John's Hospital
- Freeman Hospital
- Jasper County
- Newton County
- Joplin Special Road District
- Joplin Area Chamber of Commerce
- Carl Junction Special Road District
- Joplin Area Transportation Study Organization
- Joplin Regional Airport
- Webb City, MO
- Reddings Mill, MO
- Loma Linda, MO
- Galena, KS
- Kansas Department of Transportation (KDOT)
- Oklahoma Department of Transportation (OKDOT)
- Will Rogers Turnpike Authority
- Wildwood Ranch

b. Kickoff Letter

July 1, 2008

Mike Alley
Chief, External Communications
Public Affairs Office
Fort Leonard Wood, MO 65473

Subject: West Joplin Purpose and Need Study
Jasper and Newton Counties, Missouri
MoDOT Job No. J7P0847

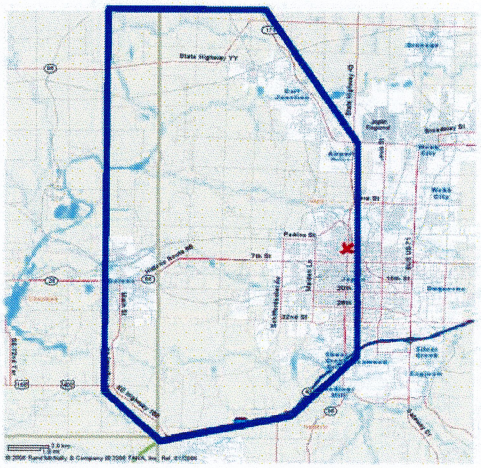
Dear Mike Alley:

The Missouri Department of Transportation (MoDOT) in conjunction with the City of Joplin has initiated a study to identify the transportation issues that may affect the western portions of Jasper and Newton Counties. A consultant team led by CH2M HILL of St. Louis is assisting with the study.

The purpose of this letter is to inform important stakeholders of the project and to initiate a mechanism for interested parties to provide input. In addition to the general contact information provided here, as the study progresses, you will have additional opportunities to provide direct input on the study's findings. We will publicize those events when they are scheduled.

Study Overview

The focus of this study will be to identify existing or future transportation problems. The clear definition of problems will allow for informed decision-making. This type of study is generally referred to as "Pre-NEPA" document. It will not look at solutions; it will however lay the groundwork for future projects that may generate and evaluate alternatives. The specific goals of the Purpose and Need Study are to:



- Identify the transportation problems that affect the study area.
- Investigate the parameters that may be important for determining how well future alternatives address the identified transportation problems.
- Establish logical termini, independent utility, and appropriate study areas. These are important precursors to any future project.

- Present the data (traffic, planning, engineering, and environmental data) that potentially affects the transportation problems. This data will also be vital to any future project.

Summary of Work Tasks

The collection, development and analysis of traffic, planning, engineering and environmental data is the primary task that will be undertaken during the West Joplin Purpose and Need Study.

- **Traffic Data** will be gathered from all available traffic forecasts in order to establish existing conditions. Traffic modeling will be used to estimate future traffic volumes.
- **Planning Data** will be collected from a multitude of sources. This data will provide important background information that will help characterize the study area. This will include crash locations and causes, applicable land use plans, comprehensive plans, and general plans that define the area and any other important community resource data available.
- **Engineering Data** will include cataloging existing vertical and horizontal alignments, important interchange data, design speeds, access management qualities, etc.
- **Environmental Data** will include gathering information about the study area from available sources. This will include natural resources, cultural resources, hazardous waste, and a range of socio-economic data.

We would be grateful to receive any input you have regarding existing or anticipated transportation problems in the portions of Newton and Jasper Counties west of Joplin. We also look forward to working with you as the study progresses. If you have any questions or comments, please contact us at the following locations.

Jerry Davis, P.E.
MoDOT
3901 East 32nd Street
Joplin, MO 64804
417-629-3377
jerry.davis@modot.mo.gov

Kevin Nichols, P.E.
CH2M HILL
727 North 1st Street, Suite 400
St. Louis, MO 63102
314.421.0900
kevin.nichols@ch2m.com

Sincerely,

Missouri Department of Transportation

Jerry Davis, P.E.
Project Manager

CH2M HILL

Kevin Nichols, P.E.
Consultant Project Manager

c. Responses

Brad Henry
Governor
Member Ex-Officio

Phil Tomlinson
Director
Secretary of Transportation

OKLAHOMA TURNPIKE AUTHORITY

3500 Martin Luther King Ave. P.O. Box 11357 • Oklahoma City, OK 73136-0357 • 405/425-3600 • Fax:405/427-8246 • www.pikepass.com

July 23, 2008

Mr. Jerry Davis, P. E.
MoDOT
3901 East 32nd Street
Joplin, MO 64804

Re: West Joplin Purpose and Need Study Jasper and Newton Counties, MO DOT, Job No. J7P0847

Dear Mr. Davis,

Thank you for your notification to this office regarding the referenced needs study. We previously provided you with traffic data last year for the Will Rogers (I-44) Turnpike. Advise us when you need to have that information updated.

The Oklahoma Turnpike Authority plan to construct a Port Entry at approximately MP 326.5 west bound within the next 3 to 5 years. If you need information about that facility please contact the office.

Sincerely,

Jim Hazeldine
Assistant to the Director

cc: Tim Stewart, Chief Operating Officer
Gordon Johnson, Director of Engineering

KANSAS
DEPARTMENT OF TRANSPORTATION

Kathleen Sebelius, Governor
Deb Miller, Secretary

http://www.ksdot.org

July 23, 2008

Jerry Davis, P.E.
Project Manager
Missouri Department of Transportation

Wildwood Ranch Development, Inc.

August 18, 2008

Jerry Davis, P. W.
MoDot
3901 East 32nd Street
Joplin, MO 64804

RE: West Joplin Purpose and Need Study

Dear Jerry,

I am writing today in support of a By-pass that would serve the west side of Joplin in Jasper and Newton Counties.

As the developer and stakeholder in **Wildwood Ranch**, a 2064 acre Master Planned Community, west of Joplin. I am happy to provide information and will be interested in receiving updated information on the progress and findings of the study.

Personally, I believe that with the growth of Joplin's Medical community, **Wildwood Ranch Development**, Downstream Casino and the potential of another casino being built in Cherokee County, the current infrastructure will prove to be insufficient. We have already seen traffic double on 20th street, near the development, and feel that it will continue to increase as we begin to build. I feel certain that within the next 3 to 5 years, 300 to 1000 people and several businesses ranging from Professional Office to Assembly/Manufacturing employing 100-600 people could easily call **Wildwood Ranch** home increasing the need for better transportation in and around Joplin's west side.

I have enclosed a copy of our Conceptual Plan and if I can be of further assistance please let me know.

Respectfully

James "Jimmer" Pinjuv
Wildwood Ranch

TELEPHONE CONVERSATION RECORD

From: Jerry.Davis@modot.mo.gov [mailto:Jerry.Davis@modot.mo.gov]
Sent: Wednesday, July 09, 2008 9:16 AM
To: Nichols, Kevin/STL
Subject: response from Carl Junction School District, West Bypass

Received a call from Phil Cook Superintendent of Joplin School District in response to our Stakeholders letter.
His comments:
the area is growing rapidly as far as new housing. The school district is averaging a growth of 85 students per year for the last 12 years.
Cedar Ridge is a subdivision that is growing rapidly.
If the Wildwood development gets started they we look at putting a new school in the area.
The School district has paid Tri-State Engineering to develop a scattergram of the students last year and would share with us if needed.
He would be willing to provide whatever information he has available to us.

Jerry Davis, P.E.
Transportation Project Manager
Missouri Department of Transportation
District 7, 3901 East 32nd Street
Joplin, MO 64802
Phone 417-629-3377
Fax 417-629-3314

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TELEPHONE CONVERSATION RECORD

From: Jerry.Davis@modot.mo.gov [Jerry.Davis@modot.mo.gov]
Sent: Tuesday, July 22, 2008 1:59 PM
To: Nichols, Kevin/STL
Subject: response to stakeholder letter

Kevin,
This is the second response to the stakeholder letters.
Penn National is the gaming company in Kansas that has not built yet near Exit 1 north side I44.
Wayne who is with Shafer, Kline & Warren, Inc , was forwarded the letter from Penn National and asked to respond.
In our phone conversation he said that they would certainly view a west corridor as a benefit to the property owned by Penn National.
He would like to be notified of any upcoming meetings or developments.

Jerry Davis, P.E.
Transportation Project Manager
Missouri Department of Transportation
District 7, 3901 East 32nd Street
Joplin, MO 64802
Phone 417-629-3377
Fax 417-629-3314

----- Forwarded by Jerry P Davis/D7/MODOT on 07/22/2008 01:51 PM -----

"Whitehead, Wayne" <whitehead@SKW-INC.COM>
07/21/2008 11:35 AM

To <jerry.davis@modot.mo.gov>
cc "Norman Nelms" <Norman.Nelms@pngaming.com>, "Vandelicht, Gary" <vandelicht@SKW-INC.COM>
Subject West Joplin Purpose and Need Study

Jerry:

As I mentioned to you in phone conversation a few minutes ago, Penn National Gaming referred your Stakeholder letter dated July 7, 2008 to me. We have been working on Transportation & Traffic issues
with Penn National on the new gaming facility. If we can be of any assistance to you as you move forward
with this study, please do not hesitate to contact us.

R. Wayne Whitehead, P.E.
Director at Large
Shafer, Kline & Warren, Inc
Office: 573-214-0335 / Cell: 660-281-1050
E-mail: whitehead@skw-inc.com

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TELEPHONE CONVERSATION RECORD

From: Jerry.Davis@modot.mo.gov [mailto:Jerry.Davis@modot.mo.gov]
Sent: Friday, August 08, 2008 3:30 PM
To: Nichols, Kevin/STL; Matthew.Burcham@modot.mo.gov; Timothy.Redmond@modot.mo.gov; tbolande@joplinmo.org
Subject: contact with George Dockery KDOT

Kevin,
I was able to chat with Mr. Dockery about the West Corridor Purpose and Needs Study and try and clarify the issue about the future of Rte 400 tying into I44. KDOT's study is just beginning so they really don't have much data to share a this point. They were somewhat concerned about capacity issues if they tied into I44 and we did the same at mile marker 1. He said that he thought that KDOT would rather partner with MoDOT since tying into I44 on the OK side would involve the toll road and possibly Indian territory. I mentioned that the OK Turnpike Authority mentioned that they plan to construct a port entry at MP 326.5. This appears to be straight south of western boundary of our study area at S Rd 680. He did not seem to be aware of this.

Jerry Davis, P.E.
Transportation Project Manager
Missouri Department of Transportation
District 7, 3901 East 32nd Street
Joplin, MO 64802
Phone 417-629-3377
Fax 417-629-3314

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3. Press Coverage

Chamber official: Study suggests increase in traffic entering Joplin

— By Wally Kennedy
wkennedy@joplinglobe.com
Joplin is a commuter town.
A new study of traffic origination and destination, undertaken in October 2007, suggests a 26 percent increase in external traffic since the last traffic study was conducted in 1999.
The estimated total number of trips entering and exiting the Joplin area has increased from 152,738 daily in 1999 to 191,842 daily in 2007, according to the ETC Institute, which conducted both the 1999 and 2007 studies for the Joplin Metropolitan Planning Organization. Joplin, Carl Junction and Webb City are members of that organization. Based on the study, representatives of the organization estimate that the metropolitan area's population swells to 220,000 on a daily basis, up from 200,000 in 1999.
Chris Tatham, representing ETC, said Joplin is an unusual place when compared with other metropolitan areas.
"We have done 20 or so of these traffic studies, including places like Kansas City, Buffalo (N.Y.), Raleigh-Durham (N.C.) and Fayetteville (N.C.), and we have never seen anything quite like Joplin," he said.
"Joplin is not a large city, but it provides employment for an area that is much larger than itself. Joplin is a significant employment center. More people are coming here than actually live here."
The results of the new study were released Thursday during a committee meeting at Joplin City Hall. Gary Shaw, a member of the Joplin City Council, was among those attending.
"I think it looks positive for Joplin," Shaw said. "We've got more people coming to Joplin than ever before."
Rob O'Brian, president of the Joplin Area Chamber of Commerce, said the traffic increase reflects the population growth that has occurred in the area, and the growth in the retail sector that includes restaurants, new storefronts and the medical community.
"Joplin is reaching out and drawing people in," O'Brian said. "When we get calls from real-estate brokers and consultants who are looking for new retail locations and small-business sites, we can use this study to show them we are not a small, Midwestern city of 47,000 to 48,000 people.
"This study shows them the traffic count in the immediate Joplin area on a daily basis. It really speaks to what the real market is. When we say Joplin serves a market that is as far away as an hour, a market that is 400,000-plus people, we can back it up with this traffic study. Joplin serves a bigger market than just itself."
Officials say the study suggests that on any given day, an estimated 115,000 to 118,000 people who live outside the immediate area enter the Joplin area. Nearly 40 percent of them come here to work or to do something that is work-related. About 17 percent of the trips were for shopping.
The 115,000 to 118,000 estimate is based on 96,902 inbound vehicles per day. The study suggested that 85 percent of the people in those vehicles were not residents of the metropolitan area. The average vehicle occupancy was 1.43 people.
The study cost $80,000. Eighty percent of the cost was covered by federal transportation planning funds, according to Troy Bolander, Joplin's city planner. The city of Joplin

More studies

David Hertzberg, Joplin public works director, said a copy of the report will be sent to the consulting firm that is doing a purpose-and-need study for the west bypass corridor study.

Highway finally ready

10/6/08
Print this story
Towns anticipate opening of corridor, Highway 249

By Wally Kennedy

wkennedy@joplinglobe.com

CARTERVILLE, Mo. - Carterville Mayor Dale Davenport's patience is about to pay off. The high-speed interchange for Missouri Highway 249, the Range Line bypass, is to open today, marking the completion of the $78 million project that began in 1993.

"Oh, yeah, we're ready for it," Davenport said. "I think it's going to open up all kinds of opportunities for business and manufacturing that we desperately need. We need the sales-tax revenue and the jobs.

"The people here will have to adjust. We're a small town, and that's what's neat about our town, but change is coming."

Davenport said it's only a matter of time before Carterville will flourish.

"Now, it's Carterville's time," he said. "The value of the property around the highway will go up, and we again will be a thriving community like it used to be. We want our town to grow and prosper. We used to be on top of a lead mine. Now, it's a gold mine."

Davenport and other mayors along the Highway 249 corridor know that someday Highway 249 will become Interstate 49, a four-lane, divided highway stretching from Baton Rouge, La., to Kansas City.

When Webb City Mayor John Biggs was asked how far away the town is from extending water and sewer services to Highway 249, he said: "It's $2 million away. We want to extend water and sewer along the 17th Street corridor. We're working on that."

Biggs echoed Davenport's belief that the economic potential for development is vast.

"That area will be great for manufacturing," he said. "You can ship product from there to anywhere in the United States. It's near the center of the country and two major arteries, Highway 71 and Interstate 44. There's lots of land and lots of people to work. We have a low cost of living, and low cost of water and sewer. We're in great shape to bring somebody in here who is involved in manufacturing or distribution."

Webb City will seek the construction of an interchange for East 17th Street.

The bypass, Biggs said, will make it much easier and convenient for Webb City residents to get "to all points south, including Newman Road, the college, and to 32nd Street and all the good restaurants."

Like Davenport, he said, "They built this high-speed interchange for one reason: to handle the traffic on what will be Interstate 49."

Bob Nichols, a resident of Webb City, said a grant from the U.S. Environmental Protection Agency paid for the creation of a development plan for the Highway 249 corridor. Noting the presence of lead and zinc mining sites along the 6.2-mile corridor, the plan suggests that the land be developed for industrial and commercial purposes. Residential construction, Nichols said, would be on the fringe of the corridor and away from the mining sites.

"But, we have no ability to implement the plan without zoning," he said. "There is really no control in the area."

Jasper County is the main player. Joplin, Duenweg, Webb City and Carterville can influence some of the development through their zoning regulations. A study completed in 2005 suggested that the area is sparsely populated, with only 1,360 residents, according to the 2000 census.

Development of the area will require a substantial investment in infrastructure for roads, utilities and water and sewer lines. The study estimated that construction eventually could cost $42 million. The study projected that an initial expenditure of $15 million would get things started near the main interchanges at Zora Street, Newman Road and East Seventh Street.

Duenweg was the first community to benefit from the first phase of Highway 249 construction more than a decade ago, said Duenweg Mayor Russell Olds.

"We have put two miles of water mains and sewer up and down it," he said. "For a city our size, we are getting steady commercial and residential development. We are growing our infrastructure."

So far, the city has spent $3 million on infrastructure installation.

"We have land available for continuous development," Olds said. "We had to brace ourselves for the changes or get run over. My plan is we never stop. We need one more high-speed at Carthage, and Interstate 49 in this area will be done."

Noting Duenweg's position with regard to Interstate 44 and what will become Interstate 49, he said, "We are the crossroads of the crossroads."

West bypass next?

CH2M Hill, a Kansas City engineering firm, was hired by the city of Joplin as a consultant to determine the potential future traffic demands for a west bypass that would link the west side of Joplin, near the Kansas border, to Highway 249, according to David Hertzberg, public works director for the city.

The next phase of the project would be to select the route for the bypass, which possibly could be built along what now is Route J/Central City Road. The current study is funded by federal tax dollars.

As part of the west bypass, an interchange would be built over North Main Street at Zora Street.

The city, working with the Missouri Department of Transportation, is completing preliminary plans for that project, which would include first-phase design of the interchange and buying property for it.

The interchange likely would span a Kansas City Southern railroad bridge and the creek that runs alongside North Main Street near the current Zora Street intersection.

THE JOPLIN GLOBE
It's your world. We deliver it.

Consultant: Traffic volume warrants West Bypass

January 15, 2009 09:33 pm

— By Debby Woodin
dwoodin@joplinglobe.com

Traffic accidents will increase on secondary roads west of Joplin and economic development will be stymied if a West Bypass is not built, a consultant told a panel of transportation planners Thursday in Joplin.

Rob Miller, an engineering consultant with CH2M Hill in St. Louis, outlined the needs and purposes for a major north-south corridor on the west side of Joplin for members of the Joplin Area Transportation Organization Policy Committee. The group is composed of city, county and state officials who plan and approve transportation projects.

Miller said the Downstream Casino Resort will pull more and more traffic across Joplin, and that there isn't an adequate route for motorists traveling from highways north of Joplin to the west or southwest side of the city. Current roads are insufficient for the amount of traffic they carry, and for efficient travel between Joplin, Carl Junction and Galena, Kan., Miller said.

He said the findings of his study suggest that the lack of a West Bypass causes overuse of local roads. Those roads are not designed for fast-moving traffic, and the traffic controls such as "yields" and "stops" cause some dangerous conditions that contribute to traffic accidents, he said. He said the roads have above average accident rates.

City and state planners are working to eventually build a major road called the West Bypass that will link up with Zora Street and North Main Street to carry traffic from highways 71, 43 and 249 to the west side of Joplin. Work to widen the intersection at 32nd and Main Streets in Joplin also was discussed.

Scott Bachman, district planning manager for the Missouri Department of Transportation's office in Joplin, said the state will open bids Feb. 20 on the construction work. He said construction has been delayed because it took longer than expected for environmental-impact studies and right-of-way acquisition to take place.

The city of Joplin will start about two weeks after the state's bid opening to contract work to finish widening 32nd Street from Jackson Avenue to Main Street, said Jack Schaller, Joplin's assistant public works director.

Bachman also announced that the state would contribute some money to a city project to build a viaduct over Connecticut Avenue, north of 26th Street, for a train overpass. The state and the city are waiting on environmental-impact studies to be completed to proceed with the project, the panel was told.

The Joplin City Council recently was told that bids will be solicited this spring for the construction work.

The planning group approved a project to build sidewalks in a two-block radius of Kelsey Norman Elementary School at 28th Street and Kansas Avenue. Sidewalks are needed because two children have been hit by cars while walking to school in the area, the group was told.

A plan to place cameras over portions of Interstate 44 also was approved. Bachman told the group that the state uses the cameras in metro areas to view accidents and incidents on interstate highways so that officials can determine more quickly what action needs to be taken and what types of emergency assistance are needed.

It has not yet been determined exactly where the cameras will be placed. The state will study where the most incidents have taken place on the stretch of I-44 within Joplin's city limits.

Camera costs

It will cost about $267,000 to install five or six cameras using fiber optics along Interstate 44 to scout traffic

accidents and incidents on the highway in the Joplin metro area, a state engineer said Thursday.

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4. JATSO Presentation – January 15, 2009

On January 15, 2009, a presentation was made to the board of JATSO. The intent was to update them on the progress of the Joplin West Corridor Purpose and Need Study. This section contains the presentation, the meeting agenda, and the meeting sign-in sheet. A *Joplin Globe* article reporting on the meeting is contained in the press coverage portion of this appendix (**Appendix B.3**).

City of Joplin

AGENDA

JOPLIN AREA TRANSPORTATION STUDY ORGANIZATION
BASEMENT CONFERENCE ROOM
POLICY COMMITTEE
THURSDAY, JANUARY 15, 2009
1:30 P.M.

I. Meeting called to Order

II. Old Business

III. New Business

A. Presentation over the Joplin West Corridor Study – CH2M Hill

B. Safe & Sound Bridge Program - MoDOT

C. Update on the 32nd & Main Interchange Project - MoDOT

D. Update on the 25th & Connecticut Viaduct Project - MoDOT

E. Adoption of 2009-2012 TIP Amendments

a) Safe Routes to School Project (City of Carterville) – MoDOT
(Vote will be needed)
b) Enhancement Project – MoDOT
(Vote will be needed)
c) Transportation Project – MoDOT
(Vote will be needed)
d) Administrative Amendment for the Joplin Airport – MoDOT
(Vote will not be needed)

F. Functional Classification Review - MoDOT

G. Adoption of 2009-2012 UPWP Admendment

a) JATSO staff (Vote will be needed)

IV. Other Business

A. Update on the Website Development – JATSO Staff

B. Review on the Public Involvement Plan (PIP) - MoDOT

V. Adjournment

The meeting will be at Joplin City Hall in the Basement Conference Room, 602 Main Street, Joplin, Missouri.

NOTE: **If you are in need of disability related auxiliary aids or services, contact our Joplin ADA Coordinator at 624-0820, Ext. 210, or the Joplin City Clerk's Office at 624-0820, Ext. 220. Kindly give us forty-eight (48) hours notice to arrange for the aids or services. TTD Number (417) 625-4774.**

West Joplin Purpose and Need Study
MoDOT Job No. J7P0847



Presentation Outline

1. Project history
2. Scope and goals of project
3. Traffic modeling
4. Summary of purpose and need statement

1. Project History

- Timeline of this project
- Regional planning environment
- Statewide planning environment

Timeline of this Project

Important startup events:

- Regional origin and destination study (O/D Study): March 2008
- Authorization to proceed: April 2008

Timeline of this Project (continued)

West Joplin Purpose and Need Study: 4/08 to 3/09

- Startup
- Data collection
- Modeling
  - Early development
  - Intermediate development
  - Forecasting
- Needs assessment

Regional Planning Environment

- Completion of Route 249
- Downstream casino resort
- O/D study
- Western bypass

West Joplin Purpose and Need Study
MoDOT Job No. J7P0847



Statewide Planning Environment

- I-44 Purpose and Need Study
- I-70 Supplemental Environment Impact Statement (EIS)

The Problems on I-44

1) Roadway capacity is becoming inadequate
2) There is a perception that safety is degrading
3) Interchanges along I-44 have deficiencies
4) Increases in freight are affecting operation
5) Inconsistencies with evolving design standards
6) Potential for positive and negative impacts to some of the state's most valuable resources

The I-70 Experience may be Illustrative

- First tier studies (1999 -2001) identified statewide need for reconstruction and additional capacity.
- Second tier studies to develop preferred alternatives concluded in 2006.
- Currently, the I-70 Supplemental EIS is investigating the impacts of truck-only lanes.
- Project web site: www.improvei70.org

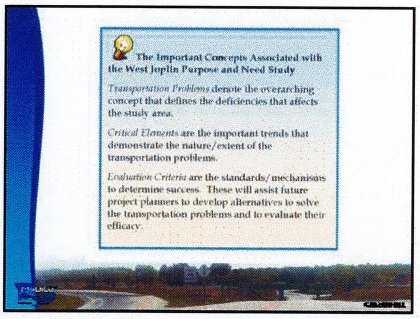
2. Scope and Goals of Project

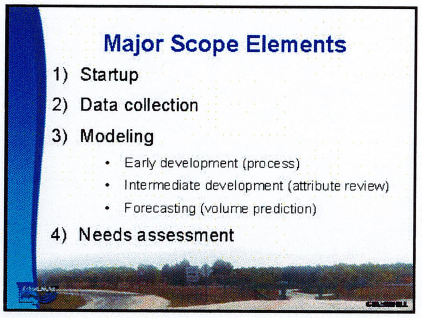
- What is a purpose and need study?
- Scope for this project and workflow

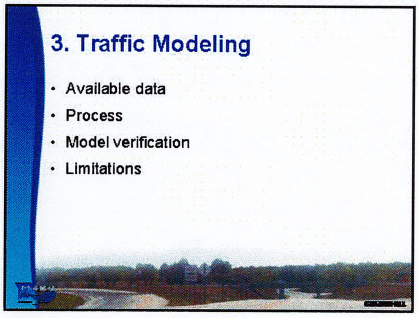
Elements of a Thorough Purpose and Need Statement

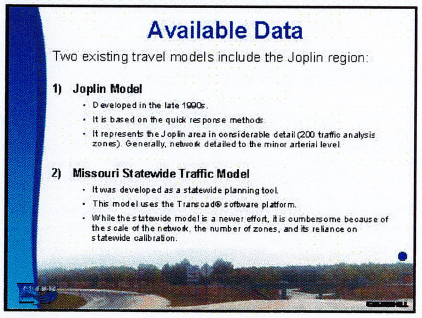
- According to MoDOT and FHWA, a thorough purpose and need will:
  - Identify and quantify the problem
  - Address logical termini
  - Not restrict other transportation improvements in the study area

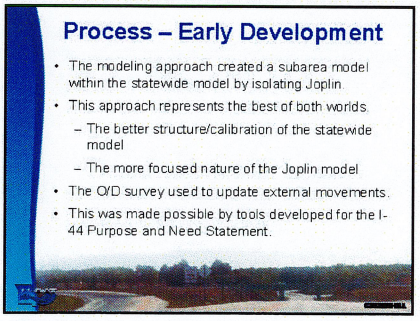
West Joplin Purpose and Need Study
MoDOT Job No. J7P0847

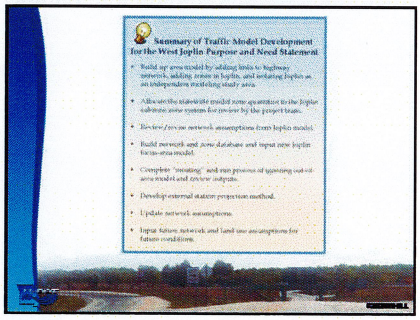












3

West Joplin Purpose and Need Study
MoDOT Job No. J7P0847

Process – Attribute Review

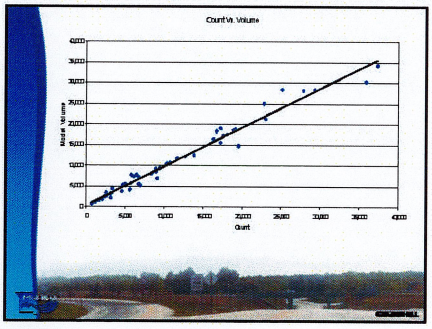
The project team reviewed and updated the model's primary inputs:

- Demographics
  Total population/households/automobiles/jobs
- Roadway network
  Speeds/lanes/access control/turn lanes
- Access connections
  Centroids and access pathways

Verification

For the purposes of the West Joplin Purpose and Need Statement, the model was determined to be adequate. The verification report concludes:

"The majority of counts located within the greater Joplin area are closely represented by the output volumes from the model."



Limitations

While the modeling conducted for the West Joplin Purpose and Need Statement was determined to be adequate for its intended use, it needs to be recognized that not all locations meet all FHWA criteria. This can be readily explained by the relatively low counts at the collector level and the incomplete representation of local streets in the network.

4. Summary of Purpose and Need

- Transportations problems
- Critical elements
- Evaluation criteria

The Important Concepts Associated with the West Joplin Purpose and Need Study

Transportation Problems denote the overarching concept that defines the deficiencies that affects the study area.

Critical Elements are the important trends that demonstrate the nature/extent of the transportation problems.

Evaluation Criteria are the standards/mechanisms to determine success. These will assist future project planners to develop alternatives to solve the transportation problems and to evaluate their efficacy.

West Joplin Purpose and Need Study
MoDOT Job No. J7P0847

Transportation Problem #1

Proposed access goals create discontinuities

Planning in Joplin envisions a future where access patterns better support community goals. The region's major planning documents specify a pedestrian-friendly downtown. To achieve these goals, vehicular traffic will be constrained. This will create discontinuities.

Critical Elements

Associated with Transportation Problem #1: Proposed Access Goals Create Discontinuities

- Speed reductions and truck restrictions on Main Street will force through traffic to take another north/south corridor.
- Speed reductions and truck restrictions on Main Street will increase the percentage of trucks in the traffic stream on local roadways.
- The growth in traffic projected for the future is expected to create an unbalanced eastward development bias that will degrade existing north/south corridors.

Critical Elements

Associated with Transportation Problem #3: Development is Affected by Mobility Deficiencies

- Negative community development consequences - without a western north/south corridor, inappropriate traffic on "local" roadways will increase.
- Negative economic development consequences - without a western north/south corridor, inadequate capacity will constrain economic development.
- Negative consequences to the I-44 interchanges - without a western north/south corridor, traffic utilizing Joplin I-44 interchanges will increase.

Transportation Problem #2

Roadway designs inadequate for users

Currently, many of the roadways in western Joplin experience above average crash rates, apparently due to roadway designs that are increasingly inadequate to the number and types of vehicles using them. Expected future growth and planned downtown pathway redistributions are expected to exacerbate this condition.

Critical Elements

Associated with Transportation Problem #2: Roadway Designs Inadequate for Users

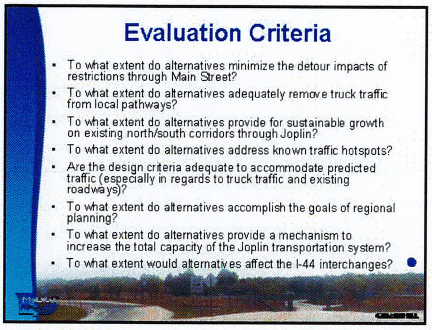
- Records indicate that some vital transportation corridors in Joplin have above average crash rates.
- A review of existing conditions concluded that the design parameters of the roadways in western Joplin are adequate for only low traffic volumes. As volumes increase (and are redistributed) they will increasingly be inadequate to the users.

Transportation Problem #3

Community and economic development is affected by mobility deficiencies

Unaddressed, the access discontinuities and traffic growth expected for western Joplin will create circumstances that will negatively affect community and economic development.

West Joplin Purpose and Need Study
MoDOT Job No. J7P0847



West Joplin Purpose and Need Study
MoDOT Job No. J7P0847

Transportation Problem #1

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Critical Elements

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Critical Elements

Associated with Transportation Problem #2: Roadway Designs Inadequate for Users

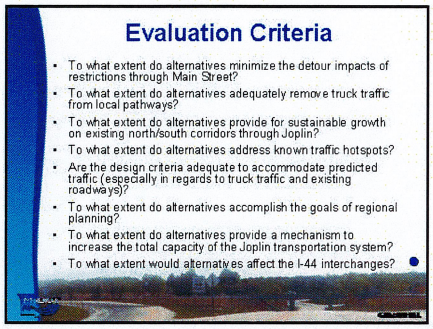
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West Joplin Purpose and Need Study
MoDOT Job No. J7P0847



Appendix C: Supporting Planning Documents

This appendix contains supporting materials pertaining to planning elements of the project. The materials in this appendix include the following:

1. Review of planning documents
2. Draft design guidelines
3. Environmental screening materials

1. Review of Planning Documents

Joplin is actively engaged in transportation planning to create a system where access patterns support community goals. The resulting planning documents form the bedrock for investigating the transportation-related conditions affecting Joplin. This planning process resulted in the inclusion of a western bypass into the Long-Range Transportation Plan (LRTP).

This review covers the following documents:

- The I-44 Purpose and Need Statement
- The City of Joplin Comprehensive Development Plan Update
- The Joplin Downtown Revitalization Plan
- The 2007 Regional Origin and Destination (O/D) Survey
- The Joplin Metropolitan Area Long-Range Transportation Plan

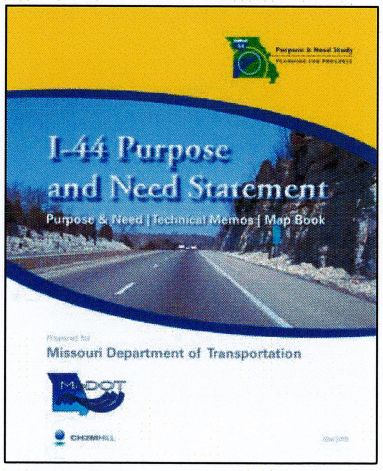
Planning and the Joplin West Corridor Purpose and Need Study

The Joplin West Corridor Purpose and Need Study will investigate the transportation problems that affect western Joplin, evaluate the consequences of a western bypass, and identify the evaluation criteria that will be important for determining how well bypass alternatives will address the identified transportation problems.

The evaluation of future conditions will utilize a design year of 2035 and include the projects contained in the LRTP – including the western bypass.

a. The I-44 Purpose and Need Statement

In 2007, using the I-70 experience as a guide, MoDOT began a statewide study of Interstate Route 44 (I-44) [1]. The goal was to determine the transportation problems associated with this major corridor and to lay the groundwork for potential future projects. The I-44 Purpose and Need Statement identified six main categories of transportation problems affecting I-44:



1) Roadway capacity is becoming inadequate for the expected demand.

2) There is a degrading safety environment on I-44.

3) Interchanges along I-44 have safety, operation, and geometric issues.

4) Increases in freight (trucks) are altering operations on I-44.

5) Evolving engineering standards result in many parts of I-44 being inconsistent with current design standards.

6) Improvements to I-44 will have both positive and negative effects to some of the State's most valuable economic and natural resources. Balancing these effects will be an important factor that must be considered when selecting solutions.

---

[1] MoDOT committed to examining I-44 in a comprehensive way. Because of its statewide and national importance, I-44 was investigated in a manner that permits all problems to be well established/documented and all options to be fully considered. The first product of the Improve I-44 program was a purpose and need statement — a document defining the magnitude of the transportation problems. The statewide model was used extensively for this effort. See http://www.modot.org/i44planningforprogress/

Many of these issues apply to the Joplin area. **Table C-1** provides a summary of the conclusions from the I-44 Purpose and Need Statement relative to the Joplin area.

Another element of the I-44 Purpose and Need Statement was to identify areas along I-44 where problems, conditions, and needs were demonstrably similar. These areas might logically be considered future study sections (FSS). The FSS that encompasses Joplin (FFS #1) begins at Exit 1 and extends approximately 19 miles eastward to Exit 18 (US Route 71 North). **Figure C-1** shows the proposed I-44 FSSs across Missouri. The I-44 Purpose and Need Statement concludes that, "*this portion of I-44 will be strongly influenced by the future expansion of Joplin. The rapid planned and expected growth in the Joplin light industrial business community is a factor through this area.*"

FIGURE C-1

Proposed Future Study Sections (I-44 Purpose and Need Statement)

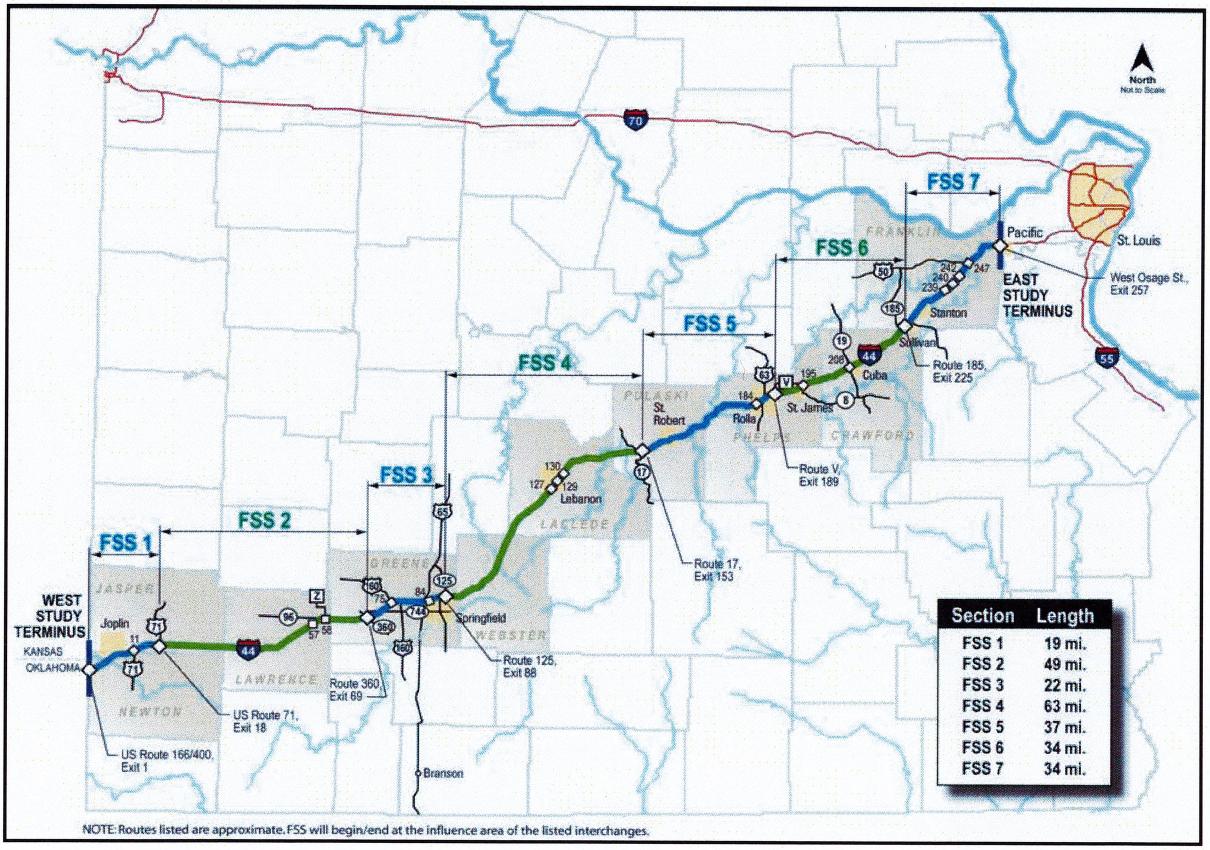


TABLE C-1
Transportation Problems Identified in the I-44 Purpose and Need Statement and Relevant Joplin-Area Data

I-44 Transportation Problems	Critical Elements/*Evaluation Criteria*	Joplin-Specific Data From I-44 Purpose and Need Statement	
		Location - Year	**Result (EB/WB)**
1) Roadway capacity on I-44 is becoming inadequate for the expected demand	Level of Service/ *LOS D (Rural) LOS E (Urban)*	Oklahoma to US-166 – 2035	E/E
		US 166 to Rest Area – 2035	F/E
		Rest Area to Weigh Station – 2035	E/E
		Route 43 to Route 86 – 2035	F/F
		Route 86 to Business 71 – 2035	F/F
		Route 66 to US 71 N – 2035	F/F
		US 71 N to 10th Rd – 2035	F/F
		10th Rd to Route 37 – 2035	F/F
		Route 37 to Route U – 2035	F/F
		Route U to Route 97 S – 2035	E/F
2) There is a degrading safety environment on I-44	Crash and Fatality Rates/ *Results Above Missouri Averages*	Newton County (2002 – 2006)	Urban Fatality Rate
		Newton County (2002 – 2006)	Rural Crash Rate
		Newton County (2002 – 2006)	Rural Fatality Rate
		Jasper County (2002 – 2006)	Rural Fatality Rate
3) Interchanges along I-44 have safety, operation, and geometric issues	Interchange Crash Rates, Level of Service and Geometry/ *Crash Hotspots, Merge-Diverge LOS, and Design Sufficiency*	Exit 1, US 66	Operation
		Exit 4, Route 43	Geometric
		Exit 6, Route 86	Operation/Safety
		Exit 8, Business Rt. 71	Operation/Safety
		Exit 11, US 71 South, 249 North	Safety
		Exit 15, Loop 44	Operation
		Exit 18, US 71 North, 59 South	Operation/Safety
4) Increases in freight are altering operations on I-44	Trucks have wide-ranging effects on I-44: they exacerbate congestion, they are sensitive to design-related issues, and they constitute a substantial component of the crash environment. This applies to the Newton/Jasper County portions of I-44, as well the entirety of I-44.		
5) Evolving engineering standards result in portions of I-44 being inconsistent with current design standards	Design Elements Including Widths, Curvatures, Grades, Clearances and Conditions/ *Corridor-Specific criteria Relating to Ensuring Safe and Efficient Movements*	Bridge – EB I-44 over Route 71	Poor Condition
		Bridge – WB I-44 over Route 71	Poor Condition
		Bridge – MO 66 over I-44	Poor Condition
6) Need to balance the access that I-44 provides with economic development and the preservation of natural resources	Acknowledgement/Support/ Preservation of Important Resources Associated with I-44/ *Seven important resources were identified for specific attention*	Historic Route 66	
		Branson	

b. The City of Joplin Comprehensive Development Plan Update

In 2004, the City of Joplin updated its **Comprehensive Development Plan**. To focus stakeholders, the plan identified three themes through which to discuss all of the planning goals and zoning issues encompassed by an effective Comprehensive Development Plan. These organizing themes were as follows:

1. Connection: How should circulation and movement be organized?

Among the goals, conflicts would be reduced between modes, different modes would be routed to appropriate pathways, and non-motorized modes would be facilitated or maximized.

2. Animation: How should the social and civic activities that constitute the city be organized?

One goal was to create distinct and identifiable gateways and districts, as well as to strengthen the community's institutions in various ways.

3. Renewal: How should the city use its resources to maintain itself?

Among the goals, incentives would be provided and policies instituted to encourage appropriate civic revitalization/redevelopment.

Using these themes, the Comprehensive Development Plan provided an inventory and a needs analysis for the resources associated with the plan, such as housing, parks, recreation, and land use. It also provided specific implementation strategies. **Table C-2** provides a summary of the Comprehensive Development Plan's themes, goals, and strategies. Relative to western Joplin, it can be inferred from the plan that there is generally adequate non-roadway infrastructure. For instance, electric, rail, and sewer systems are in place, but adequate roadways are needed for the anticipated or desired growth.

Another important element of the Comprehensive Development Plan was the introduction and conformity with the city's Downtown Revitalization Plan.

TABLE C-2 **Summary of Joplin Comprehensive Development Plan Update – Themes and Goals**	
Theme: Connection (circulation and movement)	
	Goal: Reduce the vehicular and pedestrian conflicts in business districts and in neighborhoods
	Goal: Encourage pedestrian connection to and within residential areas
Theme: Animation (organization of social and civic activities within the city)	
	Goal: Promote the use of signage, gateways, and landmarks to encourage on-street activity
	Goal: Strengthen retail activities and opportunities for expansion of commercial ventures in downtown
	Goal: Support residential stability by promoting and supporting living opportunities
	Goal: Promote affordable living by stabilizing existing neighborhoods
	Goal: Support social service programs and charitable housing opportunities
	Goal: Use landmarks and attractions to draw patrons to downtown and increase downtown activity
	Goal: Develop a major activity/community center within downtown
Theme: Renewal (how should the city maintain itself)	
	Goal: Invest in neighborhood incentives to revitalize targeted districts
	Goal: Develop strategies and incentives for renewal based on land use and compatibility
	Goal: Create opportunities for redevelopment and infill
	Goal: Use financial incentives to promote low- and moderate-income neighborhoods

c. The Joplin Downtown Revitalization Plan

Focusing on the area between 1st and 15th Streets/Grand and Sergeant Avenues, the Downtown Revitalization Plan initiated the use of the themes, later described in the Comprehensive Development Plan (see **Figure C-2**). It provides details regarding the design changes necessary to accomplish the connection, animation, and renewal goals of the plan. Relative to the Joplin West Corridor Purpose and Need Study, the most important ramification is the desire to restrict trucks and make other alterations to operations that will convert downtown streets to a more pedestrian-friendly condition. Main Street is a focal point for



Truck traffic is among the five top "connection" issues in the Downtown Revitalization Plan

"Main street is currently designated as a truck route, carrying a great deal of truck traffic through downtown. In the past, alternative routes through downtown have been developed and enforced, but have not been successful because of limited turning radii, limited site distances and conflicts created by uncontrolled intersections. An alternative truck route needs to be created to divert the trucks away from Main Street and downtown and minimize conflicts."

these changes—specifically the parts maintained by Joplin (between Route FF and Murphy Boulevard). These changes will have ramifications to the entire transportation network, which will be discussed throughout this document. **Table C-3** summarizes the important issues associated with the Downtown Revitalization Plan.

d. The 2007 Regional Origin and Destination Survey

In March 2008, the final regional O/D survey was published. This cordon/intersection survey was an update to a study conducted in 1999. The purpose of the study was to determine the travel characteristics and trends in the Joplin region. Using 26 stations that encircled Joplin, O/D data was collected. This data provides important information for general applications, as well as for the construction of the travel model created for this project. Details of the travel model are contained in **Appendix D**. **Exhibit A-5** (**Appendix A**) is a visual summary of the O/D survey, showing survey stations and the relative volumes. Some relevant facts from the O/D survey include the following:

TABLE C-3
Summary of Downtown Issues and Concerns – Joplin Downtown Revitalization Plan

Connection Issues	
	Off-street parking
	Nightlife and entertainment
	Consolidation of public buildings at 3rd and 4th Streets
	Truck traffic on Main Street
	Downtown identity
Animation Issues	
	Lack of a major activity center
	Unique identity for downtown
	Nightlife and entertainment
	Negative public perception of downtown
	Lack of cohesive land uses in downtown
Renewal Issues	
	Lack of major activity center
	On-street/off-street parking
	Brownfields
	Housing/lofts
	Incompatible uses

- 40 percent of trips passing through the cordon are work-related.
- 85 percent of the trips passing through the cordon are by people who do not live in the Joplin area.
- 15 percent of the vehicles passing through the cordon are registered to a state other than Missouri, Oklahoma, or Kansas.
- 29 percent of the trips can be described as through (as opposed to local) trips.
- 14 percent of the vehicles entering/exiting the cordon are commercial trucks. The distribution of local and through truck trips is roughly 50/50.
- The largest source of trips to the cordon is I-44.

e. The Joplin Metropolitan Area Long Range Transportation Plan

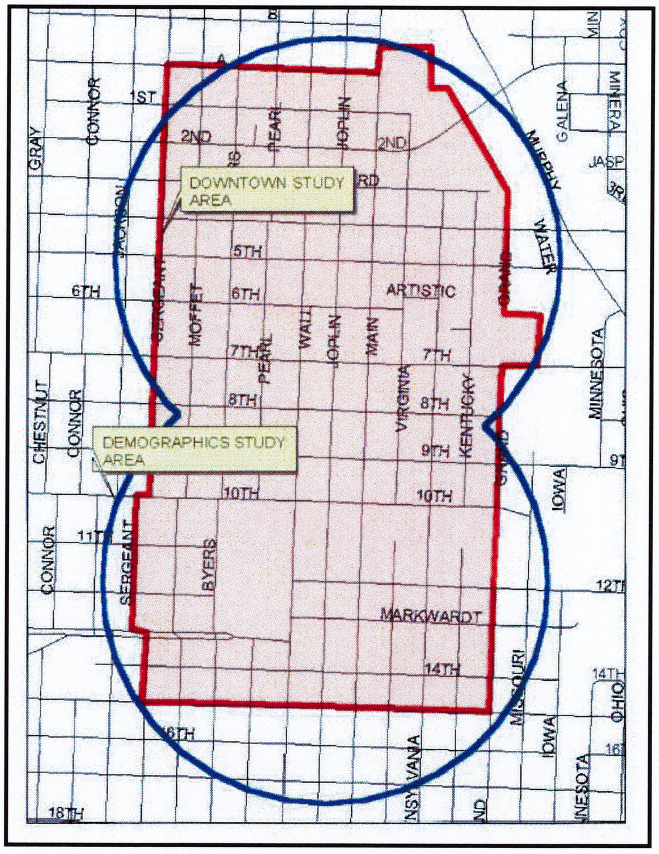
The LRTP serves as the "blueprint" for the Joplin metropolitan area's transportation system through the year 2025. Urban areas are required by the FHWA to have a Metropolitan Planning Organization (MPO) to coordinate long-range transportation planning. JATSO is the designated MPO for Joplin and the long-range plan represents its central organizing document. The broadest representation of the plan's intentions is its goals:

- Goal I – Provide for the development of a transportation system that is supported by and complements land development and enhances community development
- Goal II – Provide for the development and maintenance of an efficient and safer transportation system for the movement of people and goods
- Goal III – Be aware of and be able to adapt to technological and federal transportation policy changes
- Goal IV – Provide for a balanced transportation system that provides a choice of travel modes for different individuals and activities
- Goal V – Develop transportation improvement projects consistent with budget constraints
- Goal VI – Provide a transportation system that enhances economic vitality in the Joplin area
- Goal VII – Provide a transportation system that addresses the needs of persons without access to automobiles, including persons of low income or persons with disabilities
- Goal VIII – Maintain low environmental impact from the transportation system within the metro area

In contrast, the narrowest/most-specific representation of the plan's intentions is the list of *programmed projects* and *long-range projects*. Programmed projects are often

FIGURE C-2

Downtown Study Area from the Downtown Revitalization Plan



Predicting the Future

The modeling of future conditions was based on the programmed projects and the long-range projects listed in the Joplin Metropolitan Area LRTP.

The design year (future case) for the project is 2035.

To assist in determining the transportation problems affecting western Joplin, the future condition was modeled with, and without, the western bypass depicted in the LRTP.

referred to as committed projects. They are projects that are to be constructed in the near-term, generally included on the Transportation Improvement Program (TIP) or included in other dedicated funding mechanisms. Long-range projects can include future projects that have funding sources that may be defined or undefined. The traffic model created for this project (see **Appendix D)** utilizes the programmed projects and long-range projects as the basis for predicting future traffic conditions. **Figure C-4** depicts the programmed and future projects for the LRTP. The key map depicting the programmed and future projects is included in **Appendix A** as **Exhibit A-2**.

The western bypass is identified as a long-range project (Number 101).

FIGURE C-4

Programmed and Future Projects in the Long Range Traffic Plan

TABLE 3-1 PROGRAMMED PROJECTS

No.	Route	From	To	Length (Mi.)	Funding	Description	Cost
1	BU 71/ Range Line	Intersection w/ Rt. 66/ 7th	-	0.4	Safety, STP-Enhancement	Add turn lanes and revise geometrics and signals	$1,836,000
2	BU 71/ Range Line	Intersection w/ 20th St.	-	0.2	Safety, STP-Enhancement	Add turn lanes and revise geometrics and signals	$3,453,000
3	66	Duquesne Rd.	Rt. 249	1.6	STP, STP-Enhancement	Right-of-way acquisition and upgrade to four lanes	$105,000
4	249	Rt. 66	20th St.	1.0	STP, MoDOT	Grading, paving and bridges to add lanes for dual divided higl	$4,567,000
5	249	Rt. 171	Zora St	2.4	NHS, MoDOT	Grading and drainage for two lanes	$17,516,000
6	249	Rt. 171	Zora St	1.0	NHS, MoDOT	Grading, drainage, paving and interchange lighting	$8,816,000
7	249	Rt. 171	Zora St	2.4	NHS, MoDOT	Construction of bridges for two lanes	$16,994,000
8	Florida	Newman	Turkey Creek	0.25	Joplin Transporation Tax	Widening street to 3 lanes	$200,000
9	Florida	Bridge over Turkey Creek	-	-	Joplin Transporation Tax	Bridge construction	$1,000,000
10	Geneva	700'	2600' south of 20th	0.25	Joplin Transporation Tax	Purchase right-of-way and construction for Geneva extension	$1,200,000
11	32nd	Main	Jackson	0.5	Joplin Transportation 10 Year Tax	Purchase right-of-way and construction	$2,687,500
12	32nd	Intersection w/ Main	-	-	50% 10 Year Tax; 50% MoDOT matching	Intersection Improvement	$4,300,000
13	Connecticut	Murphy	30th	1.4	Joplin Transportation 10 Year Tax	Purchase right-of-way and construction	$6,450,000
14	Maiden	20th	32nd	1.0	Joplin Transportation 10 Year Tax		$2,150,000
15	Maiden	9th	17th	0.6	Joplin Transportation 10 Year Tax		$2,150,000
16	20th	Intersection w/ Main	-	-	Joplin Transportation 10 Year Tax	Intersection Improvement	$1,505,000
17	Connecticut	Viaduct at 26th	-	-	Joplin Transportation 10 Year Tax	Purchase right-of-way and construction of overpass	$4,300,000
18	Schifferdecker	7th	32nd	2.0	Joplin Transportation 10 Year Tax		$2,687,500
19	Murphy	Main	7th	1.8	Joplin Transportation 10 Year Tax		$1,671,625
20	Zora	Intersection w/ Main	-	-	20% 10 Year Tax; 80% Federal Funds	Purchase right-of-way and construction for interchange	$15,050,000
21	26th	Maiden	Schifferdecker	1.0	Joplin Transportation 10 Year Tax		$1,881,250
22	Zora	Range Line	Main	2.0	Joplin Transportation 10 Year Tax	Purchase right-of-way and construction for street widening	$2,150,000
23	Broadway/Buchanan	Florida	St. Louis	0.7	Joplin Transportation 10 Year Tax		$1,290,000
24	St. Louis	Broadway	Zora	1.5	Joplin Transportation 10 Year Tax		$1,827,500
25	CR190	32nd	I-44	-	Joplin Transportation 10 Year Tax		$2,150,000
						Total	**$107,937,375**

FIGURE C-5

Programmed and Future Projects in the Long Range Traffic Plan

TABLE 4-3 LONG RANGE PROJECTS

No.	Route	From	To	Length (Mi.)	Funding	Description	Cost
101	West Bypass	171	I-44	16.0	Unfunded	New highway construction with limited access	$150,000,000
102	171	Pennel	43	3.1	State/Fed	Widen road (2 to 4)	$9,820,800
103	Zora	Range Line	249	2.4	Local/STP	Improve and widen (2 to 4)	$7,603,200
104	Zora	West Bypass	Main	4.4	Local/STP	Improve and widen (2 to 4)	$13,939,200
105	Schifferdecker	66	Zora	2.1	Local/STP	Widen road (2 to 4)	$6,720,000
106	Duquesne	32nd	N 17th	2.1	Unfunded	Widen/reconstruct road (2 to 4/5)	$7,207,200
107	Hall	N 17th	Hawthorn	5.4	Unfunded	New roadway construction	$22,809,600
108	Range Line	Interchange w/ I-44	-	2.7	State/Fed	Reconstruct interchange	$15,000,000
109	43	Intersection w/ 171		1.0	State/Fed	Access management and intersection improvements	$2,000,000
110	171	Hall	Main	0.4	State/Fed	Access management and intersection improvements	$400,000
111	Range Line	171	I-44	2.7	State/Fed	Access management, signal coordination and intersection improvements	$2,700,000
112	43/86	32nd	I-44	6.5	State/Fed	Access management, turn lanes and intersection improvements	$15,444,000
113	Fir	Peace Church	171	1.3	Local/STP	Reconstruction and addition of turning lane	$2,402,400
114	Fir	Intersection w/ 171	-	1.5	Local/STP	Intersection improvement	$1,500,000
115	Newman	Range Line	249	0.4	Local/STP	Reconstruction and addition of turning lane	$739,200
116	7th	Maiden	Black Cat	2.8	Local/STP	Add turn lanes	$5,174,400
117	20th	West Bypass	Schifferdecker	2.0	Local/STP	Reconstruction and addition of turning lanes	$3,696,000
118	32nd	JJ	Schifferdecker	2.6	Local/STP	Minor roadway widening	$4,804,800
119	St. Louis	Zora	171	1.9	Local/STP	Minor roadway widening and addition of turning lanes	$3,511,200
120	St. Louis	Murphy	Broadway	2.0	Local/STP	Minor roadway widening and addition of turning lanes	$3,696,000
121	Peace Church	Zora	Fir	2.6	Local/STP	Roadway improvement	$3,432,000
122	Black Cat	Newton	66	2.1	Local/STP	Widen to 3 lanes	$3,880,800
123	Zora	Int w/ Main	-	2.0	10 Year Tax; Unfunded	Purchase right-of-way and construction for interchange	$15,050,000
124	17th	Oronogo	e/o Prairie Flower	1.3	Local/STP/unfunded	New roadway construction	$4,656,960
125	Carl Junction Rd.	Madison	Rt D	0.3	Local/STP	New roadway construction	$1,108,800
126	44th	Overpass at I-44	-	0.6	State/Fed	New overpass construction	$5,000,000
127	Route Z (Pennel)	YY	Rt 171	0.4	Unfunded	Reconstruct/widen (2 to 3)	$739,200
128	CR190	Interchage with I-44		2.3	Unfunded	Interchange	$15,000,000
129	FF	US-71	CR 190	1.0	Unfunded	Reconstruct/widen (2 to 3)	$1,848,000
130	Route 96	JJ	D	9.1	Unfunded	Access Management	$2,000,000
131	Route D	Hawthorne Rd.	Rt 96	2.0	Unfunded	Reconstruct/new bridge	$3,000,000
132	Route D	E Ivy Road		0.4	Unfunded	Intersection Improvement	$500,000
133	Route FF	Reinmiller		0.4	Unfunded	Intersection Improvement	$500,000
134	32nd	Davis		0.6	Unfunded	Intersection Improvement	$500,000
						Total	**$335,383,760**

2. Draft Design Guidelines

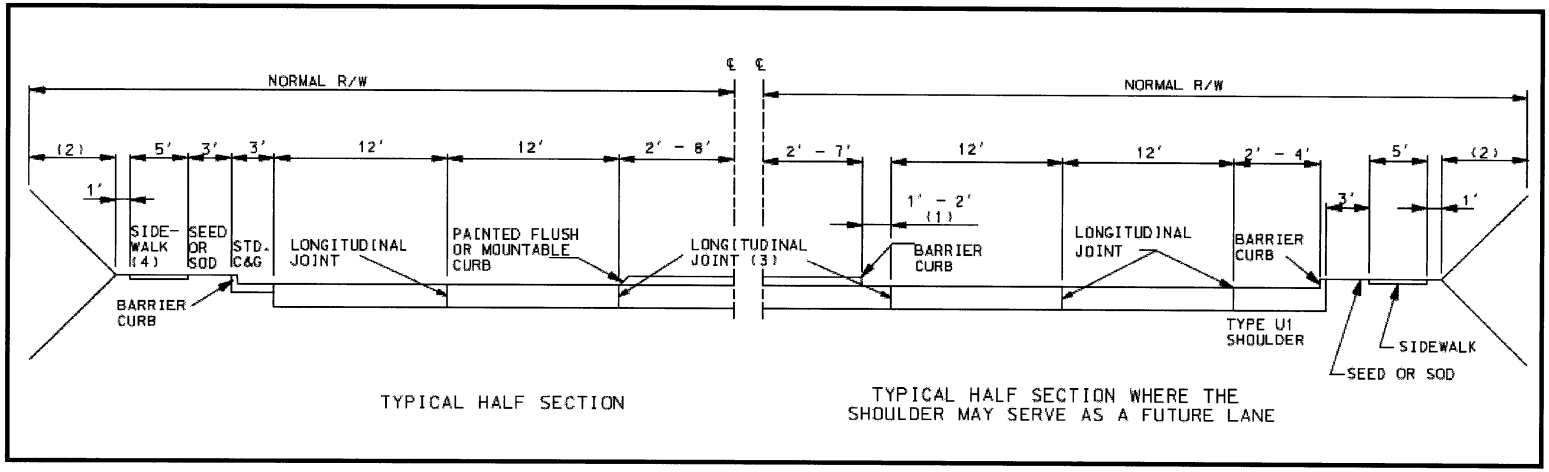
An important element to consider early in the purpose and need process is appropriate design guidelines for the project. The proposed design guidelines are outlined in **Table C-5** and include design speed, intersection/interchange spacing, right-of-way width, and horizontal and vertical curvature limits. These guidelines were developed using the guidance for practical design and the latest accepted practices of MoDOT.

The expected project design year will be 2035.

MoDOT classifications for the typical sections are shown in **Figures C-3 and C-4**. It is anticipated that an expressway typical section will exceed the needs of the proposed corridor and that a collector typical section will not provide enough capacity. Should this assumption be incorrect, additional sections and criteria will be developed.

FIGURE C-3

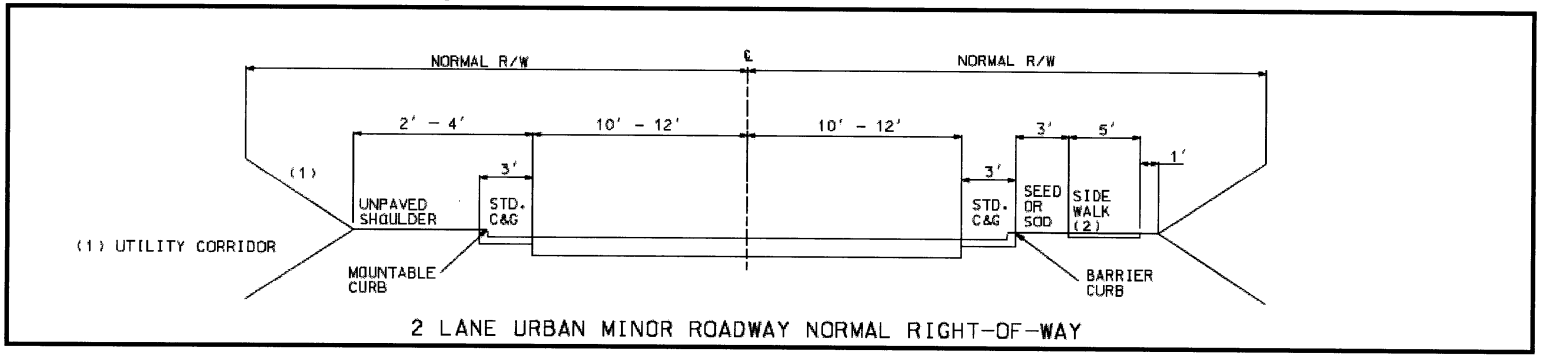
Four-Lane Minor Urban Roadway



1) A 1 foot offset is required from continuous barrier median to edge of through lane; a 2 foot offset is required from intermittent barrier median to the edge of the through lane.
2) Utility corridor
3) In one direction, the longitudinal joint at the median should be a Type M or L3 Joint. In the other direction, the longitudinal joint at the median should be a Type K or L2 Joint as shown on standard plan 502.05.
4) Type A3 shoulders are to be used for both inside and outside shoulders. However, a Type A1 shoulder is used if a future lane is pending.

FIGURE C-4

Two-Lane Urban Minor Roadway



1) Utility Corridor

2) Type A3 shoulders are to be used for both inside and outside shoulders. However, a Type A1 shoulder is used if a future lane is pending.

TABLE C-5
Joplin West Corridor – Proposed Design Criteria

DESIGN CONSIDERATION		
Functional Classification	Major Arterial	Minor arterial
Traffic Service Volume (2030)	TBD	TBD
Number of Lanes (Basic)[1]	4 or 6 Lanes	2 or 4 lanes
Anticipated Posted Speed[2]	50 mph	50 mph
Lane Width	12 feet	12 feet
Outside Shoulder Width	10 feet	8 feet
Safety Clear Zone[3]	22 feet	22 feet
Slopes (H:V): - Foreslope In Clear Zone - Foreslope Out of Clear Zone - Backslope	 6:1 4:1 Des./3:1 Min. 3:1	 6:1 4:1 Des./3:1 Min. 3:1
Maximum Horizontal degree of Curve[4] (superelevation)	6° 00 (R= 926 feet)	6° 00 (R= 926 feet)
Grade (Maximum)[5]	5 percent	5 percent
Crest Vertical Curve[6]	K = 84	K = 84
Sag Vertical Curve[7]	K = 96	K = 96
Passing Sight Distance[8]	1,835 feet	1,835 feet
Superelevation[9]	0.04 feet/foot	0.04 feet/foot
Pavement Cross Slope	2 percent	2 percent
Right-of-Way[10]	90 feet – 150 feet	90 feet – 120 feet
Intersection Spacing[11]	Minimum – 1/2 mile (2,640 feet) Maximum – 1 mile (5,280 feet)	Minimum – 1/8 mile (660 feet) Maximum – 1/4 mile (1,320 feet)
JATSO Functional Classification Descriptions from the Comprehensive Plan	The main function of an arterial street is to move large volumes of traffic from one place to another at a high speed, provide continuous linkages between major traffic generators, and serve as a transition roadway between major collector streets and expressways. Planned access is its secondary function. An arterial should be planned to have no residential lots fronting on it. Nonresidential uses may access an arterial street through a frontage road or strictly controlled entrance.	
Ditch Depth (Desirable) [12]	Sufficient to remove surface water without saturation of the subbase – including the pavement base.	

Notes:
1. Lanes depend on design year traffic forecasts.
2. MoDOT EPG Section 230.1.1 - Highways are designed according to their anticipated posted speed.
3. Refer to AASHTO "Roadside Design Guide"
4. Exhibit 3-15 – 2004 Policy on Geometric Design – AASHTO.
5. MoDOT EPG Section 230.2.1. Reference AASHTO Exhibit 7-2 for rural arterials – 2004 Policy on Geometric Design
6. Exhibit 3-72 – 2004 Policy on Geometric Design – AASHTO
7. Exhibit 3-75 – 2004 Policy on Geometric Design – AASHTO
8. Exhibit 3-7 – 2004 Policy on Geometric Design – AASHTO
9. If superelevation is used on crossroad in Urban Area, use 0.04 '/' as maximum superelevation.
10. CATSO 2025 Roadway Plan
11. MoDOT EPG 940.5 – At Grade Intersection Spacing
12. Guidance from MoDOT EPG, Section 231.6.1.1

3. Environmental Screening Materials

MoDOT policy requires a Request for Environmental Services (RES) at each stage in a project's development.

The RES process ensures that the necessary information for approvals and clearances from FHWA and environmental resource agencies are obtained. MoDOT staff examines the project and determine what environmental or historic preservation concerns, if any, are associated with the project. The goal of this process is to position projects to be compliant with environmental law and regulation before letting.

Lawrence L Ayres/SC/MODOT
06/13/2008 01:13 PM

To Jerry P Davis/D7/MODOT@MODOT
cc Toni M Prawl/SC/MODOT@MODOT, Randall D Dawdy/SC/MODOT@MODOT, Carolyn M Brockes/SC/MODOT@MODOT, Timothy.Redmond@modot.mo.gov@MODOT, Jane.Lee@modot.mo.gov@MODOT, Michael.Meinkoth@modot.mo.gov
Subject RES response for: Jasper Newton xyz, J7P0847

District: 07
County: Jasper/Newton
Route: xyz
Job No: J7P0847

Date of Request: 5/16/08
Date of Response: 6/13/08

Type of Project/Improvements: Purpose and Needs study

Right of Way and/or Easements needed: n/a

Cultural Resources Impacts:
We have reviewed the extant literature to identify potential cultural concerns within the study area. While there is not a tremendous amount of information about the study area, we have identified a variety of resources that should be considered as the study continues. These include old towns and communities that have existed, railroads, mines, cemeteries, Route 66, and some specific locations that may be of interest culturally. Only one archaeological site was identified that has been assessed as eligible (others certainly may be significant but additional investigations would be necessary to document that significance). Fourteen buildings or districts have been listed on the National Register of Historic Places (three additional ones have been determined as eligible for listing) but all of these are within Joplin. Unless an alternate is considered that would impact downtown Joplin, there will be little chance for this project to impact any of these resources.

Any alignments considered for this project will have some impact on cultural resources due to the location. Two larger streams (Shoal Creek and Turkey Creek) cross the entire study area from east to west. Both of these streams would have a high probability for archaeological resources. Linear resources such as US Route 66 and numerous early railroad grades will also be crossed. Other architectural resources (as well as archaeological resources) should be expected as the study moves forward. No bridges currently known to be historic were identified within the study area.

The two attached files provide a map and a list of most of the known cultural resources that may affect the placement of proposed alternatives.

Please let us know if additional information is needed.

Thanks
Larry Ayres
MoDOT Senior Historic Preservation Specialist
Lawrence.Ayres@modot.mo.gov
Ph. 573-526-7836 Fax. 573-526-1300

RES DATA SHEET

PROJECT STAGE:	**Initial Screening**		**DUE DATE:**	**6/20/2008**
CORE TEAM MEMBER(S):			**Letting Date:**	**No date scheduled at this time.**
JOB NO:	**XWALK:**	**COUNTY:**	**ROUTE:**	**LOCATION:**
7P0847	7P84701P	**Jasper/Newton**	**xyz**	on west side of Joplin metropolitan area.

NEPA CLASSIFICATION: **NEPA will be evaluated at the Loc/Concp stage of the project when more ROW information is available**

PROJECT DESCRIPTION: Study for need of a possible improved roadway in north/south connection west of Joplin, MO

ADD ROW:	**TEMP EASEMENT AC:**	**PERM EASEMENT AC:**
Unknown at this time.	Unknown at this time.	Unknown at this time.

DISPLACEMENTS:
Residential -
Commercial -

DISTRICT COMMENTS:

Environmental Screening and Possible Env. Or District Action

Threatened & Endangered Species This is such a broad corridor that it is difficult to review. However, there are rare mussels and fish in Shoal Creek, Center Creek, Turkey Creek, and the Spring River. There are also numerous caves within the limits defined on the RES. Finally, there are several unique natural communities identified in the area. Some of these communities may no longer exist. Field verification of all of these species and communities will be necessary. The biggest threatened and endangered species concern is with the sensitive species in the waterways.

Environmental Action: Conduct surveys once the corridor has been narrowed down.

District Action: Further define the corridor.

Hazardous Waste Impact WJW 6/13/08 Until ROW limits are determined, it is impossible to predict the impacts, however, the study area is within the limits of the Tri-State Lead / Zinc District National Priorities List Superfund Site. This region has a high occurrence of lead mines, smelters, haul roads, mine waste, mine shafts etc., and elevated lead levels and other heavy metals are frequently encountered.

Environmental Action: None until ROW limits are known.

District Action: If a hazardous waste site is encountered during the project, contact Bill Wilder, Hazardous Waste Specialist at (573) 526-2904.

Wetland Impact Possibly, wetland impacts could be associated with Shoal Creek and or Center Creek. It is likely that stream impacts could occur anywhere within the study area.

Environmental Action: Evaluate preferred alignment for impacts and obtain Section 404 permit.

District Action: Notify Wetland Specialist when preferred alternate is chosen and provide preliminary plans.

Cultural Resources Impact

We have reviewed the extant literature to identify potential cultural concerns within the study area. While there is not a tremendous amount of information about the study area, we have identified a variety of resources that should be considered as the study continues. These include old towns and communities that have existed, railroads, mines, cemeteries, Route 66, and some specific locations that may be of interest culturally. Only one archaeological site was identified that has been assessed as eligible (others certainly may be significant but additional investigations would be necessary to document that significance). Fourteen buildings or districts have been listed on the National Register of Historic Places (three additional ones have been determined as eligible for listing) but all of these are within Joplin. Unless an alternate is considered that would impact downtown Joplin, there will be little chance for this project to impact any of these resources.

Any alignments considered for this project will have some impact on cultural resources due to the location. Two larger streams (Shoal Creek and Turkey Creek) cross the entire study area from east to west. Both of these streams would have a high probability for archaeological resources. Linear resources such as US Route 66 and numerous early railroad grades will also be crossed. Other architectural resources (as well as archaeological resources) should be expected as the study moves forward. No bridges currently known to be historic were identified within the study area.

Historic Preservation Action:

District Action:

Air & Noise Impact

After considering the work that will be needed on current environmental documents and the general reduction in future work, Kathy Harvey has determined that Design will no longer have an air and noise quality specialist.

There will be times when you need help with evaluating the noise sections of environmental documents and you will work with an on-call consultant.

For air quality question please refer to Eric Curtit in the Planning Division.

District Action: **The District is responsible for complying with all Air and Noise environmental requirements.**

NOTE: Please inform us if the nature or scope of this project changes.

Cultural Resources that should be considered within the study area marked on the RES map

General

Mining (structural remains)
Railroads (historic lines)
Route 66
Cemeteries

Specific

Grand Falls (provided electrical power and water to Joplin in 1890s; Grand Falls Park completed in 1903; dam just above falls completed 1920s)

WPA Marker: A tri-state WPA marker erected during the Depression era marks the point where the Missouri, Kansas, and Oklahoma state borders meet. In correspondence from 1994, SHPO staff stated that if the marker retains integrity, it probably is eligible for the NRHP. No photos or maps further identifying the marker were found in the files; however, its location was described as about 100 yards from I-44 and not visible from the highway. Its existence/location has not been verified.

Ku Klux Klan Cave: large cave used by the KKK from ca. 1900-1940

Peace Church Cemetery: Cemetery founded in 1856 that was also used to bury Bill Cook, executed in the 1950's for the murder of 5 members of a family in Joplin. However, report by Time magazine (10/29/1952) states he was buried in Lone Elm, Kansas, approx. 100 miles northwest of Joplin.

Archaeological Sites: Only one known archaeological site was specifically identified as eligible for the NRHP. Numerous others have been recommended as eligible but would require additional investigations to determine their eligibility.

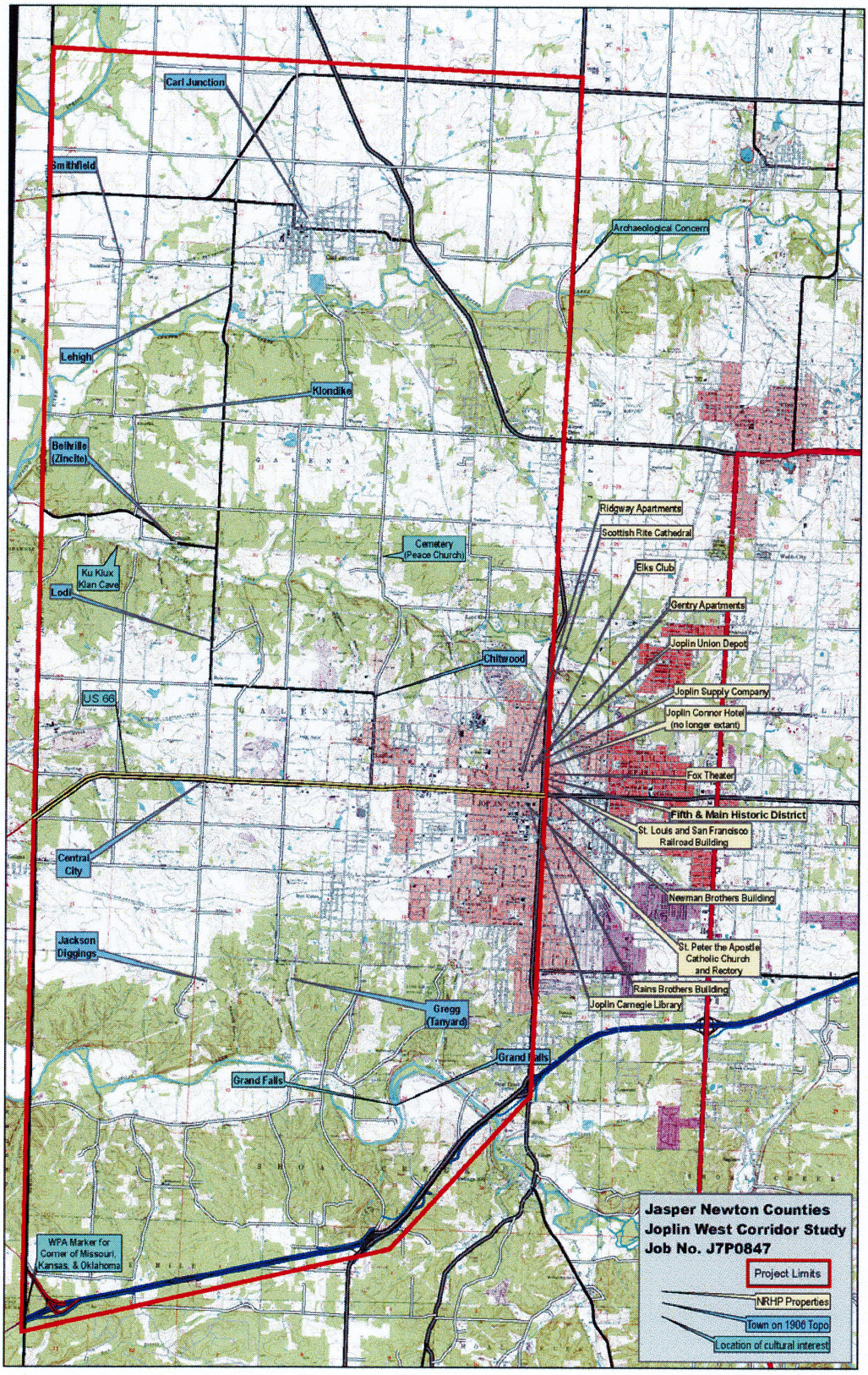
Architectural Resources: Three additional buildings have been determined eligible for the NRHP but as with the list below, all are located within Joplin. Unless an alignment was considered that went through the developed portions of Joplin, none of these would require further study.

NRHP: Buildings listed on the National Register of Historic Places

Elks Club Lodge #501, 318--320 W. 4th St., Joplin
Fifth and Main Historic District, 501-513 S. Main St., 502-508 Virginia St., Joplin
Fox Theater, 415 S. Main St., Joplin
Gentry Apartments, 318 S. Wall St., Joplin
Joplin Carnegie Library, 9th and Wall Sts., Joplin
Joplin Connor Hotel, 324 Main St., Joplin (No Longer Extant)
Joplin Supply Co. 228 S. Joplin Ave., Joplin
Joplin Union Depot, Broadway and Main St., Joplin
Newman Brothers Building, 602--608 S. Main St., Joplin
Rains Brothers Building, 906--908 S. Main St., Joplin
Ridgway Apartments, 402 and 404 S. Byers Ave., Joplin
Scottish Rite Cathedral, 505 Byers Ave., Joplin
St. Louis and San Francisco Railroad Building, 605 Main St., Joplin
St. Peter the Apostle Catholic Church and Rectory, 812 Pearl St., Joplin

Towns (Based on towns identified on 1906 topo)

Bellville (Zincite)
Jackson Diggins
Carl Junction
Joplin
Cave Springs
Klondike
Central City (Cagle)
Lehigh
Chitwood
Lodi
Greg (Tanyard)
Smithfield


Carl Junction
Smithfield
Archaeological Concern
Lehigh
Klondike
Bellville (Zincite)
Ridgway Apartments
Scottish Rite Cathedral
Cemetery (Peace Church)
Elks Club
Ku Klux Klan Cave
Lodi
Gentry Apartments
Joplin Union Depot
Chitwood
US 66
Joplin Supply Company
Joplin Connor Hotel (no longer extant)
Fox Theater
Fifth & Main Historic District
St. Louis and San Francisco Railroad Building
Central City
Newman Brothers Building
Jackson Diggings
St. Peter the Apostle Catholic Church and Rectory
Rains Brothers Building
Gregg (Tanyard)
Joplin Carnegie Library
Grand Falls
Grand Falls
WPA Marker for Corner of Missouri, Kansas, & Oklahoma
Jasper Newton Counties
Joplin West Corridor Study
Job No. J7P0847
Project Limits
NRHP Properties
Town on 1906 Topo
Location of cultural interest

Appendix D: Traffic Supporting Documents

This appendix contains supporting materials pertaining to the traffic modeling conducted for the Joplin West Corridor Purpose and Need Study. The materials in this appendix include the following:

1. Summary of Existing Traffic Models
2. Evaluation of Potential Traffic Modeling Approaches
3. Summary of the Traffic Modeling Process
4. Project Team Review – Demographics
5. Project Team Review – Roadway Network
6. Project Team Review – Access Connections
7. Verification Report

1. Summary of Existing Traffic Models

There are two usable travel models that include the Joplin region.

The first model is the Joplin model developed in the late 1990s. It is based on the quick response methods (documented in National Cooperative Highway Research Program [NCHRP] 185/365) and implemented using QRS II® software. For this project, model roadway networks developed for this model have already been converted from QRS II® to TransCAD® format. This represents the Joplin area in detail and is comprised of (including external cordon stations) about 200 traffic analysis zones (TAZs). Generally, networks are detailed to the minor arterial level and also represent significant collector facilities. Recently, a series of traffic counts, as well as a cordon intercept study, was conducted as an input to updating the model. This study (the 2007 Regional Origin and Destination Survey – O/D Survey) provides considerable detail regarding travel movements into and out of the Joplin area, as well as trips through the area. No information on local internal trip-making was collected.

The second model is the more recently developed the Missouri Statewide Travel Demand Model (MOSM), developed as a statewide planning tool with a network and zone system representing the entire state of Missouri. This model executes on the TransCAD® software platform and includes both a process and data management interface to simplify model execution for the user. The statewide model represents a newer effort and one that is familiar to the project team. The problems are (1) it is a cumbersome option because of the scale of the network and number of zones, (2) it may be less sensitive to travel behavior associated with the Joplin region because the model is based on a statewide calibration, and (3) ways to make use of the cordon intercept data recently collected need to be developed.

2. Evaluation of Potential Traffic Modeling Approaches

This section summarizes the evaluation of potential traffic modeling approaches for the West Joplin Purpose and Need Statement. This section also discusses the options considered, potential advantages, and drawbacks of each modeling approach.

In evaluating potential traffic modeling approaches, the major considerations were as follows:

- Adequacy of area network and zone representation
- Validity and robustness of models and overall representation of travel
- Ability to update and expand models based on potential new "edge" development and other changed parameters
- Quality and workability of user platform and interface for staff to execute necessary model runs and evaluation
- Compatibility with available off-the-shelf tools and procedures that could be useful in project analysis
- Quality, completeness, and readability of associated model documentation to ensure correct model implementation

Evaluation of the Joplin Model
The Joplin model is usable for planning level predictions, but some information about assumptions in the model is still needed. There is very little internal documentation of the process structure in the QRS II® software. It appears the original model was developed by HNTB, but there is no supporting documentation. Various tables and datasets are available but are ambiguous as to the categories and modeling process used. Apparently, the process was customized to specifically support the modeling in Joplin, but currently there is no documentation of the changes that were made. Also, the age of the model raises questions regarding the validity of any calibration parameters.

The existing network has been converted to TransCAD® and the geography standardized to latitude/longitude. This allows direct comparison and linking with the statewide model and will provide integration with GIS. The Joplin network appears to be more detailed than the statewide model, although additional zone and network detail could be added to the statewide model.

The O/D Survey seems to have been generated through internal-external trip tables for auto and commercial trips. The zone system applied in the survey appears to be the same one as the model (although numbering schemes are different). The following information is needed to apply this new data to the Joplin model: (1) trip purposes and vehicle class assumptions in the model, (2) updated trip generation data for the internal zones, and (3) instructions on how to apply the Joplin trip distribution model. This will provide a revised internal-internal distribution that when married with the O/D Survey tables will comprise all area trip making. This can be accomplished by converting the O/D Survey to trip tables independently or to a machine readable version (spreadsheet) of the data. Forecasting procedures for the external station trip tables will need to be created.

Evaluation of the Statewide Model (MOSM)
The statewide model represents a familiar and newer effort. The problems are (1) the scale of the network and number of zones that make this a very cumbersome option, (2) it is less sensitive to travel behavior associated with the Joplin region because the model is based on a statewide calibration, and (3) it may be possible to use the cordon intercept data to improve the model recently collected.

3. Summary of the Traffic Modeling Process

The proposed traffic modeling approach is to create a subarea model with the statewide model by isolating Joplin. This will require the use of the cordon intercept data to update the external movements. This approach will allow application of the statewide model framework to the Joplin subarea without substantive changes. It will also allow use of tools previously developed for the I-44 project and other TransCAD® based efforts.

This represents the best of both options because the better model structure/calibration of the statewide model is captured while the focused nature of the city model is retained. As an application framework, this approach may be of continuing interest to MoDOT as a way to capture their investment in the statewide model and demonstrate that it can be a platform for a greater variety of subarea and project modeling. From the local perspective, this could potentially yield a useful tool for regional and subregional efforts.

The schedule for the modeling effort had three phases:

1. Early Development Phase
    - Buildup area model by adding links to highway network, adding zones in Joplin, and isolating Joplin as an independent modeling study area (moating)
    - Allocate the statewide model zone quantities to the Joplin subzone zone system for review by the project team
    - Output geographic information system (GIS) plots of network assumptions from Joplin model for review by the project team
    - Complete early development phase
2. Project Team Review and Intermediate Development Phase
    - Build network and zone database and input new Joplin focus-area model during the 3-week review period
    - Complete "moating" around Joplin by breaking all links entering or leaving the area
    - Develop external station projection method (either by growing survey data or by reallocating survey data using cordon growth)
    - Conduct the project team meeting to update network assumptions from Step 1
3. Final Compilation and Forecasting
    - Input future network and land use assumptions for future conditions
    - Run model and review output results
    - Troubleshoot as needed
    - Complete forecasting

4. Project Team Review – Demographics

This section summarizes the review process conducted for demographic data associated with the traffic modeling process used for the West Joplin Purpose and Need Statement.

As summarized above, the proposed traffic modeling approach is to create a subarea model with the statewide model by isolating Joplin. This approach would allow application of the statewide model framework to the Joplin subarea without substantive changes. It would also allow use of tools previously developed for the I-44 project and other TransCAD® based efforts.

The first step of this process (the early development phase) involved the creation of a buildup area model by adding links to the highway network, adding zones in Joplin, and isolating Joplin as an independent modeling study area. The statewide model zone quantities were allocated to the Joplin subzone zone system.

For the best results, the preliminary data was offered to the project team for their review and consideration.

The key demographic parameters are as follows:

- Total population
- Number of households
- Number of automobiles
- Number of jobs broken into one of seven categories (retail, office, education, healthcare, manufacturing, entertainment, and other)

The project area has been subdivided into the 161 TAZs used in the original Joplin traffic model. These areas were also utilized by and referenced in the recently completed O/D Survey. The TAZ map is contained in **Appendix A**.

The form of the demographic data model is summarized in **Table D-1 and D-2**. For reference, TAZ 32 is a small zone west of downtown, along Route 66. It contains the West 7th Street Wal-Mart. **Table D-1** depicts the data contained in the model at the start of the project (year 2000). The relevant tasks were to update this data so that it was suitable to be considered as representative of existing conditions.

TABLE D-1
TAZ: 32 (existing)

			Jobs						
Population	Households	Automobiles	Retail	Office	Education	Healthcare	Manufacturing	Entertainment	Other
298	118	168	66	19	8	10	40	1	19

Table D-2 depicts the data contained in the model at the start of the project (year 2035). The relevant task was to update this data so that it was suitable to be considered representative of existing conditions in 2035.

TABLE D-2
TAZ: 32 (2035)

			Jobs						
Population	Households	Automobiles	Retail	Office	Education	Healthcare	Manufacturing	Entertainment	Other
391	162	244	93	27	12	14	56	1	27

5. Project Team Review – Roadway Network

This section summarizes the review process conducted for roadway network data associated with the traffic modeling process utilized for the West Joplin Purpose and Need Statement.

The primary attributes associated with the roadway network are as follows:

- Access control
- Presence of divided roadways
- Presence of center turn lanes
- Number of through lanes
- Free flow speed

Using graphical depictions of these attributes, the project team was able to review and update the attributes and coding of the roadway network.

6. Project Team Review – Access Connections

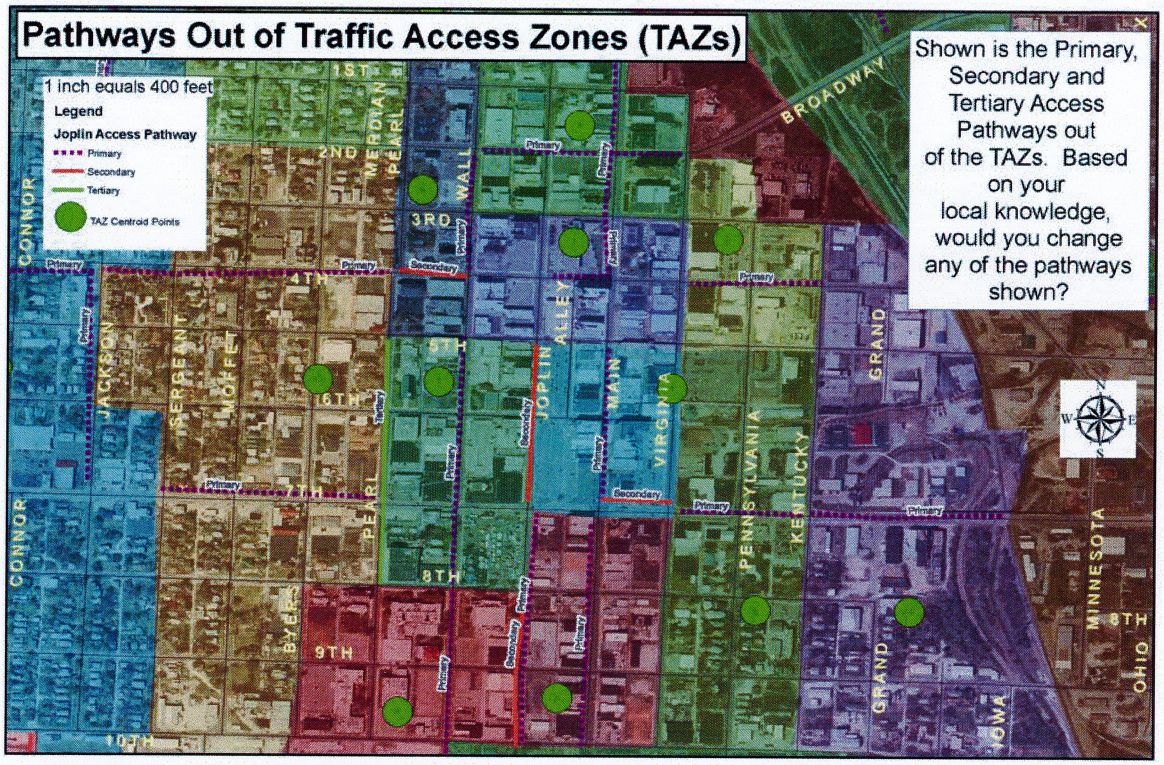
This section summarizes the review process conducted for access connection data associated with the traffic modeling process used for the West Joplin Purpose and Need Statement. The primary attributes associated with the access connections are as follows:

Locations of Access Points from Zones to Network:
This required verifying where the centroids connect to roads, adding new centroids, or deleting inaccurate ones.

Level of Access:
This required that the nature of the access is correct. Specifically, the review was intended to determine whether a centroid is considered primary, secondary, or tertiary.

Pathways:
This requires that the location and lengths of pathways be confirmed. The goal is to make sure that the model correctly has most of the traffic on the correct streets upon its exit.

FIGURE D-1
Typical Graphic Used to Update Traffic Model



7. Model Verification Report

The purpose of this section is to provide an assessment of the reasonableness of model outputs. This travel model will be used to replicate observed conditions to represent future travel conditions after development of the western bypass, future development of the casino, and other major projects within the Joplin area.

a. Background

The modeling task for this project began with two models, the MOSM and the Joplin area travel demand model. The MOSM model is more recent and has a dense street network. The Joplin model has a dense zone structure, allowing for better representation of trips and access. The two networks were combined within the greater MOSM statewide network to allow for use of procedures developed for the MOSM model.

Tasks that were completed to develop the existing network are as follows:

- Merged MOSM/Joplin street network and zone structure was finalized
- Updated assessment zone access
- Updated major employment to socioeconomic data
- Updated network link attributes (functional class, speeds, lanes, and so forth)

b. Model Verification

For the greater Joplin area, including Webb City and Carl Junction, modeled volumes were compared with the MoDOT 2006 Joplin average annual daily traffic (AADT) counts as provided from the MoDOT Web site using spreadsheet analysis. Several different methods were used for verification. Two methods rely on the U.S. Department of Transportation (USDOT) Travel Model Validation and Reasonableness Checking Manual (MVRCM), and the other is a statistical method.

Because of the nature of the street network in Joplin, many local streets carry traffic similar to collectors in the area. The model cannot accurately represent all traffic on local streets and collectors carrying fewer than 10,000 vehicles per day. For this reason, the primary concern in verification of the network was on the freeways and arterials.

Single Count Location Target
The USDOT MVRCM defined target values for assessing model systems. The observed versus estimated counts for this project were checked by facility type. The FHWA defines targets for daily volumes by facility type as shown in **Table D-3**.

TABLE D-3
Functional Classification Target

Facility Type	FHWA Targets (Relative Percentage)
Freeway	+/- 7
Major Arterial	10
Minor Arterial	15
Collector	25

Sources: FHWA, Calibration and Adjustment of System Planning Models, 1990

Table D-4 summarizes count and volume relationships in the Joplin street network. The color coding of the cells for "Relative Difference" are locations where the volumes do not meet within the target values from **Table D-4.** An orange cell is within 5 percent of the target, and a red cell is greater than 5 percent of the target. The majority of count locations are represented by model volumes within the target values. For locations where volumes differ from the counts, this is typically due to the lack of availability of a street network in the travel demand model.

TABLE D-4
Comparison of 2006 Traffic Counts and 2007 O/D Survey to Base Year Model Volumes

Location and Functional Classification	2006 Joplin AADT Maps or 2007 O/D Survey	Model Volume	Relative Percent Difference
Route 171: West of Route D (Principal Art)	16,744	18,342	10
Route 249: South of Route 66 (Collector)	8,979	9,184	2
Route 171: East of Route 43 (Minor Art)	17,230	15,466	-10
Route 43: South of 171 (Minor Art)	18,057	17,505	-3
Route 43: South of 20th (Major Collector)	18,914	18,501	-2
7th Ave: West of Maiden Lane (Major Collector)	17,614	17,298	-2
Business Route 71: North of I-44 (Major Collector)	25,072	28,411	13
Business Route 71: At 20th Street (Collector)	35,884	30,219	-16
Business Route 71: North of 7th Street (Collector)	27,817	28,115	1
Business Route 71: South of Demott Drive (Collector)	22,975	21,238	-8
Business Route 71: South of Zora (Collector)	22,770	25,022	10
Route 66: West of Route 249 (Collector)	11,553	11,451	-1
Route 66: East of Route 43 (Collector)	17,255	19,008	10
Powell Drive: North of Route 171 (Collector)	2,534	3,458	36
Route 43: North of Route 171 (Collector)	6,519	7,782	19
Route 171: North of Heron Lane (Collector)	9,006	8,472	-6
Route FF: West of Route 43 (Collector)	19,463	14,612	-25
Route D: South of Hawthorne (Collector)	4,609	5,006	9
Route FF: East of Hall Street (Collector)	13,819	12,415	-10
Joplin Street: North of Fir Rd (Collector)	3,105	3,162	2
Demott Drive: West of Route 171 (Collector)	6,968	5,127	-26
Lone Elm Avenue: Southwest quadrant of 171/43 (Collector)	3,329	4,314	30
Zora Street: At Route 43 intersection (Collector)	6,079	7,315	20
Belle Center Road: West of Schifferdecker Road (Freeway)	3,147	2,055	-35
Schifferdecker Road: South of 7th (Major Collector)	5,819	7,622	31

TABLE D-4
Comparison of 2006 Traffic Counts and 2007 O/D Survey to Base Year Model Volumes

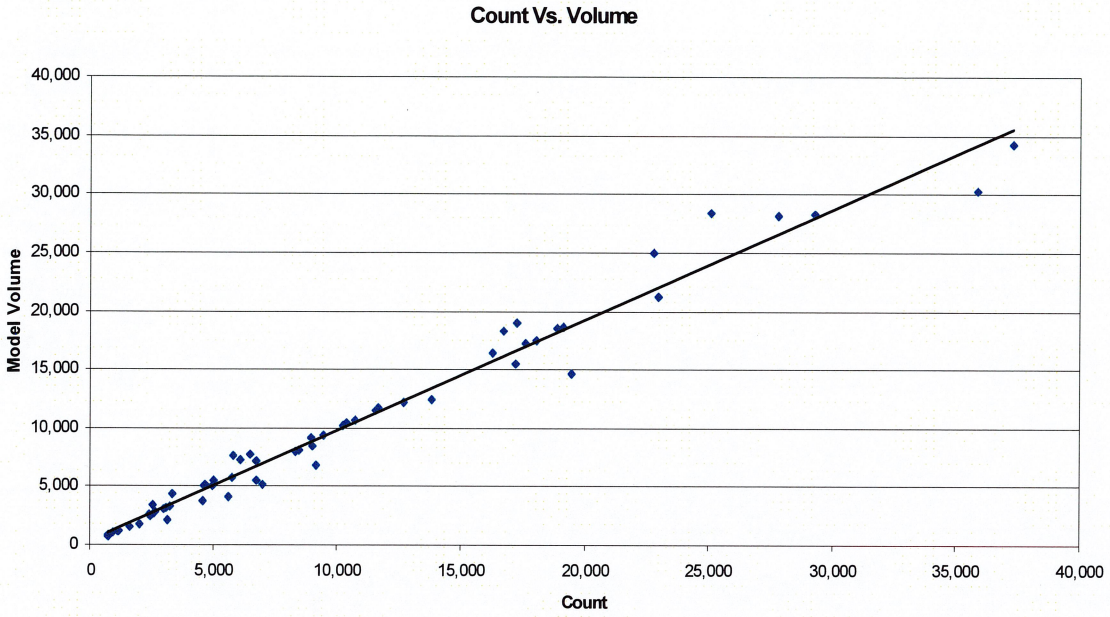
Location and Functional Classification	2006 Joplin AADT Maps or 2007 O/D Survey	Model Volume	Relative Percent Difference
Schifferdecker Road: South of 20th (Minor Art)	8,316	8,029	-3
Route FF: East of Schifferdecker Road (Minor Art)	6,720	5,466	-19
20th Avenue: West of Route 43 (Interstate)	12,685	12,213	-4
Hall Street: South of Demott Drive (Interstate)	4,554	3,722	-18
Hall Street: North of Zora Drive (Interstate)	5,594	4,085	-27
Oronogo Street: South of Demott Drive (Expressway)	2,649	2,839	7
Route TT: East of Route 71 (Collector)	9,168	6,826	-26
20th Street: East of Route 43 (Expressway)	16,300	16,444	1
Murphy Boulevard: West of Route 43 (Collector)	2,020	1,785	-12
Murphy Boulevard: East of Route 43 (Major Collector)	5,018	5,560	11
External Zone: 301=BS 71 (Rangeline) (Major Collector)	6,757	7,172	6
External Zone: 302=Route NN (Minor Art)	2,400	2,532	6
External Zone: 303=Highway 86 (Minor Art)	2,616	2,716	4
External Zone: 304=Highway 43 (South) (Major Collector)	9,437	9,440	0
External Zone: I-44 West of Joplin (Freeway)	29,276	28,278	-3
External Zone: 306=Bagdad Road (Collector)	2,449	2,410	-2
External Zone: 307=20th Street (West Side) (Principal Art)	2,990	3,032	1
External Zone: 309=Route 66 (7th Street – West Side) (Collector)	10,380	10,420	0
External Zone: 310=Belle Center Road (Interstate)	1,115	1,118	0
External Zone: 311=Route P (Interstate)	755	802	6
External Zone: 312=Route ZZ west of Route JJ (Interstate)	1,619	1,548	-4
External Zone: 314=Highway 171 (West) (Major Collector)	4,696	5,104	9
External Zone: 315=Highway 43 (North Side) (Collector)	8,480	8,102	-4

TABLE D-4
Comparison of 2006 Traffic Counts and 2007 O/D Survey to Base Year Model Volumes

Location and Functional Classification	2006 Joplin AADT Maps or 2007 O/D Survey	Model Volume	Relative Percent Difference
External Zone: 316=Route D (Freeway)	4,992	5,014	0
External Zone: 317=Highway 171 (East Side)	11,640	11,756	1
External Zone: 318=Route HH	5,778	5,740	-1
External Zone: 319=Route AA	956	1,000	5
External Zone: 320=Newman Road	1,190	1,166	-2
External Zone: 321=Route 66 (7th Street – East Side)	10,241	10,260	0
External Zone: 322=20th Street (East Side)	3,240	3,286	1
External Zone: I-44 East of Joplin	37,293	34,262	-8
External Zone: 324=Route FF (32nd Street)	10,749	10,704	0
External Zone: 325=Warner Road	731	758	4
External Zone: 326=US Highway 71	19,124	18,676	-2

Figure D-2 is a scatter graph of counts versus volumes from **Table D-4**. This table shows a consistent trend between counts and volumes.

FIGURE D-2
Count versus Volume



Facility Class Targets

Another target was developed by the Contra Costa Transit Authority in the San Francisco Bay Area for freeways and major arterials (link carries over 10,000 vehicles per day). These values are also found in the MVRCM. There are very few major facility links in the system, so the above checks have been modified slightly to make the checks more robust. For the purposes of this project; "freeway" links will be comprised of freeway, interstate, highway, and expressway, and "major arterial" links will be comprised of principal arterials, minor arterials, and major collectors.

- 75 percent of all freeway *(interstate, freeway, and expressway)* links must be within 20 percent of traffic counts
- 50 percent of all freeway *(interstate, freeway, and expressway)* links must be within 10 percent of traffic counts
- 75 percent of all major arterial *(principal arterial, minor arterial and major collector)* links must be within 30 percent of traffic counts
- 50 percent of all major arterial *(principal arterial, minor arterial and major collector)* links must be within 15 percent of traffic counts

The baseline model meets these criteria with 100 percent of freeway locations within 10 percent of the traffic counts, 97 percent of major arterials within 30 percent of traffic counts, and 90 percent of major arterials within 15 percent of traffic counts.

Root Mean Squared Error

The mean squared error (MSE) of a curve and root mean squared error (percent RMSE) value has been calculated for count locations by facility type. The MSE value is the squared distance vertically between the count and the volume. The smaller the MSE, the closer the fit is to the data. The percent RMSE is the squared root of the MSE, and is calculated using the following equation:

$$\%RMSE = \frac{\left(\sum_i (Model_i - Count_i)^2 / (Number\ of\ Counts - 1)\right)^{0.5} \cdot 100}{\left(\sum_i Count_i / Number\ of\ Counts\right)}$$

The RMSE is the average distance of a data point from the fitted line. An appropriate aggregate percent RMSE, as suggested by the Montana DOT is 30 percent. The percent RMSE values for major facilities along the corridor are included in **Table D-5.** Typically the percent RMSE value becomes larger the smaller the count value, so some of the results are slightly skewed due to low count value. Every location with a percent RMSE greater than 30 percent also has a count location relative difference greater than the target values produced by FHWA.

TABLE 5
Summary of Count Location, Percent RMSE

Location and Functional Classification	2006 Joplin AADT Maps or 2007 OD Survey	Model Projection	Percent RMSE
Route 171: West of Route D (Freeway)	16,744	17,470	7
Route 249: South of Route 66 (Major Collector)	8,979	9,947	23
Route 171: East of Route 43 (Principal Art)	17,230	17,400	0
Route 43: South of 171 (Principal Art)	18,057	18,959	10
Route 43: South of 20th (Principal Art)	18,914	19,934	12
7th Avenue: West of Maiden Lane (Principal Art)	17,614	19,441	42
Business Route 71: North of I-44 (Principal Art)	25,072	28,880	129
Business Route 71: At 20th Street (Principal Art)	35,884	31,343	128
Business Route 71: North of 7th Street (Principal Art)	27,817	26,724	10
Business Route 71: South of Demott Drive (Principal Art)	22,975	22,742	1
Business Route 71: South of Zora (Principal Art)	22,770	23,972	14
Route 66: West of Route 249 (Principal Art)	11,553	12,155	7
Route 66: East of Route 43 (Principal Art)	17,255	19,430	61
Route 43: North of Route 171 (Minor Art)	6,519	4,681	405
Route 171: North of Heron Lane (Minor Art)	9,006	8,080	83
Route FF: West of Route 43 (Major Collector)	19,463	10,608	63

TABLE 5
Summary of Count Location, Percent RMSE

Location and Functional Classification	2006 Joplin AADT Maps or 2007 OD Survey	Model Projection	Percent RMSE
Route D: South of Hawthorne (Major Collector)	4,609	15,702	162
Route FF: East of Hall Street (Major Collector)	13,819	12,415	32
External Zone: 301=BS 71 (Rangeline South) (Freeway)	6,757	7,172	6
External Zone: 302=Route NN (Major Collector)	2,400	2,532	2
External Zone: 303=Highway 86 (Minor Art)	2,616	2,716	1
External Zone: 304=Highway 43 (South Side) (Minor Art)	9,437	9,440	0
External Zone: I-44 West of Joplin (Interstate)	29,276	28,278	8
External Zone: 306=Bagdad Road (Expressway)	2,449	2,410	0
External Zone: 309=Route 66 (7th Street – West Side) (Expressway)	10,380	10,420	0
External Zone: 311=Route P (Major Collector)	755	802	1
External Zone: 312=Route ZZ west of Route JJ (Major Collector)	1,619	1,548	1
External Zone: 314=Highway 171 (West Side) (Minor Art)	4,696	5,104	8
External Zone: 315=Highway 43 (North Side) (Minor Art)	8,480	8,102	4
External Zone: 316=Route D (Major Collector)	4,992	5,014	0
External Zone: 317=Highway 171 (East Side) (Freeway)	11,640	11,756	0
External Zone: 318=Route HH (Major Collector)	5,778	5,740	0
External Zone: 319=Route AA (Major Collector)	956	1,000	0
External Zone: 321=Route 66 (7th Street – East Side) (Principal Art)	10,241	10,260	0
External Zone: I-44 East of Joplin (Interstate)	37,293	34,262	55
External Zone: 324=Route FF (32nd Street) (Major Collector)	10,749	10,704	0
External Zone: 326=US Highway 71 (Freeway)	19,124	18,676	2

c. Conclusion

The transportation model developed for this project combines the procedures and attributes associated with the MOSM model, socioeconomic information, and zone densities associated with the Joplin transportation model. The base year for the modeling is 2007. The majority of counts located within the greater Joplin area are closely represented by the output volumes from the model. The model volumes were compared against two sources of counts: 2006 AADTs from MoDOT, and 2007 counts from the external O/D Survey.

Multiple locations were checked against counts. Several locations do not meet specific FHWA criteria, but can be explained at the collector level due to the relatively low counts, and the representation of local streets in the network. The primary focus was on major facilities, all of which meet or exceed expectations for the targets that were used for comparison. The verification of the base networks is required for development of forecasts for this project.

Appendix E: Travel Model Intersection LOS – Joplin, Missouri

The purpose of this memo is to describe the methodology used to predict the Level of Service (LOS) at intersections in the City of Joplin for the West Joplin Corridor Purpose and Need Study. Intersection LOS was evaluated for existing use, 2035 with the western corridor, and 2035 without the western corridor.

1. Travel Model

The forecasting was completed using the TransCAD-based Missouri Statewide Transportation Demand Forecasting Model (*the model*) methodology. The model is a forecasting tool used for link level analysis. The model does provide a forecast that allows for turning movements at intersections, but does not include specific delays associated with traffic signals and intersection operation. The purpose of the tool is to forecast link level traffic volumes. These forecasts predict vehicle delay based on link volume-capacity relationships, but does not include the effects of intersection movement conflicts in the calculation.

The model used for the project was an average daily traffic (ADT) model. To calculate intersection LOS using the chosen methodology, peak hour volumes are used. Chapter 9 of the Highway Capacity Manual 2000 uses a K-value (a percentage of the ADT that occurs in the peak hour) of 9 percent for urban areas, and 10 percent for rural areas. Because Joplin is somewhere in the middle, this project will use a K-value of 9.5 percent.

2. LOS Methodology

The LOS methodology chosen for this analysis is the intersection capacity utilization (ICU) method. This method is a simple tool that is ideal for planning applications and is not intended for operations or signal timing design. The method was first developed in 1974 by Robert Crommelin and was published in the paper titled "Employing Intersection Capacity Utilization Values to Estimate Overall Level of Service." The ICU approach utilizes measures of the proportion of the reference cycle (assumed signal cycle) used by conflicting movements (e.g., through traffic and opposing left turns). This provides a measure of the total time available to accommodate all critical intersection movements and the capability of the intersection to meet expected traffic demand.

A spreadsheet tool was developed for applying the ICU method to multiple intersections in the Joplin area. The spreadsheet tool was developed using assumptions and guidelines in the "Intersection Capacity Utilization 2003: Evaluation Procedures for Intersections and Interchanges," 2003 Edition (ICU 2003), written by David Husch and John Albeck of Trafficware® Corporation.

The ICU 2003 method is related to the HCM 2000, but is a more realistic tool for use in planning procedures where signal information is not available. The HCM 2000 method is based on estimating the delay for the intersection, while the ICU 2003 method calculates a volume to capacity (V/C) ratio for all movements. Both the ICU 2003 and the HCM 2000 use the same saturated flow rates, lost time, and volume adjustments, thus generating comparable results.

For each intersection analyzed, there are several items that need to be manually input into the spreadsheet tool: the geometry for the number of lanes, availability of a left-turn only lane, the volume of each movement (provided as direct output from the model), the number of pedestrians (if known), the availability of a pedestrian button, and the availability of a free right turn. The general assumptions used for all intersections are a required pedestrian timing of 16 seconds (if a pedestrian button is provided), an ideal flow of 1,900 vehicles per hour per lane, a lost time of 4 seconds per cycle, a minimum green time of 4 seconds per vehicle, and a reference cycle length of 120 seconds. Using the manually input variables and the general

assumptions for each intersection, the spreadsheet tool calculates intersection ICU and assigns an LOS based on the information in **Table E-1**. **Figure E-1** is an example worksheet (for the intersection of Main Street and 32nd Street).

TABLE E-1
Level of Service and Intersection Capacity Utilization

ICU	Level of Service	Description
0 to 55%	A	The intersection has no congestion.
>55% to 64%	B	The intersection has very little congestion.
>64% to 73%	C	The intersection has no major congestion.
>73% to 82%	D	The intersection normally has no congestion, but occasionally has major congestion. Minor queues may occur, but are not expected.
>82% to 91%	E	The intersection is right on the verge of congested conditions. Moderate queues may be expected, but not continues.
>91% to 100%	F	The intersection is over capacity and likely experiences congestion periods of 15 to 60 consecutive minutes. Moderate queues are common.

3. Intersections Analyzed

Multiple intersections of major north-south/east-west streets were evaluated for this analysis: 58 intersections for the base year, 68 intersections for 2035 with a western corridor, and 62 intersections for 2035 without a western corridor. These intersections were chosen because of their potential for being affected by traffic diverted by the new western corridor. **Table E-2** is a comparison summary of ICU LOS for existing, 2035 with a western corridor, and 2035 without a western corridor.

Most of the existing intersections operate with acceptable LOS (A, B, or C). There are no existing intersections with major congestion (LOS E or worse), and only modest congestion (LOS D) at two intersections: South Main Street and East 7th Street, and Business Route 71 and East 20th Street.

Most future intersections, with and without the western corridor, are expected to operate with acceptable LOS (A, B, or C). The intersection of South Main Street with East 7th Street is expected to experience major congestion (LOS E) with and without the western corridor. The intersections of Business Route 71 with East 20th Street, Business Route 71 with East 7th Street, and South Jackson Avenue with East 7th Street are expected to experience moderate congestion (LOS D) with and without the western corridor. The future intersections of Coyote Drive (State Highway 43) with I 44 northbound ramps, Main Street (State Highway 86) with I 44 northbound ramps, and South Schifferdecker Avenue with 32nd Street are expected to experience moderate congestion (LOS D) without the western corridor, and operate at LOS C with the western corridor. A western corridor is not expected to have an effect on these intersections.

FIGURE E-1

Example ICU Spreadsheet

Intersection Capacity Utilization Worksheet

Intersection: S. Main St. and 32nd St. (State Highway FF) **City:** Joplin, MO
Analyzed by: JAE **Alternative:** Existing
Date and Time of Data: Peak Hour (9.5% of Daily) **Project:** Joplin Western Corridor

A

	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
2	Lanes	1	3	0	1	3	0	1	3	0	1	3	0
3	Shared LT Lane (y/n)	☐ Yes			☐ Yes			☐ Yes			☐ Yes		
4	Volume	210	279	217	135	195	113	175	614	70	73	517	101
5	Pedestrians			0			0			0			0
6	Ped Button (y/n)		☑ Yes			☑ Yes			☑ Yes			☑ Yes	
7	Pedestrian Timing Required		16			16			16			16	
8	Free Right (y/n)			☐ Yes			☐ Yes			☐ Yes			☐ Yes
9	Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
10	Lost Time (s)	4	4	4	4	4	4	4	4	4	4	4	4
11	Minimum Green Time (s)	4	4	4	4	4	4	4	4	4	4	4	4
12	Reference Cycle Length	120											
13	Volume Combined	210	495	0	135	308	0	175	685	0	73	618	0
14	Volume Separate Left	210	495		135	308		175	685		73	618	
15	Lane Utilization Factor	1.000	0.908	1.000	1.000	0.908	1.000	1.000	0.908	1.000	1.000	0.908	1.000
16	Turning Factor Adjust	0.950	0.934	0.850	0.950	0.945	0.850	0.950	0.985	0.850	0.950	0.976	0.850
17	Saturated Flow Combined	1805.0	4836.1	0.0	1805.0	4891.9	0.0	1805.0	5095.9	0.0	1805.0	5048.9	0.0
18	Saturated Flow Separate	1805.0	4836.1		1805.0	4891.9		1805.0	5095.9		1805.0	5048.9	
19	Pedestrian Interference Time		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
20	Pedestrian Frequency		0.0%			0.0%			0.0%			0.0%	
21	**Protected Option Allowed**		TRUE			TRUE			TRUE			TRUE	
22	Reference Time	14.0	12.3	0.0	8.9	7.6	0.0	11.6	16.1	0.0	4.9	14.7	0.0
23	Adjusted Reference Time	18.0	16.3	8.0	12.9	11.6	8.0	15.6	20.1	8.0	8.9	18.7	8.0
	Permitted Option Allowed												
24	Proportion Lefts	1.00	0.00		1.00	0.00		1.00	0.00		1.00	0.00	
25	Volume Left Lane	210	165		135	103		175	228		73	206	
26	Proportion Lefts Left	1.00	0.00		1.00	0.00		1.00	0.00		1.00	0.00	
27	Left-turn Equivalents	15	15		15	15		15.0	15.0		15.0	15.0	
28	Left-turn Factor	0.07	1.00		0.07	1.00		0.07	1.00		0.07	1.00	
29	Adjusted Saturation A	120.33	4836.1		120.33	4891.9		120.33	5095.9		120.33	5048.9	
30	Reference Time A	209.4	12.3		134.2	7.6		174.1	16.1		72.9	14.7	
31	Adjusted Saturation B		4836.1			4891.9			5095.9			5048.9	
32	Reference Time B		NA			NA			NA			NA	
33	Reference Time Lefts	NA			NA			NA			NA		
34	Reference Time		209.4			134.2			174.1			72.9	
35	Adjusted Reference Time		213.4			138.2			178.1			76.9	
	Split Timing												
36	Ref Time Combined		12.3			7.6			16.1			14.7	
37	Ref Time By Movement	14.0	12.3		8.9	7.6		11.6	16.1		4.9	14.7	
38	Reference Time		14.0			8.9			16.1			14.7	
39	Adjusted Reference Time	18.0	18.0		12.9	12.9		20.1	20.1		18.7	18.7	

	Summary	East West	North South
40	Protected Option	29.5	34.3
41	Permitted Option	213.4	178.1
42	Split Option	30.9	38.8
43	Minimum	29.5	34.3
44	Combined	63.8	

	Right Turns	EBR	WBR	NBR	SBR
45	Adjusted Reference Time	8.0	8.0	8.0	8.0
46	Cross Through Direction	SBT	NBT	EBT	WBT
47	Cross Through Adj Ref Time	18.7	20.1	16.3	11.6
48	Oncoming Left Direction	WBL	EBL	SBL	NBL
49	Oncoming Left Adj Ref Time	12.9	18.0	8.9	15.6
50	Combined	39.6	46.1	33.2	35.2

51	**Intersection Capacity Utilization**	**53.2%**
52	**Level Of Service**	**A**

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In the future, the ICU of the evaluated intersections is lower when a western corridor is in place. The average ICU of the evaluated intersections is as follows:

- Existing: 40 percent
- 2035 with a Western Corridor: 45 percent
- 2035 without a Western Corridor: 47 percent

Under the future scenario where a western corridor is place, the ICU improves at 30 intersections. The average improvement is four percentage points. The maximum improvement is 18 percentage points of ICU. These intersections are often at key locations and seem to demonstrate the anticipated trend that the addition of a western corridor will allow traffic to utilize the western corridor, in lieu of a less desirable pathway along another major corridor. ICU improvements occur at the following locations:

- I-44 intersections at Exits 1, 4, 6, 8, and 11
- Several Main Street intersections
- Route JJ
- Schifferdecker Avenue
- Route 26
- Route 66

A western corridor could potentially intersect several existing roadways. Six of these potential intersections were evaluated (Route 26, Route ZZ, Route JJ, Route 66, 20th Street, and Route 166). All of these intersections, in the future, will operate at a LOS A or B.

Twelve intersections are expected to have an ICU increase of at least 15 percentage points when comparing the existing intersections to future intersections. Seven of these fast growing intersections are positively affected by a western corridor.

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
US Highway 166 and I-44 Northbound Ramps	A (13%)	B (62%)	C (68%)
US Highway 166 and I-44 Southbound Ramps	A (13%)	A (31%)	A (36%)
Coyote Dr. (State Highway 43) and I-44 Northbound Ramps	C (65%)	C (71%)	D (73%)
Coyote Dr. and I-44 Southbound Ramps	A (13%)	A (31%)	A (36%)
Main St. (State Highway 86) and I-44 Northbound Ramps	B (56%)	C (70%)	D (75%)
Main St. and I-44 Southbound Ramps	A (34%)	A (42%)	A (43%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
Business Route 71 and I-44 Southbound Slip Ramps	A (31%)	A (36%)	A (37%)
Business Route 71 and I-44 Southbound Loop Ramps	A (45%)	A (46%)	A (47%)
Business Route 71 and I-44 Northbound Slip Ramps	A (36%)	A (43%)	A (44%)
Business Route 71 and I-44 Northbound Loop Ramps	A (23%)	A (25%)	A (28%)
State Highway 249 and I-44 Northbound and Southbound Offramp to Southbound State Highway 249	A (45%)	A (51%)	A (51%)
Southbound State Highway 249 and I-44 Northbound Loop Onramp	A (22%)	A (27%)	A (27%)
Northbound State Highway 249 and I-44 Northbound Loop Offramp	A (22%)	A (27%)	A (27%)
Northbound State Highway 249 and I-44 Southbound Loop Onramp	A (15%)	A (25%)	A (25%)
Southbound State Highway 249 and I-44 Southbound Slip Onramp	A (15%)	A (25%)	A (25%)
State Highway 249 and I-44 Southbound Offramp to Northbound State Highway 249	A (17%)	A (28%)	A (27%)
Main St. and US Highway 171	B (57%)	C (69%)	C (70%)
Main St. and Zora St.	C (68%)	N/A	N/A
Main St. (State Highway 43) Northbound Ramps and Zora St.	N/A	A (14%)	A (13%)
Main St. (State Highway 43) Southbound Ramps and Zora St.	N/A	A (31%)	A (31%)
S. Main St. and E. 7th St. (Route 66)	D (77%)	E (85%)	E (86%)
S. Main St. and W. 20th St.	C (64%)	C (69%)	C (72%)
S. Main St. and 32nd St. (State Highway FF)	A (53%)	B (58%)	B (58%)
Business Route 71 (Range Line Rd.) and US Highway 171	C (66%)	C (70%)	C (70%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
Business Route 71 (Range Line Rd.) and Zora St.	B (57%)	C (67%)	C (67%)
Business Route 71 and E. 7th St. (Route 66)	C (68%)	D (81%)	D (81%)
Business Route 71 and E. 20th St.	D (76%)	D (80%)	D (80%)
Business Route 71 and 32nd St. (State Highway FF)	A (52%)	C (71%)	C (71%)
State Highway 249 and US Highway 171 Westbound Offramp/Eastbound Onramp	N/A	A (24%)	A (24%)
State Highway 249 and US Highway 171 Eastbound Offrramp/Westbound Onramp	N/A	B (60%)	B (60%)
State Highway 249 and Zora St.	A (35%)	N/A	N/A
State Highway 249 Northbound Ramps and Zora St.	N/A	A (11%)	A (17%)
State Highway 249 Southbound Ramps and Zora St.	N/A	A (22%)	A (30%)
State Highway 249 Northbound Ramps and E. 7th St. (Route 66)	A (38%)	B (60%)	B (60%)
State Highway 249 Southbound Ramps and E. 7th St. (Route 66)	A (27%)	A (37%)	A (37%)
State Highway 249 Northbound Ramps and 32nd St. (State Highway FF)	A (40%)	A (43%)	A (44%)
State Highway 249 Southbound Ramps and 32nd St. (State Highway FF)	A (41%)	A (41%)	A (40%)
Route JJ (Central City Rd.) and Route ZZ	A (20%)	A (8%)	A (20%)
Route JJ (Central City Rd.) and Fir Rd.	A (15%)	A (18%)	A (17%)
Route JJ (Central City Rd.) and Fountain Rd.	A (19%)	A (23%)	A (22%)
Route JJ (Central City Rd.) and W. Belle Centre Rd.	A (27%)	A (37%)	A (37%)
Route JJ (Central City Rd.) and W. 7th St. (Route 66)	A (50%)	B (62%)	C (66%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
Route JJ (Central City Rd.) and W. 20th St.	A (30%)	A (39%)	A (35%)
Black Cat Rd. and Fir Rd.	A (46%)	A (53%)	A (50%)
Black Cat Rd. and Fountain Rd.	A (20%)	A (24%)	A (23%)
Black Cat Rd. and W. Belle Centre Rd.	A (21%)	A (22%)	A (26%)
Black Cat Rd. and E. 7th St. (Route 66)	A (53%)	C (66%)	B (60%)
Black Cat Rd. and 20th St.	A (14%)	A (23%)	A (21%)
Black Cat Rd. and 32nd St. (State Highway FF)	A (8%)	A (16%)	A (18%)
N. Schifferdecker Ave. and Fountain Rd.	A (51%)	A (53%)	A (55%)
N. Schifferdecker Ave. and Zora St.	A (37%)	A (47%)	A (49%)
N. Schifferdecker Ave. and W. Belle Center Rd.	A (36%)	A (45%)	A (48%)
S. Schifferdecker Ave. and E. 7th St. (Route 66)	A (48%)	B (61%)	B (63%)
S. Schifferdecker Ave. and W. 20th St.	C (69%)	C (66%)	C (65%)
S. Schifferdecker Ave. and 32nd St. (State Highway FF)	B (61%)	C (67%)	D (74%)
Lone Elm Rd. and Fountain Rd.	A (35%)	A (30%)	A (31%)
Lone Elm Rd. and W. Zora St.	A (50%)	C (65%)	C (64%)
Lone Elm Rd. and Murphy Blvd.	A (50%)	A (52%)	A (51%)
S. Jackson Ave. and E. 7th St. (Route 66)	C (68%)	D (76%)	D (77%)
S. Jackson Ave. and W. 20th St.	C (67%)	B (64%)	B (64%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
S. Jackson Ave. and W. 32nd St.	A (49%)	B (59%)	B (59%)
Route 26 and E. 7th St. (Route 66)	A (35%)	A (39%)	A (41%)
Route 26 and W. 20th St.	A (29%)	A (22%)	A (35%)
Route 26 and State Highway 400 (Route 166)	A (25%)	A (18%)	A (36%)
Route 26 and Joplin West Corridor	N/A	A (53%)	N/A
Joplin West Corridor and Route ZZ	N/A	A (21%)	N/A
Joplin West Corridor and State Highway JJ (Fountain Rd.)	N/A	A (34%)	N/A
Joplin West Corridor and E. 7th St. (Route 66)	N/A	B (64%)	N/A
Joplin West Corridor and W. 20th St.	N/A	A (31%)	N/A
Joplin West Corridor and State Highway 400 (Route 166)	N/A	A (30%)	N/A

4. Conclusion

Traffic forecasting for the Joplin West Corridor Purpose and Need Study was completed using a TransCAD-based travel demand forecasting model, determining link level analysis. The LOS methodology chosen for this analysis is the ICU method, which provides a measure of the total time available to accommodate all critical intersection movements and the capability of the intersection to meet expected travel demand. The model output was used to evaluate intersection LOS at approximately 70 intersections for existing, 2035 with a western corridor, and 2035 without a western corridor.

This analysis shows that most major intersections within the Joplin network operate at acceptable levels of service (LOS A, B, C, or D) with and without the Joplin western corridor in the future. One intersection operates at a poor level of service in the future, South Main Street with East 7th Street, but the ICU is 85 percent with a western corridor and 86 percent without a western corridor, meaning that the intersection is not affected by the western corridor.

When ICU is considered, beneficial effects as the result of the western corridor are evident. For example, the overall average ICU of the evaluated intersections improves when comparing the future intersections with and without the western corridor, showing that the western corridor reduces the overall capacity utilization of intersections throughout Joplin. Other intersections also exhibit ICU improvements as a result of the western corridor. For this analysis, the western corridor improves intersection ICU throughout the western Joplin area, and does not affect intersections in the eastern Joplin area.

c. Conclusion

The transportation model developed for this project combines the procedures and attributes associated with the MOSM model, socioeconomic information, and zone densities associated with the Joplin transportation model. The base year for the modeling is 2007. The majority of counts located within the greater Joplin area are closely represented by the output volumes from the model. The model volumes were compared against two sources of counts: 2006 AADTs from MoDOT, and 2007 counts from the external O/D Survey.

Multiple locations were checked against counts. Several locations do not meet specific FHWA criteria, but can be explained at the collector level due to the relatively low counts, and the representation of local streets in the network. The primary focus was on major facilities, all of which meet or exceed expectations for the targets that were used for comparison. The verification of the base networks is required for development of forecasts for this project.

Appendix E: Travel Model Intersection LOS – Joplin, Missouri

The purpose of this memo is to describe the methodology used to predict the Level of Service (LOS) at intersections in the City of Joplin for the West Joplin Corridor Purpose and Need Study. Intersection LOS was evaluated for existing use, 2035 with the western corridor, and 2035 without the western corridor.

1. Travel Model

The forecasting was completed using the TransCAD-based Missouri Statewide Transportation Demand Forecasting Model (*the model*) methodology. The model is a forecasting tool used for link level analysis. The model does provide a forecast that allows for turning movements at intersections, but does not include specific delays associated with traffic signals and intersection operation. The purpose of the tool is to forecast link level traffic volumes. These forecasts predict vehicle delay based on link volume-capacity relationships, but does not include the effects of intersection movement conflicts in the calculation.

The model used for the project was an average daily traffic (ADT) model. To calculate intersection LOS using the chosen methodology, peak hour volumes are used. Chapter 9 of the Highway Capacity Manual 2000 uses a K-value (a percentage of the ADT that occurs in the peak hour) of 9 percent for urban areas, and 10 percent for rural areas. Because Joplin is somewhere in the middle, this project will use a K-value of 9.5 percent.

2. LOS Methodology

The LOS methodology chosen for this analysis is the intersection capacity utilization (ICU) method. This method is a simple tool that is ideal for planning applications and is not intended for operations or signal timing design. The method was first developed in 1974 by Robert Crommelin and was published in the paper titled "Employing Intersection Capacity Utilization Values to Estimate Overall Level of Service." The ICU approach utilizes measures of the proportion of the reference cycle (assumed signal cycle) used by conflicting movements (e.g., through traffic and opposing left turns). This provides a measure of the total time available to accommodate all critical intersection movements and the capability of the intersection to meet expected traffic demand.

A spreadsheet tool was developed for applying the ICU method to multiple intersections in the Joplin area. The spreadsheet tool was developed using assumptions and guidelines in the "Intersection Capacity Utilization 2003: Evaluation Procedures for Intersections and Interchanges," 2003 Edition (ICU 2003), written by David Husch and John Albeck of Trafficware® Corporation.

The ICU 2003 method is related to the HCM 2000, but is a more realistic tool for use in planning procedures where signal information is not available. The HCM 2000 method is based on estimating the delay for the intersection, while the ICU 2003 method calculates a volume to capacity (V/C) ratio for all movements. Both the ICU 2003 and the HCM 2000 use the same saturated flow rates, lost time, and volume adjustments, thus generating comparable results.

For each intersection analyzed, there are several items that need to be manually input into the spreadsheet tool: the geometry for the number of lanes, availability of a left-turn only lane, the volume of each movement (provided as direct output from the model), the number of pedestrians (if known), the availability of a pedestrian button, and the availability of a free right turn. The general assumptions used for all intersections are a required pedestrian timing of 16 seconds (if a pedestrian button is provided), an ideal flow of 1,900 vehicles per hour per lane, a lost time of 4 seconds per cycle, a minimum green time of 4 seconds per vehicle, and a reference cycle length of 120 seconds. Using the manually input variables and the general

assumptions for each intersection, the spreadsheet tool calculates intersection ICU and assigns an LOS based on the information in **Table E-1**. **Figure E-1** is an example worksheet (for the intersection of Main Street and 32nd Street).

TABLE E-1
Level of Service and Intersection Capacity Utilization

ICU	Level of Service	Description
0 to 55%	A	The intersection has no congestion.
>55% to 64%	B	The intersection has very little congestion.
>64% to 73%	C	The intersection has no major congestion.
>73% to 82%	D	The intersection normally has no congestion, but occasionally has major congestion. Minor queues may occur, but are not expected.
>82% to 91%	E	The intersection is right on the verge of congested conditions. Moderate queues may be expected, but not continues.
>91% to 100%	F	The intersection is over capacity and likely experiences congestion periods of 15 to 60 consecutive minutes. Moderate queues are common.

3. Intersections Analyzed

Multiple intersections of major north-south/east-west streets were evaluated for this analysis: 58 intersections for the base year, 68 intersections for 2035 with a western corridor, and 62 intersections for 2035 without a western corridor. These intersections were chosen because of their potential for being affected by traffic diverted by the new western corridor. **Table E-2** is a comparison summary of ICU LOS for existing, 2035 with a western corridor, and 2035 without a western corridor.

Most of the existing intersections operate with acceptable LOS (A, B, or C). There are no existing intersections with major congestion (LOS E or worse), and only modest congestion (LOS D) at two intersections: South Main Street and East 7th Street, and Business Route 71 and East 20th Street.

Most future intersections, with and without the western corridor, are expected to operate with acceptable LOS (A, B, or C). The intersection of South Main Street with East 7th Street is expected to experience major congestion (LOS E) with and without the western corridor. The intersections of Business Route 71 with East 20th Street, Business Route 71 with East 7th Street, and South Jackson Avenue with East 7th Street are expected to experience moderate congestion (LOS D) with and without the western corridor. The future intersections of Coyote Drive (State Highway 43) with I 44 northbound ramps, Main Street (State Highway 86) with I 44 northbound ramps, and South Schifferdecker Avenue with 32nd Street are expected to experience moderate congestion (LOS D) without the western corridor, and operate at LOS C with the western corridor. A western corridor is not expected to have an effect on these intersections.

FIGURE E-1

Example ICU Spreadsheet

Intersection Capacity Utilization Worksheet

Intersection: S. Main St. and 32nd St. (State Highway FF) **City:** Joplin, MO
Analyzed by: JAE **Alternative:** Existing
Date and Time of Data: Peak Hour (9.5% of Daily) **Project:** Joplin Western Corridor

A

	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
2	Lanes	1	3	0	1	3	0	1	3	0	1	3	0
3	Shared LT Lane (y/n)	☐ Yes			☐ Yes			☐ Yes			☐ Yes		
4	Volume	210	279	217	135	195	113	175	614	70	73	517	101
5	Pedestrians			0			0			0			0
6	Ped Button (y/n)		☑ Yes			☑ Yes			☑ Yes			☑ Yes	
7	Pedestrian Timing Required		16			16			16			16	
8	Free Right (y/n)			☐ Yes			☐ Yes			☐ Yes			☐ Yes
9	Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
10	Lost Time (s)	4	4	4	4	4	4	4	4	4	4	4	4
11	Minimum Green Time (s)	4	4	4	4	4	4	4	4	4	4	4	4
12	Reference Cycle Length	120											
13	Volume Combined	210	495	0	135	308	0	175	685	0	73	618	0
14	Volume Separate Left	210	495		135	308		175	685		73	618	
15	Lane Utilization Factor	1.000	0.908	1.000	1.000	0.908	1.000	1.000	0.908	1.000	1.000	0.908	1.000
16	Turning Factor Adjust	0.950	0.934	0.850	0.950	0.945	0.850	0.950	0.985	0.850	0.950	0.976	0.850
17	Saturated Flow Combined	1805.0	4836.1	0.0	1805.0	4891.9	0.0	1805.0	5095.9	0.0	1805.0	5048.9	0.0
18	Saturated Flow Separate	1805.0	4836.1		1805.0	4891.9		1805.0	5095.9		1805.0	5048.9	
19	Pedestrian Interference Time		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
20	Pedestrian Frequency		0.0%			0.0%			0.0%			0.0%	
21	**Protected Option Allowed**		TRUE			TRUE			TRUE			TRUE	
22	Reference Time	14.0	12.3	0.0	8.9	7.6	0.0	11.6	16.1	0.0	4.9	14.7	0.0
23	Adjusted Reference Time	18.0	16.3	8.0	12.9	11.6	8.0	15.6	20.1	8.0	8.9	18.7	8.0
	Permitted Option Allowed												
24	Proportion Lefts	1.00	0.00		1.00	0.00		1.00	0.00		1.00	0.00	
25	Volume Left Lane	210	165		135	103		175	228		73	206	
26	Proportion Lefts Left	1.00	0.00		1.00	0.00		1.00	0.00		1.00	0.00	
27	Left-turn Equivalents	15	15		15	15		15.0	15.0		15.0	15.0	
28	Left-turn Factor	0.07	1.00		0.07	1.00		0.07	1.00		0.07	1.00	
29	Adjusted Saturation A	120.33	4836.1		120.33	4891.9		120.33	5095.9		120.33	5048.9	
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33	Reference Time Lefts	NA			NA			NA			NA		
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38	Reference Time		14.0			8.9			16.1			14.7	
39	Adjusted Reference Time	18.0	18.0		12.9	12.9		20.1	20.1		18.7	18.7	

	Summary	East West	North South
40	Protected Option	29.5	34.3
41	Permitted Option	213.4	178.1
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43	Minimum	29.5	34.3
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47	Cross Through Adj Ref Time	18.7	20.1	16.3	11.6
48	Oncoming Left Direction	WBL	EBL	SBL	NBL
49	Oncoming Left Adj Ref Time	12.9	18.0	8.9	15.6
50	Combined	39.6	46.1	33.2	35.2

51	**Intersection Capacity Utilization**	**53.2%**
52	**Level Of Service**	**A**

Revision 2003.01

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- Several Main Street intersections
- Route JJ
- Schifferdecker Avenue
- Route 26
- Route 66

A western corridor could potentially intersect several existing roadways. Six of these potential intersections were evaluated (Route 26, Route ZZ, Route JJ, Route 66, 20th Street, and Route 166). All of these intersections, in the future, will operate at a LOS A or B.

Twelve intersections are expected to have an ICU increase of at least 15 percentage points when comparing the existing intersections to future intersections. Seven of these fast growing intersections are positively affected by a western corridor.

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Intersection LOS and ICU Percentage

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Coyote Dr. and I-44 Southbound Ramps	A (13%)	A (31%)	A (36%)
Main St. (State Highway 86) and I-44 Northbound Ramps	B (56%)	C (70%)	D (75%)
Main St. and I-44 Southbound Ramps	A (34%)	A (42%)	A (43%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
Business Route 71 and I-44 Southbound Slip Ramps	A (31%)	A (36%)	A (37%)
Business Route 71 and I-44 Southbound Loop Ramps	A (45%)	A (46%)	A (47%)
Business Route 71 and I-44 Northbound Slip Ramps	A (36%)	A (43%)	A (44%)
Business Route 71 and I-44 Northbound Loop Ramps	A (23%)	A (25%)	A (28%)
State Highway 249 and I-44 Northbound and Southbound Offramp to Southbound State Highway 249	A (45%)	A (51%)	A (51%)
Southbound State Highway 249 and I-44 Northbound Loop Onramp	A (22%)	A (27%)	A (27%)
Northbound State Highway 249 and I-44 Northbound Loop Offramp	A (22%)	A (27%)	A (27%)
Northbound State Highway 249 and I-44 Southbound Loop Onramp	A (15%)	A (25%)	A (25%)
Southbound State Highway 249 and I-44 Southbound Slip Onramp	A (15%)	A (25%)	A (25%)
State Highway 249 and I-44 Southbound Offramp to Northbound State Highway 249	A (17%)	A (28%)	A (27%)
Main St. and US Highway 171	B (57%)	C (69%)	C (70%)
Main St. and Zora St.	C (68%)	N/A	N/A
Main St. (State Highway 43) Northbound Ramps and Zora St.	N/A	A (14%)	A (13%)
Main St. (State Highway 43) Southbound Ramps and Zora St.	N/A	A (31%)	A (31%)
S. Main St. and E. 7th St. (Route 66)	D (77%)	E (85%)	E (86%)
S. Main St. and W. 20th St.	C (64%)	C (69%)	C (72%)
S. Main St. and 32nd St. (State Highway FF)	A (53%)	B (58%)	B (58%)
Business Route 71 (Range Line Rd.) and US Highway 171	C (66%)	C (70%)	C (70%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
Business Route 71 (Range Line Rd.) and Zora St.	B (57%)	C (67%)	C (67%)
Business Route 71 and E. 7th St. (Route 66)	C (68%)	D (81%)	D (81%)
Business Route 71 and E. 20th St.	D (76%)	D (80%)	D (80%)
Business Route 71 and 32nd St. (State Highway FF)	A (52%)	C (71%)	C (71%)
State Highway 249 and US Highway 171 Westbound Offramp/Eastbound Onramp	N/A	A (24%)	A (24%)
State Highway 249 and US Highway 171 Eastbound Offrramp/Westbound Onramp	N/A	B (60%)	B (60%)
State Highway 249 and Zora St.	A (35%)	N/A	N/A
State Highway 249 Northbound Ramps and Zora St.	N/A	A (11%)	A (17%)
State Highway 249 Southbound Ramps and Zora St.	N/A	A (22%)	A (30%)
State Highway 249 Northbound Ramps and E. 7th St. (Route 66)	A (38%)	B (60%)	B (60%)
State Highway 249 Southbound Ramps and E. 7th St. (Route 66)	A (27%)	A (37%)	A (37%)
State Highway 249 Northbound Ramps and 32nd St. (State Highway FF)	A (40%)	A (43%)	A (44%)
State Highway 249 Southbound Ramps and 32nd St. (State Highway FF)	A (41%)	A (41%)	A (40%)
Route JJ (Central City Rd.) and Route ZZ	A (20%)	A (8%)	A (20%)
Route JJ (Central City Rd.) and Fir Rd.	A (15%)	A (18%)	A (17%)
Route JJ (Central City Rd.) and Fountain Rd.	A (19%)	A (23%)	A (22%)
Route JJ (Central City Rd.) and W. Belle Centre Rd.	A (27%)	A (37%)	A (37%)
Route JJ (Central City Rd.) and W. 7th St. (Route 66)	A (50%)	B (62%)	C (66%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
Route JJ (Central City Rd.) and W. 20th St.	A (30%)	A (39%)	A (35%)
Black Cat Rd. and Fir Rd.	A (46%)	A (53%)	A (50%)
Black Cat Rd. and Fountain Rd.	A (20%)	A (24%)	A (23%)
Black Cat Rd. and W. Belle Centre Rd.	A (21%)	A (22%)	A (26%)
Black Cat Rd. and E. 7th St. (Route 66)	A (53%)	C (66%)	B (60%)
Black Cat Rd. and 20th St.	A (14%)	A (23%)	A (21%)
Black Cat Rd. and 32nd St. (State Highway FF)	A (8%)	A (16%)	A (18%)
N. Schifferdecker Ave. and Fountain Rd.	A (51%)	A (53%)	A (55%)
N. Schifferdecker Ave. and Zora St.	A (37%)	A (47%)	A (49%)
N. Schifferdecker Ave. and W. Belle Center Rd.	A (36%)	A (45%)	A (48%)
S. Schifferdecker Ave. and E. 7th St. (Route 66)	A (48%)	B (61%)	B (63%)
S. Schifferdecker Ave. and W. 20th St.	C (69%)	C (66%)	C (65%)
S. Schifferdecker Ave. and 32nd St. (State Highway FF)	B (61%)	C (67%)	D (74%)
Lone Elm Rd. and Fountain Rd.	A (35%)	A (30%)	A (31%)
Lone Elm Rd. and W. Zora St.	A (50%)	C (65%)	C (64%)
Lone Elm Rd. and Murphy Blvd.	A (50%)	A (52%)	A (51%)
S. Jackson Ave. and E. 7th St. (Route 66)	C (68%)	D (76%)	D (77%)
S. Jackson Ave. and W. 20th St.	C (67%)	B (64%)	B (64%)

TABLE E-2
Intersection LOS and ICU Percentage

Intersection	Existing	2035 With a Western Corridor	2035 Without a Western Corridor
S. Jackson Ave. and W. 32nd St.	A (49%)	B (59%)	B (59%)
Route 26 and E. 7th St. (Route 66)	A (35%)	A (39%)	A (41%)
Route 26 and W. 20th St.	A (29%)	A (22%)	A (35%)
Route 26 and State Highway 400 (Route 166)	A (25%)	A (18%)	A (36%)
Route 26 and Joplin West Corridor	N/A	A (53%)	N/A
Joplin West Corridor and Route ZZ	N/A	A (21%)	N/A
Joplin West Corridor and State Highway JJ (Fountain Rd.)	N/A	A (34%)	N/A
Joplin West Corridor and E. 7th St. (Route 66)	N/A	B (64%)	N/A
Joplin West Corridor and W. 20th St.	N/A	A (31%)	N/A
Joplin West Corridor and State Highway 400 (Route 166)	N/A	A (30%)	N/A

4. Conclusion

Traffic forecasting for the Joplin West Corridor Purpose and Need Study was completed using a TransCAD-based travel demand forecasting model, determining link level analysis. The LOS methodology chosen for this analysis is the ICU method, which provides a measure of the total time available to accommodate all critical intersection movements and the capability of the intersection to meet expected travel demand. The model output was used to evaluate intersection LOS at approximately 70 intersections for existing, 2035 with a western corridor, and 2035 without a western corridor.

This analysis shows that most major intersections within the Joplin network operate at acceptable levels of service (LOS A, B, C, or D) with and without the Joplin western corridor in the future. One intersection operates at a poor level of service in the future, South Main Street with East 7th Street, but the ICU is 85 percent with a western corridor and 86 percent without a western corridor, meaning that the intersection is not affected by the western corridor.

When ICU is considered, beneficial effects as the result of the western corridor are evident. For example, the overall average ICU of the evaluated intersections improves when comparing the future intersections with and without the western corridor, showing that the western corridor reduces the overall capacity utilization of intersections throughout Joplin. Other intersections also exhibit ICU improvements as a result of the western corridor. For this analysis, the western corridor improves intersection ICU throughout the western Joplin area, and does not affect intersections in the eastern Joplin area.