Phase 2 Final Report
April 8, 2013
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Acknowledgments

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STUDY SPONSORS
Kansas Department of Transportation, Bureau of Transportation Planning
Mid-America Regional Council
Lawrence-Douglas County Metropolitan Planning Organization

CORE TEAM
Thomas Dow, KDOT Project Director
David Gurss, KDOT Project Manager
Steve Baalman, KDOT
Hugh Bogle, KDOT
Earl Bosak, KDOT
David Cronister, KDOT
Eddie Dawson, KDOT
Tom Gerend, MARC
Todd Girldler, Lawrence-Douglas County MPO
Mell Henderson, MARC
John Maddox, KDOT
Davonna Moore, KDOT
Burt Morey, KDOT
Jim Pickett, KDOT
Josh Powers, KDOT
Kimberly Qualls, KDOT
David Schwartz, KDOT
Joel Skelley, KDOT

STAKEHOLDER ADVISORY PANEL
Sean Adams, Bright Logistics
Steve Baru, Sierra Club/Johnson County Park and Recreation Board
Cindy Cash, Kansas City, KS Chamber of Commerce
Rita Cassida, City of Louisburg
Bernice Duletski, Johnson County
Mike Gaughan, Douglas County Commission
Elaine Giessel, League of Women Voters
Lisa Harris, Lawrence-Douglas County Planning Commission
Steve Jack, Leavenworth County Development Corporation
Scott Miller, City of Leavenworth
Steve Petrehn, MARC Bicycle/Pedestrian Advisory Committee
Penny Postoak Ferguson, Johnson County
George Pretz, Miami County Commission/Kansas Farm Bureau
Kise Randall, Kessinger/Hunter & Company, LLC
Marge Vogt, City of Olathe, City Council

CORRIDOR STRATEGIES WORKING GROUP
Alice Amrein, Johnson County Transit
Doug Brown, City of Overland Park
Keith Browning, Douglas County
Dale Crawford, KanBikeWalk, Inc.
Emerick Cross, Unified Government of Wyandotte County Transit
Laura Elkins, Leavenworth Council on Aging
Bill Heatherman, Unified Government of Wyandotte County
David Jacobson, Kansas Turnpike Authority
Dick Jarrold, KCATA
Ben Jones, Union Pacific
Rev. Bobby Love, Second Baptist Church of Olathe/More2
Scott McCullough, City of Lawrence
Eric McDonald, Storage Solutions
Bob Nugent, Lawrence Transit
Dean Pales, Johnson County
Erik Pollok, Miami County Planning
Rob Richardson, Unified Government of Wyandotte County
Patrick Robinson, The Allen Group
Michael Spickelmier, Leavenworth County
Nolan Sunderman, City of Lansing

TRAVEL DEMAND MODEL TECHNICAL COMMITTEE
Paul Bertrand, GBA
David Cronister, KDOT
Andrew Coe, Parsons Brinckerhoff
Jamie Gilbert, GBA
Todd Girdler, Lawrence-Douglas County MPO
Charles Gorugantula, MARC
Jeff Joseph, Leavenworth County
Christopher Kinzel, HDR
Alonzo Linan, City of Olathe
Dean Pales, Johnson County
David Peel, Johnson County
Erik Pollok, Miami County
Steve Ruegg, Parsons Brinckerhoff
David Schwartz, KDOT
Mandy Siemon, GBA
Kip Strauss, HNTB
Jinghua Xu, Parsons Brinckerhoff

CONSULTANT TEAM
Parsons Brinckerhoff
Olsson Associates
Shockey Consulting
Phase 2 Final Report
Executive Summary
Every day, drivers travel millions of miles on the 5-County region’s roadway system, thousands use the region’s transit services and bicycle facilities, and millions of dollars of goods move through the transportation network. Even with the 2010-2020 T-WORKS transportation program, funding for transportation infrastructure and services cannot address all of the traffic safety and operational issues.

The Kansas Department of Transportation (KDOT), the Mid-America Regional Council (MARC) and the Lawrence-Douglas County Metropolitan Planning Organization (L-DC MPO) have completed a two-phase study to assess the changing transportation needs in Douglas, Johnson, Leavenworth, Miami, and Wyandotte counties. This comprehensive study involved residents, community leaders, and transportation stakeholders. The Study resulted in a set of recommended strategies to improve the region’s transportation system through the year 2040.

**PURPOSE OF THE STUDY**

The purpose of the 5-County Regional Transportation Study was to assess the changing transportation needs of the region and identify key strategies to enhance the regional transportation system in a sustainable way. Difficult choices will need to be made, and this study will serve as a guide and help to shape the future transportation system for the region.

**WHY IS THE STUDY NEEDED?**

The 5-County region, shown in Figure ES-1, is the fastest growing region in the State of Kansas. Rapid development in the study region will strain the transportation infrastructure needed to support additional growth. A number of high-impact developments are underway or planned in the region that will significantly impact regional travel patterns. Examples include the BNSF Intermodal facility in Edgerton and additional growth at Village West in Kansas City, KS.

Funding for transportation is limited, so the region must prioritize the needs and develop a wider range of strategies to improve the operation and safety of the transportation system for both travelers and goods movement.

T-WORKS: In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state.
Executive Summary

STUDY SPONSORS
The sponsors for the study included KDOT, MARC, and the L-DC MPO. A Core Team of staff from each of the study sponsors provided oversight for the study process.

The study sponsors provided the following guiding principles for the 5-County Study:

The 5-County Regional Transportation Study will assess the region’s multimodal needs and develop strategies that are:

- Regionally Based
- Technically Feasible
- Politically Acceptable
- Financially Realistic
- Sustainable

STUDY PHASES
The 5-County Regional Transportation Study was broken into two phases. Figure ES-2 shows the study process with Phase 1 described in the top box and Phase 2 in the remaining boxes.

Phase 1
Phase 1 of the study provided a complete assessment of the multimodal transportation needs for the 5-County region. Stakeholder outreach was a major component of Phase 1. Multiple opportunities were provided for the general public, elected officials, local government staff, and other transportation stakeholders to provide input on transportation issues, challenges, and trends.

As a result of the stakeholder outreach, five primary themes emerged and have been used to guide the study recommendations:

1. Create a multimodal transportation system that provides choice and supports economic vitality of the region.
2. Focus on moving people and freight rather than on moving vehicles.
3. Invest in a transportation system that promotes the region's long-range vision and community goals and objectives.
4. Seek to maximize the vitality of social, economic, and environmental systems when making transportation investments.
5. Maintain and invest in the existing transportation system.

Phase 2
Phase 2 of the study used the guiding principles, vision for future transportation, and the 9 Desired Outcomes developed during Phase 1 to prioritize the region’s transportation needs. Strategies for 17 key transportation corridors were evaluated and a potential outer loop was analyzed. In addition to public officials from each of the five counties, three stakeholder groups provided guidance throughout Phase 2. The Stakeholder Advisory Panel was a group of stakeholders from the public sector and key interest groups representing a wide range of interests. This panel was responsible for recommending transportation goals and providing input on decision-making criteria. The Corridor Strategies Working Group was a well-informed group of stakeholders that provided input on the strategies recommended for each of the corridors and on the evaluation criteria used to analyze those strategies. The Travel Demand Model Technical Committee provided input on the development of the 5-County regional model.

Figure 1-2: 5-County Transportation Study Process

Determine Transportation Needs and Opportunities
- Public/Stakeholder outreach regarding transportation
- Develop travel demand model
- Identify transportation needs & opportunities
- Identify key corridors with input from Stakeholder Advisory Panel and Technical Working Groups
- Develop toolbox of strategies
- Develop vision of the future transportation system by Stakeholder Advisory Panel
- Desired outcomes developed by Stakeholder Advisory Panel

Identify Potential Strategies for Key Corridors
- Use toolbox to identify strategies for all modes and users that address the 9 Desired Outcomes
- Input from Corridor Strategies Working Group & Stakeholder Advisory Panel

Evaluate Strategies for Key Corridors
- Develop evaluation criteria with input from Corridor Strategies Working Group
- Assess strategies using the evaluation criteria
- Determine how well 9 Desired Outcomes are met
- Determine cost-effectiveness

Regional Comparison and Prioritization
- System analysis: regional impacts of each strategy
- Compare and prioritize strategies
- Logical sequencing of improvements
- Input from Stakeholder Advisory Panel, Corridor Strategies Working Group, cities and counties

Implementation Timeframe
- Set priorities by 10-year intervals
- Funding availability
- Ease of implementation

Use of Corridor Recommendations to Inform Decision-making
- Metropolitan Transportation Plans (MTP)
- Local transportation and land use plans
- Future corridor studies
- Agency project selection
- Preliminary project scoping
During Phase 1 of the study, the Stakeholder Advisory Panel and the four topical Working Groups developed a list of “9 Desired Outcomes” to be used in making transportation investment decisions. These groups used input obtained from the public and other stakeholders regarding transportation issues and desires for changes in a future multimodal transportation system.

The 9 Desired Outcomes fall into one of three categories:

**Engineering**
- **Mobility:** Move people and goods in an efficient manner.
- **Safety:** Reduce crash rates, severity, and reduce conflict points.

**Economic Impacts**
- **Regional Prosperity:** Improve economic competitiveness through reliable and timely transportation and expanded market access.
- **Efficient Use of Financial Resources:** Evaluate the affordability of transportation investments by considering the initial investment, operation/maintenance, and economic benefit.

**Community and User Impacts**
- **Choice:** Invest in a multimodal transportation system that maintains our existing roadways, but also allows individuals the choice of using other modes.
- **Environment:** Rather than mitigate the impacts on the environment, transportation investments should seek to enhance air and water quality as well as protect natural resources.
- **Public Health:** Improve traffic safety and air quality, and promote physical activity and fitness.
- **Social Equity:** Consider investment impacts on all population groups within communities.
- **Livability:** Integrate the transportation system with community desires.

These outcomes were used during Phase 2 to evaluate the strategies for 17 key corridors and were used as well to evaluate the benefits and impacts of a potential outer loop. The key corridors and potential outer loop are shown in Figure ES-3 and include:

**East-West Corridors**
- I-70
- I-435 (East-West Segment)
- US-24/40
- US-56
- K-10
- K-68
- K-92/M-92
- 175th Street/ 199th Street/223rd Street
- Shawnee Mission Parkway
- State Avenue

**North-South Corridors**
- I-35
- I-435 (North-South Segment)
- I-635/I-35/US-69
- K-5
- Metcalf Avenue
- Western Johnson County North-South Arterial

**Potential Outer Loop**
A potential outer loop was also studied during Phase 2 as a possible strategy to address the needs in one or more of the corridors studied. The blue dashed line on Figure ES-3 illustrates the path that was modeled as part of the study, but does not necessarily represent the centerline of a future roadway. A more generalized corridor is depicted on pages 123-126.

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*Figure ES-3: Key Corridors Evaluated in Phase II of the 5-County Study*
TRANSPORTATION LESSONS FROM PEER CITIES

Lessons can be learned from several Midwestern cities that have metropolitan areas of comparable size and geography to the Kansas City metropolitan area (Kansas City, KS and Kansas City, MO). These peer cities have experienced the same transportation challenges that are now facing the 5-County region and have developed strategies to address them.

Figure ES-4 provides a comparison of population, land area, and transportation system characteristics drawn from the 2011 Urban Mobility Report prepared by Texas A&M Transportation Institute.

Existing Highways and Arterial Streets

The Kansas City metropolitan area’s extensive roadway network has more than double the number of freeway lane-miles per capita found in Denver and Minneapolis-St. Paul, and almost double that in Dallas. The Kansas City area also exceeds all other peer cities in arterial street lane-miles per capita. These peer cities have determined that roadway capacity projects alone cannot address the transportation needs of their communities. They have incorporated managed lanes, transit systems, ramp metering, and other non-widening strategies to handle travel demand.

Commuter Delays

The travel delay experienced by commuters using personal vehicles is relatively low when compared to the peer cities. As part of the approach to address travel delay, the peer cities have implemented a variety of Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies.

Public Transportation

One strategy where the Kansas City metropolitan area and the 5-County region appear to be falling behind is in providing a regional system of public transit. It is apparent that the peer cities have each implemented an aggressive public transportation strategy to address peak period congestion and to provide a choice in transportation modes to their residents. The peer cities do have an advantage in higher population densities that make public transportation more feasible. In the 5-County region, the implementation of a system of Park & Ride facilities is recommended to artificially create density. The K-10 Connector bus service and the I-35 Bus-on-Shoulder service have shown that they attract riders even though the 5-County region has lower population density.

Figure ES-4: Peer City Comparison of Population and Transportation Characteristics

Source: Lomax, Tim and Schrank, David. (2010) Urban Mobility Report, Texas A&M Transportation Institute, Strategic Solutions Center
Note: Data represented in figure above is from the Kansas Metro area and does not cover the entire 5-County region.
REGIONAL CHALLENGES

In order to plan for the region’s future transportation and create strategies that will have a positive impact on the movement of people and goods, it’s important to understand the challenges that face the region through the year 2040.

Phase 2 of the study identified many of these challenges through the combined efforts of the Study Sponsors, a stakeholder/public outreach process, and technical analyses.

As shown in Table ES-1, the 9 Desired Outcomes provide a framework for discussing the challenges the region will face in the coming years.

Table ES-1: 9 Desired Outcomes and Regional Challenges

<table>
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<tr>
<th>Desired Outcome</th>
<th>Challenges</th>
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| **Mobility**    | • Recurring and Non-Recurring Congestion – understanding and addressing the types and causes of congestion  
                     • Access Management – protecting the public investment in the mobility function of major roads while supporting economic activity (balance traveler safety, system efficiency and economic activity)  
                     • Latent Travel Demand – this short-term travel growth is difficult to predict and may result in design year traffic volumes being reached in less time as people change their travel behaviors (time of travel, route choice, mode choice, trip chaining, etc.)  
                     • Corridor Widening Constraints – existing right-of-way, development, and complex interchanges make further widening of some corridors cost-prohibitive  
                     • Funding Limitations – the need for transportation improvements far outpace the funding that is and will be available  
                     • Understanding the Benefits of Non-Capacity Strategies – educating stakeholders on the benefits of new Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies |
| **Safety**      | • Identifying Effective Countermeasures – identifying the causes of crashes in the region and finding effective strategies |
| **Regional Prosperity** | • Coordinating Land Use and Transportation Planning – major developments must coordinate as early as possible with transportation agencies  
                                 • Family Budgets – the average household in the Kansas City Metropolitan area spends between 14% and 27% of their income on transportation costs |
| **Efficient Use of Resources** | • Limited Transportation Funding – spending the limited available funding for transportation in a manner to achieve the greatest benefits  
                                   • Multiple Agencies – with many different agencies being part of the decision-making process, significant coordination is a must |
| **Choice**      | • Recognizing the Regional Need for Transportation Options – many of the region’s population groups desire a more robust transit system for longer trips and improved bicycle and pedestrian facilities for shorter trips  
                     • Coordinating Transit Services – coordinating the services of the five transit agencies that serve the 5-County region  
                     • Funding Limitations – providing additional funding to address transit needs  
                     • Choice Ridership – making transit more attractive to choice riders, those who have a choice of transportation modes and choose to ride transit |
| **Environment** | • Air Quality – maintaining a reasonable level of air quality is a challenge with the current transportation system, mode choice options could provide a benefit |
| **Public Health** | • Lack of Transportation Mode Options – the lack of diversity in transportation options has an impact on public health  
                            • Access to Medical Facilities – lack of all-day transit in many areas makes it difficult for some citizens to have adequate access to medical facilities  
                            • Air Quality – the current transportation system that relies heavily on automobile travel has a negative impact on air quality |
| **Social Equity** | • Balance the Benefits of Transportation Improvements – transportation investments must be distributed throughout the region so that all population groups benefit |
| **Livability**  | • Integrating Transportation with Community Goals – balance mobility goals with community goals for livability |
REGIONAL CHANGES

Significant changes can be expected by 2040 in population demographics, development, travel demand, truck traffic, vehicle technology, and funding. These changes must be understood and considered as decisions are made for transportation investments.

Population, Employment, and Development Patterns

Population and employment within the 5-County region are expected to grow 41 percent by 2040, most of which will be in Johnson County. Many of the region’s cities are planning city centers with compact spaces, mixed-use facilities, and localized resources which can minimize the need for longer distance commuting. However, the large employment centers such as downtown Kansas City, MO, Corporate Woods, and Village West will continue to draw commuters from throughout the region.

Figure ES-5 shows the areas forecasted to experience population growth between 2010 and 2040. Most of the forecasted growth is around the perimeter of the metro area, mostly outside I-435.

Figure ES-6 shows the areas forecasted to experience employment growth between 2010 and 2040. Major new employment hubs are projected along the K-10 corridor west of I-435, at Village West in Wyandotte County, and at the new BNSF Intermodal Facility near Edgerton. Increased commute distances may be a factor for the region’s residents as development occurs outside existing developed areas.

Demographic Changes

The makeup of the region’s population will change in the coming years. The two population age groups that are expected to see the most significant change are those over the age 65 and those aged 35 and younger. Nationally, from 2010 to 2040, there is expected to be a 72 percent increase in the number of households in the age 65+ category. The changes will be seen specifically in the inner ring suburbs and this age group will want to rely less on automobiles and will desire access to medical and shopping needs via transit. National data shows that people 35 years of age and younger want to use their automobiles less and live in a more urban environment. The region will also see an increase in low-income and minority populations and these individuals are more likely to use transit.

While planning for the future, strategies considered in the region should take into account these demographic shifts and plan for multimodal transportation.

Changes in Land Use

A major land use concern facing the 5-County region is the sustainability of continued outward development. The Mid-America Regional Council (MARC) has analyzed this issue in the development of future year growth scenarios. MARC found that if 40 percent of the region’s population growth were accommodated in existing centers along established corridors, the region could save over $3 billion in infrastructure costs.

The developed area around Lawrence is also expanding, but planning efforts are being made to encourage development in a way to support financial sustainability. One concept being encouraged is the creation of new neighborhoods based on Traditional Neighborhood Design. This would increase connectivity and support walking, biking and transit travel.

Increased Travel Demand

As the population and employment increases and spreads throughout the region, the demand on the transportation system will also increase. A regional travel demand model was used to assess future travel patterns on major roads in the 5-County region. The model made use of the land use and population growth assumptions determined by the Mid-America Regional Council and by the Lawrence-Douglas County Metropolitan Planning Organization.

Table ES-2 shows the increase in vehicle-hours traveled, vehicle-miles traveled, and the lane-miles of congestion between 2010 and 2040. The congestion on the road network more than doubles over this time period.

<table>
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<th>2010 Base Year</th>
<th>2040 Existing System + Committed T-WORKS projects</th>
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<tr>
<td>Peak Hour Vehicle-Hours Traveled (VHT)</td>
<td>137,980</td>
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<td>Peak Hour Vehicle-Miles Traveled (VMT)</td>
<td>6,170,068</td>
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<td>Congestion LOS=E (Lane-Miles)</td>
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A future view of the 5-County region’s roadways shows the demand for travel on many of the major highways and some arterial streets to be near, at, or over their travel-carrying capacity during peak periods.

Figure ES-7 shows the travel demand model results for the evening peak period level of congestion in the year 2040. The 2040 model assumes the existing roadway network plus those projects that are included in the T-WORKS transportation program (2010-2020). The roadways shown in red indicate segments that are at Level of Service (LOS) E. LOS E is the capacity of the roadway and is characterized by low travel speeds and a very limited ability for drivers to change lanes. Motorist delay is very high and travel times are unreliable, impacting both commuters and freight movement. Black lines show where demand exceeds LOS E, there are too many vehicles for the road to carry and traffic comes to a stop.
As future transportation investment decisions are made, the when, where, and why congestion occurs must be considered. Figure ES-8 shows typical directional hourly traffic volumes on the I-35 Corridor. The point illustrated by the graph is that existing roadways have adequate capacity except during the times when commuters are using these facilities.

![Figure ES-8: I-35 Peak period roadway congestion in 2040](image)

This leads to two questions: Are there other transportation strategies that would effectively handle commuters without widening the roadway? And, how do we move more people and goods in fewer vehicles?

The 5-County region should take advantage of the lessons learned in peer Midwestern cities by developing a more balanced transportation system that includes transit and active modes of transportation in addition to maintaining and developing the system of highways and major streets. A regional transit system serves broader desired outcomes than just mobility. It would address social equity allowing seniors to “age-in-place” and provides transportation for the transit-dependent. It also meets the desired outcomes of choice, environment, public health, and livability that are sought by the region’s residents and stakeholders.
Increase in Truck Traffic
While truck volumes are growing throughout the region, the development of the BNSF intermodal facility north of I-35 in Edgerton is anticipated to be a major destination and generator of regional freight rail and truck traffic. Traffic studies completed for this development have forecasted the combined intermodal and logistics activity to generate about 17,000 trips a day when it is fully developed. Just the intermodal site is expected to generate 7,000 truck trips per day when fully developed with 85 percent of these trucks traveling northeast on I-35.

Changes in Vehicle Technology
Technology is being used to make vehicles smarter, safer, and connected. In-vehicle communication with satellites is becoming common (e.g. in-vehicle navigation systems). In August 2012, the United States Department of Transportation launched the first connected vehicle technology test in the U.S. This test of 3,000 vehicles in Ann Arbor, Michigan is evaluating the effectiveness of vehicles communicating with other vehicles and the road. Connected vehicle technology has the potential to increase the capacity of existing roadways. As vehicles communicate with each other, they can travel with less space between them, thereby allowing the existing number of lanes to carry more traffic.

Changes in Vehicle Fuel Mileage
In 2011, the federal government changed fuel efficiency standards for passenger vehicles and light trucks starting with the model year 2017 that require vehicles to have higher gas mileage. With these changes, it is expected that gas tax revenues will decrease sharply. The gas tax revenues flow to the federal and state governments for that gas tax revenues will decrease sharply. The gas tax will be used to fund transportation improvements in the future.

Changes in Transportation Funding
Figure ES-9 shows a comparison of statewide funding for expansion and modernization projects in Kansas. The top bar represents all the projects communities listed as needs during the 2008 Local Consult meetings, a total of $15 billion. Those projects were prioritized and in 2009 a list of top tier projects costing $6.9 billion was developed. T-WORKS will fund $1.7 billion of expansion and modernization projects ($880 million in the 5-County region) and while it will address many transportation needs, there are many more that will not be funded. This is in comparison to the CTP (the previous funding program) which when inflated to 2016 dollars had $4 billion available for modernization and expansion transportation projects.

FUTURE ROLE OF ROADWAYS
The 5-County region has a robust system of interconnected freeways, other highways, and arterial streets which create its transportation network. The roadway system serves commuter trips, freight movement, transit, bicycle and pedestrian trips, and provides links to activity centers. Highways and arterial streets will continue to be the backbone of the future transportation system. Due in part to funding limitations, the future will see a broader range of strategies implemented on the roadway system in addition to key capacity improvement projects. These will include Transportation System Management (TSM) strategies like ramp metering and expanding the KC Scout ITS traffic management system, and active lane-use control. Also, Transportation Demand Management (TDM) strategies such as providing Park & Ride facilities and expanding transit service will provide residents with more transportation options and help address peak period congestion.

FUTURE IMPACTS OF FREIGHT MOVEMENT
The 5-County region is a vital national freight hub due to a strong goods movement transportation network with relatively few bottlenecks. Kansas City is considered the second largest rail center in the nation and is served by five Class I rail carriers. The region is also one of the top five trucking centers. The construction of the BNSF Intermodal Facility in Edgerton, along with associated development, will have a significant impact on the movement of goods by truck in the region. When fully operational, the intermodal facility will generate over 7,000 truck trips per day with the majority of those trucks moving north on I-35.

FUTURE ROLE OF PUBLIC TRANSIT
Transit will play an important role in the future transportation system for the 5-County region, particularly in moving commuters during the morning and evening peak travel periods. An enhanced transit system will improve the movement of travelers both regionally and locally, connecting them to major activity centers such as universities, hospitals, shopping areas, sports arenas, and major employment centers. Enhanced transit will serve not only commuters, but also those travelers who are transit dependent (i.e. young, old, low income, disabled, or otherwise unable to drive).

FUTURE ROLE OF BICYCLE AND PEDESTRIAN FACILITIES
Bicycle and pedestrian facilities are an integral part of a future transportation system. As land use changes to more mixed development and as more of the population focuses on a healthier lifestyle, there is a growing need for alternatives to automobile travel. While bicycle and pedestrian facilities will not fully address the needs of people traveling regionally, the regional system needs to accommodate and plan for these types of facilities to eliminate the barriers created by natural features and major highways and to support regional transit service.

FUTURE ROLE OF ECONOMIC DEVELOPMENT IN TRANSPORTATION
Transportation investments have a significant impact on economic development. Future transportation investment decisions should continue to consider economic impacts.
Transportation investment decisions should take into account the vision for the region’s future transportation system that was developed by local officials, technical staff, and other transportation stakeholders in Phase 1 of the 5-County Regional Transportation Study. The shared vision of stakeholders in the region states that:

“The future 5-County transportation system should…”

- Provide efficient movement of people and goods
- Provide users with the choice to utilize multiple modes of transportation
- Support a strong regional economy
- Be safe and reliable
- Be financially efficient and affordable
- Enhance the environment
- Improve public health
- Allow every citizen to participate fully in society
- Enhance the quality, livability, and character of communities

Framework for Investment Decisions

To accomplish this vision, 9 Desired Outcomes were developed to guide decisions for future transportation investments within the funding limitations for transportation infrastructure and services.

A regional framework for transportation investment decisions was developed with guidance from the Stakeholder Advisory Panel. Decisions should follow the framework shown in Figure ES-10 and described below:

1. Maintain existing transportation facilities and services before giving consideration to other expenditures: Within this framework, maintaining and operating the existing roadways, bridges, transit services, and bicycle/pedestrian facilities comes first. Maintenance is the number one priority of residents and stakeholders in the 5-County region and maintenance first has been a practice of KDOT.

2. Manage travel demand and the operation of the transportation system before considering more costly strategies: Within this framework, the next step is to consider a wide variety of lower-cost strategies that can maximize the efficiency of the existing system and reduce the demand for use.

3. Add new capacity to the transportation system: The final step within this framework, after maintaining and managing the transportation system, is the consideration of new infrastructure and service capacity improvements. Within this framework it is understood that new capacity improvements lead to new maintenance and system management costs.

Recommended practices include:

- Maintain existing infrastructure and services before considering system expansion. Funding maintenance and operation of existing transportation systems must be provided before investments in other strategies.
- Consider life-cycle costs when making investment decisions. The life-cycle costs to maintain an improvement must be considered when making transportation investment decisions.
EVALUATION OF THE RECOMMENDED STRATEGIES

The recommended strategies were evaluated using criteria based on the 9 Desired Outcomes developed by the Stakeholder Advisory Panel. The analysis made use of the 5-County Travel Demand Model, GIS information, cost/benefit data and local land use plans.

The strategies were based on one of four broad categories:

- Operation and Maintenance: Operation and maintenance of existing roadways and transit services is a critical “baseline” strategy for all corridors.
- Transportation Systems Management: These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.
- Transportation Demand Management: These strategies seek to address transportation needs by reducing the number of vehicles during the peak travel periods.
- Capacity Improvements: These strategies increase a roadway’s capability to carry higher traffic volumes through added general purpose lanes or through managed lanes.

Table ES-3 shows the estimated costs by strategy type and decade of implementation.

**Table ES-3: Funding Requirements for Recommended Strategies**

<table>
<thead>
<tr>
<th>Strategy Type</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation &amp; Maintenance</td>
<td>Varies*</td>
<td>Varies*</td>
<td>Varies*</td>
</tr>
<tr>
<td>Transportation System Management</td>
<td>$ 93,056,080</td>
<td>$ 6,775,000</td>
<td>$ 99,831,080</td>
</tr>
<tr>
<td>Transportation Demand Management</td>
<td>$ 114,224,500</td>
<td>-</td>
<td>$ 114,224,500</td>
</tr>
<tr>
<td>Capacity – General Purpose Lanes</td>
<td>$ 1,113,134,655</td>
<td>$ 1,109,832,700</td>
<td>$ 2,282,967,355</td>
</tr>
<tr>
<td>Capacity – Managed Lanes</td>
<td>-</td>
<td>$ 305,714,200</td>
<td>$ 305,714,200</td>
</tr>
<tr>
<td>All Strategies</td>
<td>$ 1,320,415,155</td>
<td>$ 1,482,321,900</td>
<td>$ 2,802,737,055</td>
</tr>
</tbody>
</table>

*Funding for the operation and maintenance of existing transportation infrastructure and services typically comes from a separate source than that for the implementation of new strategies. KDOT’s average annual maintenance cost for pavements and bridges in the 5-County region was approximately $13.5 million for the years 2001 through 2011. Maintenance costs can vary considerably from year to year.

**EVALUATION PROCESS**

The process for evaluating the corridor strategies included these steps:

- A “triple bottom line” approach, recommended in Phase 1, requires consideration of economic, environmental, and societal factors when making transportation investment decisions.
- An evaluation matrix was created through a series of meetings with the Core Team, Corridor Strategies Working Group, and Stakeholder Advisory Panel. One or more criteria were identified for each of the 9 Desired Outcomes that best defined the regional philosophy for that outcome.
- The Stakeholder Advisory Panel and public officials from all five counties determined weights that were applied during scoring of the strategies. These weights represented the importance of each of the 9 Desired Outcomes.
- Each corridor strategy was scored and then all strategies were placed in highest to lowest order based upon total score.

**EVALUATION CRITERIA**

The criteria use for each of the 9 Desired Outcomes are:

- **Mobility:** Degree in which a strategy supports the movement of people and goods.
  - Year 2040 volume to capacity ratio
  - Change in number of congested roadway miles
  - Change in the number of vehicle-hours traveled
- **Safety:** Degree in which a strategy would lead to reduced crash rates and severity.
  - Similar process to that used for T-WORKS
- **Regional Prosperity:** Improved economic competitiveness through reliable transportation.
  - KDOT provided a TREDIS (Transportation Economic Development Impact System) analysis
- **Efficient Use of Financial Resources:** Evaluation of the affordability of transportation investments.
  - Benefit/cost analysis based upon a reduction in the number of crashes and a reduction in travel costs
- **Choice:** Degree in which strategy provides for choice in mode of transportation.
  - Travel time in automobile compared to transit
  - Transit ridership as determined by the travel demand model
  - Degree to which strategy connects various modes
  - Degree to which transit and bicycle facilities are provided
- **Environment:** Degree to which a strategy enhances the environment.
  - Impacts to sensitive natural resources
  - Reduction in air and water pollution, carbon emissions
  - Reduction in consumption of energy, fuel, and non-renewable resources
  - Uses land in a sustainable manner

**RECOMMENDED STRATEGIES**

The recommended strategies were selected primarily based upon how well they addressed the 9 Desired Outcomes as indicated by their total score. Strategies that were not selected likely had a high cost, were alternatives to another strategy, or had a low score.

The recommended corridor strategies were presented to the Stakeholder Advisory Panel, Corridor Strategies Working Group, and officials in each of the five counties. These groups provided feedback on how well the strategies address regional transportation needs.

The recommended strategies assumed a funding level similar to T-WORKS and adjusted for inflation.

The recommended strategies for the 5-County region are shown in maps and tables on the following pages.
Table ES-4: Transportation System Management Strategies

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Cost*</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>I-35</td>
<td>Ramp metering north of K-7</td>
<td>$2,900,000</td>
<td>$2,900,000</td>
<td>$2,900,000</td>
<td>569</td>
</tr>
<tr>
<td>S2</td>
<td>I-435 E-W</td>
<td>Ramp metering between Quivira Road and Metcalf Avenue</td>
<td>$700,000</td>
<td>$700,000</td>
<td>$700,000</td>
<td>551</td>
</tr>
<tr>
<td>S3</td>
<td>I-70</td>
<td>Ramp metering between K-7 and 18th Street</td>
<td>$700,000</td>
<td>$700,000</td>
<td>$700,000</td>
<td>543</td>
</tr>
<tr>
<td>S4</td>
<td>K-10</td>
<td>Ramp metering between Church Street and Ridgeview Road</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td>540</td>
</tr>
<tr>
<td>S5</td>
<td>I-635, I-35, US-69</td>
<td>Ramp metering from 119th Street to I-35</td>
<td>$600,000</td>
<td>$600,000</td>
<td>$600,000</td>
<td>520</td>
</tr>
<tr>
<td>S6</td>
<td>I-35</td>
<td>Variable speed limits from 127th Street to the KS/MO state line</td>
<td>$2,100,000</td>
<td>$2,100,000</td>
<td>$2,100,000</td>
<td>501</td>
</tr>
<tr>
<td>S7</td>
<td>K-7</td>
<td>Signal coordination from 4H Road to Parallel Parkway and from W. Harold Street to 159th Street</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>493</td>
</tr>
<tr>
<td>S8</td>
<td>I-70</td>
<td>Variable speed limits from I-435 to the KS/MO state line</td>
<td>$1,400,000</td>
<td>$1,400,000</td>
<td>$1,400,000</td>
<td>491</td>
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<tr>
<td>S9</td>
<td>I-435 E-W</td>
<td>Variable speed limits K-10 to KS/MO line</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td>487</td>
</tr>
<tr>
<td>S10</td>
<td>I-435 N-S</td>
<td>Variable speed limits Parallel Pkwy to K-10</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td>482</td>
</tr>
<tr>
<td>S11</td>
<td>K-7</td>
<td>Expand KC Scout between Parallel Parkway and College Blvd</td>
<td>$2,200,000</td>
<td>$2,200,000</td>
<td>$2,200,000</td>
<td>479</td>
</tr>
<tr>
<td>S12</td>
<td>I-70</td>
<td>Expand KC Scout ITS: K-7 to I-435</td>
<td>$500,000</td>
<td>$500,000</td>
<td>$500,000</td>
<td>469</td>
</tr>
<tr>
<td>S13</td>
<td>US-24/40</td>
<td>Access management: Follow the US 24/40 Corridor Management Plan</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>450</td>
</tr>
<tr>
<td>S14</td>
<td>US-56</td>
<td>Access management: Follow the US-56 Corridor Management Plan</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>447</td>
</tr>
<tr>
<td>S15</td>
<td>State Avenue</td>
<td>Traffic signal optimization from 150th Street to 38th Street</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>444</td>
</tr>
<tr>
<td>S16</td>
<td>I-635, I-35, US-69</td>
<td>Lengthen acceleration lanes at I-635 and I-70 interchange</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>441</td>
</tr>
<tr>
<td>S17</td>
<td>K-68</td>
<td>Access management: Follow K-68 Corridor Management Plan</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>434</td>
</tr>
<tr>
<td>S18</td>
<td>I-435 N-S</td>
<td>Expand KC Scout ITS System from KS/MO state line to Midland Drive</td>
<td>$2,200,000</td>
<td>$2,200,000</td>
<td>$2,200,000</td>
<td>430</td>
</tr>
<tr>
<td>S19</td>
<td>K-10</td>
<td>Intelligent Transportation Systems (ITS) from E. 1750 Road to Cedar Creek Road</td>
<td>$2,500,000</td>
<td>$2,500,000</td>
<td>$2,500,000</td>
<td>427</td>
</tr>
<tr>
<td>S20</td>
<td>K-92/M-92</td>
<td>Incident management on bridge</td>
<td>$2,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>424</td>
</tr>
<tr>
<td>S21</td>
<td>I-635, I-35, US-69</td>
<td>Variable speed limits on US-69 from 143rd Street to I-35</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>422</td>
</tr>
<tr>
<td>S22</td>
<td>Shawnee Mission Parkway</td>
<td>Traffic signal optimization from Hilltop Drive to Rainbow Boulevard</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>418</td>
</tr>
<tr>
<td>S23</td>
<td>K-7</td>
<td>Access management: Follow K-7 Corridor Plan</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>416</td>
</tr>
<tr>
<td>S24</td>
<td>K-10</td>
<td>Variable speed limits on K-10 from K-7 to I-435</td>
<td>$600,000</td>
<td>$600,000</td>
<td>$600,000</td>
<td>412</td>
</tr>
<tr>
<td>S25</td>
<td>I-35</td>
<td>Construct new truck inspection stations</td>
<td>$25,100,000</td>
<td>$25,100,000</td>
<td>$25,100,000</td>
<td>409</td>
</tr>
<tr>
<td>S26</td>
<td>175th, 199th and 223rd Streets</td>
<td>Access management</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>$10,000,000</td>
<td>404</td>
</tr>
<tr>
<td>S27</td>
<td>K-10</td>
<td>Incident management</td>
<td>$2,000,000</td>
<td>$2,000,000</td>
<td>$2,000,000</td>
<td>398</td>
</tr>
</tbody>
</table>

**Total** $112,200,000 | $92,900,000 | $6,700,000

---

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio** is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
Executive Summary

**Total Cost** is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio** is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

### Transportation Demand Management (TDM) Strategies

#### Table ES-5: Transportation Demand Management Strategies

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Metcalf Avenue</td>
<td>Redevelopment per Vision Metcalf Plan</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td>556</td>
</tr>
<tr>
<td>D2</td>
<td>Shawnee Mission Parkway</td>
<td>Expand transit service</td>
<td>$9,500,000</td>
<td>$9,500,000</td>
<td></td>
<td>545</td>
</tr>
<tr>
<td>D3</td>
<td>State Avenue</td>
<td>Expand transit service</td>
<td>$14,400,000</td>
<td>$14,400,000</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>D4</td>
<td>K-10</td>
<td>Expand operating hours/service for transit K-10 Connector Service</td>
<td>$10,100,000</td>
<td>$10,100,000</td>
<td></td>
<td>514</td>
</tr>
<tr>
<td>D5</td>
<td>Metcalf Avenue</td>
<td>Expand transit to Bus Rapid Transit service</td>
<td>$9,500,000</td>
<td>$9,500,000</td>
<td></td>
<td>510</td>
</tr>
<tr>
<td>D6</td>
<td>State Avenue</td>
<td>Construct Park &amp; Ride facilities near K-7 and I-435</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td>485</td>
</tr>
<tr>
<td>D7</td>
<td>K-7</td>
<td>Construct Park &amp; Ride facilities near Shawnee Mission Pkwy and in Bonner Springs</td>
<td>$735,000</td>
<td>$735,000</td>
<td></td>
<td>481</td>
</tr>
<tr>
<td>D8</td>
<td>I-70</td>
<td>Construct Park &amp; Ride facility at K-7</td>
<td>$735,000</td>
<td>$735,000</td>
<td></td>
<td>474</td>
</tr>
<tr>
<td>D9</td>
<td>I-70</td>
<td>Transit service connecting Topeka, Lawrence, Kansas City (KS) and Kansas City (MO)</td>
<td>$22,300,000</td>
<td>$22,300,000</td>
<td></td>
<td>470</td>
</tr>
<tr>
<td>D10</td>
<td>I-35</td>
<td>Construct Park &amp; Ride facilities near US-69, K-7 and Santa Fe</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>465</td>
</tr>
<tr>
<td>D11</td>
<td>I-635, I-35, US-69</td>
<td>Construct Park &amp; Ride facilities near 135th and K-68</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td></td>
<td>455</td>
</tr>
<tr>
<td>D12</td>
<td>I-435 N-S</td>
<td>Construct Park &amp; Ride facilities near Shawnee Mission Parkway, and near 95th Street</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>448</td>
</tr>
<tr>
<td>D13</td>
<td>K-7</td>
<td>Construct Park &amp; Ride facilities near 4th Road and near northern junction of K-7 and K-92</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>442</td>
</tr>
<tr>
<td>D14</td>
<td>K-10</td>
<td>Construct bicycle path across K-7 on Prairie Star Pkwy to connect existing paths</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td></td>
<td>441</td>
</tr>
<tr>
<td>D15</td>
<td>K-7</td>
<td>Commuter transit service connecting Leavenworth / State Avenue / I-70 / Shawnee Mission Parkway / College Blvd</td>
<td>$11,100,000</td>
<td>$11,100,000</td>
<td></td>
<td>440</td>
</tr>
<tr>
<td>D16</td>
<td>US-24/40</td>
<td>Construct paved shoulder with rumble strips for bicycle use from US-59 to Tonganoxie</td>
<td>$45,400,000</td>
<td></td>
<td></td>
<td>435</td>
</tr>
<tr>
<td>D17</td>
<td>K-7</td>
<td>Construct Park &amp; Ride facilities near Spring Hill</td>
<td>$700,000</td>
<td>$700,000</td>
<td></td>
<td>435</td>
</tr>
<tr>
<td>D18</td>
<td>K-7</td>
<td>Peak and off-peak transit service connecting Leavenworth/Lansing and State Ave/57th</td>
<td>$11,200,000</td>
<td>$11,200,000</td>
<td></td>
<td>434</td>
</tr>
<tr>
<td>D19</td>
<td>I-35</td>
<td>Commuter transit service from BNSF Intermodal Facility, additional service Bus on Shoulders to downtown KCMO.</td>
<td>$11,000,000</td>
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<tr>
<td>D20</td>
<td>I-435 E-W</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed bridges over I-435 (strategy not shown on TDM map)</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
<td></td>
<td>431</td>
</tr>
<tr>
<td>D21</td>
<td>I-70</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed bridges over I-70 (strategy not shown on TDM map)</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<td>428</td>
</tr>
<tr>
<td>D22</td>
<td>I-35</td>
<td>Bicycle / pedestrian facilities: Consider on all new or renovated bridges over I-35 (strategy not shown on TDM map)</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<tr>
<td>D23</td>
<td>K-7</td>
<td>Transit commuter service connecting Paola to I-35</td>
<td>$4,000,000</td>
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<tr>
<td>D24</td>
<td>K-10</td>
<td>Expand Park &amp; Ride facilities at KTA Lecompton Toll Plaza</td>
<td>$500,000</td>
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<tr>
<td>D25</td>
<td>State Avenue</td>
<td>Bicycle and pedestrian facilities</td>
<td>$12,000,000</td>
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<td>417</td>
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</tbody>
</table>

**Recommended Strategies:**

1. Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.
2. Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
Transportation Demand Management (TDM) Strategies, continued

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
</tr>
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<tbody>
<tr>
<td>D26</td>
<td>I-435 N-S</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<tr>
<td></td>
<td>bridges over I-435 (strategy not shown on TDM map)</td>
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<tr>
<td>D27</td>
<td>I-70</td>
<td>Expand Park &amp; Ride facilities near KTA toll areas at LeCompton,</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td></td>
<td>414</td>
</tr>
<tr>
<td></td>
<td>Tonganoxie and Lawrence</td>
<td></td>
<td></td>
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<tr>
<td>D28</td>
<td>I-635, I-35, US-69</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<tr>
<td></td>
<td>bridges over I-635, I-35 or US-69 (strategy not shown on TDM map)</td>
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<tr>
<td>D29</td>
<td>US-56</td>
<td>Commuter transit service to Baldwin and Lawrence</td>
<td>$4,000,000</td>
<td></td>
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<td>410</td>
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<tr>
<td>D30</td>
<td>K-68</td>
<td>Bicycle facilities</td>
<td>$14,700,000</td>
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<tr>
<td>D31</td>
<td>K-10</td>
<td>Construct Park &amp; Ride facilities near Eudora and DeSoto</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
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<tr>
<td>D32</td>
<td>K-10</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed</td>
<td>$1,600,000</td>
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<td>bridges over K-10 (strategy not shown on TDM map)</td>
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<tr>
<td>D33</td>
<td>Shawnee Mission Parkway</td>
<td>Bicycle and pedestrian facilities</td>
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<tr>
<td>D34</td>
<td>K-7</td>
<td>Bicycle / Pedestrian facilities: Consider on all new or reconstructed</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<td>bridges over K-7 (strategy not shown on TDM map)</td>
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<tr>
<td>D35</td>
<td>I-35</td>
<td>Parallel bicycle / pedestrian trail development as specified in the</td>
<td>$16,800,000</td>
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<tr>
<td></td>
<td>MARC MetroGreen plan / local plans</td>
<td></td>
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<tr>
<td>D36</td>
<td>I-435 E-W</td>
<td>Parallel bicycle / pedestrian development to connect to Metro Green.</td>
<td>$4,200,000</td>
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<tr>
<td>D37</td>
<td>175th, 199th, and 223rd Streets</td>
<td>Bicycle and pedestrian facilities</td>
<td>$14,000,000</td>
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<tr>
<td>D38</td>
<td>I-70</td>
<td>Parallel bicycle / pedestrian trail development as specified in the</td>
<td>$15,800,000</td>
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<td>398</td>
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<td>MARC MetroGreen plan / local plans</td>
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<tr>
<td>D39</td>
<td>Metcalf Avenue</td>
<td>Bicycle and pedestrian facilities</td>
<td>$8,000,000</td>
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<td>396</td>
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<tr>
<td>D40</td>
<td>US-56</td>
<td>Construct Park &amp; Ride facilities near Baldwin and Intermodal</td>
<td>$1,500,000</td>
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<td>396</td>
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<tr>
<td>D41</td>
<td>K-10</td>
<td>Construct Park &amp; Ride facilities near US-59 and near E.1750</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
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<tr>
<td>D42</td>
<td>K-68</td>
<td>Construct a Park &amp; Ride facility near US-69 and US-169</td>
<td>$1,500,000</td>
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<tr>
<td>D43</td>
<td>K-10</td>
<td>Construct bicycle path adjacent to K-10 from Lawrence to Eudora</td>
<td>$3,400,000</td>
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<tr>
<td>D44</td>
<td>I-635, I-35, US-69</td>
<td>Transit commuter service connecting Louisburg to connect with JO service</td>
<td>$4,100,000</td>
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<td>387</td>
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<tr>
<td>D45</td>
<td>K-10</td>
<td>Construct bicycle path adjacent to K-10 from US-59 to 31st Street</td>
<td>$6,400,000</td>
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<td>386</td>
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<tr>
<td>D46</td>
<td>K-10</td>
<td>Construct bicycle path between DeSoto and Prairie Star Pkwy at</td>
<td>$7,500,000</td>
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<td></td>
<td>386</td>
</tr>
<tr>
<td></td>
<td>Cedar Creek Pkwy to connect with existing path</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>D47</td>
<td>K-10</td>
<td>Construct bicycle path adjacent to K-10 from Eudora to DeSoto</td>
<td>$7,900,000</td>
<td></td>
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<td>385</td>
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<tr>
<td>D48</td>
<td>K-7</td>
<td>Parallel bicycle and pedestrian trail development per MetroGreen /</td>
<td>$17,500,000</td>
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<td>384</td>
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<td></td>
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<tr>
<td>D49</td>
<td>I-435 N-S</td>
<td>Parallel bicycle / pedestrian trail development as specified in the</td>
<td>$8,400,000</td>
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<td></td>
<td>MARC MetroGreen plan / local plans</td>
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</tbody>
</table>

| TOTAL | $325,670,000 | $114,270,000 |

*Total Cost is in 2020-dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
### Table ES-6: Capacity Strategies

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
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<tbody>
<tr>
<td>C1</td>
<td>175th, 199th and 223rd Streets</td>
<td>Widen 199th Street from a 2-lane to a 4-lane arterial street from US-56 to I-49/US-71</td>
<td>$196,350,000</td>
<td>$98,175,000</td>
<td>$98,175,000</td>
<td>614</td>
</tr>
<tr>
<td>C2</td>
<td>175th, 199th and 223rd Streets</td>
<td>Widen 175th Street from a 2-lane to a 4-lane arterial street from I-35 to I-49/US-71</td>
<td>$156,400,000</td>
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<td>586</td>
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<tr>
<td>C3</td>
<td>K-10</td>
<td>Upgrade K-10 to a 4-lane freeway from I-70 to US-59</td>
<td>$98,500,000</td>
<td>$98,500,000</td>
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<td>549</td>
</tr>
<tr>
<td>C4</td>
<td>K-7</td>
<td>Upgrade K-7 to a 4-lane freeway from 215th St to north of 175th St, arterial street improvements on Lone Elm Road to I-35</td>
<td>$60,500,000</td>
<td>$60,500,000</td>
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<td>542</td>
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<tr>
<td>C5</td>
<td>I-35</td>
<td>Construct HOV/HOT lanes from 127th to KS/MO state line</td>
<td>$1,500,000,000</td>
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<td>538</td>
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<tr>
<td>C6</td>
<td>K-7</td>
<td>Upgrade K-7 to a 6-lane freeway from Kansas Avenue to K-10</td>
<td>$215,000,000</td>
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<td>529</td>
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<tr>
<td>C7</td>
<td>K-10</td>
<td>Widen K-10 to 6 lane freeway from E. 1750 Road to I-435</td>
<td>$195,800,000</td>
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<td>528</td>
</tr>
<tr>
<td>C8</td>
<td>K-10</td>
<td>Widen K-10 to 6-lane freeway from E. 1750 Road to I-435 with high occupancy toll lanes (HOT)</td>
<td>$205,600,000</td>
<td>$184,600,000</td>
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<td>527</td>
</tr>
<tr>
<td>C9</td>
<td>K-10</td>
<td>Widen K-10 to 8-lane freeway from K-7 to I-435, K-10 remains 4-lane west of K-7</td>
<td>$82,200,000</td>
<td>$41,100,000</td>
<td>$41,100,000</td>
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<tr>
<td>C10</td>
<td>K-7</td>
<td>Upgrade K-7 to a 6-lane freeway from K-10 to I-435</td>
<td>$714,000,000</td>
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<tr>
<td>C11</td>
<td>K-7</td>
<td>Upgrade K-7 to a 4-lane freeway from 43rd Street to K-10</td>
<td>$46,200,000</td>
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<tr>
<td>C12</td>
<td>175th, 199th and 223rd Streets</td>
<td>Widen 223rd Street to a 4-lane arterial from K-7/US-169 to I-49/US-71</td>
<td>$146,400,000</td>
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<tr>
<td>C13</td>
<td>I-70 K-7</td>
<td>Construct phases 4, 5, 6, 7 and 10 of the reconfigured I-70/K-7 interchange</td>
<td>$245,200,000</td>
<td>$141,400,000</td>
<td>$103,800,000</td>
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<tr>
<td>C14</td>
<td>I-35</td>
<td>I-35 and I-635 interchange improvements</td>
<td>$210,000,000</td>
<td>$105,000,000</td>
<td>$105,000,000</td>
<td>466</td>
</tr>
<tr>
<td>C15</td>
<td>I-435 E-W</td>
<td>Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from K-10 to KS/MO state line</td>
<td>$47,000,000</td>
<td>$47,000,000</td>
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<tr>
<td>C16</td>
<td>Western JO Co. N-S Arterial</td>
<td>Construct 4-lane arterial along Sunflower Rd/Edgerton Rd/ Evening Star Rd from US-56 to K-10</td>
<td>$136,500,000</td>
<td>$68,250,000</td>
<td>$68,250,000</td>
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<tr>
<td>C17</td>
<td>I-35</td>
<td>Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from 127th to KS/MO state line</td>
<td>$94,000,000</td>
<td>$94,000,000</td>
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<tr>
<td>C18</td>
<td>K-92/M-92</td>
<td>Widen Centennial Bridge over the Missouri River 4 lanes w/ toll</td>
<td>$53,300,000</td>
<td>$53,300,000</td>
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<tr>
<td>C19</td>
<td>US-56</td>
<td>New interchange at US-56 and 199th Street</td>
<td>$26,300,000</td>
<td>$26,300,000</td>
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<td>438</td>
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<tr>
<td>C20</td>
<td>I-70</td>
<td>Reconfigure I-70 and I-635 interchange</td>
<td>$210,000,000</td>
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<td>438</td>
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<tr>
<td>C21</td>
<td>I-435 E-W K-10, I-35</td>
<td>Construct remaining phases of I-435 / I-35 / K-10 Gateway project</td>
<td>$310,800,000</td>
<td>$77,700,000</td>
<td>$233,100,000</td>
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<tr>
<td>C22</td>
<td>K-92/M-92</td>
<td>Widen Centennial Bridge over the Missouri River Bridge to 4 lanes</td>
<td>$51,700,000</td>
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<tr>
<td>C23</td>
<td>I-70</td>
<td>Reconfigure I-70 and Lewis &amp; Clark Viaduct Interchange</td>
<td>$200,000,000</td>
<td>$50,000,000</td>
<td>$150,000,000</td>
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</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs. **Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
### Capacity Strategies, continued

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
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<tbody>
<tr>
<td>C24</td>
<td>K-7</td>
<td>Expressway intersection enhancements from Lansing to State Ave</td>
<td>$21,000,000</td>
<td>$21,000,000</td>
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<tr>
<td>C25</td>
<td>US-24-40</td>
<td>Widen US-24-40 to 4 lanes from US-59 to K-16</td>
<td>$85,700,000</td>
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<tr>
<td>C26</td>
<td>I-70</td>
<td>Active lane control including &quot;hard shoulder running&quot; (raising the shoulder as a driving lane) and potential HOT or HOV lane during peak hours from K-7 to KS/MO state line</td>
<td>$88,200,000</td>
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<tr>
<td>C27</td>
<td>I-70</td>
<td>Reconfigure I-70 and 18th Street interchange as partial cloverleaf</td>
<td>$10,500,000</td>
<td>$10,500,000</td>
<td>429</td>
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<tr>
<td>C28</td>
<td>I-635, I-35, US-69</td>
<td>Widen US-69 to 6 lanes from 119th street to 167th street, includes interchange at 159th St (See C65)</td>
<td>$68,300,000</td>
<td>$5,000,000</td>
<td>$63,300,000</td>
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<tr>
<td>C29</td>
<td>I-35</td>
<td>Widen I-35 to 6 lanes from Homestead Lane to Lone Elm Road</td>
<td>$64,700,000</td>
<td>$64,700,000</td>
<td>426</td>
<td></td>
</tr>
<tr>
<td>C30</td>
<td>I-435 E-W</td>
<td>Convert general purpose lanes to HOV / HOT lanes from K-10 to KS/MO state line</td>
<td>$9,000,000</td>
<td>424</td>
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<tr>
<td>C31</td>
<td>K-5</td>
<td>Realign K-5 from K-7 to I-435 (conduct study)</td>
<td>$84,000,000</td>
<td>$400,000,000</td>
<td>421</td>
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</tr>
<tr>
<td>C32</td>
<td>I-435 N-S</td>
<td>Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from K-10 to I-70</td>
<td>$58,800,000</td>
<td>421</td>
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<tr>
<td>C33</td>
<td>I-435 N-S</td>
<td>Reconfigure I-435 and State Avenue interchange</td>
<td>$10,500,000</td>
<td>$10,500,000</td>
<td>416</td>
<td></td>
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<tr>
<td>C34</td>
<td>I-435, I-35, US-69</td>
<td>Construct remaining phases of US-69 and I-435 interchange (Brown project, Blue project, and Yellow project)</td>
<td>$203,700,000</td>
<td>$63,000,000</td>
<td>$140,700,000</td>
<td>415</td>
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<tr>
<td>C35</td>
<td>I-435 N-S</td>
<td>Add fly over ramp northbound to westbound on I-70 and I-435 interchange</td>
<td>$52,500,000</td>
<td>$52,500,000</td>
<td>412</td>
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</tr>
<tr>
<td>C36</td>
<td>US-56</td>
<td>Intersection improvement at US-56 and 199th street</td>
<td>$5,500,000</td>
<td>409</td>
<td></td>
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<tr>
<td>C37</td>
<td>State Avenue</td>
<td>New interchange at State Avenue and Village West Parkway</td>
<td>$21,000,000</td>
<td>$21,000,000</td>
<td>407</td>
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</tr>
<tr>
<td>C38</td>
<td>I-70</td>
<td>Reconfigure I-70 &amp; I-435 interchange</td>
<td>$210,000,000</td>
<td>407</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C39</td>
<td>K-92 M-92</td>
<td>Widen Missouri 92 or Missouri 45 to 4 lanes, includes 4-lane bridge</td>
<td>$111,700,000</td>
<td>404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C40</td>
<td>I-70</td>
<td>Reconfigure I-70 and Turner Diagonal interchange</td>
<td>$157,500,000</td>
<td>404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C41</td>
<td>US-24-40</td>
<td>Widen US-24-40 to 4 lanes from US-59 to K-32 and from County Road 1 to K-16</td>
<td>$32,100,000</td>
<td>404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C42</td>
<td>I-435 N-S</td>
<td>Reconfigure I-435 and Parallel Parkway interchange</td>
<td>$15,800,000</td>
<td>398</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C43</td>
<td>Potential Outer Loop</td>
<td>Widen County Road 1 to 4 lanes from I-70 to Tonganico</td>
<td>$32,100,000</td>
<td>398</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C44</td>
<td>K-7</td>
<td>Leavenworth/Lausng bypass - 2-lane west of Leavenworth connecting K-5 to US-73/K-7</td>
<td>$123,500,000</td>
<td>396</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C45</td>
<td>K-7</td>
<td>Upgrade K-7 to 4-lane freeway from Lansing to State Avenue</td>
<td>$98,300,000</td>
<td>396</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C46</td>
<td>K-7</td>
<td>Arterial street enhancements to existing K-7 in Olathe</td>
<td>$47,300,000</td>
<td>$47,300,000</td>
<td>395</td>
<td></td>
</tr>
<tr>
<td>C47</td>
<td>K-10</td>
<td>Reconstruct the K-10 and I-70 interchange</td>
<td>$157,500,000</td>
<td>391</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C48</td>
<td>K-68</td>
<td>Expand K-68 to a 4-lane highway from Old Kansas City Road to Metcalf Ave (in Louisburg)</td>
<td>$71,400,000</td>
<td>390</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recommended Strategy:**

- Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.
- Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
Phases 1 and 2 of the 5-County Regional Transportation Study analyzed the future transportation needs and identified potential strategies to address those needs. Through this stakeholder-driven process two key points were identified.

Financial resources are limited: The costs to add capacity to the roadway system is high and the needs are great, therefore a wider range of strategies must be considered that extend the service life of the existing system while directing more expensive improvements to key locations.

The future brings change: Vehicle technology, road management technology, and the transportation needs of population groups are changing quickly and future transportation investment decisions must consider these changes.

In addition, the 5-County Regional Transportation Study arrived at a number of findings and conclusions that are noted in Table ES-7.

### Table ES-7: Study Findings and Conclusions

<table>
<thead>
<tr>
<th>Desired Outcome</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mobility</strong></td>
<td>• A statistically significant survey of residents in the 5-County region showed that maintenance of roads within cities was the most important issue during the next 10 years. Maintenance of roadways between cities ranked as the third most important issue.</td>
<td>• Maintenance of existing streets and highways should continue to be funded and delivered before other strategies are considered.</td>
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<td></td>
<td>• A survey of residents in the 5-County region showed that traffic flow on highways and major roads was the second most important issue to address over the next 10 years.</td>
<td>• Transportation investments must address congestion on the region’s roadways.</td>
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<tr>
<td></td>
<td>• Vehicle technology is changing and will increase the number of vehicles per lane.</td>
<td>• Roadway travel lanes will have higher capacity in the future.</td>
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<td></td>
<td>• The Kansas City metropolitan area has more lane-miles of freeway and more lane-miles of arterial streets per 1,000 population than other peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO.</td>
<td>• Other major metropolitan areas are developing a more balanced transportation system or accept higher congestion.</td>
</tr>
<tr>
<td></td>
<td>• Annual hours of delay per automobile commuter in the Kansas City metropolitan area is less than other peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO.</td>
<td>• Other metropolitan areas have more congestion than the Kansas City metropolitan area.</td>
</tr>
<tr>
<td></td>
<td>• The congested lane-miles of roadway in the 5-County region will increase from approximately 1,000 lane-miles in 2010 to approximately 2,500 lane-miles in 2040 without future transportation investments.</td>
<td>• A variety of strategies, such as Transportation System Management, Transportation Demand Management, and new Capacity, should be considered as decisions are made regarding transportation investments.</td>
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<tr>
<td></td>
<td>• Peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO are using a variety of transportation strategies to address growing congestion.</td>
<td>• Federal, state and local transportation funding programs are a critical need for the future.</td>
</tr>
<tr>
<td></td>
<td>• Recurring congestion occurs on the region’s major roadways during peak commute times. For the rest of the day, roadways have adequate capacity for year 2040 traffic.</td>
<td>• A variety of strategies, such as Transportation System Management, Transportation Demand Management, and new Capacity, should be considered as decisions are made regarding transportation investments.</td>
</tr>
<tr>
<td></td>
<td>• Commuters are repeat travelers.</td>
<td>• Fund and encourage other transportation options for the morning and evening commute.</td>
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<td></td>
<td>• Non-recurring congestion due to crashes and vehicle breakdowns, construction/maintenance activities, and other incidents have a significant impact on traffic flow, particularly in the Kansas City metropolitan area. KC Scout reported 7,373 incidents on the metro area’s freeways. With the benefit of the KC Scout traffic management system, it took an average of 22 minutes to clear incidents and six minutes to restore normal traffic flow.</td>
<td>• The KC Scout traffic management system provides significant benefits to the area and should be expanded, along with motorist assist, along key Kansas highways.</td>
</tr>
<tr>
<td></td>
<td>• Some freeways, such as segments of I-35 and I-435, have limited potential for more right-of-way which will make it difficult to construct additional lanes.</td>
<td>• Look at strategies such as active lane use control, use of the shoulder as a driving lane during peak periods, and HOV/HOT lanes for these freeway segments.</td>
</tr>
<tr>
<td></td>
<td>• Forecasted growth in rail traffic indicates an increase of 36% from 2007 to 2030.</td>
<td>• A significant increase in truck volumes, particularly on I-35, is expected. Most of the trucks will use the roadway system during non-peak hours of the day. This volume of trucks will overload the capabilities of the vehicle inspection stations on I-35.</td>
</tr>
</tbody>
</table>

**Note:** Table ES-7 provides a summary of key findings and conclusions related to the 5-County Regional Transportation Study.
<table>
<thead>
<tr>
<th>Desired Outcome</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
</table>
| **Safety**     | • KDOT’s Strategic Highway Safety Plan (SHSP) seeks to drive strategic investments that reduce traveler casualties and the emotional and economic burdens of crashes, utilizing the 4Es (education, enforcement, engineering and emergency medical services).
• The “Destination Safe” Coalition is a regional transportation safety program that includes four of the five counties included in this study (minus Douglas County). The Coalition provides a means for various community sectors (law enforcement, engineers, safety advocates, public health officials, citizens, trauma room nurses, transit coordinators, public works managers, emergency services providers, bike/ped advocates, local officials, planners and others) to discuss transportation system safety in the Kansas City region.
• Many of the crashes on the region’s freeway system are related to congestion. | • Continue to implement the recommendations of the SHSP and the Destination Safe Coalition. |
| **Regional Prosperity** | • The 5-County region is the fastest growing region in Kansas. A number of high impact developments are being constructed or planned that will impact the transportation system.
• The average household in the Kansas City metropolitan area spends between 14% and 27% of their income on transportation costs.
• Funding for transportation facilities is often not considered when planning for major developments.
• Transportation investments have a significant impact on the state’s economy by providing more reliable travel times, logical access to businesses and by creating jobs. | • Transportation decisions must include an understanding of the impacts of planned developments. • Land use decisions must include an understanding of transportation issues. • As fuel costs increase, household budgets are impacted and different decisions will be made regarding how the transportation system is used. • Coordination between land use planning and transportation planning is critical. Steps should be taken to enhance coordination. • Continue the practice of including economic impacts in the decision making process for transportation investments. |
| **Efficient Use of Financial Resources** | • Transportation needs outweigh available transportation funding.
• Fuel prices have a significant impact on traveler behavior. As fuel prices significantly increase, travelers reduce travel by personal vehicle and increase their use of transit, carpooling, trip chaining and bicycling.
• A study by the Mid-America Regional Council determined that if 40% of the region’s population growth were accommodated in existing centers along established corridors, the region could save over $3 billion in infrastructure costs.
• Fuel efficiency standards for passenger cars and light trucks will require higher gas mileage. | • Lower cost system management and demand management strategies need to be considered as part of an overall transportation investment plan. • With the assumption that fuel costs will increase in the future, more transportation options are desired and should be planned and implemented. • Continued sprawling development patterns come with a high cost for transportation and other infrastructure. • Alternate sources of revenue will need to be developed within the timeframe that was studied. |
| **Choice**     | • The Kansas City metropolitan area has by far the fewest public transportation miles per capita (47 miles per capita) than other peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO (91-229 miles per capita).
• A survey of residents in the 5-County region shows 53% of respondents would use transit if a more extensive regional system were in place.
• The region is served by five transit agencies.
• The K-10 Connector transit service that connects Lawrence and Overland Park has a daily ridership of nearly 700. Cost per mile is approximately nine cents compared with 55 cents per mile for travel by automobile.
• “Bus-on-Shoulder” (BOS) transit is operated along I-35 in Johnson County when mainline traffic is traveling below 35 mph. Since the inception of BOS there has been a 12% increase in ridership on this route. | • As other cities in the Midwest have grown, they have developed transportation systems that offer more choices to travelers, particularly commuters. • There is a desire in the region for a more robust transit system. • Expand ongoing efforts to coordinate these systems to develop a regional transit system. • Making transit options more attractive will bring more “choice riders” to this mode of transportation. • Continue support for regional transit services such as the K-10 Connector and potential service along I-70. |
## Executive Summary

### Desired Outcome

<table>
<thead>
<tr>
<th>Environment</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• A survey of residents in the 5-County region shows that 87% think that water quality and air quality are important considerations in planning for transportation improvements.</td>
<td>• Future investment decisions should enhance air and water quality.</td>
</tr>
<tr>
<td></td>
<td>• The 5-County region had numerous days during 2012 when the air quality did not meet national standards.</td>
<td>• Future investment decisions should enhance air quality.</td>
</tr>
<tr>
<td></td>
<td>• Sprawling development patterns lead to increasing environmental impacts.</td>
<td>• Future investment decisions should enhance natural resources.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Health</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• A survey of residents in the 5-County region shows 66% believe that transportation projects should promote healthy lifestyles like biking and walking.</td>
<td>• Transportation investment decisions should include appropriate active transportation improvements such as bicycle and pedestrian facilities.</td>
</tr>
<tr>
<td></td>
<td>• Lack of all-day transit in many areas makes it difficult for some citizens to have adequate access to medical facilities.</td>
<td>• Future transportation investments should add capacity to existing transit and paratransit services to meet the needs of a growing aging population.</td>
</tr>
<tr>
<td></td>
<td>• There is a concern for air quality impacts on health in the region.</td>
<td>• Future investment decisions should enhance air quality.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Equity</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• A survey of residents in the 5-County region shows 35% of respondents don’t believe that the existing transit service meets the residents’ basic needs. 46% of the respondents don’t believe transportation services for the elderly and disabled are adequate.</td>
<td>• There is a desire in the region for a more robust transit system.</td>
</tr>
<tr>
<td></td>
<td>• A survey of residents in the 5-County region showed that 9% of respondents are dependent on transit or friends and relatives for transportation.</td>
<td>• A significant percentage of residents have need for transportation options other than a personal automobile.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Livability</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• The Kansas City metropolitan area has lower population per square mile of land area (260) than other peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO (305 to 714 people per square mile).</td>
<td>• Less dense development presents many challenges including the need for longer roads, more congestion, and the ability to develop transit. Park &amp; Ride lots or structures should play a role in the future transportation system.</td>
</tr>
<tr>
<td></td>
<td>• Many communities are planning city centers with compact spaces, mixed-use development, and localized resources which can minimize the need for longer distance commuting.</td>
<td>• The future transportation system will need to consider changing development patterns and provide more multimodal options.</td>
</tr>
<tr>
<td></td>
<td>• The National Household Travel Survey shows that the 16 to 34 year old age group wants to live in a more urban environment and have different desires for transportation. In 2009, people in this age group drove 23% fewer miles in their cars, using transit more, took 24% more bicycle trips and walked to destinations 16% more than did 16 to 34 year olds in 2001.</td>
<td>• While these are national trends, these changes in transportation user’s preferences should be part of the discussion as the future transportation system is planned.</td>
</tr>
<tr>
<td></td>
<td>• Bicycle and pedestrian facilities are an integral part of a future transportation system. As land use changes to more mixed development and as more of the population focuses on a healthier lifestyle, there is a growing need for alternatives to automobile travel.</td>
<td>• As land use patterns change, the transportation system must change as well.</td>
</tr>
<tr>
<td></td>
<td>• The National Household Travel Survey shows that the 16 to 34 year old age group wants to live in a more urban environment and have different desires for transportation. In 2009, people in this age group drove 23% fewer miles in their cars, using transit more, took 24% more bicycle trips and walked to destinations 16% more than did 16 to 34 year olds in 2001.</td>
<td>• Many cities have adopted Complete Streets policies that address multiple modes of transportation.</td>
</tr>
</tbody>
</table>
Section 1: Introducing the 5-County Regional Transportation Study

The Kansas Department of Transportation, the Mid-America Regional Council, and the Lawrence-Douglas County Metropolitan Planning Organization have completed a two-phase study that involved residents, community leaders, and transportation stakeholders to assess changing transportation needs in Douglas, Johnson, Leavenworth, Miami, and Wyandotte counties. This comprehensive study resulted in a set of recommended strategies to serve the region’s transportation needs in the next three decades.

WHY IS THE STUDY NEEDED?
The 5-County region, shown in Figure 1-1, is the fastest growing region in the state of Kansas and rapid development in the study area could strain the transportation infrastructure needed to support additional growth. A number of high-impact developments are underway or planned in the region that will significantly impact regional travel patterns. Examples include the BNSF Intermodal Facility in Edgerton and additional growth at Village West in Kansas City, KS.

Construction solutions to changing travel patterns will cost billions of dollars in a time when funding is limited. Because of this, the region must prioritize the needs and employ strategies that can be implemented with future anticipated funding.

PURPOSE
The purpose of the 5-County Regional Transportation Study was to assess the changing transportation needs of the region and identify key strategies to enhance the regional transportation system in a sustainable way. Difficult choices will need to be made, and this study will serve as a guide and help to shape the future for the region.

STUDY SPONSORS
Three transportation agencies joined to conduct the 5-County Regional Transportation Study to provide a responsible, holistic view of the region’s transportation future.

The Kansas Department of Transportation (KDOT) is responsible for the planning, development, and operation of various modes and systems of transportation within the state.

The Mid-America Regional Council (MARC) is an association of city and county governments and, as the designated metropolitan planning organization (MPO) for the 8-county bi-state region, is responsible for the transportation planning process, including four of the five counties in the study.

The Lawrence-Douglas County Metropolitan Planning Organization (LDC MPO) is responsible for shaping the transportation planning process for all of Lawrence and Douglas County.

A Core Team of staff from each of the study sponsors provided oversight for the study process.
THE 5-COUNTY STUDY PROCESS

The 5-County Study captured comprehensive stakeholder input, the existing challenges that travelers face in the region, and defined changes projected over the next three decades. The study analyzed, in detail, the transportation features of the system, and considered peer cities and their transportation successes and challenges. Finally, the issues, stakeholder needs, anticipated changes, and potential strategies were evaluated within key corridors. This evaluation resulted in regionally-based strategy packages that could be feasibly implemented to create the region’s future transportation system.

The complete 5-County Study process development is shown in the flow chart in Figure 1-2. Phase 1 consisted of the first box “Determine Transportation Needs and Opportunities.” Phase 2 consisted of the remaining boxes and defines the full evaluation process. A timeline of the study and other major transportation milestones is shown in Figure 1-3.
The Stakeholder Advisory Panel also developed 9 Desired Outcomes (listed to the right) to be used as a framework for making decisions about transportation investments and to evaluate strategies.

Phase 1 also presented approaches to facilitate a collaborative planning process, examine innovative concepts in transportation technology, and consider multimodal transportation solutions and the idea of sustainable transportation investments.

**9 Desired Outcomes**

The Study’s Stakeholder Advisory Panel and Working Groups developed a list of 9 Desired Outcomes during Phase 1. These outcomes were used to evaluate strategies during Phase 2.

**Mobility:** Move people and goods in an efficient manner where they want to go, when they want to go. Focus on minimizing person delay across modes rather than focusing exclusively on minimizing vehicle delay.

**Safety:** Reduce crash rates, severity of crashes (fatalities, serious injury crashes), and reduce conflict points. Improve the perception of safety and user-confidence.

**Regional Prosperity:** Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services and other basic needs by workers, as well as expanded business access to markets. Provide access to systems, facilities, and modes. Support sustainable economic development through transportation investments.

**Efficient Use of Resources:** Evaluate the affordability of transportation investments by considering the initial investment to plan, design, and construct; the life-cycle costs to maintain and operate; and the economic benefits to the community. Enhance and maintain the existing transportation system.

**Choice:** Invest in a multimodal transportation system that maintains our existing primarily roadway system but also allows individuals the choice of using other modes of transportation such as sharing a ride, using public transportation, bicycling, or walking. Support the independence of persons with disabilities through transportation investments.

**Environment:** Rather than mitigate the impacts upon the environment, transportation system investments should seek to enhance air and water quality, reduce climate impacts and the region’s carbon footprint, and protect high priority natural resources.

**Public Health:** Reduce the impacts to public health by improving traffic safety, improving air quality, promoting physical activity and fitness, increasing community cohesion, improving access to medical services, and increasing transportation affordability.

**Social Equity:** Consider the investment benefits and impacts on all population groups within communities. Support civil rights through transportation investments. Create jobs through transportation investments. Minimize personal transportation expenses in ways that support wealth creation. Look for opportunities to employ economically disadvantaged persons in the development of the transportation system.

**Livability:** Integrate the transportation system with the community desires. Balance mobility goals with the livability of the community including social equity.

Finally, Phase 1 identified 13 key corridors in the region in which to evaluate transportation strategies and their effectiveness in those corridors. The Phase 1 report and complete appendices can be accessed at: http://kdotapp2.ksdot.org/5CountyStudy/get_more_info/reports.aspx

**Phase 2**

Phase 2, completed in October 2012, used the goals developed in Phase 1 to prioritize the region’s needs and identify strategy “packages” that are regionally based, technically feasible, financially realistic, sustainable and politically acceptable, for 17 key corridors plus a potential outer loop. (Some of the 13 key corridors from Phase 1 were divided to create the 17 key corridors evaluated in Phase 2. Figure 1-4 shows the corridors evaluated in Phase 2.)

Engagement efforts with the Stakeholder Advisory Panel, the Corridor Strategies Working Group, the Travel Demand Model Technical Committee, elected officials and local government staff continued throughout Phase 2.

The Stakeholder Advisory Panel (SAP) was a group of informed stakeholders and decision-makers representing various interests and was responsible for recommending transportation goals and providing input on decision-making criteria. The SAP built on its work from Phase 1, developing a prioritized plan with preferred strategies and potential projects as well as a toolbox to help communities and KDOT implement the plan. The Advisory Panel integrated community needs and values into the study dialogue and deliberation.
The Corridor Strategies Working Group established for Phase 2 consisted of representatives from each of the previous working groups (1. mobility/accessibility/connectivity, 2. land use/economic development, 3. social equity and environment, and 4. freight) plus some additional key stakeholders. The purpose of the group was to provide input on the evaluation criteria used to analyze the strategies recommended for each of the corridors.

In addition, following Phase 1, the MPOs developed new land use data for the year 2040 and the 5-County travel demand model was updated to look at travel conditions in the year 2040.

Potential strategies were developed for all 17 key corridors and a potential outer loop using tools from the Transportation Toolbox, described in Section 11 and Appendix B. A new evaluation method was designed to incorporate all criteria necessary to holistically evaluate the potential strategies. Traditional transportation measures of safety and mobility were key factors. Stakeholder values and priorities were included as measurable quality of life values and weighted to represent the priorities designated in Phase 1 through the 9 Desired Outcomes. Cost measures were included and a benefit ratio provided a single number that represented the vast array of inputs considered through the process. Section 13: Recommended Strategies includes a description of the evaluation criteria and presents the scoring and weighting factors used.

Section 13: Recommended Strategies includes a description of the evaluation criteria and presents the scoring and weighting factors used.

Potential Outer Loop
A potential outer loop was also studied as a part of Phase 2. The blue dashed line on the map to the left illustrates the path that was modeled as part of the study, but does not necessarily represent where a future roadway would be built. See pages 123-126 for a map depicting the potential outer loop corridor.
Section 2: Regional Challenges

What are the transportation-related issues facing the 5-County region over the next three decades?

Transportation is an essential part of life for residents and businesses of the 5-County region. In order to plan for the future transportation system and to create strategies that will have a positive impact on the movement of people and goods, it’s important to understand the challenges that the region will face.

The 5-County Study, through combined efforts of the study sponsors, a stakeholder/public engagement process and technical analyses, has identified transportation-related challenges the region will face over the next three decades. Identifying these challenges today will help in creating a successful transportation system for the future.

During Phase 1 of the 5-County Study, the Advisory Panel and Working Groups developed a list of 9 Desired Outcomes for the study region. These outcomes provide a framework for discussing the challenges that the region will face in the coming years. Table 2-1 summarizes these challenges which are discussed in more detail on the following pages.

<table>
<thead>
<tr>
<th>Desired Outcome</th>
<th>Challenges</th>
</tr>
</thead>
</table>
| **Mobility** | • Recurring and Non-Recurring Congestion – understanding and addressing the types and causes of congestion  
• Access Management – protecting the public investment in the mobility function of major roads while supporting economic activity (balance traveler safety, system efficiency and economic activity)  
• Latent Travel Demand – this short-term travel growth is difficult to predict and may result in design year traffic volumes being reached in less time as people change their travel behaviors (time of travel, route choice, mode choice, trip chaining, etc.)  
• Corridor Widening Constraints – existing right-of-way, development, and complex interchanges make further widening of some corridors cost-prohibitive  
• Funding Limitations – the need for transportation improvements far outpace the funding that is and will be available  
• Understanding the Benefits of Non-Capacity Strategies – educating stakeholders on the benefits of new Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies |
| **Safety** | • Identifying Effective Countermeasures – identifying the causes of crashes in the region and finding effective strategies |
| **Regional Prosperity** | • Coordinating Land Use and Transportation Planning – major developments must coordinate as early as possible with transportation agencies  
• Family Budgets – the average household in the Kansas City Metropolitan area spends between 14% and 27% of their income on transportation costs |
| **Efficient Use of Resources** | • Limited Transportation Funding – spending the limited available funding for transportation in a manner to achieve the greatest benefits  
• Multiple Agencies – with many different agencies being part of the decision-making process, significant coordination is a must |
| **Choice** | • Recognizing the Regional Need for Transportation Options – many of the region’s population groups desire a more robust transit system for longer trips and improved bicycle and pedestrian facilities for shorter trips  
• Coordinating Transit Services – coordinating the services of the five transit agencies that serve the 5-County region  
• Funding Limitations – providing additional funding to address transit needs  
• Choice Ridership – making transit more attractive to choice riders, those who have a choice of transportation modes and choose to ride transit |
| **Environment** | • Air Quality – maintaining a reasonable level of air quality is a challenge with the current transportation system, mode choice options could provide a benefit |
| **Public Health** | • Lack of Transportation Mode Options – the lack of diversity in transportation options has an impact on public health  
• Access to Medical Facilities – lack of all-day transit in many areas makes it difficult for some citizens to have adequate access to medical facilities  
• Air Quality – the current transportation system that relies heavily on automobile travel has a negative impact on air quality |
| **Social Equity** | • Balance the Benefits of Transportation Improvements – transportation investments must be distributed throughout the region so that all population groups benefit |
| **Livability** | • Integrating Transportation with Community Goals – balance mobility goals with community goals for livability |
**CHALLENGE TO PROVIDING AN EFFICIENT, RELIABLE ROADWAY SYSTEM**

**Mobility:** Move people and goods in an efficient manner where they want to go, when they want to go. Focus on minimizing person delay across modes rather than focusing exclusively on minimizing vehicle delay.

A future highway and street system needs to provide reliable, safe, and efficient movement of people and goods. This is essential to support the economic well being and the quality of life in the 5-County region. In the future, roadways will continue to serve drivers, transit users, and freight movement with automobiles the dominant mode of travel. The key corridors analyzed during the 5-County Study provide the backbone of the roadway system needed for the future.

**Challenges**

The challenges to maintaining a reliable roadway system are many. Travel demand exceeds capacity in many areas during peak periods resulting in congestion and vehicle delay. Other challenges include effectively managing access, accommodating latent demand for travel, recognizing that roadway widening is cost-prohibitive in some corridors, insufficient funding for capacity improvements, and educating decision makers regarding Transportation System Management and Demand Management strategies.

**Congestion**

The challenges in addressing congestion are in understanding what the causes are and what are the most cost-effective strategies to keep traffic moving. Congestion creates environmental damage, increases energy consumption, and decreases economic productivity and quality of life.

Recurring congestion takes place regularly as a result of commuter traffic. It usually occurs at the same time of day and is fairly predictable. Currently, segments of the region’s major road system experience about 30 minutes of congestion in the AM peak and about 45 minutes in the PM peak. Traffic operations during the remaining 22 hours of the day are not typically congested.

Figure 2-1 illustrates the hourly traffic volume on one of the region’s most heavily traveled corridor, the I-35 Corridor. The blue line shows the traffic volumes per hour of the day in 2010, the red line in the figure is the capacity of the roadway. Other than the peak periods, the highway has adequate capacity for free flowing traffic.

From October 2011 to September 2012, KC Scout reported 7,373 incidents on roads monitored by their traffic management system. Figure 2-2 shows a map of the roads monitored by the KC Scout system. With the benefit of KC Scout coordination, it took an average of 22 minutes to clear incidents on the region’s roadways and an average of six minutes to restore traffic flow to pre-incident conditions. Major incidents take additional time to clear and can cause long, unpredictable delays for travelers.

**Access**

The number of access points and their location along major roadways can significantly impact the ability of major roads to move traffic efficiently. Figure 2-3 shows the primary function of highways and major arterial streets is the movement of traffic. Managing access along these roadways is important to traffic flow because each access along a roadway, whether a driveway, an intersection, or a freeway ramp, introduces potential for conflict and friction within the traffic stream and slows traffic speeds.

**Managing Access**

The challenge for access management on highways and major streets is protecting the public investment in the mobility function of these roadways by not allowing too many access points.

The Transportation Research Board (TRB) Access Management Manual defines access management as “the systematic control of the location, spacing, design, and operations of driveways, median openings, interchanges, and street connections to a roadway.”

Access management supports economic activity by preserving the efficiency of the highway and major street network and facilitating safe design. An efficient roadway allows motorists to travel at a reliable speed, without encountering recoucurring congestion, and reach their destinations in a time that meets their expectations. Figure 2-4 illustrates the impact that a reduction in average speed has on the market area for businesses.

The region’s freeway system carries the highest percentage of daily vehicle-miles traveled. Therefore, it is critical to maintain a reasonable flow of traffic during peak periods. The flow of traffic is negatively impacted if too many interchanges are provided at less than desirable spacing.
Reduction
Average intersection should be more or less than one-half mile, this side road from an on- or off-ramp to a full-movement point. If a traffic study shows that the distance on the nearest full movement side road intersection or access will extend one-half mile from the ramp intersection to Access control along the intersecting roadway ideally intersections do not interfere with interchange operations. At interchanges, access control should be extended down intersecting roadways so that adjacent side road intersections do not interfere with interchange operations. Access control along the intersecting roadway ideally will extend one-half mile from the ramp intersection to the nearest full movement side road intersection or access point. If a traffic study shows that the distance on the side road from an on- or off-ramp to a full movement intersection should be more or less than one-half mile, this information should be taken into consideration before a final decision is made.

Latent Demand
Latent traffic demand creates a challenge for realizing the full expected value from a roadway capacity project. When lanes are added to a freeway, the traffic-carrying capacity is increased and therefore congestion and travel time decrease. Long-term traffic growth is expected based upon land use changes in the region; however, increased travel on the improved facility often comes more quickly than expected due to latent travel demand. Latent demand includes the drivers that would like to use the freeway, but have chosen not to due to congestion or other constraints. When the freeway is widened, the route becomes more desirable and trips are diverted from parallel roadways. As shown in Figure 2-5, “design-year” (future) traffic forecasts in urban areas are often significantly greater than the volumes predicted using changes in land use and employment growth, due to latent demand which is very difficult to predict.

Insufficient Funding
Funding necessary to implement improvements recommended by corridor studies within the region totals between $2 and $3 billion. The 5-County Study considered capacity improvement strategies for the 17 key corridors that totaled $11 billion. Funding for these types of projects available during the 10-year T-WORKS transportation program is less than $1 billion in the 5-County region. Without a momentous change in funding, capacity (roadway widening) projects alone cannot result in a roadway system that can reliably provide efficient flow of traffic.

Educating the Public and Stakeholders Regarding the Benefits of TSM and TDM Strategies
A final challenge is educating the public and stakeholders regarding the benefits to Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies and how these strategies address congestion.

CHALLENGE TO PROVIDING A TRANSPORTATION SYSTEM THAT MAXIMIZES TRAVELER SAFETY
Safety: Reduce crash rates, severity of crashes (fatalities, serious injury crashes), and reduce conflict points. Improve the perception of safety and user-confidence.

Transportation Safety is a complex issue that requires a comprehensive approach in order to make positive impacts for both drivers and pedestrians. Vehicle motor crashes are consistently one of the leading causes of death in America1. In 2011, there were 351 fatal crashes in Kansas. Eighteen percent of those fatal crashes occurred within the 5-County region. But, fatalities are not the only safety concern for travelers. Vehicular crashes more often result in injury or property damage. As the number of people using the road system increases, the number of crashes also increases.

Figures:
Figure 2-4: Affect of travel speed reduction on market area
Figure 2-5: Metropolitan Planning Areas Overall Design Forecasts
Figure 2-6: Metropolitan Planning Areas Overall Design Forecasts

Source: Florida Department of Transportation

Source: Kansas Department of Transportation Study

Constraints to Corridor Widening
A challenge to adding lanes on parts of the I-35 and I-435 corridors is that existing right-of-way, development, and complex interchanges make further widening cost-prohibitive.

Challenges
The challenge is identifying strategies that will lower the crash rates on roadways within the 5-County region. Many of the crashes are speed-related; therefore, strategies that reduce the difference in speeds between vehicles should be effective in enhancing the safe operation of the region’s roadways. On the freeway system, this could include various Transportation System Management (TSM) strategies such as ramp metering and active lane-use control as well as geometric design features such as the spacing of interchanges and the lengths of acceleration and deceleration lanes.

In the 5-County region, two Transportation Safety Programs are working hard towards reducing fatalities and serious injuries in Kansas. The “Destination Safe” Coalition is a regional transportation safety program that includes all counties in the MARC Area and includes four of the five counties included in this study (minus Douglas County). It includes a partnership between local agencies involved in improving transportation system safety. The Coalition provides a means for various community sectors (law enforcement, engineers, safety advocates, public health officials, citizens, trauma room nurses, transit coordinators, public works managers, emergency services providers, bicycle/pedestrian advocates, local officials, planners and others) to discuss transportation system safety in the Kansas City region.

KDOT’s “Strategic Highway Safety Plan” (SHSP) which was adopted on July 1, 2011, under the “SafeKan” Program, is KDOT’s statewide transportation safety program. The Mission of the SHSP is “to drive strategic investments that reduce traveler casualties and the emotional and economic burdens of crashes, utilizing the 4E’s (education, enforcement, engineering and emergency medical services) in a collaborative process”. The Goal of “SafeKan” is to reduce the number of fatalities and disabling injuries by half within the next 20 years (from base years of 2005 – 2009 to future years of 2015 – 2029). The Vision of the “SafeKan” Program is for a time when no life will be lost, and no person disabled, as a result of a traffic crash.

CHALLENGE TO SUPPORTING CONTINUED ECONOMIC GROWTH

Regional Prosperity: Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services and other basic needs by workers, as well as expanded business access to markets. Provide access to systems, facilities, and modes. Support sustainable economic development through transportation investments.

The 5-County region is growing and will continue to expand and develop over the next 30 years. This growth is often located at new major activity centers along freeway corridors. Figure 2-6 maps the locations of current activity centers and potential future activity centers. The map illustrates that the highway network provides a backbone for major regional attractions, such as employment, shopping and entertainment centers.

Challenges

Transportation impacts economic growth at the regional level, as well as an individual resident level. For the region as a whole, coordination between land use planning and transportation planning is essential to support continued economic growth. The challenge from a transportation standpoint is to become aware of major developments with sufficient time to work with the developers, MPOs, cities, counties, and transit agencies to plan the transportation infrastructure/services needed to support the development. From the standpoint of the region’s residents, the cost of transportation has a significant impact on family budgets.

Phase 1 of this study identified a number of major traffic generators within the region. As economic growth continues, travel patterns will be impacted and strategies will need to be developed to accommodate that growth in a sustainable way. Communities and developers should be encouraged to look for opportunities to bring new development to locations already served by existing infrastructure to lessen the demand to build additional new infrastructure.

Following is a list of major developments that are planned or under construction. A more detailed discussion of these developments is included in Section 14: Key Corridors.

- BNSF Intermodal Facility, under construction north of I-35 between Edgerton and Gardener
- New Century Air Center, located along I-35 near US-56
- I-35 & 119th Street Retail Area
- Major retail development at I-70 & I-435, includes the Kansas Speedway, Sporting Park (Sporting Kansas City - Major League Soccer), Community America Ballpark (Kansas City T-Bones - Independent Professional baseball), Cabela's, Nebraska Furniture Mart, Great Wolf Lodge, Hollywood Casino, Legends Shopping Center, Cerner Corporation and Schlitterbahn Vacation Village
- Lawrence Airport
- Park Place - a mixed-use development in Leawood
- Mission Farms - a mixed-use development on both sides of the Leawood/Overland Park city limits
- The Lenexa City Center - a pedestrian friendly mixed-use development located at 87th Street Parkway and Renner Blvd.
- Corbin Park - open air retail village along 135th Street between Metcalf and Lamar Ave.
- Erickson Retirement Community - a retirement community located at 138th & Metcalf
- Deer Creek Woods - a corporate center located along US-69 in Overland Park
- Fort Leavenworth expansion
- East Hills Business Park - located along K-10 on the eastern side of Lawrence

Source: Kansas Department of Transportation, Kansas GIS, US Census
From the standpoint of the region’s citizens, another challenge being faced is the cost of fuel. The average household in the Kansas City Metropolitan Statistical Area spends between 14 percent and 27 percent of their income on transportation costs, with fuel prices making up the greatest portion of the total transportation cost. Over the past 10 years, fuel costs have spiked and wild price fluctuations have become the norm, as shown in Figure 2-7. There is increasing evidence that travelers change their transportation behavior during fuel price spikes. Figure 2-8 shows that nearly two-thirds of the survey respondents in the 5-County region changed their travel habits when fuel costs rose sharply. Strategies that enhance access to public transportation or bicycle and pedestrian facilities would provide residents more affordable transportation options.

CHALLENGE TO USING FUNDING RESOURCES EFFICIENTLY

**Efficient Use of Resources:** Evaluate the affordability of transportation investments by considering the initial investment to plan, design, and construct; the life-cycle costs to maintain and operate; and the economic benefits to the community. Enhance and maintain the existing transportation system.

Funding for transportation infrastructure and services is significantly less than the transportation needs facing the 5-County region. For that reason, funds must be used judiciously and a true understanding of the life-cycle costs of an infrastructure or service improvement must be considered.

**Challenges**
The challenge is spending limited transportation funds wisely so that the greatest benefit is achieved for moving people and goods, safely and efficiently. This challenge also includes transportation agencies working together to achieve these benefits.

Funding resources must first be allocated to maintaining and operating the existing transportation system. Subsequent decisions for transportation funding decisions should consider the true cost to implement and maintain the proposed infrastructure improvement/service, as well as address the 9 Desired Outcomes determined by stakeholders in the region. The true cost of an improvement includes not only the costs associated with planning, designing, and construction/implementation, but the costs to maintain and operate the improvement over the course of its service life.

**CHALLENGE TO DEVELOPING A MULTIMODAL TRANSPORTATION SYSTEM THAT PROVIDES MODE CHOICE**

**Choice:** Invest in a multimodal transportation system that maintains our existing primary roadway system but also allows individuals the choice of using other modes of transportation such as sharing a ride, using public transportation, bicycling, or walking. Support the independence of persons with disabilities through transportation investments.

As we move into the future, the public desires a transportation system that provides more choice in the modes by which they travel through the region. Young adults are showing a trend for living in urban, mixed-use neighborhoods where they can walk, bicycle, or use transit. Older citizens are looking for alternatives to travel by personal automobile. A segment of the population is transit-dependent and relies on non-automobile modes for their transportation needs. Also, there is evidence that as fuel prices increase, the use of transit, carpooling, and bicycle travel increases as well.

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Challenges

The challenges to creating a multimodal transportation system include recognizing that many of the region’s population groups desire a more robust transit system for longer trips and improved bicycle and pedestrian facilities for shorter distance trips. Additional challenges are planning for and providing better connections between modes, coordinating the various transit systems within the region, reviewing transportation policy to consider additional funding for these types of services and facilities, and making transit more convenient and attractive to choice riders.

Figure 2-9 shows the results of a survey of the region’s citizens that was conducted during Phase 1 of the Study. Sixty-three percent of respondents to the survey expressed the opinion that a regional transit system is needed. The areas of the map shaded in blue represent agreement with the need for region transit services while areas shaded in yellow represent a neutral response.

Nationally, young adults are increasing their travel by transit and bicycle. Older citizens also desire alternatives to the personal automobile to improve their quality of life. A segment of the population is transit-dependent and requires these services to access jobs.

Making transit a more convenient and attractive mode of transportation will increase the number of choice riders. Park & Ride lots provide a logical connection between personal automobiles and transit, amenities such as Wi-Fi on buses can allow riders to use their commute time productively, and a more regionally connected transit system will allow the users of each of the five separate transit services to travel across these systems.

CHALLENGE FOR THE ENVIRONMENT

Environment: Rather than mitigate the impacts upon the environment, transportation system investments should seek to enhance air and water quality, reduce climate impacts and the region’s carbon footprint, and protect high priority natural resources.

Challenges

Air quality in the region is an environmental challenge. The 5-County region has had numerous days over the past year where air quality has not met national standards. While this is not only due to the transportation system (higher than average summer temperatures and the burning in the Flint Hills also effect regional air quality), changes in the transportation system that increase mode choice could have a great benefit to air quality.

In addition to air quality challenges, the continued sprawling development patterns lead to increasing environmental challenges, including the conversion of key farmland and other natural resources to development. Figure 2-10 shows the water, parks and protected areas in the 5-County region.
**CHALLENGE TO PROVIDING A TRANSPORTATION SYSTEM THAT IMPROVES PUBLIC HEALTH**

**Public Health:** Reduce the impacts to public health by improving traffic safety, improving air quality, promoting physical activity and fitness, increasing community cohesion, improving access to medical services, and increasing transportation affordability.

The 5-County Study’s Stakeholder Advisory Panel recommends that future transportation investment decisions also consider the impacts on public health.

**Challenges**

The 5-County region has numerous challenges related to public health that can be directly impacted by the transportation system. All the challenges relate back to the lack of diversity in mode in the region. An overwhelming majority of the trips made in the region are by automobile. The limited choice that is offered leads to public health challenges. For instance, the continued obesity epidemic relates back to a lack of physical activity. Using a daily commute as an opportunity to get physical activity is an effective and consistent way to improve the public health of the region. Unfortunately, lack of bicycle facilities or connectivity across key travel corridors limits the ability for users to see this option as a possible choice.

Additionally, the lack of all-day public transportation in portions of the region causes public health challenges. As the population ages and as the cost to own a car continues to be prohibitive, access to medical facilities and grocery stores via public transportation needs to be enhanced.

Finally, the current transportation system in the study region has negative air quality impacts that can lead to public health challenges. Poor regional or localized air quality has been shown to cause a greater number of asthma related health incidents, especially among children.

**CHALLENGE TO MAINTAIN SOCIAL EQUITY**

**Social Equity:** Consider the investment benefits and impacts on all population groups within communities. Support civil rights through transportation investments. Create jobs through transportation investments. Minimize personal transportation expenses in ways that support wealth creation. Look for opportunities to employ economically disadvantaged persons in the development of the transportation system.

As identified in federal regulation, it is unlawful to implement a project that has a specific and significant impact on a specific population subgroup without providing remediation.

**Challenges**

The challenge to maintain social equity is always important in the development of transportation strategies. For the 5-County region, those population subgroups that are specifically targeted in federal regulation (minority and low income populations) are located throughout the region, but with the most prominence in the urban core areas. It is essential in planning for the region that investments in transportation be distributed throughout the region, so that positive impacts can be felt by all users.

**CHALLENGE TO BALANCE MOBILITY GOALS WITH COMMUNITY GOALS**

**Livability:** Integrate the transportation system with the community desires. Balance mobility goals with the livability of the community including social equity.

Finally, the region has significant challenges related to livability. The current pattern of sprawling development in the region lacks the qualities of “livability” that are seen as attractive or in keeping with the needs of the growing younger and older populations in the region. With limited growth in the 35-60 year old households expected in the region, it is essential that diversity in land developments be provided that better meet the needs of smaller households.
Section 3: Regional Changes

What is likely to change by the year 2040?

In addition to the challenges described in the previous section, significant changes to population demographics, development, travel demand, truck traffic, vehicles, transportation technology, and funding can be expected by 2040. All of these changes mean that the region’s transportation system needs to adapt in order to meet the needs for tomorrow. To create and maintain a successful, and relevant, transportation system it will be important to develop strategies that account for the changes in where people want to live, where they want to work and how they want to travel.

**POPULATION AND DEVELOPMENT PATTERNS**

Population and employment within the 5-County region are expected to grow 41 percent by 2040. Figure 3-1 shows that the most significant growth can be seen in Johnson County. Many of the region’s cities are planning city centers with compact spaces, mixed-use facilities, and localized resources which can minimize the need for longer distance commuting. However, even with the consolidation of community resources, the large employment centers such as downtown Kansas City, MO, Corporate Woods, and Village West will continue to draw commuters from throughout the region.

Figure 3-2 shows the areas forecasted to experience population growth between 2010 – 2040. The map illustrates the locations of increased population and the relative increase. The darker areas represent the most growth while lighter areas show less growth. Areas with no shading will not see significant growth, or may even experience decreases in population. It is important to note that most growth is forecasted to occur around the perimeter of the metro area, mostly outside the I-435 ring. The location density, mix of uses and other development characteristics will determine how much traffic is generated by this additional growth.

Figure 3-3 shows the areas forecasted to experience employment growth between 2010 – 2040. The map illustrates the location of increased employment and the relative increase. The darker areas represent the most growth while lighter areas show less growth. Like the population maps, areas with no shading will not see significant growth or may experience decreases in employment. Major new employment hubs are projected along the K-10 corridor west of I-435, at Village West in Wyandotte County, and at the new BNSF Intermodal Facility near Edgerton. Employment is projected to increase near areas where population is projected to increase, however employees do not always have the choice to work close to home, so increased commute distances may be a factor for the region’s residents as development occurs outside existing developed areas.

**DEMOGRAPHIC CHANGES**

The region will also see a change in the makeup of its population in the coming years. Nationally, from 2010 to 2040, there is expected to be a 72 percent change in the number of households in the 65+ age category and the number of seniors will grow from about 20 million in 1970 to just over 80 million in 2040. These changes will be seen specifically in the inner ring suburbs and this age group will want to rely less on automobiles, live in smaller homes and will require access to medical and shopping needs via transit. In addition to a rise in the senior population, the other age group that is projected to grow are people aged 35 and younger. National data shows that this group aspires to use their automobile less and live in a more urban environment. The region will also see an increase in low-income and minority populations - these individuals are more likely to use transit. While planning for the future, strategies considered in the region should take into account these demographic shifts and plan for multimodal transportation.
EMPHASIS ON SUSTAINABILITY
Sustainable transportation is often used to refer to transportation that contributes to the sustainable development of the community that owns and uses the system. It embraces the triple bottom line factors of the economy, environment and social quality of life and includes consideration of: accessibility; climate change and energy use; economic vitality; environment; place-making; public health; safety and security; system condition; and system performance.

Sustainable development relates primarily to achieving a satisfying life for all while staying within the limits of nature. The characteristics of quality of life are defined by the community and the community must recognize the limits of its natural surroundings. The ultimate goal is that the community enjoys a high quality of life while preserving the existing environmental resources.2

Financial sustainability means building only the infrastructure or providing only the services that can be adequately maintained in the future.

INCREASED TRAVEL DEMAND IN THE 5-COUNTY REGION
More people on the roads traveling farther will stress the transportation network.

As the population and employment increases and spreads throughout the region, the demand on the transportation network will also increase. The increases in demand will result in more recurring congestion and delay. To illustrate the significance of the changes, Figure 3-4 shows forecast automobile travel times for 2010 and 2040 from both downtown Kansas City, MO (on the left) and Corporate Woods in Johnson County (on the right). The colored bands show the travel time changes projected between 2010 and 2040.

In 2010, a commuter could leave origination point and reach anywhere inside the red lines within 30 minutes. By 2040, a commuter would only be able to reach areas inside the green lines. By 2040, a commuter will not be able to get as far in a 30-minute drive as he or she can today. This means that commuters will face longer commute times to get to and from their jobs.

As the region’s travel demand grows, the impact to the transportation network is likely to affect 5-County residents’ quality of life. More demand means longer travel times, more congestion and a lessened quality of life.

INCREASE IN TRUCK TRAFFIC
While truck volumes are growing throughout the region, the development of the BNSF Intermodal Facility north of I-35 in Edgerton is anticipated to be a major destination and generator of regional freight rail and truck traffic. Traffic studies completed for this development have forecasted the combined intermodal and logistics activity to generate about 17,000 trips a day when it is fully developed. Just the intermodal site is expected to generate 7,000 truck trips per day when fully developed.

There could be an increase in truck traffic on the 175th Street/199th Street Corridor in Overland Park as a result of the new BNSF facility. The new BNSF facility combined with a planned Kansas City Southern Railroad logistics node (Centerpoint) in Missouri could result in warehousing and other logistic support activities arising in this corridor to support these two major intermodal transfer points.

CHANGES IN LAND USE
A major land use challenge facing the 5-County region is the sustainability of continued outward development. Local communities are struggling to provide basic services over a larger area. Low-density development patterns also result in more and longer distance vehicle trips, which create transportation needs that are often only addressed by high cost construction projects. In some cases, new growth at the outside of urban areas occurs at the same time established areas decline. The Mid-America Regional Council (MARC) found this issue in the development of future year growth scenarios. MARC found that a more compact growth pattern would result in significant savings in infrastructure costs to local governments.

When new growth, redistributed population and employment occur in new low-density developments, less of the activity has the potential to be served by transit. Transit service works best when there is a concentration of activity at the origin, destination or both of a trip. Low-density land use also creates an environment where higher amounts of motor fuel are used, more vehicle-produced air pollution can occur and more congestion occurs on roadways.

MARC found that if 40 percent of the region’s population growth were accommodated in existing centers along established corridors, the region could save over $3 billion in infrastructure costs. However, there are local development pressures and private financial opportunities that communities and residents pursue that can make it difficult to direct growth inward.

The developed area around Lawrence is also expanding, but planning efforts are being made to encourage development in a way to support financial sustainability. The Lawrence-Douglas County Long Range Transportation Plan states that “Within the context of the long range transportation plan, effectively integrating land use and transportation helps to reinforce each other to the greatest extent possible.” One concept being encouraged is creation of new neighborhoods based on Traditional Neighborhood Design. This would increase connectivity and support walking, biking and transit travel.

CHANGES IN TRANSPORTATION FUNDING
One of the items that can be expected to change is the availability of funding for transportation improvements and the revenue source that is used for them. With limited resources at the state and federal level, there is less funding available now than a decade ago for transportation improvements. This comes at a time when the earliest investments in the Interstate Highway Program are nearing the end of their useful life and will need to be replaced.

By 2040, many of the initial transportation investments in the 5-County region will be aging and need rehabilitation or replacement. At the same time, needs have been
identified for new or expanded facilities to accommodate larger traffic volumes and new destinations throughout the region. Considerations for the ongoing operations and maintenance of these transportation investments needs to be calculated to have a full understanding of the financial obligation of investing in existing and new transportation resources. Because of this, transportation officials at the federal, state and local level are required to evaluate the relative benefit of projects against each other to determine which projects provide the best return on investment. These officials are also being required to think more creatively about how to use the existing system to its highest benefit through the use of technology and multimodal transportation.

As a companion challenge to the limited availability of funding for transportation, the sources used to fund the transportation program will probably change within the next thirty years. Currently, most transportation improvements are funded through motor fuel taxes, sales taxes and vehicle registration, or are financed through bonding. These sources of funding and financing are not sustainable. Motor fuels taxes will not sustain its purchasing power over time. With the rising fuel economy of vehicles, a per-gallon tax on fuel does not provide the same benefit it once did. And with the current price of fuel, there is little support nationally to raise the per-gallon tax rate to accommodate for the loss in revenue due to higher fuel economy and alternative fuel vehicles. Tolling continues to be considered as a funding option, and is currently utilized along I-70 in the 5-County region and is managed by the Kansas Turnpike Authority. While tolling remains a funding option, it has been found that the cost to construct and maintain a new roadway would necessitate much higher tolls than drivers would be willing to pay which means that the cost of new projects would have to be supplemented with other funds. While there have been other potential sources identified for future transportation funding, such as a mileage tax, no efforts have been made to transition away from the motor fuels tax.

Figure 3-5 shows a comparison of statewide funding for expansion and modernization projects in Kansas. The top bar represents all the projects communities listed as needs during the 2008 Local Consult meetings, a total of $15 billion statewide. Those projects were prioritized and in 2009 a list of top tier projects costing $6.9 billion was developed. T-WORKS will fund $1.7 billion of expansion and modernization projects ($880 million in the 5-County region) and while it will address many transportation needs, there are many more that will not be funded. In comparison, the CTP, the previous funding program had $4 billion available for modernization and expansion transportation projects when inflated to 2016 dollars.

Technology is being used to make vehicles smarter, safer and connected. Not only is in-vehicle communication with satellites common (e.g. in-vehicle navigation systems), but vehicles are now talking to each other and the roads. In August, 2012, the United States Department of Transportation launched the first connected vehicle technology test in the U.S. This test of 3,000 vehicles in Ann Arbor, Michigan is evaluating the effectiveness of vehicles communicating with each other and with the roads. Test vehicles have been equipped with a wi-fi signal that enables them to share data about road speeds, potential incidents and changing road conditions. The system can alert drivers to the movements of nearby vehicles, such as lane changes in blind spots, or stopped vehicles on the road ahead. These changes have the potential to significantly increase the safety on our roads by decreasing the number and severity of collisions; this can help relieve non-recurring congestion. Data collectors with wi-fi signals on the roads track the number and speed of vehicles on major roads. This information is used by drivers to select alternate routes if their planned route is congested. More information about the study and connected vehicle technology can be found at www.safercar.gov/ConnectedVehicles.

Connected vehicle technology also has the potential to increase the capacity of existing roadways. As the vehicles communicate with each other they can travel with less space between them. Less space between vehicles, executed safely, can mean that more vehicles can be moved on the same space on the roads. And, with the increases in safety achieved through the same technology, this can result in roads with less recurring congestion and non-recurring congestion because there are fewer incidents.

Self-driving or autonomous vehicles take connected vehicle technology a step further, potentially offering personal mobility to those with disabilities and overall safety benefits by turning the controls over to computers. With studies showing that 90 percent of all highway crashes are caused by human error, autonomous vehicles could dramatically reduce the number of crashes and fatalities occurring each year. Research and testing of this technology has largely been driven by private companies with Google, Intel, Volvo and other organizations leading the way.

In response, the National Highway Traffic Safety Administration (NHTSA) has begun a 2-3 year research and study program aimed at developing standards for passenger cars and light trucks starting with model year 2017 that require vehicles to have higher gas mileage. With these changes, it is expected that gas tax revenues will decrease sharply. The gas tax revenues flow to the federal and state governments for transportation projects, meaning fewer dollars could be available for transportation improvements in the future.

CHANGES IN VEHICLE FUEL MILEAGE

In 2011, the federal government changed fuel efficiency standards for passenger cars and light trucks starting with model year 2017 that require vehicles to have higher gas mileage. With these changes, it is expected that gas tax revenues will decrease sharply. The gas tax revenues flow to the federal and state governments for transportation projects, meaning fewer dollars could be available for transportation improvements in the future.

GROWTH IN ALTERNATIVE COMMUTE OPTIONS

Federal, state and local governments have historically made investments in new highway capacity and roadway infrastructure on the assumption that driving will continue to increase at a steady pace. The observed downward trend in Vehicle Miles Traveled nationally along with the changing transportation preferences of young people to link housing to work and a shift towards alternative work options, like telecommuting, throw this assumption into question.
Telecommuting or telework is a work arrangement in which employees do not commute to a central office and instead work from home one or more days a week. Other than driving alone, telecommuting has been the only commute mode to gain market share since 1980. The Census Bureau has produced a number of statistics to support this trend:

- The percentage of all workers who worked at least 1 day at home increased from 7.0 percent in 1997 to 9.5 percent in 2010.
- The percentage of all workers who worked exclusively from home increased from 4.8 percent in 1997 to 6.6 percent in 2010.

Telecommuting is not suitable to every job, person or situation. As a transportation demand strategy, the observed trends in telecommuting have the potential to decrease peak hour congestion by reducing the number of commuters on the road.

With this growth in alternative commute options, the transportation policy of the future should consider the implications of changing travel behaviors.

**NEXT GENERATION OF TRANSPORTATION USERS**

America’s young people are decreasing the amount they drive and increasing their use of transportation alternatives. According to the National Household Travel Survey:

- From 2001 to 2009, the number of vehicle-miles traveled by young people (16 to 34-year-olds) decreased from 10,300 miles to 7,900 miles per capita - a drop of 23 percent.
- In 2009, 16 to 34-year-olds took 24 percent more bike trips than they took in 2001, despite the age group actually shrinking in size by 2 percent.
- In 2009, 16 to 34-year-olds walked to destinations 16 percent more frequently than did 16 to 34-year-olds living in 2001.
- From 2001 to 2009, the number of passenger-miles traveled by 16 to 34-year-olds on public transit increased by 40 percent per capita.

Also, according to the Federal Highway Administration:

- From 2000 to 2010, the share of 14 to 34-year-olds without a driver’s license increased from 21 percent to 26 percent.

These observed trends have largely been attributed to a number of factors including lifestyle preferences, changes in technology, changes in licensing laws, and increased fuel prices which have a disproportionate effect on young people with less disposable income.

**MANAGEMENT OF TRAFFIC ON MAJOR ROADS**

By 2040, many of the major roads across the country are expected to employ techniques to better manage traffic and optimize the existing transportation network. Many of the techniques improve the flow by managing the transportation network, provide alternative transportation options for commuters, and manage incident responses to minimize the impact to travelers. As funding for capacity increases may become more limited, many agencies/municipalities are turning to alternatives that can improve the throughput and reliability of travel on existing roads.

These techniques can increase capacity of the roads by managing the operation of the roads to increase throughput rather than building more lanes. These techniques can be divided into two categories: Transportation System Management (TSM) and Transportation Demand Management (TDM).

TSM techniques contain a set of coordinated proactive strategies to maximize the transportation system performance. Techniques such as ramp metering, variable speed limits, signal coordination, access management, and intelligent transportation systems combine to proactively manage the transportation network.

TDM strategies focus on reducing the demand on the transportation system, specifically reducing the number of single occupancy vehicles. This can be done by consolidating trips of transportation system users or by redistributing the demand over time and distance. Techniques include transit service, park-and-ride networks, and bicycle and pedestrian improvements that offer transportation alternatives to allow people to be mobile without their personal auto.

TSM and TDM techniques have already been implemented in Kansas City and numerous metro regions. They have proven to be effective at managing the traffic flow to increase throughput on the road. Section 11: Transportation Management Toolbox Strategies provides detailed descriptions of TSM and TDM strategies.


6 Federal Highway Administration. National Household Travel Survey.


Section 4:
Roadways

How do roadways serve the region?

The 5-County region has a robust system of interconnected freeways, highways, arterials, and local roads which create its transportation network. This integrated system of state highways and local roads are used for commuter trips, for freight movements, for transit, for bike/ped trips and to link activity centers.

Moving into the future, a broader set of strategies needs to be considered, beyond only those that increase capacity by constructing new lanes. Strategies that focus on Transportation System Management, like ramp metering, expansion of KC Scout and variable speed limits or Transportation Demand Management, like expanding transit service and constructing bicycle and pedestrian paths, will be important to consider. These strategies and others are described in detail in Section 11 of this report.

Also critical to future success is the management of KDOT’s existing roadway system. The existing system of roads contains nearly 1,800 lane-miles of KDOT-managed highway serving the 5-County region. These lanes must be maintained to provide the current level of service. KDOT performs substantial maintenance on 10 percent of the region’s roads per year, creating a 10-year maintenance cycle with an average annual cost of $17 million. This does not include the amount spent to maintain county or city managed roadways which are essential to effective operation of the transportation network. County and city roads are maintained using local funding sources and the Special City County Highway Fund. Maintenance of the existing system is a critical aspect of planning for the future transportation system. This was confirmed during Phase 1 when stakeholders of the 5-County Study identified maintenance of current roads to be the most important issue within the region for the next 10 years.

With current funding for capacity improvements being limited, it is expected that multimodal and alternative solutions are going to have a bigger role in providing mobility within the 5-County region.

The region’s robust road network provides a valuable resource for mobility. The roads must serve personal vehicles, trucks, transit service, bicycles and pedestrians where appropriate. As fuel prices continue to rise, public demand for alternative transportation options is also rising. The American Public Transportation Association (APTA) predicts that when gas reaches a price of $5 per gallon, 1.5 billion new transit riders will seek to use the nation’s transit systems1.

KEY CORRIDORS

Phase 1 of the 5-County Regional Transportation Study identified 13 key corridors in the region along with the needs, opportunities and potential strategies for each corridor. These corridors were identified by the Stakeholder Advisory Panel because they carry high volumes of traffic, create crucial connections within the region, or are projected to serve new development as the region grows. Phase 2 considered the corridors again and broke some of them down into smaller segments. For example the I-70, US-24, State Avenue corridor from Phase 1 was split into three separate corridors, one for each major road in Phase 2. This resulted in 17 corridors with greater resolution in which strategies could be developed to address the prioritized needs described in Phase 1. Each of the corridors is described, analyzed, and recommended strategies are presented in Section 14 of this report.


MULTIMODAL USE OF ROADS

The region’s existing road network illustrates that the historic focus had been on moving vehicles efficiently. However, as revealed in the public opinion survey in Phase 1, there is an increasing desire to focus on moving people and goods, rather than vehicles. A change in focus opens new opportunities to maximize the capacity of the existing network to serve the needs of travelers and freight in the region. The roads can facilitate a multimodal approach to movement.

Key Corridors

East-West Corridors
• I-70
• I-435 (East-West)
• US-24/40
• US-56
• K-10
• K-92/M-92
• K-68
• 175th Street, 199th Street, 223rd Street
• Shawnee Mission Parkway
• State Avenue

North-South Corridors
• I-35
• I-435 (North-South)
• I-635, I-35, US-69
• K-9
• Metcalf Avenue
• Western Johnson County North-South Arterial

Potential Outer Loop
A potential outer loop was also studied in Phase 2 as a potential strategy to meet the desired outcomes of the study and to address needs in one or more of the corridors studied.

KDOT Roadway Maintenance

At-A-Glance

1,800
KDOT-managed lane-miles in the 5-County region.*

10% The number of roads per year that get substantial maintenance from KDOT

10 years How often each roadway sees maintenance work performed

$17 million The average annual cost of roadway maintenance along state highways in the 5-County region

*Lane-miles as counted by KDOT Bureau of Materials and Research for use in determining maintenance costs.
A holistic view of the region’s road network illustrates that by 2040 many of the major highways will be near, at or over their traffic volume capacity during peak hours. Figure 4-1 presents the PM peak volume-capacity ratios for the region in 2010. Figure 4-2 presents the PM peak volume-capacity ratios as forecast for 2040 and takes into account the projects that have committed funding for construction.

These two figures show what changes are expected on the transportation network. The green lines show roads operating at less than 75 percent of their total capacity. Traffic should flow at speeds at or near the posted speed limit and should not experience recurring traffic congestion. The ability to maneuver within the traffic stream varies from unimpeded to somewhat impeded.

The yellow roads are those operating between 75 and 95 percent of their total capacity. These roads may experience minor slowing, especially at entrance and exit points along the road, where vehicles are traveling slower than through speeds. Freedom to maneuver within the traffic stream is limited. The red roads are those operating at 95 to 100 percent of their total capacity and are expected to have recurring congestion during the peak hours. Speeds are typically less than 30 mph with virtually no usable gaps in the traffic stream, leaving little room to maneuver. Any disruption can produce a serious breakdown in traffic flow with substantial backups of traffic. The dark red lines indicate road sections where the travel demand exceeds the roadway’s traffic carrying capacity. Traffic flow breaks down and is very unstable.

In coordination with projected growth and development, the areas that will see more vehicles using the roads are found along north/south bound I-435, southwest Johnson County, along K-7 in Johnson and Wyandotte Counties, and K-10 between Lenexa and Lawrence. Areas that are currently at or near capacity, such as east/west bound I-435, I-35, US-69, and critical intersections will remain at or above capacity, many with increased vehicle demand. A closer view of the critical network connections shows that I-35 and east/west I-435 are currently and will continue at or near capacity. In 2040, many of the arterial streets that support the network will also near or reach capacity. The length of road segments at or near capacity...
increase, and the entire network is affected by the increase in traffic volume as travelers seek alternative paths.

Because the majority of the congestion is recurring and tied to commuter patterns, future strategies should include more than those that only look at adding capacity. Strategies should include those in the Transportation Systems Management and Transportation Demand Management categories. Examples of these strategies are provided in detail in Section 11: Transportation Management Toolbox Strategies.

PEAKING CHARACTERISTICS OF HIGHWAYS

Congestion develops daily on the highway network of the 5-County region. The first series of maps in Figure 4-3 on the next page shows a typical weekday morning “rush hour” and the second series shows a typical weekday evening “rush hour.” Real-time traffic conditions from Google Maps traffic are displayed over the road as color-coded lines. Specifically, the colors represent the travel speeds on the road. For the maps shown, the colors roughly equate to:

- **Green**: more than 50 miles per hour
- **Yellow**: 25 - 50 miles per hour
- **Red**: less than 25 miles per hour

The roads begin in a free-flow condition, shown by the green connections on the maps. As the commute hour develops the roads become yellow, showing the decreasing travel speeds and increased congestion. Finally, the critical junctions become red during the most congested times where commuters face travel speeds of less than 25 miles per hour. The critical junctions do clear relatively quickly just after the peak demand and remain clear until the next peak travel period.

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Figure 4-3: Peaking Characteristics of Highways in Johnson & Wyandotte Counties

The following maps depict a typical weekday morning “rush hour” and a typical weekday evening “rush hour” showing real-time traffic conditions from Google Maps. The colors illustrate the levels of congestion that may be encountered on those roads. Specifically, the colors represent the travel speeds on the road. For the maps shown, the colors roughly equate to:

- **Green**: more than 50 miles per hour
- **Yellow**: 25 - 50 miles per hour
- **Red**: less than 25 miles per hour

### Typical Weekday AM Peak Commute

[Google maps, accessed Tuesday, July 17, 2012.](#)

### Typical Weekday PM Peak Commute

[Google maps, accessed Wednesday, July 18, 2012.](#)
HISTORICAL CASE STUDIES: WHAT HAPPENS TO TRAFFIC VOLUMES WHEN A FREEWAY IS WIDENED?

Building new freeway capacity often draws more traffic than expected to that facility.

In 2002, the Kansas Department of Transportation evaluated the accuracy of the traffic volume forecasts for design projects made since 1965. As shown in Figure 4-4, the forecasted traffic in the "design year" (20 years in the future from the time of construction) for rural interstate highways shows a strong correlation to the actual traffic volumes in the design year. If the actual and forecast volumes match, the data point falls on the thin diagonal line across the graph. The rural data illustrates a close match between projected volumes and actual volumes and most of the data is seen near the diagonal. This means that the forecasts for rural interstate highways have been mostly accurate and actual traffic volumes match what was predicted for future operation.

It is more difficult to forecast future traffic on freeways in metropolitan areas. Figure 4-5 shows that actual traffic volumes can exceed the volumes forecasted for the design year. If the actual and forecast volumes match, the data point falls on the thin diagonal line across the graph. The data for metropolitan areas shows that the forecasts are commonly lower than the actual traffic volume. This means that more people are using the road than were expected. Not only is there a general growth trend for traffic volumes but additional growth results from latent or induced travel demand.

One of the major findings of the survey, as shown in Figure 4-6, was that the issues residents were most satisfied with were traffic flow on highway and major roads (65 percent), maintenance of current roads between the cities (56 percent), and the effect of the transportation system on safety (47 percent). When asked to name the most

PUBLIC SATISFACTION WITH ROADWAYS

As part of Phase 1 of the 5-County Study, a random sample of residents in the study area responded to a survey regarding issues and opportunities related to transportation planning for the region. This survey was conducted in the Spring of 2009.

One of the major findings of the survey, as shown in Figure 4-6, was that the issues residents were most satisfied with were traffic flow on highway and major roads (65 percent), maintenance of current roads between the cities (56 percent), and the effect of the transportation system on safety (47 percent). When asked to name the most

La...
alternatives to driving (46 percent), poor timing of traffic lights (44 percent), road construction (39 percent), and poorly planned development (39 percent).

And while 78 percent of those surveyed felt that traffic congestion would get worse to some degree over the next 10 years, 64 percent felt that more emphasis should be placed on maintaining the existing transportation system than on expanding it.

LANE-MILES PER CAPITA

The Kansas City Metropolitan Area is well recognized for its vast, well-maintained and functional roads. In fact, the Kansas City region has more than double the number of freeway miles per capita found in Denver, as seen in Figure 4-7, and exceeds all other mid-western peer cities. The Kansas City region also exceeds all other peer cities in arterial street lane miles per capita, as also seen in Figure 4-7. Our roadway capacity is very high and the associated maintenance costs will last in perpetuity. This gives credence to the idea that the region can no longer afford to rely on adding lanes as the sole solution to its transportation issues.

COST OF CONSTRUCTION

Construction cost estimates in this study were based on historical costs from this region. These estimates, shown in Table 4-1, indicate that one additional mile of a highway lane (lane-mile) will cost $3.4 million in 2020. Bridges, overpasses, and interchanges are additional costs that must be added to a per-lane mile cost if new construction will connect to an existing facility. These costs do not include right-of-way procurement, utility relocation, engineering design costs or ongoing maintenance.

Table 4-1: 2020 Road Construction Cost Estimates

<table>
<thead>
<tr>
<th>Description</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lane Mile</td>
<td>$3,400,000</td>
</tr>
<tr>
<td>Interchange (service)</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Overpass</td>
<td>$9,000,000</td>
</tr>
<tr>
<td>Expressway Intersection Enhancements</td>
<td>$553,000</td>
</tr>
</tbody>
</table>

As additional validation for construction cost estimates, actual costs for regional projects were adjusted for inflation to compare cost estimates, as shown in Table 4-2.

Table 4-2: Project Cost Estimates

<table>
<thead>
<tr>
<th>Description</th>
<th>2020 Cost Adjusted for Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-35-K-7 Interchange</td>
<td>$197,000,000</td>
</tr>
<tr>
<td>K-10/K-7 Interchange</td>
<td>$267,500,000</td>
</tr>
<tr>
<td>K-7/Kansas River Bridge</td>
<td>$20,400,000</td>
</tr>
<tr>
<td>I-70-K-7 Interchange</td>
<td>$177,300,000</td>
</tr>
</tbody>
</table>

Cost of Maintenance

During KDOT’s 5-County local consultant program, funding the maintenance of roads and bridges was universally seen as the first priority for transportation investments. Oftentimes, costs associated with maintenance are not fully discussed during the planning of new roadways. Looking at the life-cycle cost of a transportation improvement, and not just the initial construction cost, gives a broader perspective on the value of the investment. The following two sections provide information about current KDOT maintenance costs for highways and bridges on the State system in the 5-County region. It should be noted that these costs only apply to those highways and bridges that are part of the KDOT system (Kansas Highways, U.S. Highways, or Interstate Highways). County and City roadways and bridges also require substantial maintenance and are done through local funding.

Highway Maintenance

KDOT manages a substantial highway system that requires annual maintenance to keep in a state of good repair. In order to do this, KDOT has two categories for highway maintenance: routine maintenance and substantial maintenance. Routine maintenance typically includes roadside clearing, grass cutting, cleaning of ditches and culverts, patching and pothole repair. KDOT’s annual routine maintenance costs can be averaged to $5,000 per lane mile, per year.

Substantial maintenance / highway preservation typically includes such activities as resurfacing, overlay and pavement reconstruction. Costs associated with this type of activity are summarized in Table 4-3.

Table 4-3: Highway Maintenance Averages from 2001-2011

<table>
<thead>
<tr>
<th>County</th>
<th>Approximate KDOT Lane Miles</th>
<th>Approximate KDOT Lane Miles Receiving Substantial Maintenance Per Year</th>
<th>Average Cost per Lane Mile for Substantial Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas</td>
<td>250</td>
<td>20</td>
<td>$30,000</td>
</tr>
<tr>
<td>Johnson</td>
<td>580</td>
<td>80</td>
<td>$105,000</td>
</tr>
<tr>
<td>Leavenworth</td>
<td>305</td>
<td>35</td>
<td>$30,000</td>
</tr>
<tr>
<td>Miami</td>
<td>275</td>
<td>10</td>
<td>$40,000</td>
</tr>
<tr>
<td>Wyandotte</td>
<td>355</td>
<td>50</td>
<td>$135,000</td>
</tr>
<tr>
<td>Total</td>
<td>195</td>
<td></td>
<td>$340,000</td>
</tr>
</tbody>
</table>

Source: Kansas Department of Transportation

The averages are from 2001-2011 and an analysis of the data shows that costs by county are highly variable over the last 10 years for substantial maintenance work. This is due to the different types of projects that were done in the region, the age of the pavements in the region, and the fact that the state had quite a bit of older concrete pavements that needed work. Examples of these are in Johnson and Wyandotte Counties which had higher cost projects that needed substantial patching - a very expensive type of work. A good number of projects were constructed in these counties at the same time in the 1980s and 1990s, meaning they all needed to be repaired at the same time, as well. In addition, the cost for traffic control is higher in higher traffic areas and during this period of time night work, which was more expensive, became much more prevalent in the more populous areas.

3 TTI Urban Mobility Report from 2011.
Bridge Maintenance

In addition to KDOT’s road maintenance program, there is a Bridge Preservation program that keeps the bridges in KDOT’s system in good repair. Because each bridge is different, it is difficult to quantify the annual cost to maintain one bridge. In the 5-County region, Table 4-4 shows the annual bridge maintenance costs for the years 2001-2011. This data only represents the state highway system maintained by KDOT and does not include data from local roadways or the Kansas Turnpike Authority.

<table>
<thead>
<tr>
<th>County</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Total</th>
<th>Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas</td>
<td>$312,641</td>
<td>$61,601</td>
<td>$151,005</td>
<td>$258,683</td>
<td>$153,941</td>
<td>$676,064</td>
<td>$1,613,935</td>
<td>$146,721</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnson</td>
<td>$561,960</td>
<td>$588,732</td>
<td>$1,876,315</td>
<td>$1,427,758</td>
<td>$2,224,139</td>
<td>$883,168</td>
<td>$3,383,659</td>
<td>$3,466,647</td>
<td>$2,497,774</td>
<td>$3,932,990</td>
<td>$21,638,393</td>
<td>$1,967,127</td>
<td></td>
</tr>
<tr>
<td>Leavenworth</td>
<td>$75,889</td>
<td>$209,945</td>
<td>$965,805</td>
<td>$310,012</td>
<td>$344,943</td>
<td>$2,358,948</td>
<td>$4,265,542</td>
<td>$387,777</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miami</td>
<td>$6,241,195</td>
<td>$925,405</td>
<td>$872,164</td>
<td>$13,381</td>
<td>$393,520</td>
<td>$59,363</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wyandotte</td>
<td>$497,342</td>
<td>$23,447,601</td>
<td>$4,726,229</td>
<td>$1,881,736</td>
<td>$1,178,165</td>
<td>$4,111,402</td>
<td>$2,068,604</td>
<td>$830,564</td>
<td>$4,631,456</td>
<td>$648,826</td>
<td>$2,289,741</td>
<td>$46,691,666</td>
<td>$4,244,697</td>
</tr>
<tr>
<td>Total</td>
<td>$7,689,027</td>
<td>$24,961,738</td>
<td>$7,684,653</td>
<td>$3,280,321</td>
<td>$6,335,541</td>
<td>$3,345,292</td>
<td>$4,531,669</td>
<td>$8,596,987</td>
<td>$3,346,608</td>
<td>$9,257,743</td>
<td>$82,714,564</td>
<td>$7,519,506</td>
<td></td>
</tr>
</tbody>
</table>

In addition to regular maintenance, bridge replacement is at times necessary for bridges that require substantial repair. Table 4-5 shows the 10-year costs associated with the bridge replacement program at KDOT.

<table>
<thead>
<tr>
<th>County</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Total</th>
<th>Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas</td>
<td>$74,066</td>
<td>$61,601</td>
<td>$151,005</td>
<td>$258,683</td>
<td>$153,941</td>
<td>$676,064</td>
<td>$1,613,935</td>
<td>$146,721</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnson</td>
<td>$973,626</td>
<td>$4,430,765</td>
<td>$4,555,905</td>
<td>$335,865</td>
<td>$3,466,647</td>
<td>$2,497,674</td>
<td>$3,932,990</td>
<td>$21,638,393</td>
<td>$1,967,127</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leavenworth</td>
<td>$2,262,450</td>
<td>$858,090</td>
<td>$3,383,659</td>
<td>$3,466,647</td>
<td>$2,497,774</td>
<td>$3,932,990</td>
<td>$21,638,393</td>
<td>$1,967,127</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miami</td>
<td>$172,014</td>
<td>$1,591,204</td>
<td>$4,726,229</td>
<td>$1,881,736</td>
<td>$1,178,165</td>
<td>$4,111,402</td>
<td>$2,068,604</td>
<td>$830,564</td>
<td>$4,631,456</td>
<td>$648,826</td>
<td>$2,289,741</td>
<td>$46,691,666</td>
<td>$4,244,697</td>
</tr>
<tr>
<td>Wyandotte</td>
<td>$1,145,640</td>
<td>$1,591,204</td>
<td>$4,726,229</td>
<td>$1,881,736</td>
<td>$1,178,165</td>
<td>$4,111,402</td>
<td>$2,068,604</td>
<td>$830,564</td>
<td>$4,631,456</td>
<td>$648,826</td>
<td>$2,289,741</td>
<td>$46,691,666</td>
<td>$4,244,697</td>
</tr>
</tbody>
</table>

*No bridges were replaced during the 10-year period. KDOT is now looking at the Lewis & Clark Viaduct and the Fairfax Bridge

Source: Kansas Department of Transportation
AVAILABLE FUNDING
In order to estimate the amount of funding that may be available for State highway projects during the decades of 2020-2030 and 2030-2040, the study team analyzed the amount of state and federal funding that was expended in this region over previous years. In doing this, the study team used a baseline of $1.2 billion that was available in the 5-County region for funding transportation projects under T-WORKS from 2010-2020. This baseline was adjusted for inflation and $1.3 billion was assumed to be available from 2020-2030 and $1.4 billion from 2030-2040 billion. There are ongoing changes in both transportation technology and funding that may change the way projects are identified and implemented in the future, therefore the estimates identified in this study should be considered only for planning purposes.

While this may seem to be a large amount of funding that could accommodate many projects, it actually would only be able to fully fund a very small portion of the identified needs in the 5-County region. The T-WORKS program funding for the 5-County region was similar to the funding amount that the study team has identified for the future decade. Even with this large amount of funding, the following were the only major expansion projects funded in the region for 2010-2020:

Douglas
• K-10 (South Lawrence Trafficway) – new build from U.S. 59 to existing K-10 east of Lawrence

Johnson
• Johnson County Gateway- I-435, I-35 and K-10 junction in Northeast Johnson County

Leavenworth
• No major expansion projects were selected

Wyandotte
• Improvements to the I-70 / K-7 Interchange
• No construction funding has been identified, but a study of the Lewis & Clark Bridge is currently underway.

As transportation projects in urbanized areas continue to increase in complexity and cost, it can be assumed that there will only be funding available for a limited number of major projects throughout the region in the coming decades. Transportation officials will be challenged to best utilize the existing system through technology and multimodal programming in order to forego costly expansion projects while maintaining necessary capacity.
Section 5: Freight

What are the impacts of freight on the transportation system?

The 5-County region is a vital national freight hub due to a strong goods movement transportation network with few bottlenecks. Kansas City continues to be considered the second largest rail center in the nation and is served by five of the nation’s seven Class I rail carriers. The region is also one of the nation’s top five trucking centers. The movement of freight and goods has continued to increase in recent years, though trucking has been gaining a larger percentage of freight movement than rail.

Commodity movement in Kansas is dominated by coal, which is 48 percent of the total freight movement by weight. Agriculture is next (11 percent), followed by nonmetallic minerals (eight percent), and food products (six percent). The primary coal movement is from coal fields in Wyoming to power plants in the eastern United States.

- 54 percent of freight in the 5-County region is passing through without any destinations in the area
- 65 percent of the freight by weight is carried on trucks

The Phase 1 report includes additional freight analysis.

RAILROADS

The locations of the railroads are shown in Figure 5-1.

The 5-County region has five Class I railroads operators: the BNSF and Union Pacific which have extensive rail operations; and the Kansas City Southern, the Norfolk Southern, and the Canadian Pacific which operate or has limited trackage rights on short rail segments. The rail infrastructure throughout the region services industry, intermodal facilities in Edgerton, KS and Kansas City, MO, and connections to global markets.

Two significant routes through the 5-County region are the BNSF Railway’s Transcontinental Route and Union Pacific Railway’s East West Coal Route, shown in Figure 5-2. The BNSF Railway’s Transcontinental Route runs from the southwest to northeast portion of the region connecting ports in California with Illinois. The Union Pacific major coal route operates through Douglas, Leavenworth, Johnson, Miami and Wyandotte Counties into Missouri. Both of these routes carry 80-90 trains per day.

Several shortline carriers also operate rail in the 5-County region. The Kansas City Terminal (KCT) Railway Company provides track infrastructure for switching operations. KDOT recognizes one Class III operator in the 5-County region. The New Century Air Center Railway is a Class III rail provider with industrial service via a BNSF junction at the east edge of Gardner.

The BNSF and Union Pacific have rail facilities in both Kansas and Missouri.
Intermodal Freight Rail Growth in Kansas

Intermodal freight carried by rail is anticipated to grow in the future. The intermodal growth in Kansas will be tied to the growth in intermodal shipments by the BNSF, and logistical issues related to shifts in freight movement between the other BNSF intermodal facilities, as well as the total volume of shipments. Time, rate of adaption, the price of fuel, backhauls and commercial considerations will influence the competitive pricing and the use of intermodal locations, as well as the option to use of water versus rail for transport. Kansas will continue to see a significant volume of intermodal traffic from Pacific ports to Chicago.

Table 5-1 displays forecasted rail traffic growth, indicating an overall growth from 2007 to 2030 of 36.5 percent. The interstate inbound and interstate outbound traffic would relate to intermodal traffic handled at the Edgerton intermodal facility.

Table 5-2 identifies the busiest at-grade roadway/rail crossings by county. The highest exposure (number of trains multiplied by the number of automobiles and trucks) occurs in Johnson County in Merriam, Gardner, and Olathe.

At-grade rail crossings can be a safety hazard and can cause traffic delay. Across Kansas in 2011, there were

### Table 5-1: Forecasted Rail Traffic Growth

<table>
<thead>
<tr>
<th>Traffic Type</th>
<th>2007 Tonnage (millions)</th>
<th>2030 Tonnage (millions)</th>
<th>Change (%)</th>
<th>Compound Annual Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate Inbound</td>
<td>29</td>
<td>35</td>
<td>20.60%</td>
<td>0.80%</td>
</tr>
<tr>
<td>Interstate Outbound</td>
<td>21</td>
<td>50</td>
<td>44.50%</td>
<td>1.60%</td>
</tr>
<tr>
<td>Intrastate</td>
<td>1</td>
<td>2</td>
<td>25.60%</td>
<td>1.00%</td>
</tr>
<tr>
<td>Overhead</td>
<td>293</td>
<td>404</td>
<td>37.50%</td>
<td>1.40%</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>470</td>
<td>36.50%</td>
<td>1.40%</td>
</tr>
</tbody>
</table>

Source: Prepared by Wilbur Smith Associates, based on STB Waybill Sample data and adjusted HS Global Insights forecasts

### Table 5-2: Busiest At-Grade Crossings By County

<table>
<thead>
<tr>
<th>County</th>
<th>Jurisdiction</th>
<th>Railroad Crossing DOT#</th>
<th>Operating Railroad</th>
<th>Trains/Day</th>
<th>Average Annual Daily Traffic (AADT) that uses the route</th>
<th>Exposure number of trains per day multiplied by the AADT</th>
<th>Route</th>
<th>Functional Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas</td>
<td>Lawrence</td>
<td>813770T</td>
<td>UP</td>
<td>70</td>
<td>1594</td>
<td>111580</td>
<td>7th Street</td>
<td>Urban Collector</td>
</tr>
<tr>
<td></td>
<td>Lawrence</td>
<td>813757E</td>
<td>UP</td>
<td>70</td>
<td>1238</td>
<td>86660</td>
<td>3rd Street</td>
<td>Urban Local</td>
</tr>
<tr>
<td></td>
<td>Near Lawrence</td>
<td>813767K</td>
<td>UP</td>
<td>70</td>
<td>455</td>
<td>31850</td>
<td>1600 East Road</td>
<td>Rural Minor Collector</td>
</tr>
<tr>
<td></td>
<td>Near Lawrence</td>
<td>005839G</td>
<td>BNSF</td>
<td>10</td>
<td>2874</td>
<td>28740</td>
<td>15th Street</td>
<td>Urban Minor Arterial</td>
</tr>
<tr>
<td></td>
<td>Eudora</td>
<td>005829B</td>
<td>BNSF</td>
<td>10</td>
<td>2593</td>
<td>25930</td>
<td>Main Street</td>
<td>Rural Major Collector</td>
</tr>
<tr>
<td>Johnson</td>
<td>Olath</td>
<td>006149F</td>
<td>BNSF</td>
<td>88</td>
<td>14424</td>
<td>1269312</td>
<td>Santa Fe Drive</td>
<td>Urban Principal Arterial</td>
</tr>
<tr>
<td></td>
<td>Merriam</td>
<td>663556X</td>
<td>BNSF</td>
<td>38</td>
<td>23173</td>
<td>880574</td>
<td>Johnson Drive</td>
<td>Urban Minor Arterial</td>
</tr>
<tr>
<td></td>
<td>Gardner</td>
<td>006162X</td>
<td>BNSF</td>
<td>88</td>
<td>8354</td>
<td>735152</td>
<td>Moonlight Road</td>
<td>Urban Principal Arterial</td>
</tr>
<tr>
<td></td>
<td>Olath</td>
<td>006155M</td>
<td>BNSF</td>
<td>88</td>
<td>6644</td>
<td>584672</td>
<td>Dempis Avenue</td>
<td>Urban Collector</td>
</tr>
<tr>
<td></td>
<td>Olath</td>
<td>006144A</td>
<td>BNSF</td>
<td>88</td>
<td>5964</td>
<td>524832</td>
<td>Harold Street</td>
<td>Urban Local</td>
</tr>
<tr>
<td>Leavenworth</td>
<td>Near Linwood</td>
<td>813763H</td>
<td>UP</td>
<td>70</td>
<td>2397</td>
<td>167790</td>
<td>222nd Street</td>
<td>Rural Major Collector</td>
</tr>
<tr>
<td></td>
<td>Near Tonganoxie</td>
<td>813745K</td>
<td>UP</td>
<td>70</td>
<td>2363</td>
<td>165410</td>
<td>1600th Street</td>
<td>Rural Major Collector</td>
</tr>
<tr>
<td></td>
<td>Leavenworth</td>
<td>437427M</td>
<td>UP</td>
<td>37</td>
<td>231</td>
<td>8547</td>
<td>Dakota Street</td>
<td>Urban Local</td>
</tr>
<tr>
<td></td>
<td>Near Linwood</td>
<td>813766D</td>
<td>UP</td>
<td>70</td>
<td>72</td>
<td>5040</td>
<td>254th Street</td>
<td>Rural Local</td>
</tr>
<tr>
<td></td>
<td>Near Tonganoxie</td>
<td>813744D</td>
<td>UP</td>
<td>70</td>
<td>32</td>
<td>2240</td>
<td>158th Street</td>
<td>Rural Local</td>
</tr>
<tr>
<td>Miami</td>
<td>Oswawtomie</td>
<td>439515E</td>
<td>UP</td>
<td>18</td>
<td>8128</td>
<td>146384</td>
<td>Main Street</td>
<td>Rural Major Collector</td>
</tr>
<tr>
<td></td>
<td>Near Spring Hill</td>
<td>668596M</td>
<td>BNSF</td>
<td>38</td>
<td>2564</td>
<td>102322</td>
<td>Rural Major Collector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bayzyns</td>
<td>423017X</td>
<td>UP</td>
<td>25</td>
<td>3558</td>
<td>89050</td>
<td>223rd Street</td>
<td>Rural Major Collector</td>
</tr>
<tr>
<td></td>
<td>Near Paola</td>
<td>668631Y</td>
<td>BNSF</td>
<td>38</td>
<td>1984</td>
<td>75392</td>
<td>343rd Street</td>
<td>Rural Major Collector</td>
</tr>
<tr>
<td></td>
<td>Near Paola</td>
<td>423040S</td>
<td>UP</td>
<td>25</td>
<td>2807</td>
<td>70175</td>
<td>Hedge Lane</td>
<td>Rural Major Collector</td>
</tr>
<tr>
<td>Wyandotte</td>
<td>Kansas City</td>
<td>813198G</td>
<td>UP</td>
<td>80</td>
<td>5276</td>
<td>422080</td>
<td>Kansas Avenue</td>
<td>Urban Local</td>
</tr>
<tr>
<td></td>
<td>Edwardsville</td>
<td>8131215V</td>
<td>UP</td>
<td>70</td>
<td>5602</td>
<td>392140</td>
<td>4th Street</td>
<td>Rural Local</td>
</tr>
<tr>
<td></td>
<td>Kansas City</td>
<td>814993M</td>
<td>UP</td>
<td>60</td>
<td>6406</td>
<td>384360</td>
<td>Kindelburg Road</td>
<td>Urban Local</td>
</tr>
<tr>
<td></td>
<td>Kansas City</td>
<td>663550G</td>
<td>BNSF</td>
<td>42</td>
<td>7186</td>
<td>301812</td>
<td>Lamar Avenue</td>
<td>Urban Collector</td>
</tr>
<tr>
<td></td>
<td>Kansas City</td>
<td>663544D</td>
<td>BNSF</td>
<td>48</td>
<td>6283</td>
<td>301584</td>
<td>Southwest Boulevard</td>
<td>Urban Minor Arterial</td>
</tr>
</tbody>
</table>

Source: Kansas Department of Transportation

Missouri. In Kansas both railroads have rail yards in the vicinity of the intersection of I-70 and I-635. BNSF’s Argentine rail yard is located south of the Kansas River and Union Pacific’s Armourdale rail yard is north of the Kansas River. BNSF’s intermodal activities are located at the Argentine rail yard. Union Pacific’s intermodal activities are located in Missouri at the Neff Rail Yards.

A new 440-acre BNSF Kansas City Intermodal Facility (KCIMF) is being developed 30 miles southwest of Kansas City at Edgerton, KS in southwest Johnson County, near I-35 and US 56. Construction of the facility began in late 2011. The facility is expected to open in 2013. The Allen Group also plans to develop 560 adjacent acres for a separate Logistics Park that would accommodate approximately 7.1 million square feet of warehousing and supporting activities upon full build out. Zoning approval requests began in mid-2010. It has been estimated that the KCIMF and Logistics park will create 8,000 jobs for the area.

On the Missouri side of the Kansas City area, both the Northfork Southern (NS) and Kansas City Southern (KCS) Railroads have intermodal terminals. The NS has its main rail facility along M-210, east of I-435 in Missouri. The CenterPoint-KCS Intermodal Center (KCISI), which opened in March 2008, is located in Kansas City, MO on I-49/M-150. KCSI is used by KCS for the carriers’ own service, as well as part of a KCS/CSX marketing agreement. KCSI provides direct rail linkage via the KCS to the new Port of Lazaro Cardenas in Mexico.
33 highway-rail crossing incidents that occurred, with eight of them occurring in the 5-County region. There are hundreds of at-grade crossings in the 5-County region. As rail freight movement grows in the region, the volume of rail traffic will also increase, increasing the safety risk of at-grade crossings and increasing the potential delay on the roads that cross rail tracks.

**IMPACT OF BNSF INTERMODAL FACILITY**

Trip generation on I-35 specifically attributed to the BNSF facility will increase from an estimated 5,212 trips during the opening year, to 17,080 trips by 2030, including 7,000 commercial trucks. Currently 89 trains a day operate in the area. The total train traffic through the BNSF intermodal area is expected to increase by as much as 140, to 229 trains per day by 2025.1

**VERTICAL CLEARANCE ISSUES FOR WIND TURBINE COMPONENTS**

As the wind energy industry continues to grow in Kansas as a manufacturing base and a wind power producer, managing a freight network capable of transporting the oversized wind components becomes increasingly important. The number of KDOT issued permits for loads of 150,000 pounds or more carrying wind tower components increased from less than 1,000 in 2006 to more than 7,500 in 2010. The tower sections for a typical 250 foot wind turbine tower can weigh more than 70 tons, be 120 feet long, and have a 15-foot diameter. Nacelles can weigh between 50 to 90 tons, and blades can extend 110 to 145 feet.

Concerns related to transporting wind components include the possibility of delays to light traffic if the vertical clearance impedes the movement of the facility.

**TRUCKING**

Since freight shipped by truck uses the highway system, these movements are subject to the same delays as other motorists. The primary locations of highway system delay are listed in Table 5-4. These delays occur during the peak commute travel periods. For a majority of the day, the highways are unimpeded for freight movement. Truck traffic on I-70 and K-10 in the 5-County region peaks in the early morning with over 50 percent of trucks occurring between 2:00 AM and 5:00 AM on I-70, as seen in Figure 5-3. The temporal distribution of trucks on K-10 is more constant, but still exhibits a peaking behavior in early morning.

---

**Table 5-3: Overpass with Less Than 16-Foot Vertical Clearance**

<table>
<thead>
<tr>
<th>County</th>
<th>Railroad</th>
<th>Route Crossing Under</th>
<th>Location</th>
<th>Minimum Vertical Clearance (feet)</th>
<th>Average Daily Traffic</th>
<th>Functional Classification</th>
<th>Average Trains per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas</td>
<td>UP</td>
<td>US 40 Highway (2nd Street)</td>
<td>1.48 miles South of 59 N Junction</td>
<td>14' 2&quot;</td>
<td>18,600</td>
<td>Urban Principal Arterial</td>
<td>70</td>
</tr>
<tr>
<td>Johnson</td>
<td>BNSF</td>
<td>Wilder Road</td>
<td>0.03 miles North of Holiday Drive</td>
<td>13' 5&quot;</td>
<td>1,555</td>
<td>Urban Minor Arterial</td>
<td>88</td>
</tr>
<tr>
<td>Johnson</td>
<td>BNSF</td>
<td>Old Highway 56</td>
<td>0.5 mile East of K-7</td>
<td>14' 7&quot;</td>
<td>12,000</td>
<td>Urban Minor Arterial</td>
<td>38</td>
</tr>
<tr>
<td>Johnson</td>
<td>BNSF</td>
<td>Spruce Street</td>
<td>0.7 mile East of K-7</td>
<td>11' 3&quot;</td>
<td>3,933</td>
<td>Urban Collector</td>
<td>88</td>
</tr>
<tr>
<td>Miami</td>
<td>UP</td>
<td>RS 1604 (North Pearl Street)</td>
<td>North Edge of Paola</td>
<td>13' 8&quot;</td>
<td>-</td>
<td>Rural Major Collector</td>
<td>25</td>
</tr>
<tr>
<td>Miami</td>
<td>UP</td>
<td>Pleasant Valley Road</td>
<td>Pleasant Valley, 0.3 mile North of 379th</td>
<td>11' 6&quot;</td>
<td>3</td>
<td>Rural Collector</td>
<td>16</td>
</tr>
<tr>
<td>Miami</td>
<td>BNSF</td>
<td>347th</td>
<td>347th, 0.2 mile West of Hedgeline</td>
<td>10' 2&quot;</td>
<td>85</td>
<td>Rural Collector</td>
<td>38</td>
</tr>
<tr>
<td>Miami</td>
<td>BNSF</td>
<td>239th</td>
<td>239th, 0.1 mile East of Victory</td>
<td>12' 11&quot;</td>
<td>-</td>
<td>Rural Collector</td>
<td>38</td>
</tr>
<tr>
<td>Wyandotte</td>
<td>BNSF</td>
<td>74th</td>
<td>131 South 74th Street</td>
<td>13' 2&quot;</td>
<td>1,000</td>
<td>Urban Local</td>
<td>88</td>
</tr>
<tr>
<td>Wyandotte</td>
<td>BNSF</td>
<td>Douglas Avenue</td>
<td>7200 Douglas Avenue</td>
<td>13' 8&quot;</td>
<td>522</td>
<td>Urban Local</td>
<td>88</td>
</tr>
<tr>
<td>Wyandotte</td>
<td>KCT</td>
<td>Adams Street</td>
<td>300 S Adams &amp; Shawnee Avenue</td>
<td>12' 11&quot;</td>
<td>1,000</td>
<td>Urban Local</td>
<td>15</td>
</tr>
</tbody>
</table>

---

1 KDOT Department of Planning, Multi-Modal Planning Section, Rail Freight
2 I-35 SW Johnson County Interchange Study Purpose and Need Statement
3 KC Regional Freight Outlook – Freight Directory July 2009
5 “Wind industry could take toll on Kansas highways”. Metz, Christine. Lawrence Journal World. March 24, 2011
Table 5-5: Roadway Volumes

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Total Volume</th>
<th>Truck Volume</th>
<th>% Truck Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-35 south of I-435</td>
<td>116,000</td>
<td>8,760</td>
<td>8%</td>
</tr>
<tr>
<td>I-435 east of US-69</td>
<td>148,000</td>
<td>6,350</td>
<td>4%</td>
</tr>
<tr>
<td>K-7 north of K-10</td>
<td>22,800</td>
<td>1,600</td>
<td>7%</td>
</tr>
<tr>
<td>K-10 west of De Soto</td>
<td>28,200</td>
<td>1,340</td>
<td>5%</td>
</tr>
<tr>
<td>I-70 east of Lawrence</td>
<td>29,700</td>
<td>4,490</td>
<td>15%</td>
</tr>
<tr>
<td>I-35 east of I-635</td>
<td>109,300</td>
<td>7,730</td>
<td>7%</td>
</tr>
<tr>
<td>K-7 south of K-10</td>
<td>70,700</td>
<td>5,570</td>
<td>8%</td>
</tr>
<tr>
<td>I-70 east of I-435</td>
<td>57,900</td>
<td>6,350</td>
<td>11%</td>
</tr>
<tr>
<td>US-69 north of Louisburg</td>
<td>14,600</td>
<td>1,800</td>
<td>12%</td>
</tr>
<tr>
<td>K-7 at Lansing</td>
<td>19,600</td>
<td>1,000</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: Kansas Department of Transportation

INCREASE IN AIR CARGO
The region is expected to see an increase in air cargo from the KCI Airport with a master plan in place to build an integrated logistics and warehousing facility known as the KCI Intermodal Business Centre. The 690-acre multi-use phased development was announced in June 2007 and will offer 5.4 million square feet of buildings upon completion, for logistics, air cargo storage, office, warehousing and light manufacturing facilities. The air cargo and air freight facilities will be built adjoining the runways.

The first phase of development will include 1.8 million square feet of space on approximately 180 acres. The entire project is expected to cost more than $216 million. It is expected to make the airport a Foreign Trade Zone. Construction on the first building of the project was started in July 2011.
Section 6: Transit

What role should transit play in regional transportation?

Transit will play an important role in the future transportation system for the 5-County region, particularly in moving commuters during the morning and evening peak travel periods. Enhancing regional transit service will also help in connecting communities and serving more people. Regional connections serve not only commuters, but also transit dependent riders (i.e., young, old, poor, infirm, or otherwise unable to drive). A more connected transit system will improve the movement of travelers both regionally and locally, connecting them to major activity centers such as universities, hospitals, shopping areas, sports arenas and major employment centers.

**CURRENT TRANSIT SYSTEM**

Transit is used for many different purposes in the 5-County region. Figure 6-1 shows the existing transit service in the region. All-day, fixed-route bus services are provided in portions of the 5-County region as described below:

- **Douglas County**: All day, fixed-route service is provided by the Lawrence Transit System and KU on Wheels along key corridors within the city of Lawrence.
- **Johnson County**: The majority of the bus routes operated by Johnson County Transit provide service only during the peak hours. The Kansas City Area Transportation Authority (KCATA) has some routes that operate in eastern Johnson County as part of their service offerings.
- **Leavenworth County**: There are no fixed-route bus services available in Leavenworth County.
- **Miami County**: There are no all-day, fixed-route bus services in Miami County.

As required by the federal government, these fixed-route bus operators provide complementary paratransit service to those individuals who are not able to ride on the fixed-route system. Additionally, Johnson County Transit offers paratransit service and specific routes for the elderly and disabled to assist with their ongoing needs.

**Commuter transit services** are also being provided in the 5-County region. Currently, Johnson County Transit is operating all of the current commuter transit services within the region. This includes many routes that connect Johnson County with downtown Kansas City, Missouri. As many of their commuter routes connect with downtown via I-35, Johnson County Transit, in partnership with KDOT, created a Bus on Shoulder (BOS) service that allows transit vehicles to operate on...
the shoulder when mainline traffic is traveling below 35 miles per hour. In addition to providing services that connect into downtown Kansas City, Johnson County Transit also operates the K-10 Connector, which provides a transit connection between Lawrence and Overland Park, primarily connecting students at the University of Kansas Main Campus and Haskell Indian Nations University in Lawrence with the University of Kansas Edwards Campus and Johnson County Community College in Overland Park. In order for the K-10 Connector to serve a greater commuter need, there would need to be routes connecting to it that would serve a broader area in Johnson County.

The K-10 Connector
The K-10 Connector is an all-day, limited access long haul route between Lawrence and Overland Park. It is the one truly regional transit route operating in the 5-County region. The route has 30 minute peak frequency and 60 minute off-peak frequency, with a service span of 6:00 AM to 11:20 PM on most weekdays. The route provides 22 daily trips. Currently, the cost of a one-way fare is $3.00, which equates to about 9 cents a mile if riding between the two furthest stops. This compares to an automobile travel cost of 55 cents a mile. Daily ridership is nearly 700. The cost of the service was $930,000 in 2011. Users paid nearly $400,000 of this cost.

Bus on Shoulder
Bus on Shoulder (BOS) allows transit vehicles to operate on the shoulder when mainline traffic is traveling below 35 miles per hour. In 2012, 472 buses used the shoulder, traveling an estimated 1,348 miles on the shoulder. Johnson County Transit saw a 12.1 percent increase in ridership from 2011 (pre-BOS) to 2012 on the Jo Xpress routes that utilize BOS.

PUBLIC SATISFACTION WITH TRANSIT SERVICE IN THE 5-COUNTY REGION
As part of Phase 1 of the 5-County Study, a random sample of residents in the study region responded to a survey regarding issues and opportunities related to transportation planning for the region. This survey was conducted in the Spring of 2009. Many of the survey questions asked for respondents to provide their opinion regarding existing transit service and opportunities for transit in the future. It should be noted that this survey was administered soon after the gas spike of 2007/2008, at a time when consumers were addressing concerns about the price of fuel and urging multimodal solutions.

When asked about their level of satisfaction with transit options within cities and towns, the majority of those responding were neutral or dissatisfied.

When asked their level of satisfaction with transit service, particularly in southern Johnson County, along the US-69 corridor in Miami County, the I-70 corridor through Wyandotte and Douglas Counties, and all of Leavenworth County. These results are shown in Figure 6-2. Dissatisfaction with bicycle facilities was the only mode that was higher than transit.

The travel characteristics of the respondents show that nine percent of respondents were dependent on transit or friends/relatives to get them where they need to go. As shown in Figure 6-3, when asked if the region’s current transit services can serve most resident’s basic mobility needs, nearly 60 percent of respondents said that it can’t. When asked specifically about services for the elderly and disabled, only 24.5 percent agreed that those services were adequate.
The survey asked “if the 5-County region had a regional transit system that went to where you wanted to go when you wanted to go there, would you be likely to use the system to get to and from work and for personal travel?” For that question, 53 percent of respondents said “yes”, 32 percent said “no” and 15 percent said “don’t know”. Figure 6-4 shows the results of this question when the data is analyzed on a county-level.

Figure 6-4: Regional transit use by county
If the 5-County region had a regional transit system that went to where you wanted to go when you wanted to go there, would you be likely to use the system to get to and from work and for personal travel?

Regional Transit Planning is an important part of the Metropolitan Transportation Planning process that both MPOs undertake. Below is information about the strategies identified in Metropolitan Transportation Plans for transit.

Transportation 2030, the Metropolitan Transportation Plan for Lawrence/Douglas County, recommends the following action items for transit:

- Ongoing monitoring of transit performance and service
- Establish an off-street location for a regional transit hub
- Develop pedestrian and land development standards to promote productive transit service
- Study transit productivity and coverage issues
- Develop transit-friendly roadway design standards
- Pursue transit consolidation opportunities
- Develop a long-term transit funding strategy
- Develop a long-range transit plan
- Develop a long-term funding strategy for capital improvements
- Investigate the potential for regional transit connections along I-70

The Mid-America Regional Council has developed the Smart Moves Regional Transit Vision as part of the Metropolitan Transportation Planning process. The Smart Moves Regional Transit Vision provides the following goals statements for enhancing transit:

- STRENGTHEN COMMUNITIES and improve the quality of life of residents and visitors throughout the region by making transit an equal or better option to automobile travel
- EXPAND AND ENHANCE MULTIMODAL TRANSIT SERVICE throughout the metropolitan region
- SUPPORT THE ECONOMY through accessible transportation options
- SAFEGUARD THE ENVIRONMENT and improve public health through increased transit ridership

Additionally, the Smart Moves Regional Transit Vision provides a hierarchical route system that recommends urban corridors, commuter corridors and major fixed route corridors. Figure 6-5 provides a graphic of that concept.
HOW DO YOU PAY FOR LONG TERM TRANSIT COSTS?

A challenge that has been identified with the funding of transit is the lack of availability of a consistent source of annual operations funding. Under SAFETEA-LU, the previous national transportation bill, large urbanized areas (such as the Kansas City Metropolitan Area) are only allowed to use their Federal formula funds for capital improvements. While these funds are needed to keep transit vehicles and facilities in good repair, it does not provide assistance to local transit operations that need additional resources to provide the necessary transit service. With revenues from fares only recouping 15-25 percent of the cost to operate a system, funding from local governments and KDOT have been covering the difference. As the price to own and operate a personal vehicle increases, transit operators are challenged to meet the ever-increasing needs of their constituency. The current multi-year transportation bill is called MAP-21 and became law on October 1, 2012. It provides the transportation policy for fiscal years 2013 and 2014. As guidance through MAP-21 is forthcoming, it is unknown if this regulation regarding the use of federal funds for capital improvements will change.

Longer distance commuter transportation in the region also has the challenge of finding revenue for operating costs. An example is the K-10 Connector – this popular service, which operates on K-10 between Lawrence and Johnson County, received its initial start-up funds from KDOT and federal discretionary programs. After that funding was expended, the lack of a consistent source of revenue almost halted the service. Currently, Johnson County pays the operating costs for the service.

KDOT is currently planning for commuter transit along I-70 between Topeka and Kansas City. The K-10 Connector case study could apply in this case, as well as across the 5-County region. As in the K-10 example, there are multiple entities involved. In the I-70 commuter transit study area, there are four public transit operators (City of Lawrence Transit, Unified Government Transit, Topeka Transit and the Kansas City Area Transportation Authority), five counties (Shawnee, Douglas, Leavenworth, Wyandotte and Jackson (MO)) and numerous municipalities. In order for these projects to be implemented, there must be a regional funding agreement that identifies a long-term, consistent funding source.
Section 7: Active Transportation

What role should bicycles and pedestrians play in regional transportation?

Bicycles and pedestrian facilities are an integral part of a future transportation system. As land use changes to more mixed development and as more of the population focuses on a healthier lifestyle, there is a growing need for alternatives to automobile travel. Demographic trends indicate that more people will desire the ability to walk or bicycle to destinations in the future. Incorporating bicycle and pedestrian elements into planned roadway and transit projects will allow these users full access to the system. And while bicycle and pedestrian facilities may not fully address the needs of people traveling regionally, the regional transportation system needs to accommodate and plan for these types of trips as they can complement regional rideshare and transit.

Nationally, funding for bike/ped programs has increased at a higher rate than general infrastructure funding over the past five years. From 1999 to 2010, spending on bicycle and pedestrian facilities and programs rose from $204 million to $1,036 million nationally. Within the 5-County region, many cities have created bicycle and pedestrian facilities that could serve as state-of-the-art examples. In Overland Park at the intersection of 95th Street and Antioch Road, a pedestrian connection between a building front and the sidewalk enhances the entrance of a shopping area, as does a pedestrian walkway across the property frontage and on-site. In Lenexa, a pedestrian connection between a sidewalk and the crosswalk in a parking lot allows pedestrians to safely access an employment center.

And even in many small towns, the state highway is the commercial center of the town. People may walk or bike to that local destination if facilities are available.

As major highway connections are widened and vehicle capacity is increased, bicycles and pedestrians may still need to cross those facilities, even if they are not using that facility. The Federal Highway Administration (FHWA) advises, “address the need for bicyclists and pedestrians to cross corridors, as well as travel along them. Even where bicyclists and pedestrians may not commonly use a particular travel corridor that is being improved or constructed, they will likely need to be able to cross that corridor safely and conveniently. Therefore, the design of intersections and interchanges shall accommodate bicyclists and pedestrians in a manner that is safe, accessible and convenient.”

“The decision not to accommodate bicyclists and pedestrians should be the exception rather than the rule. There must be exceptional circumstances for denying bicycle and pedestrian access either by prohibition or by designing highways that are incompatible with safe, convenient walking and bicycling.” Agencies should seek to “improve the conditions and opportunities” for bicyclists and pedestrians on highways and transportation facilities where they are permitted and transportation facilities should be planned, designed and constructed with this in mind.

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2 Google Map, 95th Street and Antioch Road, Overland Park, KS. http://goo.gl/maps/yoXY
3 Google Map, Quivira Road and 85th Street, Lenexa, KS. http://goo.gl/maps/4kUM
4 Federal Highway Administration, Bicycle & Pedestrian Program.
5 Ibid.

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Figure 7-1: Existing, Planned and Proposed Bikeways and Trails

Legend

Regional Bike Ways
- Existing
- Planned & Proposed
- Proposed

Study Area
- County
- Municipal
- Waterway / River
- Waterbody

Sources: Kansas DOT.
MARC, City of Lawrence, KS
Note: Lawrence bikeway data is draft pending MPO approval.
Current bicycle infrastructure in the 5-County region is focused in the City of Lawrence and a portion of Johnson County west of I-35 and south of I-435. This infrastructure includes both on-street bicycle route designation and off-street multi-use paths. Many facilities are oriented for recreational use rather than utilitarian or commuter use. The region has a need to remove bicycle travel barriers by facilitating additional connections across rivers and major highways. River crossings at I-435 and I-635 across both the Kansas and Missouri rivers are examples where bicyclists or pedestrians cannot cross.

Bicycle infrastructure planning and development in Johnson County, Wyandotte County and Leavenworth County are influenced by MARC’s MetroGreen system. The system is a interconnected system of public and private trails, greenways, and natural areas linking communities. The trail types range from completely undeveloped in environmentally sensitive areas, to multi-use paved trails, and bike and pedestrian facilities in right-of-way.

Lawrence has an extensive bicycle network proposed throughout the city of Lawrence and reaching into Douglas County and along K-10.

Many of the roadways currently identified as bike routes could benefit from additional signage, striping, and shoulder improvements.

**Complete Streets**

Complete streets refers to roadways that are designed for all users including pedestrians, bicyclists, motorists and transit riders. Sometimes called livable streets, these facilities are designed for safe travel along and across the road for users of all ages, abilities, and modes. Complete streets provide a range of benefits. They improve public safety by making walking and biking safer, and promote good health by promoting active transportation and connecting residents.

Complete streets provide economic benefits by creating attractive transportation corridors that make businesses more easily accessible and inviting. Environmental quality of the area is enhanced by complete streets through encouraging travel with lower greenhouse gas emissions, and by including green infrastructure that retains and treats storm water runoff and reduces heat island effects.

In order to promote the building of complete streets within their communities, many local governments within the 5-County region are adopting Complete Street policies which encourage the integration of complete street principles and ideals into transportation policies, plans, and projects.

The 5-County region has been active in developing complete streets policies. A number of agencies and jurisdictions now have policies as reflected in Table 7-1. KDOT recognizes the importance of local complete street planning and is aware of the need for state highways to facilitate connectivity and support complete streets by not creating barriers to implementation.

<table>
<thead>
<tr>
<th>City</th>
<th>Date</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Leawood</td>
<td>5/16/2011</td>
<td>Resolution 3592</td>
</tr>
<tr>
<td>City of Overland Park</td>
<td>4/2/2012</td>
<td>Resolution 3919</td>
</tr>
<tr>
<td>City of Roeland Park</td>
<td>10/2/2011</td>
<td>Resolution 611</td>
</tr>
<tr>
<td>Johnson County</td>
<td>9/1/2011</td>
<td>Resolution 041-11</td>
</tr>
<tr>
<td>Unified Government of Wyandotte County/ Kansas City, Kan.</td>
<td>4/7/2011</td>
<td>Resolution R-22-11</td>
</tr>
<tr>
<td>State Resolution</td>
<td>2/23/2012</td>
<td>Resolution SR 1805</td>
</tr>
<tr>
<td>Lawrence-Douglas County MPO</td>
<td>9/15/2011</td>
<td>Approved resolution</td>
</tr>
<tr>
<td>City of Lawrence</td>
<td>3/27/2012</td>
<td>Approved policy</td>
</tr>
<tr>
<td>MARC</td>
<td>3/27/2012</td>
<td>Approved policy</td>
</tr>
</tbody>
</table>

**PUBLIC SATISFACTION WITH THE AVAILABILITY OF BICYCLE LANEs AND FACILITIES IN THE 5-COUNTY REGION**

As part of Phase 1 of the 5-County Study, a random sample of residents in the study area responded to a survey regarding issues and opportunities related to transportation planning for the region. Figures 7-2 and 7-3 show the results of two survey questions. The survey was conducted in the Spring of 2009. A major finding was that one part of the region’s transportation system that residents were least satisfied with was the availability of bicycle lanes and facilities.

**Table 7-1: Agencies and Jurisdictions with Complete Streets Policies**

**Figure 7-2: Level of satisfaction with the availability of bicycle lanes and facilities**

Please rate your satisfaction with the availability of bicycle lanes and facilities

**Figure 7-3: Level of agreement that transportation projects should promote healthy lifestyles**

Please rate your level of agreement that transportation projects should promote healthy lifestyles like biking and walking

**Source:** 5-County Regional Transportation Study Phase 1 Survey
Section 8: Economic Development

What role does economic development play in transportation?

The T-WORKS transportation program was designed to create jobs, preserve highway infrastructure and provide multimodal economic development opportunities across the state. The program was developed with input from more than 2,000 Kansans in order to create a better business model for transportation. Input from those stakeholders helped craft the following key features of T-WORKS:

- A new highway project selection process that uses engineering data, local input and economic impact analysis to evaluate projects. Economic impact analysis helps Kansans get a good return on their investments. This process is illustrated in Figure 8-1.
- An expanded Economic Development Program, which will be more flexible and responsive (i.e., decisions made in 45 days or less) to help communities capitalize on emerging economic opportunities.
- A regional transit approach to make services more efficient and expand coverage across the state.
- More Kansans will have access to air ambulance services thanks to a strategic selection process for aviation projects.
- An expanded Rail Program that will now allow shippers and industrial parks to be eligible for program funds along with local governments.
- And T-WORKS means that Kansas highways can be maintained at the performance level Kansans have come to expect.¹

Figure 8-1: The Use of TREDIS in Evaluating T-WORKS Projects

<table>
<thead>
<tr>
<th>T-WORKS</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Cost</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Input-Output Model/Economic Model</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Results</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

¹KDOT, www.ksdot.org/tworks

Source: Kansas Department of Transportation
Under T-WORKS, economic impact analysis was used as a factor in selecting highway expansion projects. Through an extensive public engagement process, Kansans made it clear they want transportation investments to be linked to the economic priorities of the state.

To analyze the potential economic impact of highway expansion projects, KDOT adopted the use of the Transportation Economic Development Impact System (TREDIS) economic model, created by the Economic Development Research Group. TREDIS estimates the number of long-term jobs, increase in Gross Regional Product, added safety benefits and income growth that would result from an expansion project. These factors are weighed against the cost of the project to determine its overall economic impact score. To calculate that score, TREDIS relies on county-level economic data about employment patterns, business activity and freight movements by type, amount and value. Rural and urban projects are scored separately. KDOT also discusses with communities how they are impacted by projects.\(^2\)

As part of T-WORKS, $1.7 billion was programmed for expansion and modernization projects across the state. An estimated $10 billion in economic impact will be generated. In the 5-County region under T-WORKS, over $650 million in highway modernization and expansion projects have been programmed, resulting in an estimated economic impact of over $8.5 billion. Those projects are listed in Table 8-1. The construction of the South Lawrence Trafficway provides the highest economic benefit in the state, with a cost of $192 million and an economic benefit of $3.7 billion.

### Table 8-1: T-WORKS Modernization & Expansion Projects in the 5-County Region

<table>
<thead>
<tr>
<th>Project</th>
<th>Construction Cost Estimate (in millions)</th>
<th>Economic Impact (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-70 and K-7 in Wyandotte County – Interchange Improvements for Phase 1, 2 and 3</td>
<td>$68</td>
<td>$1,123</td>
</tr>
<tr>
<td>This project has an excellent economic impact including helping support continued growth at the Legends. It will address the most congested movements within the existing interchange and replaces some deteriorated I-70 pavement. KTA will contribute funds for construction commensurate with the improvements gained to their maintenance responsibilities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-35 Interchange at Homestead Lane between Edgerton and Gardner</td>
<td>$26</td>
<td>$629</td>
</tr>
<tr>
<td>This project is critical to handle truck traffic from the area and opens it up for new development. This fast-track project is expected to be completed by 2013. Johnson County will provide $35 million towards construction of the local network connecting the interchange to the new intermodal facility.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-435/I-35/K-10 and Lackman Road – part of the project known as the Gateway Project (Yellow). First phase – improve ramps/add lanes on I-35 from 119th to I-435.</td>
<td>$14</td>
<td>$1,055</td>
</tr>
<tr>
<td>This is the first phase of the Gateway Project, which provides immediate and significant improvements to one of the biggest bottlenecks in the state. This project has a tremendous economic benefit for a relatively low cost.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-435/I-35/K-10 and Lackman Road – 2nd phase of the Gateway project (Orange). Builds 2-lane flyovers from I-435 to I-35, adds auxiliary lanes to just north of 95th street. Improves interchange and K-10 from Ridgeview to I-35.</td>
<td>$249</td>
<td>$1,375</td>
</tr>
<tr>
<td>While the most expensive project in T-WORKS, there’s regional support for this project because people worry this growing bottleneck threatens traffic flow and economic activity. Full build out of the Gateway is $600 million; this second phase at $249 million should provide acceptable traffic operations for the next 20-25 years. Olathe and Lenexa have agreed to consider phasing and sequencing concepts that may prolong adverse impacts to the local street connections but would reduce the total cost of the project. This is a design build project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Lawrence Trafficway (SLT) in Douglas County – construct 4-lane freeway from US-59 to K10</td>
<td>$192</td>
<td>$3,710</td>
</tr>
<tr>
<td>The SLT received strong regional support and is viewed as an important regional connector linking Topeka, Lawrence and Johnson County. This project has the highest economic impact in the T-WORKS program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US-69 improvements: I-435/Quivira to 119th in Johnson County US-69 is Overland Park’s top priority. Overland Park will contribute $8 million towards construction and $4 million for project development.</td>
<td>$102</td>
<td>$779</td>
</tr>
</tbody>
</table>

Section 9: Funding

Funding for transportation comes from many different sources. For most of the key corridors in the 5-County region, the funding for improvements comes from federal and state sources (because of the corridor’s designation as a Federal or State highway). For roadways off the State system and other modal programs, funding comes from a variety of sources, which can include the federal and state governments, but often are financed solely by the local (city and/or county) governments.

As future projects are identified in the 5-County region, it is important to analyze the effectiveness of the project against the availability of funding for implementation and maintenance. Through their local consultation efforts, KDOT has found that there are many more projects identified on the State highway system than funding allows. The following section provides information on federal and state sources of funding for transportation. The historic information related to these two sources was used to identify that amount of funding estimated for transportation projects in the 5-County region through 2040.

FEDERAL AND STATE FUNDING

KDOT receives funding for transportation projects from the United States Government (as distributed by the United States Department of Transportation) and the State of Kansas. This funding is distributed to KDOT through specific categories; some with requirements for a financial match. Funding from the USDOT is identified in a multi-year transportation bill and is appropriated annually. The current multi-year transportation bill is called MAP-21. This program became law on October 1, 2012 and provides the transportation policy for fiscal years 2013 and 2014.

Guidance is forthcoming for many of the new programs under MAP-21. However, one significant change is performance measurement reporting. Over the next two years, state DOTs and MPOs will develop performance measures to report to the federal government. The USDOT will provide guidance on the requirements, but in the mean time, Kansas and the regional MPOs are beginning to consider potential performance measurement in their jurisdictions. The performance measures developed in this study could provide a starting point for this. The strategy and corridor evaluation was conducted using commonly defined performance measures for the 9 Desired Outcomes of the stakeholders.

Performance measures were developed for:
- engineering factors
- mobility
- safety
- economic impact
- regional prosperity
- financial resources
- community development/quality of life
- environment
- public health
- social equity
- livability
- choice

Analysis of funding for investments in the 5-County region was completed by reviewing the provisions of the previous multi-year transportation funding program, called SAFETEA-LU, and assuming that the amounts appropriated annually for its implementation would be similar to those for MAP-21.

Funds are distributed annually to KDOT (or a local recipient in the case of public transit funds) from the USDOT based on funding formulas that take into account such things as highway miles, population and number of bridges. These funding programs generally require a local funding match. Depending on the program, that match can be anywhere from 20 to 50 percent.

Oftentimes, KDOT packages federal funding with funding from the State of Kansas for project implementation. Funds provided by the State of Kansas come from three sources: motor fuels taxes, sales tax and registration fees. Bonding is also used as a financing mechanism. In 2008, KDOT met with local stakeholders through a process called T-LINK to identify transportation needs and possible revenue sources. Through the T-LINK process, other possible sources of revenue were considered, such as: casino gaming revenues, tolling, and a freight tonnage tax, amongst other options. In 2010, then Governor Mark Parkinson signed T-WORKS into law, which provided the funding for a 10-year transportation program from 2010-2020. This program used motor fuels taxes, sales tax, registration fees and bonding as the revenue sources.

T-WORKS is the latest multi-year transportation program funded by the State of Kansas for project implementation. Funds provided by the State of Kansas come from three sources: motor fuels taxes, sales tax and registration fees. Bonding is also used as a financing mechanism. In 2008, KDOT met with local stakeholders through a process called T-LINK to identify transportation needs and possible revenue sources. Through the T-LINK process, other possible sources of revenue were considered, such as: casino gaming revenues, tolling, and a freight tonnage tax, amongst other options. In 2010, then Governor Mark Parkinson signed T-WORKS into law, which provided the funding for a 10-year transportation program from 2010-2020. This program used motor fuels taxes, sales tax, registration fees and bonding as the revenue sources.

T-WORKS is the latest multi-year transportation program funded by the State of Kansas to fund KDOT and local projects. The first multi-year transportation bill, the Comprehensive Highway Program (CHP), provided transportation funding for the years 1990-1997. Due to the success of the CHP, the Comprehensive Transportation Program (CTP) was passed and was the funding program for the years 2000-2009.

These three multi-year transportation bills, along with funding from Federal multi-year bills, provide the resources to implement many projects in the 5-County region. Figure 9-1 provides annual averages in state funds that were provided to the five counties during the previous multi-year transportation programs.

FUTURE FUNDING ESTIMATES FOR THE 5-COUNTY REGION

In order to estimate the amount of funding that may be available for State highway projects during the decades of 2020-2030 and 2030-2040, the study team analyzed the amount of state and federal funding expended in this region over previous years. In doing this, the study team used a baseline of $1.2 billion that was available for funding transportation projects under T-WORKS from 2010-2020. This baseline was adjusted for inflation and $1.3 billion was assumed to be available from 2020-2030 and $1.4 billion from 2030-2040. There are ongoing changes in transportation technology and funding that may change the way projects are identified and implemented in the future, therefore the estimates identified in this study should be considered for planning purposes.

As mentioned previously, there are many local roadways and multimodal transportation programs that play an important role in the functioning of the regional transportation system. While many of these programs receive support through the federal and state government, local sources oftentimes make up the majority of the funding. Generally, local governments use tax revenue (both sales and property) for transportation projects. Additionally, there are many options for local governments to use financing techniques to assist with funding of transportation projects. Most of these techniques are for projects that are required because of new development.
Section 9: Funding

SPECIAL TAX ASSESSMENT MECHANISMS

Transportation Development Districts (TDD)
Defined districts are assessed a special tax, which is then used to fund transportation projects in the district.

Community Improvement Districts (CID)
Similar mechanism to a TDD, but allows more flexibility in the types of projects that can use the proceeds of the assessment.

Benefit Districts
Cities in Kansas are allowed to issue bonds for the purpose of infrastructure improvements (limited to arterial roadways, water lines and sanitary sewers), which are then paid back through an assessment that is levied on the properties that benefit from the improvement.

DEVELOPMENT IMPACT BASED MECHANISMS

Impact Fee
A one-time charge, collected by the developer or property owner, to fund public infrastructure required of the new development. For an impact fee, this charge must be consistent with the amount required to implement the new infrastructure.

Excise Tax
Similar to an impact fee except that the amount levied is not required to be consistent with the amount required to implement the infrastructure. Additionally, the funding gained through this tax is not required to be used in serving the area that paid the tax and instead can be used throughout the community.

More information related to the these financing options, as well as an analysis of how these options could benefit specific areas within the 5 Counties, can be found in the 5-County Regional Value Capture Analysis in the Appendices.

TAX-INCREMENT BASED MECHANISMS

Tax Increment Financing
Generally used in areas where reinvestment increases property values, Tax Increment Financing (TIF) Districts use all tax revenues that are generated from greater property values to finance projects within the district.

Sales Tax Revenue (STAR) Bonds
This state financing program allows cities or counties to issue bonds for a certain district to finance improvements in the district. Future taxes collected in this district are then used to repay the bonds.

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Section 10:  
Peer Cities

Transportation Lessons From Peer Cities

This chapter outlines the transportation lessons to be learned from the following Midwestern metropolitan areas of comparable size and geography to the 5-County region:

- Dallas-Fort Worth-Arlington, Texas
- Denver-Aurora, Colorado
- Minneapolis-St. Paul, Minnesota
- St. Louis, MO-IL

The section begins with a snap-shot comparison of each peer city including data on population, land area, and transportation system characteristics in Figure 10-1. Analysis of this information provides context on where the 5-County region stands compared to the selected peer cities in Table 10-1. The second section includes a matrix of the transportation toolbox strategies implemented in the comparable metros. A follow-up narrative provides additional insights and lessons learned from specific case studies into successful and unsuccessful implementation of the transportation toolbox strategies.

**PEER CITY CHARACTERISTICS**

The following set of figures provides a snap-shot comparison of the existing population and transportation characteristics from the selected peer cities. The data presented here was primarily drawn from the 2011 Urban Mobility Report produced by the Texas Transportation Institute. This data is scaled to the metropolitan level, so Kansas City includes both the Kansas and Missouri sides of the state line rather than specifically the 5-County region. The figures presented here can be used to identify broad trends and draw comparative conclusions.

Conclusions drawn from analysis of these figures will be provided in the next section. For example, the population and land area figures combine to give a rough approximation of the relative population densities of each metropolitan area. Population density is a good indicator of land-use patterns, which can be particularly relevant when evaluating opportunities for efficient public transportation. Also, more dense land-use patterns can shorten the distances to common destinations, such as shops and schools making walking and biking more attractive options. Conversely, low density land-use patterns with abundant roads can proliferate automobile use and limit non-motorized options.

**Population Density**

It is evident that the Kansas City metropolitan area is comparatively low-density with only around 260 residents per square mile versus 544 res/sq. mile in Minneapolis-St. Paul and nearly 714 res/sq. mile in Dallas. As mentioned previously, there is a direct relationship between relative density, land-use patterns and the attractiveness of alternative transportation options.

**Existing Roadway Capacity**

In order to meet the transportation needs of the Kansas City region’s widespread, low-density land-use patterns, an extensive network of roadways has been built. The Kansas City region has more than double the number of freeway miles per capita found in Denver and Minneapolis-St.Paul, almost double the number in Dallas and 25 percent more than in St. Louis. The Kansas City region also exceeds all other peer cities in arterial lane miles per capita. Our roadway capacity is very high and

**Figure 10-1: Peer City Comparison of Population and Transportation Characteristics**

Source: Lomax, Tim and Schrank, David. (2010) Urban Mobility Report, Texas A&M Transportation Institute, Strategic Solutions Center. Note: Data represented in figure above is from the Kansas Metro area and does not cover the entire 5-County region.
the associated maintenance costs will last in perpetuity. This gives credence to the idea that the region can no longer afford to rely on adding lanes as the sole solution to its transportation issues.

**Commuter Delays**
With the abundant roadways in the Kansas City region, the figures presented here indicate that driver delay and congestion are relatively minor when compared to our peer cities. The average auto commuter in the region spends about 23 hours each year delayed by congestion or incidents, whereas commuters in Denver, Dallas and Minneapolis will spend upwards of 45 hours delayed each year. To address this issue, our peer cities have implemented many of the transportation demand and system management strategies.

**Public Transportation**
One strategy where the Kansas City region appears to falling behind is public transit. The Kansas City region was found to have roughly half the annual ridership found in Dallas and one quarter of the annual ridership of Denver. It is apparent that these regions have implemented an aggressive public transportation strategy out of necessity and commuters are drawn to this alternative to avoid widespread congestion. There is an opportunity for growth in transit ridership in the Kansas City region. The next section will present the transportation system management, demand management and capacity strategies that have been implemented in our peer cities.

**TRANSPORTATION SYSTEM MANAGEMENT LESSONS FROM PEER CITIES**
This set of strategies emphasizes the management and operation of existing transportation facilities. Transportation management strategies are typically low cost when compared with capacity projects. The objective of these strategies is to provide improved traffic and transit operation, which results in moderate improvements in travel mobility and reduced vehicle emissions. The following case examples from peer cities provide an overview of successful and unsuccessful attempts at implementing these strategies with an emphasis on lessons learned.

### Transportation System Management (TSM) Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Kansas City</th>
<th>Dallas</th>
<th>Denver</th>
<th>Minneapolis</th>
<th>St. Louis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Timing/Optimization</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
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<tr>
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### Transportation Demand Management (TDM) Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
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<th>Minneapolis</th>
<th>St. Louis</th>
</tr>
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<td>✓</td>
<td>✓</td>
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<tr>
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<td>✓</td>
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<td>Alternate Work Hours</td>
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<td>✓</td>
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<tr>
<td>Telework</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
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<td>Land Use Management</td>
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### Capacity Strategies

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<th>Minneapolis</th>
<th>St. Louis</th>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Modify or Add Interchanges</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Construct New Highways or Arterials</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Intersection Capacity Improvements</td>
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<td>Transit Capacity</td>
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<tr>
<td>HOV and Managed Lanes</td>
<td>✓</td>
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<tr>
<td>Bicycle and Pedestrian Facilities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Freight Rail Track Improvements</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Congestion Pricing - High Occupancy Toll Lanes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- ✗ - Strategies currently implemented
- ✗ - Lesson learned case study example described in following section
Traffic signal timing and optimization is a technique for upgrading traffic signal equipment and signal timing to coordinate traffic lights along arterial streets, in order to expedite smoother traffic flows. A good example comes from the Dallas area, where six local governments were operating 224 uncoordinated traffic signals along a single transportation corridor. After major negotiations, the jurisdictions agreed to treat the whole corridor as a unified system and to operate all the signals under one control plan. An evaluator of the project described the results along this corridor:

“Travel time in the corridor has been reduced by six percent, vehicle delay time has been reduced by 54 percent, and signs have been reduced by 43 percent. The estimated reduction in fuel consumption and emissions is approximately five percent, and the estimated annual benefits are $26 million at a cost of $4 million. I think one of the real benefits of the project is that it showed that Dallas County could undertake a multi-jurisdictional effort and that the County and the six cities with differing goals and priorities could work cooperatively.”

The Dallas County example is similar to efforts already under way in the Kansas City metropolitan area with the Mid-America Regional Council’s Operation Green Light initiative. The goal of Operation Green Light is to cooperate across jurisdictions to improve the coordination of traffic signals and incident response on major routes across jurisdictions to improve the coordination of traffic signals and incident response on major routes. The operation has shown that Dallas County could undertake a multi-jurisdictional effort and that the County and the six cities with differing goals and priorities could work cooperatively.

Freeway bottleneck removal is any minor, relatively low-cost roadway geometric or traffic control improvement that can reduce localized congestion, and increase safety through fewer collisions. Common locations of bottlenecks include places where the number of lanes decrease, at ramps and interchanges, or where there are roadway alignment changes.

A successful case study comes from the Dallas metro. A significant bottleneck was occurring along a stretch of State Highway 360 (SH 360), a six-lane freeway. Traffic queued badly at the point of an interchange along SH 360, but rather than undertaking a massive project to add travel lanes, the Texas DOT (TxDOT) decided to extend an auxiliary lane on the outside shoulder between two particularly trouble on/off-ramps. Despite some safety concerns, TxDOT implemented a 700-foot auxiliary lane on a trial basis at a cost of only $130,000. This improvement was completed in two months, and later performance measurement found that speeds through the bottleneck improved significantly and volumes increased as well. The overall delay benefits, i.e. decreased cost associated with all commuter delay, were calculated at approximately $200,000 per year and an injury crash reduction of 76 percent was found in this section after the auxiliary lane was added.2 This case shows that a relatively inexpensive, localized fix can have marked improvements of overall freeway traffic operations.

Ramp-metering is the use of traffic signals on a ramp to control the rate at which vehicles enter a freeway facility. By controlling the rate at which vehicles are allowed to enter a freeway, the flow of traffic onto the freeway facility becomes more consistent, smoothing the flow of traffic on the mainline and allowing more efficient use of existing freeway capacity.

In the Minneapolis area, over 400 ramp meters are currently installed on 15 different freeway facilities. At the urging of the Minnesota State Legislature and local opponents to the technology, the Minnesota Department of Transportation (MnDOT) shut down this extensive system of ramp metering on Twin Cities freeways for a month and a half in 2010. A study was carried out to compare the traffic conditions with and without ramp metering along four major freeway corridors. Turning off the region’s ramp meters resulted in the following:

- Freeway volume fell by 9 percent, and peak period throughput (VMT) fell 14 percent.
- Freeway travel times became 22 percent longer. This time loss more than offset the elimination of delays at the ramp meters when they were operating.
- Freeway speeds declined by 14 percent.
- There was a sizable net annual increase in auto emissions.
- System-wide crashes increased 26 percent.

As a result of this study, MnDOT concluded that ramp metering was effective in controlling system demand and therefore restored the use of ramp meters throughout the Twin Cities freeway system.

On the other hand, Dallas, Austin and San Antonio removed ramp meters from freeways after unsuccessful initial introduction of the technology. In Dallas, there was strong citizen pushback as ramp meters began to back-up traffic onto feeder arteries, thereby transferring traffic congestion from the freeways onto the local network. In retrospect, the traffic back-up issue in Dallas may have had more to do with roadway design than the effectiveness of ramp metering technology:

“If the roadway's entry ramps are very long (as in Minneapolis and St. Paul freeways), the queues resulting from such congestion can often be confined to the ramps themselves. But if those ramps are short (as in Dallas and Houston freeways), such queues may spill congestion out onto local streets or arterials near the main roadway.”

The lesson to be learned is that ramp-metering can be successful if implementation takes into account roadway design and other factors, such as public education, that were overlooked in Dallas.

Variable speed limits are a system management approach used to moderate freeway traffic flow in response to traffic congestion, weather or construction. The speed limit is varied based on downstream conditions that drivers are heading towards, not necessarily conditions at the site where speed limits changed.

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In 2008, the Missouri Department of Transportation implemented this strategy in St. Louis along I-270 and I-255. After a study of the system in 2010, it was determined that enforcement of the variable speed limits had been minimal and many people were angry or confused about the potential for enforcement. There was some observed reduction in congestion and crashes, but in 2011 the decision was made to change the ‘variable speed limits’ to ‘advisory speed limits’. The advisory speed is intended to advise motorists of the potential for slow down enforcement and the intent is to reduce work zone lane closures, weather conditions or stopped traffic.

Variable speed limits were initially used to facilitate signing and enforcement of work zone speed limits on high volume urban freeways. In practice, the variable speed signs display a 65 mph speed limit without construction workers and a 50 mph speed limit with construction workers. The variable speed limits are enforceable, a key component of their effectiveness. More recently, Minnesota Department of Transportation has begun to experiment with variable speed limits in combination with high occupancy toll (HOT) and high occupancy vehicle (HOV) lane implementation to reduce traffic congestion. The key lesson to be learned here is that the coordination between variable speed limits and enforcement is vital to altering driver behavior.

Traffic flow information is a strategy that involves providing information to users of the transportation system about congestion or other problems on their typical route which enables them to modify their trip enroute. A good example of travel information implementation comes from the St. Louis metro area where the Illinois and Missouri Departments of Transportation and the East-West Gateway Council of Governments worked together to develop a web application tool (sitraffic.org) that provide real-time travel information on a range of highways, freeways, and arterial streets.

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time information on roadway speeds, incidents, and road work lane closures. In the Kansas City metro a similar live traffic technology (KC Scout) has been successfully implemented on a portion of the freeway network. The KC Scout technology also relies on a partnership between the DOT’s on both sides of the state line.

**TRANSPORTATION DEMAND MANAGEMENT LESSONS FROM PEER CITIES**

This set of strategies addresses transportation needs by reducing the number of trips taken during peak travel periods. The strategies address the “desired outcome” to provide travel options, particularly for persons without access to private vehicles. Many of these strategies, such as ridesharing, public transportation, bicycling and walking, are closely tied to and somewhat dependent on an area’s population density. The following case examples from peer cities provide an overview of successful and unsuccessful attempts at implementing these strategies with an emphasis on lessons learned.

*Ridesharing* consists of an organized system or approach for providing commuters with opportunities to carpool or vanpool. This is one way for commuters to help improve traffic congestion by reducing the number of vehicles that travel on roadways from driving alone to work. The Mid-America Regional Council RideShare Program is a good example of how this type of program has been implemented in the 5-County region. Also, it is becoming increasingly common for private companies and other organizations in the Kansas City metro to encourage employees to carpool to work.

Another example of a regionally implemented rideshare program comes from the Dallas metropolitan area. *Try Parking It* is a two-part program for reducing the number of vehicles on the road and tracking the savings that result from fewer vehicles. This tool can be used to locate carpool or vanpool matches within the region. It also tracks contributions to clean air and congestion reduction and provides estimates of miles saved and trips reduced each time the user submits their commute information. This extra step of encouragement is a unique feature of the Dallas regional ridesharing program.

Fixed route *Public transportation* as a demand management strategy depends on end-to-end accessibility to destinations and transit supportive land-use patterns at transit stop locations. Fixed guide-way systems can be constructed to provide exclusive transit right-of-way. It may include track improvements for commuter rail or exclusive transit lanes to operate BRT service. In urban environments with high transit ridership, light rail transit, commuter rail or streetcar lines have been constructed.

In Denver, the Regional Transportation District (RTD) was organized in 1969 as a regional authority for operating public transit services in eight of the twelve counties of the metropolitan area. Currently, the RTD operates local, limited, express and regional bus routes, along with 5 light rail lines with 36 stations and 40 miles of track. This regional approach to transit can be seen as a success. However, it has taken many years of political will and public investment for this system to come to fruition.

In the Twin Cities metropolitan area, an extensive network of *park-and-ride facilities* has made transit a more convenient transportation option for suburban commuters. As of October 2010 the regional system consisted of 150 active facilities throughout the metropolitan area: 111 park-and-ride and 39 park-and-pool facilities. These facilities are serviced by light rail and bus routes from various transportation agencies. A recent study of system performance showed nearly 18,000 system-wide users in 2010.

In Kansas City, a more small-scale *bus on shoulder* strategy has been implemented along an eight mile stretch of I-35, from 95th street to Lamar Avenue in Johnson County. This strategy is oriented toward serving longer distance commuting trips where buses can bypass freeway congestion by traveling along the freeway shoulder. Implementation of this strategy required some infrastructure investment and minor highway improvements including guardrails and pavement markings to make the freeway shoulder suitable and safe for bus service. This strategy can be seen as a localized approach compared to the regional approach taken in Denver.

*Bicycle and Pedestrian travel* as a demand management strategy depends on the availability of safe and efficient facilities and relatively dense land-use patterns to support bicycling and walking as a viable transportation option. Bicycle and pedestrian planning at the local and regional levels is often a key first step toward making the modes viable.

A good example of bicycle planning comes from St. Louis, where a consortium of governments and organizations came together to complete the Gateway Bike Plan which calls for a regional system of on-street bikeways in the greater St. Louis region. This regional system of facilities is intended to connect key destinations such as parks, trails and greenways, colleges and universities, transit and transfer centers, employment centers, and town centers. A regional authority was formed to help local agencies implement the plan by providing technical assistance and partnerships for funding projects. It has been important for the jurisdictions of the St. Louis region to cooperate with one another to provide a connected system of bikeways, as a disjointed network offers little value as a viable transportation option.

**CAPACITY LESSONS FROM PEER CITIES**

*Interchange capacity improvement* is a strategy that involves adding turn lanes or constructing roundabout intersections in order to improve travel times by reducing vehicle delay at an intersection. A good example project is found on K-7 at Johnson Drive in Shawnee (pictured in Figure 10-2), where a modified intersection was replaced by a modified diamond interchange with a large, multi-lane roundabout where the ramps intersect Johnson Drive. The project aimed to raise the profile of the intersection as a retail center and to improve K-7 to freeway standards by providing a four-lane divided freeway.

*Modifying or adding interchanges* includes adding capacity to existing interchanges by modifying the ramp configuration, widening ramps, or adding collector/ distributor roads. Major system interchange reconstruction projects can often be costly, upwards of $400 million or more.

A good example comes from Denver’s Transportation Expansion Project (T-REX), which was a *combination interchange modification and transit capacity project* that provides an innovative example of capacity strategy to alleviate the traffic congestion issues between two primary regional employment centers. T-REX was a $1.67 billion, combined freeway reconstruction and light-rail extension design-build project within shared right-of-way that involved the coordination of four transportation agencies – the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Colorado Department of Transportation (CDOT), and Denver’s Regional Transportation District (RTD). In the United States, T-REX is widely considered to be the largest and most innovative project of its kind.

The lesson to be learned here is that when a specific project or system bottleneck is of utmost importance to the economic viability of a region, then large scale infrastructure projects can be warranted. T-Rex proves that a capacity project can be constructed in a multimodal way in order to both reduce congestion and add to transportation choice.
High-occupancy vehicle (HOV) lanes are exclusive roadways or lanes designated for high-occupancy vehicles such as buses, vanpools, and carpools. The facilities may operate as HOV lanes full time or only during peak periods. Traditional high-occupancy vehicle (HOV) lanes require passenger vehicles to have a minimum number of passengers, while high-occupancy toll (HOT) lanes are HOV lanes that allow vehicles that do not meet occupancy requirements to pay a toll to use the lane. HOT lanes (pictured in Figure 10-3) are considered to encourage carpooling and other transit alternatives while offering vehicles that do not meet occupancy requirements another option. Revenues generated through fees paid by single-occupant vehicles on HOT lanes can be used for transit and ridesharing services to add further capacity along the corridor.

A good example of HOV and lane-pricing implementation comes from the Twin Cities metro, where the MnPASS tolling technology has been implemented on a total of 25-miles along two primary freeway corridors. On I-394, MnPASS tolling lanes saw a 33 percent increase in the number of vehicles since opening in 2005 without degrading the lane’s use by HOV and transit. Furthermore, travel speeds were found to average from 50 to 55 mph for 95 percent of the time that tolling is activated in the lanes. One unique feature of the MnPASS HOT system is the Price Dynamic Shoulder Lane (PDSL) capability, which equips the freeway shoulder to operate as a MnPASS lane during peak periods to maximize capacity. In practice, electronic signs alert drivers if the PDSL is open or closed and provide pricing details.

A key consideration in implementing HOT lanes is evaluating public perception and response to system changes. In Denver, the operating HOT lanes have been found to have support from both users and non-users. While most commuters do not use the HOT lane every day, research has shown that travelers like having the HOT lane as a travel option. On I-25 in Denver (pictured in Figure 10-4), 62 percent of survey respondents say they choose the Express Lane (HOT/HOV) option because it saves time. There are some equity concerns with HOT lanes. Some argue that road-pricing can put an undue burden on lower-income drivers, or be advantageous to only those drivers who can afford to pay the toll. It is important to evaluate the potential social consequences of implementing this strategy.

Figure 10-2: K-7 & Johnson Drive, Shawnee, KS (source: City of Shawnee)

Figure 10-3: I-394 MnPASS HOT lanes (source: FHWA)

Figure 10-4: I-25 HOT and HOV express lanes, Denver (source: FHWA)

Section 11: Transportation Strategies Toolbox

Transportation strategies toolbox was developed to provide a systematic approach to identify potential strategies that address corridor transportation needs. This section describes a summary of potential transportation strategies that were considered for the 5-County region. The full toolbox can be found in the appendices.

5-COUNTY REGIONAL TRANSPORTATION STUDY PHASE 1

The Phase 1 report of the 5-County Regional Transportation Study outlined the following conclusions:

1. Traffic generation is anticipated to increase as a number of large land development projects are underway or are planned that will significantly impact the transportation system;

2. Billions of dollars in transportation needs have previously been identified.

3. Even more transportation needs will be identified as traffic impacts of many of the planned new large developments are determined.

4. Funding for transportation needs is not anticipated to increase significantly.

The Phase 1 report organized a general approach to evaluating the potential impacts of transportation investments to consider how each project not only improved travel mobility but also affected the economy, environment and society—the triple bottom line.

The consensus from the Phase 1 study was that:

- Transportation funds will not be available to address many of the corridor needs through a road construction program alone.
- Solely focusing on mobility without considering economic, environmental or societal impacts could lead to inefficient transportation investment choices.

The 5-County Study is focused on the portion of the transportation system that includes the major interstates, US highways, state routes and major arterial routes. It also includes the five transit systems – Lawrence Transit, KU on Wheels, Unified Government Transit, Kansas City Area Transportation Authority, and Johnson County Transit. Associated with these systems are supportive sidewalk and trail facilities and efforts to coordinate land use/development projects as they relate to the transportation system.

The strategies in the Toolbox have been grouped to address:
- Enhanced Management of the Existing Transportation System
- Reduced Travel Demand
- Increased Transportation System Capacity

CONGESTION MANAGEMENT PLAN PROCESS

The approach to managing the transportation system, including efforts to reduce transportation demand, was initiated in a large scale following the energy price increases and economic downturn experienced in the late 1970s and early 1980s. In the 1990s, federal transportation legislation required larger Metropolitan Planning Organizations (MPOs) to develop Congestion Management Plans (CMP). An overall objective of CMPs has been to maximize the efficiency of existing transportation systems and facilities before considering strategies that increase capacity. This 5-County planning process followed the general CMP approach and includes defining congestion management objectives, developing performance measures, and identifying and evaluating strategies.

While the transportation system serving the 5-County region is auto-oriented, recent experience with energy price increases reinforced the need for alternative transportation modes such as carpooling, public transit, bicycling, and walking to offset higher energy prices.

STRATEGY DESCRIPTION

In analyzing potential corridor strategies, three factors were considered: the scale of the strategy, how well it addressed the 9 Desired Outcomes developed by the Stakeholder Advisory Panel, and the ease of implementation.

Scale: A specific strategy can be applied at the intersection or point level, along a corridor, or area-wide.

Desired Outcomes: While each desired outcome can include consideration of a number of evaluation criteria, the evaluation of strategies as described here focuses on a simplified number of criteria or factors related to the general evaluation of the overall strategy as discussed below:
- Mobility: Degree to which the strategy supports the movement of vehicles and goods and improves travel time and reduces delay.
- Safety: Degree to which the strategy would lead to reduced crash rates.
- Regional Prosperity: The degree to which the strategy would have economic impacts.
- Efficient Use of Financial Resources: This represents general level of anticipated cost.
- Choice: Degree to which the strategy provides for choice of auto and non-auto modes of transportation or provides information on choice of travel route or time of travel.
- Environment: For this evaluation, this outcome is reflected in the anticipated impact to reduce Vehicle Miles Traveled (VMT) or vehicle emissions.
- Public Health: Degree to which the strategy supports healthy lifestyles by providing opportunities for exercise as part of travel.
- Social Equity: Degree to which the strategy provides for travel opportunities to persons without access or unable to use a private vehicle.
- Livability: Degree to which the strategy would be consistent with a development scale that enables mixed land use and would not create barriers across a community.

Ease of Implementation: This includes political considerations, public perception, reaction of transportation system managers, or environmental considerations.

Table 11-1 provides a summary of the types of transportation strategies that can be considered. A more detailed discussion of these strategies can be found in Appendix C.
Table 11-1: Types of Transportation Strategies

<table>
<thead>
<tr>
<th>Category/Strategy</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Management</td>
<td>This set of strategies emphasizes the management and operation of existing transportation facilities.</td>
</tr>
<tr>
<td>Traffic Signal Timing/Optimization</td>
<td>Upgrading traffic signal equipment and timings.</td>
</tr>
<tr>
<td>Freeway &amp; Arterial Bottleneck Removal</td>
<td>Minor roadway geometric or traffic control improvements.</td>
</tr>
<tr>
<td>Ramp Metering</td>
<td>Traffic signals on ramps control vehicles entering freeways.</td>
</tr>
<tr>
<td>Access Management</td>
<td>Careful planning of access points along roadways.</td>
</tr>
<tr>
<td>Variable Speed Limits</td>
<td>Speed limits are changed based upon traffic conditions.</td>
</tr>
<tr>
<td>Congestion Pricing</td>
<td>Variable toll pricing based upon peak or off-peak periods.</td>
</tr>
<tr>
<td>ITS Technology</td>
<td>ITS applications that address travel mobility.</td>
</tr>
<tr>
<td>Traffic Incident Management</td>
<td>Planned process to detect and respond to traffic incidents.</td>
</tr>
<tr>
<td>Travel Information</td>
<td>Provides information to drivers regarding traffic conditions.</td>
</tr>
<tr>
<td>Parking Management</td>
<td>Providing information regarding parking.</td>
</tr>
<tr>
<td>Travel Demand</td>
<td>This set of strategies addresses transportation needs by reducing the number of trips during peak periods.</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>Includes both carpooling and vanpooling.</td>
</tr>
<tr>
<td>Bicycle and Pedestrian Travel</td>
<td>Includes fixed route bus service and paratransit service.</td>
</tr>
<tr>
<td>Alternate Work Hours</td>
<td>Varying work schedules to avoid peak travel times.</td>
</tr>
<tr>
<td>Telework</td>
<td>Promoting telework to reduce the number of commuters.</td>
</tr>
<tr>
<td>Land Use Management</td>
<td>Guide development to lessen traffic impacts.</td>
</tr>
<tr>
<td>Park &amp; Ride Facilities</td>
<td>Promotes carpooling, vanpooling, and transit use.</td>
</tr>
<tr>
<td>Increasing Capacity</td>
<td>This set of strategies refers to traditional capacity improvements such as adding lanes or new roadways.</td>
</tr>
<tr>
<td>Add Travel Lanes</td>
<td>Widening existing roadways to add travel lanes.</td>
</tr>
<tr>
<td>Modify or Add Interchange</td>
<td>Adding capacity to existing interchanges or adding new interchanges to system.</td>
</tr>
<tr>
<td>Construct New Highways or Arterials</td>
<td>Constructing new roadways on new alignments.</td>
</tr>
<tr>
<td>Intersection Capacity Improvements</td>
<td>Includes adding turn lanes and roundabouts.</td>
</tr>
<tr>
<td>Transit Capacity</td>
<td>Includes added transit service and facilities such as Park &amp; Ride lots.</td>
</tr>
<tr>
<td>HOV/HOT and Managed Lanes</td>
<td>A set of lanes where operational strategies respond to changing conditions. Includes high occupancy vehicle lanes.</td>
</tr>
<tr>
<td>Bicycle and Pedestrian Facilities</td>
<td>Construct bicycle and pedestrian facilities.</td>
</tr>
<tr>
<td>Freight Rail Track Improvements</td>
<td>Track related projects or grade separations.</td>
</tr>
</tbody>
</table>

APPLYING THE TOOLBOX

The transportation toolbox presents a range of transportation strategies that can potentially address transportation issues within a corridor or an area within the 5-County region. This approach provides organization to determining which strategies could be used. The following steps are suggested:

1. Identify the Desired Outcomes most pertinent to area, corridor or point being considered.
2. Examine Toolbox strategies, using the hierarchy of system management, demand reduction, and then capacity.
3. Within this hierarchy, identify strategies that best respond to each outcome for each transportation corridor.

4. Evaluate the selected strategies using the travel demand model, highway capacity model, simulation model or manual techniques as appropriate.
5. Following implementation, review the effectiveness of the strategies in meeting the toolbox criteria.

TOOLBOX STRATEGIES

The transportation toolbox strategies are described in the following sections. Table 11-2 lists those strategies that would be considered to best address each desired outcome. While the impact of a given strategy will vary given the characteristics of the area where it is applied, this table provides a starting point to discuss how a set of transportation strategies can be applied to address this range of desired outcomes. A full comparison of strategies related to desired outcomes is provided in the Appendices.

Table 11-2: Toolbox Strategies

<table>
<thead>
<tr>
<th>Mobility</th>
<th>Safety</th>
<th>Regional Prosperity</th>
<th>Financial Resources</th>
<th>Choice</th>
<th>Environment</th>
<th>Public Health</th>
<th>Social Equality</th>
<th>Livability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottleneck Removal</td>
<td>Signal Timing</td>
<td>Add Travel Lanes</td>
<td>Signal Timing</td>
<td>Add Travel Lanes</td>
<td>Signal Timing</td>
<td>Bicycle/Ped</td>
<td>Public Transportation</td>
<td>Land Use Management</td>
</tr>
<tr>
<td>Congestion Pricing</td>
<td>Bottleneck Removal</td>
<td>Modify/Add Interchanges</td>
<td>Bottleneck Removal</td>
<td>Public Transport</td>
<td>Bottleneck Removal</td>
<td>Bike Ped Facilities</td>
<td>Ridesharing</td>
<td>Bicycle/Ped</td>
</tr>
<tr>
<td>Access Management</td>
<td>Ramp Metering</td>
<td>Freight Rail</td>
<td>Ramp Metering</td>
<td>Bicycle/Ped</td>
<td>Ramp Metering</td>
<td>Land Use Management</td>
<td>*other projects may vary by location of projects</td>
<td>*other projects can include liability elements</td>
</tr>
<tr>
<td>Add Travel Lanes</td>
<td>Variable Speed Limits</td>
<td>Access Management</td>
<td>Variable Speed Limits</td>
<td>Access Management</td>
<td>Access Management</td>
<td>Transit Capacity</td>
<td>Interaction Capacity</td>
<td></td>
</tr>
<tr>
<td>Modify/Add Interchanges</td>
<td>Transition Capacity</td>
<td>Ridesharing</td>
<td>Managed Lanes</td>
<td>Bicycle/Ped</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct New Highways or Arterials</td>
<td>*other projects may have safety benefits if addresses design criteria</td>
<td>Telework</td>
<td>Bike/Ped Facilities</td>
<td>Transit Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection Capacity</td>
<td>Frequent Work Hours</td>
<td>Park Management</td>
<td>Freight Rail</td>
<td>Bike/Ped Facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOV/HOT Lanes</td>
<td>Alternative Work Hours</td>
<td>Land use Management</td>
<td>Managed Lanes</td>
<td>Bicycle/Ped</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managed Lanes</td>
<td>Access Management</td>
<td>Managed Lanes</td>
<td>Bicycle/Ped</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects with operations or higher capital costs vary by project</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
TRANSPORTATION SYSTEM MANAGEMENT (TSM) STRATEGIES

TSM strategies seek to enhance capacity through better management and operation of the existing transportation facilities. These techniques are designed to improve traffic flow, air quality, and movement of vehicles and goods, as well as improve system reliability and safety.

Transportation management strategies are typically low cost when compared with capacity projects. The objective of these strategies is to provide for improved traffic and transit operations often reflected by moderate improvements in travel mobility and reduced vehicle emissions. These strategies are applicable to both highway and transit operations. Many of the management strategies contribute indirectly to public health, regional prosperity, social equity and livability.

Traffic Signal Timing/Optimization

Upgrading traffic signal equipment and implementing more efficient traffic signal timing and communication are ways to improve traffic movement along travel corridors. Traffic signal timing provides an opportunity to reduce vehicle delay on arterial streets by up to 15 percent, with as much as 30 percent during peak hours.

Freeway and Arterial Bottleneck Removal

This is a location specific strategy targeting congestion that occurs due to a geometric feature of the roadway. Bottleneck removal can provide significant benefits to travel mobility. This strategy consists of identifying areas to improve traffic flow, air quality, and movement of vehicles and goods, as well as improve system reliability and safety.

Ramp Metering

Ramp metering is the use of traffic signals on a ramp to control the rate at which vehicles enter a freeway facility. By controlling the rate at which vehicles are allowed to enter a freeway, the flow of traffic onto the freeway facility becomes more consistent, smoothing the flow of traffic on the mainline and allowing more efficient use of existing freeway capacity. Ramp metering can be an effective tool to address congestion and safety concerns that occur at a specific point or along a section of freeway. It is being used on a small section of I-435 east of Metcalf Avenue to manage a difficult weaving section.

Access Management

Access Management is a process used to maintain the mobility function of arterial routes by managing vehicular access points between land parcels and roadways. This practice is already in use by KDOT and many local governments. Access management can include increasing the spacing of access points of both driveways and streets, providing turn lanes, providing medians and right-of-way preservation for future streets.

Variable Speed Limits

Variable speed limits moderate freeway traffic flow in response to traffic congestion, weather, and construction. Variable speed limits can be advisory or regulatory. The speed limit is varied based on downstream conditions that drivers are heading towards, not necessarily conditions at the site where speed limits are changed. The intent of variable speed limits is to slow traffic speeds prior to reaching a congested area to improve safety and to allow the traffic in the congested area to disperse more quickly.

Active Lane Use Control

Active Lane Use Control is one element of active traffic management which seeks to dynamically manage recurrent and non-recurrent congestion based on prevailing traffic conditions. Active traffic lane use control is method of increasing peak capacity and smoothing traffic flows on busy major highways.

Techniques include variable speed limits, hard-shoulder running and High-Occupancy Vehicle/High-Occupancy Toll lanes controlled by overhead lane-specific variable message signs.

Hard shoulder running involves converting the hard shoulder into a travel lane during periods of high traffic flow to expand the capacity of the road and may reduce the need to widen roadways.

Active transportation strategies have been used effectively in Europe. Active lane use control strategies are typically those that can be used on freeways to manage traffic flow and safety.

Intelligent Transportation Systems Arterial and Freeway Applications

Intelligent Transportation Systems (ITS) focus on intelligent vehicles, intelligent infrastructure and the creation of an intelligent transportation system. ITS encompasses many areas of transportation and are part of many of the strategies included in this toolbox. This strategy includes those ITS actions that address travel mobility on freeway routes and the supportive arterial street network.

The types of ITS activities that support freeway and arterial operations include:

- Traffic surveillance systems
- Traffic control measures on freeway entrance ramps, such as ramp meters.
- Lane management applications that address the effective capacity of freeways and promote the use of high-occupancy commute modes.
- Special event transportation management systems.
- Advanced communications to improve the dissemination of information to the traveling public.
- Arterial management systems to manage traffic along arterial roadways.

The largest ITS application in the 5-County region is the Kansas City Scout freeway management system led by...
the Kansas and Missouri Departments of Transportation. The Scout system manages traffic on more than 100 miles of freeways in the Kansas City metropolitan area. Scout provides real-time information to dynamic message signs, and cameras showing traffic conditions provided through the internet.

Traffic Incident Management

Traffic incident management is a planned and coordinated process to detect, respond to, and remove traffic incidents and restore normal traffic flow as safely and quickly as possible.

Travel Information

This strategy involves providing information to users of the transportation system about congestion or other problems on their typical route to enable them to modify their trip.

TRAVEL DEMAND MANAGEMENT (TDM) STRATEGIES

These demand-side strategies are often referred to as Travel Demand Management (TDM). These types of strategies address transportation needs by reducing the number of trips taken during peak travel periods. This set of toolbox strategies have a lesser impact on mobility and traffic safety, but instead address the “desired outcome” to provide travel options, particularly for persons without access to private vehicles. Many of the travel demand strategies contribute to supporting public health, regional prosperity, social equity, and livability.

Ridesharing

Ridesharing includes both carpooling and vanpooling. A carpool is where two or more people share a ride in a private vehicle. Carpooling generally involves two or more passengers who live in the same neighborhood, or along the same route, using a private vehicle to travel to common or nearby destinations. A vanpool is where a larger group of people share a ride in a prearranged vehicle.

Public Transportation

The two primary types of public transportation service include fixed route and paratransit. Fixed route transit provides designated public transportation that is operated along a prescribed route according to a fixed schedule. Paratransit service does not follow fixed routes or schedules, and provides service to customers unable to access fixed route service. Paratransit service often entails providing on-demand door-to-door service from any origin to any destination in a service area.

Park & Ride Facilities

Park & Ride facilities include parking lots and parking structures that allow commuters and other people headed to city centers to leave their vehicles and transfer to a bus, rail system (rapid transit, light rail, or commuter rail), or carpool for the remainder of the journey. Park & Rides are generally located in the suburbs of metropolitan areas or on the outer edges of large cities.

Park & Ride facilities allow commuters to avoid the stress of driving a congested part of their journey and facing scarce, expensive city-center parking. They are meant to reduce congestion by encouraging people to use public transportation or carpool as opposed to their own personal (single-occupant) vehicles. They offer the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

Bicycle and Pedestrian Travel

Many of the bicycle and pedestrian considerations are contained within the concept known as “complete streets”. This policy approach includes a focus on the design and operation of an entire right-of-way to enable pedestrians, bicyclists, motorists, and transit riders of all ages and abilities to move safely along and across a street or highway.

Alternate Work Hours (Shift in Time of Trip)

This strategy, often called “flextime,” involves varying work schedules to shift work-trip departure times away from peak congestion times, rather than maintaining traditional arrangements requiring employees to work a standard 8:00 AM to 5:00 PM day. This strategy helps reduce travel during the highest periods of travel.

Telework

Teleworking is defined as working full- or part-time at home or another off-site location. Teleworking is increasingly used by employers to reduce the demand for office space and parking. While beneficial, this strategy is considered a complementary strategy with other strategies to address corridor needs. Promoting telework supports a transportation choice for workers to avoid making the commute.

Land Use Management

The type, intensity, and site planning associated with land development can influence transportation conditions. These are regulatory strategies involving changes in land-use plans, zoning codes, subdivision ordinances and other development policies which can be used to collectively guide development in a way to lessen traffic impacts and provide a greater balance between travel modes.

INCREASED CAPACITY STRATEGIES

Increasing capacity refers to traditional transportation supply strategies such as adding travel lanes, modifying interchanges to accommodate higher traffic volumes, and constructing new highways or urban arterials. It can also involve major capacity increases for public transportation. While capacity projects typically address traffic congestion in the short term, adding capacity can support a long-term cycle of congestion. This occurs when the added capacity induces new demand, which causes congestion to return. Other long term impacts of focusing resources on roadway capacity solutions include enabling growth to occur outward resulting in lower overall densities and disinvestment in older more established areas.

Add Travel Lanes

This strategy includes projects to widen existing highways and arterial streets by adding through travel lanes. These projects are typically targeted to congested locations and provide a direct impact of reducing traffic congestion and travel time by adding vehicle capacity. The projects typically involve a relatively high project cost.

Modify or Add Interchanges

This strategy includes adding capacity to existing interchanges by modifying the ramp configuration, widening ramps, or adding collector/distributor roads. It also includes building new interchanges on existing freeways. The principal purpose of new interchange projects is to provide access to land adjacent to freeways. The exception is with system-to-system interchanges where the primary objective is to improve mobility on the freeway system.
Construct New Highways or Arterials
This strategy involves constructing new roadways on new alignments. In recent years, issues related to implementation such as right-of-way acquisition, project cost and environmental impacts have limited the construction of highways or arterials on new alignments. Constructing new highways or arterials addresses the objective to improve or maintain mobility. Often a new roadway will provide a more direct connection between points or relieve an existing route which may be congested. The projects typically involve a high project cost. The potential outer loop that was evaluated during the study is an example of this type of strategy.

Intersection Capacity Projects
This strategy involves adding turn lanes or constructing roundabout intersections. The capacity and traffic flow related to an arterial route is often dictated by the operation of its intersections. The primary objective of an intersection capacity project is to improve travel times by reducing vehicle delay at an intersection.

Transit Capacity
A number of activities are underway to improve transit service in order to attract new riders and improve the experience for existing riders. These include construction of transit amenities such as bus shelters, improving existing or constructing new Park & Ride lots and providing real-time information on bus arrival times. Service improvements are also being planned to increase service frequency and reduce the transit travel times.

The following lists options under consideration in the 5-County region that provide an increasing level of transit capacity and service characteristics:

**Enhanced Transit** involves providing a bus route that can include features such as additional passenger amenities at transit stops, improved transit stations or bus shelters, improved Park & Ride lots, real-time schedule displays, and Transit Signal Priority (TSP) strategies to modify traffic signals with extended green time to optimize and reduce transit travel time and improve transit system reliability.

**Bus Rapid Transit (BRT)** provided in mixed traffic lanes combines station/shelter enhancement, unique vehicles, increased service frequency, and Intelligent Transportation Systems (ITS) elements. BRT systems can be described in two categories – BRT systems with dedicated guideways and BRT systems that operate predominately on regular travel lanes in mixed traffic.

**Guideways** can be constructed to provide exclusive transit right-of-way. It may include track improvements for commuter rail or exclusive transit lanes to operate BRT service.

**Bus on Shoulder** is oriented toward serving longer distance transit trips where buses could bypass freeway congestion by using the travel shoulder.

**High-Occupancy Vehicle (HOV) and Managed Lanes**
HOV lanes are exclusive roadways or lanes designated for high-occupancy vehicles, such as buses, vanpools, and carpools. New HOV lanes can be constructed or an existing lane can be converted for HOV use. A new lane would be a capacity project, while conversion would be a management strategy.

The facilities may operate as HOV lanes full time or only during the peak periods. HOV lanes typically require minimum vehicle occupancy of two or more persons. Managed Lanes are a set of lanes where operational strategies respond to changing conditions such as congestion levels, travel speeds, or downstream incidents. Managed lanes often combine tolling and vehicle occupancy elements. High-Occupancy Toll lanes, or HOT lanes, allow single-occupant vehicles to utilize HOV lanes for a fee.

**Bicycle and Pedestrian Facilities**
Bicycle and pedestrian facilities can include sidewalks, bicycle lanes, wider street accommodation for bicycles, and trails.

**Freight Rail Track Improvements**
In some cases public funds are used for track related projects or grade separations that reduce rail-vehicle conflicts; in situations where improving the flow of freight also reduces trucking demand on highways; or where the rail project results in economic development.

CONCLUSIONS
The transportation toolbox provides the mechanism to evaluate how potential transportation strategies meet a wider set of transportation objectives. Specifically, it provides a way to be able to see how a wide range of possible transportation strategies can lead to achieving a greater number of the desired outcomes identified in the 5-County Study. To better achieve these desired outcomes, a number of toolbox strategies will need to be combined. For example, many of the strategies that reduce transportation demand could be implemented together to achieve a stronger impact. In other cases, the time frame in which strategies produce benefits may also vary. For example, land use management could be implemented along a newly developing corridor. The benefits of this approach may be incrementally achieved over a period of years, rather than immediately observed.

The toolbox process also highlights how focusing on one type of strategy may not achieve all of the desired outcomes. The toolbox highlights how some strategies may be more effective at addressing congestion but may not address other desired outcomes, not serve all travel markets, or be costly or difficult to implement.
Section 12: Regional Framework for Decision Making

Transportation investment decisions should take into account the vision for the region’s future transportation system that was developed by stakeholders in Phase 1 of the 5-County Regional Transportation Study. The shared vision of local officials, technical staff, and other transportation stakeholders in the region stated that:

“The future 5-County transportation system should…”

• Provide efficient movement of people and goods
• Provide users with the choice to utilize multiple modes of transportation
• Support a strong regional economy
• Be safe and reliable
• Be financially efficient and affordable
• Enhance the environment
• Improve public health
• Allow every citizen to participate fully in society
• Enhance the quality, livability, and character of communities

FRAMEWORK FOR INVESTMENT DECISIONS

To accomplish this vision, the Stakeholder Advisory Committee developed “9 Desired Outcomes” to guide decisions for future transportation investments. Decisions must consider the funding limitations for transportation infrastructure and services.

A regional framework for transportation investment decisions was developed with guidance from the Stakeholder Advisory Panel. Decisions should follow the framework shown in Figure 12-1 and described below:

1. Maintain existing transportation facilities and services before giving consideration to other expenditures: Within this framework, maintaining and operating the existing roadways, bridges, transit services, and bicycle-pedestrian facilities comes first. Maintenance first has been a practice of KDOT and has been determined as the number one priority of residents and stakeholders in the 5-County region.

2. Manage travel demand and the operation of the transportation system before considering more costly strategies: Within this framework, the next step is to consider a wide variety of lower-cost strategies that can maximize the efficiency of the existing system and reduce the demand for use.

3. Add new capacity to the transportation system: The final step within this framework is the consideration of new infrastructure and service capacity improvements. Within this framework it is understood that new capacity improvements lead to new maintenance and system management costs.

RECOMMENDED PRACTICES

Traditionally, mobility and safety were the primary factors considered when making transportation investment decisions. With the state-funded T-WORKS transportation program, KDOT also considered the economic impacts of transportation projects and the input of local priorities as presented by city and county representatives.

During the 5-County Study, stakeholders confirmed that those factors are important, but added other Desired Outcomes that should be considered as decisions are made. These additional factors include: choice of modes, impacts to the environment, impacts on public health, social equity, community livability goals, and the efficient use of funding resources.

In applying this decision making framework, the following practices are recommended for the region.

Figure 12-1: Framework for Transportation Investment Decisions

MAINTAIN EXISTING FACILITIES AND SERVICES

1. Maintain existing infrastructure and services before considering system expansion. Maintaining and operating the existing roadway infrastructure and transit services is the foundation for the region’s transportation system of the future. Transportation funds must first address the existing system. Feedback from stakeholders and the general public indicates that maintenance and preservation should be a top priority.

2. Consider life-cycle costs when making investment decisions. The life-cycle costs to maintain as well as construct an improvement should be considered as decisions are made.

MANAGE TRAVEL DEMAND AND OPERATION OF THE TRANSPORTATION SYSTEM

3. Maximize the efficiency of existing roadways before considering lane additions. Knowing that transportation needs outweigh the expected funding, it is imperative that strategies consider maximizing the efficiency of existing roadways before more costly projects such as adding travel lanes.

Transportation System Management (TSM) strategies such as ramp metering, variable speed limits, traffic signal optimization, and access management can improve a roadway’s ability to move higher volumes of traffic.

4. Strategies should focus on moving people more than moving vehicles during peak commute times. Recurring congestion occurs during the weekday commute periods,
while during the remainder of the day, roadways have adequate capacity to serve traffic. As commuters are daily travelers, strategies that promote carpooling and transit use can significantly reduce the demand on major roadways and therefore delay or eliminate the need for added lanes. The public survey conducted in the region indicated a strong desire for enhanced transit service particularly when higher fuel costs were considered.

Transportation Demand Management (TDM) strategies such as Park & Ride facilities, transit services, ride sharing, and bicycle and pedestrian facilities should be considered before the significantly more expensive option of widening a roadway.

5. Expand programs that focus on non-recurring congestion. Non-recurring congestion due to vehicle break downs and crashes can occur at any time of the day and can significantly impact the system’s ability to move people and goods. Non-recurring congestion can be addressed through strategies such as expanding the KC Scout traffic management system, motorist assist programs, and incident management plans.

6. Manage lanes rather than build new lanes. Recognizing the difficulties in expanding a roadway within a developed urban area, consideration should be given to managing the travel lanes and making the most effective use of the full pavement width before a decision to add lanes. Strategies include active lane-use control that can incorporate the use of the shoulder as a driving lane during peak traffic conditions, High-Occupancy Vehicle (HOV) lanes, and High-Occupancy Toll (HOT) lanes.

7. Focus on correcting bottlenecks before considering widening a roadway. Many times congestion on a roadway can be traced to an operational or geometric feature at a given spot. Geometric improvements focused on these spots can often have significant impacts on the traffic flow along large sections of the road system. Examples include an auxiliary lane between an on-ramp and an off-ramp, lengthening an acceleration lane, and adding or lengthening a turn lane at an intersection.

ADD NEW CAPACITY

8. When additional lanes are recommended on freeways, HOT/HOV operation during peak periods should be considered. The ability to widen roadways is becoming increasingly more difficult. Therefore, when a decision is made to construct additional lanes on a freeway, consideration should be given to incorporating High Occupancy Vehicle (HOV) / High Occupancy Toll (HOT) features as part of the improvement. This will provide KDOT more flexibility and control to increase the throughput of persons in these lanes when needed.

9. Develop a right-of-way preservation program. While often a difficult choice to make from a short-term funding standpoint, preserving necessary right-of-way for future improvements can result in large cost savings in the long-term picture. Right-of-way preservation has the added benefit of guiding development to be compatible with future transportation infrastructure.

10. Develop a program to supplement local funds for the improvement of routes that parallel a highway. Many drivers make use of the freeway system for short distance trips, adding to congestion during peak periods. Partnerships between cities and the state to improve local streets that parallel state highways may bring congestion relief to the highways if short-distance trips can be encouraged to stay on the local roadway system.

IMPLEMENTING THE FRAMEWORK

Decisions on how to invest in the region’s transportation system are made by the Study Sponsors and many of the stakeholders that were involved in the 5-County Regional Transportation Study. The lessons learned during the study and the framework for decision making that has been presented should provide important input to each of these organizations:

KDOT
The Kansas Department of Transportation will be scheduling the update of its Long Range Transportation Plan (LRTP). The 5-County Study will provide important input to the LRTP regarding the Kansas City metro area and surrounding counties.

Goal setting and the identification of future strategies in the LRTP should distinguish the many differences between urbanized areas and rural areas.

There are many process steps completed through the 5-County Study that could be implemented statewide. This includes: the use of a transportation toolbox; identifying a broad range of issues; tying goal statements to evaluation methodology; and using diverse metrics to select appropriate strategies.

In addition to using this information for the LRTP process, it is recommended that the output from this study be used as part of the project selection and scoping process in the 5-County region.

Since a few of the key corridors in the study cross the state line into Missouri, a discussion with MoDOT regarding the results of the study is recommended.

Metropolitan Planning Organizations
KDOT staff works closely with MARC and Lawrence-Douglas County MPO staff on their planning processes. This will continue after the 5-County Study, with specific attention focused on the Metropolitan Transportation Plans. The Lawrence/Douglas County MPO just completed their MTP update. As their process has progressed, they have worked to make sure there are consistencies between both studies (specifically as it relates to network connection points and the identification of regional transit along I-70).

MARC will begin updating their MTP in 2013. Because of this, MARC will be able to use this study as input to their planning process. This will include using the list of strategies identified in this study and providing general project descriptions.

Kansas City Scout
Many of the systems management strategies identified in this study would be implemented as part of the KC Scout traffic management system. Because of this, it will be important to have targeted conversations with KC Scout about the study and its results. Since this study provides direction on the regional goals for this system, the output should be used for the identification of future sites for technology upgrades.

Local Transit Operators
The local transit operators were included throughout the study process and they should be informed of the results of the study, so that they can use this output as part of the transit system planning process. Many of the transit recommendations that were identified will require cross-agency coordination. As a result of this process, cross-agency implementation plans should be considered for all identified regional routes.

Cities/Counties
Throughout the process, City and County staff and officials were included and provided essential feedback. As the process comes to a close, these participants should be informed of the results. As these communities move forward with identified strategies, they should work closely with partner cities in order to make sure there is a unified set of strategies for a corridor as a whole.

As municipalities seek assistance from MPOs in the form of State or Federal dollars, the MPOs should consider strategies identified within the 5-County Study as those of priority in project selection. Policies may be enacted that require substantial local resources for projects that aren’t included in the strategy list (along the identified corridors).

Cities and Counties should consider the context of new land use development and its relationship with the transportation strategies recommended in this report. The concept of “place making” should be incorporated into land use decisions to capitalize on the community’s vision, assets and potential.
Section 13: Recommended Strategies

What regional transportation strategies are recommended?

The recommended strategies shown in this section of the report were evaluated using criteria based on the 9 Desired Outcomes developed by the Stakeholder Advisory Panel in Phase 1 of the study. The analysis made use of the 5-County Study Travel Demand Model, GIS information, cost/benefit data and local land use plans.

The strategies were based on one of four broad categories:

- **Operation and Maintenance**: Operation and maintenance of existing roadways and transit services is a critical “base line” strategy for all corridors.
- **Transportation Systems Management**: These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.
- **Transportation Demand Management**: These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.
- **Capacity**: These strategies increase the capability of roadways to carry higher traffic volumes through added general purpose lanes and through managed lanes.

**EVALUATION PROCESS**

The process for evaluating the strategies followed these steps:

1. Phase 1 of the 5-County Study recommended the use of a “triple bottom line” approach to sustainable decision-making. This approach requires the consideration of economic, environmental and societal factors when making transportation investment decisions.

2. The 9 Desired Outcomes were organized into three groupings: Engineering, Economic Impact, and Community Impact.

3. Through a series of meetings with the Core Team, the Corridor Strategies Working Group and the Stakeholder Advisory Panel, a matrix (available in the Appendix) was created that identified one or more criteria for the 9 Desired Outcomes. These criteria best define the regional philosophy for each outcome.

4. The Stakeholder Advisory Panel (SAP) and public officials from all five counties allocated 100 points between the 9 Desired Outcomes. These weights are shown in Table 13-1. The average weights were used in scoring the corridor strategies.

5. Scoring for each strategy was determined by rating each of the Outcomes’ criteria from 1 (low) to 10 (high), averaging those values for each Outcome, multiplying the outcome score by the weight and summing the scores for the 9 Desired Outcomes.

6. Strategies were then placed in order from highest score to lowest for further analysis.

The criteria used for each Outcome are as follows:

- **Engineering**
  These outcomes focus on the safety and mobility of highway users and are traditional factors that have been used in making decisions for transportation projects. These two outcomes and their criteria are:

  - **Mobility**: Degree in which a strategy supports the movement of people and goods.
    - Year 2040 volume to capacity ratio (v/c). This criterion looks at the future level of congestion on the corridor without any improvements. This data came directly from the travel demand model for the region.
    - Change in the number of miles of roadway congestion in the year 2040 if a strategy were to be implemented (number of miles at Level of Service E or worse) from a “no-build” scenario. This data came directly from the travel demand model for the region.
    - Change in the year 2040 vehicle-hours traveled (vht) with the strategy versus a “no-build” scenario. This data came directly from the travel demand model for the region.

- **Safety**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.

Table 13-1: Weighting of 9 Desired Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Mobility</th>
<th>Safety</th>
<th>Regional Prosperity</th>
<th>Efficient Use of Resources</th>
<th>Choice</th>
<th>Environment</th>
<th>Public Health</th>
<th>Social Equity</th>
<th>Livability</th>
</tr>
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<tr>
<td>Miami</td>
<td>20.35</td>
<td>16.55</td>
<td>14.75</td>
<td>14.8</td>
<td>12</td>
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<td>4.4</td>
<td>4.05</td>
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<td>Douglas</td>
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<td>4.95</td>
<td>4.53</td>
<td>8.68</td>
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<td>13.57</td>
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<td>Average</td>
<td>17.03</td>
<td>15.17</td>
<td>12.50</td>
<td>15.91</td>
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<td>7.69</td>
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<td>8.14</td>
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<tr>
<td>Officials</td>
<td>(May 2011)</td>
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<td></td>
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<td>(May 2011)</td>
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<td></td>
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</tr>
<tr>
<td>Average</td>
<td>15.38</td>
<td>15.95</td>
<td>12.62</td>
<td>14.73</td>
<td>8.36</td>
<td>8.89</td>
<td>6.92</td>
<td>7.71</td>
<td>8.97</td>
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<tr>
<td>of Both</td>
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<td></td>
<td></td>
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<tr>
<td>Groups</td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

- **Regional Prosperity**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.

- **Efficient Use of Resources**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.

- **Choice**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.

- **Environment**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.

- **Public Health**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.

- **Social Equity**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.

- **Livability**
  These outcomes are traditional factors that have been used in making decisions for transportation projects.
• Safety: Degree in which a strategy would lead to reduced crash rates.
  ○ A process similar to that used in the development of the T-WORKS transportation program was employed to evaluate the safety value of each strategy. This criteria reviewed the existing crash rate for a corridor, the change in the number of conflict points, the potential for crash severity reduction, and potential change in the number of crashes

Economic Impact
These outcomes focus on the impact that a strategy has on the economic prosperity of the region as well as how funding is best utilized. KDOT has always been concerned about project costs and with T-WORKS has begun to consider the economic impacts of projects.

• Regional Prosperity: Improved economic competitiveness through reliable and timely access to employment centers, educational opportunities, services and other basic needs by the public as well as expanded business access to markets.
  ○ KDOT provided analysis of the economic impacts of the strategies using the software package called TREDIS (Transportation Economic Development Impact System). TREDIS was used in analyzing potential projects for the T-WORKS transportation program.

• Efficient Use of Financial Resources: Evaluation of the affordability of transportation investments by considering the initial investment to construct the life-cycle costs to maintain and operate; and the economic benefits to the community.
  ○ A benefit to cost ratio was determined for each strategy. The benefit focused on the expected reduction in the number of crashes and the reduction in travel costs, measured by reductions in vehicle-hours of travel and vehicle-miles of travel. Cost included that to construct or implement the strategy as well as that to operate and maintain the strategy for 10 years.

Community Impact
The Stakeholder Advisory Panel determined that five community impact desired outcomes were important to the region and should be considered along with the engineering and economic impact desired outcomes.

• Choice: Degree in which strategy provides choice of auto and non-auto modes of transportation or provides information on choice of travel route or time of travel.
  ○ The travel time by automobile was compared to that by transit.
  ○ The transit ridership was determined using the travel demand model.
  ○ The degree to which a strategy connected various transportation modes.
  ○ The degree to which transit and bicycle facilities are provided.

• Environment: Transportation system investments that enhance environmental sustainability, improve air and water quality, reduce climate impacts and the region’s carbon footprint, and protect high priority natural resources.
  ○ How well the strategy protects high quality and sensitive natural resources. This is measured through habitat, prime farmland and parkland impacts and the impacts on threatened and endangered species.
  ○ How well the strategy reduces air, water and carbon pollution. The change in vehicle-hours traveled from the travel demand model provides data.
  ○ How well the strategy reduces overall consumption of energy, fuels and non-renewable resources. The change in vehicle-miles traveled from the travel demand model provides data on fuel usage.
  ○ How well the strategy “uses land in a sustainable manner,” shows the value that the groups place on local planning efforts that encourage infill development and discourage sprawl through transportation investments.

• Public Health: Public health is considered by improving traffic safety, improving air quality, promoting physical activity and fitness, improving access to medical services, and increasing transportation affordability.
  ○ Through discussions with the Advisory Panel and Working Groups, it was agreed that criteria associated with “public health” were redundant with criteria in “environment” (reduces air, water, noise and carbon pollution), “safety” (improves roadway safety) and “choice” (increases modal options to access daily needs and activities). Even though these criteria are measured through the other outcomes, the groups determined it was important to maintain the “public health” outcome and document these three criteria to get a fuller picture of how the strategy affects public health.

• Social Equity: Consider the investment benefits and impacts on all population groups within communities.
  ○ How well the strategy provides equitable access for all groups, including those that do not drive due to age or disability and those that are economically disadvantaged.
  ○ How many homes or businesses are displaced by the strategy.
  ○ How well the strategy distributes benefits to all subgroups and follows the measurements associated with Environmental Justice.

• Livability: Integration of the transportation system with the community desires including social equity. Improvements that fit the scenic, aesthetic, historic, community and environmental setting.
  ○ How well the strategy increases modal options.
  ○ How well the strategy encourages active transportation: bicycling and walking.
  ○ How well the strategy supports the development/redevelopment of activity centers.
  ○ How well the strategy improves connectivity and cohesion within the community.

RECOMMENDED STRATEGIES
The recommended strategies were selected primarily based upon their total score for the 9 Desired Outcomes. Strategies that were not selected likely had a very high cost, were alternatives to another more desirable strategy, or had a low score.

The recommended strategies for individual corridors were presented to the Stakeholder Advisory Panel and Corridor Strategies Working Group as well as to officials in each of the five counties. Those groups provided feedback on how well the strategies address regional transportation needs.
The recommended strategies assume a $1.2 billion funding level similar to the current T-WORKS program. Considering inflation, the funding for the period 2020-2030 was assumed to be $1.32 billion and for 2030-2040, $1.48 billion.

Table 13-2 shows the estimated costs by strategy type and decade of implementation.

Table 13-2: Funding Requirements for Recommended Strategies

<table>
<thead>
<tr>
<th>Decade</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy Type</td>
<td>Operation &amp; Maintenance</td>
<td>Transportation System Management</td>
<td>Transportation Demand Management</td>
</tr>
<tr>
<td>Varies*</td>
<td>$ 93,056,000</td>
<td>$ 6,775,000</td>
<td>$ 99,831,000</td>
</tr>
<tr>
<td>Varies*</td>
<td>$ 114,224,500</td>
<td>-</td>
<td>$ 114,224,500</td>
</tr>
<tr>
<td>Varies*</td>
<td>$ 1,113,134,655</td>
<td>$ 1,109,832,700</td>
<td>$ 2,282,967,355</td>
</tr>
<tr>
<td>Varies*</td>
<td>$ 305,714,200</td>
<td>$ 305,714,200</td>
<td>$ 611,428,400</td>
</tr>
<tr>
<td>$ 1,320,415,155</td>
<td>$ 1,482,321,000</td>
<td>$ 2,802,737,055</td>
<td></td>
</tr>
</tbody>
</table>

*Funding for the operation and maintenance of existing transportation infrastructure and services typically comes from a separate source than that for the implementation of new strategies. KDOT’s average annual maintenance cost for pavements and bridges in the 5-County region was approximately $13.5 million for the years 2001 through 2011. Maintenance costs can vary considerably from year to year.

The recommended strategies for the 5-County region are displayed on three maps with corresponding tables on the following pages in this section. The strategies are mapped by category: Transportation Systems Management, Transportation Demand Management and Capacity.

Strategies that are recommended during the years 2020 to 2040 are shaded in blue; strategies that were not recommended during this time period are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on maps. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The tables show the total score for each strategy based upon the 9 Desired Outcomes, the total cost given in year 2020 dollars which includes the construction/implementation cost plus 10 years of maintenance/operation cost, and the decade in which the strategy is recommended for implementation.
Figure 13-3: 2040 PM Peak Hour Volume to Capacity Ratio with All Recommended Strategies
### Transportation System Management (TSM) Strategies

**Figure 13-4: Map of Transportation System Management Strategies**

#### Table 13-3: Transportation System Management Strategies

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>I-35</td>
<td>Ramp metering north of K-7</td>
<td>$2,900,000</td>
<td>$2,900,000</td>
<td></td>
<td>569</td>
</tr>
<tr>
<td>S2</td>
<td>I-435 E-W</td>
<td>Ramp metering between Quivira Road and Metcalf Avenue</td>
<td>$700,000</td>
<td>$700,000</td>
<td></td>
<td>551</td>
</tr>
<tr>
<td>S3</td>
<td>I-70</td>
<td>Ramp metering between K-7 and 116th Street</td>
<td>$700,000</td>
<td></td>
<td></td>
<td>543</td>
</tr>
<tr>
<td>S4</td>
<td>K-10</td>
<td>Ramp metering between Church Street and Ridgeway Road</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>540</td>
</tr>
<tr>
<td>S5</td>
<td>I-635, I-35, US-69</td>
<td>Ramp metering from 119th Street to I-35</td>
<td>$600,000</td>
<td>$600,000</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>S6</td>
<td>I-35</td>
<td>Variable speed limits from 127th Street to the KS/MO state line</td>
<td>$2,100,000</td>
<td>$2,100,000</td>
<td></td>
<td>501</td>
</tr>
<tr>
<td>S7</td>
<td>K-7</td>
<td>Signal coordination from 4H Road to Parallel Parkway and from W. Harold Street to 159th Street</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td>493</td>
</tr>
<tr>
<td>S8</td>
<td>I-70</td>
<td>Variable speed limits from I-435 to the KS/MO state line</td>
<td>$1,400,000</td>
<td>$1,400,000</td>
<td></td>
<td>491</td>
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<tr>
<td>S9</td>
<td>I-435 E-W</td>
<td>Variable speed limits K-10 to KS/MO line</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td></td>
<td>487</td>
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<tr>
<td>S10</td>
<td>I-435 N-S</td>
<td>Variable speed limits Parallel Pkwy to K-10</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>482</td>
</tr>
<tr>
<td>S11</td>
<td>K-7</td>
<td>Expand KC Scout between Parallel Parkway and College Blvd</td>
<td>$2,200,000</td>
<td>$2,200,000</td>
<td></td>
<td>479</td>
</tr>
<tr>
<td>S12</td>
<td>I-70</td>
<td>Expand KC Scout ITS: K-7 to I-435</td>
<td>$500,000</td>
<td>$500,000</td>
<td></td>
<td>469</td>
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<tr>
<td>S13</td>
<td>US-24/40</td>
<td>Access management: Follow the US 24/40 Corridor Management Plan</td>
<td>$10,000,000</td>
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<td>450</td>
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<tr>
<td>S14</td>
<td>US-56</td>
<td>Access management: Follow the US-56 Corridor Management Plan</td>
<td>$10,000,000</td>
<td></td>
<td></td>
<td>447</td>
</tr>
<tr>
<td>S15</td>
<td>State Avenue</td>
<td>Traffic signal optimization from 130th Street to 38th Street</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td>444</td>
</tr>
<tr>
<td>S16</td>
<td>I-635, I-35, US-69</td>
<td>Lengthen acceleration lanes at I-635 and I-70 interchange</td>
<td>$10,600,000</td>
<td></td>
<td></td>
<td>441</td>
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<tr>
<td>S17</td>
<td>K-68</td>
<td>Access management: Follow K-68 Corridor Management Plan</td>
<td>$10,000,000</td>
<td></td>
<td></td>
<td>434</td>
</tr>
<tr>
<td>S18</td>
<td>I-435 N-S</td>
<td>Expand KC Scout ITS System from KS/MO state line to Midland Drive</td>
<td>$2,200,000</td>
<td>$2,200,000</td>
<td></td>
<td>430</td>
</tr>
<tr>
<td>S19</td>
<td>K-10</td>
<td>Intelligent Transportation Systems (ITS) from E. 1750 Road to Cedar Creek Road</td>
<td>$2,500,000</td>
<td>$2,500,000</td>
<td></td>
<td>427</td>
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<tr>
<td>S20</td>
<td>K-92/M-92</td>
<td>Incident management on bridge</td>
<td>$2,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td>424</td>
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<tr>
<td>S21</td>
<td>I-635, I-35, US-69</td>
<td>Variable speed limits on US-69 from 145th Street to I-35</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td>422</td>
</tr>
<tr>
<td>S22</td>
<td>Shawnee Mission Parkway</td>
<td>Traffic signal optimization from Hilltop Drive to Rainbow Boulevard</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td>418</td>
</tr>
<tr>
<td>S23</td>
<td>K-7</td>
<td>Access management: Follow K-7 Corridor Plan</td>
<td>$10,000,000</td>
<td></td>
<td></td>
<td>416</td>
</tr>
<tr>
<td>S24</td>
<td>K-10</td>
<td>Variable speed limits on K-10 from K-7 to I-435</td>
<td>$600,000</td>
<td></td>
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<td>412</td>
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<tr>
<td>S25</td>
<td>I-35</td>
<td>Construct new truck inspection stations</td>
<td>$23,100,000</td>
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<td>409</td>
</tr>
<tr>
<td>S26</td>
<td>175th, 199th, and 223rd Streets</td>
<td>Access management</td>
<td>$10,000,000</td>
<td></td>
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<td>404</td>
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<tr>
<td>S27</td>
<td>K-10</td>
<td>Incident management</td>
<td>$2,000,000</td>
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<td>398</td>
</tr>
</tbody>
</table>

**Recommended Strategies**

*Total Cost is in 2020 dollars and includes costs for constructing/implemented the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
**Transportation Demand Management (TDM) Strategies**

**Table 13-4: Transportation Demand Management Strategies**

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Metcalf Avenue</td>
<td>Redevelopment per Vision Metcalf Plan</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
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<td>356</td>
</tr>
<tr>
<td>D2</td>
<td>Shawnee Mission Parkway</td>
<td>Expand transit service</td>
<td>$9,500,000</td>
<td>$9,500,000</td>
<td></td>
<td>545</td>
</tr>
<tr>
<td>D3</td>
<td>State Avenue</td>
<td>Expand transit service</td>
<td>$14,400,000</td>
<td>$14,400,000</td>
<td></td>
<td>520</td>
</tr>
<tr>
<td>D4</td>
<td>K-10</td>
<td>Expand operating hours/service for transit K-10 Connector Service</td>
<td>$10,100,000</td>
<td>$10,100,000</td>
<td></td>
<td>514</td>
</tr>
<tr>
<td>D5</td>
<td>Metcalf Avenue</td>
<td>Expand transit to Bus Rapid Transit service</td>
<td>$9,500,000</td>
<td>$9,500,000</td>
<td></td>
<td>510</td>
</tr>
<tr>
<td>D6</td>
<td>State Avenue</td>
<td>Construct Park &amp; Ride facilities near K-7 and I-435</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
<td></td>
<td>485</td>
</tr>
<tr>
<td>D7</td>
<td>K-7</td>
<td>Construct Park &amp; Ride facilities near Shawnee Mission Pkwy and in Homer</td>
<td>$735,000</td>
<td>$735,000</td>
<td></td>
<td>481</td>
</tr>
<tr>
<td>D8</td>
<td>I-70</td>
<td>Construct Park &amp; Ride facility at K-7</td>
<td>$735,000</td>
<td>$735,000</td>
<td></td>
<td>474</td>
</tr>
<tr>
<td>D9</td>
<td>I-70</td>
<td>Transit service connecting Topeka, Lawrence, Kansas City (KS) and</td>
<td>$22,900,000</td>
<td>$22,900,000</td>
<td></td>
<td>470</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kansas City (MO)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D10</td>
<td>I-35</td>
<td>Construct Park &amp; Ride facilities near US-69, K-7 and Santa Fe</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>465</td>
</tr>
<tr>
<td>D11</td>
<td>I-635, I-35, US-69</td>
<td>Construct Park &amp; Ride facilities near 135th and K-68</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td></td>
<td>455</td>
</tr>
<tr>
<td>D12</td>
<td>I-435 N-S</td>
<td>Construct Park &amp; Ride facilities near Shawnee Mission Parkway, and</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>448</td>
</tr>
<tr>
<td></td>
<td></td>
<td>near 95th Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D13</td>
<td>K-7</td>
<td>Construct Park &amp; Ride facilities near 4H Road and near northern</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td></td>
<td>442</td>
</tr>
<tr>
<td></td>
<td></td>
<td>junction of K-7 and K-92</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D14</td>
<td>K-10</td>
<td>Construct bicycle path across K-7 on Prairie Star Pkwy to connect</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
<td></td>
<td>441</td>
</tr>
<tr>
<td></td>
<td></td>
<td>existing paths</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D15</td>
<td>K-7</td>
<td>Commuter transit service connecting Leavenworth / State Avenue / I-70 /</td>
<td>$11,100,000</td>
<td>$11,100,000</td>
<td></td>
<td>440</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shawnee Mission Parkway / College Blvd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D16</td>
<td>US-24/40</td>
<td>Construct paved shoulder with rumble strips for bicycle use from US-59</td>
<td>$45,400,000</td>
<td></td>
<td></td>
<td>435</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to Tonganoxie</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D17</td>
<td>K-7</td>
<td>Construct Park &amp; Ride facilities near Spring Hill</td>
<td>$790,000</td>
<td>$790,000</td>
<td></td>
<td>435</td>
</tr>
<tr>
<td>D18</td>
<td>K-7</td>
<td>Peak and off-peak transit service connecting Leavenworth/Lansing</td>
<td>$11,200,000</td>
<td>$11,200,000</td>
<td></td>
<td>434</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and State Ave/I-70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D19</td>
<td>I-35</td>
<td>Commuter transit service from BNBF Intermodal Facility, additional</td>
<td>$11,000,000</td>
<td></td>
<td></td>
<td>433</td>
</tr>
<tr>
<td></td>
<td></td>
<td>service Bus on Shoulder to downtown KCMO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D20</td>
<td>I-435 E-W</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
<td></td>
<td>431</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bridges over I-435 (strategy not shown on TDM map)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D21</td>
<td>I-70</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
<td></td>
<td>428</td>
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<tr>
<td></td>
<td></td>
<td>bridges over I-70 (strategy not shown on TDM map)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D22</td>
<td>I-35</td>
<td>Bicycle / pedestrian facilities: Consider on all new or renovated</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
<td></td>
<td>420</td>
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<tr>
<td></td>
<td></td>
<td>bridges over I-35 (strategy not shown on TDM map)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D23</td>
<td>K-7</td>
<td>Transit commuter service connecting Paola to I-35</td>
<td>$4,000,000</td>
<td></td>
<td></td>
<td>419</td>
</tr>
<tr>
<td>D24</td>
<td>K-10</td>
<td>Expand Park &amp; Ride facilities at KTA Lecompton Toll Plaza</td>
<td>$500,000</td>
<td></td>
<td></td>
<td>418</td>
</tr>
<tr>
<td>D25</td>
<td>State Avenue</td>
<td>Bicycle and pedestrian facilities</td>
<td>$12,000,000</td>
<td></td>
<td></td>
<td>417</td>
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</tbody>
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---

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
Transportation Demand Management (TDM) Strategies, continued

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
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<tbody>
<tr>
<td>D26</td>
<td>I-435 N-S</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed bridges over I-435 (strategy not shown on TDM map)</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<td>414</td>
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<tr>
<td>D27</td>
<td>I-70</td>
<td>Expand Park &amp; Ride facilities near KTA toll areas at LeCompton, Tonganoochee and Lawrence</td>
<td>$1,100,000</td>
<td>$1,100,000</td>
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<td>414</td>
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<tr>
<td>D28</td>
<td>I-635, I-35, US-69</td>
<td>Bicycle / Pedestrian facilities: Consider on all new or reconstructed bridges over I-635, I-35 or US-69 (strategy not shown on TDM map)</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<td>413</td>
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<tr>
<td>D29</td>
<td>US-56</td>
<td>Commuter transit service to Baldwin and Lawrence</td>
<td>$4,000,000</td>
<td></td>
<td></td>
<td>410</td>
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<tr>
<td>D30</td>
<td>K-68</td>
<td>Bicycle facilities</td>
<td>$14,700,000</td>
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<td>409</td>
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<tr>
<td>D31</td>
<td>K-10</td>
<td>Construct Park &amp; Ride facilities near Eudora and DeSoto</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
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<td>407</td>
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<tr>
<td>D32</td>
<td>K-10</td>
<td>Bicycle / pedestrian facilities: Consider on all new or reconstructed bridges over K-10 (strategy not shown on TDM map)</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<tr>
<td>D33</td>
<td>Shawnee Mission Parkway</td>
<td>Bicycle and pedestrian facilities</td>
<td>$3,000,000</td>
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<tr>
<td>D34</td>
<td>K-7</td>
<td>Bicycle / Pedestrian facilities: Consider on all new or reconstructed bridges over K-7 (strategy not shown on TDM map)</td>
<td>$1,600,000</td>
<td>$1,600,000</td>
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<td>402</td>
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<tr>
<td>D35</td>
<td>I-35</td>
<td>Parallel bicycle / pedestrian trail development as specified in the MARC MetroGreen plan / local plans</td>
<td>$16,800,000</td>
<td></td>
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<td>401</td>
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<tr>
<td>D36</td>
<td>I-435 E-W</td>
<td>Parallel bicycle / pedestrian development to connect to Metro Green.</td>
<td>$4,200,000</td>
<td></td>
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<td>401</td>
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<tr>
<td>D37</td>
<td>175th, 199th, and 223rd Streets</td>
<td>Bicycle and pedestrian facilities</td>
<td>$14,000,000</td>
<td></td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>D38</td>
<td>I-70</td>
<td>Parallel bicycle / pedestrian trail development as specified in the MARC MetroGreen plan / local plans</td>
<td>$15,800,000</td>
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<td>398</td>
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<tr>
<td>D39</td>
<td>Metcalf Avenue</td>
<td>Bicycle and pedestrian facilities</td>
<td>$8,000,000</td>
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<td></td>
<td>396</td>
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<tr>
<td>D40</td>
<td>US-56</td>
<td>Construct Park &amp; Ride facilities near Baldwin and Intermodal</td>
<td>$1,500,000</td>
<td></td>
<td></td>
<td>396</td>
</tr>
<tr>
<td>D41</td>
<td>K-10</td>
<td>Construct Park &amp; Ride facilities near US-59 and near E.1750</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
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<td>394</td>
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<tr>
<td>D42</td>
<td>K-68</td>
<td>Construct a Park &amp; Ride facility near US-69 and US-169</td>
<td>$1,500,000</td>
<td></td>
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<td>392</td>
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<tr>
<td>D43</td>
<td>K-10</td>
<td>Construct bicycle path adjacent to K-10 from Lawrence to Eudora</td>
<td>$3,400,000</td>
<td></td>
<td></td>
<td>389</td>
</tr>
<tr>
<td>D44</td>
<td>I-635, I-35, US-69</td>
<td>Transit commuter service connecting Louisburg to connect with JO service</td>
<td>$4,100,000</td>
<td></td>
<td></td>
<td>387</td>
</tr>
<tr>
<td>D45</td>
<td>K-10</td>
<td>Construct bicycle path adjacent to K-10 from US-59 to 31st Street</td>
<td>$6,400,000</td>
<td></td>
<td></td>
<td>386</td>
</tr>
<tr>
<td>D46</td>
<td>K-10</td>
<td>Construct bicycle path between DeSoto and Prairie Star Pkwy at Cedar Creek Pkwy to connect with existing path</td>
<td>$7,300,000</td>
<td></td>
<td></td>
<td>386</td>
</tr>
<tr>
<td>D47</td>
<td>K-10</td>
<td>Construct bicycle path adjacent to K-10 from Eudora to DeSoto</td>
<td>$7,900,000</td>
<td></td>
<td></td>
<td>385</td>
</tr>
<tr>
<td>D48</td>
<td>K-7</td>
<td>Parallel bicycle and pedestrian trail development per MetroGreen / local plans</td>
<td>$17,500,000</td>
<td></td>
<td></td>
<td>384</td>
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<tr>
<td>D49</td>
<td>I-435 N-S</td>
<td>Parallel bicycle / pedestrian trail development as specified in the MARC MetroGreen plan / local plans</td>
<td>$8,400,000</td>
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<td>381</td>
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</table>

**Total** $325,670,000 **$114,270,000**

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio** is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

Figure 13-6: Map depicting 5-County region transit with the implementation of recommended strategies
### Table 13-5: Capacity Strategies

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>175th, 199th, and 223rd Streets</td>
<td>Widen 199th Street from a 2-lane to a 4-lane arterial street from US-56 to I-49/US-71</td>
<td>$196,350,000</td>
<td>$98,175,000</td>
<td>$98,175,000</td>
<td>614</td>
</tr>
<tr>
<td>C2</td>
<td>175th, 199th, and 223rd Streets</td>
<td>Widen 175th Street from a 2-lane to a 4-lane arterial street from I-35 to I-49/US-71</td>
<td>$156,400,000</td>
<td></td>
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<td>586</td>
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<tr>
<td>C3</td>
<td>K-10</td>
<td>Upgrade K-10 to a 4 lane freeway from I-70 to US-59</td>
<td>$98,500,000</td>
<td></td>
<td></td>
<td>549</td>
</tr>
<tr>
<td>C4</td>
<td>K-7</td>
<td>Upgrade K-7 to a 4-lane freeway from 215th St to north of 175th St, arterial street improvements on Lone Elm Road to I-35</td>
<td>$60,500,000</td>
<td></td>
<td></td>
<td>542</td>
</tr>
<tr>
<td>C5</td>
<td>I-35</td>
<td>Construct HOV/HOT lanes from 127th to KS/MO state line</td>
<td>$1,500,000,000</td>
<td></td>
<td></td>
<td>538</td>
</tr>
<tr>
<td>C6</td>
<td>K-7</td>
<td>Upgrade K-7 to a 6-lane freeway from Kansas Avenue to K-10, bike/ped crossing over Kansas River</td>
<td>$215,000,000</td>
<td></td>
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<td>529</td>
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<tr>
<td>C7</td>
<td>K-10</td>
<td>Widen K-10 to 6-lane freeway from E. 1750 Road to I-435 with high occupancy toll lanes (HOT)</td>
<td>$195,800,000</td>
<td></td>
<td></td>
<td>528</td>
</tr>
<tr>
<td>C8</td>
<td>K-10</td>
<td>Widen K-10 to 8-lane freeway from K-7 to I-435, K-10 remains 4-lane west of K-7</td>
<td>$82,200,000</td>
<td></td>
<td></td>
<td>514</td>
</tr>
<tr>
<td>C9</td>
<td>K-7</td>
<td>Upgrade K-7 to a 6-lane freeway from K-10 to I-35</td>
<td>$714,000,000</td>
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<td>497</td>
</tr>
<tr>
<td>C10</td>
<td>K-7</td>
<td>Upgrade K-7 to a 4-lane freeway from 43rd Street to K-10</td>
<td>$46,200,000</td>
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<td>488</td>
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<tr>
<td>C11</td>
<td>I-70, K-7</td>
<td>Construct phases 4, 5, 6, 7 and 10 of the reconfigured I-70/K-7 interchange</td>
<td>$146,400,000</td>
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<td>474</td>
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<tr>
<td>C12</td>
<td>I-70, K-7</td>
<td>Construct phases 4, 5, 6, 7 and 10 of the reconfigured I-70/K-7 interchange</td>
<td>$245,200,000</td>
<td>$141,400,000</td>
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<tr>
<td>C13</td>
<td>I-35</td>
<td>I-35 and I-635 interchange improvements</td>
<td>$210,000,000</td>
<td>$105,000,000</td>
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<td>466</td>
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<tr>
<td>C14</td>
<td>I-35 E-W</td>
<td>Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from K-30 to KS/MO state line</td>
<td>$47,000,000</td>
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<td>466</td>
</tr>
<tr>
<td>C15</td>
<td>Western JO Co. N-S Arterial</td>
<td>Construct 4-lane arterial along Sunflower Rd/Edgerton Rd/Evening Star Rd from US-56 to K-10</td>
<td>$156,500,000</td>
<td>$68,250,000</td>
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<td>460</td>
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<tr>
<td>C16</td>
<td>I-35</td>
<td>Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from K-30 to KS/MO state line</td>
<td>$94,000,000</td>
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<tr>
<td>C17</td>
<td>K-92/M-92</td>
<td>Widen Centennial Bridge over the Missouri River Bridge to 4 lanes w/ toll</td>
<td>$55,300,000</td>
<td>$27,750,000</td>
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<td>446</td>
</tr>
<tr>
<td>C18</td>
<td>US-56</td>
<td>New interchange at US-56 and 199th Street</td>
<td>$26,500,000</td>
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<td>438</td>
</tr>
<tr>
<td>C19</td>
<td>I-70</td>
<td>Reconfigure I-70 and Lewis &amp; Clark Viaduct Interchange</td>
<td>$2,000,000,000</td>
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<tr>
<td>C20</td>
<td>I-35 E-W; K-10, I-35</td>
<td>Construct remaining phases of I-435 / I-35 / K-10 Gateway project</td>
<td>$310,800,000</td>
<td>$177,000,000</td>
<td>$133,800,000</td>
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<tr>
<td>C21</td>
<td>K-92/M-92</td>
<td>Widen Centennial Bridge over the Missouri River Bridge to 4 lanes w/ toll</td>
<td>$51,700,000</td>
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<td>436</td>
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<tr>
<td>C22</td>
<td>I-70</td>
<td>Reconfigure I-70 and Lewis &amp; Clark Viaduct Interchange</td>
<td>$290,000,000</td>
<td>$50,000,000</td>
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<td>435</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.
**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in 2020. It provides a way to compare strategies.
<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
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<tr>
<td>C24</td>
<td>K-7</td>
<td>Expressway intersection enhancements from Lansing to State Ave.</td>
<td>$21,000,000</td>
<td>$21,000,000</td>
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<tr>
<td>C25</td>
<td>US-24/40</td>
<td>Widens US-24/40 to 4 lanes from US-59 to K-16</td>
<td>$85,700,000</td>
<td>431</td>
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<tr>
<td>C26</td>
<td>I-70</td>
<td>Active lane control including &quot;hard shoulder running&quot; (raising the shoulder as a driving lane) and potential HOT or HOV lane during peak hours from K-7 to KS/MO state line</td>
<td>$88,200,000</td>
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<tr>
<td>C27</td>
<td>I-70</td>
<td>Reconfigure I-70 and 18th Street interchange as partial cloverleaf</td>
<td>$10,500,000</td>
<td>$10,500,000</td>
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<tr>
<td>C28</td>
<td>635, I-35, US-69</td>
<td>Widen US-69 to 6 lanes from 119th street to 167th street, includes interchange at 159th St (See C65)</td>
<td>$68,300,000</td>
<td>$5,000,000</td>
<td>$63,300,000</td>
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<tr>
<td>C29</td>
<td>I-35</td>
<td>Widen I-35 to 6 lanes from Homestead Lane to Lone Elm Road</td>
<td>$64,700,000</td>
<td>$64,700,000</td>
<td>426</td>
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</tr>
<tr>
<td>C30</td>
<td>I-435 E-W</td>
<td>Convert general purpose lanes to HOV / HOT lanes from K-10 to KS/MO state line</td>
<td>$9,000,000</td>
<td>424</td>
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</tr>
<tr>
<td>C31</td>
<td>K-7</td>
<td>Realign K-7 from K-7 to I-435 (conduct study)</td>
<td>$84,800,000</td>
<td>$400,000</td>
<td>421</td>
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</tr>
<tr>
<td>C32</td>
<td>I-435 N-S</td>
<td>Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from K-10 to I-70</td>
<td>$58,800,000</td>
<td>421</td>
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<tr>
<td>C33</td>
<td>I-435 N-S</td>
<td>Reconfigure the I-435 and State Avenue interchange</td>
<td>$10,500,000</td>
<td>$10,500,000</td>
<td>416</td>
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<tr>
<td>C34</td>
<td>635, I-35, US-69</td>
<td>Construct remaining phases of US-69 and I-435 interchange (Brown project, Blue project, and Yellow project)</td>
<td>$203,700,000</td>
<td>$45,000,000</td>
<td>$148,700,000</td>
<td>415</td>
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<tr>
<td>C35</td>
<td>I-435 N-S</td>
<td>Add fly over ramp northbound to westbound on I-70 and I-435 interchange</td>
<td>$52,500,000</td>
<td>$52,500,000</td>
<td>412</td>
<td></td>
</tr>
<tr>
<td>C36</td>
<td>US-56</td>
<td>Intersection improvement at US-56 and 199th street</td>
<td>$5,300,000</td>
<td>409</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C37</td>
<td>State Avenue</td>
<td>New interchange at State Avenue and Village West Parkway</td>
<td>$21,000,000</td>
<td>$21,000,000</td>
<td>407</td>
<td></td>
</tr>
<tr>
<td>C38</td>
<td>I-70</td>
<td>Reconfigure I-70 &amp; I-435 interchange</td>
<td>$210,000,000</td>
<td>407</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C39</td>
<td>K-92/M-92</td>
<td>Widen Missouri 92 or Missouri 45 to 4 lanes, includes 4-lane bridge</td>
<td>$131,700,000</td>
<td>404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C40</td>
<td>I-70</td>
<td>Reconfigure I-70 and Tamar Drive interchange</td>
<td>$157,500,000</td>
<td>404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C41</td>
<td>US-24/40</td>
<td>Widen US-24/40 to 4 lanes from US-59 to K-32 and from County Road 1 to K-16</td>
<td>$32,100,000</td>
<td>404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C42</td>
<td>I-435 N-S</td>
<td>Reconfigure I-435 and Parallels Parkway interchange</td>
<td>$15,800,000</td>
<td>398</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C43</td>
<td>Potential Outer Loop</td>
<td>Widen County Road 1 to 4 lanes from I-70 to Tonganoxie</td>
<td>$32,100,000</td>
<td>398</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C44</td>
<td>K-7</td>
<td>Leavenworth/Lansing bypass 2-lane west of Leavenworth connecting K-5 to US-75/K-7</td>
<td>$123,500,000</td>
<td>396</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C45</td>
<td>K-7</td>
<td>Upgrade K-7 to 4-lane freeway from Lansing to State Avenue</td>
<td>$98,300,000</td>
<td>396</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C46</td>
<td>K-7</td>
<td>Arterial street enhancements to existing K-7 in Olafshe</td>
<td>$47,300,000</td>
<td>$47,300,000</td>
<td>395</td>
<td></td>
</tr>
<tr>
<td>C47</td>
<td>K-10</td>
<td>Reconstruct the K-10 and I-70 interchange</td>
<td>$157,300,000</td>
<td>391</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C48</td>
<td>K-68</td>
<td>Expand K-68 to a 4-lane highway from Old Kansas City Road to Metcalf Ave (in Louisburg)</td>
<td>$71,400,000</td>
<td>390</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recommended Strategy**

<table>
<thead>
<tr>
<th>ID</th>
<th>Corridor</th>
<th>Strategy</th>
<th>Total Cost*</th>
<th>2020-2030</th>
<th>2030-2040</th>
<th>Total Score</th>
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</thead>
<tbody>
<tr>
<td>C49</td>
<td>MetaI Avenue</td>
<td>Intersection capacity improvements</td>
<td>$21,000,000</td>
<td>385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C50</td>
<td>US-56</td>
<td>Realign US-56 along 99th Street from Edgerton to I-35</td>
<td>$62,800,000</td>
<td>364</td>
<td></td>
<td></td>
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<tr>
<td>C51</td>
<td>State Avenue</td>
<td>Intersection capacity improvements</td>
<td>$21,000,000</td>
<td>372</td>
<td></td>
<td></td>
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<tr>
<td>C52</td>
<td>Shawnee Mission Parkway</td>
<td>Intersection capacity improvements</td>
<td>$21,000,000</td>
<td>370</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C53</td>
<td>K-10</td>
<td>Construct interchange at K-10 and Prairie Star Pkwy</td>
<td>$18,900,000</td>
<td>364</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C54</td>
<td>Potential Outer Loop</td>
<td>Construct new freeway from I-70 north to K-7/US-73 northwest of Leavenworth</td>
<td>$317,100,000</td>
<td>363</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C55</td>
<td>K-92/M-92</td>
<td>Intersection capacity improvements</td>
<td>$2,100,000</td>
<td>362</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C56</td>
<td>I-70</td>
<td>Construct phases 8 and 9 of reconfigured I-70/K-7 interchange</td>
<td>$60,000,000</td>
<td>358</td>
<td></td>
<td></td>
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<tr>
<td>C57</td>
<td>K-68</td>
<td>Intersection Capacity Improvements</td>
<td>$16,800,000</td>
<td>351</td>
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<td></td>
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<tr>
<td>C58</td>
<td>K-10</td>
<td>Construct interchange at K-10 and Clare Road</td>
<td>$18,900,000</td>
<td>351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C59</td>
<td>I-70</td>
<td>Widen to 6-lane freeway (KTA) from Lawrence to K-7</td>
<td>$171,700,000</td>
<td>343</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C60</td>
<td>K-68</td>
<td>Construct Louisburg Bypass: 2-lane with interchange at US-69, 4-lane from Old KC Road to US-69</td>
<td>$95,700,000</td>
<td>342</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C61</td>
<td>175th, 199th and 223rd Streets</td>
<td>Widen 223rd Street to a 4-lane arterial from K-7/K-69 to US-69</td>
<td>$60,700,000</td>
<td>340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C62</td>
<td>US-56</td>
<td>Widen US-56 to 6 lanes from Moonlight Road to I-35</td>
<td>$14,300,000</td>
<td>338</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C63</td>
<td>I-10</td>
<td>Construct interchange and collector-distributor road at K-10 and Lone Elm Road</td>
<td>$28,400,000</td>
<td>330</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C64</td>
<td>Potential Outer Loop</td>
<td>Construct new freeway connecting US-69 to I-49/US-71 in Missouri</td>
<td>$520,600,000</td>
<td>325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C66</td>
<td>Potential Outer Loop</td>
<td>Construct new freeway connecting I-70 to K-10</td>
<td>$538,700,000</td>
<td>298</td>
<td></td>
<td></td>
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<tr>
<td>C67</td>
<td>Potential Outer Loop</td>
<td>Construct new freeway connecting K-10 to I-35</td>
<td>$674,100,000</td>
<td>264</td>
<td></td>
<td></td>
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<tr>
<td>C68</td>
<td>Potential Outer Loop</td>
<td>Construct new toll road connecting K-10 to I-70</td>
<td>$359,700,000</td>
<td>255</td>
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<td></td>
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<tr>
<td>C69</td>
<td>Potential Outer Loop</td>
<td>Construct new freeway connecting I-35 to US-69</td>
<td>$846,900,000</td>
<td>248</td>
<td></td>
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<tr>
<td>C70</td>
<td>Potential Outer Loop</td>
<td>Construct new toll road connecting K-10 to I-35</td>
<td>$705,600,000</td>
<td>233</td>
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<tr>
<td>C71</td>
<td>Potential Outer Loop</td>
<td>Construct new toll road connecting US-69 to I-49/US-71 in Missouri</td>
<td>$541,600,000</td>
<td>230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C72</td>
<td>Potential Outer Loop</td>
<td>Construct new toll road connecting I-35 and US-69</td>
<td>$867,900,000</td>
<td>205</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total**: $12,866,550,000 | $913,225,000 | $1,463,625,000

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.*

**Benefit Ratio** is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

Section 13: Recommended Strategies

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Section 14: Key Corridors

This section summarizes the findings and recommended strategies for each individual corridor that was analyzed as part of the 5-County Transportation Study. A description of each corridor is provided including existing roadway geometry, transit service, traffic conditions, key connections with other corridors, and the recommended strategies that would be implemented in the 2020 to 2040 timeframe.

Each corridor presents different transportation needs and opportunities. The strategies recommended for each corridor attempt to address those needs that make the most efficient use of funding that is likely to be available.

Figure 14-1 shows the corridors that were analyzed as part of the study.

While not one of the key corridors, a potential outer loop is a strategy that is tied to many of the corridors. This strategy was evaluated in the same manner as the key corridors using the 9 Desired Outcomes developed by the Stakeholder Advisory Panel and Working Groups. The results of this evaluation is also contained in this section.
The corridors that were analyzed are shown in Table 14-1 and are discussed in detail on the pages noted.

Table 14-1: Key Corridors and Associated Pages

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-35</td>
<td>65-68</td>
</tr>
<tr>
<td>I-70</td>
<td>69-72</td>
</tr>
<tr>
<td>I-435 East-West</td>
<td>73-75</td>
</tr>
<tr>
<td>I-435 North-South</td>
<td>77-79</td>
</tr>
<tr>
<td>I-635/I-35/US-69</td>
<td>81-83</td>
</tr>
<tr>
<td>US-24/40</td>
<td>85-86</td>
</tr>
<tr>
<td>US-56</td>
<td>87-89</td>
</tr>
<tr>
<td>K-5</td>
<td>91-92</td>
</tr>
<tr>
<td>K-10</td>
<td>97-100</td>
</tr>
<tr>
<td>K-68</td>
<td>101-103</td>
</tr>
<tr>
<td>K-92/M-92/3-29</td>
<td>105-106</td>
</tr>
<tr>
<td>175th St./199th St./223rd St.</td>
<td>107-109</td>
</tr>
<tr>
<td>Metcalf Avenue</td>
<td>111-113</td>
</tr>
<tr>
<td>Shawnee Mission Parkway</td>
<td>115-116</td>
</tr>
<tr>
<td>State Avenue</td>
<td>117-119</td>
</tr>
<tr>
<td>Western Johnson County North-South Arterial</td>
<td>121-122</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Outer Loop</td>
<td>123-126</td>
</tr>
</tbody>
</table>
I-35 Corridor

Length: 36 miles

Key Developments:
- Bass Pro Shops
- BNSF Intermodal Facility
- New Century Air Center
- Oak Park Mall
- Olathe Medical Center
- Shawnee Mission Medical Center
- University of Kansas Medical Center

Corridor Profile

I-35

Figure 14-2: Traffic Volumes along I-35

2010 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing
plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T-WORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.

Legend:
- Not Congested
  - Speeds are at or above the speed limit
  - Ability to maneuver within the traffic stream is not restricted
- Moderately Congested
  - Speeds are slow (<60 mph)
  - Virtually no observable gaps within the traffic stream, leaving little room to pass
- Congested
  - Traffic operates at or below the capacity of the roadway
  - Frequent and considerable gaps within the traffic stream, leaving little room to pass
- Severely Congested
  - Frequent demand exceeds the roadway traffic carrying capacity
  - Traffic flow breaks down; very unreliable flow
CORRIDOR DESCRIPTION

I-35 is a principal freeway extending through the 5-County region from the northwest corner of Miami County through Johnson County and the southeast portion of Wyandotte County, where it connects to the Kansas City, Missouri Central Business District (CBD). In addition to accommodating travel through the region, I-35 serves as one of two major Interstates in Kansas which link the states together, providing a connection for residents in Kansas to employment opportunities in Kansas City, Missouri. I-35 also provides the connection to the regional freeway system for communities located south of I-435 including Olathe and Gardner.

Over the last few decades, employment growth in Johnson County has resulted in a strong reverse commute movement on I-35 to employment and retail opportunities that now exist in Johnson County.

There is existing development along both sides of I-35 from the City of Olathe to the north and the existing roadway has been constructed to use all the right-of-way available, particularly north east of I-435.

A new Bus-on-Shoulder transit policy has been implemented along I-35. This policy allows transit buses to use the shoulder lanes to bypass traffic when highway speeds drop below 35 mph. It has proven effective in this initial implementation test, and transit ridership in this corridor has doubled since the policy was put in place.

While the I-435 loop offers truck traffic an alternative to avoid the downtown constrictions, many trucks continue to use I-35 as their primary route. As identified in Phase 1, Section 4: Freight Movement, trucks encounter traffic congestion which delays freight movement through the region. Many of the congested areas involve I-35, which remains a critical route for the trucking industry.

EXPANSION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION

In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-2 lists the expansion and modernization projects that are funded through T-WORKS along the I-35 corridor.

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>I-435/I-35/K-10 Interchange (Johnson Co. Gateway) 1st Phase - Improve ramps and add lanes on I-35</td>
<td>$14 M</td>
<td>2012</td>
</tr>
<tr>
<td>3</td>
<td>I-435/I-35/K-10 Interchange (Johnson Co. Gateway) 2nd Phase - Construct O-O roads and ramps</td>
<td>$250 M</td>
<td>2014</td>
</tr>
<tr>
<td>7</td>
<td>I-35 at Homestead Lane between Edgerton and Gardner</td>
<td>Construct new interchange</td>
<td>$26 M</td>
</tr>
</tbody>
</table>

KEY DEVELOPMENTS

A primary future generator along the I-35 corridor will be the BNSF Intermodal Facility near Gardner and Edgerton. The majority of trucks from the facility are expected to use I-35. At I-435, intermodal truck traffic is expected to distribute on the freeway system. The intermodal facility is anticipated to be a major destination and generator of traffic congestion when speeds drop below 35 mph. This test implementation has supported an increase in transit ridership in this corridor. There is a possibility that more bus-on-shoulder operations could be implemented thereby further improving transit ridership.

Also, very high employment growth in both Olathe and Gardner is projected between 135th and 199th. Some employment growth near I-435 from 87th to 119th is anticipated. This is mostly surrounding College Boulevard to the west of I-35.

TRAFFIC

Traffic volumes forecast on I-35 are among the highest for the 5-County region. The capacity of I-35 was significantly increased in the mid-1980s. The continued growth of Johnson County has led to increased traffic on I-35 and this freeway currently experiences peak hour traffic congestion as well as incident-based congestion. Future year traffic projections for the year 2040 predict higher traffic volumes on this primarily six-lane freeway.

Traffic forecasts for the year 2040 indicate increased traffic volumes over current levels and the projections show that congestion levels on I-35 will increase. Traffic is expected to grow by as much as 60 percent in some segments. Much of the growth is expected in South Johnson County. Maintaining mobility on I-35 will be an important need to address. During peak periods, it is anticipated that congestion on I-35 will extend from downtown Kansas City, Missouri all the way south to 175th street. In all, 22 of 36 miles of the corridor are expected to experience congestion during the peak period in 2040.

KDOT is currently doing a more in-depth study of the corridor through the I-35 Moving Forward Study to look for innovative ways to address immediate, mid-term and longer-term needs for I-35 over the next 30 years (http://www.ksdot.org/kcmetro/projectstudytest.asp).

OTHER MODES

Transit service has been improved along I-35 with a bus-on-shoulder operational test. The bus-on-shoulder allows transit buses to use shoulders by-pass traffic congestion when speeds drop below 35 mph. This test implementation has supported an increase in transit ridership in this corridor. There is a possibility that more bus-on-shoulder operations could be implemented thereby further improving transit ridership.

Also, considerations of freight movements will be important to the future of the corridor. The BNSF Intermodal Facility is expected to generate an additional 7,000 trucks per day, which will rely primarily on I-35 and I-435 for northbound trips.

projectstudytest.asp
CONCORRIDOR CONNECTIONS
The area where I-435, K-10 and I-35 intersect, called the Johnson County Gateway, has been studied as part of a separate project. This location serves a complex set of travel patterns which currently result in high levels of traffic conflict and delay. The section of I-435 east of I-35 has been addressed in recent projects, but will continue to be the highest used east-west travel corridor in the region.

The connection of I-435 and I-35 in Lenexa could pose congestion problems in the future. This is an existing issue from I-435 onto I-35 from both the eastbound and westbound directions. As the two facilities interact, congestion on one facility could cause queuing that would negatively affect the other facility. Conditions on I-435 are projected to be very congested in the year 2040.

The I-635 and I-35 interchange in Merriam is a left exit/entrance onto I-35 which violates driver expectancy. Because of this, weave and merge issues exist at this interchange today and will continue to get worse as there is more traffic. This congestion will negatively impact both facilities.

A significant amount of traffic from US-69 merges with I-35 south of 75th street which causes traffic flow issues today. In the northbound direction, there is a significant amount of traffic from I-35 and US-69 that must merge into 3 lanes. In the southbound direction, there is traffic that enters I-35 from 75th Street in the same auxiliary lane that is used for traffic exiting to US-69 southbound. Congestion in both directions will continue to get worse with increased traffic.

The I-35 and K-7/US-169 interchange is a key connection providing access to southern Johnson County and Miami County. This area shows moderate congestion today and will become severely congested in the year 2040.

Other interaction points include US-56 in Gardner, where congestion is expected at the 175th/US-56 interchange. Also, at Shawnee Mission Parkway there is significant congestion on I-35 near the entrance ramp locations.

RECOMMENDED STRATEGIES
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the I-35 corridor.

A variety of strategies were considered to improve current and future traffic operations on I-35 through the year 2040. These strategies are shown in Table 14-3. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the I-35 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

System Management Strategies
These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

S1: Implement ramp metering north of the K-7 interchange in Olathe to the Kansas/Missouri state line. Ramp metering uses traffic signals on the entrance ramps to control the rate at which vehicles enter I-35. Ramp metering will improve safety and traffic flow on I-35.

S6: Implement variable speed limits north of 127th Street. Variable speed limits can reduce the speed limit on I-35 when there is considerable congestion ahead. This strategy is used to slow traffic before it reaches the congested area and to better allow that congestion to dissipate.

S25: Construct new truck inspection stations to handle the growth in truck traffic due to the opening of the BNSF Intermodal Facility. The existing inspection stations lack the capacity to handle current truck volumes. Proper inspection of trucks impacts safety throughout the region.

Demand Management Strategies
These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

D10: Construct Park & Ride facilities along I-35 near K-7 and near Santa Fe. Park & Ride facilities promote carpooling and transit use while offering the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

D22: Bicycle and pedestrian facilities should be considered on all new or renovated bridges over I-35.

Increased Capacity Strategies
These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

C14: Reconstruct the I-35 and I-635 interchange to address existing and future congestion.

C17: Implement active lane use control including “hard shoulder running” and potential High Occupancy Vehicle (HOV)/High Occupancy Toll (HOT) lane during peak hours from 127th Street to the Kansas/Missouri state line. This strategy allows individual lanes and the shoulder to be controlled as to whether or not they are open for use by traffic, their speed limit based upon conditions, and whether HOV/HOT restrictions apply. This strategy provides great flexibility in allowing KDOT to address congestion due to peak traffic periods and non-peak incidents such as crashes or vehicle breakdowns.

C21: Construct the remaining phases of the I-35/I-435/K-10 Johnson County Gateway interchange.

C29: Widen I-35 to 6 lanes from Homestead Road to Lone Elm Road.
<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
</tr>
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<tbody>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1 Ramp metering on I-35 north of K-7</td>
<td>6.0 7.3 3.3 10.0 3.3 5.0 5.0 4.4 3.3</td>
<td>569</td>
<td>2.9</td>
<td>193.4</td>
</tr>
<tr>
<td>C5 Construct HOV/HOT lanes from 127th to KS/MO state line</td>
<td>5.9 5.0 10.0 3.3 6.1 3.3 5.3 3.8</td>
<td>538</td>
<td>1.500</td>
<td>0.4</td>
</tr>
<tr>
<td>S6 Variable speed limits, north of 127th Street (16.8 mi)</td>
<td>4.9 4.4 3.3 10.0 3.3 5.0 4.2 4.4 3.3</td>
<td>501</td>
<td>2.1</td>
<td>234.0</td>
</tr>
<tr>
<td>C14 I-635 and I-35 interchange improvements</td>
<td>6.5 6.5 4.4 3.4 3.3 4.1 4.2 4.4 3.3</td>
<td>466</td>
<td>210</td>
<td>2.2</td>
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<tr>
<td>D10 Construct Park &amp; Ride facilities near US-69, K-7 and Santa Fe</td>
<td>4.8 4.4 3.3 5.9 5.0 4.1 4.2 5.0 5.0</td>
<td>465</td>
<td>1.5</td>
<td>310.1</td>
</tr>
<tr>
<td>C17 Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from 127th to KS/MO state line</td>
<td>5.4 4.4 3.7 3.6 5.5 5.0 5.0 5.2 3.7</td>
<td>453</td>
<td>94</td>
<td>4.8</td>
</tr>
<tr>
<td>C21 Construct remaining phases of I-435/I-35/K-10 Gateway project</td>
<td>6.2 5.0 5.0 3.4 3.3 3.6 4.4 4.4 2.6</td>
<td>437</td>
<td>310.8</td>
<td>1.4</td>
</tr>
<tr>
<td>D19 Commuter transit service from BNSF Intermodal Facility, additional service Bus on Shoulder to downtown KCMO</td>
<td>4.9 4.4 3.3 3.4 5.0 4.5 4.2 5.0 5.0</td>
<td>433</td>
<td>11</td>
<td>39.3</td>
</tr>
<tr>
<td>C29 Widen I-35 to 6 lanes from Homestead Lane to Lone Elm Road</td>
<td>7.7 3.7 3.7 5.0 3.3 2.3 3.4 4.4 2.3</td>
<td>426</td>
<td>64.7</td>
<td>6.6</td>
</tr>
<tr>
<td>D22 Bicycle / pedestrian facilities: consider on all new or renovated bridges over I-35</td>
<td>3.9 3.7 3.3 3.8 5.5 4.1 4.1 5.2 3.6</td>
<td>420</td>
<td>1.6</td>
<td>266.9</td>
</tr>
<tr>
<td>S25 Construct new truck inspection stations</td>
<td>5.0 5.6 3.3 3.4 3.3 3.6 3.9 4.4 3.3</td>
<td>409</td>
<td>23.1</td>
<td>17.7</td>
</tr>
<tr>
<td>D35 Parallel bicycle / pedestrian trail development as specified in the MARC Metro Green plan / local plans</td>
<td>3.3 3.3 3.3 3.3 5.5 5.0 4.5 5.2 5.1</td>
<td>401</td>
<td>16.8</td>
<td>23.9</td>
</tr>
</tbody>
</table>

Note: I-35 Managed Lanes Study is in progress

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.
**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
I-70 Corridor

Length: 51 miles

Key Developments:
- Berry Plastics
- Cerner
- Community America Ballpark
- Cricket Wireless Amphitheater
- Downtown Kansas City, Kansas
- Downtown Lawrence
- Hollywood Casino
- I-70 Business Center
- Indian Springs
- Sporting Park
- Kansas City Kansas Community College
- Kansas Speedway
- Schlitterbahn Waterpark
- Village West

Figure 14-3: Traffic Volumes along I-70

2010 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T-WORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes with the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.

Table showing traffic volumes with legends for Not Congested, Moderately Congested, and Severely Congested conditions.
DESCRIPTION OF THE CORRIDOR

I-70 is one of two major east-west routes through the 5-County region and one of two major interstates in Kansas linking to other states. I-70 is a toll facility from west of the study region to the East Toll Plaza 13 miles east of Lawrence; the number of lanes varies from 4 to 8 lanes. I-70 is currently a 6-lane facility west of the K-10/Leompton interchange, between the east and west Lawrence exits, and between the 110th Street and I-635 interchange. It widens to 8 lanes west of the interchange with I-670. East of the interchange, I-70 is 4 lanes and narrows to one east-bound lane west of the Lewis and Clark Viaduct as it approaches the Kansas City, Missouri central business district. The tolls from the eastern terminus (K-7 and I-70 interchange) of the KTA managed roads to Topeka are $2.75 each way, with an average 20 percent discount for K-TAG automated toll participants. While outside the study region, it is significant to note that I-70 winds through the central business district of Kansas City, Missouri.

KDOT owns, operates and maintains I-70 east of the 18th Street Expressway. The KTA owns and operates I-70 from the 18th Street Expressway west past the limits of the 5-County region. While it is under KTA ownership, KDOT does perform substantial maintenance activities from the 18th Street Expressway west to K-7.

EXPANSION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION

In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-4 lists the expansion and modernization projects that are funded through T-WORKS along the I-70 corridor.

Table 14-4: T-WORKS Expansion and Modernization Projects Currently Funded for Construction

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location</th>
<th>Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I-70 from I-435 to State Line</td>
<td>I-70 Real Time Traveler Information</td>
<td>$621,000</td>
<td>2012</td>
</tr>
<tr>
<td>6</td>
<td>I-70 &amp; K-7</td>
<td>Interchange Improvements</td>
<td>$88 M</td>
<td>2013</td>
</tr>
</tbody>
</table>

KEY DEVELOPMENT INFORMATION

Development of major activity centers such as Village West, potential new development near the County Road 1 interchange, and other I-70 corridor destinations is projected for 2040.

The Village West area near I-70 and I-435 continues to develop. Housing and employment are expected to grow significantly in this area. Employment is anticipated to triple in the area by 2040. Maintaining effective traffic access with I-435 is critical to the economic vitality of this area.

Cricket Wireless Amphitheater and the Kansas City Speedway are significant regional attractions. Both are accessed via I-70 near Village West. The primary I-70 exits used by travelers accessing these facilities are K-7 and 110th Street and I-435. While these facilities do not generate consistent levels of traffic, they generate significant traffic when in use. The K-7 and I-70 interchange is commonly recognized as one of the most congested interchanges along the corridor with backups onto K-7s mainline and on the westbound I-70 exit ramp.

Other areas of expected population growth include western Lawrence and Bonner Springs. Employment growth is also projected in downtown Kansas City, MO.
TRAFFIC
Recent construction along I-70 from Topeka through Lawrence should adequately provide for the future traffic demand along the corridor. Completion of the east leg of the K-10, South Lawrence Trafficway will lessen the volume of traffic using I-70 between K-10 and Kansas City by providing a more direct route from Topeka to southern Johnson County. The growth and development forecast for this corridor do not demonstrate a need for additional capacity along I-70 from Lawrence to K-7.

The highest level of congestion will be on the section of I-70 between 57th Street and I-635.

OTHER MODES
The need for transit in the I-70 corridor has been identified in public meetings. This service could provide public transportation between Topeka, Lawrence and Kansas City. Forecast ridership between Lawrence and Kansas City is around 1,100 users per day. Potentially even more riders would use the system if it were extended to Topeka. KDOT is conducting a transit study to consider the feasibility of transit service along the I-70 corridor.

I-70 corridor is currently a major east-west freight corridor in the 5-County region and will continue to be in the year 2040.

CORRIDOR CONNECTIONS
The downtown areas of Kansas City, Kansas and Kansas City, Missouri are connected on I-70 by the Lewis and Clark Viaduct. This viaduct is being studied by KDOT to improve its functionality and develop a master plan to phase construction improvements to the bridge.

We anticipate some congestion in the I-635 interchange area by 2040.

We do not anticipate significant congestion at the interchange with I-435, near State Avenue, in 2040, except for merging and weaving issues currently seen in that area. These occur particularly where the northbound I-435 to westbound I-70 traffic crosses the westbound I-70 to southbound I-435 traffic. We do anticipate that the level of congestion for this weaving area will continue to get worse as traffic increases in the future.

The I-70 and K-7 interchange currently experiences traffic congestion that will become significantly worse by the year 2040. KDOT is developing a new design concept for this interchange and the initial phases of these improvements have been programmed for construction through T-WORKS.

The opening of the new I-70 interchange at County Route 1 south of Tonganoxie provides new access and potential for development in the surrounding area.

The I-70 and K-10 interchange, west of Lawrence, is a key connection in the 5-County region. Ideally, when the west leg of the K-10 South Lawrence Trafficway is improved to a four-lane freeway, the interchange at I-70 and K-10 would be upgraded as well. Due to the cost to improve the interchange and that traffic moving from one highway to the other must pass through toll booths, this reconstruction is not recommended at this time.

RECOMMENDED STRATEGIES
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the I-70 corridor.

A variety of strategies were considered to improve current and future traffic operations on I-70 through the year 2040. These strategies are shown in Table 14-5. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the I-70 corridor maps. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

System Management Strategies
These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

S3: Implement ramp metering between K-7 and 18th Street. Ramp metering uses traffic signals on the entrance ramps to control the rate at which vehicles enter I-70. Ramp metering will improve safety and traffic flow on I-70.

S8: Implement variable speed limits from I-435 to the Kansas/Missouri state line. Variable speed limits can reduce the speed limit on I-70 when there is considerable congestion ahead. This strategy is used to slow traffic before it reaches the congested area and which allows that congestion to dissipate more quickly.

S12: Expand the KC Scout intelligent transportation system (ITS) from K-7 to I-435. The ITS devices would include dynamic message signs to warn drivers of upcoming travel conditions and a camera system to monitor the real-time flow of traffic.

S16: Lengthen the acceleration lanes at I-70 and I-635 interchange to allow safer and more efficient movement of traffic from northbound I-635 to westbound I-70 and from eastbound I-70 to southbound I-635.

Demand Management Strategies
These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

D8: Construct a Park & Ride facility near the I-70 and K-7 interchange. Park & Ride facilities promote carpooling and transit use while offering the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

D9: Initiate transit service along I-70 between Topeka, Lawrence, Kansas City, KS and Kansas City, MO. An intercity bus service similar to the service on K-10 would operate on I-70 between Topeka and Lawrence, and then Lawrence to Kansas City, Kansas and Kansas City, Missouri. The service would operate all day with more frequent service in commuter peak times. A study of this service is currently underway.

D21: Bicycle and pedestrian facilities should be considered on all new or renovated bridges over I-70.

D27: Expand Park & Ride facilities near I-70 at the Lecompton and Tonganoxie interchanges. Park & Ride facilities promote carpooling and transit use while offering the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

Increased Capacity Strategies
These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

C13: Construct phases 4, 5, 6, 7 and 10 of the reconfigured I-70 and K-7 interchange.

C23: Reconfigure the I-70 and Lewis and Clark Viaduct interchange.

C27: Reconfigure the I-70 and 18th Street interchange as a partial cloverleaf interchange to eliminate the weaving areas between ramps at this location.

C35: Add a “fly-over” ramp for the northbound to westbound traffic movement at the I-70 and I-435 interchange.
<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***)</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
<th>Decade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mobility (15.5)</td>
<td>Safety (16.0)</td>
<td>Regional Prosperity (12.5)</td>
<td>Financial Resources (15.0)</td>
<td>Choice (8.5)</td>
</tr>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3 Ramp Metering on I-70 between K-7 and 18th Street</td>
<td>5.1</td>
<td>7.3</td>
<td>3.3</td>
<td>10.0</td>
<td>3.3</td>
</tr>
<tr>
<td>S8 Variable Speed limits on I-70 from I-435 to the KS/MO state line</td>
<td>4.3</td>
<td>4.4</td>
<td>3.3</td>
<td>10.0</td>
<td>3.3</td>
</tr>
<tr>
<td>D8 Construct Park &amp; Ride facility near I-70 at K-7</td>
<td>4.0</td>
<td>3.3</td>
<td>3.3</td>
<td>9.7</td>
<td>4.1</td>
</tr>
<tr>
<td>D9 Transit service connecting Topeka, Lawrence, Kansas City (KS) and Kansas City (MO)</td>
<td>4.7</td>
<td>3.7</td>
<td>3.7</td>
<td>4.8</td>
<td>5.5</td>
</tr>
<tr>
<td>C13 Construct phases 4,5,6,7 &amp; 10 of the reconfigured I-70/K-7 interchange</td>
<td>6.8</td>
<td>6.5</td>
<td>4.4</td>
<td>3.7</td>
<td>3.3</td>
</tr>
<tr>
<td>S12 Expand KC Scout ITS on I-70, K-7 to I-435</td>
<td>4.0</td>
<td>7.3</td>
<td>3.3</td>
<td>6.3</td>
<td>3.3</td>
</tr>
<tr>
<td>S16 Lengthen acceleration lanes at I-635 and I-70</td>
<td>4.6</td>
<td>7.3</td>
<td>3.3</td>
<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>C20 Reconfigure I-70 and I-635 interchange</td>
<td>5.5</td>
<td>5.0</td>
<td>4.4</td>
<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>C23 Reconfigure I-70 and Lewis &amp; Clark Viaduct interchange</td>
<td>4.1</td>
<td>5.6</td>
<td>3.7</td>
<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>C26 Active lane control including &quot;hard shoulder running&quot; (using the shoulder as a driving lane) and potential HOT or HOV lane during peak hours from K-7 to KS/ MO state line</td>
<td>5.1</td>
<td>4.4</td>
<td>4.4</td>
<td>3.7</td>
<td>4.1</td>
</tr>
<tr>
<td>C27 Reconfigure I-70 and 18th Street interchange as Partial Cloverleaf</td>
<td>4.3</td>
<td>5.0</td>
<td>3.7</td>
<td>4.7</td>
<td>3.3</td>
</tr>
<tr>
<td>D21 Bicycle / pedestrian facilities: consider on all new or reconstructed bridges over I-70</td>
<td>3.8</td>
<td>3.7</td>
<td>3.3</td>
<td>3.8</td>
<td>5.5</td>
</tr>
<tr>
<td>D27 Expand Park &amp; Ride facilities near KTA toll areas at Lecompton &amp; Tonganoxie</td>
<td>3.8</td>
<td>3.3</td>
<td>3.3</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td>C35 Add fly-over ramp northbound to westbound on I-70 and I-435 interchange</td>
<td>5.0</td>
<td>5.6</td>
<td>3.7</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>C38 Reconfigure I-70 &amp; I-435 interchange</td>
<td>4.6</td>
<td>4.4</td>
<td>4.4</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>C40 Reconfigure I-70 and Turner Diagonal interchange</td>
<td>4.0</td>
<td>5.0</td>
<td>3.7</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>D38 Parallel bicycle / pedestrian trail development as specified in the MARC MetroGreen plan / local plans</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>5.5</td>
</tr>
<tr>
<td>C47 Reconstruct the K-10 and I-70 interchange</td>
<td>4.3</td>
<td>4.4</td>
<td>3.7</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>C56 Construct phases 8 &amp; 9 of the reconfigured I-70/K-7 interchange</td>
<td>4.8</td>
<td>3.3</td>
<td>4.4</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>C59 Widen I-70 to 6-lane freeway (KTA) from Lawrence to K-7</td>
<td>3.8</td>
<td>3.3</td>
<td>3.7</td>
<td>3.1</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.
**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.

**Recommended Strategies**

Table 14-5: I-70 Corridor Strategy Package
I-435
East-West Corridor

Length: 9 miles

Key Developments:
- Corporate Woods
- Johnson County Community College
- Mission Farms
- Overland Park Convention Center
- Park Place
- Sprint Campus
- Town Center Plaza

Transit Service: K-10 Connector

Figure 14-4: Traffic Volumes along I-435 East-West

2010 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor as well as the percentage of commercial vehicles.

<table>
<thead>
<tr>
<th></th>
<th>5% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Sales</td>
<td>114,000</td>
<td>127,000</td>
<td>129,000</td>
<td>146,000</td>
<td>150,000</td>
</tr>
</tbody>
</table>

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that projects scheduled for construction during T/WOMS have been constructed.

<table>
<thead>
<tr>
<th></th>
<th>5% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2040 Sales</td>
<td>151,000</td>
<td>176,000</td>
<td>116,000</td>
<td>155,300</td>
<td>163,700</td>
</tr>
</tbody>
</table>

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T/WOMS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.

<table>
<thead>
<tr>
<th></th>
<th>5% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
<th>4% trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2040 Sales</td>
<td>130,000</td>
<td>183,000</td>
<td>150,000</td>
<td>131,000</td>
<td>198,000</td>
</tr>
</tbody>
</table>

Legend
- Not Congested: Speeds are near the speed limit. Ability to maneuver within the traffic stream varies from unexpected to somewhat restricted.
- Moderately Congested: Speeds begin to slow. Freedom to maneuver within the traffic stream is seriously limited.
- Congested: Traffic approaches the capacity of the roadway. Speeds are slow (<30 mph), virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can produce a serious breakdown in traffic flow with substantial buildup of traffic.
DESCRIPTION OF THE CORRIDOR
I-435 from the K-10 interchange to the Kansas/Missouri state line provides the major route for east-west travel through Johnson County. The route connects Lenexa, Overland Park and Leawood to K-10 on the west and communities in Missouri on the east. The highest traffic volumes in the 5-County region occur on I-435 between Metcalf Avenue and Nall Avenue. The I-435 corridor has six lanes until the US-69 interchange, where it expands to eight lanes. There is no additional right-of-way available for further widening.

KC Scout, the Kansas Department of Transportation, and the Missouri Department of Transportation have installed ramp meter traffic signals on the ramps entering I-435 from Metcalf Avenue in Kansas to the Three Trails Memorial Crossing (formerly the Grandview Triangle) in Missouri. These special signals pace the flow of vehicles entering the freeway, thereby minimizing disruption to traffic flow on the freeway and providing more reliable travel times.

KEY DEVELOPMENT INFORMATION
Major activity centers along the corridor include the Johnson County Community College, the Corporate Woods office park, and the Overland Park Convention Center. Regional medical facilities are located along this corridor also, including Children’s Mercy Hospital, Overland Park Regional Medical Center, and St. Joseph’s Hospital.

Projected population growth is anticipated between Antioch Road and State Line, mainly to the south of the corridor. The Mission Farm mixed-use development that features both housing and employment is an example of the continuing growth in this area. Employment growth is also forecast between Antioch and State Line.

The Vision Metcalf plan, adopted by the City of Overland Park, continues to be a catalyst for redevelopment along that intersecting corridor, which will affect the demand for I-435 to connect this area.

TRAFFIC
This section of the I-435 corridor currently experiences some of the highest traffic volumes in the 5-County region. It is anticipated that the traffic volume will continue to grow in the future.

It is expected that 6 miles of the 9 mile corridor will be congested during peak period in the year 2040. Peak period congestion is expected from I-35 to US-69 and from Metcalf to the I-49/US-71 interchange in Missouri in the year 2040. The completion of the K-10 South Lawrence Trafficway will also increase the volume of traffic on I-435.

OTHER MODES
Freight carriers use this corridor to access I-70 and I-35. No transit services are currently provided on this corridor.

CORRIDOR CONNECTIONS
The section where I-435, K-10 and I-35 intersect, called the Johnson County Gateway, has been studied as part of a separate project (http://www.jocogateway.com/). This location serves a complex set of travel patterns, which currently result in high levels of traffic conflict and delay. The section of I-435 east of I-35 has been addressed in recent projects, and will continue to be the highest used east-west travel corridor in the region.

Conditions on I-35 are also expected to be very congested in the year 2040. Congestion at the interchange of the two facilities could cause queuing that would negatively affect both facilities.

Projected traffic growth on K-10 is the highest rate in the region; this will directly impact I-435 at the merge point.

There is currently peak period congestion on both sides of the US-69 interchange. It is anticipated that congestion at the interchange will continue to get worse with additional traffic expected in the future.

EXPANSION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION
In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-6 lists the expansion and modernization project funded through T-WORKS along the I-435 East-West corridor.

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
</table>
| 3              | I-435/K-10 Interchange (Johnson Co. Gateway) 2nd Phase - Construct C-D roads and ramps | $250 M | 2014 | 74
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the I-435 East-West corridor.

A variety of strategies were considered to improve current and future traffic operations on I-435 through the year 2040. These strategies are shown in Table 14-7. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the I-435 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in Smillions.

### System Management Strategies

These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

### Demand Management Strategies

These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

### Increased Capacity Strategies

These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

#### C15: Implement active lane use control including “hard shoulder running” and potential High Occupancy Vehicle (HOV)/High Occupancy Toll (HOT) lane during peak hours from K-10 to the Kansas/Missouri state line.

This strategy allows individual lanes and the shoulder to be controlled as to whether or not they are open for use by traffic, their speed limit based upon conditions, and whether HOV/HOT restrictions apply.

#### C21: Construct the remaining phases of the K-435/I-35/K-10 Johnson County Gateway interchange.

#### Table 14-7: I-435 East-West Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***</th>
<th>Total Score</th>
<th>Total Cost (Smillions)*</th>
<th>Benefit Ratio**</th>
<th>Decade 2020-2030</th>
<th>Decade 2030-2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate and maintain existing roads, bridges, transit service, ITS, traffic signals, incident management</td>
<td>D36</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2 Ramp metering: between Quivira Road and Metcalf Avenue</td>
<td>5.7 (Mobility (15.5)) 7.3 (Safety (16.0)) 3.3 (Regional Prognosis (12.5)) 10.0 (Financial Resources (15.0)) 3.3 (Choice (8.5)) 4.1 (Environment (9.0)) 4.4 (Public Health (7.0)) 4.4 (Social Equity (7.5)) 3.3 (Livability (9.0))</td>
<td>551</td>
<td>0.7</td>
<td>749.8</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>S9 Variable speed limits K-10 to KS/MISS line</td>
<td>4.8 (Mobility (15.5)) 4.4 (Safety (16.0)) 3.3 (Regional Prognosis (12.5)) 10.0 (Financial Resources (15.0)) 3.3 (Choice (8.5)) 4.1 (Environment (9.0)) 3.6 (Public Health (7.0)) 4.4 (Social Equity (7.5)) 3.3 (Livability (9.0))</td>
<td>487</td>
<td>1.1</td>
<td>429.5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C15 Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from K-10 to KS/MO state line</td>
<td>6.2 (Mobility (15.5)) 4.4 (Safety (16.0)) 3.7 (Regional Prognosis (12.5)) 4.1 (Financial Resources (15.0)) 5.0 (Choice (8.5)) 5.0 (Environment (9.0)) 4.8 (Public Health (7.0)) 5.0 (Social Equity (7.5)) 3.6 (Livability (9.0))</td>
<td>466</td>
<td>47</td>
<td>9.9</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C21 Construct remaining phases of I-435/I-35/K-10 Gateway project</td>
<td>6.2 (Mobility (15.5)) 5.0 (Safety (16.0)) 3.4 (Regional Prognosis (12.5)) 3.3 (Financial Resources (15.0)) 3.3 (Choice (8.5)) 3.6 (Environment (9.0)) 4.4 (Public Health (7.0)) 4.4 (Social Equity (7.5)) 2.6 (Livability (9.0))</td>
<td>437</td>
<td>311</td>
<td>1.4</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D20 Bicycle / pedestrian facilities: Consider on all new or reconstructed bridges over I-435</td>
<td>3.9 (Mobility (15.5)) 3.7 (Safety (16.0)) 3.3 (Regional Prognosis (12.5)) 3.9 (Financial Resources (15.0)) 5.5 (Choice (8.5)) 4.1 (Environment (9.0)) 4.1 (Public Health (7.0)) 5.2 (Social Equity (7.5)) 6.8 (Livability (9.0))</td>
<td>431</td>
<td>1.6</td>
<td>273.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C30 Convert general purpose lanes to HOV/HOT lanes from K-10 to KS/MO state line</td>
<td>1.0 (Mobility (15.5)) 5.0 (Safety (16.0)) 3.7 (Regional Prognosis (12.5)) 4.0 (Financial Resources (15.0)) 7.3 (Choice (8.5)) 4.5 (Environment (9.0)) 5.7 (Public Health (7.0)) 5.7 (Social Equity (7.5)) 4.1 (Livability (9.0))</td>
<td>424</td>
<td>9</td>
<td>47.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D36 Parallel bicycle / pedestrian development to connect to Metro Green</td>
<td>3.3 (Mobility (15.5)) 3.3 (Safety (16.0)) 3.3 (Regional Prognosis (12.5)) 3.5 (Financial Resources (15.0)) 5.5 (Choice (8.5)) 4.1 (Environment (9.0)) 4.1 (Public Health (7.0)) 5.2 (Social Equity (7.5)) 6.2 (Livability (9.0))</td>
<td>401</td>
<td>4</td>
<td>95.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
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I-435 North-South Corridor

Length: 19 miles

Key Developments:
- Cerner
- Community America Ballpark
- Cricket Wireless Amphitheater
- Hollywood Casino
- KCI Airport
- Lenexa City Center
- Sporting Park
- Prairie Creek
- Schlitterbahn Waterpark
- Village West

Figure 14-5: Traffic Volumes along I-435 North-South

2010 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T-WORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.
DESCRIPTION OF THE CORRIDOR

I-435 is a primary north-south route from K-10 north to the Kansas/Missouri state line. North into Missouri, I-435 provides access to the Kansas City International Airport. This section of I-435 was opened in the mid-1980s and has supported growth and development in the corridor since that time.

The highway is a 6-lane roadway with interchanges that service east-west highways and major arterials.

KEY DEVELOPMENT INFORMATION

While the overall roadway capacity of this section of I-435 is sufficient, a primary concern is access to and from I-435 near Village West and the Schlitterbahn Water Park. Existing development along the I-435 corridor includes a large warehouse district in Lenexa, retail activity in Shawnee, and the Kansas Speedway and Village West in Kansas City, Kansas.

A number of the future major activity centers are located along this section of I-435. These include the City Center development on 87th Street in Lenexa, proposed development on Johnson Drive, and expansion of the Village West area to include additional retail, office and recreational uses. The regional access provided by I-435 has been a catalyst for development. The future major developments will continue to need access to be successful. The Village West area continues to develop with an emphasis on automobile access. In general, projected population and employment growth between I-435 and K-7, north of I-70, is very high. I-435 also serves as major access to the KCI airport.

I-435 access is sufficient to retail activity along Shawnee Mission Parkway and to the industrial development at 95th Street and at Lackman Road. Decisions on Lackman Road access at I-435 will be important to industrial development at this location. Access to the Lenexa City Center mixed-used development now being constructed at 87th Street will need to be addressed. This area will have large amounts of new housing and employment development.

High population growth on the Missouri side of the river along I-435 could impact traffic on the Kansas side of the river as these residents would likely cross the river to access the Village West area development, as well as other employment and retail centers along the corridor.

TRAFFIC

Traffic volumes are projected to increase along the corridor through the year 2040. Six lanes should continue to provide sufficient capacity for most of this north-south section of I-435. There is some congestion expected in 2040 between 95th Street and K-32. It is expected that six miles of the 19 mile corridor will experience peak period congestion in the year 2040 between 87th Street and K-32. Both I-435 and K-7 show higher traffic volumes in the northbound direction during the evening peak. When the South Lawrence Trafficway is completed as a freeway all the way around Lawrence, traffic volumes on K-7 and I-435 are expected to be reduced.

OTHER MODES

Multimodal opportunities that are currently being explored in the Village West area include developing a Park & Ride lot and a bus rapid transit (BRT) route with a number of transit stops. To be effective, site plans need to orient development to enhance transit access.

EXTRACTION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION

In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-8 lists the expansion and modernization projects that are funded through T-WORKS along the I-435 North-South corridor.

Table 14-8: T-WORKS Expansion and Modernization Projects Currently Funded for Construction

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>I-435/I-35/K-10 Interchange (Johnson Co. Gateway) 2nd Phase - Construct C-O roads and ramps</td>
<td>$250 M</td>
<td>2014</td>
</tr>
<tr>
<td>4</td>
<td>I-70 from I-435 to State Line I-70 Real Time Traveler Information</td>
<td>$621,000</td>
<td>2012</td>
</tr>
</tbody>
</table>

CORRIDOR CONNECTIONS

Mainline I-435 does not show significant capacity issues in 2040; however, near the I-70 and State Avenue interchanges, merging and weaving in that area could cause problems. One concern is the weaving area on westbound I-70 between the I-435 ramps. The State Avenue and Parallel Parkway interchange configurations have been recommended for study to look for possible modification to provide more capacity to access key destinations. Similarly, access to the Lenexa City Center at 87th Street may need to be addressed as that development occurs.

The completion of the K-10 South Lawrence Trafficway will decrease the volume of traffic using the north-south segment of I-435. Many of the trips currently using I-70 and I-435 for travel to and from the west of Lawrence and southern Johnson County will divert to K-10.

Similarly, if K-7 were reconstructed as a freeway between I-70 and K-10, traffic would shift to this facility and decrease the volume of traffic using I-435. If K-7 is not converted to a freeway, it becomes significantly more congested and drivers will likely shift their trip to I-435. This change in travel behavior may also have an impact on east-west movement along K-10, Shawnee Mission Parkway and I-70 between the two corridors.
**RECOMMENDED STRATEGIES**

The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the I-435 corridor.

A variety of strategies were considered to improve current and future traffic operations on I-435 through the year 2040. These strategies are shown in Table 14-9. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the I-435 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

### System Management Strategies

These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

#### S10: Implement variable speed limits from Parallel Parkway to K-10.

Variable speed limits can reduce congestion ahead. This strategy is used to slow traffic before it reaches the congested area and to better allow that congestion to dissipate.

#### S18: Expand the KC Scout intelligent transportation system (ITS) from Kansas/Missouri state line to Midland Drive.

The ITS devices would include dynamic message signs to warn drivers of upcoming travel conditions and a camera system to monitor the real-time flow of traffic.

### Demand Management Strategies

These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

#### D12: Construct a Park & Ride facility near the Shawnee Mission Parkway interchange and near the 95th Street interchange.

Park & Ride facilities promote carpooling and transit use while offering the flexibility for travelers to use personal vehicles for errands either before or after their commute to work.

#### D26: Bicycle and pedestrian facilities should be considered on all new or renovated bridges over I-435.

### Increased Capacity Strategies

These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

#### C21: Construct the remaining phases of the I-435/I-35/K-10 Johnson County Gateway interchange.

#### C33: Reconfigure the I-435 and State Avenue interchange.

#### C35: Add a “fly-over” ramp for the northbound to westbound traffic movement at the I-70 and I-435 interchange.

---

### Table 14-9: I-435 North-South Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***)</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
<th>Decade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operate and maintain existing roads, bridges, transit service, ITS, traffic signals, incident management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S10</td>
<td>Variable Speed Limits from Parallel Pkwy to K-10</td>
<td>4.5</td>
<td>4.4</td>
<td>3.3</td>
<td>10.0</td>
</tr>
<tr>
<td>D12</td>
<td>Construct Park &amp; Ride facilities near Shawnee Mission Parkway, and near 95th St.</td>
<td>4.4</td>
<td>3.3</td>
<td>6.0</td>
<td>5.0</td>
</tr>
<tr>
<td>C21</td>
<td>Construct remaining phases of I-435/I-35/K-10 Gateway project</td>
<td>6.2</td>
<td>5.0</td>
<td>5.0</td>
<td>3.4</td>
</tr>
<tr>
<td>S18</td>
<td>Expand KC Scout ITS System from KS / MO state line to Midland Drive</td>
<td>4.3</td>
<td>6.5</td>
<td>3.3</td>
<td>4.4</td>
</tr>
<tr>
<td>C32</td>
<td>Active lane use control including &quot;hard shoulder running&quot; and potential HOT or HOV lane during peak hours from K-10 to I-70</td>
<td>4.9</td>
<td>3.7</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>C33</td>
<td>Reconfigure the I-435 and State Avenue interchange</td>
<td>4.8</td>
<td>4.4</td>
<td>3.7</td>
<td>5.1</td>
</tr>
<tr>
<td>D26</td>
<td>Bicycle/pedestrian facilities: consider on all new or reconstructed bridges over I-435</td>
<td>3.8</td>
<td>3.7</td>
<td>3.3</td>
<td>4.1</td>
</tr>
<tr>
<td>C35</td>
<td>Add fly over ramp northbound to westbound on I-70 and I-435 interchange</td>
<td>5.0</td>
<td>5.6</td>
<td>3.7</td>
<td>3.4</td>
</tr>
<tr>
<td>C42</td>
<td>Reconfigure I-435 and Parallel Parkway interchange</td>
<td>4.5</td>
<td>4.4</td>
<td>3.7</td>
<td>4.2</td>
</tr>
<tr>
<td>C38</td>
<td>Reconfigure I-70 &amp; I-435 interchange</td>
<td>4.6</td>
<td>4.4</td>
<td>4.4</td>
<td>3.4</td>
</tr>
<tr>
<td>D49</td>
<td>Parallel bicycle / pedestrian trail development as specified in the MARC Metro Green plan / local plans</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.4</td>
</tr>
</tbody>
</table>

**Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.**

**Benefit Ratio is determined by dividing the Total Scores of the strategy by the Total Cost in $millions.** It provides a way to compare strategies.

**The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.**

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*Sources: [Stakeholder Interviews](https://www.example.com/stakeholder-interviews), [Public Surveys](https://www.example.com/public-surveys), [Transportation Planning Consultants](https://www.example.com/transportation-planning) [Note:Links provided for reference]*
I-635/I-35/US-69 Corridor

Length: 56 miles

Key Developments:
- Argentine Railyard
- Argoys Casino
- Corbin Park
- Corporate Woods
- Deer Creek
- Erickson Retirement Community
- Fairfax Industrial
- Indian Springs
- Johnson County Community College
- KCI Airport
- Oak Park Mall
- Parkway Place
- Prairie Fire
- Shawnee Mission Medical Center

Figure 14-6: Traffic Volumes along I-635/I-35/US-69

2010 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T/WORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T/WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.
DESCRIPTION OF THE CORRIDOR
The combination of these three freeways results in a north-south corridor from the Missouri River crossing that connects to the northern portion of Kansas City, Missouri, through Kansas City, Kansas, and providing regional freeway access to numerous communities in Johnson County and the eastern half of Miami County.

I-635 is a six lane freeway. The I-35 section of this corridor is one of the heaviest traveled sections of freeway in the 5-County region, and has eight lanes for most of its length. US-69 is currently a four lane freeway that is being widened to six lanes from 111th Street to 119th Street.

KEY DEVELOPMENT INFORMATION
This is a primary travel corridor that serves existing development and future growth areas in southern Overland Park and in Miami County. With the continued growth that is projected for these areas it may be necessary to apply a strategy for reducing congestion beyond simply adding freeway capacity.

US-69 provides access to the College Boulevard office park area and adjacent office areas. US-69 is adjacent to the highest concentration of employment in the 5-County region. US-69 also provides access to developing retail, mixed-use, and other major traffic generators along the 135th Street corridor. Very high population growth is projected in Overland Park between 135th and 199th.

US-69, like the east-west portion of I-435, provides direct access to the highest employment area in the 5-County region. It is important to maintain access to this area in order to sustain existing and encourage new economic activity. Projects are now being completed on US-69 north of I-435 and opportunities to add capacity to US-69 south of I-435 are being studied.

There is some population growth expected near the US-69 and I-435 interchange, and very high employment growth projected between I-435 and 135th Street There is some employment growth expected between 135th Street and 179th Street.

TRAFFIC
Traffic projections for the year 2040 show the most growth on the US-69 and I-35 portions of this route. Traffic is expected to grow by as much as 74 percent in some segments of US-69, particularly between I-35 and 179th Street interchange.

Future congestion is expected on I-35 and on US-69 from the I-35 interchange south to College Boulevard. Peak period congestion is expected for 15 miles of the 56 mile corridor in the year 2040.

OTHER MODES
The Indian Springs Transit Center, adjacent to I-635, is a major transfer point for Wyandotte County transit services, including BRT service.

CORRIDOR CONNECTIONS
The I-635 and State Avenue interchange is a key connection for an area of redevelopment at the Indian Springs shopping center in Kansas City, Kansas. Traffic projections indicate the potential for some congestion in the future.

Congestion at the I-70 and I-635 interchange is also expected in the future. Short merge sections from the interchange ramps are one of the issues facing this interchange that impact the smooth flow of traffic.

At the I-35 and I-635 interchange there is a heavy movement of traffic during certain periods of the day, from northbound I-35 to northbound I-635 and from southbound I-635 to southbound I-35. During peak periods, these ramps are currently operating near capacity. Congestion will continue to develop in these areas as traffic volumes grow.

The I-35 and US-69 interchange north of I-35 and 87th Street is currently one of the most congested areas in the region. Completion of projects on I-35 and on US-69 between 75th Street and 95th Street allow high volumes of traffic to meet at this merge. Traffic projections show increased congestion in the future.

Significant congestion is expected along I-35 on both sides of the I-35 and Shawnee Mission Parkway interchange.

I-435 could serve as alternate routes if future traffic conditions make the US-69/I-35/I-635 corridor less attractive for north-south movements through the 5-County region.

EXPANSION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION
In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-10 lists the expansion and modernization project that is funded through T-WORKS along the I-635/I-35/US-69 corridor.

Table 14-10: T-WORKS Expansion and Modernization Projects Currently Funded for Construction

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location</th>
<th>Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>US 69</td>
<td>Improvements from I-435/Quivira to 119th</td>
<td>$102 M</td>
<td>2011</td>
</tr>
</tbody>
</table>
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the I-635 corridor.

A variety of strategies were considered to improve current and future traffic operations on I-635 through the year 2040. These strategies are shown in Table 14-11. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the I-635 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

### System Management Strategies
These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

### Demand Management Strategies
These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

### Increased Capacity Strategies
These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

### Recommended Strategies

#### Table 14-11: I-635/I-35/US-69 Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***)</th>
<th>Engineering</th>
<th>Economic Impact</th>
<th>Community Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mobility (15.5)</td>
<td>Safety (16.0)</td>
<td>Regional Prosperity (12.5)</td>
<td>Financial Resources (15.0)</td>
</tr>
<tr>
<td>Operate and maintain existing roads, bridges, transit service, ITS, traffic signals, incident management</td>
<td>S5 Ramp Metering on US-69 from 119th St. to I-35</td>
<td>5.6</td>
<td>5.6</td>
<td>3.3</td>
</tr>
<tr>
<td>C14 I-635 and I-35 interchange improvements</td>
<td>6.5</td>
<td>6.5</td>
<td>4.4</td>
<td>3.4</td>
</tr>
<tr>
<td>D11 Construct Park &amp; Ride facilities near 135th and K-68</td>
<td>4.4</td>
<td>3.3</td>
<td>3.3</td>
<td>7.3</td>
</tr>
<tr>
<td>S16 Lengthen acceleration lanes at I-635 and I-70 interchange</td>
<td>4.6</td>
<td>7.3</td>
<td>3.3</td>
<td>3.5</td>
</tr>
<tr>
<td>C20 Reconfigure I-70 and I-635 interchange</td>
<td>5.5</td>
<td>5.0</td>
<td>4.4</td>
<td>3.5</td>
</tr>
<tr>
<td>C28 Widen US-69 to 6 lanes from 119th St. to 167th St., includes interchange at 159th St</td>
<td>8.4</td>
<td>3.3</td>
<td>3.7</td>
<td>6.2</td>
</tr>
<tr>
<td>S21 Variable speed limits on US-69 from 143rd St to I-35</td>
<td>4.8</td>
<td>4.4</td>
<td>3.3</td>
<td>5.6</td>
</tr>
<tr>
<td>C34 Construct remaining phases of US-69 and I-435 interchange (Brown project, Blue project, and Yellow project)</td>
<td>8.1</td>
<td>3.3</td>
<td>3.7</td>
<td>4.5</td>
</tr>
<tr>
<td>D28 Bicycle / Pedestrian facilities: consider on all new or reconstructed bridges over I-635, I-35, or US-69</td>
<td>3.9</td>
<td>3.7</td>
<td>3.3</td>
<td>3.9</td>
</tr>
<tr>
<td>D44 Transit commuter service connecting Louisburg to connect with JO service</td>
<td>3.7</td>
<td>3.3</td>
<td>3.3</td>
<td>3.5</td>
</tr>
<tr>
<td>C65 Construct new interchange at US-69 and 159th St. (See C28)</td>
<td>5.5</td>
<td>1.0</td>
<td>3.3</td>
<td>4.0</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs. **Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies. ***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
US-24/40 Corridor

Length: 23 miles

Key Developments:
Cerner
Community America Ballpark
Cricket Wireless Amphitheater
Hollywood Casino
Lawrence Municipal Airport
Sporting Park
Kansas Speedway
Schlitterbahn Waterpark
Village West

Figure 14-7: Traffic Volumes along US-24/40

<table>
<thead>
<tr>
<th>2010 Traffic Volumes</th>
<th>6,600</th>
<th>3,800</th>
<th>5,800</th>
<th>13,100</th>
<th>13,100</th>
<th>16,100</th>
</tr>
</thead>
<tbody>
<tr>
<td>9% trucks</td>
<td>8%</td>
<td>6%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T-WORDS have been constructed.

<table>
<thead>
<tr>
<th>2040 Forecasted Traffic with Recommended Strategies</th>
<th>22,000</th>
<th>13,000</th>
<th>21,000</th>
<th>22,000</th>
<th>15,000</th>
<th>18,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% trucks</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>
DESCRIPTION OF THE CORRIDOR

This corridor serves rural Leavenworth and Douglas Counties, and for this study, is considered to be from K-7 (Bonner Springs) on the east, past City of Basehor and through the City of Tonganoxie to its junction with US-59 north of the City of Lawrence. The corridor features 2-lane rural roads west of Tonganoxie, a 5-lane section through Tonganoxie, and a 4-lane divided roadway east of Tonganoxie. This corridor provides the major regional connection for the cities of Basehor and Tonganoxie. It provides an option to the I-70 turnpike (tollled) for trips to and from the Kansas City metropolitan area and Lawrence.

KDOT and the communities in this corridor have developed a US-24/40 Corridor Management Plan which can be found at: http://www.ksdot.org/pdf_files/US-24-Corridor-Management-Plan.pdf.

KEY DEVELOPMENT INFORMATION

Population growth is expected on the eastern end of the corridor in Bonner Springs and in the Village West area located east of the corridor on State Avenue (former US-24/40). Employment growth is forecast just outside the eastern end of the corridor in the Village West area as that development continues to grow. Residents of Basehor and Tonganoxie may seek employment at Village West.

TRAFFIC

Congestion in the year 2040 is anticipated to the north of Lawrence at the US-24/40 and US-59 junction as well as the section between US-59 and K-32. As this intersection is controlled by a traffic signal, drivers on each approach will incur delay when slowing for a stop or waiting at a red signal. Delays at the signalized intersection will increase with the growth in traffic. The US-24/40-State Avenue and K-7 interchange has been constructed with future growth planned, therefore, congestion is not expected at that location. No congestion is expected at the East Lawrence I-70 exit for travelers accessing US-24/40.

OTHER MODES

There is no fixed route transit service provided in this corridor. It is not a major freight corridor.

CORRIDOR CONNECTIONS

The US-24/40 intersects with K-7 on the east end of the corridor and at US-59 north of Lawrence on the west end.

RECOMMENDED STRATEGIES

The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the US-24/40 corridor.

A variety of strategies were considered to improve current and future traffic operations on US-24/40 through the year 2040. These strategies are shown in Table 14-12. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the US-24/40 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in Smillions.

System Management Strategies

These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

S13: Implement the recommendations of the US-24/40 Corridor Management Plan. Excerpts from the Corridor Management Plan state:

• “The recommended long range (2030) traffic and access management plan must envision the transportation system needed to support the future land development. For US-24/40 to retain a high level of mobility and safety, a supporting system of arterial and collector streets will be needed to complement US-24/40.”

• The Plan limits “locations where full access to the highway will be permitted. Only right turns will be permitted at those locations where the major streets intersect US 24/40 and where full access has not been designated. It is anticipated that only those locations with full access will be permitted to have a traffic signal, and then only when the intersection meets appropriate warrants and only in consultation between local jurisdictions and KDOT.”

• “Other recommendations of the long range traffic and access management plan on the corridor include:
  ○ Medians will be constructed the full length of the corridor, with two lanes in each direction by such time that traffic volume thresholds reach the demand for four lanes throughout.
  ○ Existing access in between the full access points will be restricted to right turn only by such time that alternative traffic circulation has been provided for through reverse frontage roads.
  ○ Reverse frontage roads will be constructed to provide alternative traffic circulation and access for properties fronting US 24/40.”

Table 14-12: US-24/40 Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Corridor Strategies and Evaluation Scores</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Desired Outcomes (weighting factor*** delayed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
</tr>
<tr>
<td>Mobility (15.5)</td>
</tr>
<tr>
<td>Total Score</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>S13</td>
</tr>
<tr>
<td>D16</td>
</tr>
<tr>
<td>C25</td>
</tr>
<tr>
<td>C41</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/ implementing the strategy and 10 years of operation and maintenance costs.
**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in Smillions. It provides a way to compare strategies.
***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.

86
US-56 Corridor

Length: 21 miles

Key Developments:
- Baker University
- BNSF Intermodal Facility & Logistics Park
- New Century Air Center

Key Developments:
- Baker University
- BNSF Intermodal Facility & Logistics Park
- New Century Air Center

Figure 14-8: Traffic Volumes along US-56

**2010 Traffic Volumes**

Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

<table>
<thead>
<tr>
<th>Year</th>
<th>Trucks</th>
<th>tractor-trailers</th>
<th>Average Daily Traffic Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,900</td>
<td>4,200</td>
<td>4,200</td>
<td>4,200</td>
</tr>
<tr>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

**2040 Forecasted Traffic on Existing plus Committed Network**

Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed.

<table>
<thead>
<tr>
<th>Year</th>
<th>Trucks</th>
<th>tractor-trailers</th>
<th>Average Daily Traffic Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,700</td>
<td>13,000</td>
<td>19,000</td>
<td>5,600</td>
</tr>
</tbody>
</table>

**2040 Forecasted Traffic with Recommended Strategies**

Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.

<table>
<thead>
<tr>
<th>Year</th>
<th>Trucks</th>
<th>tractor-trailers</th>
<th>Average Daily Traffic Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,700</td>
<td>13,000</td>
<td>18,400</td>
<td>5,300</td>
</tr>
</tbody>
</table>
DESCRIPTION OF THE CORRIDOR
The section of US-56 addressed in the 5-County Study begins at I-35 and ends at US-59. The US-56 corridor is a two-lane highway that serves east-west movement of traffic. US-56 becomes Main Street in the city of Gardner and provides the primary access to the cities of Edgerton and Baldwin City to the west. The US-56 connection with US-59 provides a route between southern Johnson County and the City of Lawrence.

KEY DEVELOPMENT INFORMATION
The BNSF Intermodal Facility is anticipated to be a major generator of future travel demand. The 1,300-acre intermodal park is comparable to existing BNSF facilities in Fort Worth and Chicago. BNSF will bring freight from Pacific ports to be offloaded onto trucks and distributed regionally. A new interchange is under construction on I-35 at Homestead Lane connecting the BNSF Intermodal Facility and other industrial/warehouse development with I-35. This new interchange may lead to a desire to realign US-56 to 199th Street in Johnson County. The potential need for modifications to US-56 to accommodate higher truck volumes was studied as part of the Area Plan for Southwest Johnson County.

The economic development potential of the BNSF Intermodal Facility is likely to have a significant impact in the area around the US-56 corridor in southern Johnson County. The railroad predicts the creation of more than 7,000 new jobs and believes investment in the site could exceed $1 billion. Seven million square feet (7,000,000 sq ft) of warehouse/industrial development is anticipated with this project. A current projection of trip generation for the site is 17,000 trips per day with over 7,000 trucks expected each day. It is expected that 85 percent of trips will go north of the facility, 15 percent will go south or west. However, access to US-56 will be via 199th Street and Waverly Road from this site.

Other activity centers along the US-56 corridor include Baker University in Baldwin City and the New Century AirCenter near Gardner.

In addition, there is very high projected population growth in Olathe and Gardner between I-435 and 199th. There is also very high projected employment growth in Olathe and Gardner between 135th and 199th. Some employment growth is projected near I-435 from 87th to 119th.

KDOT and the communities in this corridor have developed a Corridor Management Plan for US-56 (http://www.us56corridorplan.org/).

TRAFFIC
In the year 2040, this route is not shown to be congested except during the peak periods at the US-56/175th Street and I-35 interchange. Another location that may experience congestion is the intersection of US-56 and 199th Street due to its geometry and an expected increase in traffic volume from the nearby BNSF Intermodal Facility. The study found two highway lanes to be sufficient along most of the corridor.

OTHER MODES
Consideration of freight movements will be important to the future of the corridor. The BNSF Intermodal Facility is expected to generate an additional 7,000 trucks per day.

CORRIDOR CONNECTIONS
Moderately high levels of congestion should be expected in the future at the interchange of 175th Street /US-56 and I-35. The New Century AirCenter and its industrial park are located just west and north of the interchange.

US-56 passes along the northwest side of the BNSF Intermodal Facility, although there is no direct connection. Traffic can access the facility from the intersection of 199th Street and US-56. A study of the expected traffic generated by the intermodal facility determined that 85 percent of the trucks will use I-35 to the north, while two percent of the truck trips, or about 140 trucks per day, will use US-56 to the west. The US-56 and 199th Street intersection is located on a curve adjacent to the BNSF rail line. The intersection geometry raises questions regarding the safe and efficient flow of traffic. A concept to replace the intersection with an interchange has been developed.

KDOT, local agencies and MARC are conducting a transportation and land use study of a 22-square mile area around the intermodal facility.

Some consideration has been given to re-routing US-56 onto 199th Street and then onto I-35 via the new interchange at Homestead Road. This would remove some of the truck and highway traffic that currently travels through the City of Gardner to the existing US-56/175th Street and I-35 interchange.
RECOMMENDED STRATEGIES
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the US-56 corridor.

A variety of strategies were considered to improve current and future traffic operations on US-56 through the year 2040. These strategies are shown in Table 14-13. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the US-56 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

### System Management Strategies

These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

**S14: Implement the recommendations of the US-56 Corridor Management Plan.** The Corridor Management Plan identifies existing access points on the highway that should be closed over time, as appropriate circumstances present themselves, to achieve access management objectives. Also, to help ensure that all property owners are afforded reasonable access to the mainline and to the local street network consistent with the full functionality of that network, it is encouraged that joint access to that network by adjacent property owners be utilized to the maximum extent possible.

### Increased Capacity Strategies

These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

**C19: Construct a new interchange at US-56 and 199th Street.** Consider re-routing US-56 onto 199th Street.

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
<th>Decade</th>
</tr>
</thead>
<tbody>
<tr>
<td>S14 Access Management: Follow the US-56 Corridor Management Plan</td>
<td>4.7</td>
<td>7.3</td>
<td>4.4</td>
<td>3.8</td>
</tr>
<tr>
<td>C19 New Interchange at US-56 and 199th Street</td>
<td>4.6</td>
<td>6.5</td>
<td>6.5</td>
<td>2.9</td>
</tr>
<tr>
<td>C36 Intersection improvement at US-56 and 199th street</td>
<td>4.1</td>
<td>5.6</td>
<td>5.0</td>
<td>3.4</td>
</tr>
<tr>
<td>D29 Commuter transit service to Baldwin City and Lawrence</td>
<td>3.8</td>
<td>4.4</td>
<td>3.3</td>
<td>3.6</td>
</tr>
<tr>
<td>D40 Construct Park &amp; Ride facilities near Baldwin City and Intermodal</td>
<td>3.8</td>
<td>3.7</td>
<td>3.3</td>
<td>4.2</td>
</tr>
<tr>
<td>C50 Realign US-56 along 199th Street from Edgerton to I-35</td>
<td>4.3</td>
<td>5.0</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>C62 Widen US-56 to 6 lanes from Moonlight Road to I-35</td>
<td>4.7</td>
<td>3.7</td>
<td>3.3</td>
<td>2.3</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
K-5 Corridor

Length: 10 miles

Key Developments:
- Fort Leavenworth
- Lansing Correctional Facility

Figure 14-9: Traffic Volumes along K-5
DESCRIPTION OF THE CORRIDOR

The section of K-5 addressed in the 5-County Study extends from I-435 northwest along Wolcott Drive, Wolcott Road, and finally Muncie Road to an intersection with K-7 in the City of Leavenworth. This section of K-5 is a winding two-lane rural highway characterized by minimal width shoulders, numerous sharp curves, and low speeds.

KEY DEVELOPMENT INFORMATION

Population growth and employment growth are projected in Lansing east of K-5 and west of K-7.

Some information regarding development potential can be found in the K-7 Corridor Economic Development Strategy, a study completed by the Mid-America Regional Council in January 2012. While the study focused on the K-7 corridor, it did provide some discussion of K-5 as a “twin” corridor. The scenario for K-5 that was explored in the study assumed K-5 was realigned and upgraded to a “parkway-style” roadway. Several findings noted in the study are:

• “While this scenario would reduce the commute time for those in the Lansing/Leavenworth area to reach certain destinations via the Interstate 435 corridor – the time savings is anticipated to be negligible.”

• “To the extent these K-5 Corridor improvements would “siphon” traffic from using the K-7 Corridor on a daily basis, the resulting reduction in traffic could also reduce the projected development demand for uses along the central portions of the K-7 Corridor. However, a marginal benefit of this scenario could be some additional development potential around the intersection of K-5 and K-7.”

• “While an improved K-5 Corridor would provide fairly direct access to Interstate 435, the existing terrain is still fairly rugged and will limit its ability to carry significant traffic at comparable rates of speed as that of the K-7 Corridor. These conditions will also limit the amount and type of adjacent development activity that could be implemented adjacent to an improved K-5 Corridor.”

TRAFFIC

Currently K-5 is one of the lowest volume corridors that was analyzed during the 5-County Study. Traffic volumes vary from a low of 2,000 vehicles per day between K-7 and McIntyre Road to a high of 3,200 vehicles per day near I-435. Traffic is anticipated to grow by the year 2040. The road will continue to operate at an acceptable level of service.

There is currently no significant congestion issue for K-5 at either I-435 or K-7.

There are safety concerns for this section of K-5 due to the number of crashes that occur versus the volume of traffic using the roadway. Over a 5 year period, there were 4 fatal crashes, 63 injury crashes, and 134 property damage only (PDO) crashes on this 10 mile section of K-5. Many of the crashes were associated with one of the curves.

CORRIDOR CONNECTIONS

K-5 and K-7 both serve to connect the Cities of Lansing and Leavenworth with the interstate highway system. As travel time increases on K-7 due to additional signalized intersections, some traffic may divert to K-5. Upgrading K-5 to a freeway would divert traffic from a K-7 expressway with signals. Traffic volumes would remain about the same if K-7 is upgraded to a freeway.

Area residents have the option of using K-5 and I-435 or K-7 and K-92/M-92 to reach the Kansas City International Airport and the commercial areas in Platte County. The route chosen by drivers in the future may depend on observed congestion or roadway improvements that increase service. If K-92 and MO-92 are not widened to 4 lanes, traffic volumes may increase on K-5 to make a connection with I-435 crossing into Missouri.

RECOMMENDED STRATEGIES

The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the K-5 corridor.

A strategy to improve the alignment of the highway was considered that would improve current and future traffic operations on K-5 through the year 2040. This strategy is shown in Table 14-14. Strategies are assigned an identifier code of a letter and number. A “C” indicates an added capacity strategy.

The tables show how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in Smillions.

Increased Capacity Strategies

These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

C31s: Conduct a study for a potential realignment and improvement of K-5 from K-7 to I-435.

Length: 72 miles

Key Developments:
- Cricket Wireless Amphitheater
- Fort Leavenworth
- Kansas BioScience Park
- Lansing Correctional Facility
- New Century Air Center

Figure 14-10: Traffic Volumes along K-7/US-73/US-169

2010 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County regional travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during TWORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that TWORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.
DESCRIPTION OF THE CORRIDOR

K-7, also designated as US-73 in Leavenworth County and as US-169 in southern Johnson County and Miami County, forms a north-south corridor along the western edge of the Kansas City Metropolitan Area that connects four of the five counties in the study. This route has provided improved access and supported residential growth in the adjacent communities.

The roadway classification type varies considerably throughout its length. Each segment of the highway has its own characteristics that are described in the following paragraphs.

KDOT studied the corridor through the development of the K-7 Corridor Management Plan (http://www.ksdot.org/projects.asp) and it has been determined that the expressway portions should be upgraded to a fully access-controlled freeway. As part of the plan, 11 cities and counties along the corridor have a Memorandum of Understanding (MOU) with KDOT where they agree to upgrade K-7 to an access-controlled freeway.

In Leavenworth, K-7 highway is also called both Metropolitan Avenue and 4th Street. In Lansing, K-7 is also called Main Street. K-7 highway is a 4-lane urban arterial with posted speed limits between 20 and 50 MPH. Due to the number of traffic signals, travel times are relatively high.

Between Lansing and I-70, K-7 was constructed as a high-speed rural 4-lane divided expressway. As development has occurred along this corridor, traffic signals have been installed at many of the intersections. Closely spaced traffic signals reduce the capacity of the highway and lower average travel speeds.

The interchange at I-70 has been studied (www.K7andI70interchange.org) and the first phases of planned improvements will be constructed during the T-WORKS transportation program.

From I-70 south to 110th Street in Olathe, K-7 was constructed as a high-speed rural 4-lane divided expressway. Over time, many at-grade intersections have been replaced with grade-separated interchanges. Ten interchanges exist along this approximately 13 mile long segment. Traffic growth on this segment will exceed the capacity of the remaining existing at-grade intersections.

Within the city of Olathe, K-7 is routed on urban arterial streets. From north to south, K-7 is carried on Parker Street, then east on old US-56 before turning south on Harrison Street crossing I-35 towards Paola. There are eight signalized intersections on S. Parker St./Lone Elm Road between Harold Street and Old 56 (1.4 miles). There are seven signalized intersections on S. Harrison between Old 56 and 159th Street (1.9 miles). The route is four lanes through Olathe.

South of Olathe, K-7/US-169 is again a 4-lane divided expressway with traffic signals at major intersections. South of 223rd Street, K-7/US-169 becomes a fully access-controlled freeway through most of Miami County.

KEY DEVELOPMENT INFORMATION

Fort Leavenworth is a major activity center at the northern end of the K-7 corridor and has seen recent expansion. To the south in Lansing, population and employment growth is projected to the east and west of K-7.

There is also some employment growth projected in Bonner Springs, and population growth expected in the Village West area around State Avenue and in Bonner Springs.

Very high population growth is expected in Shawnee adjacent to K-7 from Johnson Drive to 95th Street. Future land-use plans show continued growth in western Shawnee and Lenexa. There is also high employment growth expected in Shawnee from Johnson Drive to K-10.

In Olathe, very high population growth south of the K-10 interchange, particularly on the west side of K-7, is projected. There is also very high employment growth expected in Olathe.

Projections show population growth adjacent to K-7 south from I-35 to Miami County line, as well as increased industrial growth on US-169 south of I-35.

EXPANSION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION

In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-15 shows the expansion and modernization projects that are funded through T-WORKS along the K-7 corridor.

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location</th>
<th>Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Near I-70</td>
<td>KC Scout Expansion</td>
<td>$475 K</td>
<td>2010</td>
</tr>
<tr>
<td>6</td>
<td>I-70 &amp; K-7</td>
<td>Interchange Improvements</td>
<td>$68 M</td>
<td>2013</td>
</tr>
</tbody>
</table>
TRAFFIC
The K-7 Corridor currently experiences isolated areas of moderate congestion, primarily at signalized intersections. A concern has been expressed that travel times on the segment of K-7 between the City of Lansing and I-70 have grown significantly in recent years with the addition of traffic signals along this highway. The lack of left turn lanes at some intersections in Olathe result in traffic delays at these intersections as well.

The year 2040 traffic forecasts show traffic volume growth with traffic exceeding the capacity of some signalized intersections. Overall, traffic volumes will exceed the capacity of K-7 from the Kansas River crossing to 33rd Street in the City of Shawnee and from 95th Street to 167th Street in the City of Olathe. The interchange of K-7 and K-10 shows congestion on all four approaches.

OTHER MODES
Multimodal considerations include examining transit connections from Leavenworth/Lansing to the existing transit system in Kansas City, KS and also expanding service from Paola to the existing transit system in Johnson County. Information about Smart Moves, metropolitan Kansas City’s vision for expanded and enhanced regional transit service can be found at www.kcsmartmoves.org.

CORRIDOR CONNECTIONS
K-7, along with I-70, K-10 and I-435, form an interdependent network of roadways. A capacity improvement on any one of these corridors impacts the others. The travel demand model indicates a strong association between K-7 and I-435. As K-7 is improved to a freeway, a significant volume of traffic will shift from the north-south segment of I-435 to K-7. This also slightly increases the volume of traffic on I-70.

Widening K-10 does not have a significant impact on existing K-7, but would reduce the volume of traffic on I-70 and the north-south segment of I-435.

K-7/US-73 is a key connection for the cities of Leavenworth and Lansing with the rest of the Kansas City metropolitan area. Travel time between Lansing and I-70 has been steadily increasing as traffic signals are added at intersections in this segment of the corridor. This increase in travel time is a concern to those living and working in these cities and at Fort Leavenworth. Also, as K-7 becomes more congested between I-70 and the cities of Leavenworth and Lansing, some traffic may divert to K-5 and I-435 for north-south movements.

The interchange at I-70 provides a connection to the national interstate highway system and also serves trips to local and regional destinations. Currently several traffic movements experience significant congestion during peak periods at the K-7 and I-70 interchange. This is especially true for the southbound left turn onto the I-70 ramps and for the westbound I-70 exit to K-7. A project in the T-WORKS program will construct the initial phases of an interchange improvement that will address this congestion.

The K-7 interchange with K-10 provides an important connection for trips to and from Lawrence, as well as the I-435 corridor leading to Missouri. Congestion will grow at this location as traffic continues to increase.

The interchange with K-7/US-169 and I-35 provides an important connection for traffic coming from the south. The corridor currently approaches I-35 from the south on a city arterial street that has little access control. This area will become congested as traffic continues to grow. Some consideration has been given to realigning K-7/US-169 onto Lone Elm Road from north of 175th Street to the new interchange at I-35.

The at-grade intersections of the corridor at 175th Street and 199th Street are locations that experience some congestion today and will see congestion grow in the future.

RECOMMENDED STRATEGIES
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the K-7 corridor.

A variety of strategies were considered to improve current and future traffic operations on K-7 through the year 2040. These strategies are shown in Table 14-16. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the K-7 corridor maps. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

System Management Strategies
These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

S7: Coordinate traffic signal phasing and timings from 41st Road to Parallel Parkway and from W. Harold Street to 154th Street.

S11: Expand the KC Scout intelligent transportation system (ITS) between Parallel Parkway and College Boulevard. The ITS devices would include dynamic message signs to warn drivers of upcoming travel conditions and a camera system to monitor the real-time flow of traffic.

S23: Follow the recommendations of the K-7 Corridor Management Plan.

Demand Management Strategies
These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

D7: Construct Park & Ride facilities along K-7 near Shawnee Mission Parkway and in Bonner Springs.


D15: Implement commuter transit service connecting the cities of Leavenworth and Lansing with State Avenue, I-70, Shawnee Mission Parkway, and College Boulevard.

D17: Construct Park & Ride facilities along K-7/US-169 near Spring Hill.

D18: Implement peak and off-peak transit service connecting the cities of Leavenworth and Lansing with State Avenue and I-70.

D34: Bicycle and pedestrian facilities should be considered on all new or renovated bridges over K-7.

Increased Capacity Strategies
These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

C4: Upgrade K-7/US-169 to a 4-lane freeway from 215th Street to south of 175th Street. This lengthens the existing freeway that extends from 223rd Street to south of Osawatomie. Also, relocate K-7 from north of 175th Street to Lone Elm Road and improve this arterial street to I-35.

C6: Upgrade K-7 to a 6-lane freeway from Kansas Avenue to K-10 including a bicycle crossing over the Kansas River. C11 is a likely first step.

C11: Upgrade K-7 to a 4-lane freeway from 43rd Street to K-10.

C13: Construct phases 4, 5, 6, 7 and 10 of the reconfigured I-70/K-7 interchange.

C24: Construct expressway intersection enhancements from the City of Lansing to State Avenue.

C46: Construct arterial street enhancements to existing K-7 through the City of Olathe.
<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***)</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
<th>Decade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Engineering</td>
<td>Economic Impact</td>
<td>Community Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobility (15.5)</td>
<td>Safety (16.0)</td>
<td>Regional Prosperity (12.5)</td>
<td>Financial Resources (15.0)</td>
<td>Choice (8.5)</td>
</tr>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>C4 Upgrade K-7 to a 4-lane freeway from 215th Street to north of 175th Street, arterial street improvements on Lone Elm Road to I-35</td>
<td>6.4</td>
<td>6.5</td>
<td>4.4</td>
<td>10.0</td>
<td>3.3</td>
</tr>
<tr>
<td>C6 Upgrade K-7 to a 6-lane freeway from Kansas Ave to K-10, bike/ped crossing over Kansas River</td>
<td>8.1</td>
<td>6.5</td>
<td>5.6</td>
<td>5.3</td>
<td>3.3</td>
</tr>
<tr>
<td>C10 Upgrade K-7 to a 6-lane freeway from K-10 to I-35</td>
<td>8.8</td>
<td>4.4</td>
<td>6.5</td>
<td>5.5</td>
<td>3.3</td>
</tr>
<tr>
<td>S7 Signal coordination from 411 Road to Parallel Parkway and from W. Harold Street to 154th Street</td>
<td>5.1</td>
<td>5.0</td>
<td>3.3</td>
<td>10.0</td>
<td>3.3</td>
</tr>
<tr>
<td>C11 Upgrade K-7 to a 4-lane freeway from 43rd Street to K-10</td>
<td>6.8</td>
<td>6.5</td>
<td>3.7</td>
<td>45.1</td>
<td>3.3</td>
</tr>
<tr>
<td>D7 Construct Park &amp; Ride facilities near Shawnee Mission Parkway and in Bonner Springs</td>
<td>4.5</td>
<td>4.4</td>
<td>3.3</td>
<td>7.2</td>
<td>4.5</td>
</tr>
<tr>
<td>S11 Expand KC Scout ITS between Parallel Parkway and College Boulevard</td>
<td>5.1</td>
<td>7.3</td>
<td>3.3</td>
<td>6.3</td>
<td>3.3</td>
</tr>
<tr>
<td>C13 Construct phases 4,5,6,7 &amp; 10 of the reconfigured 1-70/K-7 interchange</td>
<td>6.8</td>
<td>6.5</td>
<td>4.4</td>
<td>3.7</td>
<td>3.3</td>
</tr>
<tr>
<td>D13 Construct Park &amp; Ride facilities near 411 Road and near northern junction of K-7 and K-92</td>
<td>4.6</td>
<td>3.7</td>
<td>3.3</td>
<td>5.9</td>
<td>4.5</td>
</tr>
<tr>
<td>D15 Commuter transit service connecting Leavenworth/State Avenue/1-70/ Shawnee Mission Parkway/College Boulevard</td>
<td>4.6</td>
<td>5.0</td>
<td>3.3</td>
<td>3.4</td>
<td>4.5</td>
</tr>
<tr>
<td>D17 Construct Park &amp; Ride facilities near Spring Hill</td>
<td>4.6</td>
<td>3.4</td>
<td>3.3</td>
<td>5.9</td>
<td>4.1</td>
</tr>
<tr>
<td>C24 Expressway intersection enhancements from Lansing to State Avenue</td>
<td>5.1</td>
<td>4.4</td>
<td>3.3</td>
<td>6.2</td>
<td>3.3</td>
</tr>
<tr>
<td>D18 Peak and off-peak transit service connecting Leavenworth/Lansing and State Ave/1-70</td>
<td>4.6</td>
<td>3.7</td>
<td>3.3</td>
<td>3.4</td>
<td>5.0</td>
</tr>
<tr>
<td>D23 Transit commuter service connecting Paola to I-35</td>
<td>4.6</td>
<td>3.3</td>
<td>3.3</td>
<td>3.4</td>
<td>5.0</td>
</tr>
<tr>
<td>S23 Access management: follow K-7 Corridor Management Plan</td>
<td>4.6</td>
<td>6.5</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>D34 Bicycle / Pedestrian facilities: consider on all new or reconstructed bridges over K-7</td>
<td>3.9</td>
<td>3.7</td>
<td>3.3</td>
<td>3.5</td>
<td>5.0</td>
</tr>
<tr>
<td>C44 Leavenworth/Lansing bypass: 2-lane west of Leavenworth connecting K-5 to US-73/K-7</td>
<td>5.8</td>
<td>1.6</td>
<td>5.0</td>
<td>6.6</td>
<td>3.3</td>
</tr>
<tr>
<td>C45 Upgrade K-7 to 4-lane freeway from Lansing to State Avenue</td>
<td>5.6</td>
<td>5.0</td>
<td>3.7</td>
<td>3.7</td>
<td>3.3</td>
</tr>
<tr>
<td>C46 Arterial street enhancements to existing K-7 in Olathe</td>
<td>5.7</td>
<td>4.4</td>
<td>3.7</td>
<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>D48 Parallel bicycle and pedestrian trail development per MetroGreen / local plans</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.5</td>
<td>5.5</td>
</tr>
<tr>
<td>C56 Construct phases 8 &amp; 9 of the reconfigured 1-70/K-7 interchange</td>
<td>4.8</td>
<td>3.3</td>
<td>4.4</td>
<td>3.4</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.
**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.
***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
K-10 Corridor

Length: 38 miles

Key Developments:
- Bauer Farms
- Berry Plastics
- East Hill Business Park
- Farmland Industries Redevelopment Site
- Haskell Indian Nations University
- Kansas Bioscience Park
- Rock Chalk Park
- Sunflower Army Ammunition Plant Redevelopment
- University of Kansas

Transit Service:
- Lawrence Transit
- K-10 Connector

Figure 14-1: Traffic Volumes along K-10

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T-WORKS have been constructed.

<table>
<thead>
<tr>
<th></th>
<th>6% trucks</th>
<th>5% trucks</th>
<th>5% trucks</th>
<th>N/A</th>
<th>4% trucks</th>
<th>4% trucks</th>
<th>5% trucks</th>
<th>6% trucks</th>
<th>6% trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>11,800</td>
<td>9,300</td>
<td>7,000</td>
<td>N/A</td>
<td>36,800</td>
<td>37,600</td>
<td>36,000</td>
<td>47,300</td>
<td>88,400</td>
</tr>
<tr>
<td>2040</td>
<td>29,200</td>
<td>24,900</td>
<td>23,800</td>
<td>26,400</td>
<td>71,300</td>
<td>78,300</td>
<td>86,100</td>
<td>76,300</td>
<td>97,600</td>
</tr>
<tr>
<td>2040 with Recommended Strategies</td>
<td>34,000</td>
<td>39,700</td>
<td>50,800</td>
<td>41,900</td>
<td>76,200</td>
<td>83,700</td>
<td>90,900</td>
<td>89,000</td>
<td>114,400</td>
</tr>
</tbody>
</table>
DESCRIPTION OF THE CORRIDOR

K-10 from the I-70 interchange west of Lawrence to I-435 in Lenexa provides a major route for east-west travel through the 5-County region. The route connects Lenexa, Olathe, De Soto, Eudora and Lawrence.

K-10 is a two-lane highway, built on a four-lane right-of-way, from I-70 to Iowa Street (designated as US-59), near the southern edge of Lawrence. K-10 is currently designated on Iowa Street and on 23rd Street moving eastward through Lawrence. KDOT studied the corridor in the K-10 Transportation Study, completed in 2005 (http://www.ksdot.org/projects.asp).

Construction is scheduled to begin in Fall 2013 on the South Lawrence Trafficway (SLT), a six-mile, four-lane freeway connecting the existing west leg of the K-10 corridor to K-10 at a point east of Lawrence, via a route around the southern edge of the city. The construction of the SLT will eliminate the K-10 designation on Iowa and 23rd Streets in Lawrence. K-10 is a four-lane freeway between Lawrence and I-435.

EXPANSION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION

In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-17 shows the expansion and modernization projects that are funded through T-WORKS along the K-10 corridor:

Table 14-17: T-WORKS Expansion and Modernization Projects Currently Funded for Construction

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>I-435/35WK-10 Interchange (Johnson Co. Gateway)</td>
<td>$250 M</td>
<td>2014</td>
</tr>
<tr>
<td>5</td>
<td>Near K-7</td>
<td>$475 K</td>
<td>2010</td>
</tr>
<tr>
<td>8</td>
<td>South junction of US-59 to K-10 near E. 1750 Road</td>
<td>$150 M</td>
<td>2013</td>
</tr>
<tr>
<td>9</td>
<td>15th St/Billy Bills Pkwy</td>
<td>$15 M</td>
<td>2014</td>
</tr>
</tbody>
</table>

KEY DEVELOPMENTS

The K-10 corridor supports existing and future redevelopment in Lawrence and cities in the Kansas City metropolitan area. Major educational institutions, industrial areas, new high technology businesses, office locations, and commercial sites are located along this corridor. This corridor supports more adjacent economic activity potential than any other corridor in the 5-County region.

The K-10 corridor is also key to the future development of Eudora, De Soto, western Shawnee, western Lenexa and western Olathe as well as the former Sunflower Army Ammunition Plant. The potential Sunflower development site is located just south of K-10 on Lexington Avenue near De Soto. This development has the potential to be a major traffic generator. It should be noted, however, that site preparation for the Sunflower development has been estimated to cost much more than originally expected. This additional cost could slow redevelopment at this site.
A new business park is proposed at the Farmland site in Lawrence. It is located near and projected to be a business/industrial park similar to East Hills business park.

High growth in population and employment is projected in western Lenexa and western Olathe adjacent to K-10. High population growth is also anticipated in Eudora, with some employment growth also expected to the east of Lawrence.

**TRAFFIC**

Traffic forecasts for the year 2040 were determined assuming completion of the projects in T-WORKS. These projections show congestion on the west leg of the K-10 South Lawrence Trafficway (SLT), on 23rd Street, and along K-10 between Lawrence and I-435.

There is a relatively high volume of traffic that currently travels through the City of Lawrence to make the connection between I-70 and K-10. The construction of the east leg of the SLT (new alignment for K-10) is scheduled to be completed by fall of 2016. Completing the east leg will divert much of the “pass-through” traffic, but with only two lanes on the west leg of the SLT, some traffic will continue to travel through the city. Interchange improvements at I-70 and K-10 are not recommended as part of the study because of the high cost to construct a system-to-system interchange and traffic must slow for the toll booths, thereby little benefit is gained by constructing a free-flowing interchange.

**IMPACTS TO OTHER CORRIDORS**

K-10 and I-70 (the Kansas Turnpike) are the two major east-west corridors serving the 5-County region. Traffic volumes are growing more quickly on K-10 than I-70.

There is a considerable volume of traffic that desires to travel to I-70 west of Lawrence and southern Johnson County. Currently, much of this traffic uses I-70 and either K-7 or I-435 for these trips. Completion of the South Lawrence Trafficway (K-10) will provide a more direct route and reduce travel times; therefore, significant traffic will likely shift from I-70 to K-10. This will place an additional burden on the Johnson County Gateway area. This shift in traffic will extend the service life of I-70, the Kansas Turnpike, delaying the need to widen this highway to six lanes.

**RECOMMENDED STRATEGIES**

The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the K-10 corridor.

A variety of strategies were considered to improve current and future traffic operations on K-10 through the year 2040. These strategies are shown in Table 14-18. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the K-10 corridor maps. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in Smillions.

**System Management Strategies**

These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

S4: Implement ramp metering from the Church Street interchange in Eudora to the Ridgeview Road interchange in Lenexa. Ramp metering uses traffic signals on the entrance ramps to control the rate at which vehicles enter K-10. Ramp metering will improve safety and traffic flow on K-10.

S19: Implement intelligent transportation system (ITS) devices from E. 1750 Road to Cedar Creek Road similar to the KC Scout devices that are in place in the Kansas City metro area. These devices would include dynamic message signs to warn drivers of upcoming travel conditions and a camera system to monitor the real-time flow of traffic.

**Demand Management Strategies**

These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

D4: Expand the operating hours/service of the K-10 Connector transit service. Additional transit trips would be added to the existing service, with this service providing stops along K-10 at Eudora, DeSoto and possibly one stop in Lenexa, before proceeding to the Edwards Campus and then continuing on to the College Boulevard/Corporate Woods area.

D14: Construct a bicycle path parallel to K-10, along Prairie Star Parkway across the bridge over highway K-7. This freeway crossing would connect two significant lengths of existing bicycle paths, the first from west of Cedar Creek Parkway to the west side of K-7 and the second from the east side of K-7 east along Prairie Star Parkway.

D31 and D41: construct Park & Ride facilities near US-59, near E. 1750 Road, near Eudora, and near DeSoto. Park & Ride facilities promote carpooling and transit use while offering the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

D32: Anytime a new bridge is constructed over K-10 or a bridge is reconstructed, consideration will be given to including a shared use path on the bridge.

**Increased Capacity Strategies**

These strategies increase the traffic-carrying capacity of a road through adding lanes, modifying interchanges, and constructing new roadways.

C3: This strategy adds two new lanes parallel to the existing lanes from I-70 to US-59 and improves at-grade intersections to grade separated interchanges to create a four-lane freeway.

C8: Widen K-10 to six lanes from approximately E. 1750 Road (eastern end of the South Lawrence Trafficway) to I-435. The two new lanes would be constructed as high occupancy toll lanes where transit and carpool vehicles travel for free but single-occupant vehicles pay a toll. HOT lanes provide the KDOT with a great deal of flexibility in managing future traffic operations along the highway.

C9: This strategy would widen the section between K-7 and I-435 to eight lanes. The high occupancy toll lanes from strategy C8 would be maintained through this area.

C21: Construct the phases of the Gateway Interchange improvements that remain following the T-WORKS project. The Gateway Interchange extends along K-10/I-435 from Ridgeview Road to US-69 and includes the interchanges with I-35 and the north-south segment of I-435.
### Recommended Corridor Strategies and Evaluation Package

**Recommended Strategy**

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Overall Score</th>
<th>Mobility (15.5)</th>
<th>Safety (16.0)</th>
<th>Regional Prosperity (12.5)</th>
<th>Financial Resources (15.0)</th>
<th>Choice (8.5)</th>
<th>Environment (9.0)</th>
<th>Public Health (7.0)</th>
<th>Social Equity (7.5)</th>
<th>Livability (9.0)</th>
<th>Total Cost</th>
<th>Benefit Ratio**</th>
<th>Decade 2020-2030</th>
<th>Decade 2030-2040</th>
</tr>
</thead>
</table>
K-68 Corridor

Length: 25 miles
Key Development: Louisburg Cider Mill

**Figure 14-12: Traffic Volumes along K-68**

### Average Daily Traffic Volumes

<table>
<thead>
<tr>
<th>Year</th>
<th>2010 Traffic Volumes</th>
<th>2040 Forecasted Traffic on Existing plus Committed Network</th>
<th>2040 Forecasted Traffic with Recommended Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,200</td>
<td>2,200</td>
<td>2,200</td>
</tr>
<tr>
<td></td>
<td>15% trucks</td>
<td>12% trucks</td>
<td>3% trucks</td>
</tr>
</tbody>
</table>

**Legend**

- **Not Congested**: Traffic is smooth with steady flow.
- **Moderately Congested**: Traffic is slow with occasional delays.
- **Congested**: Traffic is moderate with frequent delays.
- **Severely Congested**: Traffic is almost stopped with frequent delays.

**K-68 Profile**

- **K-68 Corridor Profile**
- **N**

**Corridor Studied**

- **Access Management Plans**
- **Key Development**
- **Park & Ride**
DESCRIPTION OF THE CORRIDOR
The K-68 corridor is a 2-lane, east-west highway that extends across Miami County. It provides connections between Paola and Louisburg in the 5-County region with the City of Ottawa and I-35 to the west. It also connects across the state line into Missouri where the route designation changes to M-2. Missouri highway M-2 travels eastward to Harrisonville, MO. This route is the next major road connection, south of 135th Street, between US-69 and I-49/US-71. It is the only east-west highway crossing the 5-County region south of I-435. As this is a bi-state corridor some improvements may require investments on both sides of the state line. And as would be expected, different states may have different priorities for funding transportation improvements.

Highway K-68 is a two-lane rural highway that has local concerns for the safe and efficient flow of traffic. These issues have been addressed in a separate K-68 Corridor Plan, which was collaboratively developed by KDOT and the surrounding communities (http://www.ksdot.org/pdf_files/K-68-Corridor-Management-Plan.pdf).

KEY DEVELOPMENT
As growth and development continues to move south from Johnson County into northern Miami County, K-68 will have an ever increasing role for providing traffic movement and supporting growth for the cities located along this corridor. K-68 provides one of the few east-west travel corridors in Miami County. While no large major activity centers are currently located along this corridor, both Louisburg and Paola are locating new development adjacent to K-68. Although population and employment growth are relatively slow, there is a need to manage how future development would access K-68 in order to maintain mobility and travel efficiency on one of the few direct east-west travel routes. Commercial distribution centers and warehouses along this corridor use this route to access I-35 for distribution.

TRAFFIC
Projected growth along the corridor will result in increased traffic on K-68. There are currently no projected bottlenecks or congestion points; however, traffic must slow down considerably when traveling through the town of Louisburg.

The K-68 Corridor Plan addressed land uses, traffic access and roadway improvement needs. This corridor received a highway preservation allocation as part of the T-WORKS funding program. The total trips on K-68 are expected to increase from 6,300 seen today to around 10,000 in the year 2040.

CORRIDOR CONNECTIONS

There is no significant interaction with other key corridors in the 5-County region or congestion impact expected here in the future.

EXPANSION & MODERNIZATION T-WORKS PROJECTS CURRENTLY FUNDED FOR CONSTRUCTION
In May 2010, the Kansas Legislature passed Transportation Works for Kansas (T-WORKS), an $8 billion 10-year transportation program. T-WORKS is designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Table 14-19 shows the expansion and modernization projects that are funded through T-WORKS along the K-68 corridor.

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Location</th>
<th>Description</th>
<th>Construction Cost</th>
<th>Planned Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>K-68 from US-169 to Louisburg</td>
<td>Preliminary engineering work for 4-lane expressway/evaluate, prioritize and build interim improvements</td>
<td>$10 M</td>
<td>2018</td>
</tr>
</tbody>
</table>
RECOMMENDED STRATEGIES

The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the K-68 corridor.

A variety of strategies were considered to improve current and future traffic operations on K-68 through the year 2040. These strategies are shown in Table 14-20. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the K-68 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in Smillions.

### Demand Management Strategies

These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

**D11: Construct a Park & Ride facilities near the US-69 interchanges with 135th Street and with K-68.** Park & Ride facilities promote carpooling and transit use while offering the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

### System Management Strategies

These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

**S17: Implement access management strategies from the K-68 Corridor Study.** These include:
- Interim intersection upgrades (traffic signals, turn-lanes, and acceleration lanes)
- Consolidate mainline driveways
- Relocate mainline driveways/side road access
- Relocate public road connections to mainline, reconnect to frontage roads
- Relocate private driveways, reconnect to frontage roads
- Intersection and drive way consolidation
- Convert major intersections to interchanges
- Advanced right-of-way acquisition
- Close median breaks

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### Table 14-20: K-68 Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***).</th>
<th>Total Score</th>
<th>Total Cost (Smillions)*</th>
<th>Benefit Ratio**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td>Engineering Factor</td>
<td>Economic Impact</td>
<td>Community Impact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobility (15.5)</td>
<td>Safety (16.0)</td>
<td>Regional Prosperity (12.5)</td>
<td>Financial Resources (15.0)</td>
</tr>
<tr>
<td>D11 Construct Park &amp; Ride facilities near 135th and K-68</td>
<td>4.4</td>
<td>3.3</td>
<td>3.3</td>
<td>7.3</td>
</tr>
<tr>
<td>S17 Access management: follow K-68 Corridor Management Plan</td>
<td>3.9</td>
<td>7.3</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>D30 Bicycle facilities</td>
<td>3.3</td>
<td>4.4</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>D42 Construct a Park &amp; Ride facility on K-68 near US-69 and US-169</td>
<td>4.0</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>C48 Expand K-68 to a 4-lane highway from Old Kansas City Road to Metcalf Ave (in Louisburg)</td>
<td>4.0</td>
<td>5.6</td>
<td>4.4</td>
<td>3.2</td>
</tr>
<tr>
<td>C57 Intersection Capacity Improvements</td>
<td>3.9</td>
<td>3.7</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>C60 Construct Louisburg Bypass: 2-lane with interchange at US-69, 4-lane from Old KC Road to US-69</td>
<td>4.0</td>
<td>3.3</td>
<td>3.7</td>
<td>3.3</td>
</tr>
</tbody>
</table>

---

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs. **Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in Smillions. It provides a way to compare strategies. ***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
K-92/M-92 Corridor

Length: 13 miles

Key Developments:
- Downtown Leavenworth
- Fort Leavenworth
- KCI Airport

Figure 14-13: Traffic Volumes along K-92/M-92
DESCRIPTION OF THE CORRIDOR
Kansas highway K-92 and Missouri highway M-92 provide a connection from Fort Leavenworth, the City of Leavenworth, and the City of Lansing to the Kansas City International (KCI) Airport and the commercial areas in Platte County, Missouri.

K-92 and M-92 are two-lane rural highways which include a major bridge over the Missouri River. They connect to interstate highway I-29, a freeway that runs from downtown Kansas City, MO north and west past KCI airport. KDOT is currently conducting a toll-feasibility study for the K-92 bridge.

As this is a bi-state corridor some improvements may require investments on both sides of the state line. And as would be expected, different states may have different priorities for funding transportation improvements.

KEY DEVELOPMENT INFORMATION
The major activity centers along the K-92/M-92 corridor include Fort Leavenworth and the Kansas City International (KCI) Airport. Fort Leavenworth is one of the largest single users of the airport and K-92 is the primary access between the post and the airport. An airport redesign is currently being considered to consolidate the terminals.

High levels of population and employment growth is expected in Platte County north of Barry Road, just across the river in Missouri.

TRAFFIC
By the year 2040, K-92 will be congested during peak hours due to the traffic carrying capacity of a two-lane highway. The number of daily vehicle trips on the corridor is expected to rise by 23 percent by the year 2040. At this level of traffic, a four-lane facility will likely be needed.

CORRIDOR CONNECTIONS
The K-92 Bridge over the Missouri River is a key connection point between Kansas and Missouri. The next closest bridge over the river is on I-435, approximately 15 miles to the south. Travelers would either have to take K-5 to I-435 or K-7 to I-70 to I-435. The K-92 bridge is the primary route from Fort Leavenworth and Leavenworth to the Kansas City International Airport. Trips from the south side of Leavenworth and from Lansing have two options for reaching the airport and commercial areas in Platte County, MO. Drivers can choose to take K-92 to MO-92 or MO-45, or they can take K-5 to I-435 or K-7 to I-70 to I-435. Decisions on which route to take will likely depend on travel time which is impacted by the amount of future congestion or future improvements to roadways.

RECOMMENDED STRATEGIES
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on K-92/M-92 corridor.

A variety of strategies were considered to improve current and future traffic operations on K-92 through the year 2040. These strategies are shown in Table 14-21. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the time period 2020 to 2040 are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the K-92/M-92 corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in Smillions.

Increased Capacity Strategies
These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

CI8: Widen the K-92 Centennial Bridge over the Missouri River to four lanes and implement a toll in accordance with the recommendations of the toll feasibility study. Widening of M-92 would appear to be justified by growth in traffic volumes, but is under the authority of the Missouri Department of Transportation.

Table 14-21: K-92/M-92 Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Mobility (15.5)</th>
<th>Safety (16.0)</th>
<th>Regional Prosperity (12.5)</th>
<th>Financial Resources (15.0)</th>
<th>Choice (8.5)</th>
<th>Environment (9.0)</th>
<th>Public Health (7.0)</th>
<th>Social Equity (7.5)</th>
<th>Livability (9.0)</th>
<th>Total Cost (Smillions)*</th>
<th>Benefit Ratio**</th>
<th>Decade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>C18: Widen Centennial Bridge over Missouri River to 4 lanes w/ toll*</td>
<td>7.3</td>
<td>4.4</td>
<td>3.3</td>
<td>4.8</td>
<td>3.3</td>
<td>4.1</td>
<td>4.2</td>
<td>3.8</td>
<td>3.3</td>
<td>446</td>
<td>53.3</td>
<td>8.4</td>
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<tr>
<td>C22: Widen Centennial Bridge over Missouri River to 4 lanes*</td>
<td>6.6</td>
<td>4.4</td>
<td>3.3</td>
<td>4.5</td>
<td>3.3</td>
<td>4.1</td>
<td>4.2</td>
<td>3.8</td>
<td>3.3</td>
<td>422</td>
<td>44.3</td>
<td>9.9</td>
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<tr>
<td>C20: Incident management on bridge</td>
<td>6.1</td>
<td>5.6</td>
<td>3.3</td>
<td>3.6</td>
<td>3.3</td>
<td>3.6</td>
<td>3.9</td>
<td>3.8</td>
<td>3.3</td>
<td>424</td>
<td>2</td>
<td>211.9</td>
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<tr>
<td>C39: Widen Missouri 92 or Missouri 45 to 4 lanes, includes 4-lane bridge*</td>
<td>5.7</td>
<td>4.4</td>
<td>4.4</td>
<td>3.4</td>
<td>3.3</td>
<td>4.5</td>
<td>4.2</td>
<td>2.4</td>
<td>2.6</td>
<td>404</td>
<td>132</td>
<td>3.1</td>
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<tr>
<td>C55: Intersection capacity improvements</td>
<td>4.9</td>
<td>3.3</td>
<td>3.3</td>
<td>3.6</td>
<td>3.3</td>
<td>3.6</td>
<td>3.3</td>
<td>3.8</td>
<td>3.3</td>
<td>362</td>
<td>2.1</td>
<td>172.5</td>
</tr>
</tbody>
</table>

*Centennial Bridge Toll Feasibility Study on-going
*KCI Terminal location study on-going could impact the potential route for the project

*Total Cost is in 2020 dollars and includes costs for constructing/implimenting the strategy and 10 years of operation and maintenance costs.
**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in Smillions. It provides a way to compare strategies.
***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.

RECOMMENDED STRATEGIES
These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

S20: Implement an incident management plan for the K-92 Centennial Bridge. An incident management plan details a coordinated process to detect, respond to, and remove traffic incidents and restore the flow of traffic as safely and quickly as possible. Traffic incidents include crashes, vehicle breakdowns, and other events that disrupt the normal movement of traffic.
175th/199th/223rd Street Corridor

Length
- 175th Street: 12 miles
- 199th Street: 14 miles
- 223rd Street: 9 miles

Key Developments:
- BNSF Intermodal Facility
- CenterPoint Intermodal Center
- New Century Air Center

Figure 14-14: Traffic Volumes along 175th/199th/223rd Streets

2010 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T-WORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.
**DESCRIPTION OF THE CORRIDOR**

175th Street, 199th and 223rd Street are two-lane roadways that provide for east-west travel through southern Johnson County and northern Miami County. 175th Street connects with I-35 near Gardner and stretches east to its terminus at Metcalf Avenue just east of US-69. West of I-35, 175th Street becomes US-56, which is discussed on pages 87 through 89. 199th Street also intersects I-35, just to the south of Gardner, then runs east through the community of Spring Hill to its terminus at State Line Road. 223rd Street connects to K-7/US-169 on the south side of Spring Hill and continues to the east where it ends at S. Holmes Road in Missouri.

175th, 199th and 223rd Streets are each under local jurisdiction in the unincorporated portions of Johnson and Miami Counties and in the cities of Overland Park and Olathe. 175th and 199th Streets are shown in the County Arterial Road Network Plan (CARNP) as parkways.

There is an opportunity for one of these three roadways to become a connector between US-69 in Kansas and I-49/US-71 in Missouri.

**KEY DEVELOPMENT INFORMATION**

Most of the major development will occur along 175th Street and 199th Street. These streets are located in one of the fastest growing areas in the 5-County region. Major developments include the BNSF Intermodal Facility and the New Century AirCenter. By the year 2040, these corridors will be impacted by very high population growth projected in the area between I-35 and US-69. This area is likely to take on a more suburban character with some potential at key intersections for warehouse/distribution center development.

Due to continuous growth and development into southern Johnson County, the need for a new major east-west route has been extensively studied. The CARNP concluded that east-west travel movements would need to be served by improving existing roadways. 175th and 199th Streets were the two roadways identified as the primary corridors to serve this need.

Additionally, an east-west corridor through this area could possibly become a connection between US-69 in Kansas and I-49/US-71 just across the state line in Missouri. There is the potential for employment growth and increased truck traffic in this area, attributed to the BNSF Intermodal Facility just west of I-35 and the CenterPoint - KCS Intermodal Center along I-49/US-71 in Kansas City, MO, and associated warehouse developments. One of these routes could provide improved connectivity from southern Johnson County to population and employment centers in Missouri. Connectivity between US-69 and I-49/US-71 would require cooperation with the Missouri Department of Transportation. Some of this potential demand could be served by planned improvements to 199th Street, but this area should be re-evaluated in the future to track growth and manage travel demand in this corridor.

**TRAFFIC**

Projections of future traffic growth for the year 2040, on the two-lane 175th and 199th Streets, showed significant potential for congestion. Traffic volumes on 175th Street are expected to increase by 160 percent of current vehicles per day, on 199th Street traffic volumes are expected to increase by 400 percent, and on 223rd Street traffic volumes are expected to increase by 42 percent of current vehicle counts. These traffic projections are likely to put significant strain on the capacity of existing roadways.

The analysis completed as part of the 5-County Study suggests for the regional movement of traffic, not all three streets need to be widened during the study’s timeframe.

**CORRIDOR CONNECTIONS**

The 175th Street, 199th Street and 223rd Street roadways connect with the primary north-south corridors running through southern Johnson County and northern Miami County. The projection for 2040 shows significant congestion occurring at the 175th Street and I-35 interchange. There is also significant congestion projected on US-69 north of the 175th Street interchange. The at-grade intersections of K-7 with 175th and 199th could also be significantly impacted by increased future traffic flows along the two corridors. The 223rd Street connections to K-7/US-169 and to US-69 are not expected to be congested.
## RECOMMENDED STRATEGIES

The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on all three roadways.

A variety of strategies were considered to improve current and future traffic operations on 175th, 199th, and 223rd Streets through the year 2040. These strategies are shown in Table 14-22. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended during the time period 2020 to 2040 are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the 175th, 199th, and 223rd Streets corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

### Increased Capacity Strategies

These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

<table>
<thead>
<tr>
<th>C1</th>
<th>Widen 199th Street to a four-lane arterial street from US-56 to I-49/US-71. Each of the three street corridors showed the potential for increased traffic volumes that would require widening. 199th Street scored the highest of the three and is therefore recommended.</th>
</tr>
</thead>
</table>

### Table 14-22: 175th/199th/223rd Street Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>8.1</td>
<td>614</td>
<td>3.1</td>
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<td>C2</td>
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<td>S26</td>
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<td>D37</td>
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<td>C61</td>
<td>3.6</td>
<td>340</td>
<td>165</td>
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</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
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Metcalf Corridor

Length: 11 miles

Key Developments:
- Deer Creek
- Downtown Overland Park
- Corporate Woods
- Overland Park Convention Center
- Park Place
- Sprint Campus
- Town Center Plaza

Figure 14-15: Traffic Volumes along Metcalf

2010 Traffic Volumes

Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing plus Committed Network

Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during 5-WORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies

Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that 5-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.

Legend
- City Boundaries
- Body of Water
- Transit
- County Boundaries
- Land Use
- Park

Metcalf Corridor Profile
**DESCRIPTION OF THE CORRIDOR**

The Metcalf Avenue corridor provides north-south travel movement through the City of Overland Park and provides a connection to I-35 and Downtown Kansas City, Missouri.

Metcalf Avenue is a 4-lane expressway from the I-35 and I-635 interchange south to Shawnee Mission Parkway. It continues south as a 4-lane arterial street from Shawnee Mission Parkway to 87th Street, then a 6-lane arterial to just north of 119th Street. Just north of 119th Street, Metcalf changes alignment and leaves the roadway that becomes the Blue Valley Parkway. For study purposes, the south end of the Metcalf Avenue corridor extends to 135th Street. Metcalf Avenue provides access to downtown Mission, downtown Overland Park, and considerable retail activity from 87th Street south to US-69.

**KEY DEVELOPMENTS**

Major activity centers located in close proximity to the corridor include Downtown Overland Park, the Overland Park Convention Center, the Corporate Woods office park, Sprint campus and Town Center Plaza.

The age of the development located in the Metcalf corridor varies considerably with older development to the north and newer development to the south.

A major planning effort, Vision Metcalf (http://www.opkansas.org/doing-business/special-area-studies/vision-metcalf/vision-metcalf-plan/), was completed by the City of Overland Park to identify how the corridor could be redeveloped in a more dense and urban character that would support bicycle, pedestrian and transit travel. The study area of the plan stretched from Shawnee Mission Parkway to 119th street. This planned redevelopment of the corridor is an important opportunity for sustained economic growth in the 5-County region.

Year 2040 projections show some population and employment growth expected in the Mission area on the north end of the corridor. There is some employment growth projected in the area near Metcalf and 95th Street in Overland Park, and to the south of I-435.

**TRAFFIC**

The four-lane arterial portion of this route experiences peak hour traffic congestion. Year 2040 traffic forecasts reflect a similar level of traffic to that which currently exists.

**OTHER MODES**

Johnson County, the City of Overland Park and KDOT are jointly exploring a bus rapid transit project in the Metcalf corridor as one of the initial steps to encourage the redevelopment of the Metcalf corridor and to support sustainable multimodal transportation.

The Metcalf/Shawnee Mission Parkway corridor recently received a TIGER grant to fund transit infrastructure improvements including a transit signal priority system, park-and-ride locations, transit stations and pedestrian improvements.

**CORRIDOR CONNECTIONS**

The Metcalf Avenue corridor closely interacts with the principal highways of I-35, I-435 and US-69. There is currently some congestion at the Metcalf Avenue and I-35 interchange. Year 2040 projections show this area becoming more congested, potentially causing queuing at the north end of Metcalf.

Projections show US-69 becoming more congested in 2040 and traffic from Metcalf could negatively affect the interchange north of 135th Street. If US-69 and I-35 become too congested, some drivers might choose to divert from US-69 to Metcalf Avenue, adding additional traffic. I-435 is also projected to become significantly more congested and could negatively affect traffic near the Metcalf Avenue interchange.
RECOMMENDED STRATEGIES

The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the Metcalf corridor.

A variety of strategies were considered to improve current and future traffic operations on Metcalf Avenue through the year 2040. These strategies are shown in Table 14-23. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the Metcalf Avenue corridor map. A “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes.

Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

**Demand Management Strategies**

These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

D1: Implement land use and transportation strategies from the Vision Metcalf Plan. These include: redevelopment in a more dense, urban character that supports travel by walking, bicycling, and transit. The Vision Metcalf Plan objectives are as follows:

- Establish a coherent and positive identity for the Metcalf Corridor by creating a series of unique destinations.
- Enhance the economic vitality of the Corridor and city by expanding the level of residential and commercial activity in the Metcalf Corridor, thereby increasing the potential for economic activity and job creation.
- Promote a pattern of mixed and multiple-use development within the Corridor. New buildings within nodes should appropriately combine residential, commercial, and entertainment uses and encourage a balance of jobs-to-housing.
- Integrate open and green space into the Corridor by incorporating a system of parks, plazas, natural amenities, and a continuous green streetscape.
- Develop a balanced transportation system that provides multimodal travel options within the Corridor.
- Make walking easy, desirable, and convenient.
- Amend local policy to facilitate the intent of the Plan.
- Make sustainability a theme of future development and redevelopment that guides land use and transportation decisions.

D5: Expand Bus Rapid Transit Service (BRT). Service would be added to the route to the Plaza to provide more all-day service with less time between buses. Existing corridor transit service would add 20 weekday round trips, 12 Saturday daily round trips, and 10 Sunday round trips. This improved transit service would be used with BRT-like elements including enhanced vehicles, upgraded stations, and real-time information at the stations constructed from TIGER funds.

### Table 14-23: Metcalf Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***)</th>
<th>Total Score</th>
<th>Benefit Ratio**</th>
<th>Total Cost ($millions)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>Redevelopment per Vision Metcalf Plan</td>
<td>5.5</td>
<td>3.3</td>
<td>3.7</td>
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<tr>
<td>D5</td>
<td>Expand transit to Bus Rapid Transit service</td>
<td>5.5</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>D39</td>
<td>Bicycle and pedestrian facilities</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
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<td>C49</td>
<td>Intersection capacity improvements</td>
<td>5.0</td>
<td>4.4</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
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Shawnee Mission Parkway Corridor

Length: 15 miles

Key Developments:
- Gateway
- Mission Transit Center

Figure 14-16: Traffic Volumes along Shawnee Mission Parkway

2018 Traffic Volumes
Average daily traffic volumes are shown for each segment along the corridor, as well as the percentage of commercial vehicles.

2040 Forecasted Traffic on Existing plus Committed Network
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that the projects scheduled for construction during T-WORKS have been constructed.

2040 Forecasted Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.

<table>
<thead>
<tr>
<th>2018 Traffic Volumes</th>
<th>2040 Forecasted Traffic on Existing plus Committed Network</th>
<th>2040 Forecasted Traffic with Recommended Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>39,000</td>
<td>69,500</td>
<td>69,500</td>
</tr>
<tr>
<td>40,500</td>
<td>61,600</td>
<td>61,600</td>
</tr>
<tr>
<td>37,300</td>
<td>52,000</td>
<td>52,500</td>
</tr>
<tr>
<td>39,500</td>
<td>50,800</td>
<td>49,800</td>
</tr>
</tbody>
</table>

**Not Congested**
Slopes are at or near the speed limit. Ability to maneuver within the traffic stream is generally not constrained.

**Moderately Congested**
Slopes begin to show, making it difficult to maneuver within the traffic stream. Traffic flow is occasionally impacted.

**Congested**
Traffic operates at or below the capacity of the roadway. Measures to improve traffic flow are recommended.

**Severely Congested**
Traffic demand exceeds the roadway's capacity, causing severe delays. Measures to improve traffic flow are required.
DESCRIPTION OF THE CORRIDOR

The Shawnee Mission Parkway corridor provides east-west travel movement through seven cities in northeast Johnson County. It also provides a connection to I-35, I-435, K-7 and Rainbow Boulevard (US-169).

Shawnee Mission Parkway is a four lane arterial from the Kansas-Missouri state line to the I-35 interchange. Between the I-35 interchange and Pflumm Road in Shawnee it is a six lane arterial. West of Pflumm Road, the corridor returns to four lanes and is designated as an expressway.

KEY DEVELOPMENT INFORMATION

Shawnee Mission Parkway serves as a primary east-west commercial corridor through Johnson County.

The anticipated East Gateway Development, at the intersection of Roe Avenue and Shawnee Mission Parkway in the city of Mission, is expected to be a major future generator of travel along the corridor. In accordance with this development, there is some population and employment growth expected in the area between the I-35 interchange and Pflumm Road. Shawnee Mission Parkway express bus route.

Other places of potential future growth along the corridor include the area between Quivira Road and Nieman Road in Shawnee and just to the east of the I-435 interchange also in Shawnee. Some employment growth is also anticipated at the Shawnee Mission Parkway and I-435 interchange. At the intersection of Shawnee Mission Parkway and K-7 there is also very high population and employment growth projected in the future.

TRAFFIC

The Shawnee Mission Parkway corridor currently experiences peak hour congestion from the state line to I-35. Additional congestion is projected for the year 2040 from the state line to Quivira Road and from I-435 to Woodward Road.

OTHER MODES

The Metcalf/Shawnee Mission Parkway corridor has been studied and recently received a TIGER grant to fund transit infrastructure improvements including a transit signal priority system, park-and-ride locations, transit stations and pedestrian improvements. This will include a major transit center in the City of Mission. A ridership forecast projects around 1100 riders per day on the Shawnee Mission Parkway express bus route.

CORRIDOR CONNECTIONS

The Shawnee Mission Parkway corridor interacts with the area between Quivira Road and Nieman Road in Shawnee and just to the east of the I-435 interchange.

A variety of strategies were considered to improve current and future traffic operations on the corridor through the year 2040. These strategies are shown in Table 14-24. Strategies that were not recommended during the 2020 to 2040 timeframe are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the Shawnee Mission Parkway corridor maps. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added system capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions. The Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

Table 14-24: Shawnee Mission Parkway Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***), Mobility (15.5), Safety (16.0), Regional Prosperity (12.5), Financial Resources (15.0), Choice (8.5), Environment (9.0), Social Equity (7.5), Livability (9.0)</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
</tr>
</thead>
<tbody>
<tr>
<td>D2: Expand transit service</td>
<td>5.8 4.4 3.7 7.4 5.5 5.5 5.0 4.5 6.8</td>
<td>545</td>
<td>9.5</td>
<td>57.1</td>
</tr>
<tr>
<td>S22 Traffic signal optimization</td>
<td>4.8 4.4 3.3 6.0 3.3 3.6 3.8 3.3</td>
<td>418</td>
<td>1</td>
<td>417.7</td>
</tr>
<tr>
<td>D33 Bicycle and pedestrian facilities</td>
<td>3.3 3.3 3.3 3.4 5.5 4.5 3.9 4.5 6.8</td>
<td>403</td>
<td>8</td>
<td>50.4</td>
</tr>
<tr>
<td>C52 Intersection capacity improvements</td>
<td>4.8 3.7 3.3 3.4 3.3 4.1 3.4 3.8 3.3</td>
<td>370</td>
<td>21</td>
<td>17.6</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.

Other places of potential future growth along the corridor include the area between Quivira Road and Nieman Road in Shawnee and just to the east of the I-435 interchange.

A variety of strategies were considered to improve current and future traffic operations on the corridor through the year 2040. These strategies are shown in Table 14-24. Strategies that were not recommended during the 2020 to 2040 timeframe are shaded in blue; strategies that were not recommended during the 2020 to 2040 timeframe are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the Shawnee Mission Parkway corridor maps. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added system capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions. The Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.

Table 14-24: Shawnee Mission Parkway Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Recommended Corridor Strategies and Evaluation Scores</th>
<th>Economic Impact</th>
<th>Community Impact</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
</tr>
</thead>
<tbody>
<tr>
<td>D2: Expand transit service</td>
<td>Operate and maintain existing roads, bridges, traffic signals, transit</td>
<td>5.8 4.4 3.7 7.4</td>
<td>5.5 5.5 5.0 4.5</td>
<td>545</td>
<td>9.5</td>
<td>57.1</td>
</tr>
<tr>
<td>S22 Traffic signal optimization</td>
<td>4.8 4.4 3.3 6.0 3.3 3.6 3.8 3.3</td>
<td>418</td>
<td>1</td>
<td>417.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D33 Bicycle and pedestrian facilities</td>
<td>3.3 3.3 3.3 3.4 5.5 4.5 3.9 4.5 6.8</td>
<td>403</td>
<td>8</td>
<td>50.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C52 Intersection capacity improvements</td>
<td>4.8 3.7 3.3 3.4 3.3 4.1 3.4 3.8 3.3</td>
<td>370</td>
<td>21</td>
<td>17.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
State Avenue Corridor

Length: 16 miles

Key Developments:
- Cerner
- Cricket Wireless Amphitheater
- Community America Ballpark
- Downtown Kansas City, Kansas
- Hollywood Casino
- Indian Springs
- Kansas City Kansas Community College
- Kansas Speedway
- Metro Center
- Schlitterbahn Waterpark
- Village West

**Figure 14-17: Traffic Volumes along State Avenue**

<table>
<thead>
<tr>
<th>2010 Traffic Volumes</th>
<th>13,700</th>
<th>11,700</th>
<th>12,200</th>
<th>15,000</th>
<th>8,400</th>
<th>3,600</th>
</tr>
</thead>
<tbody>
<tr>
<td>2040 Forecasted Traffic on Existing plus Committed Network</td>
<td>16,500</td>
<td>20,000</td>
<td>18,300</td>
<td>19,000</td>
<td>14,900</td>
<td>11,300</td>
</tr>
<tr>
<td>2040 Forecasted Traffic with Recommended Strategies</td>
<td>19,500</td>
<td>44,700</td>
<td>31,000</td>
<td>19,000</td>
<td>17,000</td>
<td>11,000</td>
</tr>
</tbody>
</table>

**Legend**
- Not Congested: Speeds are at or near the speed limit. Ability to maneuver within the traffic stream varies from unimpeded to somewhat restricted.
- Moderately Congested: Speeds begin to decline. Freedom to maneuver within the traffic stream is seriously limited.
- Congested: Traffic operates at or below the capacity of the roadway. Speeds are slow (< 15 mph). Freeway and/or providing through-traffic is impeded. Congestion can produce a serious breakdown in traffic flow with substantial backup of traffic.
DESCRIPTION OF THE CORRIDOR
The State Avenue corridor provides east-west travel movement through Wyandotte County from K-7 highway to I-70 in Downtown Kansas City, Kansas. The roadway continues west of K-7 as US-24/40. State Avenue provides a close, parallel route to supplement traffic movement on I-70.

State Avenue is a four lane arterial, with a center turn lane or channelized medians along most of its length. East of K-7, State Avenue is primarily rural in nature and west of K-7 it is in an urbanizing or urban area.

KEY DEVELOPMENT INFORMATION
The State Avenue corridor supports transportation access to the major regional activity center developing near the I-70 and I-435 junction. The 400-acre Village West development in this area now includes recreational, entertainment and retail activities including the Kansas Speedway, Sporting Park (Major League Soccer Venue), Community America Ballpark, Cabela’s, Nebraska Furniture Mart, Great Wolf Lodge, and Hollywood Casino. The development also includes the Legends Shopping Center, with around 750,000 square feet of retail. Upon completion, the project is predicted to create 8,300 new jobs in Wyandotte County and is estimated to produce 37,800 average daily auto trips.

To the east of I-435 along State Avenue, the Schlitterbahn Vacation Village is a 300-acre outdoor family destination and resort estimated to produce 34,700 daily auto trips, with the majority during summer weekends. Downtown Kansas City, Kansas is a major activity center at the eastern end of the State Avenue Corridor. The corridor also provides access to the Fairfax industrial district to the northeast of Downtown Kansas City, Kansas. The Fairfax district includes a number of industrial employers, with some potential for future growth and redevelopment.

The primary area of year 2040 population growth is located between K-7 and I-435, directly surrounding the Village West development. There is also some population and employment growth expected just to the east of I-435 along State Avenue.

TRAFFIC
The current level of peak hour traffic along the State Avenue corridor does not show congestion; however, some queuing issues exist around intersections serving the Village West development area. Conditions will worsen as the area continues to develop and additional congestion is projected for the year 2040. Queuing will become an even more significant problem in the area. A study of the I-70/Village West area has recommended the construction of an interchange at State Avenue/Village Parkway and an improved interchange at I-435/State Avenue.

OTHER MODES
A bus rapid transit (BRT) route along State Avenue is currently under development. The route will likely increase the transit mode share and provide improved accessibility to Village West, Downtown Kansas City, Kansas and destinations in between. A potential transit hub and redevelopment opportunity may be located on the site of the former Indian Springs Shopping Center at the intersection of I-635 and State Avenue. A ridership forecast projects around 2,400 riders per day on the planned State Avenue BRT.

CORRIDOR CONNECTIONS
The State Avenue corridor interacts with K-7, I-435, I-635 and I-70 along its east-west route through Wyandotte County. Significant capacity issues are expected in the year 2040 near the I-435 and State Avenue interchange. Queuing issues can be expected to get worse in this area with the additional traffic. There is also some congestion currently at the I-635 and State Avenue interchange.
The continued maintenance and operation of existing roadways and transit services must occur before other strategies are implemented on the State Avenue corridor.

A variety of strategies were considered to improve current and future traffic operations on State Avenue through the year 2040. These strategies are shown in Table 14-25. Strategies that are recommended as part of a corridor package are shaded in blue; strategies that were not recommended are not shaded. Each strategy was assigned an identifier code of a letter and number that are shown on the State Avenue corridor map. An “S” indicates a system management strategy, a “D” indicates a demand management strategy, and a “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

**System Management Strategies**
These strategies seek to enhance traffic flow and reduce congestion through better management and operation of the existing transportation facilities.

S15: Optimize the traffic signal phasing, timing, and coordination along State Avenue from 130th Street to 38th Street. This strategy seeks to minimize delays to drivers traveling along this corridor.

**Demand Management Strategies**
These strategies address transportation needs by reducing the number of vehicles during the peak travel periods.

D3: Expand the transit service along this corridor. Additional trips would be added to provide a service frequency level typically provided by Bus Rapid Transit (BRT) services across the country. This route is the primary service spine of transit service in Kansas City, KS.

D6: Construct Park & Ride facilities on State Avenue near K-7 and near I-435. Park & Ride facilities promote carpooling and transit use while offering the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

**Increased Capacity Strategies**
These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

C37: Construct a new interchange at State Avenue and Village West Parkway to address growing congestion and to support continued economic development.

C33: Reconfigure the I-435 and State Avenue interchange. This will increase the throughput of traffic on State Avenue and reduce congestion.

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### Table 14-25: State Avenue Corridor Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***)</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
<th>Decade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate and maintain existing roads and bridges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D3: Expand transit service to include BRT along State Ave.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D25: Bicycle and pedestrian facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C37: New interchange at State Avenue and Village West Parkway</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S15: Traffic signal optimization from 130th Street to 38th Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C33: Reconfigure the I-435 and State Avenue interchange</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D6: Construct Park &amp; Ride facilities near K-7 and I-435</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C51: Intersection capacity improvements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Note:**
*Total Cost is in 2020 dollars and includes costs for constructing/Implementing the strategy and 10 years of operation and maintenance costs.** Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $millions. It provides a way to compare strategies.*** The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
Western Johnson County North-South Arterial

Length: 8 miles

Key Developments
- Sunflower Army Ammunition Plant Redevelopment
- BNSF Intermodal Facility and Logistics Park

Figure 14-18: Traffic Volumes along Western Johnson County North-South Arterial

2040 Forecastsed Traffic with Recommended Strategies
Forecasted average daily traffic volumes from the 5-County travel demand model are shown for each segment along the corridor. It is assumed that T-WORKS projects have been constructed and that the recommended strategies from the 5-County Regional Transportation Study have been implemented.
**CONCEPTUAL ALIGNMENT**

A corridor for a north-south arterial street was studied as an alternative to a potential outer loop. The Comprehensive Arterial Road Network Plan (CARNP) for Johnson County includes a north-south arterial street. This corridor is shown as the shaded area in the corridor map. The dashed line on the map represents the alignment that was analyzed using the 5-County Travel Demand Model; this alignment is for general study purposes only.

The north end of the corridor is the existing Evening Star Road interchange on K-10 near Eudora. Going south from K-10, the alignment veers to the east and passes through the western side of the former Sunflower Army Ammunition Plant redevelopment property. The corridor then follows portions of Edgerton Road and Sunflower Road to a connection at the recommended new interchange at US-56 and 199th Street between the Cities of Edgerton and Gardner.

**KEY DEVELOPMENT INFORMATION**

For trips bound for the west, some of the trucks traveling to and from the new BNSF Intermodal Facility may seek alternatives to using the heavily traveled and urbanized I-35 and I-435 to access K-10. The intermodal facility is expected to generate a total of 7,000 truck trips per day with only approximately two percent traveling to the west. If the former Sunflower Army Ammunition Plant property redevelops as planned, a high volume of traffic will be generated. The potential North-South Arterial would be a major route accessing this property.

**TRAFFIC**

Travel demand modeling for this corridor assumed the potential population and employment growth along K-10, in the Sunflower redevelopment site, and near the BNSF Intermodal Facility. The model predicts that the North-South Arterial would carry approximately 13,900 vehicles per day in the year 2040.

**OTHER MODES**

There are no other modes planned for this corridor.

**CORRIDOR CONNECTIONS**

The potential North-South Arterial would provide a new connection between K-10 and US-56 in western Johnson County. Both K-10 and US-56 provide east-west connections across the 5-County region.

**RECOMMENDED STRATEGY**

The recommended strategy was to construct a new 4-lane arterial in western Johnson County. This strategy is shown in Table 14-26. Each strategy is assigned an identifier code of a letter and a number that is shown on the corridor map. A “C” indicates an added capacity strategy.

The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in Smillions.

**INCREASED CAPACITY STRATEGIES**

These strategies increase the traffic-carrying capacity of a roadway through adding lanes, modifying interchanges, and constructing new roadways.

**C16: Construct an improved 4-lane arterial street from K-10 south to US-56.** The alignment would begin at the existing K-10 and Evening Star Road interchange and go south through the former Sunflower Army Ammunition site then using Edgerton Road and Sunflower Road to connect to a recommended interchange at US-56 and 199th Street.

---

**Table 14-26: Western Johnson County North-South Arterial Corridor Strategy Package**

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Desired Outcomes (weighting factor***</th>
<th>Total Score</th>
<th>Total Cost ($millions)*</th>
<th>Benefit Ratio**</th>
</tr>
</thead>
<tbody>
<tr>
<td>C16</td>
<td>Mobility (15.5) Safety (16.0) Regional Prosperity (12.5) Financial Resources (15.0) Choice (8.5) Environment (9.0) Public Health (7.0) Social Equity (7.5) Livability (9.0)</td>
<td>460</td>
<td>136</td>
<td>3.4</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implmenting the strategy and 10 years of operation and maintenance costs. **Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in Smillions. It provides a way to compare strategies. ***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
Potential Outer Loop Corridor

Length: 75 miles

Key Developments
- Fort Leavenworth
- Sunflower Army Ammunition Plant Redevelopment
- BNSF Intermodal Facility and Logistics Park

Figure 14-19: Traffic Volumes along a Potential Outer Loop
The need for an outer loop has been discussed by the Johnson County Commission for several years. Johnson County continues to grow to the west along K-10 Highway and to the southwest along I-35 and there are limited connections between these two freeways. There are key developments either planned or underway that have the potential to significantly alter travel patterns in the area beyond the existing I-435 loop. These include the planned redevelopment of the Sunflower Army Ammunition Plant near De Soto and the development of the BNSF Intermodal Facility & Logistics Park in Edgerton. There has also been interest in improving the commuter connections between Johnson County and Cass County, Missouri. The potential outer loop is a strategy which could provide additional routing options for traffic within the south and west portions of the Kansas City metro area and open up new areas to urban development.

All parties involved in the 5-County Regional Transportation Study process recognize that there will be significant challenges that need to be addressed before building a new outer loop or some segments of it. A new outer loop would be very expensive to build; table 14-27 provides details about how much each segment would cost to build. The costs are high enough that building an outer loop would impact the ability to deliver other projects in the 5-County Region. A detailed toll feasibility study would need to be completed if toll financing were to be used to pay for a portion of project development and operations costs. Finding a suitable alignment for an outer loop would require the need to balance existing environmental constraints (e.g., locations of natural features such as the Kansas River, Hillsdale Lake and land reserved for the future development of Mildale Park & Big Bull Creek Park) with emerging high impact developments which could provide additional routing options for traffic.

CONCEPTUAL ALIGNMENT

A conceptual alignment for a potential outer loop was selected for analysis purposes within a general corridor. The general corridor connects K-7/US-73 northwest of the City of Leavenworth to I-70, then to I-35, and finally to I-49/US-71 in Missouri.

The potential route analyzed during the study would be a new 4-lane freeway that is shown on the corridor map on the previous page. The dashed line depicted on the map represents an approximate alignment that was used for travel demand modeling purposes. The path shown on the map attempts to avoid existing development, parks, lakes, and other established areas.

For analysis purposes, the potential outer loop was evaluated both as individual segments and as a whole. This was done to identify costs, forecasted traffic use, and benefits of each segment of new roadway. In addition, the section from I-70 to I-49/US-71 was analyzed as a toll facility to determine the impacts on traffic.

**Segment 1: K-7/US-73 to I-70**

This segment would connect K-7/US-73, northwest of the City of Leavenworth, to I-70 (the Kansas Turnpike). For travel demand modeling purposes, interchanges were assumed to be located at selected major roadways. Interchanges were assumed at K-7/US-73 approximately one mile west of 20th Street, at K-92, at Eisenhower Road, at K-16 approximately one mile west of US-24/40 to avoid existing development, at US-24/40 south of Tonganoxie, and at I-70. The interchange at I-70 would require major reconstruction to a “system” interchange that would provide appropriate connections between two freeway facilities.

**Segment 2: I-70 to K-10**

For modeling purposes, interchanges were assumed at I-70, K-32, and K-10. One of the major challenges in this section is crossing the Kansas River and associated floodplain. This would require a long and costly bridge to span this area. A second challenge is the construction of a new system interchange at K-10. With existing K-10 interchanges at E. 2300 Road and at Evening Star Road there is not sufficient spacing for a new interchange. Therefore, it would be necessary to construct an interchange that could provide the system-to-system connections for two freeways as well as the service connection with one or both local roads. This would significantly increase the cost of an outer loop and K-10 interchange.

**Segment 3: K-10 to I-35**

This segment would pass near or through the west edge of the former Sunflower Ammunition Plant and continue south near the county line between Johnson and Douglas Counties to a new interchange with I-35. For modeling purposes, interchanges were assumed at K-10, an access road serving the Sunflower redevelopment property, 159th Street, US-56, and I-35. The route would likely pass west of the City of Edgerton to a new system interchange on I-35 approximately two miles west of Sunflower Road. An alignment between Edgerton and Gardner was not selected due to the complexity of routing around obstacles near the Intermodal Facility such as the new interchange on I-35 with Homestead Lane, Johnson County parkland, a quarry, and Edgerton’s sewage treatment facilities.

**Segment 4: I-35 to US-69**

This segment would connect I-35 to US-69 in northern Miami County. For modeling purposes, the alignment was assumed to pass north of Hillsdale Lake and south of the City of Spring Hill. Interchanges were assumed at I-35, K-7/US-169, and US-69. The challenge for this segment would be to finalize an alignment that would minimize environmental impacts and avoid existing development.

**Segment 5: US-69 to I-49/US-71**

This segment would connect US-69 to I-49/US-71 in Missouri. For modeling purposes interchanges were assumed at US-69 and at I-49/US-71.

**KEY DEVELOPMENT INFORMATION**

Leavenworth County could benefit from an outer loop that provided a connection to I-70 along the western side of the county. This new roadway may relieve traffic congestion on K-7 in the cities of Leavenworth and Lansing.

If the former Sunflower Army Ammunition Plant is redeveloped as planned, there could be a large increase in traffic generated from that area. Travel demand would increase considerably in this area; our analysis shows that most travelers would connect to K-10 and to I-70. Currently, development of the site has slowed until environmental issues can be addressed.

Southwest Johnson County will soon be home to the 1,000 acre BNSF Intermodal Facility and Logistics Park (IMF/LP) which includes plans for up to 7 million square feet of warehouse and distribution center development on site. There is realistic potential for another 9 million square feet of warehouse and distribution center development between 191st Street and I-35 just south of the BNSF IMF/LP site. The BNSF IMF/LP will generate 7,000 truck trips each day at build-out. If additional areas are developed south of the IMF/LP, the truck trips in this area will be even higher. The majority of the trucks will use I-35 to access markets in metropolitan Kansas City and beyond (e.g., Saint Louis, Omaha, Des Moines). The potential outer loop could benefit some trucks destined for Lawrence and Topeka who wish to avoid the following routes: I-35, K-7 and I-435. There may also be potential for one to two million square feet of commercial development in this area as well.

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Table 14-27: Types of Transportation Strategies

<table>
<thead>
<tr>
<th>Section</th>
<th>Cost (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-7/US-73 (west of Leavenworth) to I-70</td>
<td>317</td>
</tr>
<tr>
<td>I-70 to K-10</td>
<td>339</td>
</tr>
<tr>
<td>K-10 to I-35</td>
<td>674</td>
</tr>
<tr>
<td>K-10 to 159th Street</td>
<td>847</td>
</tr>
<tr>
<td>159th Street to US-56</td>
<td>521</td>
</tr>
<tr>
<td>US-56 to I-35</td>
<td>159th Street to US-56</td>
</tr>
<tr>
<td>I-35 to K-7/US-169</td>
<td>847</td>
</tr>
<tr>
<td>K-7/US-169 to US-69</td>
<td>521</td>
</tr>
<tr>
<td>US-69 to US-71</td>
<td>521</td>
</tr>
</tbody>
</table>

Potential Outer Loop Corridor
TRAFFIC

The travel demand model assumes the population and employment growth that will occur by the year 2040 along the K-10 Corridor, at the Sunflower Ammunition Plant redevelopment site, and the BNSF Intermodal Facility and Logistics Park. Additional population and employment growth was assumed along the potential outer loop.

As shown in Figure 14-19, the model predicted that travel demand for the potential outer loop would vary widely by segment of roadway. The highest demand was forecasted for the segment between I-70 and K-10 with approximately 34,000 vehicles per day. If the west leg of the K-10, South Lawrence Trafficway were constructed, the volume of traffic using the outer loop from I-70 to K-10 would drop significantly. The segment from K-16 to I-70 is forecasted to carry 12,000 vehicles per day and the segment from K-10 to the access for the Sunflower Ammunition Plant redevelopment property would carry 11,000 vehicles per day. Future traffic volumes on the remaining segments of the outer loop vary between 3,300 and 8,800 vehicles per day. To put these traffic volumes in perspective, a four-lane freeway has the capacity to accommodate 8,000 vehicles per hour.

The section of the potential outer loop from I-70 to I-49/US-71 was also analyzed as a toll road. When tolls were included, traffic use dropped significantly. The segment from I-70 to K-10 dropped from 34,000 vehicles per day to 22,000. Other segments saw reductions in traffic that varied from approximately 50% to 90%.

OTHER MODES

No other modes such as transit or bicycle facilities are assumed for the potential outer loop. However, any new freeway creates a barrier to pedestrians and bicyclists who wish to cross the roadway. If an outer loop were to be constructed, these needs should be considered. The Kansas River also creates a barrier to bicycle and pedestrian traffic. If a new outer loop were constructed, the needs of these modes would need to be considered, although the existing bridges over the river may provide a better crossing point.

OTHER STUDIES

Johnson County completed a study of the 21st Century Parkway in 1995. The Johnson County Commission abandoned this proposed project due to local opposition. After this study, Johnson County put into place a Comprehensive Arterial Roadway Network Plan (CARNP) that would enhance the existing road corridors in order to meet anticipated travel needs.

The Mid-America Regional Council (MARC), at the request of Johnson County, completed a study of the South Metro Connector in 2007. The project was abandoned due to opposition from residents in southeast Johnson County.

KDOT, in partnership with MARC, Johnson County, Gardner, and Edgerton is currently preparing an Area Plan for Southwest Johnson County. The study will examine alternatives for the three corridors included in the CARNP plan that were truncated by the construction of the BNSF Intermodal Facility: 191st Street, Four Corners Road, and Waverly Road. This transportation and land use study will be completed in the Fall of 2013. The study will cover an approximately 22 square mile area near the BNSF Intermodal Facility. Key components of the study/plan are:

1. An update to the Johnson County Arterial Roadway Network Plan with recommendations and capital program phasing for additional transportation system improvements;
2. Identification and analysis of issues associated with the potential alignment of US-56 along 199th Street from Edgerton to I-35;
3. A bicycle/pedestrian trail plan/concept plan for Johnson County Parks District land in the area with connections between Edgerton, Gardner, and Hillsdale Lake in Miami County;
4. A land use/transportation planning software to ensure that planned developments will not exceed the capacity of the transportation system;
5. A natural resource component with Best Management Practices (MARC’s Eco-Logical) to protect Hillsdale Lake and JOCO Parkland as development occurs.

CORRIDOR CONNECTIONS

A potential outer loop would increase the connectivity of major highways in the south and west portions of the 5-County Study region. However, when evaluating the potential outer loop it appears that the service would provide for regional traffic movements that are redundant to other existing or planned highways.

- An outer loop would provide a more direct connection between I-70 west of the Kansas City metropolitan area and I-49/US-73 to the south of the metro area. However, the anticipated travel demand from I-70 to I-49/US-71 is low and this movement is adequately served by other regional roadways.
- An outer loop was evaluated to determine whether it would provide relief for I-35 from traffic that will be generated by the BNSF Intermodal Facility. Findings show that 85 percent of the traffic generated by the BNSF Intermodal Facility have destinations that make travel northeast along I-35 the most attractive route.
- The outer loop segment from I-70 to K-10 would serve a significant volume of traffic that desires to travel between I-70 west of the City of Lawrence and southern Johnson County. However, this travel movement will be served by the completion of the east leg of the K-10, South Lawrence Trafficway (SLT) that will be constructed as a four-lane freeway during the next few years. Therefore, upgrading the west leg of the SLT to a four-lane freeway is a more cost effective means of serving this travel movement and one with significantly less impact on environmental resources.
- The section of an outer loop from I-70 north to K-7/US-73 northwest of the City of Leavenworth is a roughly parallel corridor to that of K-7/US-73, which is an existing expressway that could more cost effectively be improved to a freeway.

The impact to existing development must be considered as well when evaluating the new connections provided by an outer loop. Given current development and growth plans, the most likely source of population and employment growth along an outer loop would come from the relocation of existing development. It is likely that an outer loop would require a large investment in public infrastructure, consume environmental resources, and lessen the sense of connection to the Kansas City metropolitan area. A new outer loop does not align with the regional priorities established in this study process by public officials from the 5-County region nor does it align with the vision for growth developed by either the Metropolitan Planning Organizations. However, local priorities established by the various city and county governments may result in different recommendations.

As part of the 5 County Regional Transportation Study, the impact of strategies in one corridor was evaluated against strategies in other corridors. Regarding the potential outer loop, strategies in several other corridors were examined. These are as follows:

1. East-west arterial road improvements along 199th Street from US-56 to I-49/US-71 (see pages 107-109) scored higher than any other capacity project in the 5-County region.
2. North-south arterial road improvements following an alignment that uses portions of Sunflower Road/Edgerton Road/Evening Star Road from US-56 to K-10 (see pages 121-122) also scored well.
3. Reconstructing the US-56 & 199th Street intersection as a grade-separated interchange is an important improvement from a safety and traffic operations standpoint that scored well (see pages 87-89).
4. The completion of the South Lawrence Trafficway (SLT) as a freeway scored well. This includes both the extension of K-10 to the east along the 32nd Street alignment from US-59 east to Noria Road as a freeway. It also includes the addition of two lanes along K-10 from the Lecompton Toll Plaza south to US-59 and the conversion to a freeway. (see pages 97-100).
5. The conversion of K-7 to a freeway from I-70 to K-10 and arterial improvements on K-7 from K-10 to I-35 scored well (see pages 93-96).

Together, these strategies provide solutions in a more cost effective manner and in a manner that better addresses identified traffic issues than a potential outer loop.
The table shows how each strategy scored for the criteria used to evaluate each of the 9 Desired Outcomes. Stakeholders determined that the 9 Desired Outcomes should be used in making transportation investment decisions. The total score for each strategy was determined by multiplying the individual outcome score by a weighting factor that was established by stakeholders for that desired outcome. The total cost is given in year 2020 dollars and includes the construction/implementation cost and 10 years of maintenance/operation cost. The Benefit Ratio was determined by dividing the Total Score by the Total Cost in $millions.

As an alternative to a new outer loop, two arterial street improvement strategies are recommended:

C1: Widen 199th Street to a four-lane arterial street from US-56 to I-49/US-71. Each of the three street corridors showed the potential for increased traffic volumes that would require widening. 199th Street scored the highest of the three and is therefore recommended.

C16: Construct an improved 4-lane arterial street from K-10 south to US-56. The alignment would begin at the existing K-10 and Evening Star Road interchange and go south through the former Sunflower Army Ammunition site then using Edgerton Road and Sunflower Road to connect to a recommended interchange at US-56 and 199th Street.

At this time no further activity is warranted and is not recommended; however, understanding the potential for changes in development and traffic needs the Outer Loop concept can be revisited through the local consult process if deemed necessary.

Table 14-28: Potential Outer Loop Strategy Package

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Recommended Corridor Strategies and Evaluation Scores</th>
<th>Total Cost (in Millions)*</th>
<th>Benefit Ratio**</th>
<th>Decade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desired Outcomes (weighting factor***), Total Score</td>
<td></td>
<td></td>
<td>2020-2030</td>
</tr>
<tr>
<td></td>
<td>Mobility (15.5), Safety (16.0), Regional Prosperity (12.5), Financial Resources (15.0), Choice (8.5), Environment (9.0), Public Health (7.0), Social Equity (7.5), Livability (9.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Widen 199th Street from a 2-lane to a 4-lane arterial street from US-56 to I-49/US-71</td>
<td>8.1</td>
<td>5.0</td>
<td>10.0</td>
</tr>
<tr>
<td>C16</td>
<td>Construct North-South 4-lane arterial along Sunflower Road/Edgerton Road/Evening Star Road from US-56 to K-10</td>
<td>7.1</td>
<td>4.4</td>
<td>7.3</td>
</tr>
<tr>
<td>C19</td>
<td>New Interchange at US-56 and 199th Street</td>
<td>4.6</td>
<td>6.5</td>
<td>6.5</td>
</tr>
</tbody>
</table>

*Total Cost is in 2020 dollars and includes costs for constructing/implementing the strategy and 10 years of operation and maintenance costs.

**Benefit Ratio is determined by dividing the Total Score of the strategy by the Total Cost in $Millions. It provides a way to compare strategies.

***The numbers in parenthesis below each Desired Outcome indicate the weight assigned as determined through stakeholder input.
Section 15: Findings and Conclusions

KEY POINTS FROM THE REPORT

Phases 1 and 2 of the 5-County Regional Transportation Study analyzed the future transportation needs in the 5-County region and identified potential strategies to address those needs. The study was a stakeholder-driven process that involved elected officials, city and county staff, residents in the region, and a wide range of transportation stakeholders.

This report serves as a snapshot in time. In the future, policy statements and identified strategies will need to be analyzed and potentially adjusted to react to changes. As previously stated in the report, the following challenges lay ahead as KDOT, the MPOs and their local partners look to implement strategies to improve the transportation system:

**The Future Brings Change**

Transportation technology is changing quickly and the transportation system must adjust to these changes. Current in-vehicle technology, such as GPS, has changed the way that users determine their trip routes. More advanced technology, such as vehicle to vehicle communication, will most likely be implemented in the next 30 years. This technology will change the way that vehicles operate and may increase the amount of capacity on existing roadways.

Road management technologies, such as those employed by KC Scout, will continue to evolve, giving drivers more travel information and allowing for less congestion because of more efficient lane usage. Active lane use control should be considered on congested freeways, particularly on those routes where there is limited right-of-way for additional lanes. This new strategy may include hard shoulder running, High-Occupancy Vehicle/High-Occupancy Toll lanes, speed harmonization with the use of variable speed limits, queue detection, and the ability to dynamically close lanes to address incidents on the roadway.

In addition to new technologies, demographics will change substantially in the future. The new generation of young professionals generally wants to live in more urbanized areas and depend less on personal automobiles. The growing population of senior citizens will also need other transportation options as they age. A multimodal transportation network will be needed to meet the demands of these individuals.

This study analyzed strategies on key corridors as well as the interaction between corridors. Analyzing a system together allows planners to see the interaction between corridors and identify how strategies can affect regional mobility and may be able to limit the needs for projects that have duplicate results.

**Future Role of Roadways**

The 5-County region has a robust system of interconnected freeways, other highways, and arterial streets which create its transportation network. The roadway system serves commuter trips, freight movement, transit, bicycle and pedestrian trips, and provides links to activity centers.

Highways and arterial streets will continue to be the backbone of the future transportation system. Due in part to funding limitations, the future will see a broader range of strategies implemented on the roadway system in addition to key capacity improvement projects. These will include Transportation System Management (TSM) strategies like ramp metering and expanding the KC Scout ITS traffic management system, and active lane-use control. Also, Transportation Demand Management (TDM) strategies such as providing Park & Ride facilities and expanding transit service will provide residents with more transportation options and help address peak period congestion.

**Future Impacts of Freight Movement**

The 5-County region is a vital national freight hub due to a strong goods movement transportation network with relatively few bottlenecks. Kansas City is considered the second largest rail center in the nation and is served by five Class I rail carriers. The region is also one of the top five trucking centers. The construction of the BNSF Intermodal Facility in Edgerton, along with associated development, will have a significant impact on the movement of goods by truck in the region. When fully operational, the intermodal facility will generate over 7,000 truck trips per day with the majority of those trucks moving north on I-35.

**Future Role of Public Transit**

Transit will play an important role in the future transportation system for the 5-County region, particularly in moving commuters during the morning and evening peak travel periods. An enhanced transit system will improve the movement of travelers both regionally and locally, connecting them to major activity centers such as universities, hospitals, shopping areas, sports arenas, and major employment centers. Enhanced transit will serve not only commuters, but also those travelers who are transit dependent (i.e. young, old, low income, disabled, or otherwise unable to drive).

**Future Role of Bicycle and Pedestrian Facilities**

Bicycle and pedestrian facilities are an integral part of a future transportation system. As land use changes to more mixed development and as more of the population focuses on a healthier lifestyle, there is a growing need for alternatives to automobile travel. While bicycle and pedestrian facilities will not fully address the needs of people traveling regionally, the regional system needs to accommodate and plan for these types of facilities to eliminate the barriers created by natural features and major highways and to support regional transit service.

**Financial Resources are Limited**

Due to the complexity of projects in urbanized areas, costs associated with the implementation of solutions that add capacity to highways (addition of lanes, new or enhanced interchanges, etc) can be very expensive. For example, the Johnson County Gateway Interchange project will have a cost that exceeds $580 million at full build out; an amount equal to more than half of the total dollars allocated to expansion projects in the 10-year T-WORKS program. With limited funding and a growing number of these types of projects being identified, it is increasingly important to attempt to increase the lifespan of each corridor as constructed. Doing that will mean not having to incur the expense of a large project until it is completely necessary. Using innovative techniques such as hard shoulder running and active lane use control, as well as implementing transit and traveler information, and expanding the influence of ridesharing, alternative work hours and telework, the lifespan of a corridor that is only congested during the peak periods can be increased.
Often, new projects are identified because of the potential for a key economic development opportunity that requires access to the transportation system. KDOT has worked hard to create funding programs, such as the Economic Development Program, that allow flexibility to respond to these types of projects. In addition to KDOT’s funding program, which only has limited resources, innovative financing, such as STAR Bonds or Transportation Development Districts, should be considered with projects that are adjacent to new development.

Historically, the cost to operate and maintain the transportation system has not always been considered fully when projects are identified and evaluated. KDOT and the local communities must expend resources each year to maintain and operate their transportation systems. During their local consultation efforts, KDOT found that the highest priority among participants was to maintain the system that we have at its current high level. These costs, and the additional maintenance costs needed for new or enhanced roadways, must be considered during the project identification and evaluation process.

Finally, advances in fuel economy and alternative fuels will require many changes to the current transportation funding. Since current State and Federal transportation systems are generally funded using motor fuel taxes, the increase in fuel economy, or the use of other energy sources to fuel vehicles, is anticipated to lead to additional funding challenges for governments. These entities must find other ways to fund the transportation system in order for the system to meet the demands of their constituents.

How Should This Report Be Used?
The 5-County Study was created through a partnership between KDOT and the MPOs who worked closely with cities, counties and other stakeholders. The recommendations of this report are intended to help the region make progress toward the 9 Desired Outcomes. All parties should put these outcomes at the forefront as they further develop and implement the strategies in this report.

KDOT
The Kansas Department of Transportation will be scheduling the update of its Long Range Transportation Plan (LRTP). The 5-County Study will provide important input to the LRTP regarding the Kansas City metro area and surrounding counties.

Goal setting and the identification of future strategies in the LRTP should distinguish the many differences between urbanized areas and rural areas.

There are many process steps completed through the 5-County Study that could be implemented statewide. This includes: the use of a transportation toolbox; identifying a broad range of issues; tying goal statements to evaluation methodology; and using diverse metrics to select appropriate strategies.

In addition to using this information for the LRTP process, it is recommended that the output from this study be used as part of the project selection and scoping process in the 5-County region.

Since a few of the key corridors in the study cross the state line into Missouri, a discussion with MoDOT regarding the results of the study is recommended.

Metropolitan Planning Organizations
KDOT staff works closely with MARC and Lawrence-Douglas County MPO staff on their planning processes. This will continue after the 5-County Study, with specific attention focused on the Metropolitan Transportation Plans. The Lawrence/Douglas County MPO is near completion of their MTP update. As their process has progressed, they have worked to make sure there are consistencies between both studies (specifically as it relates to network connection points and the identification of regional transit along I-70).

MARC will begin updating their MTP in 2013. Because of this, MARC will be able to use this study as input to their planning process. This will include using the list of strategies identified in this study and providing general project descriptions.

Kansas City Scout
Many of the systems management strategies identified in this study would be implemented as part of the KC Scout traffic management system. Because of this, it will be important to have targeted conversations with KC Scout about the study and its results. Since this study provides direction on the regional goals for this system, the output should be used for the identification of future sites for technology upgrades.

Local Transit Operators
The local transit operators were included throughout the study process and they should be informed of the results of the study, so that they can use this output as part of the transit system planning process. Many of the transit recommendations that were identified will require cross-agency coordination. As a result of this process, cross-agency implementation plans should be considered for all identified regional routes.

Cities/Counties
Throughout the process, City and County staff and officials were included and provided essential feedback. As the process comes to a close, each, these participants should be informed of the results. As these communities move forward with identified strategies, they should work closely with partner cities in order to make sure there is a unified set of strategies for a corridor as a whole.

As municipalities seek assistance from MPOs in the form of State or Federal dollars, the MPOs should consider strategies identified within the 5-County Study as those of priority in project selection. Policies may be enacted that require substantial local resources for projects that aren’t included in the strategy list (along the identified corridors).

Cities and Counties should consider the context of new land use development and its relationship with the transportation strategies recommended in this report. The concept of “place making” should be incorporated into land use decisions to capitalize on the community’s vision, assets and potential.

Coordination
The coordination cannot stop once the project is over. There are many complicated challenges ahead that will require coordination, such as:

• MAP-21 requires the implementation of statewide performance metrics. KDOT will work closely with the MPOs in creating these metrics. It is important that there be coordination in how measures are identified and targets are set.

• Sharing of data between agencies. There are currently multiple travel demand models in the 5-County region. This includes the TransCAD model specifically created for this study, the MARC EMME/2 Model which is used for their region (including the Missouri counties), the Lawrence/Douglas County MPO TransCAD model, plus various city models. It is important that the study participants coordinate to identify the best use of these models.

In addition to the model data, each of the agencies has access to data that could be of assistance to their partners. Partnerships should continue to be cultivated between professional specialists at each agency so that they can collaborate on data gathering.

• Project Financing and Ownership. The next step in project development for the identified strategies is to have cross-agency discussions about how these projects would be financed and what agency would take the lead.

• This report provides recommended policies and strategies that have been identified, evaluated and approved by each of the partnering agencies. Each agency has a different role to play in ensuring that the lessons learned from this process are continued in future planning and policy-making efforts.

Table 15-1, on the following pages, shows the major findings and conclusions from the 5-County Study.
### Table 15-1: Study Findings and Conclusions

<table>
<thead>
<tr>
<th>Desired Outcome</th>
<th>Findings</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mobility</strong></td>
<td>• A statistically significant survey of residents in the 5-County region showed that maintenance of roads within cities was the most important issue during the next 10 years. Maintenance of roadways between cities ranked as the third most important issue. • A survey of residents in the 5-County region showed that traffic flow on highways and major roads was the second most important issue to address over the next 10 years. • Vehicle technology is changing and will increase the number of vehicles per lane. • The Kansas City metropolitan area has more lane-miles of freeway and more lane-miles of arterial streets per 1,000 population than other peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO. • Annual hours of delay per automobile commuter in the Kansas City metropolitan area is less than other peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO. • The congested lane-miles of roadway in the 5-County region will increase from approximately 1,000 lane-miles in 2010 to approximately 2,500 lane-miles in 2040 without future transportation investments. • Peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO are using a variety of transportation strategies to address growing congestion. • Recurring congestion occurs on the region’s major roadways during peak commute times. For the rest of the day, roadways have adequate capacity for year 2040 traffic. • Commuters are repeat travelers. • Non-recurring congestion due to crashes and vehicle breakdowns, construction/maintenance activities, and other incidents have a significant impact on traffic flow, particularly in the Kansas City metropolitan area. KC Scout reported 7,373 incidents on the metro area’s freeways. With the benefit of the KC Scout traffic management system, it took an average of 22 minutes to clear incidents and six minutes to restore normal traffic flow. • Some freeways, such as segments of I-35 and I-435, have limited potential for more right-of-way which will make it difficult to construct additional lanes. • Forecasts growth in rail traffic indicates an increase of 36% from 2007 to 2030. • The BNSF Intermodal Facility will become a major generator of freight rail and truck traffic. Just the intermodal site is expected to generate 7,000 truck trips per day when fully developed.</td>
<td>• Maintenance of existing streets and highways should continue to be funded and delivered before other strategies are considered. • Transportation investments must address congestion on the region’s roadways. • Roadway travel lanes will have higher capacity in the future. • Other major metropolitan areas are developing a more balanced transportation system or accept higher congestion. • Other metropolitan areas have more congestion than the Kansas City metropolitan area. • Federal, state and local transportation funding programs are a critical need for the future. A wide variety of transportation strategies will be needed to address congestion. • A variety of strategies, such as Transportation System Management, Transportation Demand Management, and new Capacity, should be considered as decisions are made regarding transportation investments. • Fund and encourage other transportation options for the morning and evening commute. • The KC Scout traffic management system provides significant benefits to the area and should be expanded, along with motorist assist, along key Kansas highways. • Look at strategies such as active lane use control, use of the shoulder as a driving lane during peak periods, and HOV/HOT lanes for these freeway segments. • A significant increase in truck volumes, particularly on I-35, is expected. Most of the trucks will use the roadway system during non-peak hours of the day. This volume of trucks will overload the capabilities of the vehicle inspection stations on I-35.</td>
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<tr>
<td><strong>Safety</strong></td>
<td>• KDOT’s Strategic Highway Safety Plan (SHSP) seeks to drive strategic investments that reduce traveler casualties and the emotional and economic burdens of crashes, utilizing the 4Es (education, enforcement, engineering and emergency medical services). • The “Destination Safe” Coalition is a regional transportation safety program that includes four of the five counties included in this study (minus Douglas County). The Coalition provides a means for various community sectors (law enforcement, engineers, safety advocates, public health officials, citizens, trauma room nurses, transit coordinators, public works managers, emergency services providers, bike/ped advocates, local officials, planners and others) to discuss transportation system safety in the Kansas City region. • Many of the crashes on the region’s freeway system are related to congestion.</td>
<td>• Continue to implement the recommendations of the SHRP and the Destination Safe Coalition. • Implement strategies that reduce congestion.</td>
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### Desired Outcome

<table>
<thead>
<tr>
<th>Finding</th>
<th>Conclusion</th>
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<tr>
<td>KDOT’s Strategic Highway Safety Plan (SHSP) seeks to drive strategic</td>
<td>Continue to implement the recommendations of the</td>
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<td>investments that reduce traveler casualties and the emotional and</td>
<td>SHRP and the Destination Safe Coalition.</td>
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<td>economic burdens of crashes, utilizing the 4Es (education,</td>
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<td>enforcement, engineering and emergency medical services).</td>
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<tr>
<td>The “Destination Safe” Coalition is a regional transportation safety</td>
<td>Implement strategies that reduce congestion.</td>
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<td>program that includes four of the five counties included in this study</td>
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<td>(minus Douglas County). The Coalition provides a means for various</td>
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<td>community sectors (law enforcement, engineers, safety advocates,</td>
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<tr>
<td>public health officials, citizens, trauma room nurses, transit</td>
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<tr>
<td>coordinators, public works managers, emergency services providers,</td>
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<tr>
<td>bike/ped advocates, local officials, planners and others) to discuss</td>
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<tr>
<td>transportation system safety in the Kansas City region.</td>
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<tr>
<td>Many of the crashes on the region’s freeway system are related to</td>
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<td>congestion.</td>
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<tr>
<td>The 5-County region is the fastest growing region in Kansas. A number</td>
<td>Transportation decisions must include an</td>
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<tr>
<td>of high impact developments are being constructed or are planned that</td>
<td>understanding of the impacts of planned</td>
</tr>
<tr>
<td>will impact the transportation system.</td>
<td>developments.</td>
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<tr>
<td>The average household in the Kansas City metropolitan area spends</td>
<td>As fuel costs increase, household budgets are</td>
</tr>
<tr>
<td>between 14% and 27% of their income on transportation costs.</td>
<td>impacted and different decisions will be made</td>
</tr>
<tr>
<td>Funding for transportation facilities is often not considered when</td>
<td>regarding how the transportation system is used.</td>
</tr>
<tr>
<td>planning for major developments.</td>
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<tr>
<td>Transportation investments have a significant impact on the state’s</td>
<td>Coordination between land use planning and</td>
</tr>
<tr>
<td>economy by providing more reliable travel times, logical access to</td>
<td>transportation planning is critical. Steps</td>
</tr>
<tr>
<td>businesses and by creating jobs.</td>
<td>should be taken to enhance coordination.</td>
</tr>
<tr>
<td>Transportation needs outweigh available transportation funding.</td>
<td>Continues the practice of including economic</td>
</tr>
<tr>
<td>Fuel prices have a significant impact on traveler behavior. As fuel</td>
<td>impacts in the decision making process for</td>
</tr>
<tr>
<td>prices significantly increase, travelers reduce travel by personal</td>
<td>transportation investments.</td>
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<tr>
<td>vehicle and increase their use of transit, carpooling, trip chaining</td>
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<tr>
<td>and bicycling.</td>
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<tr>
<td>A study by the Mid-America Regional Council determined that if 40% of</td>
<td>Continued sprawling development patterns come</td>
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<tr>
<td>the region’s population growth were accommodated in existing centers</td>
<td>with a high cost for transportation and other</td>
</tr>
<tr>
<td>along established corridors, the region could save over $3 billion in</td>
<td>infrastructure costs.</td>
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<tr>
<td>infrastructure costs.</td>
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<tr>
<td>Fuel efficiency standards for passenger cars and light trucks will</td>
<td>Alternate sources of revenue will need to be</td>
</tr>
<tr>
<td>require higher gas mileage.</td>
<td>developed within the timeframe that was studied.</td>
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<tr>
<td>The Kansas City metropolitan area has by far the fewest public</td>
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<tr>
<td>transportation miles per capita (47 miles per capita) than other peer</td>
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<tr>
<td>cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/</td>
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<tr>
<td>St. Paul, MN, and St. Louis, MO (91-229 miles per capita).</td>
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<tr>
<td>A survey of residents in the 5-County region shows 53% of</td>
<td></td>
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<tr>
<td>respondents would use transit if a more extensive regional system</td>
<td></td>
</tr>
<tr>
<td>were in place.</td>
<td></td>
</tr>
<tr>
<td>The region is served by five transit agencies.</td>
<td>Expand ongoing efforts to coordinate these</td>
</tr>
<tr>
<td>The K-10 Connector transit service that connects Lawrence and Overland</td>
<td>systems to develop a regional transit system.</td>
</tr>
<tr>
<td>Park has a daily ridership of nearly 700. Cost per mile is</td>
<td></td>
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<td>approximately nine cents compared with 55 cents per mile for travel</td>
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<tr>
<td>by automobile.</td>
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<tr>
<td>“Bus-on-Shoulder” (BOS) transit is operated along I-35 in Johnson</td>
<td></td>
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<tr>
<td>County when mainline traffic is traveling below 35 mph. Since the</td>
<td></td>
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<tr>
<td>inception of BOS there has been a 12% increase in ridership on this</td>
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<tr>
<td>route.</td>
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<tr>
<td>As other cities in the Midwest have grown, they have developed</td>
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<tr>
<td>transportation systems that offer more choices to travelers,</td>
<td></td>
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<tr>
<td>particularly commuters.</td>
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<tr>
<td>There is a desire in the region for a more robust transit system.</td>
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<tr>
<td>Making transit options more attractive will bring more “choice</td>
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<tr>
<td>riders” to this mode of transportation.</td>
<td></td>
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<tr>
<td>Continue support for regional transit services such as the K-10</td>
<td></td>
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<tr>
<td>Connector and potential service along I-70.</td>
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<tr>
<td>Desired Outcome</td>
<td>Findings</td>
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</table>
| **Environment** | • A survey of residents in the 5-County region shows that 87% think that water quality and air quality are important considerations in planning for transportation improvements.  
• The 5-County region had numerous days during 2012 when the air quality did not meet national standards.  
• Sprawling development patterns lead to increasing environmental impacts. | • Future investment decisions should enhance air and water quality.  
• Future investment decisions should enhance air quality.  
• Future investment decisions should enhance natural resources. |
| **Public Health** | • A survey of residents in the 5-County region shows 68% believe that transportation projects should promote healthy lifestyles like biking and walking.  
• Lack of all-day transit in many areas makes it difficult for some citizens to have adequate access to medical facilities.  
• There is a concern for air quality impacts on health in the region. | • Transportation investment decisions should include appropriate active transportation improvements such as bicycle and pedestrian facilities.  
• Future transportation investments should add capacity to existing transit and paratransit services to meet the needs of a growing aging population.  
• Future investment decisions should enhance air quality. |
| **Social Equity** | • A survey of residents in the 5-County region shows 35% of respondents don’t believe that the existing transit service meets the residents’ basic needs. 46% of the respondents don’t believe transportation services for the elderly and disabled are adequate.  
• A survey of residents in the 5-County region showed that 9% of respondents are dependent on transit or friends and relatives for transportation. | • There is a desire in the region for a more robust transit system.  
• A significant percentage of residents have need for transportation options other than a personal automobile. |
| **Livability** | • The Kansas City metropolitan area has lower population per square mile of land area (260) than other peer cities such as Dallas/Fort Worth, TX, Denver/Aurora, CO, Minneapolis/St. Paul, MN, and St. Louis, MO (305 to 714 people per square mile).  
• Many communities are planning city centers with compact spaces, mixed-use development, and localized resources which can minimize the need for longer distance commuting.  
• The National Household Travel Survey shows that the 16 to 34 year old age group wants to live in a more urban environment and have different desires for transportation. In 2009, people in this age group drove 23% fewer miles in their cars, using transit more, took 24% more bicycle trips and walked to destinations 16% more than did 16 to 34 year olds in 2001.  
• Bicycle and pedestrian facilities are an integral part of a future transportation system. As land use changes to more mixed development and as more of the population focuses on a healthier lifestyle, there is a growing need for alternatives to automobile travel. | • Less dense development presents many challenges including the need for longer roads, more congestion, and the ability to develop transit. Park & Ride lots or structures should play a role in the future transportation system.  
• The future transportation system will need to consider changing development patterns and provide more multimodal options.  
• While these are national trends, these changes in transportation user’s preferences should be part of the discussion as the future transportation system is planned.  
• As land use patterns change, the transportation system must change as well.  
• Many cities have adopted Complete Streets policies that address multiple modes of transportation. |
Phase 2 Final Report Appendix

Submitted to:

Kansas Department of Transportation
Marc Mid-America Regional Council
Lawrence - Douglas County MPO

Submitted by:

Parsons Brinckerhoff

April 2013
Appendix A

5 County Regional Transportation Study
Phase 2
Evaluation Criteria

April 2013

Prepared for:
Kansas Department of Transportation
Introduction

In Phase 1 of the 5-County Study, the Stakeholder Advisory Panel and the four Working Groups identified project goals and objectives and determined a Vision and Desired Outcomes for the region’s future transportation system. Phase 1 also presented a more collaborative planning approach, examined innovative concepts in the area of transportation technology, and considered multimodal transportation solutions and the idea of sustainable transportation investments. A “triple bottom line” approach was recommended to promote sustainable decision-making. This approach requires the consideration of economic, environmental, and societal factors when making decisions for future transportation infrastructure investments.

Phase 2 of the study developed specific evaluation criteria and measurements to both define the regional philosophy for making transportation investment decisions and to evaluate the effectiveness of strategies on key corridors. Through a series of meetings with the Core Team, the Corridor Strategies Working Group and the Stakeholder Advisory Panel a matrix was created that identified criteria and measures for the nine Desired Outcomes. Measurements for these criteria were honed from almost fifty at the beginning of the process to twenty-four that best define the regional philosophy for each outcome.

The nine Desired Outcomes were grouped into engineering factors, economic factors, and community factors. Evaluation criteria and measurements were developed for each of the Desired Outcomes.
Engineering Factors

**Mobility:** Movement of people and goods in an efficient manner where they want to go and when they want to go. This outcome focused on minimizing person delay across modes rather than focusing exclusively on minimizing vehicle delay.

- Improves system reliability for goods movement.
- Improves system reliability for the traveler.

### Desired Outcome: Mobility

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Measures</th>
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</table>
| Improve system reliability for travelers and goods movement | \[v/c \text{ ratio for the evening peak period from the 2040 E+C model} \]
  
  Accounts for the “need” for mobility improvement on the corridor and provides one half of the total mobility score. |
| Change in LOS with strategy                              | Measures the change in vehicle-miles traveled on congested roads.                                 |
| Change in the Vehicle-Hours Traveled (VHT) with strategy using 2040 model results | \[The change in system-wide VHT measures the travel time savings provided by a strategy.\] |
| Total Score                                              | \[((v/c score * 2) + Change in LOS score + Change in VHT score)/4\] Each measure was scored on a 0 to 10 scale. |

Analysis: Mobility measures are the most common method for identifying the need for a transportation investment and generally, these investments include increasing the capacity of the roadway. For the purpose of this project, it was determined that mobility should consider both the traveler and goods movement. The group relied on general mobility measures for the traveler – vehicle hours of travel, volume/capacity, and level of service – but also included a measure related to the reliability of transit services.
**Safety:** Reduced crash rates, severity of crashes (fatalities, serious injury crashes), and conflict points. This outcome focused on improving traveler safety across all modes of transportation.

- Improves roadway safety.
- Increases safety for transit, bikeway and pedestrian facility users.

<table>
<thead>
<tr>
<th>Desired Outcome: Safety</th>
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<tr>
<td>Evaluation Criteria</td>
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</table>
| Increases safety for roadway, transit, bikeway and pedestrian facility users. | A process similar to that used in T-WORKS  
This process produced a raw score between 0 and 20 determined by the existing crash rate for the corridor, the change in number of conflict points, the potential for crash severity reduction, and the potential change in the number of crashes. |
| Total Score             | Raw scores were converted to a 0 to 10 scale. |

Analysis: The groups determined that safety measures be evaluated that consider both the roadway user and multimodal users – transit, bike and pedestrian. A process similar to that used for T-WORKS was employed to evaluate the value of safety investments – the existing crash rate for a corridor, the change in the number of conflict points, the potential for crash severity reduction, and potential change in the number of crashes.
**Economic Impact Factors**

**Regional Prosperity:** Improved economic competitiveness through reliable and timely access to employment centers, educational opportunities, services and other basic needs by the public as well as expanded business access to markets.

- Strengthens sustainable tax base.
- Increases economic prosperity for all demographic groups.
- Increases efficient movement of goods.

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Measures</th>
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<tbody>
<tr>
<td>The economic impact of a strategy.</td>
<td>TREDIS scores provided by KDOT.</td>
</tr>
<tr>
<td>Total Score</td>
<td>TREDIS scores were converted to a 0 to 10 scale.</td>
</tr>
</tbody>
</table>

Analysis: KDOT currently uses the software package called TREDIS (Transportation Economic Development Impact System) to determine the economic impact of projects and strategies. KDOT provided TREDIS scores that were used to evaluate individual strategies.
**Efficient Use of Financial Resources:** Evaluation of the affordability of transportation investments by considering the initial investment to plan, design, and construct; the life-cycle costs to maintain and operate; and the economic benefits to the community.

- Considers the life-cycle cost of investment, operations and maintenance.
- Considers the benefits to the road user as measured by change in VHT.
- Considers the benefits to the road user as measured by change in number of crashes.

<table>
<thead>
<tr>
<th>Desired Outcome: Efficient Use of Financial Resources</th>
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</thead>
<tbody>
<tr>
<td><strong>Evaluation Criteria</strong></td>
</tr>
<tr>
<td>Effective use of available funding for transportation infrastructure.</td>
</tr>
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<tr>
<td>Total Score</td>
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Analysis: The groups identified two very different themes associated with this outcome – the cost to the agency funding the strategy and the potential cost savings to the road user. In order to best evaluate the cost to the funding agency, it was determined that calculating the life-cycle cost of the strategy was necessary to determining the financial efficiency of this strategy. Benefits to the road user are in terms of time savings and improved safety as measured by the predicted change in the vehicle hours traveled (VHT) and numbers of crashes. A benefit to cost ratio was then calculated using these factors.
Community/Quality of Life Factors

**Choice:** Investment in a multimodal transportation system that maintains the existing primary roadway system, but also considers the changing demographics of our region and allows individuals the choice of using other modes of transportation such as sharing a ride, using transit, bicycling, or walking.

- Increases modal options to access daily needs and activities.
- Enhances intermodal connectivity.

<table>
<thead>
<tr>
<th>Desired Outcome: Choice</th>
<th>Measures</th>
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<tr>
<td><strong>Evaluation Criteria</strong></td>
<td><strong>Measures</strong></td>
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<tr>
<td>Increases modal options to access daily needs and activities.</td>
<td>Competitiveness of transit with automobiles in terms of travel time.</td>
</tr>
<tr>
<td></td>
<td>Transit ridership projections from the regional travel demand model.</td>
</tr>
<tr>
<td></td>
<td>Transit services and amenities that encourage mode shift.</td>
</tr>
<tr>
<td>Enhances intermodal connectivity.</td>
<td>Connections between two or more modes.</td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td>Each of the four measures was scored on a 0 to 10 scale. The total of the individual scores was divided by 4 for the final score.</td>
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</table>

Analysis: All groups determined that the most effective way to improve choice in the 5-County Study region is to both increase access to modes and to enhance the connectivity between modes. In order to increase modal options, the groups identified measurement items that reflect a need to add modal options, such as adding bicycle and pedestrian facilities or new transit services, and to improve the reliability of existing services. The group determined that the most effective ways to enhance intermodal connectivity are to create and promote Park & Ride facilities to encourage use for transit and carpooling and to provide other amenities to encourage use of other modes.
Environment: Rather than mitigate the impacts upon the environment, transportation system investments should seek to enhance environmental sustainability, improve air and water quality, reduce climate impacts and the region’s carbon footprint, and protect high priority natural resources.

- Protects high priority and sensitive natural resources.
- Reduces air, water and carbon pollution.
- Reduces overall consumption of energy, fuels and non-renewable resources.
- Uses land in a sustainable manner.

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Measures</th>
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</table>
| Protects high priority and sensitive natural resources. | Impact to resources  
Qualitative assessment of impacts to habitat, farmland, parkland, and threatened or endangered species. |
| Reduces overall consumption of energy, fuels and non-renewable resources. | Vehicle-miles traveled (VMT)  
The travel model was used to determine how the project impacted motor fuel use. Vehicle-miles traveled (VMT) were multiplied by a factor provided by MARC. |
| Reduces air, water and carbon pollution. | Change in vehicle emissions  
The travel model was used to determine how the strategy impacted emissions. Vehicle-miles traveled (VMT) were multiplied by a factor provided by MARC. |
| Uses land in a sustainable manner. | Consistency with regional land use plans and policies  
Avoid serving low-density areas/agricultural areas/areas not currently served by utilities. |
| Total Score | Each of the four measures was scored on a 0 to10 scale. The total of the individual scores was divided by 4 for the final score. |

Analysis: The first concept, protecting high quality and sensitive natural resources, is measured through habitat, prime farmland and parkland impacts and the impacts on threatened and endangered species. The second concept, “reduces air, water and carbon pollution,” and the third concept, “reduces overall consumption of energy, fuels and non-renewable resources,” measures the impact on each of these items, as well as vehicle hours travelled, which shows the transportation system’s effect on numerous types of pollution. The last concept, “uses land in a sustainable manner,” shows the value that the groups place on transportation investments and local planning efforts that encourage infill development and discourage sprawl.
**Public Health**: Reduced impacts to public health by improving traffic safety, improving air quality, promoting physical activity and fitness, improving access to medical services, and increasing transportation affordability.

- Reduces air, water and carbon pollution.
- Improves roadway safety.
- Increases modal options to access daily needs and services.

<table>
<thead>
<tr>
<th>Desired Outcome: Public Health</th>
<th>Measures</th>
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<tbody>
<tr>
<td><strong>Evaluation Criteria</strong></td>
<td><strong>Change in emissions</strong></td>
</tr>
<tr>
<td>Reduces air, water and carbon pollution.</td>
<td><em>The travel model was used to determine how the strategy impacted emissions. Vehicle-miles traveled (VMT) were multiplied by a factor provided by MARC.</em></td>
</tr>
<tr>
<td>Improves roadway safety.</td>
<td><strong>Change in crash rate</strong></td>
</tr>
<tr>
<td></td>
<td><em>Direct use of the safety score.</em></td>
</tr>
<tr>
<td>Increases modal options to access daily needs and activities.</td>
<td><strong>Change in modal options</strong></td>
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<tr>
<td></td>
<td><em>Direct use of the choice score.</em></td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td>Each of the three measures was scored on a 0 to 10 scale. The total of the individual scores was divided by 3 for the final score.</td>
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</table>

Analysis: Through discussions with the groups, it was identified that criteria associated with “public health” were redundant with criteria in “environment” (reduces air, water, noise and carbon pollution), “safety” (improves roadway safety) and “choice” (increases modal options to access daily needs and activities). Even though these criteria are measured through the other outcomes, the groups determined it was important to maintain the “public health” outcome and document these three measures to get a fuller picture of how the strategy affects public health.
**Social Equity:** Consider the investment benefits and impacts on all population groups within communities. Support civil rights and community cohesion through transportation investments. Promotion of job growth through transportation investments. Minimization of personal transportation expenses in ways that support wealth creation.

- Provides equitable access to daily needs for people of all income levels and abilities.
- Distributes benefits to all population subgroups and ensures that no one population subgroup is disproportionately affected.

<table>
<thead>
<tr>
<th>Desired Outcome: Social Equity</th>
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<tr>
<td><strong>Evaluation Criteria</strong></td>
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<tr>
<td>Provides equitable access to</td>
</tr>
<tr>
<td>daily needs for people of all</td>
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<tr>
<td>income levels and abilities.</td>
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<tr>
<td>Distributes benefits to all</td>
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<tr>
<td>population subgroups and</td>
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<td>ensures that no one population</td>
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<tr>
<td>subgroup is disproportionately</td>
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<td>affected.</td>
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<tr>
<td>Total Score</td>
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Analysis: Discussion in group meetings led to two focuses for this outcome. The first measures equitable access for all groups, including those that do not drive due to age or disability and those that are economically disadvantaged. The identified measures show that an increase in transit service or additions of bicycle and pedestrian facilities will best accommodate this criterion. The second criterion focuses on the distribution of benefits to all subgroups and follows the measurements associated with Environmental Justice.
**Livability:** Integration of the transportation system with the community desires. Balance of mobility goals with the livability of the community including social equity. Improvements that fit the scenic, aesthetic, historic, community and environmental setting.

- Increases bicycle, pedestrian and public transit options.
- Supports local land use plans and the Mid-America Regional Council’s regional growth vision.

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Measures</th>
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</table>
| Changes in modal options | **Change in modal options**  
  *Direct use of the choice score*  
  *Encourages active transportation*  
  *Degree to which a strategy provides for travel as a pedestrian, bicyclist, or transit rider.* |
| Supports existing activity centers | **Supports existing activity centers**  
  *Degree to which a strategy supports existing activity centers.*  
  *Impact to connectivity/cohesion*  
  *Features that connect communities divided by road or rail.* |
| Total Score | Each of the four measures was scored on a 0 to 10 scale. The total of the individual scores was divided by 4 for the final score. |

Analysis: A common theme of the discussions related to livability is that every group member had a different opinion of the definition of the term. At the end of the day, the criteria were focused around two subjects, increasing modal options and supporting local land use plans and the regional growth vision.
Appendix B

5 County Regional Transportation Study
Phase 2
Value Capture Case Study Analysis

March 2012

Prepared for:
Kansas Department of Transportation

Prepared By:
PARSONS BRINCKERHOFF
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Appendix A-1 – Village West Historical Analysis

Appendix B-1 – Economic, Demographic, and Real Estate Market Overview of 5-County Region
1. Executive Summary

Value capture refers to an approach that can be used to help pay for infrastructure projects’ capital or maintenance costs by monetizing the development benefits that the project creates and channeling them into a project fund. To provide KDOT with an understanding of the potential to use value capture to help pay for transportation improvements, Parsons Brinckerhoff researched the universe of potential mechanisms available in Kansas and analyzed their applicability to proposed transportation improvements in five different case study locations.

Tools available in Kansas fall into three general categories: tax-increment financing, special tax assessments, and development impact based fees. While each case study represents a unique scenario, revenues from the most applicable mechanisms were forecast using a range of common assumptions for long-range employment and household growth capture, the resulting development potential, property value escalation, and tax rates. The bonding capacities estimated from revenue streams created by the value capture mechanisms were then calculated to quantify the potential opportunity to finance the proposed transportation improvements.

Methodologies and assumptions used in this analysis are explained in detail later in the report, along with descriptions of the various case studies, their proposed improvements, and their surrounding real estate market conditions. Key qualitative findings of the report are, however, listed below.

The opportunity to fund improvements through value capture varies widely by case study location.

- Due to more immediate real estate development opportunities in the surrounding area, proposed interchange and highway improvements in Overland Park represent a strong value capture opportunity.
- Proposed improvements in Tonganoxie and Spring Hill could facilitate development, but shorter term value capture potential is limited due to minimal near-term growth pressure in the surrounding area.
- A park-and-ride concept located on a North Lawrence retail site would not likely generate enough new retail demand to be a viable value capture candidate. A community improvement district on the US 40/59 corridor in the same North Lawrence area is not likely feasible for value capture either. However, the park-and-ride concept may be worth exploring further as a joint development opportunity.
- A detailed historical analysis of mechanisms at Village West suggests minimal additional revenue for transportation. There is also currently no opportunity for transportation value capture as defined in this report, although future new development in the surrounding area should provide more conventional local funding options for improvements.

Mechanisms available in Kansas have often historically been used more for economic development incentives as opposed to infrastructure value capture. In these scenarios, the mechanism is used to channel local tax revenues to developers to entice development in one place or another. While the tools are often the same, economic development and infrastructure value capture have very different and sometimes conflicting objectives. Research on the historical usage of these mechanisms in Kansas indicates that in areas with strong market conditions, such as Overland Park, the local jurisdiction has the leverage to apply mechanisms for value capture to help finance public infrastructure. In areas without
strong development potential, the local jurisdiction has historically used these mechanisms as economic development tools, to facilitate development by reducing developer costs.

Based on the key findings and conclusions from the analysis, the following strategic recommendations were developed for KDOT to best capitalize on value capture in the future:

- Develop a methodology or process to identify potential value capture opportunities early on. A checklist that could provide a preliminary “go/no-go” assessment could help KDOT identify such opportunities in the future.
- Promote policies that ensure that KDOT is a part of the approval process for future large-scale redevelopment projects that impact state highway facilities. A key finding from the historical analysis of Village West suggests that KDOT may have missed the opportunity to tap into value capture to finance necessary improvements. This analysis highlights a very good example of why many states have provisions in law that require traffic impact studies to be performed as part of the development approval process.
- Consider a regional, programmatic approach to value capture. KDOT should consider the potential for funding mechanisms at the regional level as opposed to at the localized project level. The concept of creating a pool of funding could be used, where funds received from a wide-ranging special tax go towards improvements that meet specific criteria laid out in the goals/outcomes of the Phase 1 5-County Regional Study. These could be projects that help reduce congestion or vehicle miles travelled, provide more transportation choice, improve safety, or increase livability.
2. Introduction and Background

As state and local agencies develop and deliver infrastructure projects in an environment of less federal government funding and rising capital and operating costs, they have been forced to identify other revenue sources to pay for their projects. One approach is to develop a framework to calculate the expected increased property values and sales tax revenue potential generated by an infrastructure project and channel a portion of that increased value into a project’s financial plan.

Value capture refers to an approach that can be used to help pay for infrastructure projects’ capital or maintenance costs by monetizing the development benefits that the project creates and channeling them into a project fund. There are several tax or fee mechanisms that can be used to achieve this end, mostly stemming from the traditional economic development toolbox, but proper planning and a defensible mechanism to calculate the expected future benefits and revenues is required to develop a true value capture transaction.

Throughout this report, the term ‘local revenue tools’ is used to describe the set of tax and fee mechanisms (i.e. special property tax assessments or special purpose retail sales taxes) and government powers (like tax increment finance) that exist in Kansas. These can be used for a variety of purposes, not all of which constitute value capture. An important part of the analysis that follows is identifying true value capture opportunities and understanding the difference between value capture and simply raising taxes to promote economic development.

The five case studies selected represent a diverse set of location types each with specific area dynamics and regional context. The 5-County region consists of a broad range of urban, suburban, and rural landscapes and growth patterns. In the later decades of the 20th century, regional growth patterns emanating from the core of Kansas City were concentrated in certain submarkets, and Johnson County began to capture a large share of regional growth relative to other counties in the area. The area north of the river in Missouri (Clay and Platte counties) also emerged as a secondary path of growth while other older, established, closer-in areas such as Wyandotte County experienced slower growth. As a result of these ongoing growth patterns, Johnson County currently represents a disproportionate share of population, households, and employment in the defined 5-County study area. The following map shows that the Johnson County (Overland Park) case study area lies in the path of regional growth and is well positioned for new development.

The five identified projects include the following:

- Village West interchange improvements (Wyandotte County)
- Tonganoxie US-24/40 frontage road improvements (Leavenworth County)
- North Lawrence Transit Center / Park-n-Ride (Douglas County)
- Overland Park interchange improvements (Johnson County)
- Spring Hill interchange improvements (Miami County)
Value capture can be a viable supplement to federal or state funding in transportation financial plans. State and local laws for value capture vary widely, but the tools are not new to Kansas. There are numerous examples of local revenue tools’ use in Kansas at the city, county, and state level. The following sections outline the most commonly used local revenue tools, and screen each of these mechanisms with regard to potential use for funding proposed transportation improvements.
3. Potential Value Capture Mechanisms in Kansas

The most commonly used local revenue tools in Kansas fall into three general subcategories: tax-increment based mechanisms, special tax assessment mechanisms, and development impact based mechanisms. Figure 2 lists these tools under their respective subcategory.

![Figure 2: Value Capture Tools in Kansas](image)

<table>
<thead>
<tr>
<th>Tax-Increment Based Mechanisms</th>
<th>Special Tax Assessment Mechanisms</th>
<th>Development Impact Based Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Increment Financing (TIF)¹</td>
<td>Transportation Development Districts (TDD)²</td>
<td>Impact Fees</td>
</tr>
<tr>
<td>Sales Tax Revenue (STAR) Bonds³</td>
<td>Community Improvement Districts (CID)⁴</td>
<td>Excise Taxes⁵</td>
</tr>
<tr>
<td></td>
<td>Benefit Districts⁶</td>
<td></td>
</tr>
</tbody>
</table>

TIF and STAR bonds tap into increased revenue potential from forecast property and sales tax revenues based on current rates, while TDDs and CIDs incorporate special tax assessments in addition to current taxes to fund specific projects. The key difference between the two categories is that tax-increment based mechanisms divert future tax revenues that would otherwise be collected by the jurisdiction, while special tax assessments involve additional taxes on top of what the jurisdiction would collect from the project. Impact based mechanisms such as impact fees and excise taxes are generally charged directly to developers and property owners based on unit development quantities to raise revenues for various purposes.

¹ Kansas Statute Annotated (K.S.A.) 12-1770
² K.S.A. 12-17, 140
³ K.S.A. 12-17, 160
⁴ K. S. A. 12-6a26
⁵ K. S. A. 12-194
⁶ K. S. A. 12-6a01
3.1. Tax-Increment Based Mechanisms

In general terms, tax-increment financing is a mechanism for capturing all or part of the increased property tax paid by a subset of properties within a designated area. TIF is not an additional tax, nor does it deprive governments of existing property tax revenues up to a set base within the TIF district. Instead, part of or all of future property taxes (above the set base level) resulting from increased property values or new development are dedicated to paying for the public improvement that caused the value increases and additional development.

TIF is most commonly used by local governments to promote housing, economic development, and urban redevelopment in established neighborhoods, but in some cases has been used to finance transportation projects, mainly public transit. TIF revenues can be used as they accrue on a pay-as-you-go basis, or can be bonded against. A public agency may also issue a general obligation (GO) bond to finance improvements and use future TIF district revenue to replenish the general fund. This GO approach usually provides better debt terms than if the TIF revenue is the only stream dedicated to repay the bonds, though it usually has undesirable impacts on the credit of the parent entity making the GO pledge by increasing its overall debt levels.

3.1.1. TIF in Kansas – Although conventional TIF captures incremental property taxes, Kansas TIF law allows for the capture of incremental city sales taxes and franchise fees in addition to property taxes. The law allows for the diversion of 100 percent of city sales taxes above the set base level. In Kansas, TIF legislation is generally designed to stimulate economic activity in areas in need of revitalization, primarily through redevelopment. As such, to be eligible for TIF under Kansas State law, projects must meet the following criteria.
**Kansas TIF Eligibility Criteria**

<table>
<thead>
<tr>
<th><strong>Blighted area</strong> – a majority of the following factors must exist, impairing sound development and growth:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Deteriorated structures</td>
</tr>
<tr>
<td>• Defective/inadequate street layout</td>
</tr>
<tr>
<td>• Unsafe conditions</td>
</tr>
<tr>
<td>• Deteriorated site improvements</td>
</tr>
<tr>
<td>• Tax or special assessment delinquency</td>
</tr>
<tr>
<td>• Defective/unusual title conditions</td>
</tr>
<tr>
<td>• Improper subdivision or obsolete platting or land uses</td>
</tr>
<tr>
<td>• Conditions which create economic obsolescence</td>
</tr>
<tr>
<td>• Dangerous conditions</td>
</tr>
<tr>
<td>• Environmentally contaminated</td>
</tr>
<tr>
<td>• Within a 100-year floodplain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Conservation area</strong> – an area comprising 15% or less of a city’s land area, in which at least 50% of the structures are 35 years or older. Not yet blighted but may become so due to existence of two or more of the following conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dilapidated or deteriorated structures</td>
</tr>
<tr>
<td>• Illegal use of structures</td>
</tr>
<tr>
<td>• Structures below minimum code standards</td>
</tr>
<tr>
<td>• Building abandonment</td>
</tr>
<tr>
<td>• Excessive vacancies</td>
</tr>
<tr>
<td>• Overcrowding of structures</td>
</tr>
<tr>
<td>• Inadequate utilities/infrastructure</td>
</tr>
</tbody>
</table>

Other eligible areas:

- **Enterprise zone** – area designated as an enterprise zone prior to 1992
- **Intermodal transportation area** – area of at least 800 acres planned for distribution, transfer, and storage of rail and truck freight
- **Major tourism area** – area with minimum capital improvements of $100M for an auto race track
- **Major commercial entertainment and tourism area** - may include, but not limited to, a major multi-sport athletic complex
- **Bioscience development area** – area to include facilities for conducting bioscience research, including laboratory space, incubator space, and office space

TIF revenues can be applied towards a broad range of development cost categories including a variety of public infrastructure improvements, including roads. Specific transportation related costs include:
- Street grading, paving, graving, curbing, guttering, and surfacing
- Street light fixtures, connection, and facilities
- Drives and driveway approaches located within the public right-of-way

In the Kansas City region, the use of TIF has suffered from somewhat negative public opinion in recent years as the weak economy resulted in far lower revenues than sometimes forecasted, often requiring the local jurisdiction to cover shortfalls, depending on the deal structure. Nevertheless, TIF has been used to successfully redevelop numerous areas throughout the 5-county region, including in Overland Park and Olathe in Johnson County, as well as at the Village West development in Wyandotte County.

3.1.2. Sales Tax Revenue Bonds – STAR bonds are a mechanism used in Kansas that allow for the use of both state and local future sales tax revenues to finance the development of “major commercial entertainment and tourism areas.” According to the Kansas Department of Commerce, to be classified under this definition,

“a proposed project must be capable of being characterized as a statewide and regional destination, and include a high quality innovative entertainment and tourism attraction, containing unique features which will increase tourism, generate significant positive and diverse economic and fiscal impacts and be capable of sustainable development over time.”

STAR bond revenues can be applied to the same set of development cost categories as conventional TIF revenues but beyond the major entertainment/tourism definition, there is another key difference between the two mechanisms. While TIF revenues are confined to local property and sales taxes, STAR Bonds access both state and local sales taxes, but no property taxes. As such, the Kansas Department of Commerce must approve any new STAR bond issuance. Given the local dynamics of the proposed case study projects, it is unlikely that any of the sites would be eligible for STAR bonds, except for possibly Village West, where STAR bonds have been successfully issued already.
3.2. Special Tax Assessment Mechanisms

Special tax assessments are additional taxes paid within defined geographic areas where parcels receive a direct and unique benefit from a public improvement. Generally, the cost of the improvement is allocated to property owners within the defined benefit zone and collected in conjunction with property or sales taxes over a predetermined number of years. Once the annual assessment collections cover the cost of the improvement (or debt issued to pay for the improvement), the assessment is removed.

Implementation of special tax districts can be challenging relative to other value capture mechanisms, as increases in property and sales taxes are politically sensitive and highly visible to affected property owners, businesses, and local consumers. Before this mechanism becomes politically feasible, it will require additional effort to convince local landowners and businesses that the tax is worth the value of the infrastructure improvement. Once in place, however, they are relatively easy to administer and the additional taxes are collected along with current property tax.

Nationally, special tax districts are one of the most common forms of value capture for transportation projects. In Kansas, local jurisdictions have legal authority to use two types of special taxing districts: transportation development districts (TDDs) and community improvement districts (CIDs).

### Table 1: TIF Mechanisms in Kansas

<table>
<thead>
<tr>
<th>Tax-Increment Based Mechanisms</th>
<th>Eligible Projects/Areas</th>
<th>Eligible Development Cost Categories</th>
<th>Revenue Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Increment Financing (TIF)</td>
<td>Redevelopment of blighted, conservation, and other defined areas</td>
<td>Broad range of costs including road construction</td>
<td>Local property taxes, sales taxes, and franchise fees</td>
</tr>
<tr>
<td>Sales Tax Revenue (STAR) Bonds</td>
<td>Major commercial entertainment and tourism development</td>
<td>Broad range of costs including road construction</td>
<td>State and local sales taxes</td>
</tr>
</tbody>
</table>

**3.2.1. Transportation Development District (TDD)** – TDDs are available to any city or county in Kansas for the purpose of financing transportation projects. Eligible improvements include the following:

- Roads
- Traffic signals
- Parking lots and parking structures
• Sidewalks
• Utilities within or beyond the public right-of-way
• Façade improvements

TDDs generate revenues through the use of special tax assessments on property located in the TDD or a new transportation sales tax within the defined district. The transportation sales tax can be up to one percent additional local sales tax within the district for up to 22 years. TDDs are initiated by property owners in the proposed district, and require a petition involving all property owners. Because they require approval from all property owners in the proposed district, establishing a TDD with numerous property owners can be challenging, and often faces the least resistance in larger greenfield developments with a single property owner or only a small number of owners. Revenues generated from TDDs can also be used outside of the boundaries of the defined district.

TDDs have been commonly used in the 5-county region and are a logical option to fund some part of the proposed transportation improvements in the case study sites, depending on market conditions and overall development opportunity. However, the extent to which a TDD could fund major highway construction costs may be limited. Nevertheless, even a limited contribution to the project from a TDD could be sufficient to close a funding gap and make it financially feasible.

Earlier in 2011, the owners of the Oak Park Mall, located in the City of Overland Park, announced a TDD bond issuance to fund exterior improvements including upgraded landscaping, walkways, lighting, and a park-and-ride shelter and lot. The revenues are generated through a 0.5 percent sales tax increase on all sales at the retail center, which is widely considered one of the most successful retail centers in the region. The establishment of the TDD resulted in a total bond issuance of $16.8 million. Although TDDs can levy up to a maximum of one percent tax, total revenue potential and resulting bonding capacity may be limited in areas with far less proven retail sales potential than that of Oak Park Mall, an established, successful retail center in one of the strongest demographic locations in the region.

3.2.2. Community Improvement District (CID) – CIDs are structured similarly to TDDs but have more flexibility in a variety of ways. They can be used to pay for a broader range of costs beyond those of the TDD, including:
• Land acquisition
• Construction costs
• Public infrastructure, including transportation related costs
• Ongoing maintenance costs

Although the transportation cost category is the relevant factor for this analysis, CIDs also have greater revenue potential than TDDs because they are allowed to levy a higher maximum sales tax of two percent, compared to one percent allowed under a TDD. Like the TDD, revenues can also come from special tax assessments on real estate as well as through sales taxes. Unlike the TDD, CIDs only require 55 percent approval of property owners, based on both land area and assessed value. As a whole, CIDs offer far more flexibility than TDDs. However, a key advantage to using a TDD is that funds can be used to pay for transportation costs located outside of the TDD boundary while CID funds must be used within the CID boundary.
CIDs are somewhat less common in Kansas because the law was recently enacted in 2009, although numerous examples do exist. While the majority of CIDs have been structured to pay for development costs, there is one recent example of a CID used to fund a possible transportation improvement. In March of 2011, the City of Wichita approved the Greenwich & K-96 CID, which allows for a 1.2 percent sales tax at the site of a future Cabela’s retail store. 1.0 percent of the tax will be used to help fund construction of the store, including site improvements, infrastructure, parking, and landscaping costs. The additional 0.2 percent sales tax is planned to help pay for a possible improvement to the interchange at K-96 and Greenwich. The sales tax will be collected for a maximum of 22 years or until a maximum of $17.2 million is generated. Hypothetically assuming the maximum amount is collected and fully applicable to the project, the implied amount available for the transportation improvement is roughly $2.9 million. Like the Oak Park Mall example, it is worth noting the strong retail sales potential of a store like Cabela’s, a destination retailer capable of drawing strong retail demand from beyond the region.

Although CIDs offer greater flexibility with respect to eligible costs, the intentions of developers and those of the local jurisdiction for the use of a CID are not always aligned. The proportion of CID revenues that go towards the developer’s project costs will directly impact how much is left to go towards any public infrastructure. As such, the feasibility of using CIDs in this analysis to fund transportation will hinge on the overall potential of the proposed real estate development. If the financial feasibility of the development is heavily dependent on the use of the majority of the CID revenues, then the potential to fund transportation improvements will be limited.

While TDDs and CIDs have potential for funding transportation improvements, the revenues generated from the examples cited suggest that these mechanisms will likely only pay for a small percentage of any major transportation improvement. The examples also suggest that the retail sales opportunity must be very strong.

3.2.3. Benefit Districts – Benefit districts are available to cities in Kansas to directly offset the infrastructure costs associated with new development. The local jurisdiction can issue bonds for the construction of public improvements and offset the cost through assessments to properties that benefit from the improvement.

Revenues from benefit districts are limited to the construction of the following:

- arterial roadways
- water lines
- sanitary sewers

Benefit districts are designed to prevent existing residents from paying for new infrastructure necessary to serve new development. The mechanism ensures that infrastructure costs associated with new development are allocated to the development itself as opposed to the jurisdiction as a whole. Benefit districts have been used widely in Kansas, particularly in rapidly growing areas where there is ongoing new development, such as in Johnson County.
### 3.3. Development Impact Based Mechanisms

Development impact fees and excise taxes are one-time charges collected from developers and/or property owners to fund public infrastructure and services made necessary by new development. Impact programs are most successfully implemented in areas poised for significant growth with little or no existing development. Generally, rates are based on a formula taking into consideration the number of new dwelling units or square feet of non-residential space and the relative benefit the infrastructure provides the property. For transportation projects, relative benefit is usually determined by the distance a development is located from the improvement.

Development impact fees are often applied to highly localized improvements and provide a clear link between fees collected and benefits received. For instance, a residential impact fee may go to pay for sewer connection. However, they are also used programmatically for large scale projects, such as the

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<table>
<thead>
<tr>
<th>Special Tax Assessment Mechanics</th>
<th>Eligible Projects/Areas</th>
<th>Eligible Development Cost Categories</th>
<th>Revenue Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Development Districts (TDDs)</td>
<td>Any defined district with approval from 100% of property owners in district</td>
<td>Transportation related costs</td>
<td>Up to 1% sales tax or special tax assessment on property</td>
</tr>
<tr>
<td>Community Improvement Districts (CID)</td>
<td>Any defined district with approval from 55% of property owners (based on both land area and assessed value)</td>
<td>Broad range of costs including transportation improvements</td>
<td>Up to 2% sales tax or special tax assessment on property</td>
</tr>
<tr>
<td>Benefit Districts</td>
<td>Any defined district with approval from certain minimum percentage of property owners</td>
<td>Arterial roadways, water lines, and sanitary sewers</td>
<td>Special tax assessments levied on property owners</td>
</tr>
</tbody>
</table>
Impact fee program in Orange County, California which helps pay for the highway system developed in the southern half of the county to help connect large outlying tracts of developable land.

Politically, the mechanism is generally well-accepted, as fees are levied against new development rather than existing residents and business owners. Similar to TIF, the perception that imposing impact fees on new development allows improvements to “pay their own way” may increase public acceptance. However, in some instances, fees have become too onerous and have reduced the competitiveness of certain areas. Fees that are higher than one or two percent of the cost of a property could impact that property’s competitiveness relative to a similar property with no fee, as fees are usually passed through from developers to buyers and/or tenants in the form of higher home prices or commercial rents.

In Kansas, development impact fees and excise taxes are commonly used to fund infrastructure and services. Some jurisdictions levy impact fees directly applicable to new development, while others also charge excise taxes that are used to finance specific infrastructure categories. For example, the City of Olathe charges a street excise tax of $0.215 per square foot of new residential and commercial development.

**Impact Fees vs. Excise Taxes** - Impact fees and excise taxes are somewhat synonymous but do have certain distinguishing differences. An impact fee is designed to fund infrastructure required by the new development. However, by definition there should be a link between the amount of the impact fee charged and the cost of the new infrastructure serving the new development. Unlike impact fees, the amount of excise tax does not have to be related to the cost of new infrastructure. Furthermore, excise tax revenues do not have to be spent directly on infrastructure improvements serving the properties that are taxed, but can be spent throughout the jurisdiction. Although Kansas statutory language prohibits local municipalities from levying excise taxes in general, there is an exception made specifically for development excise taxes. No specific statutory language exists either allowing or prohibiting impact fees.
4. Value Capture Analysis

Representatives from KDOT, with input from local jurisdictions in the 5-County region, identified one site in each county with transportation improvement project needs, to be analyzed as hypothetical case study candidates for funding through value capture mechanisms.

The five identified projects include the following:

- **Village West improvements** - a new interchange and other transit and state highway improvements in the Village West area in western Wyandotte County; the Village West analysis also includes a detailed summary of the historical use of local revenue tools to better understand the potential to fund transportation improvements.

- **Tonganoxie US-24/40 improvements** - road improvements on a 1.5-mile corridor of US-24/40 in Leavenworth County.

- **North Lawrence Transit Center / Park-n-Ride** - a potential new transit center at the I-70 Business Center/Old Tanger Mall location in the North Lawrence neighborhood in Douglas County.

- **Overland Park interchange improvements** - on- and off-ramps and other improvements at the intersection of US-69 and 159th St in Johnson County, where a new overpass is currently under construction.

- **Spring Hill interchange improvements** – improvements to the interchange at US-169 and 223rd, in the section of Spring Hill located in Miami County.

This analysis takes into consideration Kansas statutes related to local taxation and project-specific potential for new development or economic activity in the surrounding area based on a high-level market analysis of each case study site. Those mechanisms determined to be the most feasible were then used in a financial analysis of hypothetical market-based development scenarios to determine potential revenue available to finance transportation improvements.

The following sections summarize each case study site, including relevant background and market findings to better understand future growth potential at each site. Detailed regional market findings are contained in Appendix B-1.

**Methodology** - Although each case study represents a unique scenario, for simplicity, certain assumptions were maintained for each analysis. Each case study section includes the specific rationale for what types of mechanisms could be used, although there are some common elements across all case studies. While there are a variety of potential mechanisms available in Kansas, none of the case studies appear to be eligible or good candidates for TIF or STAR bond usage, which leaves the special tax and development-impact based mechanism categories. Within these categories, statutory language generally allows for flexibility to structure mechanisms in a wide variety of ways. The only mechanisms that include specific parameters on tax rates are TDDs and CIDs on retail sales, which are limited to 1 percent and 2 percent additional taxes, respectively. However, TDDs and CIDs can also be structured as a special
property assessment, and specific tax rates are subject to negotiation and approval by the affected property owners. The same is true for most special benefit districts, and development based mechanisms like impact fees and excise taxes also offer flexibility in terms of fee structure.

To narrow the universe of analytical options and allow for better comparison of each case study analysis, when applicable, each case study uses a 1 percent TDD on any potential new retail sales. In most cases, the ability to use the TDD revenues for improvements in areas beyond the defined district, such as along a transportation corridor, is more beneficial than the higher potential tax rate of a CID. For analysis incorporating retail sales tax revenues, long-range retail employment estimates were converted to order-of-magnitude annual retail sales estimates. Except where noted otherwise, this conversion assumes 350 square feet of retail space per employee and $300 of annual retail sales revenue per square foot, based on industry averages for all retail store types.

In addition to the TDD retail analysis, a special property assessment approach was also analyzed. While statutory language specifies the maximum retail tax rate for TDDs and CIDs, these mechanisms can also be applied more loosely in the form of a special tax assessment on commercial and residential property. The special tax rates are less defined and are generally negotiable between the municipality and the property owners within the defined district. Conceptually, TDDs, CIDs, and special benefit districts can all be used as additional special taxes on property, but for the purposes of the proposed case study transportation improvements, with one exception, the special tax is assumed to be in the form of a TDD. This is because revenues can be used for improvements in areas outside of the defined district boundary.

Because a TDD special tax assessment can be structured in a variety of ways, for simplicity each case study assumes that the TDD special assessment is levied at a rate of 1 percent on residential and commercial appraised property value. Although these rates could vary based on the jurisdiction, property owners, and other factors, the assumed rates were considered low enough to be generally acceptable to property owners yet high enough to potentially generate significant revenue in the right development scenario.

There are a number of variations of financial transaction structures and credit instruments that could be used to accelerate the revenues from the various local revenue tools, but the following relatively simple approach was adopted to be conservative, as noted.

1) A 1.75X (times) debt service coverage ratio was applied to the net revenues. It is likely that a lower coverage ratio (i.e. 1.5X) may be acceptable, but the higher ratio provides additional security.

2) The revenue remaining after subtracting debt service coverage from net revenue was discounted at 6 percent, representing a blended long term interest rate applicable to various municipal debt instruments that might be used for the transaction.

3) After summing the discounted cash flows, 5 percent was subtracted representing estimated transaction costs and another 10 percent was subtracted representing the required debt service reserve funds. A debt service reserve fund may not be required but is another conservative assumption.

All property values were also assumed to grow 2 percent per year based on inflation for revenue collections purposes.
4.1. Village West Area

4.1.1. Background - The rapid growth of development around the Kansas Speedway has accelerated the need for infrastructure investment in this area. This analysis explores the use of value capture mechanisms to fund the upgrading of an existing intersection to an interchange, and possibly other transit and state highway improvements in the Village West area.

Located in the western portion of Wyandotte County, the Village West area includes numerous large-scale destination developments built in recent years including a NASCAR speedway facility, two professional sports stadiums, six hotels, and 1.4 million square feet of retail. A casino and 400-acre water park are currently under construction and a 600,000 square foot office development to house Cerner’s headquarters and 4,000 employees is planned.

4.1.2. Proposed Infrastructure Improvement - As noted in Appendix A-1, about 10 years ago KDOT made improvements to State Avenue through the Village West area (part of the state highway system) to accommodate the speedway and retail development to the north. With development now occurring to the southeast of the speedway, the intersection of State Avenue and Village West Parkway (circled in the map below) is not expected to accommodate the new traffic and needs to be upgraded to keep traffic from backing up and impacting the State Avenue / I-435 interchange.

Figure 6: Aerial Image of Village West and Surrounding Area, with Intersection of State Avenue and Village West Parkway Highlighted

Until now, the Village West area has been almost exclusively developed with retail and recreational uses, which do not create daily morning and evening peak traffic flows. Additionally, all of the development is located to the north of State Avenue, such that traffic accessing the area from I-435 either turns right or goes straight. With the addition of the casino under construction and the planned 600,000 square feet of office space to the south of State Avenue along Village West Parkway, along with existing traffic, the intersection at State Avenue and Village West Parkway will need to be improved to handle future traffic.
KDOT would also like to explore the potential to fund other improvements in the immediately surrounding areas along I-70, I-435, and other state-managed facilities.

4.1.3. Local Revenue Tool History - Numerous tools have already been used to fund the existing developments in the Village West area, and these applications represent a potential constraint to the use of new ones. The following is a brief summary of the mechanisms that have been used for various components of Village West. A more detailed summary of the history of development finance at Village West is summarized in Appendix A-1.

Figure 7: Summary of Village West Development Finance Transactions

<table>
<thead>
<tr>
<th>Village West Component</th>
<th>Mechanism</th>
</tr>
</thead>
</table>
| Legends at Village West – 400 acres of retail | STAR Bonds  
TDD |
| Plaza at the Speedway – big box retail | TIF  
TDD |
| Schlitterbahn water park – 400-acre water park with hospitality and retail - under construction | STAR bonds  
TDD |
| Livestrong Sporting Park – MLS soccer stadium | STAR bonds  
TDD |
| Cerner Headquarters – 600,000 SF office space – recently approved | STAR bonds |

The STAR bonds for the existing retail components were considered very successful and were to be paid off earlier than anticipated, but were reissued to raise $140 million for the recently completed soccer stadium and new office space. The existing retailers have been generating approximately $40 million in sales tax revenue annually, all of which is dedicated to repaying this debt.

4.1.4. Development Potential - Given that the Village West area has experienced ongoing major development and is simply outgrowing its roadway infrastructure, there appears to be minimal opportunity for value capture as defined in this report (where an improvement serves to unlock new development potential). Development agreements for the casino and office projects noted above have already been approved through local channels and are moving forward. It appears that the opportunity for KDOT to lobby for a portion of potential local tax revenues generated from these sites to be used for needed infrastructure improvements has passed. However, this analysis highlights a very good example of why many states have provisions in law that require traffic impact studies to be performed as part of the development approval process. In many cases, the developer is responsible for mitigating roadway
impacts, and could be responsible for improvements (or portions thereof) such as the State Avenue interchange improvement contemplated herein.

Despite the apparently limited opportunities for value capture to play a part in the State Avenue interchange improvement, the following conclusions informed the financial analysis of the other case studies, and helped illustrate how the tools available in Kansas could play a part in this or other similar projects given KDOT’s ability to estimate and assign responsibility for mitigating traffic impacts to developers.

With the casino and office development underway, PB looked to other undeveloped areas immediately surrounding Village West area that may have the potential to generate revenue for transportation improvements. The large, contiguous, undeveloped area immediately to the northwest of the speedway, shown in the northwest corner of the map below, was identified as a strong potential development opportunity. As such, PB used long-range forecast data to estimate the future commercial and residential development potential on the site. MPO data suggests that the area of benefit is going to grow dramatically, most likely as part of a continuation of the expanding critical mass of employment at Village West.

*Figure 8: Aerial Image of Major Developments at Village West and Surrounding Area*

It is estimated that employment on the group of undeveloped parcels immediately to the northwest of Village West could grow by approximately 3,400 retail jobs by 2040, based on employment forecasts from the Mid-America Regional Council (MARC) at the traffic analysis zone (TAZ) level. Although the TAZ encompasses a larger area than the defined developable parcel, it is assumed that land within the closest proximity to Village West will capture the majority of future employment growth. Therefore, all future retail employment estimates were assigned to the defined area. Based on this analysis of forecast
data, the hypothetical development scenario on the site consists of 850 residential units and 1.7 million square feet of office and retail space over the 22-year study period.

4.1.5. **Local Revenue Tool Eligibility** - The following figure lays out the potential for various local revenue tools assuming the hypothetical development scenario at this site.

*Figure 9: Potential Value Capture Tools for Village West*

<table>
<thead>
<tr>
<th>Local Revenue Tool</th>
<th>Eligibility</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIF</td>
<td>Not likely eligible for either TIF or STAR</td>
<td>N/A</td>
</tr>
<tr>
<td>STAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDD</td>
<td>Eligible for all three</td>
<td>TDD most applicable if funds to be used to finance interchange at State Ave and Village West Parkway. CID would not be applicable since interchange would be outside of defined district.</td>
</tr>
<tr>
<td>CID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Benefit District</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact Fees</td>
<td>Yes</td>
<td>Yes; one-time impact fees and/or excise taxes on large-scale development could generate revenue for improvements</td>
</tr>
<tr>
<td>Excise Taxes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.1.6. **Village West Financial Analysis** - In light of the above available mechanisms in the context of existing and future development at Village West, a TDD on future retail sales revenue was analyzed, as well as a TDD special assessment on commercial and residential property.

4.1.6.1. **Retail TDD** - Revenue from a 1 percent TDD tax on future retail sales from development on the undeveloped area was estimated using a hypothetical order-of-magnitude development scenario based on employment forecasts from the MARC at the TAZ level, along with a GIS analysis of the relevant parcels. It is assumed that all retail properties in the defined district would be subject to a 1 percent tax on sales and that bonds could be issued based on TDD revenue from retail sales. Using the assumptions described above in the methodology section, over the 22-year forecast period, the scenario as outlined above could provide approximately $9.9 million in TDD bonds.

4.1.6.2. **TDD Special Assessment** - A TDD special tax district analysis was also conducted, and assumes that a new tax would be applied to residential and commercial property on the developable land, using assumptions described in the methodology section above. Base parcel values were taken from a GIS analysis of county parcel data within the defined area, and future additions to base parcel values were
estimated based on average study area and county parcel values and MARC forecasts of housing and employment projections. A likely average appraised value was estimated based on residential values in the surrounding area. MARC forecasts assume a growth of 1,200 households over the 2010 to 2040 period, and growth of the value for the undeveloped parcels is based on the average household value and MARC growth forecasts for new households.

To estimate the value of future commercial development, total appraised commercial property value for the county was estimated, and county-wide employment was used to compute a proxy of per-employee value of commercial development on the parcel. The resulting commercial value per employee was $20,200. However, this county-wide figure is likely conservative given that the value of new commercial development in the Village West area is likely significantly higher than the county’s average commercial property value. Calculations using appraised value in the study area with employment estimates suggest that commercial property value per employee in the Village West area is approximately $53,000. Applying this value to MARC employment forecasts yields an estimate of future commercial property value that will be subject to the 1 percent TDD. Based on this analysis, there is a higher potential for financing of value capture revenues in this special assessment scenario, at approximately $12.7 million.

4.1.6.3. Excise Tax - Lastly, a potential excise tax structured in a way that’s consistent with other neighboring jurisdictions could generate a one-time payment of approximately $3.3 million. This calculation assumes that the 375-acre parcel receives an excise tax of $0.20 per square foot of land area. This estimate is based on existing excise taxes in nearby jurisdictions. Currently the City of Overland Park levies a $0.19 excise tax for new development to be platted, and the City of Olathe levies a $0.215 street excise tax that goes towards local transportation improvements.

Figure 10: Village West Financial Results (in $millions)

<table>
<thead>
<tr>
<th>Local Funding Tool</th>
<th>Sum of Revenue 2013-2034</th>
<th>Bonding Capacity of Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% TDD Tax on Retail Sales</td>
<td>$37.6</td>
<td>$9.9</td>
</tr>
<tr>
<td>TDD Commercial/Residential Assessment</td>
<td>$61.5</td>
<td>$12.7</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excise Tax - $0.20/SF of land</td>
<td>N/A</td>
<td>$3.3</td>
</tr>
</tbody>
</table>

4.1.7. Village West Conclusions

4.1.7.1. Revenue Potential of Hypothetical Development on Nearby Undeveloped Land - Based on the above analysis, a hypothetical development on a greenfield site adjacent to Village West could support public financing ranging from approximately $10 million to $13 million depending on whether it is structured as a retail sales tax or a special assessment on commercial and residential property. An excise tax of $0.20 per square foot of land area would generate a one-time up-front payment of $3.3 million. Although the excise tax results in far less revenue than the TDD scenarios, it does represent a simpler, lower risk form of revenue.
4.1.7.2. Analysis of Historical Trends at Village West (also see Appendix A-1) - In light of Village West’s development history and extensive use of development finance mechanisms (described in detail in Appendix A-1), PB researched the development timeline to better understand if there were potential opportunities missed for funding transportation improvements, particularly if the implementation of funding mechanisms was less fragmented over time.

An analysis of STAR bond proceeds and actual historical and forecasted sales tax revenue at Village West suggest that there was little room for additional revenue to be raised from the series of mechanisms used over time. Although the series of mechanisms used took place in a somewhat fragmented pattern over time, this was the natural progression inherent in the economic development efforts that took place. The deal to attract the speedway ultimately helped facilitate attracting the major retail anchors, which helped foster the agreement that catalyzed the Legends Outlets, and so on. The land uses in place today are a direct result of the series of mechanisms employed over time. However, had KDOT been party to the negotiations at the front end of the development planning process, they could have outlined infrastructure improvement costs foreseen as a result of a traffic impacts analysis. Clearly understanding the impacts to existing infrastructure from the planned development could have provided KDOT with the justification to request that the proper improvements be made by the developer (or paid for from the developer’s financial package).

4.2. Tonganoxie US-24/40 Improvements

4.2.1. Background and Proposed Improvements - The second case study involves the opportunity to implement road improvements along US-24/40 in the City of Tonganoxie, in western Leavenworth County. Recommendations from the US 24/40 Corridor Study conducted in 2008 include improvements to a 1.5-mile segment between 4th Street and Kansas Avenue. The proposed improvements include widening the road to three lanes, potential new signals, and new street connections running parallel to the highway in the same vicinity, as shown in the image below.

The majority of the land adjacent to the west of the 1.5-mile segment is undeveloped agricultural land. There is a variety of land uses that could be delivered on this land, however the supply of similar land around the city is plentiful and this site may not be competitive with an increased local tax burden.
Figure 11: Map of Potential Improvements; US 24/40 Corridor in West Tonganoxie

Source: US 24/40 Corridor Study
4.2.2. Development Potential - With an estimated 5,000 people and 1,900 households as of 2010, the City of Tonganoxie is a small market far removed from the fringe of growth emanating from the core of the Kansas City region. Demonstrated demand in the corridor suggests weak retail market conditions with numerous vacancies in the surrounding area, including three of the four quadrants of the intersection of US 24/40 and 4th Street, at the boundary of the corridor. Long-term historical permitting trends in Tonganoxie suggest that the city experienced an unsustainable amount of new construction during the housing boom, and a rapid decline in line with regional and national housing trends.

Figure 12: Historical Annual Residential Permits, Tonganoxie, KS 1980-2011

Tonganoxie reached over 150 permits per year in 2005, although the long-term average since 1980 is 38 units per year, and the annual average from 2006 through 2011 was 31 units. As such, while there is ample developable land along the 1.5 mile corridor (approximately 300 acres), it is not clear that the transportation improvement would create a development opportunity with the scale necessary to generate substantial tax revenues in the near term. Nevertheless, the undeveloped parcels should benefit from the improved access that the proposed transportation improvements would provide. These improvements could poise the corridor to capture a slightly increased share of future growth, but only if the value capture mechanism does not burden developable parcels by making them less attractive than other similar development opportunities nearby.
4.2.3. **Local Revenue Tool Eligibility** - The following figure lays out the potential for various local revenue tools assuming the hypothetical development scenario at this site.

*Figure 13: Potential Tonganoxie Value Capture Tools*

<table>
<thead>
<tr>
<th>Local Revenue Tool</th>
<th>Eligible?</th>
<th>Applicable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIF</td>
<td>Not eligible for either TIF or STAR</td>
<td>N/A</td>
</tr>
<tr>
<td>STAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDD</td>
<td>Eligible for all three</td>
<td>TDD most applicable if funds from large development on single parcel or two are to be used to finance the 1.5-mile corridor improvements. CID along corridor would be less feasible given required approval of numerous existing property owners on east side of road.</td>
</tr>
<tr>
<td>CID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Benefit District</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact Fees</td>
<td>Yes</td>
<td>Lack of demand/growth suggests additional fees could hinder new development.</td>
</tr>
<tr>
<td>Excise Taxes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2.4. **Tonganoxie Financial Analysis** - Value capture analysis included a baseline estimate of the corridor’s capture of long-term growth as well as an estimate of the increased capture rate that could result from the improvements. In light of the available mechanisms in the context of existing and future development near the proposed improvements, the following financial analyses were considered the most feasible.

4.2.4.1. **TDD Retail Analysis** - A hypothetical 1 percent tax on future retail sales was analyzed using MARC employment forecasts at the TAZ level along with a GIS analysis of the developable land in the corridor. Because the undeveloped area is located within one very large TAZ containing a substantial amount of other land outside of the corridor, PB estimated the amount of future TAZ employment that would be captured by the corridor. In the “build” scenario, which assumes the transportation improvements are made, it was assumed that the corridor would capture 50 percent of the total employment predicted to occur in the TAZ, while in the no-build case, the corridor would only capture 20 percent overall TAZ growth. This analysis was based on visual inspection of current development and land uses using GIS satellite imagery. It was also assumed that growth would be accelerated, and take place in the following 10 years as opposed to over the 30-year forecast period provided by MARC.

In the build case it is estimated that the site could grow by 150 employees over the analysis period versus 60 employees in the no-build case, resulting in a net increase of 90 employees. Despite a large difference
in capture rates, long-range growth forecasts are low enough that the changes in capture rates do not yield significant change in employment growth.

This is further highlighted in the resulting revenue analysis. As in the previous case, it is assumed that all properties in the study area would be subject to a 1 percent tax on retail sales and that bonds could be issued based on a 1 percent TDD drawing revenue from new retail sales. Using this series of calculations provides an estimate of potential retail sales based on average retail employment growth in the corridor.

The build scenario as outlined above could provide $5.9 million in gross TDD sales tax revenues over 22 years, resulting in $1.35 million in bonding capacity, as shown in the figure below. The no-build scenario which results in a capture rate of 20 percent of long-range growth yields $4 million in gross TDD revenue and just under $1 million in bonding capacity. This analysis suggests that even with a significantly high 50 percent capture of surrounding long-range growth, future potential retail sales will not yield significant incremental TDD revenue (approximately $400,000) at the Tonganoxie case study.

4.2.4.2. Special Tax District Analysis - As in the previous case study, the special tax district analysis assumes that a new ad valorem tax would be applied to residential and commercial properties along the corridor. Base parcel values were calculated from county parcel data and future additions to property value were based on current average per-household and per-employee values based on Leavenworth County parcel averages.

An average household value for future residential development was calculated based on the appraised residential value for existing properties along the corridor. To estimate the value of future commercial development, the total existing commercial appraised value in the county was divided by the number of county employees to compute an average per-employee value of commercial development as a proxy for new commercial development value in the corridor.

Applying the same build and no-build capture rates of 50 percent and 20 percent, the results of the special assessment are more positive due to the residential component. While the employment build scenario yields an additional 90 jobs, the residential build scenario results in an additional 375 households delivered along the corridor, the majority of which would occur in the first 10 years, or 38 per year. The build scenario could provide $8.2 million in bonding capacity, as shown in the figure below. The no-build scenario results in $6 million in bonding capacity. This suggests that the increased new development that results from the delivery of the transportation improvement could unlock an increment of $2.2 million.
Revenues from the no-build scenario are generated by existing developed properties in the corridor and the new development in the slower-growth scenario. The increased and accelerated new development reflected in the build scenario results from the transportation improvement. The difference in the two scenarios represents the potential revenue that could be captured and applied to the transportation improvement.

4.2.5. Tonganoxie Conclusion - The analysis suggests that there will be some incremental change in development potential at the site, however, the questionable demand for non-agricultural land uses in Tonganoxie results in a relatively modest amount of incremental revenues that could be applied to the improvements. A special assessment on commercial and residential property yields a larger amount of incremental revenue compared to a TDD 1 percent tax on retail sales, due to the slightly higher potential for residential growth in the corridor compared to that of commercial. The build scenario provides an increase of $9.9 million in additional gross tax revenue over the 22-year period which yields a net increase in bonding capacity of $2.2 million over the no-build scenario.

The analysis assumes that the improvement will allow for strong growth in the corridor, although the area’s rural location beyond the regional edges of growth makes it less likely to realize high levels of economic growth in the near term. While the proposed transportation improvements should enhance the development opportunity along the corridor, these improvements are not guaranteed to serve as a catalyst that immediately jumpstarts development. While it is possible that new development could occur in the immediately surrounding areas of the improvement, there is not a demonstrated pattern of growth surrounding the sites suggesting a strong likelihood of new development if the improvements were made. As a result, relying on revenue from value capture to help fund the improvement would be risky.

As a result, the ability to capture the incremental development value to help finance the improvements today is most likely limited without interim assistance from local government to help finance the improvements. For instance, Tonganoxie could set up a value capture district consistent with expected development in the undeveloped area and use general fund revenues to pay for the roadway improvements. With the new access provided by the improvements, development would be more likely to occur in the value capture district sooner and the city could recoup their investment through value capture revenue collections.
4.3. North Lawrence Transit Center

4.3.1. Background and Proposed Improvements - The third case study involves the opportunity to create a transit center at the site of the I-70 Business Center, also known as the Old Tanger Mall, in Lawrence. Located in the neighborhood of North Lawrence, the site has strong access with adjacency to I-70 and frontage along US-40/59, a main arterial that leads south to the core of Lawrence. The site consists of 95,500 square feet of retail space. Built in 1993 as a fashion outlet mall, the original plan called for 135,000 total square feet but the city requested a phased delivery to lessen the impact on existing retail supply conditions. Due to ongoing weak retail market conditions in that location, the center performed poorly and the second phase was not delivered, leaving a vacant parcel immediately to the south. Although built as retail space, the site has been repositioned and occupied primarily by office users.

Figure 15: Aerial Image of I-70 Business Park/Old Tanger Mall Site (in yellow), Adjacent Vacant Parcel (in red) and Surrounding Area

One potential concept is to integrate some form of transit center into the site, which could include a park-and-ride facility serving commuters from Lawrence using the I-70 turnpike to travel to Topeka to the west and Kansas City to the east. An alternative scenario could be to establish a broader TDD or CID.
encompassing more of the US-40/59 corridor throughout North Lawrence, to fund not only the transit center but additional transportation improvements along the route.

4.3.2. Market/Development Potential – As conceived, the park-and-ride would likely spur increased retail demand at the Tanger Mall site, primarily from commuters seeking convenience / daily needs retail such as coffee/breakfast-serving tenants, dry cleaning, newsstands, and other retail store types commonly found in transit centers. As such, the Lawrence market overview is focused primarily on retail market conditions.

According to the Lawrence-Douglas County Planning & Development Services Department, the North Lawrence submarket consists of 315,000 total commercial square feet, indicating that the subject site represents close to one third of the submarket inventory. As of October 2010, the submarket had a 28 percent commercial vacancy rate, compared to 7 percent for Lawrence as a whole, indicating very weak market conditions for commercial space in the submarket. Current listings (fall 2011) show 47,000 square feet available for lease at the site, roughly half of the entire center. The site is one of the single largest concentrations of vacant space in the city, and accounts for a large percentage of the submarket’s overall vacancy rate.

Based on these market findings and the fact that existing tenants consist primarily of office users, the current retail opportunity appears limited at the site. As such, assuming the transit center concept can generate increased retail demand, or possibly some new office demand, the proposed improvements could represent a viable case for value capture analysis.

4.3.3. Local Revenue Funding Tool Eligibility

*Figure 16: Potential North Lawrence Value Capture Tools*

<table>
<thead>
<tr>
<th>Local Revenue Tool</th>
<th>Eligible?</th>
<th>Applicable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIF, STAR</td>
<td>Not eligible for either TIF or STAR</td>
<td>N/A</td>
</tr>
<tr>
<td>TDD, CID, Special Benefit District</td>
<td>Eligible for TDD and CID</td>
<td>A TDD or CID would be applicable to both the park-and-ride improvement and the corridor improvement concepts. A CID may be more viable in the corridor improvement concept since it only requires 55% of ownership approval.</td>
</tr>
<tr>
<td>Impact Fees, Excise Taxes</td>
<td>No – these apply more to new development</td>
<td>N/A</td>
</tr>
</tbody>
</table>
4.3.4. North Lawrence Transit Center Financial Analysis

4.3.4.1. Retail Demand Analysis - A preliminary retail demand analysis from commuters using the park-and-ride was conducted to determine to what extent the concept would improve retail sales at the center as well as to quantify the potential for a retail TDD or CID.

Because potential commuter demand data for the site does not exist at this time, the preliminary estimate assumes an average of 500 commuters per day would use a park-and-ride at the site, based on a preliminary estimate of available spaces at the center. The analysis assumes that half of these commuters would make retail expenditures on-site each day, spending an average of $10 per day on convenience retail items such as breakfast, coffee, newspapers, dry cleaning, carry-out dinner, etc. This results in $2,500 in average retail expenditures from commuters per weekday, or $650,000 per year. Assuming the typical convenience retailer requires a minimum of $200 in annual sales per square foot (below the industry average of $300 for all retail types), the additional expenditures from commuters on site would yield demand for an additional 3,300 square feet of retail space.

\[
\begin{align*}
\text{Commuters per day} & \quad 500 \\
\times \% \text{ of commuters making expenditures at on-site retail} & \quad 50\% \\
= \text{Average commuter shoppers per day} & \quad 250 \\
\times \text{Average amount spent per day} & \quad $10 \\
= \text{Total average retail expenditures per day} & \quad $2,500 \\
\times \text{Weekdays per year} & \quad 260 \\
= \text{Total weekday commuter retail expenditures per year} & \quad $650,000 \\
/ \text{Typical minimum sales per square foot; convenience retail goods} & \quad$200 \\
= \text{Total feasible retail square feet from commuter expenditures} & \quad 3,250
\end{align*}
\]

There is currently approximately 47,000 square feet of vacant space in the center, suggesting that the park and ride would not improve on-site retail conditions significantly. Furthermore, a 1 percent TDD or 2 percent CID on these additional sales would yield only $6,500 or $13,000 annually in additional tax revenue.

4.3.4.2. Special Tax District Analysis - A hypothetical special tax on commercial properties was also examined on the corridor south of the proposed park-and-ride. The defined area is comprised of land adjacent to US-40/59 stretching from I-70 to the north and the Kansas River to the south, as shown in the following aerial image.
MPO employment forecasts were used to estimate employment growth over the study period for the purpose of estimating new construction value. Commercial value per employee was estimated using total existing commercial value and total estimated employees. The commercial value per employee was combined with the MPO employment forecast to determine the increase in property value caused by new employment in the corridor.

The corridor is forecasted to lag the county in growth primarily because it is mostly built out, and future growth is expected to take place in less developed areas in the county. The corridor currently represents an estimated 0.9 percent share of county employment, but growth forecasts suggest this share will fall to 0.6 percent by 2030. In the no-build case, the corridor is assumed to grow at this forecasted rate. In the build case, it is estimated that the park-and-ride facility and corridor improvements would make the corridor more attractive, and help spur increased commercial development or redevelopment in the otherwise built-out corridor. In this scenario, it is assumed that the corridor will have higher than
forecasted growth, more in line with the county-wide average growth through 2030. As such, it would retain its current 0.9 percent share of overall county commercial employment. This higher growth rate in the build scenario results in just under 200 additional jobs compared to the no-build scenario.

The figure below shows the financial results for these build and no-build cases. A special tax district in the corridor is not predicted to generate a significant increase in bonding capacity over a no-build scenario. In the no-build scenario, it is estimated that the special tax district could bring $1.5 million in financial capacity and an additional $0.4 million in capacity (or $1.9 million) in the build case.

*Figure 19: North Lawrence Financial Results (in $millions)*

<table>
<thead>
<tr>
<th>Special Tax District</th>
<th>No Build 2013-2034 Bonding Capacity of Revenue</th>
<th>Build 2013-2034 Bonding Capacity of Revenue</th>
<th>Value Capture Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Tax District</td>
<td>$5.9</td>
<td>$1.5</td>
<td>$7.6</td>
</tr>
</tbody>
</table>

4.3.5. *North Lawrence Transit Center Conclusion* - The North Lawrence Transit Center concept would not generate enough incremental retail demand to be a viable value capture candidate although a corridor improvement district on US 40/59 stretching from I-70 to the Kansas River could generate approximately $400,000 in value capture potential. However, this scenario may be less viable due to potential consensus issues with forming the value capture district. The conceptual North Lawrence park-and-ride would enhance the retail opportunity at the I-70 Business Center/Old Tanger Mall, but not nearly enough to occupy 47,000 square feet of retail (the current vacancy in the center), or enough to generate significant TDD or CID revenue to finance the improvement.

The US 40/59 corridor is largely built out, and long-range MPO forecasts show minimal growth in the corridor as a result. A TDD or CID special assessment on commercial properties in the corridor could conceivably increase long-term growth potential in the corridor from redevelopment, but the incremental change in property value does not yield significant revenue to be used for corridor improvements. Furthermore, a special district such as a TDD would require approximately 100 different property owners to agree to additional taxes, although a CID would require only 55 percent of owner approval. While the potential district does not represent a viable value capture opportunity, it could represent a more traditional local funding opportunity, with gross special tax revenues starting at just over $200,000 in the first year and increasing to over $330,000 in year 22. These revenues could be used to fund smaller scale corridor improvements, such as streetscape upgrades, sidewalks, signage, etc.

Another option for this site would be a joint development arrangement between the park-and-ride operator and the shopping center owner. If the goal is to locate a park-and-ride facility at that location, a deal could be struck to restructure the parking lot to accommodate a paid section for the park-and-ride facility. Parking revenues could be shared between the parties and the shopping center would likely benefit from the increased traffic resulting from the new bus service.

4.4. *Overland Park Interchange*

4.4.1. *Background and Proposed Improvements* - The fourth case study involves the opportunity to complete an interchange at the intersection of 159th and US-69 in the southern edge of Overland Park in
Johnson County. The planned improvements entail adding on- and off-ramps to US-69 to create an interchange as well as adding lanes to US-69 near the site, between 151st and 167th Streets. Currently there is no connectivity between the two roads, and a new overpass expansion is under construction. The improvements would cost approximately $33 million. The potential opportunity for value capture mechanisms involves numerous undeveloped parcels along the 159th corridor, including 320 acres in the southwest quadrant of the intersection, a partially developed area in the southeast quadrant, and four other potential developments to the east of the proposed interchange.

*Figure 20: Aerial Image of the 159th/US-69 Intersection (circled) and Undeveloped Land on 159th Street Corridor*

4.4.2. Market/Development Potential – As shown in Appendix B-1, Johnson County has had the strongest economic and demographic growth in the region in recent decades, and long-term real estate market conditions have been healthy as well. Although market conditions have been weaker during the latest recession, the area has not suffered as much as other submarkets in the Kansas City region. Over the past few decades, the City of Overland Park has been a primary recipient of this strong growth, and the fringe of new greenfield development emanating from the core of the region has traveled south
through the city towards the area surrounding the proposed improvements. As a result, the immediately surrounding area is poised for new development and represents a strong development opportunity.

Along with the immediately adjacent site, numerous developments are planned and proposed along the 159th corridor, primarily to the east of the site. Future retail development plans were taken directly from City development plans for six different proposed projects. The consolidated development plans of all retail stores within the study area in the build case total 1,758,000 square feet of new development by 2020. In the no-build case, the same amount of new retail development would take until 2043 to be completed, with only 467,000 completed by 2020. City of Overland Park projections are shown in the figure below.

Figure 21: City of Overland Park Development Projections (Build / No Build Cases)

<table>
<thead>
<tr>
<th>Village of Overland Park</th>
<th>Interchange Constructed in 2013</th>
<th>Interchange not Constructed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cumulative % Developed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail (SF)</td>
<td>5%</td>
<td>60%</td>
</tr>
<tr>
<td>Office (SF)</td>
<td>20,850</td>
<td>250,200</td>
</tr>
<tr>
<td>Hospital (SF)</td>
<td>47,000</td>
<td>564,000</td>
</tr>
<tr>
<td>Residential (Units)</td>
<td>45</td>
<td>538</td>
</tr>
<tr>
<td><strong>Metcalf Village Shops</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative % Developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail (SF)</td>
<td>10%</td>
<td>80%</td>
</tr>
<tr>
<td>Residential (Units)</td>
<td>36</td>
<td>288</td>
</tr>
<tr>
<td><strong>SEG A Business Park</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative % Developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office (SF)</td>
<td>-</td>
<td>93,000</td>
</tr>
<tr>
<td><strong>Retreat at Maplecrest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative % Developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail (SF)</td>
<td>-</td>
<td>14,500</td>
</tr>
<tr>
<td><strong>Village Shops</strong></td>
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<td></td>
</tr>
<tr>
<td>Cumulative % Developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail (SF)</td>
<td>10%</td>
<td>50%</td>
</tr>
<tr>
<td><strong>SW Corner 159th/Metcalf</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative % Developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail (SF)</td>
<td>-</td>
<td>64,000</td>
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<tr>
<td><strong>Summary Totals</strong></td>
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<td></td>
</tr>
<tr>
<td>Retail (SF)</td>
<td>108,600</td>
<td>1,107,400</td>
</tr>
<tr>
<td>Office (SF)</td>
<td>20,850</td>
<td>343,200</td>
</tr>
<tr>
<td>Hospital (SF)</td>
<td>47,000</td>
<td>564,000</td>
</tr>
<tr>
<td>Residential (Units)</td>
<td>81</td>
<td>826</td>
</tr>
</tbody>
</table>

Source: City of Overland Park
4.4.3. Local Revenue Funding Tool Eligibility

Figure 22: Potential Overland Park Value Capture Tools

<table>
<thead>
<tr>
<th>Local Revenue Tool</th>
<th>Eligible?</th>
<th>Applicable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIF</td>
<td>Not eligible for either TIF or STAR</td>
<td>N/A</td>
</tr>
<tr>
<td>STAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDD</td>
<td>Eligible for all three although city prefers not to use special benefit districts for transportation</td>
<td>A TDD or CID could be applicable. Properties located closer to improvements stand to benefit more than those located further away, so potential for higher rates on closer properties and lower rates on those located further away. The City has already analyzed the potential for a TDD to improve the roads adjacent to the site.</td>
</tr>
<tr>
<td>CID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Benefit District</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact Fees</td>
<td>Yes – city uses excise taxes but not impact fees</td>
<td>Yes; the City levies an excise tax of $0.19 per square foot when land is platted, although this revenue is applicable to a broad range of categories, and not necessarily the transportation improvements needed near the site.</td>
</tr>
<tr>
<td>Excise Taxes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.4. Overland Park Financial Analysis - In light of the potential development at the site as well along the 159th corridor, numerous scenarios using TDD retail revenues as well as TDD special assessment revenues were estimated using the above development build-out scenarios provided by the city based on planned and proposed projects.

4.4.4.1. TDD Analysis - For future Overland Park retail development, a hypothetical tax on retail sales was evaluated to estimate future funding / financing potential from enacting a TDD in the project area. For Overland Park, three cases were examined: a high, base, and low fees case. In the high case, it is assumed that known proposed developments in the study area would all be subject to a 1 percent tax on retail sales. In the mid case, it is assumed that development on the adjacent site, the Village at Overland Park, would be subject to a 1 percent tax on retail sales, while all other new developments in the corridor would be taxed at 0.5 percent. In the low case, retail sales on all properties, including the Village of Overland Park, would be taxed at 0.5 percent. The following figure summarizes the findings from each scenario.
These scenarios suggest that a substantial amount of revenue can be generated in the high and mid cases, with the high case generating enough in bonding capacity to cover a majority of the proposed improvement costs of the interchange and widening.

Special Tax Analysis - The special tax district analysis assumes that a tax would be applied to the new residential and commercial developments in the six known development opportunities described above. Base parcel values were taken from a GIS analysis of county parcel data within the study area, and future additions to base parcel values were estimated based on current parcel values and the City of Overland Park development plans mentioned above. An average household appraised value was calculated based on the number of existing residential units and total existing residential parcel value in the surrounding area in 2010.

To estimate the value of future commercial development, the county average commercial appraised value per employee was used. The total commercial appraised value was divided by total county employees to compute a per-employee assessed value of commercial development, which is a proxy for new commercial development space / value needed to house these employees.

The special tax build scenario results in a bonding capacity of $55 million versus $18.8 million in the no-build scenario over the 22-year period, an increase of $36 million in the build scenario. This analysis suggests that delivering the proposed transportation improvements would unlock an additional $36 million in value from the accelerated development timeline that could be captured and allocated towards the project, an amount that would cover the costs of the proposed transportation improvements.
4.4.4.2. **Excise Tax** - Along with the potential revenue generated by a retail TDD or special tax assessment, the City also levies an excise tax of $0.19 per square foot when land is platted, although this revenue is applicable to a broad range of categories, and not necessarily the transportation improvements needed near the site. With approximately 430 acres of developable land on the proposed development sites outlined above, excise tax revenue potential would be approximately $3.6 million.

4.4.5. **Overland Park Conclusion** - The Overland Park case study is the only location that fits the definition of a greenfield site on the suburban fringe of metropolitan growth. The city has already discussed creating a TDD with the developer of the large contiguous parcel in the southwest quadrant of the intersection. The city has experienced rapid growth for decades, and is well-versed in the use of local tax mechanisms to finance necessary public improvements related to new development. The build and no-build development scenarios provide the ability to quantify the incremental development value unlocked by the improvement, and suggest that significant revenue could be generated in the build scenario. The common use of these mechanisms in Overland Park underscores the increased potential that a more rapidly growing area generally possesses to use value capture to finance public improvements.

4.5. **Spring Hill Interchange**

4.5.1. **Background and Proposed Improvements** - The fifth case study site entails improvements at the interchange of US-169 and 223rd street in Spring Hill. The majority of the city lies within the border of Johnson County although the southern portion, including the interchange, is in Miami County. While three of the four quadrants of the interchange are undeveloped or underutilized, the southeast quadrant includes neighborhood-serving retail, including a grocery store, gas station, bank, and restaurants, along with senior housing and single-family residential units further from the interchange.
The interchange and its immediately surrounding area have been identified in the Miami County Comprehensive Plan as an area of regional significance due to its strong access and developable land. This designation means the County would prefer to encourage higher intensity commercial, business, or industrial development in this location. Based on a traffic study completed in 2006, recommended transportation improvements in and around the interchange include widening 223rd Street from two lanes to four, along with turn lanes at intersections. The study also recommends widening the bridge over US-169 from two lanes to four, plus turn lanes onto the interchange ramps, creating a five-lane bridge.

4.5.2. Development/Market Potential – With an estimated 1,900 households as of 2010, the City of Spring Hill is a relatively small market that is somewhat removed from the core of the Kansas City region. Due to the city’s small size, useful real estate market data is not readily available. However, studies conducted in the past suggest that the 223rd corridor, including the interchange at US-169, could experience a substantial amount of residential and commercial demand through 2030. Estimates assume long-term development potential for over 1,100 residential units and 550,000 square feet of commercial space on parcels in the area over the next 20 years. The area around the interchange could also be poised for increased industrial demand in light of its location between two new intermodal distribution facilities to the east and west of Spring Hill.

The southeast corner of the interchange has already experienced development, including retail, professional/medical service space, and a variety of residential product including single-family detached units, age-targeted duplexes, and an assisted living facility. The surrounding area should benefit from the
improved access that the proposed transportation improvements would provide. The defined area of benefit is highlighted in the aerial image below.

*Figure 26: Aerial Image of Spring Hill Interchange Area of Benefit*

The proposed improvements could position the area around the interchange to capture an increased share of the new residential and commercial potential, but only if the value capture mechanism does not burden developable parcels, making them less attractive than other similar development opportunities.
4.5.3. Local Revenue Tool Eligibility

*Figure 27: Potential Spring Hill Value Capture Tools*

<table>
<thead>
<tr>
<th>Local Revenue Tool</th>
<th>Eligible?</th>
<th>Applicable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIF</td>
<td>Not eligible for either TIF or STAR</td>
<td>N/A</td>
</tr>
<tr>
<td>STAR</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>TDD</td>
<td>Eligible for all three</td>
<td>TDD most applicable if funds from large development on single parcel or two are to be used to finance the corridor improvements.</td>
</tr>
<tr>
<td>CID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Benefit District</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact Fees</td>
<td>Yes</td>
<td>Lack of demand/growth suggests additional fees could hinder new development.</td>
</tr>
<tr>
<td>Excise Taxes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.5.4. Spring Hill Financial Analysis

4.5.4.1. TDD Retail Analysis - The Spring Hill analysis follows a similar methodology to the above cases in that the financial capacity of a 1 percent TDD is explored on new retail sales from 2013 to 2034. Because MARC does not provide long-range forecast data for Miami County, an estimate of base year employment and employment growth was performed using publicly available data sources including the Bureau of Labor Statistics and the U.S. Census Bureau. It was estimated that in the defined area of benefit, approximately 250 retail employees are currently present based on the current county total of 975 retail employees and the existing commercial development in the area of benefit. It is estimated that this 250 retail employee total would grow by approximately 1,000 by 2040 in the build case, and 250 (25 percent of build case development) in the no-build case.

4.5.4.2. TDD Special Tax Analysis - As in the previous studies, the Spring Hill special tax district analysis assumes that a new tax would be applied to residential and commercial properties in the study area. Base parcel values were taken from a GIS analysis of Miami County parcel data within the study area, and future additions to base parcel values were estimated based on current per-household and per-employee commercial and residential unit appraised values.

An average household value was calculated based on the number of existing households and total residential parcel value in the study area in 2010. The total commercial appraised value was divided by total county employees to compute a per-employee assessed value of commercial development, which is a
proxy for new commercial development space / value needed to house these employees. The same growth assumptions were used as in the TDD analysis, with 1,100 new households in the build scenario and 25 percent of this total in the no-build scenario. The results of the TDD and special tax analysis are highlighted in the following figure.

**Figure 28: Spring Hill Financial Results (in $millions)**

<table>
<thead>
<tr>
<th></th>
<th>No Build</th>
<th>Build</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of Revenue 2013-2034</td>
<td>Bonding Capacity of Revenue</td>
<td>Sum of Revenue 2013-2034</td>
<td>Bonding Capacity of Revenue</td>
</tr>
<tr>
<td>1% TDD Tax on Retail Sales</td>
<td>$3.2</td>
<td>$0.7</td>
<td>$6.3</td>
</tr>
<tr>
<td>TDD Commercial/Residential Assessment</td>
<td><strong>$51.9</strong></td>
<td><strong>$12.9</strong></td>
<td><strong>$71.6</strong></td>
</tr>
</tbody>
</table>

4.5.5. *Spring Hill Conclusion* - As shown above, the value capture potential for a retail TDD is quite low although the special tax scenario generates approximately $4 million in additional revenue in the build scenario, due primarily to increased household growth. Although the proposed transportation improvement will serve to accommodate longer-term growth, delivering the improvement may not necessarily serve as a catalyst that immediately jumpstarts development in the surrounding area, due to limited near-term growth pressure. While it is possible that new development could occur in the immediately surrounding area of the improvement, there is not a demonstrated pattern of growth surrounding the sites suggesting a strong likelihood of new development if the improvements were made. As a result, counting on this revenue source as part of the transportation improvement financial plan, as well as issuing debt relying on revenue from this value capture scenario, may be risky.
5. Conclusions and Recommendations

5.1. Value Capture versus Economic Development

As defined in earlier sections, value capture refers to a collection of mechanisms that can be used to help pay for infrastructure projects’ capital or maintenance costs by monetizing the development benefits that the project creates and channeling them into a project fund. Use of value capture involves developing a framework to calculate the expected increased property values and/or sales tax revenue potential generated by an infrastructure project and channeling a portion of that increased value into a project’s financial plan. This should not be confused with economic development incentives that channel local tax revenues to developers to entice development in one place or another, such as what has been done historically at Village West. While the tools are often the same, economic development and infrastructure value capture have very different and sometimes conflicting objectives.

As summarized in the previous sections, the State of Kansas allows for a wide variety of mechanisms that can potentially be used for value capture. However, a site’s overall market conditions, regional context, and real estate development opportunity will influence the extent to which these mechanisms can be used as value capture for infrastructure, rather than simply improving the private sector development opportunity. Research on the historical usage of these mechanisms in Kansas indicates that in areas with strong market conditions, such as Overland Park, the local jurisdiction has the leverage to apply them for value capture to help finance public infrastructure. In areas without strong development potential, the local jurisdiction has historically used these mechanisms as economic development tools, to facilitate development by reducing developer costs.

Value capture mechanisms can be effective in areas with lower development potential, but the amount of revenue raised for public infrastructure improvements is generally more limited and there is no guarantee that the improvement will result in a significant increase in development activity. In these cases, the value capture mechanism is simply a revenue generator because there is no discernable link between infrastructure investment and the real estate value created. Furthermore, depending on the mechanism used, the prospect of an increased property or sales tax could be one more factor that detracts from already limited development potential on a given site or area.
Value capture strategies are generally the most effective in scenarios and locations where increased real estate development potential is unlocked by the new or improved access. As such, in locations where market conditions suggest weak demand for new real estate development or redevelopment in the surrounding submarket, the improvement has less potential to create new value, and therefore less value to be captured. In the majority of metropolitan areas, the strongest opportunities for real estate development and resulting potential for value capture are concentrated in greenfield areas on the region’s suburban fringes that are poised for growth, as well as urban infill/redevelopment opportunities on underutilized sites. These greenfield areas lend themselves particularly well for transportation value capture, as often the road improvement is needed for any new development to take place. Conversely, many urban infill/redevelopment locations are strong candidates for transit value capture, whereby a new rail station or other type of commuter hub unlocks the potential for denser, mixed-use development on otherwise underutilized, lower-density sites in the immediately surrounding area.

5.2. Develop Process to Identify Potential Value Capture Opportunities

Given that the best transportation value capture opportunities are those that serve to unlock maximum incremental development potential, an understanding of high-level real estate market conditions and potential is a good starting point to identifying future value capture opportunities. The following section includes a “checklist” to assist KDOT with a preliminary assessment of potential value capture opportunity when considering transportation improvements in certain areas. KDOT can use the checklist to better understand if a given site, area, or corridor is ripe for value capture implementation. These screening criteria can help KDOT identify locations, submarkets, or corridors where infrastructure funding opportunities may exist.

Locational Criteria – The site- or area-specific strengths are critical to understanding the overall value capture opportunity. When evaluating the value capture potential for a given transportation improvement, there should be developable parcels or areas with the following general conditions:

- **Large, contiguous, undeveloped parcels** – this makes the implementation of mechanisms that require approval of property owners more feasible. Areas with smaller parcels and numerous property owners are more challenging to gain special district approval and require land assemblage for larger-scale development, demolition of underutilized space, etc.

- **Strong potential access and visibility** – the proposed transportation improvement should greatly enhance access to the site. The importance and type of access can vary by land use, for example, a site ideal for retail will typically require different access than an industrial, office, or residential development.

- **Potential proximity to employment** – Proximity to large concentrations of employment is a critical site strength for the majority of urban and suburban land uses other than a few exceptions, such as second-home/resort developments. Areas that are more isolated or rural, located beyond the edges of metropolitan growth, and further from such large employment concentrations tend to have lower overall opportunities. Improvements that can dramatically increase proximity to large concentrations of employment may represent strong value capture candidates.
**Strong regional/submarket economic and demographic conditions** – Although there are some exceptions, value capture potential rarely exists in regions or submarkets with weak economic and demographic fundamentals. Demand for new development hinges on certain key socioeconomic factors depending on the specific land use, but overall demand conditions can be focused on commercial and residential real estate value growth.

- **Commercial Property Value Growth** – if a defined area or submarket is experiencing strong employment growth, demand for land will typically be robust. If office property values are relatively high, an infrastructure improvement that unlocks development capacity will add significant value to the area.

- **Residential Value Growth** – strong home value growth is another key indicator of pent-up real estate development potential, for both residential and retail land uses.

These two general criteria are the most important big picture categories to consider when preliminarily sizing up demand potential in a given area.

**Political feasibility** – Although less quantifiable, backing or support from the public entities as well as support from other local stakeholders (e.g., property owners) is another critical success factor for value capture implementation. Whether or not the local jurisdiction is familiar or experienced with value capture mechanisms can also impact the overall opportunity.

For an initial “go/no go” evaluation of a given area or corridor, KDOT could leverage its existing relationships with local authorities. For a better understanding of economic and demographic trends, KDOT could leverage its existing relationship with MARC and the Lawrence/Douglas County Metropolitan Planning Organization (MPO). Long-range forecast data from these entities will shed light on those cities, submarkets, corridors, or sites are best poised to capture future real estate demand.

**5.3. Ensure that KDOT has Input in the Process**

For large-scale development deals where there is state involvement, with STAR bonds, economic development incentives, etc., it is important for KDOT to get “a seat at the table” so that infrastructure costs resulting from traffic impacts are factored into the real estate deal. Analysis of the history and evolution of Village West suggests that there may have been opportunities missed for KDOT to fund needed transportation improvements, despite such state-level involvement from various other departments, and hundreds of millions of dollars of revenue raised for other uses.

The most recent developments under construction at Village West include a large-scale office campus and a casino that will have a major traffic impact at the intersection of Village West Parkway and State Avenue. A study conducted by KDOT suggests the need for a single-point urban interchange (SPUI) to accommodate future additional traffic demand. To be approved, both developments entailed complex deal structures and required involvement at the state level. The casino required approval from the state gaming commission and eventually the original property tax abatement on the speedway property housing the casino was lifted, and the Unified Government stands to benefit from numerous other payments from the gaming operation. The Cerner/stadium agreement involved restructuring existing STAR bond
agreements, requiring approval from the state department of commerce, and Cerner will also receive $48 million in state incentives.

While the positive economic and fiscal impacts of these deals will be dramatic for the state as well as the Unified Government, it is not clear if the potential traffic impacts and necessary improvements to the nearby intersection were factored into the equation during negotiations. If not, it could be too late to go back to these property owners to structure a TDD, CID, or other mechanism to help fund the improvement despite their direct impact on the intersection. If the impacts on the intersection were not factored into the overall costs and benefits of the deal, then KDOT should consider implementing policy that requires some input or participation by the department on potential traffic impacts from any major developments requiring state-level approval in the future.

5.4. Consider a Regional, Programmatic Approach to Value Capture

The key finding from the case studies is that the ability to use available local tax mechanisms to capture value and finance transportation depends heavily on the surrounding real estate development opportunity. However, another key finding is that not all locations in need of transportation improvements necessarily have strong development opportunities. In these cases that lack the strong market conditions necessary for value capture, an alternative funding approach needs to be considered. The best solution could be to consider a programmatic approach that goes above the site-specific surrounding area, to capture value from a broader geography through the use of a city, county, or region-wide transportation funding district. Generally speaking, because value capture is inherently reliant on the opportunity for new real estate development, policy that spans a geography comprised of a diverse mix of socioeconomic submarkets can catalyze new development in already healthy localized areas without helping less affluent areas, bringing about potential issues of social inequity within a defined district. This concept would create a larger district where funds could be placed in a pool for specific district-wide infrastructure needs, including transportation, potentially mitigating any issues of inequity.

Although completely conceptual in nature at this stage, the concept of channeling funds from certain areas to others in need has been successful in other parts of the country. The City of Dallas, Texas has developed a strategy to use transit-oriented value capture to help revitalize areas with otherwise weak real estate conditions. The Dallas TOD TIF District channels funds from new transit-oriented development in stronger “sub-districts” to help foster development in weaker ones. For example, 60 percent of TIF revenue generated from new development surrounding the Mockingbird and Lover’s Lane stations is used to help finance public infrastructure improvements, new market-rate developments, parks and open space, and affordable housing in the weaker and less developed Lancaster station area. Although the TIF revenues are not used to directly finance the initial transportation improvements, the improvements and developments they finance ultimately serve to increase transit ridership and revenues at otherwise underutilized station areas.

While the Dallas TOD TIF example is not completely analogous to KDOT’s transportation improvement needs in the 5-county region, there are similar disparities in market conditions throughout the defined region. This type of intra-region or intra–district reallocation is one approach to use value capture to finance improvements in areas with otherwise weak market conditions.
Politically, this concept would likely require increased and perhaps unprecedented collaboration amongst state, city, and county authorities. Furthermore, with most mechanisms used in Kansas, there has typically been a direct linkage between the mechanism used and the area benefitted by the infrastructure improvement. As such, local jurisdictions and private sector entities involved would need to be persuaded to implement policy that allows for mechanisms used to go towards a larger geographic pool of beneficiaries. This may prove challenging in an environment where the authorities involved are accustomed to applying infrastructure mechanisms at a much more localized level. However, a regional perspective is what is necessary to improve a regional transportation network, particularly within a region with as diverse a set of socioeconomic conditions as that of the 5-County region. In some cases, this general funding has been done at the local level in some areas. For example, the City of Olathe charges separate street, traffic signal, and park excise taxes on all new development, to generate revenues that go towards city-wide improvements in those categories. The additional tax is on new development but the revenue is allocated more generally throughout the city.

Ideas to explore further include a potential region-wide fee or assessment on new or other types of development that goes into a pool that can be used for transportation improvements that meet certain defined criteria, including those consistent with the themes, vision, and strategies identified in this study. These goals include the following desired outcomes:

- **Choice:** Invest in a multi-modal transportation system that maintains our existing primarily roadway system but also allows individuals the choice of using other modes of transportation such as sharing a ride, using public transportation, bicycling, or walking. Support the independence of persons with disabilities through transportation investments.

- **Mobility:** Move people and goods in an efficient manner where they want to go, when they want to go. Focus on minimizing person delay across modes rather than focusing exclusively on minimizing vehicle delay.

- **Safety:** Reduce accident rates, crash rates, severity of crashes (fatalities, serious injury accidents), and reduce conflict points. Improve the perception of safety and user-confidence.

- **Efficient Use of Resources:** Evaluate the affordability of transportation investments by considering the initial investment to plan, design and construct; the life-cycle costs to maintain and operate; and the economic benefits to the community. Enhance and maintain the existing transportation system.

- **Environment:** Rather than mitigate the impacts upon the environment, transportation system investments should seek to enhance air and water quality, reduce climate impacts and the region’s carbon footprint, and protect high priority natural resources.

- **Public Health:** Reduce the impacts to public health by improving traffic safety, improving air quality, promoting physical activity and fitness, increasing community cohesion, improving access to medical services, and increasing transportation affordability.
- **Regional Prosperity**: Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services, and other basic needs by workers as well as expanded business access to markets. Provide access to the transportation system, facilities and modes. Support sustainable economic development through transportation investments.

- **Social Equity**: Consider the investment benefits and impacts on all population groups within communities. Strengthen civil rights through transportation investments. Create jobs through transportation investments. Minimize personal transportation expenses in ways that support wealth creation. Look for opportunities to employ economically disadvantaged persons in the development of the transportation system.

- **Livability**: Integrate transportation system with community desires. Balance mobility goals with livability of the community including social equity.

The above desired outcomes serve as well-defined guidance to identify the types of projects that could be eligible for the region-wide district funds, and provides KDOT and local jurisdictions a “scorecard” to help prioritize those transportation projects that achieve as many of the desired outcomes as possible.

Conversely, on the land use side, the district fee structure itself could be scaled in a way to incentivize dense, urban infill with access to multiple modes of transit, rather than conventional greenfield development that encourages more sprawl and the requisite transportation improvements. This approach would allow KDOT to shape land use decision making in a way that incentivizes the above desired outcomes, instead of reacting to land use decisions after they are made. Furthermore, those development projects that serve to meet fewer of the desired outcomes and yield higher transportation costs would potentially generate more in revenue for transportation improvements.

Although statewide transportation legislation may have some limitations at the local level, there is precedent for state-level action to improve specific urban and suburban traffic issues locally. In 2007, the Commonwealth of Virginia passed legislation allowing urban localities in Northern Virginia and the Hampton Roads area to levy additional commercial property taxes to go specifically towards local transportation improvements. As a result, Arlington and Fairfax Counties levy an additional 12.5 cents and 11 cents per $100 dollars of assessed value on commercial properties, respectively.

As with any new tax, however, the Virginia law has been met with opposition. Major components of the original bill (HB 3202) were declared unconstitutional, the Arlington County Chamber of Commerce continues to lobby for the repeal of the commercial tax that remains in effect, and it recently survived a state supreme court hearing from a Fairfax County property owner. Nevertheless, Fairfax County’s 11 cent tax is anticipated to generate $43 million in FY 2012 for transportation projects. This example represents a successful yet potentially controversial strategy for state-level legislation to mitigate localized transportation issues in more urbanized areas, one that may be particularly relevant given the 5-County region’s unique role in the State of Kansas.
Appendix A-1 – Village West Historical Analysis

Unlike the other case study sites, there is a large critical mass of existing new development in the Village West area, which represents a storied history of development finance mechanism usage, including TIF, STAR bonds, special benefit districts, TDDs, and CIDs. The end result is currently one of the largest retail and entertainment destinations in the Midwest, and one of the state’s largest tourist attractions. In light of the extent of new development delivered in the area, the opportunity for value capture, in which a transportation improvement unlocks new real estate development potential, is minimal at the site, including at the intersection of State Avenue and Village West Parkway. However, given that the full spectrum of mechanisms has been employed in the area, it is worth looking back at the timeline of development, including the mechanisms used to facilitate development and infrastructure improvements.

This appendix provides a backward looking account of development and incentives to better understand how the local revenue tools were used and if they could have funding transportation improvements, particularly if the implementation of funding mechanisms was less fragmented over time.

The earlier sections of this report included a brief overview of some of the mechanisms employed at Village West, however for this analysis, a more detailed review is necessary. As such, the following timeline highlights many of the mechanisms used at Village West in greater detail, including the type of mechanism, the purpose of the revenues, if applicable, and total municipal debt issued, if available.

Initial developments: the catalyst project and anchor tenants

When the International Speedway Corporation (ISC), identified the Kansas City region as a target for a new NASCAR speedway, the Unified Government attracted the racetrack owner and operator to Wyandotte County by offering to assemble 1,100 acres of underutilized land with great access at the intersection of I-70 and I-435, along with a 30-year tax abatement on the property and some public utility grants. Upon agreement to locate the new speedway at the 1,100-acre site in 1999, the Unified Government used TIF and STAR bonds for the purpose of land acquisition, relocation of the existing property owners, and various site improvement costs to prepare the land for development. The Unified Government used TIF to acquire an additional 400 acres of land adjacent to the ISC property, for the purpose of developing destination retail, entertainment, and hospitality uses to complement the Kansas Speedway development. This adjacent 400-acre area became known as Village West.
Following the redevelopment plans for Village West, $130 million in STAR bonds were used to help attract two major destination retail anchors, Cabela’s and Nebraska Furniture Mart, to the area. While the majority of the STAR bond issuance was used to cover certain development costs to attract the retail anchors, some of the revenues were also used by the Unified Government for Village West infrastructure improvements, including road construction. Due to the retail stores’ lack of demonstrated track record in terms of revenue generation at the site, 80 percent of the STAR bonds were purchased privately, by Cabela’s parent company and by Nebraska Furniture Mart’s sister company under the Berkshire Hathaway roof.

Along with a portion of the STAR bond revenues, the Unified Government also used Special Benefit Districts to raise an additional $15 million to cover public street improvements and utility costs. Together, this series of debt issuances totaled $269 million, and served to lay the foundation of the area, by first attracting and facilitating development of the Speedway catalyst project, as well as the two destination retail anchors, along with necessary public infrastructure improvements.
Later developments: the Legends retail and new development beyond the Village West redevelopment boundary

Once the catalyst Speedway was built and the anchor retail tenants in place, the Unified Government struck a deal to provide $54 million in STAR bonds to help facilitate the development of the Legends Outlets, a 680,000-SF open-air retail center in the Village West area, north of the Speedway and west of the Nebraska Furniture Mart parcel. In 2005, the Unified Government refinanced and consolidated some of the outstanding public debt into a new series of STAR bonds, totaling $265 million.

*Figure 30: Village West Debt Consolidation*

<table>
<thead>
<tr>
<th>Year</th>
<th>Mechanism</th>
<th>Purpose</th>
<th>Public Debt Issued (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>STAR</td>
<td>Village West retail development - Legends Outlets</td>
<td>$54</td>
</tr>
<tr>
<td>2005</td>
<td>STAR</td>
<td>1st lien series &quot;Refunding&quot; bonds</td>
<td>$90.8</td>
</tr>
<tr>
<td>2005</td>
<td>STAR</td>
<td>2nd lien series &quot;Refunding&quot; bonds</td>
<td>$174</td>
</tr>
<tr>
<td>2006</td>
<td>TDD</td>
<td>0.1% additional tax on Cabela’s/NFM sales - TDD for improvements in Village West</td>
<td>$2.4</td>
</tr>
<tr>
<td>2006</td>
<td>TDD</td>
<td>0.6% additional tax on Legends Outlets sales - TDD for parking garage and road improvements</td>
<td>$17.5</td>
</tr>
<tr>
<td>2008</td>
<td>TIF</td>
<td>Plaza at the Speedway – retail north of Village West</td>
<td>$28</td>
</tr>
<tr>
<td>2008</td>
<td>TDD</td>
<td>0.6% or 1% additional tax on Plaza at the Speedway sales – retail north of Village West</td>
<td>$15</td>
</tr>
<tr>
<td>2009</td>
<td>STAR</td>
<td>Schlitterbahn – water park east of Village West</td>
<td>NA</td>
</tr>
<tr>
<td>2009</td>
<td>TDD</td>
<td>Schlitterbahn – water park east of Village West</td>
<td>NA</td>
</tr>
</tbody>
</table>
In 2006, two new TDDs were created. The first was a 0.1 percent additional tax on retail sales at Cabela’s and Nebraska Furniture Mart, which raised $2.4 million in public financing for general transportation improvements in the Village West area. TDDs can include an additional tax on retail sales up to a maximum of 1 percent, however given that much of the merchandise at Cabela’s and Nebraska Furniture Mart tend to be “bigger-ticket” items, this relatively low TDD rate of 0.1 percent stands to reason and was likely the highest the property owners would approve without concern for deterring from competitiveness. The second district included a 0.6 percent additional tax on the majority of retail tenants in the Legends Outlets. This TDD raised $17.5 million for the purpose of a new parking garage at the Legends Outlets along with some additional road improvements.

At this stage new development plans began to take place beyond the defined Village West district, with the Plaza at the Speedway, a big box retail center immediately north of Village West on Parallel Parkway, and the Schlitterbahn water park immediately to the east, on the other side of I-435. Although the Kansas Speedway and Village West retail concentrations served as catalysts for these two new developments, both required significant public financing, in the form of TIF, TDDs, and STAR bonds, to be financially feasible. Furthermore, both developments have suffered somewhat from unfortunate market timing, with delays in construction and leasing due to economic recession, frozen capital markets, and slower than expected lease-up pace.

**Most recent Village West developments: MLS soccer, casino, and headquarter office space**

Despite a decade of intense, large-scale development, there are still major projects planned, under construction, and just recently built on both the ISC speedway property as well as the Village West district. Construction of a Major League Soccer (MLS) stadium was recently completed on a parcel formerly owned by Nebraska Furniture Mart, construction of a new casino on ISC’s property is almost complete, and groundbreaking for 600,000 square feet of headquarter office space is scheduled for the end of 2011.

The Hollywood Casino, a joint venture between ISC and Penn National Gaming, will open in 2012, and is located on the southeast portion of the Speedway property. In order to gain approval from the State of Kansas for the project, the original 30-year tax abatement on the property allocated for the casino was lifted, although no public financing mechanisms were used to facilitate the project.

The soccer stadium and office campus projects are interrelated and required further use of STAR bonds, TDDs, CIDs, and state economic development incentives. The Kansas City region is home to Cerner, a billion-dollar health care information technology provider, and some of Cerner’s executive leadership makes up the ownership of the local MLS soccer team, which had been seeking a dedicated stadium for the better part of the last decade. The Unified Government offered to extend the existing 2005 series STAR bonds to provide $147 million for the construction of a new stadium, in exchange for Cerner’s relocation of its headquarters to the area, from its current location in Kansas City, Missouri.

As of early 2010, the 1st lien 2005 series of STAR bonds totaling $91 million had been repaid and $143 million of the $174 million 2nd lien series was still outstanding. Village West retail sales were generating as much as $40 million per year in sales tax revenues, and the STAR bonds were scheduled to be paid off earlier than forecasted, providing the Unified Government with the leverage to make an aggressive deal to attract Cerner and the stadium.
Along with STAR bonds, a TDD tax on soccer ticket sales was implemented to help finance the construction and lease of surface parking on adjacent ISC land near the stadium. A CID was also created on the stadium property to finance general improvements involved with the stadium property.

**Development economics and mechanisms at Village West: economic development, not value capture**

Although a wide variety of mechanisms are available for value capture in the State of Kansas, the case of Village West demonstrates how these mechanisms were used to finance new development in a pioneering location. While the typical value capture process involves establishing a district, delivering the infrastructure improvement, and using the mechanism of choice to capture incremental value from new development that the improvement helped trigger, the mechanisms used at Village West were applied differently, in the context of economic development. In this context, the district is established, and mechanisms used to attract and facilitate new development, with some of the resulting revenues going towards infrastructure improvements. In the context of economic development, the more pioneering the location is for new real estate development, the more the mechanisms will be used to finance private development as opposed to public improvements. This is especially true in the early stages of development. In the early phases of the Village West development, the Unified Government was especially aggressive in targeting the catalyst Speedway project, as well as the major retail anchors.

Despite the fact that much of the public finance revenue went towards offsetting development costs, a substantial amount of revenue was raised for public infrastructure improvements, including transportation. Along with $33 million in transportation improvements funded by the state, an additional $62 million from STAR bonds, TDDs, and special benefit districts went towards on- and off-site infrastructure improvements, as shown in the following figure.
### Figure 32: Publicly Financed On and Off-Site Improvements at Village West

<table>
<thead>
<tr>
<th>Mechanism / Source</th>
<th>Transportation and other Public Improvement</th>
<th>Amount (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State of Kansas</td>
<td>As of 2006:</td>
<td>$33</td>
</tr>
<tr>
<td></td>
<td>- relocation of State Avenue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- improvements to I-70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- construction of France Family Drive</td>
<td></td>
</tr>
<tr>
<td>STAR</td>
<td>Contributions to on-site improvements, including construction of:</td>
<td>$27.4</td>
</tr>
<tr>
<td></td>
<td>- Village West Parkway</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Sunflower Lane</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Prairie Crossing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off-site improvements:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- construction of Village West Parkway south of State Avenue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- expansion of Parallel Parkway from I-435 to 110th Street into four-lane road, including signals and turn lanes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Additional turn lanes at State Avenue/Village West Parkway and State Avenue/Sunflower Lane</td>
<td></td>
</tr>
<tr>
<td>TDDs</td>
<td>General Village West improvements including:</td>
<td>$19.9</td>
</tr>
<tr>
<td></td>
<td>- Parking garage adjacent to Legends retail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- General road improvements in Village West</td>
<td></td>
</tr>
<tr>
<td>Special Benefit Districts</td>
<td>- general public street improvements</td>
<td>$15</td>
</tr>
<tr>
<td></td>
<td>- certain utility costs</td>
<td></td>
</tr>
</tbody>
</table>

While the State of Kansas contributed over a third of funds for improvements, STAR bonds, TDDs, and special benefit districts were used to generate the remainder of the $95 million total.

**Looking back at the Village West evolution: could more revenue have been raised for transportation?**

In the light of the broad spectrum of mechanisms available, and the long history of their usage at Village West, the question raised was whether or not the optimal mix of mechanisms was used, or if more revenues could have been raised, particularly for transportation improvements. However, without
knowing the context of the negotiations between the Unified Government, State of Kansas, and the private sector entities involved, we assume that the series of deal structures were designed to pass the “but for” test, i.e., the developments would not have occurred but for the revenues generated by the mechanism in place. Nevertheless, Parsons Brinckerhoff analyzed scenarios to determine if more revenue could have been generated in light of actual historical retail sales and property assessment data in the Village West area.

In 2005, when the Unified Government issued the second series of STAR bonds, a total of $264 million was raised. In the years following 2005, the bonds were anticipated to be paid off earlier than initially expected, due to strong retail sales and transient guest taxes. This trend suggests that perhaps more STAR bonds could have been issued, and potentially used for transportation improvements. However, a preliminary analysis of forecasted sales and transient guest tax revenues indicates that the amounts raised in 2005 and at other points in time were likely the highest amount possible. Forecasted revenue from the feasibility study for the 2010 stadium STAR bond issuance was used in a simplified calculation of financial capacity from a sales tax revenue bond. This calculation shows the potential total funding that the sales tax revenue could generate in the form of STAR bonds using actual historical sales revenues from 2003 to 2009 combined with the most recent forecasted revenues from 2010 through 2022. Using this timeline provides a hypothetical estimate of total STAR bond capacity as of 2003, with the insight of actual and forecasted sales tax revenue as of 2010.

The following assumptions were used in the calculation:

1) The moderate scenario of forecasted sales and transient guest tax revenue from a feasibility study conducted by Real Estate Research Consultants, Inc. (RERC) was used. Historical sales tax revenue is provided although transient guest taxes were estimated based on the number of hotel rooms built from 2003 to 2008.
2) A 1.75X (times) debt service coverage ratio was applied to the net sales tax revenues.
3) The revenue remaining after subtracting debt service coverage from net revenue was discounted at 6 percent, representing a blended long term interest rate applicable to various municipal debt instruments that might be used for the transaction.
4) After summing the discounted cash flows, 5 percent was subtracted representing estimated transaction costs and another 10 percent was subtracted representing the required debt service reserve funds. The remaining net proceeds represent the funds that would be available.

Figure 33 shows these calculations. The scenario as outlined above could provide approximately $252 million in STAR bonds, which is very close to the actual amount of 1st and 2nd refunding STAR bonds issued in 2005 ($264 million) as well as the original combination of public debt issued in the early stage of development ($269 million).
Figure 33: Conceptual Village West Consolidated STAR Bond Calculation

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales Revenue</th>
<th>Tax Rate</th>
<th>Gross Sales Tax Revenue</th>
<th>Transient Guest Tax</th>
<th>Total Tax Revenue</th>
<th>RDSC @ 1.75X</th>
<th>DCF @ 6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>$182.09</td>
<td>7.49%</td>
<td>$13.63</td>
<td>$0.91</td>
<td>$14.54</td>
<td>$8.31</td>
<td>$8.31</td>
</tr>
<tr>
<td>2004</td>
<td>$204.32</td>
<td>7.49%</td>
<td>$22.79</td>
<td>$1.07</td>
<td>$23.86</td>
<td>$13.63</td>
<td>$12.86</td>
</tr>
<tr>
<td>2005</td>
<td>$349.21</td>
<td>7.49%</td>
<td>$26.15</td>
<td>$1.31</td>
<td>$27.46</td>
<td>$15.69</td>
<td>$13.97</td>
</tr>
<tr>
<td>2006</td>
<td>$490.09</td>
<td>7.49%</td>
<td>$36.70</td>
<td>$1.31</td>
<td>$38.01</td>
<td>$21.72</td>
<td>$18.24</td>
</tr>
<tr>
<td>2007</td>
<td>$553.04</td>
<td>7.49%</td>
<td>$41.41</td>
<td>$1.31</td>
<td>$42.72</td>
<td>$24.41</td>
<td>$19.34</td>
</tr>
<tr>
<td>2008</td>
<td>$553.18</td>
<td>7.49%</td>
<td>$41.42</td>
<td>$1.61</td>
<td>$43.03</td>
<td>$24.59</td>
<td>$18.37</td>
</tr>
</tbody>
</table>

**Actual** 2009 $550.22 7.49% $41.20 $1.61 $42.81 $24.46 $17.25

Forecasted 2010 $558.69 7.86% $43.93 $1.61 $45.54 $26.02 $17.31
2011 $575.33 7.86% $45.24 $1.69 $46.93 $26.82 $16.83
2012 $592.46 7.86% $46.58 $1.82 $48.41 $27.66 $16.37
2013 $610.10 7.86% $47.97 $1.93 $49.90 $28.51 $15.92
2014 $628.27 7.86% $49.40 $2.06 $51.46 $29.40 $15.49
2015 $646.97 7.86% $50.87 $2.14 $53.01 $30.29 $15.05
2016 $660.69 7.86% $51.95 $2.22 $54.17 $30.95 $14.51
2017 $674.69 7.86% $53.05 $2.28 $55.33 $31.62 $13.98
2018 $689.00 7.86% $54.17 $2.35 $56.52 $32.30 $13.48
2019 $703.60 7.86% $55.32 $2.41 $57.73 $32.99 $12.99
2020 $718.52 7.86% $56.50 $2.46 $58.96 $33.69 $12.51
2021 $736.82 7.86% $57.94 $2.52 $60.46 $34.55 $12.10
2022 $755.60 7.86% $59.41 $2.59 $62.00 $35.43 $11.71

**Gross Bond Proceeds $296.6**

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans Costs</td>
<td>5%</td>
<td>($14.83)</td>
</tr>
<tr>
<td>DSRF - Debt service reserve fund</td>
<td>10%</td>
<td>($29.66)</td>
</tr>
<tr>
<td>Net Proceeds</td>
<td></td>
<td>$252.10</td>
</tr>
</tbody>
</table>

**Source:** RERC; PB analysis

Based on this preliminary analysis, it appears that there was little capacity for additional STAR bond issuance to fund transportation improvements at any time during the early and middle stages of Village West development.

The second question raised was whether more revenue could have been generated if the series of mechanisms used was less piecemeal and more overarching. Perhaps a TDD or CID special assessment covering the entire area could raise more revenue but TDD legislation was not introduced until 2002, after several of the largest development deals were in place, and CIDs were not available until 2009. Using a similar analysis as the STAR bond calculation, a hypothetical 1 percent TDD on all sales revenues could generate $31 million in revenue available for transportation-related improvements. However, this amount of financing would be highly unlikely because in 2003, other than the anchor tenants, less was known about the amount and type of retail that would eventually be built at Village West.

Furthermore, retailers selling products in very different price ranges and categories (e.g., fast food versus furniture) have different levels of sensitivity towards an additional sales tax. As such, a comprehensive TDD on such a large project in the early stages of development may not be feasible, and could have hindered the ability to attract certain retailers in the future. TDDs were eventually used, but as a result of
the broad range of retail categories and existing deals in place, there is a patchwork of districts with varying TDD tax rates, as shown in the following map.

*Figure 34: Village West TDDs*

Parcels in gold, including the ISC property, casino property, and numerous parcels in the Legends Outlets property, have no additional tax above and beyond the tax rate of 8.8925 percent that combines local, county, and state tax rates. Parcels in blue and green, which include big box retailers such as Target and JC Penney in blue and the balance of Legends Outlets retailers in green, include a TDD special sales tax rate of an additional 0.6 percent. Parcels in yellow include Nebraska Furniture Mart and Cabela’s and have a TDD special sales tax rate of an additional 0.1 percent. The Plaza at the Speedway, to the north of Village West not shown on the map, includes more big-box retailers such as Wal-Mart and has two additional TDD tax rates as well, at 0.6 percent and 1 percent for different retailers at the site.

The Unified Government did begin using Special Benefit Districts in 2002, once the agreements with Cabela’s and Nebraska Furniture Mart were in place. Issuing public financing without these deals would not be feasible without agreements in place with major anchor tenants. This helps explain why the Unified Government could not do more in terms of financing in the early stages of the Village West development.
Additionally, although the series of mechanisms used took place in a somewhat fragmented pattern over time, this was the natural progression inherent in the economic development efforts that took place. The arrangement to attract the speedway ultimately helped facilitate the agreement that attracted the Cabela’s and Nebraska Furniture Mart anchors, which helped foster the deal that catalyzed the Legends Outlets, and so on. The land uses in place today are a direct result of the series of mechanisms employed over time.

**Going forward: ensure that KDOT is part of the process**

The most recent developments under construction, involving the new office space and casino are the first major developments south of Village West Avenue since the 62-room Chateau Avalon was built in 2004. These two large-scale developments will have a major traffic impact at the intersection of Village West Parkway and State Avenue, and a study conducted by KDOT and the Unified Government suggests the need for a single-point urban interchange (SPUI) to accommodate additional traffic demand. To be approved, both developments entailed complex deal structures and required involvement at the state level. The casino required approval from the state gaming commission and eventually the original property tax abatement on the speedway property housing the casino was lifted. The Cerner/stadium agreement involved restructuring the existing STAR bond agreements, requiring approval from the state department of commerce, and Cerner will also receive $48.5 million in state workforce incentives.

While the positive economic and fiscal impacts of these deals will be dramatic for the state as well as the Unified Government, it is not clear if the potential traffic impacts and necessary improvements to the nearby intersection were factored into the equation during negotiations. If not, it could be too late to go back to these property owners to structure a TDD, CID, or other mechanism to help fund the improvement despite their direct impact on the intersection. If the impacts on the intersection were not factored into the overall costs and benefits of the deal, then KDOT should consider implementing policy that requires some input or participation by the department on potential traffic impacts from any major developments requiring state-level approval in the future.
Appendix B-1: Economic, Demographic, and Real Estate Market Overview

The 5-County region is comprised of a diverse group of counties consisting of a broad range of urban, suburban, and rural landscapes and growth patterns. In the later decades of the 20th century, regional growth patterns emanating from the core of Kansas City were concentrated in certain submarkets, and Johnson County began to capture a large share of regional growth relative to other counties in the area. The area north of the river in Missouri (Clay and Platte counties) also emerged as a secondary path of growth while other older, established, closer-in areas such as Wyandotte County experienced slower growth. As a result of these ongoing growth patterns, Johnson County currently represents a disproportionate share of population, households, and employment in the defined 5-County study area.

*Figure 35: Map of 5-County Region*

The population of the 5-County region was 925,000 in 2010, with Johnson County representing 59 percent of the total. Johnson County’s share of the region has grown steadily from 46 percent in 1980. This increasing share is due to the County’s 2.4 percent average annual growth rate compared to the 5-County average rate of 1.5 percent.
Wyandotte County was the only area to experience negative population growth over the period. As a result, its share of the region’s population fell from 29 percent in 1980 to 17 percent in 2010. However, Wyandotte’s rate of population loss has slowed over time, from -0.6 percent during the 1980s to almost flat from 2000 to 2010. Douglas, Leavenworth, and Miami Counties have generally maintained their share of the region’s population over time, with 12, 8, and 4 percent respectively.

Household data over the same period reflects similar trends, with Johnson County outpacing the region and Wyandotte County experiencing negative growth.

The 5-County region had 354,000 households as of 2010, growing by an average annual rate of 1.8 percent since 1980.

Employment over the same period reflected similar growth trends, with Johnson County outpacing the other four counties and Wyandotte County experience a net loss. Over the entire period, employment in the 5-County region grew by an average annual rate of 2.1 percent.
Only Johnson County surpassed the 5-County average rate over the period from 1980 to 2010. Due to the time periods selected and timing of recent periods of economic expansion and recession, the 2000 to 2010 timeframe reflects flat growth of 0.2 percent relative to previous decades. Annual employment growth in Johnson County averaged 6.3 percent during the 1980s, as large-scale office concentrations emerged in submarkets such as Overland Park.

Median incomes as of 2010 are consistent with other economic and demographic trends in the 5-County region. Johnson County has a higher median income relative to the other four counties while Wyandotte and Douglas County were significantly below the 5-County median of $66,800.

Figure 39: Median Household Income by County, 5-County Region, 2010

Source: ESRI, PB Analysis

The economic and demographic trends in the 5-County study area suggest that the proposed case study projects are located in very different locations throughout the region, each with a unique set of market strengths and weaknesses. The following sections provide a market overview of each site.

Village West Market Overview

Although Wyandotte County lags the other four counties in terms of economic and demographic fundamentals, the area immediately surrounding Village West has stronger demand characteristics. Within a three-mile radius of the Village West area, household growth was significantly higher than that of the County from 2000 to 2010. At 2.3 percent, household growth outpaced both the county as well as the overall 5-County study area, consistent with other greenfield areas in the region.
Figure 40: Average Annual Household Growth and Median Income, Wyandotte County and Village West 3-Mile Radius, 2000-2010

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wyandotte County</td>
<td>-0.2%</td>
<td>$44,200</td>
</tr>
<tr>
<td>Village West 3-Mile Radius</td>
<td>2.3%</td>
<td>$71,800</td>
</tr>
</tbody>
</table>

Source: ESRI, PB Analysis

With a median household income of $71,800, the defined area surrounding Village West is far more affluent than the county as a whole, even slightly higher than the 5-County median of $66,800.

Office - While Wyandotte County has trailed in the employment growth category, the newest planned addition to the Village West area should spark employment growth in the near future. Cerner, a large healthcare information technology provider, announced that it will relocate its headquarters from Kansas City, Missouri, to a new 600,000-square-foot office space in the Village West area. This move will result in 4,000 new employees in the county, a 5-percent increase in Wyandotte County employment. Historically, the majority of Wyandotte County office inventory has been concentrated in downtown Kansas City, Kansas but the Cerner relocation should help shift the center of gravity closer to the western edge of the County.

Regional office data show that the Wyandotte County office market does not represent a large share of the total inventory in the area. Figure 41 shows that the submarket had the lowest total inventory of office space compared relative to the other defined areas in the region.

Figure 41: Total Office Square Feet (in millions) by Submarket, Kansas City Region, 2nd Quarter, 2011

Source: CBRE, PB Analysis

The submarket also has some of the lowest office rents in the region. Figure 42 shows that the Wyandotte County submarket had the second lowest lease rate in the region as of 2nd quarter 2011.
While the metro-wide average was $17, the Wyandotte County average asking rate was $13.40, just slightly higher than East Kansas City’s $13.25. On the positive side, the relatively small amount of inventory and lower asking rents have resulted in the lowest submarket vacancy rate in the metro area during the same period.

Although the Wyandotte County submarket is less established relative to other submarkets in the region in terms of inventory and rents, its 9.1 percent vacancy rate is the lowest in the region and significantly lower than the metro average of 16.5 percent. Although office market conditions are mixed, in light of the expansive new development in the Village West area, the location could be poised for significant new office development once the Cerner headquarters site is delivered and economic conditions improve.
Retail – Like the office market, average retail lease rates are somewhat low compared to the rest of the Kansas City area. At $11.37, the submarket is below the metro average of $12.36 and is the second lowest submarket next to East Jackson County.

*Figure 44: Average Retail Asking Rent by Submarket, Kansas City Region, 2nd Quarter, 2011*

The vast amount of new retail at Village West delivered in recent years has helped improve the submarket’s average achievable rent. However, despite the Village West’s substantial 1.2 million square feet of retail space, it accounts for just 14 percent of the total Wyandotte County submarket inventory.

The Wyandotte County average retail vacancy rate is on par with the metro average at 9.8 percent.

*Figure 45: Average Retail Vacancy Rate by Submarket, Kansas City Region, 2nd Quarter, 2011*

*Source: CBRE, PB Analysis*
Retail market conditions in the County appear mixed, with relative low achievable rents and an average vacancy rate on par with that of the broader metro area. Given the significant amount of retail already delivered at Village West, it is unlikely that future potential for additional retail is strong.

**Residential** – Residential conditions in Wyandotte County have been weak in recent years, reflecting regional and national trends.

*Figure 46: Median Residential Sale Prices, Wyandotte County and Kansas City MSA, 2005-2011*

![Figure 46: Median Residential Sale Prices, Wyandotte County and Kansas City MSA, 2005-2011](image)

*Source: Hanley Wood, PB Analysis*

Residential prices trail the region as a whole by a significant amount, and prices have been steadily declining since 2006. Although residential market conditions are weak, demographic trends near the Village West area suggest that there could be residential demand potential at the site when economic conditions improve. The ongoing office opportunity at the site spurred by the Cerner relocation should also be a catalyst for new residential demand over time, as the area evolves into an employment concentration. Currently the site is a concentration of retail and destination entertainment, and the delivery of office and residential represent the next logical step in Village West area’s long-term evolution.

**Overland Park Market Overview**

As shown above, Johnson County has had the strongest economic and demographic growth in the region in recent decades, and long-term real estate market conditions have been relatively healthy as well. Over the past few decades, the City of Overland Park has been a primary recipient of this strong growth, and the fringe of new greenfield development emanating from the core of the region has traveled south through the city towards the proposed case study site at the intersection of 159th Street and US-69.

The area encompassing a three-mile radius of the site has grown dramatically over the last decade, confirming the site’s position on the edge of new growth in the submarket. Figure 47 shows that the area had household growth of 6.7 percent from 2000 to 2010, far outpacing the county average.
Median household income is also significantly higher than the county average, suggesting generally more affluent households in the immediately surrounding area. As a result of these strong demographic indicators, the subject site is well positioned for new development and with 320 contiguous acres, represents a strong development opportunity.

Office – The subject site is located in the South Johnson County office submarket, which has emerged as a major office concentration within the region. As shown above in Figure 41, the submarket has the second largest amount of inventory in the region, trailing only the central business district in downtown Kansas City. The submarket is also achieving the highest average lease rates in the region, as shown in Figure 42. Lastly, the submarket’s vacancy rate is on par with the overall regional average of 16.5 percent. These metrics suggest that the site could be well positioned to absorb new office space as the economy improves and demand increases.

Retail – The South Johnson County retail submarket has emerged as a major concentration of retail in recent years, as new retail space has followed the ongoing household growth in the area. Currently the submarket represents the second largest concentration of retail of any of the defined submarkets, as showing in Figure 48.

*Figure 47: Average Annual Household Growth and Median Income, Johnson County and 3-Mile Radius from 159th and US-69, 2000-2010*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson County</td>
<td>2.0%</td>
<td>$80,500</td>
</tr>
<tr>
<td>159th/US-69 3-Mile Radius</td>
<td>6.7%</td>
<td>$117,700</td>
</tr>
</tbody>
</table>

*Source: ESRI, PB Analysis*

*Figure 48: Total Retail Square Feet (in millions) by Submarket, Kansas City Region, 2nd Quarter, 2011*

*Source: CBRE, PB Analysis*
As shown in Figure 44, the submarket is commanding the second highest average retail lease rates in the region, at $15.23 per square foot. This figure surpasses the metro average of $12.36 and only trails the Midtown/Plaza submarket, which includes the Country Club Plaza and other concentrations of high-quality retail. Figure 45 shows that the submarket has a below average vacancy rate of 8.7 percent, which is the 3rd lowest in the region. This snapshot of retail market indicators, combined with ongoing strong household growth in the immediately surrounding area, and the site’s strong access, suggests that the site is well positioned to absorb retail space.

**Residential** – Median residential prices for both new and used home sales in Johnson County as well as within the site’s zip code are significantly higher than the regional median. In 2011, the median sale price in Johnson County was 22 percent higher than the region and the zip code was 47 percent higher than the region.

*Figure 49: Median Residential Sale Prices, 66223 Zip Code, Johnson County, and Kansas City MSA, 2005-2011*

![Median Residential Sale Prices Graph](image)

*Source: Hanley Wood, PB Analysis*

However, since 2005, prices in the County and zip code have declined more rapidly than that of the overall region, suggesting that these higher-priced residential areas were more severely impacted as the housing market and economy weakened. Although residential market conditions remain somewhat weak, the local area’s strong household growth in recent years suggests that the site is positioned to deliver new residential, assuming it is properly priced for its target market audience.

Current market conditions suggest that there is an opportunity for retail, office, and residential at the site. Proposed development plans for the site appear to reflect these market conditions, and call for large-scale office and retail uses, a proposed hospital, and residential units targeting retirees.

**Tonganoxie US-24/40 Market Overview**

**Residential** - With an estimated 5,000 people and 1,900 households as of 2010, the City of Tonganoxie is a small market, relatively far removed from the fringe of growth emanating from the core of the Kansas
City region. However, household growth within a 3-mile radius of the case study site has been stronger than that of Leavenworth County as a whole.

*Figure 50: Average Annual Household Growth and Median Income, Leavenworth County and 3-Mile Radius from 159th and US-69, 2000-2010*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leavenworth County</td>
<td>1.3%</td>
<td>$60,200</td>
</tr>
<tr>
<td>US-24/40 3-Mile Radius</td>
<td>2.4%</td>
<td>$58,400</td>
</tr>
</tbody>
</table>

*Source: ESRI, PB Analysis*

This trend indicates that Tonganoxie and the site’s immediately surrounding area has been better positioned to capture household growth relative to the County as a whole. Despite the strong percentage growth, Total growth averaged 85 households per year in the city from 2000 to 2010, suggesting that any residential or retail development hinging on new household growth would be of a smaller scale and a longer term opportunity.

Historical sales prices for Tonganoxie and Leavenworth County show that median prices are consistent with those of the overall metro area.

*Figure 51: Median Residential Sale Prices, City of Tonganoxie, Leavenworth County, and Kansas City MSA, 2005-2011*

*Source: Hanley Wood, PB Analysis*

After experiencing a spike in the median sales price from 2005 to 2006, the median price in the City and County fell from 2006 through 2008 before stabilizing from 2009 to 2011.

**Commercial** - Due to the small size of the Tonganoxie market, minimal macro-level commercial real estate data is readily available. However, a recent study commissioned by Leavenworth County analyzed the commercial demand potential for the entire US-24/40 corridor, stretching roughly 12 miles from the City of Basehor to the east through Tonganoxie in Figure 52.
The subject site (denoted by the star), at the west end of the corridor, consists of a large undeveloped parcel in the southwest quadrant of US-24/40 and K-16. The study estimated that the entire corridor could experience demand for approximately 750,000 square feet of new commercial space through 2030 in a moderate-growth scenario. This figure includes 330,000 square feet of retail, 160,000 square feet of office, and 260,000 square feet of industrial space.

The higher-growth scenario forecasts total commercial demand of 980,000 square feet over the same period, with increases of 20,000 square feet of retail potential and 30,000 square feet of additional office space.

The study also recommended segments along the corridor that should have the highest density, with the most intense development taking place within the cities of Basehor and Tonganoxie, including the segment adjacent to the subject site. The study goes on to identify the necessary traffic improvements needed to support this future growth in the identified locations.

The presence of numerous vacancies in the site’s immediately surrounding area suggests weak current retail market conditions. Nevertheless, in light of its location along the corridor, the site should benefit from the improved access that the proposed transportation improvements would provide. These improvements could make the site poised to capture an increased share of the new commercial potential estimated above. However, although the site represents a viable candidate for value capture, any new commercial space will likely be relatively smaller in scale, thus limiting the revenue potential from a value mechanism such as a TDD or CID.
North Lawrence Transit Center

Relative to the other case study locations, the City of Lawrence is the furthest removed geographically and economically from Kansas City. In recent decades, the County has demonstrated the second highest employment growth of the 5-County area due in part to the presence of the University of Kansas, the primary economic driver in the area. With approximately 9,900 employees, the school represents close to 20 percent of Douglas County employment.

The case study concept under consideration is to create a transit center at the site of the I-70 Business Center, also known as the Old Tanger Mall. The site is located in the neighborhood of North Lawrence, which is somewhat separated from the core of Lawrence and the University of Kansas by the Kansas River. However, the site has strong access with adjacency to I-70 and frontage along US-40/59, a main arterial that leads to the core of Lawrence.

![Figure 54: Map of North Lawrence Subject Site and Surrounding Area](image)

Although originally built as retail space, the 95,500-square-foot space is currently occupied primarily by office users. The preliminary concept is to integrate some form of transit center into the site, which could include a park-and-ride facility serving commuters from Lawrence using the I-70 turnpike to travel to Topeka to the west and Kansas City to the east.
As conceived, this type of transportation improvement would likely spur increased retail demand at the Tanger Mall site, primarily from commuters seeking convenience/daily needs retail such as coffee/breakfast-serving tenants, dry cleaning, newsstands, and other retail store types commonly found in transit centers. As such, the Lawrence market overview is focused primarily on retail market conditions.

The demographic profile of the North Lawrence submarket matches that of Lawrence and Douglas County as a whole. Average annual household growth from 2000 to 2010 was the same for both areas, and median incomes were similar as well.

*Figure 55: Average Annual Household Growth and Median Income, Douglas County, City of Lawrence, and North Lawrence Neighborhood, 2000-2010*

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Douglas County</td>
<td>1.2%</td>
<td>$47,700</td>
</tr>
<tr>
<td>Lawrence</td>
<td>1.2%</td>
<td>$44,400</td>
</tr>
<tr>
<td>North Lawrence</td>
<td>1.2%</td>
<td>$45,400</td>
</tr>
</tbody>
</table>

*Source: ESRI, PB Analysis*

**Retail -** According to the Lawrence-Douglas County Planning & Development Services Department, the North Lawrence submarket consists of 315,000 total commercial square feet, indicating that the subject site represents close to one third of the submarket inventory. As of October 2010, the submarket had a 28 percent commercial vacancy rate, compared to 7 percent for Lawrence as a whole, indicating very weak market conditions for commercial space in the submarket.

*Figure 56: Average Commercial Vacancy Rate by Submarket, Lawrence, KS, 2010*

*Source: 2010 Retail Market Report, Lawrence-Douglas County Planning & Development Services Department, Kansas Planning and Development Services*
Current listings show 47,000 square feet available for lease at the site, roughly half of the entire center. According to the report, the site represents one of the single largest concentrations of vacant space in the city, and accounts for a large percentage of the submarket’s overall vacancy rate.

Based on these market findings, and the fact that existing tenants consist primarily of office users, the current retail opportunity appears limited at the site. As such, assuming the transit center concept can generate increased retail demand at the site, and possibly some new office demand, the proposed improvements could represent a viable case for value capture analysis.

**Spring Hill Interchange Market Overview**

**Residential** - The City of Spring Hill lies on the boundary of Johnson and Miami counties, with the older, more established core of the city located on the Johnson county side and with relatively newer development on the Miami county side. On the Johnson County side, the unincorporated area immediately surrounding the City is defined as the Spring Hill Township. For the purposes of this analysis, the Township is combined with the City to form the Spring Hill area. As of 2010, there were 2,640 households, with 42 percent located on the Johnson County side of the city, 30 percent on the Miami County side, and 27 percent in the Township area. Although the City represents a relatively small component of the Kansas City region, it has experienced strong household growth in recent years, particularly on the Miami County side of the City.

*Figure 57: Total Households and Average Annual Household Growth, Spring Hill City and Township, 2000-2010*

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Hill City - Johnson Co</td>
<td>850</td>
<td>1,120</td>
<td>24</td>
<td>2.8%</td>
</tr>
<tr>
<td>Spring Hill City - Miami Co</td>
<td>140</td>
<td>800</td>
<td>27</td>
<td>19.0%</td>
</tr>
<tr>
<td>City Total/Wtd. Avg.</td>
<td>990</td>
<td>1,920</td>
<td>68</td>
<td>6.8%</td>
</tr>
<tr>
<td>Spring Hill Township (a)</td>
<td>660</td>
<td>720</td>
<td>6</td>
<td>0.9%</td>
</tr>
<tr>
<td>Total/Wtd. Avg.</td>
<td>1,650</td>
<td>2,640</td>
<td>74</td>
<td>4.8%</td>
</tr>
</tbody>
</table>

(a) Spring Hill Township is the unincorporated area immediately surrounding the City of Spring Hill in Johnson County

*Source: U.S. Census, PB Analysis*

The Miami County section of Spring Hill experienced an average annual growth rate of 19 percent. Despite strong percentage growth on the Miami County side, total growth was just 27 households per year, slightly higher than the 24 households per year in the Johnson County section of Spring Hill. Altogether, the entire Spring Hill area grew by an annual average of 74 households over the ten-year period. These demographic trends indicate that new construction residential or retail development relying on household growth would be of limited scale and likely represent a longer term opportunity.

While Spring Hill has grown rapidly over the past decade, historical residential permit data suggests that demand for new housing rose and fell dramatically over the same period. As the housing boom took place, Spring Hill experienced a rapid increase in residential construction activity that peaked in 2003.
The peak was followed by an equally rapid decline in activity that hit bottom in 2008 with the lowest permitting levels since 1996.

Figure 58: Historical Single-Family and Multifamily Permit Activity, Spring Hill, 1990-2010

![Graph showing permit activity in Spring Hill from 1990 to 2010. The x-axis represents the years from 1990 to 2010, and the y-axis represents the number of permits. The graph shows a peak in 1996 followed by a sharp decline in 2008, with the lowest levels since 1996.]

Source: U.S. Census, HUD, PB Analysis

Despite the recent dramatic fluctuations in new construction activity, home values in Spring Hill and Miami County appear to have stabilized, as shown in Figure 59. From 2007 to 2010, average home prices in Spring Hill have experienced a small net gain, while those in Miami County have declined somewhat.

Figure 59: Average Single-Family Sales Prices, Spring Hill and Miami County, 2007-2010

![Graph showing average sales prices for single-family homes in Spring Hill and Miami County from 2007 to 2010. The graph shows that prices in Spring Hill have increased slightly, while those in Miami County have decreased.]

Source: Miami County Appraiser’s Office, PB Analysis

Commercial - Due to the small size of the Spring Hill market, minimal macro-level commercial real estate data is readily available. However, an update to the City’s comprehensive plan includes an assessment of future commercial development potential and discussions with the County and City suggest that this update includes the most recent market data available. The plan update estimates commercial
development demand in light of Spring Hill’s potentially strategic location within relatively close proximity to new multimodal distribution hubs in the area. These include the BNSF intermodal facility, which is under construction and located eight miles west of Spring Hill in the town of Edgerton, as well as the Centerpoint Intermodal Center, located to the east in Kansas City, MO. These developments could be catalytic to commercial development in Spring Hill, particularly for light industrial and or distribution-related land uses, from tenants seeking good access to both facilities.

According to the comprehensive plan, estimated long-term industrial demand potential for the City ranges from 1.7 million to 2.2 million square feet through 2030. These figures include additional intermodal demand potential ranging from 120,000 to 640,000 square feet. If these multimodal developments do increase the commercial development potential in Spring Hill, the area immediately surrounding the interchange at 223rd and US-169 could stand to benefit due to its strong regional access.

There is a mix of new commercial and residential development in the southeast quadrant of the 223rd/US-169 interchange, which consists of the following uses:

- **Blackhawk Plaza** – a 98-acre multi-use development which includes a variety of retail and commercial tenants including a grocery store, restaurants, and service-oriented medical/professional offices
- **Blackhawk Estates** – 134 single-family residential units located further from the interchange
- **Blackhawk Commons** – 32 maintenance-free duplexes targeting retirees
- **Assisted Lifestyles of Blackhawk** – An assisted living facility with 36 units

There is currently available space for new tenants in the commercial area as well as 12 available pad sites for additional new construction at the site.

Studies conducted in the past suggest that the 223rd corridor, including the interchange at US-169, could experience a substantial amount of residential and commercial demand through 2030. Estimates assume long-term development potential for over 1,100 residential units and 550,000 square feet of commercial space on 8 developable parcels near the interchange and along the 223rd corridor over the next 20 years.
The areas identified as Phase 1 and Phase 2 represent the recently developed Blackhawk commercial and residential uses described above.

Due to the area’s location along the 223rd corridor and designation as an area of regional significance, the site should benefit from the improved access that the proposed transportation improvements would provide. These improvements could make the area poised to capture an increased share of new commercial and residential development.
Appendix C

5 County Regional Transportation Study Phase 2
Transportation Management Toolbox Strategies

Prepared for:
Kansas Department of Transportation

Prepared By:
PARSONS BRINCKERHOFF
A transportation strategies toolbox was developed to provide a systematic approach to identify potential strategies that address corridor transportation needs. This appendix describes a summary of potential transportation strategies that were considered for the 5-County region.

**5-COUNTY REGIONAL TRANSPORTATION STUDY PHASE 1**

The Phase 1 report of the 5-County Regional Transportation Study outlined the following conclusions:

1. Traffic generation is anticipated to increase as a number of large land development projects are underway or are planned that will significantly impact the transportation system.

2. Billions of dollars in transportation needs have previously been identified.

3. Even more transportation needs will be identified as traffic impacts of many of the planned new large developments are determined.

4. Funding for transportation needs is not anticipated to increase significantly.

The Phase 1 report organized a general approach to evaluating the potential impacts of transportation investments to consider how each project not only improved travel mobility but also affected the economy, environment and society—the triple bottom line.

The consensus from the Phase 1 study was that:

- Transportation funds will not be available to address many of the corridor needs through a road construction program alone.
- Solely focusing on mobility without considering economic, environmental or societal impacts could lead to inefficient transportation investment choices.

The 5-County Study is focused on the portion of the transportation system that includes the major interstates, US highways, state routes and major arterial routes. It also includes the five transit systems – Lawrence Transit, KU on Wheels, Unified Government Transit, Kansas City Area Transportation Authority, and Johnson County Transit. Associated with these systems are supportive sidewalk and trail facilities and efforts to coordinate land use/development projects as they relate to the transportation system.

The strategies in the Toolbox have been grouped to address:

- Enhanced Management of the Existing Transportation System
- Reduced Travel Demand
- Increased Transportation System Capacity
CONGESTION MANAGEMENT PLAN PROCESS
The approach to managing the transportation system, including efforts to reduce transportation demand, was initiated in a large scale following the energy price increases and economic downturn experienced in the late 1970s and early 1980s. In the 1990s, federal transportation legislation required larger Metropolitan Planning Organizations (MPOs) to develop Congestion Management Plans (CMP). An overall objective of CMPs has been to maximize the efficiency of existing transportation systems and facilities before considering strategies that increase capacity. This 5-County planning process followed the general CMP approach and includes defining congestion management objectives, developing performance measures, and identifying and evaluating strategies.

While the transportation system serving the 5-County region is auto-oriented, recent experience with energy price increases reinforced the need for alternative transportation modes such as carpooling, public transit, bicycling, and walking to offset higher energy prices.

STRATEGY DESCRIPTION
In analyzing potential corridor strategies, three factors were considered: the scale of the strategy, how well it addressed the 9 Desired Outcomes developed by the Stakeholder Advisory Panel, and the ease of implementation.

Scale: A specific strategy can be applied at the intersection or point level, along a corridor, or area-wide.

Desired Outcomes: While each desired outcome can include consideration of a number of evaluation criteria, the evaluation of strategies as described here focuses on a simplified number of criteria or factors related to the general evaluation of the overall strategy as discussed below:

- **Mobility**: Degree to which the strategy supports the movement of vehicles and goods and improves travel time and reduces delay.
- **Safety**: Degree to which the strategy would lead to reduced crash rates.
- **Regional Prosperity**: The degree to which the strategy would have economic impacts.
- **Efficient Use of Financial Resources**: This represents general level of anticipated cost.
- **Choice**: Degree to which the strategy provides for choice of auto and non-auto modes of transportation or provides information on choice of travel route or time of travel.
- **Environment**: For this evaluation, this outcome is reflected in the anticipated impact to reduce Vehicle Miles Traveled (VMT) or vehicle emissions.
- **Public Health**: Degree to which the strategy supports healthy lifestyles by providing opportunities for exercise as part of travel.
- **Social Equity**: Degree to which the strategy provides for travel opportunities to persons without access or unable to use a private vehicle.
Livability: Degree to which the strategy would be consistent with a development scale that enables mixed land use and would not create barriers across a community.

Ease of Implementation: This includes political considerations, public perception, reaction of transportation system managers, and environmental considerations.

Table 1 provides a summary of the types of transportation strategies that can be considered.

Table 1: Types of Transportation Strategies

<table>
<thead>
<tr>
<th>Category/Strategy</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Management</strong></td>
<td></td>
</tr>
<tr>
<td>Traffic Signal Timing/Optimization</td>
<td>Upgrading traffic signal equipment and timings.</td>
</tr>
<tr>
<td>Freeway &amp; Arterial Bottleneck Removal</td>
<td>Minor roadway geometric or traffic control improvements.</td>
</tr>
<tr>
<td>Ramp Metering</td>
<td>Traffic signals on ramps control vehicles entering freeways.</td>
</tr>
<tr>
<td>Access Management</td>
<td>Careful planning of access points along roadways.</td>
</tr>
<tr>
<td>Variable Speed Limits</td>
<td>Speed limits are changed based upon traffic conditions.</td>
</tr>
<tr>
<td>Congestion Pricing</td>
<td>Variable toll pricing based upon peak or off-peak periods.</td>
</tr>
<tr>
<td>ITS Technology</td>
<td>ITS applications that address travel mobility.</td>
</tr>
<tr>
<td><strong>Traffic Incident Management</strong></td>
<td></td>
</tr>
<tr>
<td>Traffic Information</td>
<td>Provides information to drivers regarding traffic conditions.</td>
</tr>
<tr>
<td>Parking Management</td>
<td>Providing information regarding parking.</td>
</tr>
<tr>
<td><strong>Travel Demand</strong></td>
<td>This set of strategies addresses transportation needs by reducing the number of trips during peak periods.</td>
</tr>
<tr>
<td>Ridesharing</td>
<td>Includes both carpooling and vanpooling.</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>Includes fixed route bus service and paratransit service.</td>
</tr>
<tr>
<td>Bicycle and Pedestrian Travel</td>
<td>Bicycle and pedestrian facilities.</td>
</tr>
<tr>
<td>Alternate Work Hours</td>
<td>Varying work schedules to avoid peak travel times.</td>
</tr>
<tr>
<td>Telework</td>
<td>Promoting telework to reduce the number of commuters.</td>
</tr>
<tr>
<td>Land Use Management</td>
<td>Guide development to lessen traffic impacts.</td>
</tr>
<tr>
<td>Park &amp; Ride Facilities</td>
<td>Promotes carpooling, vanpooling, and transit use.</td>
</tr>
<tr>
<td><strong>Increasing Capacity</strong></td>
<td>This set of strategies refers to traditional capacity improvements such as adding lanes or new roadways.</td>
</tr>
<tr>
<td>Add Travel Lanes</td>
<td>Widening existing roadways to add travel lanes.</td>
</tr>
<tr>
<td>Modify or Add Interchange</td>
<td>Adding capacity to existing interchanges or adding new interchanges to system.</td>
</tr>
<tr>
<td>Construct New Highways or Arterials</td>
<td>Constructing new roadways on new alignments.</td>
</tr>
<tr>
<td>Intersection Capacity Improvements</td>
<td>Includes adding turn lanes and roundabouts.</td>
</tr>
<tr>
<td>Transit Capacity</td>
<td>Includes added transit service and facilities such as Park &amp; Ride lots.</td>
</tr>
<tr>
<td>HOV/HOT and Managed Lanes</td>
<td>A set of lanes where operational strategies respond to changing conditions. Includes high occupancy vehicle lanes.</td>
</tr>
<tr>
<td>Bicycle and Pedestrian Facilities</td>
<td>Construct bicycle and pedestrian facilities.</td>
</tr>
<tr>
<td>Freight Rail Track Improvements</td>
<td>Track related projects or grade separations.</td>
</tr>
</tbody>
</table>
APPLYING THE TOOLBOX

The transportation toolbox presents a range of transportation strategies that can potentially address transportation issues within a corridor or an area within the 5-County region. This approach provides organization to determining which strategies could be used. The following steps are suggested:

1. Identify the Desired Outcomes most pertinent to area, corridor or point being considered.
2. Examine Toolbox strategies, using the hierarchy of system management, demand reduction, and then capacity.
3. Within this hierarchy, identify strategies that best respond to each outcome for each transportation corridor.
4. Evaluate the selected strategies using the travel demand model, highway capacity model, simulation model or manual techniques as appropriate.
5. Following implementation, review the effectiveness of the strategies in meeting the toolbox criteria.

TOOLBOX STRATEGIES

The transportation toolbox strategies are described in the following sections. Table 2 lists those strategies that would be considered to best address each desired outcome. While the impact of a given strategy will vary given the characteristics of the area where it is applied, this table provides a starting point to discuss how a set of transportation strategies can be applied to address this range of desired outcomes.

Table 2: Toolbox Strategies

<table>
<thead>
<tr>
<th>Mobility</th>
<th>Safety</th>
<th>Regional Prosperity</th>
<th>Financial Resources</th>
<th>Choice</th>
<th>Environment</th>
<th>Public Health</th>
<th>Social Equality</th>
<th>Livability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottleneck Removal</td>
<td>Signal Timing</td>
<td>Add Travel Lanes</td>
<td>Signal Timing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion Pricing</td>
<td>Bottleneck Removal</td>
<td>Modify/Add Interchanges</td>
<td>Bottleneck Removal</td>
<td>Public Trans</td>
<td>Bottleneck Removal</td>
<td>Bike Ped Facilities</td>
<td>Ridesharing</td>
<td>Bicyc/e/Ped</td>
</tr>
<tr>
<td>Access Management</td>
<td>Ramp Metering</td>
<td>Freight Rail</td>
<td>Ramp Metering</td>
<td>Bicycle/Ped</td>
<td>Ramp Metering</td>
<td>Land Use Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp Metering</td>
<td>Access Management</td>
<td>Access Management</td>
<td>Access Management</td>
<td>Transit Capacity</td>
<td>Intersection Capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add Travel Lanes</td>
<td>Variable Speed Limits</td>
<td>Intersection Capacity</td>
<td>Variable Speed Limits</td>
<td>HOV/HOT Lanes</td>
<td>Public Trans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify/Add Interchanges</td>
<td>Transit Capacity</td>
<td>Ridesharing</td>
<td>Managed Lanes</td>
<td>Bicycle/Ped</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection Capacity</td>
<td></td>
<td>Telework</td>
<td>Bike/Ped Facilities</td>
<td>Transit Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transit Capacity</td>
<td>Parking Management</td>
<td></td>
<td>Freight Rail</td>
<td>Bike Ped Facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOV/HOT Lanes</td>
<td>Managed Lanes</td>
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</tr>
</tbody>
</table>

*others will vary by location of projects
*other projects can include livability elements
TRANSPORTATION SYSTEM MANAGEMENT (TSM) STRATEGIES

TSM strategies seek to enhance capacity through better management and operation of the existing transportation facilities. These techniques are designed to improve traffic flow, air quality, and movement of vehicles and goods, as well as improve system reliability and safety.

Transportation management strategies are typically low cost when compared with capacity projects. The objective of these strategies is to provide for improved traffic and transit operation often reflected by moderate improvements in travel mobility and reduced vehicle emissions. These strategies are applicable to both highway and transit operations. Many of the management strategies contribute indirectly to public health, regional prosperity, social equity and livability; however, this contribution in the 5-County Study rating process is typically shown as “low”. These strategies typically do not have a major impact on increasing transportation modal choices.

Traffic Signal Timing/Optimization
Upgrading traffic signal equipment and implementing more efficient traffic signal timing and communication are ways to improve traffic movement along travel corridors. Traffic signal timing provides an opportunity to reduce vehicle delay on arterial streets by up to 15 percent, with as much as 30 percent during peak hours.¹

The effort to provide more efficient signal timing is currently underway in the Kansas City area. The most prominent effort is Operation Green Light, a cooperative effort among more than 20 local governments to improve the coordination of traffic signals on major routes throughout the Kansas City area. In addition, some communities also operate separate arterial traffic management centers that are integrated with Operation Green Light and extend similar benefits to the arterial network.

By improving travel times, signal coordination projects have been shown to provide travel mobility and safety benefits. The projects are considered to provide an efficient use of resources with modest costs related to signal hardware upgrades and construction of communications centers. Signal timing projects achieve environmental goals by reducing vehicle emissions but because of the travel time savings, the projects can lead to increased travel and a possible increase in vehicle miles traveled (VMT) which can negate some of the environmental benefits. Signal timing projects have less of an impact on other desired outcomes such as public health, social equity and livability.

Freeway and Arterial Bottleneck Removal
The freeway system and major arterial routes in the 5-County region are rated as good condition and have been constructed or re-constructed to meet current design standards. However, in certain locations, there could be opportunities to address traffic congestion through bottleneck removal. This strategy consists of identifying congested locations and improving elements including:

¹ FHWA, Olsson Associates
- Insufficient acceleration/deceleration lanes and ramps
- Improving weaving sections
- Addressing narrow lanes and shoulders
- Providing adequate signage and pavement striping
- Addressing other geometric deficiencies that may exist

This is a location specific strategy targeted to users of the street and highway system. In some cases where congestion occurs due to a few constrained locations, bottleneck removal can provide benefits to travel mobility. If the project addresses upgrading a design standard, it provides safety benefits. Compared to larger capacity projects, these projects can provide a very efficient use of financial resources by providing benefits with modest costs. Bottleneck removal projects which address vehicle delay will provide environmental benefits by reducing vehicle emissions, however it does not typically result in longer term sustainable environmental improvement by reducing vehicle miles traveled (VMT). Like most TSM strategies, bottleneck removal will have less of an impact on other desired outcomes such as public health, social equity and livability.

**Ramp Metering**

Ramp metering is the use of traffic signals on a ramp to control the rate at which vehicles enter a freeway facility. By controlling the rate at which vehicles are allowed to enter a freeway, the flow of traffic onto the freeway facility becomes more consistent, smoothing the flow of traffic on the mainline and allowing more efficient use of existing freeway capacity. It can also encourage an increased use of surface arterials for shorter length trips. Ramp metering can be an effective tool to address congestion and safety concerns that occur at a specific point or along a section of freeway. It is being used on a small section of I-435 east of Metcalf Avenue to manage a difficult weaving section.

By regulating the entry of vehicles on to the freeway, ramp metering has been shown to improve vehicle mobility by increasing average freeway throughput and travel speed and decreasing travel delay on freeway mainlines. This is a point or corridor specific strategy targeted to users of the street and highway system. This project strategy can be considered to efficiently use resources due to travel benefits with modest costs. Ramp metering can provide environmental benefits through reduced travel delay leading to reduce vehicle emissions. This strategy typically has a small impact on improved travel safety, public health, social equity and livability.

**Access Management**

Access Management is a process used to maintain the mobility function of arterial routes by limiting vehicular access points between land parcels and roadways. This practice is already in use by KDOT and many local governments. KDOT has developed a Corridor Management Program that partners with local governments to develop transportation plans along highways experiencing growth and development. Access management can include increasing the distance of intersection spacing of both driveways and streets, providing turn lanes, providing medians and right-of-way preservation for future streets.
Access management supports the mobility function of a roadway and improves vehicle and bicycle/pedestrian safety. Studies have shown that access management also leads to economic benefit over a period of time. While these actions do not typically require an environmental study, they do typically require completion of a corridor study, including extensive coordination with businesses located on the corridor. Access management can support regional prosperity, but is not considered to have much impact on public health, social equity and livability.

**Variable Speed Limits**

Variable speed limits moderate freeway traffic flow in response to traffic congestion, weather, and construction. Variable speed limits can be advisory or regulatory. The speed limit is varied based on downstream conditions that drivers are heading towards, not necessarily conditions at the site where speed limits are changed. The intent of variable speed limits is to slow traffic speeds prior to reaching a congested area to improve safety and to allow the traffic in the congested area to disperse more quickly.

A moderated traffic flow can result in higher highway vehicle capacity and safety. When congestion (either recurring or due to traffic incidents) is detected, a traffic management center modifies speed limits upstream of the congestion so vehicles have slowed down prior to reaching congested areas. This speed reduction lowers the number of additional traffic incidents once the congested area is reached and harmonizes the speed and traffic flow over a larger segment of the highway. Speed limit variations across the entire facility smooth the flow of traffic which may prevent further congestion. The process results in traffic traveling through congestion-prone areas more quickly.

The Missouri Department of Transportation (MoDOT) uses variable advisory speeds (pictured in Figure 11-2) along I-270/I-255 in St. Louis. When congestion starts building along stretches of I-270, MoDOT activates changeable speed signs to vary the advisory speed on the road. Variable Advisory Speeds along I-270/I-255 could range from 60 mph during extremely light traffic, to as low as 10 mph during extreme congestion. If the advisory speed posted is less than 60 mph, the speed will flash continuously. An earlier version of the program limited the minimum variable speed to 40 mph.

Variable speed limits can improve travel mobility in congested freeway locations by increasing average throughput and decreasing travel delay. It also can improve travel safety. The strategy requires coordination with existing Intelligent Transportation Systems (ITS) infrastructure and the costs of advisory speed signs. By reducing travel delay, variable speed projects will reduce vehicle emissions. This strategy is oriented toward highways, and as such, will not impact travel choices. This is a new strategy that has not been widely used and as such may be initially difficult for motorists to understand and could have concerns related to public acceptance. This strategy can be very efficient with financial resources, in that project costs are relatively small.
Active Lane Use Control

Active Lane Use Control is one element of active traffic management which seeks to dynamically manage recurrent and non-recurrent congestion based on prevailing traffic conditions. Active traffic lane use control is a method of increasing peak capacity and smoothing traffic flows on busy major highways.

Techniques include variable speed limits, hard-shoulder running and High-Occupancy Vehicle/High-Occupancy Toll lanes controlled by overhead lane-specific variable message signs.

Hard shoulder running involves converting the hard shoulder into a travel lane during periods of high traffic flow to expand the capacity of the road and may reduce the need to widen roadways.

Active transportation strategies have been used effectively in Europe. Active lane use control strategies are typically those that can be used on freeways to manage traffic flow and safety.

Speed Harmonization

Speed harmonization on freeways is similar to the variable speeds strategy but would be part of an overall system used throughout the corridor. It could include the following elements:

- Sensor deployment for traffic and weather monitoring.
- Installation of sign gantries to ensure that at least one speed limit sign is in sight at all times.
- Placement of speed limit signs over each travel lane.
- Connection to a traffic management center that serves as the focal point for the system.
- Uniform signing related to speed harmonization.
- Modeling tools to assess the impacts of speed harmonization on overall network operations.
- Closed-circuit television cameras to support the monitoring of the system.
- Dynamic message signs to provide traveler information and regulatory signs.
- Automated speed enforcement to deter violations.

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Temporary Shoulder Use
Temporary shoulder (aka hard shoulder running) use should be implemented where appropriate to temporarily increase capacity during peak travel periods. Specific elements of the operational strategy would include the following:

- Deployment in conjunction with speed harmonization.
- A policy for uniform application of the strategy through entrance and exit ramps and at interchanges.
- Installation of sign gantries to provide operational information.
- Placement of lane control signals over each travel lane and the shoulder.
- Uniform signing and markings related to temporary shoulder use.
- Provision of pullouts at regular intervals with automatic vehicle detection to provide refuge areas for minor incidents.
- Advanced incident detection capabilities.
- Dynamic message signs to provide guide sign information and regulatory signs to adapt to the addition of the shoulder as a travel lane.

Truck Restrictions
Truck restrictions, such as designated truck-only lanes or lane restrictions, are implemented in a corridor to better segregate vehicles when implementing lane management strategies listed above that may not allow for safe operation in particular lanes. In addition to some of the elements in the strategies listed above, truck restrictions include the following:

- Uniform signing and marking to indicate truck restrictions are in effect.
- Installation of signage to show truck restrictions.

Congestion Pricing
Congestion pricing implements variable price tolling between peak and off-peak times in toll areas on bridge and roadway facilities, tollways, zones, or High Occupancy Tollway (HOT) lanes. The price differences induce drivers of less critical or more discretionary trips to shift their highway travel to off-peak periods or other modes.

Congestion pricing (as shown in Figure 3) has different pricing strategies:

- Variably priced lanes have variable tolls on separated express toll lanes or high-occupancy toll (HOT) lanes within a highway.
- Variable tolls on entire roadways, which would place variable tolls on both toll roads and bridges, and on existing toll-free roadways and bridges during rush hour.
Zone-based charges would charge a fixed or variable toll to drive within or into a congested area, such as a central business district.

Area-wide or system-wide charges would utilize per-mile charges on all facilities with an area or roadway network that may vary by level of congestion.

At its fullest extent, congestion pricing would entail setting fees at a rate sufficient to maintain free-flow traffic speeds within the toll area. Toll amounts can be predetermined according to a schedule or can be dynamically changed based on real-time congestion levels. Fees are typically collected electronically through the use of vehicle transponders or license plate identification technology. Congestion pricing in the U.S. is more common on High Occupancy Vehicle (HOV) lanes converted to High Occupancy Toll (HOT) lanes.

Multiple locations throughout the U.S. and abroad have implemented versions of congestion pricing. Minnesota DOT is using congestion pricing on converted HOV lanes and Priced Dynamic Shoulder Lanes (PDSL) on I-35W into downtown Minneapolis (as shown in Figure 4). San Diego’s I-15 has fees varied in 25-cent increments, as often as every six minutes with the intent to maintain HOV lanes free-flow traffic conditions. Approximately half of the revenue is used to support corridor transit service. Colorado DOT implemented congestion pricing in Denver on I-25 HOT lanes between downtown Denver and US 36. Drivers pay different rates based on the time of day use. Carpools and hybrid cars are exempt from the tolls on the I-25 HOT lane.

Congestion pricing can have a moderate impact on reducing traffic congestion, increasing travel speed and reducing or spreading VMT. Congestion pricing has been shown to significantly spread weekday peak-period traffic to the hours just before or after peak toll rates are in effect for both cars and trucks. This can also contribute to lower vehicle emissions. Congestion pricing may not have a major impact on travel safety. This strategy would not have a major impact in the 5-County region, given that most highways and roadways do not have tolls.

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The cost of this strategy would be high to develop toll facilities on major routes. Another approach being tested by the Federal Highway Department involves the use of GPS devices in individual vehicles to record vehicle movement and to assess a VMT charge. These charges could be adjusted for peak and off-peak travel. A considerable amount of research and development will need to be completed in order to make congestion pricing a strategy that can be used in the 5-County region or most urban areas. The practical and political factors make this strategy difficult to implement on existing non-tolled highways. Like most traffic management strategies, congestion pricing will have less of an impact on other desired outcomes such as public health, social equity and livability.

Intelligent Transportation System Arterial and Freeway Applications

Intelligent Transportation System (ITS) focuses on intelligent vehicles, intelligent infrastructure and the creation of an intelligent transportation system. ITS encompasses many areas of transportation and are part of many of the strategies included in this toolbox. This strategy includes those ITS actions that address travel mobility on freeway routes and the supportive arterial street network.

The types of ITS activities that support freeway and arterial operations include:

- Traffic surveillance systems use detectors and video equipment to support the most advanced freeway management applications.
- Traffic control measures on freeway entrance ramps, such as ramp meters, can use sensor data to optimize freeway travel speeds and ramp meter wait times.
- Lane management applications can address the effective capacity of freeways and promote the use of high-occupancy commute modes.
- Special event transportation management systems can help control the impact of congestion at stadiums or convention centers. In areas with frequent events, large changeable destination signs or other lane control equipment can be installed. In areas with occasional or one-time events, portable equipment can help smooth traffic flow.
- Advanced communications have improved the dissemination of information to the traveling public. Motorists are now able to receive relevant information on location specific traffic conditions in a number of ways, including dynamic message signs, highway advisory radio, interactive websites, targeted text alerts, in-vehicle signing, or specialized information transmitted only to a specific set of vehicles.
- Arterial management systems manage traffic along arterial roadways, employing traffic detectors, traffic signals, and various means of communicating information to travelers.

The largest ITS application in the 5-County region is the Kansas City Scout freeway management system led by the Kansas and Missouri departments of transportation. The Scout system manages traffic on more than 100 miles of freeways in the Kansas City metropolitan area. Scout provides real time information to dynamic message signs and deploys cameras showing traffic conditions viewable by the public on the Internet.
ITS Technology currently available is an effective tool to manage congestion by providing information about alternate routes and encouraging travel outside of the highest peak travel times. ITS Technology can lead to some improvement in travel speeds along freeway corridors and with signal coordination applications, improvements in travel speed along arterial corridors. Costs will vary with specific applications, but are generally less than with capacity projects. There are few issues which would impact implementation.

**Traffic Incident Management**

Traffic incident management is a planned and coordinated process to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible. This strategy minimizes disruptions to existing capacity resulting from traffic incidents. Traffic incidents cause approximately 25 percent of traffic congestion. This strategy addresses non-reoccurring traffic congestion related to incidents which can occur anywhere on the transportation system. This strategy is considered to be supportive to any set of transportation investments that would be undertaken.

Traffic incident management can improve travel mobility in congested locations by reducing the severity and duration resulting from an incident on a freeway or highway. It also can improve travel safety. The strategy would require coordination with ITS infrastructure. By reducing the duration of congestion resulting from incidents, traffic incident management reduces vehicle emissions. This strategy is oriented toward highways, and as such will not impact travel choices.

Incident management plans coordinate the actions of agencies that typically respond to highway incidents, including:

- Transportation agencies
- Police
- Fire
- 911 dispatch
- Emergency medical service
- Towing and recovery
- Hazardous materials
- Media

Incident management techniques include:

- Detection and verification of the incident
- Response management
- Motorist information
- Site management
- Traffic management
- Clearance of the incident

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4 FHWA
Travel Information
This strategy involves providing information to users of the transportation system about congestion or other problems on their typical route to enable them the option to modify the trip.

In the Kansas City metropolitan area, the Kansas City Scout program provides real-time traffic web pages, as shown in Figure 5, that provide up-to-the-minute information on traffic conditions such as speeds; incidents; congestion levels; real-time video images of roads; and other pertinent information. In addition, there are private companies such as Google that provide mapping of travel speeds. Some in-vehicle GPS navigation systems provide route information based upon traffic conditions. Travel information technology is also available for transit service in some areas.

An increasing number of transportation agencies are offering alerts to their customers on a subscription basis. Commuters can select specific routes for which they want to receive e-mail or text message alerts sent to a PDA, mobile phone, or an Internet account. KDOT provides e-mail alerts on traffic conditions, construction projects, or weather information to subscribers and those connected by Twitter. Transit agencies can provide e-mail alerts on a commuter’s specific routes sent to a PDA, mobile phone, or to an Internet account.

KDOT is currently working to aggregate traveler information into one portal called KanDrive. The KanDrive website is http://www.kandrive.org/ and is also the web location for Kansas 511. Emails and tweets are sent out for geographically relevant projects. The Kansas City Area Transportation Authority (KCATA) has a program called Web Watch (shown in Figure 6), which enables users to receive emails or view from the website (http://www.kcata.org/maps_schedules/webwatch/ie) the real-time location of transit vehicles on specific routes. Technology is available to provide information directly to mobile phones or websites about transit vehicle location and arrival times. Studies have determined that providing access to real-time information on transit vehicle arrival time reduces transit user’s perceived waiting time by 20 percent. Passenger information at transit stops is estimated to be 7 percent of BRT’s elasticity increment for attracting new riders.

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Providing travel information is a valuable service to transit users and the motoring public allowing individuals to better manage travel. In aggregate, the impacts of this strategy related to the reduction of congestion, increase in travel speed, or changes to VMT are difficult to measure. This strategy does provide information that can support making travel choices. Investments in the technology needed to provide the information does result in moderate costs, but are well received by the public.

Parking Management
Parking management strategies include minimizing parking requirements and providing information about parking availability. Allowing coordinated parking between complementary daytime/nighttime or weekday/weekend land-uses potentially reduces the number of spaces necessary for a development. Displaying real-time information of available parking spaces reduces the amount of both vehicle dwell in parking lots and circulation in the surrounding street network. Parking management can also include the use of regulation and fees; parking facility operation and maintenance; special event transportation; and parking distribution plans. Parking management has been used to complement other travel demand strategies.

The following are examples of parking management:

- Fees for parking where a high cost results in lower single-occupancy vehicle rates.
- Discounts for carpooling / ridesharing, when combined with preferential locations and ridesharing matching programs. This must be balanced to avoid shifting mode share from transit.
- Providing electronic signage to offer real-time information about parking space availability.

Within the 5-County region, the largest example of parking management is at University of Kansas in Lawrence and the KU Medical Center in Kansas City. Both university locations use parking management where annual parking fees, restricted access, and limited supply provide incentives for alternative mode use and prevent the need to construct additional parking structures.

Parking management provides information regarding parking availability leading to a reduction in congestion at an activity center. With incentives, parking management can support a shift in travel mode. This strategy helps reduce congestion, particularly related to event parking. This strategy can lead to small reductions in VMT. Investments in the technology needed to provide the information does result in some costs, but much less costly than constructing new parking facilities.
TRAVEL DEMAND MANAGEMENT (TDM) STRATEGIES

These demand-side strategies are often referred to as Travel Demand Management (TDM). These types of strategies address transportation needs by reducing the number of trips taken during peak travel periods. This set of toolbox strategies have a lesser impact on mobility and traffic safety, but instead address the “desired outcome” to provide travel options, particularly for persons without access to private vehicles. Many of the travel demand strategies contribute to supporting public health, regional prosperity, social equity and livability.

Ridesharing

Ridesharing includes both carpooling and vanpooling. A carpool is where two or more people share a ride in a private vehicle. Carpools generally have two or more passengers who live in the same neighborhood, or along the same route, using a private vehicle to travel to common or nearby destinations. A vanpool is where a larger group of people share a ride in a prearranged vehicle.

Mid-America Regional Council’s RideShare Program is an example of a program that offers assistance to individuals to match potential shared rides and information to employers about carpooling and vanpooling. Users enter their trip information into the RideShare website and are matched to other users with similar trip patterns. This service is orientated towards daily commuter trips. Increasing vehicle occupancy during peak commuter travel periods would have benefits in the reduction of congestion, reduction in VMT and improvements in air quality. The participation in carpooling and vanpooling has contributed to slowing traffic growth. This is a complementary strategy to addressing mobility needs within a given corridor.

A recent variation of ridesharing is called dynamic ridesharing. Also known as ad-hoc ridesharing or dynamic carpooling, dynamic ridesharing is a service that coordinates carpooling on very short notice. Private companies, such as Zimride, link ride matches and account creation to within existing networks such as universities, corporations, and social networking websites. Typical attributes for this type of carpooling include:

- One-time trips instead of recurring commutes.
- Utilizing mobile phones for placing and receiving carpooling requests.
- Utilizing either existing social networks or a service-specific network for automatic and instant ride matching.
- Driver compensation by the rideshare service through an integrated billing service.

Ridesharing provides a transportation choice for work travel. It is a strategy that results in fewer vehicle trips taken during the peak hour. In aggregate, this strategy would only have small impacts to reduction of congestion, travel safety, or to the environment. It is not a costly strategy to provide. It is a strategy that addresses social equity in that it is a travel option that provides access to jobs for persons without access to their own vehicle.
**Public Transportation**

The two primary types of public transportation service include fixed route and paratransit. Fixed route transit provides designated public transportation that is operated along a prescribed route according to a fixed schedule. Paratransit transit service does not follow fixed routes or schedules, and provides service to customers unable to access fixed route service. Paratransit service often entails providing on-demand door-to-door service from any origin to any destination in a service area.

Public transportation typically serves specific travel markets. One market is transit dependent households that have limited access to private vehicles, are elderly, are persons with disabilities, or cannot afford the costs to operate a vehicle. Another travel segment served by public transportation is work trips oriented toward major employment centers such as the Kansas City, Kansas and Missouri Central Business Districts or the University of Kansas.

Specific development characteristics are needed for fixed route transit service to be cost effective. This includes having concentrations of residential development near a transit route with pedestrian connections to provide good access. Parking spaces need to be made available for Park & Ride access for persons located further away from a route. Access is also necessary at the destination end of the trip.

Transit service improvements would include:

- Provide additional revenues to support increased transit operations. This would include providing additional local transit route service, increasing frequency and service times to midday, evening and weekends.
- Increasing paratransit service, to provide for additional trips for persons with disabilities, and the elderly, as well as other potential users.
- Construction of transit amenities such as bus shelters, improving existing or constructing of new Park & Ride lots and providing real time information on bus arrival times.

Public transportation provides transportation to persons without access to private vehicles, and for some travel markets, can attract “choice” riders. In most cases, public transportation use can have a small positive effect on traffic congestion levels and roadway safety. Increased transit service can lead to reductions in vehicle emissions. It is a strategy that addresses social equity in that it is a travel option that provides access to jobs and other destinations for persons without their own vehicle. Transit projects are considered to support the development of a pedestrian environment considered important to improving livability.

Transit operating costs are typically large enough to be a concern to local governments. Funds for daily operations are required from local or state sources and the lack of these funds have limited the growth of transit service. The costs of capital funding are more easily shared using federal sources.
**Park & Ride Facilities**

Park & Ride facilities include parking lots and parking structures that allow commuters and other people headed to city centers to leave their vehicles and transfer to a bus, rail system (rapid transit, light rail, or commuter rail), or carpool for the remainder of the journey. Park & Rides are generally located in the suburbs of metropolitan areas or on the outer edges of large cities.

Park & Ride facilities allow commuters to avoid the stress of driving a congested part of their journey and facing scarce, expensive city-center parking. They are meant to reduce congestion by encouraging people to use public transportation or carpool as opposed to their own personal (single-occupant) vehicles. They offer the flexibility for travelers to use personal vehicles for errands either before or after their workday commute.

**Bicycle and Pedestrian Travel**

Many of the bicycle and pedestrian considerations are contained within the concept known as “complete streets”. This policy approach includes a focus on the design and operation of an entire right-of-way to enable pedestrians, bicyclists, motorists, and transit riders of all ages and abilities to move safely along and across a street or highway.

The techniques used to create complete streets include sidewalks buffered from cars; reduced crosswalk crossing distance; bus pullouts or special bus lanes; traffic calming features, such as sidewalk bulb-outs and on-street parking; and the use of bike lanes and bike parking areas. To encourage pedestrian use, complete streets have features that make users feel comfortable and safe (for example: benches and other resting places, street art that adds interest, buildings that front the street with windows and doors, street lighting, clear directional signage, and narrow street widths).

A related approach is called Context Sensitive Solutions (CSS) which is a process that involves customizing road design to fit within its surrounding context. One primary example is transitioning a high-speed suburban road that enters a community, a neighborhood, or some other walkable district, into a more human-scaled design that causes cars to drive slower to support a walkable, pedestrian-friendly environment. A CSS process can apply to the planning of a new road, a road widening, or rehabilitation or retrofit of an existing road facility.

Bicycle accommodations can be considered when addressing transportation projects. Facility enhancements that separate bicycle and pedestrians from vehicle traffic increases safety. In some cases, bike lanes can be added to existing roadways through restriping. Other roadway improvements can be made to improve the visibility of the roadway use for bicyclists. Many communities are incorporating additional roadway width into their street standards to accommodate bicyclists. Some state departments of transportation provide bicycle facilities along and across highway corridors. In additional to creating additional facilities, projects that enhance bicycle safety, such as lighting, signage, striping and pavement quality are important to consider when accommodating bicyclists.
Providing for effective movement of pedestrians can be challenging in auto-oriented suburban environments. Numerous actions can be considered to create a safer environment for walking. Sidewalk safety projects can include installing curb cuts, curb extensions, median pedestrian refuges, and crosswalks. In some cases bridges, interchanges or freeways result in barriers to pedestrian movement and can be addressed.

Bicycle and pedestrian improvement strategies address objectives related to transportation choice and public health. Bicycle and pedestrian improvement strategies can provide a small positive impact in the reduction of congestion, reduction in VMT and improvements in air quality. While these strategies may have little institutional barriers related to implementation, in some cases there are decisions related to trade-offs between bicycle accommodation and lower vehicle capacity or lower travel speeds. This strategy addresses the social equity objective to the extent that the specific projects are provided to all population sub-groups and also to the extent in which the strategy improves access to-and-from transit. The direct connection between bicycle and pedestrian strategies and economic prosperity is generally considered to be longer term in that improvements in livability can attract or sustain growth.

Alternate Work Hours (Shift in Time of Trip)
This strategy, often called “flextime,” involves varying work schedules to shift work-trip departure times away from peak congestion times, rather than maintaining traditional arrangements requiring employees to work a standard 8:00 AM to 5:00 PM day. In a compressed work week, employees complete their required number of work hours in fewer-than-normal days per week (or per pay period) typically leading to commute travel that avoids the peak travel times. This arrangement allows employees to have one day off each week or one day off every other week, depending on which type of compressed work week program is utilized.

Promoting flextime supports a transportation choice for work travel related to the time of travel. In aggregate, this strategy helps reduce travel during the highest periods of travel. This strategy contributes to reducing of congestion, but has less impact on travel safety, or changes to VMT. Some improvement in air quality is possible with movement of travel to less congested times. It is not a costly strategy to provide. The strategy has a small impact on public health, regional prosperity and livability.

Telework
Teleworking is defined as working full- or part-time at home or another off-site location. Teleworking is increasingly used by employers to reduce the demand for office space and parking. The use of electronics to communicate for various work activities is expanding and provides some benefit to trip reduction. While beneficial, this strategy is considered a complementary strategy with other strategies to address corridor needs.

Promoting telework supports a transportation choice for workers to avoid making the commute. If widely used, this strategy could potentially provide small reductions in peak period congestion and VMT, and provide small improvement in air quality. It is not a costly strategy to provide. Because the time
previously spent traveling is now available for other uses, this strategy can have a small positive impact on public health and livability.

**Land Use Management**

The type, intensity and site planning associated with land development can influence transportation conditions. These are strategies involving changes in land-use plans, zoning codes, subdivision ordinances and other development policies which can be used to collectively guide development in a way to lessen traffic impacts and provide a greater balance between travel modes.

One land-use management strategy involves developing site plans that result in livable, walkable, and healthy places to live. Conventional development patterns often create a low density development pattern where nearly all travel must be completed using private automobiles. Site planning that locates buildings in a way that can be accessed by walking or biking can promote a development pattern that reduces motorized travel. Development can also be located close to public transportation to enable more potential riders to use transit. Many of these land development principles are described as Transit Oriented Development (TOD) or neo-traditional land use.

A second land-use management strategy involves ensuring that the trip generation of planned activity centers can be supported by the existing roadway system. If a higher level of activity were to be proposed, improvements to the existing transportation system would need to be made in order to maintain the desired level-of-service.

A third land-use management strategy is oriented to the regional level. This strategy involves using the local planning process to ensure that affordable housing is provided near employment centers. In some high employment areas, affordable housing may not be available, which can result in longer commutes. Conversely, higher end residential areas may be located away from the central city, which can result in longer commutes for that income group.

Land-use management strategies are typically applied at a site or corridor level. Land-use management at the site level can result in lower traffic congestion on the arterial adjacent to the site development. If implemented on a corridor scale, these strategies could have larger impacts on transportation system performance, mode choice and urban form leading to a reduction in VMT. This strategy directly addresses livability and public health by encouraging pedestrian and bicycle travel. Land-use management can also lead to shorter trip lengths, lower travel speeds and improved travel safety.
INCREASED CAPACITY STRATEGIES

Increasing capacity refers to traditional transportation supply strategies such as adding travel lanes, modifying interchanges to accommodate higher traffic volumes; and constructing new highways or urban arterials. It can also involve major capacity increases for public transportation. Capacity projects are often identified for roadway locations where the level of traffic volume results in traffic congestion. When this occurs, a traffic study or a design project is often initiated to determine how to increase roadway capacity.

Projects to increase roadway capacity are typically undertaken to address existing or anticipated traffic congestion or to provide a new route connection. In order to complete the project, sufficient right-of-way needs to be available and the project should not result in adverse environmental impacts. Projects of this type are targeted to provide benefits to the overall driving public. This includes a majority of the population but may not include those without access to a vehicle, or people who use non-auto modes.

Potential or planned transportation capacity projects are identified in the Long Range Transportation Plans prepared by the two Metropolitan Planning Organizations located in the 5-County region. Projects which have a dedicated funding source and are scheduled over the next five years are listed in each MPO’s Transportation Improvement Program. In addition, KDOT has developed a transportation program called T-WORKS which identifies funding for transportation capacity projects through 2020. These sources provide a listing of planned capacity projects for the 5-County region.

While capacity projects typically address traffic congestion in the short term, adding capacity can support a long term cycle of congestion. This occurs when the added capacity induces new demand, which causes congestion to return. Other long term impacts of focusing resources on roadway capacity solutions include enabling growth to occur outward resulting in lower overall densities, increased VMT, and disinvestment in older more established areas.

Add Travel Lanes

This strategy includes projects to widen existing highways and arterial streets by adding through travel lanes. These projects are typically targeted to congested locations and provide a direct impact of reducing traffic congestion and travel time by adding vehicle capacity. Often roadways are widened in new or recently developed areas in response to higher traffic that is now generated for that development. In some cases, roadways in developed areas are widened in response to increased traffic traveling through the area. Acquiring the right-of-way for these projects can be difficult, and the project can impact adjacent development.

Adding travel lanes directly addresses the objective of improving vehicle mobility and is a strategy that can potentially lead to an increase in regional prosperity. Lane addition projects can be difficult to implement, particularly where there are impacts to right-of-way, community and the environment. The projects typically involve a relatively high project cost.

Some lane addition projects have secondary impacts. Larger lane addition projects that reduce vehicle travel times increase accessibility outward and can lead to economic development at the edges of the
urban area. An expanding metropolitan area can result in longer trip length which over time leads to a return of traffic congestion. The resulting higher vehicle miles of travel can also lead to higher vehicle emissions. There are cases where lane addition projects can bring air quality benefits if the project provides a reduction in stop-and-go congestion. The impact on public health will be minimal or possibly negative if the project leads to higher vehicle emissions. Another unintended consequence of roadway widening is that by adding width and carrying more traffic, the projects make pedestrian and bicycle travel more difficult. Adding travel lanes typically does not impact travel safety as the design characteristics of the roadway should not change.

**Modify or Add Interchanges**

This strategy includes adding capacity to existing interchanges by modifying the ramp configuration, widening ramps, or adding collector/distributor roads. It also includes building new interchanges on existing freeways. The principal purpose of new interchange projects is to provide access to land adjacent to freeways. The exception is with system-to-system interchanges where the primary objective is to improve mobility on the freeway system. This type of project could lead to an increase in VMT and little impact on travel speeds. Major system interchange reconstruction projects can cost upwards of $400 million or more. Access interchange construction or reconstruction is less costly, typically between $5-15 million. Some of these projects require a break-in-access study to be completed for Federal Highway Administration (FHWA), and can involve environmental impact studies.

Improved access often leads to an increase in economic activity of the area served, which should improve regional prosperity. The projects typically involve a relatively high project cost. Interchange projects typically have fewer implementation concerns than do roadway widening projects. In general, improving an existing interchange should not lead to higher vehicle miles of travel and higher vehicle emissions with the exception of new interchanges located on the edge of urban areas which could lead to higher VMT and emissions. Larger interchange projects may have a long term negative impact on livability. By adding width and carrying more traffic, the projects can make pedestrian and bicycle travel more difficult unless these modes are accommodated in the project design. Interchange modifications often can lead to improved travel safety if the design characteristics of the roadway are upgraded.

**Construct New Highways or Arterials**

This strategy involves constructing new roadways on new alignments. In recent years, issues related to implementation such as right-of-way acquisition, project cost and environmental impacts have limited the construction of highways or arterials on new alignments.

Constructing new highways or arterials addresses the objective to improve or maintain mobility. Often a new roadway will provide a more direct connection between points, or relieve an existing route which may be congested. This strategy also provides the means to develop additional land area. New highway or arterial projects can be very difficult to implement due to right-of-way impacts, impacts to the community and to the environment. The projects typically involve a high project cost.
This strategy can address the objective of regional prosperity but it may also involve consideration of other transportation objectives. If a new alignment is located on the periphery of the urban area, it may lead to an expanded urban area and higher vehicle miles of travel. The impact on public health will be minimal or possibly negative if the project leads to higher vehicle emissions. If attention is given to accommodating bicycles and pedestrians, those impacts can be minimal. New road construction would positively impact travel safety as the design characteristics of the new roadway would likely be higher than current facilities.

**Intersection Capacity Projects**

This strategy involves adding turn lanes or constructing roundabout intersections. The capacity and traffic flow related to an arterial route is often dictated by the operation of its intersections. The primary objective of an intersection capacity project is to improve travel times by reducing vehicle delay at an intersection. This project could involve adding left or right turn lanes.

Intersection capacity projects contribute to the improvement of intersection operation, but will also increase bike/ped crossing distances which can negatively impact the bike/ped environment. Intersection projects often improve vehicle safety by removing turning vehicles from through traffic lanes. The reduction in vehicle delay reduces vehicle emissions. Impacts to public health may be less clear -- the reduced vehicle emissions provide a benefit, but the negative impact on the bike/ped environment is a negative impact. Intersection capacity projects may provide small economic benefit due to improved access but this is difficult to measure on a regional scale. The costs related to this type of project can be relatively low, particularly if right-of-way is available.

**Transit Capacity**

A number of activities are underway to improve transit service in order to attract new riders and improve the experience for existing riders. These include construction of transit amenities such as bus shelters, improving existing or constructing new Park & Ride lots and providing real time information on bus arrival times. Service improvements are also being planned to increase service frequency and reduce the transit travel times.

For the Kansas City metropolitan area, MARC has defined locations for potential higher capacity transit service along urban corridors and freeway corridors. A number of these higher capacity corridors are currently in operation. In Kansas, this includes the K-10 Connector route that is operated by Johnson County Transit and provides a connection between higher education campuses in Johnson and Douglas Counties. Design work is being completed to enhance transit service along two additional corridors: State Avenue in Wyandotte County; and Metcalf Avenue, Martway Street, and Shawnee Mission Parkway in Johnson County. A photograph of express bus that operates in Johnson County is shown in Figure 7.

Options under consideration in the 5-County region that provide an increasing level of transit capacity and service characteristics include the following:
Enhanced Transit involves providing a bus route that can include features such as additional passenger amenities at transit stops, improved transit stations or bus shelters, improved Park & Ride lots, real time schedule displays, and Transit Signal Priority (TSP) strategies to modify traffic signals with extended green time to optimize and reduce transit travel time and improve transit system reliability.

Bus Rapid Transit (BRT) provided in mixed traffic lanes combines station/shelter enhancement, unique vehicles, increased service frequency, and Intelligent Transportation Systems (ITS) elements. BRT systems can be described in two categories – BRT systems with dedicated guideways and BRT systems that operate predominately on regular travel lanes in mixed traffic. In some instances, the mixed traffic travel lanes are restricted for BRT use only for certain portions of the day. BRT features can include exclusive ITS treatments, simplified fare payment methods, specially branded vehicles, and passenger stations with increased amenities. BRT also involves Transit Signal Priority (TSP) strategies to modify traffic signals with extended green time to optimize and reduce transit travel time and improve transit system reliability.

Guideways can be constructed to provide exclusive transit right-of-way. It may include track improvements for commuter rail or exclusive transit lanes to operate BRT service. In more urban environments with high transit ridership, light rail transit, commuter rail or streetcar lines have been constructed.

Bus on Shoulder is oriented toward serving longer distance transit trips where buses could bypass freeway congestion by using the travel shoulder.

Increasing transit capacity is a strategy targeted to improving transportation choice. It is targeted to attracting “choice” riders by improving the performance and convenience of transit. This strategy leads to a reduction in VMT, fewer vehicle emissions and in the long term could support a compact land-use pattern consistent with livability and public health objectives. However, with a lower density development pattern, it becomes increasing difficult to serve diverse trip origins and destinations with a single route. Transit capacity projects involve capital costs and increases in annual operating costs required with added transit service. Transit capacity projects impacting right-of-way would have the same public concerns as with roadway widening.
High-Occupancy Vehicle (HOV) and Managed Lanes

HOV lanes are exclusive roadways or lanes designated for high-occupancy vehicles, such as buses, vanpools, and carpools. New HOV lanes can be constructed or an existing lane can be converted for HOV use. A new lane would be a capacity project, while conversion would be a management strategy.

The facilities may operate as HOV lanes full time or only during the peak periods. HOV lanes typically require minimum vehicle occupancy of two or more persons. However, in some locations, occupancy requirements have been increased to prevent congestion on the HOV lane. Support facilities, such as Park & Ride lots and transit centers with direct access to the HOV lane, are important system elements to increase facility use. HOV lanes may also be used to provide bypass lanes on entrance ramps with ramp meter signals.

High Occupancy Vehicle (HOV) facilities, as seen in Figure 8, serve to increase the total number of people moved through a congested corridor by offering two kinds of travel incentives: a savings in travel time, along with a reliable and predictable travel time. Because HOV lanes carry vehicles with a higher number of occupants, they can potentially move more people during congested periods, even if the number of vehicles that use the HOV lane is lower than the adjoining general purpose lanes. In general, carpoolers, vanpoolers, and bus patrons are the primary beneficiaries of HOV lanes by allowing them to move through congestion. Keys to the success of lanes include location (areas of high congestion do better); enforcement; interagency coordination; and synergy with parking policy, trip reduction ordinances, transit, ridesharing programs, education and marketing.

Managed Lanes are a set of lanes where operational strategies respond to changing conditions such as congestion levels, travel speeds, or downstream incidents. Managed lanes often combine tolling and vehicle occupancy elements. High-occupancy toll lanes, or HOT lanes, allow single-occupant vehicles to utilize HOV lanes for a fee. HOT lanes can expand the range of travel choices available to all users and even help articulate the perceived “value” of HOV lanes to transit, vanpool, or carpool travelers able to use the same lanes at free or reduced rates. Revenues generated through fees paid by single-occupant vehicles on HOT lanes can be used for transit and ridesharing services along a HOT/HOV route.

HOV and Managed Lanes are strategies targeted to improving transportation choice. They are both strategies that encourage achieving transportation objectives beyond mobility. HOV lanes support attracting “choice” riders by improving the performance and convenience of transit or carpools. This strategy can lead to a reduction in VMT and fewer vehicle emissions. Managed lanes add a toll component, supporting project costs or providing a congestion pricing mechanism while still supporting transit objectives. However, these projects involve extensive capital costs, particularly with new lane
construction. HOV/Managed lane projects impacting right-of-way would have the same public concerns as with roadway widening.

**Bicycle and Pedestrian Facilities**

Bicycle and pedestrian facilities can include sidewalks, bicycle lanes, and wider street accommodation for bicycles and trails. The type of projects or facilities includes:

- Stream or greenway trails
- Arterial street accommodations
- Transit access facilities
- Sidewalks, including safe routes to school

Both MARC and Lawrence-Douglas County MPO have prepared bicycle and pedestrian elements of their Metropolitan Transportation Plans. MARC has overseen the development of a project called MetroGreen which defines a system of greenway trails. In addition, many local governments have developed approaches to accommodate bicycles and provide for sidewalks or trails as part of development and as part of street construction and re-construction.

Bicycle and pedestrian facilities address the toolbox objectives of increasing transportation choice and support healthier lifestyles. The costs related to trail projects will range depending on right-of-way and utility constraints. Trail costs can vary between $250,000 per mile to $1 million per mile in complex locations. Sidewalk projects will also vary but typically are approximately $100,000 per mile. The impact on traffic congestion and level of VMT is typically minimal. These projects do contribute to public safety.

**Freight Rail Track Improvements**

In some cases public funds are used for track related projects or grade separations that reduce rail-vehicle conflicts; in situations where improving the flow of freight also reduces trucking demand on highways; or where the rail project results in economic development.

Freight rail improvements address transportation choice related to the movement of goods. There is public support of rail projects in specific cases in order to reduce rail - vehicle conflicts or to have an influence on shifting goods movement from truck to rail. In this case, the strategy will provide mobility benefits and support regional prosperity.
CONCLUSIONS

This transportation toolbox provides a comprehensive assessment that can be used to evaluate how potential transportation strategies meet a wider set of transportation objectives. Specifically, it provides a way to be able to see how a wide range of possible transportation strategies can lead to achieving a greater number of the 9 Desired Outcomes identified in the 5-County Study. To better achieve these 9 Desired Outcomes, a number of toolbox strategies will need to be combined. For example, many of the strategies that reduce transportation demand could be implemented together to achieve a stronger impact. In other cases, the time frame in which strategies produce benefits may also vary. For example, land use management could be implemented along a newly developing corridor. The benefits of this approach may be incrementally achieved over a period of years, rather than immediately observed.

The toolbox approach also highlights how focusing on one type of strategy may not achieve all of the desired outcomes. The toolbox highlights how some strategies may be more effective at addressing congestion but may not address other desired outcomes, not serve all travel markets or be costly or difficult to implement.
Appendix D

5 County Regional Transportation Study
Phase 2
EMME to TransCAD Model Conversion

Prepared for:
Kansas Department of Transportation

Prepared By:
PARSONS BRINCKERHOFF
Introduction
As a part of the 5-County Regional Transportation Study Phase 2, Parsons Brinckerhoff was tasked with converting the EMME model that was built in Phase 1 of the project into a TransCAD model. The Phase 1 model was constructed from the MARC MPO model, the Lawrence-Douglas County (LDC) MPO model, and added new network coverage in Leavenworth, Miami, and parts of Franklin Counties. A comprehensive description of the EMME model development is described in Appendix D of the 5-County Phase 1 Report.

The Phase 2 model increased the modeled areas based on the most up to date networks and datasets from the MPOs. It converted all the EMME processes into TransCAD, preserving the original EMME methodologies as closely as possible. It also incorporated some new features to bring the model up to date with current best practices.

The purpose of this document is to describe the inputs into the 5-County model, document the outputs from each model step, comparing the EMME results to the TransCAD results, and to give an overview of the changes made to the model.

Model Inputs
Model inputs include socioeconomic data, highway networks, and special generators.

Socioeconomic Data and TAZ Structure
The Socioeconomic data was updated from 2006 and 2030 to 2010 and 2040 for this model. This included 2010 base year data from MARC and LDC MPOs. Totals for Miami and Franklin Counties were factored by using 2006 to 2010 observed county totals. 2040 forecasts were also incorporated from MARC and LDC MPOs, while Totals for Miami and Franklin Counties were scaled up by comparing 2006 to 2030 growth and projecting the totals to 2040.
The zone system was expanded to include all of Cass County, based on the 2010 MARC model update. Zones in Leavenworth County were modified to incorporate the MARC boundaries. Some Jackson County zones were split by MARC, and those changes were added to the 5-County model as well. Figure 1 shows the new TAZ structure in Green. The old boundaries are in red.

**Model Network**

The model network was updated based on the 2010 MARC model network. This network includes ramp details that previously did not exist in the EMME network.
This network adds coverage in Cass County which is a part of the new MARC coverage area. Figure 2 shows the TransCAD network. Manual network updates were made in Miami and Franklin counties to keep the level of detail consistent across the modeled area. The addition of the ramps to the network does not have a large effect on the demand model. But it does change the distances between trips by direction. In some cases, this can cause asymmetric trip patterns. Figure 3 and Figure 4 show some of the differences in network detail at the I-35, I-435, and US-69 interchanges.
Figure 3 – Old EMME Network Details

Figure 4 – New TransCAD Network Details
Special Generator Sites
The special generator sites included in the EMME model in phase 1 were reviewed against the socioeconomic (SE) data forecasts. These were adjusted based on the most current findings for these developments at the time the model was being converted. In some cases, additional trips were added to the model to account for these developments, in other cases, the base SE data was deemed sufficient.

BNSF Intermodal
The BNSF intermodal facility was reviewed using results from the Traffic Impact Study. The special generator trips were reduced to better reflect the existing development plans. The trip distribution factors from the TIS were used to allocate external trips from the site.

Figure 5 - BNSF Development Socioeconomic Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Households</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>19</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>2030</td>
<td>34</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>2040</td>
<td>48</td>
<td>19</td>
<td>52</td>
</tr>
</tbody>
</table>

Figure 6 - BNSF TAZ (1005)

Figure 5 shows the socioeconomic data in the BNSF Site TAZ. Figure 6 shows the TAZ.

Special Generator Trips added - 2030 model: 59,809, 2040 model: 17,080
The Legends / Village West

The Legends and Village West areas were reviewed based on the most recent site development plans. The Socioeconomic data was deemed adequate and no additional trips were added.

Figure 7 - The Legends / Village West Site Socioeconomic Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Households</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1040</td>
<td>389</td>
<td>4602</td>
</tr>
<tr>
<td>2030</td>
<td>2320</td>
<td>897</td>
<td>11459</td>
</tr>
<tr>
<td>2040</td>
<td>5828</td>
<td>2821</td>
<td>12099</td>
</tr>
</tbody>
</table>

Figure 8 - The Legends / Village West TAZs (106-109)

Figure 7 shows the socioeconomic data in the Legends / Village West zones. Figure 8 shows the TAZs representing the area.

Special Generator Trips added - 2030 model: 0, 2040 model: 0
**Sunflower Development**

The sunflower development site has been impeded by a difficult cleanup process. Also, the socioeconomic data reflected some growth in this area. The special generator trips were reduced to reflect these two factors.

*Figure 9 - Sunflower Development Socioeconomic Data*

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Households</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1719</td>
<td>698</td>
<td>46</td>
</tr>
<tr>
<td>2030</td>
<td>1296</td>
<td>466</td>
<td>302</td>
</tr>
<tr>
<td>2040</td>
<td>6353</td>
<td>3029</td>
<td>3125</td>
</tr>
</tbody>
</table>

*Figure 10 - Sunflower Development TAZs (769, 1000-1002)*

Figure 9 shows the socioeconomic data in the Sunflower zones. Figure 10 shows the TAZ structure.

Special Generator Trips added - 2030 model: 91,378, 2040 model: 8,000.
EMME vs. TransCAD Model Steps Comparison
The socioeconomic data inputs are summarized in Figure 11. For the purposes of comparison, the 2006 socioeconomic data was used in both the EMME and TransCAD models. The TransCAD totals are higher because of the larger modeled area.

**Figure 11 - Socioeconomic Data Comparison**

<table>
<thead>
<tr>
<th></th>
<th>POP</th>
<th>HH</th>
<th>EMP</th>
<th>RET</th>
<th>NR</th>
<th>AVG INC</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMME</td>
<td>1,899,000</td>
<td>760,000</td>
<td>1,361,000</td>
<td>238,000</td>
<td>1,124,000</td>
<td>$56,000</td>
</tr>
<tr>
<td>TC</td>
<td>1,957,000</td>
<td>782,000</td>
<td>1,375,000</td>
<td>244,000</td>
<td>1,130,000</td>
<td>$49,000</td>
</tr>
</tbody>
</table>

Model Comparison – Generation
The Trip Generation rates were preserved, so the totals are very similar. Figure 12 shows the productions and attractions by trip type.

**Figure 12 - Trip Generation Comparison**

<table>
<thead>
<tr>
<th></th>
<th>Productions</th>
<th>Home-Based Work Total</th>
<th>Home Based School</th>
<th>Home Based Shop</th>
<th>Home-Based Social / Recreation</th>
<th>Home-Based Other</th>
<th>Non-Home-Based Work</th>
<th>Non-Home-Based Other</th>
<th>Truck</th>
<th>TOTAL Productions</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMME</td>
<td>1,214,000</td>
<td>1,272,000</td>
<td>1,176,000</td>
<td>1,485,000</td>
<td>478,000</td>
<td>645,000</td>
<td>853,000</td>
<td>861,000</td>
<td>590,000</td>
<td>7,708,000</td>
</tr>
<tr>
<td>TC</td>
<td>1,279,000</td>
<td>1,265,000</td>
<td>1,172,000</td>
<td>1,494,000</td>
<td>484,000</td>
<td>663,000</td>
<td>861,000</td>
<td>576,000</td>
<td></td>
<td>7,795,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Attractions</th>
<th>Home-Based Work Total</th>
<th>Home Based School</th>
<th>Home Based Shop</th>
<th>Home-Based Social / Recreation</th>
<th>Home-Based Other</th>
<th>Non-Home-Based Work</th>
<th>Non-Home-Based Other</th>
<th>Truck</th>
<th>TOTAL Attractions</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMME</td>
<td>1,132,000</td>
<td>1,272,000</td>
<td>1,158,000</td>
<td>1,457,000</td>
<td>457,000</td>
<td>619,000</td>
<td>835,000</td>
<td>867,000</td>
<td>590,000</td>
<td>7,520,000</td>
</tr>
<tr>
<td>TC</td>
<td>1,299,000</td>
<td>1,265,000</td>
<td>1,179,000</td>
<td>1,502,000</td>
<td>489,000</td>
<td>672,000</td>
<td>867,000</td>
<td>576,000</td>
<td></td>
<td>7,848,000</td>
</tr>
</tbody>
</table>

Model Comparison – Distribution
Trip Distribution showed differences based on a few factors. First, the zone system had some differences. Also, while the network was similar and the major connections are consistent, the additional detail in the TransCAD network meant the travel times and lengths would be inherently different. Finally, the 2010 MARC network used different zone connectors than the 2006 network. Figure 13 and Figure 14 illustrate some of these path differences.
Figure 13 - EMME Peak Path

Figure 14 - TransCAD Peak Path

Figure 15 shows more detail on the differences between the TransCAD and EMME zone to zone impedances. The gravity model uses a weighted time and distance impedance. Note that the zone numbering system has changed in the TransCAD model.

Figure 15 - Trip Impedances for Selected PA Pairs

<table>
<thead>
<tr>
<th>TC</th>
<th>Anode</th>
<th>Bnode</th>
<th>Off-Peak Time</th>
<th>Off-Peak Dist</th>
<th>OP Composite Impedance</th>
<th>Peak Time</th>
<th>Peak Dist</th>
<th>PK Composite Impedance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1321</td>
<td>1349</td>
<td></td>
<td>2.72</td>
<td>1.59</td>
<td>3.1</td>
<td>2.72</td>
<td>1.59</td>
<td>3.43</td>
</tr>
<tr>
<td>1311</td>
<td>1321</td>
<td></td>
<td>4.25</td>
<td>2.48</td>
<td>4.85</td>
<td>4.25</td>
<td>2.48</td>
<td>5.37</td>
</tr>
<tr>
<td>1331</td>
<td>1333</td>
<td></td>
<td>4.86</td>
<td>2.83</td>
<td>5.54</td>
<td>4.86</td>
<td>2.83</td>
<td>6.13</td>
</tr>
<tr>
<td>1330</td>
<td>1333</td>
<td></td>
<td>10.69</td>
<td>8.00</td>
<td>12.61</td>
<td>10.69</td>
<td>8.01</td>
<td>14.3</td>
</tr>
<tr>
<td>1771</td>
<td>1782</td>
<td></td>
<td>12.61</td>
<td>9.89</td>
<td>14.99</td>
<td>12.61</td>
<td>9.89</td>
<td>17.06</td>
</tr>
<tr>
<td>1311</td>
<td>1333</td>
<td></td>
<td>26.04</td>
<td>18.32</td>
<td>30.43</td>
<td>26.20</td>
<td>18.36</td>
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<td>237</td>
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<td>28.62</td>
<td>23.70</td>
<td>34.3</td>
<td>29.86</td>
<td>23.70</td>
<td>40.53</td>
</tr>
<tr>
<td>225</td>
<td>1676</td>
<td></td>
<td>43.93</td>
<td>35.85</td>
<td>52.54</td>
<td>48.42</td>
<td>35.87</td>
<td>64.56</td>
</tr>
</tbody>
</table>
County to County distributions were compared between the EMME and TransCAD models. Differences were seen, but did not look unreasonable. Figure 16, Figure 17, Figure 18, and Figure 19 show these comparisons.

**Figure 16 - County to County Person Trips, EMME**

<table>
<thead>
<tr>
<th>AM Peak Period</th>
<th>Douglas</th>
<th>Leavenworth</th>
<th>Wyandotte</th>
<th>Johnson</th>
<th>Miami</th>
<th>Other</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMME</strong> Douglas Co</td>
<td>15,042</td>
<td>277</td>
<td>400</td>
<td>3,399</td>
<td>28</td>
<td>981</td>
<td>20,127</td>
</tr>
<tr>
<td>Leavenworth Co</td>
<td>228</td>
<td>7,347</td>
<td>1,222</td>
<td>1,495</td>
<td>5</td>
<td>1,752</td>
<td>12,050</td>
</tr>
<tr>
<td>Wyandotte Co</td>
<td>88</td>
<td>610</td>
<td>11,423</td>
<td>6,610</td>
<td>12</td>
<td>9,913</td>
<td>28,657</td>
</tr>
<tr>
<td>Johnson Co</td>
<td>678</td>
<td>558</td>
<td>5,150</td>
<td>72,056</td>
<td>572</td>
<td>15,940</td>
<td>94,953</td>
</tr>
<tr>
<td>Miami Co</td>
<td>45</td>
<td>10</td>
<td>47</td>
<td>2,190</td>
<td>2,908</td>
<td>578</td>
<td>5,778</td>
</tr>
<tr>
<td>Other</td>
<td>630</td>
<td>1,040</td>
<td>8,246</td>
<td>20,591</td>
<td>311</td>
<td>158,880</td>
<td>189,698</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td><strong>16,709</strong></td>
<td><strong>9,843</strong></td>
<td><strong>26,488</strong></td>
<td><strong>106,341</strong></td>
<td><strong>3,837</strong></td>
<td><strong>188,045</strong></td>
<td><strong>351,263</strong></td>
</tr>
</tbody>
</table>
## Figure 17 - County to County Person Trips, TransCAD

### AM Peak Period

<table>
<thead>
<tr>
<th>TransCAD</th>
<th>Douglas</th>
<th>Leavenworth</th>
<th>Wyandotte</th>
<th>Johnson</th>
<th>Miami</th>
<th>Other</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas Co</td>
<td>15,437</td>
<td>188</td>
<td>191</td>
<td>2,878</td>
<td>22</td>
<td>1,131</td>
<td>19,847</td>
</tr>
<tr>
<td>Leavenworth Co</td>
<td>139</td>
<td>9,100</td>
<td>1,228</td>
<td>1,411</td>
<td>4</td>
<td>1,500</td>
<td>13,382</td>
</tr>
<tr>
<td>Wyandotte Co</td>
<td>45</td>
<td>570</td>
<td>10,390</td>
<td>8,059</td>
<td>21</td>
<td>10,935</td>
<td>30,020</td>
</tr>
<tr>
<td>Johnson Co</td>
<td>545</td>
<td>580</td>
<td>6,337</td>
<td>69,728</td>
<td>501</td>
<td>21,642</td>
<td>99,334</td>
</tr>
<tr>
<td>Miami Co</td>
<td>22</td>
<td>8</td>
<td>84</td>
<td>1,959</td>
<td>3,102</td>
<td>742</td>
<td>5,918</td>
</tr>
<tr>
<td>Other</td>
<td>553</td>
<td>947</td>
<td>10,055</td>
<td>24,251</td>
<td>472</td>
<td>170,832</td>
<td>207,109</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td>16,739</td>
<td>11,394</td>
<td>28,285</td>
<td>108,286</td>
<td>4,123</td>
<td>206,782</td>
<td>375,609</td>
</tr>
</tbody>
</table>

## Figure 18 - County to County Person Trips, TransCAD-EMME

### AM Peak Period

<table>
<thead>
<tr>
<th>Difference</th>
<th>Douglas</th>
<th>Leavenworth</th>
<th>Wyandotte</th>
<th>Johnson</th>
<th>Miami</th>
<th>Other</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas Co</td>
<td>395</td>
<td>-89</td>
<td>-208</td>
<td>-521</td>
<td>-6</td>
<td>150</td>
<td>-280</td>
</tr>
<tr>
<td>Leavenworth Co</td>
<td>-89</td>
<td>1,752</td>
<td>6</td>
<td>-85</td>
<td>-1</td>
<td>-253</td>
<td>1,331</td>
</tr>
<tr>
<td>Wyandotte Co</td>
<td>-43</td>
<td>-40</td>
<td>-1,033</td>
<td>1,450</td>
<td>9</td>
<td>1,021</td>
<td>1,363</td>
</tr>
<tr>
<td>Johnson Co</td>
<td>-133</td>
<td>22</td>
<td>1,187</td>
<td>-2,328</td>
<td>-70</td>
<td>5,702</td>
<td>4,381</td>
</tr>
<tr>
<td>Miami Co</td>
<td>-23</td>
<td>-2</td>
<td>37</td>
<td>-231</td>
<td>194</td>
<td>164</td>
<td>139</td>
</tr>
<tr>
<td>Other</td>
<td>-77</td>
<td>-93</td>
<td>1,809</td>
<td>3,660</td>
<td>160</td>
<td>11,953</td>
<td>17,411</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td>30</td>
<td><strong>1,551</strong></td>
<td><strong>1,797</strong></td>
<td><strong>1,945</strong></td>
<td>286</td>
<td><strong>18,737</strong></td>
<td><strong>24,346</strong></td>
</tr>
</tbody>
</table>

## Figure 19 - County to County Person Trips, Percent Difference

### AM Peak Period

<table>
<thead>
<tr>
<th>% Difference</th>
<th>Douglas</th>
<th>Leavenworth</th>
<th>Wyandotte</th>
<th>Johnson</th>
<th>Miami</th>
<th>Other</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas Co</td>
<td>3%</td>
<td>-32%</td>
<td>-52%</td>
<td>-15%</td>
<td>-21%</td>
<td>15%</td>
<td>-1%</td>
</tr>
<tr>
<td>Leavenworth Co</td>
<td>-39%</td>
<td>24%</td>
<td>0%</td>
<td>-6%</td>
<td>-16%</td>
<td>-14%</td>
<td>11%</td>
</tr>
<tr>
<td>Wyandotte Co</td>
<td>-49%</td>
<td>-7%</td>
<td>-9%</td>
<td>22%</td>
<td>71%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Johnson Co</td>
<td>-20%</td>
<td>4%</td>
<td>23%</td>
<td>-3%</td>
<td>-12%</td>
<td>36%</td>
<td>5%</td>
</tr>
<tr>
<td>Miami Co</td>
<td>-51%</td>
<td>-20%</td>
<td>79%</td>
<td>-11%</td>
<td>7%</td>
<td>28%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>-12%</td>
<td>-9%</td>
<td>22%</td>
<td>18%</td>
<td>52%</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td>0%</td>
<td>16%</td>
<td>7%</td>
<td>2%</td>
<td>7%</td>
<td>10%</td>
<td>7%</td>
</tr>
</tbody>
</table>
Trip length frequency distributions were generated to compare the travel patterns generated by the distribution. Figure 20, Figure 21, Figure 22, and Figure 23 show some of the trip length distributions.

**Figure 20 - HBW Trip Length Frequency Distribution**

![Home-Based Work](image1)

**Figure 21 - HBSH Trip Length Frequency Distribution**

![Home-Based Shop](image2)
Figure 22 - HBSR Trip Length Frequency Distribution

Home-Based Social-Recreation

Figure 23 - NHBW Trip Length Frequency Distribution

Non-Home Based Work
Model Comparison – Mode Split

The mode choice model was adapted for use with TransCAD files. This involved writing the person trip matrices into .bin files for processing then back into OD matrices by mode. Some differences were observed based on the different skims. Figure 24 shows the mode split by trip purpose.

Figure 24 - Mode Split

<table>
<thead>
<tr>
<th>Mode Split</th>
<th>Drive Alone</th>
<th>2 Person Auto</th>
<th>3+ Person Auto</th>
<th>Walk</th>
<th>Bicycle</th>
<th>Local Bus</th>
<th>Express Bus</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home-Based Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMME</td>
<td>79.6%</td>
<td>11.4%</td>
<td>4.3%</td>
<td>2.1%</td>
<td>0.2%</td>
<td>2.36%</td>
<td>0.03%</td>
<td>100%</td>
</tr>
<tr>
<td>TransCAD</td>
<td>78.7%</td>
<td>11.0%</td>
<td>4.0%</td>
<td>3.5%</td>
<td>0.4%</td>
<td>2.07%</td>
<td>0.27%</td>
<td>100%</td>
</tr>
<tr>
<td>Home-Based Shop</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMME</td>
<td>38.9%</td>
<td>30.3%</td>
<td>28.5%</td>
<td>1.6%</td>
<td>0.1%</td>
<td>0.57%</td>
<td>0.00%</td>
<td>100%</td>
</tr>
<tr>
<td>TransCAD</td>
<td>33.5%</td>
<td>30.4%</td>
<td>35.0%</td>
<td>0.4%</td>
<td>0.2%</td>
<td>0.38%</td>
<td>0.06%</td>
<td>100%</td>
</tr>
<tr>
<td>Home-Based Social/Recreation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMME</td>
<td>35.7%</td>
<td>32.9%</td>
<td>22.8%</td>
<td>7.2%</td>
<td>0.6%</td>
<td>0.83%</td>
<td>0.02%</td>
<td>100%</td>
</tr>
<tr>
<td>TransCAD</td>
<td>36.2%</td>
<td>35.2%</td>
<td>25.7%</td>
<td>1.9%</td>
<td>0.2%</td>
<td>0.75%</td>
<td>0.09%</td>
<td>100%</td>
</tr>
<tr>
<td>Home-Based Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMME</td>
<td>39.6%</td>
<td>28.8%</td>
<td>25.9%</td>
<td>4.7%</td>
<td>0.1%</td>
<td>0.86%</td>
<td>0.01%</td>
<td>100%</td>
</tr>
<tr>
<td>TransCAD</td>
<td>41.0%</td>
<td>30.2%</td>
<td>26.8%</td>
<td>1.0%</td>
<td>0.1%</td>
<td>0.79%</td>
<td>0.05%</td>
<td>100%</td>
</tr>
<tr>
<td>Non-Home-Based</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMME</td>
<td>46.3%</td>
<td>18.6%</td>
<td>31.7%</td>
<td>2.6%</td>
<td>0.1%</td>
<td>0.69%</td>
<td>0.01%</td>
<td>100%</td>
</tr>
<tr>
<td>TransCAD</td>
<td>41.3%</td>
<td>18.3%</td>
<td>39.0%</td>
<td>0.6%</td>
<td>0.0%</td>
<td>0.67%</td>
<td>0.07%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Model Comparison – Assignment

Daily traffic assignments were compared to check for consistent overall trip-making patterns. Daily totals were compared against KDOT 2010 traffic counts. Figure 25 and Figure 26 show the daily traffic assignment results from the two models, while Figure 27 and Figure 28 look at the assignment patterns for trips on a selected segment of I-35, just north of the US-69 interchange. This is to evaluate if the travel patterns are similar.
Figure 27 - EMME Selected Link I-35
Figure 28 - TransCAD Select Link I-35
Once the 2006 comparison was done, then the 2010 dataset was entered into the model. Figure 29 shows the comparison of the 2010 TransCAD model assignment against 2010 KDOT traffic counts.

*Figure 29 - Daily Volume Vs. Observed*

![Graph showing comparison of modeled vs. observed daily volume](image)

\[
y = 0.9913x + 2654.6 \\
R^2 = 0.7988
\]

Figure 30 shows the percent root mean squared error (PRMSE) by 2010 KDOT ADT. In general higher traffic roadways show better comparisons to the observed counts.

*Figure 30 - PRMSE by KDOT ADT*
Figure 31 shows the comparison sorted by facility type. In general, higher classification roadways show better comparisons to the observed data.

*Figure 31 - PRMSE by Facility Type*
TransCAD Model Structure Flow Chart

START

Initialization
- Walk Access Buffer
- Network Preprocess
- Highway Initial Assignment
- Transit Access Link

Highway/Transit Skimming

Trip Generation

Trip Distribution

Airport Distribution

Special Generator

External Trips

Mode Choice

Time of Day
(for AM Peak and Midday trip tables only)

Highway Assignment
(for average peak and midday hourly assignment only)

PKVP Travel Time Update

Is Feedback Complete?

No

Yes

Time of Day
(for all 24 hours)

Highway Assignment
(for all 24 hours)

Transit Assignment

STOP
TransCAD Model – New Features

A few new features were added to the TransCAD model to bring it up to best practice standards. These include a feedback mechanism, a toll assignment routine, and some analysis tools.

**Feedback**

Feedback loops were introduced to the model. This is a common best practice so that the impedance in trip distribution is consistent with the volumes assigned. The default closure criteria is that the PRMSE of link travel times between loops is less than 5%. The user may enter different closure criteria if desired.

The feedback routine is as follows:

- During the feedback, only the average hourly trip tables for AM peak and Mid-day each are assigned; once the feedback routine is completed, all the 24 hourly trip tables are calculated and assigned to the highway network.
- Between feedback loops, the network congested travel time based on the assignment from the current loop only will be used to update highway/transit skim in the next loop.
- PRMSEs for both AM peak and Mid-day should satisfy the closure criteria, to determine if the feedback is converged.

**Toll Routine**

A dynamic toll assignment procedure is also introduced. This allows toll road alternatives to be built and tested. The application of a dynamic toll is an iterative procedure involving a modification of the assignment routines for each hour. In each hour iteration, the toll is adjusted, and the resulting level of service (LOS) (in terms of V/C on the toll links) is examined until an acceptable LOS is obtained, ensuring the maintenance of a relatively free-flowing toll facility. The results of this process are hourly toll and non-toll trip tables, with associated matrices of toll values.

Figure 31 illustrates the toll diversion curves. These show the model’s assumed relationship between travel time savings (over non-tolled paths), the toll assessed, and the likelihood of a traveler to choose the tolled option. It should be noted that, since the time travel savings relationship is applied to all drivers, it assumes a common value of time. In fact, value of time varies by trip purpose and socioeconomic level, so this is an approximation of that average.
Selected Link
A Select Link Analysis tool was added so the highway assignment will automatically generate select link outputs when the select link query file exists. This file is called “selectlink_query.txt”

Figure 33 - Select Link File Format

query1, OR, link AB (16255), link AB (8459)
query2, or, Node (7146), Node (6910), Node (6731), Node (6769)
query3, AND, link AB (16107), link BA (7316), Node (863)

Turning Movements
A Turning Movement Option was also included. Turning movement outputs will be automatically generated when the selected intersection node file exists. This file is called “turning_movements.txt”.

Figure 34 - Turn Movement Output
Appendix E

5 County Regional Transportation Study
Phase 2
Stakeholder Outreach

April 2013

Prepared for:
Kansas Department of Transportation
The goal of the stakeholder engagement for Phase 2 of the 5-County Regional Transportation Study was to develop relationships with stakeholders, instilling trust in and support for the process. This was done through a program that recognized the unique circumstances of the project, provided for continuing substantive input by stakeholders, ensured that stakeholder concerns received fair consideration and met state and federal requirements.

The stakeholder engagement plan employed a variety of methods for communicating with stakeholders and was coordinated with on-going technical activities. The plan comprised a Stakeholder Advisory Panel (SAP), a Corridor Strategies Working Group (Working Group), and numerous communication strategies, including a project website, newsletters, elected officials briefings, and a speakers’ bureau.

The objectives for communication and stakeholder engagement were to:

- **Inform** the stakeholders by providing balanced and objective information to assist them in understanding the problems, alternatives, opportunities, and solutions.
- **Consult** stakeholders by obtaining feedback on analysis, alternatives and/or decisions.
- **Involve** stakeholders by working directly with them throughout the process to ensure that concerns and aspirations were consistently understood and considered.
- **Develop** an informed group of stakeholders.
- **Enlist** stakeholders in identifying and implementing the solutions.
- **Build** partnerships with other agencies and stakeholders.

**Stakeholder Groups**

The stakeholder outreach program was designed to involve and obtain feedback from the following key stakeholders:

- Local elected officials
- City and county staff
- Government partners
- Business community
- Rural/agricultural community
- Minority/low-income populations
- Environmental and civic groups
- Advocacy groups
- Transit agencies

The following provides a description of the stakeholder groups that were established for Phase 2.
a) **Stakeholder Advisory Panel** – The Stakeholder Advisory Panel was a group of stakeholders that provided big picture recommendations to the Project Core Team. Members of the Stakeholder Advisory Panel that participated in Phase 1 were asked to reconvene for Phase 2 to develop the evaluation criteria and provide a recommendation regarding priority corridors and potential strategies. The members of the Panel consisted of representatives from each of the five counties as well as representatives from various organizations, developments, and committees.

The SAP was established to reflect a balance of interests, and participants were encouraged to consider all sides of the issues and their affect on the entire 5-County Study area.

The panel met twice between May and October 2011. Its work concluded in a third meeting that was held in conjunction with the Corridor Strategies Working Group (see below) on August 8, 2012.

Advisory Panel meeting information was distributed by email to the Project Core Team and the Panel members prior to each meeting. Meeting announcements were posted on the project’s website. Following each meeting, materials were posted on the project website.

The chart below outlines the meeting agenda items for the Stakeholder Advisory Panel:

<table>
<thead>
<tr>
<th>Meeting Date</th>
<th>Agenda Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2, 2011</td>
<td>• Project overview</td>
</tr>
<tr>
<td></td>
<td>• Consideration of evaluation criteria</td>
</tr>
<tr>
<td>October 31, 2011</td>
<td>• Project purpose, process and assumptions</td>
</tr>
<tr>
<td></td>
<td>• Transportation toolbox strategies and use</td>
</tr>
<tr>
<td></td>
<td>• Use of study and corridor recommendations</td>
</tr>
<tr>
<td>August 8, 2012</td>
<td>• Project review</td>
</tr>
<tr>
<td></td>
<td>• Corridor strategies, desired outcomes and planning for 2040</td>
</tr>
</tbody>
</table>

b) **Corridor Strategies Working Group** – For the second phase of the project, a single Corridor Strategies Working Group made up of key members of each of the four working groups from Phase 1 was established. These members were representative geographically and had various viewpoints and/or expertise. The Corridor Strategies Working Group applied the criteria to the corridors and worked with the consulting team to develop strategies.

The group met three times between April 2011 and October 2011 and concluded its work in a third meeting, conducted in conjunction with the Stakeholder Advisory Panel on August 8, 2012.

Working Group meeting information was distributed by email to the Project Core Team and the Working Group members prior to each meeting. Meeting announcements were posted on the project’s website. Following each meeting, materials were posted on the project website.
Listed below are the meeting agenda items for the Corridor Strategies Working Group:

<table>
<thead>
<tr>
<th>Meeting Date</th>
<th>Agenda Items</th>
</tr>
</thead>
</table>
| April 18, 2011 | • Project overview  
| | • Consideration of evaluation criteria  
| | • Transportation toolbox strategies  
| | • Introduction of projects identified |
| June 7, 2011 | • Evaluation criteria recommendations  
| | • Measurements for evaluation criteria  
| | • Transportation toolbox strategies |
| October 31, 2011 | • Study process review  
| | • Corridor analysis overview and discussion  
| | • Strategy selection for each corridor |
| August 8, 2012 | • Project review  
| | • Corridor strategies, desired outcomes and planning for 2040 |

c) Transit Working Group – Members of the project consulting team met in December 2011 with fixed-route transit agencies in the 5-County Study area. The purpose of the meeting was to discuss regional transit needs, opportunities, and strategies and identify the transit strategy for each of the study’s key corridors.

d) Freight Users Working Group – Members of the project consulting team met with freight stakeholders in the 5-County Study area in February 2012. The purpose of the meeting was to discuss regional freight needs, opportunities, and strategies and obtain a solid understanding of the transportation issues faced by those who move goods throughout the region.

Stakeholder Meetings

Two separate rounds of meetings were conducted with stakeholders in the 5-County Study area. The meetings took place with the county chairs and also with public officials and were intended to provide an update on the study process and obtain feedback on the priorities and recommended strategies.

a) County Chairs Meetings – County elected officials were briefed twice throughout Phase 2 so that they were informed about the 5-County Study and could speak with their constituents about it. These meetings were specifically for the five commission chairs and were designed to give them an opportunity to discuss the study first-hand with project team members.

The first meeting summarized the findings of Phase 1 and laid out the approach for Phase 2. The second meeting asked for feedback on the criteria being developed to prioritize projects in the 5-County Study area.

b) Public Officials Briefings – To gain feedback on the prioritization criteria and on the draft study, two meetings were held in each of the five counties. In addition to the county commission
chairmen all other elected and appointed officials and staff were invited. The briefings were unique to each county so that participants could engage in a discussion that focused on their area of interest.

The first series of briefings were workshops conducted in November and December 2011. The purpose of the workshops was to continue the regional dialogue regarding the study’s key corridors, what transportation strategies should be employed, and how they should be prioritized. Participants provided feedback to the project team by using automated response systems where the results of their voting were used as discussion topics. They were also asked to provide weighting to the nine desired outcomes identified in Phase 1. The second briefing was conducted in August 2012, and the purpose of the meeting was to discuss the regional and local strategies identified by the project team and identify ways for local and state entities to work together to implement those strategies.

Public Participation Plan Tasks

This section provides information on work associated with additional public participation and outreach for the first phase of the 5-County Study.

a) Stakeholder Engagement Plan – The project consulting team developed a stakeholder engagement plan for Phase 2. The plan documented the overall stakeholder engagement protocol, planning framework, anticipated activities, schedule, and materials to be produced.

b) Newsletters – Throughout the outreach process, five newsletter fact sheets were created. The newsletters provided a written source of easily understood, up-to-date information on the second phase of the 5-County Study. The newsletters were emailed to a notification list of approximately 400 targeted stakeholders in February, October and November of 2011 and March and October of 2012. Hard copies were also made available to distribute at planned meetings. The newsletters always included the logo and link to the study website.

c) Email Notification List- Project updates and meeting announcements were sent to a notification list of approximately 400 targeted stakeholders throughout the study area. The notification list was updated to included new elected and appointed officials as elections occurred.

d) Speakers Bureau – A standard PowerPoint presentation was developed for presentations to a variety of interested stakeholders. Stakeholders were encouraged to contact the project team to schedule a presentation. Over the Phase 2 planning process, the following presentations were made to interested groups:

- Jayhawk Breakfast Rotary Club (August 2011)
- Lawrence-Douglas County Metropolitan Planning Organization Executive Board (October 2011)
- Mid-America Regional Council’s Total Transportation Policy Committee (November 2011, August 2012, January 2013, February 2013)

e) Study Website – A 5-County Regional Transportation Study website from Phase 1 was updated
to include information from Phase 2. The website, www.5countystudy.org, provides a thorough source of information about the study. In addition to general information about the study, the website provides links to meeting presentations and notes from all stakeholder meetings that occurred. The website also provides a contact page that allowed browsers to request information or to provide comments.

There are currently more than twenty-five (25) pages of information on the website, not including specific meeting pages. The website is also compliant with the American with Disabilities Act.